NORTHWEST RAPID TRANSIT

PROJECT INTEGRATED MANAGEMENT SYSTEM

CONSTRUCTION FLORA AND FAUNA MANAGEMENT PLAN

FOR

SYDNEY METRO NORTHWEST OPERATIONS, TRAINS and SYSTEMS PPP

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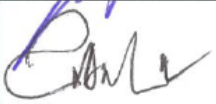
Construction Flora and Fauna Management Plan Approval Records

Approval Record

FUNCTION	POSITION	NAME	SIGNATURE	DATE
Reviewed by	Environment Manager	Peter Monsted		12.11.18
Reviewed by	Infrastructure Director	David Jackson		12.11.18
Reviewed by	Trains & Systems Director	Roger Ho		18/11/18
Reviewed by	D&D Director	Malachy Breslin		19/11/18
Reviewed by	MTS CEO	Ivan Lai		26/11/18
Approved by	NRT CEO	Mark Elliott		29/11/18

Amendment Record

Changes made to this document since its last revision, which affect its scope or sense, are marked in the right margin by a vertical bar (|).

DATE	REV	AMENDMENT DESCRIPTION	BY	INITIALS
29/10/2015	03	Updated following TfNSW & IC informal comments	Cameron Newling	CN
09/03/2016	03.01	Updated to include Norwest Pedestrian Link works and 33kV Underground Feeder Powerline works	Alex Bamford Cameron Newling	AB CN
04/08/2016	03.02	Updated following TfNSW comments	Cameron Newling	CN
29/11/2016	04	Updated to include revised vegetation clearance maps	Cameron Newling	CN
17/8/17	05	Review and update for annual recertification	Cameron Newling	CN

DATE	REV	AMENDMENT DESCRIPTION	BY	INITIALS
4/4/18	06	Update to include mitigation measures and monitoring for the Cheltenham Community Facility include OEH comments	Maulik Bapodara	MB
26/04/18	07	Incorporation of DP&E and Hornsby Shire Council consultation with regard to the Cheltenham Community Facility.	Peter Monsted	PM
15/05/18	07.01	Minor word change	Deb Allan	DA
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6/11/2018	08	Review and update for annual recertification	Peter Monsted	PM

Certification Record

DATE	REV	AMENDMENT DESCRIPTION	BY	INITIALS
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15/11/2017	05	NWRLOTS-OIC-1NL-PM-CER-000151	OIC	OIC
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30/05/2018	07.02	NWRLOTS-OIC-1NL-PM-CER-000179	OIC	OIC

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1 Introduction

This *Construction Flora and Fauna Management Plan* (CFFMP) outlines the construction environmental management arrangements by which Northwest Rapid Transit (NRT), in partnership with Transport for NSW (TfNSW), is delivering the Operations, Trains and Systems (OTS) Public Private Partnership (PPP) component of the North West Rail Link (NWRL) Project, now renamed as 'Sydney Metro Northwest'.

Note: In June 2015, TfNSW changed the project's name to Sydney Metro Northwest (from the North West Rail Link) to reflect its role in Sydney's new railway network. Any references to the North West Rail Link in this plan can be assumed to be referring to the Sydney Metro Northwest. Similarly, the Rapid Transit Rail Facility (RTRF) is now known as the Sydney Metro Trains Facility (SMTF).

1.1 OTS PPP

Sydney Metro is Australia's largest public transport project. Sydney Metro Northwest, formerly known as the North West Rail Link, is the first stage of Sydney's new fully-automated metro system and will open to customers in the first half of 2019.

Stage 2, Sydney Metro City & Southwest, will extend metro rail under Sydney Harbour, through the CBD and southwest to Bankstown.

The $8.3 billion Sydney Metro Northwest will deliver eight new railway stations and 4,000 commuter car parking spaces to Sydney's growing North West. Services will start with a train every four minutes in the peak. The project also includes the upgrade and conversion of five existing railway stations to metro standards.

The OTS contract is a 15-year PPP project – the largest in the history of New South Wales as well as the largest of the three delivery contracts for Sydney Metro Northwest.

Northwest Rapid Transit is delivering Sydney's new generation metro trains; building the new stations and car parks; installing tracks, signalling, mechanical and electrical systems; building and operating the RTRF at Tallawong Road; upgrading and converting the railway between Epping to Chatswood to rapid transit standards; and operating Sydney Metro Northwest – including all maintenance work.

1.2 Purpose and Application

This CFFMP describes how NRT will manage and minimise impacts on flora and fauna issues during OTS Works. The OTS Works include Phase 1 Works (RTRF and Cudgegong Road Station), Epping to Chatswood Rail Link (ECRL) Conversion Works, Phase 2 Works (remaining new stations and associated infrastructure), Norwest Pedestrian Link Works, 33kV Underground Feeder Powerline Works and Rouse Hill Temporary Bypass Powerline works.

Figure 1 below illustrates the delineation of the Phase 1, ECRL Conversion and Phase 2 of the OTS Works.

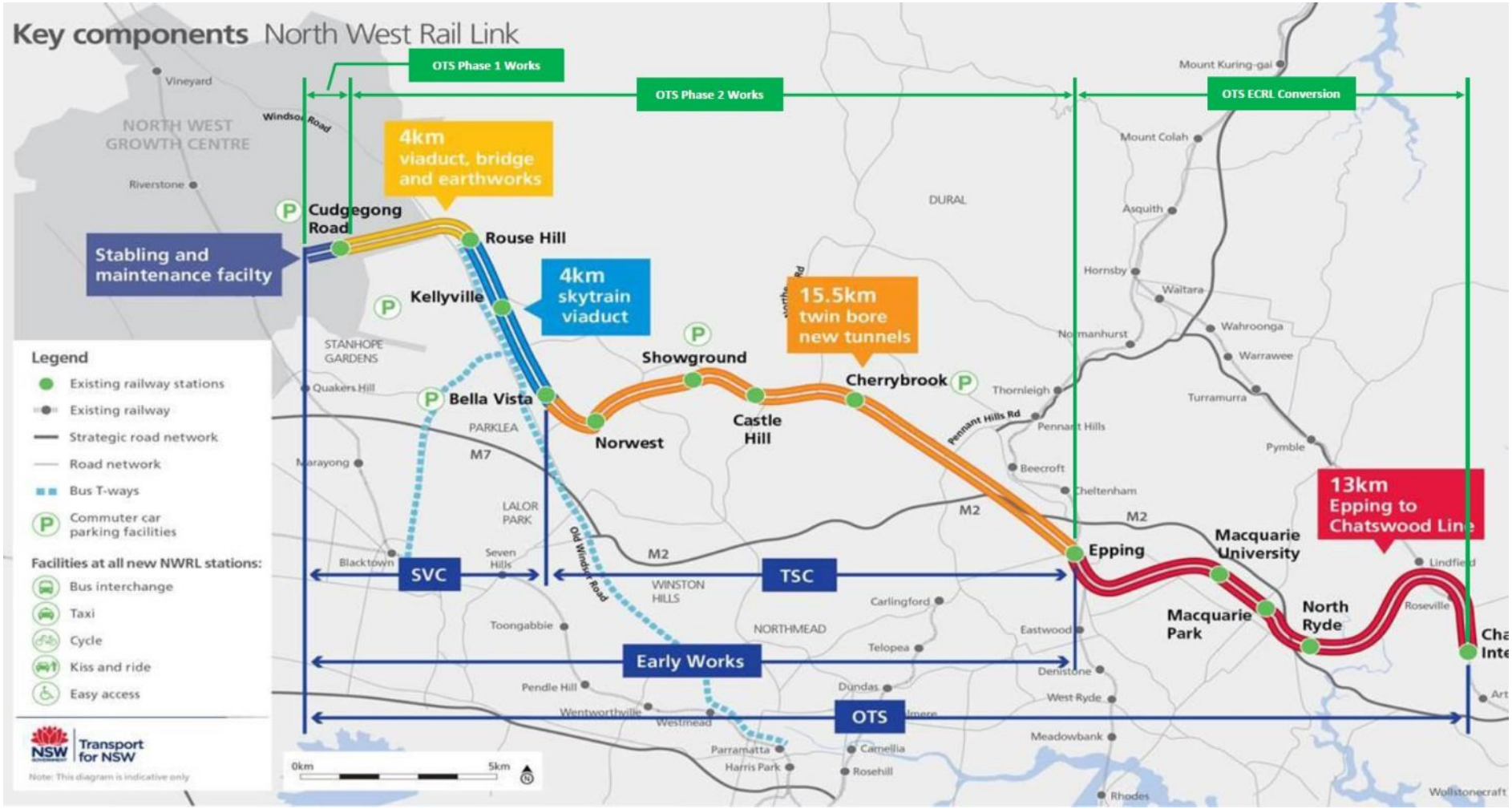


Figure 1 Schematic of NWRL OTS Phase 1, ECRL and Phase 2 Works

Phase 1 Works are associated with the delivery of the RTRF and the Cudgegong Road Precinct Enabling Works, being the works west of Cudgegong Road and including the initial earth works in the vicinity of Cudgegong Road Station. Refer to Figure 2 below.

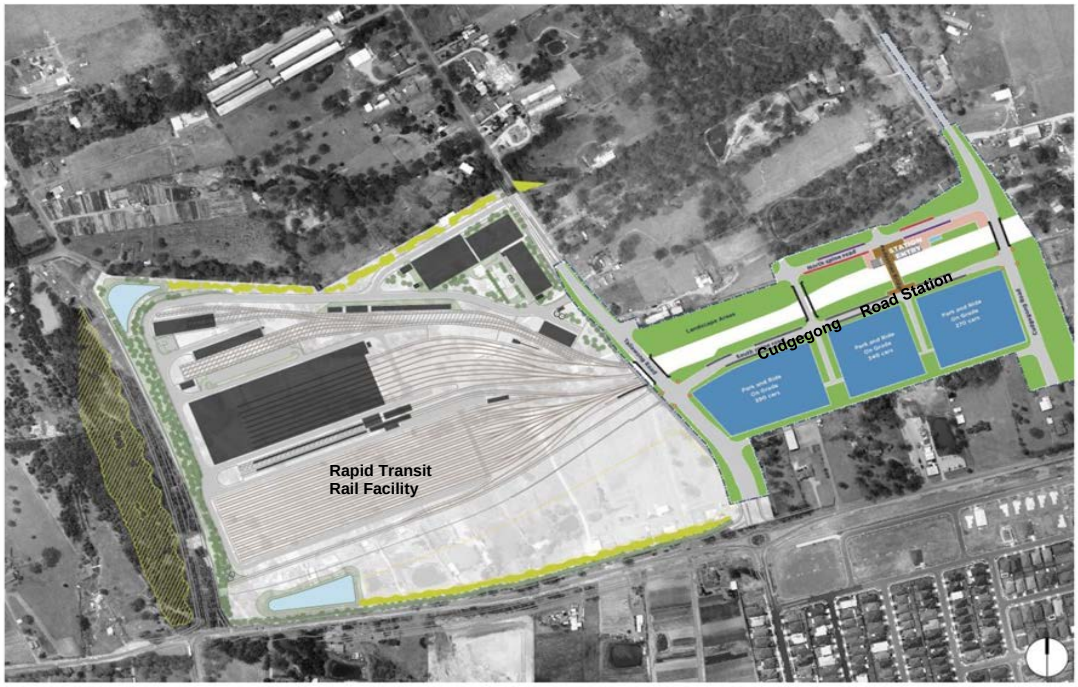


Figure 2 Indicative NWRL OTS Phase 1 Site: RTRF and Cudgegong Road Station

ECRL Conversion Works refer to the conversion of the existing Epping to Chatswood Rail Line to rapid transit. Refer to Figure 3 below.

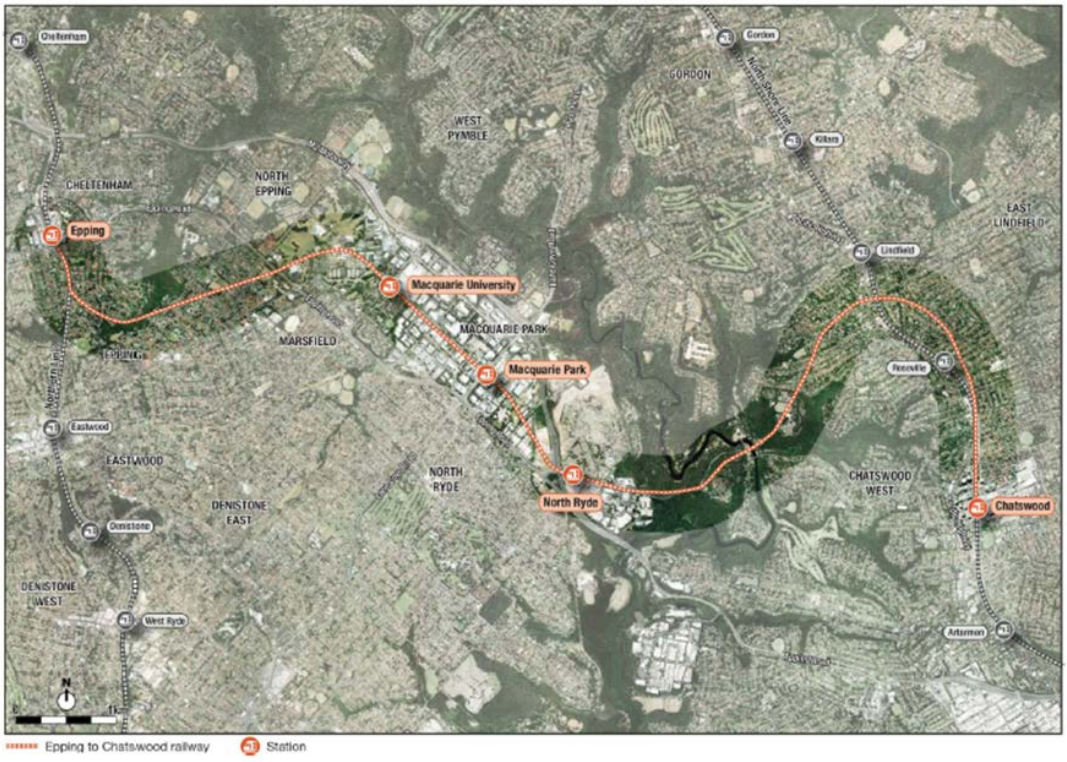


Figure 3 Indicative ECRL Conversion Works Area

Phase 2 Works refer to the construction of:

- New railway stations and precincts at Rouse Hill, Kellyville, Bella Vista, Norwest, Showground, Castle Hill and Cherrybrook (connecting to the Phase 1 works to the west and ECRL Conversion works to the south-east. These works include the major civil construction work areas, including but not limited to the seven stations sites and six sites associated with the above rail corridor from Bella Vista to the Phase 1 work areas.
- Services facilities at Epping and Cheltenham including a new Community Facility at Cheltenham Oval
- Rail infrastructure and systems
- Infrastructure such as road works, pedestrian/cycle facilities, landscaping associated with construction of precincts and stations.

The scope of Phase 2 Works is illustrated in Figure 4 below.

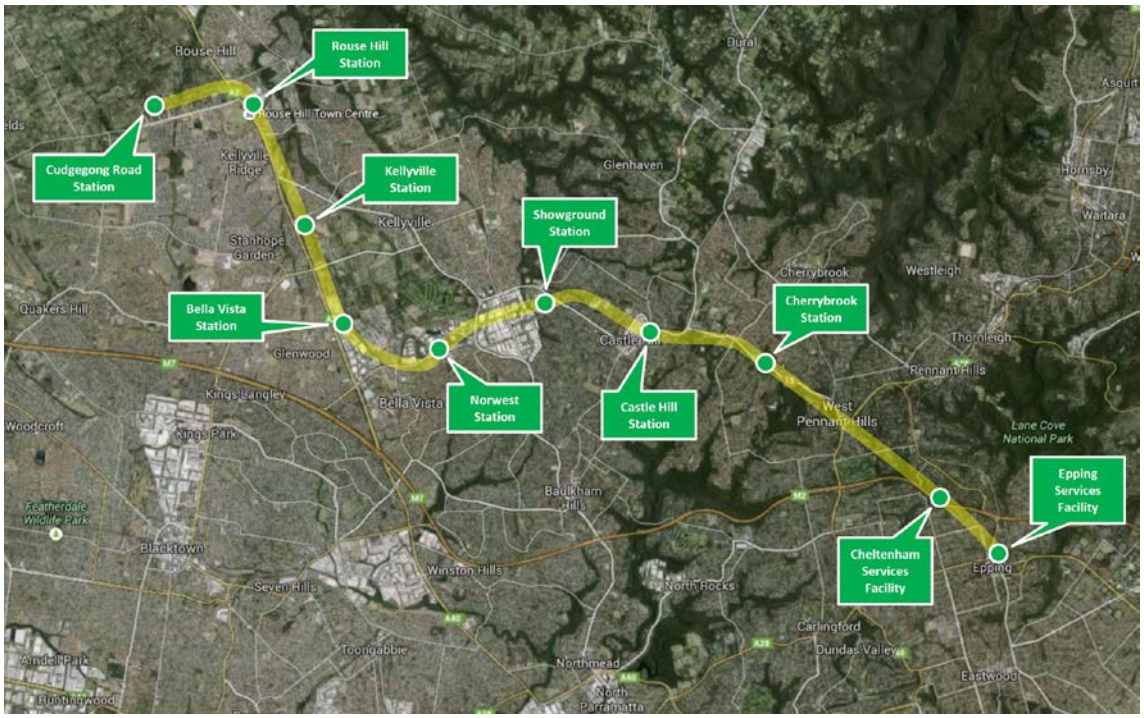


Figure 4 Indicative NWRL OTS Phase 2 Works Areas

Norwest Pedestrian Link works refer to the installation of an underground pedestrian link and second station entry on the northern side of Norwest Boulevard at Norwest Station. See Figure 5.

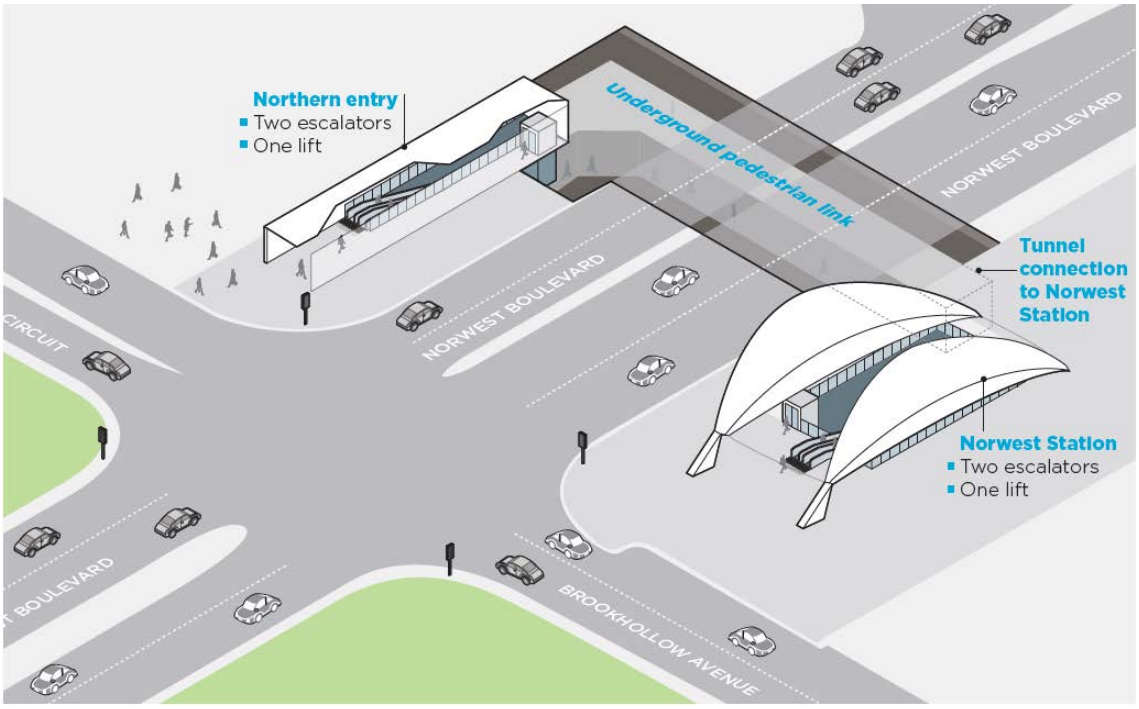


Figure 5 Artist Impression of the Norwest Pedestrian Link

The 33kV Underground Feeder Powerline works refer to the building and maintaining a new five kilometre 33kV feeder power line between Ausgrid's Willoughby Sub transmission Substation and the TfNSW Chatswood North Traction Substation. The proposal is required to provide dedicated, independent 33kV connection in order to meet the reliable supply of electricity requirements for this project. See Figure 6.

The Rouse Temporary Bypass Powerline involves the construction of a temporary powerline from the southern side of the Sydney Metro Windsor Road Bridge crossing Schofields Road, running underground through Castlebrook Memorial Park transitioning back to overhead and crossing Windsor Road to the Rouse Hill traction substation located south of Sanctuary Drive. The purpose of the temporary powerline is to enable energisation and commissioning of the rail systems associated with the construction of Sydney Metro Northwest. See Figure 7 below.

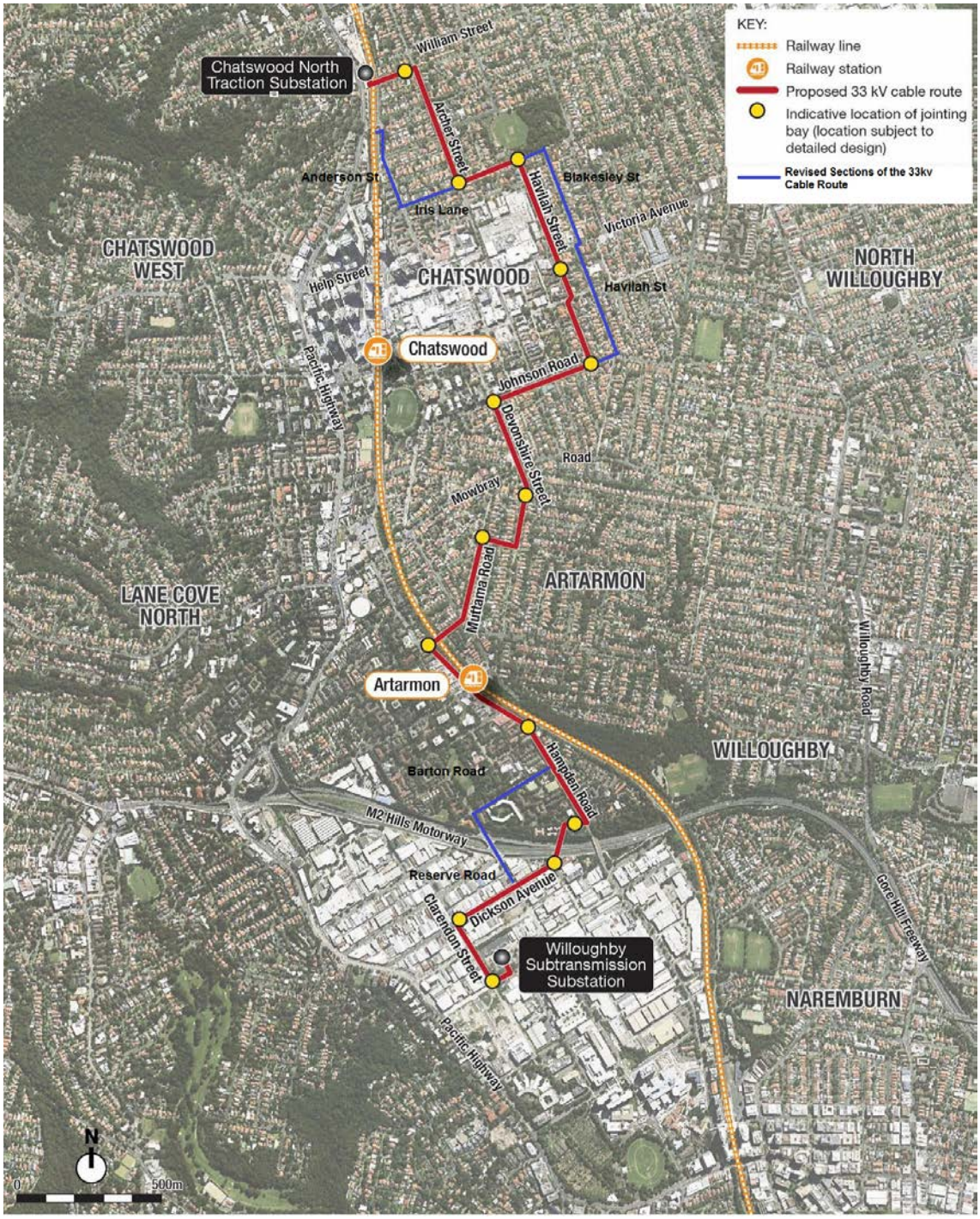


Figure 6 Overview of the 33kV Underground Feeder Powerline Route

Figure 7 Rouse Temporary Bypass Powerline Work Area

Specifically, this Sub Plan:

- Describes the legislative framework specific to flora and fauna issues and relevant guidelines that must be followed
- Identifies the existing ecological communities and their conservation status under Commonwealth and State legislation
- Identifies key ecological risks and impacts associated with the Works
- Describes procedures that will be used for management of aspects and potential impacts associated flora and fauna.

This Plan is a Sub Plan of the *OTS Works Construction Environmental Management Plan* (CEMP). The relationship of this Plan to other NRT Plans is described in detail below (Section 1.4).

1.3 Flora and Fauna Management Objectives and Targets

The CFFMP addresses the following requirements:

- OTS Project Deed, Operations, Trains and Systems, Exhibit 1, Scope and Performance Requirements, Appendix 54 – Project Plan Requirements, Section 3.17
- Project Planning Approval – Rapid Transit Rail Facility (ref SSI-5931) – All Conditions applicable to Phase 1 NWRL OTS works.
- Project Planning Approval (and Modification 20 May 14) – NWRL Stage 2 – Stations, Rail Infrastructure & Systems (SSI-5414) – applicable to Phase 1 NWRL OTS works, as defined in Staging Report
- Cheltenham Community Facility Epacris Salvage Plan (EcoLogical, 2018)
- ECRL Conversion Determination Report Conditions of Approval

- Applicable Environmental Mitgation Measures from Project EISs:
  - Environmental Impact Statement 2 (EIS2) and Submissions Report (including – NWRL Stage 2 Stations, Rail Infrastructure and Systems (2012/3)
  - Environmental Impact Statement and Submissions Report – Tallawong Road, Rouse Hill Rapid Transit Rail Facility (JBA 2013).
- ECRL Conversion Review of Environmental Factors (Parsons Brinkerhoff, 10 October 2014) and Submissions Report (Parsons Brinkerhoff, 5 February 2015)
- Norwest Pedestrian Link Review of Environmental Factors (Parsons Brinkerhoff 4 June 2015) and Submissions Report (Parsons Brinkerhoff, 1 October 2015)
- Norwest Pedestrian Link Determination Report Conditions of Approval
- Willoughby to North Chatswood 33kV Underground Feeder Powerline Review of Environmental Factors (Parsons Brinkerhoff 20 October 2015) and Submissions Report (Parsons Brinkerhoff 9 March 2016)
- 33kV Underground Feeder Powerline Determination Report Conditions of Approval
- Rouse Hill Temporary Bypass Powerline Environmental Impact Assessment (EIA)
- NWRL Construction Environmental Management Framework (Rev1.4)
- Applicable Legislative Obligations.

The Compliance Matrix in Annexure B details how the CFFMP complies with the requirements of the applicable Conditions of Approval (CoA) requiring this Sub Plan to be prepared, consulted and approved. Annexure B provides a comprehensive list of compliance requirements, environmental documents and the contract documents. Additional detail on compliance management is also contained in Section 2.2

NRT's flora and fauna management objectives & targets for the delivery of the OTS Works are:

- Minimise impacts and disturbance on flora and fauna
- Design waterway modifications and crossings to incorporate best practice principles
- Retain and enhance existing flora and fauna habitat wherever possible
- Appropriately manage and control the spread of weeds and plant pathogens.
- These objectives conform to TfNSW's objectives as described in the NWRL Construction Environmental Management Framework.

1.4 NRT Environmental Management System

In accordance with the OTS Project Deed, Exhibit 1, Scope and Performance Requirements, Section 5.2, NRT must implement and maintain an effective Management System, which addresses all its obligations under the Deed.

