# CEMP

Light Horse Business Hub

Stage 3a – Bulk Earthworks and Stormwater

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# 1. Document Control

| Revision | Prepared By | Position | Date | Changes from Previous | **Status** |
|---|---|---|---|---|---|
| 1 | Tom Game | Delivery Manager – Charter Hall | 21 March 2022 | - | For Approval |
| | | | | | |

# 2. Introduction

## 2.1. Purpose

The Construction Environmental Management Plan (CEMP) has been prepared to address how the construction of Light Horse Business Hub will comply with the Development Consent granted under Section 4.38 of the Environmental Planning and Assessment Act 1979.

The purpose of this CEMP is to provide a structured approach to the management of environmental issues during construction of the project. The CEMP has been developed to:

- identify the relevant statutory approvals that apply to the development
- describe all activities to be undertaken on the site during the project including a clear indication of construction stages
- outline all environmental management practices and procedures to be followed during construction in order to comply with licences, approvals and laws
- detail how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts and
- describe of the roles and responsibilities of all relevant employees involved in earthworks and construction

## 2.2. The Proposal

The proposed development on the Light Horse Business Hub will involve a subdivision of the land and infrastructure works to facilitate future industrial warehouse and distribution type developments. The subdivision layout is for up to 7 development lots, public road reserve and a drainage reserve over approximately 33.6 Ha.

Light Horse Business Hub works approved under the concept approval will include the following elements:

- Demolition of existing structures
- Remediation
- Site preparation and bulk earthworks
- Construction of road access and installation of essential infrastructure services
- Provision of flood and stormwater management infrastructure works
- Subdivision

## 2.3. Revision of the CEMP

### 2.3.1. General

The CEMP and the management processes described in the document will be subject to a process of periodic review. This will ensure the document is updated as appropriate to the specific work taking place onsite. It will also ensure that the provisions of the CEMP and its plans are being correctly implemented, monitored, managed and audited.

Should the document review process identify any issues or items within the documents that are either redundant or in need of updating, it is the responsibility of the Contractor's Environmental Manager to revise the documents. The revised document will then be issued to the Charter Hall Delivery Manager for certification of the changes. The Charter Hall Delivery Manager can approve minor changes to the CEMP such as:

- Editorial changes e.g. staff and agency/authority name changes
- Changes that do not increase the magnitude of impacts on the environment when considered individually or cumulatively
- Changes that do not compromise the ability of the project to meet approval or legislative requirements
- Where the changes fall out of the scope of the above or where Charter Hall deem it necessary, the amended CEMP will be forwarded to the Secretary of the Department of the Department of Planning, Industry and Environment for approval.
- Project Contractors will be advised when this CEMP is updated. They will be required to review their own CEMP and make the necessary amendments to remain compliant with this CEMP.

### 2.3.2. Other Reviews

The CEMP will also be reviewed and updated if required under the following circumstances:

- Within 3 months of the submission of an incident report as per Section  Pollution Events.
- An approval of any modification of the conditions of consent
- An issue of a direction of the Planning Secretary

The Planning Secretary will be notified when a review is being carried out.

# 3. Regulatory requirements

## 3.1. Applicable Legislation, Policies and Guidelines

The relevant legislation applicable to the development is outlined in Annexure A.

## 3.2. Conditions of Consent SSD 9667

The below table shows the applicable conditions of Consent and where they have been addressed within this document.

| Schedule | Condition Ref | Condition | Comments |
|---|---|---|---|
| Schedule 3 | C1 | Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:<br>(a) detailed baseline data;<br>(b) details of:<br>(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);<br>(ii) any relevant limits or performance measures and criteria; and<br>(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;<br>(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;<br>(d) a program to monitor and report on the:<br>(i) impacts and environmental performance of the development; and<br>(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;<br>(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;<br>(f) a program to investigate and implement ways to improve the environmental performance of the development over time;<br>(g) a protocol for managing and reporting any:<br>(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);<br>(ii) complaint;<br>(iii) failure to comply with statutory requirements; and<br>(h) a protocol for periodic review of the plan. | <br><br><br>See individual Annexures<br><br>See Annexure A<br><br>See individual Annexures<br><br>Section 8 and individual Annexures<br><br><br><br>See Annexure B and individual annexures<br><br><br>See Annexure B and individual annexures<br><br><br><br><br><br>See individual Annexures<br><br><br><br>Section 8<br><br><br><br>Section 10<br><br><br><br><br><br>Section 2.3 |
| Schedule 3 | C2 | The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of Condition C1 and to the satisfaction of the Planning Secretary. | The whole of this plan |
| Schedule 3 | C3 | As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:<br>(a) Construction Traffic Management Plan (see Condition B1);<br>(b) Erosion and Sediment Control Plan; | <br>(a) – see Annexure D<br><br>(b) – see Annexure C<br><br>(c) – see Annexure E |

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| | | (c) Construction Noise Management Plan (see Condition B20);<br>(d) Vegetation Management Plan (see Condition B33);<br>(e) Construction and Demolition Waste Management Plan (see Condition B38);<br>(f) Landscape Plan (see Condition B49); and<br>(g) Community Consultation and Complaints Handling. | (d) – see Annexure H<br><br>(e) – see Annexure J<br><br>(f) – See Annexure G<br>(g) – see Annexure J |
| Schedule 3 | C5 | Within three months of:<br>(a) the submission of an incident report under condition C7;<br>(b) the approval of any modification of the conditions of this consent; or<br>(c) the issue of a direction of the Planning Secretary under condition A1(b) of Schedule 2 and condition A2(b) of Schedule 3 which requires a review, the strategies, plans and programs required under this consent must be reviewed, and the Planning Secretary must be notified in writing that a review is being carried out | Section 2.3.2 |
| Schedule 3 | C7 | The Planning Secretary must be notified in writing via the Major Projects website immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one), and set out the location and nature of the incident. Subsequent notification requirements must be given and reports submitted in accordance with the requirements set out in Appendix 3. | Section 10.1.1 |
| Schedule 3 | C8 | The Planning Secretary must be notified in writing to via the Major Projects website within seven days after the Applicant becomes aware of any non-compliance. | Section 8.4 |
| Schedule 3 | C9 | A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. | Section 8.4 |
| | B1 | "Prior to the commencement of construction, the Applicant must prepare a Construction Traffic Management Plan for the Stage 1 development to the satisfaction of the Planning Secretary. The plan must form part of the CEMP required by condition C2 and must:<br>(a) be prepared by a suitably qualified and experienced person(s);<br>(b) be prepared in consultation with Council and TfNSW; | See table within the relevant Annexure |

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| | | (c) detail the measures that are to be implemented to ensure road safety and network efficiency during construction;<br>(d) detail heavy vehicle routes, access and parking arrangements;<br>(e) include a Driver Code of Conduct to:<br>(i) minimise the impacts of earthworks and construction on the local and regional road network;<br>(ii) minimise conflicts with other road users;<br>(iii) minimise road traffic noise; and<br>(iv) ensure truck drivers use specified routes;<br>(f) include a program to monitor the effectiveness of these measures; and<br>(g) if necessary, detail procedures for notifying residents and the community (including local schools), of any potential disruptions to routes. " | |
| Schedule 3 | B11 | Prior to the commencement of any construction or other surface disturbance the Applicant must install and maintain suitable erosion and sediment control measures on-site, in accordance with the relevant requirements of the Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom, 2004) guideline and the Erosion and Sediment Control Plan included in the CEMP required by condition C2. | See the relevant Annexure |
| Schedule 3 | B20 | "The Applicant must prepare a Construction Noise and Vibration Management Plan for the Stage 1 development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must<br>(a) be prepared by a suitably qualified and experienced noise expert;<br>(b) be approved by the Planning Secretary prior to the commencement of construction of each stage of the Stage 1 development;<br>(c) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time);<br>(d) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;<br>(e) include strategies that have been developed with the community for managing high noise generating works; and<br>(f) describe the community consultation undertaken to develop the strategies in condition B20(e).<br>(g) include a complaints management system that would be implemented for the duration of the development. " | See table within the relevant Annexure |

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| Schedule 3 | B24 | "Before the commencement of any clearing or construction works, the Applicant must prepare an ACHMP for the development to protect and manage aboriginal heritage within the site. The plan must form part of the CEMP required by Condition C2 and must:<br>(a) be prepared by a suitably qualified and experienced expert in consultation with the Registered Aboriginal Parties;<br>(b) be submitted to the satisfaction of the Planning Secretary prior to construction of any part of the development; and<br>(c) address the recommendations within the Aboriginal Cultural Heritage Assessment Report prepared by Extent Heritage dated February 2020. " | See table within the relevant Annexure |
| Schedule 3 | B33 | "Prior to clearing for construction, the Applicant must prepare a Vegetation Management Plan (VMP) for the Stage 1 development. The Vegetation Management Plan must be prepared in consultation with the Environment, Energy and Science Group and the Natural Resources Access Regulator, to the satisfaction of the Planning Secretary and form part of the CEMP in accordance with condition C2. The Plan must include:<br>(a) measures to protect native vegetation that would be retained on site, from construction and operational activities;<br>(b) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth;<br>(c) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone;<br>(d) details of revegetation works along the realigned Eskdale Creek and Reedy Creek within the site, including plant species and densities, native seed collection and propagation and translocation of juvenile native plants and hollow-bearing trees on the site (where feasible);<br>(e) details of topsoil and weed management measures;<br>(f) performance indicators and completion criteria, including criteria for triggering remedial action, if necessary; and<br>(g) a maintenance and monitoring schedule. " | See Annexure H |
| Schedule 3 | B44 | Prior to the commencement of earthworks, the Applicant must prepare an unexpected contamination procedure to ensure that potentially contaminated material and unexploded ordinance is appropriately managed. The procedure must form part of the of the CEMP in accordance with condition C2 and must ensure | Please see Annexure L |

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| | | any material identified as contaminated must be disposed off-site, with the disposal location and results of testing submitted to the Planning Secretary, prior to its removal from the site. | |
| Schedule 3 | B49 | "Prior to clearing for construction, the Applicant must prepare a Landscape Plan (LP) for Stage 1 for landscape buffer areas, street planting and the estate basin in consultation with the Environment, Energy and Science Group to the satisfaction of the Planning Secretary. The Landscape Plan must form part of the CEMP in accordance with Condition C2. The Plan must:<br>(a) detail local native species to be used in landscaping, pot sizes, planting densities, locations and use of trees to reduce urban heat island effects;<br>(b) detail the species to be planted within the bioretention area, including bank areas; and<br>(c) describe the monitoring and maintenance procedures to ensure the on-going success of the landscaping works and measures to replace any plant loss. " | See Annexure G |

# 4. The Site and Context

## 4.1. The Site

The site is adjacent to the junction of the M4 Western Motorway and M7 Westlink Motorway, providing excellent access to the local and regional road transport network. The site is currently accessible from a driveway via Wallgrove Road to the west (via an underpass under the M7) and Ferrers Road to the east. The access to Wallgrove Road is not currently in use. Ferrers Road connects to the Great Western Highway and Doonside Road in the north and The Horsley Drive to the south.

The development site is located within the within the City of Blacktown local government area (LGA). The site is 33km west of the Sydney CBD, 15km from the Parramatta CBD, 15km from Penrith and 6km from Blacktown. The Western Sydney Airport is 15km south-west of the site. The site is south of the industrial areas at Huntingwood and Arndell Park and east of warehouse and industrial uses which form part of the Western Sydney Employment Area (WSEA).

The surrounding land use activities include the following:

- To the north of the site is the M4 Western Motorway beyond which the Western Sydney Parklands continue along the alignment of Eastern Creek. To the north-east is the Huntingwood industrial and warehouse precinct.

- To the east of the site is the Sydney Motorsport Park and Sydney Dragway. Adjacent to the Sydney Motorsport Park is the Prospect Reservoir.
- To the south of the site is the Eastern Creek landfill facility.
- To the west of the site is the M7 Westlink Motorway and Wallgrove Road. To the west of Wallgrove Road is the Eastern Creek industrial and warehousing precinct.

## 4.2. General Features of the Development

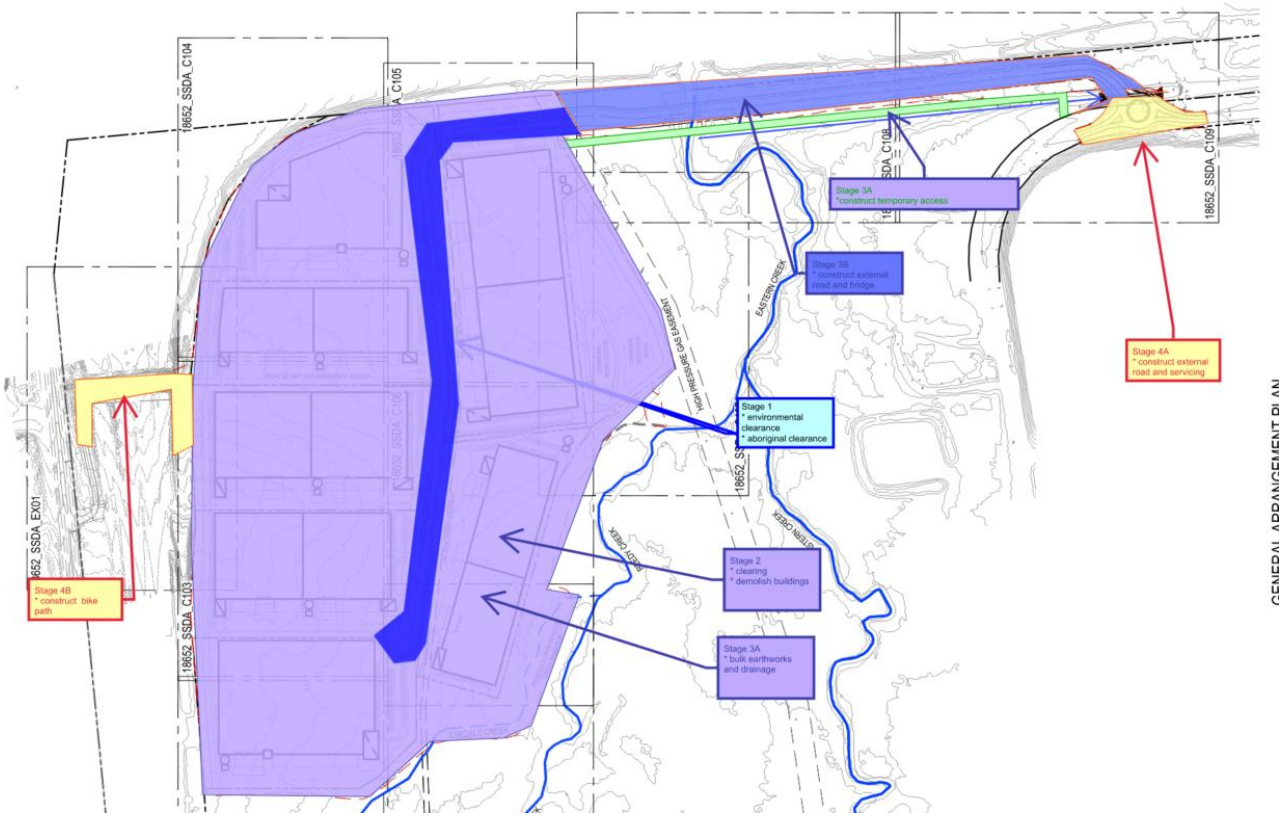
The Development is being delivered through a staged approach with the civil works having already commenced. Below is an indication of the features of the development.

| Component | Description |
|---|---|
| Earthworks and Civil | • Demolition of existing buildings<br>• Contamination Remediation<br>• Clearing<br>• Bulk earthworks<br>• Construction of retaining walls<br>• Landscaping |
| Roadworks and Bridge | • Construction of bike paths and shared paths<br>• Pavement construction<br>• Streetscape landscaping<br>• Signage and Line marking<br>• Barriers and Road furniture<br>• Bridge construction including scour protection |
| Stormwater Management | • Construction of temporary and permanent water quality basins<br>• Construction of open drainage channels<br>• Construction of stormwater drainage for roadworks<br>• Construction of inter-allotment drainage |
| Utility Works | • Construction of maintenance access tracks<br>• Relocation of utilities along Ferrers Rd<br>• Construction of new utilities to service the Light Horse Business Hub<br>• Modification of existing manholes within the site |

## 4.3. Staging

The below table provides an overview of the anticipated sequence of construction activities and timing associated with the development. The need to complete each activity will depend on the location and nature

of construction and what work needs to take place in a given area.




| Component | Description |
|---|---|
| **Stage 1 – Remediation and Salvage** | |
| Archaeological Salvage | • Manual excavation of salvage sites<br>• Screening for archeologically significant remains |
| Contamination Remediation | • Removal of rubbish and contamination<br>• Excavation of contaminated areas and stockpiling on site, or removal off-site<br>• Installation of Erosion and Sediment Environmental Controls |
| **Stage 2 – Demolition and Clearing** | |
| Site Establishment | • Installation of boundary fencing<br>• Establishment of site compounds<br>• Installation of environmental controls<br>• Pre-clearing vegetation fauna surveys<br>• Construction of access roads and temporary culvert crossing |
| Demolition | • Demolition of existing structures, driveways and fencing<br>• Progressive installation of environmental controls including temporary or permanent fencing, enabling noise mitigation measures<br>• Clearing of vegetation and mulching |

| | |
|---|---|
| Clearing | • Felling of trees<br>• Mulching and stockpiling |
| **Stage 3A – Bulk Earthworks** | |
| Open drainage and basins | • Construction of diversion and catch drains along the formation and sedimentation control basins or swales (where required)<br>• Construction of sedimentation basins<br>• Diversion of existing waterways where required |
| Bulk Earthworks | • Stripping topsoil and stockpiling it for reuse in landscaping<br>• Foundation treatments prior to filling<br>• Excavation of cuttings, including the processing, stockpiling or haulage of material<br>• Construction of retaining walls<br>• Stabilisation of batters through topsoiling |
| Roadworks External to the site | • Clearing and vegetation management<br>• Stripping topsoil and stockpiling it for reuse in landscaping<br>• Foundation treatments prior to filling<br>• Excavation of cuttings, including the processing, stockpiling or haulage of material<br>• Construction of retaining walls<br>• Construction of pavements and stormwater drainage<br>• Construction of services such as electricity, streetlighting, water and sewer |
| Bridge Construction | • Installation of temporary platforms<br>• Substructure construction including piling, piers and headstock construction<br>• Superstructure construction including installation of pre-cast planks, decks and parapets<br>• Backfilling and scour protection<br>• Ancillary works such as maintenance footpaths, realigning and bridge streetlighting |
| **Stage 3B – Roadworks** | |
| Roadworks within the site | • Clearing and vegetation management<br>• Stripping topsoil and stockpiling it for reuse in landscaping<br>• Foundation treatments prior to filling<br>• Excavation of cuttings, including the processing, stockpiling or haulage of material<br>• Construction of retaining walls<br>• Construction of pavements and stormwater drainage<br>• Construction of services such as electricity, streetlighting, water and sewer |
| **Stage 4 – Public Roadworks** | |
| Existing Road Adjustment | • Utility relocation<br>• Construction of local road diversions including any temporary pavements<br>• Construction of permanent stormwater drainage and road pavements<br>• Construction of new roundabout<br>• Construction of road furniture such as streetlighting, signage, line making and safety barriers |

| | |
|---|---|
| In ground Services | • Construction of in ground services including sewer, electrical and water<br>• Connection of drainage to stormwater provision |
| External Works and Landscaping | • Construction of carparking<br>• Construction of fencing and gates<br>• Landscaping finishes |

The below diagram shows the indicative timing of the staging.

| Description | Q4 2021 | Q1 2022 | Q2 2022 | Q3 2022 | Q4 2022 | Q1 2023 | Q2 2023 | Q3 2023 | Q4 2023 | Q1 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stage 1 | | | | | | | | | | |
| Stage 2 | | | | | | | | | | |
| Stage 3A | | | | | | | | | | |
| Stage 3B | | | | | | | | | | |
| Stage 4 | | | | | | | | | | |

# 5. Environmental Management Framework

All works carried out on the site will be in accordance with:

- All legal requirements
- Ministers Development Consent
- This CEMP and applicable sub plans

This CEMP is an overarching guideline for the scope of works in Stage 3A, which ensures compliance with the above with an aim at minimising the risk to the environment for all of the stages of the development. A CEMP for the stage 1 and stage 2 works was previously submitted and accepted by DPIE on 18th November 2021 and 17th February 2022 respectively. The CEMP will need to be updated with specific plans for the scope withing stages 3 and 4 of the development as the construction methodology is developed.

