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ADDENDUM TO A SUPPLEMENTARY FLORA AND FAUNA ASSESSMENT FOR THE EAST - WEST CONNECTOR ROAD, ST MARYS PROPERTY

Dear Sean,

The purpose of this letter is to provide an addendum to an assessment prepared by Cumberland Ecology for the East – West Connector Road upgrade works, within the St Marys Property (letter dated 24 August 2017). The Road upgrade works are required to link the suburbs of Ropes Crossing and Jordan Springs East, and include construction of the new single lane road, and bridges crossing South Creek and Ropes Creek.

An addendum report is considered to be necessary due to the restricted access under each of the bridges proposed for demolition during the previous site inspection (on 18 October 2016).

This addendum assessment, contained in **Appendix A**, should be read in conjunction with 16194 Let11, and the supporting documentation, including the Species Impact Statement prepared for the Central Precinct (now the suburb of Jordan Springs East). An updated Assessment of Significance is provided in **Appendix B**, to address impacts to threatened microchiropteran bats (microbats).

Yours sincerely

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Appendix A

Addendum Assessment

A.1 Introduction

Incivil Pty Ltd and JBA Planning, on behalf of Lend Lease are preparing several Development Applications (DAs) for construction of a 3.4 km section of road that will connect the Central Precinct (referred to as the suburb of Jordan Springs East) with the suburb of Ropes Crossing. This addendum and report will be utilised for multiple development applications for the demolition and reconstruction of the Connector Road and bridges.

Parts of the road and Road Widening Zone that will be developed as part of the current scope of the DAs have been included in previous ecological assessments prepared for the Central Precinct, Dunheved Precinct works and East West Connector Road Extension. These include the Central Precinct Bulk Earthworks DA (Cumberland Ecology 2014), the Ropes Crossing Connector Road Extension (Cumberland Ecology 2016) and the Dunheved Haul Rd Extension (Cumberland Ecology 2014). These previous assessments assumed complete removal of vegetation within the road and Road Widening Zone. As these areas of works do not require further ecological assessment, they have been excluded from the subject site. The supplementary assessment was prepared by Cumberland Ecology for the remainder of the East West Connector Road in a letter dated 27 February 2017 (Cumberland Ecology 2017).

An addendum report to the East West Connector Road Supplementary Assessment (Cumberland Ecology 2017) is considered to be necessary due to the restricted access under each of the bridges proposed for demolition during the previous site inspection (on 18 October 2016), for which a detailed assessment was not conducted.

A.2 Methods

An inspection of the vegetation beneath and adjoining the South Creek and Ropes Creek bridges, which is proposed for removal, was conducted by an ecologist and botanist on 8 February 2018. The survey included temporary access tracks, for machinery to work on demolition and construction of South Creek Bridge, in the locations of existing access tracks through the Regional Park. Vegetation communities were traversed using a random meander technique. In particular, the following were noted during the meander survey:

- Presence of priority and environmental weeds;
- Location of potential fauna habitat, including hollow bearing trees and logs;
- Locations of threatened flora species known to occur within the subject site; and
- Potential habitat for the threatened Cumberland Plain Land Snail.

The general condition of the vegetation was also noted. Searches for threatened flora species known to occur in the vicinity of the road were incorporated into the meander survey.

A single 20 x 20 m quadrat was surveyed with the native vegetation adjoining South Creek Bridge. In the quadrat, the following information was recorded:

- All vascular flora species present within the plot or directly adjacent to the plot;
- The stratum in which each species occurred;
- The relative frequency of occurrence of each plant species;
- Vegetation structural data (i.e. height and percentage cover of each stratum);
- A waypoint to mark the location of the quadrat, using a handheld GPS; and
- Photographs of the quadrat.

A fauna habitat assessment was conducted concurrently, including a visual inspection of the bridge structure for potential roost habitat, such as crevices for small mammals to shelter in. Due to the height of the bridges, neither was inspected closely with torches, as this would require working at heights with protective fall equipment.

