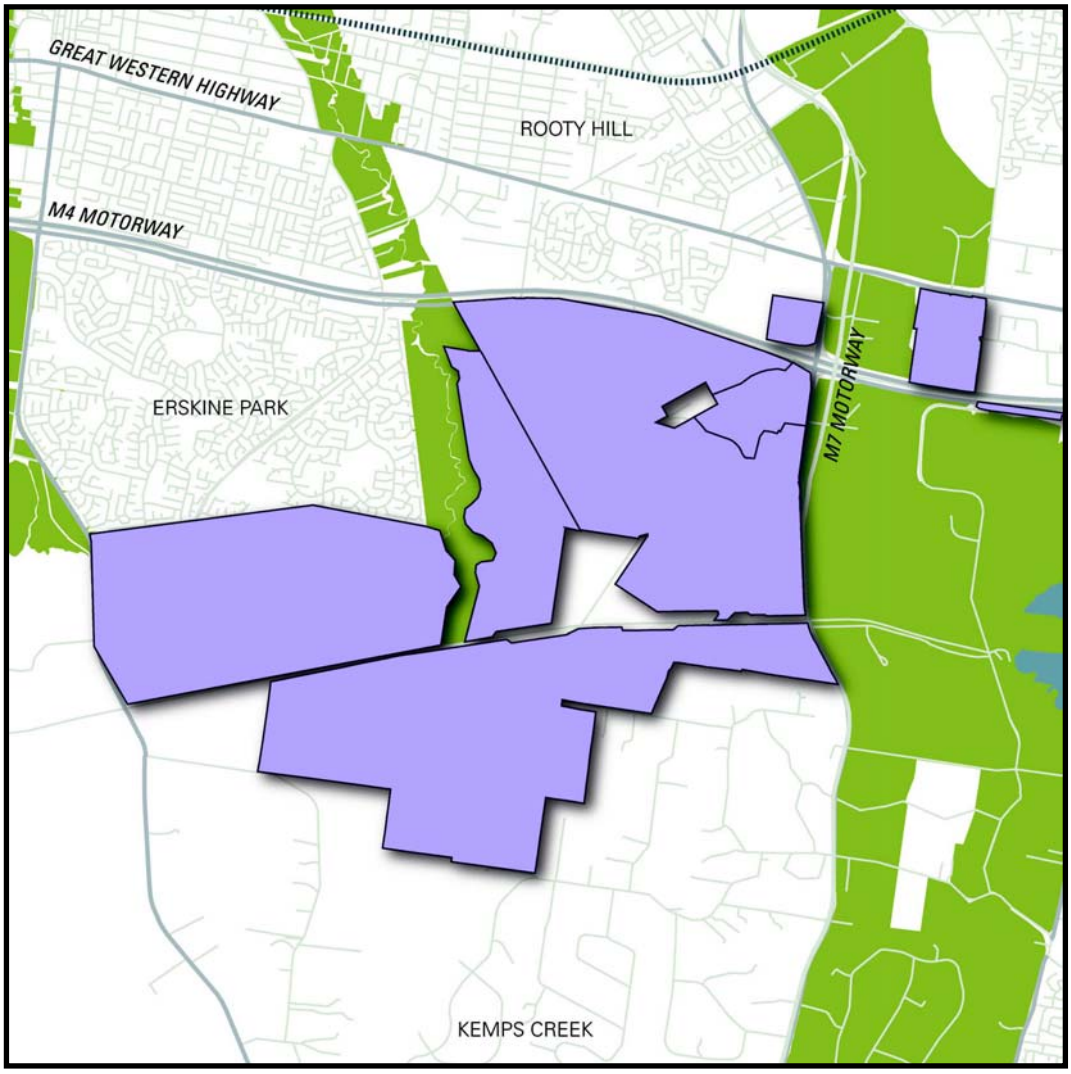
Western Sydney Employment Hub
Proposed Erskine Park Link Road Network

Working Paper No 1
Road Alignment and Constraints

February 2007



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Western Sydney Employment Hub - Proposed Erskine Park Link Road Network Road Alignment and Constraints

Prepared for

Roads and Traffic Authority

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Executive Summary

In May 2004, the then Premier of NSW announced that land would be rezoned under the provisions of State Environmental Planning Policy number 59 (SEPP 59) and a road to be built that would link the existing Erskine Park Employment Area (EPEA) and the Westlink M7. A preferred option by Penrith City Council envisaged that the proposed road would be a higher order route linking the EPEA in the Penrith LGA at its western end, through the SEPP 59 employment lands in Blacktown LGA at its eastern end, to Wallgrove Road and the Westlink M7 Motorway via Old Wallgrove Road - a distance of approximately 7 kilometres.

Previously, various stakeholders had undertaken traffic studies, including strategic modelling and the development of road network proposals to serve various development scenarios in the vicinity of the EPEA and Eastern Creek SEPP59 lands.

In December 2005 the Minister for Planning announced his intention to declare the Western Sydney Employment Hub (the Hub) a State significant site (refer Figure 1.1). The Hub comprises land known as the EPEA in Penrith LGA and SEPP 59 employment lands in Blacktown, Fairfield and Holroyd LGAs and a new employment land release area south of the Sydney water supply pipeline in Penrith and Fairfield LGAs.

After considering various road proposals, in March 2006, the RTA engaged Maunsell to undertake constraints mapping and to develop a road network within the NWP of the Hub but also connecting the SWP of the Hub. The proposed road network (Erskine Park Link Road Network) would then be used to seek concept plan approval from the Department of Planning under Part 3A of the EP&A Act. Subsequent to the concept plan approval, further analysis would be undertaken during the project approval stage to refine the road network requirements.

This report has been prepared by Maunsell for the RTA and investigates the feasibility and impacts for the Erskine Park Link Road (EPLR) Network. The EPLR Network links Mamre Road/Erskine Park Road to the west, Wallgrove Road/Westlink M7 to the east and the M4/Great Western Highway to the north to employment lands in the Fairfield, Blacktown and Penrith Local Government areas.

