TECHNICAL REPORT NO 6

FLORA, FAUNA AND AQUATIC IMPACT ASSESSMENT REPORT & ADDENDUMS

BIOSIS RESEARCH (BIOSIS)

TECHNICAL REPORT NO 6

ADDENDUM NO 1

Correspondence 20 January 2010

18-20 Mandible Street, Alexandria,
NSW 2015
Tel. (02) 9690 2777
Fax. (02) 9690 2577
Email sydney@biosisresearch.com.au

Attention: Warwick Giblin
WSN Environmental Solutions (WSN)

Date: 20/01/2010

From: Brendan Smith
Biosis Research Pty. Ltd.

Pages (including cover sheet):4

Subject: Letter of Advice in relation to Eastern Creek Landfill Extension (Cell 5) and Cumberland Plain Woodland (CPW) under the *Commonwealth Environment Protection and Biodiversity Conservation Act* (1999) (EPBC Act).

Dear Warwick,

As part of WSN's current proposal to increase the yearly inflow capacity of the Eastern Creek Waste and Recycling Centre, approximately 1.02ha of Cumberland Plain Woodland requires clearing (hereafter referred to as 'the proposal'). A flora and fauna assessment has been prepared for the proposal (Biosis Research 2009) and was undertaken based on consent sought under Part 3A of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) and State Environmental Planning Policy (Major Projects) 2005. Recommendations made by Biosis Research (2009) included "*that consideration be given to preparation of a Referral for Matters of National Significance*" for impacts to CPW which at that time was listed as "Endangered" under the EPBC Act.

Since preparation and submission of the Biosis Research (2009) report, CPW has been up-listed from "Endangered" to "Critically Endangered" under both the Commonwealth EPBC Act and NSW *Threatened Species Conservation Act* (1995) (TSC Act). The highest category for which an ecological community is eligible to be listed is critically endangered. Biosis Research has been commissioned by WSN to provide a letter of advice regarding the impacts upon CPW as previously described by Biosis Research (2009) with reference to the updated Commonwealth listing advice (Threatened Species Scientific Committee 2008) for CPW under the EPBC Act..

Biosis Research (2009)

The Biosis Research (2009) report describes CPW within the study area as follows.

There are several narrow bands of continuous Woodland within Cell 5, although in all cases there is a ground-cover of mostly exotic species, and where a mid-storey does occur, it mainly consists of exotic shrub species, especially *Sida rhombifolia* and *Lycium ferocissimum*. The floristics of the Woodland canopy is monotypic throughout

Cell 5, with *Eucalyptus tereticornis* being the sole representative. The larger mature trees are at least 80 years old and are generally 24 m in height, with canopy spreads of 8 m or more and Foliage Projective Canopy (FPC) of <20%. There are also eucalypt seedlings, (possibly including some *Eucalyptus moluccana*) varying in age from two to five years old, and numbers of juvenile and established trees of ages varying from five to 25 years.

Approximately half of the ground-cover species recorded in the woodland vegetation are exotic, although in terms of biomass, the exotic species are dominant. Common exotic species include *Lolium perenne*, *Paspalum dilatatum, Pennisetum clandestinum* and *Ehrharta erecta.* The most commonly occurring rush in the drainage line is the exotic *Juncus acutus.* Occasional native species include *Microlaena stipoides* var. *stipoides, Dichondra repens* and *Centella asiatica.*

The Cumberland Plain Woodland within the study area was considered to be in Moderate condition, (in terms of the canopy) but Poor, in terms of the mid-storey and ground-cover, as a result of previous disturbance, weed invasions and over-use by the large Ibis population.

Quadrat data included within the Biosis Research (2009) report provides the estimated cover abundance of native and exotic species recorded from CPW within the study area. This data also supports the report description of CPW within the study area, as including a partially intact canopy with the mid-storey and ground cover dominated by weeds.

The extent of CPW at the site provides limited connectivity because it originates in the Western Sydney International Dragway, and is fragmented by Ferrers Road, as well as two other access tracks. Therefore the proposal including the removal of CPW would not reduce connectivity.

Commonwealth Listing Advice (Threatened Species Scientific Committee 2008)

In order to qualify as CPW under the EPBC Act, a patch of this community must always have the upper tree layer species present and either a shrub or ground layer present (Threatened Species Scientific Committee 2008). As described above, CPW within the study area includes the upper tree layer species, however, the mid-storey and ground cover is dominated by weeds. In spite of the dominance of weeds, occasional native species were identified in the ground-cover and are considered characteristic of CPW.

The Commonwealth listing advice (Threatened Species Scientific Committee 2008) also prescribes condition thresholds which (p7):

> *…are intended to function as a set of criteria that assists in identifying when the EPBC Act is likely to apply to an ecological community. They provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under the EPBC Act. This means that the protection provisions of the EPBC Act are focussed on the most valuable elements of Australia's natural environment, while heavily degraded patches,*

which do not trigger the "significance test" of the EPBC Act will be largely excluded.

The listing advice prescribes four categories of condition thresholds for patches of CPW that meet the description of CPW. With reference to the four condition categories (see Table 1 within the listing advice) and the minimum condition thresholds, patches of CPW that meet the description for CPW under the EPBC Act must have a minimum of 30 per cent cover of native species.

On the basis of the above, the patch of CPW within the study area does not meet the minimum condition thresholds prescribed in the Commonwealth listing advice.

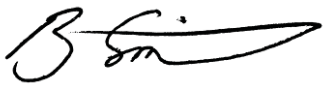
Conclusion

Given that CPW woodland within the study area does not appear to meet the minimum condition thresholds prescribed in the Commonwealth listing advice, it is unlikely that the proposal would require a Referral for impacts on Matters of National Environmental Significance as listed under the EPBC Act.

Despite being in a degraded condition, patches of CPW that do not qualify as part of the community under the EPBC Act still retain important natural values (e.g. tree hollows) and therefore should not be excluded from appropriate management actions (Threatened Species Scientific Committee 2008) such as those prescribed by Biosis Research (2009). Although the patch of CPW within the study area does not qualify as part of the community under the EPBC Act, it is likely that it will still meet the criteria for this community under the NSW TSC Act 1995, under which CPW is now also listed as critically endangered.

If you should have any further question relating to the above, please do not hesitate to contact me to discuss this matter further.

Yours sincerely,



Brendan Smith
Senior Botanist
Ph: 02 9690 2777
Mob: 0418 522 401

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TECHNICAL REPORT NO 6

ADDENDUM NO 2

Correspondence 23 March 2010

18-20 Mandible Street,
Alexandria, NSW 2015
Tel. (02) 9690 2777
Fax. (02) 9690 2577
Email: sydney@biosisresearch.com.au

Attention: Warwick Giblin
WSN Environmental Solutions (WSN)

Date: 23/03/2010

From: Brendan Smith
Biosis Research Pty. Ltd.

Pages (including cover sheet): 10

Subject: Addendum to address agency submissions - *Flora, Fauna and Aquatic Impact Assessment: Cell 5 – Northern Extension Landfill EC Stage 2* (Biosis Research 2009)

Dear Warwick,

As part of WSN's current proposal to increase the yearly inflow capacity of the Eastern Creek Waste and Recycling Centre a Flora, Fauna and Aquatic Impact Assessment (Biosis Research 2009) has been prepared based on consent sought under Section 75W of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act). The report was submitted as part of a Section 75W Modification Application No: 271-6-2003-I MOD 4. Subsequent to submission of the application, agency responses included comments on the Biosis Research (2009) report.

In response to submissions from the Department of Environment, Climate Change and Water (DECCW) (dated 10 February 2010) and Blacktown City Council (dated 29 January 2010), please refer to the attached addendum figures. The attached addendum should be read in conjunction with the Biosis Research (2009) report, AECOM flood study (2009) and AECOM (2010) preliminary concept design for the drainage diversion channel. Further to addressing agency comments, the following addendum also includes assessment for the revised design of the drainage diversion at the confluence with Eastern Creek.

If you should have any further question relating to the above, please do not hesitate to contact me to discuss this matter further.

Yours sincerely,

Brendan Smith
Senior Botanist
Biosis Research Pty Ltd

ADDENDUM

FLORA, FAUNA AND AQUATIC IMPACT ASSESSMENT: CELL 5 – NORTHERN EXTENSION LANDFILL EC STAGE 2

1 DECCW General Comments and Additional Information

Item four (4) in the DECCW submission requires further information in relation to:

- Survey guidelines for the vulnerable plant species *Pimelea spicata*;
- The area of Cumberland Plain Woodland (CPW) impacted by the proposal; and,
- Requirements to offset the removal of CPW.

Each of these points is addressed in the following.

1.1 DECCW survey guidelines for *Pimelea spicata*

Pimelea spicata is a slender decumbent or erect shrub to 50 cm high. According to the DECCW Environmental Impact Assessment Guidelines for *P. spicata* (NPWS 2000), this species is cryptic and may be difficult to detect, especially when not in flower.

The survey guidelines specify the following requirements for survey of *P. spicata*:

- Surveys should not be relied upon unless undertaken while the species is in flower. Given the sporadic and opportunistic flowering habit of *P. spicata*, survey of other nearby known populations should be used as an indicator of flowering time.
- *P. spicata* needs to be the subject of a specific targeted survey and should be undertaken using the random meander method, favouring suitable habitat areas.
- Survey effort should be at least one hour per hectare of suitable habitat.

1.2 Seasonal survey for *Pimelea spicata*

Previous surveys covering the study area were undertaken by National Environmental Consultation Services (NECS 2002) during June 2001, 22 October 2001 and 26 November 2001. The Biosis Research (2009) survey was conducted by an experienced botanist on 20 October 2008. When considered in combination, the current and previous surveys should be sufficient to address the Director Generals Requirements issued for the project.

Repeat seasonal surveys to identify the flowering time of nearby populations of *P. spicata* was beyond the scope of works undertaken by Biosis Research. Given that the species may not have been flowering during the survey period, it is acknowledged that

the requirement for survey effort to be conducted during the known flowering period of populations occurring in the locality has not been met.

If necessary, further surveys for this species can be undertaken during the known flowering period of local populations of this species before any on ground works are undertaken. This will be enforced through a legally binding Statement of Commitments. If the species is found, DECCW would be notified and further impact assessment would be undertaken along with appropriate amendments to offsetting arrangements or project design.

1.3 Flora survey effort

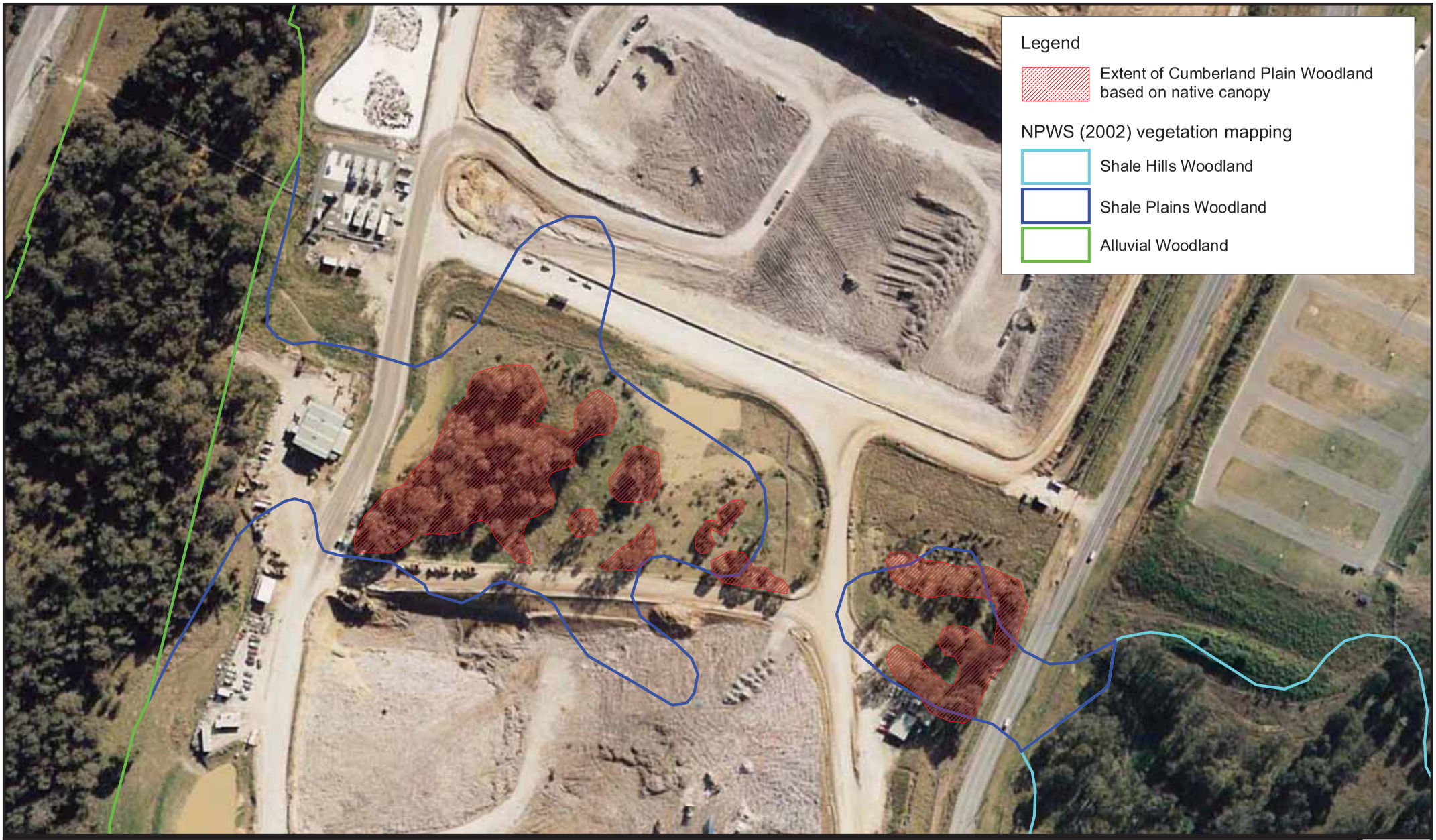
Survey effort undertaken by Biosis Research included approximately 3.5 person hours specifically allocated to flora survey on site. The Random Meander method, as outlined by Cropper (1993) was used by Biosis Research during survey to compile a representative list of plant species and to carry out targeted searches for plant species of conservation significance. Further to this, three 20 x 20 m quadrats were also undertaken in order to establish a detailed assessment of the frequency of occurrence and densities of the commonly occurring ground-cover, mid-storey and canopy species. Plot based surveys or quadrats are also recognised as a useful method for the detection of inconspicuous or threatened species, as a smaller area is sampled in a concentrated search (DEC 2004).

The total area to be disturbed is 2.5 ha, although the area within Cell 5 in which Cumberland Plain Woodland (potential habitat for *P. spicata*) occurs has been calculated as approximately 1.02 ha. Both the survey time (3.5 hours) and number of quadrats per unit area are more than sufficient to meet DECCW survey guidelines.

1.4 Area of Cumberland Plain Woodland (CPW)

An anomaly exists between the area of CPW identified by Biosis Research (2009) and that previously identified in the Commission of Inquiry (COI) report. Specifically, the COI states that 2.5 – 3 ha of CPW occurs in Cell 5, while the Biosis Research report identifies 1.02 ha of CPW in Cell 5. The area of CPW identified in the COI appears to be based on the area described in the earlier Environmental Impact Statement (EIS) for the broader Stage 2 landfill modification (NECS 2002).

The mapped area used to calculate the 2.5 – 3 ha in the EIS (NECS 2002) has been derived from the broad scale mapping of the Cumberland Plain (NSW National Parks and Wildlife Service 2000) that was available at that time and includes open grassy areas within Cell 5 along with other areas subject to inundation. While derived native grasslands are included as part of CPW under the NSW *Threatened Species Conservation Act* 1995, the areas of grassland/herbland/sedgeland within Cell 5 consist almost completely of exotic species which occur in dense swards that would inhibit regeneration of native species (Biosis Research 2009). On this basis, the extent of CPW in the study area is based on the mapped extent of the native canopy (Figure 1) derived from aerial photography and Geographic Information Systems (GIS). This is considered to provide a more accurate calculation of the extent of CPW present in the study area (approximately 1.02 ha).



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18-20 Mandible Street
Alexandria
NEW SOUTH WALES 2015

Figure1. Mapped extent of Cumberland Plain Woodland within Cell 5 based on native canopy

Date: 22/03/2010	Drawn by: JER
File number: 5848	Checked by: BJS
Location: P:\5000\5800s\5848\Mapping\S5848_F1_CPW_mapping.WOR	

Scale: 0 25 50 75 100 125 metres

N W E S

2 Potential Impacts on Eastern Creek

The Blacktown City Council submission requires further information in relation to hydrological and related ecological impacts associated with the relocation of the drainage line. The initial Biosis Research (2009) report was based on alignment of the ephemeral drainage line, discharging into sediment ponds within cleared areas adjacent to Eastern Creek, avoiding direct impacts upon Eastern Creek and associated riparian vegetation. The revised drainage alignment and discharge point includes the construction of a rock lined drainage channel which discharges approximately 60 m upslope of Eastern Creek. A revised assessment of impacts including the potential hydrological impacts on Eastern Creek is based on the updated concept design for the diversion channel and outlet (AECOM 2010).

2.1 Aquatic Ecology

Diversion of the ephemeral drainage line includes proposed discharges into Eastern Creek via a constructed channel with ponding structures, rock gabions and rock rip rap located to the north of the existing bridge crossing . It is proposed that a rip rap energy dissipator be constructed at the outlet of the stormwater diversion pipe and channel. The function of the energy dissipater is to disperse the discharge and reduce its velocity thereby protecting the downstream waterway and bridgeworks from potential erosion. The new drainage line outlet would discharge outside the Eastern Creek riparian zone, approximately 60 m upslope of the creek.

While the Biosis Research (2009) survey focused on the ephemeral drainage line, surveys did include habitat based assessment and water quality sampling within Eastern Creek as part of the survey. Database searches indicated threatened aquatic biota (such as threatened fish) listed under the *Fisheries Management Act* 1994 (FM Act) and/or *Environment Protection and Biodiversity Conservation Act* 1995 (EPBC Act) are known in the Hawkesbury-Nepean Catchment; however it was identified that no threatened aquatic species were likely to occur in the study area (Bionet Online Database). A recent (2010) search of the DPI Fisheries Database (pending public release) also identified that no threatened aquatic species were likely to occur in the study area. Furthermore, following habitat based assessment, aquatic habitats within Eastern Creek were considered to be in poor to fair condition. The potential for threatened aquatic biota to occur within the Eastern Creek portion of the study area is considered to be low.

Provided recommendations included within this addendum and the Biosis Research (2009) report are implemented including appropriate sediment and erosion controls (see Landcom 2004), monitoring and adaptive management, the potential impacts on the aquatic ecology of Eastern Creek should be mitigated.

2.2 Potential Impacts on Riparian Vegetation

Riparian vegetation within the study area is part of the Endangered Ecological Community (EEC), River Flat Eucalypt Forest on Coast Floodplains, as listed under

the TSC Act. No riparian vegetation along Eastern Creek will be removed as a result of the drainage re-alignment.

Predicted hydrological impacts (AECOM 2010) include minor changes in flow regimes within the study area along Eastern Creek. The results of the flood study (AECOM 2009) suggest that the diversion of the existing tributary does not have a significant impact on flood levels in Eastern Creek. Peak flows (e.g. following heavy rain events) are increased by approximately 7% for the 320 m section of Eastern Creek down steam of the proposed discharge point (AECOM 2009). The *Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands* is a Key Threatening Process (KTP) listed under the TSC Act.

On the basis of the above, impact assessment has been conducted to identify potential effects of the proposal on the EEC, River Flat Eucalypt Forest on Coastal Floodplains. Impact assessment in accordance with the draft guidelines for threatened species assessment under Part 3a of the EP&A Act (DEC & DPI 2005) is provided in Appendix 1 of this Addendum.

Based on the results of impact assessment, the proposal is considered unlikely to reduce the long-term viability of, accelerate the extinction of and/or adversely affect critical habitat in relation to the occurrence of this EEC within the study area. The Part 3A assessment guidelines (DEC & DPI 2005) set out a number of key thresholds which need to be addressed to justify the impacts of the proposal on threatened species, populations and ecological communities.

The key thresholds include the requirement to compensate for unavoidable impacts in order to maintain or improve biodiversity values. In order to maintain or improve biodiversity values within the study area, it is recommended that offset calculation includes provisions for the potential indirect impacts on native vegetation downstream of the drainage discharge point.

3 Conclusion and Recommendations

Area of Cumberland Plain Woodland

Based on the current extent of intact native canopy, the area of CPW to be removed by the proposal is approximately 1.02 ha (Biosis Research 2009). However, based on previous assessment of the site including a Commission of Inquiry, approximately 2.5 - 3.0 ha of CPW was present on site including open grassy areas. On this basis, WSN Environmental Solutions has agreed to apply offset calculation based on the removal of 3 ha, however, that the poor condition of the CPW also be considered in the offset requirements.

The potential indirect impacts on this plant community such as increased weed invasion will be mitigated with the implementation of restoration actions within the study area. WSN Environmental Solutions are currently committed to restoration and revegetation of Eastern Creek including within the study area as part of existing landscape rehabilitation plans. To date, extensive areas of noxious and environmental weeds have been removed and controlled from within the Eastern Creek riparian zone.

Appendix 1

Impact Assessment - River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (RFEF) is listed as an Endangered Ecological Community in Part 3 of Schedule 1 of the TSC Act.

According to Biosis Research (2009) RFEF occurs along the extreme south-western boundary of the study area along the alignment of Eastern Creek. There is a complete, continuous canopy of *Casuarina glauca*, with occasional *Eucalyptus tereticornis* emergents.

The height of the trees varies from 12 to 20 m, and FPC varies from 20 to 40%. There are few mature or over-mature specimens of *Casuarina glauca*, indicating that most of the vegetation along this section of Eastern Creek is regrowth. Native mid-storey species are uncommon and include *Bursaria spinosa* and *Melaleuca styphelioides. Clematis aristata* is an occasionally occurring native climber and small clumps of *Adiantum aethiopicum* are rare occurrences on sections of the creek-bank. There are clumps of *Phragmites australis* and *Typha orientalis* in the creekline as well as in drainage lines between the sedimentation control pond and Eastern Creek. Common exotic shrub species include *Lycium ferocissimum*, *Rubus fruticosus* sens. lat. and *Lantana camara*. *Tradescantia fluminensis* was common in the ground layer, and often dominant on the eroded stream banks. The main groundcover species recorded in the grassland adjoining the riparian zone were the exotic pasture grasses *Lolium perenne, Avena fatua* and the cosmopolitan *Cynodon dactylon.*

The proposal includes the diversion of the existing ephemeral drainage line to a rock-lined channel that discharges approximately 60 m upslope of Eastern Creek. The channel will be designed to match the existing landform at the discharge point.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

N/A – RFEF is an endangered ecological community.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

NPWS (2002) mapped approximately 338 ha of Alluvial Woodland within the locality (5 km radius of the study area). Alluvial Woodland includes RFEF and another EEC, Swamp Oak Floodplain Forest. The NPWS mapping is based on 1998 aerial photographs, however there has been extensive industrial land development in the Eastern Creek area since this time and the total area of Alluvial Woodland in the locality could be smaller. The mapping shows Alluvial Woodland as occurring in thin strips and fragmented patches adjoining creeklines in the region.

The proposal will not result in the removal of any areas of RFEF. However, alterations in hydrological regimes may result from the proposal and could affect the

habitat of the RFEF adjoining the study area. Hydrological modelling by AECOM (2009) found that the tributary diversion would increase peak flows by approximately 7% for the 320 m section of Eastern Creek between the creek crossing at the proposed discharge point and the original tributary outfall.

Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands is listed as a key threatening process (KTP) under the TSC Act. Impacts associated with this KTP which are relevant to the proposal include:

- Riparian zone degradation through altered flow patterns - changes in flow patterns can lead to bank erosion, reduced nutrient filtering capacity and changes to stream behaviour.
- Increased habitat for invasive species - The creation of deeper, more permanent and disturbed habitat may permit the establishment and spread of exotic aquatic flora and fauna species that may displace native species. According to the KTP, the disturbance of riparian zones by changes in water regime may permit establishment and spread of weeds, for example Willows (*Salix* spp.), Blackberry (*Rubus fruticosus* complex) and Broad Leaved Privet (*Ligustrum lucidum*).

Potential impacts of the proposal on the RFEF in the study area are associated with the estimated small increase in peak flows. This minor increase in flows could potentially result in a subsequent increase in weed propagules introduced into the area during peak flood events. However given the current dominance of weeds, particularly *Tradescantia fluminensis,* in the understorey of the riparian vegetation, this proposal is unlikely to significantly alter the existing composition of the RFEF in the study area by introducing or increasing the spread of weeds.

There is already considerable erosion and degradation of the banks of Eastern Creek. The discharge point of the diversion channel is approximately 60 m upslope of the top of the creek bank, so there are unlikely to be any further increases in bank erosion as a result of the proposal.

The potential indirect impacts on this plant community such as increased weed invasion will be mitigated with the implementation of restoration actions within the study area. WSN Environmental Solutions are currently committed to restoration and revegetation of Eastern Creek including within the study area as part of existing landscape rehabilitation plans. To date, extensive areas of noxious and environmental weeds have been removed and controlled from within the Eastern Creek riparian zone.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

N/A

How is the proposal likely to affect current disturbance regimes?

The study area is highly modified, with a long history of grazing and intensive industrial development in the past decade. Natural disturbance regimes such as fire are

no longer likely to influence the extent or functioning of the RFEF within the study area.

Current disturbance regimes affecting RFEF in the study area are largely related to the existing waste management facility and other development nearby. The proposal is unlikely to increase the intensity of this disturbance

The hydrology of the study area and surrounds has been highly modified over the previous decade. The ephemeral drainage line running from east to west through the Study Area has been disturbed and narrowed and is now to be managed with a detention basin and high flow channel discharging to the grassed area upslope of Eastern Creek.

The proposal will slightly modify flooding flows, with approximately a 7% increase in peak flows expected in the for the 320 m section of Eastern Creek between the creek crossing at the proposed discharge point and the original tributary outfall (AECOM 2009). The increase in flows downstream of the original tributary outfall is likely to be negligible.

It is considered unlikely that the small increases in peak flows (e.g. following heavy rain events) will significantly impact the degraded RFEF adjoining Eastern Creek.

How is the proposal likely to affect habitat connectivity?

The RFEF in the study area occurs along Eastern Creek. This riparian vegetation has a highly degraded ground layer, but retains a continuous tree canopy in the area to the west of the proposal. This tree canopy will not be disturbed by the proposal and it is considered unlikely to affect habitat connectivity. The EEC is currently impacted by edge effects; these are unlikely to be exacerbated by the proposal.

How is the proposal likely to affect critical habitat?

Under the TSC Act, the Director-General of Department of Environment and Climate Change maintains a Register of Critical Habitat. To date, no critical habitat has been declared for RFEF.

Conclusion:

The impact of the proposed upgrade on RFEF is likely to be minor as:

- The RFEF within the study area is already subject to significant impacts, with severe weed infestation in the understorey.

- The proposal will result in minor increases in peak flows, however these are considered unlikely to have an significant impact on the degraded RFEF in the study area.

