Review of Environmental Factors

CADDENS ROAD UPGRADE REF

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Draft 1.0	22/06/18	Calia Jones Lauren Byrne	Natascha Arens Fiona McKay	Natascha Arens
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NGH Environmental Pty Ltd (ACN: 124 444 622. ABN: 31 124 444 622).

www.nghenvironmental.com.au e: ngh@nghenvironmental.com.au

Sydney Region
18/21 mary st
surry hills nsw 2010 (t 02 8202 8333)

Canberra - NSW SE & ACT
8/27 yallourn st (po box 62)
fyshwick act 2609 (t 02 6280 5053)

Brisbane
level 7, 320 adelaide st
brisbane qld 4000 (t 07 3511 0238)

Newcastle - Hunter and North Coast
7/11 union st
newcastle west nsw 2302 (t 02 4929 2301)

Wagga Wagga - Riverina and Western NSW
suite 1, 39 fitzmaurice st (po box 5464)
wagga wagga nsw 2650 (t 02 6971 9696)

Bega - ACT and South East NSW
suite 1, 216 carp st (po box 470)
bega nsw 2550 (t 02 6492 8333)

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ACRONYMS AND ABBREVIATIONS

AHIMS	Aboriginal heritage information management system
ASL	Above sea level
CEMP	Construction environmental management plan
Cwth	Commonwealth
DECCW	Refer to OEH
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIA	Environmental impact assessment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares
Heritage Act	*Heritage Act 1977* (NSW)
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
KFH	Key Fish Habitat
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (*c.f.*)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy (NSW)
SEWPAC	(Cwth) Department of Sustainability, Environment, Water, Population and Communities
sp/spp	Species/multiple species

1 INTRODUCTION

Penrith City Council proposes to upgrade Caddens Road from the intersection of Gipps Street / Kent Road to Claremont Creek, providing a widened single-carriageway road, a roundabout at White Cedar Avenue and a new bus stop, shared pathway and pedestrian facilities. The proposal would be funded by the Australian Government under the Western Sydney Infrastructure Plan. The funding for construction will become available upon successful application by Council in June 2018 for Round 3 funding with the Federal Department of Infrastructure and Regional Development (DIRD) for the upgrade of Caddens Road at Claremont Meadows.

1.1 PURPOSE OF THE REF

Penrith City Council is the determining authority and as such, the proposal would be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This REF has been prepared according to the requirements of section 5.5 of the EP&A Act, specifying a "duty to consider environmental impact'. It provides an analysis of all environmental, economic, physical and social implications of the proposal.

2 THE PROPOSAL

2.1 BACKGROUND

Penrith City Council LGA is forecast to grow by 23.46% from 209,140 in 2018 to 258,195 in 2036 (ABS, 2018). High traffic volumes and delays during peak hours are already experienced in the LGA. Penrith City Council is aiming to cater for future growth in the Local Government Area by upgrading local roads to improve traffic flow, road safety, road network efficiency and reduce travel times – particularly along key regional link roads which connect residential, education, employment, transport and retail hubs.

Suburbs surrounding Caddens Road are predominately residential and land to be used for future residential developments. Caddens Road is a collector road which serves to move traffic from local streets within Claremont Meadows to arterial roads such as the Great Western Highway. Caddens Road is used by local residents and also residents from surrounding suburbs. Caddens Road is a two-way, two lane council road with "Watts Profile[1]" speed humps and a speed limit of 60km/h. Construction is currently underway of residential properties within the Caddens Meadow Estate to the north of Caddens Road and Caddens Heights Estate to the south of Caddens Road. Further development is proposed in the region in the future.

Caddens Road has been identified for upgrade under the government's Western Sydney Infrastructure Plan as it is a connector road. Upgrades to connector roads such as Caddens Road is required for the continued safe use and maintenance of future traffic flow.

[1] Watts Profile speed humps are a flat top road hump used as a standard traffic calming device.

2.2 LOCATION OF THE ACTIVITY

The proposal is located in Western Sydney within Penrith Local Government Area in the suburb of Claremont Meadows. The site is approximately 5kms south east of Penrith and 45kms west of the Sydney Business District (CBD). The location of the proposal is shown in Figure 2-1 below.

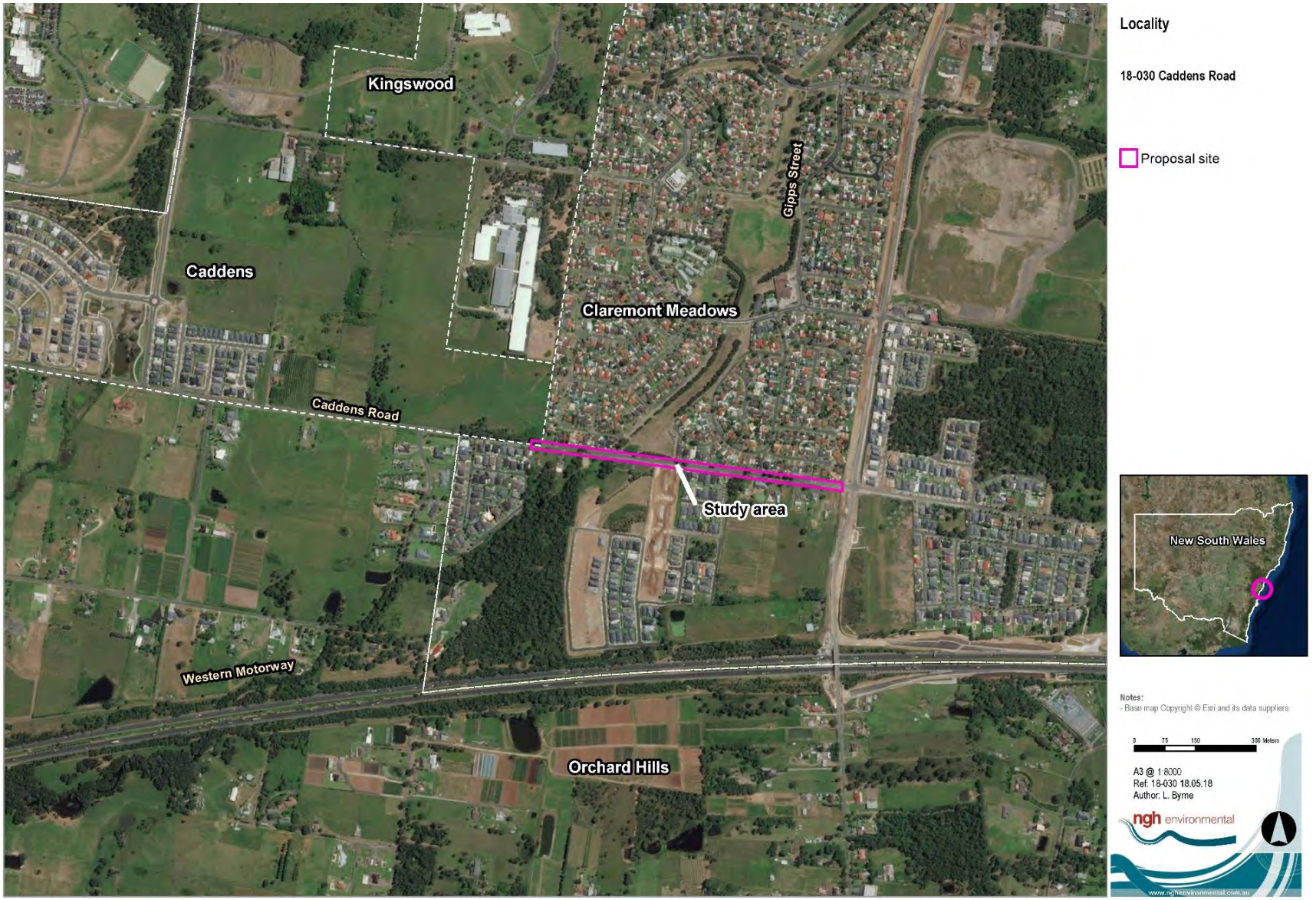

Figure 2-1 Proposal location

2.3 STRATEGIC NEED FOR THE PROPOSAL

2.3.1 NSW State Priorities: Making it Happen

NSW State Priorities: Making it Happen (State Priorities) (NSW Government, 2018d) replaces the NSW 2021: A Plan to Make NSW Number One. It sets out 12 Premier's priorities and 18 state priorities which include improving road travel reliability (Building Infrastructure) and reducing road fatalities (Safe Communities).

The objective of the Building Infrastructure priority is to ensure consistency of journey times on key roads by making better use of existing road infrastructure, building extra road capacity and encouraging commuters to use public transport and to undertake off-peak travel more often. This objective would enable business and the community to move around Sydney and regional centres with greater ease, reducing travel times, boosting productivity and reducing business costs. The proposal would reduce travel times by alleviating congestion and reducing variability in traffic speeds. The proposal would also provide benefits to commuters, which would in turn support the improvement of the NSW economy.

The aim of the Safer Communities State Priority strategy is to reduce road fatalities by at least 30 per cent from 2011 levels by 2021. The main objective is to work with local government to deliver road safety improvements. The proposal would provide a safe road to cater for additional growth in the area that will reduce the potential for future accidents. This would therefore improve safety conditions at this location, which would be consistent with the NSW State Priority strategy.

2.3.2 NSW Government State Infrastructure Strategy 2018-2038

The NSW Government's State Infrastructure Strategy 2018-2038 sets out the Government's commitment to infrastructure delivery and reform initiatives (NSW Government 2012a). Under this strategy and part of the NSW Government has adopted a number of infrastructure priorities for Western Sydney as by 2036, over 50 per cent of Sydney's population will live west of Parramatta. People in new and existing suburbs will need access to high quality, infrastructure-enabled public services.

The proposal would be consistent with the strategy, as it would provide an improved road environment for people in existing and future residential areas whilst allowing for economic growth and infrastructure growth in Western Sydney.

2.3.3 National Road Safety Strategy 2011-2020

The National Road Safety Strategy 2011–2020 (Australian Transport Council (ATC), 2011) was released on 20 May 2011. The strategy outlines road directions for the future of Australian road safety, planned initiatives for the first three years and a range of options for further consideration as the strategy progresses. The initiatives and options are set out in four key areas –Safe Roads, Safe Speeds, Safe Vehicles and Safe People.

The NSW Road Safety Strategy 2012-2021 (NSW 2021) establishes the direction of road safety in NSW for the next 10 years. The strategy supports the short term action of the National Road Safety Strategy 2011-2020. NSW 2021 aims to improve road safety by identifying and upgrading black spots, promoting safety features in cars, enforcing speed limits and other road rules, and education to encourage road users to take less risks on NSW roads.

The key directions identified within the National and State strategies are considered consistent with the objectives of the proposal (refer to Section 2.4) and the anticipated outcomes of the proposal.

2.3.4 Western Sydney Infrastructure Plan

The Australian and NSW governments are funding a 10 year, $3.6 billion road investment program for western Sydney. The Western Sydney Infrastructure Plan will deliver major road infrastructure upgrades to support an integrated transport solution for the region and capitalise on the economic benefits from developing the Western Sydney Airport. The Plan provides improved road transport capacity ahead of future traffic demand, as planned residential and employment development comes online in western Sydney growth areas and the Western Sydney Employment Area.

The proposal would be consistent with the plan, as it would provide an improved road environment for people using Caddens Road and provide connectivity to important arterial roads such as the Great Western Highway and allow for safe use of Caddens Road whilst supporting future growth in Western Sydney.

2.4 REASONS FOR THE ACTIVITY AND CONSIDERATION OF ALTERNATIVES

Proposal Objectives

The objectives of the proposal include:

- Support planned growth in western Sydney by
  - Improving traffic flow
  - Improving road safety and road network efficiency
  - Reducing travel times – particularly along key regional link roads which connect residential, education, employment, transport and retail hubs.

Consideration of alternatives

Two options were considered:

Do nothing

Do not undertake works on Caddens Road from the intersection of Gipps Street / Kent Road to Claremont Creek.

This option would not satisfy the objectives of the proposal; travel time would increase over time with predicted increases in traffic levels and the efficiency and safety of the road network would not be improved.

Upgrade Caddens Road

Upgrade Caddens Road from the intersection of Gipps Street / Kent Road to Claremont Creek, providing a widened single-carriageway road, a roundabout at White Cedar Avenue and a new bus stop, shared pathway and pedestrian facilities. This option would improve the safety and efficiency of the road network, catering for future growth and improving efficiency and safety of the road network. This option best meets the objectives of the proposal.

2.5 DESCRIPTION OF THE ACTIVITY

The proposed upgrade of Caddens Road includes:

- Widening of Caddens Road to accommodate 3.2m wide travel lane and 3.2m wide parking lanes each direction within the existing 21m wide road corridor with double barrier central line-marking connecting this section of Caddens Road upgrade with newly constructed intersection of Gipps Street, Kent Road. Also connecting this section of Caddens Road with the new already widened section road towards the western end of Caddens Road
- Bridge extension - Construction of a cantilever structure to the north for the provision of a 2.5m wide pedestrian footpath on Caddens Road across the culvert at Claremont Creek. The cantilever structure would comprise of steel frames fixed at the top to the headwall of the culvert with a diagonal brace down to and fixed to the top of the culvert crown units
- Line marking on the approach to the Gipps Street traffic signals (eastbound) to include a 60m right turn lane to Caddens Road with the kerbside lane to be through and left
- Construction of a single lane mountable roundabout at the intersection of Caddens Road and White Cedar Avenue including splitter islands with pedestrian walkthroughs on all three legs of the roundabout and pavement works and line marking extending into White Cedar Avenue
- Remove temporary Watts profile speed humps currently in place for this section of Caddens Road
- Installation of new bus stop adjacent to the roundabout on the northern side
- Construction of a seagull island at the intersection of Caddens Road and Silkwood Drive
- Installation of a stormwater drainage system along the length Caddens Road
- Construction of a 2.5m wide shared use path on the northern side of Caddens Road adjacent to the back of properties
- Adjustment, relocation and protection of utilities
- Installation of street lighting.

Detailed designs are located in Appendix A.

Construction methods

An indicative work plan and methodology are provided below.

Pre-construction requirements

- Development of Construction Environmental Management Plan and Traffic Control Plan
- Establishment of Site Compound on White Cedar Avenue, opposite Red Gum Street

Site establishment

- Implementation of traffic controls
- Progressive installation of temporary erosion and sediment controls
- Establishment of ancillary site and temporary stockpiles
- Clearing and grubbing of vegetation

Construction

Construction sequencing and methods would generally be as follows:

- Surveys, investigations and setting out work in accordance with design plans
- Install traffic management measures including temporary traffic signs and barricades
- Install temporary erosion, sediment and water quality controls
- Mark trees that would need to be removed or trimmed
- Clear and grub vegetation
- Relocate overhead power lines
- Adjust and/or relocate other utilities
- Construct cantilever structure
- Remove the existing pavement and associated speed humps
- Excavate and fill to the road formation levels
- Dispose of unsuitable and/or surplus material from the proposal site
- Install new drainage lines, pits and subsoil drains to connect into the existing drainage lines within the road formation
- Install new kerb and gutter
- Construct the pavements, including placing and compacting select fill, sub base, and asphalt wearing surface
- Construct shared path
- Install new roundabout and traffic islands
- Install new street lights
- Rehabilitate disturbed areas and landscape in accordance with the landscaping plan
- Line marking and sign posting

During construction traffic movements would be maintained at all times.

Post construction works

- Progressive stabilisation and rehabilitation of all areas disturbed during works
- Site clean-up
- Removal of traffic and erosion and sediment controls after stabilisation of disturbed areas.

Proposed construction equipment

The following indicative list of equipment / machinery are expected to be used during construction:

- Excavator 20t
- Stabiliser (Wirtgen 2400)
- Spreader
- Front end loader
- Chainsaws
- Mulchers
- Tip trucks
- Light vehicles
- Pad foot roller
- Smooth drum roller
- Multi tyre roller

- Grader
- Profiler
- Crane
- Concrete agitators
- Pneumatic jackhammer
- Traffic control equipment
- Concrete Trucks
- Asphalt Paver
- Crew Trucks
- Paveliner
- Asphalt Delivery Trucks
- MTV
- Light Towers
- Line marking unit

Proposed construction materials

The following materials would be required for construction of the proposal:

- Concrete
- Concrete RW blocks
- Concrete drainage pipes
- Stabilising product
- Asphalt
- Signs and delineation
- Rebar
- Guardrail
- Base material
- No fines concrete
- Imported topsoil
- Trees
- Streetlights including poles and cabling

Earthworks

The majority of the earthworks would be associated with the excavation for the widening of Caddens Road including the removal of the existing footpath and asphalt pavement.

The estimated quantities of materials associated with earthworks are shown in Table 2-1 below.

Table 2-1 Quantities of material to be removed during construction

Type	Quantity (m^2)
Clearing and Grubbing	4,119
Concrete Footpath	339
Asphalt Pavement	5,653
Total	10,111

Earthwork requirements would be confirmed during detailed design.

Ancillary facilities

A site compound would be established on White Cedar Avenue, opposite Red Gum Street. The compound would be used during construction for storage of materials, parking and stockpiling.

Construction hours and timing

The proposed works would be undertaken during standard working hours in accordance with the *Interim Construction Noise Guideline* (DECC 2009), as follows:

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm
- Sunday and Public Holidays: No work

Proposed date of commencement:

The proposed work area is anticipated to commence in September 2018

Estimated length of construction period:

Construction is expected to take approximately 40 weeks to complete and is anticipated to commence in late 2018.

Traffic management and access

Construction of the proposal would generate heavy vehicle movements. These heavy vehicle movements would mainly be associated with:

- Delivery of construction materials
- Spoil and waste removal
- Delivery and removal of construction equipment and machinery.

Light vehicle movements would be required for the movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

Construction vehicles would access the site via arterial roads wherever possible. About X to X heavy vehicles would be required on-site per day, resulting in about ten to X heavy vehicles movements in and out of the site per day. In addition, light vehicles would be required to transport staff, resulting in up to X to X light vehicle movements in and out of the site per day.

A traffic management plan would be prepared. The traffic management plan would provide details of the traffic management to be implemented during construction to ensure traffic flow is maintained. Property accesses would be maintained as far as practicable throughout construction and there would be no disruption to bus services.

Figure 2-2 Overview of the proposal

3 LEGAL AND POLICY REQUIREMENTS

3.1 LEGAL PERMISSIBILITY

Table 3-1 Legal requirements for the proposal

Law, Policy or Regulation	Objective	Requirement for the proposal
State Law		
Environmental Planning and Assessment Act 1979	Provides for a co-ordinated approach development ensuring the proper management, development and conservation of natural and cultural resources and promoting social and economic welfare and a better environment. Proposals which do not require development consent under a planning instrument may be approved by relevant government agencies under division 5.1 of the Act. A Review of Environmental Factors is required to assess if significant impacts are likely. If significant impacts are likely, an Environmental Impact Statement (EIS) would be required (See also EP&A Regulation below for 'designated development').	This REF has been completed under Division 5.1 of the EP&A Act, and aims to address Penrith Council's duty in respect to considering the environmental impact of the proposed activities under section 5.5 of the EP&A Act.
Environmental Planning and Assessment Regulation 2000 **(EP&A Regulation)**	This regulation details the assessment processes and information that must accompany development applications. Clause 228 (Part 14, environmental assessment under Part 5 of the Act) outlines the factors that must take into account concerning the impact of an activity on the environment.	A clause 228 checklist is included in this REF in Appendix F.
State Environmental Planning Policy (Infrastructure) 2007 **(Infrastructure SEPP)**	The object of the Infrastructure SEPP is to facilitate the effective and efficient delivery of infrastructure across the state. Clause 94 (1) states that development for the purposes of a road or road infrastructure facilities may be carried out by or on behalf of a public authority on any land without development consent. Clause 94 (2) (c) states that development for road infrastructure facilities includes alterations to an existing road (such as widening,	The proposal is permissible without consent under the infrastructure SEPP. Impacts resulting from these activities have been discussed in section 5 of this REF.

Law, Policy or Regulation	Objective	Requirement for the proposal
	duplication or reconstruction of lanes, changing the alignment or strengthening of the road). Clause 94 (2) (d) allows environmental management works to be undertaken without consent if the works are in or adjacent to a road corridor.	
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011	The aims of this policy are to provide for healthy water catchments that deliver high quality water while permitting development that is compatible with that goal. The policy provides that consent must not grant consent to a proposed development unless it is satisfied that the proposed development will have a neutral or beneficial effect on water quality. The assessment criteria are set out in the *Neutral or Beneficial Effect on Water Quality Assessment Guideline 2015 (SCA 2015*). The policy also aims to support the maintenance or achievement of the water quality objectives for the Sydney Drinking water catchment.	The proposal is not located within the Sydney Drinking Water Catchment.
Crown Lands Act 2016	The objective of the Crown Lands Act is to ensure that Crown land is managed for the benefit of the people of New South Wales. Department of Industries (DI) is responsible for the sustainable and commercial management of Crown land. This involves the management of state-owned land, linking with other agencies, local government, the private sector and communities to provide social and economic outcomes for NSW.	Penrith City Council will consult with Department of Industry regarding the works.
Fisheries Management Act 1994 **(FM Act)**	The FM Act aims to protect fishery resources and marine species, and conserver habitats and diversity. The FM Act works in conjunction with the EP&A Act. If the following activities form part of the proposal, Section 201 of this Act requires a permit from DPI prior to works commencing: • Aquaculture • Dredging or reclamation • Harm marine vegetation (mangrove, seagrass, seaweed). • Obstruct free passage of fish	Claremont Creek is classed as key fish habitat. No excavation of the creek bed would occur. Scaffolding would be placed on the concrete slab in the creek bed and would not obstruct more than 10% of the opening to the culvert. Works would be undertaken when the creek bed is dry. A fisheries permit is not required.

Law, Policy or Regulation	Objective	Requirement for the proposal
National Parks & Wildlife Act 1974 **(NPW Act)**	The NPW Act establishes the fundamental functions of the NSW National Parks and Wildlife Service. These include the conservation of nature, objects, features, places and management of land reserved under the Act. The NPW Act also sets out to protect and preserve Aboriginal Heritage values and is required to maintain a register of sites of archaeological and Aboriginal heritage significance (Schedule 14). Part 6 of this Act refers to Aboriginal objects and places and prevents persons from impacting on an Aboriginal place or relic, without consent or a permit. Office of Environment and Heritage (OEH, formerly DECCW) has released Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW that when followed meets the requirements of due diligence under the Act (DECCW 2010). If works impact on an Aboriginal object or place, an Aboriginal Heritage Impact Permit would be required.	Section 5.9 of this REF addresses potential impacts to Aboriginal Heritage.
Biodiversity Conservation Act 2016 **(BC Act)**	The BC Act outlines the framework for addressing impacts on biodiversity from development and clearing and sets out to: • Conserve biological diversity and promote ecologically sustainable development; • Prevent the extinction and promote the recovery of threatened species, populations and ecological communities; • Protect the critical habitat of those species, populations and ecological communities that are endangered; • Eliminate or manage certain threatening processes; • Ensure proper assessment of activities impacting threatened species, populations and ecological communities, and • Encourage the conservation of threatened species, populations and ecological communities through co-operative management.	Section 5.4 discusses the potential impacts of the proposed works on threatened species, populations or EECs in the vicinity of the proposed work areas.

Law, Policy or Regulation	Objective	Requirement for the proposal
Biosecurity Act 2015	The primary object of the *Biosecurity Act 2015* is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers. The biosecurity framework and tools safeguard our economy, environment and community and Any land managers and users of land have a responsibility for managing weed biosecurity risks that they know about or could reasonably be expected to know about.	A search of the Department of Primary Industries WeedWise database for regional priority weeds for Greater Sydney was undertaken in March 2018 (see Appendix B). Section 5.4 addresses impacts relating to priority weeds.
Heritage Act 1997	This Act aims to conserve heritage values. The Act defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts listed in the local or state heritage significance. A property is a heritage item if it is listed in the heritage schedule of the local council's Local Environmental Plan or listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW.	Heritage impacts are considered in section 5.10 of this REF.
Water Management Act 2000 **(WM Act)**	Under the WM Act a controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land (i.e. in or within 40 metres of a river lake or estuary). Under the WM Act a controlled activity means: (a) The erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or (b) The removal of material (whether or not extractive material) or vegetation from land, whether by excavation or otherwise, or (c) The deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or (d) The carrying out of any other activity that affects the quantity or flow water in a water source.	A controlled activity approval is not required as works would not be undertaken on waterfront land and under Clause 39A of the Water Management (General) Regulation 2004, all public authorities (other than Landcom) are exempt from controlled activity approvals. Impacts on broader water quality are considered in section 5.2 of this REF.

Law, Policy or Regulation	Objective	Requirement for the proposal
	It is an offence under Section 91E (1) of the WM Act to carry out controlled activity without, or otherwise than as authorised by, a controlled activity approval. However, Penrith Council is exempt from obtaining a controlled activity approval for works, pursuant to Clause 38 of the Water Management (General) Regulation 2011: A public authority is exempt from 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.	
Protection of the Environment and Operations Act 1997 **(POEO Act)**	The objectives of this Act include protecting, restoring and enhancing the quality of the environment in NSW having regard to the need to maintain ecologically sustainable development; reducing risks to human health and preventing the degradation of the environment. Under the Act, the Environment Protection Authority (EPA) is responsible for issuing licences for specified activities. Schedule 1 lists the types of premises and non-premises based activities that require a license under the Act.	The proposal is not an activity listed under Schedule 1 of the Act. Therefore, a license would not be required.
Roads Act 1993	The objectives of this Act include, but are not limited to, the rights of persons to pass along public roads, the rights of neighbouring landowners, the responsibilities and requirements of roads authorities and the regulation of various activities on public roads. The council is the roads authority for all public roads within an LGA, other than any freeway, crown road, or road for which some other public authority is declared to be the roads authority.	Section 71 of the Act states that a roads authority may carry out road work on any public road for which it is the roads authority and on any other land under its control. The proposal would not require approval or any additional licences under this Act.
Commonwealth Law		

Law, Policy or Regulation	Objective	Requirement for the proposal
Commonwealth Environment Protection and Biodiversity Conservation Act 1999 **(EPBC Act)**	The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulates the assessment and approval of activities that will have or is likely to have a significant impact on Matters of National Environmental Significance (MNES), activities by Commonwealth government agencies and activities by any person on Commonwealth land. Currently MNES include: • World Heritage properties • National Heritage places • Wetlands of international importance (listed under the Ramsar Convention) • Nationally listed threatened species and ecological communities, migratory species (protected under international agreements) • Commonwealth marine areas • Great Barrier Reef Marine Park • Nuclear actions (including uranium mines) A water resource, in relation to coal seam gas development and large coal mining development	An EPBC Act protected matters search was undertaken in March 2017 (Appendix B). An assessment of the impacts of the proposal determined that the proposal does not constitute an activity which may have a significant adverse impact on any MNES (5.13). MNES relevant to the study area include: • Nationally listed threatened species and ecological communities • migratory species (protected under international agreements)
Local Law		
Penrith Local Environmental Plan 2010 **(LEP)**	The particular aims of this Plan are as follows: (a) to provide the mechanism and planning framework for the management, orderly and economic development, and conservation of land in Penrith, (b) to promote development that is consistent with the Council's vision for Penrith, namely, one of a sustainable and prosperous region with harmony of urban and rural qualities and with a strong	The road upgrade works are located in SP2 and these works are permitted with consent. In addition, Clause 8 of the ISEPP serves to override the permissible development provisions of the LEP, the development restrictions of the LEP do not apply.

Law, Policy or Regulation	Objective	Requirement for the proposal
	commitment to healthy and safe communities and environmental protection and enhancement, (c) to accommodate and support Penrith's future population growth by providing a diversity of housing types, in areas well located with regard to services, facilities and transport, that meet the current and emerging needs of Penrith's communities and safeguard residential amenity, (d) to foster viable employment, transport, education, agricultural production and future investment opportunities and recreational activities that are suitable for the needs and skills of residents, the workforce and visitors, allowing Penrith to fulfil its role as a regional city in the Sydney Metropolitan Region, (e) to reinforce Penrith's urban growth limits by allowing rural living opportunities where they will promote the intrinsic rural values and functions of Penrith's rural lands and the social well-being of its rural communities, (f) to protect and enhance the environmental values and heritage of Penrith, including places of historical, aesthetic, architectural, natural, cultural, visual and Aboriginal significance, (g) to minimise the risk to the community in areas subject to environmental hazards, particularly flooding and bushfire, by managing development in sensitive areas, (h) to ensure that development incorporates the principles of sustainable development through the delivery of balanced social, economic and environmental outcomes, and that development is designed in a way that assists in reducing and adapting to the likely impacts of climate change.	

4 CONSULTATION

4.1 COMMUNITY CONSULTATION

Consultation would be undertaken by Penrith City Council to inform residents of proposed works prior to commencement of construction.

4.2 ISEPP CONSULTATION

Clauses 13, 14, 15 and 16 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) requires that public authorities (which includes the Penrith City Council) undertake consultation with councils and other public authorities when proposing to carry out development without consent. Table 4-1 lists items that may trigger consultation and assesses whether they are relevant to the proposal.

Table 4-1 ISEPP consultation requirements

Item	Response
Clause 13 Consultation with councils—development with impacts on council-related infrastructure or services	
(1) This clause applies to development carried out by or on behalf of a public authority that this Policy provides may be carried out without consent if, in the opinion of the public authority, the development: (a) A substantial impact on stormwater management services provided by a council. (b) Likely to generate traffic to an extent that will strain the capacity of the road system in a local government area. (c) Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council. (d) Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council. (e) Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential. (f) Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	Clause 13 are not applicable to the proposed development. Penrith City Council is undertaking the works within their own council area and are the roads authority for Caddens Road. Consultation within the relevant sections of council has occurred regarding this proposal.

Item	Response
Clause 14 Consultation with councils—development with impacts on local heritage	
(1) This clause applies to development carried out by or on behalf of a public authority if the development: (a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area. (b) is development that this Policy provides may be carried out without consent.	No heritage listed items within the vicinity of the proposal site.
Clause 15 Consultation with councils—development with impacts on flood liable land	
(2) A public authority, or a person acting on behalf of a public authority, must not carry out, on flood liable land, development that this Policy provides may be carried out without consent and that will change flood patterns other than to a minor extent unless the authority or person has: (a) given written notice of the intention to carry out the development to the council for the area in which the land is located, and (b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	The proposed works would not alter flood patterns other than to a minor extent of Claremont Creek. Refer to Section 5.2 for further details on flooding.
Clause 16 Consultation with public authorities other than councils	
Clause 16 of the ISEPP states that a consent authority must not carry out any of the following development without giving written notice to the specified authority and taken their responses into consideration: (a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974* – the Department of Environment and Climate Change [now the Office of Environment and Heritage]. (b) development adjacent to a marine park declared under the *Marine Parks Act 1997* – the Marine Parks Authority. [It is noted this act has been replaced with the Marine Estate Management Act 2014]. (c) development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994* – the Department of Environment and Climate Change [now the Office of Environment and Heritage]. (d) development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998* – the Sydney Harbour Foreshore Authority. (e) development comprising a fixed or floating structure in or over navigable waters – the Maritime Authority of NSW. (f) development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act) – the NSW Rural Fire Service.	Not applicable - the proposal is not: • Adjacent to land reserved under the *National Parks and Wildlife Act 1974* • Adjacent to a marine park declared under the *Marine Estate Management Act 2014* • Adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994* • In the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998* • Comprising of a fixed or floating structure in or over navigable water • Development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes.

5 ENVIRONMENTAL ASSESSMENT

5.1 TOPOGRAPHY GEOLOGY AND SOILS

5.1.1 Existing environment

The proposal is located along Caddens Road in Claremont Meadows. The slope of the site varies locally between gentle slopes and has an elevation of between 10 metres and 30 metres. The site has previously been disturbed during the road construction, however, the surface is generally well grassed outside of the road reserve with stands of shrubs, trees and some informal landscaping.

The proposal is located within the Penrith LGA within the Cumberland Plain subdivision of the Sydney Basin and is comprised of quaternary alluvium derived from Wiananmatta Group shales and Hawkesbury Sandstone. The *Soil Landscapes of the Penrith 1:100 000 Sheet* map and report (Soil Conservation Service of NSW, 1990) indicates that the soil profiles for the proposal site are classed as Blacktown and South Creek (refer to Figure 5-1).

Blacktown is a residual landscape characterised by Ashfield Shale consisting of laminite and dark grey siltstone, Bringelly Shale which consists of shale with occasional calcareous claystone, laminite and infrequent coal, and Minchinbury Sandstone consisting of fine to medium-grained quartz lithic sandstone. Limitations of the soil profile include high acidity, localised salinity and low fertility.

South Creek landscapes occur along drainage depressions of the channels on the Cumberland Plain and are characterised by quaternary alluvium with dull brown sand and clay loam. Limitations of this soil profile include seasonal waterlogging and high erodibility.

There is no risk mapping for acid sulfate soils for proposal site. Works are not expected to require excavation of acid generating sediments. The proposal site is mapped as a moderate risk for salinity.

Contaminated Land

A search of the NSW Contaminated Lands register and list of sites notified to the EPA was undertaken on 29 March 2018 (NSW Environmental Protection Authority, 2018). The search revealed that no contaminated sites were listed for the suburbs of Claremont Meadows or Caddens. The proposal is therefore not expected to interfere with known occurrences of contaminated land.

The proposed works are not within a proclaimed Mine Subsidence District, therefore there would be no impacts or restrictions relating to mine subsidence.

5.1.2 Potential impacts

Construction

The potential impacts to soils and contaminant sources from general construction works include:

- Erosion as a result of excavation
- Sediment run-off into Claremont Creek
- Soil erosion and damage to soil structure due to movements of construction machinery and general construction activities
- Potential spills of hydrocarbons during construction (fuels, oils, lubricants) from the use of equipment, vehicles and machinery

- Dust or leachate from road construction works (asphalt and concrete).

Adverse soil impacts can also have ecological impacts, affecting habitat condition, water quality and riparian ecosystems of Claremont Creek. Risks to soils are influenced by landscape position, slope, soil type, hydrology and land use. Overall, short term risks to soils would be high, primarily during excavation works adjacent to Claremont Creek, and culvert works in Claremont Creek, but localised. Known (demonstrated to be effective on similar projects) mitigation strategies are considered highly likely to be able to adequately address these risks. Medium to long term impacts would be low provided stabilisation strategies are effectively implemented. Stabilisation and revegetation would act to resist soil erosion to the same extent that existing vegetation now functions.

These potential impacts would be minimised through the implementation of the mitigation measures provided in Section 5.1.3.

Operation

The operation of the proposed works would be unlikely to impact geology and soils. Exposed areas would be revegetated, minimising the risk of erosion.

5.1.3 Safeguards and mitigation measures

- A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation
- A Soil and Water Management Plan (SWMP) shall be implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion, water pollution and salinity and describe how these risks will be addressed during construction
- An Erosion and Sedimentation Control Plan (ESCP) shall be developed as part of SWMP for the works. The ESCP shall provide for:
  - Disturbed areas will be stabilised to minimise further erosion
  - The construction footprint will be delineated to ensure that no soil disturbance occurs beyond this
  - Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets
  - Reduce water velocity and capture sediment on site
  - Minimise the amount of material transported from site to surrounding pavement surfaces.
  - Erosion and sedimentation controls are to be checked and maintained on a regular basis and records kept and provided on request
  - Erosion and sediment control measures are to be implemented until the works are complete or areas are stabilised
  - Work areas are to be stabilised progressively during the works
- Construction would be managed in accordance with the Blue Books 1 and 2D; *Managing Urban Stormwater, Soils & Construction, Volume 1* (Landcom 2004) and *Managing Urban Stormwater, Soils and Construction, Volume 2D, Main Road Construction* (DECC 2008).
- Vehicles, plant and equipment will be checked for leaks and appropriate spill kits will be available onsite at all times
- Bulk chemicals will not be stored on site

- All chemicals and fuels shall be stored in suitable bunded areas away from drainage lines. The capacity of the bunded area would be at least 120 per cent of the largest chemical container stored within the bunded area
- If contaminated soils are uncovered or are suspected to have been uncovered, due to odour or discolouration of soils, works shall cease immediately, and the appropriate management requirements would be determined
- All staff will be appropriately trained through toolbox talks for the minimisation and management of accidental spills
- All refuelling will be carried out off-site, as far as practicable
- Spill kits will be made available at the site at all times throughout construction
- All personnel will be appropriately trained for the minimisation and management of accidental spills.

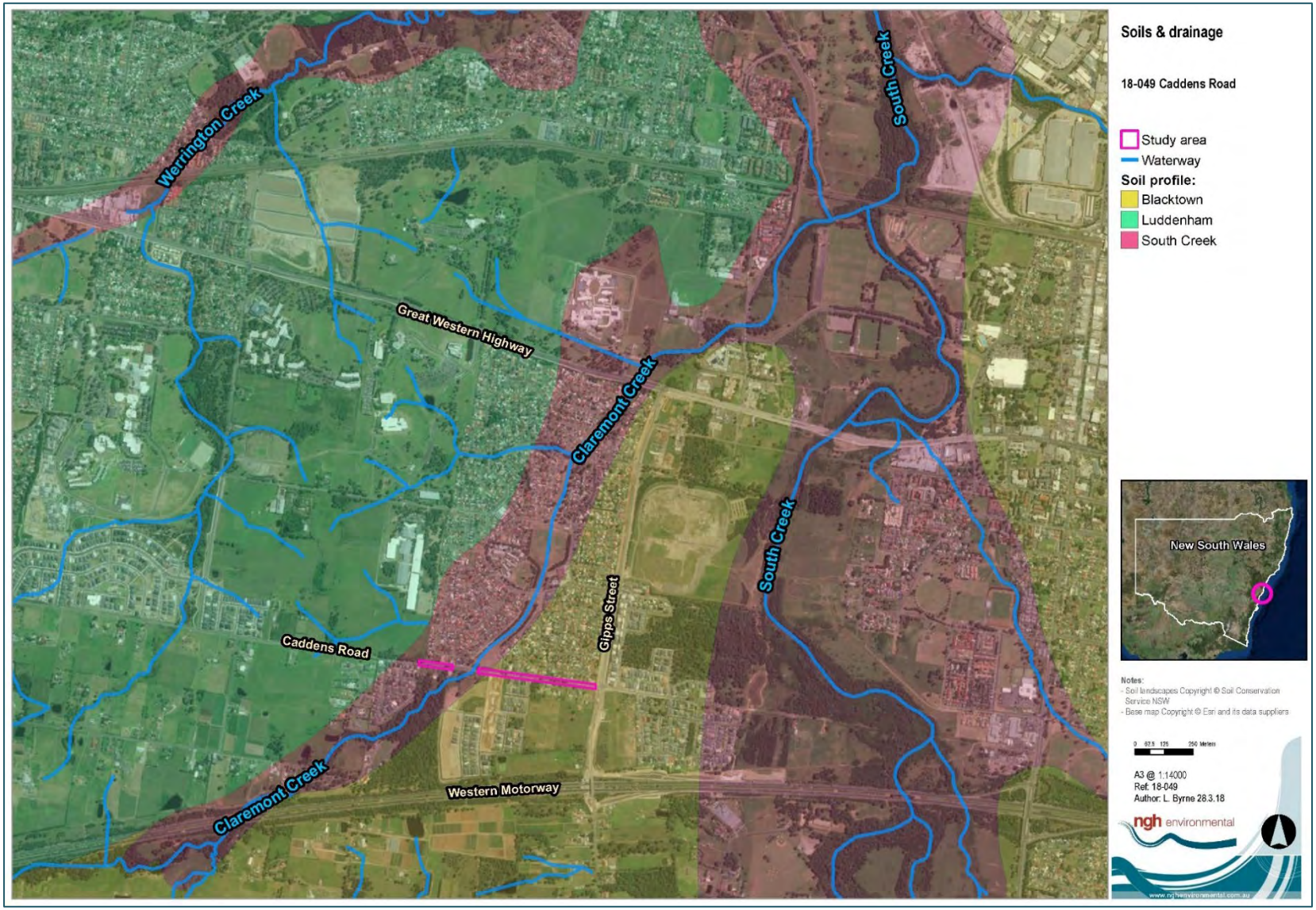

Figure 5-1 Soil profiles and drainage lines

5.2 HYDROLOGY, CATCHMENT VALUES AND WATER QUALITY

5.2.1 Existing environment

The proposed works are located within the Nepean River sub-catchment of the Hawkesbury-Nepean catchment. There are three tributaries within and in proximity to the proposed works; South Creek, Claremont Creek and Werrington Creek (refer to Figure 5-1).

South Creek is a tributary of the Hawkesbury River that drains a 414 km^2 catchment in Western Sydney. South Creek generally flows from south to north through the catchment with the commercial centres of Penrith and Blacktown located to the west and east, respectively. Large areas of the catchment have been urbanised, particularly in the vicinity of these commercial centres (Worley Parsons, 2015). Historical records indicate two major floods occurred in the South Creek Catchment in the 1980s. The 1988 flood was in the order of a 100-year recurrence flood within South Creek; other significant floods occurred in 1867, 1956, 1961 and 1978 (Worley Parsons, 2015).

Claremont Creek and Werrington Creek are minor tributaries of South Creek. Historical data is unavailable for Claremont Creek, however, Claremont Creek is mapped as a flood planning area in the Penrith LEP with levels predicted to reach to 35 metres at the peak of the 100-year recurrence flood. The creek is perennial and is a 4th order stream, which is classified as fish habitat.

During the site inspection the proposal site at Claremont Creek was dry, however, emergent native aquatic flora located on the southern side of the culvert indicates water does intermittently flow through the proposal site. North of the culvert the creek flattens, where the drainage line flows through large grassed open areas. The water quality when flowing would be potentially impacted by upstream land uses including urban development and agriculture. The existing culvert is a five-cell box culvert under Caddens Road, crossing Claremont Creek. Currently no other stormwater infrastructure exists on-site.

5.2.2 Potential impacts

Construction

Construction of the proposed works has the potential to impact water quality in drainage lines through accidental spills. The risk of pollutant spills is increased at the site compound on White Cedar Avenue opposite Red Gum Street where vehicle, machinery and other equipment may be stored. These pollutants may potentially include:

- Sediment laden water (including construction waste water)
- Fuels spilled during refuelling of plant and equipment
- Hydraulic and lubricating oil leaking from plant and equipment
- Rinse water from plant washing
- Construction waste such as concrete wash and concrete slurries which could alter the pH of water if spilled into a drainage line
- Water containing biological contaminants such as nutrients and bacteria from site toilets and taps (within the compound sites).

Introduction of the above pollutants from the proposed works into the surrounding environment, if uncontrolled, could potentially impact the gross pollutants entering receiving waterways and a reduction

of water quality due to an influx of man-made substances resulting in adverse impacts to aquatic flora and fauna.

Proposed works to the culvert include a cantilever structure that would involve the erection of temporary scaffolding on the concrete slab in the creek bed during construction. The scaffolding would reduce the cross-section of the culvert by less than ten per cent during construction only. The scaffolding would be attached to the concrete slab and be in place only whilst the creek bed is dry. No excavation to the creek bed is proposed as part of the proposed works. Disturbance would be temporary and restricted to construction.

Operation

The additional hard surface associated with the road widening and provision of a new roundabout would result in potential increased runoff during rain events, potentially influencing localised flood behaviour. The construction of new stormwater infrastructure that would receive the runoff within the proposed works area would have adequate capacity and therefore would minimise downstream impacts. Flood patterns and behaviours are unlikely to be significantly altered due to the works altering the environment to a minor extent only, and through the provision of new stormwater drainage infrastructure.

5.2.3 Safeguards and mitigation measures

As noted in Section 5.1.3, an Erosion and Sediment Control Plan would be prepared and implemented for the proposed works to manage risks to water quality. Impacts to hydrology would be managed by the safeguards outlined in Section 5.1.3.

Works within Claremont Creek

- Scaffolding shall only be erected whilst the creek is dry and be restricted to the concrete slab.
- Regular checks of the BOM website will be made and the CEMP will include provisions for managing equipment and works during high rainfall and /or flood events. Including the potential requirement to remove equipment from the floodplain prior to predicted high flow events.
- All materials would be removed from the creek bed before times of predicted heavy rainfall.
- Due to the increased risk of pollutant spills at site compounds, the compound must:
    - Be located more than 50 metres from a waterway.
    - Be located in areas of low ecological significance and require minimal clearing of native vegetation (not beyond that already required by the Project)
    - Be located on relatively level land
    - Be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented

5.3 AIR QUALITY

5.3.1 Existing environment

Air quality at the proposal site is characteristic of an urban environment (e.g. localised vehicle emissions). Main sources of odour and dust would be from the M4 Western Motorway to the south and the Great Western Highway to the north. There is also potential for dust to be generated from the nearby construction of residential properties within the Caddens Meadow Estate to the north of Caddens Road and Caddens Heights Estate to the south of Caddens Road.

Sensitive receivers in the vicinity of the proposal include the residential properties within Claremont Meadows, small businesses within Claremont Meadows including the NSW State Emergency Service (SES) and a childcare centre, and commuters who use Caddens Road.

5.3.2 Potential impacts

Construction

Atmospheric pollutants created during the construction phase would include dust from the transport and operation of vehicles and excavators as well as exhaust emissions. Dust production can increase during dry and windy conditions. High levels of dust can supress vegetation growth and impact on houses near the works as well as inconvenience nearby receivers. These negative impacts would be restricted to the construction period.

Excavation works during periods of heavy rain and flooding can lead to loss of soil to erosive forces and potential to take dirty water offsite (refer to section 5.1).

Existing vegetation would act to mitigate the impacts of dust on nearby receivers. Given the short duration of works, negative air quality impacts from construction are likely to be low and manageable through the implementation of the safeguards and mitigation measures outlined below.

