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Submission: Northern Road Stage 3 EIS

The upgrading of the Northern Road creates a fundamental change to the character and environment of Western Sydney. It is a personal tragedy to observe the urbanisation which our community and landscape are being subjected to for private profit, and critical that this project is subjected to real rigor in its design & execution.

The following submission outlines areas requiring attention regarding the biodiversity impacts of the project with practical recommendations for their redress. A summary of recommendations is provided.

When considering the biodiversity impacts and mitigation of this project it is important to understand the scale of impact. This is a monumental project with biodiversity impacts which greatly exceed the direct impacts of habitat loss. The environmental mitigation measures considered must be considered as seriously and on a scale commensurate with the scale of these impacts.

Existing connectivity

The benchmark of existing wildlife permeability at the site has not been accurately assessed in EIS documentation.

The project will transform a presently rural single-carriage road into a 4 to 8 lane highway. This highway runs the majority of the length of the Cumberland Plain landscape, dissecting it in two. The greatest impacts of the project are not vegetation loss, but the loss associated by major disconnection of landscape connectivity for biodiversity and particularly fauna. It is also worth noting that existing fencing at Defence Establishment Orchard Hills is not presently a major barrier to wildlife which move freely through the area (as evidenced by the mature Red Deer which have recently established within DEOH).

Presently the region is highly permeable to wildlife, which use both mapped vegetation and other land in equal measure. The fragmentation of the landscape which will occur is not limited to vegetated corridors, although these areas provide the best opportunities for mitigation measures.

With all the effort in the world on crossing structures, the road will nonetheless cause a significant and permanent decline in regional wildlife populations and to their mobility (e.g. Soanes et al 2013, McCall et al 2010). In this light serious measures need to be given genuine prioritisation to ensure that maximum fauna movement is retained by this project – not just a box-ticking exercise.

East-West Migrants

A particular concern is the fate of east-west obligatory migrant species. The Northern Road cuts the majority of the Cumberland Plain North-South, much of this in the Stage 3 area. A large number of altitudinal migrants rely on safe passage from the Blue Mountains to the Cumberland Plain each year. This includes threatened migrant species Flame & Scarlet Robin. It is alarming that this functional ecology is overlooked by the FBA assessment process. This matter is very serious and should be specifically addressed in the EIS.

Both species are Vulnerable (requiring impact assessment not satisfactorily undertaken in the EIS) and confirmed to be in decline nationally (Birdlife Australia 2015)

At present both Flame and Scarlet Robin (listed threatened species) cross Northern Road to visit the Defence Establishment Orchard Hills (DEOH) every winter. There is a very real possibility of creating barriers (such as fencing, landscaping, noise, light, or sound barriers) which could cut off this annual migration resulting in the rapid and permanent loss of these species from over 800 hectares of habitat at DEOH.

Specific consideration should be given to threatened Flame & Scarlet Robin migrating over Northern Road, especially to known habitat in DEOH. Assessment should be made of the potential loss of over 800 hectares of habitat if these species are isolated. Specific consideration should be made to avoiding physical barriers exceeding 2 m height, including noise barriers or tall fencing which may interfere with migration routes anywhere along the DEOH boundary.

Remnant Trees – Orchard Hills

Two remnant trees are located on the current roadside beside the RMS inspection bay at Orchard Hills. These trees have significant local heritage value and form an integral part of the local aesthetic and character.