A separate CEMP submission will be made prior to Stage 3b and 4 works commencing which will consider some of the scope specific impacts and mitigation measures to the environment from these works.

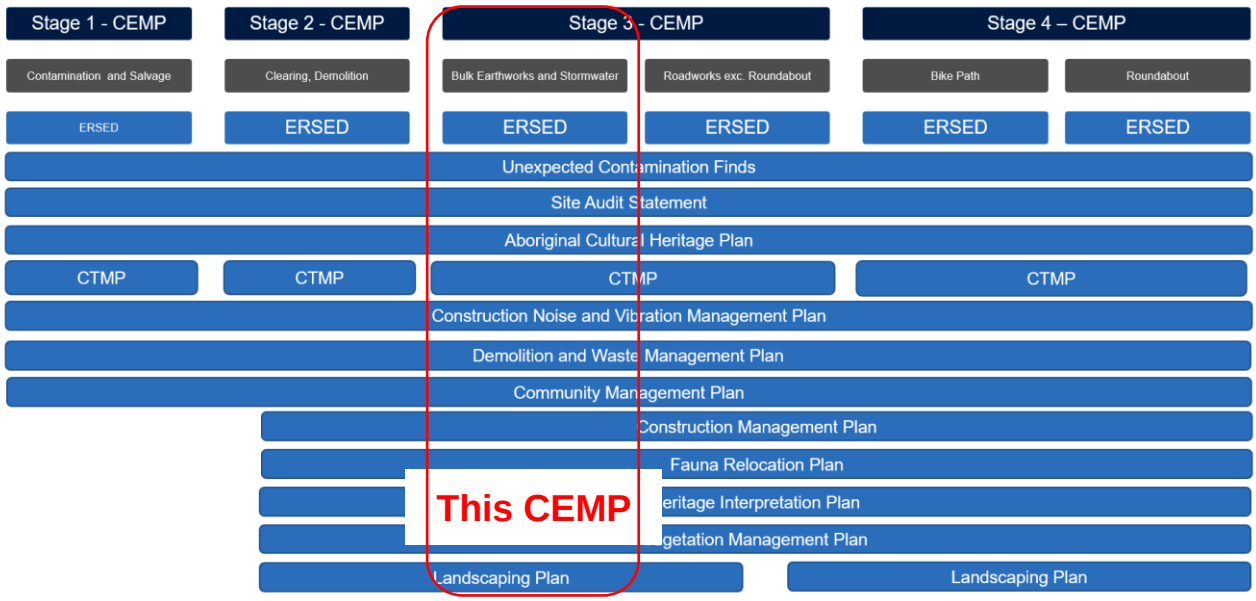
The structure of the environmental management framework discussed above is shown in the below diagram.

Under this CEMP the following plans are specific to the Stage 3:

- ERSED Control Plan
- Construction Traffic Management Plan

The following plans, submitted as part of this CEMP will cover scope of works across all the stages:

- Unexpected Contamination Finds procedure
- Aboriginal Cultural Heritage Management Plan
- Construction Noise and Vibration Management Plan
- Community Management Plan
- Landscape Plan
- Vegetation Management Plan



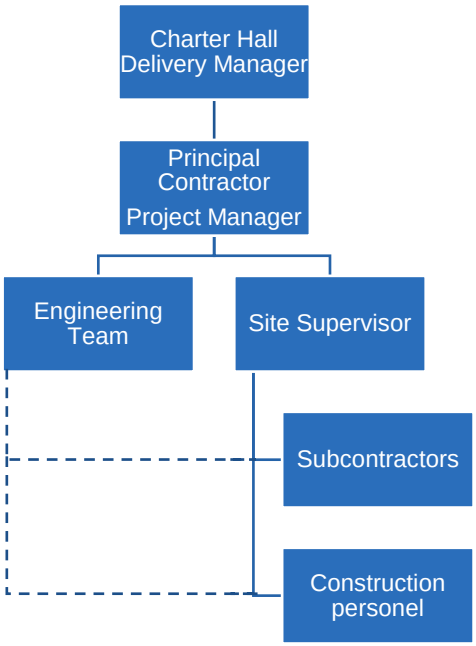
# 6. Construction Activities and Environmental Impact

Appendix B specifies specific environmental controls and responsibilities to be implemented across the development.

# 7. Roles and Responsibilities

## 7.1. Organisational Structure

The key structure of environmental management roles and responsibilities for the construction phase of the works is shown below.




The responsibilities relating to environmental management of each part of the development team is outlined below.

## 7.2. Responsibilities

### 7.2.1. Charter Hall Delivery Manager

- Evaluate and advise on compliance with Overarching CEMP environmental requirements
- Review and approve any environmental management plans for the work or related activities that are not required to be approved by the Secretary of the Department of Planning and Environment.
- Review any environmental management plans and related documents prepared for the work
- Review minor work refinements that are consistent with the work environmental assessment and approval documentation
- Monitor the environmental performance of the work in relation to Overarching CEMP requirements.

- Refer where required environmental issues to Advisory Environmental Consultant for recommendation

#### 7.2.2.Project Manager

- Liaise with Charter Hall Delivery Manager on environmental issues, including the written notification of non-conformances
- Ensure compliance with all relevant statutes, regulations, rules, procedures, standards and policies
- Ensure that environmental records and files are collected and maintained
- Ensure that non-conformances and environmental incidents are recorded and written reports provided Charter Hall Delivery Manager. Liaise with the required stakeholders to confirm the nature of the corrective action required and comply with the timeframe within which corrective actions must occur
- Provide support to the project team to enable them to meet their environmental commitments
- Report any reportable incidents to EPA
- Ensure that independent audits of the system are conducted
- Review audit outcomes and take action as necessary
- Review environmental performance through the monthly reporting cycle
- Authorise resourcing on environmental issues
- Resolve major issues which cannot be resolved by the development's leadership team
- Lead the development and maintenance of the CEMP inclusive of requirements for programs, strategies and campaigns.
- Ensure that the CEMP is effectively established, implemented and maintained at the project level

#### 7.2.3. Engineering Team

The Project management team includes qualified professionals in charge of planning and implementing the construction of the works. They can be made of Project Managers, Project Engineers and Site Engineers. The Project team is responsible for:

- Ensure environmental management requirements are discharged by subcontractors in accordance with the Contract, the Development Consent, EIS and the Overarching CEMP.
- Ensure that internal audits of the system are conducted
- Review audit corrective actions and take action as necessary to ensure timely close out of issues.
- Ensure the works are planned and achieve compliance with the environmental management plans and environmental requirements
- Carefully select suppliers and subcontractors based upon their ability to meet stated requirements

#### 7.2.4.Site Supervisor

- Perform visual inspections and daily checks to ensure environmental controls are in place
- Communicate and provide training where necessary on environmental requirements to Construction Personnel and Subcontractors
- Ensure that environmental controls, materials and equipment are maintained
- Report to Project Manager on the performance of the system and environmental breaches
- Supervise all site construction activities and personnel by ensuring that they meet environmental and other requirements
- Take action to resolve environmental non-conformances and incidents
- Organise and manage site plant, labour and temporary materials
- Ensure that site environmental controls are properly maintained and provide support for their environmental management personnel
- Ensure that their environmental documentation is effectively implemented and maintained

#### 7.2.5.Construction Personnel & Subcontractors

- Comply with all legal and contractual requirements
- Comply with site environmental requirements
- Comply with management/supervisory directions from Project Management Team and Development Environmental Manager
- Participate in induction and training as directed
- Report to Site Supervisor on the performance of the system and environmental breaches
- Comply with instructions to resolve environmental non-conformances and incidents

### 7.3. Subcontractor and Supplier Management

Subcontractors, and suppliers shall meet the environmental management requirements specified in the Overarching CEMP and the Contractor CEMP for each Stage. Subcontractors shall be made aware of their responsibilities under the terms of the applicable environmental legislation, by being provided a copy of this Environmental Management Plans and by participating in site induction. Subcontractors will be requested to submit Safe Work Method Statements (SWMS), ITPs or environmental procedures with details of how they manage any environmental aspects and impacts associated with their activities. Consideration of normal and abnormal operations, along with emergency scenarios will be included in ITPs as required. Subcontractor performance will be monitored to ensure that contracts are being fulfilled and appropriate environmental management practices are being followed.

## 8. Environmental Monitoring and Continual Improvement

### 8.1. Objectives of Monitoring

The CEMP shall be monitored following implementation to ensure that:

- Environmental operational controls are being effectively applied Environmental Control is being developed with continuous monitoring and updating during monthly audits
- Project specific environmental monitoring targets specified in the Development Consent or other planning permits for air, water and noise are met.
- Unpredicted impacts are identified, and remedial action is taken.
- The development objectives listed above are being met and
- Measures are implemented to ensure that the environmental performance of the development improves over time.

### 8.2. Performance Indicators

Specific performance indicators that will be used to evaluate the implementation and effectiveness of this CEMP are as follows:

- Number of notices and corrective action reports raised by relevant authorities
- Number of internal and external non-conformances raised through audits
- Number of community complaints and concerns

### 8.3. Monitoring

Specific monitoring actions have been specified in Annexure B  additionally the below general monitoring of environmental performance shall be carried out through a combination of the following:

- Weekly site inspections by project contractor staff. Inspections are to be recorded an inspection checklist form with details of any maintenance required nature of the deficiency and any actions required.
- Post rainfall inspections to be performed by construction workers
- Monthly Project Manager’s audit
- Ad-hoc Charter Hall audits

- Weekly work task observations by construction personnel
- External audits by third parties

### 8.4. Non-conformances

The Contractor shall identify any non-conformances with this plan and provide details on the date, description and actions taken to correct any non-conformances to the Charter Hall Delivery Manager.

The Charter Hall Delivery Manager shall notify the Planning Secretary must be notified in writing to via the Major Projects website within seven days after Charter Hall becomes aware of any non-compliance. A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. A non-compliance which has been notified as an incident as per Section 10 does not need to also be notified as a non-compliance.

## 9. Communication and Consultation

### 9.1. Training

- Prior to the commencement of development activities, all site personnel (including sub-contractors) will attend site induction
- Site Induction shall include an outline of the requirements of this CEMP and the responsibilities and accountabilities of all site personnel.
- The development environmental site rules will be included in the induction session.
- Training records will be kept to verify who has attended the training.

### 9.2. Community Consultation

Community Consultation will be carried out in accordance with Annexure K – Community Consultation Plan.

Generally, the community is to be consulted through a variety of methods including:

- Consultation Meetings on specific issues
- Agency Meetings on specific issues
- Project Information and complaints number
- Letter box drops on specific issues
- Project signage
- Toolbox and Pre-start meetings
- Project Website

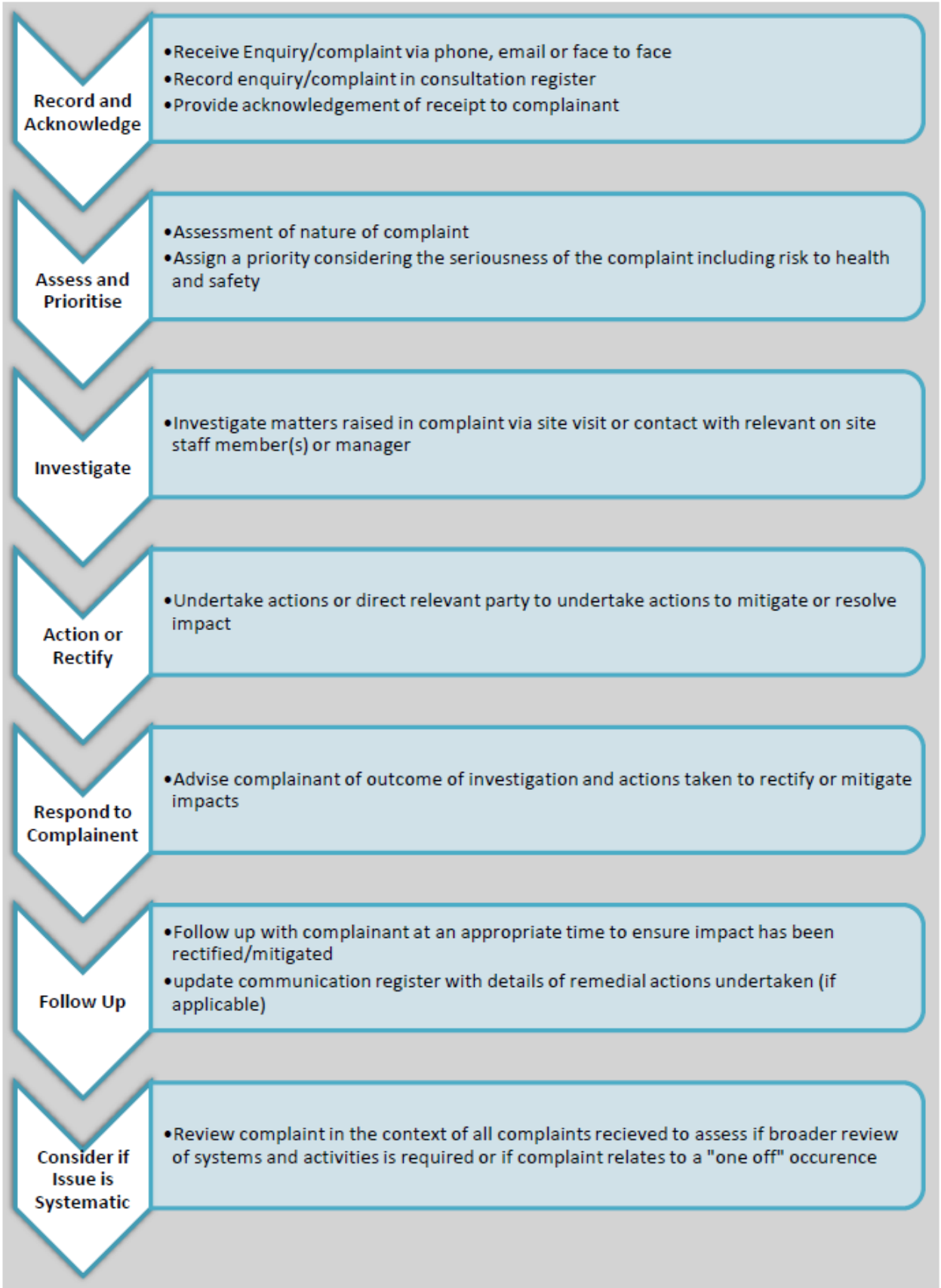
Specific issues which will require engagement include:

- High noise generating activities
- Vibration intensive activities
- Traffic management and disruption
- Emergency events

### 9.3. Community Complaints

A Community complaints procedure has been established in Annexure K – Community Consultation plan.

Generally the procedure below is to be followed.

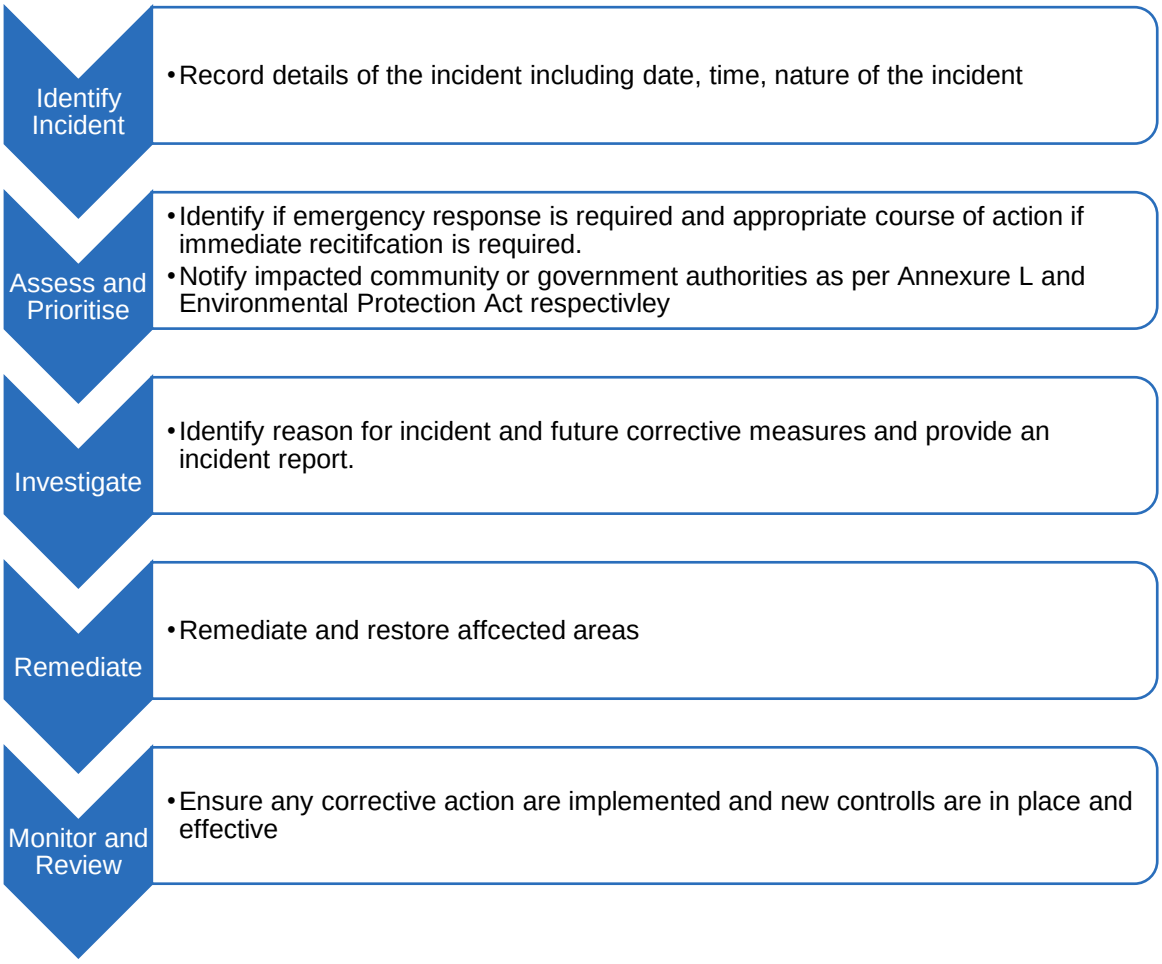

Record and Acknowledge
•Receive Enquiry/complaint via phone, email or face to face
•Record enquiry/complaint in consultation register
•Provide acknowledgement of receipt to complainant
Assess and Prioritise
•Assessment of nature of complaint
•Assign a priority considering the seriousness of the complaint including risk to health and safety
Investigate
•Investigate matters raised in complaint via site visit or contact with relevant on site staff member(s) or manager
Action or Rectify
•Undertake actions or direct relevant party to undertake actions to mitigate or resolve impact
Respond to Complainent
•Advise complainant of outcome of investigation and actions taken to rectify or mitigate impacts
Follow Up
•Follow up with complainant at an appropriate time to ensure impact has been rectified/mitigated
•update communication register with details of remedial actions undertaken (if applicable)
Consider if Issue is Systematic
•Review complaint in the context of all complaints recieved to assess if broader review of systems and activities is required or if complaint relates to a "one off" occurence

# 10. Incident Investigation and Reporting

## 10.1. Procedure

The Construction Personnel and particularly the site supervisor shall ensure that all incidents occurring in or around the site, including company personnel, subcontractors, visitors or passers-by, are investigated and reported regardless of how minor they appear at the time of the occurrence.