Based on this concept investigation into environmental and engineering constraints (as identified in **Section 2** and **Section 3** of this report) it is considered that it is feasible to locate a road network to have minimal impact on the existing natural and built environment. The concept road network is provided in **Appendix B**.

The proposed road network generally consists of four lanes with divided carriageways (two lanes in each direction) and be located in a 40m wide road corridor. Further analysis would be undertaken during the project approval stage to refine the road network requirements.

1.0 Introduction

1.1 Background

In May 2004, the then Premier of NSW announced that land would be rezoned under the provisions of State Environmental Planning Policy number 59 (SEPP 59) and a road to be built that would link the existing Erskine Park Employment Area (EPEA) and the Westlink M7. A preferred option by Penrith City Council envisaged that the proposed road would be a higher order route linking the EPEA in the Penrith LGA at its western end, through the SEPP 59 employment lands in Blacktown LGA at its eastern end, to Wallgrove Road and the Westlink M7 Motorway via Old Wallgrove Road - a distance of approximately 7 kilometres.

Previously, various stakeholders had undertaken traffic studies, including strategic modelling and the development of road network proposals to serve various development scenarios in the vicinity of the EPEA and Eastern Creek SEPP59 lands.

In December 2005 the Minister for Planning announced his intention to declare the Western Sydney Employment Hub (the Hub) a State significant site (refer Figure 1.1). The Hub comprises land known as the EPEA in Penrith LGA and SEPP 59 employment lands in Blacktown, Fairfield and Holroyd LGAs and a new employment land release area south of the Sydney Water supply pipeline in Penrith and Fairfield LGAs.

1.2 Scope of Investigation

After considering various road proposals, in March 2006, the RTA engaged Maunsell to undertake constraints mapping and to develop a road network within the NWP of the Hub but also linking the SWP of the Hub. The proposed road network (Erskine Park Link Road Network) would then be used to seek concept plan approval from the Department of Planning under Part 3A of the EP&A Act. Subsequent to the concept plan approval, further analysis would be undertaken during the project approval stage to refine the road network requirements.

The initial concept for the proposed road network was provided by the RTA, and has been further developed by Maunsell based on identified site constraints as part of this study.

This report has been prepared by Maunsell for the RTA and investigates the feasibility and impacts for the Erskine Park Link Road Network (EPLR) associated with the NWP of the Hub. The EPLR links Mamre Road/Erskine Park Road to the west, Wallgrove Road/Westlink M7 to the east and the M4/Great Western Highway to the north to employment lands in the Fairfield, Blacktown and Penrith Local Government areas.

For the proposed road network the following tasks were carried out during the study:

a) Preparation of a more detailed concept road network. The concept road network was developed with due regard to known environmental and engineering constraints; existing and future land usage; and major stakeholder (Councils, Department of Planning, Utility, Landowner) input
b) Preparation of a typical road cross-section including a shared use pedestrian/cycle path on one side for both east-west and north-south lane configurations. A general median to allow for future single lane right turn storage bays.

1.3 Locality

The NWP of the Hub is located within the Penrith and Blacktown LGAs and is bounded by Erskine Park Road and Mamre Road in the west, the Westlink M7 in the east, the Great Western Highway in the north and the Sydney water supply pipeline and SWP in the south. Refer Figure 1.2- Locality Plan. The SWP of the Hub is located within the Fairfield LGA and is bounded by Sydney water pipeline, M7 and Mamre Road.

The main features of the road network include:

- An east-west route ('Erskine Park Link Road' as an extension of Lenore Lane) connecting Erskine Park Road to the Old Wallgrove Road interchange with Wallgrove Road
- Eastern and western north-south link roads (Old Wallgrove Road and "N-S Link" respectively) connecting the Erskine Park Link Road to the SWP
- A northern route to Archbold Road connecting the Erskine Park link Road to the M4 and Great Western Highway