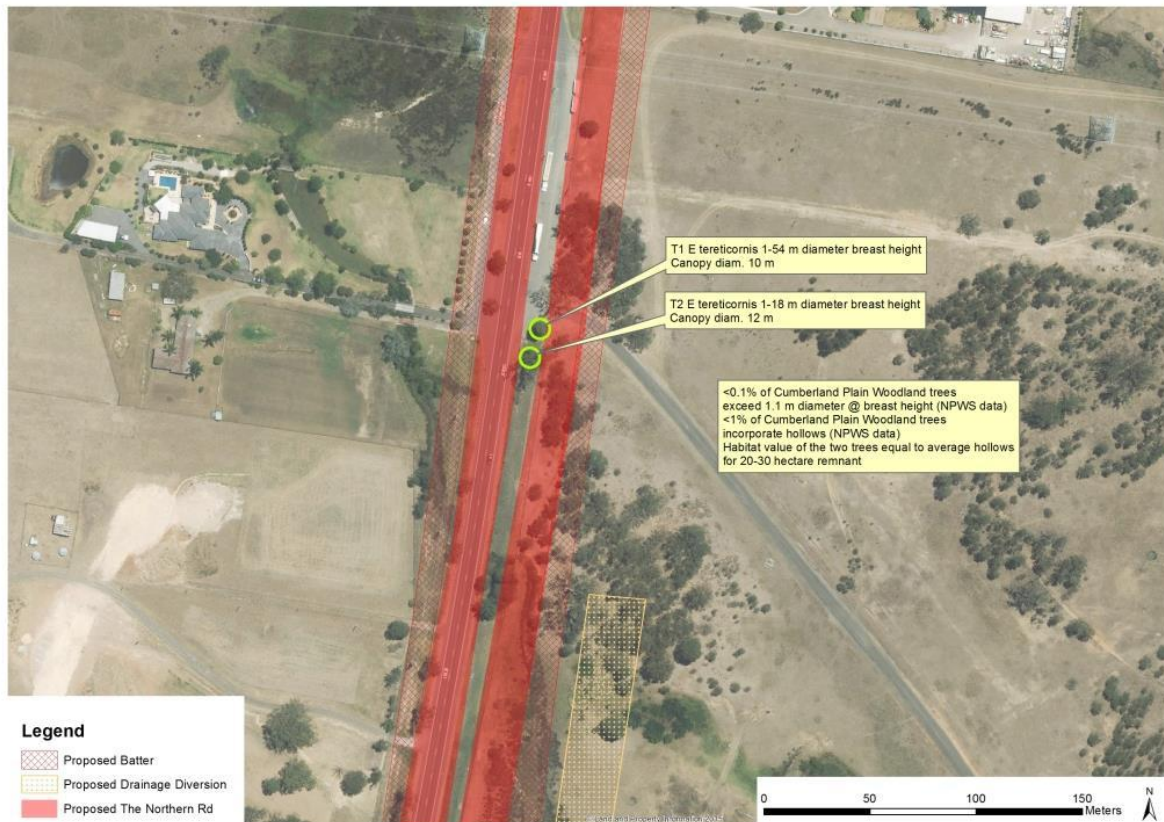
These trees are also of outstanding ecological value which has not been satisfactorily assessed in the EIS. The FBA and many non-local ecologists do not appreciate quite how significant such trees are in the Cumberland Plain. Remnant trees over 1.1 m dbh constitute a mere <0.1% of Cumberland Plain Woodland trees remaining (NPWS data, unpublished) and have the habitat equivalent (measured in useable hollows) of 20 -30 hectares of typical vegetation (NPWS data, unpublished). These two individual trees alone are of greater ecological significance than a number of the vegetation remnants considered under the FBA.



The Northeast tree is the largest with a diameter 1.54 m (Dec 2014), and the southwest tree about 10 m away a diameter of 1.18 m.