Upon identification that an incident has occurred the following procedure is to be implemented.




## 10.2. Notification of Authorities

### 10.2.1. Pollution Events

Environmental manager shall notify the OEH Pollution Line, 131 555, regarding pollution incidents that have occurred in the course of the Contractor's activities, if the following apply:

- The actual or potential harm to the health or safety of human beings or ecosystems is not trivial.
- The actual or potential loss or property damage (including clean-up costs) associated with a pollution incident may exceed $10,000.

In addition to the above The Planning Secretary must be notified in writing immediately after an incident is identified. The notification must identify the development (including the development application number and the name of the development if it has one) and set out the location and nature of the incident. Subsequent notification requirements must as per Section 10.3 Incident Reporting Requirements.

### 10.2.2. Unexpected Finds

In the case of unexpected finds of suspected heritage significance, the Unexpected Finds procedure in Annexure F shall be followed.

In the case of unexpected finds for contamination or Unexploded Ordinance the procedure in Annexure L shall be followed.

## 10.3. Incident Reporting Requirements

### 10.3.1. Written incident notification requirements

1. A written incident notification addressing the requirements set out below must be submitted to the Planning Secretary via the Major Project's website within seven days after the Applicant becomes aware of an incident. Notification is required to be given under this condition even if the Applicant fails to give the notification required under condition C7 or, having given such notification, subsequently forms the view that an incident has not occurred.
2. Written notification of an incident must:
    a. identify the development and application number;
    b. provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
    c. identify how the incident was detected;
    d. identify when the applicant became aware of the incident;
    e. identify any actual or potential non-compliance with conditions of consent;
    f. describe what immediate steps were taken in relation to the incident;
    g. identify further action(s) that will be taken in relation to the incident; and
    h. identify a project contact for further communication regarding the incident.

### 10.3.2. Incident report requirements

3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Applicant must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.
4. The Incident Report must include:
    a. a summary of the incident;
    b. outcomes of an incident investigation, including identification of the cause of the incident;
    c. details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
    d. details of any communication with other stakeholders regarding the incident.

# Annexure Section

# Annexure A- Applicable Legislation

**NSW Environmental Legislation**

- Threatened Species Conservation Act 1995
- Contaminated Land Management Act 2008
- Contaminated Land Management Regulation 2008
- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Environmental Trust Act 1998
- Protection of the Environment Administration Act 1991
- Protection of the Environment Administration Regulation 2012
- Protection of the Environment Operations Act 1997
- Protection of the Environment Operations (Clean Air) Regulation 2010
- Protection of the Environment (General) Regulation 2009
- Protection of the Environment (Noise Control) Regulation 2008
- Protection of the Environment (Waste) Regulation 2005
- Environmentally Hazardous Chemicals Act 1985
- Environmentally Hazardous Chemicals Regulation 2008
- Heritage Act 1977
- Heritage Regulation 2012
- Local and Environment Court Act 1979
- Local Government Act 2009
- Water Act 1912
- Water Management Act 2000
- Water Management (General) Regulation 2011
- Work Health and Safety Act 2011 (NSW)
- Work Heal and Safety Regulation 2017 (NSW)
- Western Lands Act 1901
- Western Lands Regulation 2011

**Federal Environmental**

- Environment Protection and Biodiversity Conservation Act 1999
- National Environment Protection Council Act 1994
- National Environment Protection Measures (Implementation) Act 1998
- Natural Heritage Trust of Australia Act 1997
- Sydney Harbour Federation Trust Act 2001

**Other**

- Storing and Handling of Liquids: Environmental Protection – Participants Manual (Department of Environment and Climate Change, 2007)
- AS 1940 The Storage and Handling of Flammable and Combustible Liquids Storage and Handling of Dangerous Goods
- Australia and New Zealand Guidelines 2018, Australian and New Zealand Guidelines for Fresh and marine Water Quality
- PFAS National Environmental Management Plan (version 2)
- Guidelines for NSW Site Auditor Scheme, 3rd ed., NSW EPA

- Consultants Reporting on Contaminated Land, 2020, NSW EPA
- Guidelines for Implementing the Protection fo the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019
- Waste Classification Guidelines – Part 1: Classifying Waste, 2014, NSW EPA
- Resources Recover Order under Part9, Clause 93 of the Protection of the Environment Operations (Waste Regulation) 201
- Code of Practice – How to Manage and Control Asbestos in the Workplace 2016
- Code of Practice – How to Safely Remove Asbestos 2016

# Annexure B - Environmental Actions and Monitoring

The below controls have been collated from the Plans attached within the appendices, the development consent and other project plans which have recommended environmental controls are implemented for the works.

| Environmental Impact | Mitigation Measure | Responsibility/Monitoring |
|---|---|---|
| Air Quality | | |
| Dust Control | exposed surfaces and stockpiles are suppressed by regular watering | Site Supervisor |
| | all trucks entering or leaving the site with loads have their loads covered | Site Supervisor |
| | trucks associated with the development do not track dirt onto the public road network | Site Supervisor |
| | public roads used by these trucks are kept clean; and | Site Supervisor |
| | land stabilisation works are carried out progressively on site to minimise exposed surfaces | Project Manager |
| Communications | Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. | Site Supervisor/Project Manager |
| | Display the head or regional office contact information. | Project Manager |
| Site Management | Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. | Community Consultation Manager |
| | Make the complaints log available to the local authority when asked | Project Manager |
| | Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book. | Project Manager |
| Monitoring | Perform daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, during periods of greater likelihood of dust generation. | Site Supervisor |
| | Carry out regular site inspections for dust, record inspection results, and make an inspection log available to the local authority when asked. | Site Supervisor |

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| | Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. | Site Supervisor/Project Manager |
| Preparing and Maintaining the Site | Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. | Project Manager |
| | Where appropriate, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. | Site Supervisor |
| | Keep site fencing, barriers and scaffolding clean using wet methods. | Site Supervisor |
| | Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below | Site Supervisor |
| | Cover, seed or fence stockpiles to prevent wind erosion | Site Supervisor |
| Operating Vehicle/Machinery and Sustainable Travel | Ensure all on-road vehicles comply with relevant vehicle emission standards, where applicable | Site Supervisor |
| | Ensure all vehicles switch off engines when stationary - no idling vehicles | Site Supervisor |
| | Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable | Project Manager |
| | Impose and signpost a maximum-speed-limit of 15 kmph on surfaced and 10 kmph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided (such as regular water carts along main unsealed road), subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). | Project Manager |
| | Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate | Site Supervisor |
| | Use enclosed chutes and conveyors and covered skips | Site Supervisor |
| | Minimise drop heights from loading shovels and other loading or handling equipment anduse fine water sprays on such equipment wherever appropriate | Site Supervisor |
| Waste Management | Avoid bonfires and burning of waste materials. | Site Supervisor |
| | Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually | Site Supervisor |

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| | controlled, can produce fine water droplets that effectively bring the dust particles to the ground. | |
| | Avoid explosive blasting, using appropriate manual or mechanical alternatives | Project Manager |
| | Refer to Waste Management Plans recommendations for management measures on onsite waste management. | Project Manager |
| Track out | Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site. | Site Supervisor |
| | Avoid dry sweeping of large areas. | Site Supervisor |
| | Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. | Site Supervisor |
| | Record all inspections of haul routes and any subsequent action in a site log book. | Site Supervisor |
| | Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). | Site Supervisor |
| Soil and Water | | |
| Soil Management | Ensure that only VENM, ENM, or other material approved in writing by EPA is brought onto the site | Project Manager |
| | Accurate records are to be kept of the volume, sources and type of fill to be used; and records of these can be provided to the Planning Secretary on request. | Project Manager |
| Stormwater discharge (from sedimentation basins and flooding) | Control discharge from water quality basins so that the quality prior to discharge meets the following criteria:<br>PH – 6.5 to 8.5, Turbiditiy <50 NTU, no visible oil or grease<br>Use gypsum as a flocculant to control turbidity | Site Supervisor |
| | Do not discharge basins where contamination is suspected. Seek advice from Environmental Manager | Site Supervisor |
| Maintenance of ERSED controls and Sediment Basins | Sediment and erosion control measures will be installed prior to commencing construction to avoid impacts on downstream water quality. | Site Supervisor |
| | ERSED controls will be inspected for damage and performance:<br>After each runoff event<br>At least fortnightly if no runoff events have occurred in that time<br>Prior to and immediately after periods of site shut downs longer than 7 days<br>Contractor is to keep records of inspection dates, any issues identified, rectification measure proposed and date in which it was implemented. | Project Manager |
| | Accumulated sediment will be cleaned out when it reaches the marker board/post, and restore the original storage volume. Place | Project Management team |

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| | sediment in a disposal area or, if appropriate, mix with dry soil on the site. | |
| Adjoining waterways (dewatering, soil erosion and run off) | Utilise permanent and temporary drainage systems to divert clean water around disturbed areas | Environmental Manager<br>Site Supervisor |
| | Erect silt fences, bunds and swale drains to slow down and de-silt water flows on site | Site Supervisor |
| | Regular sweeping of surrounding road network if mud and dirt is tracked on to roads from construction activities | Site Supervisor |
| | Develop Erosion and Sedimentation Plans for each major stage of works | Environmental Manager |
| | Install erosion and sediment controls as per approved plans | Site Supervisor |
| | Install sediment controls downslope of the site to catch sediment | Site Supervisor |
| | Maintain Erosion and Sediment Controls in good condition | Site Supervisor |
| | Limit vehicle entries as much as practicable | Site Supervisor |
| | Create all weather access by installing cattle grids and stabilising pavements at exits from the site to ensure trucks associated with the development do not track dirt onto the public road network | Project Management team<br>Site Supervisor |
| | Minimise stripping of topsoil and stockpile on site for re-use during landscaping | Project Management team<br>Site Supervisor |
| | Connect construction to permanent drainage design as soon as possible after completion this includes directing surface water flows into new pits and connecting downpipes to stormwater network | Site Supervisor |
| | Dig pits on site for concrete wash outs to prevent discharge of dirty water into waterways<br>Site this area upslope and at least 10m from existing waterways or drainage | Site Supervisor |
| | Revegetate and landscape areas as soon as possible upon completion of each stage. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days. | Site Supervisor |
| | Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed | Site Supervisor |
| | Removal of sediment controls only after the catchment has been stabilised | Site Supervisor |
| | Where practical, foot and vehicular traffic will be kept away from all recently established areas. | Site Supervisor |
| Stockpiles | Ensure adequate erosion and sediment controls are installed around stockpiles | Site Supervisor |
| | Stabilise or cover on-site stockpiles if in place for longer than 2 months | Site Supervisor |

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| | Stockpiles should be located on land:<br>at least 5m away from concentrated water flows<br>at least 10m from a waterway and the Upper Canal<br>on land with a slope of 1:10 or flatter<br>on land that does not require the removal of threatened species and native vegetation<br>in areas of low conservation significance (including identified Aboriginal cultural value) | Site Supervisor |
| | Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils (landscaped areas only) remain on the surface at the completion of works. | Site Supervisor |
| Existing channels and waterways | Do not deposit material, excavate, or remove material within a watercourse bank, shore or bed, or on land 40 metres inland, or interfere with the likely flow of water to such a body, without a controlled activity approval | Site Supervisor |
| Biodiversity | | |
| Existing Tree Protection | Clearly mark areas of vegetation to be retained with flagging and appropriate signage. Ensure flagging is maintained for the duration of the project | Site Supervisor |
| | Do not locate haul roads, stockpiles or other temporary works underneath the drip line of trees to be retained | Site Supervisor |
| | Trees shall be felled in a controlled manner so that felling does not pose a danger of damaging other trees and also does not pose a threat to traffic, structures and people's safety. | Site Supervisor<br>Subcontractors |
| | Do not prune more than 30% of a trees canopy to be retained | Site Supervisor |
| Clearing | Mulch cleared trees for reuse in landscaping on-site | Site Supervisor |
| | Do not pick protected native plants without a licence | Construction Personnel<br>Subcontractors |
| | The Contractor will ensure that clearing does not result in more than:<br>a. 0.97 hectares (ha) of **CPW**;<br>b. 9.83 ha of **Grey-headed Flying-fox (GHFF) foraging habitat**; | Environmental Manager<br>Subcontractors<br>Site Supervisor |
| Creek Diversion | Water ingress is diverted prior to commencing works | Site Supervisor |
| | Water is to be pumped out and aquatic ecologist to be on standby to capture and relocate fauna which are trapped. Fauna is to be relocated as per the Fauna Relocation Plan | Site Supervisor |
| Fauna | Review planning documentation to identify sites where there may be threatened species | Environmental Manager |
| | Immediately prior to clearing compete a site walk to look for habitat areas | Environmental Manager<br>Site Supervisor |

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| | Prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided | Site Supervisor<br>Subcontractors |
| | Relocate fauna prior to clearing by calling the project ecologist | Site Supervisor<br>Construction Personnel<br>Subcontractors |
| Contamination and Waste | | |
| Imported Fill | Minimise fill import by maximising site won cut material. | Project Management Team |
| | Any material brought on site is to be VENM certified or other material approved in writing by EPA as approved for use on site Contractor is to keep all certificates and dockets relating to importing material and this is to be handed over upon Practical Completion | Project Management Team |
| | All material brought on site is to be recorded in an Material Tracking Register | Project Management Team |
| General Contamination Remediation | The site shall be remediated as per the Remediation Action Plan | Project Management Team |
| | Unexpected finds must be managed as per Annexure L | Project Management Team |
| Waste | Hazardous materials surveys to be completed prior to construction | Project Management Team |
| | Hazardous materials to be removed prior to demolition by qualified professional | Project Management Team |
| | Maintain registers for waste disposal as per WorkCover and OEH\EPACW\EPA requirements | Project Management Team |
| | Segregate waste on site to maximise recycling and re-use | Site Supervisor |
| | Send demolition waste to licenced recycling facilities where possible | Site Supervisor |
| | Dispose all waste in licenced facilities | Site Supervisor |
| | Reuse natural materials on site where possible ie topsoil, site won cut and mulch | Site Supervisor |
| | The collection of waste generated during construction of the development shall be undertaken between 7 am to 10 pm Monday to Friday | Site Supervisor |
| | Comply with general requirements for the transport of waste. For example, any vehicle used by the person to transport waste must be kept in a clean condition and be maintained so as to prevent spillage of waste. For some wastes only licensed transporters can be used. | Project Management Team |
| | Ensure vehicles transporting waste have adequate covers to prevent littering | Site Supervisor |
| | Waste management and strategies to be implemented during the construction and earthworks program, including the stockpiling of construction materials waste (likely in a skip) to be transported off Site for recycling or disposal. | Project Management Team |

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| Chemical storage and use on site | Chemicals to be stored in bunded areas which are to be impervious and have a capacity at least 110% of the largest container. | Project Management Team<br>Site Supervisor |
| | | |
| | Chemical storage is to be kept away from drains and waterways | Site Supervisor |
| | Implement the Workcover Code of Practice for Storage and Handling of Dangerous Goods and EPA guidelines for bunding<br>*http://www.environment.nsw.gov.au/water/bundingspill.htm* | Site Supervisor |
| | Chemical storage to be compliant with:<br>AS 1940 The Storage and Handling of Flammable and Combustible Liquids<br>Storage and Handling of Dangerous Goods WorkCover Code of Practice 2005- refer p. 86<br>Below screening threshold quantities listed in Department's Hazardous and Offensive Development Application Guidelines Applying SEPP 33<br>EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual (Department of Environment and Climate Change, 2007) | Project Management Team |
| | Ponding water within bunds is not to be discharged into stormwater | Site Supervisor |
| | Fuel and hydraulic leaks to be cleaned up immediately | Site Supervisor |
| | Drilling muds are to be stored in bunded areas and dried out prior to reuse | Site Supervisor<br>Construction Personnel<br>Subcontractors |
| | Liquid paints are to be spread on waste cardboard or similar and left to dry. Paint brushes to be rinsed an pain solids allowed to settle. Paint solids and liquid paint to be disposed of at a licenced liquid waste facility. | Site Supervisor<br>Construction Personnel<br>Subcontractors |
| | Storage of bulk fuels (>200L) on site is prohibited. All refuelling shall be undertaken by a mobile facility with appropriate spill control and containment equipment. | Site Supervisor |
| | MSDSs to be obtained prior to a chemical being received on site and by subcontractors using chemical products | Site Supervisor |
| | Spill kit to be kept on site by each Contractor | Project Management Team |
| Noise and Vibration | | |
| Project Planning | Use quieter and less vibration emitting construction<br>methods where feasible and reasonable. | Project Manager |
| | Works will be completed during standard daytime<br>construction hours outlined in Section 6.2. | Project Manager |
| | Truck routes to site should be limited to major roads. | Project Manager |
| Scheduling | Respite offers should be considered where high noise | Project Manager |

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| | and vibration generating activities are near receivers. As a guide, work should be carried out in blocks that do not exceed three hours, with a minimum respite period of one hour between each block. | |
| | Consult with the affected community to determine the need for respite periods. | Community Consultation Manager |
| Site Layout | Compounds and worksites will be designed to promote one-way traffic and minimise the need for vehicle reversing. | Project Manager |
| | Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography. | Project Manager |
| | Equipment that is noisy will be started away from sensitive receivers | Site Supervisor |
| Training | Training will be provided to all personnel on noise and vibration requirements for the project. Inductions and toolbox talks to be used to inform personnel of the location and sensitivity of surrounding receivers. | WH&S Representative |
| Plant and Equipment Source Mitigation | Where practicable, tonal reversing alarms (beepers) will be replaced with non-tonal alarms (squawkers) on all equipment in use (subject to occupational health and safety requirements). | Site Supervisor |
| | Noisy equipment will be sited behind structures that act as barriers, or at the greatest distance from the noise sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise. | Site Supervisor |
| | Noise generating equipment will be regularly checked and effectively maintained, including checking of hatches/enclosures regularly to ensure that seals are in good condition and doors close properly against seals. | Site Supervisor |
| | Dropping materials from a height will be avoided. | Site Supervisor |
| | Loading and unloading will be carried out away from noise sensitive areas, where practicable. | Site Supervisor |
| | Trucks will not queue outside residential properties.<br>Truck drivers will avoid compression braking as far as practicable. | Site Supervisor |
| | Truck movements will be kept to a minimum, i.e. trucks are fully loaded on each trip. | Site Supervisor |
| Screening | Where possible, install purpose-built screening or | Site Supervisor |