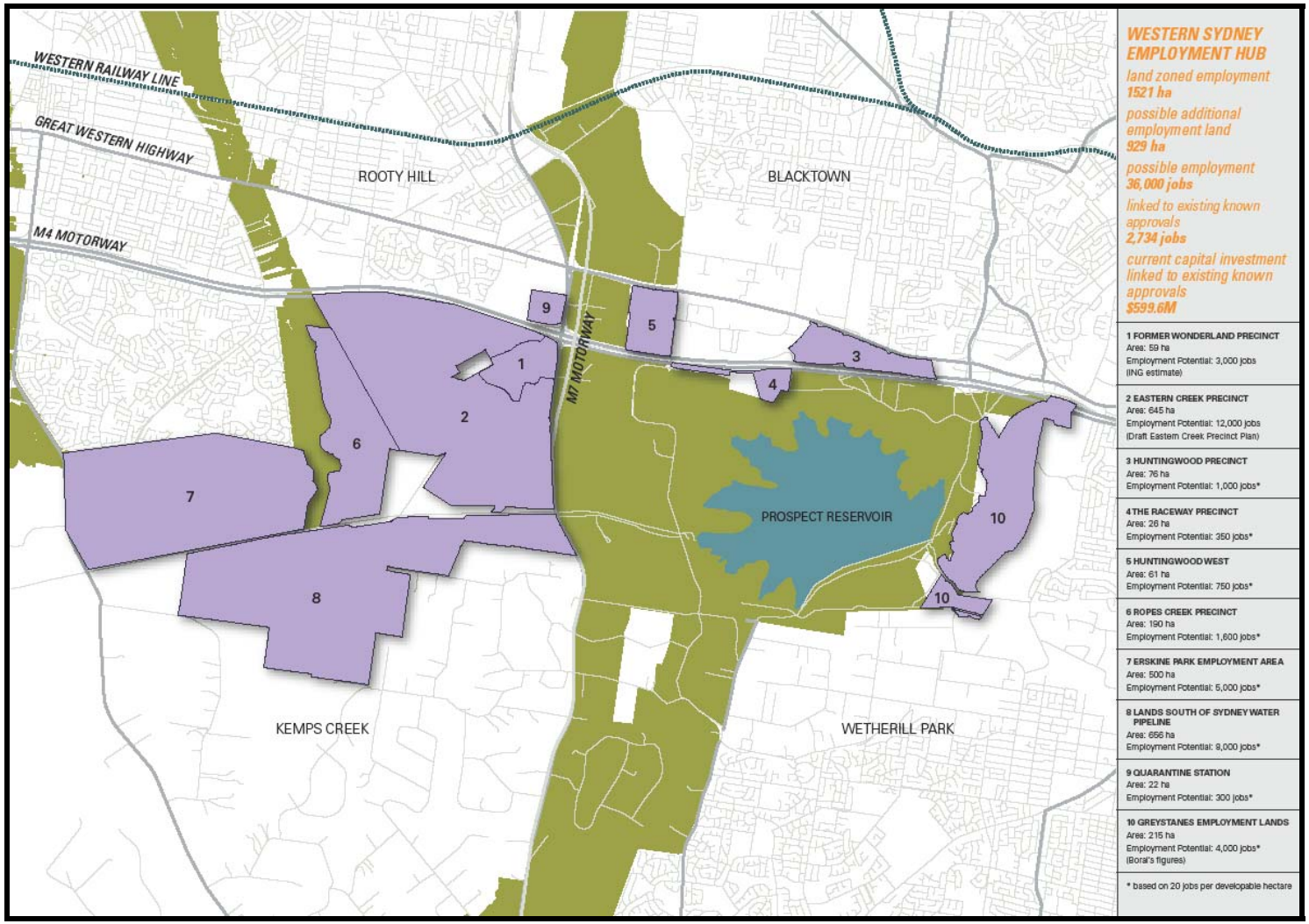

Figure 1.1 – Western Sydney Employment Hub

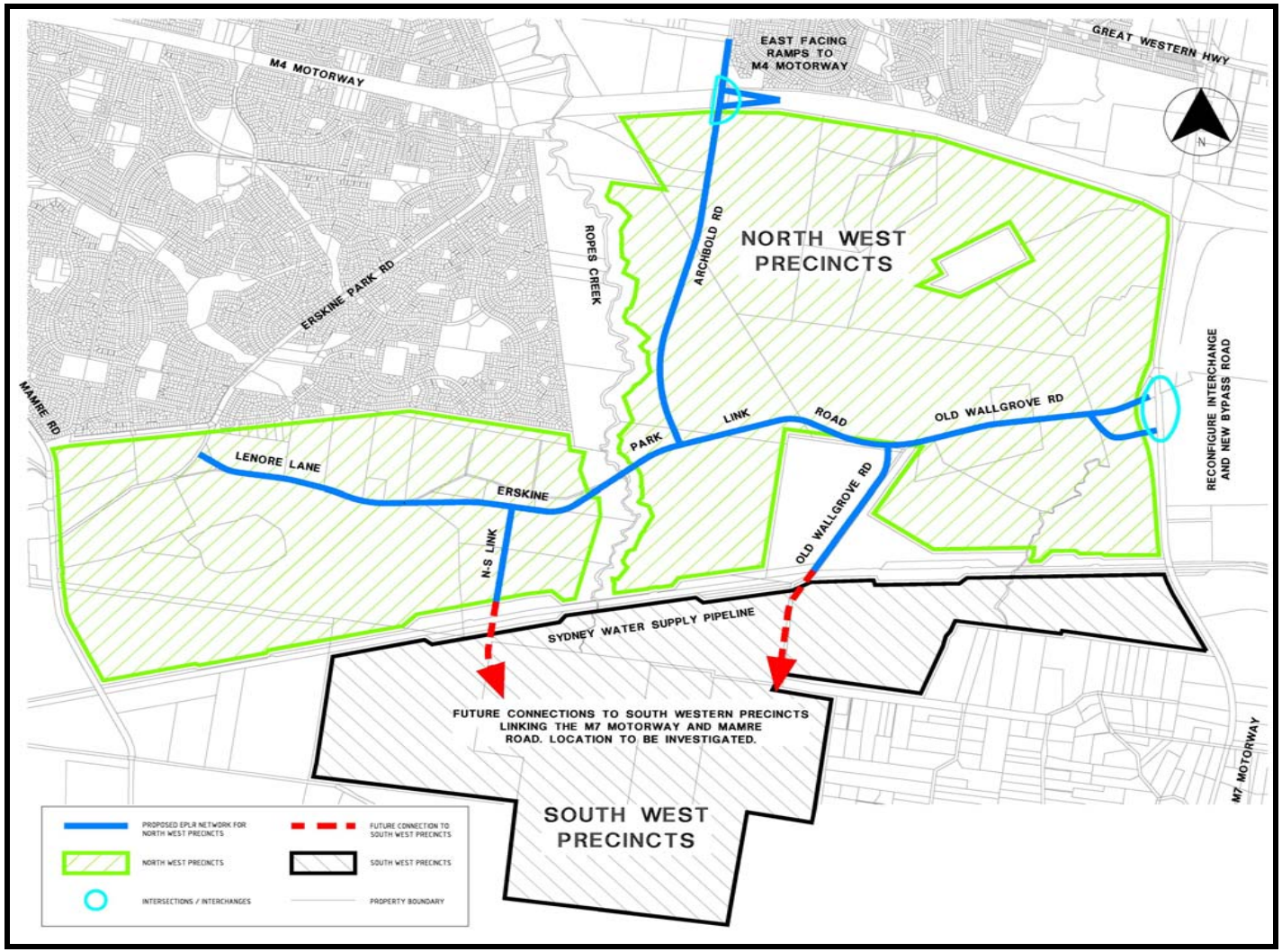

Figure 1.2 - Locality Plan

2.0 Environmental Constraints

2.1 Objectives

An environmental constraints analysis was undertaken to:

- Provide the RTA with a preliminary overview of the ecological values of the site, outlining key ecological constraints and issues that may arise if development of the area were to occur
- To ensure that issues of environmental significance are considered in the concept design phase of the link road network.