The Management Systems must seamlessly integrate all NRT's systems and processes, including those related to rail safety and rail accreditation quality, environmental,

sustainability, health and safety and they must accommodate, coordinate and give effect to the Project Plans.

Details of NRT's Integrated Management System including the integrated relationship of the CFFMP with the other Project Plans and with the delivery Core Processes are contained in the Project Management Plan. As improvements are made to the processes and systems, these will be reflected in updates to the relevant Project Plans. All elements of the Integrated Management System will reside on Aconex as controlled copies. An intranet will contain a front page to the Integrated Management System with links between documents, processes and forms utilising the Aconex search engine

1.5 Approval Before Submission

The CFFMP and future updates are to be approved by NRT's CEO before being submitted to TfNSW.

1.6 Certification by Independent Certifier

This updated CFFMP and any future update is to be submitted, in accordance with the provisions of clause 8 of the Deed, to TfNSW for comment and to the OTS Independent Certifier for certification prior to its implementation by NRT.

1.7 Update and Ongoing Development

The CFFMP is incorporated as Appendix 76 of the Deed.

The CFFMP will be updated regularly in accordance with the requirements of the *Deed,* clause 8 and annually as required in *Exhibit 1, Scope and Performance Requirements, Appendix 54 – Project Plan Requirements, Table 1.*

NRT will undertake the ongoing development, amendment and updating of the *CFFMP* to ensure it remains consistent with Project priorities, risk management, client requirements and Project objectives, taking into account:

- The status and progress of NRT's activities
- Changes in the design, delivery and operations processes and conditions
- Lessons learnt during delivery and operations
- Changes in other related Project Plans
- Requirements and matters not covered by the existing Project Plans
- Changes to Plans resulting from any comments from the OTS Independent Certifier
- Changes to Project Plans as directed by TfNSW's Representative under the Deed
- Hand-over from previous contracts
- Actions and initiatives with regards to minimising vegetation removal and monitoring programs from previous contracts

- Changes to scope of works
- New areas included into NRT brief.

1.8 Agency and Stakeholder Consultation

1.8.1 OTS Works Consultation

The Minister's Condition of Approval (CoA) requires that the CFFMP and the Ecological Monitoring Program (contained within this plan) be prepared in consultation with the Office of Environment and Heritage (OEH) and relevant local councils. Further, the Plan is required to be approved by Department of Planning & Environment (DP&E) prior to construction as part of the CEMP.

This Sub Plan (and the CEMP) has been provided, for review and comment, to:

- Office of Environment and Heritage (OEH)
- Blacktown City Council
- The Hills Shire Council
- Hornsby Shire Council
- Department of Planning & Environment (DP&E)

Annexure A details the comments received during this consultation process and NRT's response. It is noted that these stakeholders will have an ongoing role in the reviewing relevant subsequent Plans and documents relating to NRT's works.

No further consultation was required for updates associated with the Norwest Pedestrian Link, Willoughby to Chatswood 33kV works and Rouse Hill Temporary Bypass Powerline works.

2 Legal and Other Requirements

2.1 Relevant Legislation

A summary of legislation applicable to this FFMP is provided below.

The main legislation relevant to flora and fauna management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Fisheries Management Act 1994* (FM Act)
- *National Parks and Wildlife Act 1974* (NPW Act)
- *Biodiversity Conservation Act 2016* (BC Act) (the BC Act began on 25 August 2017 and replaces the *Threatened Species and Conservation Act 1995* and amendments (TSC Act)).
- *Native Vegetation Act 2003* (NV Act)
- *Noxious Weeds Act 1993* (NW Act)
- *Pesticides Act 1999*
- *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

Section 2 of the CEMP provides additional details of the relevant sections of each Act and any approvals required.

2.2 Compliance Requirements

Relevant compliance requirements, pertinent to management of flora and fauna, from the contract, the various Conditions of Approval (CoA) supporting documents and the EPL are listed in Annexure B.

All compliance requirements associated with this sub plan including the Revised Environmental Management and Mitigation Measures from the NWRL Project Environmental Impact Assessments and Submissions Report, the ECRL REF and Submissions Reports, the Norwest Pedestrian Link REF and Submission and Determination Report and the 33kV Underground Feeder Powerline REF and Submission and Determination Report that are pertinent to this sub plan are tracked and reported via the OTS compliance tracking program developed in accordance with CoA D5((a)-(h)).

2.3 Relevant Guidelines

Additional guidelines and standards relating to the management of flora and fauna include:

- A Field Manual for the Surveying and Mapping of Nationally Significant Weeds (McNaught, I., Thackway, R., Brown, L. and Parsons, M 2008)
- Asparagus Weeds Best Practice Management Manual

- Australian Standard 4970–2009 Protection of trees on development sites
- Best Practice Guidelines for Blue Gum High Forest (DECC 2008)
- Best Practice Guidelines Sydney Turpentine-Ironbark Forest (DECC 2008)
- Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Suddaby, T. and Liew, E. 2008).
- Control Manual for Lantana (Van Oosterhout 2004)
- Cumberland Plain Recovery Plan (DECCW 2011)
- Guidelines for Threatened Species Assessment (DEC and Department of Primary Industries, 2005)
- Noxious and Environmental Weed Control Handbook, 4th Edition, NSW Industry & Investment Management Guide
- Protection and Restoring Blue Gum High Forest (DECC 2008)
- Recovering Bushland on the Cumberland Plain. Best practice guidelines for the management and restoration of bushland (DECC 2005)
- Survey Guidelines for Australia's Threatened Frogs (Australian Government Department of the Environment, Water, Heritage and the Arts, 2010)
- Threatened Biodiversity Survey and Assessment Guidelines (working draft, DEC, 2004)
- Weed Management Guide, Weed of National Significance Madiera Vine (*Andrederacordifolia*) Caring for Our country (http://www.weeds.org.au/WoNS/madeiravine/)

3 Roles and Responsibilities

The roles and responsibilities of key NRT personnel with respect to flora and fauna are as follows:

Table 1 Roles and Responsibilities

Role	Responsibilities
Project Director	Manage the delivery of the Project including overseeing implementation of flora and fauna management measures. Act as Contractor's Representative
Environment Manager (EM)	Manage the on-ground application of flora and fauna management measures during construction. Provide guidance to senior management with regard to aspects and risks associate with management of flora and fauna. Responsible for managing ongoing compliance with the CoA, environmental document requirements and any EPBC Act compliance requirements.
Design Team Manager	Ensure relevant flora and fauna management requirements are addressed in design development.
Commercial Manager	Ensure that relevant flora and fauna management requirements are considered in procuring materials and services.
Construction Managers Site Superintendent	Manage the delivery of the construction process, in relation to flora and fauna management across all sites in conjunction with the Environment and Sustainability team.
Environment Coordinator	Develop and oversee implementation of on-ground management documents associated with flora and fauna. Monitor and report on flora and fauna management during construction.
Project Engineer	Implement flora and fauna management activities during construction works, as directed by the Construction Manager and or the Environment Manager.

Role	Responsibilities
Specialist Consultant	Specialist consultants will be engaged to undertake specific monitoring and management activities with regard to flora and fauna including pre- and post-clearance surveys, species-specific fauna surveys as well as fauna rescue and relocation measures. A suitably qualified ecologist will prepare an ecological monitoring program to monitor the effectiveness of the biodiversity mitigation measures.

4 Existing environment

4.1 Phase 1 Works

Flora and fauna directly or indirectly impacted during the delivery of Phase 1 of the OTS Works are described and assessed in studies and reports completed for EIS 2 (OTS) and RTRF EIS.

Chapters 11 (EIS 2) and 13 (RTRF EIS) include assessments of the existing environment along the Project alignment, with more detailed specialist ecological reports presented as appendices. The EIS documents describe the flora and fauna and their habitats present at the site and provide detailed species lists. These assessments consider both the construction impact areas, as well as much of the adjoining land.

The likelihood of occurrence of threatened species, populations and communities detected within a 10-kilometre radius of the site were considered in those documents and it was determined that the following species were most relevant: the Cumberland Plain Land Snail, Green and Golden Bell Frog, microchiropteran bat species, threatened birds, Cumberland Plain Woodland EEC and the River-flat Eucalypt Forest EEC.

As noted in the EISs, work undertaken on the NWRL Project by Early Works¸ will have altered the environment described in numerous locations. The subsequent revisions of this CFFMP will account for the environment at the time of NRT's possession of each site.

This section provides an overview of the existing flora and fauna characteristics of the Phase 1 NWRL OTS site areas, as documented in the documents above and verified during the recent site inspection.

4.1.1 Additional Assessment

NRT engaged SLR consulting to carry out a site inspection to confirm the condition of the vegetation and habitats across the site and ensure that the site remains in a similar condition to that reported during the EIS process.

It was found that much of the site remains in a similar state ecologically to that described in the original EIS documentation. No additional threatened species, populations or areas of EEC vegetation were observed during this site visit.

See Appendix D for details.

4.1.2 Terrestrial Flora

4.1.2.1 Existing Vegetation

Much of the site is comprised of land cleared and disturbed for past rural ventures, including residents, small-scale farming and market gardens.

- The existing intact native vegetation present on the site includes:

- Isolated patches of “poor or moderate condition” Cumberland Plain Woodland (CPW), which is listed a Critically Endangered Ecological Community (CEEC in the TSC and EPBC Acts); and
- Bands of River-flat Eucalypt Forest on Coastal Floodplain Forest (REFCF) EEC (TSC Act listed) in “poor or moderate condition” along Second Ponds Creek.
- The condition of much of the vegetation is reduced due to clearing and maintenance (mowing or grazing) of the understorey and groundcover layers and subsequent invasion of weed species (including exotic grasses and pasture weeds, as well as more invasive species such as Mother-of-Millions, Prickly Pear, Madeira Vine, Small-leaved Privet, Large-leaved Privet, African Boxthorn, African Olive and Green Cestrum).

There are a few patches in the east of the site (rear of properties 75, 77, 79 and 81 Schofields Road) in moderate condition, which may be suitable for the salvage and translocation of leaf litter and topsoil (including native seed bank) for bush regeneration purposes.

- Based on the approved impact area, there appear to be limited opportunities for vegetation retention and enhancement. There is a moderately-sized area of exotic Radiata Pine Forest with a heavily disturbed understorey of Privet, African Olive and Green Cestrum in the north-eastern quadrant of Property 51 Schofields Road, which may be suitable to large-scale weed removal and offset planting or topsoil introduction.

4.1.2.2 Threatened Flora Species

No threatened flora species or endangered populations have been identified on the Phase 1 works area. Given the highly disturbed nature and artificial condition of the vegetation across the subject site and in its vicinity, and the long history of management (including probable use of fertilisers, irrigation and weed control), it is not likely that any of the subject land constitutes suitable habitat for any of the additional threatened plant species known in the locality.

4.1.3 Terrestrial Fauna

4.1.3.1 Existing Fauna

The Phase 1 Works site generally provides only limited habitat opportunities for native fauna, threatened or otherwise, because of the generally high levels of modification and degradation, and the intensity of historical and ongoing human activities.

Patches of woodland and forest to be cleared may be occupied by native birds (such as Lorikeets and Rosellas), micro-bats (such as Common Bent-wing Bat and Little Bent-wing Bat), reptiles (Red-bellied Black Snake and Blue-tongue Lizard) and invertebrate (such as the Cumberland Plain Land Snail) at the time of clearing.

In addition dams and surrounding exotic paddock weeds (such as thickets of Kikuyu grass) may be home to frogs (such as the Common Eastern Froglet and Smooth Toadlet), turtles (the Eastern Long-necked Turtle), waterbirds (such as the White-faced Heron) and other reptiles (such as snakes and lizards).

Six habitat trees which contained a few small to medium sized hollows were identified during the recent site inspection (see Figure 8 below). These trees may provide habitat

to common birds, micro-bats and possibly the Brush-tail or Ringtail Possum. These trees will be subject to slow-drop removal procedure in accordance with the development conditions (including slow-drop felling with an ecologist or suitably qualified wildlife handler present).

Figure 8 Phase I Habitat Trees – SMTF and Cudgegong Station

There are limited habitat features suitable for salvage (such as rocks and large hollow logs), however, some leaf litter may be salvaged as habitat for lizards and invertebrate, as well as for ground stabilisation qualities.

4.1.3.2 Threatened Fauna Species

Only two threatened fauna species have been recorded on the Phase 1 works site, the Common Bent-wing Bat and the Little Bent-wing Bat. An additional two species, the Cumberland Plain Land Snail and the Green & Golden Bell Frog are considered to have some potential habitat, although neither species have been recorded on the site. It is also possible that a number of other (generally widespread and highly mobile species) could occur on the site on occasions (such as the Grey-headed Flying Fox and Swift Parrot), however it is not likely that these species would reside on the site on any permanent basis and even if present they are not likely to be affected by the clearing and construction program.

4.1.4 Aquatic Flora and Fauna

There are two key water courses in the vicinity of the Phase 1 Works site including:

- Second Ponds Creek (east of the site – not likely to be impacted by this phase of development)

- First Ponds Creek (directly adjoining the western boundary of the site).

The vegetation along First Ponds Creek constitutes River-flat Eucalypt Forest EEC in “poor or moderate condition”, which is also thought to provide some potential habitat for the Green & Golden Bell Frog (although not actually sighted despite past targeted surveys).

The conditions of riparian and aquatic habitats along the watercourse associated with the project area are generally poor and degraded. In particular large stands of exotic Radiata Pine with thickets of noxious environmental weeds are present on property 51 Schofields Road and weeds (such as Moth Vine and Panic Veldt Grass) dominate much of the area of native canopy.

Riparian vegetation and habitats are largely retained in accordance with current plans and will be suitably protected and rehabilitated in accordance with the project approval documentation.

Despite some potential habitat for the Green & Golden Bell Frog, there are unlikely to be threatened aquatic species or endangered aquatic populations in the creeks associated with the Project Area and the Phase 1 works will not directly impact on or impede fish passage

4.1.5 Groundwater Dependent Ecosystems

It is unlikely that any of the ecosystems present on the Phase 1 Works site (RTRF and Cudgegong Road Precinct Enabling) site are groundwater dependent ecosystems.

The riparian vegetation along First Ponds and Second Ponds Creeks, are more dependent upon incipient rainfall and localised overland flow than on any groundwater that may be present at this location.

4.2 ECRL Conversion Works

The ECRL Conversion REF stated the following:

The proposed works to the Epping to Chatswood railway as part of the this REF are mostly confined to the Epping to Chatswood railway corridor and station precincts, an ecological assessment was not considered necessary for the proposed Epping to Chatswood railway conversion works portion of the proposal.

Minor vegetation clearance at the proposed chiller unit sites at Epping, Macquarie University, Macquarie Park and North Ryde may be required. The amount of vegetation clearance required however is minimal as most of the proposed sites are existing hardstand areas or would generally be restricted to the removal some small bushes, grasses areas or small planted trees.

4.3 Phase 2 Works

EIS 1 (Vol. 1B, Section 15.4) contained detailed studies of the existing terrestrial and aquatic environment prior to the Early Works, TSC Works and SVC Works contracts commencing. Since the commencement of these contract packages, the existing environment has changed significantly at each of the Phase 2 worksites.

The locality of any existing vegetation and areas where vegetation clearance has not occurred within the TSC and OTS worksites would be provided to OTS upon handover.

Until handover of sites occurs, this CFFMP provides an assessment of the potential direct and indirect impacts of the OTS Works, with reference to impact assessments on terrestrial and aquatic ecology already contained with the Construction Flora and Fauna Management Plans completed for TSC (NWRLTSC-TJV-0-02016-TSC-EN-PLN) and SVC (NWRLSVC-ISJ-SVC-PM-PLN-120206). A

Terrestrial ecology assessments undertaken for EIS 1 (and referred to in EIS 2) include the Project construction footprint. This footprint typically has been extended to the edge of adjoining infrastructure (e.g. roads), urban development, or to a 100 m buffer to account for indirect impacts. The following extracts from TSC and SVC Construction Flora and Fauna Management Plans describe the existing flora and fauna characteristics of the relevant worksites to be handed over to OTS.

As noted in the EISs, work undertaken on the NWRL Project by Early Works¸ TSC and SVC contractors, will have altered the environment described in numerous locations. The subsequent revisions of this CFFMP will account for the environment at the time of NRT's possession of each site.

4.3.1 Additional Assessment

TfNSW engaged EcoLogical to carry additional ecological assessment of the construction footprint of the Cheltenham Community Facility in July 2017 (EcoLogical 2017) following determination of a new location outside of the EIS project area through consultation with community groups and Hornsby Shire Council.

4.3.2 Terrestrial Flora

EIS 1 recorded six native vegetation communities mapped across the NWRL alignment relevant to Phase 2 Works. Of these, five are listed under the Commonwealth EPBC Act and/or the NSW TSC Act as Endangered Ecological Communities (EECs) or Critically Endangered Ecological Communities (CEECs). Annexure C contains vegetation maps for each of the OTS Worksites, which illustrate the indicative location of remaining native and exotic vegetation communities in and in the immediate surrounding area of the worksites.

Table 2 provides a description of the native vegetation communities recorded within proximity to the OTS Works construction sites, and identifies the status of each vegetation community under the NSW TSC Act and the EPBC Act.

Table 2 Threatened Ecological Communities Recorded within the NWRL Alignment

Vegetation Community	Typical Description of Community	Location in Relation to OTS Worksites	TSC Act Status*	EPBC Act Status*
Blue Gum High Forest	A moist, tall open forest community dominated by either Blackbutt (*Eucalyptus pilularis*) or Sydney Blue Gum (*Eucalyptus saligna*) Has a highly restricted and fragmented geographic distribution comprised of a series of small remnant patches Identified at the Cherrybrook Station site	Within and adjacent to the Cherrybrook Worksite		
Sydney Turpentine-Ironbark Forest	Open forest with dominant canopy trees, including Turpentine (*Syncarpia glomulifera*), Grey Gum (*Eucalyptus punctata*), Grey Ironbark (*Eucalyptus paniculata*), and Thin-leaved Stringybark (*Eucalyptus eugenioides*). It is generally located between Cumberland Plain Woodland in drier areas and Blue Gum High Forest on adjacent higher rainfall ridges. Identified at three locations in the Study Area: Epping Services Facility, Cheltenham Services Facility, and the Showground Station sites.	Within and adjacent to the Epping, Cheltenham (including 0.028ha within the footprint of the Cheltenham Community Facility as illustrated in Appendix C and D figure D15) and Showground Worksites	EEC	
Shale/ Sandstone Transition Forest	The main tree species include Forest Red Gum (*Eucalyptus tereticornis*), Grey Gum, Thin-leaved Stringybark, Broad-leaved Ironbark (*Eucalyptus fibrosa*) and Narrow-leaved Ironbark (*Eucalyptus crebra*). Occurs at the edges of the Cumberland Plain. Identified at the Showground Station site.	Within and adjacent to the Showground Worksite		
Cumberland Plain Woodland	The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum, with Narrow-leaved Ironbark, Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark occurring less frequently. Occurs in the drier parts of the Sydney Basin on the Cumberland Plain. Identified at the following locations within the Study Area: Cherrybrook Station, Showground Station, and Bella Vista Station, Rouse Hill.	Adjacent to the Cherrybrook worksite; within and adjacent to the Showground Worksite; within and adjacent to the Bella Vista, Memorial Ave, Balmoral Road and Kellyville Worksites; within and adjacent to Old Windsor Road to White Hart Drive near Sanctuary Drive; adjacent to Rouse Hill worksite. Within and adjacent to Windsor Road to the		

Vegetation Community	Typical Description of Community	Location in Relation to OTS Worksites	TSC Act Status*	EPBC Act Status*
		Cudgegong Road worksite.		
River Flat Eucalypt	The dominant canopy species are Broad-leaf Apple (*Angophora floribunda*),Cabbage Gum (*Eucalyptus amplifolia*) Forest Red Gum, and Swamp Oak (*Casuarina glauca*). Occurs on stream banks and alluvial flats draining soils from Wianamatta shale. Identified at the Bella Vista site.	Adjacent to the Bella Vista and Kellyville Worksite. Within and adjacent to Windsor Road to the Cudgegong Road worksite.		
Coastal Shale Sandstone Forest	A tall open forest with a sparse dry shrub layer and grassy ground cover. Tree species include Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*). Occurs on shale or ironstone of coastal plateaux in the Sydney Basin. Identified at the Cheltenham Services Facility site.	Within and adjacent to the Cheltenham worksite		

* EEC = Endangered Ecological Community, CEEC = Critically Endangered Ecological Community

Generally the overall condition of native vegetation across the NWRL alignment was moderate to poor due to the urban context, past land use and edge effects such as weed invasion.

4.3.2.1 Existing Vegetation (post-Early Works, TSC and SVC site establishment)

The existing vegetation at each of the Phase 2 worksites has largely been cleared through the prior site establishment works undertaken by the Early Works, TSC and SVC contractors.

A number of the Phase 2 worksites do contain areas of vegetation that have not been cleared within worksites, particularly Cheltenham, Cherrybrook, Balmoral Road to Memorial Avenue, Old Windsor Road to White Hart Drive and Windsor Road to Cudgegong Road. Adjacent vegetation (outside of footprint) across worksites is retained as per the EIS1 and EIS 2 assessed construction and end-state footprints.

4.3.3 Threatened Flora Species

EIS 1 states that while potential habitat was present for a number of threatened flora species, targeted searches of the NWRL worksites (undertaken by the TSC and SVC appointed ecologists during appropriate survey seasons) recorded only one threatened flora species (*Epacris purpurascens var. purpurascens*) and the existing remnant vegetation is in poor condition.

Epacris purpurascens var. purpurascens is an erect flowering shrub listed as vulnerable under the TSC Act. The shrub was recorded during the field surveys at the Cheltenham Services Facility site. EIS 1 identifies three shrubs at two locations within the Cheltenham Service Facility worksite, and a patch of individual shrubs located outside of the service facility footprint, approximately 80m to the east.

Epacris *purpurascens* var. *purpurascens* has also been identified within the Cheltenham Community Facility construction footprint (EcoLogical 2017) in a small area on the slope of the sandstone cutting (location illustrated in Appendix D, Figure D15). The area where this species was recorded covered an area approximately 20m2 and extended for approximately 5-6m in length in the northeast corner of Cheltenham Oval. A total of 37 individuals of varying size were recorded.

The threatened species *Hibbertia* sp. "Turramurra" (*Hibbertia spanantha)* was also recorded at the Cheltenham Services Facility site during pre-clearance surveys. The species was not recorded during the additional assessment for the Cheltenham Community Facility (EcoLogical 2017), however as *Hibbertia spanantha* is known to occur in the area, the clearing surveys will also target this species.

No other threatened flora species were detected or are considered likely to occur within the study area of NWRL alignment concerning Phase 2 Works.

4.3.4 Terrestrial Fauna

The ecological assessments for EIS 1 and EIS 2 and identified that a number of threatened and migratory fauna have been identified as potentially occurring and therefore have the potential to be impacted by the construction works associated with Phase 2 Works. These identified species (as provided in Table 3) generally utilise native vegetation as habitat except for the Green and Golden Bell Frog (*Litoria aurea*) and Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*).

As indicated in EIS 1, the following numbers of species have been recorded within the Study Area:

- 140 birds
- 38 reptiles
- 18 frogs
- 11 flying mammals (bats)
- 16 non-flying mammals (including ten introduced species)
- snail species (including one introduced species)
- 13 fish species (including three introduced species).

This list includes many species previously recorded in or near the NWRL alignment identified during a desktop review, as well as species recorded during field surveys.

4.3.5 Threatened Fauna Species

For the Green and Golden Bell Frog, up to 0.61 hectare(ha) of potential breeding habitat in the form of dams or ponds will be removed with just over 80% of this habitat within the Growth Centres certified lands (west of Rouse Hill). Up to 3.25ha of potential movement

corridor (as secondary habitat) will be removed although no individuals were detected during targeted searches.

Table 3 below (adapted from EIS 1) provides a summary of the threatened fauna species recorded within a 10 km radius of the construction footprint, for which the Study Area is likely to provide habitat. The table provides information on the likelihood of occurrence of the threatened species in the Study Area. No threatened fish or reptiles are considered likely to occur in the Study Area.

Table 3 Threatened Fauna Species with the Potential to Occur Across the Phase 2 Works

Common Name / Scientific Name	TSC Act Status	EPBC Act Status	Likelihood of Occurrence Across Phase 2 Works
Amphibians			
Green and Golden Bell Frog (*Litoria aurea*)	E	V	Potential
Diurnal Birds			
Regent Honeyeater (*Anthochaera Phrygia*)	E	E & M	Potential
Gang-gang Cockatoo (*Callocephalon fimbriatum*)	V, E2	-	Likely
Glossy Black-Cockatoo (*Calyptorhynchus lathami*)	V	-	Likely
Brown Treecreeper (eastern subspecies) (*Climacteris picummus victoriae*)	V	-	Potential
Varied Sittella (*Daphoenositta chrysoptera*)	V	-	Potential
Swift Parrot (*Lathamus discolour*)	E	E	Likely
Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*)	V	-	Potential
Turquoise Parrot (*Neophema pulchella*)	V	-	Potential
Scarlet Robin (*Petroica boodang*)	V	-	Potential
Superb Fruit-Dove (*Ptilinopus superbus*)	V	-	Potential
Nocturnal Birds			
Barking Owl (*Ninox connivens*)	V	-	Potential
Powerful Owl (*Ninox strenua*)	V	-	Likely
Mammals			
Spotted-tailed Quoll (SE Mainland Population) (*Dasyurus maculatus maculates*)	V	E	Potential
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	V	Potential

Common Name / Scientific Name	TSC Act Status	EPBC Act Status	Likelihood of Occurrence Across Phase 2 Works
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	V	-	Likely
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	V	-	Likely
East Coast Freetail bat (*Mormopterus norfolkensis*)	V	-	Likely
Southern/Large-footed Myotis (*Myotis macropus*)	V	-	Potential
Grey-headed Flying Fox (*Pteropus poliocephalus*)	V	V	Yes
Yellow-bellied Sheathtail-bat (*Saccolaimus flaiventris Yellow*)	V	-	Potential
Greater Broad-nosed Bat (*Scoteanax rueppellii*)	V	-	Potential
Cumberland Plain Land Snail (*Meridolum corneovirens*)	E	-	Potential
Fork-tailed Swift (*Apus pacificus*)	-	M	Potential
White-throated Needletail (*Hirundapus caudacutus*)	-	M	Potential
Black-faced Monarch (*Monarcha melanopsis*)	-	M	Potential
Satin Flycatcher (*Myiagra cyanoleuca*)	-	M	Potential
Rufous Fantail (*Rhipidura rufifrons*)	-	M	Potential
Great Egret (*Ardea alba*)	-	M	Potential
Cattle Egret (*Ardea ibis*)	-	M	Yes
Latham's Snipe (*Gallinago hardwickii*)	-	M	Yes

* M = migratory, V = Vulnerable, E = endangered, E2 = endangered population, - = not listed.

4.3.6 Terrestrial and Aquatic Fauna Habitat

EIS 1 notes that the NWRL alignment provides a variety of habitat features for a range of threatened fauna species. Vegetation condition and the availability of habitat features varied across the study area. Vegetation within the eastern part of the study area (including suburbs of Epping, Beecroft, Cheltenham, Cherrybrook and Castle Hill) contained dense patches of vegetation strongly influenced by sandstone/shale geology providing some reptile habitat and a more diverse vegetation structure. A total of four native vegetation communities were represented within the eastern part of the study area, including several EEC and CEEC.

In contrast, extensive vegetation clearing, grazing and weed infestation has resulted in much of the native vegetation within the western part of the study area (from Bella Vista Station) being of poor condition.

With the Phase 2 worksites largely established and with little potential for further vegetation clearance (with the exception of Cheltenham and Cherrybrook worksites), significant changes to habitat potential within worksites exists. Adjacent habitat to worksites however still provides the potential for fauna to be accessing worksites, particularly in areas where temporary and permanent water bodies are located, particularly:

- Minor creeks – Elizabeth Macarthur and Caddies Creek (adjacent to Bella Vista, Balmoral Road to Memorial Avenue through to Windsor Road.
- Second drainage creek – Charlies Creek
- Farm dams
- Constructed wetlands around the Bella Vista Station (Celebration Drive) and Norwest Station sites (Norwest Boulevard).