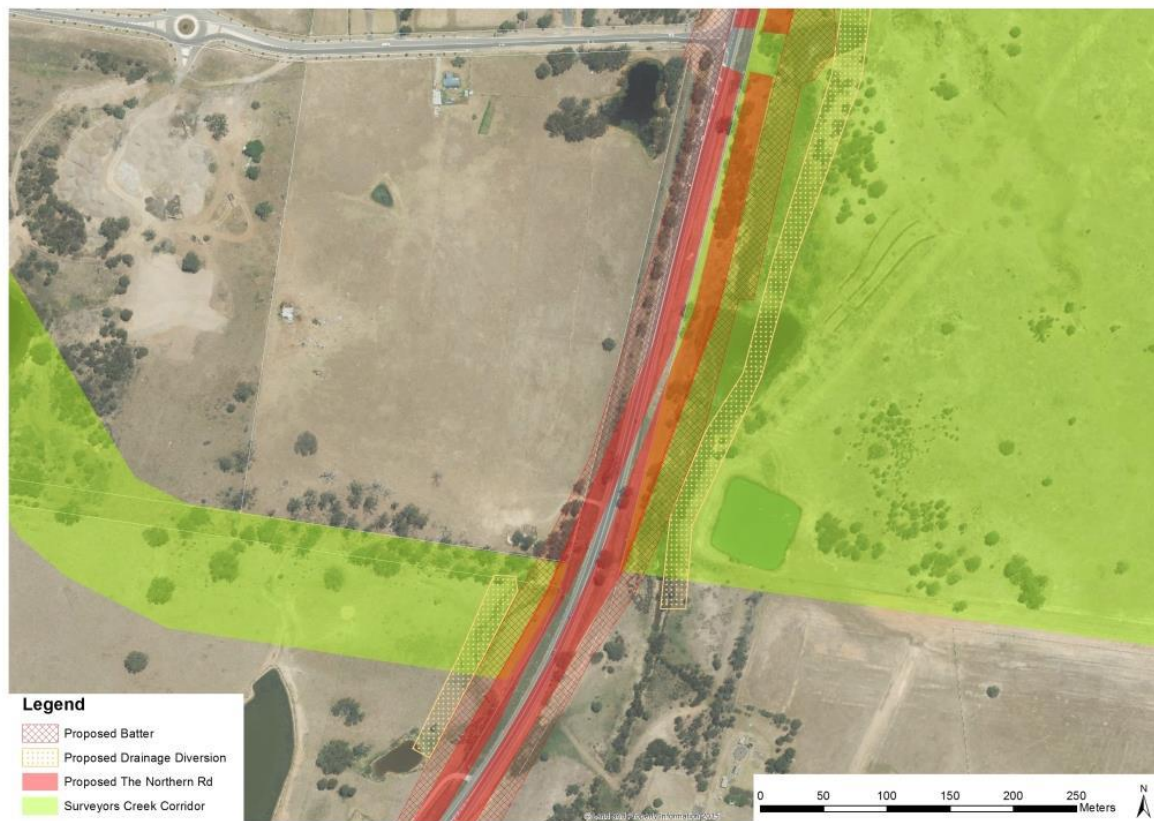
It is realistic and sufficiently important to retain these trees through the design & construction process. This opportunity should be pursued.

The EIS does not incorporate design drawings however subsidiary documents within the EIS show a preliminary design in which these two trees are located within the median strip. This alignment should be retained within the design process and median width & management maintained sufficiently to retain these trees in a safe manner.



Surveyors Creek Wildlife Corridor (general)

The 'Surveyors Creek Nature Reserve' is a dedicated wildlife corridor being constructed and transferred to Penrith Council through the development of Glenmore Park and surrounding suburbs. The corridor is as gazetted in the relevant Local Environment Plans and DCPs. Surveyors Creek Corridor constitutes Regional Corridor 17 of the NSW OEH BIO Map reflecting its significance as a critical local wildlife corridor. The BIO Map has some minor errors in alignment and the correct alignment as per the LEP mapping is shown below.



This corridor is of particular significance for two biodiversity matters. The first is for movement of obligatory altitudinal migrants Vulnerable Flame and Rose Robin as discussed above.

The second significance is for the movement of Eastern Grey Kangaroos. Individuals of the species regularly move between DEOH and Mulgoa Nature Reserve (despite DEOH fencing) but would be dislocated by the proposed development. This issue is further considered in the following discussion on a potential wildlife underpass.

Surveyors Creek & DEOH – Landscaping & Lighting

A number of design details will be critical for maintaining genuine ecological performance of the Surveyors Creek corridor.

It is important to note that the Surveyors Creek Corridor is an existing development offset and is under restoration to benchmark Cumberland Plain Woodland. The proposal will remove portions of this development offset. It is critical that the damage caused to this future woodland is fully restored back to functional Cumberland Plain Woodland and not simply landscaped.

It is not possible with any technique to reinstate Cumberland Plain Woodland on degraded soil, although in many circumstances degraded soil can be removed by scalping to make restoration possible. Given that major fill & earthworks are required at this location, the restoration of Surveyors Creek will require soil translocation from areas of healthy CPW understorey (i.e. from quality habitat being removed elsewhere on the project site).

Revegetation should be undertaken to BAM/FBA benchmark standard. This is not possible through landscaping. Instead 'Grassy Groundcover' technique of intensive & diverse groundcover seeding should be used (e.g. as per Greening Australia/Toolijooa programs in the region).

Such revegetation should be undertaken beside the corridor on both western and eastern (DEOH) sides, along the associated median strip, and for the full length of roadside which adjoins Cumberland Plain Woodland beside DEOH. These works will not only maintain the ecological integrity of the region and serve to mitigate biodiversity harm, but also ensure the rural and scenic heritage values of this stretch are respected. The amenity of this section of road beside DEOH is of very high social value.