2.2 Study Area

The study area is centred on the suburbs of Erskine Park and Horsley Park within the Penrith, Blacktown and Fairfield local government areas. Ecological and cultural constraints were investigated within a rectangular area defined by the coordinates:

- Zone: 56
- Min E: 289004 Min N: 6250873
- Max E: 304245 Max N: 6260766

This area extends beyond the expected upgrade footprint in order to capture potential indirect impacts of the proposed road network, such as sedimentation and water pollution impacting on downstream habitats and wetlands.

2.3 Methodology

Desktop and Literature Review

A desktop review of relevant databases and literature was conducted, including:

- Commonwealth Department of the Environment and Heritage's (DEH) Environment Protection and Biodiversity Conservation (EPBC) online database
- the NSW Department of Environment and Conservation (National Parks and Wildlife Service) Atlas of NSW Wildlife
- Previously published work
- Aerial photographs
- Biodiversity Strategies and Local Environmental Plans for Penrith City Council, Blacktown City Council, and Fairfield City Council
- A review of past archaeological and heritage desktop information within and around the potential development area including:
  - Aboriginal Heritage Management Information System (AHIMS)
  - Register of the National Estate (RNE) database
  - State Heritage Inventory
- Information relating to the local catchment characteristics
- The Erskine Park Employment Area Ecological Study (Dray and Saunders 1999).

Site visit

A site visit was undertaken for the purpose of site familiarisation and to detect any outstanding issues. Due to access limitations a majority of the site could not be assessed however aerial photography has been utilised to obtain information for these areas and is considered appropriate for this stage of reporting.

Mapping

Spatial data collected during the initial research was collated into a Geographic Information System (GIS) and an environmental constraints map was developed (refer **Appendix A**). The constraints map was then used to identify areas of particular ecological or cultural sensitivity.

Constraints Analysis

A constraints and opportunities analysis of the study area involved the following:

- A review of the ecological and cultural information pertaining to the study area
- Recognition of environmentally sensitive areas
- Presenting environmental constraints by means of GIS.

2.4 Site Ecology

The ecological values of the study area have been severely compromised by previous land clearing, construction of a water pipeline, quarrying, urban expansion, agricultural activities and grazing. As such, the study area is characterised by exotic grassland and pastures. Natural terrestrial habitat is generally restricted to remnant vegetation along Ropes Creek and isolated remnant patches. Aquatic habitat occurs in farm dams and Ropes Creek that flows south to north through the study area.

The remaining patches of vegetation within the study area are listed as endangered ecological communities; Cumberland Plain Woodland (listed as endangered under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)) and River Flat Eucalypt Forest (listed as Endangered under the TSC Act). Previous vegetation surveys in the area indicate that these communities are Grey Box Woodland, a sub-unit of Cumberland Plain Woodland, and Swamp Oak Forest (a sub-unit of River Flat Eucalypt Forest).

Threatened flora and fauna species previously identified within the study area include:

- *Hypsela sessiliflora*
- *Grevillea juniperina subsp. Juniperina* (Juniper-leaf Grevillea)
- *Meriodolum corneovirens* (Cumberland Land Snail).

In addition, several threatened fauna and flora species, listed under the TSC Act and EPBC Act could potentially utilise habitat within the study area. These are listed in **Appendix C**. The potential for these species to occur within the study area should be considered during the project approval stage.

2.5 Key Environmental Constraints

Key environmental constraints in the immediate vicinity of the road network are presented in Figure 1 – **Appendix A** (Ecological Constraints), Drawing 20016306-SK-1002 – **Appendix A** (showing the Erskine Park Employment Area DCP proposed Biodiversity Corridors), and the Blacktown LGA Concept Master Plan – **Appendix D**. Much of the proposed link road network falls within the boundaries of the DCP Area. Detailed flora and fauna studies of the Erskine Park Employment area have been undertaken by Mount King Ecological Surveys (1991), Burcher (1998) and Biosis (1999). However, these studies extend only as far east as Ropes Creek and the Sydney water supply pipeline to the south. The limited extent of these surveys is likely to explain why there is a concentration of constraints recorded in the western portion of the study area.

In general, the key constraints associated with flora and fauna and their habitats for the proposed road network are the presence of:

- Endangered ecological communities (Cumberland Plain Woodland and River Flat Eucalypt Forest)
- Threatened and migratory species (in particular the Cumberland Land Snail and several species of threatened flora)
- Potential habitat for threatened and migratory species
- Ropes Creek crossing
- Biodiversity areas/corridors as listed by the Erskine Park Biodiversity Management Strategy.

These constraints are presented in detail in **Table 1**, together with recommendations on how to avoid these constraints and minimise impacts on the recognised ecological values of the project area.

Note that these are only the known recorded constraints (refer to **Section 2.6**: Limitations). Other environmental values may be identified during detailed ecological and cultural surveys which will be required during the future project approval stage.

Table 1 A summary of the Key Environmental Constraints and Recommendations for Road Network