The general existing condition of these water bodies is poor, with nutrient enrichment and an absence of native vegetation cover. However, they provide habitat to reptile, amphibian and wading avian species (noted during the field inspection). Noxious weeds such as Narrow and Broad Leaved Privet were present along riparian corridors and in general native flora resilience was low, particularly in areas of high weed infestation.

The survey identified substantial areas of potential primary and secondary habitat for the Green and Golden Bell Frog, including potential breeding sites (consisting of seven water bodies likely to support breeding located between First Ponds Creek and Samantha Riley Drive) and movement corridors along Caddies Creek and Elizabeth Macarthur Creek.

Table 4 Summary of Habitat Features Across the Phase 2 Worksites

Phase 2 Worksite	Summary of Fauna Habitat
Epping (Epping Decline and Epping Services Facility)	Potential habitat affected by small remnant vegetation patch size, adjacent to urbanised area and prevalence of weed species. Although fragmented by urban development, scattered urban trees and riparian corridor (Devlins Creek) may provide suitable connectivity between habitat patches only for highly mobile species. The Tributary to Devlins Creek at Edensor Street demonstrates a degraded riparian and aquatic condition.
Cheltenham Services Facility and Cheltenham Community Facility	Native species were represented within each vegetative stratum and habitats provided a number of different foraging and roosting resources for a diversity of fauna species. Active bush regeneration activities reduce weed coverage and encouraged germination of native groundcover species and bush regeneration works were observed along Devlins Creek. Devlins Creek located is downstream of the M2 motorway and within the Chilworth/Beecroft Reserve. The creek demonstrates a moderate to near intact riparian condition from downstream from the M2 motorway through to the Devlins Creek tributary within the Beecroft Reserve.
Cherrybrook Station	At the Cherrybrook Station site native shrubs and groundcover species were poorly represented in areas of high weed infestation and mechanical disturbance. The Blue Gum High Forest within the site is in poor condition with severe weed infestation. The Blue Gum High Forest located outside of the site (to the north east) is classified as in good condition and contains regenerating native species.

Phase 2 Worksite	Summary of Fauna Habitat
	Pyes Creek (upstream of Robert Road) has been described in EIS 1 as demonstrating a degraded riparian condition and degraded/moderate aquatic condition. Excelsior Creek (located upstream of Highs Road) demonstrates a degraded riparian and aquatic condition.
Castle Hill Station	Dominance of planted/exotic vegetation in surrounding area, adjacent to highly urbanised area. The site is devoid of any suitable habitat to support native species.
Showground Station	The Showground Station site contained the only patch of Shale/Sandstone Transition Forest (EEC) with native shrubs and groundcover species poorly represented and areas of high weed infestation and disturbance. Scattered Narrow-leaved Scribbly/Snappy Gum (*Eucalyptus racemosa*) with several hollows of varying size and shape in each tree exist outside the worksite. Hollow-dependant avian species including, migratory species such as Dollarbird (*Eurystomus orientalis*) were observed nesting in hollows and foraging in tree canopy. Cattai Creek is upstream of Showground Road, but has been described in EIS 1 as demonstrating a moderate riparian condition and a degraded aquatic condition. The tributary to Cattai Creek at Anella Avenue south-east of Showground has a moderate riparian condition and degraded aquatic condition.
Norwest Station	Dominance of planted/exotic vegetation in surrounding area, adjacent to highly commercialised area. The site is devoid of any suitable habitat to support native species although constructed wetlands do exist. Strangers Creek located north-east of Norwest site has a moderate riparian condition, however a degraded aquatic condition which improves to moderate at the tributary to Strangers Creek near Edgewater Drive.
Bella Vista Station to Rouse Hill	Applies to all sites between Bella Vista Station and Rouse Hill. Specific descriptions for each section follow below. The north-western portion of the study area (from Bella Vista Station to Rouse Hill Station) contains large tracts of exotic weed grasses and shrubs with low native species richness. Clearing of vegetation, underscrubbing and grazing have led to the area having poor condition habitat. A few small pockets of moderate Cumberland Plain Woodland (CEEC) vegetation in moderate condition were retained in private lots. Some regenerating Cumberland Plain Woodland canopy trees (*Eucalyptus tereticornis* and *crebra*) were present, which could provide foraging resources for winter migrant bird species. Occasional mature canopy trees were present with hollows. Primary and secondary habitat for the threatened Cumberland Plain Land Snail is defined as all areas of Cumberland Plain Woodland and River Flat Eucalypt Forest in moderate or good condition. The north-western portion of the study area contained limited habitat resources for small terrestrial fauna such as reptiles and midstorey foraging habitat for avian species. The native shrub layer was absent over much of the area and weed infestation was high. Rocks and logs were only recorded within riparian corridors during the field inspection however, disused building material including timber and metal sheeting within private lots provided supplementary habitat for reptiles and their prey items. Overall, habitat complexity was low.
Bella Vista Station	The site was previously vegetated, including substantial tracts of moderate to poor Cumberland Plain Woodland. Constructed wetlands and the Elizabeth Macarthur Creek system are adjacent to the worksite. It is likely that this section of creek relies on groundwater base flow. The creek extends onto floodplains and a series of natural wetlands.
Celebration Drive to Balmoral Road Balmoral Road to Memorial Avenue	These two construction sites are surrounded by residential development and service installations. The natural creek line and riparian vegetation surrounding Elizabeth Macarthur Creek demonstrates some areas of moderate to high environmental sensitivity.

Phase 2 Worksite	Summary of Fauna Habitat
	The T-way is a recent transport infrastructure with parking and roadway running parallel to Windsor Road, running adjacent to these worksites. EIS 1 notes that ecological field assessment surveys identified substantial areas of potential primary and secondary habitat for the Green and Golden Bell Frog including potential breeding sites (consisting of seven water bodies likely to support breeding located between First Ponds Creek and Samantha Riley Drive) and movement corridors along Caddies Creek and Elizabeth Macarthur Creek. Elizabeth Macarthur Creek from Memorial Avenue to Samantha Riley Drive has a moderate and aquatic condition.
Kellyville	This site is surrounded by residential and services development and the establishment of the Northwest T-way. Native vegetation has been largely stripped, except adjacent to Elizabeth Macarthur Creek. Primary and secondary Green and Golden Bell Frog primary and secondary habitat to the north of the site.
Samantha Riley Drive to Windsor Road	This area has been developed more recently with housing and water utilities and the establishment of the Northwest T-way. Native vegetation has been largely stripped, except adjacent to Elizabeth Macarthur Creek. It is likely that this section of creek relies on groundwater base flow with the creek located on a floodplain. The survey identified substantial areas of potential primary and secondary habitat for the Green and Golden Bell Frog.
Old Windsor Road to White hart Drive	The site is located on the eastern side of Windsor Road, north of the intersection with Old Windsor Road. Caddies Creek exists downstream of Windsor Road. The creek demonstrates a moderate aquatic condition.
Rouse Hill	The site is surrounded by the grounds of the Rouse Hill Town Centre with the majority of the area cleared and subject to extensive urban development. To the east of the site, Caddies Creek demonstrates moderate-condition riparian vegetation with moderate to degraded aquatic condition.
Windsor Road Viaduct	This area is relatively undeveloped, with low-level of ground disturbance through vegetation clearance. Agricultural, low level rural properties and some light industrial/commercial land use is common in this area.
Windsor Road to Cudgegong Road	This area has predominant land use characteristic of rural properties concerned with agricultural, grazing and farming activities. Schofields Road has recently been widened and residential development to the south of Schofield Road is rapidly growing. To the north of Schofields Road, the landscape is changing to accommodate the construction of the proposed rail corridor; however various rural properties still surround the proposed alignment. The Second ponds Creek and First Pond Creek (both downstream of Schofields Road) demonstrate degraded riparian and aquatic condition.

4.3.7 Threatened Aquatic Fauna

The project crosses many sub-catchments of the Lane Cove River, Hawkesbury River and Parramatta River. Major creeks in and around the study area include:

- Devlins Creek (flows to Lane Cove River)
- Pyes Creek (flows to Berowra Creek)
- Excelsior Creek (flows to Darling Mills Creek and then Parramatta River)
- Cattai Creek (flows to Hawkesbury River)

- Strangers, Elizabeth Macarthur, Caddies, First Ponds and Second Ponds Creeks (all flowing to Cattai Creek).

These creeks are located in the residential suburbs of Hornsby, Baulkham Hills and Blacktown Local Government Areas. Further downstream, all creeks and rivers flow through at least one conservation reserve (e.g. Lane Cove National Park, Berowra Valley Regional Park, Cattai National Park) plus many other regional reserves and parks. The riparian and aquatic health of these creeks and watercourses has been included in Table above. The ecological assessment conducted by Eco Logical Australia (2012) confirmed that no threatened aquatic species or endangered aquatic populations were identified as likely to occur within the watercourses of the study area.

4.3.8 Groundwater Dependant Ecosystems

Groundwater dependent ecosystems (GDEs) have varying degrees of dependency on groundwater, which is partially determined by underlying geology and groundwater hydrology. EIS 1 identifies that the geology of the Study Area is comprised of Hawkesbury Sandstone and Ashfield Shale. Areas of Hawkesbury Sandstone are overlain by a varying thickness of alluvium, and the Ashfield Shale occurs mostly as a 'capping layer' on elevated ridgelines.

Two major aquifers exist within the broader study area, and are essentially fractured rock aquifers, with groundwater present within the primary matrix as well as fractures, joints, and bedding planes. Groundwater levels are typically uneven due to variations in topography created by the Hawkesbury Sandstone formations.

Table 5 (adapted from EIS 1) provides a summary of the groundwater dependence likelihood of various systems within proximity to the OTS Works.

Table 5 Summary of Groundwater Dependence Likelihood of Various Systems

Potential GDE	Location in Relation to OTS Worksites	Condition	Likelihood of Dependency on Groundwater
Blue Gum High Forest	Within and adjacent to the Cherrybrook Worksite	Degraded	It is unlikely that the Blue Gum High Forest vegetation communities located within the NWRL study area are dependent on groundwater.
Sydney Turpentine-Ironbark Forest	Within and adjacent to the Epping, Cheltenham and Showground Worksites	Degraded to good	This vegetation community would potentially use groundwater, however the dependency on groundwater is expected to be low. Surrounding Cattai Creek trees are likely to tap into groundwater at periods of low surface water. Large riparian trees in the region may rely on groundwater discharged as surface flows.
Shale/ Sandstone Transition Forest	Within and adjacent to the Cheltenham Worksite	Degraded to good	It is unlikely that Shale / Sandstone Transition Forest vegetation communities located within the NWRL study area are dependent on groundwater.

Potential GDE	Location in Relation to OTS Worksites	Condition	Likelihood of Dependency on Groundwater
Cumberland Plain Woodland	Adjacent to the Cherrybrook worksite; within and adjacent to the Showground Worksite; within and adjacent to the Bella Vista, Memorial Ave, Balmoral Road and Kellyville Worksites; within and adjacent to Old Windsor Road to White Hart Drive near Sanctuary Drive; adjacent to Rouse Hill worksite. Within and adjacent to Windsor Road to the Cudgegong Road worksite.	Degraded to good	This vegetation community is likely to be groundwater dependent. The distance of this community from Elizabeth Macarthur Creek at Bella Vista Station site suggests that it is reliant on groundwater discharged as surface water as well as Eucalyptus tree species potentially tapping into groundwater.
River Flat Eucalypt	Adjacent to the Bella Vista and Kellyville Worksite. Within and adjacent to Windsor Road to the Cudgegong Road worksite.	Poor	The River Flat Eucalypt vegetation community is considered likely to be groundwater dependent. Roots of Casuarina and Eucalyptus tree species in this floodplain vegetation community are likely to tap into groundwater. The dominant canopy species are Broad-leaf Apple (*Angophora floribunda*), Cabbage Gum (*Eucalyptus amplifolia*) Forest Red Gum, and Swamp Oak (*Casuarina glauca*). Occurs on stream banks and alluvial flats draining soils from Wianamatta shale.
Coastal Shale Sandstone Forest	Within and adjacent to the Cheltenham worksite	Degraded to good	Portions of the creek potentially have some groundwater base flow. Level of groundwater dependency is likely to be low. Small areas of Coastal Shale-Sandstone Forest located near Devlins Creek would potentially only use groundwater opportunistically when surface water was in limited supply. A tall open forest with a sparse dry shrub layer and grassy ground cover. Tree species include Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*). Occurs on shale or ironstone of coastal plateaux in the Sydney Basin.
Natural Wetlands	Wetland ecosystems are expected to have a strong connection to groundwater in the study area.	Poor to Moderate	Natural wetlands located on the Elizabeth Macarthur Creek / Caddies Creek floodplain (near Windsor Road) are likely to be dependent on groundwater. All natural wetland species may rely on groundwater discharged as surface flows.
Artificial Wetlands	Artificial wetlands within the area (for example those located around the proposed Norwest Station) are assumed to be man-	-	These wetlands are unlikely to be dependent on groundwater as the clay lining prevents a direct connection to groundwater. Farm dams and other artificial wetlands scattered across the

Potential GDE	Location in Relation to OTS Worksites	Condition	Likelihood of Dependency on Groundwater
	made and lined with clay. These would include farm dams.		study area are unlikely to rely on groundwater as they are located along drainage lines and would be fed by rainfall and surface runoff.

4.4 Norwest Pedestrian Link Works

The Norwest Station Subsurface Pedestrian Link and Northern Entry REF stated the following:

The Project footprint contains planted amenity vegetation that is maintained and managed. It comprises native and non-native species dominated by an immature canopy of mixed-origin eucalypts with an understory of grevillea and lomandra. In ecological value terms the area is highly-disturbed, urbanised and fragmented. Its value is therefore low to negligible.

No threatened flora or fauna species were recorded onsite given the absence of suitable habitat in the area. The only potential item of interest, the eucalypts, are too immature to contain any tree hollows; an ecological feature that is taken to indicate the possible presence of important ecological species. Winter flowering of the eucalypts may provide a limited foraging resource for nectar-feeding migratory birds and potentially the grey-headed flying fox. The impact rating for this loss is assessed as negligible to minor adverse.

Any mobile species affected by the proposal would be able to temporarily move out of the area; however this would not be the case for less mobile species. Consequently, the species most at risk of injury or death would be any small terrestrial and arboreal mammals, microchiropteran bats or reptiles, none of which are likely to be threatened, endangered or vulnerable.

There are no records of noxious weeds in the area.

4.5 33kV Underground Feeder Powerline Works

The Willoughby to North Chatswood 33kV Underground Feeder Powerline Works REF stated the following: At a local level along the alignment, the majority of the streetscapes within the Willoughby LGA contain a mixture of formal avenues, and streets with mixed exotic and non-local native plantings. Along the alignment, vegetation is generally consistent with non-Indigenous ornamental landscape street plantings. In particular, this vegetation has been identified around the Ausgrid Willoughby STS. This vegetation is not considered to form part of any remnant native vegetation.

No open spaces, parkland, bushland or other recreation areas would be impacted.

Minor clearing or tree trimming may be required at the boundary of the Willoughby STS. This would be determined during the detailed design and depend on the final access point for the feeder line.

4.6 Rouse Hill Temporary Bypass Powerline Works

There are established areas of Endangered Ecological Communities (EEC) in the project area; however the proposal has been specifically designed around the protected vegetation.

Due to the disturbed / modified nature of the chosen alignment and nature of the proposed works, it is considered unlikely that vegetation removal other than the clearing of grasses and weeds would be required. If vegetation, other than grass and weeds, needs to be trimmed or removed, further assessment and approval would be obtained from Sydney Metro.

It is likely that if not controlled correctly, the proposed works could cause the spread of weeds. Fauna is unlikely to be impacted by the proposed works, although there is a low risk that animals could fall into open holes and become trapped or injured if left uncovered.

5 Aspects and Potential Impacts

The key aspects and potential impacts associated with the management of flora and fauna during the delivery of OTS Works are listed in Table .

These identified risks have been taken into account in the development of the flora and fauna management strategy and site-specific procedures for the works.

Table 6 Summary of Overall Aspects and Potential Impacts

Aspects	Potential Impacts/Opportunities	Risk Level for OTS Works (Qualitative)
Vegetation removal/habitat disturbance during clearing works and construction activities	• Reduction in area of EEC/CEEC, threatened flora species and fauna habitat • Removal of *Epacris purpurascens* var. *purpurascens* • Removal of *Hibbertia spanantha* • Habitat degradation, fragmentation and severance • Disturbance or mortality of fauna • Reduction in visual amenity to surrounding receivers	L-M
Light spill and noise from construction facilities and equipment	• Disturbance of fauna/potential to interfere with breeding cycles	L-M
Site activities causing fire	• Damage to native vegetation, fauna and property	L-M
Change in groundwater levels	• Impact on Groundwater dependant ecosystems and river system	L-M
Sedimentation from site areas to waterways	• Sediment laden runoff polluting and damaging riparian and waterway aquatic environments	M
Spread of pathogens	• Potential for the movement of Myrtle Rust or *Phytophthora Cinnamomi* into remnant vegetation	M
Sustainability	• Reduction in biological sustainability due to vegetation and/or habitat removal	L-M
Vegetation waste	• Opportunity to reuse material from felled trees (i.e. mulch) • Risk of propagation of weeds following clearing • Transfer of weeds through importation of plant	M
Weed Invasion	• Increase in potential for weed dispersal from edge effects and construction activities	M-H
Design specifications impacting clearing	• Limitations on opportunities to minimise vegetation clearing • Opportunity to limit the need for vegetation clearance	L-M
Fauna interacting with work sites	• Native and/or introduced fauna entering compounds and/or stuck in trenches, pits, site materials.	M

Aspects	Potential Impacts/Opportunities	Risk Level for OTS Works (Qualitative)
	• Presence or increased distribution of feral animals, birds and vermin (pests) attracted by uncovered bins / food waste	

6 Change in Ecological Value

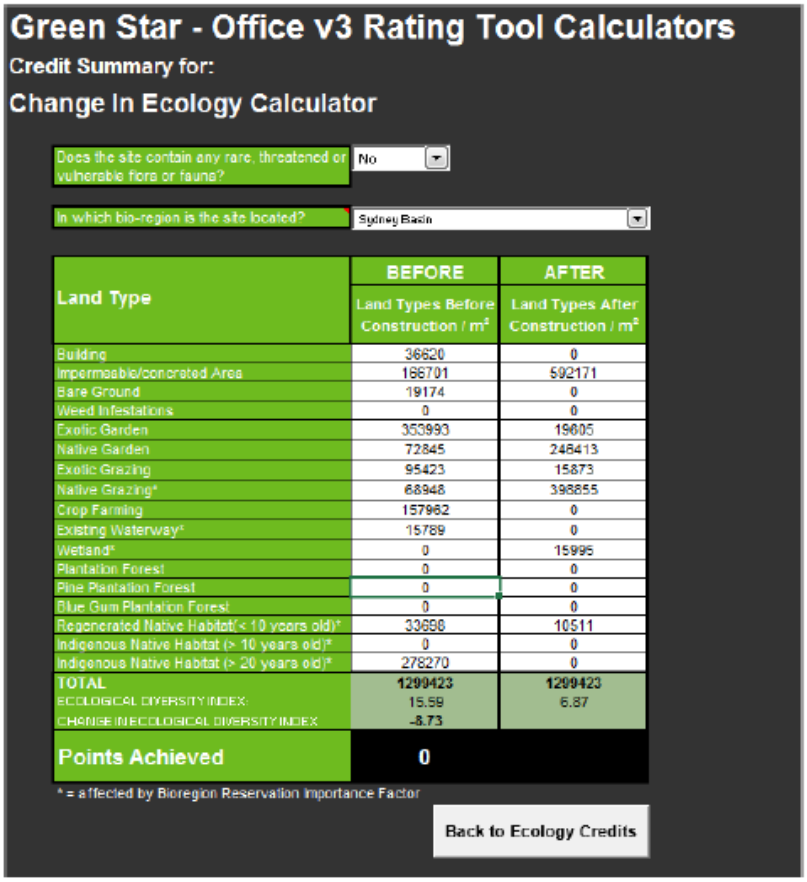
The overall change in ecological value resulting from the OTS Works has been calculated using the Green Star Change of Ecological Value Calculator.

This Calculator was developed to compare the relative ecological value of land prior to construction to that which exists after completion of development.

For the purpose of this assessment relative ecological weightings have been determined using land types that will be in existence at the time of contract award for OTS Works.

Land type areas were measured across a number of sites in the OTS package. Using the Change of Ecological Value Calculator, areas were aggregated to depict the overarching impact of the Works on the ecological value of the sites. The calculated Change in Ecological Value is 1. This represents a moderate enhancement of the ecological value of the total site area of the project and achieves Level 2 under the ISCA IS rating tool credit Eco-2 – Ecological value.

Figure 9 below shows the relative change in ecological value of each of the affected land types.



Green Star - Office v3 Rating Tool Calculators

Credit Summary for:

Change In Ecology Calculator

Does the site contain any rare, threatened or vulnerable flora or fauna? No

In which bio-region is the site located? Sydney Basin

Land Type	BEFORE Land Types Before Construction / m²	AFTER Land Types After Construction / m²
Building	36620	0
Impermeable/concreted Area	186701	592171
Bare Ground	19174	0
Weed Infestations	0	0
Exotic Garden	353993	19605
Native Garden	72845	248413
Exotic Grazing	95423	15873
Native Grazing*	68948	396855
Crop Farming	157962	0
Existing Waterway*	15789	0
Wetland*	0	15995
Plantation Forest	0	0
Pine Plantation Forest	0	0
Blue Gum Plantation Forest	0	0
Regenerated Native Habitat(< 10 years old)*	33698	10511
Indigenous Native Habitat (> 10 years old)*	0	0
Indigenous Native Habitat (> 20 years old)*	278270	0
TOTAL	1209423	1209423
ECOLOGICAL DIVERSITY INDEX	15.59	6.87
CHANGE IN ECOLOGICAL DIVERSITY INDEX	-8.73	
Points Achieved	**0**	

* = affected by Bioregion Reservation Importance Factor

Back to Ecology Credits

Source: AMBS - Green Star Assessment for Northwest Rapid Transit (August 2017)

Figure 9 Change in Ecological Value Calculator

7 Flora and Fauna Management

This Section describes the overall approach and principles associated with managing and mitigating flora and fauna risks during the OTS Works.

Annexure B details specific actions and responsibilities to be implemented during the works. The management measures are based on the mitigation measures compiled from the EISs, Submissions Reports, Environmental Mitigation Measures and Revised Environmental Mitigation Measures or REMMs) and the Minister's Conditions of Approval (CoA), as well as the requirements and standards of TfNSW and NRT, and the NWRL CEMP Framework.

7.1 Phase 1 and Phase 2 Works

7.1.1 Ecological Monitoring Program

The Ecological Monitoring Program required under Condition C1 of SSI-5931 and Condition 23 of SSI-5414 (which references Condition C1 of SSI-5100) has been prepared and included as part of this Construction Flora and Fauna Management Plan.

The RTRF EIS notes that the potential impacts of the project on terrestrial, riparian and aquatic areas are extremely limited because of the degraded nature of most of the vegetation present. There are no threatened or migratory species which are likely to be adversely affected. There is no potential for a significant impact upon any such biota as a consequence of the proposed RTRF.

Phase 2 Works cover much of the approved NWRL alignment, and accordingly the impact of construction works at the worksites may have an insignificant to moderate impact on flora and fauna. EIS 1 and 2 report the following main impacts:

- Disturbance or removal of flora and fauna habitat.
- Fragmentation and isolation of habitats.
- Damage or disturbance to vegetation communities, particularly endangered ecological communities (EECs).
- Damage or disturbance of protected or threatened flora species.
- Disturbance, injury or mortality of protected or threatened fauna species.
- Poor success at release of affected fauna.
- Disturbance impacts on retained native vegetation due to locating site compounds, workers, machinery or stockpiles.
- Damage or degradation of retained vegetation and fauna habitat as a result of land pollution
- Degradation of remnant vegetation by an increase in weed species.
- Inadequate disposal of removed weeds.
- Weeds/pathogens are inadequately controlled.
- Vegetation removal may result in a reduction in surrounding visual amenity.

- Vegetation removal and grubbing could increase risk of soil erosion.
- Increased sedimentation from site runoff from cleared areas.
- Inappropriate culvert and drainage works could adversely affect waterways.
- Loss of feeding and breeding habitat for aquatic fauna.
- Potential hazardous chemical spillages leading to a reduction in water quality.
- Reduction in aquatic habitat quality through sedimentation and pollution of waterways.
- Aquatic weed growth, eutrophication or toxic algal blooms.

The Ecological Monitoring Program has subsequently been prepared in line with the ecological assessments carried out for EIS 1, EIS 2, the RTRF EIS, Cheltenham Community Facility Epacris Salvage Plan (Ecological 2018), as well as other subsequent ecological assessments referenced in the TSC and SVC Flora and Fauna Management Plans.

7.1.1.1 Scope

The Program is an adaptive monitoring program, collecting quantitative data where possible. The Program includes:

a) an adaptive monitoring program to assess the effectiveness of the mitigation measures identified within documents outlined in Condition B1 of SSI 5391 and updated as per Condition 23 of SSI 5414 (noting that Condition C23 reflects Condition C1 of SSI 5100). The monitoring program shall monitor performance parameters and criteria against which effectiveness of the mitigation measures will be measured;

b) mechanisms for developing additional monitoring protocols to assess the effectiveness of any additional mitigation measures implemented to address additional impacts in the case of design amendments or unexpected threatened species finds during construction (where these additional impacts are generally consistent with the biodiversity impacts identified for the SSI);

c) provision for the assessment of the data to identify changes to habitat usage and whether this can be directly attributed to the SSI;

d) details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the SSI; and

e) provision for annual reporting of monitoring results to the Director General and relevant councils (including Blacktown City Council (under SSI-5931), Hills Shire Council and Hornsby Shire Council (under SSI 5414), or as otherwise agreed by those agencies.

It is noted for SSI-5414, Condition C23 requires that the Ecological Monitoring Program required under Condition C1 of SSI-5100 shall continue and be updated as necessary during the construction of the SSI, unless otherwise agreed by the Director-General, in consultation with OEH and relevant Council's depending on the outcomes of the monitoring.

7.1.1.2 Project Area

The project area includes the extent of land proposed to be to be cleared or otherwise disturbed by the construction of the OTS, as well as specified areas for storage, lay-down of materials or site offices and facilities.

The Ecological Monitoring Program specifically applies to those areas of the project where mitigation measures are to be implemented.

7.1.1.3 Flora Monitoring

The following flora monitoring activities will be implemented as part of the program:

- Initial site inspection by an Ecologist to confirm the assessment completed in RTRF EIS, EIS 1 and 2 and document any changes or the presence of any new or previously unidentified EEC.
- Monitoring within the construction areas to ensure fencing and signage is protecting vegetation that is to be retained. Each site will be monitored weekly for signs of physical damage to retained vegetation and significant trees, and sedimentation or erosion within protected areas.
- Monitoring of native vegetation (including riparian vegetation and EECs) adjacent to construction sites, in particular around First Ponds Creek, Caddies Creek, Elizabeth Macathur Creek, Cattai Creek and Devlins Creek.
- Monitoring of weed growth as per the Weed Management Procedure.
- Monitoring of revegetated and landscaped areas in accordance with Urban Design and Corridor Landscape Plan.
- OEH issued a Certificate under section 95 of the TSC Act for the management and 3-year monitoring of plantings *Epacris purpurascens* var. *purpurascens* and *Hibbertia* sp. “Turramurra” commencing Autumn 2015. Monitoring of these threatened species is to be undertaken with consideration of the requirement of the Certificate.
- Monitoring of *Epacris purpurascens* var. *purpurascens* every year for five years following the plantings of stock salvaged from the construction footprint of the Cheltenham Community Facility. Areas of vegetation to be retained adjacent to the Project Area will be managed and monitored in accordance with the SEPs and Section 7.1.3 and Section 7.1.3.1.

7.1.1.4 Fauna Monitoring

The following fauna monitoring activities will be implemented as part of the program:

- Prior to works commencing at each site, pre clearing surveys and inspections for threatened flora and fauna species and habitat features will be undertaken by an Ecologist. This would include identifying any hollow bearing trees. Hollow bearing trees would be retained wherever possible and where the design allows.
- Nest boxes would be installed upon the advice of the Ecologist after completing the assessment and before the removal of the hollow bearing trees.
- As part of handover of sites from TfNSW to OTS, nest boxes installed at TSC and SVC sites would be incorporated into OTS ecological monitoring program and managed by OTS during the construction phase.