A.3 Results

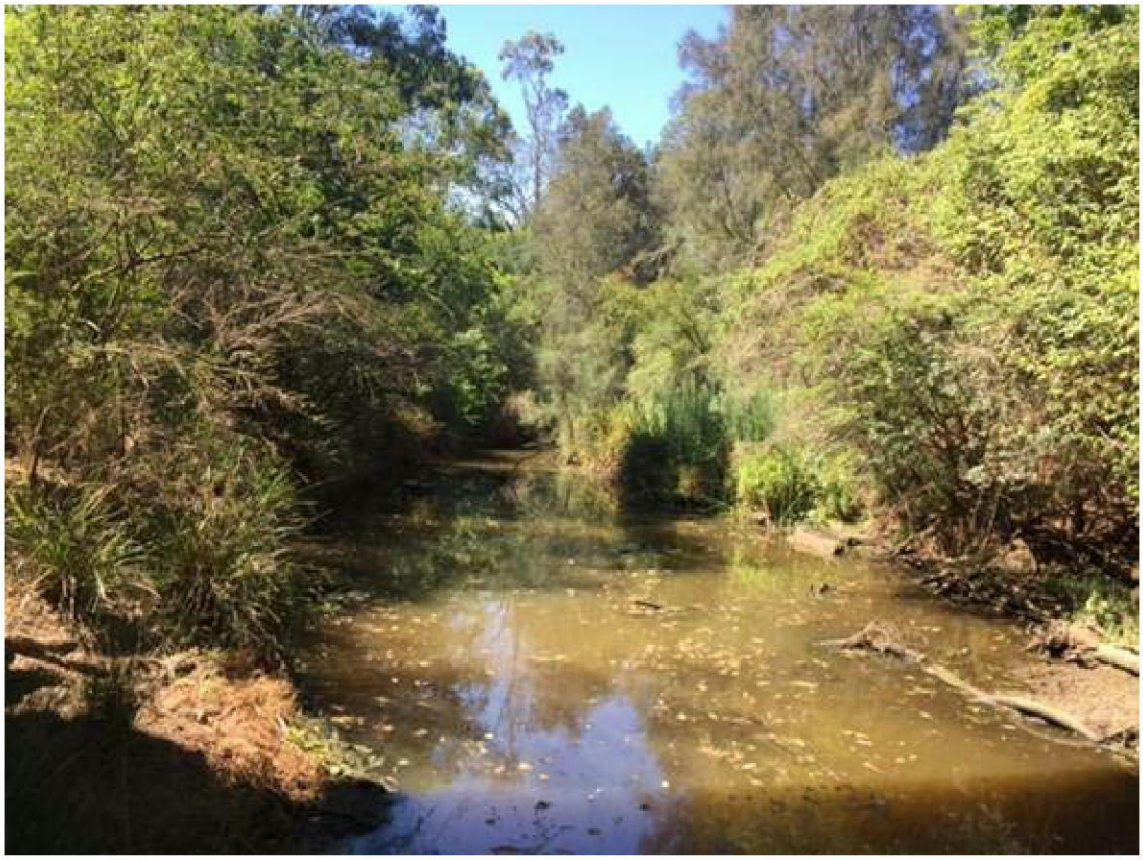
A.3.1 Flora

The vegetation in association with the South Creek bridge is Alluvial Woodland as described in the mapping of the Cumberland Plain (OEH 2013), which is listed as River-flat Eucalypt Forest Endangered Ecological Community under the *NSW Biodiversity Conservation Act 2015* (BC Act). This community is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Riparian zone vegetation in South Creek was dominated by *Casuarina glauca* (Swamp Oak) with smaller proportions of *Angophora floribunda* (Rough-barked Apple), *Eucalyptus amplifolia* and *Eucalyptus tereticornis* (Forest Red Gum). The sub-canopy included a mix of native and exotic species including the native *Acacia parramattensis* (Parramatta Wattle) and juvenile canopy species, and the exotic *Salix babylonica* (Weeping Willow). A dense shrub layer was present, dominated by the exotics*Ligustrum sinense* (Large-leaved Privet), *Senna pendula* var. *glabrata* (Winter Cassia) and *Olea europaea ssp. cuspidata* (African Olive), with some natives represented by regenerating canopy species and *Bursaria spinosa* (Black-thorn). The ground cover was dominated by the exotic grasses *Eragrostis curvula* (African Love Grass) and *Cynodon dactylon* (Couch) and the exotic shrubs *Pavonia hastata* and *Sida rhombifolia* (Paddys Lucerne), with native understorey species uncommon.

No threatened flora species were recorded within the areas proposed for clearing beneath the bridges.

Alluvial Woodland is shown in **Photograph 1**. The full list of species recorded is including in **Appendix B**.