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Flora, Fauna and Aquatic Impact Assessment: Cell 5 – Northern Extension Landfill EC Stage 2

June 2009

Natural & Cultural Heritage Consultants 18-20 Mandible St, Alexandria NSW 2015

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RESEARCH

Report for

National Environmental Consulting Services

Flora, Fauna and Aquatic Impact Assessment: Cell 5 Northern Extension Landfill EC Stage 2

June 2009

Gary Leonard
Melissa Starling
Timothy Martin

Project no: s5219

Ballarat:
449 Doveton Street North, Ballarat VIC 3354
Ph: (03) 5331 7000 Fax: (03) 5331 7033
email: ballarat@biosisresearch.com.au

Melbourne:
38 Bertie Street, Port Melbourne VIC 3207
Ph: (03) 9646 9499 Fax: (03) 9646 9242
email: melbourne@biosisresearch.com.au

Queanbeyan:
55 Lorn Road, Queanbeyan NSW 2620
Ph: (02) 6284 4633 Fax: (02) 6284 4699
email: queanbeyan@biosisresearch.com.au

Sydney:
18-20 Mandible Street, Alexandria NSW 2015
Ph: (02) 9690 2777 Fax: (02) 9690 2577
email: sydney@biosisresearch.com.au

Wollongong:
8 Tate Street, Wollongong NSW 2500
Ph: (02) 4229 5222 Fax: (02) 4229 5500
email: wollongong@biosisresearch.com.au

***BIOSIS** RESEARCH Pty. Ltd. A.C.N. 006 075 197*
Natural & Cultural Heritage Consultants

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- Sue Just (NECS)
- Paul Newcombe (WSN Environmental Solutions)
- Robert Suansri (GIS Operator, Biosis Research)
- Rhidian Harrington (Senior Ecologist/Manager, Biosis Research)
- Brendan Smith (Senior Botanist, Biosis Research)

ABBREVIATIONS

ANZECC	Australian and New Zealand Environment Conservation Council
CEEC	Critically endangered ecological community
CPW	Cumberland Plain Woodland
DBH	Diameter at breast height
DECC	NSW Department of Environment and Climate Change, (formerly NSW Department of Environment and Conservation, DEC)
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
DO	Dissolved Oxygen
DPI	Department of Planning and Infrastructure
ECWR	Eastern Creek Waste and Recycling
EP&A Act	NSW *Environmental Planning and Assessment Act* 1979
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
FM Act	*Fisheries Management Act* 1994
FPC	Foliage Projective Cover
LGA	Local Government Area
NECS	National Environmental Consulting Service
NPWS	NSW National Parks and Wildlife Service (now part of DECC)
NTU	Turbidity units
RCE	Riparian, Catchment and Environment Scores
RFI Act	*Rivers and Foreshores Improvement Act 1948*

ROTAP	Rare or Threatened Australian Plant as listed by Briggs and Leigh (1995)
Sens. lat.	*Sensu lato* – in the broader circumscription
SEPP	NSW State Environmental Planning Policy
TSC Act	NSW *Threatened Species Conservation Act* 1995
sp.	Species (singular)
spp.	Species (plural)
subsp.	Subspecies
var.	Variety
WM Act	*Water Management Act 2000*

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1.0 SUMMARY

Biosis Research Pty. Ltd. was commissioned by National Environmental Consulting Services to conduct a terrestrial flora, fauna and aquatic assessment for the proposed clearing of a woodland community and realignment of a drainage line in order to increase the yearly inflow capacity of Eastern Creek Waste and Recycling Centre. This assessment has been carried out for approval under Part 3A of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) with reference to threatened biota listed on the NSW *Threatened Species Conservation Act* 1995 (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

Stands of woodland on the site have previously been mapped as Shale Plains Woodland and Shale Hills Woodland (see NPWS 2004). During this survey the remaining stands of native woodland were considered to contain components of Shale Plains Woodland, which may also be described as Cumberland Plain Woodland, an Endangered Ecological Community (EEC) listed on the TSC Act and recently proposed as a Critically Endangered Ecological Community (CEEC)

The Proposal would involve clearing or modifying approximately 1.02 ha of Shale Plains Woodland.

Native vegetation which complies with the description of the EEC Cumberland Plain Woodland, listed on the TSC and EPBC Acts, was recorded in the study area. No threatened plant species were recorded within the study area. However, potential habitat for five threatened species (*Pimelea spicata, Grevillea juniperina* subsp. *juniperina, Hypsela sessiliflora, Acacia pubescens* and *Cynanchum elegans*) and one threatened population (*Marsdenia viridiflora* subsp. *viridiflora*) occurs within the study area.

The proposal is likely to remove or modify potential habitat for nine threatened animal species listed on the TSC Act (Greater Broad-nosed Bat, Eastern False Pipistrelle, Eastern Bentwing Bat, Eastern Freetail-bat, Large-footed Myotis, Cumberland Land Snail, Grey-headed Flying-fox, Regent Honeyeater, and Swift Parrot) and four threatened species (Grey-headed Flying Fox, Regent Honeyeater, Swift Parrot and White-bellied Sea-eagle) listed on the EPBC Act.

Impact Assessments following the Part 3A Guidelines under the EP&A Act were carried out for the threatened biota listed on the TSC Act occurring or with potential habitat in the study area. These assessments concluded that the proposal would have a minor impact (in the context of the relative size and condition of the vegetation patch, compared to the area and condition of native vegetation in the region), given that a relatively small area of potential habitat would be

impacted and no individuals of any of the threatened species were recorded during surveys of the study area.

Impact assessments following the EPBC Act Significant Impact Guidelines have been prepared for threatened biota listed under the EPBC Act with potential habitat in the study area. These assessments found that the Proposal is not likely to have a significant impact on threatened species, endangered ecological communities or their habitats, as listed on the EPBC Act. However, it is recommended that consideration be given to preparation of a Referral for Matters of National Significance based on the fact that 1.02 ha of Cumberland Plain Woodland is to be removed.

The following mitigation measures are proposed to ameliorate any disturbances of the proposal on the ecological values of the study area:

- All native trees requiring removal should be chipped and used as mulch on revegetation areas. Sections of branches or trunks containing hollows should be sawn into useable sections and laid over the finished surfaces in revegetation areas, to provide habitat. Large woody debris should be installed into the newly created drainage line to enhance and replicate the existing available instream aquatic habitat;

- Revegetation of approved offset areas should ideally be commenced prior to clearing of the native vegetation in Cell 5;

- A suitably qualified ecologist should be on site during clearing to ensure no resident fauna are harmed;

- Best practice sediment and erosion control measures should be implemented on all sites to prevent erosion during and after construction;

- Any chemicals used on site should be taken off site after use and disposed of appropriately;

- During any instream and near stream works; such as excavation, drainage line removal or casting, water quality should be protected by a sedimentation and erosion control plan. This should include suitably designed and maintained sediment and turbidity controls, such as silt curtains surrounding the Cell 5 construction site (proposed), sedimentation fencing and sediment basins, run-off controls and geotextile fabric sand bags. The protection measures should be designed to cope with greater than average rainfall and/or flow events and must be regularly inspected and maintained throughout the construction and rehabilitation phase;

- The modified drainage line pools currently existing on the Cell 5 site should be redesigned and re-established post-development on adjacent land directly

north of the proposed modified drainage line, preferably adjacent to the current workshop/plant/amenity area. This should aim to develop a pseudo-natural water course and riparian area while protecting against extreme flows. This could include habitat features such as pools and riffle and the replanting of macrophytes and riparian vegetation. The areas could also be designed and managed to support riparian birds, frogs and other aquatic fauna;

- A detailed spill and contamination plan should be prepared to protect the environmental values of the modified drainage line and Eastern Creek. The plan should contain emergency and remediation measures;
- Water quality in the modified drainage line, Eastern Creek (in the vicinity of the drainage inlet), and Eastern Creek upstream and downstream of the proposed drainage modification should be monitored to manage potential impacts upon aquatic systems;
- Damaged riparian areas downstream of Cell 5 should be rehabilitated with local native plant species as part of the rehabilitation of the site in accordance with the site Landscape Rehabilitation Plan;
- A program to monitor the potential impact on aquatic ecosystems throughout the project is recommended. The program could include physio-chemical water quality monitoring and biotic monitoring such as AUSRIVAS macro-invertebrate sampling, as well as of macrophytes before, during and after the construction;
- Any development undertaken on the Cell 5 site shuld include measures to prevent and qualitatively assess the permeation of leachate from past, current, and future underground landfill cells surrounding the site, according to best practice;
- A suitably qualified aquatic ecologist should be on site during the initial site setup phase of the drainage line redevelopment, to ensure key habitat features and species are not adversely impacted by the proposal; and,
- Appropriately designed culverts should be installed under each intersecting roadway along the proposed redeveloped drainage line to enhance drainage transferrance and reduce flow impediment.

2.0 INTRODUCTION

Biosis Research Pty. Ltd. (Biosis Research) was commissioned by National Environmental Consulting Services (NECS) to conduct a terrestrial flora and fauna and aquatic assessment for the clearing of approximately 1.02 ha of woodland and the realignment of a drainage line as part of a proposal to increase the yearly inflow capacity of the Eastern Creek Waste and Recycling Centre.

This assessment has been carried out for determination under Part 3A of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act), with reference to threatened biota listed on the NSW *Threatened Species Conservation Act* 1995 (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

2.1 Aims

The specific aims of this assessment are to:

1. conduct a literature review and database search for the locality;
2. undertake targeted field surveys for habitat of threatened terrestrial flora and fauna species, populations or ecological communities that are listed on the TSC Act and the EPBC Act and have been identified as potentially occurring in the locality;
3. provide an assessment of the habitat values of the site;
4. undertake impact assessments for threatened biota listed on the TSC and/or EPBC Acts following the guidelines for threatened species assessment under Part 3A of the EP&A Act (DEC & DPI 2005) and the EPBC Act Significant Impact Guidelines (DEH 2006); and,
5. provide recommendations to minimise the environmental impacts of the proposal.

2.2 Definitions

The following terms are used frequently throughout the report:

- ***Proposal*** is the development, activity or action proposed. In this case the proposal is the removal of a stand of Cumberland Plain Woodland and the realignment of the existing drainage line.
- ***Subject site*** is defined in *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC 2004b) and means the area directly affected by the proposal. In this case, the subject site consists of Cell 5 and the area around the existing sedimentation control pond.

- ***Study area*** is defined in DECC (2004b) as the subject site and any additional areas that are likely to be affected by the proposal, either directly or indirectly.
- ***Subject species*** means those threatened species that are known or considered likely to occur within the study area.
- ***Affected subject species*** means subject species that are likely to be impacted (affected) by the proposal.
- ***Abundance*** means a quantification of the population of the species or community.
- ***Regional*** means the area defined within the applicable IBRA Bioregion (Thackway and Cresswell 1995), i.e., The Sydney Basin Bioregion.
- ***Local population*** is defined in DECC (2004b) as the population of a species within the study area.
- ***Local occurrence*** is used in reference to endangered ecological communities and is defined in (Thackway and Cresswell 1995) as the community that occurs within the study area.
- ***Locality*** is the area within a 5 km radius of the study area.
- ***Threatened biota*** refers to threatened species, populations and ecological communities as listed on the TSC and EPBC Acts.

2.3 The Proposal

WSN Environmental Solutions are proposing to remove 1.02 ha of woodland and realign a drainage line at the Eastern Creek Landfill site to enable the site to accommodate a greater annual inflow of waste. The Proposal comprises the removal of the remaining woodland between two existing landfill cells and the diversion of the drainage line to create a new landfill cell.

The diverted drainage channel has been designed by WSN Environmental Solutions and final rehabilitation will incorporate meander and pool riffle systems along with planted reed beds to dissipate hydraulic energy. The banks of the new drainage channel will be seeded with a stabilising crop at completion and planted with local native species.

2.3.1 Potential Impacts of the Proposal

The disturbance footprint is made up of three areas, one approximately 100 m x 130 m on the western side and one approximately 70 m x 70 m east of that. These two footprints are separated by an access track and are referred to as Cell 5. The third disturbance footprint is located to the south-west of Cell 5, and consists of the existing Sedimentation Control Pond and its surrounds.

Direct impacts that may apply to this proposal and will therefore be considered in this assessment include:

- vegetation clearance;
- the removal of potential habitat; and,
- the fragmentation of potential habitat;

Indirect impacts that may apply to this proposal include:

- Varied noise, dust and odour emissions; and,
- Increased truck movements over a longer period.

2.4 The study area

The study area is located on the Blacktown Local Government Area (LGA) boundary, within the Eastern Creek Waste and Recycling Centre (ECWRC; Figure 1). The ECWRC is located to the west of Prospect Reservoir and to the east of Eastern Creek. The study area relates to the proposed Stage 2 of a series of landfill sites and currently consists of a section of disturbed native woodland in an area described as Cell 5. Cell 5 is located between Cell 4 and Cell 6 which have been excavated and are being filled (Figure 2).

A drainage line flows through Cell 5 towards Eastern Creek. This drainage line extends westwards from the Western Sydney International Dragway, under Ferrers Road. The drainage line flows beneath an access road into a grassed area and Sedimentation Control Pond 2. This area to the south-west of Cell 5 is also included as part of the study area.

Vegetation mapping of the site (NPWS 2002) indicates the occurrence of two forms of Cumberland Plain Woodland (Shale Plains Woodland and Shale Hills Woodland), although it is apparent that the mapped stands of native vegetation have since undergone some modification, with only one canopy species now occurring within Cell 5 and a ground-cover that mainly consists of introduced grass and forb species.

2.4.1 Geology, Soils and Topography

Large-scale mapping of Soil Landscape Groups by Hazelton, Bannerman and Tille (1989) indicate the occurrence of soils derived from the Blacktown Group throughout Cell 5, grading to soils derived from the South Creek Group along Eastern Creek.

Soils of the Blacktown Group mainly consist of Wainamatta Shales and soils of the South Creek Group consist of Quaternary alluvium derived from Wainamatta Shales and Hawkesbury Sandstone (Bannerman and Hazelton 1989).

The topography of the site is level to very gently sloping. A drainage line flows westwards through the site towards Eastern Creek. The creek banks are mostly eroded and sparsely vegetated. The drainage line flows beneath Ferrers Road into Cell 5, then through a culvert at the western end of Cell 5 into a grassed area and Sedimentation Control Pond, before flowing into Eastern Creek.

All boundaries of Cell 5 are raised bunds, either for roadways or for landfill bunds.

2.4.2 Climate

Climatic conditions within the study area vary with a mean annual maximum temperature of 23.0^{o}C and a mean annual minimum of 12.2 ^{o}C, with an annual rainfall of 871.3 mm (BOM Website http://www.bom.gov.au/).

2.5 Planning Approvals

The proposal has been included as a Major Project under Part 3A of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) and State Environmental Planning Policy (Major Projects) 2005.

The EP&A Act was amended in June 2005 to reform the land-use planning and development assessment and approval system, particularly as it relates to major infrastructure and other significant development. In the new Part 3A, the Act provides a single assessment and approval regime for all major infrastructure and other projects previously undertaken under Part 4 and/or Division 4 of Part 5 of the EP&A Act. The new Part applies to major State government infrastructure projects, development that was previously classified as State significant development and other projects, plans or programs declared by the Minister for Planning.

Provisions have been made in the amended Act for:

- Independent Hearings and Panel Assessments to strengthen the assessment process;
- Concept plans for complex projects, plans or programs so that the overall provisions can be evaluated prior to consideration of the details of the project(s). This provides for matters such as the suitability of the site/route and environmental issues to be resolved up-front and provides for the simplification of subsequent approvals where environmental impacts can be avoided or minimised; and,

- The Minister to declare projects to be 'critical infrastructure projects'. Prior to making such a declaration, a preliminary risk assessment will be required to consider the financial, economic, social and environmental risks of declaring the project a critical infrastructure project. These projects only require a concept approval and there are no appeal rights except if initiated by the Minister.

3.0 METHODS

3.1 Legislation

Federal and State Acts and Policies that may apply to the study area, with respect to terrestrial and aquatic flora and fauna conservation, are listed below:

Commonwealth

- *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act) - Matters of National Environmental Significance (Land & Water 2000), including nationally threatened species and Endangered Ecological Communities (EECs);

NSW

- *Environmental Planning and Assessment Act* 1979 (EPA Act) – the primary planning law in NSW;
- *Threatened Species Conservation Act 1995* (TSC Act) - threatened species, populations and ecological communities listed in NSW;
- *The Fisheries Management Act* 1994 (FM Act) - threatened species, populations and EECs and approval process for instream works and developments, such as dredging and blocking of fish passage;
- *Rivers and Foreshores Improvement Act* 1948 (RFI Act)- recently repealed and replaced by the *Water Management Act* 2000 (WM Act) - instream and near waterway development;
- *Local Government Act 1993* (LG Act) - provides the legal framework for the operation of local government in New South Wales, including amongst other things the establishment of Local Environmental Plans (LEPs); and,

- State Environmental Planning Policy (SEPP) 19 – Urban Bushland and SEPP 55 – Remediation of Lands.

3.2 Taxonomy

The plant taxonomy (method of classification) used in this report follows Harden (1992, 1993, 2000, 2002) and subsequent advice from the National Herbarium of NSW. In the body of this report plants are referred to by their scientific names only. Common names where available have been included in the Appendices.

Names of vertebrates follow the Census of Australian Vertebrates (CAVs) maintained by Department of the Environment, Water, Heritage and the Arts (DEWHA). In the body of this report vertebrates are referred to by both their

common and scientific names when first mentioned. Subsequent references to these species cite the common name only. Common and scientific names are included in the Appendices.

3.3 Literature and Database Review

A list of documents used to prepare this report is located in *References*. Records of threatened species, populations and communities were obtained from the NSW Department of Environment and Climate Change (DECC) *Atlas of NSW Wildlife* within a 10 km radius of the study area. Records of fish species for the Blacktown LGA, including threatened fish listed on the FM and EPBC Acts were obtained from the NSW Bionet online database.

Potential occurrences of threatened species, populations and communities listed on the EPBC Act were obtained from the DEWHA *EPBC Online Database* within a 10 km radius of the study area. Database searches were conducted in October 2008.

3.4 Field Survey

The study area was surveyed by a botanist (Gary Leonard), zoologist (Melissa Starling), and aquatic ecologist (Timothy Martin) on 20th October 2008. Conditions during the field survey were warm and partially cloudy (24.2°C max) with no rain recorded during the 72 hr period prior to the sampling day (Bureau of Meteorology, Canberra).

The study area included the Cell 5 dam site, Cell 5 vegetation, surrounding drainage line vegetation, area surrounding the Cell 5 perimeter, the existing Sedimentation Control Pond and adjacent areas, as well as upstream and downstream of Eastern Creek (see Figure 2).

3.4.1 Flora

All vegetation stands in Cell 5, as well as adjacent vegetation stands were surveyed during the botanical survey. The Random Meander method, as outlined by Cropper (1993) was used to determine the extent and location of stands of native vegetation, as well as to compile a representative list of plant species and to carry out targeted searches for plant species of conservation significance. Three 20 x 20 m quadrats were also described, in order to establish a detailed assessment of the frequency of occurrence and densities of the commonly occurring ground-cover, mid-storey and canopy species.

A compiled plant species list for the study area was entered into the NSW Flora Information System (Viridians 2003) and is included in Appendix 1 The table

indicates the frequency of occurrence of each species in the eastern and western portions of Cell 5, as well as in the area adjacent to the existing sedimentation pond .

3.4.2 Vegetation Condition Assessment

Vegetation condition was assessed according to the degree to which it resembled relatively natural, undisturbed vegetation. Vegetation was assessed as being in Good, Moderate or Poor condition or Disturbed according to the following criteria:

- **species composition** (species richness, degree of weed invasion);
- **vegetation structure** (representation of each of the original layers of vegetation); and,
- **resilience** (This is the capacity of a site for natural regeneration. This is primarily linked to the degree to which the natural soil profile of the area has been disturbed).

The categories of vegetation conditions are as follows:

Good: containing a high number of indigenous species; no weeds present or weed invasion restricted to edges and track margins; vegetation community contains original layers of vegetation; vegetation layers (ground, shrub, canopy etc.) are intact, or if modified, natural soil profile remains intact;

Moderate: containing a moderate number of indigenous species; moderate level of weed invasion; weeds occurring in isolated patches or scattered throughout; one or more of original layers of vegetation are modified; vegetation layers (ground, shrub, canopy etc.) are largely intact, or if modified, natural soil profile remains intact; able to be regenerated to Good condition with minimal level of management;

Poor: containing a low number of indigenous species; high level of weed invasion; weeds occurring in dense patches or scattered throughout; one or more of the original layers of vegetation are highly modified; one or more original vegetation layers (ground, shrub, canopy etc.) are modified or missing, but natural soil profile intact; able to be regenerated to Moderate or Good condition with substantial management; and,

Disturbed: highly modified landscape containing few or no indigenous species; exotic species dominant; original native vegetation layers removed; natural soil profile disturbed; unable to be regenerated to natural condition; requires a high input of resources to achieve restoration goals.

3.4.3 Fauna

The fauna survey was undertaken as a habitat-based assessment. Fauna species using the site were surveyed by undertaking active searching and listening, as well as recording incidental observations.

3.4.4 Fauna Habitat Assessment

The site assessment was primarily a habitat assessment; active searching or trapping for animal species was not undertaken during this assessment. The habitat assessment was based on the presence of one or more of the following features:

- vegetation cover;
- size range and abundance of tree hollows;
- rock outcrops, overhangs or crevices;
- freestanding water bodies, ephemeral drainage or seepage areas;
- disturbances including weed invasion, clearing, rubbish dumping or fire;
- connectivity to off site habitats; and,
- surrounding habitat.

The following three categories were used to evaluate habitat value:

Good: ground flora containing a high number of indigenous species; vegetation community structure, ground, log and litter layer intact and undisturbed; a high level of breeding, nesting, feeding and roosting resources available; a high richness and diversity of native fauna species.

Moderate: ground flora containing a moderate number of indigenous species; vegetation community structure, ground log and litter layer moderately intact and undisturbed; a moderate level of breeding, nesting, feeding and roosting resources available; a moderate richness and diversity of native fauna species.

Poor: ground flora containing a low number of indigenous species, vegetation community structure, ground log and litter layer disturbed and modified; a low level of breeding, nesting, feeding and roosting resources available; a low richness and diversity of native fauna species.

Other habitat features, such the value of the study area as a habitat corridor, the presence of remnant communities or unusual ecological vegetation community structure, were also used to assess habitat quality.

3.5 Aquatic Survey

The aquatic survey consisted of visual habitat assessments, and brief water quality assessments at four sites within the study area (See plates 1 to 6). Aquatic assessments were undertaken at two sites located within the WSN Eastern Creek Stage 2, Cell 5 study site across two major pools. Two further sites assessed were located within Eastern Creek: approximately 100 m west and 200 m downstream of the drainage line and the proposed redevelopment Cell 5 site, and approximately 200 m upstream of the site within Eastern Creek (see Figure 2). By design this investigation was a brief assessment, therefore, fish and macroinvertebrate sampling was not undertaken during this survey.

3.5.1 Aquatic Stream Assessment

The aquatic stream assessments were undertaken visually, with each survey site defined according to the RCE (Riparian, Channel and Environment) Inventory Scoring system (after Chessman *et al.* 1997). The RCE Inventory provides a comparative measure of stream condition by assessing both the stream and riparian environment in terms of habitat diversity, habitat condition and the degree of human induced disturbance. Thirteen categories are scored between 1 and 4 in terms of their condition, giving a range of scores between 4 and 52. Sites with scores of 20 or less are considered to be in poor condition and scores above 40 indicate good condition.

3.5.2 Water Quality Assessment

Basic physiochemical water quality measurements were taken at each site using a TPS 90FLT Water Probe. The parameters measured included:

- pH;
- Dissolved oxygen (mg/l);
- Temperature (^{o}C);
- Conductivity (µs/cm); and
- Turbidity.

3.6 Limitations

This study was by design a brief habitat assessment, and therefore did not include trapping, electrofishing, macroinvertebrate sampling, spotlighting, active searching, or call playback techniques.

Some plant species that occur in the locality are annuals (completing their life cycle within a single season) and are present only in the seed bank for much of the year. Other plant species are perennial but are inconspicuous unless flowering. However, as the assessment of impact is based on the presence or absence of suitable habitat for threatened flora and fauna (which is adequate to satisfy the requirements of the EP&A Act), such species are taken into account during the assessment even though they may not have been conspicuous during the survey.

4.0 RESULTS

Lists of the plant and animal species recorded during the survey are provided in Appendix 1 and 2 respectively.

4.1 Soil

The soil landscapes of the study area are mapped at a 1:100 000 scale as Blacktown (map unit bt), with South Creek (map unit sc) along the western boundary in the vicinity of Eastern Creek. Soils of the Blacktown Soil Landscape Group are described as occurring on "…..gently undulating rises on Wianamatta Group shales" (Bannerman & Hazelton 1990). Soils of the South Creek Soil Landscape Group are described as occurring on "…….floodplains, valley flats and drainage depressions of the channels on the Cumberland Plain" (Bannerman & Hazelton 1990).

4.2 Plant Communities

Large-scale mapping by NSW National Parks and Wildlife Service (NPWS 2002) indicates the occurrence of stands of Cumberland Plain Woodland within the study area, and a narrow band of Sydney Coastal River-flat Forest Alluvial Woodland following Eastern Creek. More detailed mapping of the Cumberland Plain (see DEC 2004) divides the stands of Cumberland Plain Woodland (CPW) into Shale Plains Woodland at the western end of the study area, and Shale Hills Woodland at the eastern end (see Figure 3). Both Shale Plains Woodland and Shale Hills Woodland are listed as forms of Cumberland Plain Woodland in the Determination of CPW as an EEC under Schedule 3 of the TSC Act. Moreover, Sydney Coastal River-flat Forest has recently been re-listed as River-flat Eucalypt Forest.

Cumberland Plain Woodland is also listed as an EEC under the EPBC Act and has also been proposed as a Critically Endangered Ecological Community on Part 2 of Schedule 1A of the TSC Act..

Brief descriptions of the vegetation stands are included below:

Woodland (Cumberland Plain Woodland)

There are several narrow bands of continuous Woodland within Cell 5, although in all cases there is a ground-cover of mostly exotic species, and where a mid-storey does occur, it mainly consists of exotic shrub species, especially *Sida rhombifolia* and *Lycium ferocissimum*. The floristics of the Woodland canopy is monotypic throughout Cell 5, with *Eucalyptus tereticornis* being the sole representative. The larger mature trees are at least 80 years old and are generally 24 m in height, with canopy spreads of 8 m or more and Foliage Projective

Canopy (FPC) of <20%. There are also eucalypt seedlings, (possibly including some *Eucalyptus moluccana*)varying in age from two to five years old, and numbers of juvenile and established trees of ages varying from five to 25 years.

Approximately half of the ground-cover species recorded in the woodland vegetation are exotic, although in terms of biomass, the exotic species are dominant. Common exotic species include *Lolium perenne*, *Paspalum dilatatum, Pennisetum clandestinum* and *Ehrharta erecta.* The most commonly occurring rush in the drainage line is the exotic *Juncus acutus.* Occasional native species include *Microlaena stipoides* var. *stipoides, Dichondra repens* and *Centella asiatica.*

The woodland recorded within the study area is consistent with the description of the EEC Cumberland Plain Woodland according to the Final Determination (NPWS 1997a): The vegetation stand occurs on Wianamatta Shale and includes 24 of the listed characteristic species (although in very small numbers).

The Cumberland Plain Woodland within the study area was considered to be in Moderate condition, (in terms of the canopy) but Poor, in terms of the mid-storey and ground-cover, as a result of previous disturbance, weed invasions and over-use by the large Ibis population.