5.3.3 Safeguards and mitigation measures

The following safeguards and mitigation measures are recommended to minimise air quality impacts from the proposed works:

- Dust controls would be implemented during construction, as required; for example, use of a water cart or ceasing construction activities when weather conditions are such that dust cannot be adequately controlled
- Cleared vegetation, waste or other materials shall not be burnt at the site
- Stabilisation of disturbed surfaces will take place as soon as practicable
- Vehicles transporting waster or other materials that may produce odours or dust will be covered during transportation
- Construction plant and other equipment will be maintained in good working condition to minimise impacts on air quality
- Construction plant and machinery will be turned off when not in use.

5.4 BIODIVERSITY

5.4.1 Methodology

Potential impacts of the proposed works on biodiversity were assessed based on information collected during both a desktop review and a site inspection undertaken on 4 April 2018.

Database Searches

Database searches undertaken for the purposes of this assessment included threatened species databases and priority weed databases (Appendix B). The combined results of the database searches for threatened species, populations and communities informed an evaluation of presence of habitat and likelihood of occurrence of threatened flora and fauna species and ecological communities. These are provided in Appendix C, with an explanation of the categories used.

Table 5-1 Database searches undertaken for the biodiversity assessment.

Resource	Target	Search date	Search area
OEH Wildlife Atlas Data (Bionet)	Threatened flora and fauna species, populations and ecological communities listed under the BC Act	28/03/18	*Study Locality.* 10 km radius of proposed work area
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species	28/03/18	10 km radius of proposed work area
DPI Weed Wise database	Priority weeds declared in the relevant LGA	28/03/18	Greater Sydney
Bureau of Meteorology National Atlas of Groundwater Dependant Ecosystems	Vegetation communities that are likely to rely on groundwater	28/03/18	10 km radius of proposed work area

Field Survey

During the site visit, an ecologist undertook a random meander (Cropper, 1993) survey of the proposal site recording all flora observed and searching for threatened flora identified by the desktop search (Appendix B). Remnant vegetation at the proposal site was recorded and eligibility of remnants for classification to a NSW Plant Community Type (BioNet Vegetation Classification application) was assessed with reference to the relevant Final Determinations of the NSW Scientific Committee.

In the proposal site, vegetation, drains, rock walls and the creek culvert were assessed for their potential to provide habitat for the threatened fauna species identified in the desktop search. Additionally, incidental observations of fauna and their traces (e.g. scats, tracks, nests) were recorded.

5.4.2 Existing environment

Flora

At the time of survey, the following native vegetation groups existed in the proposal Site:

a. Remnant trees (Figure 5-2, Figure 5-3 and Figure 5-4)
b. Disturbance-tolerant, weedy native grasses, groundcovers (Figure 5-2, Figure 5-3, and Figure 5-4);
c. emergent aquatic plants (Figure 5-5, Figure 5-6)
d. Planted trees and shrubs (Figure 5-7).

Scattered remnant trees (*Eucalyptus tereticornis*, *E. moluccana*, *Angophora floribunda* and *Casuarina cunninghamiana*) were the only direct vestiges of previously-existing Cumberland Shale Plains Woodland and Cumberland Riverflat Forest communities, as past clearing and disturbance had removed most canopy trees and near-eliminated the understorey and ground-layer elements of those communities. Few other hardy and/or weedy native grasses and groundcover species survived in low densities in the highly disturbed, weed-dominated groundlayer of the road verges. Beds of emergent aquatic native plants Common Reed *Phragmites australis* and Broad-leaf Cumbungi *Typha orientalis* occurred in Claremont Creek adjacent to the Proposal Site.

Immediately adjacent and parallel to the existing footpath on the north side of Caddens Road, between Claremont Creek and the existing walkway to Egret Place, were densely planted with native trees and shrubs within slightly raised earth mounds (Figure 5-7).

Figure 5-2 Remnant trees with disturbed groundcover

Figure 5-3 Remnant trees with disturbed groundcover

Figure 5-4 Remnant trees with disturbed groundcover

Figure 5-5 Claremont Creek crossing north of the culvert, showing emergent aquatic vegetation.

Figure 5-6 Claremont Creek crossing south of the culvert, showing emergent aquatic vegetation.

Figure 5-7 Planted mound north of Caddens Road, between Claremont Creek and the existing walkway to Egret Place

Ground layer weeds dominated the roadside areas affected by the proposal due to extensive past soil disturbance associated with the development of the existing road, adjacent properties and infrastructure. During the site inspection, 27 weed species were recorded, including 4 Priority Weeds for the Greater Sydney Region (Appendix C).

Fauna

Desktop searches identified eight fauna species listed as threatened in New South Wales (*Biodiversity Conservation Act 2016*) that may also potentially be impacted by the Proposal (Appendix D).

During the site inspection six native bird species relatively common in suburban Sydney and two introduced bird species were recorded (Native: Yellow Thornbill *Acanthiza nana*, Australian Raven *Corvus coronoides*, Silvereye *Zosterops lateralis*, Superb Fairywren *Malurus cyaneus*, Golden Whistler *Pachycephala pectoralis* and Magpie Lark *Grallina cyanoleuca*; Introduced: Indian Mynah *Acridotheres tristis* and Spotted Turtle-dove *Streptopelia chinensis*). No other fauna were recorded during the site inspection.

5.4.3 Potential Impacts

Approximately 15 remnant trees would be removed to allow for road widening and footpath construction (nine *E. moluccana*, six *E. tereticornis*, two *A. floribunda*, three *C. cunninghamiana*). Where practical, the proposed works will retain three remnant *E. moluccana* trees.

Proposed works have the potential to impact the Cumberland Plain Land Snail (*Meridolum corneovirens)* which has been recorded in vegetation on Claremont Creek adjacent to the proposal site. Although this area of habitat is not directly affected by the proposal, Cumberland Land Snail could potentially occur as a vagrant and may utilise the disturbed habitat within the proposal site, where the sensitive, slow-moving gastropod could potentially be indirectly impacted by construction and site preparation works. A Test of Significance (ToS) for this species has been undertaken (Appendix E). The ToS concluded that with the appropriate measures there would not be a significant impact to the Cumberland Plain Land Snail.

Removal of remnant trees could potentially impact seven threatened species (two birds and five bats) that potentially use the trees for movement and foraging; however, due to the species being highly mobile and more suitable habitat being located in areas surrounding the proposal site, ToS were not required. No trees identified for removal contain hollows. Impacts to these species can be mitigated by implementing safeguards outlined below. Works in the Claremont Creek have the potential to affect the quality of the riparian and aquatic habitat at the site. No threatened aquatic species were identified in the background searches.

5.4.4 Safeguards and mitigation measures

Threatened Fauna

- A process would be included in the CEMP to undertake a survey for Cumberland Plain Land Snail before works. The CEMP would also identify suitable relocations sites and if snails are found onsite, species would be relocated to appropriate habitat within the surrounding area
- If unexpected threatened fauna or flora species are discovered, stop works immediately and seek the advice of a qualified Ecologist.

Stabilisation and rehabilitation

- Any trees cut from the site would be mulched onsite to assist stabilise areas of disturbance as a first option, offsite disposal would be a second option. Mulch shall be spread a maximum of 10-40mm so as not to suppress natural germination
- Stabilise and reseed disturbed areas with fast colonising species, appropriate to the area. Native dominated understorey areas shall be planted with native or sterile stabilisation species. Replacement plantings shall include similar species (i.e. *E. tereticornis*, *E. moluccana*, *A. floribunda*).

Weed and pathogen controls

- Priority weed infestations including African Olive, African Boxthorn, Cape Broom and Madeira Vine in the works area would be treated prior to works, in accordance with the Local Land Services Greater Sydney Regional Strategic Weed Management Plan 2017-2022
- The works would apply a high level of weed hygiene to prevent the introduction and spread of significant weeds at the site.

Works in Claremont Creek

- Safeguards are outlined in section 5.2.3.

5.5 PUBLIC AMENITY (VISUAL AMENITY AND SOCIO-ECONOMIC)

5.5.1 Existing environment

The proposal site is located in Claremont Meadows in the Penrith LGA of Western Sydney. The area surrounding the proposal site is a mixture of established and future residential and also recreational area. Residential properties occur predominantly along the northern side of Caddens Road with development south east and also west of the proposal site.

5.5.2 Potential impacts

Construction

Residents and motorists within proximity to the works may experience some socioeconomic impacts of the proposal through the generation of traffic, noise, air emissions and visual impacts during construction.

Visual impacts relate to the removal of vegetation, excavation works and presence of machinery and materials on site. During construction, there is also potential for visual amenity to be impacted through construction litter and untidy construction site. The presence of machinery and a construction site would be short term and temporary, confined to the construction period of the works.

Operational

Rehabilitation works would extend post-construction. All disturbed areas would be rehabilitated, however visual amenity impacts would continue until vegetation re-establishes. This impact is considered short term to medium term.

No negative operational impacts are considered likely during operation. Positive impacts would occur due to the upgrade of shared paths along Caddens, improving pedestrian safety.

5.5.3 Safeguards and mitigation measures

Visual

- Work areas would be left neat and tidy at the end of each day
- Keep vegetation removal to a minimum where practical (set out in section 5.4)
- Rehabilitation works would take place as soon as possible following the completion of construction
- Remove temporary erosion and sediment controls from the site once landforms have been assessed as stable.

Community wellbeing

- Consultation shall be undertaken with residents identified as sensitive receivers prior and during construction works. A contact number would be provided for community queries in relation to the works
- The community shall be notified of the work prior to construction commencing and kept updated on the progress of the works during construction

- Signage and barriers shall be implemented at the works site to prevent public access to areas deemed unsafe (borrow sites, around plant and machinery)
- To avoid impacts on residences the side compound will:
    - Be separated from the nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant)
    - Not unreasonably affect the land use of adjacent properties
    - Provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours.

5.6 WASTE MINIMISATION AND MANAGEMENT

5.6.1 Policy

Legal requirements for the management of waste are established under the *Protection of the Environment Operations Act 1997* (POEO Act) and the POEO (Waste) Regulation 2005. Unlawful transportation and deposition of waste is an offence under section 143 of the POEO Act.

Waste management would be undertaken in accordance with *the Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The objectives of this Act are:

a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,
b) to ensure that resource management options are considered against a hierarchy of the following order:
    i. avoidance of unnecessary resource consumption,
    ii. resource recovery (including reuse, reprocessing, recycling and energy recovery)
    iii. disposal,
c) to provide for the continual reduction in waste generation
d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste
e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste,
f) to ensure the efficient funding of waste and resource management planning, programs and service delivery,
g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis
h) to assist in the achievement of the objectives of the Protection of the Environment Operations Act 1997

Materials appropriate for reuse include rock, soil, sand, bitumen, reclaimed asphalt pavement, gravel, slag from iron and steel manufacturing, fly and bottom ash, concrete, brick, ceramics and other materials that hold a resource recovery order for use in road making activities.

For this proposal, appropriate material includes all natural materials such as rock, soil and sand. All non-natural materials would require transport off site to an appropriate facility.

5.6.2 Potential impacts

Possible waste streams generated during the construction would include:

- Surplus excavated soil and rocks, including topsoil
- Green waste from vegetation removal
- Concrete waste from existing kerb and guttering
- Surplus construction materials (surplus erosion and sediment control materials, concrete, rock)
- Paper and office waste from project management
- General waste from staff (lunch packaging, portable toilets etc.).

Waste that is not adequately managed can have a range of potential impacts, including:

- Loss of potentially recoverable resources
- Contamination of the site and surrounding environment (including potential visual and ecological impacts)
- Offsite contamination due to inappropriate disposal or handling by unlicensed operators.

Impacts from waste would only occur during the construction phase.

There is a good potential for reuse and recycling of the following materials as part of the proposed works:

- Surplus excavated soil and rocks, including topsoil – used for stabilisation
- Green waste from vegetation removal – mulched onsite and used for stabilisation.

Surplus vegetative matter, timber, steel and concrete would be disposed of at a facility able to accept the waste or at Council storage facility for later reuse.

The materials required during the proposed construction works are not currently restricted resources however, materials such as metals and fuels are considered non-renewable and should be used conservatively.

5.6.3 Safeguards and mitigation measures

- Cleared vegetation shall not be burnt at the site
- Waste shall be managed in accordance with the *Protection of the Environment Operations Act 1997*. A Waste Management Plan shall be prepared for construction which includes the following:
    - Identify all potential waste streams associated with the works
    - Identify opportunities to minimise the use of resources, and to reuse and recycle materials
    - Outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities. Waste must be disposed of at a facility able to accept the waste.
- Reuse of the following material would be undertaken:
    - Surplus excavated soil and rocks, including topsoil – used for stabilisation
    - Green waste from vegetation removal – mulched onsite and used for stabilisation.
- Waste not able to be reused would be transported to an appropriate waste disposal facility
- Working areas shall be maintained, free of rubbish and cleaned up at the end of each working shift
- Toilets (e.g. portable toilets) will be provided for construction workers.

5.7 NOISE AND VIBRATION

5.7.1 Approach

A noise and vibration assessment was carried out by RAPT consulting to assess the impacts of the proposal. A summary is provided in this section and a complete copy of the report is provided at Appendix G. The assessment was prepared with consideration to the Construction Noise and Vibration Guideline (RMS, 2016) and the following EPA publications:

- NSW Road Noise Policy (RNP) (DECCW, 2011)
- Interim Construction Noise Guideline (ICNG) (DECC, 2009)
- Noise Policy for Industry (NPI) (EPA, 2017)
- Assessing Vibration: A Technical Guideline (DEC, 2006).

The assessment methodology included:

- Identification of potentially affected noise sensitive receivers using aerial photographs and mapping
- Unattended noise monitoring to determine the existing environmental noise levels of the potentially affected area, and to enable an assessment of the potential noise impacts on the receiving environment
- Determining the relevant noise criteria for construction and operation
- Performing noise modelling and the Calculation of Road Traffic Noise (CoRTN) NSW method to predict the potential impacts of the construction, and operation phase of the proposal, respectively, on receivers
- Assessment of impacts and recommending measures to mitigate adverse impacts.

5.7.2 Existing environment

The area around the proposal site is described as urban, with residential receivers along Caddens Road within 10 metres of the proposal site. Background noise is considered low to medium due to the urban location. The main sources of noise within the area would be from traffic along residential streets.

5.7.3 Criteria

Operational Noise

The NSW Road Noise Policy (RNP) recommends various criteria for different road and residential developments and uses. Although it is not mandatory to achieve the noise assessment criteria in the RNP, proponents need to provide justification if it is not considered feasible or reasonable to achieve them. Based on the definitions in the RNP, Caddens Road is a Sub-Arterial Road. The following noise goals provided in below. The assessment timeframe for the criteria are in the year of opening and 10 years after opening.

Table 5-2 Road Noise Policy Goals

Road Category	Day	Night
Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	60 $L_{Aeq(15hr)}$	55 $L_{Aeq(9hr)}$

Construction Noise

Construction noise is assessed with consideration to DECCW Interim Construction Noise Guidelines (ICNG) (July 2009). The INCG is a non-mandatory guideline that is usually referred to by local councils and other NSW government entities when construction / demolition works require development approval. The ICNG recommend standard hours for construction activity as detailed in Table 5-3 .

Table 5-3 ICNG Recommended Construction Hours

Work type	Recommended standard hours of work
Normal construction	Monday to Friday: 7 am to 6 pm. Saturday: 8 am to 1 pm. No work on Sundays or Public Holidays.
Blasting	Monday to Friday: 9 am to 5 pm. Saturday: 9 am to 1 pm. No work on Sundays or Public Holidays.

The ICNG provides noise management levels for construction noise at residential and other potentially sensitive receivers. These management levels are to be calculated based on the adopted rating background level (RBL) at nearby locations, as shown in Table 5-4 .

Table 5-4 Recommended Construction Hours

Period	Management Level $L_{Aeq(15\ min)}$
Residential Recommended standard hours	Noise affected level: RBL + 10 Highly noise affected level: 75 dB(A)
Residential Outside recommended standard hours	Noise affected level: RBL + 5
Classrooms at schools and other educational institutions	Internal Noise Level 45 dB(A) (applies when properties are being used)
Offices, retail outlets	70 dB(A)

The above levels apply at the boundary of the most affected residences / offices or within 30 m from the residence where the property boundary is more than 30 m from the residence.

The *noise affected level* represents the point above which there may be some community reaction to noise. Where the *noise affected level* is exceeded all feasible and reasonable work practices to minimise noise should be applied and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and a method of contact. The *noise affected level* is the background noise level plus 10 dB(A) during recommended standard hours and the background noise level plus 5 dB(A) outside of recommended standard hours.

The *highly noise affected level* represents the point above which there may be strong community reaction to noise and is set at 75 dB(A). Where noise is above this level, the relevant authority may require respite periods by restricting the hours when the subject noisy activities can occur, considering:

- Times identified by the community when they are less sensitive to noise (such as mid-morning or mid-afternoon for works near residences).
- If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Based on the above and the RBL determined from site monitoring, construction noise goals have been derived, as shown in Table 5-5.

Table 5-5 Construction Noise Goals dB(A) LAeq(15min)

Receiver	Within Recommended Standard Hours	Outside Recommended Standard Hours	
		Evening (6pm-10pm)	Night (10pm-7am)
Residential	47	46	40
Classrooms at schools and other educational institutions	45(internal)	45(internal)	45(internal)
Offices, retail outlets	70	70	70

Vibration

Vibration during construction and operational activity is expected to primarily originate from trucks and machinery during stages of construction and activities. Blasting and heavy ground impact activities is not expected to occur during the upgrade works.

Vibration goals during the were sourced from the DECCW's *Assessing Vibration: a technical guideline*, which is based on guidelines contained in British Standard (BS) 6472–1992, *Evaluation of human exposure to vibration in buildings (1–80 Hz).*

Intermittent vibration is assessed using the vibration dose value (VDV), fully described in BS 6472 – 1992. Table 5-6 provides acceptable vibration dose values.

Table 5-6 Acceptable Vibration Values for Intermittent Vibration (m/s1.75)

Location	Daytime [1]		Nighttime [1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas [2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26

Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

5.7.4 Potential impacts

Operational Traffic Noise

The Calculation of Road Traffic Noise (CoRTN) method of traffic noise prediction was used, which is approved by the OEH. The CoRTN method accommodates the following factors affecting traffic noise.

- Posted Speed;
- % Heavy Vehicle traffic;
- Roadway Gradient;
- Topographic features;
- Receiver / Source distance and heights;
- Intervening Ground Cover;
- Reflections from buildings.

The noise model of the existing situation is checked against the measured noise levels on Caddens Road. If the predictions of the noise model are similar to the measured levels then there is confidence that the future scenario noise predictions will also be accurate. The CoRTN algorithm and noise modelling process was validated against the road traffic noise monitoring data and simultaneous traffic counts, and the average vehicle speed undertaken for the proposal in July 2017. The model is deemed to be verified if the average difference between the measured and calculated values of the descriptors is within +/- two dBA.

The model was verified with the noise data from the monitoring location. The predicted $L_{A10(18hr)}$ was compared with the $L_{A10(18hr)}$ calculated from logging data, and a calibration factor was determined. Table 5-7 shows the measured and predicted L10 (18hr) values used to calculate the calibration constants.

Table 5-7 Noise Model Verification

Descriptor	Noise Level dB(A)
Measured $L_{A10(18hr)}$	57.1
Predicted $L_{A10(18hr)}$	58.6
Difference	-1.5

The CoRTN method predicts the $L_{A10(18hr)}$ statistics. To determine the other required noise parameters $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$, correction factors are provided in Table 5-8 .

Table 5-8 Assessment Correction Factors

Descriptor	Measured L_{Aeq}	Measured $L_{A1018hr}$	Difference
$L_{Aeq(15hr)}$	56.3	57.1	-0.8

Descriptor	Measured L_{Aeq}	Measured $L_{A1018hr}$	Difference
$L_{Aeq(9hr)}$	49.4	57.1	- 7.7

The total noise source adjustment in the model to predict noise parameters, which include the model calibration and the noise parameter conversion taken from Table 5-7, Table 5-8 , are shown in Table 5-10 below.

Table 5-9 Summary of Calculated Adjustments

Descriptor	Model Verification (Table 8)	Assessment Correction (Table 9)	Difference
$L_{Aeq(15hr)}$	-1.5	-0.8	-2.3
$L_{Aeq(9hr)}$	-1.5	-7.7	- 9.2

Client provided information has indicated that a 2% annual traffic growth on Caddens Road should be applied. Table 5-10 shows the predicted noise level at 298 Caddens Road which is considered representative of the residences located adjacent to Caddens Road within the study area.

Table 5-10 Summary of Noise Assessment Results

Location	Before Construction 2018 Not Built		After Construction 2019 Built		10 Years Post Construction 2029 Built		Criteria (Day / Night)
	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	
298 Caddens Road	56.3	49.4	56.4	49.5	57.2	50.3	(60 / 55)

As can be seen from the assessment results in Table 5-10 , the predicted noise levels safely comply with adopted road noise goals for day and night.

Construction Noise and Vibration

Noise emissions from construction have been assessed for receivers in the project area during standard construction hours. The assessment has been undertaken with consideration to the ICNG.

The proposed works would be undertaken during standard working hours in line with the ICNG as follows:

- Monday to Friday: 7am to 6pm;
- Saturday: 8am to 1pm; and
- Sundays and Public Holidays: No work.

Noise Generating Equipment

Plant and equipment needed for the proposal would be determined during the construction planning phase. Likely equipment including typical sound levels are summarised in Table 5-11 . Noise level data has been obtained from AS2436, the ENMM and RAPT Consulting internal database. Other equipment may be used however it is anticipated that they would produce similar noise emissions.

The magnitude of off-site noise impacts associated with construction would be dependent upon a number of factors:

- The intensity and location of construction activities;
- The type of equipment used;
- Existing background noise levels;
- Intervening terrain and structures; and
- Prevailing weather conditions.

Construction machinery would likely move about the study area altering noise for individual receivers. During any given period, the machinery items to be used in the study area would operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Certain types of construction machinery would be present in the study area for only brief periods during construction. Therefore, noise predictions are considered conservative.

Table 5-11 Typical Construction Item Sound Power Levels

Plant and Equipment	Typical Sound Power Level dB(A)	LAeq @10m	Noise Management Level $L_{Aeq(15min)}$
Pneumatic Jackhammer	113	85	
Concrete Trucks	112	84	
Front End Loader	111	83	
Mulcher	110	82	
Grader	110	82	
Pad foot Roller	109	81	
Asphalt Delivery Trucks	109	81	
Asphalt Paver	108	80	47(Day)
Tip Trucks	108	80	
Smooth Drum Roller	107	79	
Line Marking Unit	106	78	
Light Vehicles	106	78	
Excavator 20t	105	77	
Chainsaw	105	77	
Crane	98	70	

Construction noise levels have been predicted based on the potential construction noise levels provided in Table 5-11. The different scenarios would occur from site establishment to re-surfacing works. These noise levels represent different equipment noise levels and give an idea how noise levels may change across the proposal area with different activities being undertaken. This is considered a worst-case scenario.

5.7.5 Safeguards and mitigation measures

Notification

- Affected neighbours to the construction works would be advised in advance of the proposed construction period at least 2 weeks prior to the commencement of works.
- Consultation and communication between the site(s) and neighbours to the site(s) would assist in minimising uncertainty, misconceptions and adverse reactions to noise.
- All site workers (including subcontractors and temporary workforce) should be familiar with the potential for noise impacts upon residents and encouraged to take all practical and reasonable measures to minimise noise during their activities.
- The constructor or site supervisor (as appropriate) should provide a community liaison phone number and permanent site contact so that the noise related complaints, if any, can be received and addressed in a timely manner.
- The constructor (as appropriate) should establish contact with the residents and communicate, particularly when noisy activities are planned.

Best Management Practice (BMP)

- Construction works should adopt Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) practices as addressed in the ICNG. BMP includes factors discussed within this report and encouragement of a project objective to reduce noise emissions. BATEA practices involve incorporating the most advanced and affordable technology to minimise noise emissions.
- Ensure that all construction works scheduled for standard construction hours comply with the start and finish time.
- Where practical, simultaneous operation of dominant noise generating plant should be managed to reduce noise impacts, such as operating at different times or increase the distance between plant and the nearest identified receiver.
- High noise generating activities such as jack hammering should only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block.
- Where possible, reversing beepers on mobile equipment would be replaced with low-pitch tonal beepers (quackers). Alternatives to reversing beepers include the use of spotters and designing the site to reduce the need for reversing may assist in minimising the use of reversing beepers.
- Equipment which is used intermittently should be shut down when not in use.
- All engine covers should be kept close while equipment is operating.
- The construction site would be arranged to minimise noise impacts by locating potentially noisy activities away from the nearest receivers wherever possible.
- Material dumps should be located as far as possible from the nearest receptors.
- Wherever possible, loading and unloading areas should be located as far as possible from the nearest receptors.

- Where possible, trucks associated with the work area should not be left standing with their engine operating in a street adjacent to a residential area.
- All vehicular movements to and from the site should comply with the appropriate regulatory authority requirement for such activities.

Complaints handling

- Noise and vibration monitoring should be undertaken upon receipt of a complaint to identify and quantify the issue and determine options to minimise impacts.
- If valid noise/vibration data for an activity is available for the complainant property, from works of a similar severity and location, it is not expected that monitoring will be repeated upon receipt of repeated complaints for these activities, except where vibration levels are believed to be potentially damaging to the building.
- Any noise and vibration monitoring should be undertaken by a qualified professional and with consideration to the relevant standards and guidelines. Attended noise and vibration monitoring should be undertaken in the following circumstances:
- Upon receipt of a noise and/or vibration complaint. Monitoring should be undertaken and reported within a timely manner (say 3 to 5 working days). If exceedance is detected, the situation should be reviewed to identify means to reduce the impact to acceptable levels.

5.8 TRAFFIC AND ACCESS

5.8.1 Existing environment

Caddens Road is a collector road which serves to move traffic from local streets within Claremont Meadows to arterial roads such as the Great Western Highway. Caddens Road is used by local residents and also residents from surrounding suburbs. At the proposal site the road is a two lane, two-way 60km/h speed limited road with Watts profile speed humps placed out along the stretch of road. Access to residences occurs on along both sides of Caddens Road.

The 2016 traffic data shows the Annual Average Daily Traffic (AADT) count across seven days, of vehicles travelling both east and west on Caddens Road was 2,188 vehicles. In 2017 the ADDT across seven days increased to 3,405 ADDT. Peak traffic levels are generally experienced at approximately 8am (eastbound) and between 5- 6pm (westbound) The population of the area is forecasted to experience a growth of 23.46% from 209,140 in 2018 to 258,195 in 2036 (ABS, 2018). Traffic on Caddens Road is expected to increase by 2% each year due to the expected growth of the population within the surrounding area. Five accidents have occurred on Caddens Road and at the Intersection of Caddens Road and Gipps Street within the last five years. Potential impacts

Construction

During construction there would be some temporary traffic delays whilst the roundabout is being installed and the road being widened. Traffic controls and reduced speed limits would be required during the construction period, resulting in some increases in travel time. No road closures are proposed as part of the works.

During construction, noise, dust and plant movements would create additional safety risks for motorists on Caddens Road.

Access for the adjacent private residences and pedestrians would be maintained throughout construction. Bus routes would also be maintained during construction.

Operation

The upgrade of Caddens Road would have a positive impact for motorists due to the improved safety and access for future residential development through the provision of a roundabout, removal of speed humps and widening of the road. This will ensure there is no increase in travel times and traffic flow will be maintained.

5.8.2 Safeguards and mitigation measures

Safeguards and mitigation measures are recommended to minimise traffic and access related impacts from the proposed works:

- A Traffic Management Plan would be prepared to provide for the safe passage of traffic at all times and to minimise delays and disruptions.
- Consultation would be undertaken with residents who will be directly affected by access disruptions.
- If any impacts occur to any private accesses, the accesses must be restored to prior condition, in consultation with the landowner.
- Notification to the local community of any changed traffic conditions (i.e. road closures, detours, lane closures) in advance of works commencing. A contact number would be provided for community queries in relation to the works.
- Roads would be closed for the least amount of time and closures would be avoided where possible.

5.9 INDIGENOUS HERITAGE

5.9.1 Introduction

A Due Diligence assessment for Aboriginal heritage sites was undertaken by a qualified archaeologist. The area of investigation comprised of the entire study area, extending from the Caddens Hill Playing Fields in the northwest to the intersection of Caddens Road and Gipps Street in the northeast. The southern boundary extends from Heaton Avenue in the west to the intersection of Caddens and Kent Roads and Gipps Street in the east.

The area is within the boundaries of Deerubbin Local Aboriginal Land Council. The Due Diligence process does not formally require consultation with Aboriginal community groups however the Deerubbin LALC were informed of the due diligence level assessment for the proposed Caddens Road upgrades by NGH.

5.9.2 Approach

This report has been drafted in keeping with the sequence of steps identified in the NSW Office of Environment and Heritage's (OEH) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (OEH 2010).

The Code of Practice provides a five-step approach to determine if an activity is likely to cause harm to an Aboriginal object, as defined by the *NSW National Parks and Wildlife Act* (1974). The steps follow a logical sequence of questions, the answer to each question determines the need for the next step in the process.

The progress through the steps in the Code of Practice is aimed at providing an assessment of the potential for an activity to impact either a known Aboriginal object, or whether it is likely that unrecorded Aboriginal objects are present that may be impacted. The result of the process is aimed at providing the proponent with information about the likelihood that their activity will impact an Aboriginal object and whether an Aboriginal Heritage Impact Permit may be required.

Field Assessment

The field assessment was undertaken by NGH Environmental archaeologist Amy Ziesing on Wednesday 4 April 2018, along with two representatives from J. Wyndham Prince: Peter Calantzis and Martin Patfield.

Visual inspection of the entire study area was completed, extending from the Caddens Hill Playing Fields in the northwest to the intersection of Caddens Road and Gipps Street in the northeast. The southern boundary extends from Heaton Avenue in the west to the intersection of Caddens and Kent Roads and Gipps Street in the east. The majority of the works are proposed for the northern side of the road corridor, with only minor disturbances being proposed for the southern road verge, most of which will be confined to the area southwest of Claremont Creek.

The ground surface along the extent of the study area on both sides of Caddens Road has been previously disturbed to some extent, with the exception of one area to the south of Caddens Road and the immediate west of Claremont Creek.

A large portion of the existing juvenile trees on the northern side of Caddens Road are to be removed to allow for the construction of the shared pedestrian recreational footpath (2.5m wide). A smaller number of more mature trees are to be retained on the northern side, with the newly constructed pedestrian footpath to curve around the root structures. All trees to be impacted within the study area were inspected, especially those in close proximity to Claremont Creek, but they were young trees and bore no evidence of cultural modification.

5.9.3 Potential impacts

During the design phase for this project, every effort has been made to reduce impacts to any landscape feature within the study area.

All areas outside the existing road corridor that are to be impacted by construction include the area immediately surrounding Claremont Creek, which would house a cantilever bridge extension to the north, allowing the continuation of the 2.5m wide pedestrian footpath in this location. Closer inspection of this area during the site visit, confirmed that a degraded concrete apron surface has previously been installed under Claremont Creek bridge, possibly at the time of its original construction. This artificial ground surface has removed the potential for Aboriginal heritage finds in this area. No excavation is proposed as part of the proposal within the creek.

The only other location that has the potential for heritage material is located just outside the southern study area boundary, to the immediate west of Claremont Creek. This parcel of land remains undeveloped and is currently owned by Penrith City Council. No impacts would be undertaken in this area and it was, therefore, excluded from closer visual inspection. If the concept design plans for the proposed Caddens Road upgrade works are amended and/or encroach upon this area, then a re-inspection of this area would be required (Figure 5.8).

Figure 5-8 Indigenous heritage Site Inspection Results

5.9.4 Safeguards and mitigation measures

The proposed work can *proceed with caution*, provided the following recommendations are followed:

- The proposed Caddens Road upgrade works may proceed with caution, following the Unexpected Finds Procedure (Appendix A) in areas marked **green** on 5.8 and shown in the 80% detailed design plans (Figures 6 to 8). These areas have been identified as 'disturbed land' as defined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010) and do not require further investigation and are approved for the proposed construction works;
- If the proposed works are to extend into area marked **red**, which has been provided with a 10m buffer zone on 5.8, then a re-assessment of this area will need to be undertaken by a qualified archaeologist/heritage professional prior to any works commencing to determine if Aboriginal sites or objects may be present;
- In the event that previously undiscovered Aboriginal finds are located during construction, all works in the vicinity of the find must cease and the 'Unexpected Finds Procedure' (in Appendix A of the Due Diligence assessment (Appendix G)) should be adhered to, with a qualified archaeologist/heritage consultant called in to inspect the find and provide recommendations on proceeding, and
- In the event that, human skeletal remains are identified during any aspect of the proposed construction works, then all work in the vicinity of the find must stop and the OEH/police must be notified to inspect the site.

5.10 NON-INDIGENOUS HERITAGE

5.10.1 Existing environment

A desktop assessment was undertaken to determine the heritage values of any objects or places within the proposal area, with a particular focus on the area of the proposed works. Heritage database searches were conducted on 28th March 2018 and included:

- The NSW State Heritage Inventory (SHI) (for items listed on the State Heritage Register, Heritage and Conservation Registers for State Government Agencies and local heritage items on the Penrith Council Heritage Schedule).
- The Australian Heritage Database (for items listed on the National and Commonwealth Heritage Lists and World Heritage List).

No items were identified on the Commonwealth or World Heritage Lists. The breakdown of results of identified items is provided below.

Table 5-12 Summary of heritage findings

Register	Listings
State Heritage Register	29
Penrith LEP and State Government Agencies	245

5.10.2 Potential impacts

The closest heritage item is 1.5km west of the proposal site. The proposed works would not impact any of the listed heritage items identified above.

5.10.3 Safeguards and mitigation measures

Safeguards to be implemented are:

- If any items suspected of being of historic value are uncovered during the works, works must cease in the vicinity of the find and advice would be sought from a heritage consultant as to whether the NSW Division Branch (OEH) must be notified in accordance with the NSW *Heritage Act 1977*. In this case, works would proceed only under the direct of the Heritage Division.

5.11 CUMULATIVE IMPACTS

5.11.1 Policy setting

There is a requirement under Clause 228(2) of the Environmental Planning and Assessment regulation 2000 to take into account any cumulative impacts with other existing or likely future activities. Cumulative impacts of the proposed works include the combines effect of individual impacts of other activities in the area. These may include current and future road works and local land development that could result in ongoing biodiversity, noise, air quality, visual, waste generation and traffic impacts.

5.11.2 Potential impacts

Key adverse cumulative impacts for the proposed works relate to the combined impact from proposed construction activities within the area on the local environment. This is namely potential water quality risks to Claremont Creek and loss of topsoil through excavation activities. Additionally, there may be cumulative social impacts, related to traffic delays, noise and dust, for users and residents of Caddens Road. The proposed works would coincide with existing development activities occurring within the area such as residential developments (Caddens Hill and Caddens Heights). The similar impacts of the proposed works would be temporary and limited to the construction period.

The positive cumulative impacts associated with the proposal would result in support for future growth through improving road safety and road network efficiency. These benefits offset to some degree the environmental impacts of the works and therefore the cumulative impacts of this proposal on balance, are considered to be acceptable.

5.11.3 Safeguards and mitigation measures

Adverse cumulative impacts relate to the construction phase of the proposed works. Cumulative impacts are considered to be best managed by dealing with each component individually. No additional safeguards are proposed.

5.12 PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

5.12.1 The precautionary principle

According to the precautionary principle, if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be seen as a reason not to protect the environment. The use of the precautionary principle implies that proposals should be carefully evaluated to identify possible impacts and assess the risks of potential consequences.

The precautionary principle has been applied in assessing conservation values and environmental threats and impacts associated with works proposed throughout this REF. Assessments have been precautionary with respect to threatened entities and impacts to Aboriginal heritage. The development of mitigation measures and safeguards to manage impacts aims to reduce the risk of serious and irreversible impacts on the environment.

Generally, throughout this assessment, there has been found to be a low level of uncertainty in regard to all factors assessed.

5.12.2 Inter-generational equity

The principle of inter-generational equity requires the present generation to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The impacts of the proposal are likely to be localised and temporary, and would not significantly diminish resources and nature conservation values available for use by future generations.

5.12.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity are a fundamental consideration of ESD.

An assessment of the existing local environment has been undertaken in order to identify and manage any potential impacts of the proposal on local biodiversity. The impacts of the proposal on local populations of threatened species, threatened communities and their habitats have been assessed. The proposal is not considered to have a significant impact on biological diversity and ecological integrity.

5.12.4 Appropriate valuation of environmental factors

The principle requires that “costs to the environment should be factored into the economic costs of a project.

This REF has examined the environmental consequences of the proposal and identified mitigation measures for factors which have the potential to experience adverse impacts. Requirements imposed in terms of implementation of these mitigation measures would increase both capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

5.13 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

5.13.1 Summary of MNES searches

MNES searches	Items within 10kms	Potential for Impact
World Heritage Places	None	**Nil**
National Heritage Places	None	**Nil**
Wetlands of International Importance	None	**Nil**
Great barrier Reef Marine Park	None	**Nil**
Commonwealth Marine Areas	None	**Nil**
Listed Threatened Ecological Communities	5	**Assessed in section 5.4**
Listed Threatened Species	43	**Assessed in section 5.4**
Listed Migratory Species	15	**Assessed in section 5.4**

5.13.2 Potential impacts

Based on the results of the Protected Matters Search, the only MNES that may occur within proximity to the works are listed threatened ecological communities and listed threatened and migratory species. The potential for the proposed works to impact on these species was assessed in section 5.2 of this report. No impacts to threatened or migratory species are considered likely.

5.13.3 Safeguards and mitigation measures

No significant impacts to any MNES are considered likely. Additional safeguards and mitigation measures are not considered to be required for MNES.

6 SUMMARY OF SAFEGUARDS

Table 6-1 Key environmental safeguards

Major Issues	Key Environmental Objectives
Topography, geology and soils	• A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation • A Soil and Water Management Plan (SWMP) shall be implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion, water pollution and salinity and describe how these risks will be addressed during construction • An Erosion and Sedimentation Control Plan (ESCP) shall be developed as part of SWMP for the works. The ESCP shall provide for: - Disturbed areas will be stabilised to minimise further erosion - The construction footprint will be delineated to ensure that no soil disturbance occurs beyond this - Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets - Reduce water velocity and capture sediment on site - Minimise the amount of material transported from site to surrounding pavement surfaces. - Erosion and sedimentation controls are to be checked and maintained on a regular basis and records kept and provided on request - Erosion and sediment control measures are to be implemented until the works are complete or areas are stabilised - Work areas are to be stabilised progressively during the works • Construction would be managed in accordance with the Blue Books 1 and 2D; *Managing Urban Stormwater, Soils & Construction, Volume 1* (Landcom 2004) and *Managing Urban Stormwater, Soils and Construction, Volume 2D, Main Road Construction* (DECC 2008). • Vehicles, plant and equipment will be checked for leaks and appropriate spill kits will be available onsite at all times • Bulk chemicals will not be stored on site • All chemicals and fuels shall be stored in suitable bunded areas away from drainage lines. The capacity of the bunded area would be at least 120 per cent of the largest chemical container stored within the bunded area • If contaminated soils are uncovered or are suspected to have been uncovered, due to odour or discolouration of soils, works shall cease immediately, and the appropriate management requirements would be determined • All staff will be appropriately trained through toolbox talks for the minimisation and management of accidental spills • All refuelling will be carried out off-site, as far as practicable • Spill kits will be made available at the site at all times throughout construction

	• All personnel will be appropriately trained for the minimisation and management of accidental spills.
Hydrology, catchment values and water quality	**Works within Claremont Creek** • Scaffolding shall only be erected whilst the creek is dry and be restricted to the concrete slab. • Regular checks of the BOM website will be made and the CEMP will include provisions for managing equipment and works during high rainfall and /or flood events. Including the potential requirement to remove equipment from the floodplain prior to predicted high flow events. • All materials would be removed from the creek bed before times of predicted heavy rainfall. • Due to the increased risk of pollutant spills at site compounds, the compound must: o Be located more than 50 metres from a waterway. o Be located in areas of low ecological significance and require minimal clearing of native vegetation (not beyond that already required by the Project) o Be located on relatively level land o Be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented
Air quality	• Dust controls would be implemented during construction, as required; for example, use of a water cart or ceasing construction activities when weather conditions are such that dust cannot be adequately controlled • Cleared vegetation, waste or other materials shall not be burnt at the site • Stabilisation of disturbed surfaces will take place as soon as practicable • Vehicles transporting waster or other materials that may produce odours or dust will be covered during transportation • Construction plant and other equipment will be maintained in good working condition to minimise impacts on air quality • Construction plant and machinery will be turned off when not in use.
Biodiversity	**Threatened Fauna** • A process would be included in the CEMP to undertake a survey for Cumberland Plain Land Snail before works. The CEMP would also identify suitable relocations sites and if snails are found onsite, species would be relocated to appropriate habitat within the surrounding area • If unexpected threatened fauna or flora species are discovered, stop works immediately and seek the advice of a qualified Ecologist.

	Stabilisation and rehabilitation • Any trees cut from the site would be mulched onsite to assist stabilise areas of disturbance as a first option, offsite disposal would be a second option. Mulch shall be spread a maximum of 10-40mm so as not to suppress natural germination • Stabilise and reseed disturbed areas with fast colonising species, appropriate to the area. Native dominated understorey areas shall be planted with native or sterile stabilisation species. Replacement plantings shall include similar species (i.e. *E. tereticornis*, *E. moluccana*, *A. floribunda*). **Weed and pathogen controls** • Priority weed infestations including African Olive, African Boxthorn, Cape Broom and Madeira Vine in the works area would be treated prior to works, in accordance with the Local Land Services Greater Sydney Regional Strategic Weed Management Plan 2017-2022 • The works would apply a high level of weed hygiene to prevent the introduction and spread of significant weeds at the site.
Public amenity	**Visual** • Work areas would be left neat and tidy at the end of each day • Keep vegetation removal to a minimum where practical (set out in section 5.4) • Rehabilitation works would take place as soon as possible following the completion of construction • Remove temporary erosion and sediment controls from the site once landforms have been assessed as stable. **Community wellbeing** • Consultation shall be undertaken with residents identified as sensitive receivers prior and during construction works. A contact number would be provided for community queries in relation to the works • The community shall be notified of the work prior to construction commencing and kept updated on the progress of the works during construction • Signage and barriers shall be implemented at the works site to prevent public access to areas deemed unsafe (borrow sites, around plant and machinery) • To avoid impacts on residences the side compound will: o Be separated from the nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant) o Not unreasonably affect the land use of adjacent properties o Provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number

	of deliveries required outside standard construction hours.
Waste minimisation and management	• Cleared vegetation shall not be burnt at the site • Waste shall be managed in accordance with the *Protection of the Environment Operations Act 1997*. A Waste Management Plan shall be prepared for construction which includes the following: o Identify all potential waste streams associated with the works o Identify opportunities to minimise the use of resources, and to reuse and recycle materials o Outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities. Waste must be disposed of at a facility able to accept the waste. • Reuse of the following material would be undertaken: o Surplus excavated soil and rocks, including topsoil – used for stabilisation o Green waste from vegetation removal – mulched onsite and used for stabilisation. • Waste not able to be reused would be transported to an appropriate waste disposal facility • Working areas shall be maintained, free of rubbish and cleaned up at the end of each working shift • Toilets (e.g. portable toilets) will be provided for construction workers.
Noise and vibration	**Notification** • Affected neighbours to the construction works would be advised in advance of the proposed construction period at least 2 weeks prior to the commencement of works. • Consultation and communication between the site(s) and neighbours to the site(s) would assist in minimising uncertainty, misconceptions and adverse reactions to noise. • All site workers (including subcontractors and temporary workforce) should be familiar with the potential for noise impacts upon residents and encouraged to take all practical and reasonable measures to minimise noise during their activities. • The constructor or site supervisor (as appropriate) should provide a community liaison phone number and permanent site contact so that the noise related complaints, if any, can be received and addressed in a timely manner. • The constructor (as appropriate) should establish contact with the residents and communicate, particularly when noisy activities are planned.

Best Management Practice (BMP)

- Construction works should adopt Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) practices as addressed in the ICNG. BMP includes factors discussed within this report and encouragement of a project objective to reduce noise emissions. BATEA practices involve incorporating the most advanced and affordable technology to minimise noise emissions.
- Ensure that all construction works scheduled for standard construction hours comply with the start and finish time.
- Where practical, simultaneous operation of dominant noise generating plant should be managed to reduce noise impacts, such as operating at different times or increase the distance between plant and the nearest identified receiver.
- High noise generating activities such as jack hammering should only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block.
- Where possible, reversing beepers on mobile equipment would be replaced with low-pitch tonal beepers (quackers). Alternatives to reversing beepers include the use of spotters and designing the site to reduce the need for reversing may assist in minimising the use of reversing beepers.
- Equipment which is used intermittently should be shut down when not in use.
- All engine covers should be kept close while equipment is operating.
- The construction site would be arranged to minimise noise impacts by locating potentially noisy activities away from the nearest receivers wherever possible.
- Material dumps should be located as far as possible from the nearest receptors.
- Wherever possible, loading and unloading areas should be located as far as possible from the nearest receptors.
- Where possible, trucks associated with the work area should not be left standing with their engine operating in a street adjacent to a residential area.
- All vehicular movements to and from the site should comply with the appropriate regulatory authority requirement for such activities.