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| | enclosures around long-term fixed plant that has the<br>potential to impact nearby receivers | |
| | Site layout should take advantage of existing screening from local topography, where possible. Position site huts, maintenance sheds and/or shipping containers between noisy equipment and the affected receivers. | Site Supervisor |
| Community Consultation | Notifications will be provided to the affected community where high impacts are anticipated or where out of hours works are required, in accordance with the CEMP.<br>Notification will be a minimum of 24 hours. | Community Consultation Manager |
| | Where complaints are received, work practices will be<br>reviewed and feasible and reasonable practices<br>implemented to minimise any further impacts | Project Manager |
| Monitoring | Noise and/or vibration monitoring will be conducted (as appropriate) in response to any complaints received to verify that levels are not substantially above the predicted levels. | Project Manager |
| Vibration | If vibration generating works are required within the<br>minimum cosmetic damage working distances and<br>considered likely to exceed the criteria:<br>• Different construction methods with lower source<br>vibration levels will be investigated and implemented, where feasible<br>• Attended vibration measurements will be undertaken at the start of the works to determine<br>actual vibration levels at the item. Works will cease<br>if the monitoring indicates vibration levels are likely<br>to, or do, exceed the relevant criteria. | Project Manager/ Site Supervisor |
| | Where works are required within the cosmetic damage minimum working distances, building condition surveys will be completed before and after the works to ensure no cosmetic damage has occurred. | Project Manager |
| Heritage | | |
| Unexpected Finds | If human skeletal remains are found on the site please follow the Unexpected Finds procedure for Discovery of Possible Human Skeletal Remains as per Appendix 2 of the Aboriginal and Cultural Heritage Management Plan | Site Supervisor<br>Project Manager |
| | If potential Aboriginal heritage items are found on the site please follow the Unexpected Finds procedure for Aboriginal Heritage as per Appendix 3 of the Aboriginal and Cultural Heritage Management Plan | Site Supervisor<br>Project Manager |

| | | |
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| | If any Aboriginal object or Aboriginal place is identified on site, or suspected to be on site:<br>(a) all work in the immediate vicinity of the object or place must cease immediately;<br>(b) a 10 m buffer area around the object or place must be cordoned off; and<br>(c) OEH must be contacted immediately. | Site Supervisor<br>Project Manager |
| | Work in the immediate vicinity of the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the National Parks and Wildlife Act 1974. | Site Supervisor<br>Project Manager |
| | | |

# Annexure C - Erosion and Sedimentation Plan

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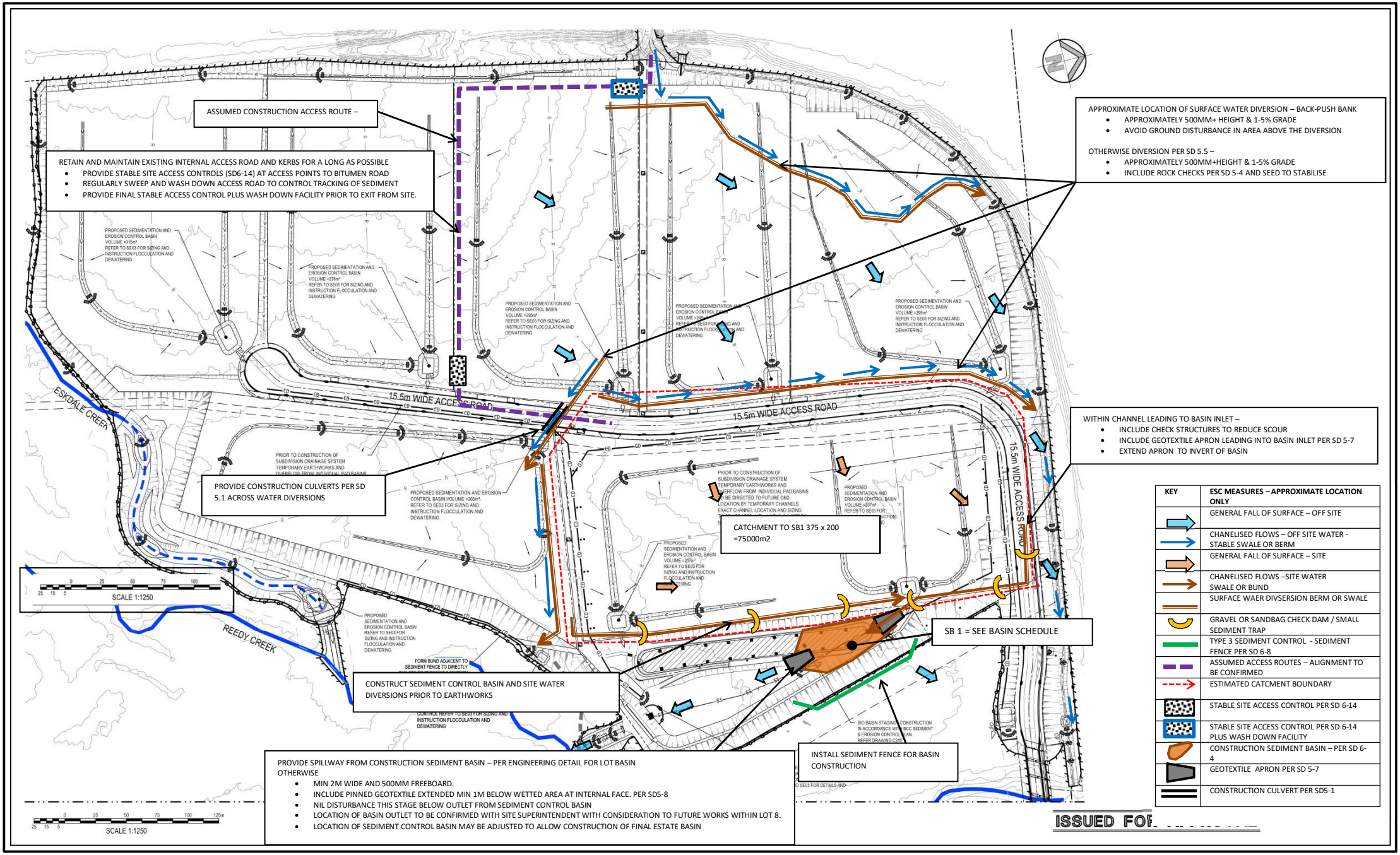


ErSed Environmental Pty Ltd
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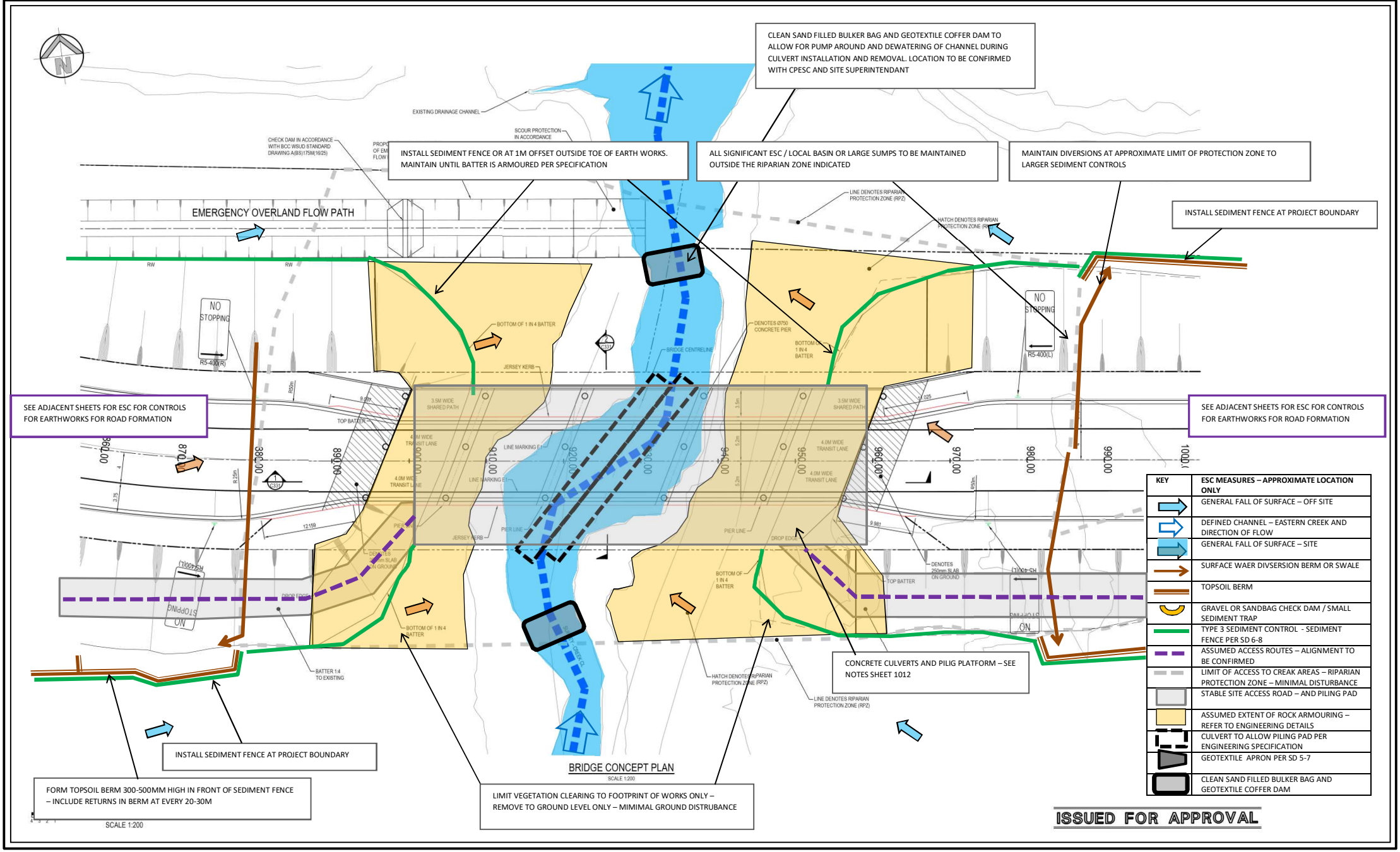
SHEETS IN THIS PLAN SET
1. SEE DRAWING LIST SHEET KEY-1000

| | | |
|---|---|---|
| CLIENT | AWJ | **PROGRESSIVE EROSION AND SEDIMENT CONTROL PLAN** |
| DRAWN | CV | LIGHT HORSE INTERCHANGE INDUSTRIAL DEVELOPMENT<br>EROSION AND SEDIMENT CONTROLS<br>GENERAL ARRANGMENT |
| CREATED | NOV 2021 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **21024** | **ESC** | **EW** | **1010** | **0** | **24/11/21** |
| CLIENT BASE PLAN: 18652_SSDA_C | SHEET | ERSED REF | PLAN | PREFIX | SHEET NUMBER | AMDT | DATE |

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SHEETS IN THIS PLAN SET
1. SEE DRAWING LIST SHEET KEY-1000

CLIENT: AWJ
DRAWN: CV
CREATED: NOV 2021

**PROGRESSIVE EROSION AND SEDIMENT CONTROL PLAN**

LIGHT HORSE INTERCHANGE INDUSTRIAL DEVELOPMENT
EROSION AND SEDIMENT CONTROLS
BRIDGE WORKS

| | | | | | |
|---|---|---|---|---|---|
| **21024** | **ESC** | **EW** | **1011** | **0** | **24/11/21** |
| CLIENT BASE PLAN: 18652_SSDA_C | SHEET | ERSED REF | PLAN | PREFIX | SHEET NUMBER | AMDT | DATE |

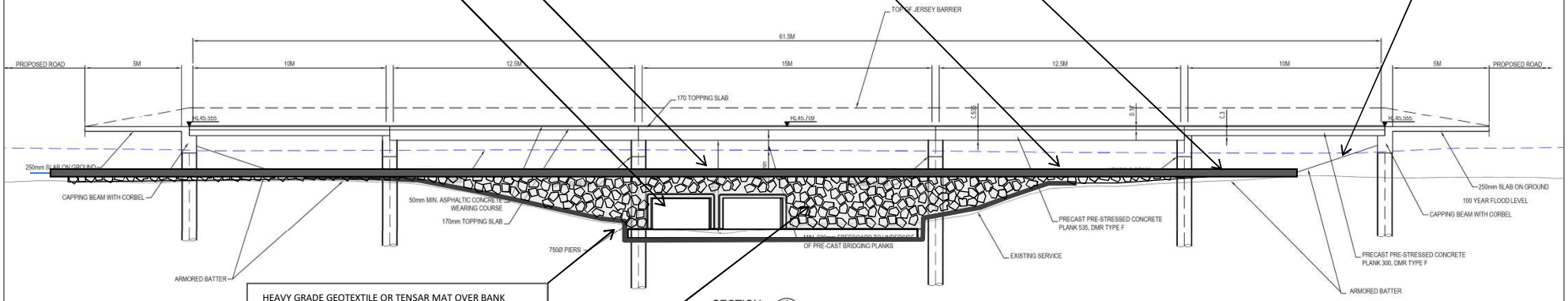
SMALLER ROCK OVER LARGE ROCK AND RUNNING SURFACE FOR PILING WORKS PER ENGINEERING SPECIFICATIONS

EXTEND RUNNING SURFACE AS STABLE ACESS ROUTE TO BOTH SIDES OF CREEK BANKS

SEE ESCP SHEET 1011 FOR SEDIMENT CONTROLS FOR BRIDGE UBUTYMENTS AND ACESS WORKS

CONCETE CULVERTS PER ENGINEERING SPECIFICATIONS & AS CAN BE ACCOMODATEDWITHIN THE CHANNEL

LIMIT VEGETATION CLEARING TO FOOTPRINT OF WORKS ONLY – REMOVE TO GROUND LEVEL ONLY – MIMIMAL GROUND DISTRUBANCE

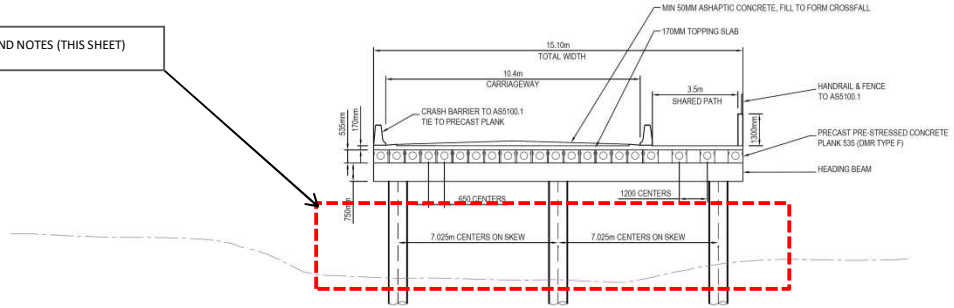



SECTION 1 C330
SCALE: 1:100

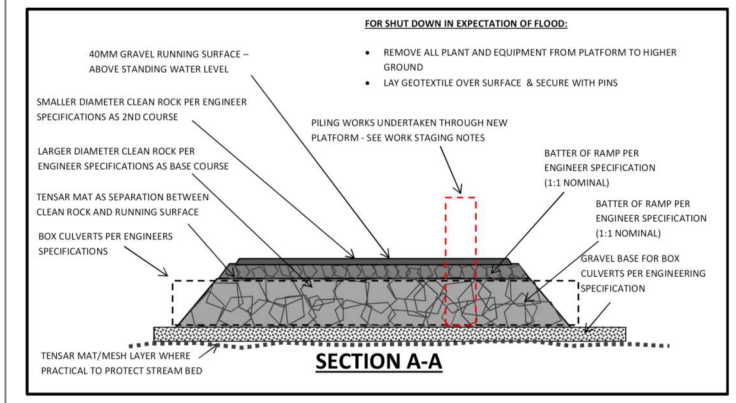
HEAVY GRADE GEOTEXTILE OR TENSAR MAT OVER BANK AREAS AND INVERT OF CHANNEL – MINIMAL DISTURBANCE TO NATURAL FORMATION

LARGE DIAMETER CLEAN ROCK AS BASE OVER GEOTEXTILE/TENSAR MAT. PLACE PER ENGINERING SPECIFICATIONS

SEE SECTION A-A AND NOTES (THIS SHEET)




SECTION 2 C330
SCALE: 1:100




**PILING PLATFORM CONSTRUCTION – SEE DETAIL THIS SHEET**

1. PLATFORM TO BE CONSTRUCTED PER ENGINEERING SPECIFICATION
2. PLATFORM TO BE CONSTRUCTED FULL WIDTH & INCLUDING CONCRETE CULVERT OR PIPES PER ENGINEERING SPECIFICATIONS
3. FULL WIDTH PLATFORM TO BE MAINTAINED TO ALLOW CONSTRUCTION OF FULL PILE SETS– APPROX. 1 MONTH

**ORDER OF WORKS**

1. INSTALL BULKER-BAG AND GEOTEXTILE COFFER DAMS ABOVE AND BELOW EXTENT OF WORKS AND ESTABLISH PUMP AROUND
2. OUTLET OF THE PUMP AROUND TO GEOTEXTILE APRON TO STREAM SECURED WITH PINS
3. DEWATER STREAM SLOWLY TO PREVENT DISTURBANCE OF SEDIMENT.
4. LAY TENSAR MAT/GEOTEXTILE OVER STREAM BED AND INSTALL GRAVEL BED TO SUPPORT CULVETS
5. INSTALL BOX CULVERTS PER ENGINEERING SPECIFICATION
6. LAY GEOTEXTILE MAT BANK AREAS AND PLACE CLEAN ROCK TO FORM ROCK PLATFORM PER ENGINEERING SPECIFICATIONS
7. INSTALL SEPARATION LAYER [illegible] AND BRIDGE APPROVISURFACE OF SMALLER GRAVEL.