There are also extensive stands of grassland/herbland/sedgeland within large sections of Cell 5, as well as around the existing sedimentation management pond. As these swards mainly consist of exotic species they are not considered in this report. A proposal to include grassland containing a representative suite of native grass and forb species into the description of CPW has been made in the Proposal to list CPW as a CEEC. The areas of grassland/herbland/sedgeland within Cell 5 and adjacent to the existing sedimentation management pond consist almost completely of exotic species and occur in dense swards that would inhibit regeneration of native species.

Riparian Forest (River-flat Eucalypt Forest)

The woodland vegetation along the extreme south-western boundary of the study area follows the alignment of Eastern Creek. There is a complete, continuous canopy of *Casuarina glauca*, with occasional *Eucalyptus tereticornis* emergents.

The height of the trees varies from 12 to 20 m, and FPC varies from 20 to 40%. There are few mature or over-mature specimens of *Casuarina glauca*, indicating that most of the vegetation along this section of Eastern Creek is regrowth. Native mid-storey species are uncommon and include *Bursaria spinosa* and *Melaleuca styphelioides. Clematis aristata* is an occasionally occurring native climber and small clumps of *Adiantum aethiopicum* are rare occurrences on sections of the creek-bank. There are clumps of *Phragmites australis* and *Typha orientalis* in the creekline as well as in drainage lines between the sedimentation

control pond and Eastern Creek. Common exotic shrub species include *Lycium ferocissimum*, *Rubus fruticosus* sens. lat. and *Lantana camara*. *Tradescantia fluminensis* is a common exotic ground-cover species.

The structure and canopy floristics of the Riparian Forest within the study area is more consistent with the EEC River-flat Eucalypt Forest according to the Final Determination (NPWS 2004), further to the north of the study area, where the Eucalyptus canopy is more complete. It is apparent that the stand of *Casuarina glauca* in the study area is an artefact of early succession after initial disturbance, and it is possible that there will eventually be a greater representation of Eucalypts within the canopy. It is therefore reasonable to describe the stand of riparian vegetation in the Study area as regrowth River-flat Eucalypt Forest.

4.3 Flora

A total of 113 plant species were recorded in the study area, including 57 (51%) native species and 56 (49%) exotic species. Of the exotic species recorded, nine species are listed as Noxious for Blacktown LGA. These are: *Cortaderia selloana, Echium plantagineum, Lantana camara, Lycium ferocissimum, Oxalis perennans, Ambrosia artemisiifolia, Rubus fruticosus* sens. lat., *Xanthium occidentale* and *Asparagus asparagoides* (syn. *aethiopicus*)

A list of plant species recorded in the study area as well as details relating to the three quadrats are provided in Appendix 1.

4.3.1 Threatened Flora

A total of 15 threatened plant species listed on the TSC Act and/or the EPBC Act have been previously recorded within 10 km of the study site, of which potential habitat for six species occurs in the study area. Records from the Biosis Research Threatened Flora Database have also been included from previous work in the locality. The distribution of threatened plants derived from DECC Atlas of NSW Wildlife and the Biosis Research Threatened Flora Database are illustrated in Figure 4.

No threatened plant species were recorded within the study area. However, potential habitat exists within the study area for *Pimelea spicata, Marsdenia viridiflora* subsp. *viridiflora, Grevillea juniperina* subsp. *juniperina, Acacia pubescens* and *Hypsela sessiliflora.*

Table 1: Threatened flora within 10 km of the study area

Key: 1) Listed on the TSC Act (NSW) as Endangered (E1), Extinct (E4) or Vulnerable (V); 2) Listed on the EPBC Act (Commonwealth) as Endangered (E) or Vulnerable (V)

Botanical Name	EPBC Act	TSC Act	Habitat	Potential habitat
Pultenaea parviflora	V	E1	*Pultenaea parviflora* is endemic to the Cumberland Plain, with a core distribution from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce. *P. parviflora* may be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland (NPWS 2002b). Often found in association with other threatened species such as *Dillwynia tenuifolia, Dodonaea falcata, Grevillea juniperina, Micromyrtus minutiflora, Persoonia nutans* and *Styphelia laeta.* Flowering may occur between August and November depending on environmental conditions (DEC 2005g).	No; inappropriate soil and vegetation types
Cynanchum elegans White-flowered Wax Plant	E	E1	Rainforest gullies scrub and scree slopes in Gloucester and Wollongong districts (Harden 1992). Occurs mainly at the ecotone between dry subtropical rainforest and sclerophyll forest/woodland communities (DEC 2005i). Has been recorded in dry subtropical rainforest, littoral rainforest, *Leptospermum laevigatum-Banksia integrifolia* Coastal scrub, *Eucalyptus tereticornis* forest and woodland, *Corymbia maculata* forest and woodland and *Melaleuca armillaris* scrub to open scrub (DEC 2005i).	No; inappropriate soil and vegetation types
Marsdenia viridiflora subsp. *viridiflora* Native Pear		EP	This species has a wide distribution in subcoastal and southern Queensland but has been recorded rarely in NSW and from a disjunct occurrence near Sydney where it occurs as very scattered plants in areas of remnant vegetation (NSW Scientific Committee 2003). Grows in woodland and scrub (Harden 1992) and is typically found in Sydney Turpentine Ironbark Forest (NSW Scientific Committee 2003). Grows in vine thickets and open shale woodland. Recent records of populations include sites at Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range (DEC 2005d).	Possible, but no individuals recorded
Dillwynia tenuifolia		V 1	The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include: the Bulga Mountains at Yengo in the north, Kurrajong Heights and Woodford in the Lower Blue Mountains. Locally abundant particularly within dry areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. Flowering occurs sporadically from August to March depending on environmental conditions (DEC 2005a).	No; inappropriate soil and vegetation types
Acacia pubescens	V	V	Grows in open sclerophyll forest or woodland on clay soils (Harden 1991) (Robinson 1994) usually on gravelly clay containing ironstones. This species typically occurs at the intergrade between shales and sandstones in Cooks River/	Possible, but no individuals recorded

Botanical Name	EPBC Act	TSC Act	Habitat	Potential habitat
Downy Wattle			Castlereagh Ironbark Forest, Shale/Gravel Transition Forest or Cumberland Plain Woodland (NPWS 2003a; NPWS 2003b).	
Hypsela sessiliflora	X	E1	Grows in damp areas on the Cumberland Plain; previously considered to be extinct but found occasionally after rainy periods near Austral, to the immediate south of the study area	Possible, but no individuals recorded
Eucalyptus nicholii Narrow-leaved Black Peppermint	V	V	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property. Grows in dry grassy woodland, on shallow and infertile soils, mainly on granite (DEC 2005b).	No; inappropriate habitat as well as soil and vegetation types
Syzygium paniculatum Magenta Lilly Pilly	V	V	Subtropical and littoral rainforest on sandy soils or stabilised dunes near the sea (Harden 1991). Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities (DEC 2005h).	No; inappropriate habitat as well as soil and vegetation types
Pterostylis saxicola Sydney Plains Greenhood	E	E1	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines (NSW Scientific Committee 1997). The vegetation communities that occur above the shelves are either shale/sandstone transition or shale communities. Often occurs near streams. Picnic Point to Picton (Harden 1993). Currently known from only 5 localities (NSW Scientific Committee 1997).	No; no sandstone shelves present on site
Grevillea juniperina subsp. *juniperina*		V	Its distribution is centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town (NPWS 2002a). It is found on clay soils in open forest on the Cumberland Plain (Robinson 1994). Grows in moist sites, usually near creek on acidic soils (Harden 1991).	Possible, but no individuals recorded
Grevillea parviflora subsp. *parviflora*		V	Found on sandstone in dry sclerophyll forest or heath (Harden 1991).	No; inappropriate soil and vegetation types
Persoonia nutans Nodding Geebung	E	E1	Grows in Woodland to dry sclerophyll forest on clay soils and old alluviums on the Cumberland Plain (Robinson 1994) (Harden 2002). The species has been recorded in Castlereagh Scribbly Gum Woodlands, Agnes Banks Woodland, Shale Gravel Transition Forest, Cooks River Castlereagh Ironbark Forest and Shale Sandstone Transition Forest (DEC 2005e). Peak flowering is from December to January with sporadic flowering all year round.	No; inappropriate habitat as well as soil and vegetation types
Pimelea curviflora var. *curviflora*	V	V	Confined to the coastal area of northern Sydney and inland to Maroota. Occurs on lateritic soils and shale-sandstone transition soils on ridgetops in woodland. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and	No; inappropriate soil and vegetation

Botanical Name	EPBC Act	TSC Act	Habitat	Potential habitat
			scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots (DEC 2005f).	types
Pimelea spicata Spiked Rice-flower	E	E1	In western Sydney, *P. spicata* is restricted to areas supporting, or that previously supported, Cumberland Plain Woodland. *Pimelea spicata* has been recorded from both shale hills and shale plains woodland. *Pimelea spicata* has also been recorded from highly degraded areas that no longer support native vegetation, but that would have supported CPW previously (DEC 2004). In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a more well developed shrub and grass understorey.	Possible, but no individuals recorded

4.4 Fauna Habitats

The fauna habitat types within the study area are Woodland and Waterbodies. These habitat types are described in more detail below.

Woodland

Woodland occurred in the study area adjacent to Ferrers Road, within Cell 5 and as riparian vegetation along Eastern Creek. This woodland is consistent with Cumberland Plain Woodland. The vegetation was largely regrowth vegetation, supporting trees with a diameter at breast height (DBH) of up to 30 cm, but mostly consisted of short saplings. A few remnant trees with a DBH of approximately 40-100 cm occurred close to the creekline and scattered within the regrowth woodland. The only canopy tree species recorded in the Woodland was *Eucalyptus tereticornis*.

The regrowth woodland provided limited breeding, nesting, or foraging resources for fauna, there being little to no ground leaf litter or hollow logs, or structural diversity. However, some of the larger trees did contain hollows, their size (<300m in nheight by <200mm in width) making them suitable for animal species such as insectivorous Microchiropteran Bats, Rainbow Lorikeets, Galahs, Cockatoos or Ringtail Possums. One such hollow was observed to contain nesting material, most likely from a Common Mynah *Acridotheres tristis*.

Ground leaf litter and scattered dead wood was present under the large, remnant trees. These microhabitats may provide foraging and breeding resources for fauna species such as reptiles, small mammals, and amphibians. Potential habitat for the Endangered Cumberland Plain Land Snail *Meridolum corneovirens*,

occurs in the woodland alongside Eastern Creek on the western side of the study area.

The woodland in the study area was considered to be in poor condition due to its degraded nature, with little understorey and being heavily infested by weeds and Brown Rats *Rattus norvegicus*.

Aquatic Habitats

There were three waterbodies in the study area: a drainage line running from Ferrers Road west through the study area towards Eastern Creek, Eastern Creek itself, and a dam in the southwest part of the study area near Eastern Creek (see Figure 2).

At the time of the survey, the drainage line had higher than usual water levels and, as a result, resembled a creek with a series of large, shallow pools. The water was heavily polluted from a large colony of Australian White Ibis *Threskiornis molucca* nesting and roosting in and around it and was very turbid. A thick, green alga was abundant. The weedy rush species *Juncus acutus* was growing in and around the water and was being used as nesting sites by the colony of Ibis. All vegetation from the water's edge to approximately 15 m back was liberally splashed with Ibis guano.

Despite the poor condition of the water, two frog species were heard calling: *Limnodynastes peronii* and *Limnodynastes tasmaniensis*. No tadpoles were seen in the water, but some small, (unsampled) schooling fish were present.

Eastern Creek was in marginally better condition than the drainage line. The water in the creek was similarly polluted and Ibis were present in large numbers. No frogs were seen or heard, but tadpoles were present in the water. There was minimal aquatic vegetation and the understorey largely consisted of exotic weeds.

The dam itself was devoid of vegetation and therefore fauna habitat, but the drainage line leading to the dam contained some vegetation and may represent ephemeral habitat for frogs. The drainage line was damp during the site survey, but there was no standing water and no frogs were seen or heard. There were few refuge sites for frogs available.

4.5 Fauna

A detailed fauna survey was not undertaken for this assessment. Incidental observations of fauna species utilising the study area are listed in Appendix 2 and include two frog species, seven bird species, one mammal species and one reptile species.

4.5.1 Significant Fauna

A total of 32 threatened and/or Migratory animal species have been previously recorded within the locality (DECC Atlas of NSW Wildlife and DEWHA EPBC Online Database). Of these, 22 animal species are listed under the TSC Act and 21 under the EPBC Act.

No threatened fauna were recorded during the current survey. However, the study area contains potential habitat for ten threatened animal species listed on the TSC Act, of which six are only listed on this Act (Greater Broad-nosed Bat *Scoteanax ruepellii*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Eastern Bentwing Bat *Miniopterus schreibersii oceanensis*, Eastern Freetail-bat *Mormopterus norfolkensis*, Large-footed Myotis *Myotis macropus*, Cumberland Plain Land Snail), and one Migratory species listed on the EPBC Act alone (White-bellied Sea Eagle *Haliaeetus leucogaster*). Three species are listed on both the EPBC and TSC Acts (Grey-headed Flying Fox *Pteropus poliocephalus*, Regent Honeyeater *Xanthomyza phrygia* and Swift Parrot *Lathamus discolor*)(see Table 2 below).

A detailed aquatic survey was not undertaken for this assessment. No threatened aquatic species listed on the FM and/or EPBC Acts, have potential habitat or have been previously recorded within the locality and no threatened aquatic species were recorded during the current surveys.

Table 2: Terrestrial fauna listed on the TSC Act or EPBC Act that may occur in the locality.

Key: 1) Listed on the TSC Act as Endangered (E), Vulnerable (V); 2) Listed on the EPBC Act as Endangered (E) or Vulnerable (V) or covered under migratory provisions (M) on the EPBC Act

Latin Name **Common Name**	**EPBC Act**	**TSC Act**	**Habitat**	**Potential habitat**
Ardea alba Great Egret	M		Terrestrial wetlands, estuarine and littoral habitats and moist grasslands. Inland, prefer permanent waterbodies on floodplains; shallows of deep permanent lakes (either open or vegetated), semi-permanent swamps with tall emergent vegetation and herb dominated seasonal swamps with abundant aquatic flora. Also regularly use saline habitats including mangrove forests, estuarine mudflats, saltmarshes, bare saltpans, shallows of salt lakes, salt fields and offshore reefs. Breeding requires wetlands with fringing trees in which to build nests including mangrove forest, freshwater lakes or swamps and rivers (Marchant and Higgins 1990).	No
Ardea ibis Cattle Egret	M		Occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands (Marchant and Higgins 1990).	No

Latin Name **Common Name**	**EPBC Act**	**TSC Act**	**Habitat**	**Potential habitat**
Callocephalon fimbriatum Gang-gang Cockatoo		V	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests (Higgins 1999). Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest (Forshaw and Cooper 1981). In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas (Shields and Crome 1992). It requires tree hollows in which to breed (Gibbons and Lindenmayer 1997).	Not enough foraging resources; heavy competition for hollows from Common Mynah.
Chalinolobus dwyeri Large-eared Pied Bat	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range (Hoye and Dwyer 1995). Can also be found on the edges of rainforests and in wet sclerophyll forests (Churchill 1998). This species roosts in caves and mines in groups of between 3 and 37 individuals (Churchill 1998).	No roosting sites.
Dasyurus maculatus maculatus Spotted-tailed Quoll (southeastern mainland)	E	V	Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests (Dickman and Read 1992). Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage (Edgar and Belcher 1995).``	Not enough foraging habitat.
Falsistrellus tasmaniensis Eastern False Pipistrelle		V	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high (Churchill 1998). Two observations have been made of roosts in stem holes of living eucalypts (Phillips 1995). There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor (Menkhorst and Lumsden 1995). This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites (Menkhorst and Lumsden 1995).	Unlikely, but foraging habitat may occur.
Gallinago hardwickii Latham's Snipe	M		Typically found on wet soft ground or shallow water with good cover of tussocks. Often found in wet paddocks, seepage areas below dams (Pizzey and Knight 1997).	No
Haliaeetus leucogaster White-bellied Sea-eagle	M		A migratory species that is generally sedentary in Australia, although immatures and some adults are dispersive (Marchant and Higgins 1993). Found in terrestrial and coastal wetlands; favoring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes (English and Predavec 2001). Also hunt over open terrestrial habitats. Feeds on birds, reptiles, fish, ammmals, crustaceans and carrion. Roost and nest in trees (Marchant and Higgins 1993).	Yes, limited foraging.

Latin Name **Common Name**	**EPBC Act**	**TSC Act**	**Habitat**	**Potential habitat**
Heleioporus australiacus Giant Burrowing Frog	V	V	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks (Daly 1996; Recsei 1996). Can also occur within shale outcrops within sandstone formations. In the southern part of its range can occur in wet and dry forests, montane sclerophyll woodland and montane riparian woodland (Daly 1996). Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water (Barker *et al.* 1995).	No
Hirundapus caudacutus White-throated Needletail	M		An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. Breed in Asia (Pizzey and Knight 1997).	No; may fly over site.
Hoplocephalus bungaroides Broad-headed Snake	V	E1	Mainly occurs in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they generally use rock crevices and exfoliating rock during the cooler months and tree hollows during summer (Webb 1996; Webb and Shine 1998).	No
Lathamus discolor Swift Parrot	E	E1	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects (Forshaw and Cooper 1981). The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW (Shields and Crome 1992). This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability (Pizzey and Knight 1997).	Yes; opportunistic foraging only.
Litoria aurea Green and Golden Bell Frog	V	E1	Found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes (NPWS 1999b). Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks (NPWS 1999b; White and Pyke 1996).	Yes; possible foraging habitat.
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)		V	Found mostly in open forests and woodlands dominated by box and ironbark eucalypts (Higgins *et al.* 2001). It is rarely recorded east of the Great Dividing Range (Higgins *et al.* 2001).	No
Meridolum corneovirens Cumberland Plain Land Snail		E1	Most likely restricted to Cumberland Plain, Castlereagh Woodlands and boundaries between River-flat Forest and Cumberland Plain Woodland. It is normally found beneath logs, debris and amongst accumulated leaf and bark particularly at the base of trees. May also use soil cracks for refuge (NPWS 1999a).	Yes

Latin Name **Common Name**	**EPBC Act**	**TSC Act**	**Habitat**	**Potential habitat**
Merops ornatus Rainbow Bee-eater	M		Usually occurs in open or lightly timbered areas, often near water. Nest in emankments, including banks of creeks and rivers, in sand dunes, in quarries and in roadside cuttings. Breeding occurs from November to January. It has complex migratory movements in Australia. NSW populations migrate north for winter (Higgins 1999).	No
Miniopterus schreibersii oceanensis Eastern Bentwing Bat		V	Broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Roost in caves and man made habitats and under road culverts (Strahan 1995).	Yes; foraging habitat only.
Mixophyes iterates Giant Barred Frog	E	E1	Usually found in coastal riverine rainforest and upland areas such as the Border Ranges (Barker *et al.* 1995). It lives in forests such as Antarctic Beech, wet sclerophyll and rainforests (FAN 2005). It often hides in leaf litter near permanent fast-flowing streams (FAN 2005).	No
Monarcha melanopsis Black-faced Monarch	M		A migratory species found during the breeding season in damp gullies in temperate rainforests. Disperses after breeding into more open woodland (Pizzey and Knight 1997).	No
Mormopterus norfolkensis Eastern Freetail Bat		V	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits (Allison and Hoye 1995; Churchill 1998).	Yes; foraging habitat only.
Myiagra cyanoleuca Satin Flycatcher	M		Migratory species that occurs in coastal forests, woodlands and scrubs during migration. Breeds in heavily vegetated gullies (Pizzey and Knight 1997).	No
Myotis macropus (adversus) Large-footed Myotis		V	Occurs in most habitat types as long as they are near permanent water bodies, including streams, lakes and reservoirs. Commonly roost in caves, but can also roost in tree hollows, under bridges and in mines (Richards 1995; Churchill 1998).	Yes
Ninox connivens Barking Owl		V	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country (Pizzey and Knight 1997).	No; too small for foraging. Single record 12 years old.
Petrogale penicillata Brush-tailed Rock-wallaby	V	E1	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices (Eldridge and Close 1995).	No
Phascolarctos cinereus Koala		V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall (Reed and Lunney 1990; Reed *et al.* 1990).	No; only record 10 km to north-west on other side of two motorways.
Potorous tridactylus Long-nosed Potoroo	V	V	Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy (Johnston 1995).	No

Latin Name **Common Name**	**EPBC Act**	**TSC Act**	**Habitat**	**Potential habitat**
Pteropus poliocephalus Grey-headed Flying-fox	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost (Tidemann 1995) although some individuals may travel up to 70 km (Augee and Ford 1999).	Yes; may visit flowering trees opportunistically.
Pyrrholaemus sagittatus Speckled Warbler		V	This species occurs in eucalypt and cypress woodlands on the hills and tablelands of the Great Dividing Range. They prefer woodlands with a grassy understorey, often on ridges or gullies (Blakers *et al.* 1984; NSW Scientific Committee 2008). The species is sedentary, living in pairs or trios and nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground and in the understorey for arthropods and seeds (Blakers *et al.* 1984; NSW Scientific Committee 2008). Home ranges vary from 6-12 hectares (NSW Scientific Committee 2008).	No
Rhipidura rufifrons Rufous Fantail	M		Migratory species that prefers dense, moist undergrowth of tropical rainforests and scrubs. During migration it can stray into gardens and more open areas (Pizzey and Knight 1997).	No
Rostratula australis Australian Painted Snipe	VM	E1	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, ephemeral or permanent, although they have been recorded in brackish waters (Marchant and Higgins 1993).	No
Scoteanax rueppellii Greater Broad-nosed Bat		V	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m (Churchill 1998). In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat (Hoye and Richards 1995). This species roosts in hollow tree trunks and branches (Churchill 1998).	Possible foraging habitat.
Xanthomyza Phrygia Regent Honeyeater	E	E1	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS 1999c; Pizzey and Knight 1997).	Yes; opportunistic foraging only.

4.6 Aquatic Habitat Assessments

4.6.1 Water Quality

The results of the water quality analysis can be seen in Table 3.

Table 3: Water quality results for the four Sample Sites at Eastern Creek Landfill

Location	Temp (C^o)	pH	Conductivity (µS/cm)	Turbidity (NTU)	DO (mg/l)
Cell 5 Western Pool	20.0	7.04	910	182.4	103.74
Cell 5 Eastern Pool	20.6	7.28	931	169.7	100.21
Eastern Creek 200m Downstream	17.5	7.12	1142	146.1	20.08
Eastern Creek 200m Upstream	18.0	7.35	968	151.7	22.21
ANZECC Guidelines	N/A	6.5-8.0	300	20	90-110

The major difference in water quality between the four waterbodies was related to turbidity and dissolved oxygen. The high dissolved oxygen (DO) concentration in the Cell 5 western and eastern pools is most likely due to the extreme shallowness of the two pools. High surface area to volume ratio of the pools means the impacts of wind driven oxygen disolvement are enhanced (Osborne and Kovacic 2006). The high dissolved oxygen content may also be influenced by the abundance of a dense green alga that surrounded the entire pools as well as the bottom sediment layer of the pool (Osborne and Kovacic 2006). The notably lower levels of DO in the upstream and downstream sites within Eastern Creek may correlate to the notable lack of macrophytes and algae. Poor aquatic flora abundance often results in low DO levels in waterways (Harris and Gehrke 1997).

The turbidity was consistently high within the two Cell 5 pools and was also high at both the upstream and downstream sites on Eastern Creek. The extreme shallowness of the two pools within Cell 5 increases the impact of wind and rain mixing the sediments into the water column. The high turbidity within the upstream and downstream sites of Eastern Creek may be attributed to the notable bank degradation and collapse along the course of the creek banks.

Both the Cell 5 pools and Eastern Creek sites are well above the ANZECC guideline value for conductivity in a slightly disturbed lowland river (30 - 300 µS/cm) (ANZECC 2000). The sites sampled are also above the ANZECC

Guidelines for turbidity (0 - 20 NTU). This indicates that both waterways may have disturbed water quality, which is common feature of rivers and streams in urban/agricultural areas and downstream of major works and developments.

4.6.2 Habitat Assessment

The two pools within Cell 5 and the upstream and downstream sites of Eastern Creek were inspected and assigned with RCE scores. Site scores varied between 12 and 21, indicating that site conditions ranged between poor and fair. The Cell 5 western pool; site scored 12, Cell 5 eastern Pool scored 15. The upstream site of Eastern Creek scored 18, while the downstream site of Eastern Creek scored 21. Aquatic habitat condition was notably lower within Cell 5 in contrast to Eastern Creek.

All sites lacked a continuous cover of native riparian vegetation, which greatly reduced the habitat condition, especially within Cell 5. The Eastern Creek downstream site tended to have a high abundance of dead trees which had fallen into the creek, which in turn had damaged the bank structure. However the downstream site of Eastern Creek was rated the highest with a score of 21 (fair). The upstream site scored 18 (poor) which can be attributed to the notably undercut, crumbling banks that were devoid of any vegetation. The distinguishable decline in quality between the Eastern Creek downstream and upstream sites may indicate that the Cell 5 drainage line is adversely impacting the overall Eastern Creeek health.

All sites had a clear lack of essential in-stream substrates, ranging from mud in the Cell 5 sites, to muddy silt in the creek sites. Slow flowing riffle habitat was only encountered at the eastern Cell 5 pool site. The principal reason for some sites scoring lower RCE scores was large quantities of muddy silt and detritus, lack of aquatic and riprain vegetation, and unstable and often collapsed creek banks.

5.0 IMPACT ASSESSMENT

5.1 Predicted Impacts

The Proposal comprises the removal of the remaining woodland between two existing landfill cells and the diversion of the drainage line to create a new landfill cell. The disturbance footprint is made up of two areas, one approximately 100 x 130 m on the western side and one approximately 70 x 70 m east of that. These two footprints are separated by an access track. Over these two areas, there are several bands of woodland, while the open spaces consist either of waterbodies and mostly exotic grassland. The area covered by native woodland has been calculated to be 1.02 ha.

Impacts associated with the proposal include:

- Removal of an area of 1.02 ha of Cumberland Plain Woodland, an EEC;
- Variation to the surface water management and leachate management system; and,
- Variation to the approved landscape plan.

The indirect impacts associated with the proposal include:

- Varied noise, dust and odour emissions resulting from the increased rate of filling, increased duration and total amount of waste to landfill; and,
- Increased truck movements over a longer period.

5.1.1 Legislative Constraints

Control Activity Provisions Approval may be required under the Water Management (WM) Act for instream and near stream activities and developments. The WM Act includes approvals and permit requirements for instream works, removal of aquatic vegetation and temporary and/or permanent blocking or partial blocking of waterways. Declared authorities are generally exempt from applying for these permits, however, the principles of the legislation are relevant to this project. Approval may be required for the construction phase for temporary blocking of flows and the construction of vehicular crossings. The design of the crossings should be consistent with DPI policies on crossing design.

5.1.2 Habitat Removal

Potential impacts of the proposed clearing of Cell 5, include clearing of existing woody vegetation, redirection of environmental flows, changes in water quality, instream works such as pool construction, temporary and permanent vehicle crossing upgrades, and bank reforming and stabilizing of the proposed drainage line.

Within the Eastern Creek landfill broader site the works should be limited to the Cell 5 drainage line and surrounding drainage channels. The micro habitat in this area is limited to features such as grassy vegetation and low weedy patches and adult trees, which will be permanently affected by the works when they are removed.

The majority of the area is currently exposed, highly polluted and unsuitable habitat for most aquatic fauna. At higher water levels this area could provide some habitat for the majority of the aquatic species know to occur in the greater Eastern Creek region, which include threatened species. The portion of the pools contained within the Cell 5 fragment will be removed by the proposal, but given the available current habitat, and the nature of the potential impact, this is not considered to be significant for aquatic flora.