Photograph 1 Alluvial Woodland beneath South Creek Bridge

The access tracks proposed for temporary use are established, and were clear of midstorey and canopy cover, with some overhang in parts of shrub species, as shown in **Photograph 2**. The vegetation consisted of grass species, dominated by the same understorey species recorded in the Alluvial Woodland, but with the addition of some grasses, including the native *Themeda australis* (Kangaroo Grass) and the exotic *Chloris gayana* (Rhodes Grass). No threatened flora species were recorded within or directly adjoining the existing access tracks.

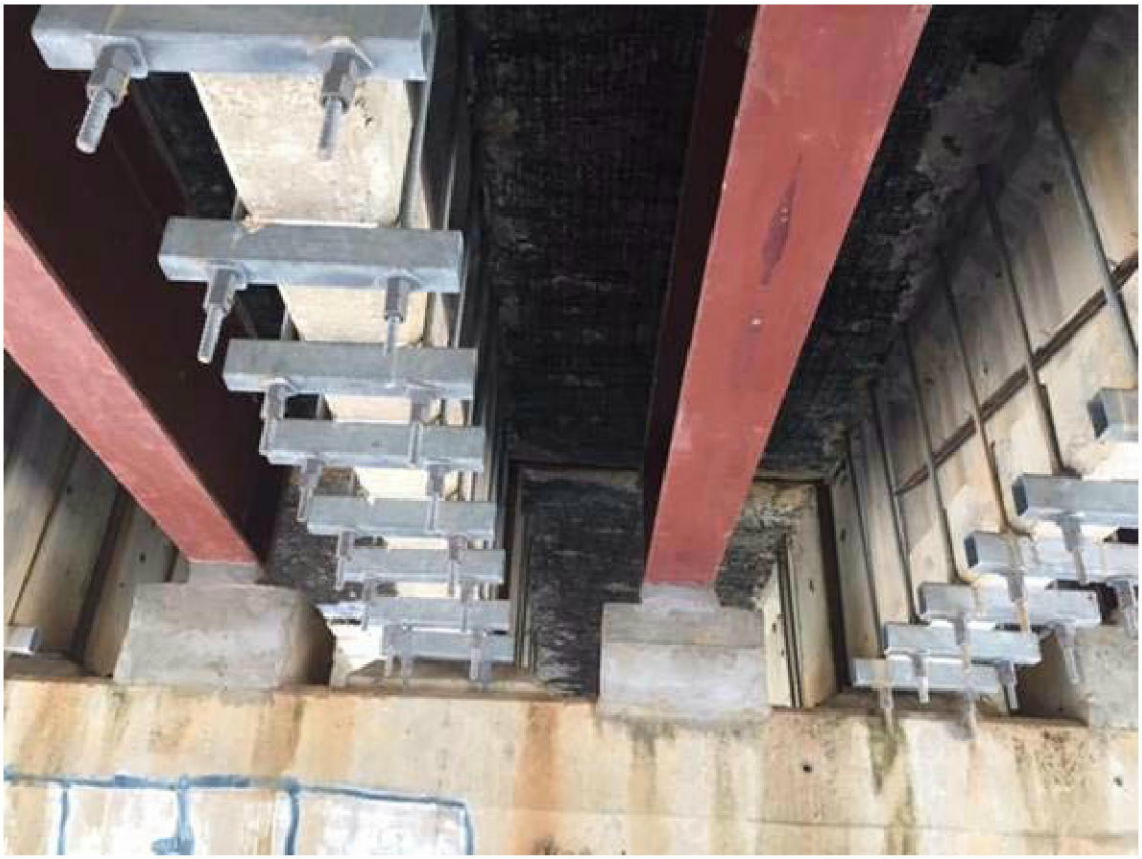
Photograph 2 **Grassed access track within the Regional Park to be used for access during construction**

A.3.2 Fauna

As identified in the Supplementary Assessment, potential habitat for threatened fauna species was identified on the subject site, provided by the young and regenerating woodland vegetation. South Creek and Ropes Creek provide a water source for fauna and foraging habitat for the 'fishing bat' Southern Myotis (*Myotis macropus*), which is listed as vulnerable under the BC Act. The Alluvial Woodland present in association with the creek crossing would additionally act as a corridor for movement by fauna throughout the riparian zone.

The South Creek Bridge is a solid concrete structure, with no crevices present, which could provide roosting habitat for cave-dependant microchiropteran bats, or any other fauna with potential to utilise bridges as habitat.