ISSUED FOR APPROVAL

0 2 4 6 8 10m
2 1
SCALE 1:100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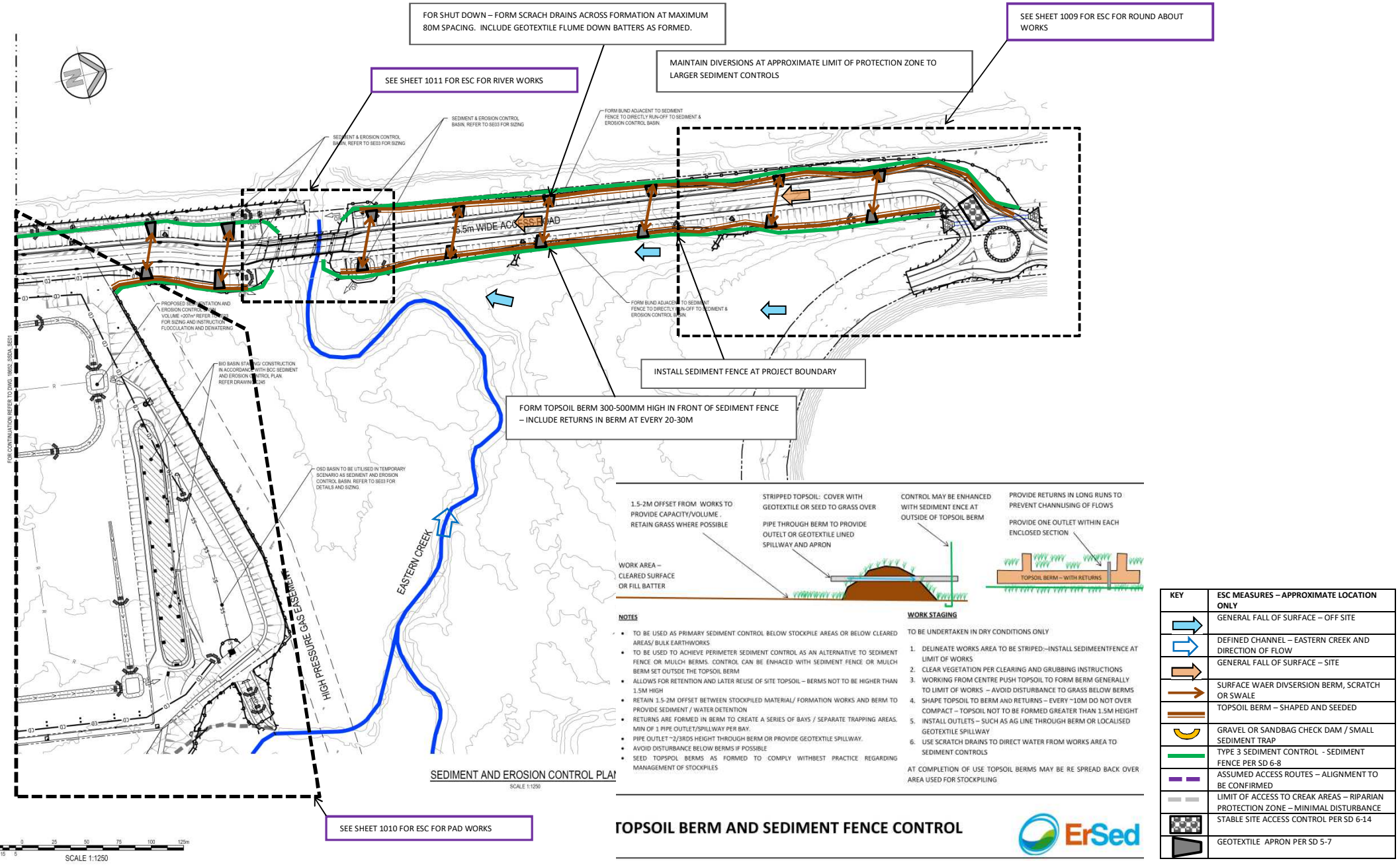
SHEETS IN THIS PLAN SET
1. SEE DRAWING LIST SHEET KEY-1000

CLIENT: AWJ
DRAWN: CV
CREATED: NOV 2021

**PROGRESSIVE EROSION AND SEDIMENT CONTROL PLAN**

LIGHT HORSE INTERCHANGE INDUSTRIAL DEVELOPMENT
EROSION AND SEDIMENT CONTROLS
BRIDGE WORKS

| CLIENT BASE PLAN: 18652_SSDA_C | SHEET | ERSED REF | PLAN | PREFIX | SHEET NUMBER | AMDT | DATE |
|---|---|---|---|---|---|---|---|
| | | 21024 | ESC | EW | 1012 | 0 | 24/11/21 |

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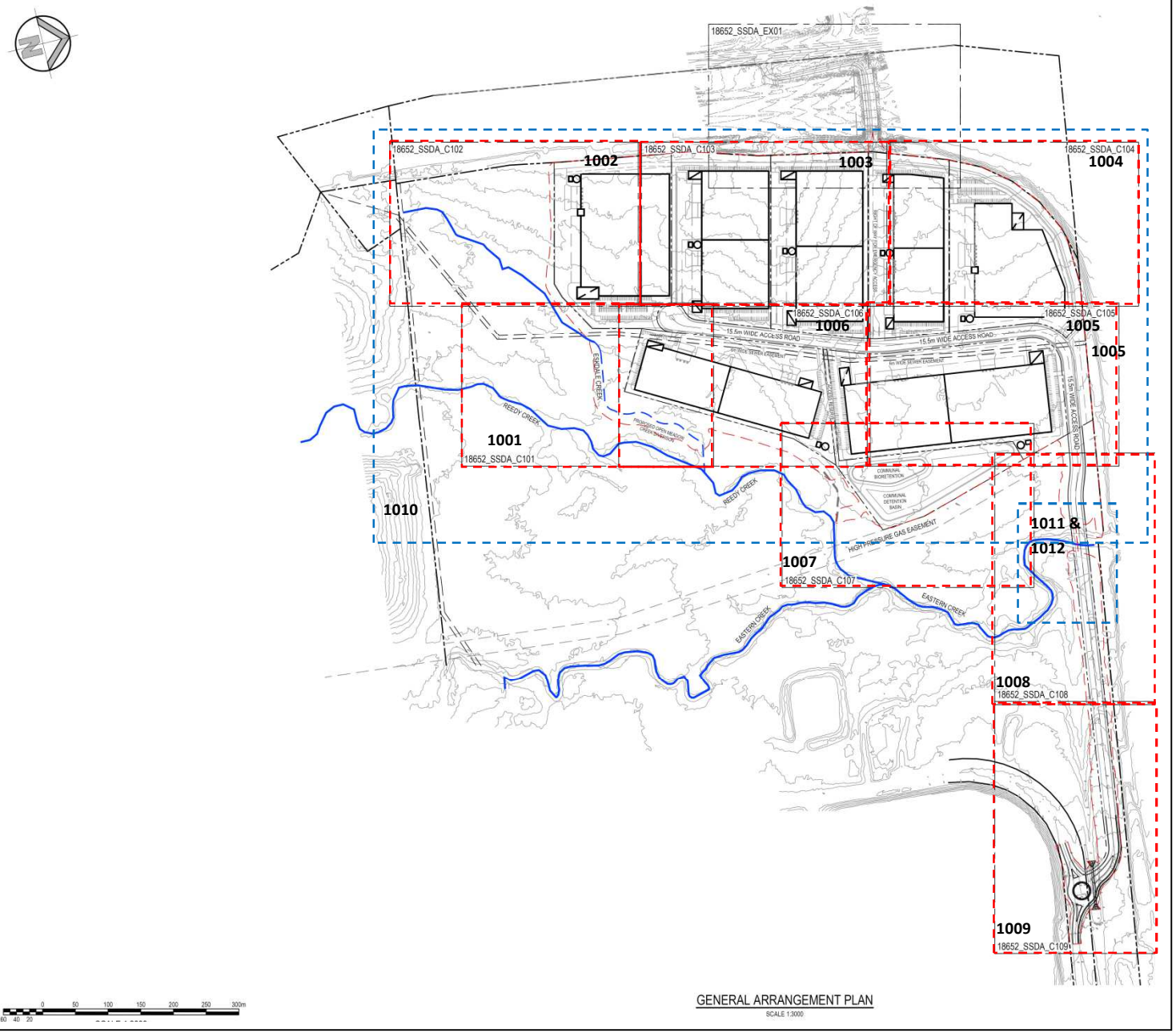
SHEETS IN THIS PLAN SET
1. SEE DRAWING LIST SHEET KEY-1000

CLIENT BASE PLAN: 18652_SSDA_C

| CLIENT | AWJ | PROGRESSIVE EROSION AND SEDIMENT CONTROL PLAN | | | | |
|---|---|---|---|---|---|---|
| DRAWN | CV | LIGHT HORSE INTERCHANGE INDUSTRIAL DEVELOPMENT<br>EROSION AND SEDIMENT CONTROLS<br>EASTERN ROAD WORKS | | | | |
| CREATED | NOV 2021 | | | | | |
| | 21024 | ESC | EW | 1013 | 0 | 24/11/21 |
| SHEET | ERSED REF | PLAN | PREFIX | SHEET NUMBER | AMDT | DATE |




GENERAL ARRANGEMENT PLAN
SCALE 1:3000

| DRAWING SET UPDATED | | DRAFT | ISSUED | |
|---|---|---|---|---|
| PLAN | NUMBER | REV | DATE | NOTES |
| GENERAL ARRANGEMENT SHEETS | | | | |
| 21024 ESC-KEY- | 1000 | 0 | 24 NOV 21 | KEY TO ESC SHEETS |
| 21024 ESC-EW- | 1001 | 0 | | |
| 21024 ESC-EW- | 1002 | 0 | | |
| 21024 ESC-EW- | 1003 | 0 | | |
| 21024 ESC-EW- | 1004 | 0 | | |
| 21024 ESC-EW- | 1005 | 0 | | |
| 21024 ESC-EW- | 1006 | 0 | | |
| 21024 ESC-EW- | 1007 | 0 | | |
| 21024 ESC-EW- | 1008 | 0 | | |
| 21024 ESC-EW- | 1009 | 0 | | |
| 21024 ESC-EW- | 1010 | 0 | 24 NOV 21 | STAGE 2 GENERAL ARRANGEMENT |
| 21024 ESC-EW- | 1011 | 0 | 24 NOV 21 | BRIDGE WORKS – PLAN VIEW |
| 21024 ESC-EW- | 1012 | 0 | 24 NOV 21 | BRIDGE WORKS SECTION VIEW |
| 21024 ESC-EW- | 1013 | 0 | 24 NOV 21 | EASTERN ACCCESS ROAD |
| | | | | |
| NOTES AND DETAILS SHEETS | | | | |
| 21024 ESC-EW | **0001** | **0** | 24 NOV 21 | GENERAL NOTES TO ESC |
| | **0002** | **0** | 24 NOV 21 | STANDARD DETAILS OF CONTROLS |
| | **0003** | **0** | 24 NOV 21 | STANDARD DETAILS OF CONTROLS |
| | | | | |
| | | | | |
| | | | | |
| OTHER SHEETS | | | | |
| REMEDIATION | | | | |
| 21024 ESC-REM- | | | | |
| | | | | |

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SHEETS IN THIS PLAN SET
1. SEE DRAWING LIST SHEET KEY-1000

CLIENT: AWJ
DRAWN: CV
CREATED: NOV 2021

**PROGRESSIVE EROSION AND SEDIMENT CONTROL PLAN**

LIGHT HORSE INTERCHANGE INDUSTRIAL DEVELOPMENT
EROSION AND SEDIMENT CONTROLS
KEY TO ESC SHEETS

| CLIENT BASE PLAN: 18652_SSDA_C | SHEET | ERSED REF | PLAN | PREFIX | SHEET NUMBER | AMDT | DATE |
|---|---|---|---|---|---|---|---|
| | | **21024** | **ESC** | **KEY** | **1000** | **0** | **24/11/21** |

# Annexure D - Construction Traffic Management Plan

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ttpa TRANSPORT AND TRAFFIC PLANNING ASSOCIATES
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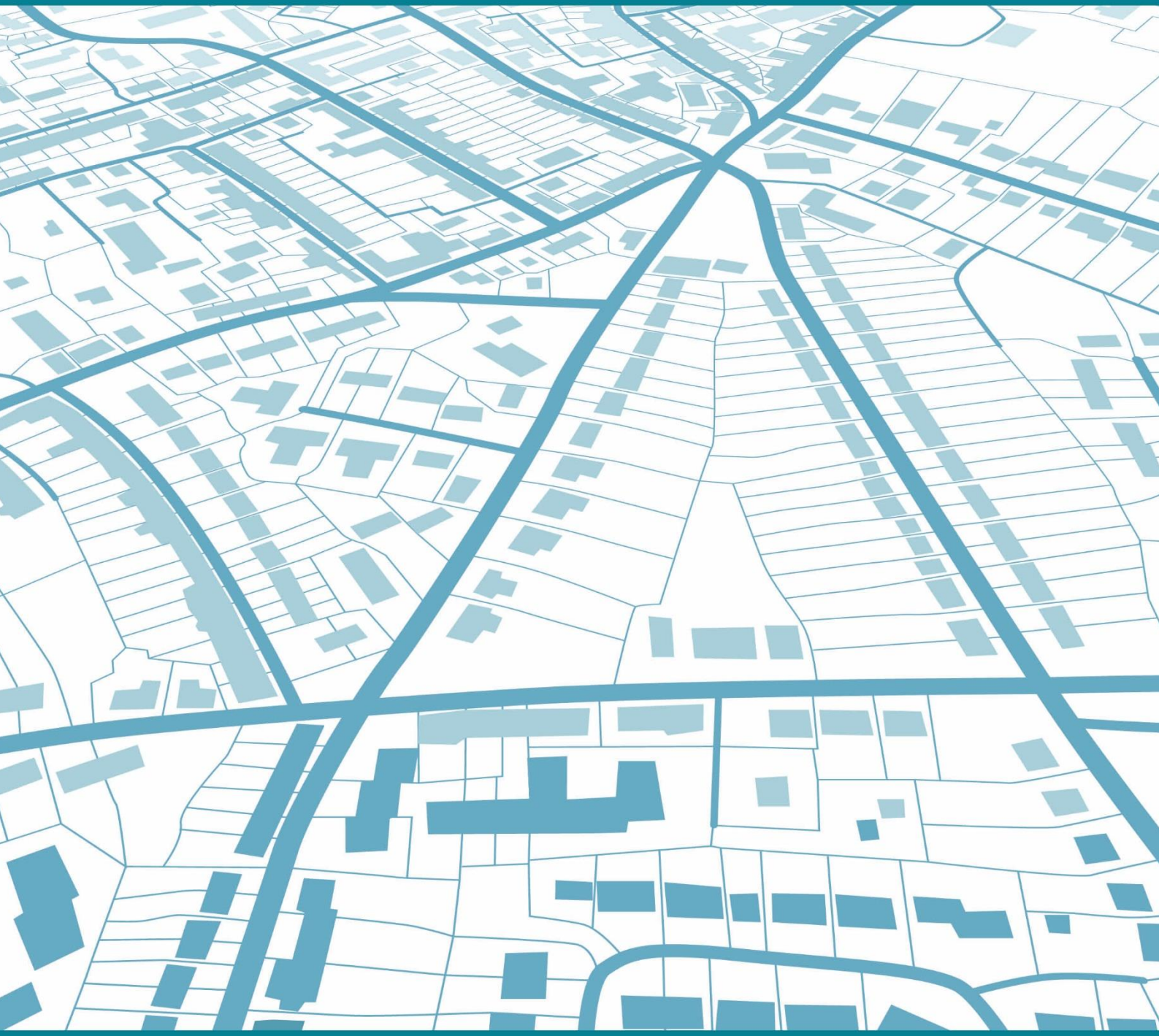

# Light Horse Business Hub, Eastern Creek

## Bulk Earthworks and Infrastructure

## Construction Traffic Management Plan

Ref: 21077 (B)
Date: March 2022
Rev: C

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Appendix D Work Program
Appendix E Traffic Control Plans

# 1.0 Introduction

Consent (SSD-9667) has been granted for the Concept Proposal and Stage 1 Works for development of the Light Horse Interchange Business Hub (LHBH) on the site known as 165 Wallgrove Road and 475 Ferres Road, Eastern Creek (Figure 1).

This revised report has been prepared to incorporate an unforeseen change to permit temporary egress from the site along the future road alignment to Ferres Road via a temporary bridge over Eastern Creek. The vehicle movements involved would be as follows:

- 4 “floats” per week for 3 weeks
- 30 “truck & dog” movements per week

The proposal involves egress only movements with a NO RIGHT TURN restriction preventing direct egress to the south on Ferres Road (these vehicles will be able to U-turn at the Bradham Drive roundabout). Details of the proposal are shown on the final TCP contained in Appendix E.

The DPIE has issued Consent Conditions for the proposed development and these include the following in relation to Traffic, Access and Parking together with the summarised responses:

| | | Summary Response | CTMP Section |
|---|---|---|---|
| | ***Traffic and Access***<br>***Construction Traffic Management Plan*** | | |
| *B1.* | *Prior to the commencement of construction, the Applicant must prepare a Construction Traffic Management Plan for the Stage 1 development to the satisfaction of the Planning Secretary. The plan must form part of the CEMP required by condition C2 and must:* | | |
| | - *be prepared by a suitably qualified and experienced person(s);* | *This CTMP was prepared by Ross Nettle, a Director of TTPA. The TCP’s were prepared by Ronak Gandhi TCT0063633* | *N.A.* |

| | | | |
|---|---|---|---|
| | - *be prepared in consultation with Council and TfNSW;* | *Blacktown Council & TfNSW have endorsed the CTMP* | *Refer to Section 8.0* |
| | - *detail the measures that are to be implemented to ensure road safety and network efficiency during construction;* | | *Refer to Section 4.2* |
| | - *detail heavy vehicle routes, access and parking arrangements;* | *Trucks routes have been designated and location of parking identified* | *Refer to Section 4.3 & 4.4* |
| | - *include a Driver Code of Conduct to:* | *Provided* | *Refer to Section 6.0* |
| | i. *minimise the impacts of earthworks and construction on the local and regional road networks;* | *Vehicle access and truck routes are limited to State Roads except for Ferrers Road* | *Refer to Section 4.3* |
| | ii. *minimise conflicts with other road users;* | *The site generated movements will be widely distributed and readily accommodated on the road system* | *Refer to Section 4.2* |
| | iii. *minimise road traffic noise; and* | *For others* | |
| | iv. *ensure truck drivers use specified routes;* | *Included* | *Refer to Section 6.2* |
| | - *include a program to monitor the effectiveness of these measures; and* | *Included* | *Refer to Section 7.0* |
| | *if necessary, detail procedures for notifying residents and the community (including local schools), of any potential disruptions to routes.* | *Included* | *Refer to Section 7.3* |
| | | **Summary Response** | **CTMP Section** |
| | ***Environmental Management Management Plan Requirements*** | | |
| *C1* | *Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:* *(a) detailed baseline data;* | *Baseline data provided* | *Refer to Section 3.0* |
| | *(b) details of:* i. *the relevant statutory requirements (including any relevant approval, licence or lease conditions);* | *The TCP is prepared in accordance with AS1742.3* | *Refer to Section 5.0* |
| | ii. *any relevant limits or performance measures and criteria; and* | *Included* | *Refer to Section 7.2* |
| | iii. *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;* | *Included* | *Refer to Section 7.2* |
| | *(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;* | *Included* | *Refer to Section 7.2* |
| | *(d) a program to monitor and report on the:* i. *impacts and environmental performance of* | *The plan outlines requirements for this plan to be updated* | *Refer to Section 7.0* |

| | | | |
|---|---|---|---|
| | *the development; and* | | |
| | *ii. effectiveness of the management measures set out pursuant to paragraph (c) above;* | *Included* | *Refer to Section 7.0* |
| *(e)* | *a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;* | *Included* | *Refer to Section 7.2* |
| *(f)* | *a program to investigate and implement ways to improve the environmental performance of the development over time;* | *The plan outlines the requirement for this plan to be updated* | *Refer to Section 7.0* |
| *(g)* | *a protocol for managing and reporting any:*<br>*i. incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);* | *Management and reporting protocols are outlined in the CEMP* | *-* |
| | *ii. compliant;* | *Included* | *Refer to Section 7.0* |
| | *iii. failure to comply with statutory requirements; and* | *Included* | *Refer to Section 7.0* |
| *(h)* | *a protocol for periodic review of the plan.* | *Included* | *Refer to Section 7.0* |

***Note**: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans*

This Construction Traffic Management Plan has been prepared in relation to the Bulk Earthworks and Infrastructure. Separate CTMP's will be prepared for the development on individual lots.