During construction, discharges from the drainage line, which contributes ephemerally to the environmental flow to the Eastern Creek, will need to be temporarily piped and released into the storage dam currently lying west of the Cell 5 site. It is likely that the large pool adjacent to the Cell 5 fragment will remain through the proposed works and could be utilised for sediment control. The temporary redirection will protect the lower Eastern Creek from upstream impacts during construction. However, this will result in the temporary loss of approximately 0.5 hectare of land (between the Cell 5 site and Eastern Creek) as the pool increases in size to replace the two lost pools. As this dam area has already been significantly modified, and is in a very poor condition, the land loss may enhance aquatic habitat in the area.

Reconstruction and re-establishment of the aquatic and riparian zones within this section of Eastern Creek is recommended following construction. Despite the loss of habitat due to the redirection of flow, it is unlikely that the direct and/or indirect impacts to habitat will have a significant impact on the aquatic values of Eastern Creek.

During construction, efforts should be made to manage the sedimentation runoff to prevent it entering the Eastern Creek system. This will assist in maintaining aquatic or semi aquatic fauna and flora, which persist below the Cell 5 site.

5.1.3 Water Quality

There is potential that the works will result in a permanent disruption to water quality, due to factors such as an increase in turbidity and changes in dissolved oxygen. The activities that may result in an impact to water quality include instream works, clearing of vegetation area, sedimentation and runoff from bank works and access roads and leachate from existing landfill cells.

Degradation of water quality due to sedimentation and increases in turbidity could have short and long term impacts on aquatic habitat downstream of the works. This could include effects such as fish kills, smothering of macroinvertebrates or degrading of instream habitat by filling interstitial spaces in riffles, smothering or blocking light for macrophytes.

Above the Cell 5 Site

Impacts within the Cell 5 fragment will be limited to the area in the immediate vicinity of the Cell and likely to be limited to the construction period. The placement of sediment traps and other measures will limit any potential impacts such as runoff and sedimentation into the creek upstream, potentially caused by vehicular access and site redevelopment anywhere above the Cell 5 site. However, the habitat features in this area, which are predominantly exposed banks and exotic vegetation, are unlikely to be greatly affected by the potential impacts such as sedimentation and runoff.

Below the Cell 5 Site

The proposed works have the potential to affect water quality in the lower Eastern Creek through runoff, sedimentation, road crossings, impact to riparian areas, culvert construction and works on the Cell 5 site. To minimise the impact on the creek a carefully constructed amelioration plan will be required to prevent the impacts of the proposed work effecting downstream habitats. Given the works area is on an existing sediment based drainage line, care should be taken to ensure that any potential impact is minimised by sedimentation controls and that infiltration through the redirected drainage line is also prevented. To prevent potential impacts downstream during site remediation, water quality issues should be addressed prior to rehabilitation and restoration of flow in the section downstream of the Cell 5 fragment. This includes sediment dams, retaining walls or other control structures.

Landfill cells have the potential to leach waste material and this can introduce undesirable and toxic materials into the surrounding waterways. However, if the proposed landfill extension within Cell 5 is constructed and maintained according to governmental requirements, the drainage line should be safe from inadvertent contamination from landfill leachate which is managed in accordance

with the leachate management system for the site. Therefore, the potential risk from leachate on downstream habitats of Eastern Creek is considered to be low.

5.2 Proposed Amelioration Measures

In order to mitigate the potential impacts of the proposed redevelopment of the Eastern Creek Stage 2, Cell 5 and associated works, the following matters should be considered.

5.2.1 Terrestrial

1 All native trees requiring removal should be chipped and used as mulch on revegetation areas. Sections of branches or trunks containing hollows should be sawn into useable sections and laid over the finished surfaces in revegetation areas, to provide habitat. Large woody debris should be installed into the newly created drainage line to enhance and replicate the existing available instream aquatic habitat;

2 Revegetation of appropriate offsets should ideally be commenced prior to clearing of the native vegetation in Cell 5. The offsets should be located as near as possible to the study area, and be located on similar soils, in similar topography to that which occurs in Cell 5. The total area to be disturbed is 2.5 ha, although the area within Cell 5 in which Cumberland Plain Woodland occurs has been calculated as 1.02 ha. A minimal size of the offset area would be 1.02ha, although a larger size of up to 5 ha would provide greater opportunities for habitat creation. A Plan of Management for the offset areas should be prepared and a conservation agreement should be made with either DECC or Blacktown City Council;

3 A suitably qualified ecologist should be on site during clearing to ensure no resident fauna are harmed;

4 Best practice sediment and erosion control measures should be implemented on all sites to prevent erosion during and after construction; and,

5 Any chemicals used on site should be taken off site after use and disposed of appropriately.

5.2.2 Aquatic

1. During any instream and near stream works; such as excavation, drainage line removal or casting, water quality should be protected by a sedimentation and erosion control plan. This should include suitably designed and maintained sediment and turbidity controls, such as silt curtains surrounding the Cell 5 construction site (proposed), sedimentation fencing and sediment basins, run-off controls and geotextile fabric sand bags. The protection measures should be designed to cope with greater than average rainfall

and/or flow events and must be regularly inspected and maintained throughout the construction and rehabilitation phase;

2. The modified drainage line pools currently existing on the Cell 5 site should be redesigned and re-established post-development on adjacent land directly west of the proposed modified drainage line, preferably adjacent to the current workshop/plant/amenity area . This should aim to develop a pseudo-natural water course and riparian area while protecting against extreme flows. This could include habitat features such as pools and riffle and the replanting of macrophytes and riparian vegetation. The areas could also be designed and managed to support riparian bird, frog and other aquatic fauna;

3. A detailed spill and contamination plan should be prepared to protect the environmental values of the modified drainage line and Eastern Creek. The plan should contain emergency and remediation measures;

4. Water quality in the modified drainage line, Eastern Creek (in the vicinity of the drainage inlet), and Eastern Creek upstream and downstream of the proposed drainage modification should be monitored to manage potential impacts upon aquatic systems;

5. Damaged riparian areas downstream of Cell 5 should be rehabilitated with local native plant species as part of the rehabilitation of the site;

6. The protection of snags, boulders and other instream habitats under and near the development footprint should be included in an Environmental Management Plan and their removal avoided, wherever possible (see NSW Fisheries, 1999);

7. A program to monitor the potential impact on aquatic ecosystem throughout the project is recommended. The program could include physio-chemical water quality monitoring and biotic monitoring such as AUSRIVAS macro-invertebrate sampling, as well as of macrophytes before, during and after the construction;

8. Any development undertaken on the Cell 5 site shuld include measures to prevent and qualitatively assess the permeation of leachates from past, current, and future underground landfill cells surrounding the site, according to best practice;

9. A suitably qualified aquatic ecologist should be on site during the initial site setup phase of the drainage line redevelopment, to ensure key habitat features and species are not adversely impacted by the proposal; and,

10. Appropriately designed culverts should be installed under each intersecting roadway along the proposed redeveloped drainage line to enhance drainage transferrance and reduce flow impediment.

5.3 Part 3A Guidelines for Threatened Species Assessment (EP&A Act)

The impacts of the proposal on threatened biota listed under the TSC Act have been undertaken following the Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act (DEC & DPI 2005). Where threatened biota **is recorded** within a study area, an impact assessment is required under the EP&A Act. When threatened biota **is not recorded** during a survey, the presence of potential habitat for this species is used to determine the need to undertake an impact assessment under the EP&A Act. Where there is no potential habitat in the study area for threatened biota, there is unlikely to be any impact on these species and therefore these species are not required to be considered further.

The impact assessments included in Appendix incorporate a consideration of the predicted impacts and amelioration measures, as outlined in Sections 5.1 and 5.2 respectively.

5.3.1 Endangered Ecological Communities

Components of one EEC (Cumberland Plain Woodland) occurs within Cell 5, and components of another EEC, River-flat Eucalypt Forest occurs in the extreme western margins of the study area. The impact of the proposal on these communities has been considered in Appendix 3.

5.3.2 Flora

The stands of vegetation which comply with descriptions of Cumberland Plain Woodland in Cell 5 provide habitat for the threatened plant species *Pimelea spicata, Acacia pubescens, Grevillea juniperina subsp. juniperina, Hypsela sessiliflora* and *Marsdenia vididiflora subsp. viridiflora*. Although targeted searches of each of these species were carried out and no individuals were recorded, the impact of the proposal on these species has been considered in Appendix 3.

5.3.3 Fauna

No threatened fauna were recorded during the current survey. However, several state and/or federally listed threatened animal species have been recorded in close proximity of the study area or have potential habitat within the study area. These species are shown below in Table 4. Where there is potential habitat (foraging or breeding resources) for a threatened species in the study area, further consideration must be given to the potential impact of the proposal on these species.

Table 4: State and/or federally listed threatened animal species which have been recorded in close vicinity of the study area or have potential habitat within the study area

Latin Name	Common Name	EPBC Act	TSC Act (NSW)	Extent of Habitat in study area
Falsistrellus tasmaniensis	Eastern False Pipistrelle		V	Unlikely, but possible foraging and roosting habitat
Haliaeetus leucogaster	White-bellied Sea-eagle	M		Limited foraging resources.
Litoria aurea	Green and Golden Bell Frog	V	E	Limited foraging resources.
Lathamus discolour	Swift Parrot	E	E1	Very limited opportunistic foraging resources.
Meridolum corneovirens	Cumberland Plain Land Snail		E1	Potential habitat mostly in woodland edges near Eastern Creek.
Miniopterus schreibersii oceanensis	Eastern Bentwing Bat		V	Foraging habitat only.
Mormopterus norfolkensis	Eastern Freetail Bat		V	Foraging habitat only.
Myotis macropus (adversus)	Large-footed Myotis		V	Possible foraging habitat and roosting resources.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Very limited opportunistic foraging resources.
Scoteanax rueppellii	Greater Broad-nosed Bat		V	Marginal foraging habitat, possible roosting resources.
Xanthomyza Phrygia	Regent Honeyeater	E	E1	Very limited opportunistic foraging resources.

The proposal may significantly impact threatened species by causing any of the following situations to arise:

- death or injury of individuals;
- loss or disturbance of limiting foraging resources; and
- loss or disturbance of limiting breeding resources.

Limiting resources are specialised habitat components that species are dependent on for their ongoing survival. Such limiting resources are predominantly associated with specialised breeding habitats (such as tree hollows or suitable nest/maternity roost sites) that occur at low densities, with high levels of competition from a range of species. However for some species, limiting resources include specialised foraging habitats that have a restricted distribution.

Impact assessments have been prepared for these species listed in Table 4 and can be found in Appendix 4. The remaining 21 threatened species were not recorded within the study area and/or potential habitat for these species does not occur within the study area, therefore these species are not considered further.

5.3.4 Conclusions of the Impact Assessments

The impact assessments (Appendix 3) concluded that the proposal is likely to have a minor impact on threatened biota, as listed on the TSC Act, provided recommended ameliorative measures are implemented and assuming that the patch of CPW proposed for removal is considered in the context of CPW stands in the region.

5.3.5 Key Thresholds

The Part 3A Guidelines of the EP&A Act (DEC & DPI 2005) set out a number of key thresholds which need to be addressed to justify the impacts of the proposal on threatened species, populations or ecological communities. The key thresholds are (DEC & DPI 2005):

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

Amelioration measures are detailed in Section 5.2 in order to ensure that the proposal is likely to maintain the biodiversity values of the locality. Prior to initial clearing, rehabilitation of adjacent disturbed areas, or revegetation in adjacent vegetation stands would be critical in maintaining biodiversity values of the impacted areas. In Gerroa Environmental Protection Society Inc v Minister

for Planning & Cleary Bros (Bombo) Pty Ltd (2008) NSWLEC 173, various judgements included the requirement that criteria be established to ensure that any revegetation is "….an effective replacement for the east west link, and a requirement that his be certified by an ecologist before the east west link can be severed." In the situation at Eastern Creek, the east west link lacks adequate biodiversity values, because it originates in the Western Sydney International Dragway, and is fragmented by Ferrers Road, as well as two other access tracks, and therefore removal of this vegetation would not reduce connectivity. However, the NSWLEC 173 case highlights that compensatory measures need to be in place and agreed on before clearing can begin.

Based on the impact assessments following the Part 3A Guidelines of the EP&A Act for Threatened Species Assessment (Appendix 3), the proposal is unlikely to reduce the long-term viability of, accelerate the extinction of and/or adversely affect critical habitat for any threatened species and/or populations within the study area.

Table 4: Assessment of Key Thresholds

Threatened Biota	Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts, will maintain or improve biodiversity values.	Will the proposal reduce the long-term viability of a local population of the species, population or EEC?	Will the proposal accelerate the extinction of the species, population or EEC or place it at risk of extinction?	Will the proposal adversely affect critical habitat?
Threatened Flora				
Marsdenia viridiflora subsp. viridiflora	Not relevant, because this species does not occur on the site	Unlikely	Unlikely	No
Acacia pubescens	Not relevant, because this species does not occur on the site	Unlikely	Unlikely	No
Hypsela sessiliflora	Not relevant, because this species does not occur on the site	Unlikely	Unlikely	No
Grevillea juniperina subsp. juniperina	Not relevant, because this species does not occur on the site	Unlikely	Unlikely	No
Pimelea spicata	Not relevant, because this species does not occur on the site	Unlikely	Unlikely	No
Endangered Ecological Communities				
Cumberland Plain Woodland	Removal of complete stand, therefore No	Yes	Unlikely	No
River-flat eucalypt Forest	No clearing of this vegetation type, and amelioration of adjacent habitat	No	Unlikely	No
Threatened Fauna				
White-bellied Sea Eagle	No	Unlikely	Unlikely	No
Grey-headed Flying Fox	No	Unlikely	Unlikely	No

Threatened Biota	Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts, will maintain or improve biodiversity values.	Will the proposal reduce the long-term viability of a local population of the species, population or EEC?	Will the proposal accelerate the extinction of the species, population or EEC or place it at risk of extinction?	Will the proposal adversely affect critical habitat?
Large-footed Myotis	No	Unlikely	Unlikely	No
Other Microchiropteran Bats (Eastern False Pipistrelle, Eastern Bentwing Bat, Greater Broad-nosed Bat, Eastern Freetail-bat)	No	Unlikely	Unlikely	No
Regent Honeyeater and Swift Parrot	No	Unlikely	Unlikely	No
Green and Golden Bell Frog	Likely	Unlikely	Unlikely	No
Cumberland Plain Land Snail	No	Unlikely	Unlikely	No

5.4 Commonwealth Significance Impact Criteria (EPBC Act)

Under the Commonwealth EPBC Act, if the proposal has the potential to have an adverse impact on threatened biota listed on the Act, the proposal must be referred to the Federal Minister for the Environment for further consideration. The Significant Impact Criteria are used to assess the likelihood of impact.

The address of Significant Impact Criteria included in Appendix 4 incorporates a consideration of the predicted impacts and amelioration measures as outlined in Sections 5.1 and 5.2 respectively.

5.4.1 Endangered Ecological Communities

The Endangered Ecological Community, Cumberland Plain Woodlands, listed under the EPBC Act, occurs on the site. The proposal would require the removal of 1.02 ha of Cumberland Plain Woodlands currently occurring in Cell 5.

5.4.2 Flora

Cumberland Plain Woodlands provide potential habitat for the threatened plant species *Acacia pubescens, Grevillea juniperina* subsp. *juniperina* and *Pimelea spicata*.

Each of these species is listed as threatened on the EPBC Act and, as such, the impact of the proposal on these species has been considered in Appendix 5.

5.4.3 Fauna

No threatened fauna were recorded during the current survey. Twenty-one threatened fauna species and migratory species were recorded as having the potential to occur in the locality (DEWHA 2008). The study area contains potential habitat for the Green and Golden Bell Frog Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and White-bellied Sea-eagle.

Assessments of the Significance Impact Criteria have been prepared for these species in Appendix 4. Potential habitat for the remaining 16 threatened species does not occur within the study area, and therefore Assessments of Significance are not required for these species.

5.4.4 Conclusions of the Significant Impact Criteria

The Significant Impact Criteria Assessments under the EPBC Act (Appendix 5) found that the Proposal is not likely to have a significant impact on threatened species, endangered ecological communities or their habitats, as listed on the EPBC Act, provided recommended ameliorative measures are adhered to. However it is recommended that consideration be given to preparation of a Referral for Matters of National Significance based on the fact that 1.02 ha of Cumberland Plain Woodland is to be removed.

6.0 CONCLUSION

The Proposal will involve clearing of approximately 1.02 hectares of Cumberland Plain Woodland.

No threatened plant species were recorded within the study area. However, potential habitat for five threatened species (*Acacia pubescens, Grevillea juniperina* subsp. *juniperina, Pimelea spicata, Marsdenia viridiflora* subsp. *viridiflora* and *Hypsela sessiliflora*) occurs within the study area.

The Proposal is likely to remove or modify potential habitat for ten threatened animal species listed on the TSC Act (Green and Golden Bell Frog, Greater Broad-nosed Bat, Eastern False Pipistrelle, Eastern Bentwing Bat, Eastern Freetail-bat, Large-footed Myotis, Cumberland Land Snail, Grey-headed Flying-fox, Regent Honeyeater, and Swift Parrot) and five threatened species (Green and Golden Bell Frog, Grey-headed Flying Fox, Regent Honeyeater, Swift Parrot and White-bellied Sea-eagle) listed on the EPBC Act.

Impact Assessments following the Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act (DEC & DPI 2005) and Significant Impact Guidelines under the EPBC Act (DEH 2006) were carried out for threatened biota occurring or with potential habitat in the study area. It was found the impacts of the proposal are likely to be minor, however, it is recommended that as a precaution consideration be given for Referral for Matters of National Significance to be carried out, in the context of the proposal to remove a 1.02 ha stand of Cumberland Plain Woodland.

A number of amelioration measures, including the establishment of Offsets are recommended in Section 5.2 to reduce the potential impacts of the proposal on flora and fauna of the locality.

FIGURES

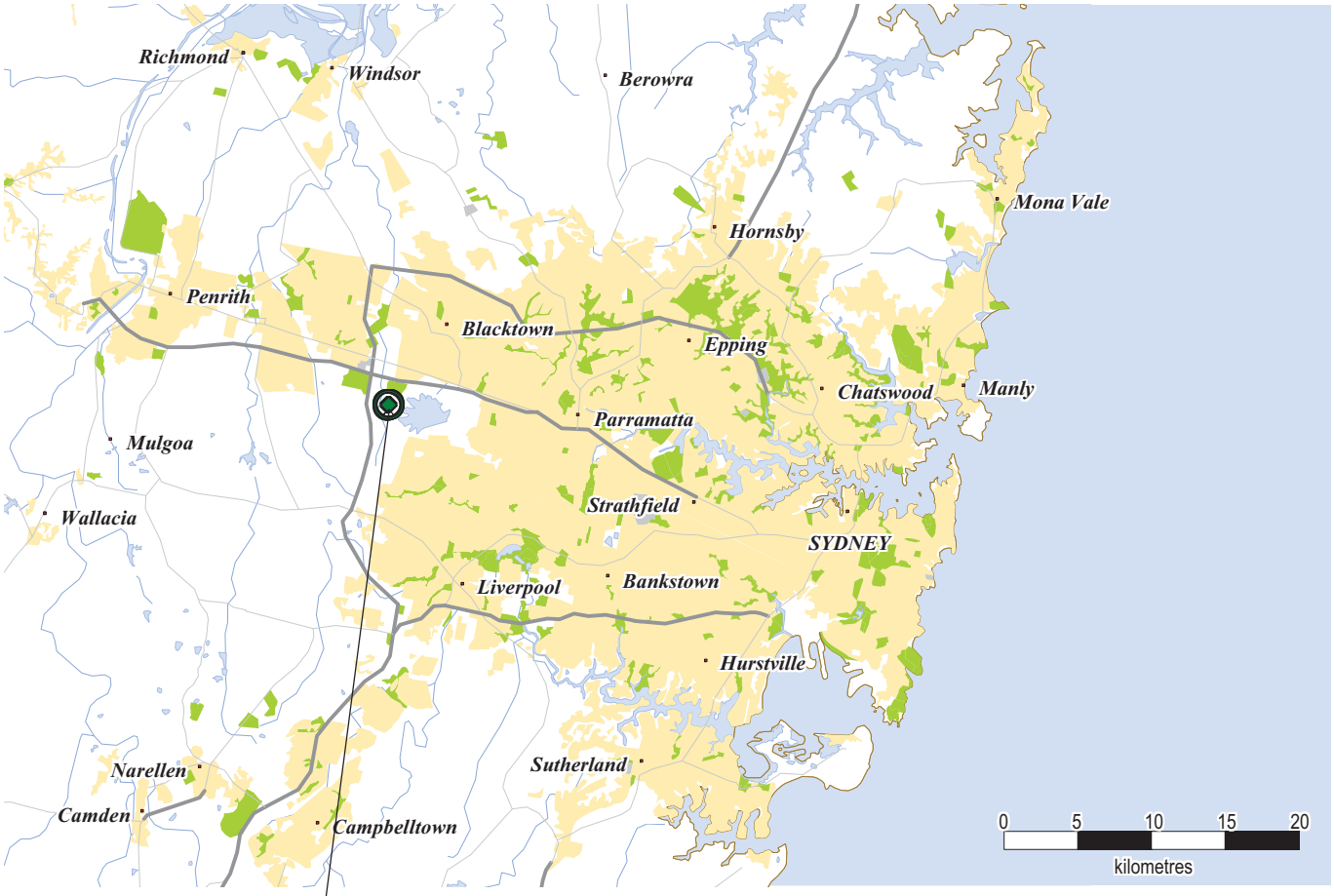

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Figure 1: Location of the Study Area in a regional context.

Date: 3 November 2008

Checked by: GGL | File number: S5219

Location:-5000\5200s\5219\Mapping\S5219 F1_region.WOR

Scale: 0 0.5 1.0 1.5 2.0 kilometres

N W E S

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Figure 2: Location of survey sites and overview of Study Area

Date: 24 June 2009

Checked by:GGL | File number: S5219

Loc:5000\5200s\5219\Mapping\S5219 F2_overview.WOR

Scale: 0 40 80 120 160 metres

N W E S

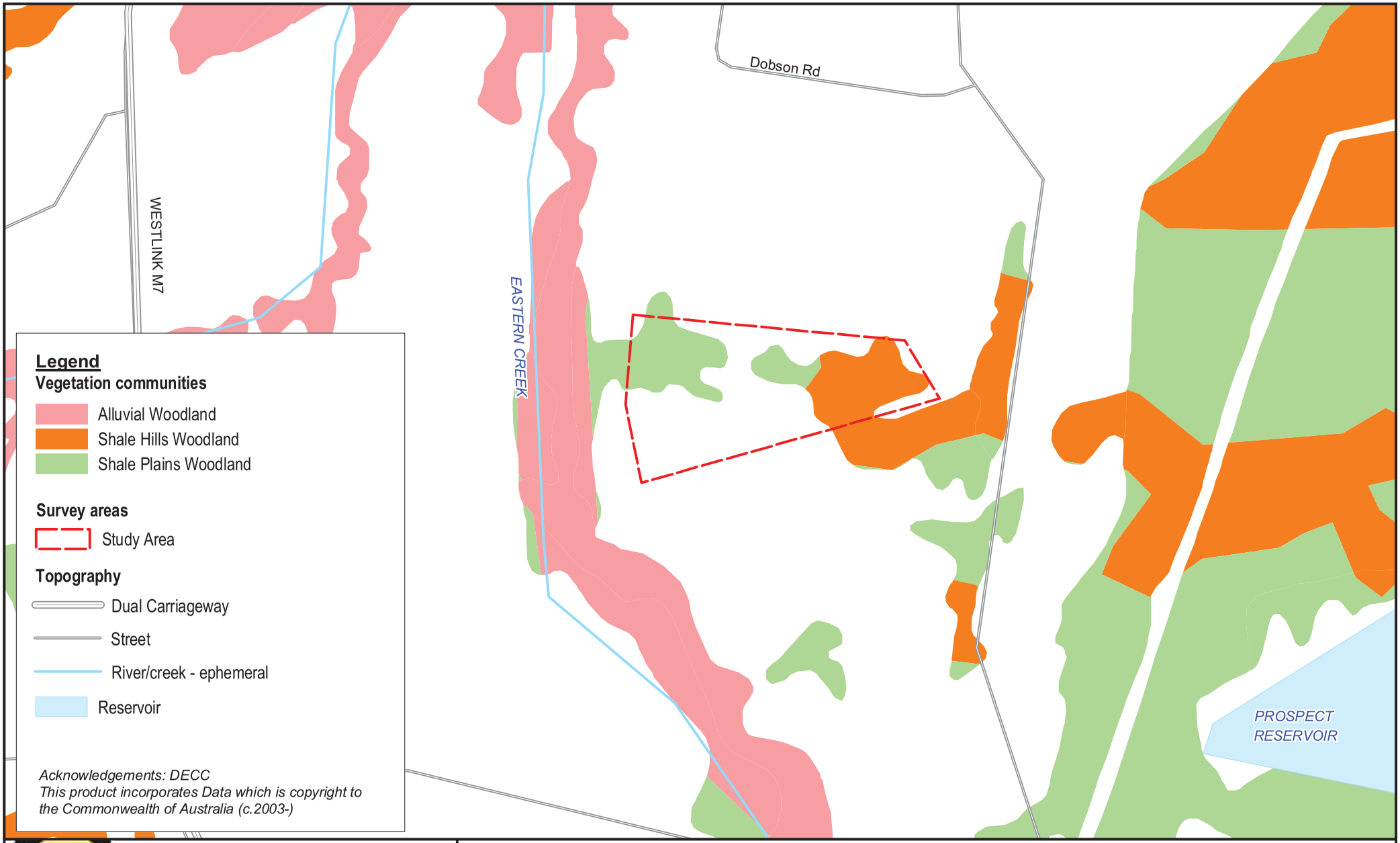

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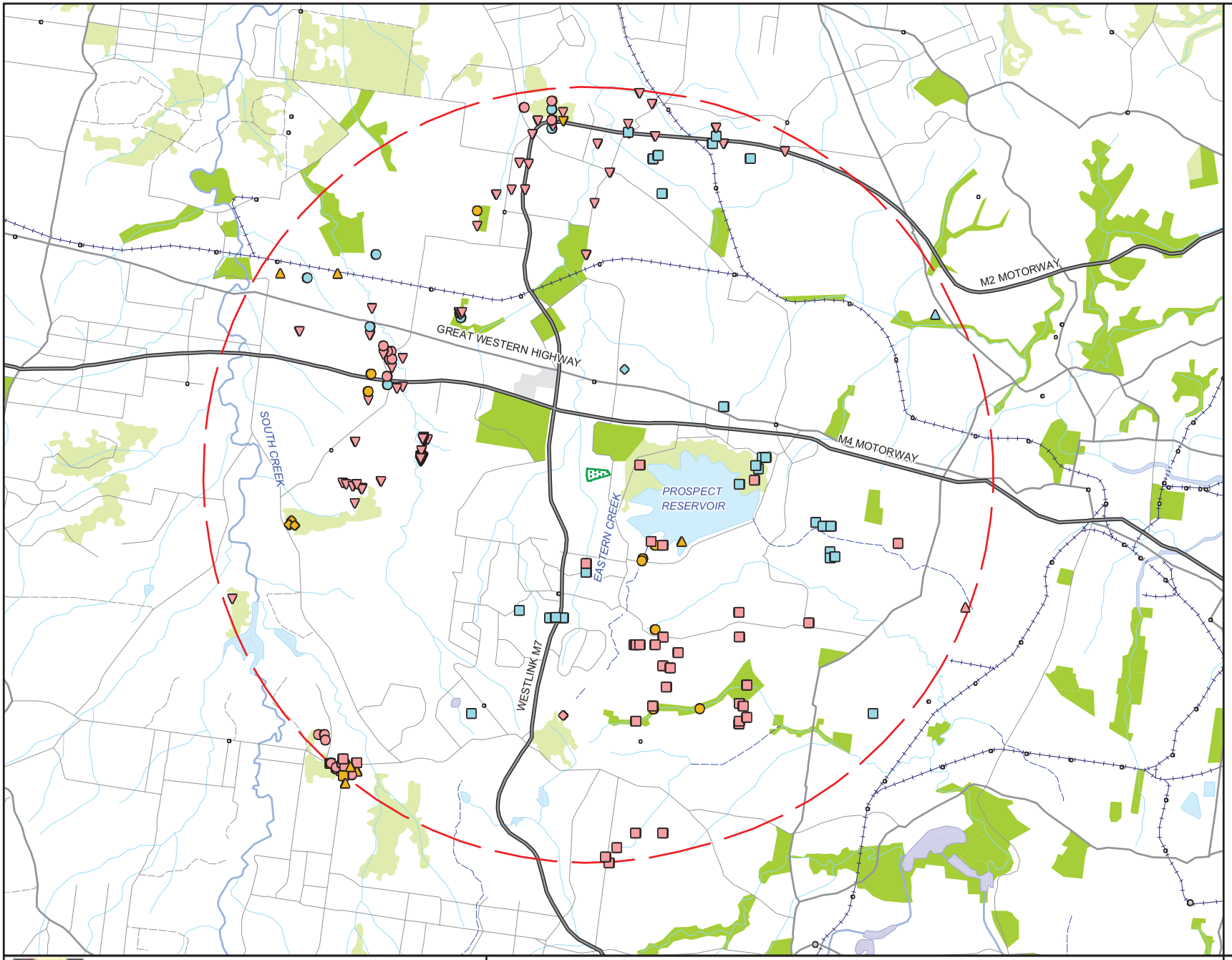
Figure 3: Vegetation communities within the vicinity of the Study Area