Potential Impact	Issue	Recommendation
Due to the presence of threatened flora and fauna in close proximity to the proposed road network, it is possible that other populations of threatened species listed under the *Threatened Species Conservation Act 1995* occur within the area.	The Threatened Species Conservation Act 1995 (TSC Act) outlines the protection of threatened species, communities and critical habitat in NSW. The Act is administered by the NSW Department of Environment and Conservation (DEC). Under Part 3A of the EP&A Act, following the making of a project application, the Director General of the Department of Planning would provide environmental assessment requirements to the proponent, prioritizing and focusing on key issues. If threatened species and communities are determined to be a key issue, these requirements may include: - the requirement for a field survey in accordance with DOP guidelines "Guideline for Threatened Species Assessment", - likely impacts on threatened species and their habitat assessed evaluated and reported on, and - mitigation measures/compensatory measures proposed to ameliorate impacts. Assessment of threatened species and their habitats would be undertaken accordance with Section 5A of the EP&A Act and a Seven Part Test would be undertaken to determine the significance of the project on a particular threatened species or EEC. Should this determine that the proposed network would result in a significant impact on the species or EEC then appropriate mitigation measures and compensatory habitat strategies (in negotiation with the DEC), is likely to be required prior to construction. As stated above, the level of assessment required is determined by the Department of Planning. Section 91 of the Act requires that a license be obtained should a development result in one or more of the following: • harm to any animal that is of, or is part of, a threatened species, population or ecological community • the picking of any plant that is of, or is part of, a threatened species, population or ecological community • damage to critical habitat • damage to habitat of a threatened species, population or ecological community.	Align road network to avoid disturbance to known populations of threatened flora and fauna. Undertake a targeted survey for flora and fauna of conservation significance along the proposed alignment during the preparation of the Environmental Assessment (EA) during the project approval stage. Preferably prior to Detailed Design. It is considered appropriate for these surveys to be undertaken during the project approval stage.

Potential Impact	Issue	Recommendation
	Section 91 Permits are not required if the act is essential to the carrying out of an approved Part 3A project. However if impacts to threatened species communities or critical habitats are expected it is recommended that the DEC are consulted during the approval process to determine appropriate mitigation measures and/or compensatory habitat strategies.	
Potential impact to the Cumberland Land Snail *(Meriodolum corneovirens)*, listed as Endangered under the *Threatened Species Conservation Act 1995*. could occur through widening of the existing Old Wallgrove Road at the eastern end of the Erskine Park link Road Network.	See above for details of the TSC Act.	Conduct targeted search for the Cumberland Land Snail and assess the potential for CLS habitat during the preparation of the Environmental Assessment (EA), during the project approval stage. Preferably prior to Detailed Design. During detailed design, align road network to minimise disturbance to known populations or habitat of the Cumberland Land Snail Ensure that any known populations of the Cumberland Land Snail, located in close proximity to the proposed alignment, are protected during the construction phase through implementation of an environmental management plan
Potential clearing of River Flat Eucalypt Forest (RFEF) an Endangered Ecological Community (EEC) listed under the TSC Act	See above for details of the TSC Act.	Align road network to minimise disturbance to River Flat Eucalypt Forest wherever possible. Use bridge structure to cross Ropes Creek to avoid disturbance to the RFEF
Potential clearing of Cumberland Plain Woodland (CPW) an	See above for details of the TSC Act The *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) governs the	Align road network to minimise disturbance to Cumberland Plain Woodland wherever possible.

Potential Impact	Issue	Recommendation
Endangered Ecological Community (EEC) listed under the TSC Act and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)	Commonwealth Environmental Assessment process and provides protection for matters of National Environmental Significance (NES), which include: • Nationally threatened species and ecological communities (i.e. Cumberland Plain Woodland) • Australia's world heritage properties • Ramsar wetlands of international importance • Migratory species listed under the EPBC Act (species protected under international agreements) • Commonwealth marine areas • Nuclear actions, including uranium mining • National heritage. Likely significant impact upon Cumberland Plain Woodland, or any other matters of NES (or impacts to Commonwealth Land) would necessitate submission of a referral (containing a brief description of the project and the potential impact) to the Commonwealth Environment and Heritage Minister under Section 68 of the EPBC Act. The purpose of the referral is to determine whether or not a proposed action would require approval under the EPBC Act. Once submitted, the referral process can take up to 20 days. Should it be determined that approval under the EPBC Act is required, environmental assessment would be undertaken in accordance with Commonwealth requirements. The Commonwealth may choose to accredit the NSW Part 3A process for the purposes of EPBC Act assessment. Once environmental assessment has been undertaken a decision on approval would be made within 30 days. If approval is granted it may be with conditions. The EPBC Act is separate from other approvals (such as those under the *Threatened Species Conservation Act 1995*) and does not remove the requirement for these other approvals.	
The proposed road network alignment crosses a 'Biodiversity	The Erskine Park Biodiversity Management Strategy recommends management strategies to facilitate a balanced approach to biodiversity conservation and development for employment purposes. This strategy outlines that: No clearing of native vegetation should	Align road network to minimise impacts to Erskine Park biodiversity corridors.

Potential Impact	Issue	Recommendation
Corridor' and a Biodiversity Area' as identified by the Erskine Park Biodiversity Management Strategy. The proposed alignment crosses these corridors along the Erskine Park link Road and north-south connections to the SWP. A total of 1.58ha of mapped biodiversity corridors will be impacted. These biodiversity areas are subject to the planning provisions of the Erskine Park Development Control Plan	occur within biodiversity areas or biodiversity corridors "unless otherwise permitted by clause 17 of Penrith Local Environmental Plan 1994 (Erskine Park Employment Area)" (PCC 2002). The Biodiversity Areas represent valuable areas of native vegetation and fauna habitat and the strategy considers that "any development within those areas would be likely to have a significant adverse impact on flora and fauna" (PCC 2002). The plan also outlines a number of other broad management strategies in relation to biodiversity areas and corridors. Any development within these areas will require consideration of the Biodiversity Strategy and relevant planning provisions. The locations of crossings have been located to minimise the impact of the proposed biodiversity corridor.	Any development within these areas will require consideration of the Biodiversity Strategy and relevant planning provisions. The environmental assessment should include a comprehensive ecological survey in accordance with management recommendations of the 'Erskine Park Biodiversity Management Strategy' to assess potential for significant impact to flora, fauna and vegetation of significance (in consultation with Penrith City Council). It is considered appropriate for these surveys to be undertaken during the project approval stage. The results of this survey would be used to mitigate environmental impacts to biodiversity corridors (e.g. inclusion of design measures such as fauna fencing, and movement corridors (culverts, underpasses) etc).
Ecological impacts associated with the Ropes Creek crossing	A permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948* (RFI Act) for works within 40m of a watercourse is not required. However the proponent still has a duty to conduct suitable remedial works in accordance with the requirements of the Department of Planning (DoP) and the Department of Primary Industries (DPI Fisheries).	A bridging structure is recommended to minimise impacts to Ropes Creek and associated riparian vegetation. The alignment should endeavour to cross Ropes Creek at a location perpendicular to the watercourse, avoiding the bed, banks and riparian vegetation.