**LEGEND**

N

**LOCATION**

**FIG 1**

# 2.0 Proposed Development Scheme

## 2.1 Site, Context and Existing Circumstances

The site (Figure 2) is Part Lot 10 in DP 1061237 and Part Lot 5 in DP 804051, being portion of the Western Sydney Parklands landholding at Eastern Creek. The site occupies an area of 34.4ha located on the south-east corner of the M4 Motorway and M7 Motorway intersection known as the "Light Horse Interchange".

The site is bound to the north by the M4 Motorway and to the west by the M7 Motorway while the surrounding uses comprise:

- Western Sydney Parklands and the Huntingwood/Bungarribee Industrial Estates extending to the north
- Western Sydney Parklands and the Eastern Creek Waste Management Centre extending to the south
- Sydney Motor Sport Park and International Dragway to the east
- The Interchange/Wonderland Business Parks to the west of Wallgrove Road

The site is relatively "low lying" with Eastern Creek running through the eastern part and its tributaries including Reedy Creek running through the central part.

The site is largely grassland with scattered areas of shrubs and trees with a number of dams. The demolition and site remediation processes have been completed however the only vehicle access at this time is provided by an access track connecting under the M7 to Wallgrove Road where the intersection is provided with a right turn bay for vehicles approaching from the south and a left turn deceleration lane for vehicles approaching from the north.

This access also provides for vehicles to ingress and egress a materials storage depot for the M7 Motorway which extends southerly along the narrow strip between Wallgrove Road and the M7 (see details overleaf).

**LEGEND**

N

**SITE**

**FIG 2**

nearmap

## 2.2 Concept Development

The Concept Plan approval, which was granted in August 2020, provided for:

- a total of 157,600m$^2$ warehouse etc. floorspace and 7,900m$^2$ ancillary office floorspace (total building area 165,500m$^2$)
- a new access intersection on Ferres Road with an emergency access (existing connection) on Wallgrove Road
- a cul-de-sac access road within the site
- a Shared Path link connecting between the site and the existing shared path along the M7 corridor
- Site works including:
  - Remediation of the site;
  - Demolition of existing structures;
  - Site preparation and bulk earthworks;
  - Installation of essential infrastructure services;
  - Flood and stormwater management infrastructure works; and
  - Subdivision of the site into 11 Torrens title lots, to provide seven future development lots and four lots comprising the stormwater detention basin, access road reserve and residual land to remain within Western Sydney Parklands.

Details of the proposed development are provided on the approved Concept Plan prepared by Nettleton Tribe Architects which is reproduced in Appendix A.

## 2.3 Proposed Bulk Earthworks and Infrastructure

The proposed works comprise:

- Construction of temporary egress one-way track to connect between the site and Ferres Road either along the High Pressure Gas Easement as Indicated in the Appendix B diagrams or along an alternative through the future access road corridor with left turn only to Ferres Road
- Bulk earthworks (cut/fill and import of fill)
- Construction of the new future access intersection on Ferres Road
- Construction of the new access road with a bridge crossing of Eastern Creek
- Preparation of the new lot levels
- Installation of services
- Construction of a connection from the existing M7 shared path to the site
- Basin construction
- Creek realignment works
- Other infrastructure works

The existing temporary vehicle access on Wallgrove Road (with left turn IN/OUT only for trucks) and the existing site compound will be retained.

The plans provided in Appendix B detail these works and essentially all truck access will be inwards from Wallgrove Road and egress to Ferres Road apart from trucks associated with construction of the new roundabout on Ferres Road.

# 3.0 Road Network and Traffic Conditions

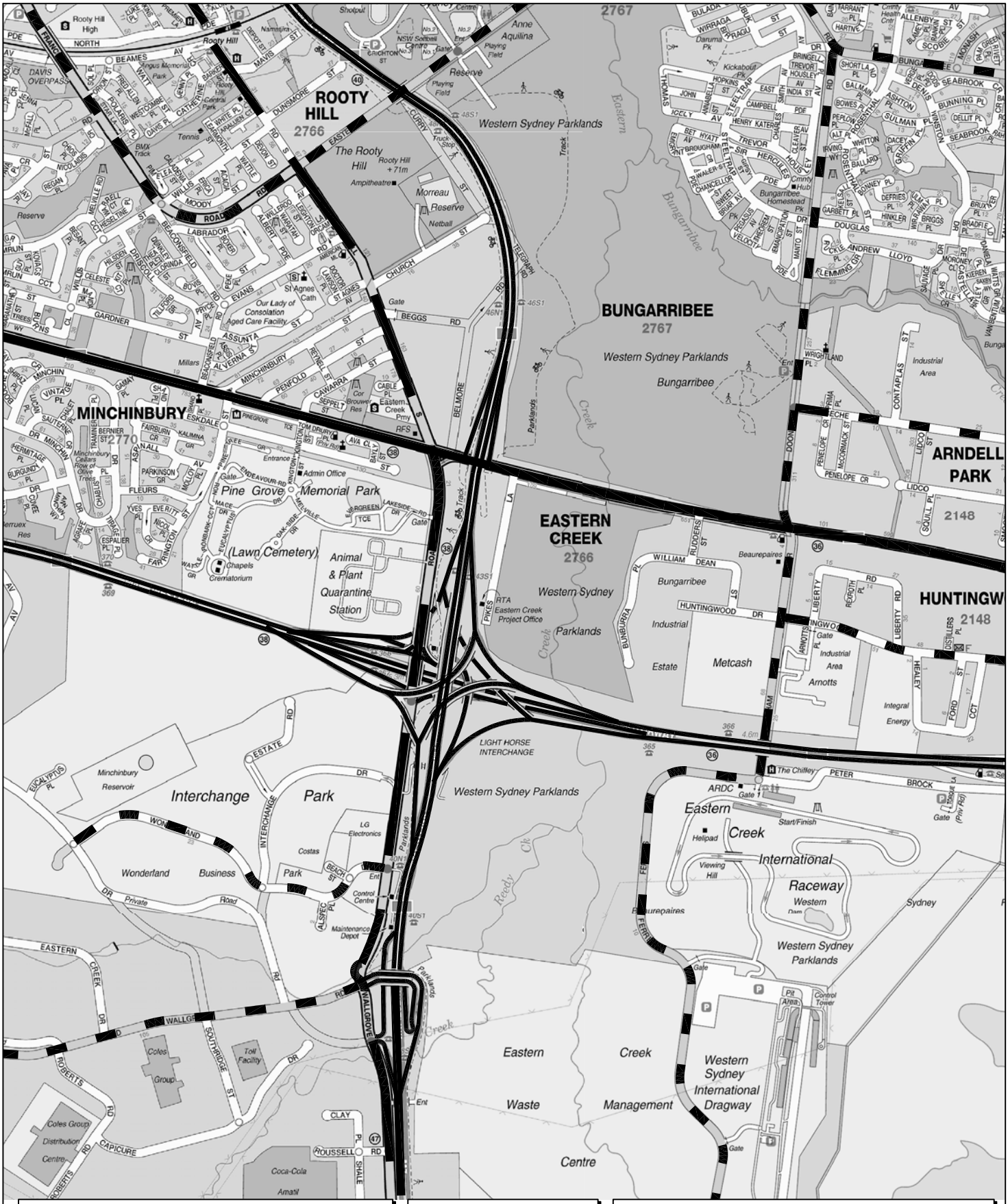
## 3.1 Road Network

The road network serving the site (Figure 3) comprises:

- *Westlink M7* – a State Road (private Motorway) and major arterial route connecting between the Southwest Motorway and the Hume Motorway at Prestons and the M2 Motorway at Seven Hills
- *M4 Motorway* – a State Road and major arterial route connecting between Sydney and Penrith
- *Great Western Highway* – a State Highway and arterial route connecting between Sydney, Penrith and the Blue Mountains crossing
- *Wallgrove Road* – a State Road and sub-arterial route connecting between the Great Western Highway and Elizabeth Drive
- *Ferres Road/Brabham Drive* – a collector road connecting between the Great Western Highway and The Horsley Drive

The Light Horse Interchange is formed by a complex system of ramps and connections between the M4, M7 and Wallgrove Road with further ramp connections to the south to Wallgrove Road and to Great Western Highway to the north.

Ferrers Road is relatively level with one lane in each direction and a large radius 90° bend located towards the northern end where the site access will be provided.




## LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR

N

# ROAD NETWORK

FIG 3

## 3.2 Traffic Controls

The existing traffic controls on the road network in the vicinity of the site (Figure 4) comprise:

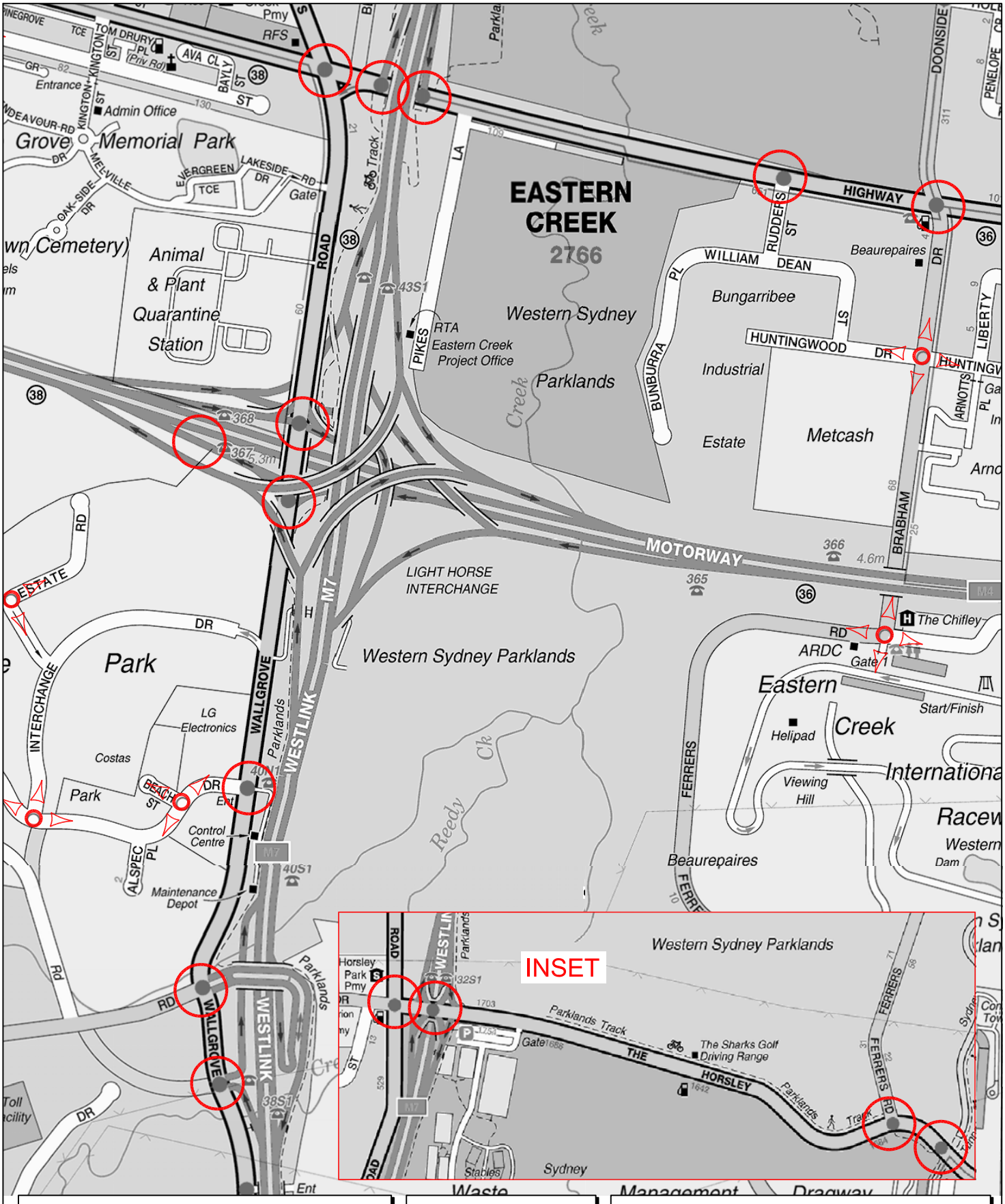
- the traffic signals at the Great Western Highway, Brabham Drive and Doonside Road intersection (see details overleaf)
- The traffic signals at the Wallgrove Road and the Great Western Highway intersection (see details overleaf)
- The traffic signals at the Wallgrove Road and M4 Ramp intersection where there are two separate intersections serving the eastbound and westbound ramps
- The traffic signals at the intersection of The Horsley Drive and Ferres Road
- The roundabouts at the intersections of Brabham Drive/Huntingwood Drive and Brabham Drive/Ferres Road
- The 70 kmph speed restriction on Wallgrove Road and 60 kmph on Ferres Road

## 3.3 Traffic Conditions

An indication of the traffic conditions on the road system serving the site is provided by data published by TfNSW and other available data. The data published by TfNSW is expressed in terms of Annual Average Daily Traffic (AADT) and the most recent recorded volumes are provided in the following:

| | **AADT** |
|---|---|
| Wallgrove Road North of M4 Motorway | 39,904 |
| Great Western Highway West of Wallgrove Road | 31,827 |

Traffic data for the morning and afternoon peak periods at intersections serving the site as provided by TfNSW and surveys undertaken for this study is summarised in Figure 5.




## LEGEND

- TRAFFIC SIGNAL CONTROL
- ROUNDABOUT
- RESTRICTED TURNING MOVEMENT

# TRAFFIC CONTROLS

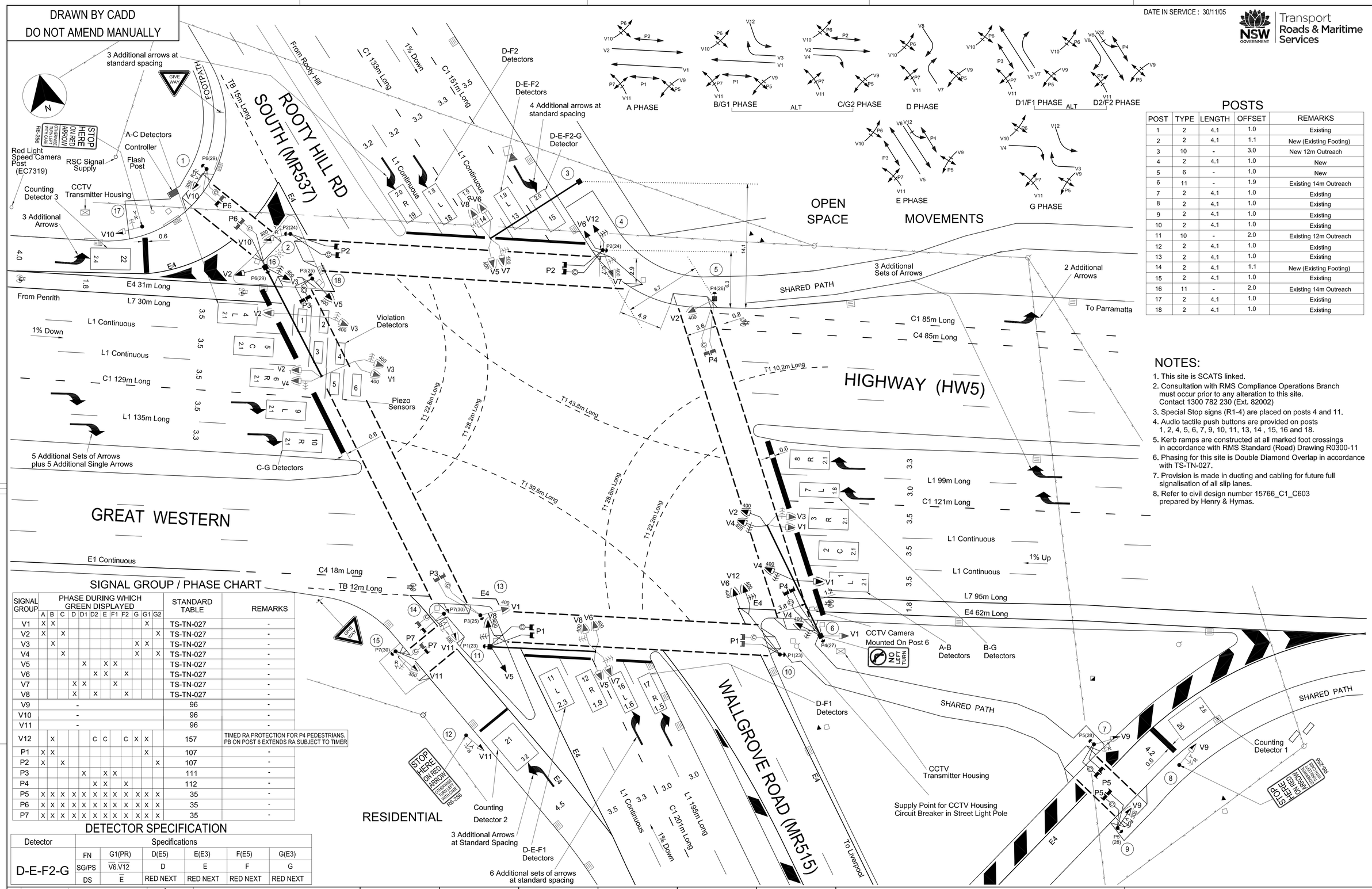
**FIG 4**

TCS 0779

DRAWN BY CADD
DO Nnot AMEND MANUALLY

DATE IN SERVICE : 30/11/05

NSW GOVERNMENT Transport Roads & Maritime Services




## POSTS

| POST | TYPE | LENGTH | OFFSET | REMARKS |
|---|---|---|---|---|
| 1 | 2 | 4.1 | 1.0 | Existing |
| 2 | 2 | 4.1 | 1.1 | New (Existing Footing) |
| 3 | 10 | - | 3.0 | New 12m Outreach |
| 4 | 2 | 4.1 | 1.0 | New |
| 5 | 6 | - | 1.0 | New |
| 6 | 11 | - | 1.9 | Existing 14m Outreach |
| 7 | 2 | 4.1 | 1.0 | Existing |
| 8 | 2 | 4.1 | 1.0 | Existing |
| 9 | 2 | 4.1 | 1.0 | Existing |
| 10 | 2 | 4.1 | 1.0 | Existing |
| 11 | 10 | - | 2.0 | Existing 12m Outreach |
| 12 | 2 | 4.1 | 1.0 | Existing |
| 13 | 2 | 4.1 | 1.0 | Existing |
| 14 | 2 | 4.1 | 1.1 | New (Existing Footing) |
| 15 | 2 | 4.1 | 1.0 | Existing |
| 16 | 11 | - | 2.0 | Existing 14m Outreach |
| 17 | 2 | 4.1 | 1.0 | Existing |
| 18 | 2 | 4.1 | 1.0 | Existing |

## NOTES:

1. This site is SCATS linked.
2. Consultation with RMS Compliance Operations Branch must occur prior to any alteration to this site. Contact 1300 782 230 (Ext. 82002)
3. Special Stop signs (R1-4) are placed on posts 4 and 11.
4. Audio tactile push buttons are provided on posts 1, 2, 4, 5, 6, 7, 9, 10, 11, 13, 14 , 15, 16 and 18.
5. Kerb ramps are constructed at all marked foot crossings in accordance with RMS Standard (Road) Drawing R0300-11
6. Phasing for this site is Double Diamond Overlap in accordance with TS-TN-027.
7. Provision is made in ducting and cabling for future full signalisation of all slip lanes.
8. Refer to civil design number 15766_C1_C603 prepared by Henry & Hymas.