Ropes Creek Bridge was observed to have crevices between the concrete formwork and metal support structures, as shown in **Photographs 3** and **4**. Close inspection was not possible, due to the height of the structure, and safety concerns with the steep banks of the creek, however, from the visual inspection conducted, the crevices appeared sufficiently deep to provide habitat for a number of cave-roosting microbats, known from the area. This includes the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Little Bentwing-bat (*Miniopterus australis*) and Southern Myotis (*Myotis macropus*) which are listed as vulnerable under the BC Act.



Photograph 3 View of the underside of Ropes Creek Bridge

Photograph 4 Crevices between concrete formwork in Ropes Creek Bridge

A.4 Impact Assessment

Direct impacts as a result of the East West Connector Road will involve complete removal of vegetation within the road corridor easement, as outlined in the Supplementary Assessment (Cumberland Ecology 2017). The summary of impact areas is provided in **Table 1**.

Table 1 Vegetation to be Removed from the Subject Site for the East West Connector Road

Vegetation Community	Area (ha)
Shale/Gravel Transition Forest	0.34
Alluvial Woodland	1.26
Shale Plains Woodland	1.65
Low Diversity Derived Native Grassland (CPW)	0.48
Total	**3.74**

Additionally, the demolition of South Creek Bridge and Ropes Creek Bridge has the potential to remove roosting habitat for cave-roosting microbats, including the threatened species; Eastern Bentwing-bat, Little Bentwing-bat and Southern Myotis. An updated Assessment of Significance has been prepared for this species, as included in **Appendix B**. The Assessment concludes that no significant impact is likely to occur as a result of this development.

Temporary disturbance of vegetation located within the existing grassed access tracks located at the boundary of the Regional Park and the road easement, in order for machinery to access South Creek Bridge. The single lane tracks will not be widened, outside of the road easement, and will be remediated after the works are complete.

A.5 Mitigation Measures

A suite of mitigation measures have been outlined in the Supplementary Assessment (Cumberland Ecology 2017), and the SIS for Central Precinct (Cumberland Ecology 2014). Additional measures proposed include the following:

- Installing temporary fencing at the perimeter of each access track located within the Regional Park;
- Rehabilitate the access tracks, to an equivalent grassed finish (or as agreed with the Office of Environment and Heritage) after the construction phase is complete;
- Conduct surveys for cave-dependant microbats as part of the preclearing process. The survey would aim to carefully examine the creviced identified in Ropes Creek Bridge, and identify bats leaving their roost sites (if present), using bat echolocation recording and analysis; AND
- If microbats are detected, or considered highly likely to occur due to evidence of roosting, such as the presence of guano (faeces), a Bat Management Plan will be developed, in consultation with OEH. This is likely to include methods to exclude the bats from returning to roost, through blocking access when bats are active and foraging. Consideration will be given to the season, as species such as Eastern Bentwing-bat go into torpor, or have an inactive period, during winter.

A.6 Conclusion

This findings of this addendum assessment indicate that the road construction works, including bridge demolition and construction works, is not likely to result in any significant impacts to threatened species, populations or ecological communities. This is provided that the proposed mitigation measures outlined in **Section A.5**, and also within the supporting documentation, are followed. The potential for roosting habitat for cave-dependant microbats, including the threatened Eastern Bentwing-bat, to occur within Ropes Creek Bridge must be investigated further prior to construction. Development of a Bat Management Plan will be incorporated into the pre-construction phase of works, and this will ensure that bats are excluded from the

structure prior to demolition, using methods approved by OEH as part of similar bridge works projects, such as the M2 Motorway Upgrade (Greg Richards and Associates 2011).

Although the proposed works will result in the removal of a relatively small area of regenerating woodland, they will also result in improved access and drainage in the Regional Park. This will have for long term benefits to biodiversity in the long-term due to improved park management.

The East West Connector road works should proceed with caution, and the implementation of appropriate mitigation measures, as outlined above.

A.7 References

Cumberland Ecology (2014). Development within the Central Precinct, St Marys Property: Species Impact Statement. Carlingford Court, NSW, Cumberland Ecology.

Cumberland Ecology (2014). Ecological Assessment of Dunheved Precinct Haul Road Extension within the St Marys Property. Letter to Glyn Richard of Lend Lease.