Similarly for both aesthetic and biodiversity considerations it is important that no lighting or light-spill should occur over the 100 m wide corridor or along the entire Orchard Hills bushland section. This is realistic under current road safety guidelines (assuming suitable design safety considerations are made) as per considerable 'Dark Skies' sections of the M4 motorway. This measure would considerably reduce community concern over the amenity and 'urban' nature of the proposed works in this section of road much loved for its rural character.

Surveyors Creek - Bike Trails

There are two bike trails proposed in EIS documents at Surveyors Creek and both present unacceptable impacts on biodiversity and connectivity.

The first is the shared bike path proposed along the western side of the Northern Road. Presently there is no bike path in this location. The installation of a bike path would serve to widen the barrier to fauna movement and increase disturbance. If possible this path should be located proximate to the road, rather than separated in a manner which would increase both habitat loss and disturbance.

The second proposed trail runs along the surveyors creek corridor (see p72 Landscape Assessment). While it's construction would be outside the project scope it's planning is relevant. There has been no community consultation in regard to this trail or it's impact on the Surveyors Creek Corridor which is an existing development offset and already problematically narrow as a wildlife corridor. No further encroachment into the Surveyors Creek Corridor can be ecologically sustained and any regional bike trail must be located outside this dedicated wildlife corridor.

Surveyors Creek (underpass)

An underpass should be installed at the Surveyors Creek corridor to maintain wildlife connectivity and improve road safety. This may need to be closed for the present (in line with DEOH security requirements) but should be installed as part of the current project which would otherwise sterilise any future opportunities for maintaining this connectivity (i.e. after the DEOH relocates).

Such an underpass would be located near (or combined with) proposed Flood Culvert PXD2. It is understood that a 1.5 m high crossing culvert has been proposed in draft RMS plans for this location, however this is not of suitable dimensions as detailed below.

This overpass is especially critical for the Eastern Grey Kangaroo (*Macropus giganteus*). The Eastern Grey Kangaroo is a habitat engineer critical to the long-term health of Cumberland Plain Woodland and associated fauna. Without the species, interstitial space (bare earth between grass tussocks) disappears. As a result flora which rely on interstitial space (especially lilies & orchids) decline, and endangered woodland-specialist fauna which feed specifically in interstitial space (e.g. Scarlet and Flame Robin, Speckled Warbler) similarly decline. ***These species simply do not persist long term in sites without healthy Eastern Grey Kangaroo populations*** as is clearly evidenced in the remaining populations on the Cumberland Plain.

For this reason any underpass must specifically meet the needs for this species.

Physical requirements for effective movement of Eastern Grey Kangaroo

It is understood that a 1.5 m underpass has been provided in draft designs, based on advice in the Wildlife Connectivity Guidelines for Road Projects (RMS in prep) that this height is suitable for Eastern Grey Kangaroos. This is not correct, and if the Guidelines do recommend this value it is critical that they are amended in line with the available scientific evidence.

As this is a critical matter this evidence base is reproduced below.

It is well understood that underpass use by native fauna is dictated by species *behavioural* needs more so than their *physical* dimensions. Most wildlife (excepting some burrowing species) prefer underpass structures which are far larger than is physically necessary in order to feel comfortable entering structures. Similarly critical is to assess the dimensions necessary for an underpass to be **likely** to be **regularly** used. Some guidelines instead adopt of the minimum sizes which have been used by a species under exceptional circumstances – this is not appropriate when mitigating the impacts of development.

Almost all the relevant research on underpass dimensions is reviewed in a former DEWHA (now Federal Department Environment & Energy) assessment of habitat fragmentation by roads (van der Ree et al 2008). Table 3 outlines the studies in which Eastern Grey Kangaroo and other species were surveyed in underpass projects. This table should not be misinterpreted as a number of the subject studies combine underpasses, overpasses and bridges, requiring individual reports to be assessed to determine which structure was suitable for the species in question.

For convenience this literature is summarised in two tables below.