## SIGNAL GROUP / PHASE CHART

| SIGNAL GROUP | PHASE DURING WHICH GREEN DISPLAYED | | | | | | | | | | | | STANDARD TABLE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | D1 | D2 | E | F1 | F2 | G | G1 | G2 | | |
| V1 | X | X | | | | | | | | | X | | TS-TN-027 | - |
| V2 | X | | X | | | | | | | | | X | TS-TN-027 | - |
| V3 | | X | | | | | | | | X | X | | TS-TN-027 | - |
| V4 | | | X | | | | | | | X | | X | TS-TN-027 | - |
| V5 | | | | | X | | X | X | | | | | TS-TN-027 | - |
| V6 | | | | | | X | X | | X | | | | TS-TN-027 | - |
| V7 | | | | X | X | | | X | | | | | TS-TN-027 | - |
| V8 | | | | X | | X | | | X | | | | TS-TN-027 | - |
| V9 | - | | | | | | | | | | | | 96 | - |
| V10 | - | | | | | | | | | | | | 96 | - |
| V11 | - | | | | | | | | | | | | 96 | - |
| V12 | | X | | | | C | C | | C | X | X | | 157 | TIMED RA PROTECTION FOR P4 PEDESTRIANS. PB ON POST 6 EXTENDS RA SUBJECT TO TIMER |
| P1 | X | X | | | | | | | | | X | | 107 | - |
| P2 | X | | X | | | | | | | | | X | 107 | - |
| P3 | | | | | X | | X | X | | | | | 111 | - |
| P4 | | | | | | X | X | | X | | | | 112 | - |
| P5 | X | X | X | X | X | X | X | X | X | X | X | X | 35 | - |
| P6 | X | X | X | X | X | X | X | X | X | X | X | X | 35 | - |
| P7 | X | X | X | X | X | X | X | X | X | X | X | X | 35 | - |

## DETECTOR SPECIFICATION

| Detector | Specifications | | | | | |
|---|---|---|---|---|---|---|
| D-E-F2-G | FN | G1(PR) | D(E5) | E(E3) | F(E5) | G(E3) |
| | SG/PS | $\overline{V6}.V12$ | D | E | F | G |
| | DS | $\overline{E}$ | RED NEXT | RED NEXT | RED NEXT | RED NEXT |

| ISSUE | |
|---|---|
| A | ORIGINAL ISSUE |
| B | ISSUE<br>South east island near post 10 changed to existing location and P4 crossing moved to suit. P1, P2 and P3 crossings and Stop Lines changed to PCW (per m250 and R141).<br>Pram ramp at post 2 shown as per existing.<br>TTPA 18.05.2020 |
| C | ISSUE<br>Post 3 relocated due to water main clash<br>TTPA 07.07.2020 |

| PUBLIC UTILITY LEGEND | | REFERENCE PLANS | |
|---|---|---|---|
| HYDRANT | ☐ | SYMBOLS/ABRVS | VD003-6 |
| STOP VALVE | ▲ | STD POSN CMPT | VD001-5 |
| GAS VALVE | ⌗ | INSTL STOP DET | VC005-17 |
| SEWER MANHOLE | Ⓢ | VEH GROUP OP | TS-TN-019 |
| COMMS PIT | ◪ | DET LOGIC OP | TS-TN-020 |
| ELECT LIGHT POLE | ○ | PED MVT OP | TS-TN-021 |
| POWER POLE | ○ | | |
| STAY POLE | ⊘ | | |
| TELEPHONE BOX | T | SURVEYOR : LANDPARTNERS | |
| COMMS PILLAR | ◪ | DATE : 2015 | |

U.B.D. Ref. Map 187 G8
I.S.G. E : 286 410
CO-ORDS N : 1 259 785

DESIGNED : J. SINGH
CHECKED : C.TOMA
J.SINGH
SITE CHECKED
B. LO
RECOMMENDED

**DESIGN APPROVAL**
APPROVED
NAME R. NETTLE
POSITION DIRECTOR
DATE 03.07.2020
DESIGN PREPARED BY
TRANSPORT AND TRAFFIC PLANNING ASSOCIATES

**RMS RECOMMENDATION**
ROAD DESIGN ENGINEERING
P. QUIGG
NAME PHILLIP QUIGG
POSITION TRAFFIC SIGNAL DESIGN MANAGER
DATE 18/03/2019
NETWORK OPERATIONS
T. DEWBERRY
NAME TIMOTHY DEWBERRY
POSITION AREA LEADER NETWORK OPERATIONS
DATE 25/03/2019

**RMS ACCEPTANCE**
ACCEPTED
D. LANCE
NAME DAVID LANCE
POSITION SENIOR MANAGER NETWORK & SAFETY
DATE 02/04/2019
ACCEPTED BY
NETWORK & SAFETY SERVICES NW / PRECINCT SECTION

ROADS AND MARITIME SERVICES

BLACKTOWN COUNCIL AREA
TRAFFIC SIGNALS AT GREAT WESTERN HIGHWAY (HW5), WALLGROVE ROAD (MR515) AND ROOTY HILL ROAD SOUTH (MR537)
EASTERN CREEK

DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒
CADD FILE: VV0779_20C.DES.dgn
SCALE 5 0 (1:200) 5 10
FILE SF2014/009859
SUPERSEDES SHEET/ISSUE 20/B
ISSUE C
REG No. DS2014/001171
TCS No. 0779
SHEET 20

Revision 6 - July 2017

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DRAWN BY CADD
DO NOT AMEND MANUALLY

0005.040.VV.1120

DATE IN SERVICE : 02/10/62

R T A

## NOTES

1. This site is SCATS linked.
2. Special Regulatory Stop Signs (R1-4) placed on posts 2. 3. 6 and 7.
3. Audio tactile push buttons are provided on posts 4 and 6. drawing No MD.R173.B01.A.1.
4. Posts 2. 4. 6 and 8 hold directional signage.
5. For linemarking in Brabham Drive and Doonside Road. refer to concept drawing 27026_Linemarking_fig1 by Transport and Urban Planning.
6. Double Diamond Overlap phasing with filter option in accordance with TS-TN-027 Version 1.

'WESTERN SYDNEY PARKLANDS'

DOONSIDE ROAD

LEVEL

C1 77m Long

L1 51m Long

L1 Continuous

One additional set of arrows at standard spacing

D-F2 Detectors

D-E-F2-1 Detector

D-E-F2-2 Detector (Presence timed)

'A' Phase 'B' Phase 'C' Phase 'D' Phase (ALTERNATE)

'D1' Phase 'D2' Phase 'E' Phase 'F1' Phase 'F2' Phase (ALTERNATE)

MOVEMENTS

Counting Detector 2

A-C Detectors

A-C-G Detector

Four additional arrows at standard spacing

C1 104m Long

E4 41m Long

E4 42m Long

L1 99m Long

1.0% up

L1 Continuous

C1 161m Long

From PENRITH

COMMERCIAL / RETAIL

Supply

Controller

Two additional arrows at standard spacing

(HW.5) HIGHWAY

To PARRAMATTA

T1 8.7m Long

T1 7.8m Long

T1 7.8m Long

T1 7.8m Long

T1 850m - 35.2m Long

T1 R17.5m - 19.5m Long

A-B-G Detector

A-B Detectors

Four additional arrows at standard spacing

C1 141m Long

L1 Continuous

L1 111m Long

2.0% down

E4 48m Long

C1 101m Long

E4 46m Long

E1 Continuous

GREAT WESTERN

CONCRETE DRIVEWAY

BOUNDARY

Two additional arrows at standard spacing

COMMERCIAL / RETAIL

CCTV Transmitter Housing(CCTV33)

CCTV Camera

BRABHAM DRIVE

E4 14.6 Long

C1 13m Long

Counting Detector 1

Four additional arrows at standard spacing

'G' Phase 'G1' Phase 'G2' Phase (ALTERNATE)

MOVEMENTS (cont.)

D-E-F1-2 Detector (Presence timed)

D-E-F1-1 Detector

D-F1 Detector

One additional arrow at standard spacing

T1 7.8m Long

T1 7.8m Long

L1 Continuous

C1 57m Long

1.0% down

From HORSLEY PARK

## SIGNAL GROUP PHASE CHART

| SIGNAL GROUP | PHASE DURING WHICH GREEN DISPLAYED A | B | C | D | D1 | D2 | E | F1 | F2 | G | G1 | G2 | OVERLAPS PERMITTED | OVERLAP CONDITIONS | DURATION OF L.T.R.A. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V1 | X | X | | | | | | | | | X | | G1/A/B, B/A A/G1 | | |
| V2 | X | | X | | | | | | | | | X | G2/A/C C/A A/G2 | | |
| V3 | | X | | | | | | | | X | X | | G/G1 B/G | | |
| V4 | | | X | | | | | | | X | | X | G/G2 C/G | | |
| V5 | | | | | X | | X | X | | | | | D1/E/F1 | | |
| V6 | | | | | | X | X | | X | | | | D2/E/F2 | | |
| V7 | | | | X | X | | | X | | | | | D/D1 | | |
| V8 | | | | X | | X | | | X | | | | D/D2 | | |
| V9 | | | X | | | | | | | X | | X | C/C2* C/G2 C/E* | * P1 NOT DEMANDED | ARROW TIME ■ |
| V10 | | X | | | | | | | | X | X | | B/G1 G/G1 B/E | | |
| P1 | | | | | X | | X | X | | | | | D1/E/F1 | | |

■ R.A. PROTECTION EXTENDED BY P.B. ON POST 6 SUBJECT TO TIMER

## POSTS

| POST | TYPE | LENGTH | OFFSET | REMARKS |
|---|---|---|---|---|
| 1 | 2 | 4.1 | 2.0 | EXISTING |
| 2 | 6 | – | 2.0 | EXISTING |
| 3 | 5L | – | 1.0 | EXISTING |
| 4 | 6 | – | 1.0 | EXISTING |
| 5 | 2 | 4.1 | – | EXISTING |
| 6 | 6 | – | 1.0 | EXISTING |
| 7 | 5L | – | 1.0 | EXISTING |
| 8 | 6 | – | 1.0 | EXISTING |

A ORIGINAL ISSUE

B ISSUE1, J1 SM560 24/03/09
ADDED: 1 no. CCTV camera in the westbound traffic lane on the GWH, from Doonside Rd & 1 no. CCTV camera on Doonside Rd into Doonside Rd from GWH.
D.A. 05/02098

C ISSUE: 06/09
POST 1 AND 2 WERE CHANGED.
CORRIGAN 06/09

D ISSUE J1 SM605 12/10/09
ADDED: AUDIO TACTILE PBs TO POSTS 4 & 6 ONLY.
AMENDED: POST CHART. NOTES.
REMOVED: CIVIL WORKS DETAILS
D.A. 27/11/09

E ISSUE: WAE COMPLETED
T.L 24/07/2012 M.W

| PUBLIC UTILITY LEGEND | | REFERENCE PLANS | |
|---|---|---|---|
| HYDRANT | □ | SYMBOLS/ABBS. | VD003-6 |
| STOP VALVE | ▲ | STD POSIT | VD001-5 |
| GAS VALVE | # | DET SCHED EXP | VD018-10 |
| SEWER MANHOLE | Ⓢ | PRES. DETECT | VC005-17 |
| TELECOM PIT | ◪ | SSG DIS. SEQ. | VD018-8 |
| ELECT LIGHT POLE | ☾ | SDO PHASING | VD018-5 |
| POWER POLE | ○ | SDO FILTER OPTION | VD018-14 |
| STAY POLE | ⊘ | | |
| TELEPHONE BOX | T | SURVEYOR : Whelans | |
| TELECOM PILLAR | ◕ | DATE : 6.3.07 | |

U.B.D. Ref. Map 187 P10
I.S.G. CO-ORDS E: 288 004 N: 1 259 418

DESIGNED L TULAU
CHECKED T LAWRENCE
L TULAU SITE CHECKED
T LAWRENCE RECOMMENDED

DESIGN APPROVAL
APPROVED
DATE 12.11.07
TRANSPORT & URBAN PLANNING

RTA ACCEPTANCE
RECOMMENDED
POSITION N.O.T.L.
DATE 15.04.08
ACCEPTED
POSITION A/RNM (W)
DATE 15.04.08

Roads and Traffic Authority, N.S.W

BLACKTOWN COUNCIL AREA
TRAFFIC SIGNALS AT THE INTERSECTION OF GREAT WESTERN HWY (HW.5), DOONSIDE RD AND BRABHAM DRIVE, EASTERN CREEK

DESIGN LAYOUT TCS No 1120

EXISTING ☒ PROPOSED ☐
CADD FILE: VV1120_17E.dgn
SCALE 5 0 (1:200) 5 10
ISSUE E
FILE 40 TS 153
SUPERSEDES SHEET/ISSUE 17/D
REGN. 0005.040.VV.1120
SHEET 17

$DATE$ $TIME$ $FILE$

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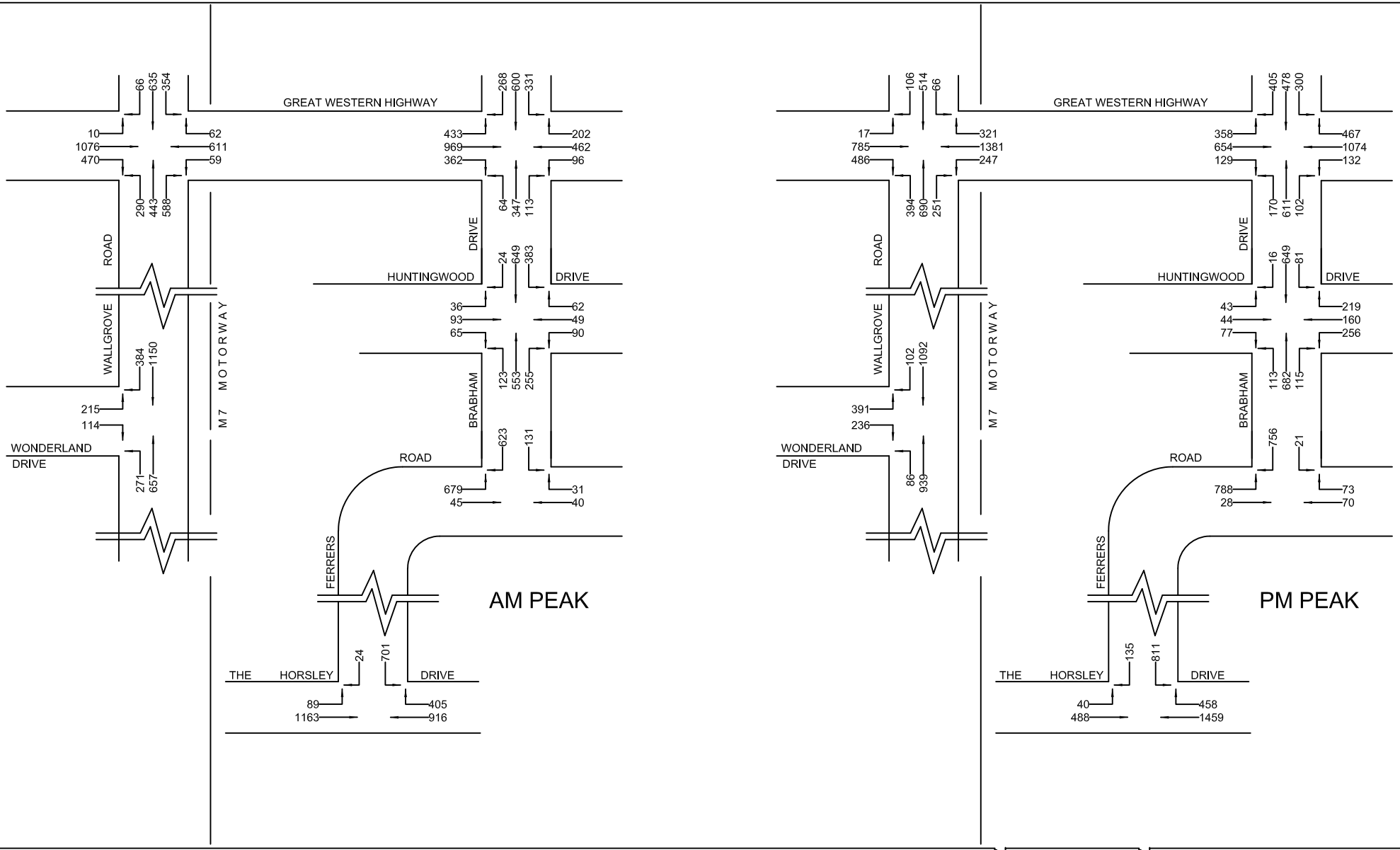
vv1120_17E.dgn 24/07/2012 3:05:08 PM




**LEGEND**

**EXISTING PEAK TRAFFIC VOLUMES**

**FIG 5**

The operational performance of intersections has been analysed using SIDRA and the results of that assessment[1] are provided in Appendix C and summarised in the following table, while the criteria for interpreting the SIDRA output is provided overleaf.

| | AM | | PM | |
|---|---|---|---|---|
| | **LOS** | **AVD** | **LOS** | **AVD** |
| Great Western Highway/ Brabham/ Doonside | D | 48.4 | D | 53.1 |
| Great Western Highway/ Wallgrove/ Rooty Hill | D | 50.6 | D | 52.7 |
| Brabham/Huntingwood | A | 6.9 | A | 9.1 |
| Brabham/Ferres | A | 6.4 | A | 7.0 |
| The Horsley/Ferres | C | 41.1 | B | 26.3 |

The results indicate that these intersections currently operate satisfactorily during the morning and afternoon peak traffic periods although the Great Western Highway intersections accommodate significant arterial flows and experience some queuing during the peak periods.

It is noted that the Great Western Highway/Brabham Road/Doonside Road intersection has recently been upgraded as part of the TfNSW "pinch point" program and that TfNSW commence work on the upgrading of The Horsley Drive, which will include the Ferres Road intersection, in 2023 with completion of the works in 2025.

## 3.4 Transport Services

Public transport services in the vicinity of the site are provided by the 'Busway' bus routes 723 and 738, which run along Wallgrove Road past the site and linking Mount Druitt and Rooty Hill stations. Route 724 also operates along Peter Brock Drive to the north of the site providing a link to Blacktown Railway Station.