Complaints handling

- Noise and vibration monitoring should be undertaken upon receipt of a complaint to identify and quantify the issue and determine options to minimise impacts.
- If valid noise/vibration data for an activity is available for the complainant property, from works of a similar severity and location, it is not expected that monitoring will be repeated upon

	receipt of repeated complaints for these activities, except where vibration levels are believed to be potentially damaging to the building. • Any noise and vibration monitoring should be undertaken by a qualified professional and with consideration to the relevant standards and guidelines. Attended noise and vibration monitoring should be undertaken in the following circumstances: • Upon receipt of a noise and/or vibration complaint. Monitoring should be undertaken and reported within a timely manner (say 3 to 5 working days). If exceedance is detected, the situation should be reviewed to identify means to reduce the impact to acceptable levels.
Traffic and Access	• A Traffic Management Plan would be prepared to provide for the safe passage of traffic at all times and to minimise delays and disruptions. • Consultation would be undertaken with residents who will be directly affected by access disruptions. • If any impacts occur to any private accesses, the accesses must be restored to prior condition, in consultation with the landowner. • Notification to the local community of any changed traffic conditions (i.e. road closures, detours, lane closures) in advance of works commencing. A contact number would be provided for community queries in relation to the works. • Roads would be closed for the least amount of time and closures would be avoided where possible.
Indigenous heritage	• The proposed Caddens Road upgrade works may proceed with caution, following the Unexpected Finds Procedure (Appendix A) in areas marked **green** on 5.8 and shown in the 80% detailed design plans (Figures 6 to 8). These areas have been identified as 'disturbed land' as defined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010) and do not require further investigation and are approved for the proposed construction works; • If the proposed works are to extend into area marked **red**, which has been provided with a 10m buffer zone on 5.8, then a re-assessment of this area will need to be undertaken by a qualified archaeologist/heritage professional prior to any works commencing to determine if Aboriginal sites or objects may be present; • In the event that previously undiscovered Aboriginal finds are located during construction, all works in the vicinity of the find must cease and the 'Unexpected Finds Procedure' (in Appendix A of the Due Diligence assessment (Appendix G)) should be adhered to, with a qualified archaeologist/heritage consultant called in to inspect the find and provide recommendations on proceeding, and

	• In the event that, human skeletal remains are identified during any aspect of the proposed construction works, then all work in the vicinity of the find must stop and the OEH/police must be notified to inspect the site.
Non-indigenous heritage	• If any items suspected of being of historic value are uncovered during the works, works must cease in the vicinity of the find and advice would be sought from a heritage consultant as to whether the NSW Division Branch (OEH) must be notified in accordance with the NSW *Heritage Act 1977*. In this case, works would proceed only under the direct of the Heritage Division.

7 CONCLUSION

This REF has been prepared for Penrith City Council to assess the construction and operational impacts of the proposed upgrade of Caddens Road from the intersection of Gipps Street / Kent Road to Claremont Creek. The road would be widened and a roundabout constructed at the intersection of Caddens Road and White Cedar Avenue. The works would meet the objectives of supporting future growth in Western Sydney by improving traffic flow, improving road safety and road network efficiency and reducing travel times.

This REF has been prepared according to the requirements of Section 5.5 of the EP&A Act, specifying a "duty to consider environmental impact". It provides a full analysis of all environmental, economic, physical and social implications of the proposal.

The key environmental risks of the works have been identified as soil and water, biodiversity and public amenity. A range of safeguards have been developed for the potential impacts identified. This would ensure that the negative impacts of the proposal are prevented, mitigated or limited as far as practical. With the effective implementation of safeguards listed in this REF the potential impacts of the proposal are considered acceptable and justified and unlikely to generate a significant adverse impact.

8 REFERENCES

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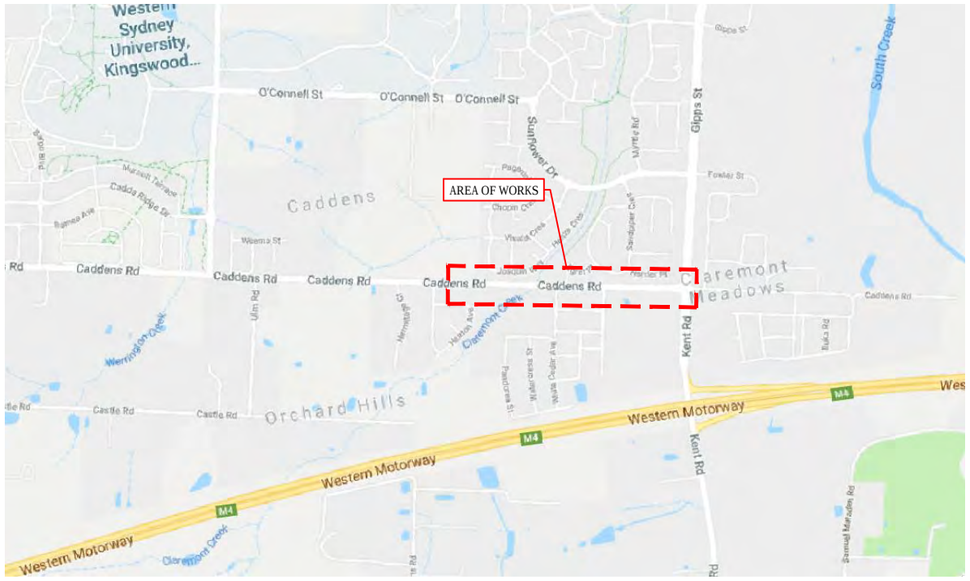
APPENDIX A PLANS OF THE PROPOSAL

PENRITH CITY COUNCIL

PROPOSED ROAD UPGRADE
CADDENS ROAD, CLAREMONT MEADOWS
CONCEPT DESIGN



LOCALITY SKETCH

DRAWING NUMBER	DRAWING TITLE	ISSUE
110489-CD-001	COVER	A
110489-CD-002	TYPICAL CROSS SECTIONS	A
110489-CD-003	CONCEPT PLAN - CH 0 TO CH 240 - SHEET 1 OF 3	A
110489-CD-004	CONCEPT PLAN - CH 240 TO CH 520 - SHEET 2 OF 3	A
110489-CD-005	CONCEPT PLAN - CH 520 TO CH 830 - SHEET 3 OF 3	A
110489-CD-006	LONGITUDINAL SECTION - CH 0 TO CH 150 - SHEET 1 OF 5	A
110489-CD-007	LONGITUDINAL SECTION - CH 150 TO CH 300 - SHEET 2 OF 5	A
110489-CD-008	LONGITUDINAL SECTION - CH 300 TO CH 450 - SHEET 3 OF 5	A
110489-CD-009	LONGITUDINAL SECTION - CH 450 TO CH 600 - SHEET 4 OF 5	A
110489-CD-010	LONGITUDINAL SECTION - CH 600 TO CH 770 - SHEET 5 OF 5	A
110489-CD-011	DRAINAGE & UTILITIES PLAN - CH 0 TO CH 240 - SHEET 1 OF 3	A
110489-CD-012	DRAINAGE & UTILITIES PLAN - CH 240 TO CH 520 - SHEET 2 OF 3	A
110489-CD-013	DRAINAGE & UTILITIES PLAN - CH 520 TO CH 800 - SHEET 3 OF 3	A
110489-CD-014	PAVEMENT PLAN - CH 0 TO CH 240 - SHEET 1 OF 3	A
110489-CD-015	PAVEMENT PLAN - CH 240 TO CH 520 - SHEET 2 OF 3	A
110489-CD-016	PAVEMENT PLAN - CH 520 TO CH 800 - SHEET 3 OF 3	A
110489-CD-017	SIGNAGE & LINEMARKING - CH 0 TO CH 240 - SHEET 1 OF 3	A
110489-CD-018	SIGNAGE & LINEMARKING - CH 240 TO CH 520 - SHEET 2 OF 3	A
110489-CD-019	SIGNAGE & LINEMARKING - CH 520 TO CH 800 - SHEET 3 OF 3	A
110489-CD-020	TURNING PATH DIAGRAMS - WHITE CEDAR RD & SILKWOOD AVE	A
110489-CD-021	ALTERNATIVE CONCEPT PLAN - CH 520 TO CH 830	A

Prepared By:

J. WYNDHAM PRINCE

CONSULTING CIVIL INFRASTRUCTURE ENGINEERS
& PROJECT MANAGERS

PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au
E jwp@jwprince.com.au

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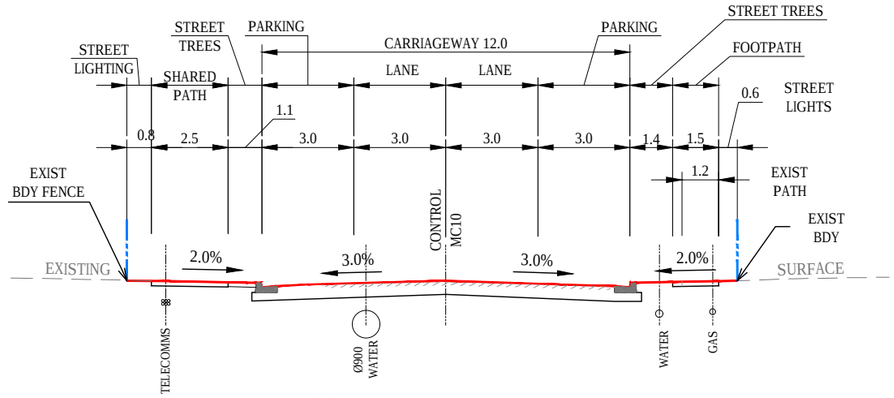
PLAN No. 110489-CD-001 A

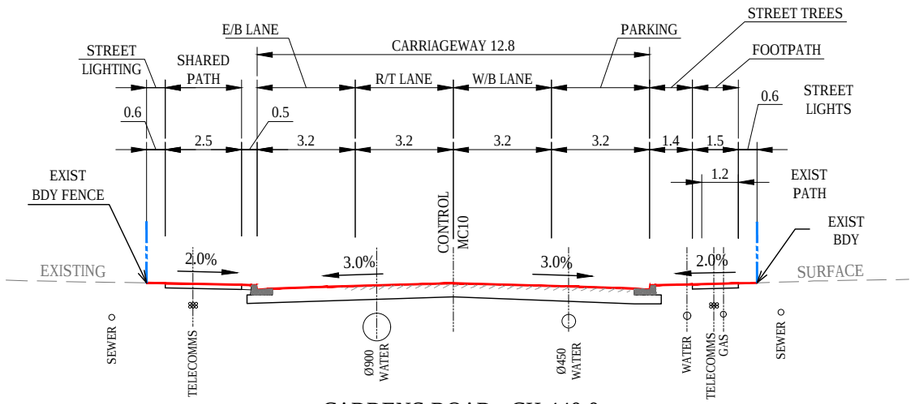
FILE No. 110489-CD-001

NOTES

1. EXISTING UTILITIES ARE APPROXIMATE ONLY AND BASED ON LEVEL C INVESTIGATION . EXISTING UTILITIES ARE NOMINALLY SHOWN AT STANDARD DEPTH. ACTUAL DEPTH AND LOCATION MAY VARY.



CADDENS ROAD - CH 0.0 - 140.0



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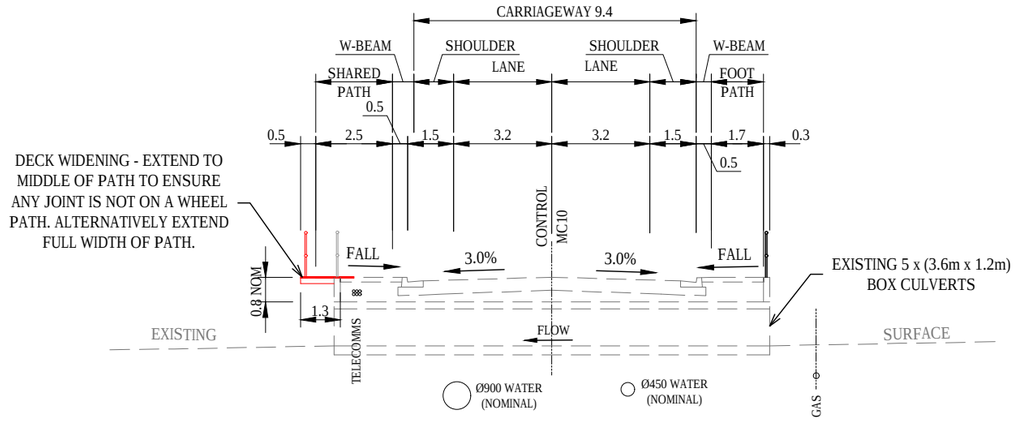
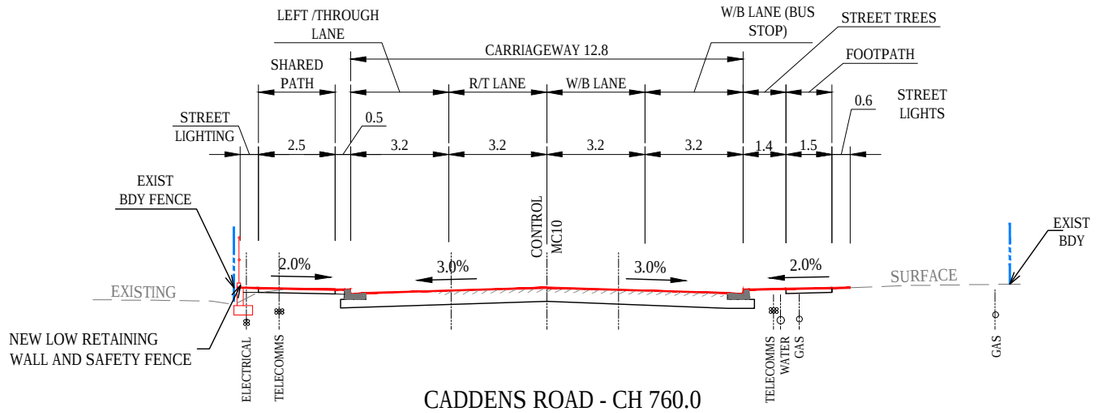


CADDENS ROAD - CULVERTS OVER CLAREMONT CREEK



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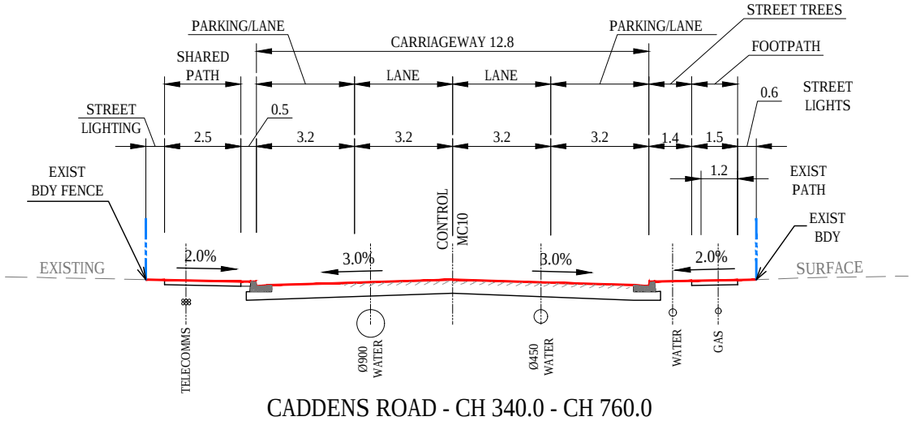

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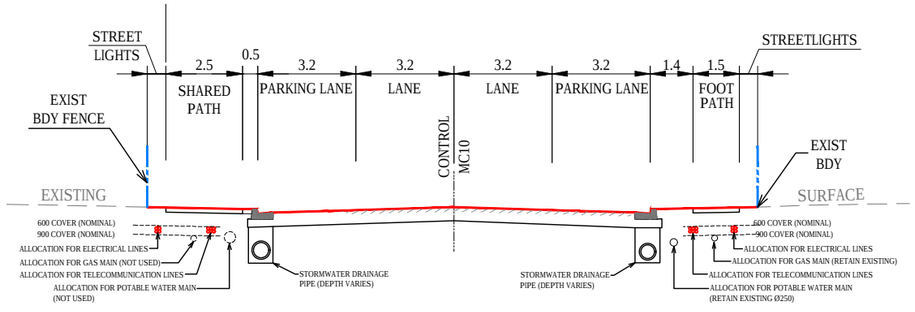

CADDENS ROAD - ALLOCATION DIAGRAM FOR NEW AND RELCOATED SERVICES

0 2.5 5 7.5
SCALE 1:200m

ISSUE	AMENDMENT					
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18
		DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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ORIGIN: MGA

CLIENT: PENRITH CITY COUNCIL

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
TYPICAL CROSS SECTIONS

PLAN No: 110489-CD-002 A
FILE No: 110489-CD-002
SHEET SIZE: A3 ORIGINAL

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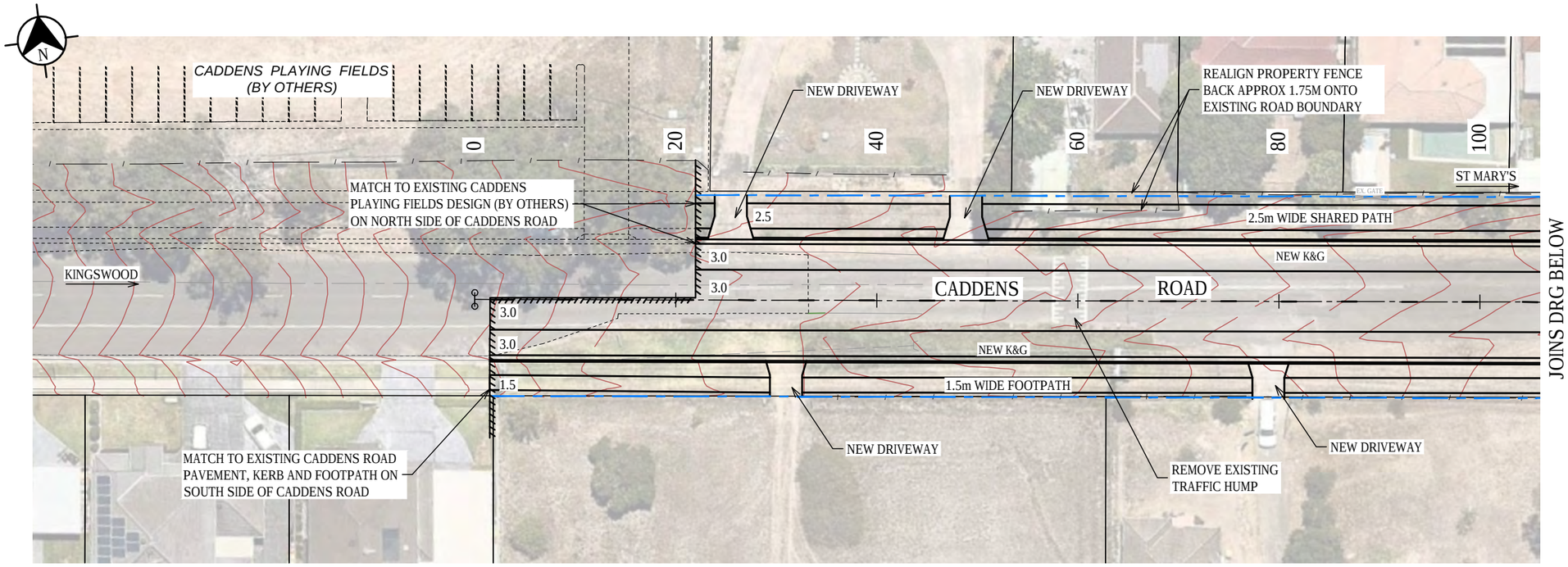
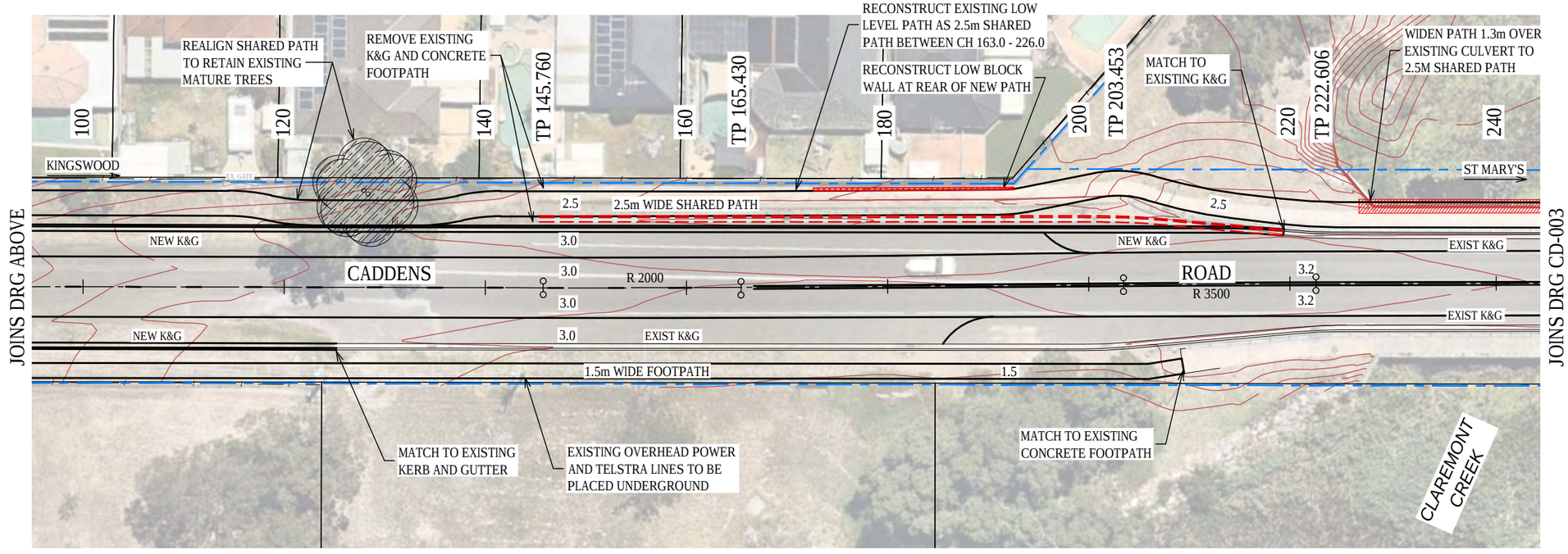


PLAN



PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING ROAD BOUNDARY
- EXISTING KERBS/FOOTPATHS TO BE REMOVED
- TREE TO BE REMOVED
- EXISTING SAFETY BARRIER
- RELOCATED SAFETY BARRIER
- NEW BLOCK RETAINING WALL (0.9m)
- LIMIT OF WORK

NOTES

1. HORIZONTAL ALIGNMENT SUBJECT TO DETAIL SURVEY.
2. VERTICAL ALIGNMENT IS TO MATCH EXISTING LEVELS ALONG CADDENS ROAD, SILKWOOD AVENUE AND WHITE CEDAR ROAD.
3. EXISTING KERB & GUTTER AND FOOTPATHS ARE TO BE RETAINED WHERE NOT DIRECTLY IMPACTED BY THE ROAD WORKS.

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
CONCEPT PLAN - CH 0 TO CH 240 - SHEET 1 OF 3

PLAN No: 110489-CD-003 A
FILE No: 110489-CD-003
SHEET SIZE: A3 ORIGINAL

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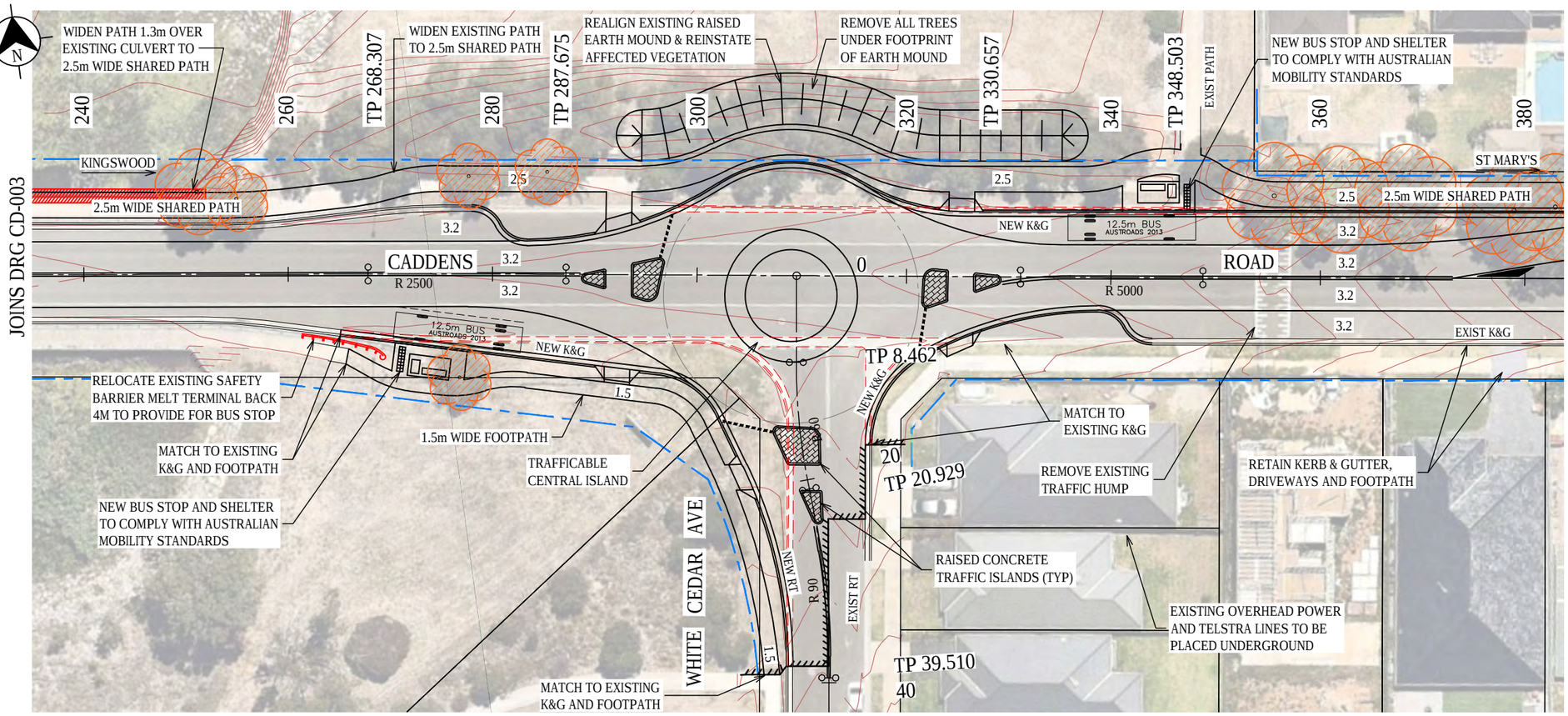

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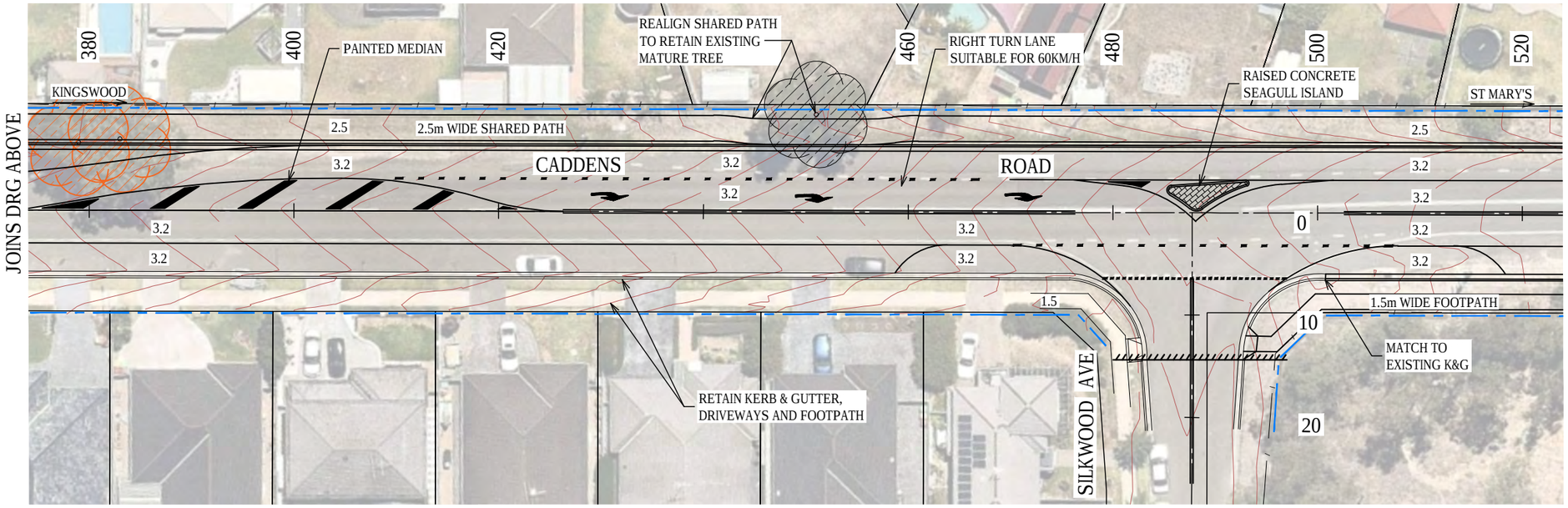

PLAN

SCALE 1:500m

LEGEND

- EXISTING ROAD BOUNDARY
- EXISTING KERBS/FOOTPATHS TO BE REMOVED
- TREE TO BE REMOVED
- EXISTING SAFETY BARRIER
- RELOCATED SAFETY BARRIER
- NEW BLOCK RETAINING WALL (0.9m)
- LIMIT OF WORK

NOTES

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P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD

CONCEPT DESIGN
CONCEPT PLAN - CH 240 TO CH 520 - SHEET 2 OF 3

PLAN No: 110489-CD-004 A
FILE No: 110489-CD-004
SHEET SIZE: A3 ORIGINAL

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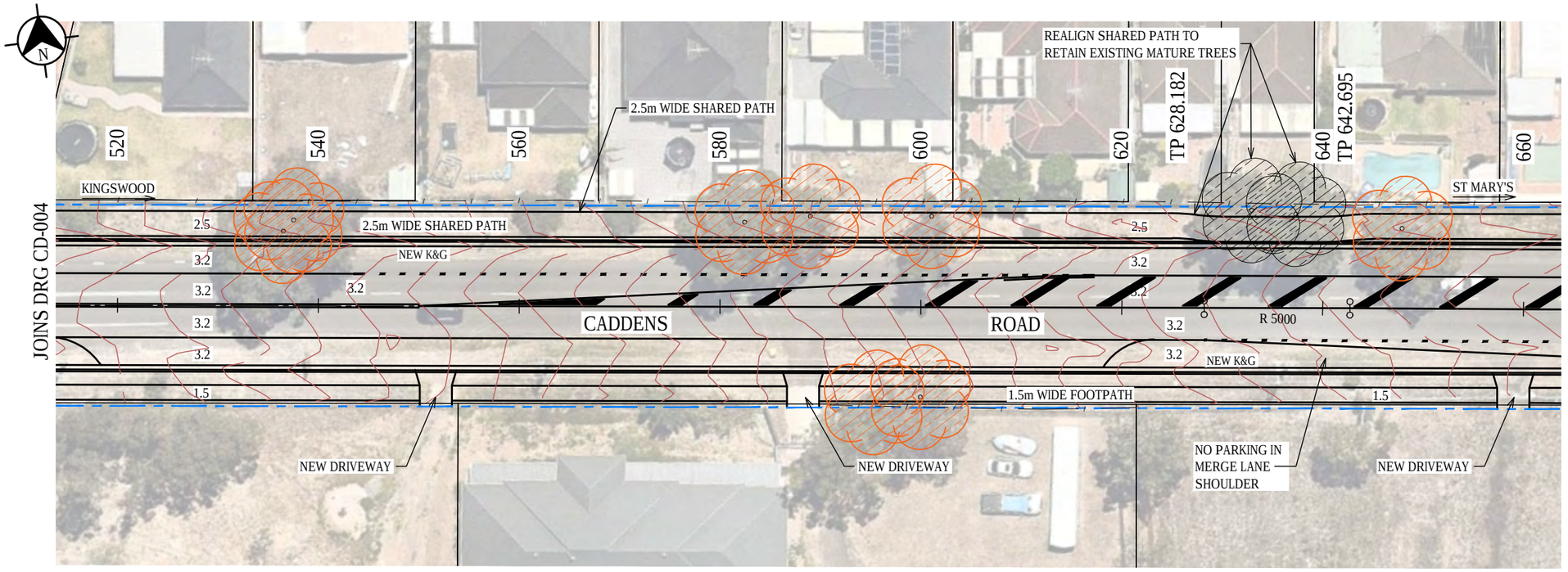

PLAN

LEGEND

- EXISTING ROAD BOUNDARY
- EXISTING KERBS/FOOTPATHS TO BE REMOVED
- TREE TO BE REMOVED
- EXISTING SAFETY BARRIER
- RELOCATED SAFETY BARRIER
- NEW BLOCK RETAINING WALL (0.9m)
- LIMIT OF WORK

NOTES

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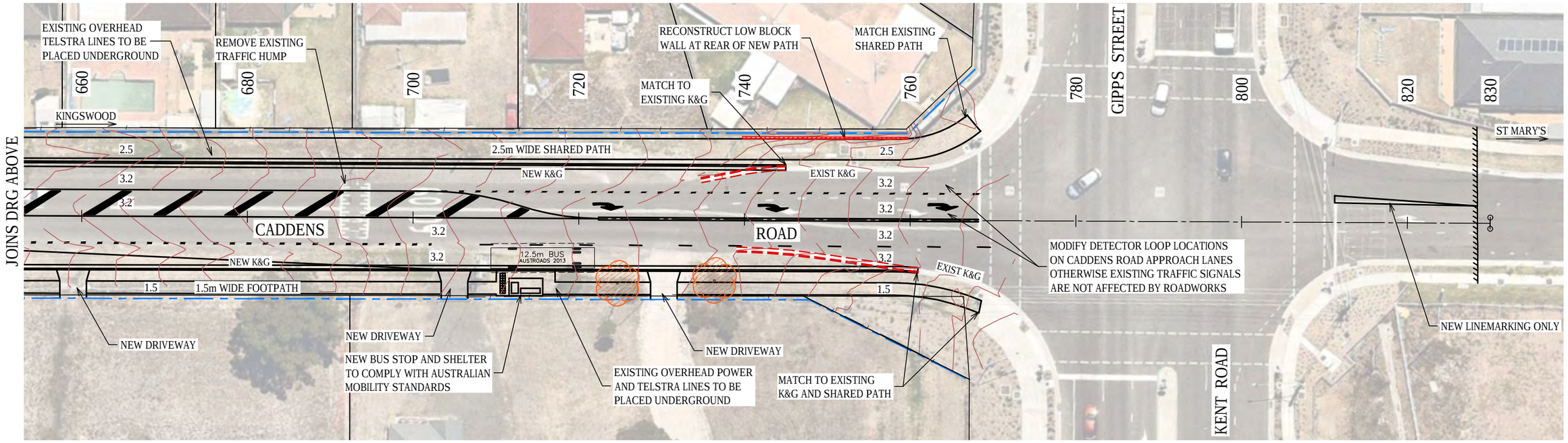
2. VERTICAL ALIGNMENT IS TO MATCH EXISTING LEVELS ALONG CADDENS ROAD, SILKWOOD AVENUE AND WHITE CEDAR ROAD.
3. EXISTING KERB & GUTTER AND FOOTPATHS ARE TO BE RETAINED WHERE NOT DIRECTLY IMPACTED BY THE ROAD WORKS.



PLAN

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SCALE 1:500m

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
CONCEPT PLAN - CH 520 TO CH 830 - SHEET 3 OF 3

PLAN No: 110489-CD-005 A
FILE No: 110489-CD-005
SHEET SIZE: A3 ORIGINAL

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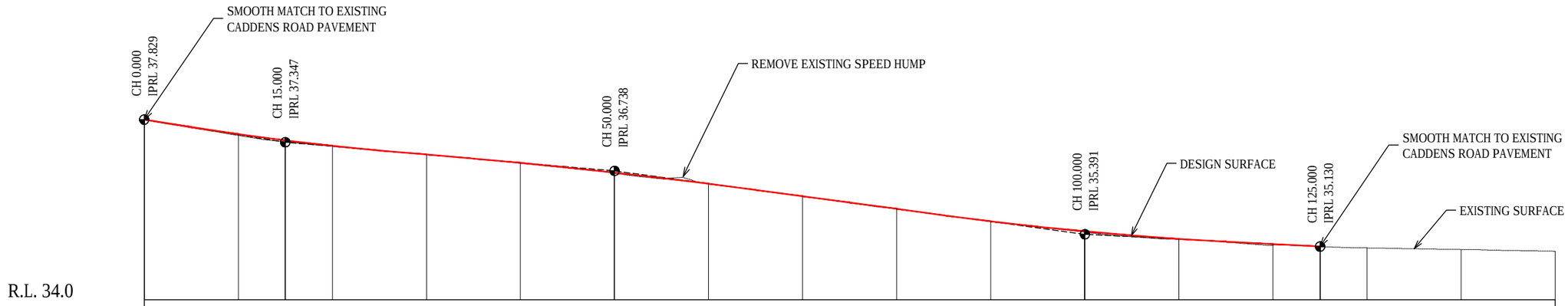
NOTES

1. FOR ROAD PLANS, REFER TO SHEETS 110489-CD-003 TO 110489-CD-005.
2. FOR ROAD TYPICAL CROSS SECTIONS, REFER TO SHEET 110489-CD-002.



R.L. 34.0															
CROSSFALL															
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HORIZONTAL GEOMETRY	D=145.760 R														
DESIGN LEVELS	37.829	37.517	37.269	37.086	36.908	36.702	36.465	36.199	35.930	35.667	35.453	35.293	35.182	35.101	35.069	35.030
EXISTING LEVELS	37.829	37.492	37.260	37.086	36.899	36.688	36.459	36.199	35.928	35.660	35.436	35.288	35.160	35.101	35.069	35.030
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000

LONGITUDINAL SECTION - CADDENS ROAD - MC10

0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
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PO Box 4366 PENRITH WESTFIELD NSW 2750
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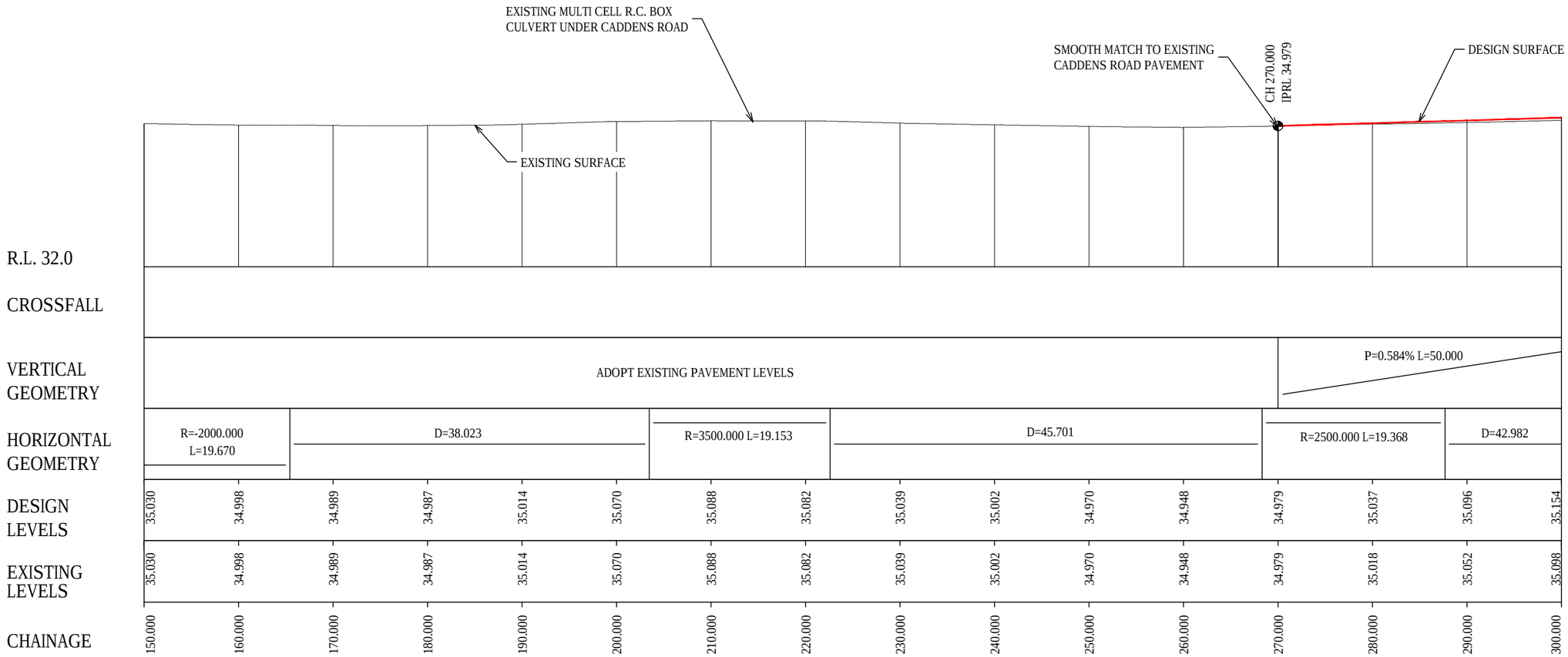
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
LONGITUDINAL SECTION - CH 0 TO CH 150 - SHEET 1 OF 5

PLAN No: 110489-CD-006 A
FILE No: 110489-CD-006
SHEET SIZE: A3 ORIGINAL

NOTES

1. FOR ROAD PLANS, REFER TO SHEETS 110489-CD-003 TO 110489-CD-005.
2. FOR ROAD TYPICAL CROSS SECTIONS, REFER TO SHEET 110489-CD-002.



LONGITUDINAL SECTION - CADDENS ROAD - MC10

0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT		DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW		M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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ORIGIN: MGA

CLIENT: PENRITH CITY COUNCIL

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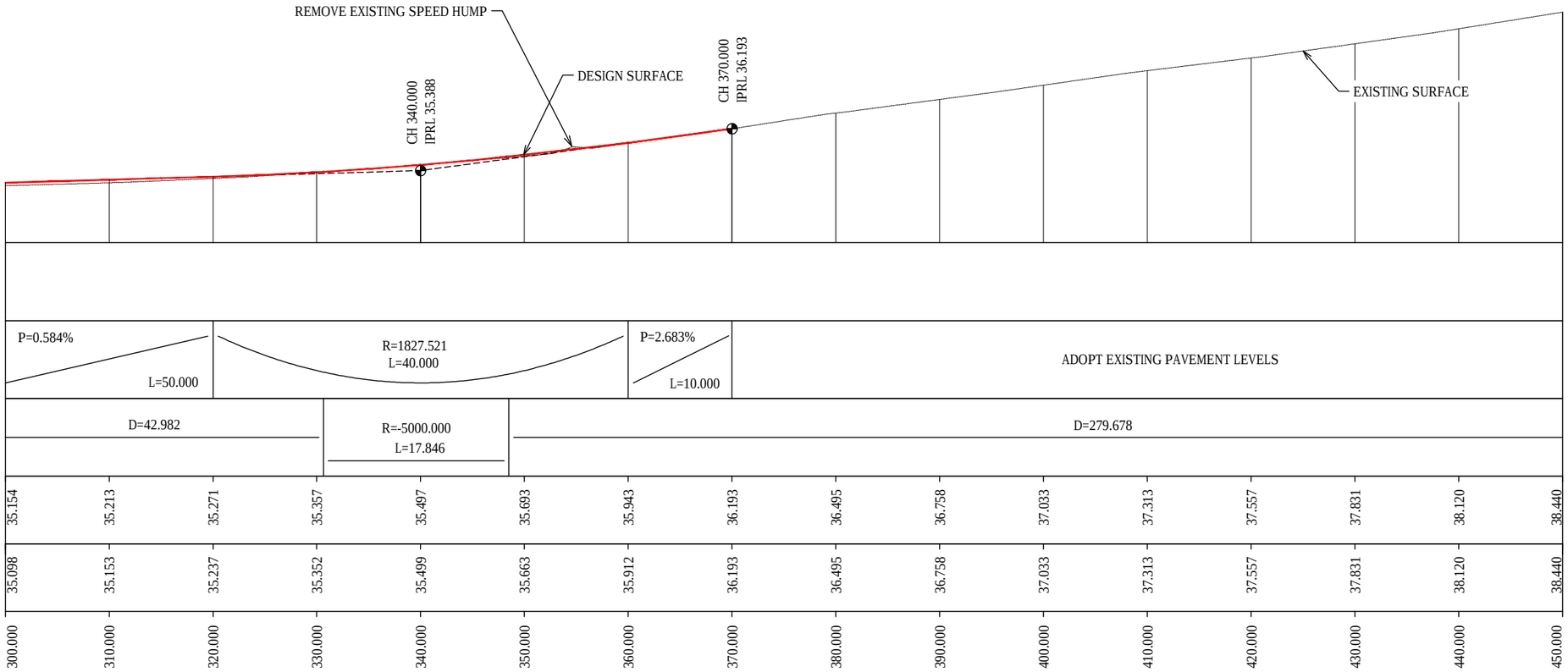
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
LONGITUDINAL SECTION - CH 150 TO CH 300 - SHEET 2 OF 5

PLAN No: 110489-CD-007 A
FILE No: 110489-CD-007
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:35:37 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTIC\CD\110489-CD-007.dwg

NOTES

1. FOR ROAD PLANS, REFER TO SHEETS 110489-CD-003 TO 110489-CD-005.
2. FOR ROAD TYPICAL CROSS SECTIONS, REFER TO SHEET 110489-CD-002.