Potential Impact	Issue	Recommendation
		Bridge works are recommended to be greater than 40m from the watercourse (in accordance with the RFI Act).
	Under Part 3A of the EP&A Act (Section 75U (b)) obstruction to fish passage by structures within Ropes Creek would not require approval under the FM Act. However it is recommended that Fish passage is considered in the design of bridge crossings to avoid adverse impacts to threatened aquatic species. Aquatic habitats are classified according to the DPI Fisheries Fish Habitat Scheme, which assesses the waterway on their potential for fish habitat. The waterways class is used to determine the appropriate type of bridge required and whether inclusion of a fishway is required within a development (NSW Fisheries 1999).	Bridging structures are recommended to minimise impacts to Ropes Creek and associated riparian vegetation. During the project approval stage consultation will be required with the Department of Natural Resources to discuss the riparian buffer required for Ropes Creek.
Indigenous Heritage - due to the presence of sites in close proximity to the proposed road network, it is possible that other sites of heritage significance may occur within the area.	The *National Parks and Wildlife Act 1974* provides for the protection of Aboriginal objects (sites, relics and cultural material) and Aboriginal places. Under the Act (S. 5), an Aboriginal object is defined as: *any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises New South Wales, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.* This includes individual artefacts, scatters of stone artefacts, rock art sites, ancient camp sites, human burials, scarred trees, and ruins and archaeological deposits associated with Aboriginal missions or reserves. Under Part 3A of the EP&A Act (Section 75U (d)) a permit under Section 87 (Permits relating to aboriginal objects) or consent under Section 90 (Destruction etc of Aboriginal objects) is not required in relation to approved Part 3A projects . However it is recommended that prior to disturbance to sites of heritage significance the Cultural Heritage Unit Manager at the relevant DEC Aboriginal Heritage Division regional Office should be consulted.	A comprehensive Aboriginal heritage assessment is recommended prior to detailed design. The assessment is to be undertaken during the project approval stage. The DEC provides guidelines for standard archaeological reporting and assessment (NPWS 1997). These guidelines are currently being updated and are in draft form (NPWS 2003)

2.6 Limitations

This report is a preliminary constraints analysis for the NWP of the Hub. This analysis aims to present known environmental constraints within the study area in order to avoid areas of environmental and cultural sensitivity at the planning/concept design stage. It is not intended as a comprehensive environmental assessment. The level of information in this report would be sufficient for the purpose of seeking concept plan approval. During the project approval stage, further environmental analysis would be undertaken.

The constraints presented in this report are based on aerial photography as supplied by the Roads and Traffic Authority and current ecological data as supplied by the National Parks and Wildlife Service (March 2006). However, discussions with the Penrith City Council and recent aerial photography (provided by PCC) indicate that some areas, shown as intact endangered ecological communities and habitats of conservation significance in **Figure 1 – Appendix A,** are actually cleared areas under construction. In light of this information the following should be considered:

- Ground-truthing of ecological constraints (by means of ecological and heritage surveys) presented in **Figure 1 – Appendix A** may provide opportunities for design as many constraints may actually be 'removed' by recent construction associated with the Erskine Park Employment Area development
- Biodiversity corridors and biodiversity areas (as shown in **Drawing 20016306-SK-1002 – Appendix A**) should be considered as key constraints to development given the potential for future development within the Erskine Park employment area and the allocation of these areas by the Penrith City Council as biodiversity areas.

In addition, review of aerial photography indicates that many areas mapped as Endangered Ecological Communities under the TSC Act and EPBC Act appear to be reduced in area and density from that presented by NPWS Mapping (**Figure 1 – Appendix A**). Confirmation of this by ground-truthing of these areas may provide opportunities for design, and is likely to reduce the calculation of total potential impact to these communities (listed in **Table 1**).

This constraints analysis only presents publicly available information in regards to ecological and heritage constraints. Comprehensive environmental impact assessment will be required in order to present all environmental constraints. Of particular concern are the presence of threatened flora and fauna and/or sites of aboriginal heritage significance.

The constraints map does not present all threatened flora and fauna that are known or likely to occur within the survey area due to the absence of geographical locations for many species in the datasets received. In addition, the extent of the flora and fauna populations for which geographical locations were obtained are unknown.

2.7 Recommendations

Whilst the EPLR has been aligned to minimise environmental impact and disturbance, the following is provided to assist the detailed design during the project approval stage.

The findings of the preliminary investigations has allowed the ecological values of the study area to be identified. The main issues imposing constraints on the proposed road network relate to Ropes Creek (as a waterway and habitat movement corridor); remnant patches of Cumberland Plain Woodland and River Flat Eucalypt Forest; biodiversity areas/corridors as listed by the proposed Erskine Park Biodiversity Management Strategy; the potential for impacts to threatened flora and fauna (in particular the Cumberland Land Snail) and sites of aboriginal heritage significance.

Initial recommendations would guide design of the proposed road network and avoid and minimise impact from its development are outlined below. Wherever possible, the route should be aligned to avoid impacts on areas of ecological and heritage significance. Where this is not feasible, appropriate approvals and mitigation measures will be required.

Threatened Species and Communities

- Where possible, patches of remnant vegetation should be retained
- Align road network as to avoid disturbance to known populations of threatened flora and fauna and endangered ecological communities
- Ensure that the population of *Grevillea juniperina* subsp. *Juniperina*, located in close proximity to the proposed alignment, is protected during the construction phase through implementation of an environmental management plan
- Conduct targeted search for the Cumberland Land Snail, particularly at the eastern end of the northern east-west route
- Conduct a targeted survey for flora and fauna of conservation significance likely to occur along the proposed alignment
- Ensure that any known populations of the Cumberland Land Snail, located in close proximity to the proposed alignment, is protected during the construction phase through implementation of an environmental management plan
- Conduct a comprehensive vegetation and flora survey in accordance with management recommendations of the 'Erskine Park Biodiversity Management Strategy' and NPWS guidelines to assess potential for significant impact to flora, fauna and vegetation of significance (in consultation with Penrith City Council).The results of this survey would be used to mitigate environmental impacts to biodiversity corridors (e.g. inclusion of design measures such as fauna fencing, and movement corridors (culverts, underpasses) etc).