- Populations of Bent-winged Bat colony in the M2 culverts will be monitored during the construction period and adaptive management will be undertaken to ensure there are no detrimental impacts and the population continues to utilise the culvert.
- Unexpected finds would be managed in accordance with the Fauna Handling Procedure.

7.1.1.5 Monitoring Actions

The following table identifies actions to monitor the effectiveness of the biodiversity mitigation measures implemented as part of project.

Table 7 Overview of Monitoring to be Undertaken Within and Surrounding the Construction Worksites

Monitoring Action	Description	Timing	Reporting/Inspections	Responsibility	Assessment/Performance Criteria
Initial Inspection and Pre Clearing Survey	Document the actual extent of native vegetation	Before construction works commence	Report and Survey prepared by Ecologist	Environment Coordinator Ecologist	Assessment against the EIS for consistency Identify vegetation to be retained Identification of hollow bearing trees
Nest Box Installation and Maintenance	Installation of nest boxes where required and removal of pests	Before removal of hollow bearing trees Yearly	Report and Survey prepared by Ecologist	Environment Coordinator Ecologist	Use of nest boxes by a wide range of native fauna species. Use of nest boxes designed for specific species by those same species
Hollow bearing tree removal	Trees containing hollows would be felled using “Slow drop” technique (or similar as agreed with OEH). The slow-drop technique involves nudging and shaking the tree, followed by a controlled lowering of the tree to the ground.	During removal	Inspection form by Ecologist Site Environmental Plans Vegetation Removal Permit	Environment Coordinator Ecologist	Zero direct harm to wildlife. Incidental harm to be managed/reported on by Ecologist/Environment Manager.
Protective fencing and signage	Signage and fencing installed around areas of vegetation to be retained	Before construction works	Site Environmental Plans Site Inspection Checklists	Environment Coordinator	No damage to vegetation being retained Damage to be reported through incident management system

Monitoring Action	Description	Timing	Reporting/Inspections	Responsibility	Assessment/Performance Criteria
Weed Growth	Weed management and identification will occur throughout the extent and duration of the project.	During construction works	Site Inspection Checklists Weed Management Procedure Plant induction	Environment Coordinator	No new noxious weed infestations within the project area and in adjacent bushland as a result of the project. A reduction in the area of noxious weed infestations within the project area.
Riparian Habitat Monitoring	Monitoring of any impacts on the riparian habitat around first ponds creek	During construction works	Site Inspection Checklists	Environment Coordinator Ecologist	No damage to existing habitat resulting from site works
Revegetation and Rehabilitation	Specific measures for revegetation and rehabilitation	During Construction Works	Urban Design and Landscape Plan (UDLP)	Environment Manager	Works meet the criteria of the UDLP
Epacris purpurascens var purpurascens	Specific measures for monitoring survival of translocated plants, topsoil and other habitat features salvaged from the Cheltenham Community Facility.	Post-Construction and salvage plan mitigation measure implementa-tion Yearly for five years	Report and survey prepared by Ecologist	Environment Coordinator	Persistence of translocated plants. Assessment against the EIS for consistency and also to ensure Salvage Plan recommendations and Mitigation Measures are adequately implemented
Hibbertia spanantha	Specific measures for monitoring survival of individuals identified and translocated from the Cheltenham Community Facility.	Yearly for five years	Report and survey prepared by Ecologist	Environment Coordinator	Persistence of translocated plants.

7.1.1.6 Contingency Measures

The following section summarises the potential issues that may arise and the recommended contingency measures.

Table 8 Contingency Measures

Aspect	Issue	Contingency Measure
Clearing	Unexpected fauna sighting in work area	Stop works Implement Unexpected Ecological Finds procedure
	Previously undetected threatened flora species is located	Stop Works Project ecologist to record location of species with GPS. Delineate threatened species with highly visible tape to protect it from clearing. Seek approval from relevant authorities to translocate species if required.
Habitat Usage	Fauna habitat usage change as a result of construction works	Habitat usage to be assessed by an Ecologist in pre-clearance survey and monitored during construction.
Revegetation	Inappropriate species selection Poor survival rates of revegetated plantings	Revegetation to be monitored in accordance with the UDLP. An annual monitoring report to be prepared to outline revegetation successes and failures and recommendations.

7.1.1.7 Reporting

A report on the Ecological Monitoring Program will be prepared annually based on the scope of work set out in Table . The first annual report will document the findings of the pre-clearing survey and other relevant baseline data including:

- Details of any animals relocated (species, date and location collected, date and location released, etc.)
- Weed species diversity and abundance at monitoring locations
- Native species diversity and abundance at monitoring locations
- Any additional locations of threatened flora or fauna
- Any additional monitoring required to assess the effectiveness of mitigation measures.

The subsequent reports would compare findings to the baseline data and make recommendations on any adaptations to management strategies, which could include the following:

- Undertaking targeted weed management more often (within the OTS Worksites and/or surrounding the OTS Worksites)

- Improvement of protection methods (fencing and signage)
- Pest control
- Introduction of additional planting.

Annual reports will be provided to DP&E and other stakeholder councils including Blacktown City Council, the Hills Shire Council and Hornsby Shire Council.

7.1.2 General Principles

- Pre clearing surveys will be completed to mitigate potential impacts and identify risks to flora, fauna and habitat prior to construction activities occurring and to identify the presence of any unidentified threatened or endangered species.
- Relevant procedures will be implemented to manage flora and fauna impacts associated with construction for the project.
- The project induction will include identification of sensitive flora and fauna areas, flora and fauna awareness, protection of ecological sites and the pre-clearance process.
- All sensitive areas within the project corridor will be assessed via the Work Risk Assessment (WRA) process and indicated on Site Environmental Plans (SEP).
- Protective fencing and environmental signage will be installed.
- Vegetation removal will only be carried out under a permit system
- Flora and/or fauna located during works will be subject to the Vegetation Clearing Procedure and/or Fauna Rescue Procedure.
- Revegetation works will occur in areas as soon as possible when there is no risk of damage from ongoing construction works.
- Where feasible and reasonable, topsoil and habitat elements (e.g. logs and felled trees) from sites that have few weed species would be stored and reused onsite.
- Where feasible and reasonable, plant stock (seed or cuttings) will be collected from significant plants that cannot be avoided by the construction footprint.
- Site offices, stockpiles, machinery wash down areas, and plant storage areas would be located outside of any ecologically sensitive areas being retained onsite.
- Fuel (or other chemical) storage would be located outside all riparian zones, and at least 10m from any retained ecologically sensitive areas onsite.

7.1.3 Management of Flora and Vegetation Communities

The RTRF EIS concluded that the removal of the degraded and modified vegetation from the site is not considered to constitute a significant impact upon the Cumberland Plain Woodland community given the nature of the vegetation present and the extent of that vegetation type in this general locality. There is no requirement for the retention of any of the vegetation on the site, nor is there any further requirement for offsets for the vegetation which is to be removed. EIS 1 and EIS 2 described impacts to threatened ecological communities recorded within the NWRL Alignment (and detailed in Table 2).

The NWRL Biodiversity Offsets package will however be updated to offset the impacts associated with the removal of vegetation required for the Cheltenham Community Facility.

Noting the assessment of impact to threatened ecological communities, the project design and worksite layouts have been developed to maximise the preservation of native vegetation and will be further refined as detailed design progresses.

Annexure D details where vegetation will be removed and retained, which will be transposed onto the SEP. The SEP will be the primary tool for the management of retained vegetation on site.

- Native vegetation and riparian zone adjacent to or within construction sites that is to be retained will be protected via the following:
- Areas to be demarcated (e.g. fenced, flagged, etc.), and signage erected identifying these areas as 'Environment No-Go Zones'.
- Areas marked on SEPs as 'Environment No-Go Zones'. SEPs will be developed prior to commencing works on site and endorsed by the Environment Representative. The SEPs will include information obtained from the preclearance surveys, including areas of retained vegetation and no-go zones.
- Weekly Joint Environment Inspections will include monitoring areas of retained vegetation to ensure that no unapproved disturbance occurs.
- Where vegetation requires clearance, the Vegetation Clearing Procedure will be applied.

Clearing will follow a two-stage process as follows:

- Non-habitat trees will be cleared first after sign-off of the pre-clearing inspection.
- Habitat trees will be cleared no sooner than 48 hours after non-habitat trees have been cleared. A suitably qualified ecologist will be present on site during the clearing of habitat trees. Felled habitat trees will be left on the ground for 24 hours or inspected by the ecologist prior to further processing.

Vegetation outside the project boundary or not identified within the project determination as requiring removal will be subject to a consistency assessment. The consistency assessment process is described in the CEMP.

The rehabilitation or revegetation of the sites is detailed in the Urban Design and Corridor / Precinct Landscape Design Packages.

Phase 1 work sites have been surveyed and unexpected EEC are not expected. Unexpected finds of threatened flora or EEC will be managed in accordance with the Ecological Unexpected Finds Procedure.

Phase 2 work sites have been surveyed by TSC and SVC contractor appointed ecologists prior to site clearance. Due to limited vegetation clearance being required by Phase 2 Works, unexpected EECs are not anticipated.

Unexpected finds of threatened flora or EEC will be managed in accordance with the Ecological Unexpected Finds Procedure.

7.1.3.1 Management of Significant Flora at Cheltenham Community Facility

Epacris purpurascens var. *purpurascens* within the construction footprint at the Cheltenham Community Facility will be directly impacted by the construction works.

An Epacris salvage plan will be developed by TfNSW to outline the measures proposed for the collection of plant stock (cuttings) for nursery propagation, or translocation of individual plants directly impacted by the construction works, for replanting back in the Cheltenham Oval bushland reserve. The salvage plan will include the maintenance and monitoring of the salvaged plants and be developed in consultation with OEH and Hornsby Council.

The proposed recipient site is within a natural area (bushland) reserve maintained by Hornsby Shire Council. This site is considered a suitable recipient site for the translocated plants. The proposed sites have been nominated based on advice from the local Bush Care group and assessment of the ecological conditions by consultant ecologist from EcoLogical. The proposed recipient sites contain high resilience remnant bushland that is actively managed (weed control and bush regeneration) by Hornsby Shire Council. The ecological conditions are suitable for *Epacris purpurascens* var. *purpurascens.* The site is unlikely to be disturbed by development, edge effects or other direct or indirect impacts that would be deleterious to the long term persistence of the slavaged plants.

Native vegetation that is to be retained at the Cheltenham Community Facility site shall be clearly delineated on the ground (protective fencing and delineation signage) to avoid it being cleared or disturbed.

Topsoil (within 1m of directly impacted Epacris plants) and other juvenile plants are to be salvaged, translocated and planted in the bushland adjoining the Cheltenham Oval. Microhabitat resources from trees cleared for the community facility, such as trees hollows or tree trunks (greater than 250mm diameter and 3m in length), will also be salvaged and used to enhance habitat in adjoining bushland areas including the reserve adjoining Cheltenham Oval. Recipient areas with the Cheltenham Oval bushland reserve shall also be clearly delineated on the ground (protective fencing and delineation signage).

A Section 91 license under the Biodiversity Conservation Act 2017 will be obtained from OEH for the replanting

7.1.3.2 Protection of Adjacent Watercourses and Riparian Buffer Zones

Phase 1 and Phase 2 works will not involve vegetation removal within the riparian zones of First or Second Ponds Creeks, Caddies Creek, Elizabeth Macarthur Creek, Strangers Creek, Cattai Creek and Devlins Creek. In accordance with CoA C24 (SS1-5414 OTS Approval) and CoA C2 (SSI-5931 RTRF Approval), NRT are required to apply the following:

> *"Riparian Buffer Widths for waterways (including First Ponds Creek and Second Ponds Creek) which are affected by the SSI are to be managed for a Total Riparian Buffer Width of between 10m to 50m dependant on the Category of Watercourse determined by the Riparian Corridor Management Study (RCMS) (DIPNR, 2004)."*

The RCMS category of both First and Second Ponds Creeks is Category 1 and therefore the corresponding Riparian Buffer Width is 50 metres.

Phase 2 Works RCMS Category of creeks is shown in Table below with the riparian buffer identified for each waterway impacted by the NWRL alignment.

Table 9 Category of Creeks in or near Phase 2 Worksites

Waterway Name	Field Riparian Corridor Management Study (RCMS)	Riparian Buffer
Devlins Creek and tributaries to Devlins Creek (except Edensor St – Cat 3)	1	50m
Pyes Creek (upstream of Robert Road)	3	10m
Excelsior Creek (upstream of Highs Road)	3	10m
Cattai Creek (upstream of Showground Road)	1	50m
Tributary to Cattai Creek (Anella Avenue)	3	10m
Lake of Strangers Creek (Norwest Boulevard) and tributary to Strangers Creek (Edgewater Drive)	3	10m
Elizabeth Macarthur Creek and associated tributaries (from Norwest through to Windsor Road)	1	50m
Caddies Creek (downstream of Windsor Road)	1	50m
Tributary to Caddies Creek (opposite Ettamogah Pub)	2	30m
Tributary to Caddies Creek (White Hart Drive)	3	10m

According to CoA C25 and 26 of SSI-5414 (OTS Approval), watercourses affected by the OTS works (where reasonable and feasible) will require rehabilitation and Riparian vegetation in and around watercourses affected by the OTS works will also require rehabilitation in consultation with NOW and DPI (Fisheries) and relevant councils.

To satisfy the various conditions as discussed above, site offices, stockpiles, machinery wash down areas and plant storage areas will be located outside of these buffer zones. Buffer zones around ecologically sensitive areas will be highlighted on Site Environment Plans (SEPs). Management within buffer zones is also addressed in the Construction Soil and Water Management Plan (CSWMP) and the Construction Compound and Ancillary Facilities Management Plan (CCAMP).

Measures to minimise impacts on waterways are addressed in the CSWMP. The measures address the erosion and sedimentation impacts associated with vegetation clearing and set out the Water Quality Monitoring Program and discharge procedures.

Where the Water Quality Monitoring Program detects an impact that is attributed to construction, further mitigation will be carried out and further ecological monitoring may be required.

Weed management will be undertaken in buffer zones as part of the overall management of weeds in adjacent vegetation.

Watercourse crossings (temporary and permanent) will be designed in consultation with NOW, and where feasible and reasonable, be consistent with the Guidelines for Controlled Activities, Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries, 2004) and Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures (NSW Fisheries, 1999). Where multiple cell culverts are proposed for creek crossings, at least one cell will be provided for fish passage, with an invert or bed level that mimics creek flows.

7.1.3.3 Rehabilitation of Riparian Areas

During Phase 1 Works, it is not envisaged that riparian areas will be impacted by the construction works. Details of the processes and procedures utilised to define landscaping applications and scopes of work in riparian areas will be contained in the Design and Landscaping Plan (as per CoA C23 SSI-5931 and an overview is given in Section 7.1.3.4 of this CFFMP below.

Phase 2 Works have the potential to impact riparian areas, however riparian vegetation is largely located outside of worksite footprints and hence there may be indirect construction impacts such as amenity and soil and water impacts. Approved vegetation clearance has largely already occurred as per the relevant CoA under SSI-5100 (completed by Early Works, TSC and SVC contractors prior to OTS Works). Should riparian areas be directly impacted by construction activities under the OTS Works (SSI-5414) these riparian areas will be rehabilitated as soon as is reasonably practicable to mitigate potential impacts on in-stream and above-bank habitats.

Details of the processes and procedures utilised to define landscaping applications and scopes of work in riparian areas will be contained in the Urban Design and Corridor Landscape Plan (as per CoA C44 SSI-5414) and an overview is given in Section 7.1.3.4 of this FFMP below.

Development of final designs for restoration and rehabilitation of riparian areas will be undertaken in consultation with NOW, DPI (Fishing and Aquaculture) and with relevant councils, and in accordance with the Riparian Corridor Management Study (DIPNR 2004).

7.1.3.4 Revegetation and Landscaping Works

Revegetation works will be carried out in accordance with the Design and Landscape Plan and Urban Design and Corridor Landscape Plan as required respectively under Conditions C23 (RTRF SSI-5931) and C44 (OTS SSI-5414). Construction sites will be revegetated using endemic native plant species where appropriate.

Proposed landscaping works are detailed below (which are subject to change as the detailed design progresses).

Proposed landscaping and corridor works for Phase 2 Works are detailed under Urban Design and Corridor Landscape Plan.

7.1.3.5 Landscape Design Principles

Access and Circulation

- Provide safe and direct pedestrian movement around the RTRF and each station.

- Ensure a coordinated suite of directional signage (RTRF is not for pedestrian/public access).

Image and Character

- Position trees and vegetation to allow views and vistas to detention basins from within the site.
- Locate and select appropriate high canopy, clear stemmed trees to help with passive surveillance and CCTV positioning.
- Create a strong sense of arrival at key destinations within the site.
- Create well vegetated boundaries to screen the facility from the surroundings, while allowing the site to blend into immediate environs.

Facilities and Uses

- To ensure shading to external recreation areas, pathways and car parks to address amenity requirements for site users.
- Provide spaces that are multifunctional and take advantage of sunlight.

Environment

- Ensure permeable surface treatments are used throughout with a vegetated ground cover and abundant tree planting where site function and internal operations allow.
- Carefully manage all drainage swales to direct surface storm water to the two detention basins with the intention of developing organically shaped detention basins in future design stages.
- Improve water management in basins before storm water flows off site.

7.1.3.6 Landscape Concept – Phase 1 Works

Vegetated Boundaries

- West, east and north boundaries of the site are to be well vegetated with the provision of a generous landscape buffer. This will incorporate as many existing mature trees as possible. To the south a planted embankment will establish a screening to north of the future expansion area.

Embankments

- To the north and west, batters will allow site levels to meet existing and are generally at a 1 in 4 grade to reduce the requirement for geo-textile erosion control. A 1 in 3 batter can be introduced where existing trees need to be retained.

Ground Cover

- Generally a dry grassland surface is proposed across the open spaces. This ensures open views are available across the site which has safety and supervision benefits. Trees planted at a small size are scattered where they do not impose upon the functions of the site. Water tolerant grasses are planted along swales and around detention basins.

Tree Planting

- Larger sized trees are to be planted at the entry, arrival road and within the administration building car park, and in the workshop car park. These locations will benefit most from instant impact of larger trees both for shade and shelter, as well as be visually more significant.

Vehicle Circulation

- Road layouts are designed around access and servicing needs. Controlled entry is from Tallawong Road.

Pedestrian Circulation

- Footpaths are provided to the entry sequence and alongside the maintenance and workshop buildings. Elsewhere across the site pedestrians share the roadway space.

Internal Site Layout

- Internally across the facility, the site layout responds directly to functional and safety requirements necessitated by operations to move, house, clean and maintain the trains.

Car Parking

- The administration building car parking will be used by both visitors and staff, plus immediately. Car parking is also available further into the site at the workshop

Significant Views

- Views from South west are screened with planting. The impact of retaining edge is treated with a planted terrace gabion wall detail.
- Views of the facility are offered from Tallawong Road where the extents of the site will be seen within a landscape vegetation settings.

7.1.3.7 Phase 2 Works

The landscape concept varies from worksite within the Phase 2 works. General revegetation principles are followed, to include:

- Any cleared vegetation shall be replaced and/or offset. All vegetation planted on-site is to consist of locally endemic native species, unless otherwise agreed by TfNSW.
- Any replanting must be undertaken in consultation with the relevant Council, where relevant, and/or the owner of the land upon which the -vegetation is to be planted.
- Details of revegetation and landscaping would be contained in the Urban Design and Landscape Report required under CoA 444 (OTS SSI-5414).
- Due to the minimal impacts predicted as a result of the proposed ECRL Conversion Works, the general principles outlined in Section 7.1.2 would be adopted.
- Where any additional vegetation removal/trimming/cutting or pruning is required outside of that identified in Section 0 and Annexure D, approval be required from TfNSW before removal of the vegetation.

7.1.3.8 Proposed Vegetation

A number of vegetation characters are proposed across the facility. The vegetation characters proposed include:

- Screening planting

- Bushland broad scale planting
- Dry grassland with scattered trees
- Turf
- Massed plant beds
- Swale and bio-retention basin
- Planting
- Entry road and car park trees.

7.1.4 Management of Fauna

The management of fauna encountered on site will follow the procedures presented in the Unexpected Ecological Finds procedure.

To mitigate potential impact to fauna species during construction activities, pre-clearance surveys will be undertaken. A specialist ecologist will oversee and direct the surveys to ensure that targeted fauna species are identified and relocated prior to the start of construction activities.

In the event that threatened species are identified during construction, OEH will be consulted to determine appropriate mitigation and potential relocation measures. This process is defined in the Unexpected Ecological Finds Procedure.

7.1.4.1 Management of Sensitive Fauna Species

Increased lighting and noise levels may potentially disturb fauna, altering their movement patterns or behaviour, and potentially resulting in reductions in reproductive output or overall fitness. Threatened micro bat species and birds that may occur in or adjacent to the construction impact area can be impacted by noise and lighting associated with construction activities.

- To reduce disturbance to bats and nocturnal birds (and other sensitive fauna), where reasonable and feasible, the following measures will be implemented:
- Temporary construction lighting, security and ancillary facility lighting will be directed to where it is needed and in a downwards orientation to avoid light spillage
- Artificial light will be positioned to face away from areas of native vegetation
- Low-pressure sodium lamps will be used instead of high-pressure sodium or mercury lights. Where mercury lights are used, UV filters will be fitted
- The brightness of lights will be reduced to the lowest legal level
- Loudspeakers will be directed downwards and away from areas of native vegetation.

7.1.4.2 Fauna Rescue and Relocation

Licensed fauna handlers will be used to capture and relocate any fauna encountered during construction activities. Capture and relocation of fauna encountered during the

delivery phase of the project will be managed by following the Unexpected Ecological Finds Procedure.

7.1.5 Pest Control

Should pest control be required, a qualified subcontractor will be engaged to undertake this work. Where pest control has been undertaken, a record will be made and maintained on the NRT system.

7.1.6 Weed Management

As part of the scope of pre-clearing surveys each site will be surveyed to record the type and location of weed species. Weeds encountered will be managed as necessary to control their spread.

Weed management is to be completed prior to vegetation removal where practicable. Management of weeds will occur throughout the delivery phase of OTS Works.

The environmental inspection and monitoring program includes measures for weed management. When an area is identified as requiring weed management, activities will only occur following completion of the appropriate documentation and with the approval of the Environment Manager or delegate. Cleared weed material will either be managed as organic waste on site or disposed of at a site licensed to receive green waste. This protocol is reflected in the Weed Management Procedure.

Any use of herbicides will be strictly in accordance with the *Pesticides Act 1999*, product label, and the *Project Safety Management Plan*. Where approved herbicides are required to be used to control weed species near water, i.e. creeks, drainage depressions and stormwater drains, extra care is to be taken to limit overspray. All herbicides will only be used during suitable weather conditions.

Herbicides are not to be used without the prior approval of the Environment Manager or delegate. If a non-glyphosate herbicide is to be used, approval from the Safety Manager and the Environmental and Sustainability Manager is required; this ‘hold point’ is clearly stated in the Weed Management Procedure.

7.2 ECRL Conversion Works

7.2.1 General Principles

Due to the minimal impacts predicted as a result of the proposed ECRL Conversion Works, the general principles outlined in Section 7.1.2 would be adopted.

The final location of the chiller units is currently being progressed through the design phase. Indicative locations of the areas that may require minor vegetation removal is contained in Annexure D.

Where any additional vegetation removal/trimming/cutting or pruning is required outside of that identified in Section 4.2 and Annexure D, approval be required from TfNSW before removal of the vegetation.

7.2.2 Revegetation

- Any cleared vegetation shall be replaced and/or offset. All vegetation planted on-site is to consist of locally endemic native species, unless otherwise agreed by TfNSW.
- Any replanting must be undertaken in consultation with the relevant Council, where relevant, and/or the owner of the land upon which the vegetation is to be planted.
- In the event of clearance to native vegetation an offset strategy in accordance with the requirements of Transport for NSW 'Vegetation Offset Guide' is to be developed.
- Details of revegetation and landscaping would be contained in the Urban Design and Landscape Report required under Condition 40 (SSI-5414).

7.3 Norwest Pedestrian Link Works

7.3.1 General Principles

Due to the minimal impacts predicted as a result of the Norwest Pedestrian Link works, the general principles outlined in Section 7.1.2 would be adopted.

Where any additional vegetation removal / trimming / cutting or pruning is required outside of the project footprint approval is required from TfNSW before removal of the vegetation.

7.3.2 Revegetation

- The amenity vegetation would be reinstated following construction. This would likely provide the same limited ecological values as the vegetation removed during construction.
- Details of revegetation and landscaping would be contained in the Urban Design and Corridor Landscape Plan required under Condition C44 (SSI-5414).

7.4 33kV Underground Feeder Works

7.4.1 General Principles

Due to the minimal impacts predicted as a result of the 33kV Underground Feeder Powerline works, the general principles outlined in Section 7.1.2 would be adopted.

Where any additional vegetation removal / trimming / cutting or pruning is required approval is required from TfNSW before removal of the vegetation. Willoughby City Council and an ecologist or arborist would be consulted prior to the removal or pruning of any trees.

7.5 Rouse Hill Temporary Bypass Powerline Works

7.5.1 General Principles

- If vegetation, other than grass and weeds, needs to be trimmed or removed, further assessment would be undertaken and approval sought from Sydney Metro prior to trimming or removal.
- If threatened flora or fauna species are identified on site, work in the vicinity of these species would stop immediately A spotter/ catcher / botanist would be engaged to survey the site and advise on species management
- The location or route of pole holes would be modified to avoid any damage to trees or tree roots, where possible
- Pole holes would be covered at the end of each day and inspected before poles are installed to ensure no fauna species are harmed
- Stockpiles, plant, equipment and materials are to be located on existing cleared areas, away from the drip zone of trees and native vegetation
- Soil and vegetation that could contain weed material should be removed from machinery prior to any movements off site.

8 Training Review and Reporting

8.1 Training

The flora and fauna component of the site induction will include information on:

- Sensitivity of surrounding vegetation, as shown on Site Environment Plans (SEPs) detailing clearing boundaries, environmental no-go areas
- Sensitivity of threated fauna species (birds and bats)
- Site environmental procedures relating to flora and fauna (tree clearing and grubbing, sediment and erosion control, weed control)
- Emergency and incident response/spill management (chemical spills, fire, injured fauna)
- What to do if you find native animals on the worksite.

Relevant personnel will receive training appropriate to their role in the management of potential impacts on flora and fauna during the project. Ongoing toolbox talks on the requirements for management of flora and fauna will be used to raise and maintain awareness among the wider project team and will cover aspects such as

- Vegetation Clearing Procedure
- Reinforcement of information from inductions and where procedures are amended or new procedures are introduced.

8.2 Monitoring, Compliance and Reporting

Flora and fauna management and mitigation measures and project boundary fencing will be included in regular inspections and compliance records will be retained. NRT documents specific to aspects associated with the FFMP will be used to support construction planning, risk management and quality management processes.

Monitoring and reporting completed as part of the Ecological Monitoring Program outlined in Section 7.1.1 will be incorporated into the overall flora and fauna monitoring program. In addition to the environmental management requirements and procedures defined in this Plan, environmental documents (forms and checklists) will be used to record monitoring and management activities.

Typical records generated would be:

- Pre-clearance checklists
- Environmental Inspections Forms
- Flora and Fauna Surveys.
- Results and outcomes of inspections, monitoring and auditing will be reported internally on a monthly basis. Quarterly construction compliance reports will be prepared to report compliance with the Project Approval.

8.3 Review and Improvement

A non-conformance is an action or omission that does not conform with the requirements of this Plan or any legal and other requirements. Any member of the project team or the Environmental Representative can identify a non-conformance or opportunity for improvement. The CEMP identifies the process for identifying, reporting, recording and reviewing non-conformances. This will ensure continual improvement.

The processes described in the CEMP may result in the need to update or revise this Plan. This will occur as needed. This Plan will be audited within six months of the commencement of construction and thereafter as per the CEMP. The Plan shall be reviewed and updated based on the findings of the audit.