There are five (5) studies of underpasses which Eastern Grey Kangaroo were present regionally but **failed** to use underpass structures:

Study	Working Height (m)	Length (m)	Notes
AMBS (2001) Taree	2.4	Not given	EGK did use bridges but not underpasses
Bond A. & Jones D (2008)	2 (2.4 plus fill)	48	Intensive monthly survey
Taylor, B.D. and Goldingay, R.L. (2003) Brunswick Heads	1.2	18	Wallabies using underpass but not the much larger EGK. Mistakenly used in RMS guidelines for EGK
Hunt, A., Dickens, H. J. & Whelan, R. J. (1987)	Up to 2.4 m	Various	
AMBS (1997) F3	1.5 m		

There are two (2) studies of underpasses which Eastern Grey Kangaroo **succeeded** in using:

Study	Working Height (m)	Length (m)	Notes
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AMBS 2002 (2001) Bulahdelah to Coolongolook	3 m	unspecified	
Hayes, I.F. (2006)	3 m	unspecified	Refers to macropods only (no species given)

It's important to note the numerous underpasses which failed to assist this species. It's possible that some underpass smaller than 3 m will be used by Eastern Grey Kangaroos at some time. However significant use is clearly limited to underpasses of minimum 3 m working heights. The intent of mitigation works are to create an underpass we can be confident will work - not one that has a slim technical possibility of working.

These findings are reflected in other Australian roads guidelines. For example the Queensland DTMR guidelines (DTMR 2002) recommend 3 m x 3 m box culverts for Eastern Grey Kangaroos.

RMS have suggested that their unpublished guidelines list 1.2 m (1.5 m?) as suitable underpass height for Eastern Grey Kangaroos. This is clearly a mistaken interpretation of the Brunswick Heads program where **wallabies** were found to use underpass structures of this height. Most wallabies are one half to two thirds the height of Eastern Grey Kangaroos and are not a suitable surrogate for their underpass needs. Again the evidence base clearly shows 3 m as the appropriate height for Eastern Grey Kangaroo movement.

Finally a layer of practicality should always be overlaid on all ecological planning. Given that mature Eastern Grey Kangaroos are on average 1.5 – 1.7 standing height it is highly unlikely that 1.5 m high underpasses would be suitable for their regular use. While in exceptional circumstances individuals may crawl through on all fours (this has been observed in the Western Grey Kangaroo) it is clearly challenging for a species of 1.5-1.7 m standing height to crawl over 60 m through an underpass.

Recommendations

- Specific assessment should be made of potential barriers to the annual migration of Vulnerable Flame & Scarlet Robin migrating over Northern Road, especially to known habitat in DEOH. Physical barriers exceeding 2 m height should not be placed along any of the Defence Establishment Orchard Hills boundary as this is likely to interfere with migration routes
- The old-growth remnant trees beside the RMS inspection bay at Orchard Hills should be retained for their outstanding ecological significance and as a key local aesthetic icon
- The full 100 m width of the existing Surveyors Creek Corridor on both western and eastern (DEOH) sides should be capped with suitable Cumberland Plain Woodland substrate via soil translocation at the conclusion of earthworks. The site should not be landscaped but rather restored to BAM/FBA-criteria functional Cumberland Plain Woodland, preferably through 'Grassy Groundcover' or similar techniques under the direction of qualified bush regenerators.
- The median strip and verges for chains adjoining Defence Establishment Orchard Hills bushland should not be landscaped but restored to BAM/FBA-criteria functional Cumberland Plain Woodland to maintain both the ecology and character of this section. This contributes to the EIS heritage assessment recommendations for this section which is of high scenic significance.

- Lighting or light-spill should be excluded from the full width of Surveyors Creek Corridor on both eastern and western sides, and along the full length of Cumberland Plain Woodland on the Defence Establishment Orchard Hills.
- An earth-floor box culvert underpass should be constructed to link Defence Establishment Orchard Hills – Surveyors Creek Corridor, suitable for use by Eastern Grey Kangaroos (minimum 3 m height x 3 m width)
- Suitable ‘flop-top’ fencing should be installed along Surveyors Creek Corridor on both sides of the Northern Road to direct fauna safely into the underpass and to ensure road safety
- Services should be routed to avoid interfering with Surveyors Creek Corridor and its future restoration on both Eastern and Western (DEOH) sides
- No bike trails should be installed through or across the Surveyors Creek Corridor; this is a dedicated offset for development and would lose ecological function through such construction

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