Habitat and Biodiversity Corridors

- The proposed road network should be achieved without undermining the ecological values of the area by severing biodiversity areas and corridors as outlined in the Erskine Park Employment Area Biodiversity Strategy and Concept Masterplan for the Eastern Creek Employment Area (i.e. align road network to minimise impacts to Erskine Park biodiversity corridors). Any development within these areas will require consideration of the biodiversity strategy and relevant planning provisions
- Maintain the habitat corridor created by the riparian vegetation of Ropes Creek and associated tributaries. The design should provide for movement of ground-dwelling and arboreal fauna.

Wetlands and Waterways

- Bridging structures are recommended to minimise impacts to Ropes Creek, and associated riparian vegetation (River Flat Eucalypt Forest)
- Consultation will be required with the DoP and the DPI (Fisheries) to discuss the riparian buffer required for Ropes Creek
- Aquatic habitats should be assessed for classification according to the DPI (Fisheries) Fish Habitat Scheme, which assesses the waterway on their potential for fish habitat. The waterways class will be used to assist in the determination of the appropriate type of bridge required and whether inclusion of a fishway is required within a development (NSW Fisheries 1999)
- Bridge works are recommended to be greater than 40m from the watercourse (in accordance with the RFI Act)
- Creek crossing design must ensure there is a means for aquatic fauna to move through Ropes Creek. Crossing should be designed not to impede fish movement or modify creek flow.

Cultural Heritage

- A comprehensive indigenous heritage survey is recommended at the project approval stage in accordance with DEC guidelines (NPWS 2003).

Approval

As the project is to be assessed under Part 3A of the EP&A Act for Major Infrastructure it is considered that a full impact assessment of the proposed road upgrade in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) will need to be undertaken during the Project Approval stage of the assessment process. This will include consideration of the requirements of the TSC Act and the EPBC Act (determining the need for a Species Impact Statement and/or Referral). Ecological and heritage surveys outlined above would provide information on the existing environment on which further assessment would be undertaken during the project approval stage.

3.0 Engineering Constraints

3.1 Objectives

An engineering constraints analysis was undertaken to identify areas of physical site constraints to aid in the development of the EPLR. Such constraints include:

- Existing road connections
- Existing natural features including topography, water courses and flood extents
- Existing infrastructure including development and utilities
- Existing property boundaries, easements and opportunity for future development
- Specific geometric road alignment design requirements.

3.2 Study Area

The development area currently comprises two main landform zones, these include:

- Current construction of industrial units (including several proposed and approved development applications) and roadworks within the Erskine Park and Eastern Creek employment areas; and
- Rural green field areas, comprising rural properties, Ropes Creek, Sydney water supply pipeline and an electricity substation and associated easements.

In time, a majority of the area would comprise employment zones and precincts and the proposed link road network would provide access to the local motorway infrastructure for businesses within this employment hub.

3.3 Methodology

Data Collection

Key stakeholders were contacted to obtain current and relevant data to identify key site constraints. The key stakeholders included Penrith, Blacktown, and Fairfield City Council; Sydney Water; Integral Energy and Transgrid.

The Stakeholders were contacted to obtain information relating to:

- Existing and proposed infrastructure and types of protection measures (as necessary)
- Existing and proposed development
- Property boundaries and land ownership
- Site topography.

Existing site aerial photography, property boundary information and contouring has been supplied by the RTA for the purposes of this project.

Site Visit

A site visit was undertaken for the purpose of site familiarisation and to detect any outstanding issues. Due to access limitations a majority of the site could not be assessed however aerial photography has been utilised to obtain information for these areas and is considered appropriate for this stage of reporting.

Constraints Analysis and Mapping

A concept road network has been developed (refer **Appendix B**) in accordance with the geometric alignment principles contained within the RTA's Road Design Guide and with consideration of the following physical constraints:

- Existing and proposed utilities infrastructure. This includes existing transmission towers and a proposed Transgrid 500kV line. Also, existing and proposed Sydney water supply pipelines were considered
- Existing property boundaries and easements
- Existing site features, creek crossings and flood extents, etc
- Existing environmental constraints (as discussed in **Section 2**)
- Existing roadworks undertaken at the western end of Lenore Lane within the Penrith City Council LGA
- Proposed intersection work (Wallgrove Road) as advised by the RTA
- Lane widths and cross section as advised by the RTA

3.4 Key Engineering Constraints

A number of Key Engineering Constraints have been identified and are listed in **Table 2** below. These have been coupled with the concept design action undertaken.

Table 2 Engineering Constraints

Constraint	Concept Design Action
Property Boundaries	• Alignments aim to follow existing property boundaries wherever feasible. This minimises property severance and prevents the creation of small pockets of non-developable land • Individual property boundaries have been identified and the alignments attempt to provide access to each property
Ropes Creek	• The east-west alignment (Erskine Park Link Road) crosses Ropes Creek. A bridge crossing has been allowed at this location
Sydney water supply pipelines	• Both the eastern and western north-south alignments (N-S Link and Old Wallgrove Road respectively) will need to cross the existing twin 2100mm diameter water supply pipelines for the future connection to the SWP • Due to the proposed biodiversity corridor within the Penrith LGA, a bridge crossing location is recommended to minimise impact on flora and fauna corridors • Based on work-as-executed plans obtained from Sydney Water/ Sydney Catchment Authority, the eastern crossing at Old Wallgrove Road is concrete encased. Due to the presence of the existing concrete encasement and great depth of cover it is not envisaged that any further remediation works will be required for the pipeline in this location
Aboriginal sites	• The alignments avoid any historical aboriginal sites identified in the environmental constraint mapping
Old Wallgrove Road	• The route alignment ties into Old Wallgrove Road at a level matching the existing pavement and alignment
Topographical features	• Hilltops have generally been avoided where feasible. This prevents excessive earthworks excavation, steep grades and making a hilltop road a prominent feature of the local area • The alignments endeavour to fit into the local environment • The alignments endeavour to avoid natural/existing water features, such as