LONGITUDINAL SECTION - CADDENS ROAD - MC10

0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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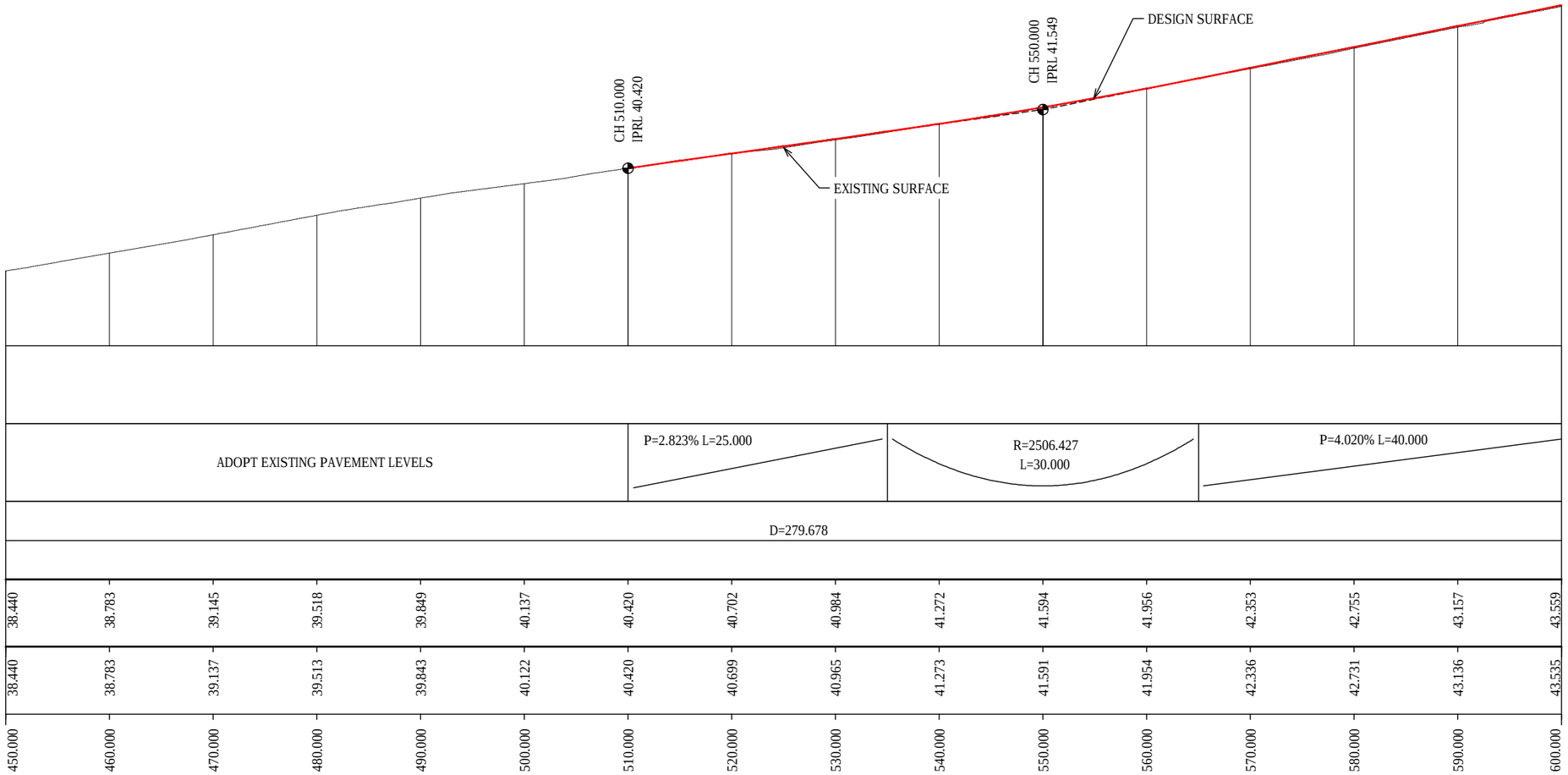
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
LONGITUDINAL SECTION - CH 300 TO CH 450 - SHEET 3 OF 5

PLAN No: 110489-CD-008 A
FILE No: 110489-CD-008
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:35:43 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTI\CD\110489-CD-008.dwg

NOTES

1. FOR ROAD PLANS, REFER TO SHEETS 110489-CD-003 TO 110489-CD-005.
2. FOR ROAD TYPICAL CROSS SECTIONS, REFER TO SHEET 110489-CD-002.



LONGITUDINAL SECTION - CADDENS ROAD - MC10

0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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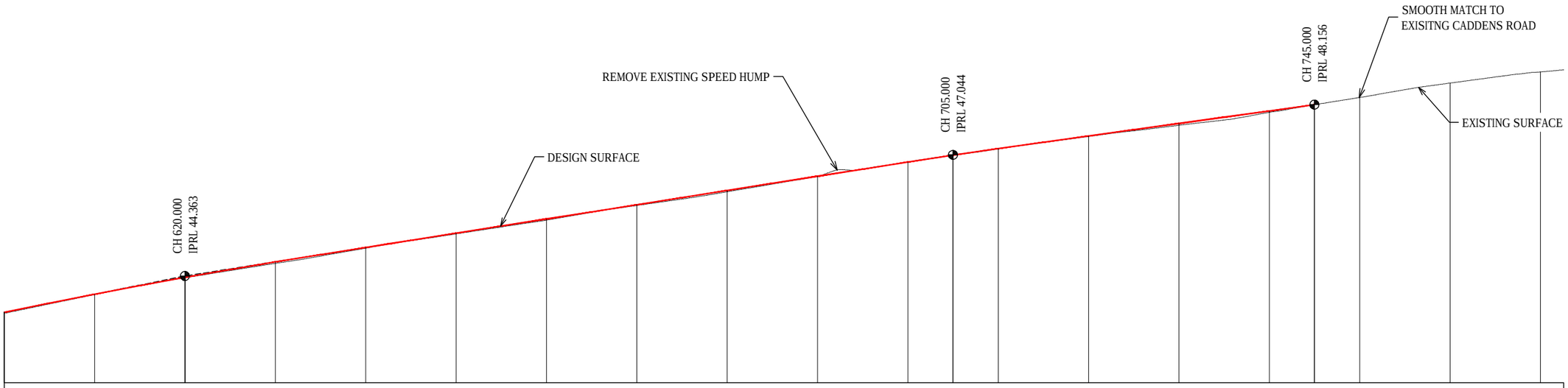
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
LONGITUDINAL SECTION - CH 450 TO CH 600 - SHEET 4 OF 5

PLAN No: 110489-CD-009 A
FILE No: 110489-CD-009
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:35:48 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTNCD\110489-CD-009.dwg

NOTES

1. FOR ROAD PLANS, REFER TO SHEETS 110489-CD-003 TO 110489-CD-005.
2. FOR ROAD TYPICAL CROSS SECTIONS, REFER TO SHEET 110489-CD-002.



R.L. 42.0

CROSSFALL

VERTICAL GEOMETRY	P=4.02% L=40.0	R=-3464.674 L=30.000	P=3.154% L=60.000							R=-5345.912 L=20.000	P=2.780% L=30.000				ADOPT EXISTING PAVEMENT LEVELS		
HORIZONTAL GEOMETRY	D=279.678			R=5000.000 L=14.513	D=138.517												
DESIGN LEVELS	43.559	43.957	44.331	44.675	44.994	45.309	45.625	45.940	46.255	46.571	46.884	47.181	47.461	47.739	48.017	48.314	48.633	48.880
EXISTING LEVELS	43.535	43.952	44.322	44.641	44.979	45.294	45.600	45.923	46.226	46.565	46.882	47.174	47.450	47.698	47.986	48.314	48.633	48.880
CHAINAGE	600.000	610.000	620.000	630.000	640.000	650.000	660.000	670.000	680.000	690.000	700.000	710.000	720.000	730.000	740.000	750.000	760.000	770.000

LONGITUDINAL SECTION - CADDENS ROAD - MC10

0 5 10 15 20
SCALE 1:500m

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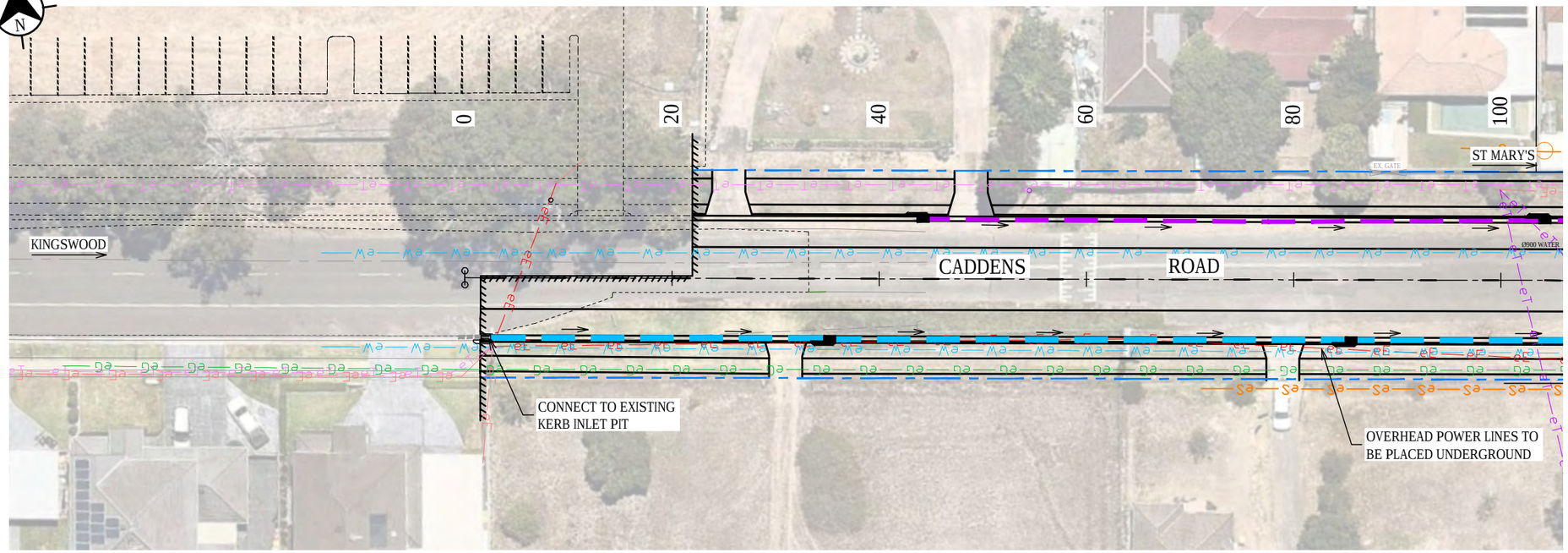
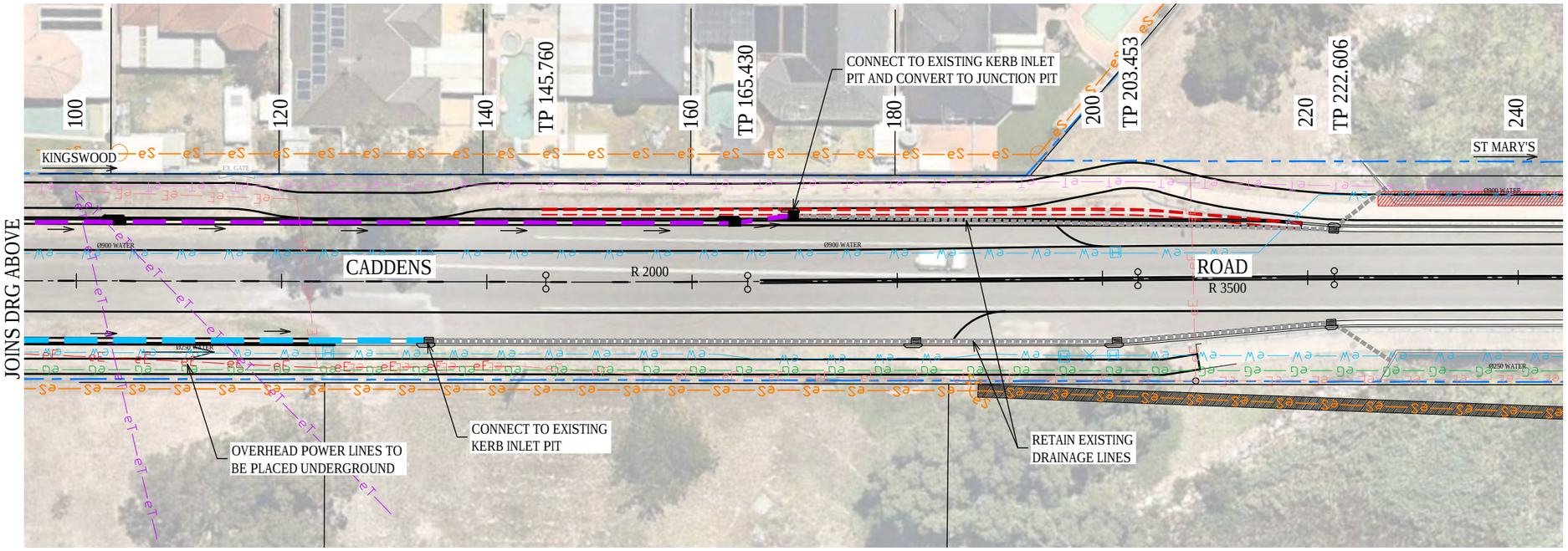
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
LONGITUDINAL SECTION - CH 600 TO CH 770 - SHEET 5 OF 5

PLAN No: 110489-CD-010 A
FILE No: 110489-CD-010
SHEET SIZE: A3 ORIGINAL



PLAN



PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING DRAINAGE PIT
- NEW STORMWATER GULLEY PIT
- NEW STORMWATER JUNCTION PIT
- NEW Ø375mm STORWATER PIPE
- NEW Ø450mm STORMWATER PIPE
- NEW Ø525mm STORMWATER PIPE
- NEW Ø600mm STORMWATER PIPE
- EXISTING STORMWATER PIPE
- DIRECTION OF PIPE FLOW
- eE U/G ELECTRICITY
- eE AERIAL ELECTRICITY
- eT U/G TELECOMMUNICATIONS
- eT AERIAL TELECOMMUNICATIONS
- eG GAS
- eW WATER (Ø900, Ø450, Ø250)
- eS SEWER
- eS SEWER 9CONCRETE ENCASED)
- eNBN NATIONAL BROADBAND NETWORK
- LIMIT OF WORKS
- EXISTING PROPERTY BOUNDARY

DRAINAGE NOTES

1. EXISTING STORM WATER PIPE SYSTEM IS TO BE CONFIRMED BY DETAIL SURVEY.
2. PROPOSED STORM WATER DESIGN IS SCHEMATIC ONLY AND IS SUBJECT TO DETAIL DESIGN.
3. PROPOSED PIT AND PIPE SIZES ARE APPROXIMATE ONLY AND SUBJECT TO DETAIL DESIGN.

UTILITY NOTES

1. THE LOCATION AND LEVEL OF ALL NEW PUBLIC UTILITIES SHOWN ON THIS PLAN IS INDICATIVE ONLY. FINAL LOCATIONS TO BE CONFIRMED ON SITE BY THE RESPECTIVE AUTHORITIES AND THE SUPERINTENDENT.
2. THE LOCATIONS OF SERVICES AT THE SITE DEPICTED ON THIS PLAN HAVE BEEN DETERMINED BY DIAL BEFORE YOU DIG AND SITE INSPECTION AND SHOWN TO DETERMINE THE NATURE AND EXTENT OF THE EXISTING UTILITIES ONLY. REFERENCE MUST BE MADE TO THE DETAIL SURVEY PRIOR TO THE COMMENCEMENT OF ROADWORKS, AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALING PH. 1100 OR FAX. 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.
3. FOR DETAILS OF NEW UTILITY ALLOCATIONS REFER TO DRAWING 110489-CD-002

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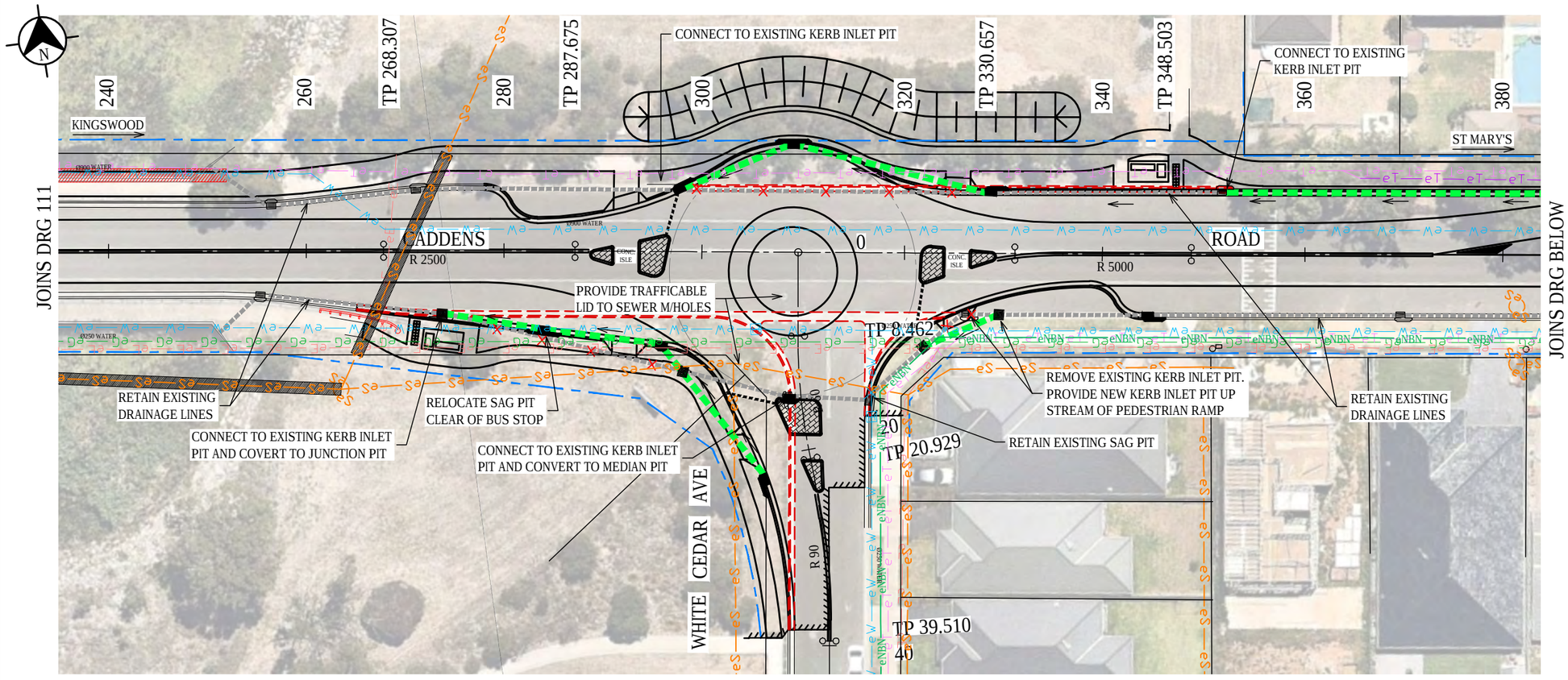
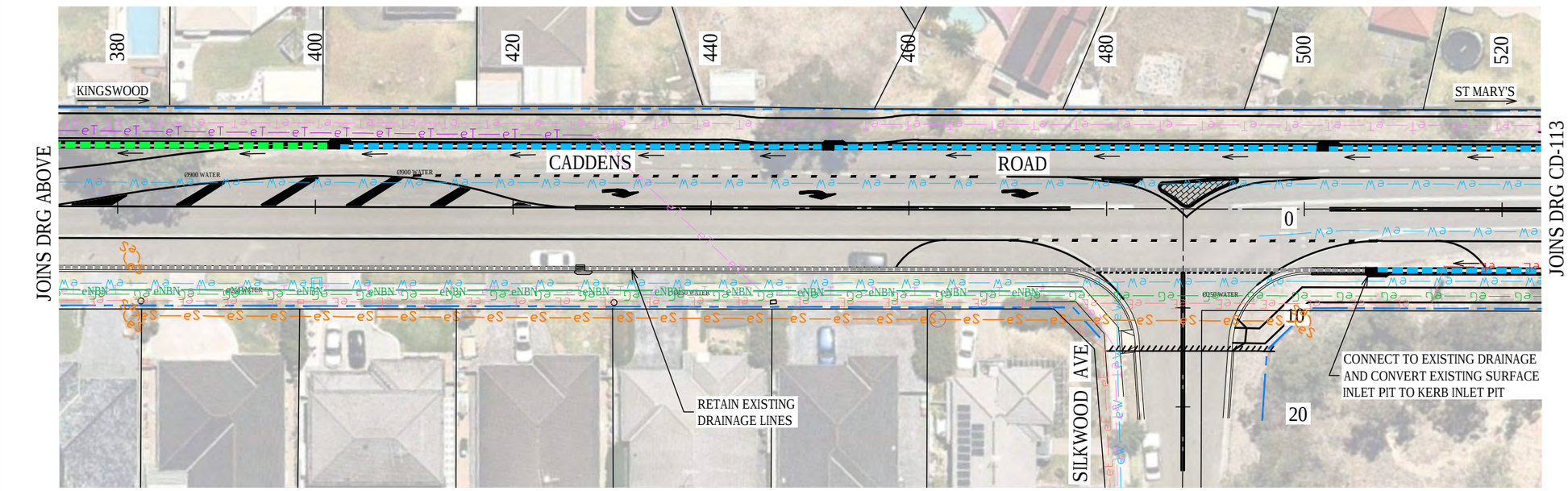
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
DRAINAGE & UTILITIES PLAN - CH 0 TO CH 240 - SHEET 1 OF 3

PLAN No: 110489-CD-011 A
FILE No: 110489-CD-011
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:36:02 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RT\CD\110489-CD-011.dwg



PLAN



PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING DRAINAGE PIT
- NEW STORMWATER GULLEY PIT
- NEW STORMWATER JUNCTION PIT
- NEW Ø375mm STORWATER PIPE
- NEW Ø450mm STORMWATER PIPE
- NEW Ø525mm STORMWATER PIPE
- NEW Ø600mm STORMWATER PIPE
- EXISTING STORMWATER PIPE
- DIRECTION OF PIPE FLOW
- eE U/G ELECTRICITY
- eE AERIAL ELECTRICITY
- eT U/G TELECOMMUNICATIONS
- eT AERIAL TELECOMMUNICATIONS
- eG GAS
- eW WATER (Ø900, Ø450, Ø250)
- eS SEWER
- eS SEWER 9CONCRETE ENCASED)
- eNBN NATIONAL BROADBAND NETWORK
- LIMIT OF WORKS
- EXISTING PROPERTY BOUNDARY

DRAINAGE NOTES

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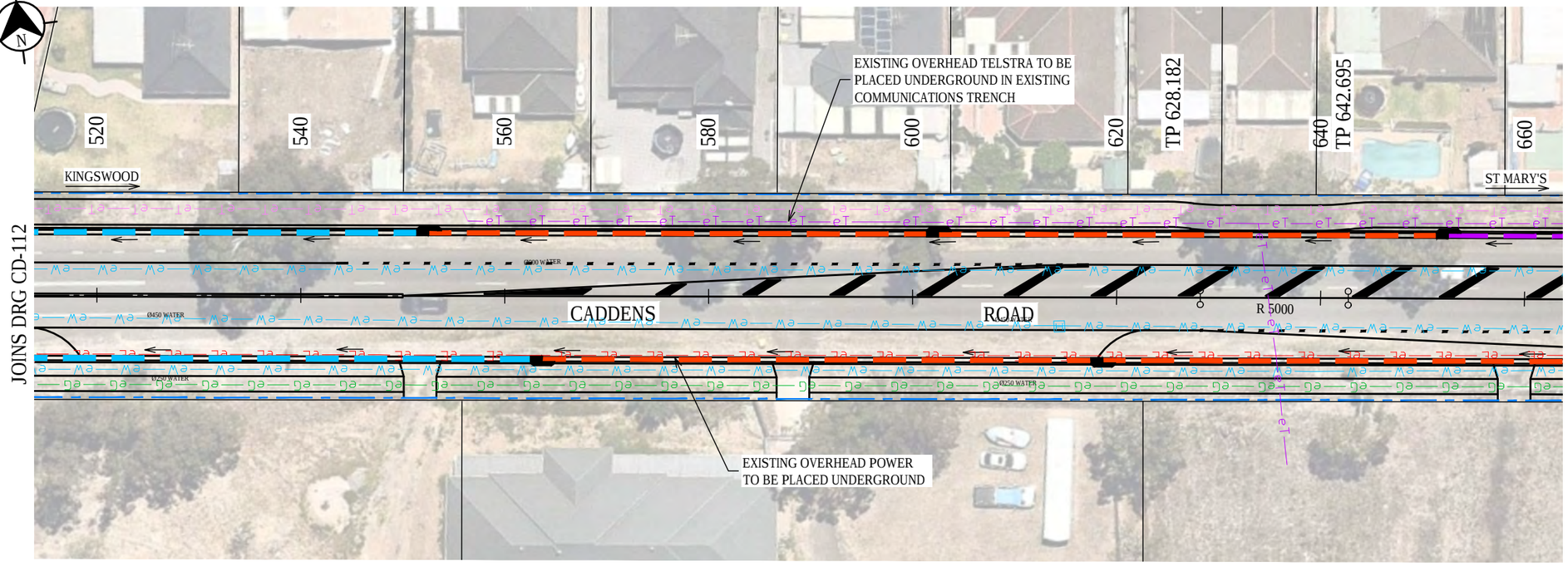
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
DRAINAGE & UTILITIES PLAN - CH 240 TO CH 520 - SHEET 2 OF 3

PLAN No: 110489-CD-012 A
FILE No: 110489-CD-012
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:36:12 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTIC\D110489-CD-012.dwg



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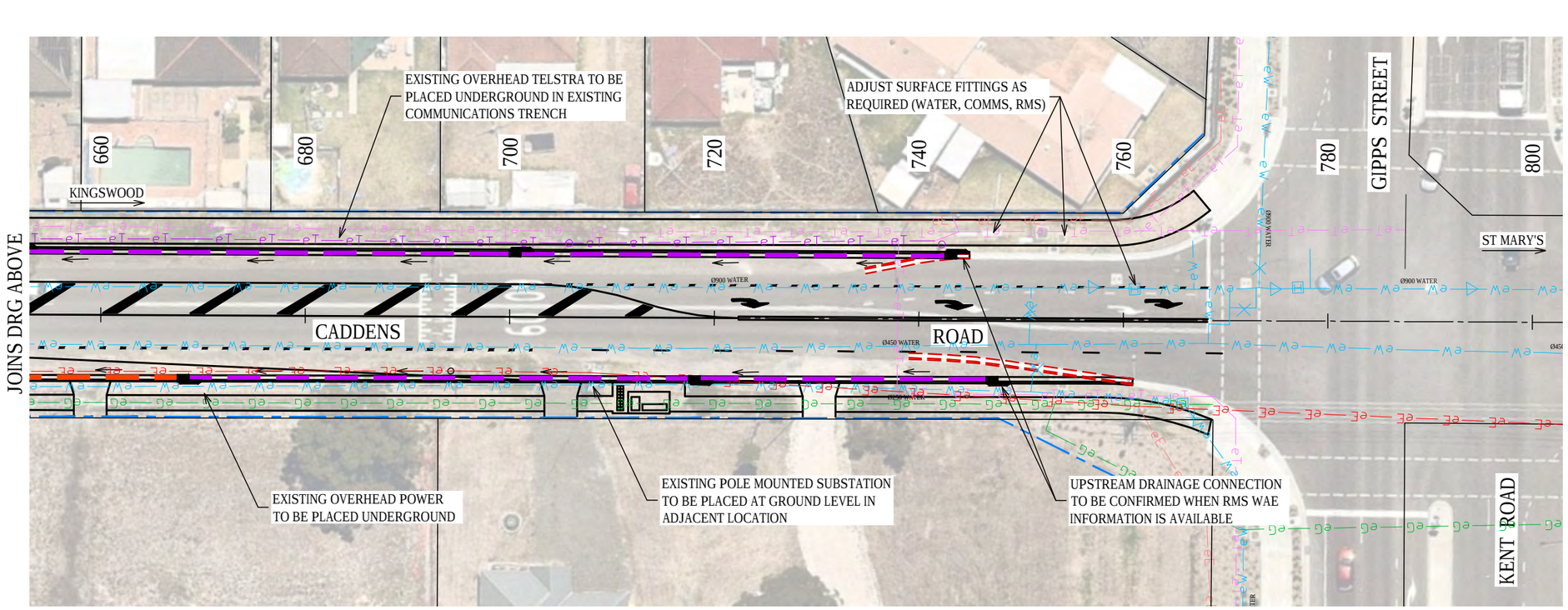

PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING DRAINAGE PIT
- NEW STORMWATER GULLEY PIT
- NEW STORMWATER JUNCTION PIT
- NEW Ø375mm STORWATER PIPE
- NEW Ø450mm STORMWATER PIPE
- NEW Ø525mm STORMWATER PIPE
- NEW Ø600mm STORMWATER PIPE
- EXISTING STORMWATER PIPE
- DIRECTION OF PIPE FLOW
- eE U/G ELECTRICITY
- eE AERIAL ELECTRICITY
- eT U/G TELECOMMUNICATIONS
- eT AERIAL TELECOMMUNICATIONS
- eG GAS
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- eS SEWER
- eS SEWER 9CONCRETE ENCASED)
- eNBN NATIONAL BROADBAND NETWORK
- LIMIT OF WORKS
- EXISTING PROPERTY BOUNDARY

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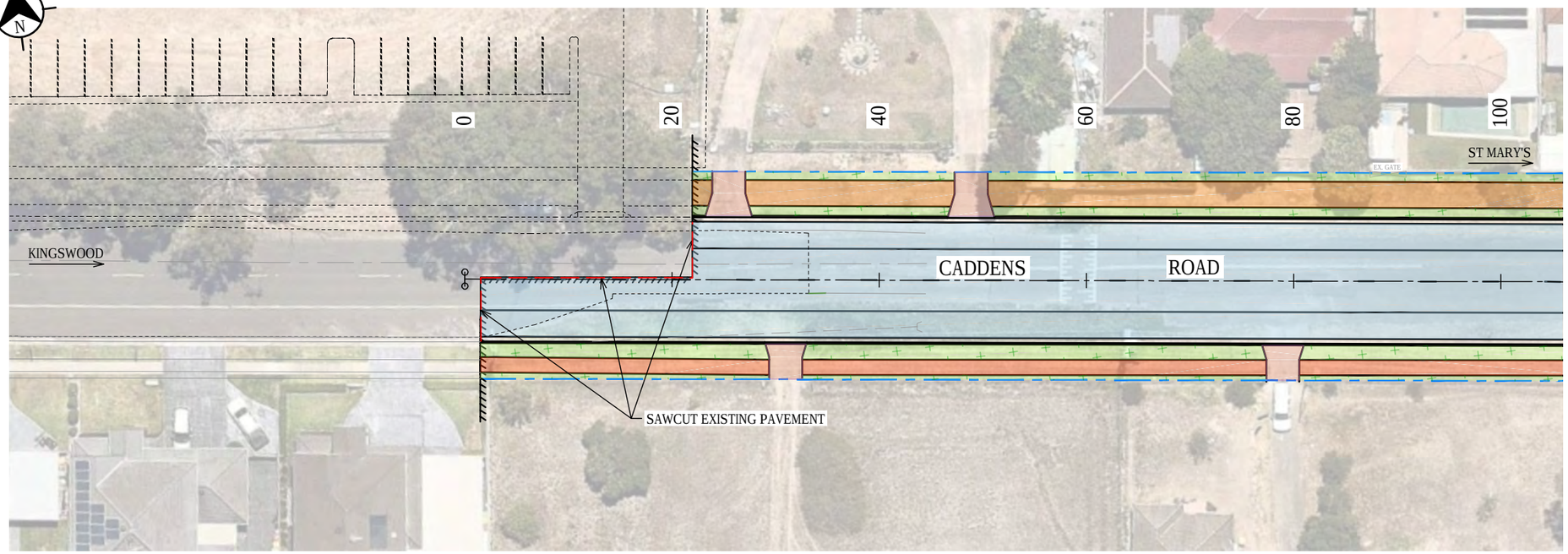
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
DRAINAGE & UTILITIES PLAN - CH 520 TO CH 800 - SHEET 3 OF 3

PLAN No: 110489-CD-013 A
FILE No: 110489-CD-013
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March. 2018 4:36:21 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\IRTIC\D\110489-CD-013.dwg



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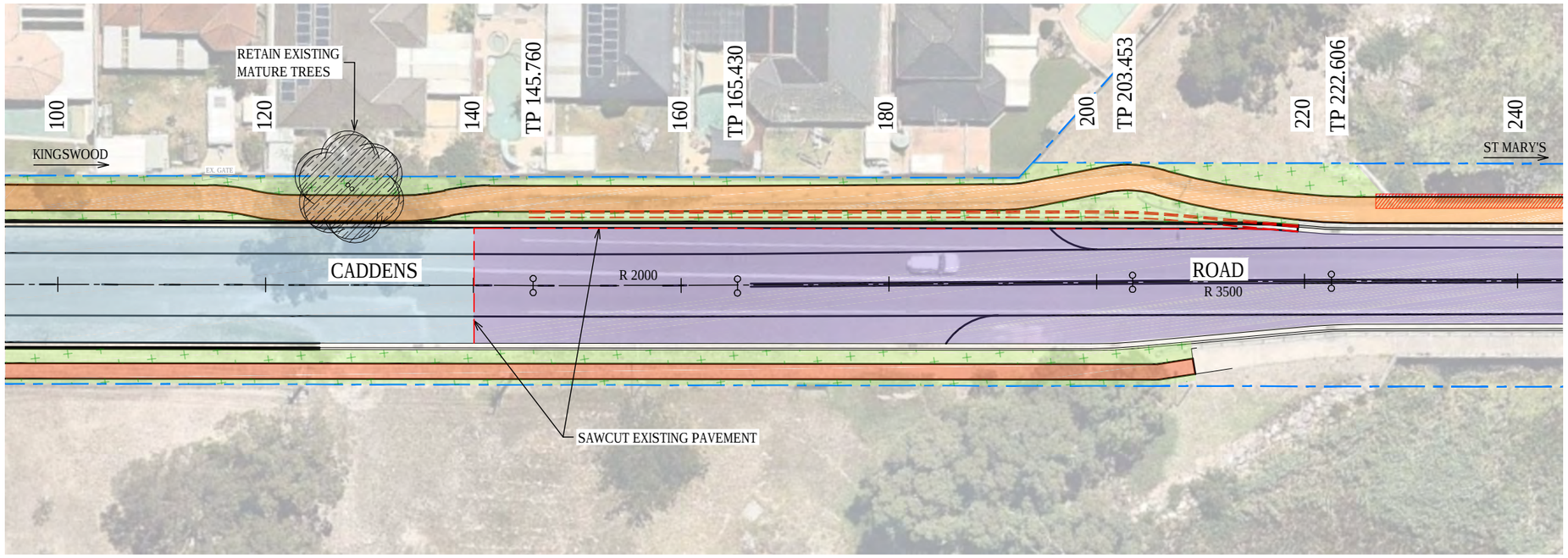

PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING PROPERTY BOUNDARY
- LIMIT OF WORKS

NOTES

1. EXTENT AND TYPE OF NEW PAVEMENT WORKS IS SUBJECT TO GEOTECHNICAL INVESTIGATION.
2. LOCATION OF LIMITS OF NEW PAVEMENT WORKS IS SUBJECT TO DETAIL DESIGN.
3. EXISTING KERBS ARE TO BE RETAINED WHERE NOT IMPACTED BY THE NEW WORKS.

PAVEMENT LEGEND

- FULL DEPTH PAVEMENT
- MILL AND RESHEET EXISTING PAVEMENT
- CONCRETE FOOTPATHS AND PEDESTRIAN RAMPS
- CONCRETE SHARED PATHS AND PEDESTRIAN RAMPS
- CONCRETE MEDIAN & SPLITTER ISLANDS
- CONCRETE ROUNDABOUT ANNULUS
- LANDSCAPING OPPORTUNITY
- EXISTING ROAD PAVEMENT

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
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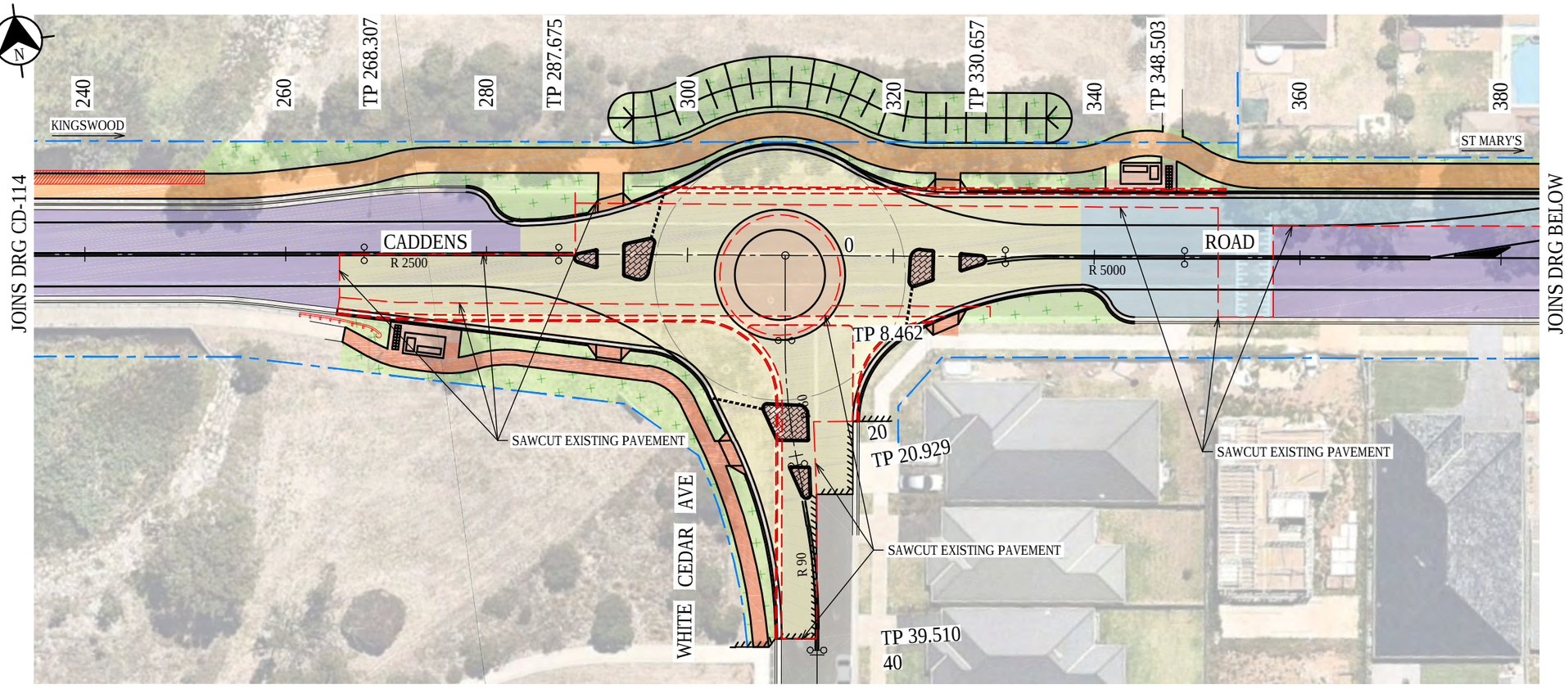
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
PAVEMENT PLAN - CH 0 TO CH 240 - SHEET 1 OF 3

PLAN No: 110489-CD-014 A
FILE No: 110489-CD-014
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:36:31 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTI\CD\110489-CD-014.dwg



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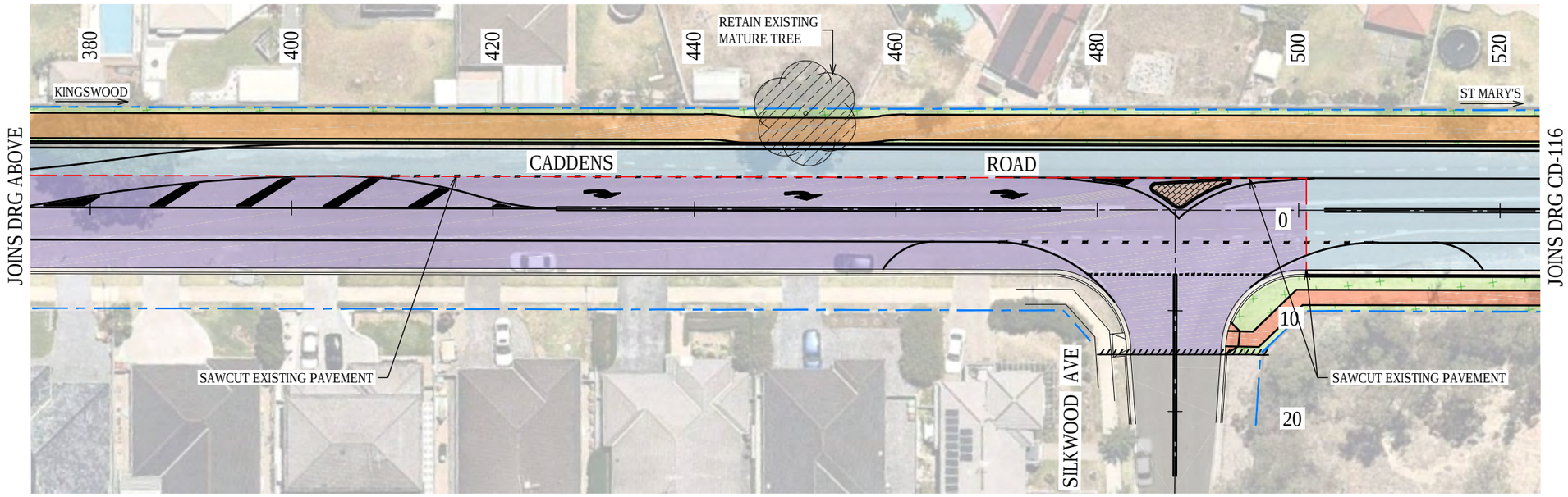

PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING PROPERTY BOUNDARY
- LIMIT OF WORKS

NOTES

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PAVEMENT LEGEND

- FULL DEPTH PAVEMENT
- MILL AND RESHEET EXISTING PAVEMENT
- CONCRETE FOOTPATHS AND PEDESTRIAN RAMPS
- CONCRETE SHARED PATHS AND PEDESTRIAN RAMPS
- CONCRETE MEDIAN & SPLITTER ISLANDS
- CONCRETE ROUNDABOUT ANNULUS
- LANDSCAPING OPPORTUNITY
- EXISTING ROAD PAVEMENT

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
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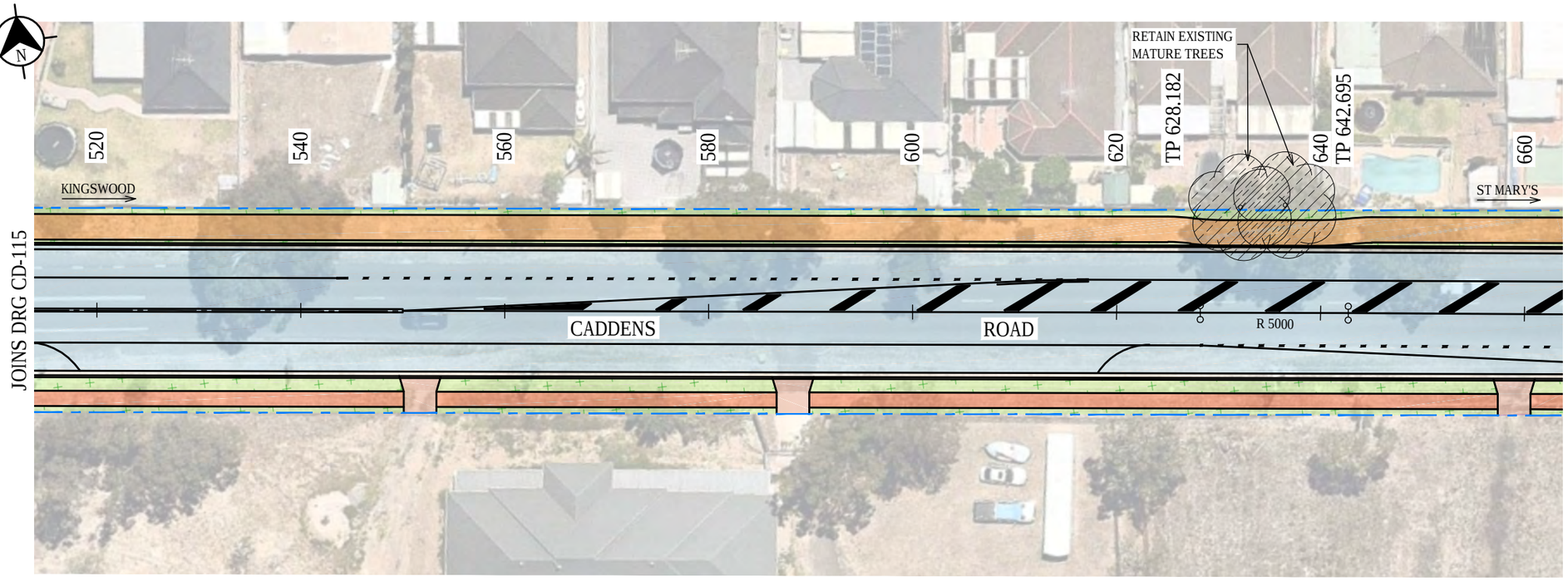
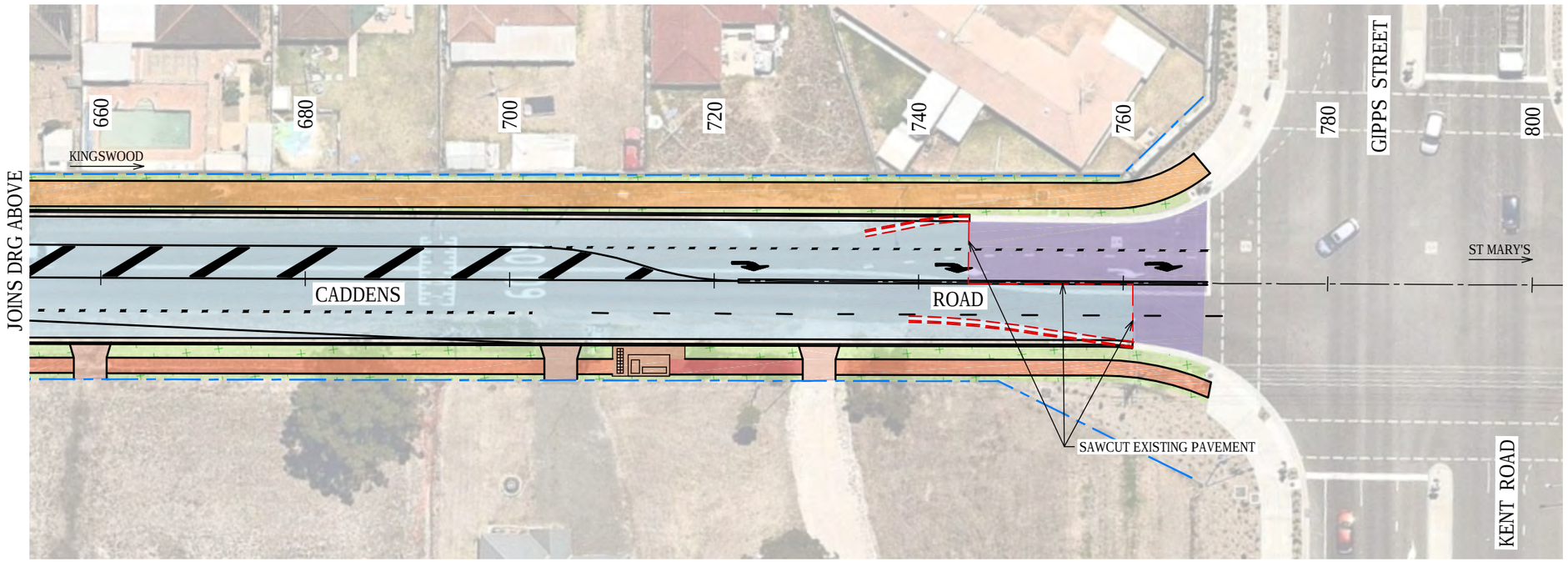
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD

CONCEPT DESIGN
PAVEMENT PLAN - CH 240 TO CH 520 - SHEET 2 OF 3

PLAN No: 110489-CD-015 A
FILE No: 110489-CD-015
SHEET SIZE: A3 ORIGINAL



PLAN



PLAN

0 5 10 15 20
SCALE 1:500m

LEGEND

- EXISTING PROPERTY BOUNDARY
- LIMIT OF WORKS

NOTES

1. EXTENT AND TYPE OF NEW PAVEMENT WORKS IS SUBJECT TO GEOTECHNICAL INVESTIGATION.
2. LOCATION OF LIMITS OF NEW PAVEMENT WORKS IS SUBJECT TO DETAIL DESIGN.
3. EXISTING KERBS ARE TO BE RETAINED WHERE NOT IMPACTED BY THE NEW WORKS.