Annexure A Stakeholder Consultation Feedback

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
Phase 1						
E29(f), C1	E35(f), C23	Construction Flora and Fauna Management Plan (including Ecological Monitoring Program)	Office of Environment and Heritage	Submitted 9 December 2014	OEH have notified that they will undertake a review of the Plan and reply by 9 January 2015. No response received as at 12 February 2015	N/A
			Blacktown City Council	Response received 15 December 2014	1. Section 4.3 3rd dot point – reword as text missing and statement is unclear 2. s7.3 states that no rehabilitation will occur however subsequent sections discuss weeding and riparian rehabilitation. The requirements should be clarified and text amended to clearly set out requirements of the current OTS works. 3. s7.3 - Is consultation with OEH also required for threatened flora as stated for threatened fauna in s7.6. 4. Annexure B – table rows repeated in first section Project Approval - Specific Management Plan Requirements. 5. In EIS Environmental Mitigation Measures section the action related to Sensitivity of threatened fauna species (birds and bats) should be expanded to include other groups e.g. Cumberland Plain Land Snail. 6. The map in annexure highlights Cudgegong Reserve – some brief text	1. Updated 2. 7.3 has been updated to clarify rehabilitation requirements and measures to protect or retain vegetation where possible. 3. Yes 4. Rows are repeated to reflect the dual requirements of the two relevant planning approvals. 5. Noted, management measures within the plan are not intended to be specific to a species but cover the possibility of management of any and all threatened fauna species. 6. Cudgegong Reserve is highlighted as a sensitive area close to the site however, as it is not within the site boundary, details of this site have not been provided as they are

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					highlighting this conservation zone is required within the existing environment section; and 7. is there a requirement for pest species management within approval, EIS etc. as this has not been addressed. Rabbit and foxes occur within the area.	outside the scope of management for the project. 7. S5, table 2 identifies the possible impact of pests on site. Pests will be addressed through ecological monitoring program findings, and the resulting recommendations, or unexpected finds protocols where fauna interacts with construction works.
Phase 2						
N/A	E35(f), C23	Construction Flora and Fauna Management Plan (including Ecological Monitoring Program)	Office of Environment and Heritage	Response received 16 October 2015	1. The Ecological Assessment for the Sydney Metro Northwest project stated "it is unlikely that the Bent-winged Bat colony in the M2 culverts would be detrimentally impact (sic) by the proposal. Nonetheless, it is recommended the population is monitored during the construction period and adaptive management is undertaken to ensure there are no detrimental impacts to the population continues to utilise the culvert". This requirement should be included in the Fauna Monitoring section (Section 7.1.1.4) of the Flora and Fauna Management Plan (FFMP). 2. Section 4.3.2 of the FFMP states that during searches of the worksites, the only threatened flora species recorded was *Epacris purpurascens* var. *purpurascens*. However, OEH understands that the threatened species *Hibbertia* sp. "Turramurra" was also recorded at the Cheltenham worksite during pre-clearance surveys.	1. Monitoring of the Bent-winged Bat colony in the M2 culvert has been added to Section 7.1.1.4. 2. Section 4.3.3 has been amended to include that the threatened species *Hibbertia* sp. "Turramurra" was also recorded at the Cheltenham worksite during pre-clearance surveys. 3. Section 7.1.1.3 has been updated to include monitoring of *Epacris purpurascens* var. *purpurascens* and *Hibbertia* sp. "Turramurra" commencing Autumn 2015 in line with the requirement of the Certificate issued under Section 95 of the TSC Act by OEH.

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					3. OEH issued a Certificate under section 95 of the TSC Act for the management and 3-year monitoring of plantings *Epacris purpurascens* var. *purpurascens* and *Hibbertia* sp. "Turramurra" commencing Autumn 2015. OEH is unclear as to why there is no mention of this program in the FFMP, and suggests it may be advantageous to include the requirements in the FFMP so all requirements in relation to biodiversity are contained in one document.	
			The Hills Shire Council	Response received 20 October 2015	Council advises that they have not reviewed but would like the opportunity to in future as part of the regular review process.	Noted.
			Hornsby Shire Council	Response received 16 October 2015	Council advises no issues for the Flora and Fauna Management Plan. They are generally supportive of the controls, monitoring and reporting included.	Noted
Rev 6 updated to incorporate the Cheltenham Community Facility						
	E35(f), C23	Construction Flora and Fauna Management Plan (including Ecological Monitoring Program)	Office of Environment and Heritage	Response received 3 April 2018	1. It is recommended the FFMP includes details on: a) the total area of this vegetation community to be removed b) the location of the vegetation community c) mitigation measures to mitigate the removal of native vegetation, including: i) Native vegetation to be retained at the Cheltenham Community Facility site is clearly delineated on the ground to avoid it being cleared/disturbed ii) Juvenile plants are translocated and planted in the bushland reserve adjoining the Cheltenham oval	1.a) Added to Table 2 1.b) Reference to Appendix C & D added to table 2 1.c) Recommendations added to Section 7.1.3.1

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					iii) any native trees to be removed are salvaged and used in the reserve adjoining the Cheltenham oval to enhance habitat including tree hollows and tree trunks (greater than approximately 25-30cm in diameter and 3m in length).	
					2. it is recommended Section 4.3.1 explains why additional ecological assessment at the Cheltenham Community Facility site was undertaken	Section 4.3.1 has been updated to - TfNSW engaged EcoLogical to carry additional ecological assessment of the construction footprint of the Cheltenham Community Facility in July 2017 (EcoLogical 2017) following determination of a new location outside of the EIS project area through consultation with community groups and Hornsby Shire Council.
					3. Should a modification application be required by the Department of Planning and Environment (OPE) for the additional impacts outside the approved construction footprint it will need to comply with the relevant sections of the *Biodiversity Conservation Act 2016*.	Noted.
					4. Section 4.3.3 refers to the Cheltenham Services facility site and the Cheltenham Community Facility site (page 24). It is suggested this section is cross referenced to the relevant figures in Annexure D which show details on the two sites.	Cross reference has been added in Section 4.3.3 to Appendix D, Figure D15.
					5. It is recommended Section 4.3.3 is amended to add to following text (in bold italicised font): The species was not recorded during additional assessment for the Cheltenham Community	Suggested text has been added in Section 4.3.3

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					Facility, however as Hibbertia spanantha is known to occur in the area,the clearing survey will also target this species	
					6. It is noted that the second Table 3 includes a summary of fauna habitat at the Cheltenham Services Facility work site but not the Cheltenham Community Facility site.	Table numbering has been corrected. Reference to Cheltenham Community Facility has been added in Table 4 (formerly Second Table 3).
					7. OEH recommends Table 5 (the potential impacts/opportunities column) is amended and includes reference to the potential impact on Hibbertia spanantha particularly as it is known to· occur in the area: • Removal of *Hibbertia spanantha*	Removal of *Hibbertia spanantha* has been added to Table 6 (formerly table 5).
					8. It is recommended an additional monitoring activity is included: • Tree hollows salvaged and reused from removed native trees are monitored on an ongoing basis to determine if they are being used by native fauna	This has been added to the scope of the scope of the *Epacris purpurascens* var *purpurascens* monitoring in table 7 (formerly Table 6).
					9. It is recommended Table 6 is amended to include the following additional monitoring actions: a) Monitoring of *Hibbertia spanantha* b) Monitoring of tree hollows salvaged from native trees that have been removed.	This has been added to the scope of the s monitoring in table 7 (formerly Table 6).
					10. It is recommended the following amendments are made to Section 7.1.2: a) Protective fencing and environmental signage is to be installed at the impact sites and	These recommendations are specific to Cheltenham service

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					receiving sites prior to any works commencing b) individual plants of *Epacris purpurascens* var. *purpurascens* which are impacted by the proposed Cheltenham Community Facility are salvaged (cuttings taken) and the plants transplanted to a suitable receiving site(s) that will be protected and managed in perpetuity c) Topsoil within 1m of directly impacted Epacris plants is to be scraped off and spread at the receiving sites around the transplanted plants	facility and have therefore been added to Section 7.1.3.1 It is noted that the Cheltenham Oval bushland reserve is not a biobank site and is not been utilised as an offset. As such NRT cannot commit to the site being protected and managed in perpetuity.
					11. It is noted that the NWRL Biodiversity Offset package will be updated to offset the impacts associated with the removal of vegetation required for the Cheltenham Community Facility. OEH requests that prior to the FFMP being finalised, the offset calculations for the loss of STIF from the development of the Cheltenham Community Facility be provided to OEH.	Sydney Metro will provide OEH with the Biodiversity Offset calculations as requested.
					12. The second paragraph in Section 7.1.3.1 is amended to clarify: An Epacris Salvage plan will be developed by TfNSW to outline the measures proposed for the collection of plant stock (cuttings) for nursery propagation from plants that will be directly impacted by construction works.	7.1.3.1. has been updated as per the recommendations.
					13. Figure 8 - it is unclear where the air photo of the habitat trees is located. It is suggested the location of the trees is included in the title of the figure; the air photo labels the road names; the font size in the legend is increased.	The title for Figure 8 has been updated to reference Phase 1 works.

Condition of Approval SSI-5931	Condition of Approval SSI-5414	CEMP Document	Agency Consultation	Status	Comments	NRT Response
					14. The figures in Annexure D are numbered and cross referenced in the relevant sections of the FFMP	The Figures in Appendix D have been numbered as recommended.
			DP&E	Response received 24 April 2018	The FFMP is approved subject to submission of the revised plan with the following updates: a) Include the reasoning / consideration for determining the site(s) is suitable for translocation of Epacris. b) Section 7.1.3.1, second last paragraph - the plan states that "other juvenile plants may also be salvaged, translocated and planted in the bushland adjoining the Cheltenham Oval". Please replace "may also be" with 'are to be'. Section 7.1.3.1, third last sentence - before the full stop, to include 'including the reserve adjoining the Cheltenham Oval'.	7.1.3.1 has been updated as with the following text The proposed sites have been nominated based on advice from the local Bush Care group and assessment of the ecological conditions by consultant ecologist from Ecoogical. 7.1.3.1. has been updated as per the recommendations. 7.1.3.1. has been updated as per the recommendations.
			Hornsby Shire Council	Response received 24 April 2018	Council supports the revision of the FFMP. No specific additional changes requested.	-

Annexure B Flora and Fauna Management Measures and Compliance Matrix

ID	Measure	Timing	Requirement	Responsibility	Reference
Project Approval – Specific Management Plan Requirements					
1)	The Construction Environmental Management Plan shall include a Construction Flora and Fauna Management Plan to detail how construction impacts on ecology will be minimised and managed. The Plan shall be developed in consultation with relevant Councils and shall include, but not necessarily be limited to:	Prior to Construction	RTRF Approval SSI-5931 CoA E29f	Environment and Sustainability Manager	This Plan Annexure A
2)	plans for impacted and adjoining areas showing vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded; including pre-clearing surveys to confirm the location of threatened flora and fauna species and associated habitat features;	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(i)	Environment Manager	Annexure C Section 7.1.2Environmentally Sensitive Area Map
3)	the identification of areas to be cleared and details of management measures (such as fencing, clearing procedures, removal and relocation of fauna during clearing, habitat tree management and construction worker education) to avoid any residual habitat damage or loss and to minimise or eliminate time lags between the removal and subsequent replacement of habitat. Specifically, temporary fencing is to be placed around all non-certified areas in the vicinity of the construction footprint and no vegetation is permitted to be directly or indirectly affected by the works;	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(ii)	Environment Manager	Section 7.1.3 Annexure D Section 7.1.3.4 Section 8.1
4)	rehabilitation details, including identification of flora species and sources, and measures for the management and maintenance of rehabilitated areas;	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(iii)	Environment Manager	Section 7.1.1 Section 7.1.3.3 Section 7.1.3.4
5)	weed management measures focusing on early identification of invasive weeds and effective management controls;	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(iv)	Environment Manager	Section 7.1.6 Weed Management Procedure

ID	Measure	Timing	Requirement	Responsibility	Reference
6)	a description of how the effectiveness of these management measures would be monitored; in consultation with OEH	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(v)	Environment Manager	Section 7 Section 7.1.1 Section 8.2
7)	a procedure for dealing with unexpected EEC/ threatened species identified during construction, including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and updating of ecological monitoring and/ or biodiversity offset requirements and	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(vi)	Environment Manager	Section 7.1.3
8)	mechanisms for the monitoring, review and amendment of this plan.	Prior to Construction	RTRF Approval SSI-5931 CoA E29f(vii)	Environment Manager	Section 8
9)	Construction Environmental Management Plan shall include a Construction Flora and Fauna Management Plan to detail how construction impacts on ecology will be minimised and managed. The Plan shall be developed in consultation with the OEH and relevant Councils and shall include, but not necessarily be limited to:	Prior to Construction	OTS Approval SSI-5414 CoA E34f	Environment Manager	This Plan Annexure A
10)	plans for impacted and adjoining areas showing vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded	Prior to Construction	OTS Approval SSI-5414 CoA E34f(i)	Environment Manager	Annexure C
11)	vegetation management plan(s) for sites where vegetation is proposed to be retained and for reaches of riparian zones, which intersect with the construction footprint;	Prior to Construction	OTS Approval SSI-5414 CoA E34f(ii)	Environment Manager	Section 7.1.3 Section 7.1.3.1 Annexure D
12)	identification of measures to reduce disturbance to bats and nocturnal birds (and other sensitive fauna	Prior to Construction	OTS Approval SSI-5414 CoA E34f(iii)	Environment Manager	Section 7.1.4.1
13)	rehabilitation details, including identification of flora species and sources, and measures for the management and maintenance of rehabilitated areas (including duration of the implementation of such measures);	Prior to Construction	OTS Approval SSI-5414 CoA E34f(iv)	Environment Manager	Section 7.1.3.3 Section 7.1.3.4

ID	Measure	Timing	Requirement	Responsibility	Reference
14)	weed management measures focusing on early identification of invasive weeds and effective management controls;	Prior to Construction	OTS Approval SSI-5414 CoA E34f(v)	Environment Manager	Section 7.1.6
15)	a description of how the effectiveness of these management measures would be monitored and linked to the Ecological Monitoring Program	Prior to Construction	OTS Approval SSI-5414 CoA E34f(vi)	Environment Manager	Section 8.2
16)	a procedure for dealing with unexpected EEC/ threatened species identified during construction, including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and updating of ecological monitoring and/ or biodiversity offset requirements and	Prior to Construction	OTS Approval SSI-5414 CoA E34f(vii)	Environment Manager	Section 7.1.3
17)	mechanisms for the monitoring, review and amendment of this plan.	Prior to Construction	OTS Approval SSI-5414 CoA E34f(viii)	Environment Manager	Section 8
EIS Environmental Mitigation Measures					
18)	The ecological component of the site induction would include information on: • Sensitivity of surrounding vegetation (particularly threatened vegetation). • Sensitivity of threatened fauna species (birds and bats). • Site environmental procedures (vegetation management, sediment and erosion control, protective fencing, weed control). • Emergency and incident response/ spill management (chemical spills, fire, injured fauna	Prior to Construction & ongoing	RTRF EIS REMM E1 EIS 2 REMM E1	Environment Manager	Section 8.1
19)	Pre-clearing surveys would be undertaken to identify the presence of: • Hollow bearing trees and other habitat features • Threatened flora and fauna.	Prior to Construction	RTRF EIS REMM E2 EIS 2 REMM E2	Environment Coordinator / works Engineer	Section 7.1.1 Section 7.1.2
20)	Trees containing hollows would be felled using “Slow drop” technique (or similar as agreed with OEH). The slow-drop technique involves nudging and shaking the tree, followed by a controlled lowering of the tree to the ground.	Prior to Construction	RTRF EIS REMM E6	Environment Coordinator / works Engineer	Section 7.1.1.5

ID	Measure	Timing	Requirement	Responsibility	Reference
			EIS 2 REMM E6		
21)	Construction sites would be revegetated using endemic native plant species where appropriate.	Post Construction	RTRF EIS EMM E10 EIS 2 REMM E10	E&SM / Design Manager	Section 7.5 UDCLP
22)	To prevent establishment or spread of weeds: • Machinery would be cleaned before entering work sites • Weeds would be removed from within the mapped native vegetation areas at least 10m from the edge of the construction footprint (where access allows). • Cleared weed material would be disposed of at a site licensed to receive green waste.	Prior to Construction & ongoing	RTRF EIS REMM E12 EIS 2 REMM E12	Environment Coordinator / Works Engineer / Site supervisor	Section 7.1.6 Weed Management Procedure
23)	To reduce disturbance to bats and nocturnal birds where reasonable and feasible, a range of measures would be undertaken, such as: • Artificial lighting would be directed to where it is needed and in a downwards orientation to avoid light spillage, • Artificial light would be positioned to face away from areas of native vegetation. • Low-pressure sodium lamps would be used instead of high-pressure sodium or mercury lights. Where mercury lights are used, UV filters would be fitted. • The brightness of lights would be reduced to as low as legally possible, and in conformance with workplace health and safety standards. • Amplified speakers would be directed downwards and away from areas of native vegetation	Ongoing	RTRF EIS REMM E15 EIS 2 REMM E15	E&SM / Environment Coordinator / Works Engineer	Section 7.1.4.1
24)	Where native vegetation is to be retained adjacent to or within construction sites, protective fencing and signage would be maintained in accordance with Australian Standard 4970 – 2009 Protection of Trees.	Prior to Construction	RTRF EIS REMM E22 EIS 2 REMM E22	Environment Coordinator / Works Engineer / Site Supervisor	Section 7.1.2 Section 7.1.3
25)	Where feasible and reasonable, topsoil and habitat elements (e.g. logs and felled trees) from sites that have few weed species would be stored and reused onsite.	Prior to Construction & ongoing	EIS 2 REMM E7	E&SM / Environment Coordinator	Section 7.1.2

ID	Measure	Timing	Requirement	Responsibility	Reference
26)	Site offices, stockpiles, machinery wash down areas, and plant storage areas would be located outside of any ecologically sensitive areas being retained onsite	Ongoing	EIS 2 REMM E8	Environment Coordinator / Works Engineer / Site Supervisor	Section 7.1.2
27)	Fuel (or other chemical) storage would be located outside all riparian zones, and at least 10m from any retained ecologically sensitive areas onsite	Ongoing	EIS 2 REMM E9	Environment Coordinator / Works Engineer / Site Supervisor	Section 7.1.2
28)	Maintenance of waterway crossings and structures would be undertaken in accordance with relevant guidelines such as Fish and Fauna Friendly Waterway Crossings (Fairfull & Witheridge, 2003) and Fish Passage Requirements of Waterway Crossings (2003)		EIS 2 REMM E21		N/A to this stage of works
Project Approval – Specific Conditions					
29)	An Ecological Monitoring Program shall be developed to monitor the effectiveness of the biodiversity mitigation measures implemented as part of the SSI. The Program shall be developed by a suitably qualified and experienced ecologist in consultation with OEH and Blacktown City Council and shall include, but not necessarily be limited to: (a) an adaptive monitoring program to assess the effectiveness of the mitigation measures identified within documents outlined in Condition B1 of this approval. The monitoring program shall monitor performance parameters and criteria against which effectiveness of the mitigation measures will be measured; (b) mechanisms for developing additional monitoring protocols to assess the effectiveness of any additional mitigation measures implemented to address additional impacts in the case of design amendments or unexpected threatened species finds during construction (where these additional impacts are generally consistent with the biodiversity impacts identified for the SSI); (c) provision for the assessment of the data to identify changes to habitat usage and whether this can be directly attributed to the SSI; (d) details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the SSI; and	Prior to Construction	RTRF Approval SSI-5931 CoA C1	Environment Manager	Section 7.1.1 Section 7.1.1.3 Section 7.1.1.4 Section 7.1.1.5 Section 7.1.1.5 Section 7.1.1.6

ID	Measure	Timing	Requirement	Responsibility	Reference
	(e) provision for annual reporting of monitoring results to the Director General and Blacktown City Council, or as otherwise agreed by those agencies."				Section 7.1.1.7
30)	Riparian Buffer Widths for waterways (including First Ponds Creek and Second Ponds Creek) which are affected by the SSI are to be managed for a Total Riparian Buffer Width of between 10m to 50m dependant on the Category of Watercourse determined by the Riparian Corridor Management Study (DIPNR, 2OO4).	Prior to Construction & ongoing	RTRF Approval SSI-5931 CoA C2	E&SM / Environment Coordinator	Section 7.1.3.1
31)	Riparian vegetation in and around watercourses affected by the SSI shall be restored and rehabilitated to a condition equal to or better than its current state in consultation with NOW and DPI fisheries) and with the relevant Council/s. Consultation with NOW and DPI (Fisheries) should include duration of restoration and rehabilitation measures, including timeframes and reporting on completion of works.	During and post construction	RTRF Approval SSI-5931 CoA C3	E&SM / Design Manager	Section 7.1.3.1
32)	Watercourses affected by the SSI shall, where feasible and reasonable, be rehabilitated to emulate a natural stream system. All works undertaken on riparian land, including the rehabilitation of watercourses, shall be consistent with the Guidelines for Controlled Activities on Waterfront Land (NOW, 2012) and stream armouring should be minimised to the greatest extent practicable.	During and post construction	RTRF Approval SSI-5931 CoA C4	E&SM / Design Manager	Section 7.1.3.1
33)	The clearing of native vegetation shall be minimised with the objective of reducing impacts to any threatened species or EECs to the greatest extent practicable.	Prior to and during construction	RTRF Approval SSI-5931 CoA E2	E&SM / Design Manager	Section 7.1.3
34)	The Ecological Monitoring Program required under condition C1 of State Significant Infrastructure Approval SSI-5100 shall continue and be updated as necessary during the construction of the SSI, unless otherwise agreed by the Director-General, in consultation with OEH and relevant Council's depending on the outcomes of monitoring.	Ongoing	OTS Approval SSI-5414 CoA C23	Environmental Planning and Approvals Manager	N/A to this phase of works
35)	Riparian Buffer Widths for waterways which are affected by the SSI are to be managed for a Total Riparian Buffer Width of between 10m to 50m where feasible and reasonable, dependant on the Category of Watercourse determined by the Riparian Assessment for the North West Rail Link (Ecological Australia, 2011)	Prior to and during construction	OTS Approval SSI-5414 CoA C24	E&SM / Design Manager	Section 7.1.3.1
36)	Watercourses affected by the proposal shall, where feasible and reasonable, be rehabilitated to emulate a natural stream system. The rehabilitation of watercourses	During and post construction	OTS Approval SSI-5414 CoA C25	E&SM / Design Manager	Section 7.1.3.1

ID	Measure	Timing	Requirement	Responsibility	Reference
	shall be consistent with the Guidelines for Controlled Activities (DWE, 2008) and stream armouring should be minimised to the greatest extent practicable.				
37)	Riparian vegetation in and around watercourses affected by the SSI shall be restored and rehabilitated in consultation with NOW and DPI (Fisheries) and with the relevant Council/s. Restoration and rehabilitation measures, including timeframes and reporting on completion of works, shall be included in the Construction Flora and Fauna Management Plan (condition E34(f)).	During and post construction	OTS Approval SSI-5414 CoA C26	E&SM / Design Manager	Section 7.1.3.1
38)	Watercourse crossings (temporary and permanent) shall be designed in consultation with NOW, and where feasible and reasonable, be consistent with the *Guidelines for Controlled Activities, Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW Fisheries, 2004) and *Policy and Guidelines for Design* and *Construction of Bridges, Roads, Causeways, Culverts and Similar Structures* (NSW Fisheries, 1999). Where multiple cell culverts are proposed for creek crossings, at least one cell shall be provided for fish passage, with an invert or bed level that mimics creek flows.	Prior to and during construction	OTS Approval SSI-5414 CoA C36	E&SM / Design Manager	Section 7.1.3.1
39)	The SSI shall be constructed with the objective of not clearing additional vegetation beyond that approved under State Significant Infrastructure Approval SSI 5100 or identified in the documents listed in Condition B1.	Prior to and during construction	OTS Approval SSI-5414 CoA E11	E&S Manager / Design Manager	Section 7.1.3
40)	Where land associated with construction sites are not proposed to be utilised as part of the operational stage of the SSI, the Proponent shall ensure that these sites are fully rehabilitated to either the same level or better than their condition, prior to the construction of Infrastructure Approval SSI-5100, in consultation with relevant Council(s).	During and post construction	OTS Approval SSI-5414 CoA E12	E&SM / Design Manager	N/A to this stage of works.
North West Rail Link Construction Environmental Management Framework					
41)	Flora and Fauna Management Objectives The following flora and fauna management objectives will apply to the construction of the project: • Minimise impacts on flora and fauna. • Design waterway modifications and crossings to incorporate best practice principles. • Retain and enhance existing flora and fauna habitat wherever possible.	Ongoing	NWRL CEMP Framework Section 11.1	Environment Manager	Section 7.2 Not applicable to this stage of works

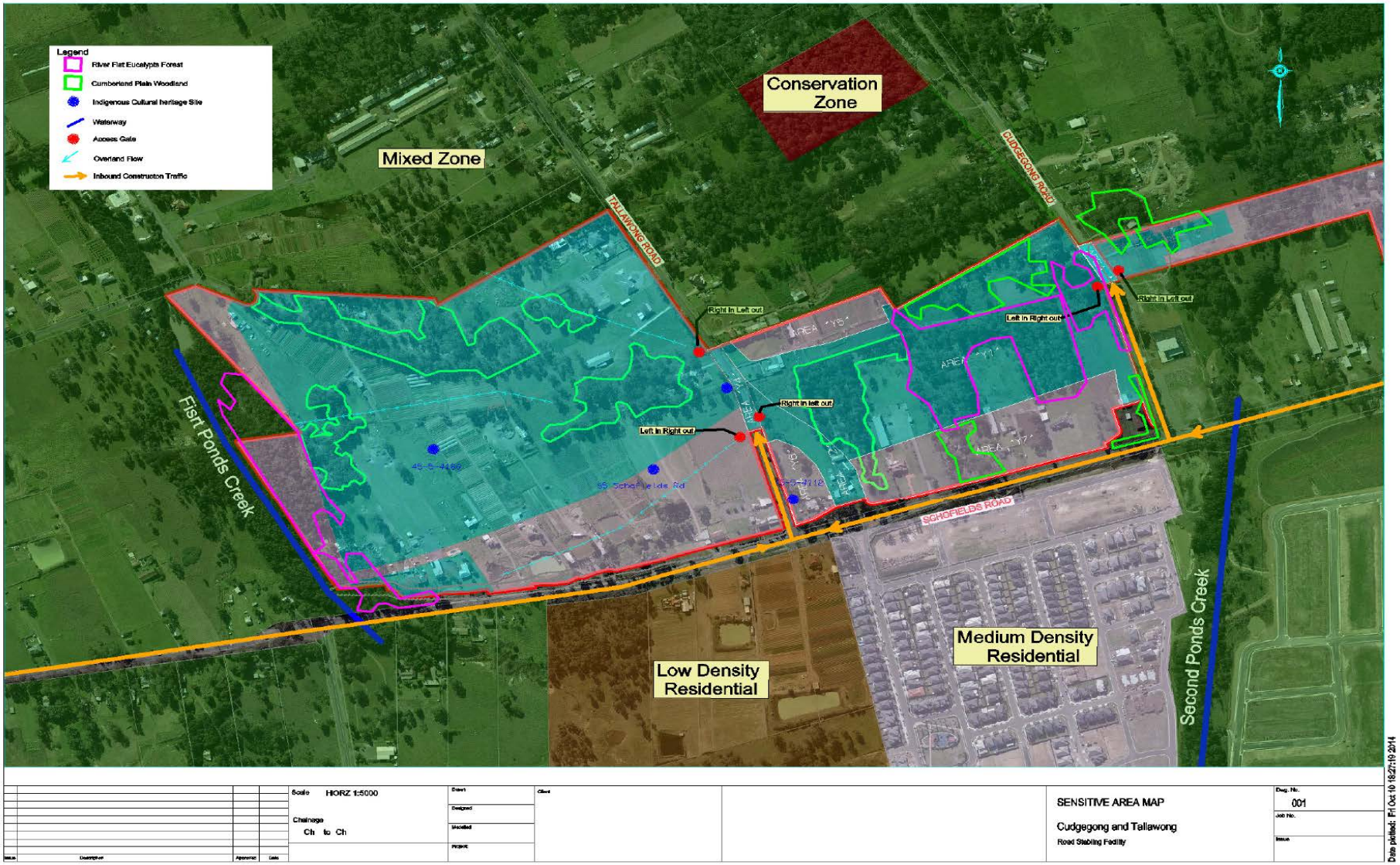
ID	Measure	Timing	Requirement	Responsibility	Reference
	• Appropriately manage the spread of weeds and plant pathogens				Section 7.2 Section 7.7
42)	NWRL Principal Contractors will develop and implement a Flora and Fauna Management Plan which will include as a minimum: • The ecological mitigation measures as detailed in the environmental approval documentation. • The responsibilities of key project personnel with respect to the implementation of the plan. • Procedures for the clearing of vegetation. • Ecological monitoring requirements. • Compliance record generation and management	Prior to construction	NWRL CEMP Framework Section 11.2	Environment Manager	This Plan This Table Section 3 Section 7.1.3 Section 7.1.1 Section 8.3
43)	The Principal Contractors regular inspections will include a check on the ecological mitigation measures and project boundary fencing.	Ongoing	NWRL CEMP Framework Section 11.2	Environment Coordinator	Section 8.2
44)	The following compliance records would be kept by the NWRL Principal Contractor: • Records of pre-clearing inspections undertaken. • Records of the release of the pre-clearing hold point. • Records of ecological inspections undertaken.	Ongoing	NWRL CEMP Framework Section 11.2	Environment Coordinator	Section 8.2
45)	Flora and Fauna Mitigation Examples of flora and fauna mitigation measures include: • Areas to be retained and adjacent habitat areas will be fenced off prior to works to prevent damage or accidental over clearing. • Clearing will follow a two-stage process as follows: • Non-habitat trees will be cleared first after sign-off of the pre-clearing inspection. • Habitat trees will be cleared no sooner than 48 hours after non-habitat trees have been cleared. A suitably qualified ecologist will be present on site during	Ongoing	NWRL CEMP Framework Section 11.3	Environment Coordinator	Section 7.1.2 Section 7.1.3 Vegetation Removal Procedure