Constraint	Concept Design Action
	ponds (where possible) as construction work in these areas is undesirable due to potential environmental considerations • The alignments endeavour to avoid significantly vegetated areas where possible to limit the impact on the local environment
Electricity Transmission Easements	• Given the close proximity of the TransGrid sub-station, the local environment is dominated by electricity transmission easements. The proposed road network alignments have been developed to have a minimum impact on the electricity utilities • TransGrid and Integral Energy utilities have been identified within the area and there has been correspondence with both authorities, refer **Appendix F**. • The proposed road network has been developed to avoid electricity towers and provide as much clearance as possible between the road boundary and electricity tower structure. Relocation of towers has been avoided • The proposed road network alignments endeavour to cross under the overhead HV cables at locations close to the electricity towers where sag is at a minimum. This is desirable as cable sag can vary with ambient temperature. The minimum clearance between cable and road surface is listed in **Appendix F**, ESAA C(b)1 – 2003, Table 8.1 • The vertical alignment endeavours to be in cut or at ground level at locations where the alignment and overhead cables intersect • The proposed road network alignments endeavour to cross the cables and easements as perpendicular as possible in order to reduce the length of alignment underneath the overhead cable
EPEA Biodiversity Corridor (as supplied by Penrith City Council)	• Crossing the proposed biodiversity corridor is unavoidable and crossing locations have been dictated by other constraints such as property boundaries, proposed and existing developments, and not to circumvent property lots. At locations where sections of road intersect with the biodiversity corridor; measures, as advised by the relevant authorities, will need to be implemented to maintain the corridor. For the purposes of this investigation where a biodiversity corridor is crossed it is proposed to bridge over this area
Lenore Lane (recently constructed)	• Lenore Lane has recently been upgraded to provide a dual carriageway (4 lane) access road for the EPEA. This section of road has been incorporated into the east – west route (Erskine Park Link Road) and the concept design has been developed as a continuation of the “as-built” horizontal alignment
Lenore Lane access road (located to the south of Lenore Lane, providing access to CSR developments and identified as Road No.1) [refer to CSR Concept Design, **Appendix D**]	• This route was considered for a north – south connection. However, upon consultation with Penrith City Council and referring to the proposed CSR developments it was decided that this location would not be suitable. The primary reason being that the recently constructed road would require upgrading to accommodate the increased volumes of traffic travelling between the northern and southern road alignments • CSR have proposed a number of developments within their land and have subsequently been granted approval for a number of sites. The concept plan for the Erskine Park Developments is included in **Appendix D**. The proposed link road network does not encroach upon any CSR proposed or approved development sites
Old Wallgrove Road (adjacent to Electricity Sub-Station)	• The existing road reserve in the vicinity of the sub-station is in the order of 18m wide. The local constraints consist of: electrical stanchions on both sides of the reserve; the narrow road reserve and a secure building to the west • There are two existing stanchions to the east of the road reserve that are offset 5-6m from the road boundary and therefore restrict widening possibilities. To accommodate widening on the east, relocation of the stanchions would be required and it is understood that this would not be a desirable option to utility authorities

Constraint	Concept Design Action
	• Widening to the west is recommended. There is approximately 38 metres between the existing eastern road boundary and the western HV stanchions. This is considered sufficient to provide for proposed widening and adequate horizontal clearance between the road boundary and electricity stanchion • A proposed road corridor of 30m is recommended to: provide adequate horizontal clearance between road boundary and western stanchions; and maintain the existing secure building • Works to be considered would include: relocation of the low voltage over head power lines located to the west of Old Wallgrove Road; and provision of a new road access to the secure building
Fitzpatrick Development [refer to **Appendix D**].	• The western north-south link connecting the Erskine Park Link Road with the future SWP road network for the Hub has been developed to take advantage of the location of the proposed access from Lenore Lane to the Fitzpatrick development.
Blacktown LGA – Concept Masterplan [refer to **Appendix D**]	• The road network has been developed in consideration of the concept master plan for the Eastern Creek Employment Area. Existing and proposed conservation areas have not been impacted upon by the proposed road network.

3.5 Road Design Criteria

Design Criteria

The concept road network has been designed to comply with the general requirements of the RTA Road Design Guide. Specific design criteria adopted include:

- Design speed of 80km/h
- 4 lane divided carriageway
- Lane widths – 3.5m -4.5m outside (measured to face of kerb) and 3.5m inside (measured to face of kerb)
- Shared footway/cycleway - 3.0m wide
- Raised median – 5.0m – 7.0m wide
- Cut and fill batters.

Geometric Design

The concept engineering drawings have been provided in **Appendix B** and adopt the following geometric criteria:

- Min Horizontal Curve Radii: 280m
- Max Vertical Grade: 6%
- Min Vertical Grade: 0.5%
- Road Reserve: 40m, except along Old Wallgrove Road adjacent to the Transgrid substation where the road reserve is reduced to 30m.

4.0 Conclusion

Based on this concept investigation into environmental and engineering constraints (as identified in **Section 2** and **Section 3** of this report) it is considered that it is feasible to locate a road network that not only serves the NWP of the Hub, but can be located to have minimal impact on the existing natural and built environment and allows for the future connection to the SWP, south of the Sydney water supply pipeline. The level of investigation undertaken in this report would be sufficient to seek concept plan approval from the Department of Planning under Part 3A of the EP&A Act. Further analysis would be undertaken in the next stage of the proposal (project approval) to refine the road network requirements.

5.0 References

5.1 References

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