PAVEMENT LEGEND

- FULL DEPTH PAVEMENT
- MILL AND RESHEET EXISTING PAVEMENT
- CONCRETE FOOTPATHS AND PEDESTRIAN RAMPS
- CONCRETE SHARED PATHS AND PEDESTRIAN RAMPS
- CONCRETE MEDIAN & SPLITTER ISLANDS
- CONCRETE ROUNDABOUT ANNULUS
- LANDSCAPING OPPORTUNITY
- EXISTING ROAD PAVEMENT

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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ORIGIN: MGA

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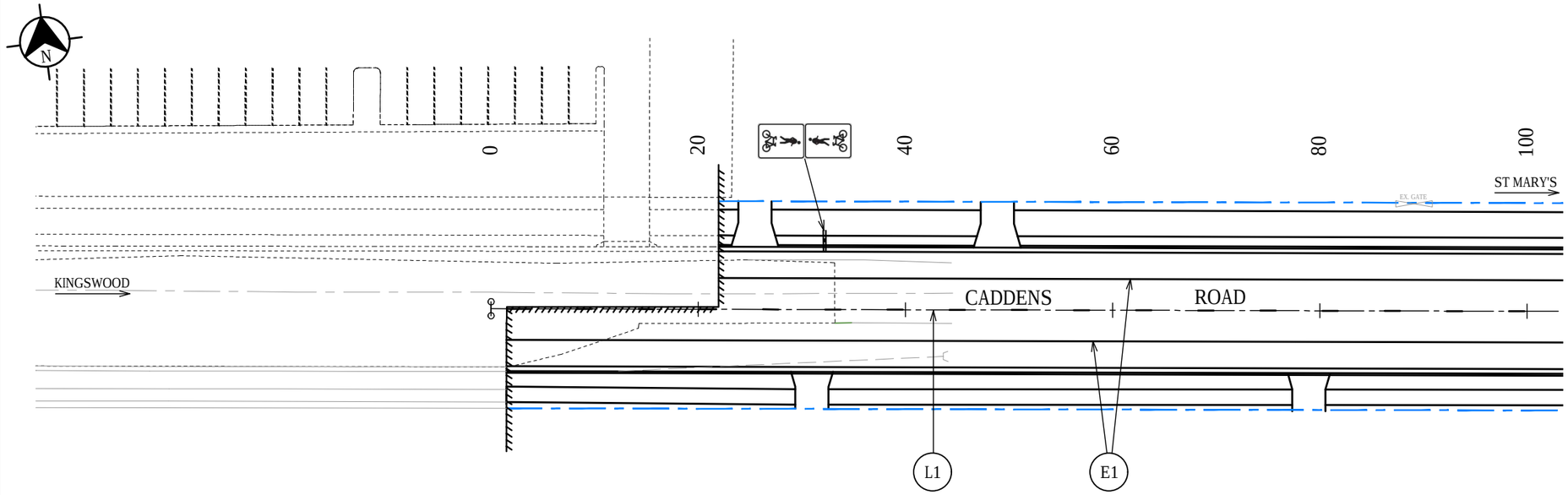
CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD

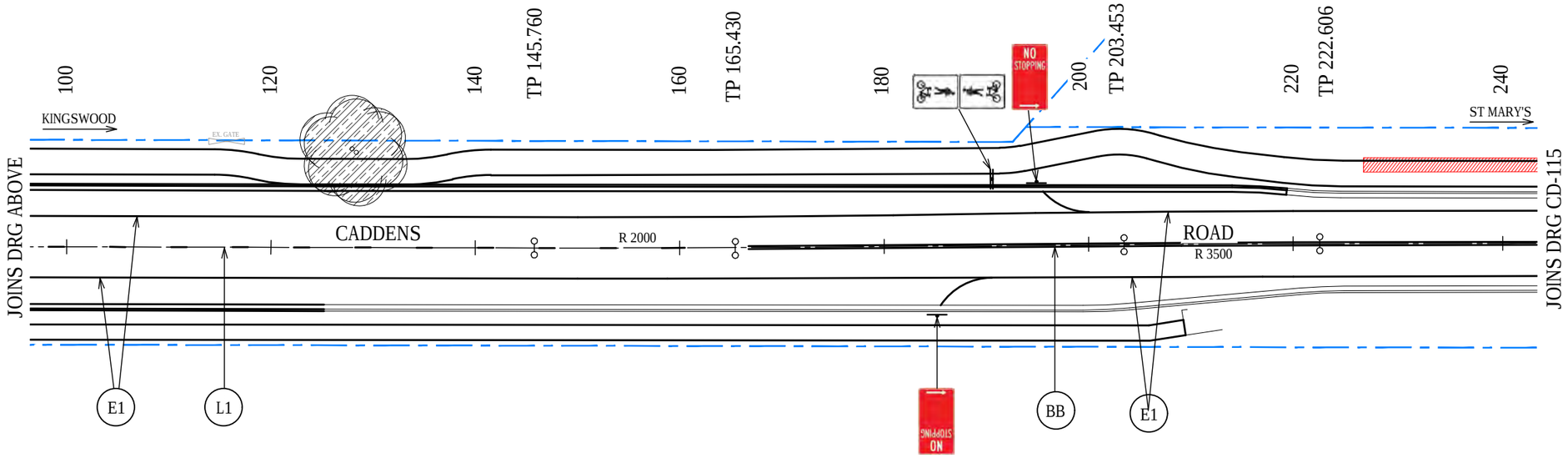
CONCEPT DESIGN
PAVEMENT PLAN - CH 520 TO CH 800 - SHEET 3 OF 3

PLAN No: 110489-CD-016 A
FILE No: 110489-CD-016
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:36:51 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTI\CD\110489-CD-016.dwg



PLAN



PLAN

0 5 10 15 20
SCALE 1:500m

LINEMARKING LEGEND

CODE	STYLE	USE
BB	3 x 100mm	BARRIER LINE
E1	150mm	LEFT HAND EDGE LINE ON GENERAL PURPOSE ROAD
E4	150mm	OUTLINE OF TRAFFIC ISLAND
E5	150mm	OUTLINE OF PAINTED MEDIAN
E7	100mm	BICYCLE EDGE LINE FOR OFF ROAD BIKE & SHARED PATHS
TB		GIVE WAY LINE
TF	600mm	STOP LINE A TRAFFIC SIGNALS
L1	100mm	LANE LINE ON MULTILANE ROAD
L7	100mm	BICYCLE LANE
C1	150mm	EDGE OF THROUGH CARRIAGEWAY, BUS BAY, START OR END OF AUXILIARY LANE
C3	1000mm, 3000mm, 0.15m	EDGE OF THROUGH CARRIAGEWAY TO TURNING LANE, FREEWAY RAMP, BUS BAY AND START OR END OF AUXILIARY LANE

SIGNPOSTING LEGEND

EXISTING SIGN — E1 LINEMARKING TYPE

NEW SIGN — NEW BACK TO BACK SIGN

NOTES

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2. THESE LINEMARKING AND SIGNPOSTING PLANS ARE INDICATIVE ONLY AND SUBJECT TO DETAIL DESIGN AND APPROVAL BY PENRITH CITY COUNCIL TRAFFIC COMMITTEE.

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
SIGNAGE & LINEMARKING - CH 0 TO CH 240 - SHEET 1 OF 3

PLAN No: 110489-CD-017 A
FILE No: 110489-CD-017
SHEET SIZE: A3 ORIGINAL

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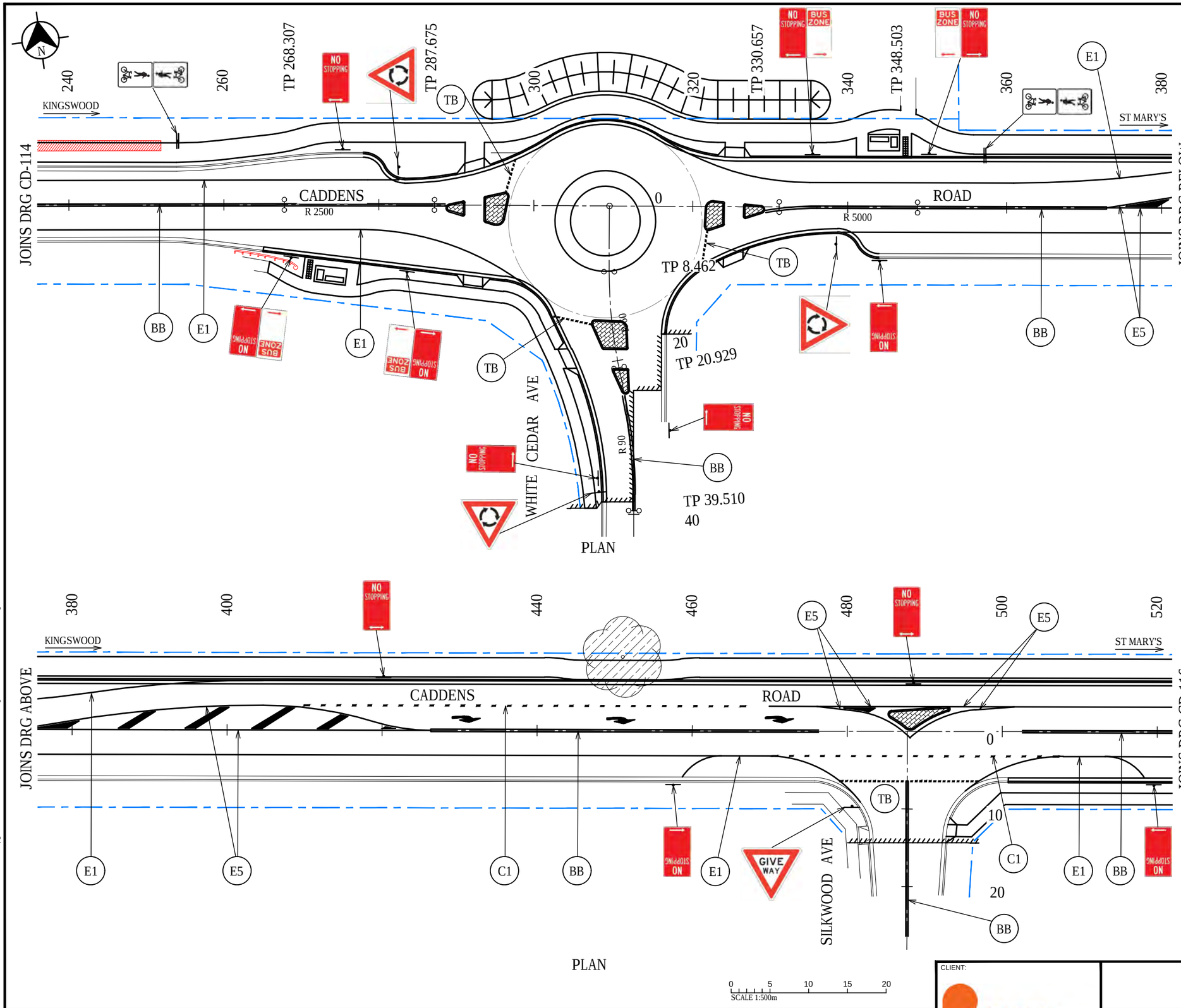

LINEMARKING LEGEND

CODE	STYLE	USE
BB	3 x 100mm	BARRIER LINE
E1	150mm	LEFT HAND EDGE LINE ON GENERAL PURPOSE ROAD
E4	150mm	OUTLINE OF TRAFFIC ISLAND
E5	150mm	OUTLINE OF PAINTED MEDIAN
E7	100mm	BICYCLE EDGE LINE FOR OFF ROAD BIKE & SHARED PATHS
TB		GIVE WAY LINE
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C1	150mm	EDGE OF THROUGH CARRIAGEWAY, BUS BAY, START OR END OF AUXILIARY LANE
C3	1000mm, 3000mm, 0.15m	EDGE OF THROUGH CARRIAGEWAY TO TURNING LANE, FREEWAY RAMP, BUS BAY AND START OR END OF AUXILIARY LANE

SIGNPOSTING LEGEND

EXISTING SIGN — E1 LINEMARKING TYPE

NEW SIGN — NEW BACK TO BACK SIGN

NOTES

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
SIGNAGE & LINEMARKING - CH 240 TO CH 520 - SHEET 2 OF 3

PLAN No: 110489-CD-018 A
FILE No: 110489-CD-018
SHEET SIZE: A3 ORIGINAL

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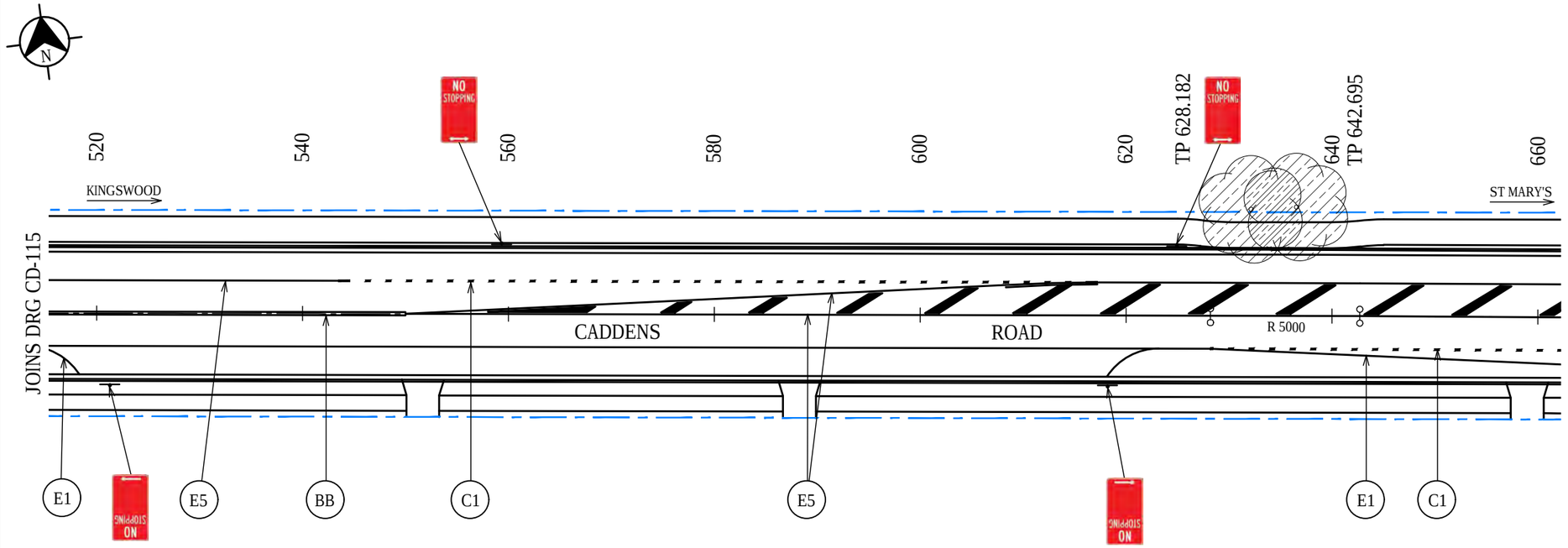

PLAN

LINEMARKING LEGEND

CODE	STYLE	USE
BB	3 x 100mm	BARRIER LINE
E1	150mm	LEFT HAND EDGE LINE ON GENERAL PURPOSE ROAD
E4	150mm	OUTLINE OF TRAFFIC ISLAND
E5	150mm	OUTLINE OF PAINTED MEDIAN
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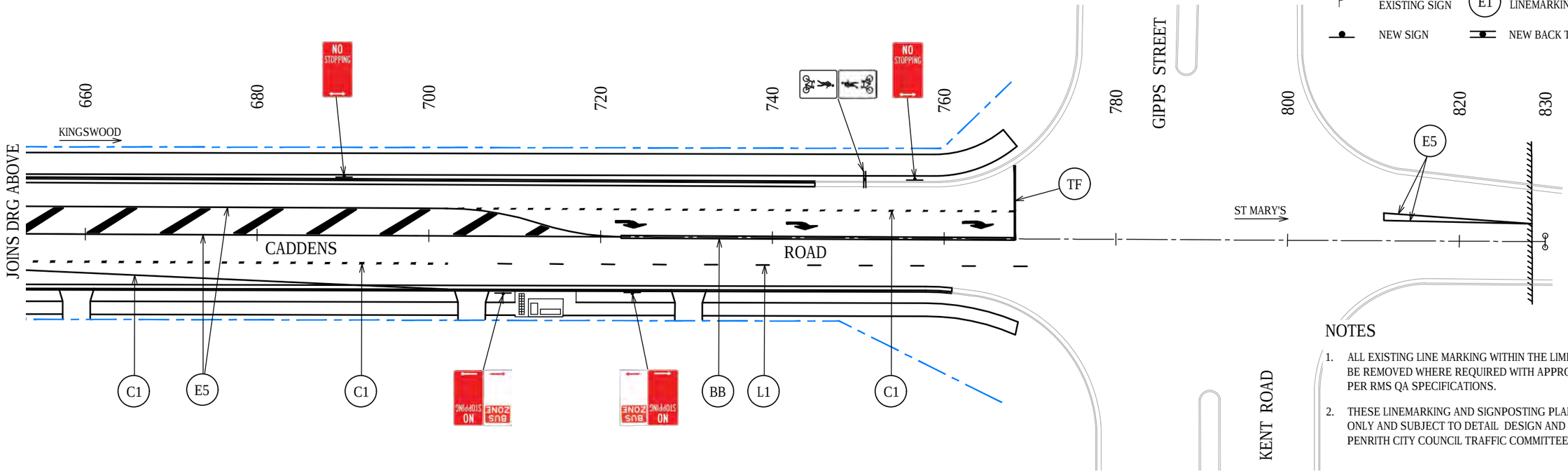
SIGNPOSTING LEGEND

EXISTING SIGN — E1 LINEMARKING TYPE

NEW SIGN — NEW BACK TO BACK SIGN



PLAN

0 5 10 15 20
SCALE 1:500m

NOTES

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ISSUE	AMENDMENT	M.J.P DES	T.L.J / M.J.P DRN	P.S. CKD	P.C. APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW					29.03.18

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PO Box 4366 PENRITH WESTFIELD NSW 2750
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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
SIGNAGE & LINEMARKING - CH 520 TO CH 800 - SHEET 3 OF 3

PLAN No: 110489-CD-019 A
FILE No: 110489-CD-019
SHEET SIZE: A3 ORIGINAL

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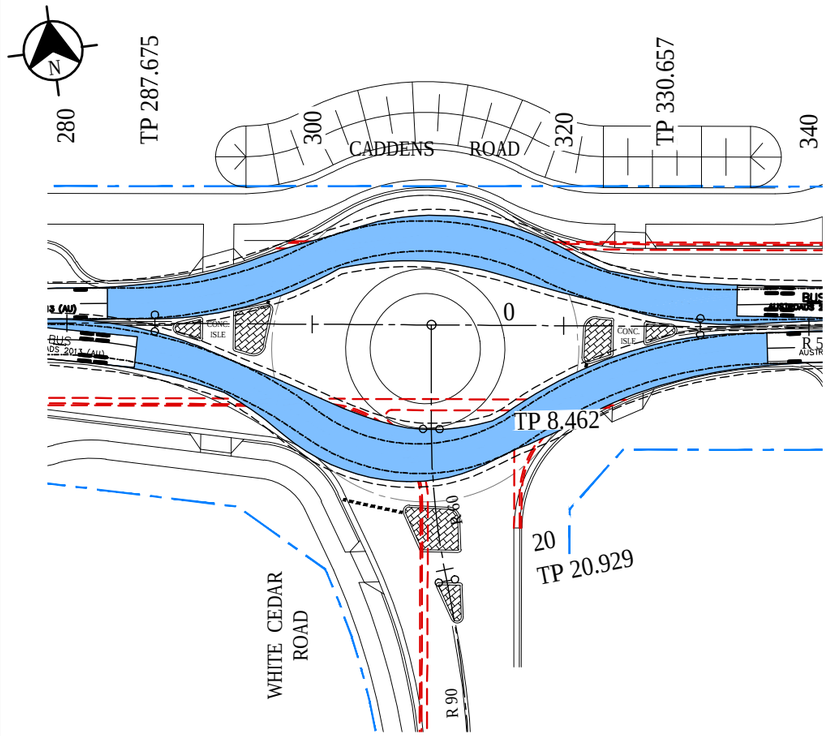

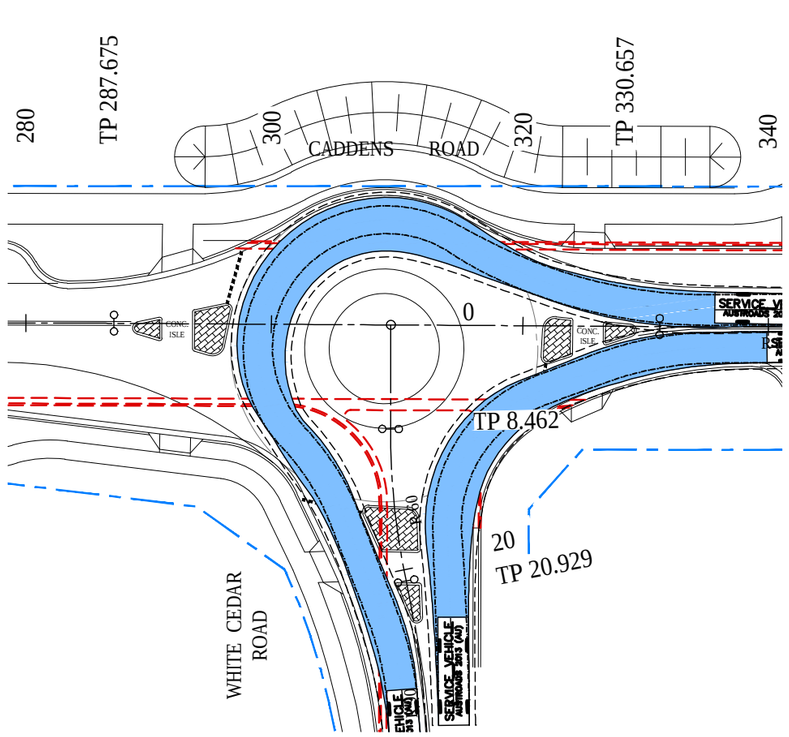

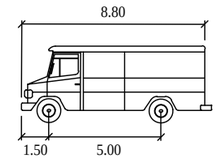

SERVICE VEHICLE

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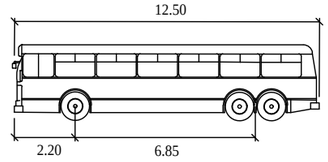
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7



BUS

	meters
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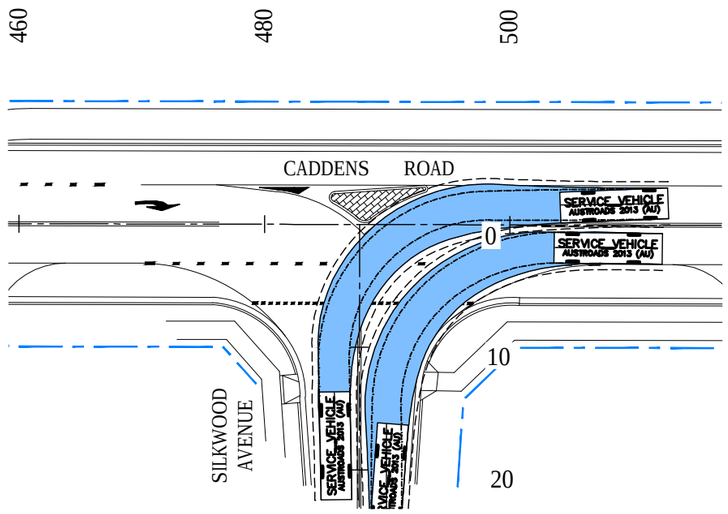
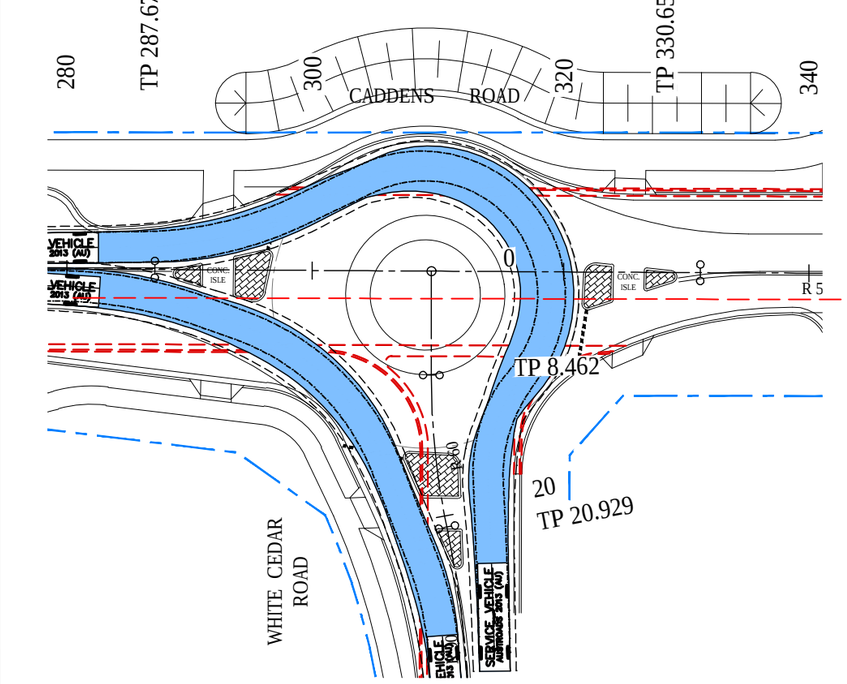
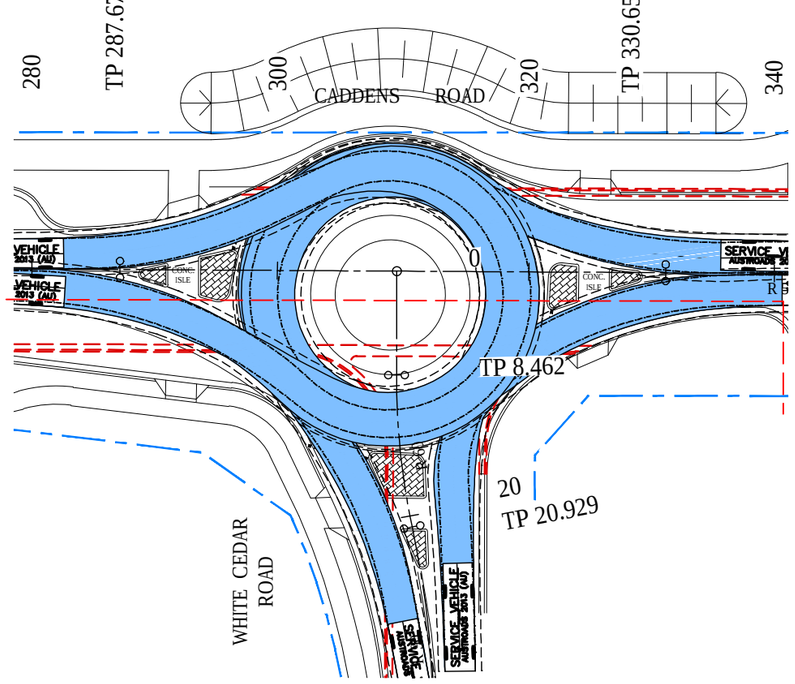
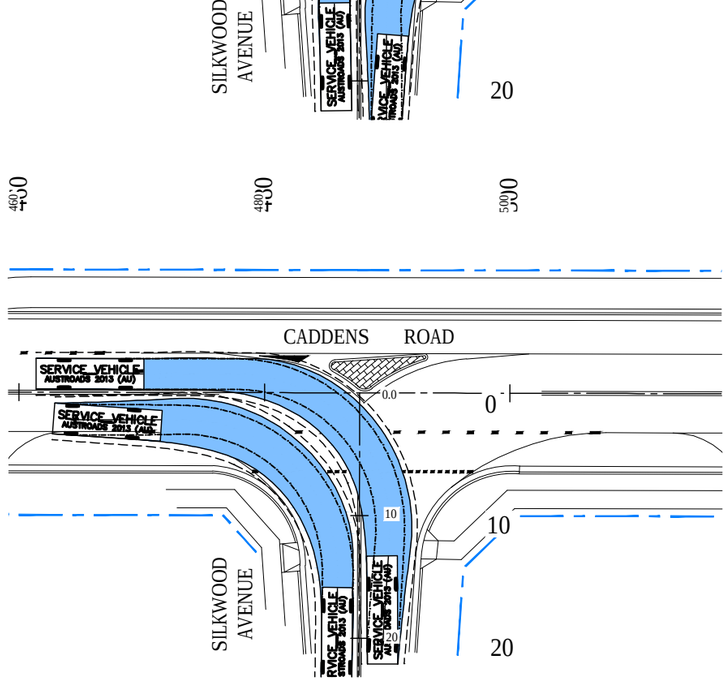
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

DESIGN VEHICLES









0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT					
		M.J.P	T.L.J / M.J.P	P.S.	P.C.	
A	CONCEPT DESIGN ISSUED FOR REVIEW	DES	DRN	CKD	APR	29.03.18 DATE

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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
TURNING PATH DIAGRAMS - WHITE CEDAR RD & SILKWOOD AVE

PLAN No: 110489-CD-020 A
FILE No: 110489-CD-020
SHEET SIZE: A3 ORIGINAL

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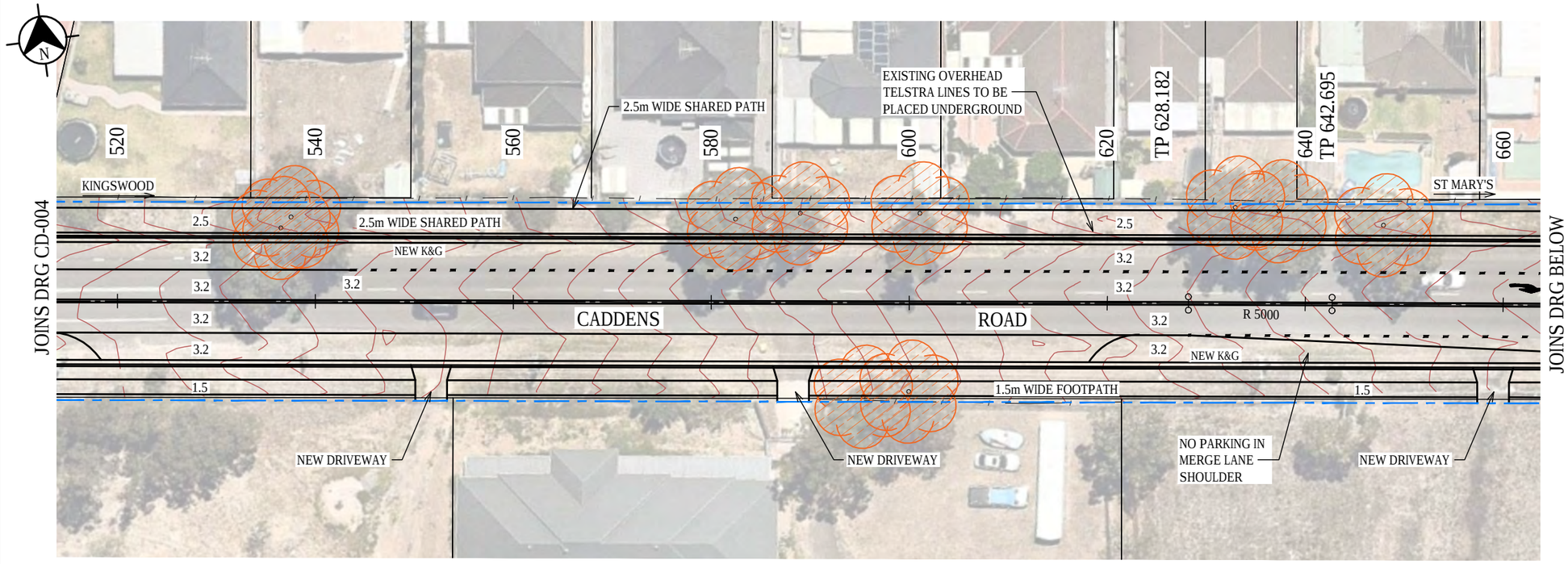
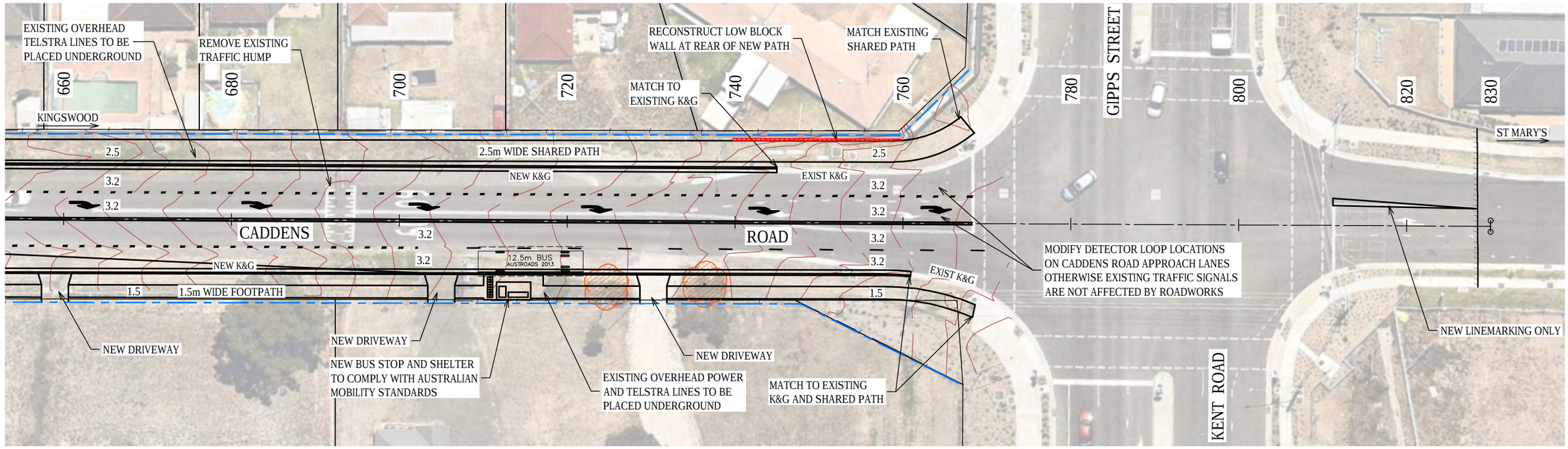


PLAN



PLAN

LEGEND

- EXISTING ROAD BOUNDARY
- EXISTING KERBS/FOOTPATHS TO BE REMOVED
- TREE TO BE REMOVED
- EXISTING SAFETY BARRIER
- RELOCATED SAFETY BARRIER
- NEW BLOCK RETAINING WALL (0.9m)
- LIMIT OF WORK

NOTES

1. HORIZONTAL ALIGNMENT SUBJECT TO DETAIL SURVEY.
2. VERTICAL ALIGNMENT IS TO MATCH EXISTING LEVELS ALONG CADDENS ROAD, SILKWOOD AVENUE AND WHITE CEDAR ROAD.
3. EXISTING KERB & GUTTER AND FOOTPATHS ARE TO BE RETAINED WHERE NOT DIRECTLY IMPACTED BY THE ROAD WORKS.

0 5 10 15 20
SCALE 1:500m

ISSUE	AMENDMENT	DES	DRN	CKD	APR	DATE
A	CONCEPT DESIGN ISSUED FOR REVIEW	M.J.P	T.L.J / M.J.P	P.S.	P.C.	29.03.18

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CADDENS ROAD UPGRADE
FROM CADDENS PLAYING FIELDS TO KENT ROAD
CONCEPT DESIGN
ALTERNATIVE CONCEPT PLAN - CH 520 TO CH 830

PLAN No: 110489-CD-021 A
FILE No: 110489-CD-021
SHEET SIZE: A3 ORIGINAL

Plotted: 29 March, 2018 4:37:31 PM File Name: J:\110489 - Caddens Road Upgrade Claremont Meadows\02 - Detailed Design\RTIC\D\110489-CD-021.dwg

APPENDIX B DATABASE SEARCHES

PENRITH CITY COUNCIL

Penrith Local Environmental Plan 2010

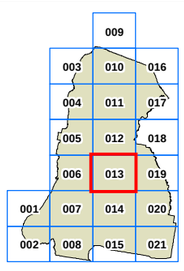
Land Zoning Map - Sheet LZN_013

Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business development
- B6 Enterprise Corridor
- B7 Business Park
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU2 Rural Landscape
- RU4 Primary Production Small Lots
- RU5 Village
- SP1 Special Activities
- SP2 Infrastructure
- SP3 Tourist
- W1 Natural Waterways
- W2 Recreational Waterways
- DM Deferred Matter
- WSEA SEPP (Western Sydney Employment Area) 2009
- SM SREP No. 30 - St Marys

Cadastre

Cadastre 20/03/2017 © Penrith City Council



N

200 0 200 400 600

Metres

Projection: GDA 1994
MGA Zone 56

Scale: 1:20,000 @ A3

Map identification number:
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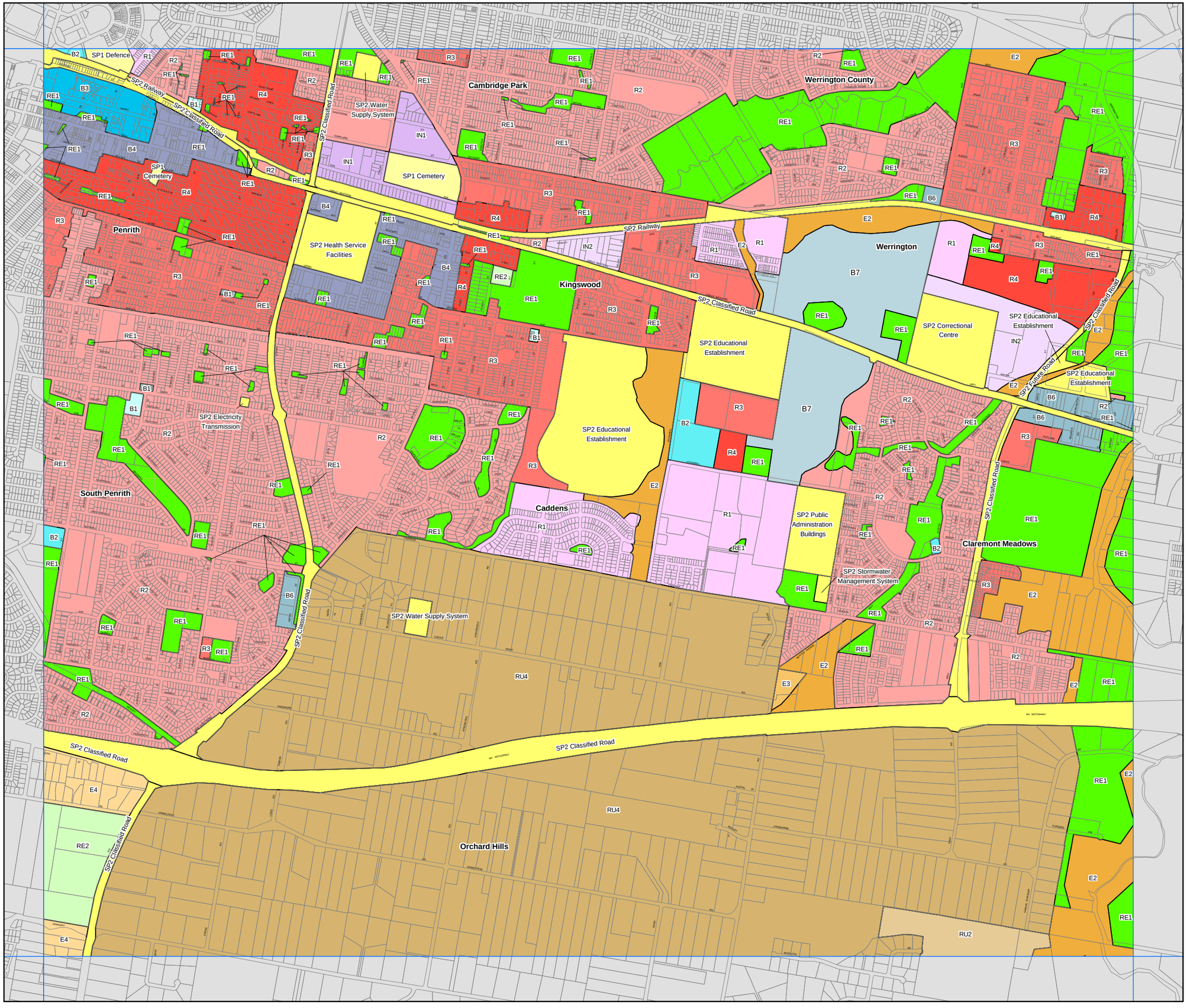


Australian Government
Department of the Environment and Energy

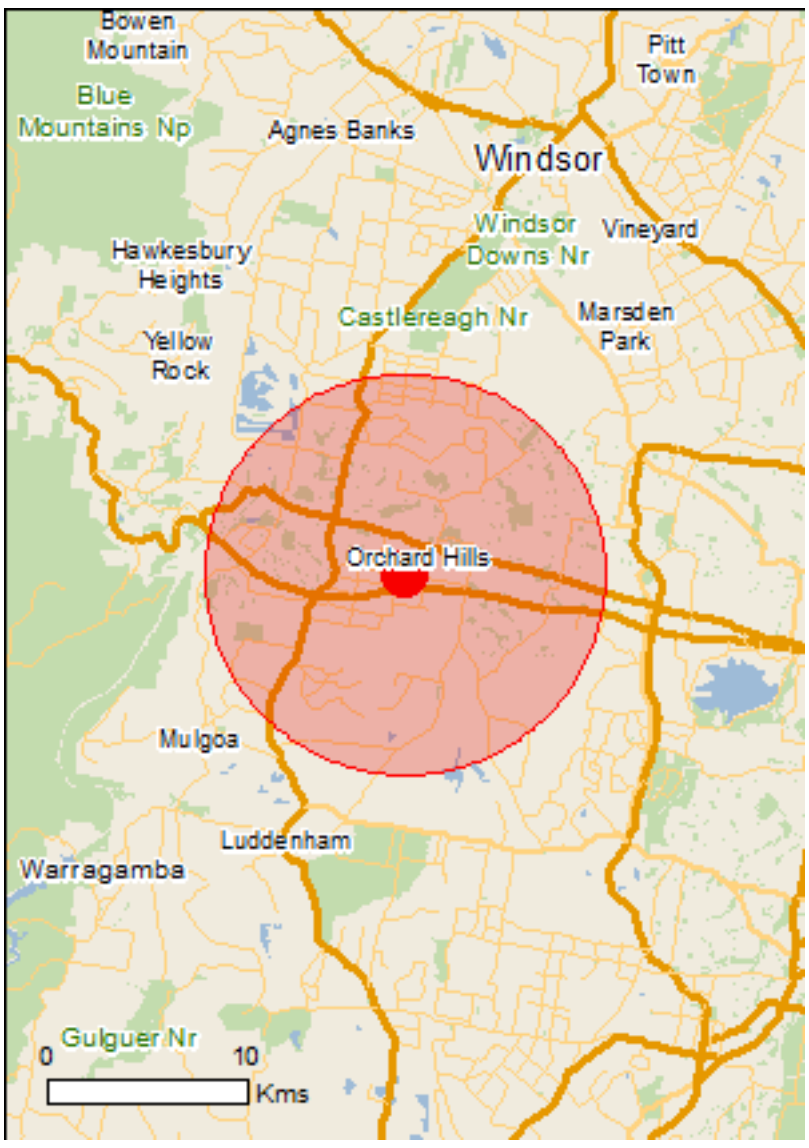
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 28/03/18 14:59:21



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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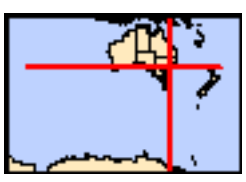

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	43
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	15
Commonwealth Heritage Places:	2
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	52
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Frogs		
[Heleioporus australiacus](#) Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
[Litoria aurea](#) Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Mammals		
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
[Petauroides volans](#) Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
[Petrogale penicillata](#) Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
[Pseudomys novaehollandiae](#) New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
[Pommerhelix duralensis](#) Dural Land Snail [85268]	Endangered	Species or species habitat likely to occur within area
Plants		
[Acacia bynoeana](#) Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat known to occur within area
[Acacia pubescens](#) Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
[Allocasuarina glareicola](#) [21932]	Endangered	Migration route known to occur within area
[Cryptostylis hunteriana](#) Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
[Cynanchum elegans](#) White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
[Eucalyptus aggregata](#) Black Gum [20890]	Vulnerable	Species or species habitat may occur within area
[Genoplesium baueri](#) Yellow Gnat-orchid [7528]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat may occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat likely to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat likely to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat may occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species	[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.	
Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - 1CAD ORCHARD HILLS KINGSWOOD
Defence - AIRTC ST MARYS
Defence - PENRITH DEPOT (Army Stores)
Defence - RANMME (DEOH)
Defence - SIGNAL STRS DEPOT-KINGSWOOD

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Orchard Hills Cumberland Plain Woodland	NSW	Listed place
Shale Woodland Llandilo	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Castlereagh	NSW
Mulgoa	NSW
Wianamatta	NSW
Wianamatta	NSW

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.77813 150.74347

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Priority weeds for the Greater Sydney

Note: this region includes the local council areas of Bayside Council, Blacktown, Blue Mountains, Burwood, Camden, Campbelltown, Canada Bay, Canterbury-Bankstown, Central Coast, City of Parramatta, Cumberland, Fairfield, Georges River, Hawkesbury, Hornsby Shire Council, Hunters Hill, Inner West, Ku-ring-gai, Lane Cove, Liverpool, Mosman, North Sydney, Northern Beaches, Penrith, Randwick, Ryde, Strathfield, Sutherland, Sydney, The Hills , Waverley, Willoughby, Wollondilly and Woollahra.