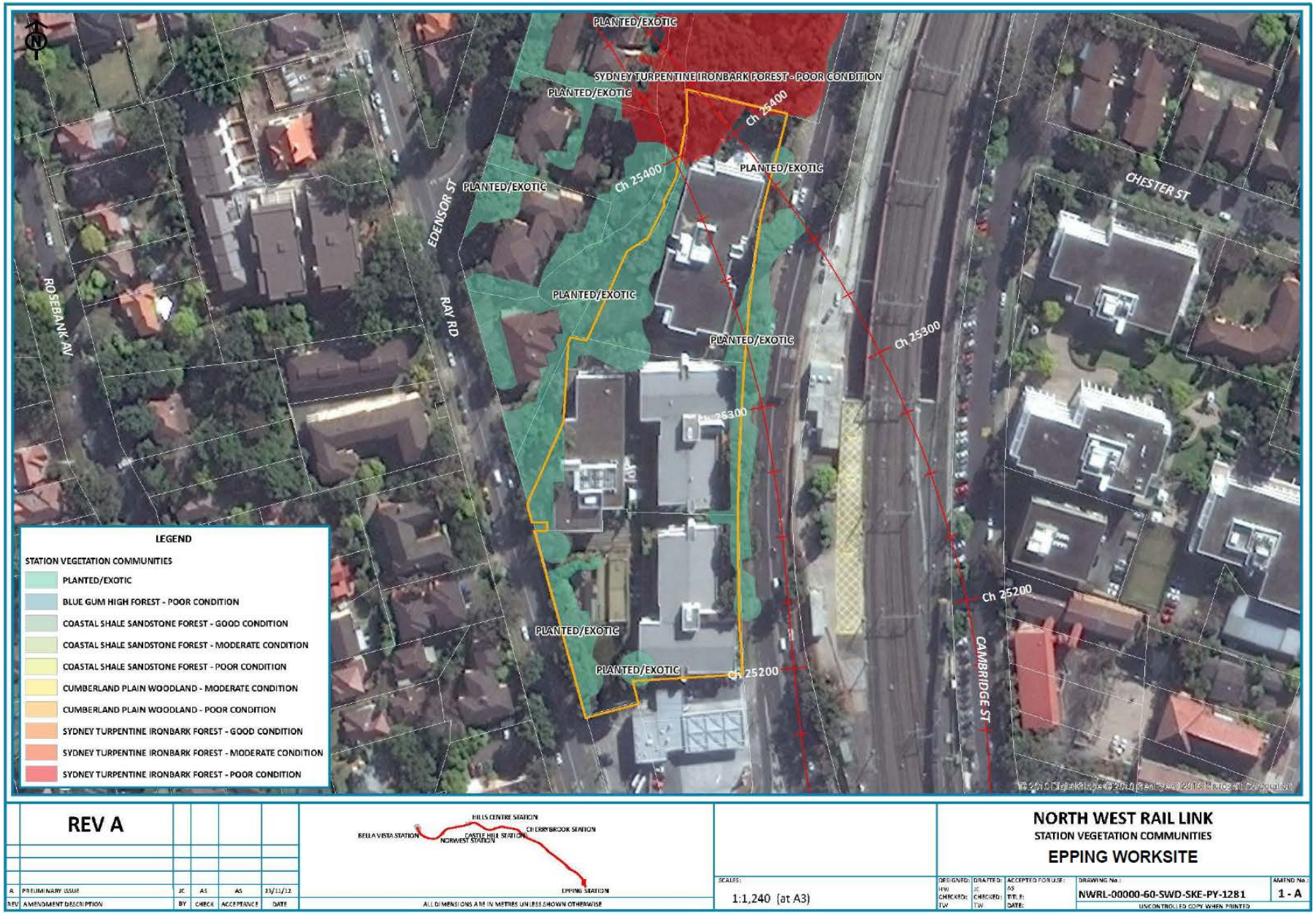
ID	Measure	Timing	Requirement	Responsibility	Reference
	the clearing of habitat trees. Felled habitat trees will be left on the ground for 24 hours or inspected by the ecologist prior to further processing. • Weed management is to be undertaken in areas affected by construction prior to any clearing works in accordance with the Noxious Weeds Act 1993.				Section 7.1.6 Weed Management Procedure
Project Deed Requirements					
46)	In addition to the requirements identified in the Environmental Documents, the Construction Flora and Fauna Management Plan must include an estimate of the change in ecological value associated with the Delivery Activities (as calculated using the Green Building Council of Australia's Change in Ecological Value Calculator).	Prior to construction	Project Deed App 54 – Section 3.17 (i)	Environment Manager	Section 6
ECRL Determination Report Conditions of Approval					
47)	Replanting Program a) Any cleared vegetation shall be replaced and/or offset. All vegetation planted on-site is to consist of locally endemic native species, unless otherwise agreed by TfNSW. b) Any replanting must be undertaken in consultation with the relevant Council, where relevant, and/or the owner of the land upon which the vegetation is to be planted. c) In the event of clearance to native vegetation an offset strategy in accordance with the requirements of Transport for NSW 'Vegetation Offset Guide' is to be developed	During Construction	CoA 31	Environment Manager	Section 7.2.2
48)	Removal of Vegetation Separate approval is required for the trimming, cutting, pruning or removal of vegetation where the impact has not already been identified and approved in the EIA.	During Construction	CoA 32	Environment Manager	Section 7.2.1
Norwest Station Subsurface Pedestrian Link and Northern Entry REF					
49)	As a precautionary measure, ensure a qualified ecologist would be on call during the removal of the amenity vegetation to identify and manage wildlife that may be	During Construction	Norwest Pedestrian Link EMM 74	Environment Coordinator	Section 7.1.4

ID	Measure	Timing	Requirement	Responsibility	Reference
	disturbed and / or injured. The ecologist would assess the species and then release them to the nearest suitable habitat if uninjured			Project Engineer	
50)	Noxious and environmental weeds would be controlled within the operational site boundary. To prevent establishment or spread of weeds: • Machinery would be cleaned before entering the works site • Cleared weed material would be disposed of at a site licenced to receive green waste	During Construction	Norwest Pedestrian Link EMM 75	Environment Coordinator Project Engineer	Section 7.1.6
Willoughby to North Chatswood 33kV Underground Feeder Powerline Determination Report Conditions of Approval					
51)	Where impacts to existing street trees are unavoidable, both Willoughby City Council and an ecologist or arborist would be consulted prior to removal or pruning of any trees.	During Construction	CoA 19	Project Engineer	Section 8.4.1
Willoughby to North Chatswood 33kV Underground Feeder Powerline Submissions Report Revised Environmental Management Measures					
52)	The following mitigation measures would be implemented during construction for any impacts to existing vegetation: ■ Where vegetation clearing is required, such as potentially at the Willoughby Subtransmission Substation, pre-clearing surveys would be completed to mitigate potential impacts and identify risks to flora, fauna and habitat prior to construction activities occurring and to identify the presence of any unidentified threatened or endangered species. ■ Where impacts to existing street trees are unavoidable, both Willoughby City Council and an ecologist or arborist would be consulted prior to removal or pruning of any trees. ■ If the removal of any tree with hollows/dead trees/tree stump is unavoidable (subject to detailed design), further assessment by a qualified ecologist would be undertaken. ■ Relevant procedures would be implemented to manage flora and fauna impacts associated with construction. ■ Any sensitive areas along the alignment would be identified during detailed design and indicated on a site environmental plan for the proposed works. Protective fencing and environmental signage would be installed as required. ■ Vegetation removal would only be carried out under a permit system. ■ Flora and/or fauna located during works would be subject to a Vegetation Clearing Procedure and/or Fauna Rescue Procedure.	Construction	REMM 16	Environment Coordinator Project Engineer	Section 7

ID	Measure	Timing	Requirement	Responsibility	Reference
	▪ Site office, stockpiles, machinery wash down areas, and plant storage areas would be located outside of any ecologically sensitive areas. ▪ Fuel (or other chemical) storage would be located outside all identified riparian zones, and at least 10 metres from any retained ecologically sensitive areas onsite.				
Rouse Hill Temporary Bypass Powerline EIA					
53)	• If vegetation, other than grass and weeds, needs to be trimmed or removed, further assessment would be undertaken and approval sought from Sydney Metro prior to trimming or removal. • If threatened flora or fauna species are identified on site, work in the vicinity of these species would stop immediately A spotter/ catcher / botanist would be engaged to survey the site and advise on species management • The location or route of pole holes would be modified to avoid any damage to trees or tree roots, where possible • Pole holes would be covered at the end of each day and inspected before poles are installed to ensure no fauna species are harmed • Stockpiles, plant, equipment and materials are to be located on existing cleared areas, away from the drip zone of trees and native vegetation • Soil and vegetation that could contain weed material should be removed from machinery prior to any movements off site	During Construction	EIA Control Measure	Site Supervisor Environment Coordinator	Section 7.5.1

Annexure C Environmentally Sensitive Area Map




PLANTED/EXOTIC
SYDNEY TURPENTINE IRONBARK FOREST - POOR CONDITION
PLANTED/EXOTIC
Ch 25400
PLANTED/EXOTIC
Ch 25400
PLANTED/EXOTIC
EDENSOR ST
ROSEBANK AV
RAY RD
CHESTER ST
PLANTED/EXOTIC
PLANTED/EXOTIC
Ch 25300
Ch 25300
Ch 25200
PLANTED/EXOTIC
PLANTED/EXOTIC
Ch 25200
CAMBRIDGE ST
LEGEND
STATION VEGETATION COMMUNITIES
PLANTED/EXOTIC
BLUE GUM HIGH FOREST - POOR CONDITION
COASTAL SHALE SANDSTONE FOREST - GOOD CONDITION
COASTAL SHALE SANDSTONE FOREST - MODERATE CONDITION
COASTAL SHALE SANDSTONE FOREST - POOR CONDITION
CUMBERLAND PLAIN WOODLAND - MODERATE CONDITION
CUMBERLAND PLAIN WOODLAND - POOR CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - GOOD CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - MODERATE CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - POOR CONDITION
REV A
A PRELIMINARY ISSUE JC AS AS 23/11/12
REV AMENDMENT DESCRIPTION BY CHECK ACCEPTANCE DATE
HILLS CENTRE STATION
BELLA VISTA STATION
CASTLE HILL STATION
CHERRYBROOK STATION
NORWEST STATION
EPPING STATION
ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE
SCALES:
1:1,240 (at A3)
NORTH WEST RAIL LINK
STATION VEGETATION COMMUNITIES
EPPING WORKSITE
DESIGNED: HW
DRAFTED: JC
CHECKED: TW
ACCEPTED FOR USE: AS
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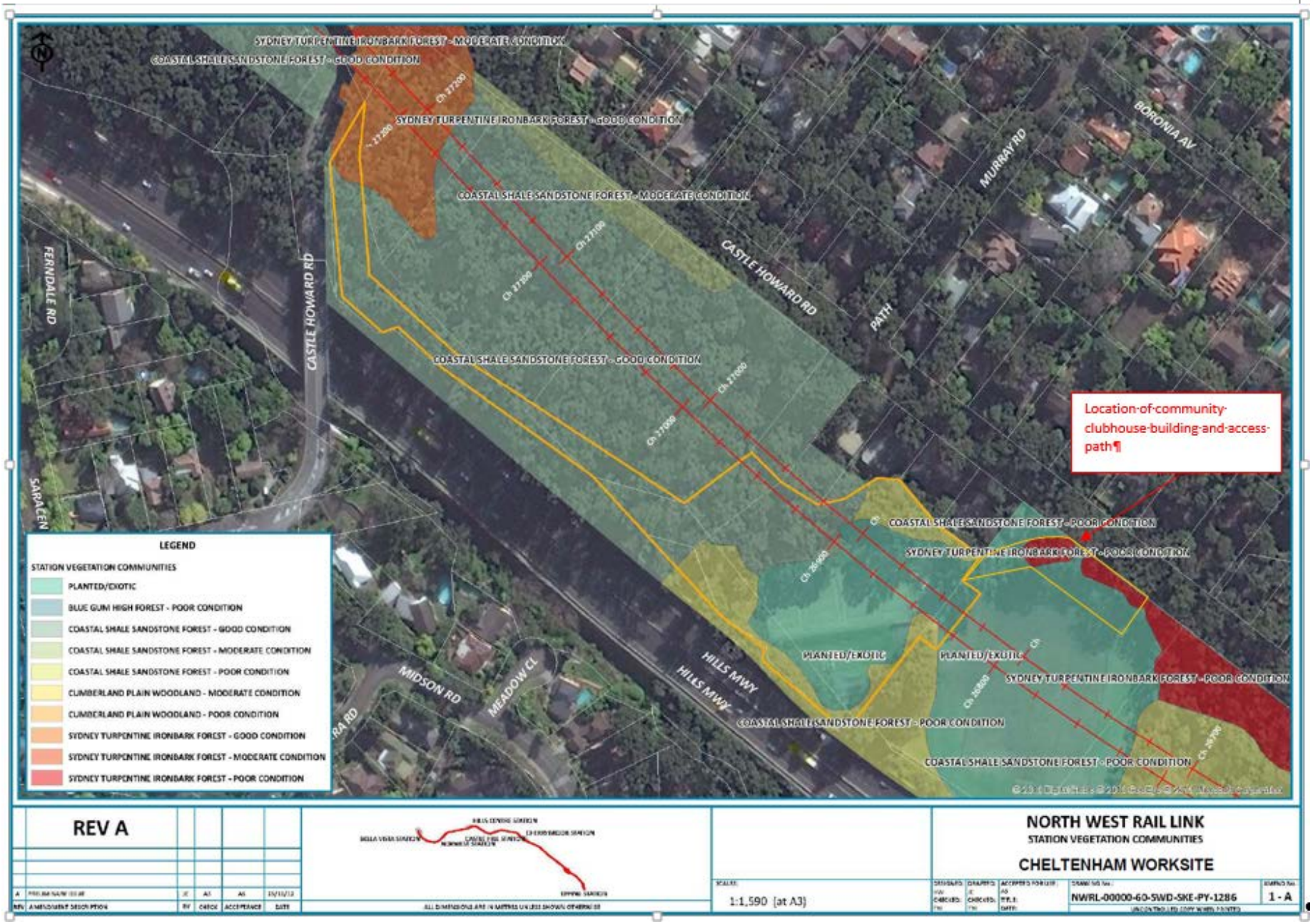
SYDNEY TURPENTINE IRONBARK FOREST - MODERATE CONDITION
COASTAL SHALE SANDSTONE FOREST - GOOD CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - GOOD CONDITION
COASTAL SHALE SANDSTONE FOREST - MODERATE CONDITION
COASTAL SHALE SANDSTONE FOREST - GOOD CONDITION
COASTAL SHALE SANDSTONE FOREST - POOR CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - POOR CONDITION
PLANTED/EXOTIC
PLANTED/EXOTIC
SYDNEY TURPENTINE IRONBARK FOREST - POOR CONDITION
COASTAL SHALE SANDSTONE FOREST - POOR CONDITION
COASTAL SHALE SANDSTONE FOREST - POOR CONDITION
Location of community clubhouse building and access path
CASTLE HOWARD RD
FERNDALE RD
SARACEN
MURRAY RD
BORONIA AV
PATH
MIDSON RD
MEADOW CL
HILLS MWY
HILLS MWY
Ch 27200
Ch 27300
Ch 27400
Ch 27500
Ch 27600
Ch 27700
Ch 28000
Ch 28500
Ch 29000
LEGEND
STATION VEGETATION COMMUNITIES
PLANTED/EXOTIC
BLUE GUM HIGH FOREST - POOR CONDITION
COASTAL SHALE SANDSTONE FOREST - GOOD CONDITION
COASTAL SHALE SANDSTONE FOREST - MODERATE CONDITION
COASTAL SHALE SANDSTONE FOREST - POOR CONDITION
CUMBERLAND PLAIN WOODLAND - MODERATE CONDITION
CUMBERLAND PLAIN WOODLAND - POOR CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - GOOD CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - MODERATE CONDITION
SYDNEY TURPENTINE IRONBARK FOREST - POOR CONDITION
REV A
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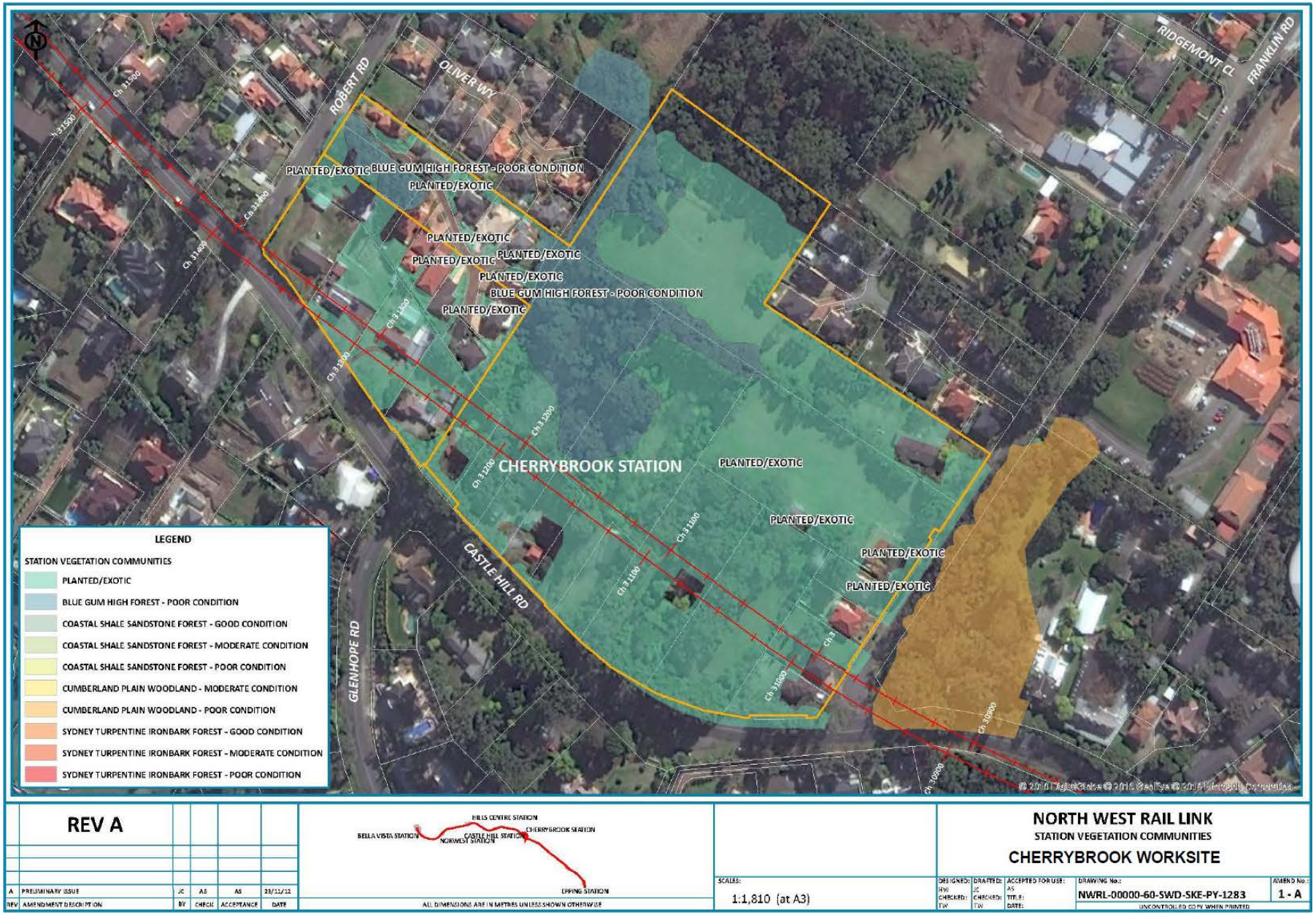
STATION VEGETATION COMMUNITIES
CHELTENHAM WORKSITE
NWRL-00000-60-SWD-SKE-PY-1286
1 - A



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A	PRELIMINARY ISSUE	JC	AS	AS	23/11/12

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BELLA VISTA STATION
NORWEST STATION
CASTLE HILL STATION
CHERRYBROOK STATION
EPPING STATION

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

SCALES: 1:1,810 (at A3)

DESIGNED: HW | DRAFTED: JC | ACCEPTED FOR USE: AS
CHECKED: TW | CHECKED: TW | TITLE:
DATE:

NORTH WEST RAIL LINK
STATION VEGETATION COMMUNITIES
CHERRYBROOK WORKSITE

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BELLA VISTA STATION
CHERRYBROOK STATION
CASTLE HILL STATION
NORWEST STATION
EPPING STATION

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

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DATE:

NORTH WEST RAIL LINK
STATION VEGETATION COMMUNITIES
CASTLE HILL WORKSITE

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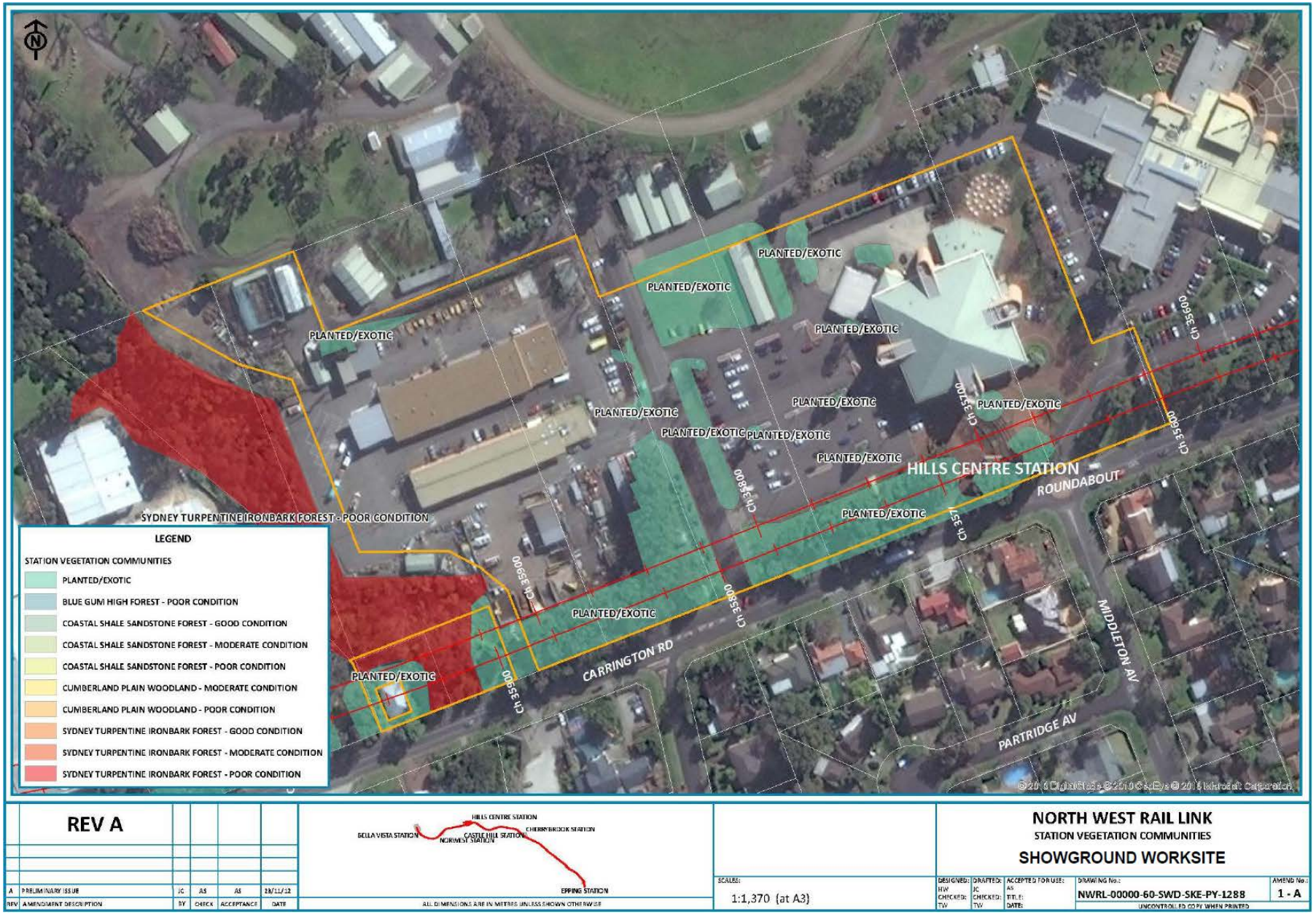

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CASTLE HILL STATION
CHERRYBROOK STATION
NORWEST STATION
EPPING STATION

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

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DESIGNED: HW | DRAFTED: JC | ACCEPTED FOR USE: AS
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DATE:

NORTH WEST RAIL LINK
STATION VEGETATION COMMUNITIES
SHOWGROUND WORKSITE

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UNCONTROLLED COPY WHEN PRINTED

REV A

REV	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE
A	PRELIMINARY ISSUE	JC	AS	AS	25/11/13

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

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CHECKED: FW | CHECKED: TW | TITLE: | DATE:

NORTH WEST RAIL LINK
STATION VEGETATION COMMUNITIES
NORWEST WORKSITE

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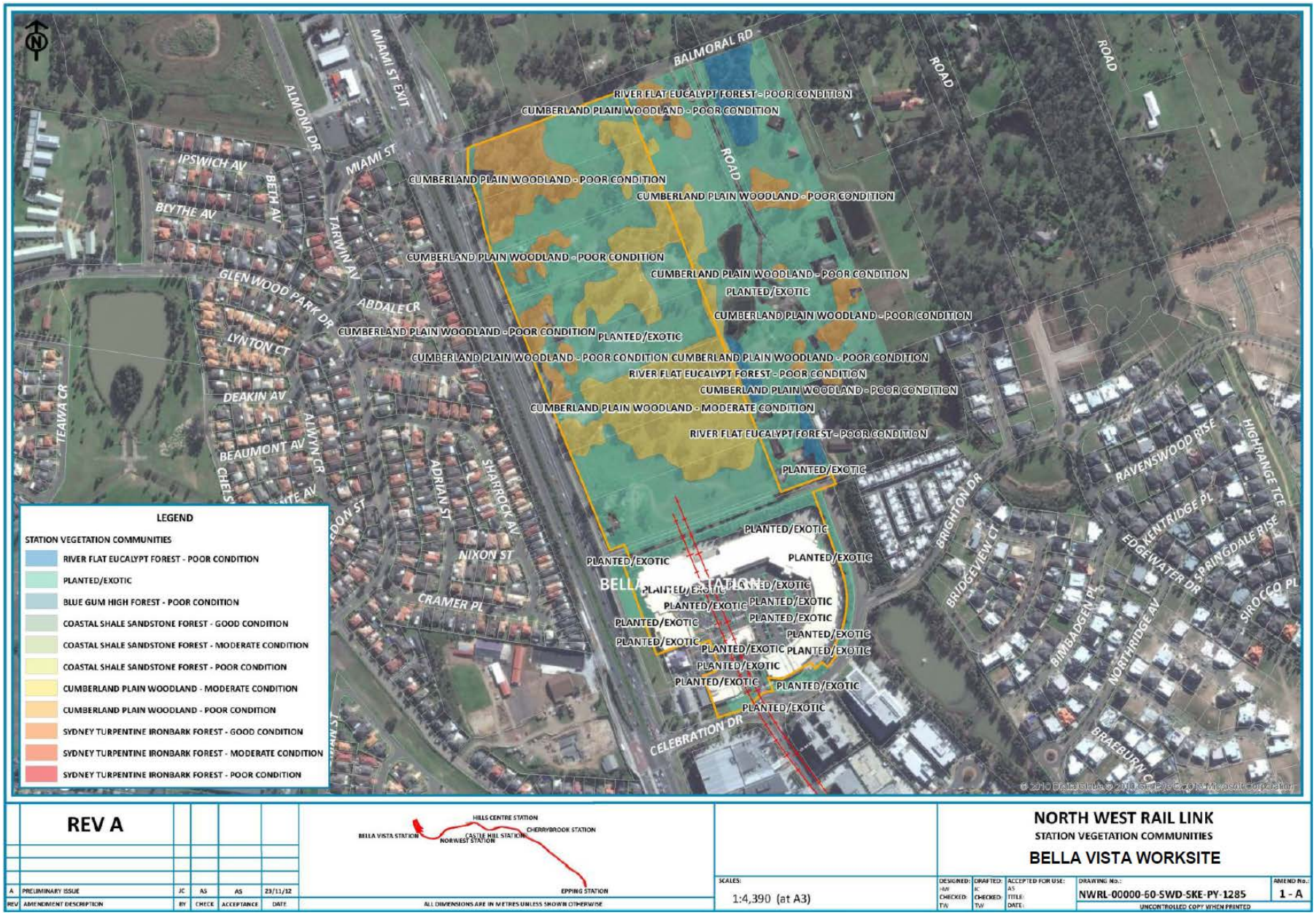

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A	PRELIMINARY ISSUE	JC	AS	AS	23/11/12

HILLS CENTRE STATION · BELLA VISTA STATION · CASTLE HILL STATION · CHERRYBROOK STATION · NORWEST STATION · EPPING STATION

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

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UNCONTROLLED COPY WHEN PRINTED

NORTH WEST RAIL LINK

STATION VEGETATION COMMUNITIES

BELLA VISTA WORKSITE

Annexure D Vegetation to be Cleared and Retained

Figure D1 - SMTF and Cudgegong – Areas to be cleared shown within the red line


Figure D2 - Epping
Potential Chiller Unit Location
Area to be cleared


Figure D3 – Macquarie Park
Potential Chiller Unit Location
Area to be cleared

Figure D4 – North Ryde

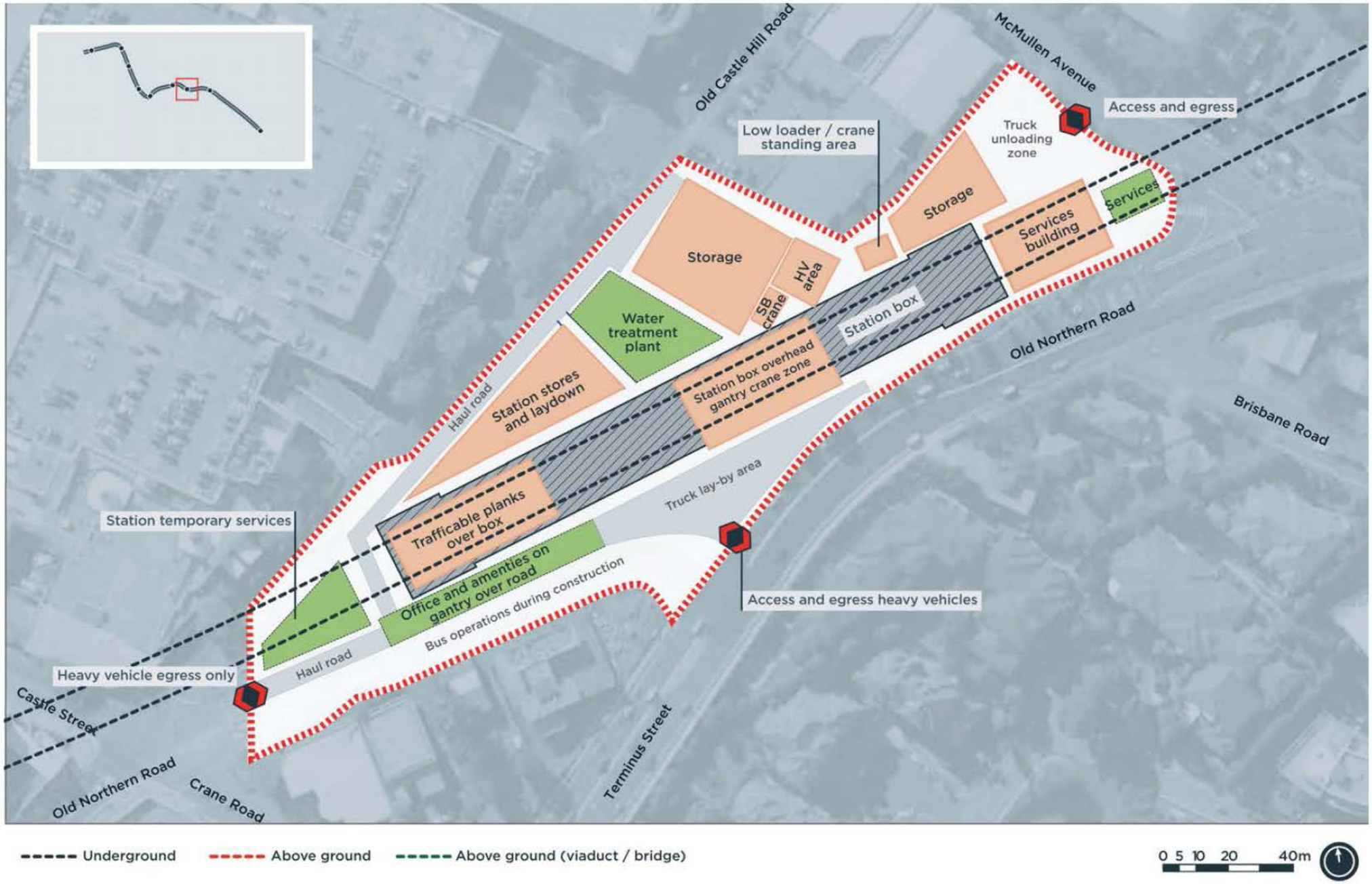

Figure D6 - Castle Hill Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

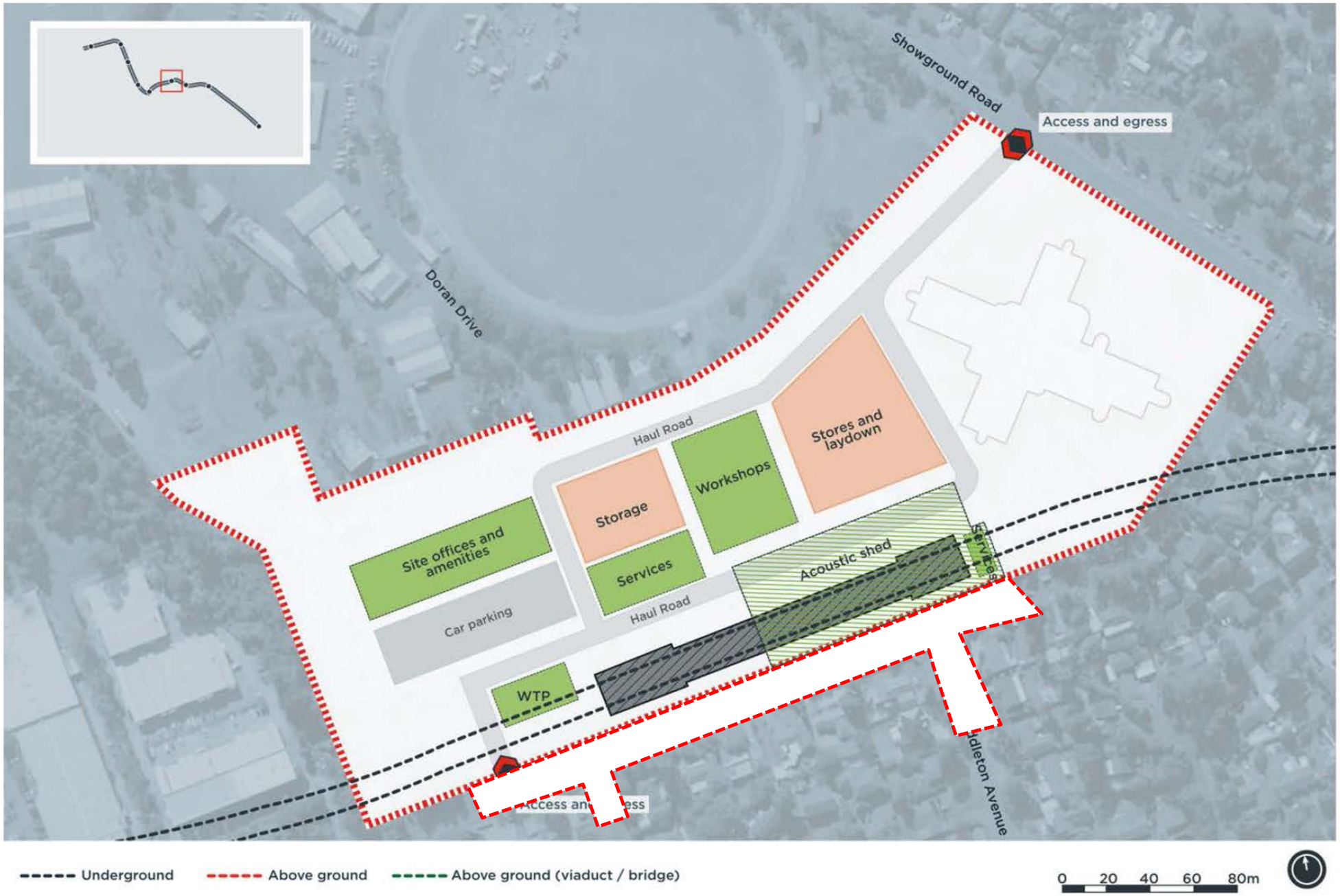

Figure D7 - Showground Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

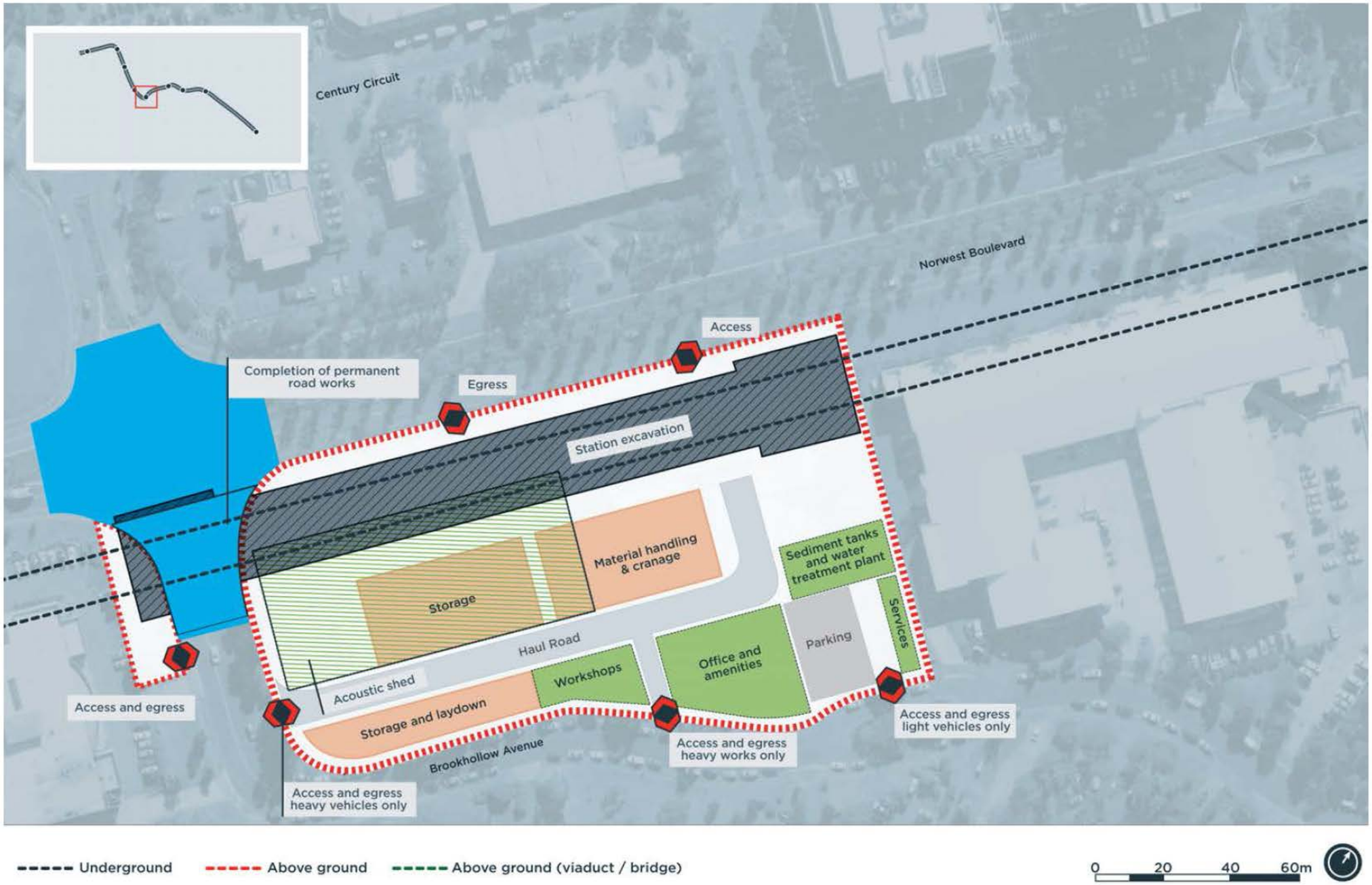

Figure D8 - Norwest Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

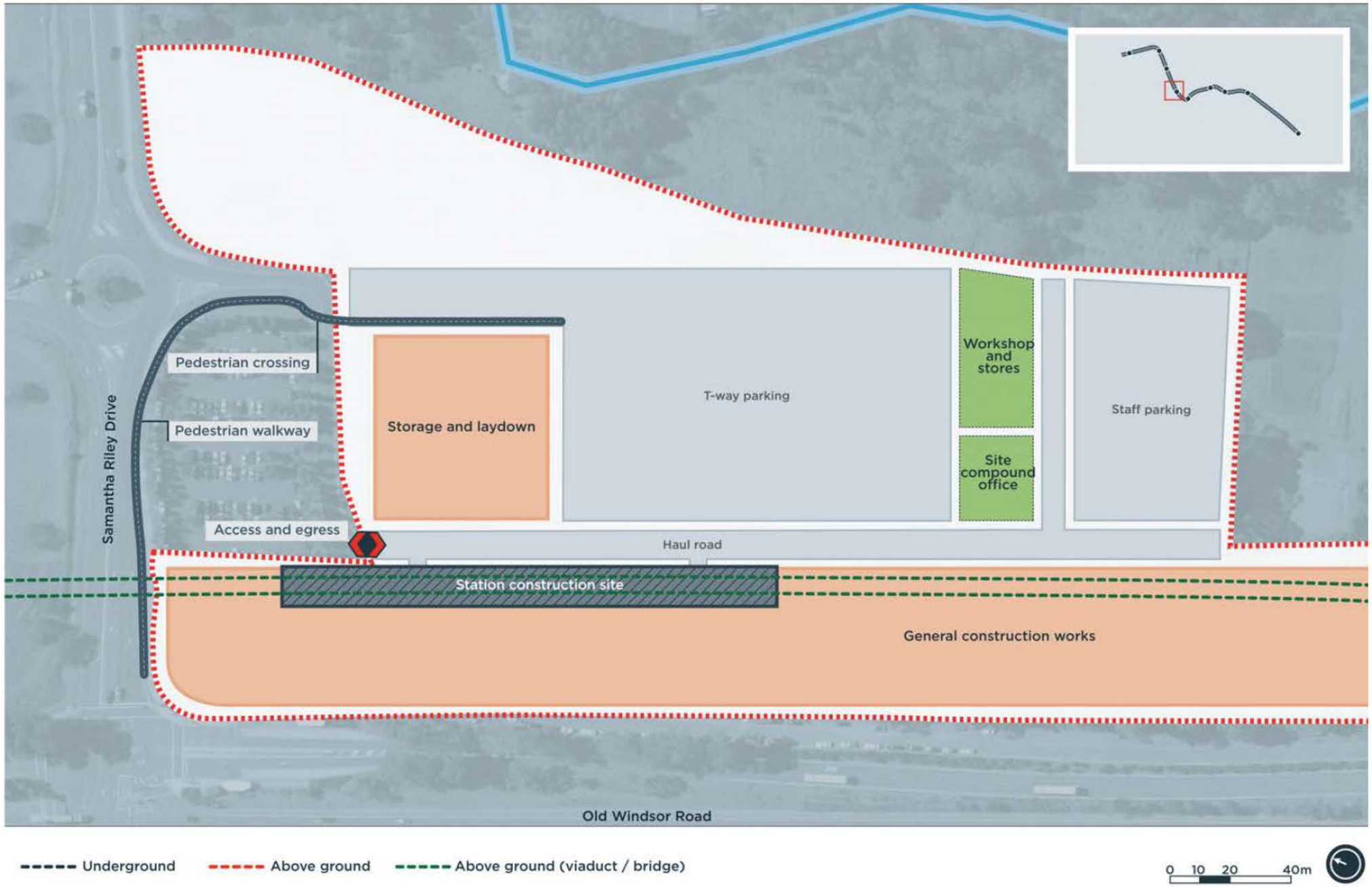

Figure D9 - Kellyville Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

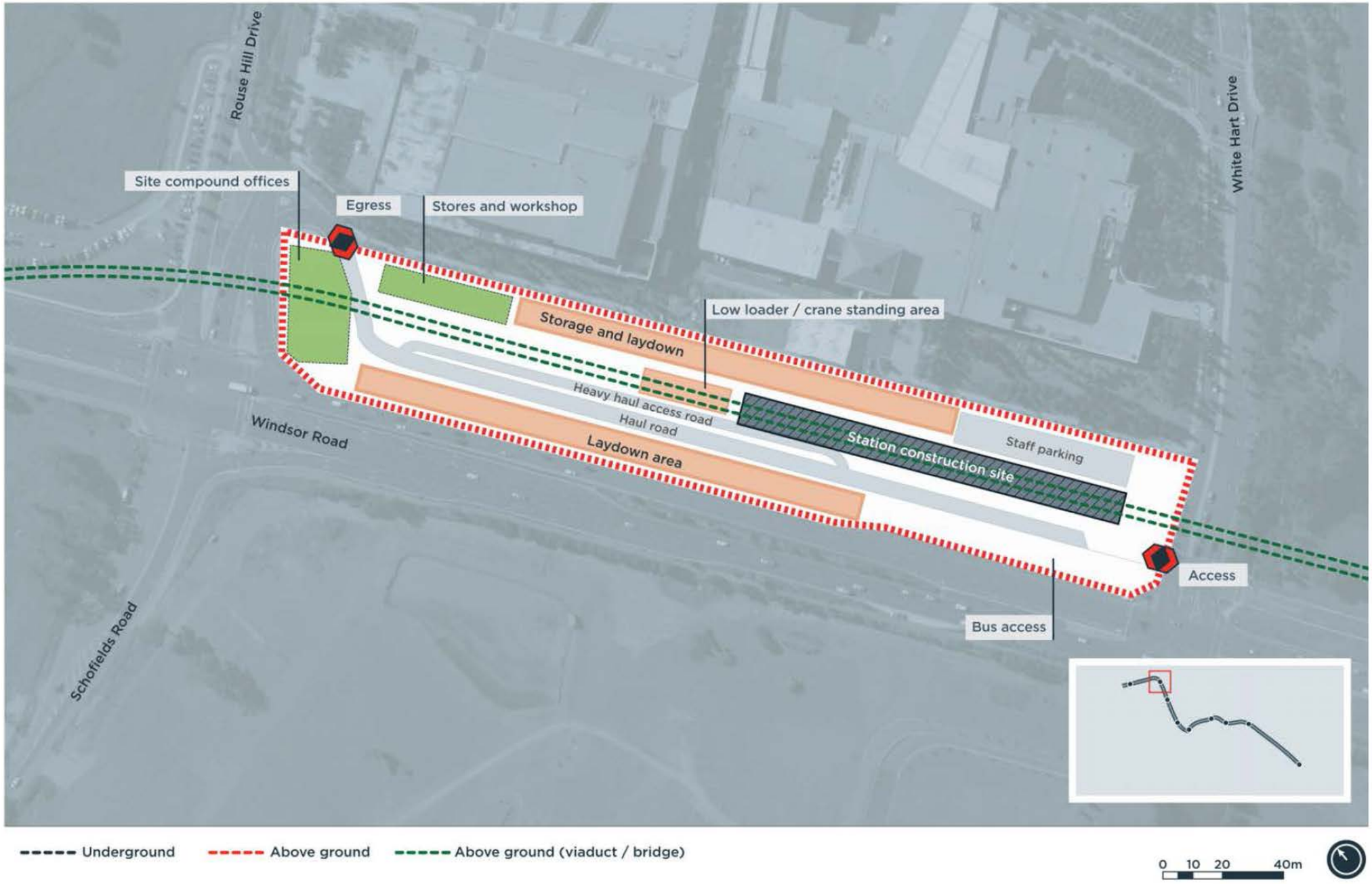

Figure D10 - Rouse Hill Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

Figure 6.11 Cherrybrook Station – Indicative layout

Figure D11 - Cherrybrook Worksite – Construction Boundary (i.e. clearing footprint) indicated dashed line.