Date: 17 October 2008
Checked by: BJS
File number: S5219
Location:-5000\5200s\5217\Mapping\S5219 F3_veg.WOR

Scale: 0 0.1 0.2 0.3 0.4 0.5 kilometres

N W E S



Legend

Threatened plant species

- *Acacia pubescens*
- *Cynanchum elegans*
- *Dillwynia tenuifolia*
- *Eucalyptus nicholii*
- *Grevillea juniperina subsp. juniperina*
- *Grevillea parviflora subsp. parviflora*
- *Hypsela sessiliflora*
- *Marsdenia viridiflora subsp. viridiflora*
- *Persoonia nutans*
- *Pimelea curviflora var. curviflora*
- *Pimelea spicata*
- *Pterostylis saxicola*
- *Pultenaea parviflora*
- *Syzygium paniculatum*

Survey areas

- Study Area
- 10km search area

Topography

- City/Town
- Locality
- Dual Carriageway
- Major road
- Secondary/minor road
- Track
- Rail bridge
- Railway
- Canal
- River/creek - perennial
- River/creek - ephemeral
- Lake
- Reservoir
- Cemetery
- Park
- Forest

Acknowledgements:
Species records from DECC/NPWS and Biosis Research
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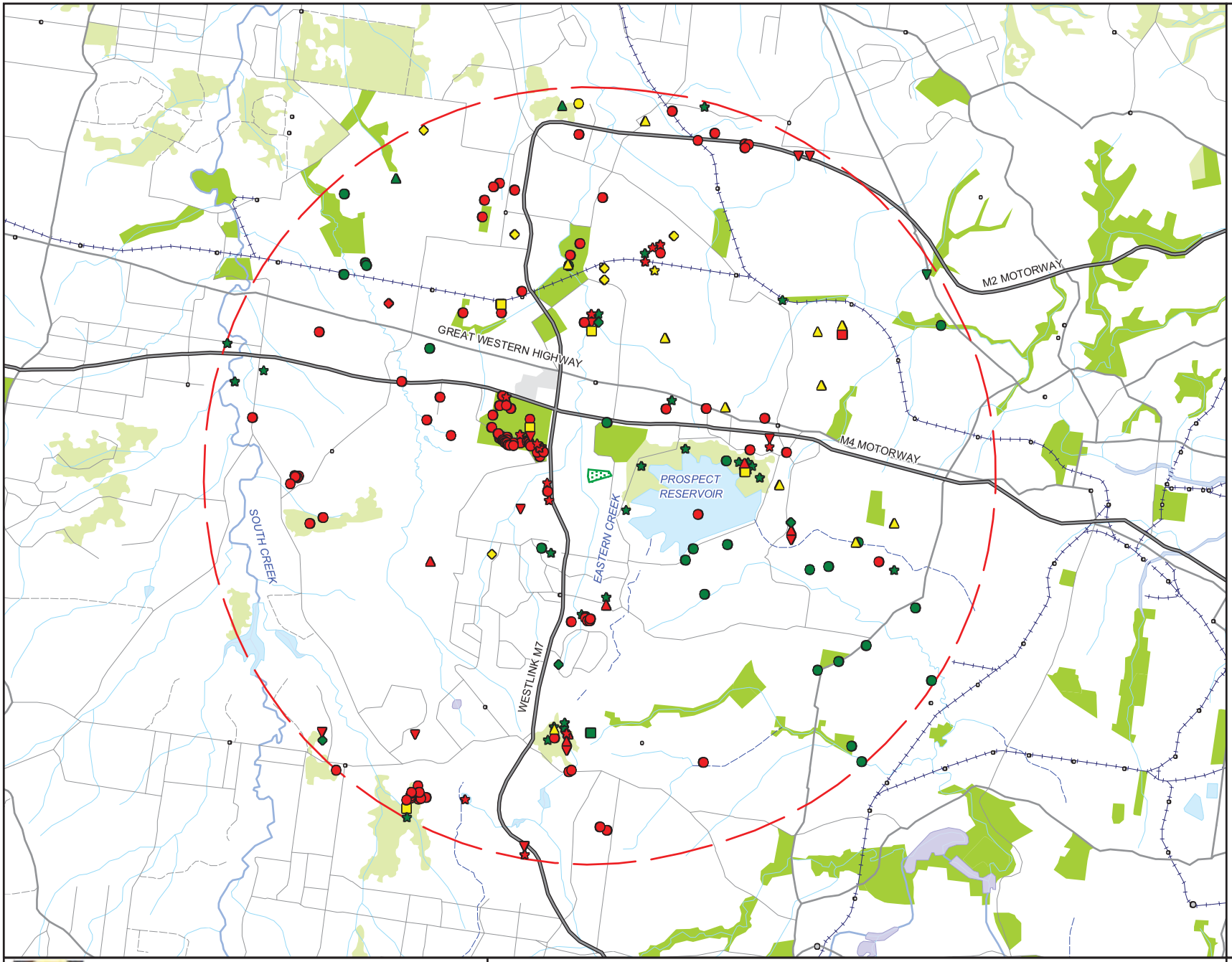
Figure 4: Threatened plant species, listed on the TSC Act, within 10km of the Study Area

Date: 16 October 2008
Checked by: GGL
File number: S5219
Location:-..5000\5200s\5219\Mapping\S5217 F4_flora.WOR

Scale: 0 1 2 3 4 5 kilometres

N W E S

Figure 4: Threatened plant species, listed on the TSC Act, within 10km of the Study Area



Legend

Threatened animal species

- Barking Owl
- Black-chinned Honeyeater (eastern subspecies)
- Cumberland Plain Land Snail
- Eastern Bentwing-bat
- Eastern False Pipistrelle
- Eastern Freetail-bat
- Gang-gang Cockatoo
- Greater Broad-nosed Bat
- Green and Golden Bell Frog
- Grey-headed Flying-fox
- Koala
- Large-eared Pied Bat
- Large-footed Myotis
- Regent Honeyeater
- Speckled Warbler
- Spotted-tailed Quoll
- Swift Parrot

Survey areas

- Study Area
- 10km search area

Topography

- City/Town
- Locality
- Dual Carriageway
- Major road
- Secondary/minor road
- Track
- Rail bridge
- Railway
- Canal
- River/creek - perennial
- River/creek - ephemeral
- Lake
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- Forest

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Figure 5: Threatened animal species, listed on the TSC Act, within 10km of the Study Area

Date: 16 October 2008
Checked by: GGL
File number: S5219
Location:-..5000\5200s\5219\Mapping\S5217 F5_fauna.WOR

Scale: 0 1 2 3 4 5 kilometres

N W E S

Figure 5: Threatened animal species, listed on the TSC Act, within 10km of the Study Area

APPENDICES

APPENDIX 1

Flora Results

Plant species recorded from the study area. 1 = Eastern portion of Cell 5; 2 = Western portion of Cell 5; and, 3 = Area around existing Siltation Management Pond

Family		Scientific Name	1	2	3	Common Name
Ferns and Fern-like Plants						
Adiantaceae						
		Adiantum aethiopicum			u	Maidenhair Fern
		Cheilanthes sieberi subsp. *sieberi*	u	u		
Monocotyledons						
Anthericaceae						
		Arthropodium milleflorum		u		Pale Vanilla-lilly
Asparagaceae						
	*N	*Asparagus aethiopicus*	u	u	o	Sprengeri 'Fern'
Commelinaceae						
		Commelina cyanea			u	Scurvy Weed
	*	*Tradescantia fluminensis*	u	u	o	Wandering Jew
Cyperaceae						
		Bolboschoenus (?) fluviatilis			u	
		Carex inversa			u	Knob Sedge
	*	*Cyperus eragrostis.*	o	u	u	Umbrella Sedge
	*	*Cyperus rotundus*	u			Nut Grass
		Fimbristylis dichotoma	u			Common Fringe-sedge
		Schoenoplectus validus			u	
Juncaceae						
	*	*Juncus acutus* subsp. *acutus*	o	o	o	Sharp Rush
		Juncus subsecundus		u		
		Juncus usitatus	u	u	u	
Lomandraceae						
		Lomandra longifolia			u	Spiny-headed Mat-rush
		Lomandra multiflora subsp. *multiflora*		u		Many-flowered Mat-rush
Phormiaceae						
		Dianella revoluta var. *revoluta*	u			Flax-lily
Poaceae						
	*	*Andropogon virginicus*	u	u		Whisky Grass
		Aristida vagans	u	u		Threeawn Speargrass
	*	*Avena fatua*	o	o	o	Wild Oats
	*	*Briza minor*	u	u	u	Shivery Grass
	*	*Bromus catharticus*	o	o		Prairie Grass
	*	*Chloris gayana*	u	u	u	Rhodes Grass
		Chloris ventricosa		u		Tall Chloris
	*N	*Cortaderia selloana*			u	Pampas Grass
		Cymbopogon refractus			u	Barbed Wire Grass
		Cynodon dactylon	o	o	o	Common Couch
	*	*Echinochloa crusgalli*	u	u	u	Barnyarg Grass
		Echinopogon caespitosus var. *caespitosus*	u		u	Tufted Hedgehog Grass
	*	*Ehrharta erecta*	c	c	u	Panic Veldtgrass

Family		Scientific Name	1	2	3	Common Name
		Entolasia stricta		u		Wiry Panic
	*	*Eragrostis curvula*	o	o	u	African Lovegrass
		Eragrostis leptostachya	u			Paddock Lovegrass
	*	*Lolium perenne*	c	c	c	Perennial Ryegrass
		Microlaena stipoides var. stipoides	u	u	u	Weeping Grass
		Oplismenus imbecillis	u	u	o	Basket Grass
	*	*Paspalum dilatatum*	c	c	o	Paspalum
		Paspalum distichum	u	u	u	Water Couch
	*	*Paspalum urvillei*			o	Vasey Grass
	*	*Pennisetum clandestinum*	c	c	o	Kikuyu Grass
	*	*Phalaris aquatica*	u	u	u	Phalaris
		Phragmites australis		u	u	Common Reed
	*	*Setaria gracilis*	u	u		Slender Pigeon Grass
		Sporobolus creber	u			Slender rat's Tails
		Themeda australis	u	u	u	Kangaroo Grass
Typhaceae						
		Typha orientalis	u	u	u	Cumbungi
Dicotyledons						
Acanthaceae						
		Brunoniella australis		u		Blue Trumpet
Amaranthaceae						
		Alternanthera denticulata			u	Lesser Joyweed
Apiaceae						
		Centella asiatica	u	u	u	Pennywortr
	*	*Cyclospermum leptophyllum*	u			Slender Celery
Asteraceae						
	*N	*Ambrosia artemisifolia*		u		Annual Ragweed
	*	*Aster subulatus*		u	u	Wild Aster
	*	*Bidens pilosa*	u	u	u	Pitchforks
	*	*Bidens subalternans*		u		Greater Beggar's Ticks
		Calotus lappulacea	u	u		Yellow Burr-daisy
	*	*Carduus pycnocephalus*	u			Slender Thistle
	*	*Cirsium vulgare*	u	u	u	Spear Thistle
	*	*Conyza bonariensis*		u		Fleabane
	*	*Conyza sumatrensis*			u	Tall Fleabane
		Euchiton involucratus	u	u	u	Star Cudweed
	*	*Hypochaeris radicata*	u		u	Catsear
	*	*Senecio madagascariensis*	u	u		Fire Weed
		Sigesbeckia orientalis subsp. *orientalis*	u			Indian Weed
	*	*Sonchus oleraceus*			u	Common Sowthistle
	*	*Taraxacum officinale*	u			Dandelion
		Vernonia cinerea		u		
	*N	*Xanthium occidentale*	u	u		Cockle Burr
Boraginaceae						
	*N	*Echium plantagineum*	u			Patterson's Curse
Brassicaceae						
	*	*Capsella bursa-pastoris*	u	u	u	Shepherd's Purse

Family		Scientific Name	1	2	3	Common Name
Campanulaceae						
		Wahlenbergia communis			u	Tufted Bluebell
		Wahlenbergia gracilis	u	u		Australian Bluebell
Caryophylaceae						
	*	*Cerastium glomeratum*	u	u		Mouse-ear Chickweed
	*	*Stellaria media*		u	u	Common Chickweed
Casuarinaceae						
		Casuarina glauca			c	Swamp Oakk
Chenopodiaceae						
	*	*Chenopodium album*	u		u	Fat Hen
		Einadia hastata	o	o	o	Berry Saltbush
		Einadia polygonoides	o	o	o	
Clusiaceae						
		Hypericum gramineum	o	o	u	Small St John's Wort
Convolvulaceae						
		Dichondra repens	c	c	o	Kidney Weed
Euphorbiaceae						
		Breynia oblongifolia	u		u	Coffee Bush
		Chamaesyce (?) dallachyana		u	u	
Fabaceae (Mimosoideae)						
		Acacia parramattensis			o	Parramatta wattle
	*	*Acacia saligna*		u		Golden Wreath wattle
Fabaceae (Faboideae)						
		Desmodium varians	u	u		Slender Tick-trefoil
		Glycine microphylla	u			
		Glycine tabacina	u	u	u	
		Hardenbergia violacea			u	False Sarsparilla
	*	*Trifolium repens*			o	White Clover
Gentianaceae						
	*	*Centaurium tenuiflorum*	u	u	u	Blue Dampiera
Malvaceae						
	*	*Malva parviflora*	u			Small-flowered Mallow
	*	*Modiola caroliniana*	u	u	u	Red-flowered mallow
	*	*Sida rhombifolia*	o	o	o	Paddy's Lucerne
Myoporaceae						
		Eremophila debilis	u			Amulla
Myrrsinaceae						
	*	*Anagallis arvensis*	u	u		Blue Pimpernel
Myrtaceae						
		Eucalyptus (?) moluccana (seedlings only)		o		Grey Box
		Eucalyptus tereticornis	o	o	u	Forest Red Gum
		Melaleuca styphelioides			u	Prickly-leaf Paperbark
Oxalidaceae						
	*N	*Oxalis corniculata*	u	u		Creeping Oxalis
		Oxalis perennans			u	
Phytolaccaceae						

Family		Scientific Name	1	2	3	Common Name
	*	*Phytolacca octandra*		u		Inkweed
Pittosporaceae						
		Bursaria spinosa			u	Blackthorn
Plantaginaceae						
	*	*Plantago lanceolata*	u	u	u	Lamb's Tongue
	*	*Plantago major*			u	Large Plantain
Polygonaceae						
	*	*Rumex crispus*	o	o	u	Curled Dock
Ranunculaceae						
		Clematis aristata			o	Old Man's beard
Rosaceae						
	*N	*Rubus fruticosus* sens. lat.			u	Blackberry
Rubiaceae						
		Asperula conferta			u	Common Woodruff
		Opercularia diphylla	u		u	
Solanaceae						
	*N	*.Lycium ferocissimum*	o	o	o	African Boxthorn
	*	*Solanum nigrum*	u		u	Nightshade
		Solanum prinophyllum			u	Forest Nightshade
	*	*Solanum pseudocapsicum*	u	u		Madeira Winter Cherry
Verbenaceae						
	*N	*Lantana camara*			u	Lantana
	*	*Verbena bonariensis*	u	u	u	Purpletop

Legend: * signifies exotic species
N = Noxious in the Blacktown LGA
c = common; o = occasional; u = uncommon

FLORA QUADRAT DATA

Site	1	Condition	Moderate to Poor
Location	Eastern section, adjacent to Ferrers Rd		

Plant Name	Tree Stems >30 cms DBH	Tree Stems <30 cms DBH or dead	Cover Abundance
Eucalyptus tereticornis	1	3	4
Eucalyptus tereticornis seedlings		(13)	2
*Lolium perenne**			6
*Setaria gracilis**			3
*Avena fatua**			3
*Ehrharta erecta**			4
*Bromus catharticus**			3
*Briza minor**			3
*Paspalum dilatatum**			3
*Juncus acutus**			3
*Cyperus eragrostis**			3
Cynodon dactylon			3
*Rumex crispus**			2
*Hypochaeris radicata**			2
*Oxalis perennans.**			2
Euchiton involucratus			1
*Cirsium vulgare**			1
*Lycium ferocissimum**			3
*Pennisetum clandestimum**			4
Leaf litter cover			4

Site	2	Condition	Fair to poor
Location	Centre of Cell 5		

Plant Name	Tree Stems >30 cms DBH	Tree Stems <30 cms DBHor dead	Cover Abundance
Eucalyptus tereticornis	1	9	4
Eucalyptus tereticornis seedlings		(8)	1
*Pennisetum clandestinum**			6
*Sida rhombifolia**			4
*Lycium ferocissimum**			4
*Avena fatua**			4
*Taraxacum officinale**			3
*Malva parviflora**			2
Dichondra repens			2
*Rumex crispus**			3
*Ehrharta erecta**			4
Cynodon dactylon			3
Juncus acutus			3
*Cirsium vulgare**			2
*Paspalum dilatatum**			4
*Lolium perenne**			4
Leaf litter cover			4

Site	3	Condition	Fair to poor
Location	Between existing Sedimentation Pond and Eastern Creek		

Plant Name	Tree Stems >30 cms	Tree Stems <30 cms or dead	Cover Abundance
Eucalyptus tereticornis	1	3	4
Casuarina glauca			4
Melaleuca styphelioides			1
*Tradescantia flumensis**			3
Typha orientalis			3
Adiantum aethiopicum			1
Wahlenbergia communis			2
*Lolium perenne**			6
Juncus usitatus			1
Cynodon dactylon			4
*Avena fatua**			4
Centella asiatica			3
Dichondra repens			3
*Cirsium vulgare**			2
Bursaria spinosa			2
*Juncus acutus**			2
*Rubus fruticosus** sens. lat.			3
*Paspalum urvillei**			3
*Sida rhombifolia**			4
Clematis aristata			4
*Lycium ferocissimum**			3
Leaf litter cover			4

APPENDIX 2

Fauna Results

Animal species recorded from the study area

Latin Name	Common Name	Eastern Creek	Eastern Creek corridor
*Acridotheres tristis**	Common Myna*		OW
Anas gracilis	Grey Teal		O
Corvus coronoides	Australian Raven	OW	OW
Limnodynastes peronii	Striped Marsh Frog		W
Limnodynastes tasmaniensis	Spotted Grass Frog		W
Manorina melanocephala	Noisy Miner		OW
Ocyphaps lophotes	Crested Pigeon		OW
Psephotus haematonotus	Red-rumped Parrot		OW
*Rattus norvegicus**	Brown Rat*		O
Threskiornis molucca	Australian White Ibis	OW	OW
	unidentified skink sp.	O	O

Key: **O:** Observed, **W:** Heard, ***:** Introduced species
Eastern Creek is the area around Eastern Creek and where the proposed drainage line would empty. Eastern Creek corridor is where the current drainage line runs.

APPENDIX 3

Impact Assessment following the Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act

Flora

Impact assessments are undertaken for five threatened plant species with potential habitat in the study area:

- *Acacia pubescens;*
- *Pimelea spicata;*
- *Grevillea juniperina* subsp. *juniperina;*
- *Marsdenia viridiflora subsp. viridiflora;* and
- *Hypsela sessiliflora;*

Acacia pubescens

Acacia pubescens is listed as Vulnerable in Schedule 2 of the TSC Act.

Acacia pubescens is a spreading shrub 1-4 m high with brilliant yellow flowers, bipinnate leaves and conspicuously hairy branches (NPWS 2003c). This species is known to occur on alluviums, shales and at the intergrade between shales and sandstones. The species has been recorded within Cumberland Plain Woodland, Cooks River Castlereagh Ironbark Forest and Shale Gravel Transition Forest (NPWS 2003c).

Acacia pubescens was not recorded in the study area; however potential habitat does exist in Cumberland Plain Woodland in the study area.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Acacia pubescens was recorded to the east of the study area in the vegetation around Prospect Reservoir. *Acacia pubescens* was not recorded in the study area. Potential habitat for the species does, however, exist within the CPW in the study area. Since no individuals were recorded in the study area, it is unlikely that a viable population of the species will be placed at risk of extinction due to the proposed works.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A..

(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.

N/A.

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

(i) the extent to which the 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.

The species has been recorded within Cumberland Plain Woodland, Cooks River Castlereagh Ironbark Forest and Shale Gravel Transition Forest (NPWS 2002e). DEC (NPWS 2002e) have mapped approximately 3,559 ha of potential habitat for *A. pubescens* within a 10 km radius of the study area.

The majority of the potential habitat for this species within the study area is in Moderate condition, with exotic species present in most structural layers and ecosystem functioning highly modified due to the high number of disturbances that the vegetation community is exposed to and the small size of the patch. Approximately 1.02 ha of potential habitat for *Acacia pubescens* will be impacted by the proposed development. The area of potential habitat for *Acacia pubescens* that will be removed as part of the proposed development equates to 0.03 % of the extent of potential habitat for the species in the locality (10 km radius of the study area).

Potential habitat for *Acacia pubescens* that will be disturbed as part of the proposed works is a small isolated patch of vegetation, with historical clearing fragmenting surrounding vegetation. The clearing of the vegetation in Cell 5 would not result in the isolation of any areas of potential habitat, as propagules are likely to be able to cross this distance.

Given the condition and size of the potential habitat to be removed, and the fact that no individuals were recorded during the current survey, this patch of vegetation is not considered to be vital for the long term survival of the species in the locality.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for *Acacia pubescens.*

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

A recovery plan has been prepared for *Acacia pubescens* (NPWS 2003a). The overall objective of the recovery plan is to prevent the status of *Acacia pubescens* from becoming endangered, by reducing habitat loss and by implementing management regimes aimed at maintaining representative populations across the species' range (NPWS 2003a).

Specific objectives of the recovery plan are (NPWS 2003a):

- to ensure that a representative sample of *A. pubescens* populations occurring on public and private lands are protected from habitat loss and managed for conservation;
- to reduce the impacts of threats at sites across the species' range;
- to ensure that any planning and management decisions that are made which affect the species, are made in accordance with the recovery objectives of this plan;
- to understand the biology, ecology, health and distribution of the species including the range of genetic variation;
- to develop the awareness and involvement of the broader community in the species and its conservation; and,
- to re-assess the conservation status of the species.

The recovery actions which aim to meet the overall objective include:

- identify sites that are a high priority to protect;
- carry out negotiations with public authorities to increase protection of sites;
- liaise with private landholders to increase protection of sites;
- negotiate with public authorities to implement threat and habitat management programs on public lands;
- informed environmental assessment and planning decisions are made; undertake studies into the genetic variability of the species;

- investigate the cause of disease in the species;
- research other aspects of the species' biology, ecology and distribution;
- encourage community involvement;
- provide advice and assistance to private landholders;
- maintain a database on the species;
- NPWS to be advised of any consents or approvals which affect *A. pubescens*; and,
- re-assess conservation status of species.

The proposal does not interfere with the objectives or recovery actions of the recovery plan for *Acacia pubescens,* since no individuals were recorded in the study area.

(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 listed as a Key Threatening Process. The proposal will involve the clearing of approximately 1.02 ha of vegetation that is potential habitat for *Acacia pubescens.*

'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' is another Key Threatening Process that is relevant to this species (NPWS 2003a). The proposal is not likely to result in an increased fire frequency in potential habitat for the species.

Conclusion

Acacia pubescens is known to occur within 2 km of the study area; however, it was not recorded during the field surveys for this assessment. Potential habitat for this species that will be removed by the proposed development represents a relatively small area and is degraded. For these reasons it is considered unlikely that the proposed development would have a significant impact on this species. A Species Impact Statement is not recommended.

Pimelea spicata

Pimelea spicata is listed as an endangered species on Schedule 1 of the TSC Act.

Pimelea spicata is a small spreading or erect shrub growing to 50 cm (NPWS 2004b). *Pimelea spicata* is known to occur in areas supporting or areas

previously supporting Cumberland Plain Woodland. Approximately 0.1 ha of CPW will be impacted by the proposed development.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

There are a number of recordings of *Pimelea spicata* within 10 km of the study area, the closest of which are approximately 3 km to the south and north-east (Figure 4). *Pimelea spicata* was not recorded in the study area. Potential habitat for the species does, however, exist within the CPW in the study area. Since no individuals were recorded in the study area, it is unlikely that the proposal will have an adverse impact on the lifecycle of the species such that a viable local population will be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(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.

N/A.

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

(i) the extent to which the 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.

In the study area, potential habitat for the species occurs in Cumberland Plain Woodland. DEC (NPWS 2002e) have mapped approximately 3,385 ha of CPW within a 10 km radius of the study area.

The potential habitat for this species within the study area is in Moderate condition, with exotic species present in most structural layers and ecosystem functioning highly modified due to the high number of disturbances that the vegetation community is exposed to. Approximately 1.02 ha of potential habitat will be impacted by the proposed development. The area of potential habitat for *Pimelea spicata* that will be removed as part of the proposed development equates to 0.03% of the extent of habitat for the species in the locality (10 km radius of the study area).

The patch of vegetation that is potential habitat for *Pimelea spicata* to be disturbed as part of the proposed works is currently isolated from surrounding vegetation by clearing for industrial and suburban development. The removal of part of this patch would not result in the isolation of any areas of potential habitat.