Select another region

Weed	Duty
All plants	General Biosecurity Duty *All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*
African boxthorn *Lycium ferocissimum*	Prohibition on dealings *Must not be imported into the State or sold*
African olive *Olea europaea* subsp. *cuspidata*	Regional Recommended Measure An exclusion zone is established for all lands in Blue Mountains City Council and Central Coast local government areas. The remainder of the region is classified as the core infestation area. *Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant. Core infestation area: Land managers prevent spread from their land where feasible.*
Alligator weed *Alternanthera philoxeroides*	Prohibition on dealings *Must not be imported into the State or sold*
Alligator weed *Alternanthera philoxeroides*	Biosecurity Zone The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens). *Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local*

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 18-089 Caddens Rd

Client Service ID : 336108

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-0356	Claremont Creek	AGD	56	291673	6260538	Open site	Valid	Artefact : -	Open Camp Site	260,1018
	Contact	**Recorders**	Jenny Hanrahan					**Permits**		
45-5-3013	OAD-1	AGD	56	292080	6259600	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	2134,2505	
45-5-3014	Claremont Meadows 3	AGD	56	292160	6259770	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	2134,2505	
45-5-3015	Claremont Meadows 4	AGD	56	292180	6259800	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	2134,2505	
45-5-3016	Claremont Meadows 5	AGD	56	292000	6260270	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	2134,2505	
45-5-3017	Claremont Meadows 6	AGD	56	292210	6259880	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	2134,2505	
45-5-3393	Claremont Meadows South West 1 (CMSW 1)	GDA	56	291100	6259720	Open site	Valid	Artefact : -		99122,103732
	Contact	**Recorders**	ERM Australia Pty Ltd- Sydney CBD					**Permits**	2899,3219	
45-5-3394	Claremont Meadows South West 2 (CMSW 2)	GDA	56	291130	6259790	Open site	Valid	Artefact : -		99122
	Contact	**Recorders**	ERM Australia Pty Ltd- Sydney CBD					**Permits**	2876	
45-5-3395	Claremont Meadows South West 3 (CMSW 3)	GDA	56	291100	6259720	Open site	Valid	Artefact : -		99122,103732
	Contact	**Recorders**	ERM Australia Pty Ltd- Sydney CBD					**Permits**	2899,3219	
45-5-3396	Claremont Meadows South West 4 (CMSW 4)	GDA	56	291207	6259737	Open site	Valid	Artefact : -		99122,103732
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,ERM Australia Pty Ltd- Sydney CBD,Miss.K					**Permits**	2899,3219	
45-5-3397	Claremont Meadows South West 5 (CMSW 5)	GDA	56	291080	6259500	Open site	Valid	Artefact : -		99122,103732
	Contact	**Recorders**	ERM Australia Pty Ltd- Sydney CBD					**Permits**	2899,3219	
45-5-3398	Claremont Meadows South West 6 (CMSW 6)	GDA	56	291080	6259498	Open site	Valid	Artefact : -		99122
	Contact	**Recorders**	ERM Australia Pty Ltd- Sydney CBD					**Permits**	2876	
45-5-3572	CRA1	GDA	56	290616	6260686	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,ERM Australia Pty Ltd- Sydney CBD,Miss.K					**Permits**	3023,3274	
45-5-3573	CRA2	GDA	56	290679	6260251	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Kelleher Nightingale Consulting Pty Ltd,ERM Australia Pty Ltd- Sydney CBD,Miss.K					**Permits**	3023,3274	
45-5-4428	GS4	GDA	56	291833	6260574	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Doctor.Alan Williams					**Permits**	3762	
45-5-4429	M4 North 1	GDA	56	291995	6259719	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Doctor.Alan Williams,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	
45-5-4430	Kent Road South 12A	GDA	56	292142	6259600	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Matthew Kelleher					**Permits**	3762	

Report generated by AHIMS Web Service on 28/03/2018 for Jakob Ruhl for the following area at Lot : 901, DP:DP1209049 with a Buffer of 1000 meters. Additional Info : Due diligence assesssment. Number of Aboriginal sites and Aboriginal objects found is 25

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 18-089 Caddens Rd

Client Service ID : 336108

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-4431	Kent Road South 12B	GDA	56	291991	6259609	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Matthew Kelleher					**Permits**	3762	
45-5-4477	South Creek 4	GDA	56	292197	6259703	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	
45-5-4423	GS5	GDA	56	291757	6259770	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Doctor.Alan Williams,Kelleher Nightingale Consulting Pty Ltd,Ms					**Permits**	3762	
45-5-4424	Kent Road North 13	GDA	56	291810	6259711	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Matthew Kelleher,Matthew Kelleher					**Permits**	3762	
45-5-4575	M4-14C Claremont Creek	GDA	56	291151	6259659	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	
45-5-4576	M4-15 Claremont Creek	GDA	56	290518	6259496	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	
45-5-4578	M4- 14A Claremont Creek	GDA	56	290740	6259618	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	
45-5-4579	M4-14B Claremont Creek	GDA	56	290919	6259635	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					**Permits**	4001	

Report generated by AHIMS Web Service on 28/03/2018 for Jakob Ruhl for the following area at Lot : 901, DP:DP1209049 with a Buffer of 1000 meters. Additional Info : Due diligence assesssment. Number of Aboriginal sites and Aboriginal objects found is 25

Search Results

No results found.

Enter at least one search criterion.

Search Hints

Search Reset form

Place name

Street name
caddens road

Town or suburb

State
New South Wales

Country

Advanced search options

List
All Lists
Different lists will provide different status and class options

Local Government Area
Penrith

Place ID number

Legal status
--All--

Class
--All--

Keyword Search

☑ Description ☑ Statement of Significance ☑ Place history

Latitude/Longitude

N

Latitude 1

Longitude 1 S Longitude 2

W E Latitude 2 E **E**

S

S

○ Wholly within region
◉ Wholly or partially within region

Longitude coordinates should be entered as ddd.mm.ss
Latitude coordinates should be entered as dd.mm.ss

Map Ref No

1:100,000 eg 2357
1:250,000 eg SF-50-01

Search Hints

- Not all fields need to be filled in. The fewer you fill in the more results you will get.
- If you cannot find a place, check spelling and try alternative names. Reduce the number of words that you include and use fewer fields.
- The Local Government field used on its own will provide a comprehensive list of places in an area.

Office of Environment & Heritage

Home > Topics > Heritage places and items > Search for heritage

Search for NSW heritage

Return to search page where you can refine/broaden your search.

Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by the Heritage Division.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the Heritage Division.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act, 1979 and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

Section 2. Items listed under the NSW Heritage Act.

Your search did not return any matching results.

Section 3. Items listed by Local Government and State Agencies.

Your search returned 1 record.

Item name	Address	Suburb	LGA	Information source
Farmhouse	Caddens Road	Orchard Hills	Penrith	LGOV

There was a total of 1 records matching your search criteria.

Key:
LGA = Local Government Area
GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.
Note: While the Heritage Division seeks to keep the Inventory up to date, it is reliant on State agencies and local councils to provide their data. Always check with the relevant State agency or local council for the most up-to-date information.

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Section 1. Aboriginal Places listed under the National Parks and Wild

Your search did not return any matching results.

Section 2. Items listed under the NSW Heritage Act.

Your search returned 29 records.

Item name	Address	Suburb	LGA
Ahrens Fox PS2 Fire Engine (1929)	1 Museum Drive	Penrith	Penri
Cox's Cottage	2 St Thomas Road	Mulgoa	Penri
Craithes House	34-40 Borec Road	Penrith	Penri
Dennis Big 6 Fire Engine (1939)	1 Museum Drive	Penrith	Penri
Edward Smith Headquarters Switchboard (1909)	1 Museum Drive	Penrith	Penri
Emu Plains (Nepean River)	Off Bruce Neale Dr, Steel Trusses 1.3	Penrith	Penri

Underbridge	Km Past Station		
Emu Plains Railway Station group	Main Western railway	Emu Plains	Penri
Fairlight Homestead & Barn	Fairlight Road	Mulgoa	Penri
Fernhill	Mulgoa Road	Mulgoa	Penri
Fire and Rescue NSW Heritage Fleet	Museum Drive	Penrith	Penri
Ford 21W Fire Brigade Mobile Canteen (1942)	Museum Drive	Penrith	Penri
Fossil Collection	947-953 Londonderry Road	Londonderry	Penri
Glenleigh Estate	427 Mulgoa Road	Regentville	Penri
Glenmore	754-760 Mulgoa Road	Mulgoa	Penri
Hadley Park	14-278 Old Castlereagh Road	Castlereagh	Penri
Mamre	Mamre Road	St. Marys	Penri
Natural Area	Rickards Avenue	Agnes Banks	Penri
NSW Fire Brigades No 10 Vehicle Number Plates	Castlereagh Road	Penrith	Penri
Penrith Railway Station group	Great Western Railway	Penrith	Penri
Petrology Collection	947-953 Londonderry Road	Londonderry	Penri
Rose Cottage and Early Slab Hut	Water Street	Werrington	Penri
Shand Mason 7 inch Manual Fire Engine (1869)	1 Museum Drive	Penrith	Penri
Shand Mason Curricle Ladders (1898)	1 Museum Drive	Penrith	Penri
Shand Mason Fire Engine (1891)	Museum Drive	Penrith	Penri
St. Marys Railway Station Group	Great Western Railway	St. Marys	Penri
St. Thomas Anglican Church	St Thomas Road	Mulgoa	Penri

Torin Building	26 Coombes Drive	Penrith	Penri
Upper Castlereagh Public School and residence	Castlereagh Road	Castlereagh	Penri
Victoria Bridge	Nepean River, Great Western Highway	Penrith	Penri

Section 3. Items listed by Local Government and State Agencies.

Your search returned 245 records.

Item name	Address	Suburb	LGA	In so
1841 Tilley 5 inch Manual Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1869 Shand Mason 7" Manual Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1891 Shand Mason Steamer Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1898 Shand Mason Curricle Ladders - Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1916 Garford Type 64 Chain Drive Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1929 Ahrens Fox PS2 Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1939 Dennis Big 6 Fire Engine	1 Museum Drive	Penrith	Penrith	SG
1942 Ford 21W Fire Brigade Mobile Canteen	1 Museum Drive	Penrith	Penrith	SG
1949 Dennis F1 Fire Engine (Scout Car)	1 Museum Drive	Penrith	Penrith	SG
Agnes Banks Public School (Former)	Castlereagh Road	Agnes Banks	Penrith	LG
Arms of Australia Inn	Great Western Highway	Emu Plains	Penrith	LG

Australian Arms Inn (Former)	Great Western Highway	Emu Plains	Penrith	LG
Avenue and Garden Planting	Lemko Place	Penrith	Penrith	LG
Barn to Tannery site (Former)	Pages Road	St. Marys	Penrith	LG
Bayley Park House	Mamre Road	Kemps Creek	Penrith	LG
Bellbird Reserve	Barina Crescent	Emu Plains	Penrith	LG
Bennetts Wagon Works Site (Former)	Queen Street	St. Marys	Penrith	LG
Brells Tannery (Former)	Great Western Highway	St. Marys	Penrith	LG
Brick Cottage	Park Road	Luddenham	Penrith	LG
Brick Cottage	Campbell Street	Luddenham	Penrith	LG
Broadville Victorian House	98 Station Street	Penrith	Penrith	LG
Bronte Villa	50 Gidley Street	St. Marys	Penrith	LG
Building AA - Werrington Park House and Poplar Avenue	Great Western Highway	Werrington	Penrith	SG
Castlereagh Council Chambers (Former)	Castlereagh Road	Castlereagh	Penrith	LG
Castlereagh General Cemetery	Church Lane	Castlereagh	Penrith	LG
Castlereagh Public School (Former)	West Wilchard Road	Castlereagh	Penrith	LG
Chestnut Cottage	R17 Castlereagh Road	Agnes Banks	Penrith	LG
Christchurch Anglican Church	Church Lane	Castlereagh	Penrith	LG
Combewood House, garden and original entrance	Coreen Avenue	Penrith	Penrith	LG
Combewood Trees	Coreen Avenue	Penrith	Penrith	LG

Commissioner's Uniform (NSWFire Brigades) - Ian Mac Dougall	1 Museum Drive	Penrith	Penrith	SG
Community Arts Centre	Great Western Highway	Emu Plains	Penrith	LG
Concrete House	2 Railway Street	Emu Plains	Penrith	LG
Cottage	14 York Street	Emu Plains	Penrith	LG
Cottage	Eastern end Seventh Avenue	Llandilo	Penrith	LG
Cottage	Seventh Avenue (Eastern end)	Llandilo	Penrith	SG
Cottage	Littlefields Road	Mulgoa	Penrith	LG
Cottage	Lenore Lane	St. Marys	Penrith	LG
Cottage, The	St Thomas Road	Mulgoa	Penrith	LG
Cottages	38-42 Gidley Street	St. Marys	Penrith	LG
Cottages	Great Western Highway	St. Marys	Penrith	LG
Craithes House	Borec Road	Penrith	Penrith	LG
Cram Place - Cast Iron Fence	338-340 High Street	Penrith	Penrith	LG
Cram Place - Well and Pump	338-340 High Street	Penrith	Penrith	LG
Cram Place (Former CBC Bank)	338-340 High Street	Penrith	Penrith	LG
Cram Place (Former Coach House)	338-340 High Street	Penrith	Penrith	LG
Cranebrook Public School (Former)	Cranebrook Road	Cranebrook	Penrith	LG
Crushing Plant	Jacksons Lane	Upper Castlereagh	Penrith	LG
Derby Street P33b Conservation Area Cottages	Castlereagh Street	Penrith	Penrith	LG

Derby Street P33c Conservation Area Cottages	Derby Street	Penrith	Penrith	LG
Desboroughs Tannery (Former)	Desborough Road	St. Marys	Penrith	LG
Dunheved Fire Station	50 Christie Street	Penrith	Penrith	SG
Dunheved Homestead Site		Dunheved	Penrith	LG
Edinglassie House	22-24 Bunyan Road	Leonay	Penrith	LG
Edward Smith Headquarters Switchboard - 1909	1 Museum Drive	Penrith	Penrith	SG
Edwardian Cottage	323 Castlereagh Road	Penrith	Penrith	LG
Edwardian Cottage	46 Russell Street	Emu Plains	Penrith	LG
Emu Hall Homestead	Great Western Highway	Emu Plains	Penrith	LG
Emu Plains (Nepean River) Underbridge	Off Bruce Neale Dr, Steel Trusses 1.3 Km Past Station	Penrith	Penrith	SG
Emu Plains Assembly Hall	17 Great Western Highway	Emu Plains	Penrith	LG
Emu Plains Railway Culvert	Lamrock Street	Emu Plains	Penrith	SG
Emu Plains Railway Station	Station Street/Railway Row	Emu Plains	Penrith	LG
Emu Plains Railway Station Group	Mackellar Street	Emu Plains	Penrith	SG
Explorers Memorial	Memorial Avenue	Penrith	Penrith	LG
Farmhouse	Caddens Road	Orchard Hills	Penrith	LG
Farmhouse	Aldington Road	Kemps Creek	Penrith	LG
Farmhouse (Collapsed) & outbuildings	Springwood Road	Agnes Banks	Penrith	LG
Federation Farmhouse	R37 Castlereagh Road	Castlereagh	Penrith	LG
Federation House & Garden	6 First Street South	Kingswood	Penrith	LG

Ferry Crossing	Ferry Road	Emu Plains	Penrith	LG
Four Winds	Great Western Highway	Werrington	Penrith	SG
Four Winds Bungalow	Great Western Highway	Werrington	Penrith	LG
Gateposts to Colesbrook	Aldington Road	Kemps Creek	Penrith	LG
Gosling Street & Hessel Place Reserves	Gosling Street	Emu Plains	Penrith	LG
Governor Phillip Special Hospital Original Building	Glebe Place	Penrith	Penrith	LG
Gwandalan Cottage	Nepean Street	Emu Plains	Penrith	LG
Hadley Park	RMB 113 Castlereagh Road	Castlereagh	Penrith	GA
House	1 Bundarra Road	Regentville	Penrith	LG
House Hall family	13 Hessel Place	Emu Plains	Penrith	LG
House to Tannery (Former) site	Pages Road	St. Marys	Penrith	LG
Huntington Hall Country House	52 Beach Street	Emu Plains	Penrith	LG
Johnson's Cottage	Nepean Street	Cranebrook	Penrith	LG
Kenilworth House	Boundary Road	Cranebrook	Penrith	LG
Kentucky	146 Station Street	Penrith	Penrith	LG
Kingswood Public School Classroom and Teachers Residence	Second Avenue	Kingswood	Penrith	LG
Knapsack Gully Railway Viaduct		Emu Plains	Penrith	LG
Lawson Footbridge	East of Station At 94.93 Km, Old Overbridge	Lawson	Penrith	SG
Leeholme Horse Stud-Exercise Yard	Luddenham Road	St. Clair	Penrith	LG
Lemongrove Conservation Area Cottages	18-29 The Crescent	Lemongrove	Penrith	LG

Lemongrove Conservation Area Cottages	18 Blaxland Avenue	Lemongrove	Penrith	LG
Lemongrove Conservation Area Cottages	15-53 Lemongrove Road	Lemongrove	Penrith	LG
Lemongrove Conservation Area Cottages	1-16 Macquarie Avenue	Lemongrove	Penrith	LG
Lemongrove Conservation Area Cottages	4 - 22 Hemmings Street	Lemongrove	Penrith	LG
Lemongrove Lodge	24 Lemongrove Avenue	Lemongrove	Penrith	LG
Leo Buring Cottage, barn, glasshouse and memorial	Leonay Parade	Leonay	Penrith	LG
Lewers Houses & Garden	86 River Road	Emu Plains	Penrith	LG
Little Manly	Western side Nepean River	Emu Plains	Penrith	LG
Londonderry Cemetery	Londonderry Road	Londonderry	Penrith	LG
Luddenham Progress Hall	The Northern Road	Luddenham	Penrith	LG
Luddenham Uniting Church	The Northern Road	Luddenham	Penrith	LG
Luddenham Uniting Church Cemetery	The Northern Road	Luddenham	Penrith	LG
Madang Park Farmhouse	Jamison Road	Jamisontown	Penrith	LG
Mamre	Mamre Road	St. Marys	Penrith	SG
Mamre House	Mamre Road	St. Marys	Penrith	LG
Mansion (Site)	Mulgoa Road	Regentville	Penrith	LG
Margaret Farm & Barn	Pages Road	St. Marys	Penrith	SG
McCarthys Cemetery	McCarthys Lane	Castlereagh	Penrith	GA
McCarthys Farm Archaeological remains (Demolished)	McCarthys Lane	Cranebrook	Penrith	LG
Memorial Cairn	Mamre Road	St. Marys	Penrith	LG

Memorial Cairn	Luddenham Road	St. Marys	Penrith	LG
Memorial Park	Woodriff Street	Penrith	Penrith	LG
Memorials	Castlereagh Road	Castlereagh	Penrith	LG
Methodist Cemetery		Castlereagh	Penrith	GA
Methodist Church (Former)	Henry Street	Penrith	Penrith	LG
Mile Stones	Great Western Highway	Oxley Park	Penrith	LG
Mimosa Stables (Former)	Pages Road	St. Marys	Penrith	LG
Mimosa Villa	Pages Road	St. Marys	Penrith	LG
Moore Cottage	8 Sainsbury Street	St. Marys	Penrith	LG
Mourilyan House (original section)	333 Great Western Highway	St. Marys	Penrith	LG
Mulgoa Conservation Area		Regentville	Penrith	LG
Mulgoa Public School	Mulgoa Road	Mulgoa	Penrith	LG
Museum of Fire Penrith (Former Penrith Power Station)	Castlereagh Road	Penrith	Penrith	LG
Nepean Park	Castlereagh Road	Castlereagh	Penrith	GA
Nepean River		Penrith	Penrith	LG
NSW Fire Brigades Heritage Fleet	1 Museum Drive	Penrith	Penrith	SG
NSWFB 'No. 10' Vehicle Number Plates	1 Museum Drive	Penrith	Penrith	SG
Old Police Station	Great Western Highway	Emu Plains	Penrith	SG
Orange Grove Cottage	Park Avenue	Emu Plains	Penrith	LG
Orchard Hills Reservoir (WS 0083)	Castle Road	Orchard Hills	Penrith	SG
Orchard Hills Uniting Church	Kingswood Road	Orchard Hills	Penrith	LG

Original building	Glebe Place	Penrith	Penrith	SG
Osborne Homestead	Castlereagh Road	Agnes Banks	Penrith	LG
Pages Tannery (Former)	Pages Road	St. Marys	Penrith	LG
Parkers Slaughter Yard	Castlereagh Road	Castlereagh	Penrith	LG
Parkinson Real Estate Cottage	NE corner Great Western Highway	Emu Plains	Penrith	LG
Passadena House	Allan Road	Mulgoa	Penrith	LG
Peach Tree Creek Bridge	Great Western Highway	Penrith	Penrith	SG
Penrith Ambulance Station	High Street	Penrith	Penrith	LG
Penrith Brick Company (Former) (Demolished)	Copeland Street	Kingswood	Penrith	LG
Penrith Council Chambers	Henry Street	Penrith	Penrith	LG
Penrith General Cemetery	Copeland Street	Kingswood	Penrith	LG
Penrith Infants Department	Henry Street	Penrith	Penrith	LG
Penrith Public School Building	High Street	Penrith	Penrith	LG
Penrith Public School Palm Trees	High Street	Penrith	Penrith	LG
Penrith Railway Station	Jane Street	Penrith	Penrith	LG
Penrith Railway Station Group and Residence	Station Street	Penrith	Penrith	SG
Penrith Weir	Nepean River	Penrith	Penrith	SG
Pise House Ruins	Church Lane	Castlereagh	Penrith	LG
Plantings Farmhouse Garden	Church Lane	Castlereagh	Penrith	LG
Police Station & Residence (Former)	1 Punt Road	Emu Plains	Penrith	LG

Police Station Old (Destroyed)	Great Western Highway	Emu Plains	Penrith	LG
Poplars Garden (The)	Farrells Lane	Cranebrook	Penrith	LG
Poplars Old slab cottage (The)	Farrells Lane	Cranebrook	Penrith	LG
Poplars Pise House (The)	Farrells Lane	Cranebrook	Penrith	LG
Princess Mary Street Cottages	Princess Mary Street	St. Marys	Penrith	LG
Rectory (Former)	95 Glebe Place	Penrith	Penrith	LG
Regentville		Mulgoa Valley	Penrith	GA
Regentville Public School and Gardens	School House Road	Regentville	Penrith	LG
Rose Cottage & Barn	Water Street	Werrington	Penrith	LG
Rose Cottage and Early Slab Hut	Water Street	Werrington	Penrith	SG
Rotunda	Luddenham Road	St. Clair	Penrith	SG
Rowing Course		Emu Plains	Penrith	LG
Sawmill Precinct	Station Street	St. Marys	Penrith	LG
Sir John Jamisons Cemetery	Lilac Place	Regentville	Penrith	LG
Site of Edinglassie House	Lapstone Place	Leonay	Penrith	LG
Site of Fultons Church School	Church Street	Castlereagh	Penrith	LG
Sites of Early Water Mills		Castlereagh	Penrith	LG
Slab Cottage	Castlereagh Road	Castlereagh	Penrith	LG
South Creek Bridge (Eastbound)	Great Western Highway	St Marys	Penrith	SG
St Andrews Church of England (Former)	Park Road	Wallacia	Penrith	LG

St Aubin's Terrace	255-265 High Street	Penrith	Penrith	LG
St Marys Railway Station Group	Queen Street	St Marys	Penrith	SG
St. James Church of England	The Northern Road	Luddenham	Penrith	LG
St. James Church of England Cemetery	The Northern Road	Luddenham	Penrith	LG
St. Mary Magdalene Cemetery	Magdalene Street	St. Marys	Penrith	LG
St. Mary Magdalene Church	Magdalene Street	St. Marys	Penrith	LG
St. Marys Catholic Church	Mulgoa Road	Mulgoa	Penrith	LG
St. Marys Council Chambers (Former)	Mamre Road	St. Marys	Penrith	LG
St. Marys General Cemetery	Sydney Street	Oxley Park	Penrith	LG
St. Marys Public School & Buildings	Princess Mary Street	St. Marys	Penrith	LG
St. Marys Railway Station	Station street	St. Marys	Penrith	LG
St. Marys Railway Station Parcels Office	Station Street	St. Marys	Penrith	LG
St. Marys Railway Station Waiting Room	Station Street	St. Marys	Penrith	LG
St. Pauls Anglican Cemetery	Nixon Street	Emu Plains	Penrith	LG
St. Pauls Anglican Church	Nixon Street	Emu Plains	Penrith	LG
St. Pauls Church Of England (Relocated)	Castlereagh Road	Agnes Banks	Penrith	LG
St. Phillips Anglican Church	Bringelly Road	Kingswood	Penrith	LG
St. Stehens Cemetery	252 High Street	Penrith	Penrith	LG
St. Stephens Church Hall	252 High Street	Penrith	Penrith	LG

St. Stephens Church of England	252 High Street	Penrith	Penrith	LG
Staff Cottages	Forrester,Viney,Griffiths,Maple	St. Marys	Penrith	LG
State Records Movable Heritage - Furniture	143 O'Connell Street	Kingswood	Penrith	SG
State Records Movable Heritage - Memorials	143 O'Connell Street	Kingswood	Penrith	SG
Station Masters House (Former)	57 Belmore Street	Penrith	Penrith	LG
Stone House	143 Great Western Highway	Emu Plains	Penrith	LG
Stone Stables Ruins	Castlereagh Road	Castlereagh	Penrith	LG
Swampland	Werrington Road	Werrington	Penrith	LG
Tannery Site (Former)	Pages Road	St. Marys	Penrith	LG
Tannery Sites St. Marys & Kingswood (Former)		St. Marys	Penrith	LG
Tannery Werrington Brells (Former)	Great Western Highway	Werrington	Penrith	LG
The Cottage	39 Warwick Street	Penrith	Penrith	LG
The Lodge	54 Camden Road	Penrith	Penrith	LG
Thompsons Tannery (Former)	Saddington Street	St. Marys	Penrith	LG
Thornton Hall	Mountain View Crescent	Penrith	Penrith	LG
Timber Cottage	71 Parker Street	Penrith	Penrith	LG
Timber Cottages	29 and 41 The Northern Road	Luddenham	Penrith	LG
Torquay	555 Great Western Highway	Werrington	Penrith	SG
Torquay Cottage	Great Western Highway	Werrington	Penrith	LG
Tree - The Cottage	39 Warwick Street	Penrith	Penrith	LG
Tree to Victorian House	48 Warwick Street	Penrith	Penrith	LG

Trees to St Pauls Anglican Church	Castlereagh Road	Agnes Banks	Penrith	LG
Two Storey Brick Cottage (Destroyed)	7 Lawson Street	Penrith	Penrith	LG
Tyreel Homestead	Castlereagh Road	Agnes Banks	Penrith	LG
Union Inn (Former)	36 Great Western Highway	Emu Plains	Penrith	LG
Uniting Church	Emerald Street	Emu Plains	Penrith	LG
Upper Castlereagh Methodist Church and Hall		Castlereagh	Penrith	GA
Upper Castlereagh School and Residence		Castlereagh	Penrith	GA
Upper Castlereagh War Memorial	Castlereagh Road	Upper Castlereagh	Penrith	LG
Victoria Bridge	Great Western Highway	Penrith	Penrith	GA
Victoria Bridge	Great Western Highway	Penrith	Penrith	LG
Victoria Bridge over Nepean River	Great Western Highway	Penrith	Penrith	SG
Victoria Park	Great Western Highway	St. Marys	Penrith	LG
Victoria Park War Memorial	Great Western Highway	St. Marys	Penrith	LG
Victorian Farmhouse	Grays Lane	Cranebrook	Penrith	LG
Victorian Farmhouse	R97 Castlereagh Road	Castlereagh	Penrith	LG
Victorian House	322 Castlereagh Road	Penrith	Penrith	LG
Victorian House	48 Warwick Street	Penrith	Penrith	LG
Victorian House	6 Rawson Avenue	Penrith	Penrith	LG
Victorian House	148 Station Street	Penrith	Penrith	LG
Victorian Terrace	219-221 High Street	Penrith	Penrith	LG
Victorian Villa	150 Lethbridge Street	Penrith	Penrith	LG

Wagon Wheel Hotel	Great Western Highway	St. Marys	Penrith	LG
Wallacia Hotel	Mulgoa Road	Wallacia	Penrith	LG
Wallacia Weir		Wallacia	Penrith	GA
War Memorial	Park Street	Emu Plains	Penrith	LG
Weatherboard House	66 Great Western Highway	Emu Plains	Penrith	LG
Webbs Tannery (Former)	Carinya Avenue	St. Marys	Penrith	LG
Weir and Former Pumping Station	Memorial Avenue	Penrith	Penrith	LG
Werrington House	108 Rugby Street	Werrington	Penrith	LG
Werrington Park House (Former), garden & Poplar Avenue	Great Western Highway	Werrington	Penrith	LG
Westbank House	2-6 Nepean Street	Emu Plains	Penrith	LG
Wool Pack Inn (Ruin)	556 Great Western Highway	St. Marys	Penrith	SG
Workers Cottages for Brickwork's	Mulgoa Road	Jamisontown	Penrith	LG
Yamba Cottage	32 Nixon Street	Emu Plains	Penrith	LG
Yodalla House	26-28 Nepean Street	Emu Plains	Penrith	LG

There was a total of 274 records matching your search criteria.

Key:
LGA = Local Government Area
GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS =
LGOV = Local Government, SGOV = State Government Agency.
Note: While the Heritage Division seeks to keep the Inventory up to date, it is reliant on State agencies and local councils data. Always check with the relevant State agency or local council for the most up-to-date information.

Search results

Your search for:LGA: Penrith City Council

Matched 23 notices relating to 7 sites.

Search Again

Refine Search

Suburb	Address	Site Name	Notices related to this site
BERKSHIRE PARK	(Northern end of Compartment 5) The Northern ROAD	Castlereagh State Forest	6 former
COLYTON	88 Great Western HIGHWAY	Ampol Service Station	1 current
JAMISONTOWN	92 Mulgoa ROAD	7-Eleven Service Station	2 current
LUDDENHAM	Lot 4 The Northern ROAD	Elura Liquid Waste Disposal Site	1 current
MULGOA	Mulgoa ROAD	Penrith Waste Services	2 former
PENRITH	Castlereagh ROAD	Crane Enfield Metals	3 current and 3 former
ST MARYS	Vallance STREET	Drum Recycler	5 former

28 March 2018

APPENDIX C SPECIES RECORDED ON-SITE

Flora species recorded during the inspection of the Caddens Road Proposal site on 4 April 2018.

Scientific name	Common name	Origin	Status
Eucalyptus tereticornis		Native, remnant	Non-threatened
Eucalyptus moluccana		Native, remnant	Non-threatened
Angophora floribunda		Native, remnant	Non-threatened
Casuarina cunninghamiana subsp. *cunninghamiana*		Native, remnant	Non-threatened
Melia azedarach	White cedar	Native	Non-threatened
Acacia falcata		Native	Non-threatened
Bursaria spinosa		Native	Non-threatened
Callistemon sieberi		Native	Non-threatened
Olea europaea subsp. *cuspidata*	African olive	Exotic	Priority Weed
Ligustrum sinense	Small-leaved privet	Exotic	Weed
Ligustrum lucidum	Broad-leaved privet	Exotic	Weed
Genista monspessulana	Montpellier broom	Exotic	Priority Weed
Lycium ferocissimum	African boxthorn	Exotic	Priority Weed
Morus sp.	Mulberry	Exotic	Weed
Einadia polygonoides	Knotted goosefoot	Native	Non-threatened
Anredera cordifolia	Madeira vine	Exotic	Priority Weed
Arauja sericifera	Moth vine	Exotic	Weed
Phytolacca octandra	Inkweed	Exotic	Weed
Verbena bonariensis	Verbena	Exotic	Weed
Ricinus communis	Castor-oil plant	Exotic	Weed
Solanum sisymbriifolium		Exotic	Weed
Capsella bursa-pastoris	Shepherds purse	Exotic	Weed
Sisymbrium irio	London rocket	Exotic	Weed
Lepidium africanum		Exotic	Weed
Conyza bonariensis	Fleabane	Exotic	Weed
Cirsium vulgare	Spear thistle	Exotic	Weed
Sonchus oleraceus	Common sowthistle	Exotic	Weed
Portulaca oleracea	Pigweed	Native	Non-threatened

Persicaria lapathifolia	Pale knotweed	Native	Non-threatened
Plantago lanceolata	Plantain	Exotic	Weed
Nothoscordum gracile	Onion weed	Exotic	Weed
Chloris gayana	Rhodes grass	Exotic	Weed
Digitaria sanguinalis	Summer grass	Exotic	Weed
Eragrostis curvula	African lovegrass	Exotic	Weed
Sporobolus africanus	Parramatta grass	Exotic	Weed
Echinochloa crus-galli	Barnyard grass	Exotic	Weed
Paspalum dilatatum	Paspalum	Exotic	Weed
Enteropogon acicularis		Native	Non-threatened
Entolasia stricta	Wiry panic	Native	Non-threatened
Pennisetum clandestinum	Kikuyu	Exotic	Weed
Cynodon dactylon	Cooch	Native	Non-threatened
Phragmites australis	Common reed	Native	Non-threatened
Typha orientalis	Broad-leaf cumbungi	Native	Non-threatened

APPENDIX D THREATENED SPECIES EVALUATIONS

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for Penrith in the *Atlas of NSW Wildlife*[2] and those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*[3].

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species

Yes: The proposal could impact this species or its habitats. An AoS has been applied to these entities.

[2] The *Atlas of NSW Wildlife* is administered by the NSW Department of Environment, Climate Change and Water (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[3] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment, Water, Heritage and the Arts.

D.1 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FLORA SPECIES

Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Habitat presence	Likelihood of occurrence	Possible impact
Apocynaceae	*Marsdenia viridiflora* subsp. *Viridiflora* population		Presumed extinct		14	Absent	Unlikely	No
Fabaceae	*Pultenaea parviflora*		Endangered	Vulnerable	19	Absent	Unlikely	No
	Dillwynia tenuifolia		Vulnerable		26	Absent	Unlikely	No
Lobeliaceae	*Hypsela sessiliflora*			Extinct	7	Absent	Unlikely	No
Myrtaceae	*Micromyrtus minutiflora*		Endangered	Vulnerable	2	Absent	Unlikely	No
Proteaceae	*Persoonia nutans*	Nodding Geebung	Endangered	Endangered	13	Absent	Unlikely	No
	Grevillea juniperina subsp. *Juniperina*	Juniper-leaved Grevillea	Vulnerable		332	Absent	Unlikely	No
Thymelaeaceae	*Pimelea spicata*	Spiked Rice Flower	Endangered	Endangered	1	Absent	Unlikely	No

D.2 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FAUNA

Class	Scientific Name	Common Name	NSW status	Comm. status	Records	Habitat presence	Likelihood of occurrence	Possible impact	Comment
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	Endangered	Vulnerable	8	Present	Possible	No	The emergent aquatic vegetation providing potential habitat in Claremont Creek is outside the development footprint.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records	Habitat presence	Likelihood of occurrence	Possible impact	Comment
Aves	*Chthonicola sagittata*	Speckled Warbler	Vulnerable		11	Absent	Unlikely	No	
	Hieraaetus morphnoides	Little Eagle	Vulnerable		1	Absent	Unlikely	No	
	Apus pacificus	Fork-tailed Swift		Migratory	1	Absent	Unlikely	No	
	Ardea ibis	Cattle Egret		Migratory	10	Present	Possible	No	Open, grassy areas providing potential foraging opportunities are abundant in surrounding areas. This highly mobile species is more likely to associate with livestock in the surrounding areas than forage in the Proposal Site.
	Ixobrychus flavicollis	Black Bittern	Vulnerable		1	Absent	Unlikely	No	
	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable		3	Absent	Unlikely	No	
	Burhinus grallarius	Bush Stone-curlew	Endangered		2	Absent	Unlikely	No	
	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable		1	Absent	Unlikely	No	
	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered		2	Absent	Unlikely	No	
	Stagonopleura guttata	Diamond Firetail	Vulnerable		1	Absent	Unlikely	No	
	Daphoenositta chrysoptera	Varied Sittella	Vulnerable		7	Present	Possible	No	Removal of mature eucalypts could potentially reduce local foraging opportunities within the site however, there is suitable foraging habitat in surrounding vegetation.
	Petroica boodang	Scarlet Robin	Vulnerable		1	Absent	Unlikely	No	
	Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	3	Present	Possible	No	Removal of mature eucalypts could potentially reduce local foraging opportunities within

Class	Scientific Name	Common Name	NSW status	Comm. status	Records	Habitat presence	Likelihood of occurrence	Possible impact	Comment
									the site however, there is suitable foraging habitat in surrounding vegetation.
	Rostratula australis	Australian Painted Snipe	Endangered	E	1	Absent	Unlikely	No	
	Actitis hypoleucos	Common Sandpiper		Migratory	1	Absent	Unlikely	No	
	Gallinago hardwickii	Latham's Snipe		Migratory	1	Absent	Unlikely	No	
	Ninox strenua	Powerful Owl	Vulnerable		6	Present	Possible	No	Powerful owl have large territories and they could potentially visit and forage in the Proposal Site, but there is no roosting or nesting habitat for this species there.
Gastropoda	*Meridolum corneovirens*	Cumberland Plain Land Snail	Endangered		102	Present	Possible	Yes	Although no intact Cumberland Plain Woodland or Cumberland Riverflat Forest is present in the Proposal Site, the snail could potentially survive there in disturbed habitat. The snail has been recently recorded near the Proposal Site in vegetation on Claremont Creek. Potentially, construction works could directly endanger snails and the Proposal could remove snail shelter and/or foraging sites.
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	Vulnerable	Endangered	3	Absent	Unlikely	No	
	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable		1	Present	Possible	No	Although removal of mature eucalypts could potentially reduce roost sites, more suitable roosting and foraging

Class	Scientific Name	Common Name	NSW status	Comm. status	Records	Habitat presence	Likelihood of occurrence	Possible impact	Comment
									habitat is in surrounding dense vegetation.
	Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable		11	Present	Possible	No	Although removal of mature eucalypts could potentially reduce roost sites, however more suitable roosting and foraging habitat in surrounding dense vegetation.
	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	V	16	Present	Possible	No	Although removal of mature eucalypts could potentially reduce roost sites, however more suitable roosting and foraging habitat in surrounding dense vegetation.
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable		3	Present	Possible	No	Although removal of mature eucalypts could potentially reduce roost sites, however more suitable roosting and foraging habitat in surrounding dense vegetation.
	Miniopterus australis	Little Bentwing-bat	Vulnerable		1	Absent	Unlikely	No	No roosting habitat present at time of survey.
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable		19	Absent	Unlikely	No	No roosting habitat present at time of survey.
	Myotis macropus	Southern Myotis	Vulnerable		10	Absent	Unlikely	No	No potential roost sites in Claremont Creek culvert at time of survey.
	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable		2	Present	Possible	No	Although removal of mature eucalypts could potentially reduce roost sites, however more suitable roosting and foraging habitat in surrounding dense vegetation.

APPENDIX E THREATENED SPECIES TEST OF SIGNIFICANCE

Cumberland Plain Land Snail *(Meridolium corneovirens) – Test of Significance (Biodiversity Conservation Act 2016)*

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;

The proposed works would result in the loss of 15 remnant trees and the disturbance of groundcover vegetation that is dominated by weed species that provides potential habitat for foraging for this species. Patches of primary habitat for this species is located in areas surrounding the proposal site. Habitat within the proposal site is highly disturbed due to the existing road and road corridor. It is considered unlikely that the species would be reliant on this habitat as a breeding resource and the modification of this habitat would not impact foraging resources for the species. As such, the proposed works are considered unlikely to have an adverse effect on the life cycle the species that a viable local population would be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A

(c) in relation to the habitat of a threatened species or ecological community:

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

(i) The Cumberland Plain Snail primarily inhabits Cumberland Plain Woodland. This community is a grassy, open woodland with occasional dense patches of shrubs. The snail also inhabits Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest. The habitat within the proposal site is not considered to

constitute breeding habitat as the site is a highly disturbed road corridor. Works will be restricted to the existing road corridor.

(ii) The proposal occurs in an existing road corridor and adjacent to current residential areas and housing estate construction sites that have already contributed to fragmentation of habitat to a minor degree relative to the surrounding cleared landscape. The habitat would not become further fragmented, as only trees and understorey within the road corridor will be disturbed.

(iii) The proposed works are unlikely to impact the long- term survival of this species in the locality. The proposal occurs in an existing Road Corridor that has already contributed to fragmentation of habitat to a minor degree relative to the surrounding cleared landscape and semi-urban landscape. The proposal site comprises non-breeding habitat, where snails may occur as vagrants. There is an abundance of better quality, contiguous habitat in the surrounding area. The habitat for the species within the proposal area is not considered important to the long-term survival of the species within the locality. The habitat is subject to edge effects, and larger contiguous areas of suitable breeding and foraging habitat are located in surrounding areas.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly

No areas of outstanding biodiversity value were present or would be impacted.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

Three (3) key threatening processes are relevant to the proposed works including:

- Clearing of native vegetation
- Removal of dead wood and dead trees
- Invasion of native plant communities by exotic perennial grasses

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. A maximum of 15 Eucalypt trees would be removed and groundcover would be impacted as a result of the proposal.

Conclusion

The proposed works would further modify already disturbed foraging habitat through the loss of ground cover and Eucalypt trees. However; there is suitable habitat in areas surrounding the proposal site. Due to the disturbed nature of the site and works being restricted to the existing road corridor, the Test of Significance has concluded that the proposed works are unlikely to significantly affect the Cumberland Plain Land Snail, as they are not likely to:

- Reduce the long-term viability of the species populations;
- Accelerate the extinction of a species or place it at risk of extinction;

APPENDIX F CLAUSE 228 CHECKLIST

A checklist of factors that should be considered in the assessment of impacts prior to its determination is included within Clause 228 of the *Environmental Planning and Assessment Regulation 2000*. This clause identifies sixteen issues that need to be addressed. The following text provides summary details of each of the issues, the majority of which have been addressed within the body of this document.

Environmental factor	Impact
(a) Any environmental impact on a community? The proposed work area would cause minor short-term environmental impacts on the community, such as delays to traffic and construction noise impacts, however the potential impacts would be minimised with the implementation of the safeguards as detailed in this REF. The proposed work area would have no environmental impact on a community in the long-term and road users would benefit from safer travelling conditions.	Minor short-term negative
(b) Any transformation of a locality? The proposed work area would include a minor transformation of the locality with widening of Caddens Road and the addition of a roundabout at the intersection of Caddens Road with white cedar avenue.	Minor Negative
(c) Any environmental impact on the ecosystems of a locality? The proposed work would have potential minor environmental impacts on the ecosystems of the locality through the clearing of vegetation, however, the potential impacts would be minimised with the implementation of the safeguards given in Section 3 of this REF.	Minor negative
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? Overall the proposed works would not reduce the aesthetic, recreational, scientific or other environmental quality or value of the locality. Potential impacts would be minimised with the implementation of the safeguards given in Section 3 of this REF.	Minor short-term negative
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present generations? The proposed work area would not have any effect on a locality, place or building of significance or other special value for present or future generations. Works would not substantially alter the existing environment.	Nil.
(f) Any impact on habitat of any protected fauna (within the meaning of the *Biodiversity Conservation Act 2016*)? The proposed work area would not have any impact on the habitat of any protected or endangered fauna.	Nil.