Cumberland Ecology (2016). Ropes Crossing Connector Road Extension, St Marys Property. Prepared for Lend Lease.

Cumberland Ecology (2017). St Marys East - West Connector Road Upgrade Works - Supplementary Ecological Assessment. Letter to Sean Porter, Lend Lease. Epping, NSW.

Greg Richards and Associates (2011). M2 Motorway Upgrade: Short Report on Impact Mitigation for Bats in Culverts - Draft. ACT, Greg Richards and Associates Pty Ltd.

OEH (2013). Remnant Vegetation Mapping of the Cumberland Plain. O. o. E. a. Heritage. NSW.

Appendix B

Assessments of Significance

B.1 Microchiropteran Bats

The following Assessments of Significance demonstrates apply to the following species of cave-roosting microchiropteran bats (microbats) known to occur in the locality:

- Eastern Bentwing-bat (*Miniopterus orianae oceanensis (formerly M. schreibersii oceanensis*);
- Little Bentwing-bat (*Miniopterus australis*); and
- Southern Myotis (*Myotis macropus*).

The Eastern Bentwing Bat occurs along the east and north-west coasts of Australia. It roosts in caves, derelict mines, stormwater tunnels, buildings and other man-made structures. It forages above the canopy in forested areas. The Eastern Bentwing Bat forms maternity colonies in caves and populations usually centre on such caves (OEH 2012b). The Eastern Bentwing Bat is listed as Vulnerable on Schedule 2 of the TSC Act.

The Little Bentwing-bat occurs along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. It is generally found in well-timbered areas of moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. It roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings (OEH 2012h). The Little Bentwing-bat is listed as Vulnerable on Schedule 2 of the TSC Act.

The Southern Myotis occurs in coastal areas from north western Australia to south western Victoria (DEC (NSW), 2005i). It roosts close to water in caves, mine shafts, tree hollows, stormwater channels, buildings, under bridges and in dense foliage. It forages over streams and pools by raking its feet across the surface for insects and small fish (OEH 2012j) (DEC (NSW), 2005i). The Southern Myotis is listed as Vulnerable on Schedule 2 of the TSC Act.

a) *In the case of a threatened species, whether the lifecycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

Potential roosting habitat for cave-dwelling species has been identified within crevices beneath Ropes Creek Bridge. However, despite that lack of detailed survey data to confirm their absence, no evidence of habitat use, such as the presence of guano (faeces) was noted during the site inspection. As part of the mitigation measures for the subject site, a detailed pre-clearance survey is proposed, and development of a Bat Management Plan if individuals are found to roost in the bridge structure.

Extensive foraging habitat will be retained for these species throughout the 900ha Regional Park. South Creek and Ropes Creek will continue to provide foraging resources for the fishing bat and insectivorous bat species, and the improved drainage will benefit these species. For these reasons, it is not likely that the proposal will affect the life cycle of these species such that a viable local population is placed at risk of extinction.

b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised,

There are no populations of these species listed as endangered under the TSC Act.

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(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.

d) In relation to the habitat of a threatened species, population or ecological community:

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

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

All of the known and potential habitat for these species on the subject site will be removed or substantially modified as a result of the proposed development.

The potential foraging habitat for these species in the study area occurs in patches isolated from larger occurrences in the Regional Park. Any significant trees or patches of understorey that are retained within the subject site will remain isolated from the Regional Park.

The habitat to be removed, modified or isolated as a result of the proposed development is not important to the long-term survival of these species within the locality. It is unlikely that a large colony of microbats roost in the bridge, due to the lack of evidence of habitat use. Areas of high quality habitat occur within the Regional Park and will be conserved within the Regional Park and managed for conservation.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for these species has currently been identified by the Director-General of the OEH.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery plans have been prepared for these species. No threat abatement plans are relevant to these species.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.

Clearing of native vegetation is a listed key threatening processes under the TSC Act. Limited mature trees occur on the subject site, which would provide foraging habitat for these species, and will be removed for the proposed development. However 900 ha of vegetation, including mature vegetation, will be conserved within the Regional Park. Future management of the Regional Park will also be designed to protect fauna habitats. The extent of clearing proposed is therefore not considered to be a threat to microchiropteran bat species in the precinct.

No other key threatening process that may be exacerbated by the proposed action will affect these species.

Conclusion

The proposed development will not have a significant impact on threatened microchiropteran bats.