Given the condition and size of the potential habitat to be removed, and the fact that no individuals were recorded during the current survey, this patch of vegetation is not considered to be vital for the long term survival of the local population.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for *Pimelea spicata.*

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

A draft recovery plan has been prepared for *Pimelea spicata* (DEC 2004). The overall objective of this recovery plan is to ensure the continued and long-term survival of *P. spicata* in the wild by promoting the *in-situ* conservation of the species across its natural range. Specific recovery objectives include:

- conserve *P. spicata* using land-use and conservation planning mechanisms;
- identify and minimise the operation of threats at sites where *P. spicata* occurs;
- develop and implement a survey and monitoring program that will provide information on the extent and viability of *P. spicata*;
- provide the community with information that assists in conserving the species;

- raise awareness of the species and involve the community in the recovery program; and,
- conduct research that will assist future management decisions.

Since *Pimelea spicata* is not known to occur at the site, the removal of 1.02 ha of potential habitat is not considered to be inconsistent with the objectives or actions of the recovery plan.

(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 listed as a Key Threatening Process. The proposal will involve the clearing of approximately 1.02 ha of vegetation that is potential habitat for *Pimelea spicata.*

'Invasion of native plant communities by exotic perennial grasses' is also listed as a Key Threatening Process that may impact on *Pimelea spicata,* with *Pennisetum clandestinum* known to compete with the species at the majority of known sites (DEC 2004). *Pennisetum clandestinum* was recorded on the edges of the patch of CPW in the study area, underneath the existing easement. Maintenance of the powerline should ensure that exotic grasses do not spread from the edges into the adjoining patch of CPW. Some bush regeneration may be required to prevent weeds occurring on the edge of the powerline easement from further spreading into adjoining areas.

Conclusion

Pimelea spicata is known to occur within 10 km of the study area; however, it was not recorded during the field surveys for this assessment. Potential habitat for this species that will be removed by the proposed development represents a relatively small area and is degraded. For these reasons it is considered unlikely that the proposed development would have a significant impact on this species. A Species Impact Statement is not recommended.

Grevillea juniperina subsp *juniperina*

Grevillea juniperina subsp. *juniperina* is listed as Vulnerable in Schedule 2 of the TSC Act.

Grevillea juniperina subsp. *juniperina* is broadly spreading to erect shrub to 3 m in height. This species is known to occur within reddish clay to sandy soils derived from Wianamatta shale and Tertiary alluvium. The species has been recorded within Cumberland Plain Woodland, Castlereagh Ironbark Woodland,

Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest (NPWS 2002c).

Grevillea juniperina subsp. *juniperina* was not recorded in the study area; however potential habitat does exist in the Cumberland Plain Woodland in the study area. The proposed development will impact on 1.02 ha of Cumberland Plain Woodland in the study area that is potential habitat for *Grevillea juniperina* subsp. *juniperina.*

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

There are eight recordings of *Grevillea juniperina* subsp *juniperina* within 5 km of the study area (Figure 4). *Grevillea juniperina* subsp. *juniperina* was not recorded in the study area. Potential habitat for the species does, however, exist within the CPW in the study area. Since no individuals were recorded in the study area, it is unlikely that a viable population of the species will be placed at risk of extinction due to the proposed works.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(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.

N/A.

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

(i) the extent to which the 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.

The species has been recorded within Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest (NPWS 2002c). DEC (NPWS 2002e) have mapped approximately 1,032 ha of potential habitat for *Grevillea juniperina* subsp. *juniperina* within a 10 km radius of the study area.

The potential habitat for this species within the study area is in moderate condition, with exotic species present in most structural layers and ecosystem functioning highly modified due to the high number of disturbances that the vegetation community is exposed to. Approximately 1.02 ha of potential habitat will be impacted by the proposed development. The area of potential habitat for *Grevillea juniperina* subsp. *juniperina* that will be removed as part of the proposed development equates to 0.1% of the extent of potential habitat for the species in the locality (10 km radius of the study area).

The patch of vegetation that is potential habitat for *Grevillea juniperina* subsp. *juniperina* to be disturbed as part of the proposed works is currently isolated from surrounding vegetation by clearing for industrial and suburban development. The removal of part of this patch would not result in the isolation of any areas of potential habitat.

Given the condition and size of the potential habitat to be removed, and the fact that no individuals were recorded during the current survey, this patch of vegetation is not considered to be vital for the long term survival of the species in the locality.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for *Grevillea juniperina* subsp. *juniperina.*

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

To date, no recovery plan or threat abatement plan has been written for *Grevillea juniperina* subsp. *juniperina.*

(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 listed as a Key Threatening Process. The proposal will involve the clearing of approximately 1.02 ha of vegetation that is potential habitat for *Grevillea juniperina* subsp. *juniperina.*

Conclusion

Grevillea juniperina subsp. *juniperina* is known to occur within 10 km of the study area; however, it was not recorded during the field surveys for this assessment. Potential habitat for this species that will be removed by the proposed development represents a relatively small area and is degraded. For these reasons it is considered unlikely that the proposed development would have a significant impact on this species. A Species Impact Statement is not recommended.

Marsdenia viridiflora subsp. *viridiflora* population

Marsdenia viridiflora subsp. *viridiflora* is listed as an Endangered Population in Part 2 of Schedule 1 of the TSC Act.

The *Marsdenia viridiflora* subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas, occurs as very scattered plants in areas of remnant vegetation (NSW Scientific Committee 2002). There are relatively recent records from Prospect Reservoir, approximately 2 km to the west of the study area (Figure 4).

Potential habitat for *Marsdenia viridiflora* subsp. *viridiflora* occurs in Cumberland Plain Woodland in the study area. Approximately 1.02 ha of potential habitat for *Marsdenia viridiflora* subsp. *viridiflora* will be impacted by the proposed development.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Several recordings of *Marsdenia viridiflora* subsp. *viridiflora occur* within 10 km of the study area (Figure 4). However, *Marsdenia viridiflora* subsp. *viridiflora* was not recorded in the study area. Potential habitat for the species does, however, exist within the CPW in the study area. Since no individuals were recorded in the study area, it is unlikely that the proposal will have an adverse impact on the lifecycle of the species that constitutes the endangered population such that a viable local population will be placed at risk of extinction.

(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.

N/A.

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

(i) the extent to which the 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.

The species is known to occur in woodland and scrub. In the study area, potential habitat for the species occurs in Cumberland Plain Woodland. DEC (NPWS 2002e) have mapped approximately 3,385 ha of CPW within a 10 km radius of the study area.

The potential habitat for this species within the study area is in Moderate condition, with exotic species present in most structural layers and ecosystem functioning highly modified due to the high number of disturbances that the vegetation community is exposed to. Approximately 1.02 ha of potential habitat will be impacted by the proposed development. The area of potential habitat for *Marsdenia viridiflora* subsp. *viridiflora* that will be removed as part of the

proposed development equates to 0.03% of the extent of similar habitats for the species in the locality (10 km radius of the study area).

The patch of vegetation that is potential habitat for *Marsdenia viridiflora* subsp. *viridiflora* to be disturbed as part of the proposed works is currently isolated from surrounding vegetation by clearing for industrial, residential and recreational development. The removal of part of this patch would not result in the isolation of any areas of potential habitat.

Given the condition and size of the potential habitat to be removed, and the fact that no individuals were recorded during the current survey, this patch of vegetation is not considered to be vital for the long term survival of the local population.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for *Marsdenia viridiflora* subsp. *viridiflora.*

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

To date, no recovery plan or threat abatement plan has been written for *Marsdenia viridiflora* subsp. *viridiflora.*

(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 listed as a Key Threatening Process. The proposal will involve the clearing of approximately 1.02 ha of vegetation that is potential habitat for *Marsdenia viridiflora* subsp. *viridiflora.*

Conclusion

Marsdenia viridiflora subsp. *viridiflora* is known to occur within 10 km of the study area; however, it was not recorded during the field surveys for this assessment. Potential habitat for this species that will be removed by the proposed development represents a relatively small area and is degraded. For these reasons it is considered unlikely that the proposed development would have a significant impact on this species. A Species Impact Statement is not recommended.

Hypsela sessiliflora syn. *Isotoma sessiliflora*

Hypsela sessiliflora is listed as an Endangered Species in Part 2 of Schedule 1 of the TSC Act.

Hypsela sessiliflora is only known from two locations in Erskine Park, approximately 6 km to the south of the study area. All previous locations, where it is assumed that the species is now extinct, are within western Sydney. *Hypsela sessiliflora* is a prostrate herb which grows in damp places in or adjacent to Cumberland Plain Woodland.

Potential habitat for *Hypsela sessiliflora* occurs in wet areas adjacent to stands of Cumberland Plain Woodland in the study area. Approximately 0.5 ha of potential habitat for *Hypsela sessiliflora a* will be impacted by the proposed development.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

There are only two recordings of *Hypsela sessiliflora* within 10 km of the study area (Figure 4). *Hypsela sessiliflora* was not recorded in the study area. Potential habitat for the species does, however, exist in wet areas adjacent to the CPW in the study area. Since no individuals were recorded in the study area, it is unlikely that the proposal will have an adverse impact on the lifecycle of the species that constitutes the endangered population such that a viable local population will be placed at risk of extinction.

(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.

N/A.

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

(i) the extent to which the 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.

The species is known to occur in wet areas adjacent to Cumberland Plain Woodland. In the study area, potential habitat for the species occurs in several wet areas adjacent to narrow bands of Cumberland Plain Woodland. DEC (NPWS 2002e) have mapped approximately 3,385 ha of CPW within a 10 km radius of the study area.

The potential habitat for this species within the study area is in Poor condition, with ground-cover adjacent to wet areas either sparse, or consisting mainly of exotic species and an ecosystem functioning highly modified due to the high number of disturbances that the vegetation community is exposed to. Approximately 0.5 ha of potential habitat will be impacted by the proposed development. The area of potential habitat for *Hypsela sessiliflora* that will be removed as part of the proposed development equates to 0.03% of the extent of similar habitats for the species in the locality (10 km radius of the study area).

The patch of vegetation that is potential habitat for *Hypsela sessiliflora* to be disturbed as part of the proposed works is currently isolated from surrounding vegetation by clearing for industrial, residential and recreational development. The removal of part of this patch would not result in the isolation of any areas of potential habitat.

Given the condition and size of the potential habitat to be removed, and the fact that no individuals were recorded during the current survey, this patch of vegetation is not considered to be vital for the long term survival of the local population.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for *Hypsela sessiliflora.*

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

To date, no recovery plan or threat abatement plan has been written for *Hypsela sessiliflora.*

(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 listed as a Key Threatening Process. The proposal will involve the clearing of approximately 0.5 ha of vegetation that is potential habitat for *Hypsela sessiliflora.*

Conclusion

Hypsela sessiliflora is known to occur within 10 km of the study area; however, it was not recorded during the field surveys for this assessment. Potential habitat for this species that will be removed by the proposed development represents a relatively small area and is degraded. For these reasons it is considered unlikely that the proposed development would have a significant impact on this species. A Species Impact Statement is not recommended.

Cumberland Plain Woodland

Cumberland Plain Woodland (CPW) is listed as an Endangered Ecological Community (EEC) in Part 3 of Schedule 1 of the TSC Act. A preliminary determination to list Cumberland Plain Woodland as a Critically Endangered Ecological Community (CEEC) was proposed on 21/11/08. The Determination for CPW as an EEC includes the comment that "The understorey is generally grassy to herbaceous with patches of shrubs, or if disturbed, contains components of indigenous native species sufficient to re-establish the characteristic native understorey…" The preliminary determination to list CPW as a CEEC states that "Either or both of the upper-storey and mid-storey may be absent from the community".

CPW occurs in the study area and will be impacted by the proposed development. The majority of the patch has a canopy in Moderate condition, with impacts from weed invasion, rubbish dumping, fragmentation and adjoining land uses resulting in a low diversity of native species in the understorey and exotic species present in both the midstorey and understorey. The patch is isolated from riparian vegetation along Eastern Creek by clearing for buildings, roads and pipelines. To the east the patch has been isolated by the realignment of Ferrers Road.

The proposal will result in clearing of approximately 1.02 ha of Cumberland Plain Woodland in the study area.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A.

(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.

The vegetation in the study area occurs within a highly developed area, with the expansion of Sydney resulting in large industrial and residential developments in the local area. DEC (NPWS 2002e) vegetation mapping indicates that approximately 3,385 ha of CPW (Shale Plains Woodland and Shale Hills Woodland) occurs within a 10 km radius of the study area. This mapping also shows the vegetation community generally occurs as small disturbed remnants within developed land. The proposal will result in the removal of approximately 1.02 ha of CPW in the study area.

The patch of CPW that will be removed as a result of the proposed works is already highly modified through disturbances such as weed invasion, rubbish dumping, soil modification, fragmentation and edge effects. Given the small size of the patch and the presence of ongoing disturbances, without significant resources allocated to its rehabilitation it is likely that the patch will further degrade with time. Furthermore, the small size of the patch, together with its isolation, suggests its rehabilitation would not significantly improve the status of the community in the locality.

The species composition of the patch of CPW is already modified, with highly invasive exotic species present in most structural layers. The ecosystem functioning of this community has been significantly altered due to the variety of disturbances that the vegetation is exposed to.

The proposed development will occur in already modified areas of CPW that are unlikely to naturally regenerate without significant resources allocated to its rehabilitation.

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

(i) the extent to which the 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.

DEC (NPWS 2002e) have mapped approximately 3,385 ha of CPW with a 10 km radius of the study area. The CPW within the study area is in Moderate condition at canopy level, with exotic species present in most structural layers and ecosystem functioning modified due to the high number of disturbances that the community is exposed to and the small size of the patch. Approximately 1.02 ha of CPW would be impacted by the proposal.

The area that would be impacted by the proposed development equates to 0.03% of the extent of the community in the locality (10 km radius of the study area).

The patch of CPW to be disturbed is currently isolated from surrounding patches of vegetation by existing roads, powerlines, pipelines and clearing for industrial development. The removal of this patch would not result in the isolation of any CPW.

Given the condition and area of CPW to be removed, this patch of vegetation is not considered to be vital for the long term survival of the community in the locality, as it is likely to degrade further with time unless a significant amount of resources are allocated to its rehabilitation.

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

Under the TSC Act, the Director-General maintains a Register of Critical Habitat. To date, no critical habitat has been declared for CPW.

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

A recovery plan for CPW is currently being prepared. The Endangered Ecological Community Information for CPW (NPWS 2004a) refers to regeneration of disturbed patches and maintaining all structural layers, including the understorey, to ensure the viability of the remnant, although the preliminary determination suggests that "….restoration of Cumberland Plain Woodland has proved to be problematic on sites that have been exposed to ….soil disturbances" (such as earthworks, cultivation, fertiliser application or other means of nutrient or moisture enrichment). In its present state, the understorey is not intact, with a low diversity of native species present. A large amount of resources would need to be dedicated to the regeneration of the patch to make to patch viable in the long term.

(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 listed as a Key Threatening Process. The proposal will involve clearing of approximately 1.02 ha of CPW.

Conclusion

Given the size and condition of the patch of CPW that will be impacted by the proposed works, the clearance of modified CPW within the study area is considered unlikely to have a significant impact on this Endangered Ecological Community. A Species Impact Statement is not considered to be required.

River-flat Eucalypt Forest

A component of River-Flat Eucalypt Forest on Coastal Floodplains occurs on the extreme western boundary of the study area. Although no trees will require removal from this stand, an assessment of significance for this vegetation type has been prepared.

River-Flat Eucalypt Forest on Coastal Floodplains occurs principally on silts, clay loams and sandy loams on alluvial flats, drainage lines and river terraces associated with coastal floodplains [NSW Scientific Committee, 2004 #4685]. River-Flat Eucalypt Forest on Coastal Floodplains generally occurs below 50 m elevation but may occur on localised river flats up to 250 m elevation. The community varies between regions, but dominant tree species generally include

Eucalyptus tereticornis, *E. amplifolia*, *Angophora floribunda*, *A. subvelutina* and *Casuarina glauca*. In 1998,there were "….less than 10,000 ha on the NSW south coast from Sydney to Moruya, of which up to about three-quarters occurred on the Cumberland Plain" (NSW Scientific Committee, 2004). The proposed increased Sedimentation Control Pond will not impact on the section of River-Flat Eucalypt Forest on Coastal Floodplains as no trees from the stand will require removal.

In the case of a threatened species, whether the life cycle 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

NA

In the case of an Endangered Population, whether the life cycle 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

NA

In relation to the regional distribution of a habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed

River-Flat Eucalypt Forest on Coastal Floodplain is located in the North Coast, Sydney Basin and South East corner bioregions. The distribution of River-Flat Eucalypt Forest on Coastal Floodplain is now highly fragmented throughout this range and the total area of this community remaining is unknown.

No trees or shrubs within the stand of River-Flat Eucalypt Forest on Coastal Floodplain will be removed. Therefore a significant area of known habitat is not likely to be removed by the proposal.

Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community

The Proposed Project will not directly impact on the stand of River-Flat Eucalypt Forest on Coastal Floodplain. This patch forms part of a complete continuous stand of riparian vegetation along Eastern Creek, although this corridor is cut to the north and to the south of the study area by highways

The vegetation adjacent to the proposed diverted drainage channel has a low number of native species, and a number of past disturbances have led to a moderate infestation of weeds, an altered forest structure and a subsequent

reduction in ecosystem resilience. For these reasons, the section of River-Flat Eucalypt Forest on Coastal Floodplain is generally considered to be in a Moderate condition.

It is not anticipated that the Proposed Project will exaggerate the existing fragmentation of River-Flat Eucalypt Forest on Coastal Floodplain that falls within the development footprint. Furthermore, the Proposed Project is not likely to increase the fragmentation and isolation of River-Flat Eucalypt Forest on Coastal Floodplain throughout its range.

Whether critical habitat will be affected

Critical habitat is declared under the TSC Act. No critical habitat is present within the study area or is likely to be impacted by the Proposed Project.

Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region

It is considered that this community is not adequately represented in conservation reserves given the current and continuing threats to the community (NSW Scientific Committee, 2004).

Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Clearing of Native Vegetation is recognised as a Key Threatening Process under Schedule 3 of the TSC Act. The Proposed Project will not result in the clearance of this community.

Whether any threatened species, population or ecological community is at the limit of its known distribution

Given that River-Flat Eucalypt Forest on Coastal Floodplain is a listed EEC on the North Coast, Sydney Basin and South East Corner bioregions it is not likely that the community is at the known limit of its distribution.

Conclusion

River-Flat Eucalypt Forest on Coastal Floodplain is not likely to be adequately represented in conservation reserves in NSW and clearing of native vegetation is a Key Threatening Process.

However, the area of River-Flat Eucalypt Forest on Coastal Floodplain to be impacted by the proposal is not considered to be significant, the proposed diversion will not exaggerate existing fragmentation of the community, critical

habitat is not declared for this EEC and it is not likely that the River-Flat Eucalypt Forest on Coastal Floodplain vegetation along thewestern boundary of the study area is at the limit of its known distribution.

On balance, the future survival of River-Flat Eucalypt Forest on Coastal Floodplain is not considered to be under threat from the proposed development and therefore it is not likely to have a significant impact on this EEC.

Fauna

Impact assessments are undertaken for 11 threatened animal species with potential habitat in the study area:

- Cumberland Plain Land Snail
- Green and Golden Bell Frog
- White-bellied Sea Eagle
- Native nectar and flower feeders:
    - Grey-headed Flying-fox
    - Swift Parrot
    - Regent Honeyeater
- Microchiropteran Bats – hollow/cave-dependant species
    - Eastern Freetail-bat
    - Large-footed Myotis
    - Greater Broad-nosed Bat
    - Eastern False Pipistrelle
    - Eastern Bentwing Bat

Cumberland Plain Land Snail — *Meridolum corneovirens*

The Cumberland Plain Land Snail is listed as Endangered on Schedule 1 of the TSC Act. Cumberland Land Snails occur in on the Cumberland Plain west of Sydney, generally associated with Cumberland Plain Woodland. Cumberland Land Snails live under the litter of bark, leaves and logs, or shelter in loose soil around grass clumps, and feed on fungus. During drought the snail will burrow deeper into the soil to avoid the dry conditions (NPWS 1999a).

Potential habitat for this species occurs throughout the study area.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Very little is known of the ecology and biology of the Cumberland Land Snail. It occurs within Cumberland Plain Woodland, Castlereagh Woodlands of the Cumberland Plain. The snails feed on fungus associated with decaying leaf litter and bark of eucalypts. Cumberland Land Snails can probably breed year-round, laying up to 25 eggs when conditions are suitable (i.e. damp). It is not known

what number of individuals constitutes a viable local population, or what the dispersal patterns are or how far individuals can travel (NPWS 1999a; NPWS 2000).

The Cumberland Plain Land Snail was not recorded in the study area during this survey or a previous survey nearby from several years ago (NECA 2002) despite targeted searches. The woodland that is to be removed does not represent prime Cumberland Plain Land Snail habitat, lacking good cover for the species. It is unlikely the species is present, but ground cover for the species does occur in the study area, albeit sparsely and in highly disturbed areas. If the species was present, the Proposal may significantly affect the lifecycle of this species by killing breeding individuals and destroying possible breeding sites.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The Cumberland Land Snail was not recorded during the field surveys. Potential habitat for the species occurs throughout woodland in the study area.

The woodland in the study area does not contain the ample leaf litter this species prefers, and the shelter available would not protect any snails substantially from the large number of predators (Australian White Ibis, Australian Raven, Brown Rat) present. Brown Rats were observed running through a maze of tunnels and overhangs on the banks of the drainage line and at the base of large trees where snails might normally shelter.

Cumberland Land Snail habitat within the study area is therefore of poor quality. It is slightly better around Eastern Creek to the west of the corridor to be removed, but the best areas where the soil is moister and shelter more readily available are unlikely to be significantly impacted by the Proposal. The Proposal would remove some poor quality habitat for this species and may impact indirectly on some moderate quality habitat for this species.This is unlikely to impact on a local population of this species as the habitat in the immediate vicinity is already heavily fragmented and degraded and the likelihood of the species being present there is low. There is also slightly better quality habitat nearby where snails may find refuge if the Proposal disturbed them.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Cumberland Land Snail has a very restricted distribution, occurring from Richmond and Windsor in the north to Picton in the south and Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains (NPWS 1999a). The study area is not at or near the limits of this species' known distribution.

How is the proposal likely to affect current disturbance regimes?

The Proposal is unlikely to affect fire regimes of the study area. The Proposal will alter the path of a drainage line and inundate a small area that was not previously flood-prone. This is unlikely to have an affect on the Cumberland Land Snail.

How is the proposal likely to affect habitat connectivity?

The Proposal would remove 1.02ha of woodland joining the forest around Prospect Reservoir to the east of the study area with the Eastern Creek corridor to the west of the study area. The Cumberland Land Snail is calculated to have a genetic neighbourhood with a radius of 350 m and high genetic variation within just 2 m, which is very small (Clarke and Richardson 2002). This number indicates this species moves very little and the corridor to be removed is considered too fragmented for use by the Cumberland Land Snail due to its disruption by two roads – one within the study area and one at the eastern boundary of the study area.

It is not known how far individual snails travel or what their dispersal patterns are (NPWS 1999a), but it is expected that they are not very mobile and do not disperse far. It is uncertain if the corridor contains habitat the Cumberland Land Snail is able to live in. Potential predators are abundant and cover is relatively sparse. However, if the species was present in the study area, the Proposal would likely reduce habitat connectivity for this species.

How is the proposal likely to affect critical habitat?

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General of DECC maintains a register of critical habitat. To date, no critical habitat has been declared for this species.

Conclusion:

The impact of the Proposal on the Cumberland Land Snail is likely to be moderate if the species occurs in the study area as:

- The Proposal may impact detrimentally on the lifecycle of a local population of this species if one exists;
- The Proposal may result in the removal of poor quality potential habitat for this species;

However, the species has not been recorded in the study area despite targeted surveys. The potential habitat that would be directly impacted is considered poor at best. The Proposal would not impact on critical habitat for this species.

Green and Golden Bell Frog *Litoria aurea*

The Green and Golden Bell Frog (GGBF) is listed as Endangered under Schedule 1 of the TSC Act and as Vulnerable under the EPBC Act. The species was not recorded within the study area during the previous or current surveys.

The GGBF is a medium-sized, stout frog, usually pea green in colour with brass or gold-coloured spots on the back. A cream stripe runs down the side of the body from the eye almost to the groin (DEC 2005c). The GGBF is known to occupy areas with a variety of habitat features throughout its range. However, there are important habitat components that the species requires to survive, including ephemeral water bodies, grassy surroundings for foraging and refuge, shelter sites, basking sites and over-wintering sites (Pyke and White 2001). The presence of exotic predatory fish *Gambusia holbrooki* is considered a crucial limiting factor, affecting the long-term survival of the species (Pyke and White 2001). The GGBF spends much of its time amongst emergent aquatic or riparian vegetation but also uses and disperses into other areas including fallen timber adjacent to breeding habitat and other vegetation such as grassland, cropland and modified pastures.

Potential habitat for this species occurs in and around water bodies in the study area.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The GGBF has not been recorded in the study area. The species breeds in still or slow flowing water bodies with some aquatic emergent vegetation such as *Typha* spp. or *Eleocharis* spp. The drainage line in the study area is slow flowing, but has little emergent vegetation. The water quality is very poor, but this species is known for occurring in disturbed sites. The study area is also lacking in refuge and basking sites for this species. It is therefore unlikely the water bodies in the study area represent breeding habitat for this species.

The study area may act as a corridor for GGBFs moving from areas they have been recorded east of the study area at Prospect Reservoir and west of the study area. The Proposal may affect the lifecycle of this species through reduced gene flow.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The GGBF was not recorded during the field surveys. Potential habitat for the species occurs and around water bodies in the study area.

The water bodies in the study area were generally of poor quality, heavily polluted from the abundant Australian White Ibis roosting and nesting in the area. Riparian vegetation was sparse and usually somewhat flattened by the nesting activities of the Ibis. The water bodies lacked the bulrushes and spikerushes favoured by GGBFs and there were few refuge sites or basking sites. There was an over-abundance of predators such as the Ibis, Australian Ravens, Brown Rats, and many reports of snakes.

The Proposal would divert the current drainage line, thus removing potential habitat for the GGBF.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. The study area is not at or near the limits of this species' known distribution.

How is the proposal likely to affect current disturbance regimes?

The Proposal is unlikely to affect fire regimes of the study area. The Proposal will alter the path of a drainage line and inundate a small area that was not previously flood-prone. This is likely to temporarily remove any frog habitat in the study area, however, as the new drainage line will be revegetated and it is unlikely any GGBFs are permanent residents in the study area, this is unlikely to significantly affect the GGBF.

How is the proposal likely to affect habitat connectivity?

The Proposal would remove a drainage line that may act as part of a corridor joining the forest around Prospect Reservoir to the east of the study area with the Eastern Creek corridor to the west of the study area.

GGBFs are considered a highly mobile amphibian species and have been recorded up to 700 m from breeding sites (Goldingay and Lewis 1999). The drainage line may therefore be an important conduit for this species moving throughout the landscape. Final rehabilitation of the diverted drainage line would potentially create better GGBF habitat than that offered by the current drainage line. It is considered that for the time between the removal of the current drainage line and the establishment of vegetation in the new drainage line, the Proposal would result in greatly reduced habitat connectivity for this species. Once the new drainage line has been revegetated, connectivity would be reinstalled for this species.

How is the proposal likely to affect critical habitat?

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General of DECC maintains a register of critical habitat. To date, no critical habitat has been declared for this species.

Conclusion:

The impact of the Proposal on the GGBF is likely to be insignificant as:

- The Proposal is unlikely to impact on the lifecycle of this species;
- The Proposal may result in the temporary removal of poor quality potential habitat for this species and the creation of better habitat for this species; and,
- The Proposal would be likely to disrupt habitat connectivity for this species temporarily if a local population exists.