Environmental factor	Impact
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? No flora/fauna species would be endangered by the proposed works.	Nil
(h) Any long-term effects on the environment? The proposed works would have minor long-term effects on the environment due to removal of vegetation. This vegetation is highly disturbed and exotic dominated and does not form part of a wildlife corridor. There are no other anticipated negative long-term effects on the environment from the proposed works due to the limited scope of these works and the implementation of the safeguards given in Section 3 of this REF.	Minor short-term negative
(i) Any degradation of the quality of the environment? The proposed work area would potentially degrade the quality of the environment in the short-term during construction through temporary impacts described in Section 3 of this REF. However, these potential impacts would be minimised with the implementation of the safeguards also given in Section 3 of this REF.	Minor short-term negative
(j) Any risk to the safety of the environment? The proposed work area would pose minimal risk to the safety of the environment due as the scope of works is limited and any potential impacts would be minimised with the implementation of the safeguards given in Section 3 in this REF.	Nil
(k) Any reduction in the range of beneficial uses of the environment? The proposed work area would cause a minor reduction in the use of the road from traffic management during construction, which would potentially increase travelling time for road users in the short-term. There would be no long-term reduction in the range of beneficial uses of the environment as a result of the works.	Minor short-term negative
(l) Any pollution of the environment? The proposed work area could potentially cause pollution of the environment through dust, soil erosion and the mobilisation of sediment in surface water during construction. However, pollution of the environment is unlikely with the implementation of the safeguards given in Section 3 of this REF.	Minor short-term negative
(m) Any environmental problems associated with the disposal of waste? The quantity of waste generated during the construction phase of the proposed work area would be reduced through the re-use of materials where possible. No environmental problems are anticipated for the disposal of waste. Potential impacts would be minimised with the implementation of the safeguards given in Section 3 of this REF.	Nil.
(n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply? The proposed works would not significantly increase demands on resources, which are, or are likely to become, in short supply (asphalt, concrete, lime, guardrail etc). Relatively small amounts of materials would be required for the proposed works. The safeguards listed in Section 3 of this REF would be implemented to minimise any impacts.	Nil.

Environmental factor	Impact
(o) Any cumulative environmental effect with other existing or likely future activities? The proposed works have the potential to have cumulative environmental effects with other existing or likely future activities, particularly the residential development, however the effects would be minimal due to the limited scope of works for the activities covered in this REF. Positive impacts of the proposal include potential include improved safety and maintenance of traffic flow and improvements to shared paths. Impacts on the environment would be minimised with the implementation of the safeguards given in Section 3 in this REF.	Minor short-term negative Long-term positive.
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? There would be no impact on coastal processes or hazards.	Nil.

APPENDIX G NOISE ASSESSMENT REPORT

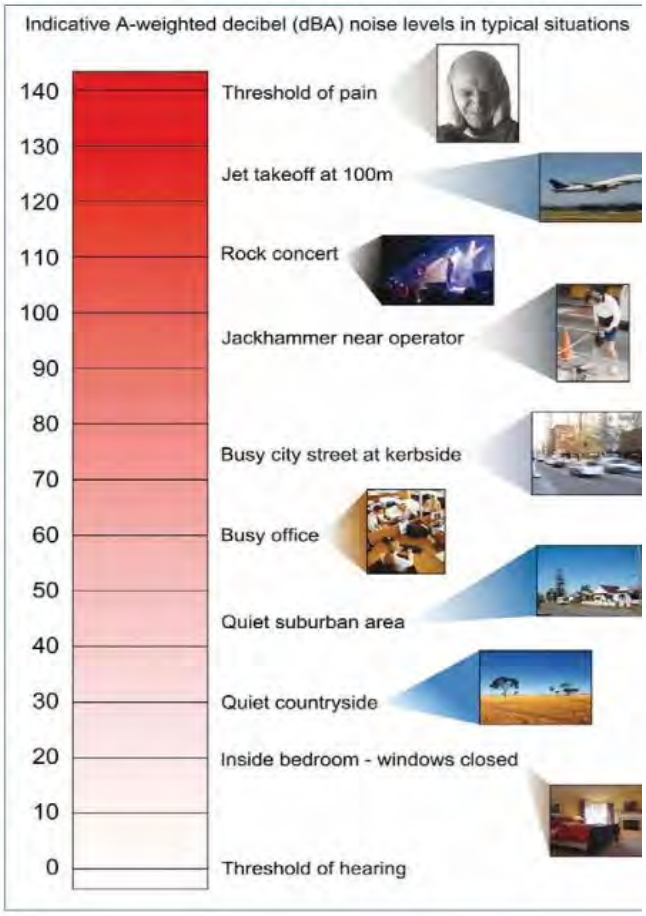
RAPT CONSULTING

NGH Environmental

Noise Impact Assessment – Caddens Road, June, 2018

Greg Collins T:0488 512224 E:greg@raptconsulting.com.au

Glossary of Acoustic Terms

Term	Definition
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics. The picture below indicates typical noise levels from common noise sources. 
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A10(period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.
Noise sensitive receiver	An area or place potentially affected by noise which includes:

	A residential dwelling. An educational institution, library, childcare centre or kindergarten. A hospital, surgery or other medical institution. An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area. Commercial or industrial premises. A place of worship.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Feasible and Reasonable (Noise Policy for Industry Definition)	**Feasible** mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. Selecting **Reasonable** measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. To make a judgement, consider the following: Noise impacts Noise mitigation benefits Cost effectiveness of noise mitigation Community views.
Sound power level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).

1. Introduction

1.1 Background

RAPT Consulting has been commissioned by NGH Environmental to prepare a noise assessment as part of a Review of Environmental Factors (REF) for the proposed upgrade of Caddens Road from the intersection of Gipps Street / Kent Road to Claremont Creek. Construction is expected to take 26 weeks to complete and is anticipated to commence in September 2018.

1.2 Project overview

Caddens Road is a collector road which serves to move traffic from local streets within Claremont Meadows to arterial roads such as the Great Western Highway. Caddens Road is used by local residents and also residents from surrounding suburbs. Caddens Road is a two way, two lane council road with Watts profile speed humps and a speed limit of 60km/h. The proposal is located 45kms west of the Sydney CBD in western Sydney within Penrith City Council LGA. The project site and surrounding area is shown in Figure 1.

Figure 1 Site Location and Surrounding Area

The upgrade of Caddens road from the intersection of Gipps Street / Kent Road to Claremont Creek includes widening the road and a new roundabout at the intersection of Caddens Road and White Cedar Avenue.

The proposed upgrade Caddens Road Includes:

- Widening of Caddens Road to accommodate 3.2m wide travel lane and 3.2m wide parking lanes each direction within the existing 21m wide road corridor with double barrier central line-marking.
- Line marking on the approach to the Gipps Street traffic signals (eastbound) to include a 60m right turn lane to Caddens Road with the kerbside lane to be through and left.
- Construction of a single lane mountable roundabout at the intersection of Caddens Road and White Cedar Avenue including splitter islands with pedestrian walkthroughs on all three legs of the roundabout
- Remove temporary Watts profile speed humps currently in place for this section of Caddens Road
- Installation of new bus stop adjacent to the roundabout on the northern side
- Construction of a seagull island at the intersection of Caddens Road and Silkwood Drive
- Installation of a stormwater drainage system
- Construction of a 2.5m wide shared use path on the northern side of Caddens Road adjacent to the back of properties
- Adjustment, relocation and protection of utilities
- Connect this section of Caddens road upgrade with newly constructed intersection of Gipps Street, Kent Road
- Connect this section of Caddens with the new already widened section road towards the western end of Caddens Road
- Installation of street lighting.

1.3 Limitations

The purpose of the report is to provide an independent noise assessment for the proposed Caddens Road Upgrade, located at Claremont Meadows NSW.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise were referred to. This work has been conducted in good faith with RAPT Consulting's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Existing Environment

2.1 Ambient Noise Environment

To establish ambient noise levels, unattended monitoring for a period of one week was undertaken at 298 Caddens Road from April 30 to May 6, 2018 using an RION NL-42 Type 2 noise logger within calibration. These loggers are capable of measuring continuous sound pressure levels and are able to record LAmin, LA90, LA10, LAmax and LAeq noise descriptors. The instrument was programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period. The site was selected as it was indicative of the overall ambient noise environment for the project and it presented as a secure location whereby minimising the risk of theft or vandalism to the monitoring equipment.

During site visits it was noted that existing road traffic, and wildlife sources primarily described the ambient noise environment and was typical of an urban area.

Logged data was reviewed and filtered to exclude any data affected by adverse weather conditions during the monitoring period. The cumulative background and ambient noise results are provided in Table 1 below.

Descriptor	Noise Level dB(A)	Time Interval
$L_{Aeq(15hr)}$	56.3	7:00am - 10:00pm
$L_{Aeq(9hr)}$	49.4	10:00pm – 7:00am
$L_{A10(18hr)}$	57.1	6:00am – 12:00am
$L_{Aeq(1hr)}$ Day	58.2	7:00am - 10:00pm
$L_{Aeq(1hr)}$ Night	52.5	10:00pm – 7:00am
L_{A90} Day	37.3	7:00am - 6:00pm
L_{A90} Evening	41.2	6:00pm - 10:00pm
L_{A90} Night	34.7	10:00pm - 6:00am

Table 1 Ambient and Background Noise Levels

3. Noise Criteria

3.1 Operational Noise Criteria

The NSW Road Noise Policy (RNP) recommends various criteria for different road and residential developments and uses. Although it is not mandatory to achieve the noise assessment criteria in the RNP, proponents will need to provide justification if it is not considered feasible or reasonable to achieve them. Based on the definitions in the RNP, Caddens Road is a Sub-Arterial Road. The following noise goals provided in Table 2 Below. The assessment timeframe for the criteria are in the year of opening and 10 years after opening.

Road Category	Day	Night
Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	60 $L_{Aeq(15hr)}$	55 $L_{Aeq(9hr)}$

Table 2 Road Noise Policy Goals

The RNP does specify that redevelopment does not cover minor road works designed to improve safety, such as straightening curves, installing traffic control devices or making minor road alignments which this particular project could qualify.

3.2 Construction Noise

Construction noise is assessed with consideration to DECCW Interim Construction Noise Guidelines (ICNG) (July 2009). The INCG is a non-mandatory guideline that is usually referred to by local councils and other NSW government entities when construction / demolition works require development approval. The ICNG recommend standard hours for construction activity as detailed in Table 3.

Work type	Recommended standard hours of work
Normal construction	Monday to Friday: 7 am to 6 pm. Saturday: 8 am to 1 pm. No work on Sundays or Public Holidays.
Blasting	Monday to Friday: 9 am to 5 pm. Saturday: 9 am to 1 pm. No work on Sundays or Public Holidays.

Table 3 ICNG Recommended Construction Hours

The ICNG provides noise management levels for construction noise at residential and other potentially sensitive receivers receivers. These management levels are to be calculated based on the adopted rating background level (RBL) at nearby locations, as shown in Table 4.

Period	Management Level $L_{Aeq(15\ min)}$
Residential Recommended standard hours	Noise affected level: RBL + 10 Highly noise affected level: 75 dB(A)

Period	Management Level $L_{Aeq(15\ min)}$
Residential Outside recommended standard hours	Noise affected level: RBL + 5
Classrooms at schools and other educational institutions	Internal Noise Level 45 dB(A) (applies when properties are being used)
Offices, retail outlets	70 dB(A)

Table 4 Recommended Construction Hours

The above levels apply at the boundary of the most affected residences / offices or within 30 m from the residence where the property boundary is more than 30 m from the residence.

The *noise affected level* represents the point above which there may be some community reaction to noise. Where the *noise affected level* is exceeded all feasible and reasonable work practices to minimise noise should be applied and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and a method of contact. The *noise affected level* is the background noise level plus 10 dB(A) during recommended standard hours and the background noise level plus 5 dB(A) outside of recommended standard hours.

The *highly noise affected level* represents the point above which there may be strong community reaction to noise and is set at 75 dB(A). Where noise is above this level, the relevant authority may require respite periods by restricting the hours when the subject noisy activities can occur, considering:

- Times identified by the community when they are less sensitive to noise (such as mid-morning or mid-afternoon for works near residences).
- If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Based on the above and the RBL determined from site monitoring, construction noise goals have been derived, as shown in Table 5.

Receiver	Within Recommended Standard Hours	Outside Recommended Standard Hours	
		Evening (6pm-10pm)	Night (10pm-7am)
Residential	47	46	40
Classrooms at schools and other educational institutions	45(internal)	45(internal)	45(internal)
Offices, retail outlets	70	70	70

Table 5 Construction Noise Goals dB(A) LAeq(15min)

3.3 Vibration Guidelines

Vibration during construction and operational activity is expected to primarily originate from trucks and machinery during stages of construction and activities. RAPT Consulting also understand that blasting and heavy ground impact activities is not expected to occur during the upgrade works.

3.3.1 Human Exposure

Vibration goals during the were sourced from the DECCW's *Assessing Vibration: a technical guideline*, which is based on guidelines contained in British Standard (BS) 6472–1992, *Evaluation of human exposure to vibration in buildings (1–80 Hz)*.

Intermittent vibration is assessed using the vibration dose value (VDV), fully described in BS 6472 – 1992. Acceptable values of vibration dose are presented in **Error! Reference source not found.**.

Location	Daytime [1]		Nighttime [1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas [2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Table 6 Acceptable Vibration Values for Intermittent Vibration ($m/s^{1.75}$)

3.3.2 Building Damage

Currently, there is no Australian Standard that sets the criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained from reference to the following International Standards and Guidelines:

- British Standard BS7385.2 - 1993 *Evaluation and Measurement for Vibration in Buildings*, Part 2 - Guide to damage levels from ground borne vibration; and
- German Standard DIN 4150-3: 1999-02 Structural Vibration – Part 3: *Effects of vibration on structures*.

BS7385.2 – 1993 is utilised in this case in the assessment of potential building damage resulting from ground borne vibration produced by the proposed activity.

The recommended Peak Particle Velocity (PPV) guidelines for the possibility of vibration induced building damage are derived from the minimum vibration levels above which any damage has previously been encountered and are presented in Table 7.

Building Type	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures. Residential or light commercial type buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Table 7 Transient Vibration Guideline Values for Potential Building - Cosmetic Damage

Unlike noise which travels through air, the transmission of vibration is highly dependent on substratum conditions between the source/s and receiver. Also dissimilar to noise travelling through air, vibration levels diminish quickly over distance, thus an adverse impact from vibration on the broader community is not typically expected. Vibration during works is considered an intermittent source associated with two main types of impact; disturbance at receivers and potential architectural/structural damage to buildings. Generally, if disturbance issues are controlled, there is limited potential for structural damage to buildings.

4. Assessment of Potential Impacts

4.1 Traffic Noise Model Verification

The Calculation of Road Traffic Noise (CoRTN) method of traffic noise prediction was used, which approved by the OEH. The CoRTN method accommodates the following factors affecting traffic noise.

- Posted Speed;
- % Heavy Vehicle traffic;
- Roadway Gradient;
- Topographic features;
- Receiver / Source distance and heights;
- Intervening Ground Cover;
- Reflections from buildings.

The noise model of the existing situation is checked against the measured noise levels on Caddens Road. If the predictions of the noise model are similar to the measured levels then there is confidence that the future scenario noise predictions will also be accurate. The CoRTN algorithm and noise modelling process was validated against the road traffic noise monitoring data and simultaneous traffic counts, and the average vehicle speed undertaken for the proposal in July 2017. The model is deemed to be verified if the average difference between the measured and calculated values of the descriptors is within +/- two dBA.

The model was verified with the noise data from the monitoring location. The predicted $L_{A10(18hr)}$ was compared with the $L_{A10(18hr)}$ calculated from logging data, and a calibration factor was determined. Table 8 shows the measured and predicted L10 (18hr) values used to calculate the calibration constants.

Descriptor	Noise Level dB(A)
Measured $L_{A10(18hr)}$	57.1
Predicted $L_{A10(18hr)}$	58.6
Difference	-1.5

Table 8 Noise Model Verification

The CoRTN method predicts the $L_{A10(18hr)}$ statistics. To determine the other required noise parameters $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$, correction factors are provided in Table 9.

Descriptor	Measured L_{Aeq}	Measured $L_{A1018hr}$	Difference
$L_{Aeq(15hr)}$	56.3	57.1	-0.8
$L_{Aeq(9hr)}$	49.4	57.1	- 7.7

Table 9 Assessment Correction Factors

The total noise source adjustment in the model to predict noise parameters, which include the model calibration and the noise parameter conversion taken from Table 8 and 9, are shown in Table 10 below.

Descriptor	Model Verification (Table 8)	Assessment Correction (Table 9)	Difference
$L_{Aeq(15hr)}$	-1.5	-0.8	-2.3
$L_{Aeq(9hr)}$	-1.5	-7.7	- 9.2

Table 10 Summary of Calculated Adjustments

4.2 Traffic Noise Assessment

Client provided information has indicated that a 2% annual traffic growth on Caddens Road should be applied. Table 11 shows the predicted noise level at 298 Caddens Road which is considered representative of the residences located adjacent to Caddens Road within the study area.

Location	Before Construction 2018 Not Built		After Construction 2019 Built		10 Years Post Construction 2029 Built		Criteria (Day / Night)
	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	$L_{Aeq(15hr)}$	$L_{Aeq(9hr)}$	
298 Caddens Road	56.3	49.4	56.4	49.5	57.2	50.3	(60 / 55)

Table 11 Summary of Noise Assessment Results

As can be seen from the assessment results in Table 11, the predicted noise levels safely comply with adopted road noise goals for day and night.

4.3 Construction Noise and Vibration

Noise emissions from construction have been assessed for receivers in the project area during standard construction hours construction hours. The assessment has been undertaken with consideration to the ICNG.

The project scope has been provided in Section 1.2. The proposed works will be undertaken during standard working hours in line with the ICNG as follows:

- Monday to Friday: 7am to 6pm;
- Saturday: 8am to 1pm; and
- Sundays and Public Holidays: No work.

The following materials will be required as part of the road upgrade:

- Concrete
- Concrete RW blocks;
- Concrete drainage pipes;
- Stabilising products;

- Signs and delineation;
- Rebar;
- Base material;
- No fines concrete;
- Imported topsoil;
- Trees; and
- Streetlights including poles and cabling.

Noise Generating Equipment

Plant and equipment needed for the proposal would be determined during the construction planning phase. Likely equipment including typical sound levels are summarised in Table 12. Noise level data has been obtained from AS2436, the ENMM and RAPT Consulting internal database. Other equipment may be used however it is anticipated that they would produce similar noise emissions.

The magnitude of off-site noise impacts associated with construction will be dependent upon a number of factors:

- The intensity and location of construction activities;
- The type of equipment used;
- Existing background noise levels;
- Intervening terrain and structures; and
- Prevailing weather conditions.

Construction machinery would likely move about the study area altering noise for individual receivers. During any given period, the machinery items to be used in the study area would operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Certain types of construction machinery would be present in the study area for only brief periods during construction. Therefore, noise predictions are considered conservative.

Plant and Equipment	Typical Sound Power Level dB(A)	LAeq @10m
Excavator 20t	105	77
Front End Loader	111	83
Chainsaw	105	77
Mulcher	110	82
Tip Trucks	108	80

Plant and Equipment	Typical Sound Power Level dB(A)	LAeq @10m
Light Vehicles	106	78
Pad foot Roller	109	81
Smooth drum roller	107	79
Grader	110	82
Crane	98	70
Pneumatic Jackhammer	113	85
Concrete Trucks	112	84
Asphalt Paver	108	80
Asphalt Delivery Trucks	109	81
Line Marking Unit	106	78

Table 12 Typical Construction Item Sound Power Levels

Construction noise levels have been predicted based on the potential construction noise levels provided in Table 3. The different scenarios will occur from site establishment to re-surfacing works. These noise levels represent different equipment noise levels and give an idea how noise levels may change across the proposal area with different activities being undertaken. This is considered a worst-case scenario.

Construction Noise Mitigation

While noise levels provided represent an unlikely worst-case scenario there is potential for construction noise levels to exceed the project noise goals. Roads and Maritime Construction Noise and Vibration Guideline provides guidance for mitigation measures and may be used as to how to minimise the impacts on the community from noise and vibration.

It is recommended that the following standard noise mitigation measures be implemented where feasible and reasonable and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and provided a point of contact.

4.4 Project Construction Environmental Management Plan

A Project Construction Environmental Management Plan (PCEMP) could be prepared prior to the commencement of works and implemented through all phases of the proposed construction works. The PCEMP would provide the framework for the management of all potential noise impacts resulting from the construction works and would detail the environmental mitigation measures to be implemented throughout the construction works.

4.4.1 Planning and design of construction works

During the detailed planning, scheduling and design of the construction works the following noise management and mitigation measures are could be investigated and, as required, implemented prior to the commencement of noise generating works.

4.4.1.1 Notification before and during construction

- Affected neighbours to the construction works would be advised in advance of the proposed construction period at least 2 weeks prior to the commencement of works.
- Consultation and communication between the site(s) and neighbours to the site(s) would assist in minimising uncertainty, misconceptions and adverse reactions to noise.
- All site workers (including subcontractors and temporary workforce) should be familiar with the potential for noise impacts upon residents and encouraged to take all practical and reasonable measures to minimise noise during their activities.
- The constructor or site supervisor (as appropriate) should provide a community liaison phone number and permanent site contact so that the noise related complaints, if any, can be received and addressed in a timely manner.
- The constructor (as appropriate) should establish contact with the residents and communicate, particularly when noisy activities are planned.

4.4.1.2 Utilising best practice measures when operating on construction site

- Construction works should adopt Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) practices as addressed in the ICNG. BMP includes factors discussed within this report and encouragement of a project objective to reduce noise emissions. BATEA practices involve incorporating the most advanced and affordable technology to minimise noise emissions.
- Ensure that all construction works scheduled for standard construction hours comply with the start and finish time.
- Where practical, simultaneous operation of dominant noise generating plant should be managed to reduce noise impacts, such as operating at different times or increase the distance between plant and the nearest identified receiver.
- High noise generating activities such as jack hammering should only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block.
- Where possible, reversing beepers on mobile equipment would be replaced with low-pitch tonal beepers (quackers). Alternatives to reversing beepers include the use of spotters and designing the site to reduce the need for reversing may assist in minimising the use of reversing beepers.
- Equipment which is used intermittently should be shut down when not in use.
- All engine covers should be kept close while equipment is operating.
- The construction site would be arranged to minimise noise impacts by locating potentially noisy activities away from the nearest receivers wherever possible.
- Material dumps should be located as far as possible from the nearest receptors.
- Wherever possible, loading and unloading areas should be located as far as possible from the nearest receptors.
- Where possible, trucks associated with the work area should not be left standing with their engine operating in a street adjacent to a residential area.
- All vehicular movements to and from the site should comply with the appropriate regulatory authority requirement for such activities.

4.4.1.3 Complaints handling

- Noise and vibration monitoring should be undertaken upon receipt of a complaint to identify and quantify the issue and determine options to minimise impacts.
- If valid noise/vibration data for an activity is available for the complainant property, from works of a similar severity and location, it is not expected that monitoring will be repeated upon receipt of repeated complaints for these activities, except where vibration levels are believed to be potentially damaging to the building.
- Any noise and vibration monitoring should be undertaken by a qualified professional and with consideration to the relevant standards and guidelines. Attended noise and vibration monitoring should be undertaken in the following circumstances:
    - Upon receipt of a noise and/or vibration complaint. Monitoring should be undertaken and reported within a timely manner (say 3 to 5 working days). If exceedance is detected, the situation should be reviewed to identify means to reduce the impact to acceptable levels.

4.5 Construction Vibration

Vibration impacts discussed in this section essentially focus on potential structural damage to properties in close vicinity of the study area and/or potentially affected by construction activities.

Energy from construction equipment is transmitted into the ground and transformed into vibrations, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment)
- The Frequency content;
- The impact medium stiffness;
- The type of wave (surface or body)
- The ground type and topography.

Due to the above factors, there is inherent variability in ground vibration predictions without site-specific measurement data.

Due to the nature of the works the vibration risk is low. However, it is possible that local sensitive receivers may perceive construction vibration at times. The level of annoyance, however, would depend on individuals.

Table 13 outlines typical vibration levels for different plant activities sourced from the NSW RTA Publication *Environmental Noise Management Manual*.

Item	Peak Particle Velocity at 10m (mm/s)
Pile Boring	12-30
15 Tonne Compactor	7-8
7 Tonne Compactor	5-7
Roller	5-6

Item	Peak Particle Velocity at 10m (mm/s)
Dozer	2.5-4
Backhoe	1
Jackhammer	0.5

Table 13 Typical Vibration Levels - Construction Equipment

Table 13 indicates that vibration goals may have the potential to be exceeded for buildings within 10 metres from potential pile boring impacts. Therefore, if piling is necessary, it is recommended that screw piling rather than pile boring methods be used for this development thus minimising vibration impact risks and therefore compliance is expected. Impacts to residential receiver are expected to comply. While the nature of the works indicates the risk is low, it is important that this risk is captured and managed in the Project CNVMP.

5. Conclusion

Operation

The results of the assessment indicate the proposal is predicted to comply with operational noise goals for day and night. The result of the project is expected to have a negligible effect on overall traffic noise levels. While the project aims to improve traffic flow and safety, it does not increase the volume of traffic other than normal annual growth projections for the road study area.

Construction

A set of standard mitigation measures for construction noise and vibration have been provided based on anticipated requirements of the proposal, however a CNVMP which includes requirements for periodic noise monitoring at sensitive receivers and a community consultation program is recommended to be developed as part of a CEMP for the proposal's construction stages. It is believed construction noise can be minimised and managed acceptable to the local community through the implementation of a CNVMP similar to what has been recommended in this report.

Should you have any further questions regarding this report, please do not hesitate to contact Greg Collins on 0488512224 or greg@raptconsulting.com.au.

Thank you,

Greg Collins

Director – RAPT Consulting

APPENDIX H INDIGENOUS HERITAGE

Aboriginal Heritage Due Diligence Assessment

CADDENS ROAD UPGRADE, CLAREMONT MEADOWS

APRIL 2019

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Document Verification

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NGH Environmental Pty Ltd (ACN: 124 444 622. ABN: 31 124 444 622) and NGH Environmental (Heritage) Pty Ltd (ACN: 603 938 549. ABN: 62 603 938 549) are part of the NGH Environmental Group of Companies.

)

www.nghenvironmental.com.au e: ngh@nghenvironmental.com.au

Sydney Region
18/21 mary st
surry hills nsw 2010 (t 02 8202 8333)

Canberra - NSW SE & ACT
8/27 yallourn st (po box 62)
fyshwick act 2609 (t 02 6280 5053)

Brisbane
level 5, 320 adelaide st
brisbane qld 4000 (t 07 3511 0238)

Newcastle - Hunter and North Coast
7/11 union st
newcastle west nsw 2302 (t 02 4929 2301)

Wagga Wagga - Riverina and Western NSW
suite 1, 39 fitzmaurice st (po box 5464)
wagga wagga nsw 2650 (t 02 6971 9696)

Bega - ACT and South East NSW
suite 1, 216 carp st (po box 470)
bega nsw 2550 (t 02 6492 8333)

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ACRONYMS AND ABBREVIATIONS

AHIMS	Aboriginal heritage information management system
AHMS	Archaeological Heritage Management Solutions
DLALC	Deerubbin Local Aboriginal Land Council
EIS	Environmental Impact Statement
ERM	Environmental Resources Management
Km	kilometres
LALC	Local Aboriginal Land Council
LGA	Local Government Area
M	Metres
NPW Act	*National Parks & Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors
RMS	Roads and Maritime Services
URS	United Research Services

EXECUTIVE SUMMARY

BACKGROUND ASSESSMENT

NGH Environmental has been engaged by J. Wyndham Prince (on behalf of Penrith City Council) to undertake an Aboriginal Due Diligence Assessment for the proposed upgrade works to Caddens Road. The study area is located within the Penrith Local Government Area (LGA) and is bounded by Gipps Road to the east, Heaton Avenue to the west and the housing development of Caddens Hill to the north and south, between Claremont Street and Gipps Street, Claremont Meadows (the study area). No sites of Aboriginal heritage are registered with the Aboriginal Heritage Information Management System (AHIMS) within the project area or within a 200m buffer of the proposed works zone. The closest site to the project area is located approximately 250m west and consists a surface artefact scatter (AHIMS#45-5-3573). This site was subsequently destroyed after the completion of two stages of heritage investigation by AHMS in 2012 (AHMS 2012). Other artefact scatters registered within 500m of the study area, as well as the close vicinity to multiple third and second order streams and creeks (Werrington, Claremont and South Creeks) suggest there is potential for Aboriginal artefacts to occur within the landscape.

Historic land use in the region has been restrained until the creation of the housing estate in 1984. Prior to this, extensive ploughing and agricultural practices were undertaken, but little extensive sub-surface ground disturbance was identified. Vegetation clearance of the area for cropping, ploughing and grazing would have disturbed many surface artefacts.

The proposal includes a narrow and minor impact corridor, extending marginally to the north and south of the present road corridor. The implications are that it is unlikely that any Aboriginal heritage objects would be present.

FIELD ASSESSMENT

The field assessment was undertaken by NGH Environmental archaeologist Amy Ziesing on Wednesday 4 April 2018, along with two representatives from J. Wyndham Prince: Peter Calantzis and Martin Patfield.

Visual inspection of the entire study area was completed, extending from the Caddens Hill Playing Fields in the northwest to the intersection of Caddens Rd and Gipps Street in the northeast. The southern boundary extends from Heaton Avenue in the west to the intersection of Caddens and Kent Roads and Gipps Street in the east. The majority of the works are proposed for the northern side of the road corridor, with only minor disturbances being proposed for the southern road verge, most of which will be confined to the area southwest of Claremont Creek.

The ground surface along the extent of the study area on both sides of Caddens Road has been previously disturbed to some extent, with the exception of one area to the south of Caddens Road and the immediate west of Claremont Creek.

A large portion of the existing juvenile trees on the northern side of Caddens Rd are to be removed to allow for the construction of the shared pedestrian recreational footpath (2.5m wide). A smaller number of more mature trees are to be retained on the northern side, with the newly constructed pedestrian footpath to curve around the root structures. All trees to be impacted within the study area were inspected, especially those in close proximity to Claremont Creek, but they were young trees and bore no evidence of cultural modification.

IMPACT ASSESSMENT CONCLUSION

During the design phase for this project, every effort has been made to reduce impacts to any landscape feature within the study area.

All areas outside the existing road corridor that are to be impacted by construction include the area immediately surrounding Claremont Creek, which will house a cantilever bridge extension to the north, allowing the continuation of the 2.5m wide pedestrian footpath in this location. Support pylons for this extension to the bridge will be required, extending to the base of the creek. Closer inspection of this area during the site visit, confirmed that a degraded concrete apron surface has previously been installed under Claremont Creek bridge, possibly at the time of its original construction. This artificial ground surface has removed the potential for Aboriginal heritage finds in this area.

The only other location that has the potential for heritage material is located just outside the southern study area boundary, to the immediate west of Claremont Creek. This parcel of land remains undeveloped and is currently owned by Penrith City Council. No impacts would be undertaken in this area and it was, therefore, excluded from closer visual inspection. If the concept design plans for the proposed Caddens Road upgrade works are amended and/or encroach upon this area, then a re-inspection of this area would be required (Figure 5).

RECOMMENDATIONS

The following recommendations are based on the results of this Due Diligence assessment in conjunction with the field inspection completed on Wednesday 4 April 2018 and an appraisal of the potential for Aboriginal artefacts and sites to occur within the proposed Caddens Road upgrade study area at Claremont Meadows.

As no sites of registered Aboriginal heritage were located within the study area it is recommended that:

1. The proposed Caddens Road upgrade works may proceed with caution, following the Unexpected Finds Procedure (Appendix A) in areas marked **green** on Figure 5 and shown in the 80% detailed design plans (Figures 6 to 8). These areas have been identified as 'disturbed land' as defined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010) and do not require further investigation and are approved for the proposed construction works;
2. If the proposed works are to extend into area marked **red**, which has been provided with a 10m buffer zone on Figure 5, then a re-assessment of this area will need to be undertaken by a qualified archaeologist/heritage professional prior to any works commencing to determine if Aboriginal sites or objects may be present;
3. In the event that previously undiscovered Aboriginal finds are located during construction, all works in the vicinity of the find must cease and the 'Unexpected Finds Procedure' (Appendix A) should be adhered to, with a qualified archaeologist/heritage consultant called in to inspect the find and provide recommendations on proceeding, and
4. In the event that, human skeletal remains are identified during any aspect of the proposed construction works, then all work in the vicinity of the find must stop and the OEH/police must be notified to inspect the site.

1 INTRODUCTION

NGH Environmental was commissioned by J. Wyndham Prince (on behalf of Penrith City Council) to undertake a Due Diligence level assessment for Aboriginal heritage sites for the proposed upgrade works to Caddens Road, Claremont Meadows, New South Wales (Figure 1). These works comprise just a small portion of the larger infrastructure expansion for Western Sydney, which is a larger infrastructure project funded by the Australian Government. Caddens Road is listed as part of the (Western Sydney Infrastructure Plan) WSIP Local Roads Package – Round 3 (Penrith City Council 2018). These works are proposed to commence in September 2018 and will take approximately 26 weeks to complete.

Penrith City Council is aiming to cater for future growth in the Local Government Area (LGA) by upgrading the local roads to improve traffic flow, road safety, road network efficiency and reduce travel times – particularly along key regional link roads which connect residential, education, employment, transport and retail hubs.

Caddens Road is a collector road which serves to move traffic from local streets within Claremont Meadows to arterial roads such as the Great Western Highway. Caddens Road is used by local residents and also residents from surrounding suburbs. Caddens Road is a two-way, two lane council road with Watts profile speed humps and a speed limit of 60km/h.

This stage of the works will primarily focus on the following, which includes ground disturbance.:

- Widening existing Caddens Road to accommodate additional parking and travel lanes in each direction.
- A 60m right-turn lane from Caddens Road to Silkwood Drive, including kerb carriageway and lane length modifications.
- A single lane mountable roundabout at the intersection of Caddens Road and White Cedar Avenue, including the construction of splitter lanes with pedestrian walkthroughs on all three legs of the roundabout. This will include the removal of current Watts profile speed humps in this location.
- Provision of a bus shelter adjacent to the roundabout facility.
- Provision of a seagull island treatment or similar at the intersection of Caddens Road and Silkwood Drive.
- Installation of a stormwater drainage system.
- Construction of 2.5m and 1.5m shared footpath to the north and south of Caddens Road respectively.
- The relocation, protection and adjustment of existing utilities as required.
- Joining eastern end of Caddens Road with new intersection at Gipps and Kent Streets and joining western end of Caddens Road with newly widened section.
- Interface of new pavements with existing older pavement.

1.1 PROJECT PARTICIPANTS

The Due Diligence assessment was carried out by qualified archaeologists Jakob Ruhl and Amy Ziesing of NGH Environmental. Amy Ziesing prepared the background research and undertook the field inspection on Wednesday 4 April 2018, along with Calia Jones and James Rees (NGH). Amy Ziesing completed this report and Matthew Barber (Director) reviewed it internally for quality assurance purposes.

The project is within the boundaries of the Deerubbin Local Aboriginal Land Council. The Due Diligence process does not formally require consultation with Aboriginal community groups however the Deerubbin LALC were informed of the due diligence level assessment for the proposed Caddens Road upgrades by NGH.

1.2 FORMAT OF THIS REPORT

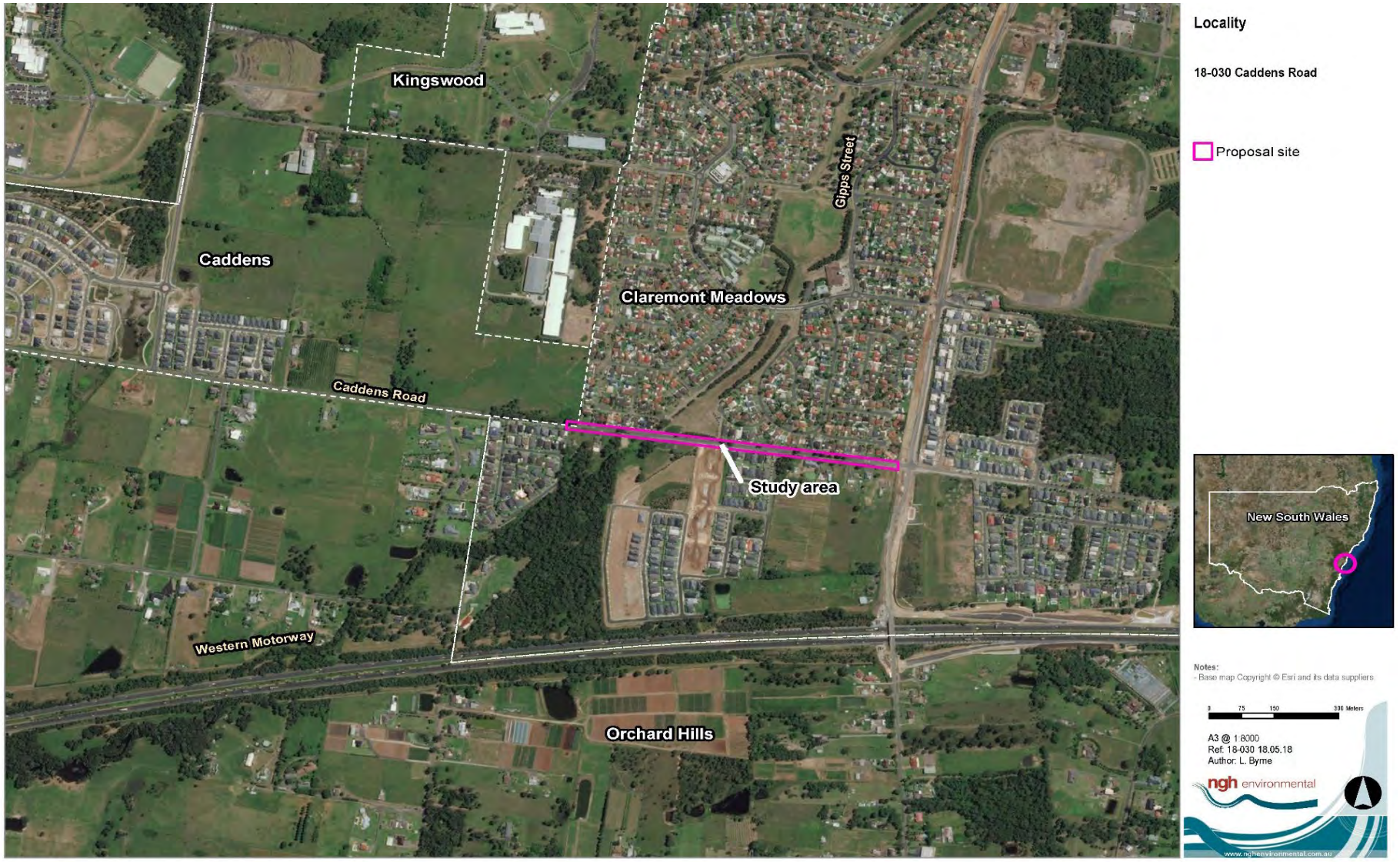
This report has been drafted in keeping with the sequence of steps identified in the NSW Office of Environment and Heritage's (OEH) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (OEH 2010).

The Code of Practice provides a five-step approach to determine if an activity is likely to cause harm to an Aboriginal object, as defined by the *NSW National Parks and Wildlife Act* (1974). The steps follow a logical sequence of questions, the answer to each question determines the need for the next step in the process.

The progress through the steps in the Code of Practice is aimed at providing an assessment of the potential for an activity to impact either a known Aboriginal object, or whether it is likely that unrecorded Aboriginal objects are present that may be impacted. The result of the process is aimed at providing the proponent with information about the likelihood that their activity will impact an Aboriginal object and whether an Aboriginal Heritage Impact Permit may be required.

Each section below follows the relevant step outlined in the Code of Practice.

Figure 1. General project location.



2 LANDSCAPE CONTEXT

2.1 INTRODUCTION

Assessment reports for potential or known archaeological sites include information relating to the environmental context of the area, as these characteristics play a vital role in the formation and types of archaeological sites that may exist within an area. The environment of a landscape impacted upon the type and availability of raw materials and the types of activities that were carried out in specific landscape locations in the past.

A detailed understanding of the former environmental context and how this may have been altered over time is essential in developing accurate models of cultural activity, site distribution patterns and the archaeological potential of any area.

The environmental context for Claremont Meadows and the wider Penrith area are discussed below.

2.2 GEOLOGY AND SOILS

According to Bannerman et al. (1989), two different soil landscapes occur within the study area, South Creek (sc) and Blacktown (bt), with the Luddenham (lu) Soil Landscape comprising the majority of the environment to the immediate west of the study area (Figure 2). The study area is located predominantly on the Blacktown Soil Landscape with the western third of the study area being situated on the South Creek Soil Landscape.

The Blacktown Soil Landscape consists of hard-setting texture contrast soils of loam and mottled clay (up to 100 cm deep). The underlying geology consists of Wianamatta Group Ashfield Shale, which comprises laminate of Bringelly Shale and siltstone, and Minchinbury Sandstone. This soil landscape is generally located on undulating hills with local relief of 10 to 30 metres ASL. Rock outcrops have not been found to occur naturally, however, some have been identified in areas where the ground surface has been disturbed.

The South Creek Soil Landscape consists of fluvial soils on floodplains and drainage channels and depressions. Occasional terraces and levees occur. Local relief is typically up to 10 metres. The soils consist of loams, sandy loams and clays overlying Quaternary alluvium of Wianamatta Shale and Hawkesbury Sandstone origin. Both deposition and erosion, particularly sheet erosion, occur in this soil landscape.

The Luddenham Soil Landscape consists of brown loamy soils or massive earthy clays. This deposit appears shallow on crest ridges and moderately deep on slopes and depressions and maintains a relatively low to moderate fertility. The underlying geology consists of Wianamatta Shale and Bringelly Shale and between these two shale components sits Minchinbury Sandstone, consisting of fine-medium grained examples. Luddenham soils are generally good for being grazed and cultivated. The erosion capacity of these soils is high, especially in the higher clay content areas. Minor gully erosion and sheet erosion are evident in disturbed areas of land (PPK Environment & Infrastructure 1997:352).

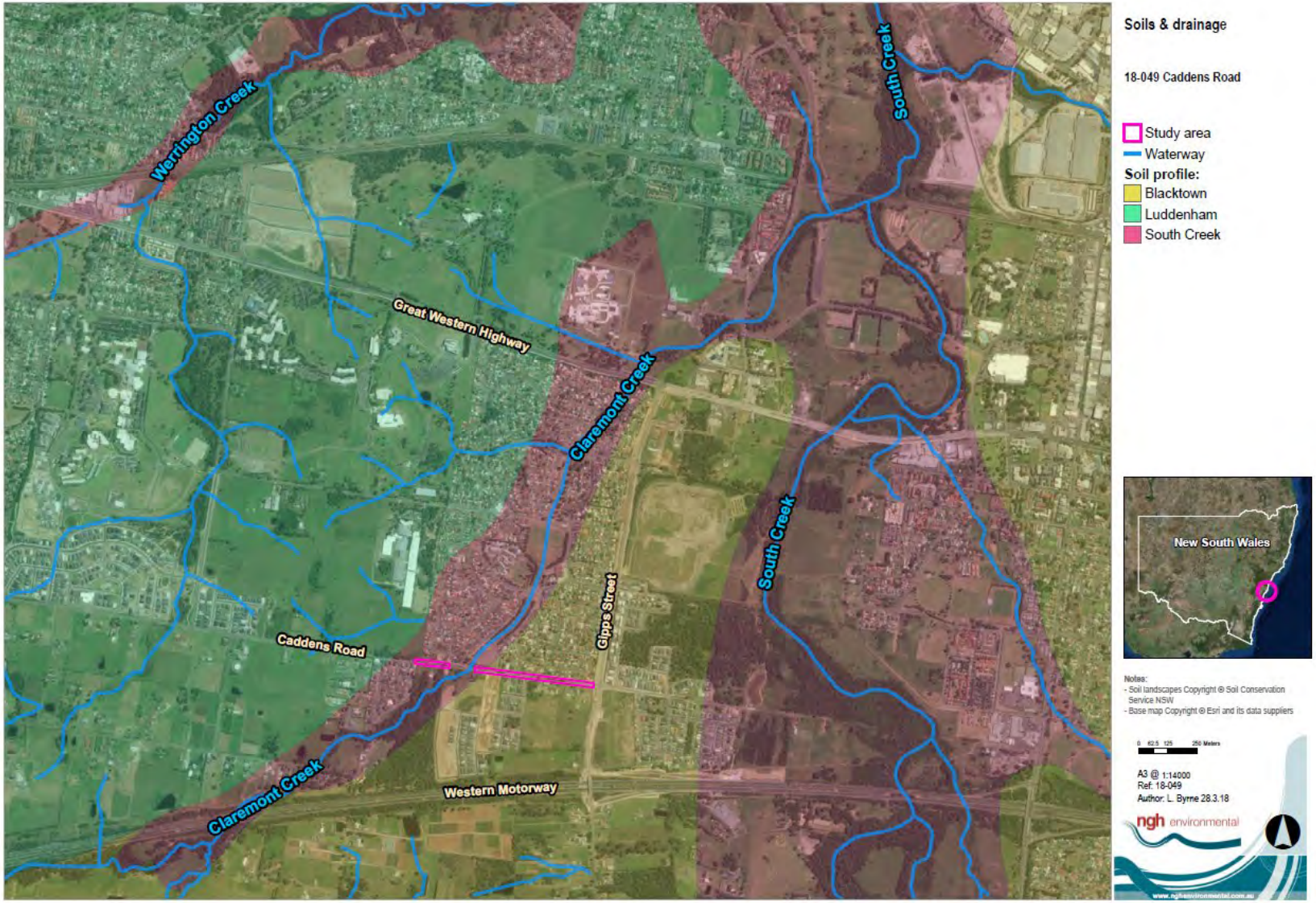


Figure 2. Soil Landscapes and Waterways for the proposed Caddens Road study area and the wider Claremont Meadows region.