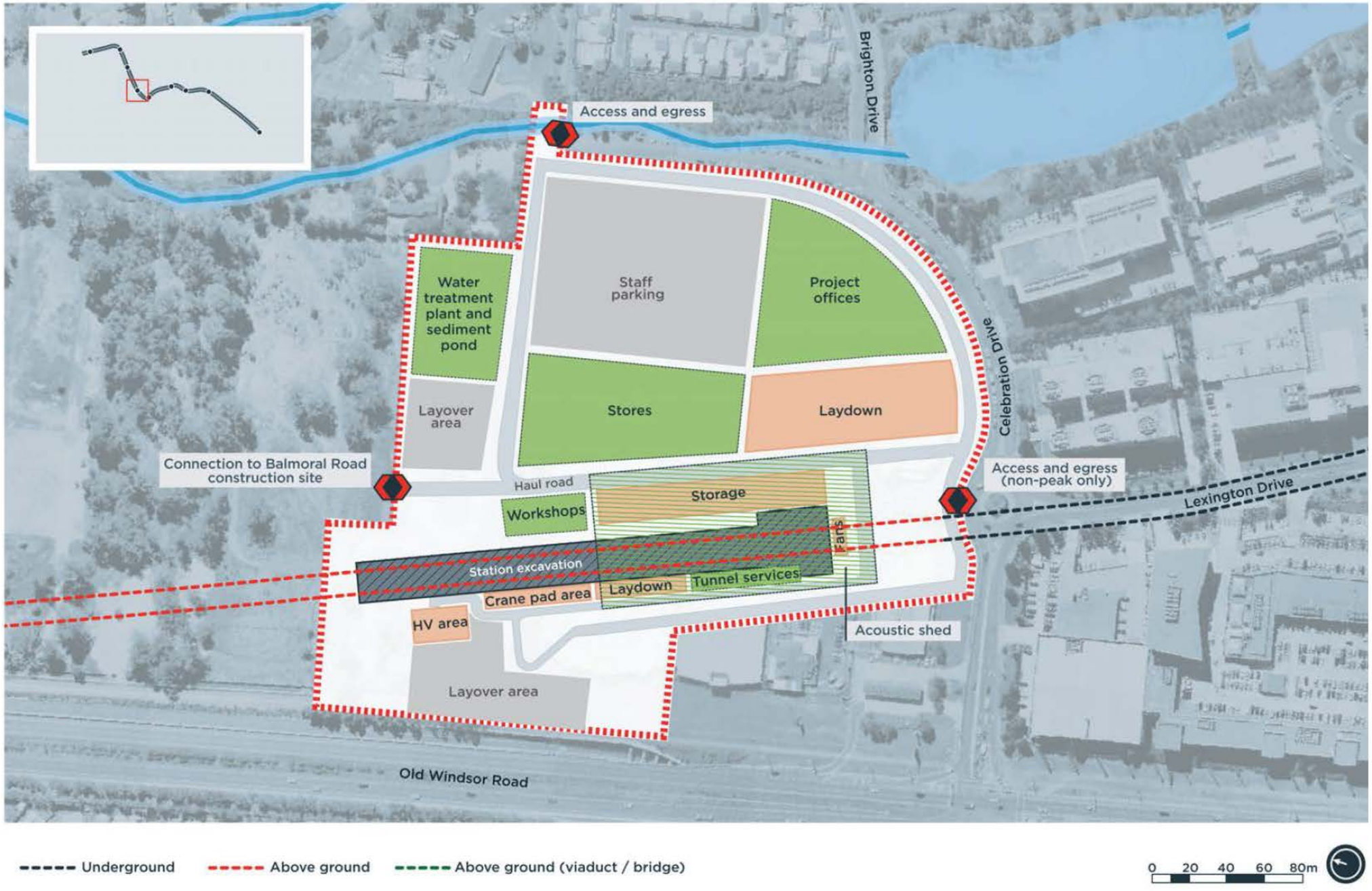

Figure D12 - Bella Vista Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

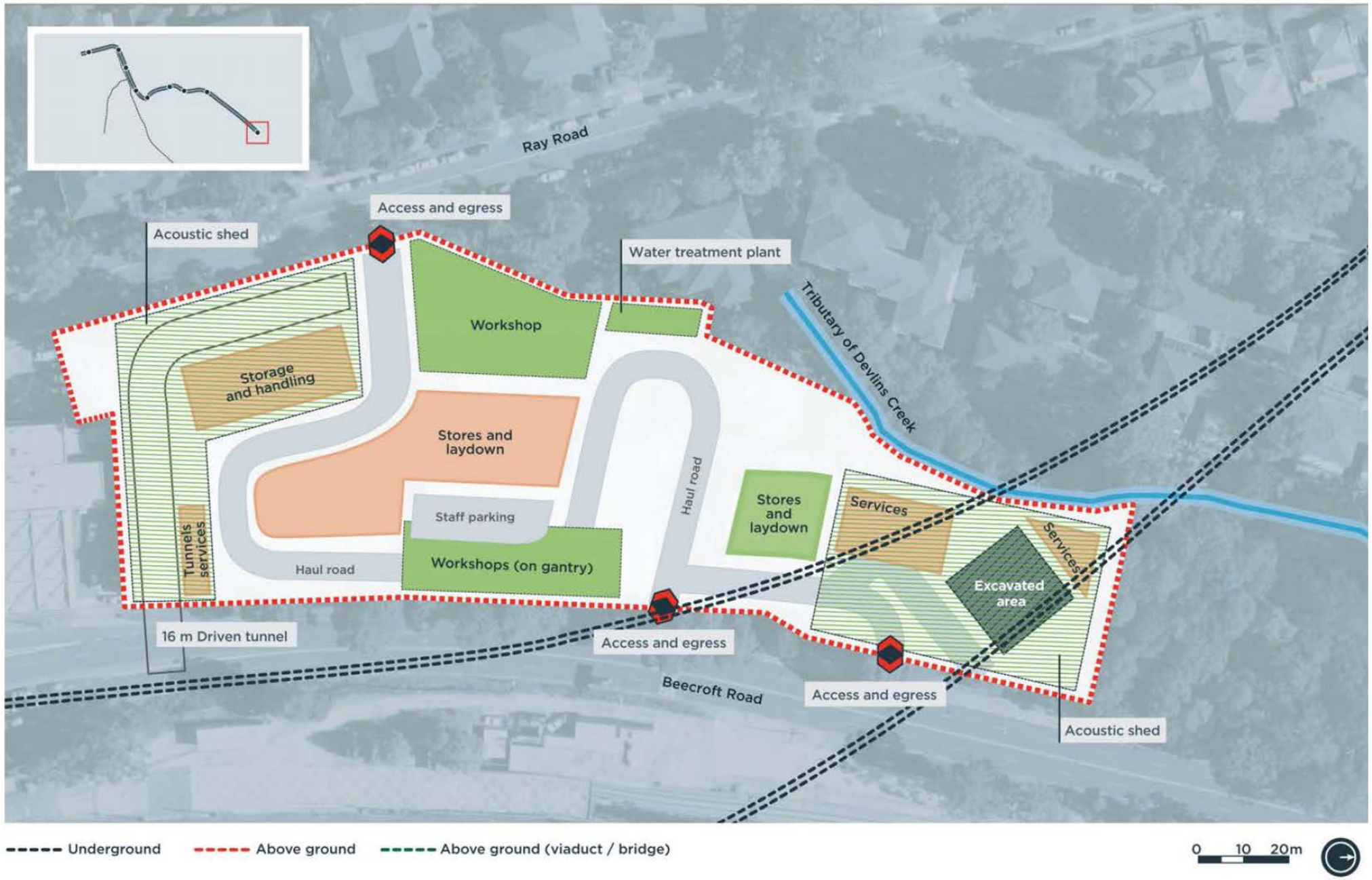

Figure D13 - Epping Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

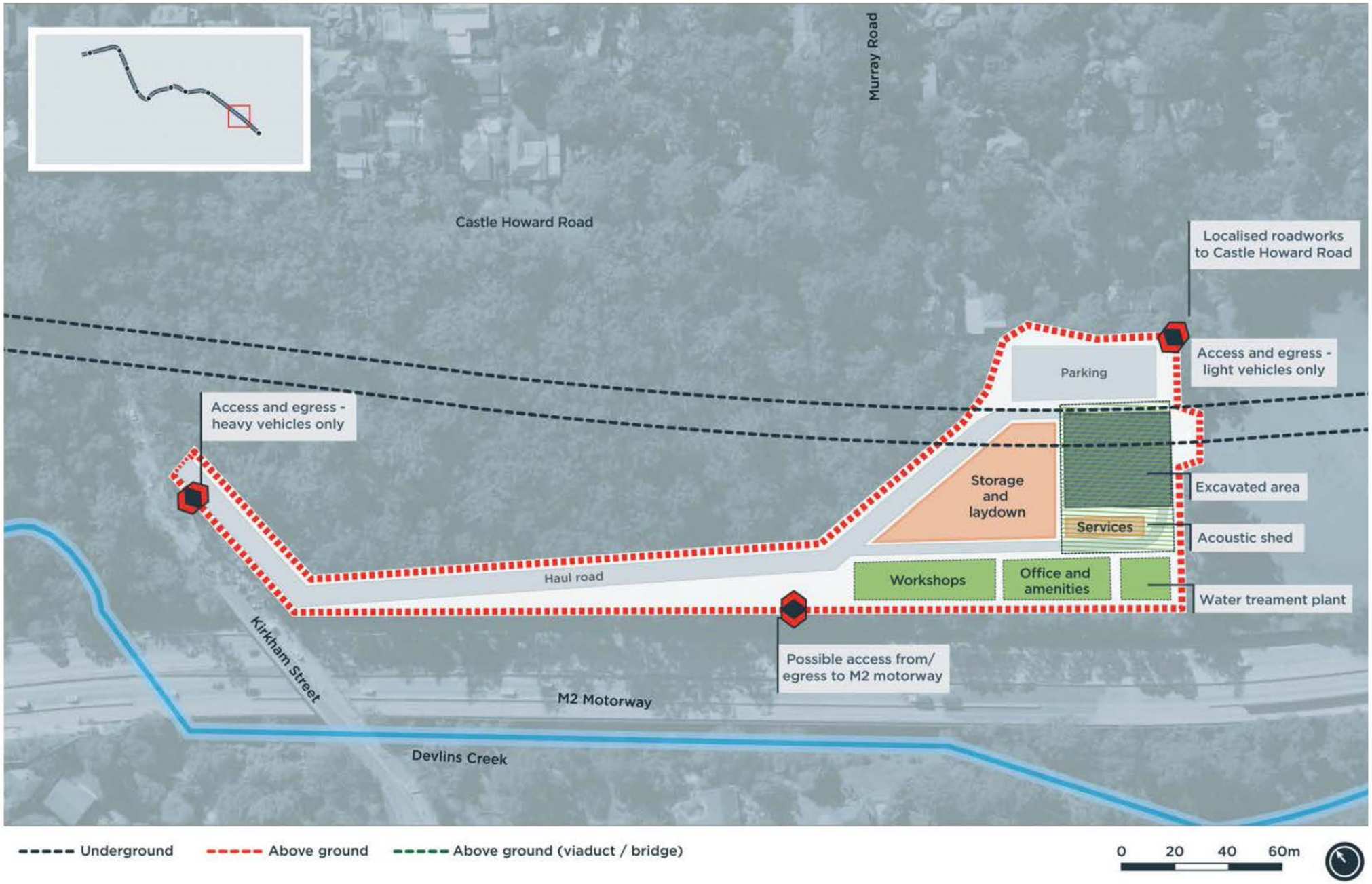

Figure D14 - Cheltenham Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line

Figure D15 - Cheltenham Community Facility Worksite boundary

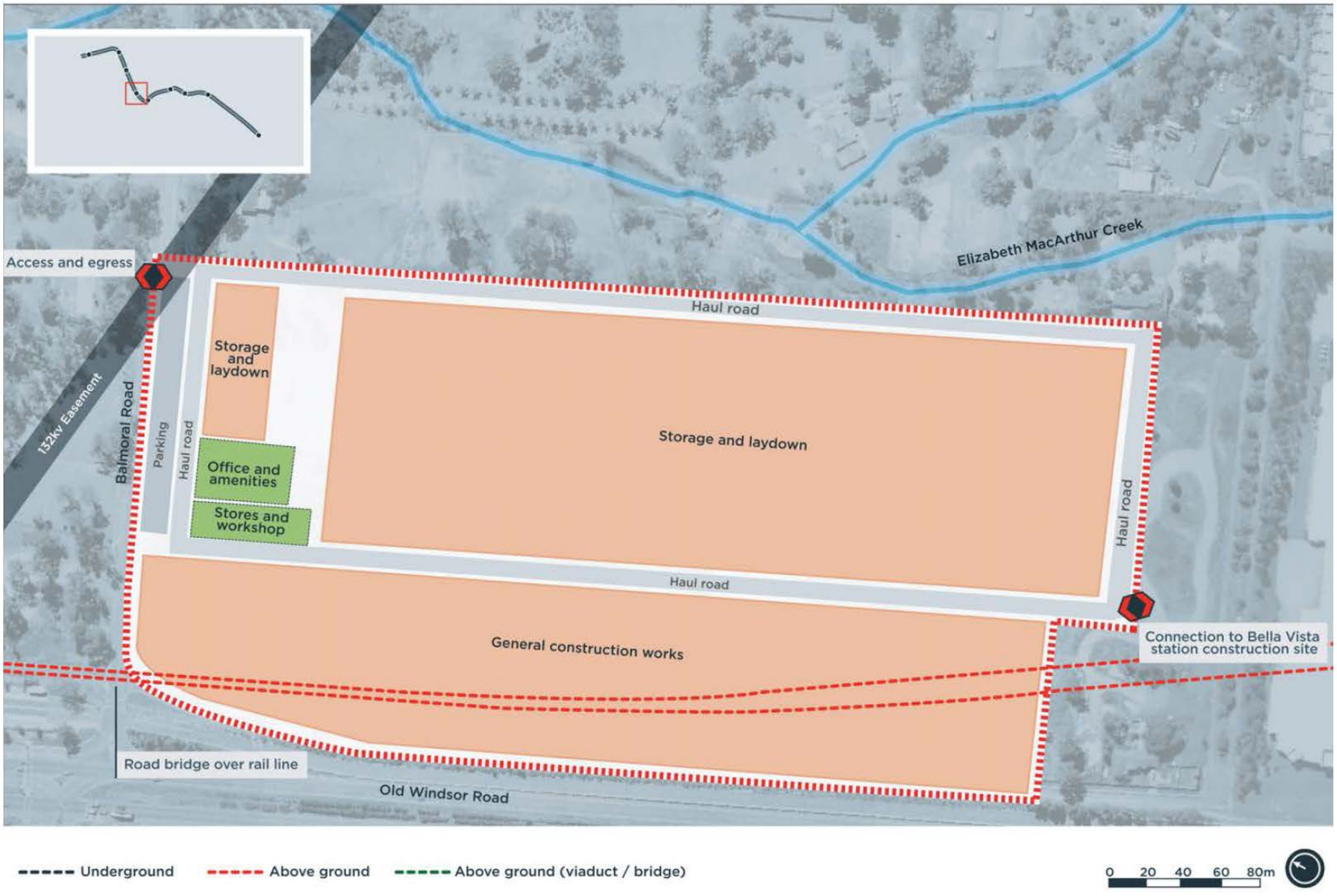

Figure D16 - Balmoral Road Worksite – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

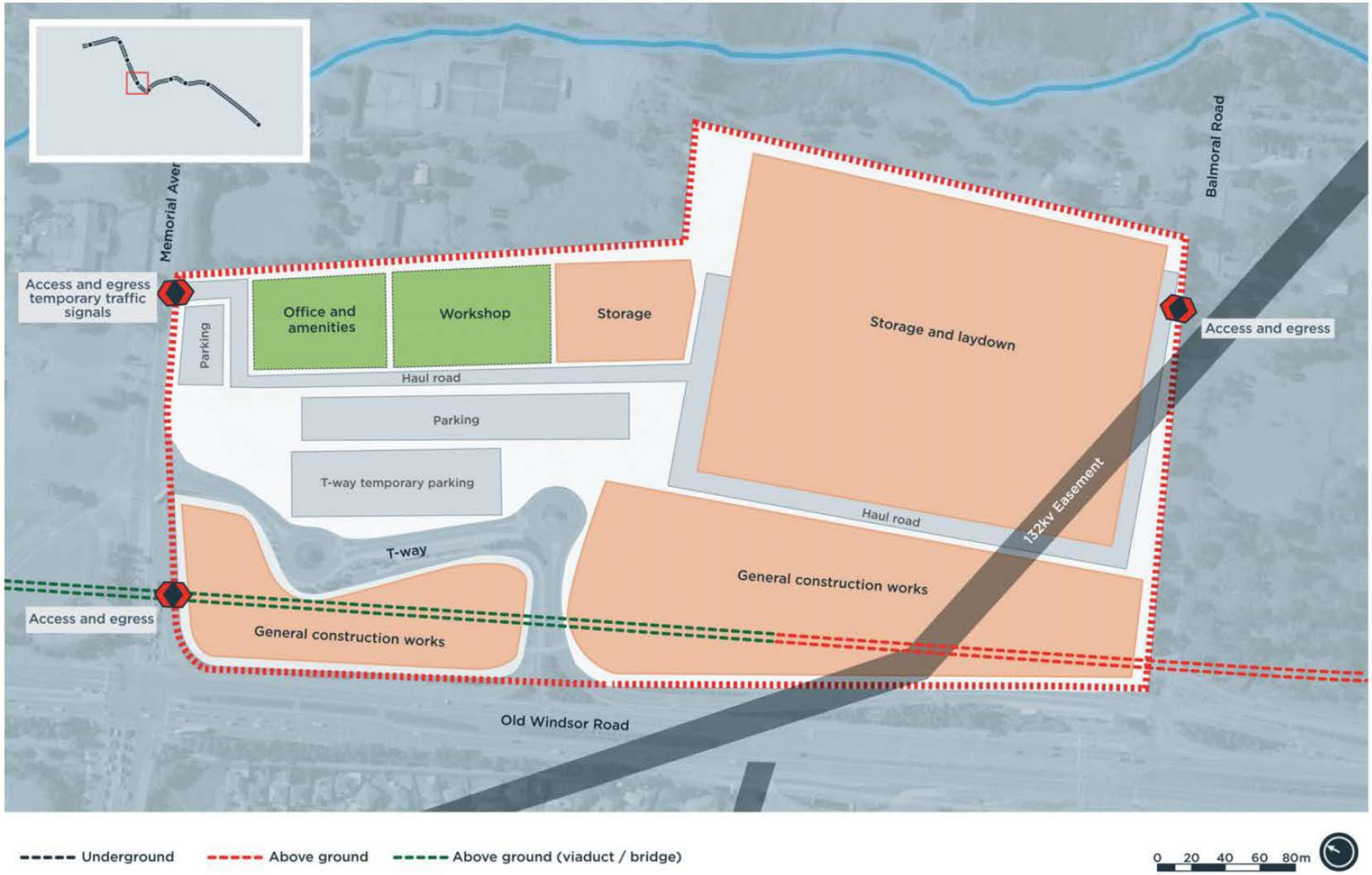

Figure D17 - Memorial Avenue Worksite – Construction Boundary (and clearing footprint) indicated in red dashed line.

Figure D18 - Samantha Riley Drive to Windsor Road – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

Figure D19 - Windsor Road to White Hart Drive – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

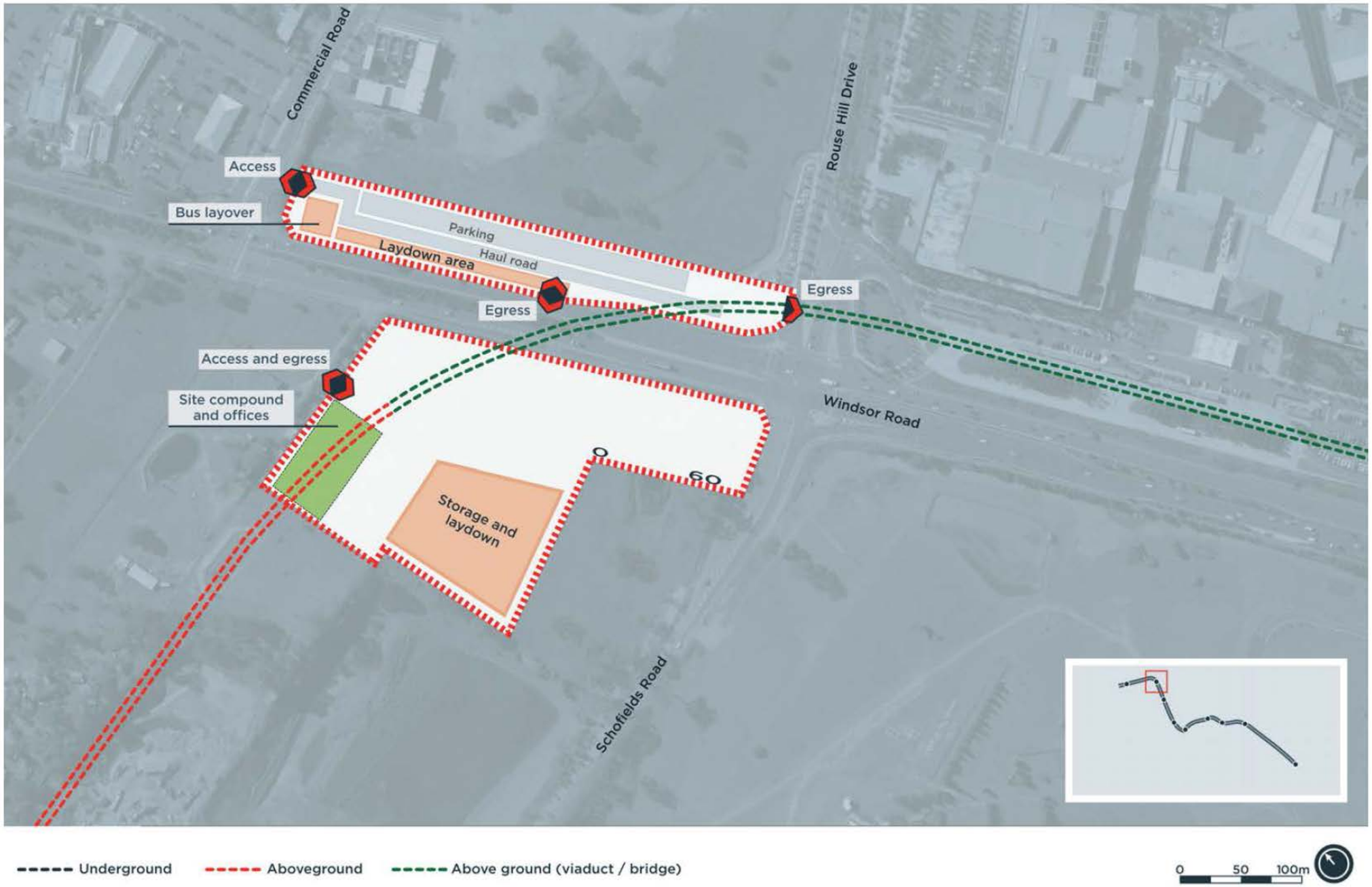

Figure D20 - Windsor Road Viaduct – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

Figure D21 - Windsor Road Viaduct to Cudgegong Road – Construction Boundary (i.e. clearing footprint) indicated in red dashed line.

Annexure E Additional Site Assessment

15 January 2015

610.14554.00000 Letter 20150115.docx

Northwest Rapid Transit
Level 6, 22 Giffnock Avenue
Macquarie Park NSW 2113

Attention: Mr Ewan Watson

Northwest Rail Link RTRF & OTS Facilities Tallawong Road, Rouse Hill
Ecological Assistance with CEMP measures

To Whom It May Concern,

the following letter has been prepared to detail a recent site inspection which was undertaken by a Senior Ecologist of SLR Consulting and a representative of the Northwest Rapid Transit team on the 3rd of December 2014. The site inspection was undertaken to confirm the condition of the vegetation and habitats across the site and ensure that the site remains in a similar condition to that reported during the EIS process.

Generally, much of the site remains in a similar state ecologically to that described in the original EIS documentation. No additional threatened species, populations or areas of EEC vegetation were observed during the recent site visit.

1.0 Flora and Vegetation

Much of the site is comprised of land cleared and disturbed for past rural ventures, including residents, small-scale farming and market gardens.

The existing intact native vegetation present on the site includes:

- isolated patches of "*poor or moderate condition*" Cumberland Plain Woodland (CPW), which is listed a Critically Endangered Ecological Community (CEEC in the TSC and EPBC Acts); and
- bands of River-flat Eucalypt Forest on Coastal Floodplain Forest (REFCF) EEC (TSC Act listed) in "*poor or moderate condition*" along Second Ponds Creek.

The condition of much of the vegetation is reduced due to clearing and maintenance (mowing or grazing) of the understorey and groundcover layers and subsequent invasion of weed species (including exotic grasses and pasture weeds, as well as more invasive species such as Mother-of-Millions, Prickly Pear, Madiera Vine, Small-leaved Privet, Large-leaved Privet, African Boxthorn, African Olive and Green Cestrum).

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There are a few patches in the east of the site (rear of properties 75, 77, 79 and 81 Schofields Road) in moderate condition, which may be suitable for the salvage and translocation of leaflitter and topsoil (including native seed bank) for bush regeneration purposes.

Based on the approved impact area, there appear to be limited opportunities for vegetation retention and enhancement. There is a moderately-sized area of exotic Radiata Pine Forest with a heavily disturbed understorey of Privet, African Olive and Green Cestrum in the northeastern quadrant of Property 51 Schofields Road, which may be suitable to large-scale weed removal and offset planting or topsoil introduction.

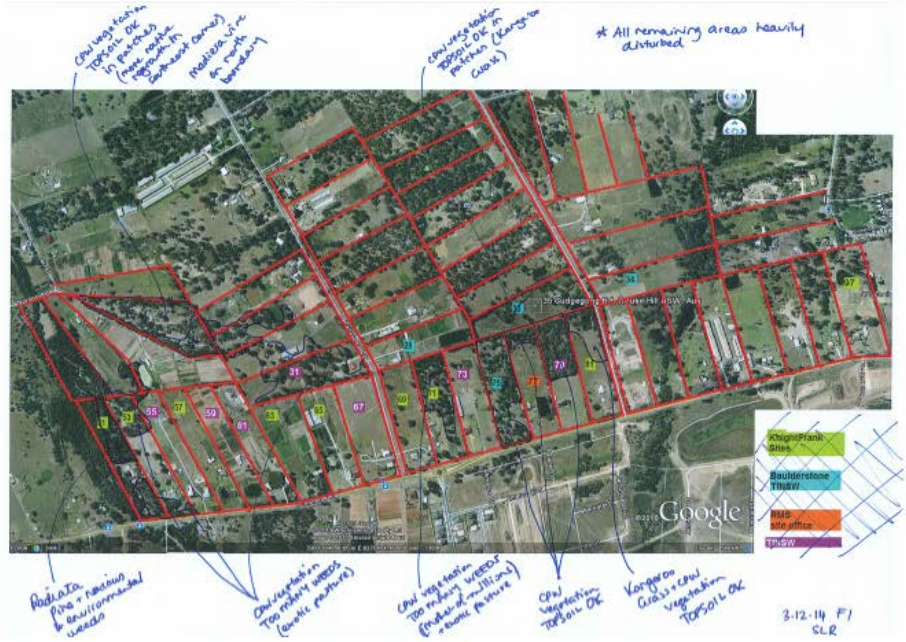

Figure 1 Vegetation Notes from recent site inspection

2.0 Fauna and Fauna Habitats

The Phase 1 Works site generally provides only limited habitat opportunities for native fauna, threatened or otherwise, because of the generally high levels of modification and degradation, and the intensity of historical and ongoing human activities.

Patches of woodland and forest to be cleared may be occupied by native birds (such as Lorikeets and Rosellas), micro-bats (such as Common Bent-wing Bat and Little Bent-wing Bat), reptiles (Red-bellied Black Snake and Blue-tongue Lizard) and invertebrate (such as the Cumberland Plain Land Snail) at the time of clearing.

In addition dams and surrounding exotic paddock weeds (such as thickets of Kikuyu grass) may be home to frogs (such as the Common Eastern Froglet and Smooth Toadlet), turtles (the Eastern Long-necked Turtle), waterbirds (such as the White-faced Heron) and other reptiles (such as snakes and lizards).

Six habitat trees which contained a few small to medium sized hollows were identified during the recent site inspection (see Figure 2 below). These trees may provide habitat to common birds, micro-bats and possibly the Brush-tail or Ringtail Possum. These trees will be subject to slow-drop removal procedure in accordance with the development conditions (including slow-drop felling with an ecologist or suitably qualified wildlife handler present).

Figure 2 Habitat Trees

There are limited habitat features suitable for salvage (such as rocks and large hollow logs), however, some leaflitter may be salvaged as habitat for lizards and invertebrate, as well as for ground stabilisation qualities.

Kind Regards,

Fiona Iolini
Senior Ecologist

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Photo 1 Habitat Trees have been mapped and tagged across the site.

Photo 2 Areas of moderate condition woodland in the southeast of the site

Photo 3 Areas of moderate condition woodland in the southeast of the site

Photo 4 Areas of moderate condition *Themeda australis* grassland in the southeast of the site

Photo 5 Areas of moderate condition *Themeda australis* grassland in the southeast of the site

Annexure F Glossary

Term	Definition
AEC	Areas of Environmental Concern
AHIMS	Aboriginal Heritage Information Management System
AMS	Activity Method Statement
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resources Management Council of Australia and New Zealand
ASS	Acid Sulfate Soil
Blue Book	Managing Urban Stormwater: Soils and Construction (Landcom 2004)
BOM	Bureau of Meteorology
CAQMP	Construction Air Quality Management Plan
CBD	Central Business District
CCAMP	Construction Compounds and Ancillary Facilities Management Plan
CEEC	Critically Endangered Ecological Community
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CFFMP	Construction Flora and Fauna Management Plan
CHMP	Construction Heritage Management Plan
CNVIS	Construction Noise and Vibration Impact Statement
CNVMP	Construction Noise and Vibration Management Plan
CoA	Condition of Approval
CoPC	Contaminants of Potential Concern
CPESC	Certified Professional in Erosion and Sediment Control
CSWMP	Construction Soil and Water Management Plan
DACHA	Darug Aboriginal Cultural Heritage Assessments
DACHi	Darug Aboriginal Land Care Inc.
DCAC	Darug Custodian Aboriginal Corporation
DECC	Department of Environment and Climate Change (now OEH and EPA)
DECCW	Department of Environment, Climate Change and Water (now OEH and EPA)

Term	Definition
DLALC	Darkinjung Local Aboriginal Land Council
DLO	Darug Land Observations
DLWC	Department of Land and Water Conservation (now NSW Office of Water)
DP&E	Department of Planning and Environment
DPI	Department of Primary Industries
DTAC	Darug Tribal Aboriginal Corporation
E&SM	Environment Manager
EC	Environmental Coordinator
ECRL	Epping to Chatswood Rail Link
EEC	Ecologically Endangered Community
EIA	Environmental Impact Assessment
EIL	Ecological Investigation Levels
EIS	Environmental Impact Statement
EIS 1	EIS for SSI-5100 – NWRL Early Works and Major Civil Construction Works (Incorporating Staged Infrastructure Modification Assessment)
EIS 2	EIS for SSI-5414 – NWRL works associated with the construction and operation of stations and wider precincts, service facilities, rail infrastructure and systems
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999 (Cth)*
EPL	Environment Protection Licence
EPM	Environmental Planning and Approvals Manager
ER	Environmental Representative
ERP	Emergency Response Plan
ESCP	Erosion and Sediment Control Plan
GDE	Groundwater Dependant Ecosystems
IC	Independent Certifier
IFD	Intensity-Frequency-Duration

Term	Definition
IJV	Infrastructure Joint Venture (of NRT)
ITP	Inspection and Test Plan
JHET	John Holland Event Tracking
JHPL	John Holland Propriety Limited
LCPL	Leighton Contractors Propriety Limited
LOR	Limits of Reporting
MLALC	Metropolitan Local Aboriginal Land Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NOW	NSW Office of Water
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NRT	Northwest Rapid Transit
NTU	Nephelometric Turbidity Units
NWRL	North West Rail Link (now Sydney Metro Northwest)
OEH	Office of Environment and Heritage
OpCo	OTS Operating Company
OTS	Operations, Trains and Systems
PAD	Potential Archaeological Deposit
PASS	Potential Acid Sulfate Soil
PIMS	Project Integrated Management System
PIRMP	Pollution Incident Response Management Plan
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
PPP	Public Private Partnership
Project	Sydney Metro Northwest OTS Project
Project Approval	Minister for Planning and Infrastructure's Approval for SSI-5414, SSI-5931 and TfNSW's Approval for the ECRL Conversion Works
RAP	Registered Aboriginal Parties
REF	Review of Environmental Factors

Term	Definition
REMM	Revised Environmental Mitigation Measures
RFP	Request for Proposal
RFT	Request for Tender
RMS	Roads and Maritime Services
RTRF	Rapid Transit Rail Facility (now Sydney Metro Trains Facility)
RTRF EIS	EIS for SSI-5931 – Rapid Transit Rail Facility
SDS	Safety Data Sheet
SEP	Site Environment Plan
SEPP	State Environmental Planning Policy
SES	State Emergency Service
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now Department of the Environment)
SM	OTS Sustainability Manager
SMP	Spoil Management Plan
SMTF	Sydney Metro Trains Facility (formerly the Rapid Transit Rail Facility)
Spoil	Material generated by excavation into the ground
SPR	Scope and Performance Requirements
SQERM	Safety, Quality and Environment Risk Management
SSI	State Significant Infrastructure
SVC	Surface and Viaduct Civil Works
SWTC	Scope of Works and Technical Criteria
TBM	Tunnel Boring Machine
TDS	Total Dissolved Solids
TfNSW	Transport for New South Wales
TRA	Task Risk Assessment
TSC	Tunnels and Station Civil Works
TSC Act	*Threatened Species Conservation Act 1995*
TSS	Total Suspended Solids
VAMP	Visual Amenity Management Plan

Term	Definition
VENM	Virgin Excavated Natural Material – natural material (such as clay, gravel, sand, soil and rock) that is not mixed with any other type of waste and/or has been excavated from areas of land that are not contaminated
WAD	Works Authorisation Deed
WBNM	Watershed Bound Network Model
WM Act	*Water Management Act 2000*
WMRP	Waste Management and Recycling Plan
WRA	Workplace Risk Assessment
WRAPP	Waste Reduction and Purchasing Policy
WTP	Water Treatment Plant