Regent Honeyeater *Xanthomyza phrygia*, Swift Parrot *Lathamus discolor* and Grey-headed Flying-fox *Pteropus poliocephalus*

The Regent Honeyeater is listed as Endangered under Schedule 1 of the TSC Act and as Endangered under the EPBC Act. The Swift Parrot is listed as Endangered on Schedule 2 of the TSC Act and as Endangered on the EPBC Act. The Grey-headed Flying-fox is listed as Vulnerable on Schedule 2 of the TSC Act and as Vulnerable on the EPBC Act.

Potential foraging habitat for these threatened species exists within the study area. These species have been grouped together for their similar foraging requirements, and because the study area contains foraging resources only for these species.

The Grey-headed Flying-fox, Swift Parrot and Regent Honeyeater were not recorded during the current survey or within the study area but have been recorded on a few occasions within the locality. Potential foraging habitat exists in the study area in woodlands and forests. It is possible that the Swift Parrot and Regent Honeyeater would use the resources within the study area on occasion however it is unlikely they are dependant on them.

The Proposal is likely to impact 1.02 ha of potential woodland habitat containing possible food resources for these species. It is unlikely that the Proposal would have a significant impact on the habitats for these species as this woodland habitat is small in size and foraging resources for these species are sparse and seasonal.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW the species mostly occurs on the coast and south west slopes (DEC 2005r).

The Regent Honeyeater breeds at only three known key breeding regions: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. The study area is not located near any of the key breeding areas for this species. The species does not nest unless it has access to large amounts of nectar from native trees (D. Geering pers. comm.). There are not enough native flowering trees in the study area to support Regent Honeyeaters for very long and if they were to occur in the study area they would likely be visiting for an opportunistic feed only.

The Grey-headed Flying-fox congregates in large numbers at roosting sites (camps) in a wide range of vegetation types. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring. No camps occur in the study area or nearby.

It is therefore unlikely that the study area supports a local population of the Swift Parrot, Regent Honeyeater, or Grey-headed Flying-fox. It is possible that these species would visit the native trees in the study area when they were flowering to forage. The potential foraging resources in the study area are not considered to be important to these species due to the sparcity of native trees present combined with the overwhelming presence of Australian White Ibis and Australian Ravens, the latter being a potential predator of Regent Honeyeaters and Swift Parrots and the former occurring in such densities as to possibly alter the suitability of the habitat for use by some other species. These species are all highly mobile and it is unlikely that they would be dependant on the habitat resources within the study area for continued survival. Therefore it is unlikely the removal and/or modification of 1.02 ha of potential habitat would have a major impact on the lifecycle of these species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The Swift Parrot, Regent Honeyeater and Grey-headed Flying-fox were not recorded during the current survey or within the study area, but night surveys were not done to record Grey-headed Flying-foxes. All three species are considered highly mobile ((NPWS 1999c; Higgins *et al.* 2001). Most records of the Regent Honeyeater are from box-ironbark eucalypt forests associations and

wet lowland coastal forests, and Swift Parrots are also known to favour these vegetation assemblages (NPWS 1999c; Pizzey and Knight 2007).

The Regent Honeyeater has a patchy distribution throughout a large geographic range. The species is known to breed at a small number of sites containing a variety of key *Eucalyptus* spp., particularly *E. sideroxylon*, *E. melliodora* and *E. albens*, *E. robusta*, but also *E. tereticornis* and *E. moluccana* (Schedvin 1996; Webster & Menkhorst 1992; Franklin *et al*. 1989). There are particular box-ironbark woodlands usually associated with breeding for the Regent Honeyeater which were not observed during the survey and there are no known breeding sites within the locality. The study area is not located near any of the key breeding areas for this species.

The Swift Parrot breeds in Tasmania during spring and summer. In NSW the species mostly occurs on the coast and south west slopes (DEC 2005r). When migrating during the non-breeding season, the Swift Parrot can occur on the mainland in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta*, *Corymbia maculata*, *C. gummifera*, *E. sideroxylon*, and *E. albens*. Commonly used lerp infested trees include *E. microcarpa*, *E. moluccana* and *E. pilularis* (DEC 2005r).

The diet of the Grey-headed Flying-fox is varied, encompassing a wide range of fruits and blossoms from both native and non-native trees (Strahan 1995). The study area contains some flowering native trees that may provide opportunistic foraging resources for this mobile species, but given the small number of such trees in the study area and the poor quality of the site in general, it is highly unlikely the study area contains significant foraging resources for this species.

The Proposal is likely to impact 1.02 ha of potential woodland habitat. Larger, higher quality areas of potential habitat occur within the locality and as such it is unlikely that the habitat to be removed is important to the long-term survival of the species.

It is unlikely this proposal would have major impacts on the composition of potential habitat of these species.

However, given the lack of records within the locality; the lack of preferred feed trees within the study area; and the species' high mobility, it is unlikely that the Swift Parrot would be dependant on the habitat resources within the study area for continued survival. Therefore it is unlikely the removal and/or modification of 1.02 ha of potential habitat would have a significant impact on these species.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland.

The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland.

The Grey-headed Flying-fox occurs along the east coast of Australia from Rockhampton in Queensland to western Victoria.

The study area is not at the limit of the distribution for the Regent Honeyeater, Swift Parrot or Grey-headed Flying-fox.

How is the proposal likely to affect current disturbance regimes?

The Proposal is unlikely to affect fire regimes of the study area. The Proposal will alter the path of a drainage line and inundate a small area that was not previously flood-prone. This is unlikely to have an affect on the Regent Honeyeater, Swift Parrot or Grey-headed Flying-fox.

How is the proposal likely to affect habitat connectivity?

The Proposal would remove 1.02 ha of woodland which is part of a fragmented corridor joining the forest around Prospect Reservoir to the east of the study area with the Eastern Creek corridor to the west of the study area. This corridor that would be removed is approximately 250 m long and 70-100 m wide. This corridor is unlikely to be used by Grey-headed Flying-foxes, which are not only very mobile but large enough to be relatively safe and comfortable flying over large, open areas.

Regent Honeyeaters and Swift Parrots are smaller birds active during the day when predators such as raptors are hunting. If they occurred in the area, they would likely prefer to travel through a woodland corridor such as the one in the study area. However, there is no good quality foraging habitat usually preferred by these species nearby. It is therefore unlikely they would frequent the area or use the corridor in the study area to move throughout a landscape with only sparse foraging resources.

How is the proposal likely to affect critical habitat?

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical

habitat has been declared for the Regent Honeyeater, Swift Parrot or Grey-headed Flying-fox.

Conclusion

The impacts of the proposal on the Regent Honeyeater, Swift Parrot and Grey-headed Flying-fox are likely to be minor as:

- The Proposal is unlikely to have a major impact on the lifecycle of these three species;
- The Proposal is unlikely to have a major impact on the composition of potential habitat for these species within the locality;
- Potential habitat within the study area is not considered to be prime or core habitat for the Grey-headed Flying-fox, Regent Honeyeater or Swift Parrot given the lack of preferred winter flowering trees and general scarcity of foraging resources.
- No critical habitat has been declared for these species.

Microchiropteran Bats

The Eastern Freetail-bat (*Mormopterus norfolkensis*), Large-footed Myotis (*Myotis macropus*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Eastern Bentwing Bat (*Miniopterus shreibersii oceanensis* are all listed as Vulnerable on Schedule 2 of the TSC Act. The Large-footed Myotis is currently being separated into three divisions. Of these, the southern subspecies, Southern Myotis *Myotis macropus*, is discussed in this assessment.

These species have been grouped for the purpose of this assessment on the basis of their similar habitat requirements and likely use of the study area.

The Eastern Freetail-bat, Eastern False Pipistrelle, and Greater Broad-nosed bats use tree-hollows as primary roosting and maternity habitat (other structures may provide similar microhabitat components) and are therefore dependent upon them for their survival (Churchill 1998). The Eastern Bentwing Bat roosts in caves or under bridges, and the Southern Myotis usually chooses similar roosting sites, although it has been recorded roosting in tree hollows, drains, amongst vegetation, and in mines and tunnels (Churchill 1998). All species may forage within forest and woodland habitat, although the Large-footed Myotis utilises mainly water sources for foraging, and the Greater Broad-nosed Bat also prefers to forage along watercourses (Churchill 1998).

None of these species have been recorded within the study area or adjacent areas, however they have all been recorded within 10 km of the study area. Potential habitat for these species occurs within the study area in woodland and forest vegetation types, particularly alongside waterbodies. These habitats contain suitable roosting habitat for species that roost in tree hollows, and potential foraging habitat for all species.

The Proposal is likely to directly impact 1.02 ha of potential woodland habitat. The area to be modified or cleared as part of the proposal represents a very small proportion of the broader distribution of these habitat types within the locality. These species are highly mobile and roosting habitat occurs in the study area only for species that roost in tree hollows. The potential foraging habitat in the study area for all species is relatively small and isolated and in poor condition. It is therefore unlikely that any of these bat species would depend upon the vegetation in the study area. It is unlikely that the proposal would have a significant impact habitat considered important for these species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Factors likely to disrupt the life cycle of these bat species include the loss, disruption or modification of roost sites, particularly “maternity roosts” and loss of foraging habitat. The Proposal will remove 1.02 ha of potential foraging and roosting habitat for these species in the form of woodland and forest habitats. These habitats are close to water sources (creeks and farm dams) which provide foraging opportunities for the Southern Myotis and contain mature, hollow bearing trees. These trees are likely to be suitable for roosting and possibly breeding for the species that roost in tree hollows, but competition for hollows is likely to be very high in the area, which may result in hollow-bearing trees in the study area being unsuitable as breeding sites.

The potential habitat occurs in the study area in small, highly degraded stands. It is likely that better quality and larger stands occur nearby at Prospect Reservoir and in other forested areas in the locality.

Given the mobility of these species and the extent of higher quality potential habitat within the locality, it is unlikely that the proposal would disrupt the lifecycle of the Eastern Bentwing Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Southern Myotis or the Eastern Freetail-bat such that a viable local population would be placed at risk of extinction.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The study area is not at the limit of the distribution of any of the bat species discussed here.

How is the proposal likely to affect habitat connectivity?

The Proposal would remove 1.02 ha of potential foraging and roosting habitat of poor quality from within woodland and forest habitats in the study area. This potential habitat contains trees with hollows suitable for roosts for the species that roost in tree hollows and potential foraging habitat for all species. In addition, the study area contains water sources, which provide foraging habitat for the specialised Southern Myotis. None of the threatened bat species discussed in this assessment have been recorded in the study area despite these habitat features. Potential and known habitat of better quality for these species occurs in the locality, particularly at Prospect Reservoir and north-west of the study area near Doonside such as Nurragingy Reserve. All species discussed in this assessment have been recorded at one or both of those areas.

The Proposal would remove a 1.02 ha of woodland which is part of a fragemented corridor joining the forest around Prospect Reservoir to the east of the study area with the Eastern Creek corridor to the west of the study area. The corridor that would be removed is approximately 250 m long and 70-100 m wide. This corridor contains low quality foraging and roosting habitat. It is possible bats may use this corridor, but as bats are very mobile and the corridor is of poor quality and the Eastern Creek corridor is also of poor quality, it is unlikely the corridor to be removed could be considered of high value. However, it is the only corridor on the western side of Prospect Reservoir excepting one possible corridor at the southern end of the forest surrounding the Reservoir over a kilometre to the south of the study area. It is unknown if any or all of these threatened bat species would depend on this corridor to move from Prospect Reservoir to Eastern Creek and beyond if they occurred in the area. It is considered unlikely these species would depend on the corridor, as they are very mobile and not at large risk of predation while travelling.

How is the proposal likely to affect current disturbance regimes?

The Proposal is unlikely to affect fire regimes of the study area. The Proposal will alter the path of a drainage line and inundate a small area that was not previously flood-prone. This may reduce or alter potential foraging habitat for the Southern Myotis, which forages almost exclusively around water. It may also reduce preferred foraging habitat for the other species, as bats in general often forage around water where insect life is abundant.

Will the proposal impact critical habitat?

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for these species (DECC Threatened Species Unit).

Conclusion

- The Proposal is unlikely to have a major impact on the lifecycle of these species;
- The Proposal is unlikely to have a major impact on the composition of potential habitat for these species within the locality;
- Potential habitat within the study area is not considered to be prime or core habitat for these species. The potential habitat to be impacted is unlikely to represent important habitat for these species in the locality.
- No critical habitat has been declared for these species.

As such, it is **unlikely** that the proposal would have a major impact on the local population of Eastern Bentwing Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Southern Myotis or Eastern Freetail-bat or affect the long-term survival of a local population of the Southern Myotis or Eastern Freetail-bat.

APPENDIX 4

EPBC Act Significant Impact Criteria

Significant Impact Guidelines

The EPBC Act Significant Impact Guidelines (DEH 2006) list Significant Impact Criteria for matters of national environmental significance that should be taken into consideration to determine whether a proposal is likely to have a significant impact on threatened species, populations or ecological communities that are known to occur or potentially occur in the study area.

Under the EPBC Act, if the proposal has the potential to have an adverse impact on a threatened species, population or ecological community listed on the Act, the proposal must be referred to the Federal Minister for the Environment for further consideration.

Endangered Species

Pimelea spicata

Potential habitat for this species is considered to be within Shale Plains Woodland within the study area.

Is the action likely to lead to a long-term decrease in the size of an important population of a species?

Although, *Pimelea spicata* was not recorded within the study area during the current survey, the species is cryptic and difficult to detect, particularly when not in flower. The species flowers sporadically throughout the year. The proposal would directly impact a small area (1.02 ha) of potential habitat. The proposal is therefore unlikely to lead to a long term decrease in the size of a population in the study area, if one exists.

Is the action likely to reduce the area of occupancy of the species?

Potential habitat for *Pimelea spicata* occurs in Shale Plains Woodland in the study area. The disturbance or removal of approximately 1.02 ha of vegetation that is potential habitat for this species is not likely to significantly reduce the area of occupancy of the species.

Is the action likely to fragment an existing population into two or more populations?

No known populations of *Pimelea spicata* would be impacted by the proposal. The proposal would impact on a very small proportion of potential habitat and this is not expected to result in the fragmentation of any populations of this species or areas of potential habitat.

Is the action likely to adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or,
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006). To date, there is no critical habitat listed by the Minister for the Department of the Environment, Water, Heritage and the Arts for *Pimelea spicata*.

Critical habitat for *Pimelea spicata* has not been identified in the recovery plan for the species (DEC 2004). However, the recovery plan identifies the habitat features and locations that would contain habitat that is important to the survival of the species, as required by the EPBC Act (DEC 2004). These include 28 known locations throughout the species' known distribution. The study area is not one of these known locations.

The potential habitat in the study area is not an area considered to be necessary for breeding, dispersal or succession; to maintain genetic diversity; or for the reintroduction of populations or recovery of the species. Therefore, the proposal will not impact on habitat critical to the survival of the *Pimelea spicata.*

Is the action likely to disrupt the breeding cycle of an important population?

The proposal is considered unlikely to impact the pollination or dispersal of a local population (if one exists) of *Pimelea spicata* given that the proposal;

- Will not resulting in the total destruction of habitat,
- Will not interfere with fire regimes within the study area or locality,
- Will not increase vehicular, bike, pedestrian, or other, access to a known population of the species,
- Is unlikely to increase rubbish dumping within known or potential habitats for the species, and,
- Is unlikely to significantly increase levels of weed invasion within adjacent areas as they are already subject high levels of weed invasion.

Given that no individuals were detected within the study area, it is unlikely that the proposal will disrupt the lifecycle of the species.

Is the action likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposal will result in direct impacts to approximately 1.02 ha of potential habitat for *Pimelea spicata.* The area to be directly impacted represents

approximately 0.06% of similar habitat types in the local area. Vegetation adjacent to the proposal is already largely cleared, subject to disturbances and edge effects and has a high degree of existing weed invasion.

Given the relatively small area of habitat directly impacted and poor condition of vegetation in the study area, the proposal is unlikely to modify, destroy or decrease the availability or quality of habitat such that it may result in the decline of the species.

The proposal would impact a very small area of potential habitat for *P. spicata*, within Cell 5. The proposal will not result in the isolation or fragmentation of potential habitat for the species.

Given the condition and size of the potential habitat within the study area and the very small area to be removed or modified, it is not considered that the proposal would affect the long term survival of a local population, if present. The proposal is not likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a population of the species is likely to decline.

Is the action likely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;?

The vegetation within the study area that provides potential habitat for *Pimelea spicata* is already subject to significant invasion by weeds due to their proximity to the road and disturbed private properties. Further disturbance as a result of the proposal would be minimal and it is considered unlikely to significantly increase of weed invasion in the study area.

Is the action likely to introduce disease that may cause the species to decline?

The proposal is unlikely to introduce disease that may cause *Pimelea spicata* to decline.

Is the action likely to interfere with the recovery of the species?

No Recovery Plan as published by DEWHA is available for *Pimelea spicata* (Department of Environment and Heritage 2005), however, a draft recovery plan has been prepared for *Pimelea spicata* by NSW Department of Environment and Climate Change (DEC 2004). The overall objective of this recovery plan is to ensure the continued and long-term survival of *P. spicata* in the wild by promoting the *in-situ* conservation of the species across its natural range. Specific recovery objectives include:

- conserve *P. spicata* using land-use and conservation planning mechanisms;

- identify and minimise the operation of threats at sites where *P. spicata* occurs;
- develop and implement a survey and monitoring program that will provide information on the extent and viability of *P. spicata*;
- provide the community with information that assists in conserving the species;
- raise awareness of the species and involve the community in the recovery program; and
- conduct research that will assist future management decisions.

Since *Pimelea spicata* is not known to occur at the site, direct impacts to1.02 ha of Poor to Moderate condition potential habitat is not considered to be inconsistent with the objectives or actions of the recovery plan.

Conclusion

The proposal would impact upon a small area of potential habitat for *Pimelea spicata* in the study area. A relatively small area of potential habitat would be impacted by the proposal (1.02 ha) compared to the area of potential habitat available in the locality (approximately 721 ha). The proposal is unlikely to fragment or isolate any local populations of this species, and the potential habitat to be disturbed is not considered important to this species. For these reasons it is considered **unlikely** that the proposal would have a significant impact on a population of *Pimelea spicata*.

Vulnerable Species

Grevillea juniperina subsp *juniperina*

Potential habitat for this species is considered to be within Shale Plains Woodland within the study area.

Is the action likely to lead to a long-term decrease in the size of an important population of a species?

Although, *Grevillea juniperina* subsp. *juniperina* was not recorded within the study area during the current survey, individuals of the species have been recorded nearby, adjacent to Prospect Reservoir The proposal would directly impact a small area (1.02 ha) of potential habitat. The proposal is therefore unlikely to lead to a long term decrease in the size of a population in the study area, if one exists.

Is the action likely to reduce the area of occupancy of the species?

Potential habitat for *Grevillea juniperina* subsp. *juniperina* occurs in Shale Plains Woodland in the study area. The disturbance or removal of approximately 1.02 ha of vegetation that is potential habitat for this species is not likely to significantly reduce the area of occupancy of the species.

Is the action likely to fragment an existing population into two or more populations?

No known populations of *Grevillea juniperina* subsp. *juniperina* would be impacted by the proposal. The proposal would impact on a very small proportion of potential habitat and this is not expected to result in the fragmentation of any populations of this species or areas of potential habitat.

Is the action likely to adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or,
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006). To date, there is no critical habitat listed by the Minister for the Department of the Environment, Water, Heritage and the Arts for *Grevillea juniperina* subsp. *juniperina*.

Grevillea juniperina subsp. *juniperina* has a restricted range (St Marys – Londonderry - Prospect) and occurs on red sandy to clay soils on Wianamatta Shale and Tertiary alluvium, occurrung as localised, often small populations.

The potential habitat in the study area is not an area considered to be necessary for breeding, dispersal or succession; to maintain genetic diversity; or for the reintroduction of populations or recovery of the species. Therefore, the proposal will not impact on habitat critical to the survival of the *Grevillea juniperina* subsp. *juniperina.*

Is the action likely to disrupt the breeding cycle of an important population?

The proposal is considered unlikely to impact the pollination or dispersal of a local population (if one exists) of *Grevillea juniperina* subsp. *juniperina* given that the proposal;

- Will not resulting in the total destruction of habitat,
- Will not interfere with fire regimes within the study area or locality,
- Will not increase vehicular, bike, pedestrian, or other, access to a known population of the species,
- Is unlikely to increase rubbish dumping within known or potential habitats for the species, and,
- Is unlikely to significantly increase levels of weed invasion within adjacent areas as they are already subject high levels of weed invasion.

Given that no individuals were detected within the study area, it is unlikely that the proposal will disrupt the lifecycle of the species.

Is the action likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposal will result in direct impacts to approximately 1.02 ha of potential habitat for *Grevillea juniperina* subsp. *juniperina.* The area to be directly impacted represents approximately 0.03% of similar habitat types in the local area. Vegetation adjacent to the proposal is already largely cleared, subject to disturbances and edge effects and has a high degree of existing weed invasion.

Given the relatively small area of habitat directly impacted and poor condition of vegetation in the study area, the proposal is unlikely to modify, destroy or decrease the availability or quality of habitat such that it may result in the decline of the species.

The proposal would impact a very small area of potential habitat for *Grevillea juniperina* subsp. *juniperina*, within Cell 5. The proposal will not result in the isolation or fragmentation of potential habitat for the species.

Given the condition and size of the potential habitat within the study area and the very small area to be removed or modified, it is not considered that the proposal would affect the long term survival of a local population, if present. The proposal is not likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a population of the species is likely to decline.

Is the action likely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;?

The vegetation within the study area that provides potential habitat for *Grevillea juniperina* subsp. *juniperina* is already subject to significant invasion by weeds due to their proximity to the the waste facility, the drag strip and other developments. Further disturbance as a result of the proposal would be minimal and it is considered unlikely to significantly increase of weed invasion in the study area.

Is the action likely to introduce disease that may cause the species to decline?

The proposal is unlikely to introduce disease that may cause *Grevillea juniperina* subsp. *juniperina* to decline. However, as a precaution contractors should ensure that sub contractor plant and vehicles are clean and free of dirt and organic materials prior to use on sites near areas of native vegetation.

Is the action likely to interfere with the recovery of the species?

No Recovery Plan as published by DEWHA or DEC is available for *Grevillea juniperina* subsp. *juniperina.*

Since *Grevillea juniperina* subsp. *juniperina* is not known to occur at the site, direct impacts to1.02 ha of Poor to Moderate condition potential habitat is not considered to be inconsistent with the objectives or actions of the recovery plan.

Conclusion

The proposal would impact upon a small area of potential habitat for *Grevillea juniperina* subsp. *juniperina* in the study area. A relatively small area of potential habitat would be impacted by the proposal (1.02 ha) compared to the area of potential habitat available in the locality (approximately 721 ha). The proposal is unlikely to fragment or isolate any local populations of this species, and the potential habitat to be disturbed is not considered important to this species. For these reasons it is considered **unlikely** that the proposal would have a significant impact on a population of *Grevillea juniperina* subsp. *juniperina*.

Acacia pubescens

Potential habitat for this species is considered to be within Shale Plains Woodland within the study area.

Is the action likely to lead to a long-term decrease in the size of an important population of a species?

Although, *Acacia pubescens* was not recorded within the study area during the current survey, individuals of the species have been recorded in similar habitat adjacent to prospect reservoir.

The proposal would directly impact a small area (1.02 ha) of potential habitat. The proposal is therefore unlikely to lead to a long term decrease in the size of a population in the study area, if one exists.

Is the action likely to reduce the area of occupancy of the species?

Potential habitat for *Acacia pubescens* occurs in Shale Plains Woodland in the study area. The disturbance or removal of approximately 1.02 ha of vegetation that is potential habitat for this species is not likely to significantly reduce the area of occupancy of the species.

Is the action likely to fragment an existing population into two or more populations?

No known populations of *Acacia pubescens* would be impacted by the proposal. The proposal would impact on a very small proportion of potential habitat and this is not expected to result in the fragmentation of any populations of this species or areas of potential habitat.

Is the action likely to adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or,
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006). To date, there is no critical habitat listed by the Minister for the Department of the Environment, Water, Heritage and the Arts for *Acacia pubescens*.

Critical habitat for *Acacia pubescens* has not been identified in the recovery plan for the species (NPWS 2003). However, the NSW recovery plan identifies the

habitat features and locations that would contain habitat that is important to the survival of the species, as required by the EPBC Act (DEC 2004). The overall objective of the recovery plan is to prevent the status of *Acacia pubescens* from becoming endangered, by reducing habitat loss and by implementing management regimes aimed at maintaining representative populations across the species' range (NPWS 2003a).

Specific objectives of the recovery plan are (NPWS 2003a):

- to ensure that a representative sample of *A. pubescens* populations occurring on public and private lands are protected from habitat loss and managed for conservation;
- to reduce the impacts of threats at sites across the species' range;
- to ensure that any planning and management decisions that are made which affect the species, are made in accordance with the recovery objectives of this plan;
- to understand the biology, ecology, health and distribution of the species including the range of genetic variation;
- to develop the awareness and involvement of the broader community in the species and its conservation; and,
- to re-assess the conservation status of the species.

The recovery actions which aim to meet the overall objective include:

- identify sites that are a high priority to protect;
- carry out negotiations with public authorities to increase protection of sites;
- liaise with private landholders to increase protection of sites;
- negotiate with public authorities to implement threat and habitat management programs on public lands;
- informed environmental assessment and planning decisions are made; undertake studies into the genetic variability of the species;
- investigate the cause of disease in the species;
- research other aspects of the species' biology, ecology and distribution;
- encourage community involvement;
- provide advice and assistance to private landholders;
- maintain a database on the species;
- NPWS to be advised of any consents or approvals which affect A. pubescens; and
- re-assess conservation status of species.

The potential habitat in the study area is not an area considered to be necessary for breeding, dispersal or succession; to maintain genetic diversity; or for the

reintroduction of populations or recovery of the species. Therefore, the proposal will not impact on habitat critical to the survival of the *Acacia pubescens.*

Is the action likely to disrupt the breeding cycle of an important population?

The proposal is considered unlikely to impact the pollination or dispersal of a local population (if one exists) of *Acacia pubescens* given that the proposal;

- Will not resulting in the total destruction of habitat,
- Will not interfere with fire regimes within the study area or locality,
- Will not increase vehicular, bike, pedestrian, or other, access to a known population of the species,
- Is unlikely to increase rubbish dumping within known or potential habitats for the species, and,
- Is unlikely to significantly increase levels of weed invasion within adjacent areas as they are already subject high levels of weed invasion.

Given that no individuals were detected within the study area, it is unlikely that the proposal will disrupt the lifecycle of the species.

Is the action likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposal will result in direct impacts to approximately 1.02 ha of potential habitat for *Acacia pubescens.* The area to be directly impacted represents approximately 0.03% of similar habitat types in the local area. Vegetation adjacent to the proposal is already largely cleared, subject to disturbances and edge effects and has a high degree of existing weed invasion.

Given the relatively small area of habitat directly impacted and poor condition of vegetation in the study area, the proposal is unlikely to modify, destroy or decrease the availability or quality of habitat such that it may result in the decline of the species.

The proposal would impact a very small area of potential habitat for *Acacia pubescens*, within Cell 5. The proposal will not result in the isolation or fragmentation of potential habitat for the species.

Given the condition and size of the potential habitat within the study area and the very small area to be removed or modified, it is not considered that the proposal would affect the long term survival of a local population, if present. The proposal

is not likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a population of the species is likely to decline.

Is the action likely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;?

The vegetation within the study area that provides potential habitat for *Acacia pubescens* is already subject to significant invasion by weeds due to their proximity to theWaste Facility, Drag Strip and other industrial sites. Further disturbance as a result of the proposal would be minimal and it is considered unlikely to significantly increase of weed invasion in the study area.