2.3 VEGETATION

The character of the native vegetation depended to a great extent on the underlying soils and topography.

Areas of South Creek Soil Landscape have frequently been cleared of most native vegetation, however, remaining common species include broad-leaved apple (*Angophora subvelutina*), cabbage gum (*Eucalyptus amplifolia*) and swamp oak (*Casuarina glauca*). Species such as tall spike rush (*Eliocharis sphacelata*, *Juncus usitatus* and *Polygomum* spp.) have been identified in areas of deposition. At the highest elevations paperbark (*Melaleuca* spp.) and tea tree (*Leptospermum* spp.) also occur. Due to the extensive vegetation clearance, weed species, such as blackberry proliferate in some areas.

The remaining vegetation species include spotted gum (*Eucalyptus maculata*), grey box (*E. moluccana*), broad-leaved ironbark (*E. fibrosa* and *E. crebra*), forest red gum (*E. tereticornis*) and woollybutt (*E. longifolia*). The dominant shrub species are blackthorn (*Bursaria spinosa*), coffee bush (*Breynia oblongifolia*), forest oak (*Allocasuarina torulosa*), hickory (*Acacia implexa*) and hairy clerodendrum (*Clerodendrum tomentosum*). Common grasses are speargrass (*Aristida vagans*), bordered panic grass (*Entolasia marginata*), paddock lovegrass (*Eragrostis leptostachya*) and kangaroo grass (*Themeda australis*).

The vegetation of the Blacktown Soil Landscape is very similar to the South Creek composition, containing forest red gum (*E. tereticornis*), narrow-leaved ironbark (*E. crebra*), woollybutt (*E. longifolia*), broad-leaved ironbark (*E. fibrosa*) and grey box (*E. maculata*). However, around St Marys the dominant species are white stringybark (*E. globoidea*), which are also present as understorey growth.

Examples of natural vegetation do remain in the wider environmental area of Penrith and examples of these can be found near Werombi and Floxton Park.

2.4 WATER

The study area is located approximately 750m to the south-west of South Creek. The presence of Claremont Creek has served to dissect the study area into an eastern portion (approximately 700m long) and western portion (approximately 250m long). Claremont Creek itself is not included in the study area but at its closest point it is only 20m to the west of the eastern portion of the site boundary. To the west, the smaller section under assessment is located approximately 100 m west of the study area, which sits well within the potential zone for Aboriginal occupation and is therefore may contain heritage material.

A chain of dams – possibly an earlier creek line – also runs around the base of the hill to the south of the M4 Motorway and west of Gipps Street, approximately 420m from the western boundary of the current study area. Prior to damming, this creek may have joined South Creek with Claremont Creek and been a focus of Aboriginal activity, as is suggested by several nearby archaeological sites.

2.5 LAND-USE HISTORY

2.5.1 ABORIGINAL LAND-USE

More than 4,500 sites have been recorded and registered with the OEH Aboriginal Heritage Information Management System (AHIMS) for Sydney, reflecting both the wealth of archaeology in the region and the number of archaeological investigations undertaken.

The dominant site types in the Sydney region (in the 15 - 20 % frequency range) are rock shelters with midden deposit, rock shelters with art, rock art engravings and open artefact scatters (Attenbrow 2002). The distribution, density and size of sites are largely dependent on environmental context.

A study of the regional archaeology of the Cumberland Plain by Kohen (1986) made a number of findings about site location patterns in the Sydney area. The study demonstrated that proximity to water was an important factor in site patterning. Kohen found that 65 % of open artefact scatter sites were located within 100 metres of permanent fresh water (Kohen 1986). Only 8 % of sites were found more than 500 metres away from permanent fresh water. In short, Kohen argued that open artefact scatters are larger, more complex and more densely clustered along permanent creek and river lines. Kohen's study also found that silcrete (51 %) and chert (34 %) are the most common raw materials used to manufacture stone artefacts. Other raw materials include quartz, basalt and quartzite.

Although the patterns described above have been generally supported by subsequent investigations, Kohen's study was limited by a reliance on surface evidence. Extensive excavation across the Cumberland Plain has since shown that areas with no surface evidence often contain sub-surface archaeological deposits. This is a critical consideration in aggrading soil landscapes, such as those commonly found across the Cumberland Plain.

In a 1997 study of the Cumberland Plain, McDonald (1997) found that:

- 17 out of 61 excavated sites had no surface artefacts prior to excavation;
- The ratio of recorded surface to excavated material was 1:25; and
- None of the excavated sites could be properly characterised on the basis of surface evidence. In short, surface evidence (or the absence of surface evidence) does not necessarily indicate the potential, nature or density of sub-surface material.

The results of McDonald's study clearly highlight the limitations of surface survey in identifying archaeological deposits in this landscape. The study also shows the importance of test excavation in establishing the nature and density of archaeological material on the Cumberland Plain.

J. McDonald has undertaken over 20 years of consulting archaeology in the Cumberland Plain, and like Kohen has developed predictive models for the distribution of Aboriginal objects. In a recent publication, White & McDonald (2010:29) summarised this model as follows:

> Topographic and stream order variables correlate with artefact density and distribution. High artefact density concentrations may have resulted from large number of artefact discard activities and/or from intensive stone flaking. Highest artefact densities occur on terraces and lower slopes associated with 4th and 2nd order streams, especially 50 – 100 m from 4th order streams. Upper slopes have sparse discontinuous artefact distributions, but artefacts are still found in these landscape settings.

2.5.2 HISTORIC LAND-USE

Historical and recent land uses have extensively disturbed the majority of the study area. It has been cleared of original vegetation, although there is evidence of re-growth along the eastern side of Kent Road and Gipps Street, and along the north and south sides of the M4 Motorway.

Historical land uses have included early agricultural, fishing and pastoral activities; however, generally the types of development in Watson's Bay were restricted until the construction of the housing estate in 1984. Ground disturbance is likely to have been caused by ploughing, grazing of farm animals and the construction of fences, tracks, dams, electricity transmission lines and drainage.

More recent land use activities include:

- ongoing rural use of land along the eastern side of Kent Road and Gipps Street;
- urban development along either side of Gipps Street;
- A former landfill site on the eastern side of Kent Road and Gipps Street;
- the construction of existing roadways within, adjacent to, or in the vicinity of the study area, in particular upgrade works along the M4 Motorway. This has resulted in significant ground disturbance both during and post- road construction and in some cases (i.e. along the M4 Motorway) has resulted in the modification of natural landforms, such as cuts through crests; and
- housing sub-division and related construction activities north and south of Caddens Road in Claremont Meadows.

Figure 2 outlines the various soil landscapes and significant watercourses that characterise the study area and the wider region of Claremont Meadows.

2.6 LOCAL ARCHAEOLOGICAL STUDIES

A small number of specific archaeological assessments, surveys and targeted sub-surface testing programmes have previously occurred within, or in the immediate vicinity of the project area. The major relevant studies are summarised below, with the areas covered by each study are shown in Figure 3 (*AHMS* 2012:34).

Housing Commission Subdivision, Claremont Meadows (Hanrahan 1981)

In 1981 Jenny Hanrahan conducted an archaeological survey prior to the subdivision at South Werrington for the Housing Commission of NSW (Hanrahan 1981). The area covered in this survey is now known as the suburb of Claremont Meadows. Hanrahan's survey work covered all areas from the Great Western Highway to the now M4 Motorway and from South Creek to government owned land in the west. The survey area was divided into two sections by the junction of Gipps and Kent Streets.

The results of this survey identified one surface artefact scatter to the north of Caddens Road, along the banks of Claremont Creek. Significant ground disturbance was, however; noted throughout this location due to the presence of historic agricultural practices, such as ploughing and vegetation clearance (Hanrahan 1981:4).

M4 Upgrade, Parramatta to Mays Hill and Prospect to Emu Plains (HBHC 1996)

In 1996, two consultants from Helen Brayshaw Heritage Consultants (HBHC) completed an Aboriginal heritage survey prior to the commencement of upgrade works to the M4 Motorway at various locations from Church Street, Parramatta to Coleman Street, Mays Hill and another section at Prospect and Emu Plains respectively.

During the surveys, 20 Aboriginal sites were recorded including isolated finds and surface artefact scatters. It seems that these sites were never registered with the AHIMS database as they did not appear in the searches conducted for the current study area, including those with a 200m and 1km buffer zone.

Overall, it seems that the majority of these new sites were located in areas of previous historic ground disturbance. Recommendations were provided to conserve sites 1, 8 and 9, whereas all other remaining newly identified sites were recommended for applications for Section 90 consent to destroy permits.

Further investigation, as well as the site inspection undertaken for this current assessment, identified areas that have been fenced off from public access, just south of the Caddens Road corridor. It is suggested that these locations represent the HBHC sites which were in fact never destroyed or the remnant boundaries of sites 1, 8 and 9 (AHMS 2012:31).

Gipps Street Landfill Site, Claremont Meadows (URS 2001)

In 2001, URS completed an Environmental Impact Statement (EIS) for the Gipps Street Landfill Site in Claremont Meadows. The area covered by this report is immediately north and west of the current study area, comprising the eastern side of Gipps Street to north of Caddens Road.

This report identified no Aboriginal sites or objects within the study area and suggested that the level of ground disturbance across the site was significant enough not to warrant any further heritage investigation.

Land Solutions Department, Claremont Meadows (ERM 2003)

In 2003, ERM undertook an Aboriginal and Historical Heritage Assessment of the wider Claremont Meadows region for Land Solutions Pty Ltd. The study area covered in this report extended to Gipps Street to the west, the M4 Motorway to the south and is dissected by Caddens Road to the east and west, which includes the full extent of the current study area for the proposed Caddens Road upgrade works.

A total of nine sites were recorded during this assessment and associated field inspection, including two open sites, two isolated finds, two open archaeological deposits and one possible scarred tree. None of these sites are located within the current study area.

The 2003 study area was defined in two sections, with the land to the north experiencing increased historic ground disturbance and not maintaining the landscape characteristics indicative for Aboriginal occupation. The land to the south of Caddens Road was identified as far less disturbed and possessing characteristics deemed favourable for the presence of Aboriginal activity, such as the presence of fresh water from Claremont Creek and the heightened views maintained from the hill crest across the overall area (ERM 2003:66-7).

Recommendations were made to apply for Section 90 consent to destroy for sites located in the northern portion of the study area, sub-surface investigation of Claremont Meadows Open Archaeological Deposit-1 (AHIMS#45-5-2898) and further application for Section 90 consent to destroy for sites in the south of the study area.

Test and subsequent salvage excavations were completed in 2004 and 2005 respectively by ERM and it was determined that Sites #45-5-3013 and #45-5-2898 were to be included as part of previously recorded site South Creek 4, as they occupy the same landform of a 30m high crest overlooking South Creek flood plain (Brayshaw and Haglund 1996).

The salvage excavation yielded approximately 2000 artefactual finds from two areas experiencing low historic ground disturbance. The findings from these stages of investigation suggested that a new predictive model for Aboriginal occupation and activity across the Cumberland Plain be formulated, which is known as the “economic resource model” and is summarised in Section 4.1 below (AHMS 2012:33).

Lots 8, 9, 10 DP27107 and Lot 19 DP239091, Claremont Meadows (ERM 2006)

In 2006, ERM also undertook a heritage assessment of various Lots extending along Caddens Road in Claremont Meadows. This area is located approximately 500m to the west of Kent Road and immediately south of the current study area.

A total of six Aboriginal sites were identified during the field inspection, which followed on from the earlier work undertaken by the same consultancy company. Identification of artefacts was impeded by significant vegetation cover, but despite this, finds were located in all areas of exposed ground, especially in the centre and north of the study area, heading towards Caddens Road. ERM suggested that the presence of surface artefacts indicated that an extensive sub-surface archaeological deposit may be present across the South Creek floodplain. Further sub-surface testing was recommended at four sites across the study area.

In 2009, a testing programme was completed by ERM at the four recommended sites, with further salvage excavation also being completed at CMSW1 (ERM 2010). A total of 773 artefacts were retrieved from a 92m² open area excavation, including examples of flaked glass, suggesting that occupation of the site continued into the late Holocene and contact periods.

Lot 2 DP771697, Claremont Meadows (Jo McDonald Cultural Heritage Management Pty Ltd 2008)

In 2008, Jo McDonald Cultural Heritage Management Pty Ltd undertook an Aboriginal Cultural Heritage Assessment of Lot 2 DP771697, Claremont Meadows, NSW. This area lies to the east of the study area covered in the current report.

One isolated find was identified during these works (GS01) in the road corridor of Gipps Street on the edge of an eroding bank. The overall study area was deemed to be of low archaeological sensitivity by McDonald, based on the significant level of historic disturbance encountered across the site boundary. Despite this, the presence of an isolated find, along with the relatively frequent number of previously recorded sites within the wider area, led McDonald to conclude that Aboriginal objects would be present in the area.

Werrington Arterial Road, M4 Motorway – Great Western Highway, Claremont Meadows (AHMS 2012)

In 2012, AHMS was engaged by Aurecon Australia, on behalf of Roads and Maritime Services (RMS) to undertake an archaeological survey of the proposed Werrington Arterial Road, extending from the M4 Motorway to the Great Western Highway (AHMS 2012:12).

This work was carried out in five stages, with Stage 1 involving the ground identification of any potential Aboriginal objects in the study area. Stage 2 required the production of an archaeological survey report and further site inspection in conjunction with representatives from Local Aboriginal Land Council and Native Title claimants/holders. Based on the findings from this stage, a third stage was implemented requiring a full archaeological assessment in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (OEH 2010) and in order to apply for AHIP permits. Stages 4 and 5 involved any recommendation from the previous assessments for sub-surface testing, monitoring and salvage excavation. The progression of each stage was only to be achieved if deemed necessary in the previous stages of works.

Upon completion of the AHMS report, only Stages 1 and 2 had been completed. The results of the site inspections identified significant historic ground disturbance over most of the site resulting from road construction and maintenance (AHMS 2012:43). One area of archaeological potential was identified, but this was restricted to the elevated crest in the vicinity of previously recorded site #45-5-2898, which has undergone minimal vegetation clearance. Overall, nine sites were recorded, with four having been previously recorded and five being newly identified. Out of the five new sites, all were isolated artefact finds and one was a potential archaeological deposit with artefacts.

Based on the reviewed reports and predictive modelling, the key attribute taken into consideration to develop the predictive model was that areas of archaeological sensitivity will occur in association with water sources and along crests, spurs and ridges.

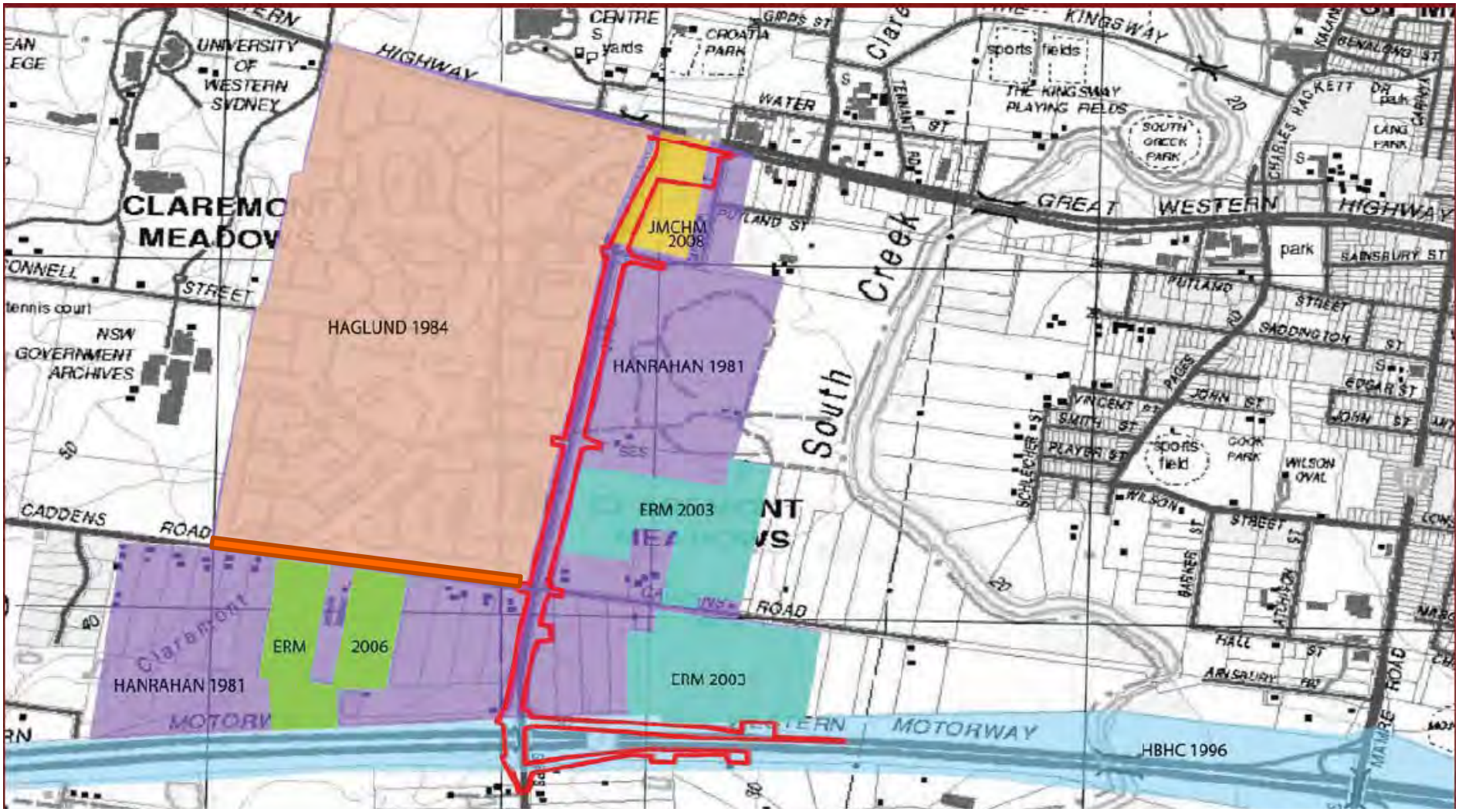


Figure 3. Map showing the areas involved in previous archaeological investigation in Claremont Meadows. Please note that the red outline depicts the extent of the survey area covered by AHMS in 2012 and the orange represents the current study area for this Due Diligence report (*AHMS* 2012:34).

3 GROUND DISTURBANCE

Step 1. Will the activity disturb the ground surface or any culturally modified trees?

The following is a detailed outline of the work components proposed for the Caddens Road upgrade redevelopment which may require ground disturbance (*J. Wyndham Prince*, 2018).

- Widening of exiting road to accommodate 3.2m wide travel lane and 3.2m wide parking lanes each direction within the existing 21m road corridor with double barrier central line-marking. 3.2m wide parking lanes also to be design as per road standards as these lanes are subject to converting into future traffic lanes when demand increases;
- Approach line marking to the Gipps Street Traffic Signals (eastbound) to include a 60m right turn lane in Caddens Road with the kerbside lane to be through and left (modification to kerb carriageway and lane lengths on the Eastern leg of the TCS intersection only);
- Provision of a single lane mountable roundabout at the intersection of Caddens Road and White Cedar Avenue including the provision of splitter islands with pedestrian walkthroughs on all three legs of the roundabout. Design vehicle to be buses for the through movement (and semi-trailer for the check path), with 8.8m service vehicles for the remaining turning movements.
- Provision of a seagull island treatment or similar at Caddens Road and Silkwood Drive;
- Provision of stormwater drainage system;
- Provision of a 2.5m shared use path on the northern side of Caddens Road adjacent to the back of properties, 1.5m footpath on the southern side;
- Construction of new driveways for at least six individual properties;
- Culvert construction over Claremont Creek;
- Utilities adjustment / relocation / protection as required. Existing overhead Telstra cables to be relocated underground; and
- Joining the one end of road with the newly constructed intersection of Gipps Street, Kent Road and Caddens Road and other end with the section that has already been widened (playing field).
- This new roundabout will remove the need for the temporary Watts profile speed humps currently in place for this section of Caddens Road;
- Re-align existing raised earth mound and reinstate affected vegetation;
- Construction of a raised concrete traffic island on White Cedar Avenue and Caddens Road;
- Painting of new road-lines and median
- Relocation of existing safety barrier melt terminal back 4m to allow for new bus stop;
- Bus shelter provision adjacent to the roundabout facility on the northern side (Note: The Local Traffic Committee to endorse the bus stop relocation from near Gipps Street);
- Retain kerb, gutters, driveways and footpaths immediately west of Silkwood Avenue;
- Pavement design meeting the requirements of a collector road, including interface pavements between older and new pavements;
- Reconstruction of existing low-level path as 2.5m shared pathway;
- Reconstruction of low block wall at rear of new pathway; and
- Assessing and designing of street lighting.

It is likely that many of these proposed works would be undertaken involving use of heavy earthwork machinery, such as a 5-tonne excavator. The affirmation that ground disturbance will occur requires the next step in the Due Diligence process.

4 REGISTER SEARCH AND LANDSCAPE ASSESSMENT

Step 2a. Search the AHIMS Database and other information sources

A search of relevant heritage registers for Aboriginal sites and places provides an indication of the presence of previously recorded sites. A register search is not conclusive however, as it requires that an area has been inspected and any site locations are provided to the relevant body to add to the register. However, as a starting point, the search will indicate whether any sites are known within or adjacent to the investigation area.

Multiple searches of the AHIMS database were undertaken on Tuesday 27 March 2018 for the study area (AHIMS Client Service Number was: 335901), including an area approximately 760m east-west by 20m north-south. As the study area extends along an existing road corridor, a parcel of land in the centre of the road (Lot 901, DP1209049) was selected and buffer zones of 50, 200 and 1000 metres respectively were then applied. There were 25 Aboriginal sites recorded within the wider search area (1km buffer zone) and no declared Aboriginal Places. The closest registered valid sites to the study area boundary include multiple surface artefact scatters (AHIMS#45-5-3393, #45-5-3394, #45-5-3395, #45-5-3396 and #45-5-4423). None of the recorded AHIMS sites are within or adjacent to the project area, with the closest site (AHIMS#45-5-3573) being located approximately 250m west of the Caddens Road upgrade works study area.

Table 1 shows the breakdown of site types within the 1km buffer zone and which of these sites remains valid and which have been subsequently destroyed and Figure 4 show the location of the AHIMS sites closest to the current project area. Please note the high number of destroyed sites across the area indicated the significant amount of ground disturbance that has occurred over the last 30 years.

Table 1 Breakdown of previously recorded Aboriginal sites in the region.

Site Type	Number
Artefacts (1 or more) – Valid Sites	13
Artefacts (1 or more) - Destroyed	12
TOTAL	**25**

It is clear from these search results that the dominant site type in this area are occurrences of stone artefact.

The Aboriginal Heritage Information Management System (AHIMS) is maintained by OEH and provides a database of previously recorded Aboriginal heritage sites. A search provides basic information about any sites previously identified within a search area. The results of the search can be relied upon for 12 months for the purposes of a due diligence level assessment.

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Figure 4. AHIMS sites close to the project area.

Step 2b. Are there undisturbed landscape features likely to contain Aboriginal objects?

As outlined above, Aboriginal heritage sites have been recorded in the general Claremont Meadows and wider Penrith area. The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* also outlines a range of landscape features that have higher potential to contain Aboriginal objects. It is necessary to consider whether there are landscape features of undisturbed land that may contain Aboriginal objects. These include land that is:

- within 200m of water,
- located within a sand dune system,
- located on a ridge top, ridge line or headland,
- located within 200m below or above a cliff face, or
- within 20m of a cave, rock shelter or cave mouth.

4.1 ERM PREDICTIVE MODELLING

The predictive model developed by ERM was only described in brief, as the 2006 report could not be accessed at the time of this report production. This summary comes directly from the AHMS 2012 report outlined above and has been provided below (Section 2.6).

> Higher artefact densities and evidence of intensive site use would be found on landform interface zones. For examples on the interface between crests, slopes and/or floodplains. Assemblages in the area also indicate resource pressure for raw materials, where glass and other materials were being used conservatively (AHMS 2012:33).

Using the predictive model, outlined above, for the Cumberland Plain region as proposed by ERM in 2006 the study area has landforms present which are predicted to have low to moderate archaeological sensitivity. While the majority of the project area has previously been disturbed by the construction and maintenance of significant arterial roads and highways, housing developments and associated infrastructure, there is still potential for Aboriginal objects to occur in areas that remain relatively undisturbed in the immediate vicinity of Claremont Creek. Therefore, the desktop and landscape assessment of the proposed Caddens Road upgrade works, including an area from Gipps Street in the east to Heaton Avenue in the west, indicate that there are at least one landscape present which may have the potential to contain Aboriginal sites or objects. The identification of this landscape within the study area triggers the next step in the OEH Due Diligence process, requiring a field inspection to be undertaken. However, the design footprint for the proposed upgrade works only extends marginally outside the existing road corridor boundaries for Caddens Road, effectively minimising the area to be inspected in the field and any disturbance to potential Aboriginal heritage finds.

5 IMPACT AVOIDANCE

Step 3. Can any AHIMS listed objects, or landscape features be avoided?

The area proposed for the Caddens Road upgrade works in Claremont Meadows is minimal and extends only marginally outside the north and south boundaries of the existing road corridor.

It is unlikely that a re-design of the proposed road expansion works would eliminate or reduce the impact on such low to moderate archaeological sensitive landscapes as described by ERM, unless the construction footprint was reduced to the current width of Caddens Road (ERM 2006). The desktop assessment alone is not sufficient to conclusively appraise the archaeological potential of the landscape or the location of any sites. Therefore, the next step in the process, a visual site inspection, must be conducted to fully comprehend and identify the presence and potential for Aboriginal sites or objects to occur.

6 DESKTOP ASSESSMENT AND VISUAL INSPECTION

Step 4. Does the desktop assessment and visual inspection confirm that there are likely to be Aboriginal objects present or below the ground surface?

The assessment process is primarily a desktop exercise, using available information such as the AHIMS search results and relevant archaeological reports that have been previously completed in the area. Visual inspection is also required where undisturbed landscape features are present that may contain sites.

The field inspection was completed by Amy Ziesing (NGH Environmental archaeologist) with two representatives from J. Wyndham Prince, Peter Calantzis and Martin Patfield on Wednesday 4 April 2018.

The study area extends along Caddens Road, from Heaton Ave in the west to the intersection of Gipps and Kent Streets in the east (Figure 1). The majority of the works will be undertaken to the northern side of the road corridor, with only minor disturbances being proposed for the southern road verge, most of which will be confined to the area west of Claremont Creek.

The southern side of Caddens Road will be widened by 800 mm to correspond with the existing section of Caddens Road travelling west towards the housing development of Caddens Hill and the associated playing field. All existing overhead Telstra cables will be removed and placed below ground in a trench parallel to the Caddens Road corridor. The ground surface along the extent of the study area on both sides of Caddens Road has been previously disturbed by the installation of the road corridor (Plate 4). JW Prince representatives have advised that this area would not be impacted by the works proposed for this project, but that this land was owned by Penrith City Council and may be included in future proposed redevelopment works, at which stage this area would require further assessment to ensure no Aboriginal heritage items are present. If the concept design for this area is altered in any way that may encroach upon this undeveloped portion of the study area, re-inspection will be required.

The results of the desktop assessment and field survey collectively suggest that the preservation of archaeological sites is related to the level of ground disturbance. The ground disturbance was wide-spread and significant in all areas of the study area, ranging from landscaping and vegetation clearance to modifications to Claremont Creek and its banks (Plates 1 and 2.).

Plate 1. Significant modifications and disturbance to Claremont Creek, facing west.

Plate 2. Claremont Creek bank modifications on southern side, facing southeast.

Plate 3. The western extent of the study area, looking towards Caddens Hill Playing Field, facing west.

Plate 4. Undeveloped portion of Caddens Road (southwest of Claremont Creek), facing south.

A large portion of the existing trees on the northern side of Caddens Rd are to be removed to allow for the construction of the shared pedestrian recreational footpath (2.5m wide), however, these plantings are predominantly juvenile examples of red and grey gums, many of which are already experiencing damage (Plate 5). A number of larger, more mature trees on the northern side are to be retained, with the newly constructed pedestrian footpath to curve around the root structures.

Plate 5. Stand of juvenile eucalypts to be removed as part of the proposed pedestrian footpath widening works, facing northwest.

One northern tree will undergo increased disturbance through increasing the level of the existing footpath by approximately 500 mm to make it consistent with the existing retaining wall to the immediate west of the Claremont Creek Bridge culvert (Plate 6). All trees to be impacted within the study area were inspected, especially those in close proximity to Claremont Creek, but as most were juvenile trees none bore any evidence of cultural modification.

Plate 6. Large mature eucalypt that will be retained as part of the proposed works. The newly constructed shared footpath with be raised to the existing retaining wall height and will travel south around the root system.

Trees that may have been mature enough for cultural modification were located along the creek line south of Caddens Road, approximately 30-50m from the southern boundary of the study area (Plate 7). However, as previously stated, if the proposed works were to be amended to extend into this area then a re-inspection of this creek line will be required.

Plate 7. Mature stand of trees travelling southwest along creek line, but excluded from the study area for the proposed upgrade works. Re-assessment may be required if design plans are altered and this area is included in the impact zone.

The only other possible location for the presence of potential Aboriginal heritage was on the northern side of Caddens Road along the creek line, however; this area has undergone extensive ground disturbance, creek modification and bush landscaping. The course of Claremont Creek has previously been altered and large granite boulders have been installed to create a four-tiered retaining bank infilled with various native and introduced reed species (Plate 8).

Plate 8. Showing the four-tiered boulder bank modifications and the native and introduced reed species dominating the creek line, facing northeast.

The base of the creek, which runs south under Caddens Rd has been concreted extending to the edge of the vegetated areas on both sides of the bridge (Plate 9). A cantilever platform is proposed for the northern side of the bridge to allow for the continuation of new widened pedestrian footpath. Support pylons will be required for this structure, extending to the base of the creek. No opportunity for Aboriginal heritage items remains in these highly disturbed areas.

Plate 9 and 10. Showing significant modifications and disturbances to northern side of Claremont Creek, including concrete apron (close-up), bank modifications and introduced plant species, facing east.

No sites or items of Aboriginal heritage were located within the study area for the proposed Caddens Road upgrade works. The area has undergone varying levels of modern disturbance, and the majority of these significant development activities have been completed in locations most likely to correspond with potential heritage landforms, therefore, reducing or removing entirely the potential for Aboriginal heritage objects to remain. It was determined that no further investigation is required and the proposed works are able to proceed with caution within the identified study boundary.

Figure 5. Field survey results map.

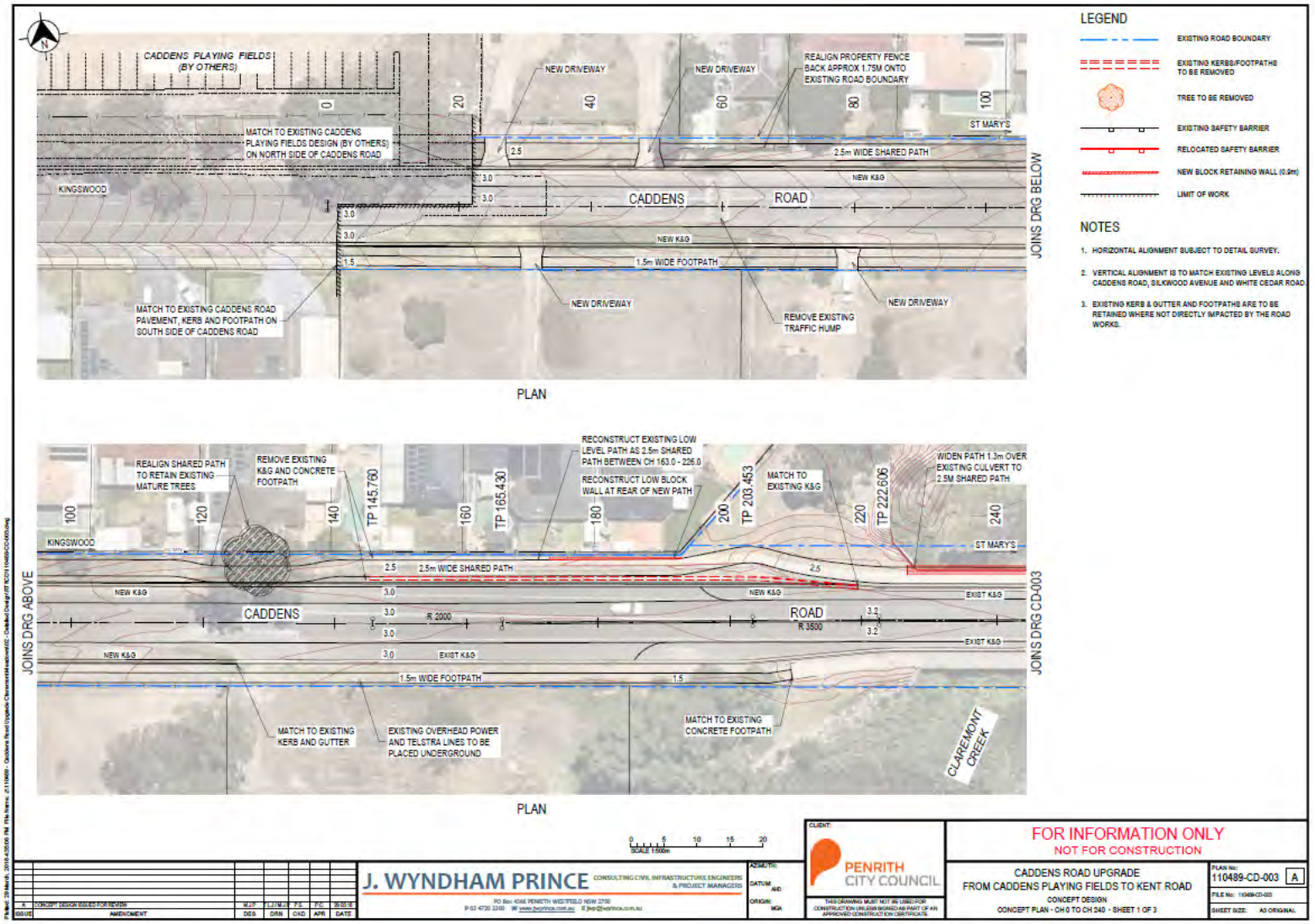

Figure 6. Cadden Road Concept Design, Sheet 1 of 3 (J. Wyndham Prince, 05.05.2018)

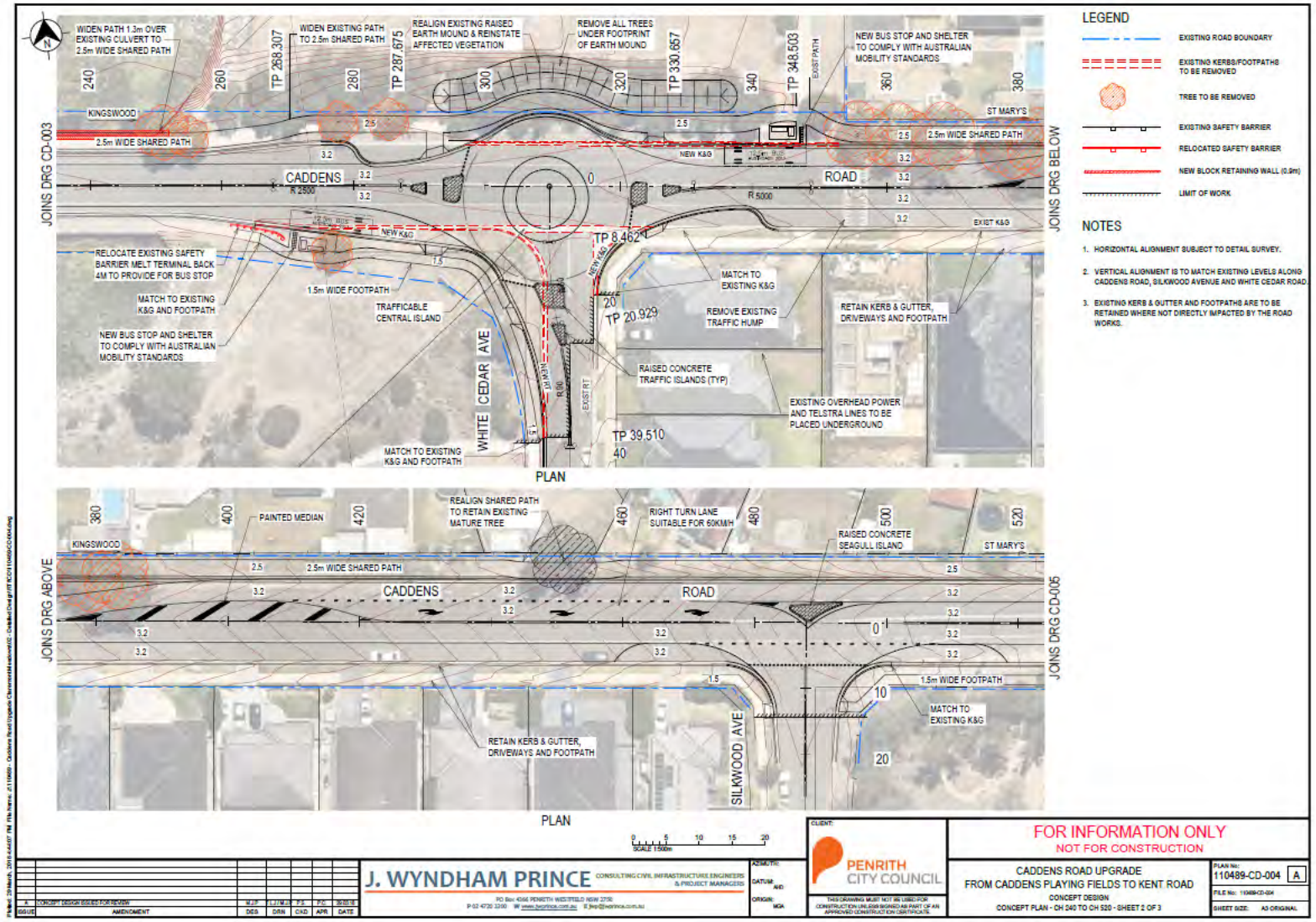

Figure 7. Caddens Road Upgrade Concept Design, Sheet 1 of 3 (J. Wyndham Prince, 05.05.2018).

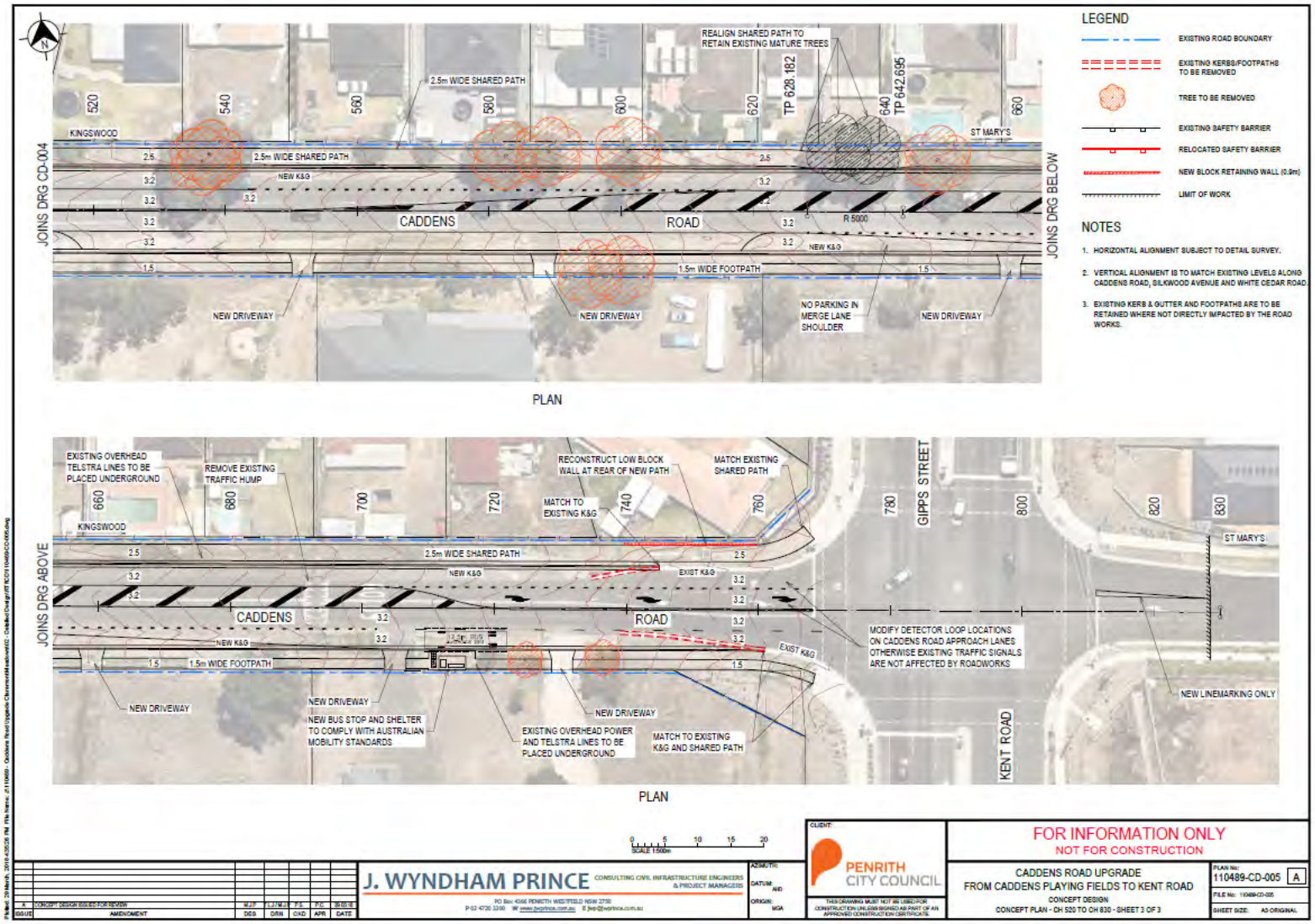

Figure 8. Caddens Road Upgrade Concept Design, Sheet 1 of 3 (J. Wyndham Prince, 05.05.2018).

7 FURTHER ASSESSMENT

Step 5. Is further investigation or impact assessment required?

The Due Diligence Code of Practice states that if, after the desktop research and visual inspection is completed, it is evident that harm will occur to Aboriginal objects or heritage places then further and more detailed assessment is required. However, if the research and inspection conclude that there are no, or unlikely to be any objects impacted by the proposed activity, then the activity can proceed with caution.

The field assessment identified no new sites and no areas of potential to contain Aboriginal heritage within the study area for the Caddens Road upgrade works. Therefore, the proposed construction and maintenance activities can proceed with caution with an 'Unexpected Finds Procedure' in place. This procedure has been laid out in detail below (Appendix A).

8 RECOMMENDATIONS

The following recommendations are based on the results of this Due Diligence assessment in conjunction with the field inspection completed on Wednesday 4 April 2018 and an appraisal of the potential for Aboriginal artefacts and sites to occur within the proposed Caddens Road upgrade study area at Claremont Meadows.

As no sites of registered Aboriginal heritage were located within the study area it is recommended that:

1. The proposed Caddens Road upgrade works may proceed with caution, following the Unexpected Finds Procedure (Appendix A) in areas marked **green** on Figure 5 and shown in the 80% detailed design plans (Figures 6 to 8). These areas have been identified as 'disturbed land' as defined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010) and do not require further investigation and are approved for the proposed construction works;
2. If the proposed works are to extend into area marked **red**, which has been provided with a 10m buffer zone on Figure 5, then a re-assessment of this area will need to be undertaken by a qualified archaeologist/heritage professional prior to any works commencing to determine if Aboriginal sites or objects may be present;
3. In the event that previously undiscovered Aboriginal finds are located during construction, all works in the vicinity of the find must cease and the 'Unexpected Finds Procedure' (Appendix A) should be adhered to, with a qualified archaeologist/heritage consultant called in to inspect the find and provide recommendations on proceeding, and
4. In the event that, human skeletal remains are identified during any aspect of the proposed construction works, then all work in the vicinity of the find must stop and the OEH/police must be notified to inspect the site.

9 REFERENCES

AHMS, 2012. *Aboriginal Archaeological Survey Report: Werrington Arterial Road (M4 Motorway to Great Western Highway), Claremont Meadows, NSW*. Unpublished report for Aurecon Australia.

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JMCHM, 2008. *Aboriginal Cultural Heritage Assessment of Lot 2 DP771697, Claremont Meadows.*

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URS, 2001. *Environmental Impact Statement for Gipps Street Landfill Site, Claremont Meadows.* Unpublished report prepared for Roads and Maritime Services.

APPENDIX A UNEXPECTED FIND PROTOCOL

An unexpected heritage item means any unanticipated discovery of an actual or potential heritage item, for which the Proponent does not have prior approval to disturb or does not have a safeguard in place to manage the disturbance.

These discoveries are categorised as either:

a) Aboriginal objects
b) Historic/non-Aboriginal heritage items
c) Human skeletal remains

If any of the above items are suspected or identified during construction activities, then a series of steps must be followed. These are outlined below:

1. All work should cease in that area and notify a Project Manager or Supervisor immediately of the find;
2. A 'no-go' zone should be established around the find, using visibility fencing (where applicable);
3. Inform all on-site personnel and staff of the find and the demarcated 'no-go' zone;
4. Contact a qualified archaeologist/heritage consultant/OEH to inspect the find and provide recommendations.
5. In the event that human remains are identified, complete steps 1-3. Replace Step 4 by immediately contacting the local police to investigate if the find relates to a criminal investigation. The police may take command of part or all of the site.

Once clearance of the site has been given by either the qualified archaeologist/heritage consultant and/or the local police then works may proceed within the 'no-go' zone UNLESS specifically instructed by the professional(s) that no further works can be completed in these areas.