Is the action likely to introduce disease that may cause the species to decline?

The proposal is unlikely to introduce disease that may cause *Acacia pubescens* to decline.

Is the action likely to interfere with the recovery of the species?

No Recovery Plan as published by DEWHA is available for *Acacia pubescens* (Department of Environment and Heritage 2005), however, a draft recovery plan has been prepared for *Acacia pubescens* by NSW Department of Environment and Climate Change (DEC 2004). The overall objective of this recovery plan is to ensure the continued and long-term survival of *Acacia pubescens* in the wild by promoting the *in-situ* conservation of the species across its natural range. Specific recovery objectives are described above.

Since *Acacia pubescens* is not known to occur at the site, direct impacts to1.02 ha of Poor to Moderate condition potential habitat is not considered to be inconsistent with the objectives or actions of the recovery plan.

Conclusion

The proposal would impact upon a small area of potential habitat for *Acacia pubescens a* in the study area. A relatively small area of potential habitat would be impacted by the proposal (1.02 ha) compared to the area of potential habitat available in the locality (approximately 721 ha). The proposal is unlikely to fragment or isolate any local populations of this species, and the potential habitat to be disturbed is not considered important to this species. For these reasons it is considered **unlikely** that the proposal would have a significant impact on a population of *Acacia pubescens*.

Threatened Ecological Communities

Cumberland Plain Woodland

Cumberland Plain Woodland (CPW) is listed as an Endangered Ecological Community on the EPBC Act. This community was recorded within the study area in Cell5 and will be impacted by the proposal, with approximately 1.02 ha requiring removal.

Is the action likely to lead to a long-term adverse affect on an ecological community?

Cumberland Plain Woodland within the study area is highly modified through weed invasion, soil disturbance, fragmentation and edge effects. The area that will be impacted by the proposal is in Moderate (Canopy) to Poor (mid-storey and ground-cover) condition. Given the condition and small size of the area to be impacted, the loss or modification of 1.02 ha is not considered likely to have long-term adverse impact on the ecological community in the region, but it is apparent that the single isolated patch will require removal, therefore it could be argued that there would be a "long-term adverse affect" this small isolated representative of CPW.

Is the action likely to reduce the extent of a community?

The vegetation in the study area occurs within a largely cleared industrial and recreational area. Vegetation mapping (NPWS 2002) indicates that approximately 721 ha of CPW (Shale Plains Woodland and Shale Hills Woodland) occurs within a 5 km radius of the study area. This mapping also shows the plant community generally occurs as small disturbed remnants within agricultural, industrial, residential and recreational land. The proposal will result in direct impacts to approximately 1.02 ha of CPW from within Cell 5.

Is the action likely to fragment an occurrence of the community?

The patch of CPW to be removed as part of the proposal is currently isolated from surrounding vegetation by clearing for other components of the Waste Facility. The removal or modification of vegetation within cell 5 would not result in the further isolation of any areas of CPW.

Is the action likely to adversely affect habitat critical to the survival of an ecological community?

The Threatened Species Scientific Committee and the Minister for the Environment, Water Resources, Heritage and the Arts maintain a register of critical habitat. To date, there is no critical habitat listed for Cumberland Plain Woodland.

Is the action likely to modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival?

The proposal will result in the removal of 1.02 ha of CPW that is in Moderate to Poor condition. The action is not likely to modify or destroy abiotic factors that are necessary for the survival of the remaining patches of CPW in the vicinity of the study area, as the disturbance area will be restricted to an isolate pocket, completely surrounded by Waste Facility infrastructure and the proposal will not involve use of any chemicals or result in disturbance to the soil profile of the adjoining vegetation. The removal of 1.02 ha of CPW is not considered likely to impact on the survival of CPW in the region, but if the patch is considered in isolation, it is assumed that the proposed modification of the site would affect the existing vegetation patch.

Is the action likely to result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community?

Given the presence of invasive weed species in the study area, there is potential for further weed dispersal post clearing, however, given the high density of exotic weeds in adjacent (largely cleared) areas it is considered unlikely to further impact CPW in the study area.

Is the action likely to interfere with the recovery of an ecological community?

A recovery plan for CPW is currently being prepared. The Endangered Ecological Community Information for CPW (NPWS 2004a) refers to regeneration of disturbed patches and maintaining all structural layers, including the understorey, to ensure the viability of the remnant. In its present state, the understorey of CPW in the study area is not intact, with a low diversity of native species present in less than 30% of the study area. A large amount of resources would need to be dedicated to the regeneration of CPW in the study area to make it viable in the long term.

Conclusion

Based on the above assessment, CPW in the region is unlikely to be significantly impacted by the proposal although it is also recognized that the 1.02 ha of CPW, if considered in isolation, would be completely removed. It is however recommended as a precautionary measure that consideration be given to preparation of a Referral for Matters of National Significance.

Fauna

Potential habitat occurs within the study area for two Endangered animal species listed on the EPBC Act, the Swift Parrot and Regent Honeyeater. The potential impacts of the Proposal on these species are assessed against the Significant Impact Criteria of the EPBC Act below.

Swift Parrot ***Lathamus discolor***

Is there a real chance or a possibility that the action would lead to a long-term decrease in the size of a population of a species?

The study area does not contain breeding habitat and none of the species' key feed trees. Given the range and mobility of this species and the small number of native flowering trees offering foraging opportunities, the Swift Parrot is unlikely to be wholly dependent upon resources within the study area. Additionally, the species has not been recorded within the study area (DECC 2008). It is therefore unlikely that the Proposal would lead to a long-term decrease in the size of a population of the Swift Parrot.

Is there a real chance or a possibility that the action will reduce the area of occupancy of the species?

The Proposal would not impact breeding sites (which exist in Tasmania only). Some winter/spring flowering potential feed trees (*Eucalyptus tereticornis*) will be removed, but these are few and not a species normally sought out by the Swift Parrot. It is probable that the trees in the study area would be used opportunistically by Swift Parrots at best as they travel to other areas where food resources are more abundant. It is therefore unlikely that the Proposal would reduce the area of occupancy of a population of the Swift Parrot.

Is there a real chance or a possibility that the action will fragment an existing population into two or more populations?

The Proposal would result in the removal of an existing disturbed woodland corridor between forest surrounding Prospect Reservoir east of the study area and the Eastern Creek corridor to the west of the study area. The study area and surrounds are already fragmented. The Swift Parrot is a highly mobile, migratory, and somewhat nomadic species that ranges far and wide over eastern Australia to south-eastern Queensland. It is highly unlikely the corridor to be removed would be important to this species. The removal of 1.02 ha of woodland is unlikely to create a barrier for this species that would fragment a population.

Is there a real chance or a possibility that the action will adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006).

To date, no critical habitat for the Swift Parrot has been listed on the Register of Critical Habitat.

The potential habitat for the Swift Parrot in the study area is not likely to be critical habitat, as the species was not recorded in the study area and prefered feed trees for the species are not present.

Is there a real chance or a possibility that the action will disrupt the breeding cycle of a population?

Swift Parrots breed in Tasmania. Following winter on the mainland they return to Tasmania where they breed from September to January (DEC 2005r). The study area does not contain any breeding habitat for the Swift Parrot and very limited foraging resources that would be unlikely to support Swift Parrots for longer than a brief visit. The Proposal is therefore unlikely to disrupt the breeding cycle of a population of the Swift Parrot.

Is there a real chance or a possibility that the action will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposal is likely to directly impact approximately 1.02 ha of habitat containing foraging resources. This represents a small percentage of the distribution of similar potential habitat within the locality. This species is very mobile and travels large distances in search of favoured feed trees that produce

large amounts of nectar. The potential habitat for this species in the study area is very small, containing few possible feed trees of a species not normally preferred by the Swift Parrot. Given the species' mobility and the low quality of potential habitat for this species in the study area, it is unlikely that the Proposal would decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or a possibility that the action will result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat?

Potential habitat within the study area has been previously disturbed to a high degree and is subject to ongoing disturbance including weed invasion. The Proposal will remove a vegetated corridor already weed infested, but is unlikely to increase weed invasion in other parts of the study area.

Is there a real chance or a possibility that the action will introduce disease that may cause the species to decline?

The Swift Parrot, like any other parrot species in Australia, is vulnerable to Psittacine Circovirus Disease (PCD).

Clearing vegetation and the associated construction works have the potential to introduce or increase incidence of external diseases into vegetation or fauna populations. However, as the potential habitat for the Swift Parrot in the study area is already degraded and fragmented by existing roads and landfill, it is unlikely that the Proposal would introduce new diseases into the area which could result in the species' decline.

Is there a real chance or a possibility that the action will interfere with the recovery of the species?

The Australian Government Minister for the Department of Environment and Water Resources may make or adopt and implement recovery plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

There is a recovery plan for the Swift Parrot. Recovery Actions identified in the plan include:

- Action 1. Identify the extent and quality of foraging habitat;
- Action 2. Manage Swift Parrot habitat at a landscape scale;
- Action 3. Reduce the incidence of collisions;

- Action 4. Population and habitat monitoring;
- Action 5. Community education and information; and,
- Action 6. Manage the recovery process through a recovery team.

The Proposal would result in the clearing of a small amount of potential foraging habitat for the Swift Parrot. Clearing of potential habitat is identified as a threat to the recovery of the Swift Parrot in the plan, but the Proposed area to be cleared is estimated to be a small percentage of the broader distribution of potential habitat in the locality. In addition, potential habitat within the study area is considered to be of poor quality and contains no breeding sites. It is therefore unlikely that the Proposal would interfere with the recovery of the Swift Parrot.

Conclusion

Based on the above assessment, the Swift Parrot is **unlikely** to be significantly impacted by the Proposal, and as such, a Referral under the provisions of the EPBC Act is not recommended for this species.

Regent Honeyeater	***Xanthomyza phrygia***

Is there a real chance or a possibility that the action will lead to a long-term decrease in the size of a population of a species?

The study area does not contain known breeding sites and none of the species' key feed trees. Given the range and mobility of this species it is unlikely to be dependent upon the scarce resources within the study area. Additionally, the species has not been recorded within the study area (DECC 2008). It is therefore unlikely that the Proposal would lead to a long-term decrease in the size of a population of the Regent Honeyeater. Given the above, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of the Regent Honeyeater.

Is there a real chance or a possibility that the action will reduce the area of occupancy of the species?

The Proposal would not impact breeding sites as they occur only in a few key areas where favoured trees that produce large amount of nectar grow. Some winter/spring flowering potential feed trees (*Eucalyptus tereticornis*) will be removed, but these are few and not a species normally sought out by the Regent Honeyeater. It is probable that the trees in the study area would be used opportunistically by Regent Honeyeaters at best as they travel to other areas where food resources are more abundant. It is therefore unlikely that the Proposal would reduce the area of occupancy of a population of the Regent Honeyeater.

Is there a real chance or a possibility that the action will fragment an existing population into two or more populations?

The Proposal would result in the removal of 1.02ha of existing woodland which forms part of a fragmented corridor between forest surrounding Prospect Reservoir east of the study area and the Eastern Creek corridor to the west of the study area. The study area and surrounds are already fragmented. The Regent Honeyeater is a highly mobile, partially nomadic species that ranges far and wide over eastern Australia from north-eastern Victoria to south-eastern Queensland. It is highly unlikely the 1.02 ha of woodland to be removed would be important to this species. The removal of the corridor is unlikely to create a barrier for this species that would fragment a population.

Is there a real chance or a possibility that the action will adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006).

To date, no critical habitat for the Regent Honeyeater has been listed on the Register of Critical Habitat.

The potential habitat for the Regent Honeyeater in the study area is not likely to be critical habitat, as the species was not recorded in the study area and preffered feed trees for the species are not present.

Is there a real chance or a possibility that the action will disrupt the breeding cycle of a population?

Breeding of this species is well known (Higgins *et al.* 2001) and the study area does not contain any known breeding sites. The study area also does not contain

preferred foraging resources for this species, and the feed trees available are in low numbers. The Proposed action is therefore unlikely to disrupt the breeding cycle of a population of the Regent Honeyeater.

Is there a real chance or a possibility that the action will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposal is likely to directly impact approximately 1.02 ha of habitat containing foraging resources. This represents a small percentage of the distribution of similar potential habitat within the locality. This species is very mobile and can travel large distances in search of favoured feed trees that produce large amounts of nectar. The potential habitat for this species in the study area is very small, containing few possible feed trees of a species not normally preferred by the Regent Honeyeater. Given the species' mobility and the low quality of potential habitat for this species in the study area, it is unlikely that the Proposal would decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or a possibility that the action will result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat?

Potential habitat within the study area has been previously disturbed to a high degree and is subject to ongoing disturbance including weed invasion. The Proposal will remove a vegetated corridor already weed infested, but is unlikely to increase weed invasion in other parts of the study area.

Is there a real chance or a possibility that the action will introduce disease that may cause the species to decline?

Diseases have not been identified as a threat to populations of the Regent Honeyeater (DEC 2005o).

Clearing vegetation and the associated construction works have the potential to introduce or increase incidence of external diseases into vegetation or fauna populations. However, as the potential habitat for the Regent Honeyeater in the study area is already modified and fragmented by existing roads andpowerlines, it is unlikely that the proposal would introduce new diseases into the area which could result in the species' decline.

Is there a real chance or a possibility that the action will interfere with the recovery of the species?

The Australian Government Minister for the Department of Environment and Water Resources may make or adopt and implement recovery plans for threatened

fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

There is a recovery plan for the Regent Honeyeater. Recovery Actions identified in the plan include:

- Action 1. Organisational arrangement including continued use of the Regent Honeyeater Recovery team to guide and review progress as well as close liaison with the Regent Honeyeater Recovery team, state agencies and other groups;
- Action 2. Active management including preparation of regional work plans in four key regions by Operations Groups;
- Action 3. Monitor population levels and changes in distribution;
- Action 4. Conduct research on post-breeding movements, isolation between population, habitat availability and resource use;
- Action 5. Maintain and develop community participation and awareness; and,
- Action 6. Maintain and improve captive population management.

In addition, with relation to Regent Honeyeater habitat, Objective 2 of the recovery plan states: 'Maintain and enhance the value of Regent Honeyeater habitat at the key sites and throughout the former range'.

The Proposal would result in the clearing of a small portion of potential foraging habitat for the Regent Honeyeater. Clearing of potential habitat is identified as a threat to the recovery of the Regent Honeyeater in the plan, but the Proposed area to be cleared is estimated to be a small percentage of the broader distribution of potential habitat in the locality. In addition, potential habitat within the study area is considered to be of poor quality and contains no breeding sites. It is therefore unlikely that the Proposal would interfere with the recovery of the Regent Honeyeater.

Conclusion

Based on the above assessment, the Regent Honeyeater is **unlikely** to be significantly impacted by the proposal, and as such, a Referral under the provisions of the EPBC Act is not recommended for this species.

Fauna

Potential habitat occurs within the study area for two Vulnerable animal species listed on the EPBC Act, the Green and Golden Bell Frog and the Grey-headed Flying-fox. The potential impacts of the proposal on this species are assessed against the Significant Impact Criteria of the EPBC Act below.

Green and Golden Bell Frog	***Litoria aurea***

Populations of the GGBF that may occur within the study area are not considered important populations because:

- they are unlikely to be key source populations either for breeding or dispersal, seeing as no individuals have been recorded in the study area and breeding habitat is not present;
- they are unlikely to be necessary for maintaining genetic diversity, as there is no evidence that the study area contains an isolated genetic variant of this species or that the proposal would impact on the overall genetic diversity of the species; and,
- the study area is not at or near the limit of the species range.

Is there a real chance or a possibility that the action will lead to a long-term decrease in the size of an important population of a species?

The study area is not considered to contain an important population of the GGBF. Furthermore, as the study area contains poor quality foraging habitat and no breeding habitat for this species, it is unlikely to be wholly dependent upon resources within the study area. Therefore the Proposal is unlikely to lead to a long-term decrease in the size of an important population.

Is there a real chance or a possibility that the action will reduce the area of occupancy of an important population of this species?

The Proposal is unlikely to impact breeding sites as there are none known to exist in the area. The study area may act as a corridor for this species and the removal of this corridor may result in the severing of gene flow from the population east of the study area at Prospect Reservoir, which could lead to the decline of populations to the west of the study area. However, the removal of the corridor would be temporary only and the new corridor is likely to provide better habitat for this species than what is currently available in the study area.

Is there a real chance or a possibility that the action will fragment an existing important population into two or more populations?

The Proposal would result in the removal of a possible corridor between forest surrounding Prospect Reservoir east of the study area and the Eastern Creek corridor to the west of the study area. The study area and surrounds are already fragmented. The removal of 1.02ha of woodland is unlikely to fragment an existing population, but may reduce gene flow for this species in the area. The corridor would be reinstalled with the revegetation of the new drainage line.

Is there a real chance or a possibility that the action will adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006).

To date, no critical habitat for the GGBF has been listed on the Register of Critical Habitat.

The potential habitat for the GGBF in the study area is not likely to be critical habitat, as the species was not recorded in the study area and potential breeding habitat does not occur in the study area.

Is there a real chance or a possibility that the action will disrupt the breeding cycle of an important population?

The study area does not contain any breeding habitat and lacks safe basking sites and refuge sites. The Proposed action is therefore unlikely to disrupt the breeding cycle of a population of the GGBF.

Is there a real chance or a possibility that the action will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposal is likely to directly impact approximately 1.02 ha of habitat containing foraging resources. This represents a small percentage of the distribution of similar potential habitat within the locality. The potential habitat in the study area is of poor quality, lacking emergent vegetation and good basking and refuge sites. Furthermore, the new drainage line is to be planted with rushes, possibly making it better quality habitat for the GGBF than that currently available in the study area.

It is therefore unlikely that the Proposal would decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or a possibility that the action will result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Predation by *Gambusia holbrooki* has also been identified as a serious threat to the GGBF (DECC 2005).

A threat abatement plan relevant to the GGBF is the Predation by *Gambusia holbrooki* (Plague Minnow) Threat Abatement Plan (NPWS 2003c). The Proposal is consistent with the objectives of the Threat Abatement Plan and is unlikely to cause *Gambusia holbrooki* to be introduced into the study area or Locality. Potential habitat within the study area has been previously disturbed to a high degree and is subject to ongoing disturbance including weed invasion. The Proposal will remove a vegetated corridor already weed infested, but is unlikely to increase weed invasion in other parts of the study area.

Is there a real chance or a possibility that the action will introduce disease that may cause the species to decline?

Infection by amphibian chytridiomycosis disease has been identified as a serious threat to the GGBF. This disease has been identified as being widespread in NSW populations by the Threat Abatement Plan: *Infection of Amphibians with Chytrid fungus resulting in Chytridiomycosis* (DEH 2006). To avoid introducing this disease into areas within the study area which constitute potential habitat for the GGBF, all works related to the Proposal nearby or within watercourses of the study area should adhere to the guidelines developed by the NPWS, Hygiene Protocol for the Control of Disease in Frogs (NPWS 2001).

Clearing vegetation and the associated construction works have the potential to introduce or increase incidence of external diseases into vegetation or fauna populations. However, as the potential habitat for the GGBF in the study area is already modified and fragmented by existing roads, it is unlikely that the Proposal would introduce new diseases into the area which could result in the species' decline.

Is there a real chance or a possibility that the action will interfere substantially with the recovery of the species?

The Australian Government Minister for the Department of Environment may make or adopt and implement recovery plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). A recovery plan has not yet been made for the GGBF under the EPBC Act, however a draft recovery plan has been developed by DECC (Department of Environment and Conservation NSW 2005). The broad objectives of the Draft GGBF Recovery Plan (Department of Environment and Conservation NSW 2005) are time frame dependant. The first objective framed to operate within the first five years of the plan is to: "*manage threats impacting on currently known populations……..so as to stabilise and prevent the decline of the species"*. The longer term objective is "*returning the species to its former distribution, abundance and role in the ecosystem wherever possible*".

The GGBF has not been recorded within the study area or Locality. The Proposal, and associated vegetation clearance/disturbance, will be undertaken in accordance with the guidelines set out in the recovery plan for this species.

The loss and/or disturbance of a small percentage of suboptimal potential habitat for the GGBF within the Locality is considered unlikely to interfere substantially with the recovery of this species.

Conclusion

Based on the above assessment, the GGBF is **unlikely** to be significantly impacted by the Proposal, and as such, a Referral under the provisions of the EPBC Act is not recommended for this species.

Grey-headed Flying-fox	***Pteropus poliocephalus***

Populations of the Grey-headed Flying-fox that may occur within the study area are not considered important populations because:

- they are unlikely to be key source populations either for breeding or dispersal, seeing as no camps have been recorded in the study area;
- they are unlikely to be necessary for maintaining genetic diversity, as there is no evidence that the study area contains an isolated genetic variant of this species or that the proposal would impact on the overall genetic diversity of the species; and,

- the study area is not at or near the limit of the species range which extends along the coast from Bundaberg in Queensland, south to western Victoria.

Is there a real chance or a possibility that the action will lead to a long-term decrease in the size of an important population of a species?

The study area is not considered to contain an important population of the Grey-headed Flying-fox. Furthermore, as the study area contains no camps and limited foraging resources, and given the range and mobility of this species, it is unlikely to be wholly dependent upon resources within the study area. Therefore the Proposal is unlikely to lead to a long-term decrease in the size of an important population.

Is there a real chance or a possibility that the action will reduce the area of occupancy of an important population of this species?

The Proposal is unlikely to impact potential roost sites (camps) as there are none known to exist in the area. Some flowering eucalypts that may offer foraging opportunities would be removed. It is therefore unlikely that the Proposal would reduce the area of occupancy of an important population of this species.

Is there a real chance or a possibility that the action will fragment an existing important population into two or more populations?

The Proposal would result in the removal of 1.02 ha of woodland which forms part of a fragmented corridor between forest surrounding Prospect Reservoir east of the study area and the Eastern Creek corridor to the west of the study area. The study area and surrounds are already fragmented. The Grey-headed Flying-fox is a highly mobile species. It is highly unlikely the corridor to be removed would be important to this species. The removal of 1.02ha of woodland is unlikely to create a barrier for this species that would fragment a population.

Is there a real chance or a possibility that the action will adversely affect habitat critical to the survival of a species?

'Habitat critical to the survival of a species or ecological community' is defined by DEH (2006) as areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act (DEH 2006).

To date, no critical habitat for the Grey-headed Flying-fox has been listed on the Register of Critical Habitat.

The potential habitat for the Grey-headed Flying-fox in the study area is not likely to be critical habitat, as the species was not recorded in the study area and potential foraging resources for the species are low in abundance and diversity.

Is there a real chance or a possibility that the action will disrupt the breeding cycle of an important population?

The study area does not contain any known roosting/breeding sites. The study area also does not contain a diversity of foraging resources for this species, or a regular food supply. The Proposed action is therefore unlikely to disrupt the breeding cycle of a population of the Grey-headed Flying-fox.

Is there a real chance or a possibility that the action will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The Proposal is likely to directly impact approximately 1.02 ha of habitat containing foraging resources. This represents a small percentage of the distribution of similar potential habitat within the locality. This species is very mobile and can travel large distances in search of food. The potential habitat for this species in the study area is very small, containing few possible foraging resources, all of the same species. Given the species' mobility and the low quality

of potential habitat for this species in the study area, it is unlikely that the Proposal would decrease the availability or quality of habitat to the extent that the species is likely to decline.

Is there a real chance or a possibility that the action will result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Potential habitat within the study area has been previously disturbed to a high degree and is subject to ongoing disturbance including weed invasion. The Proposal will remove a vegetated corridor already weed infested, but is unlikely to increase weed invasion in other parts of the study area.

Is there a real chance or a possibility that the action will introduce disease that may cause the species to decline?

Diseases have not been identified as a threat to populations of the Grey-headed Flying-fox (NPWS 2001a).

Clearing vegetation and the associated construction works have the potential to introduce or increase incidence of external diseases into vegetation or fauna populations. However, as the potential habitat for the Grey-headed Flying Fox in the study area is already modified and fragmented by existing roads, it is unlikely that the Proposal would introduce new diseases into the area which could result in the species' decline.

Is there a real chance or a possibility that the action will interfere substantially with the recovery of the species?

The Australian Government Minister for the Department of Environment may make or adopt and implement recovery plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).To date, there is no recovery plan for the Grey-headed Flying-fox.

The Proposal would result in the clearing of potential foraging habitat for the Grey-headed Flying-fox. Although clearing of habitat is identified as a threat to the recovery of the Grey-headed Flying-fox, the proposed area to be cleared is estimated to be a small percentage of the broader distribution of potential habitat in the locality. In addition, potential habitat within the study area is considered to be of poor quality and contains no recorded camps/roosting sites. For these reasons it is unlikely that the proposal would interfere with the recovery of the Grey-headed Flying-fox.

Conclusion

Based on the above assessment, the Grey-headed Flying-fox is **unlikely** to be significantly impacted by the proposal, and as such, a Referral under the provisions of the EPBC Act is not recommended for this species.

Migratory species

The White-bellied Sea-eagle is listed as a Migratory species under the EPBC Act. It has not been recorded in the study area.

For the purposes of the Act, an area of important habitat for migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- habitat that is of critical importance to the species at particular life cycle stages;
- habitat utilised by a migratory species which is at the limit of the species range; and/or
- habitat within an area where the species is declining.

The study area contains potential foraging habitat for the White-bellied Sea-eagle. Prospect Reservoir nearby likely provides good habitat for this species, although it has not been recorded there. The abundance of Australian White Ibis on the site may provide easy hunting opportunities for this species. The study area is unlikely to support an ecologically significant proportion of the population of these species because:

- It is unlikely to be critical to particular life cycle stages of the species;
- It is not located at the limit of the distribution of the species; and,
- It is not located in an area where the species is declining.

Furthermore the potential foraging habitat available in the study area is small and of poor quality. The species is very mobile and more suitable foraging habitat exists at Prospect Reservoir east of the study area.

Is the action likely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species?

The study area is not considered to contain an area of important habitat for the White-bellied Sea-eagle, as this species is more often found around larger bodies of water such as lakes, estuaries and ocean shores where it typically feeds on fish. It is therefore unlikely that the Proposal would substantially modify, destroy or isolate area of important habitat for these species.

Is the action likely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?

Potential habitat within the study area has been previously disturbed to a high degree and is subject to ongoing disturbance including weed invasion. The Proposal will remove a vegetated corridor already weed infested, but is unlikely to increase weed invasion in other parts of the study area.

Is the action likely to seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the migratory species?

The White-bellied Sea-eagle has not been recorded in the study area or even nearby at Prospect Reservoir, although it is likely the species occurs there. The study area is small and does not offer any foraging or nesting resources for this species that are not available in other areas nearby. The Proposal is therefore unlikely to seriously disrupt the life cycle of a significant proportion of the population if one occurs in the area.

Conclusion:

Based on the above assessment, the White-bellied Sea-eagle is unlikely to be significantly impacted by the Proposal and as such a Referral under the provisions of the EPBC Act is not recommended for these species.

PLATES

Plate 1: Eastern Creek Landfill - Cell 5 Western Pool Site

Plate 2: Eastern Creek Landfill - Cell 5 Eastern Pool Site

Plate 3: Eastern Creek Landfill - Eastern Creek Downstream Site facing upstream

Plate 4: Eastern Creek Landfill - Eastern Creek Downstream Site facing downstream

Plate 5: Eastern Creek Landfill - Eastern Creek Upstream Site facing upstream

Plate 6: Eastern Creek Landfill - Eastern Creek Upstream Site facing downstream

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