[1] *Light Horse Interchange (SSD 9667)*
*Traffic Impact Assessment*
*Ason Group, May 2019*

# Criteria for Interpreting Results of SIDRA Analysis

## *1. Level of Service (LOS)*

| LOS | Traffic Signals and Roundabouts | Give Way and Stop Signs |
|---|---|---|
| 'A' | Good | Good |
| 'B' | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| 'C' | Satisfactory | Satisfactory but accident study required |
| 'D' | Operating near capacity | Near capacity and Accident Study required |
| 'E' | At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode | At capacity and requires other control mode |
| 'F' | Unsatisfactory and requires additional capacity | Unsatisfactory and requires other control mode |

## *2. Average Vehicle Delay (AVD)*

The AVD provides a measure of the operational performance of an intersection as indicated on the table below, which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

| Level of Service | Average Delay per Vehicle (secs/veh) | Traffic Signals, Roundabouts | Give Way and Stop Signs |
|---|---|---|---|
| A | Less than 14 | Good operation | Good operation |
| B | 15 to 28 | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| C | 29 to 42 | Satisfactory | Satisfactory but accident study required |
| D | 43 to 56 | Operating near capacity | Near capacity and accident study required |
| E | 57 to 70 | At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode | At capacity and requires other control mode |

## *3. Degree of Saturation (DS)*

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals** both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

# 4.0 Bulk Earthworks and Infrastructure Processes

## 4.1 Timing

The work is programmed to commence in March 2022 after completion of the Remediation, Demolition and Clearing works (subject of previous CTMP's) and finish at the end of April 2023 (see program details in Appendix D), however depending on the circumstances encountered (e.g. availability of fill), the program could be extended.

## 4.2 Vehicle Access

Vehicle access will comprise:

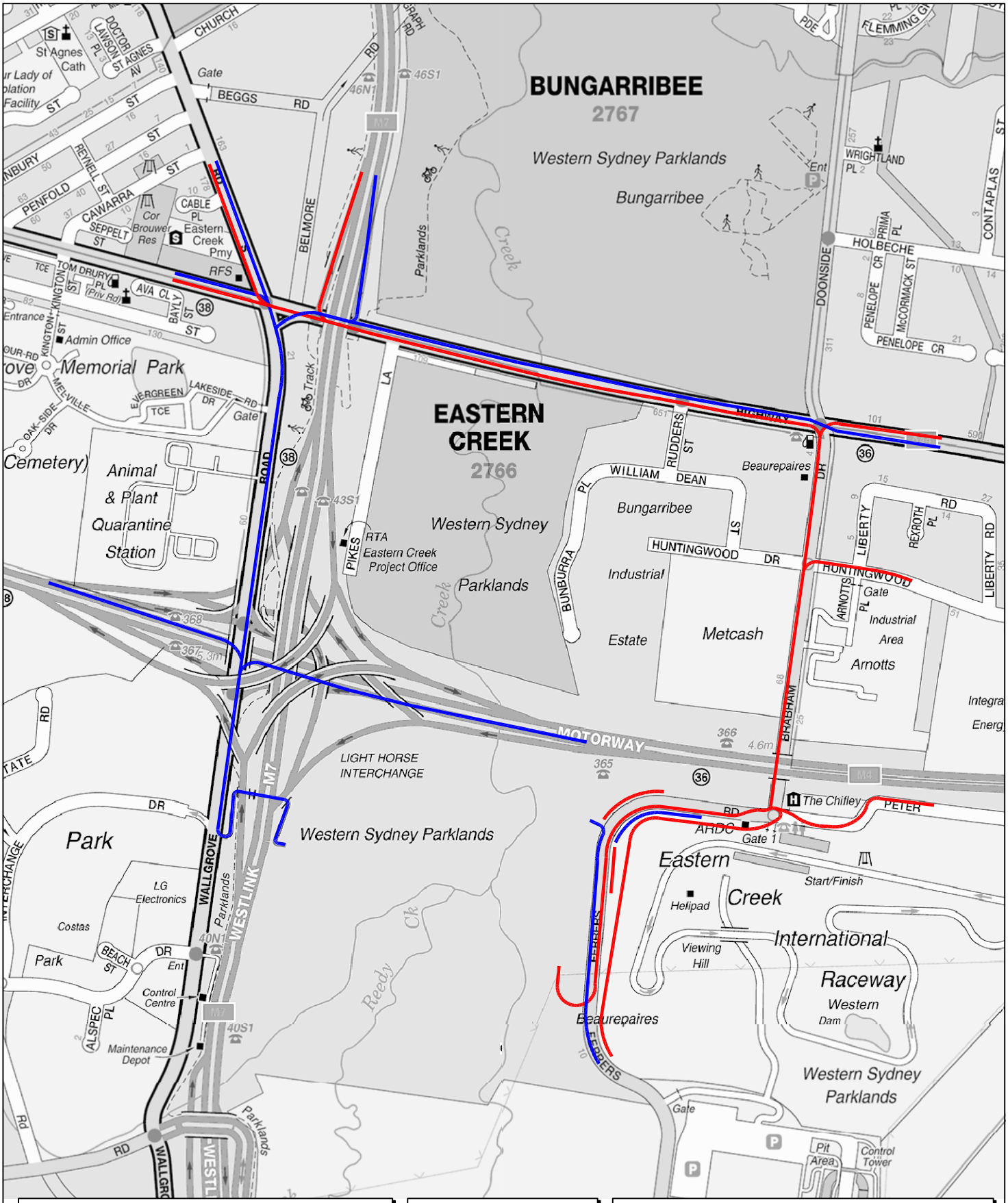
- Workers
  Ingress and egress on Wallgrove Road (as currently exists)
- Trucks
  Ingress on Wallgrove Road (left turn only)
  Egress on Ferres Road either along the HPG easement or along the future access road corridor (left turn only)
- Localised construction access in various forms through the stages of work for construction of the Ferres Road roundabout generally left turn IN/OUT only

## 4.3 Truck Routes

The proposed truck routes are shown on Figure 6 except for the last few weeks after the Eastern Creek bridge is completed when trucks will be able to ingress and egress at the new Ferres Road access intersection.

## 4.4 Parking

Parking for workers and visitors will continue to be provided in the existing Site Compound.




## LEGEND

**ARRIVAL**

**DEPARTURE**

# TRUCK ROUTES

**FIG 6**

## 4.5 Vehicle Movements

The envisaged vehicle visitations to the site through the various processes are shown on the Work Program in Appendix D and these movements will be entirely dominated by the truck movements associated with the import of fill over some 40 weeks. The origins of this fill are not apparent at this time, however it will not be sourced from any major infrastructure projects but will largely be sourced from excavations at individual development sites and the like.

The anticipated average of 1,800 trucks per week will fluctuate to some extent, however they will be managed and monitored to spread throughout the day in order to facilitate the on-site processing. There will be no on-street queuing, however, there will be significant queuing capacity within the site should this be necessary.

Heavy vehicle activity will very largely involve Truck&Dog units and semi-trailers with some smaller trucks for fuel and other deliveries etc. The light vehicles will essentially be workers arriving in the morning and departing in the afternoon through the Wallgrove Road access reflecting the existing satisfactory circumstances.

## 4.6 Clean Up

All trucks will be required to have covers over their trailers particularly when loaded. A “cattle grid” will be installed at the egress to remove spoil from wheels and tyres while the pavement of Ferres Road will be constantly monitored and any spillage will be swept up as soon as possible.

## 4.7 Working Hours

The permitted working hours as per Consent Conditions B17 and B18 (unless otherwise agreed in writing by the Planning Secretary) are as follows:

| | |
|---|---|
| Monday to Friday | 7.00am to 6.00pm |
| Saturday | 8.00am to 1.00pm |
| Sunday and Public Holidays | No work |

# 5.0 Traffic

## 5.1 Traffic Implications

The approved working hours will permit truck arrival for 60 hours per week with an average maximum of 30 trucks per hour, again this will be managed/metered to maintain consistency. The traffic signals at the intersections providing for ingress and egress operate with some 26 cycles per hour.

The Figure 6 Truck Routes diagram shows that the approaching trucks, the Wallgrove Road site access will be spread over 2 intersections as follows:

**Great Western Highway/Wallgrove Road**

- Westbound on the Highway including Southbound on M7
- Eastbound on the Highway
- Southbound on Rooty Hill Road

**Wallgrove Road / M4 Ramps**

- Eastbound on M4
- Westbound on M4
- Southbound on Wallgrove Road

Given the spread of the truck approach routes, the potential for some 30 trucks per hour (1 per traffic signal cycle) will not result in any perceptible adverse traffic implications. It is not possible nor is it necessary to undertake any traffic modelling assessment particularly when the origins of the truck movements are not known (see Figure 6).

In regard to the egress movements while these will be restricted to left turn to Ferres Road, the roundabout at the Brabham Drive intersection will enable these trucks to turn to depart south along Ferres Road and east along Peter Brook Drive (as well as north along Brabham Drive). Thus, the distribution of the projected maximum of 30 trucks per hour over the numerous available egress routes will result in a circumstance

where there will be no adverse traffic implications (it is noted that the Ferres Road/Brabham Drive/Peter Brook Drive intersection currently operates with a Level of Service A in the AM and PM peak traffic periods).

## 5.2 Traffic Control Plans

The Traffic Control Plans required for the Ferrers Road access intersection works are provided in Appendix E and these will be submitted for Authority approval in the normal manner.

# 6.0 Driver Code of Conduct

**Safe Driver Policy For Light Horse Business Hub Construction Activities**

## 6.1 Objective of the Drivers Code of Conduct

- to minimise the impact of earthworks and construction on the local and regional road network;
- Minimise conflict with other road users
- Minimise road traffic noise; and
- Ensure truck drivers only use the approved routes

## 6.2 Code of Conduct

The code of conduct requires that while driving any vehicle for work-related purposes, drivers are to be issued with a copy of the Drivers Code of Conduct, and must comply with all of the following:

- Demonstrate safe driving and road safety activities
- Abide by traffic, road and environmental legislations
- Follow site signage and instructions
- Drivers must only enter and exit the site via the approved entry and exit points and travel routes

The below activities in any vehicles will be considered as a breach of conduct and will result in removal from site:

- Reckless or dangerous driving causing injury or death
- Driving whilst disqualified or not correctly licensed
- Drinking or being under the influence of drugs while driving
- Failing to stop after an incident
- Loss of demerit points leading to suspension of licence
- Any actions that warrant the suspension of a licence
- Exceeding the speed limit in place on any permanent or temporary roads
- Not adhering to the prescribed restrictions on site access and truck routes

### 6.3 Driver Responsibility

All drivers on site must:

- Be responsible and accountable for their actions when operating a company vehicle or driving for the purposes of work
- Display the highest level of professional conduct when driving a vehicle at all times
- Ensure they have a current driver licence for the class of vehicle they are driving, and this licence is to be carried at all times
- Immediately notify their supervisor or manager if their driver's licence has been suspended, cancelled, or has had limitations applied
- Comply with all traffic regulations when driving
- Undertake daily pre-start checks of oil, tyre pressures, radiator and battery levels of company vehicles they regularly used
- Drive within the legal speed limits, including driving to the conditions
- Not drive outside of the approved heavy vehicle routes. All drivers must obey weight, length and height restrictions imposed by the National Heavy Vehicle Regulator, and other Local and State agencies
- Be cognisant of the noise and emissions requirements imposed within the EIS, and in a broader sense, the NSW / Australian Road Rules
- Do not queue on public roads unless a prior approval has been granted
- Never drive under the influence of alcohol or drugs, including prescription and over the counter medication if they cause drowsiness – to do so will merit disciplinary measures
- All drivers to report to their supervisor if they have been prescribed medication prior to the start of work
- Wear a safety seat belt at all times when in the vehicle
- Avoid distraction when driving
- Report any traffic incidents involving the vehicle
- Report any infringements to their manager at the earliest opportunity.
- Report any vehicle defects to their manager
- Follow the speed limits as imposed within the site
- Keep loads covered at all times.

### 6.4 Site Team Responsibilities

The Contractor is responsible to take all steps necessary to ensure company vehicles are as safe as possible and will not require staff to drive under conditions that are unsafe.

This will be achieved by undertaking the following:

- Ensuring all vehicles are well maintained and that the equipment enhances driver, operator and passenger safety by way of:
  - Pre-commencement checks for all new plant arriving on-site and prior to undertaking any work.
  - Daily prestart inspections for all plant, vehicles and equipment currently on-site.
  - All construction plant must be fitted with a flashing light, fire extinguisher and reverse alarms
  - Ensure all operators onsite have a current verification of competency (VOC) for their current driver's licence of the appropriate class.
  - Ensure maintenance requirements are met and recorded.
- Identify driver training needs and arranging appropriate training or re-training. This may include providing the below:
  - Operator VOC assessment as part of all inductions.
  - Regular Toolbox discussions on safety features, managing fatigue, approved heavy routes, driver responsibility and drink-driving
- Encouraging Safe Driving behaviour by:
  - Ensuring the subcontractor is informed if their staff become unlicensed
  - Not covering or reimbursing staff speeding or other infringement notices
  - Ensuring Legal use of mobile phones in vehicles while driving only and that illegal use does not occur.
- Encouraging better fuel efficiency by:
  - Use of other transport modes or remote conferencing, whenever practical.
  - Providing training on, and circulating information about, travel planning and efficient driving habits.

### 6.5 Crash or Incident Procedure

- Stop the vehicle as close to it as possible to the scene, making sure you are not hindering traffic. Ensure your own safety first, then help any injured people and seek assistance immediately if required.
- Ensure the following information is noted:
  - Details of the other vehicles and registration numbers
  - Names and addresses of the other vehicle drivers
  - Names and addresses of witnesses
  - Insurers details
- Give the following information to the involved parties:
  - Name, address and company details
- If the damaged vehicle is not occupied, provide a note with your contact details for the owner to contact the company.
- Ensure that the police are contacted should the following circumstances occur:
  - If there is a disagreement over the cause of the crash.
  - If there are injuries.
  - If you damage property other than your own.
- As soon as reasonably practical, report all details gathered to your manager.

### 6.6 Environmental Procedure

A range of measures – including those detailed in the Construction Environmental Management – shall be implemented to ensure the following:

- No dirt or debris from the construction vehicles is tracked on to the public road network;
- Reduce the impacts to sensitive receivers, including, where practicable, starting noisy equipment away from sensitive receivers and implementing respite periods;
- Watering of dusty activities will be undertaken, or activities temporarily halted and then resumed once weather conditions have improved;
- Containment measures for potential spillages will be provided at appropriate locations
- Keep an accurate record which includes the range of measures undertaken to reduce environmental impacts.

# 7.0 Monitoring, Review and Contingencies

## 7.1 Monitoring Program

This CTMP shall be subject to ongoing review and will be updated accordingly. Regular reviews will be undertaken by the on-site coordinator. As a minimum, review of the CTMP shall occur every 3 months. All and any reviews undertaken should be documented, however key considerations regarding the review of the CTMP shall be:

- Tracking deliveries against the volumes outlined within report. Deliveries will be tracked against approved volumes, and will keep a vehicle log - including rego & time of entry - for the purpose of assessing the effectiveness of these monitoring programs.
- To identify any shortfalls and develop an updated action plan to address issues that may arise during construction (Parking and access issues)
- To ensure TCP's are updated (if necessary) by "Prepare a Work Zone Traffic Management Plan" card holders to ensure they remain consistent with the set-up on-site.
- Regular checks undertaken to ensure all loads are entering and leaving site covered as outlined within this CTMP.
- A Dilapidation report shall be undertaken every periodically to assess the condition of the road, and note whether there has been any reduction in quality of the road as result of construction vehicles.

The development of a program to monitor the effectiveness of this CTMP shall be established by the Contractor. This process is expected to form part of the monitoring plan required to be included as part of the Construction Environmental Management Plan (CEMP), of which this CTMP forms a part.

## 7.2 Contingency Plan

A contingency plan shall be established by the Contractor and is to be included in the CEMP. Notwithstanding, the table overleaf outlines an indicative plan to be undertaken by the builder in the event that the monitoring program identifies the management plan is not effective in managing the construction impacts.

## Contingency Plan

| Rick | | Condition Green | Condition Amber | Condition Red |
|---|---|---|---|---|
| Construction Movements | Trigger | Construction traffic volume is in accordance with permissible and programmed volume and time constraints | Construction traffic volumes exceeds programmed volume but is within permissible volume constraints | Construction traffic volumes exceeds programmed volume and time constraints |
| | Response | No response required<br>Continue monitoring program | Review and investigate construction activities, and where appropriate, implement additional remediation measures such as:<br>- Temporary halting of activities and resuming when conditions have improved<br>- Review CTMP and update where necessary<br>- Provide additional training | Review and investigate construction activities. Where appropriate, implement additional remediation measures such as:<br>- Temporary halting of activities and resuming when conditions have improved<br>- Stop all transportation into and out of the site<br>- Review CTMP and update where necessary<br>Provide additional training. |
| | Trigger | Construction traffic adheres to the nominated truck routes | Occasionally fails to Construction traffic utilise the nominated truck routes | Consistently fails to Construction traffic utilise the nominated truck routes |
| | Response | No response required<br>Continue monitoring program | Review and investigate construction activities, and where appropriate, implement additional remediation measures such as:<br>Review vehicles arriving to site and remind them of the strict exclusion time periods<br>Provide additional training (including toolbox talks and further notification of | Review and investigate construction activities. Where appropriate, implement additional remediation measures such as:<br>- Stop all transportation into and out of the site.<br>- Review CTMP and update where necessary.<br>- Provide additional |

| | | | | |
|---|---|---|---|---|
| | | | Drivers Code of Conduct) | training (including toolbox talks and further notification of Driver Code of Conduct) |
| Queuing | Trigger | No queuing identified | Queuing identified within site | Queuing identified on the public road |
| | Response | No response required<br>Continue monitoring program | Review the delivery schedule prepared by the builder. If drivers are not following the correct schedule, then they should be provided with additional training and an extra copy of the Driver Code of Conduct. | Review and Investigate construction activities. Where appropriate, implement additional remediation measures such as:<br>- Temporary halting of activities and resuming when conditions have improved<br>- Stop all transportation into and out of the site.<br>- Review CTMP and update where necessary |
| Noise | Trigger | Noise levels do not exceed imposed noise constraints | Noise levels in minor excess of imposed noise constraints | Noise levels greatly in excess of imposed noise constraints |
| | Response | No response required<br>Continue monitoring program | Undertake all feasible and reasonable mitigation and management measures to minimise noise impacts | Undertake all feasible and reasonable mitigation and management measures to ensure noise levels are below Highly Noise Affected criteria. If noise levels cannot be kept below applicable limits, then a different construction method or equipment must be utilised. |

| | | | | |
|---|---|---|---|---|
| Traffic Control Plans | Trigger | No observable issues | Minor inconsistencies with TCP to onsite operations | Near miss or incident occurring regardless of/as a results of the TCP being implemented |
| | Response | No response required<br>Continue monitoring TCPs | Traffic Controllers to amend TCP on site and to keep a log of all changes | Stop work until an investigation has been undertaken into the incident. There are to be changes made to the TCP to ensure that the safety of all workers, students and civilians are catered for. |
| Dust & Spoil | Trigger | No observable dust | Minor quantities of dust in the air and tracking on to the road | Large quantities of dust in the air and tracking on to the road |
| | Response | No response required<br>Continue monitoring program | Review and investigate construction activities and respective control measures, where appropriate, implement additional remedial measures, such as:<br>- Deployment of additional water sprays<br>- Relocation or modification of dust-generating sources<br>- Check condition of vibrating grids to ensure they are functioning correctly<br>- Temporary halting of activities and resuming when conditions have improved | Review and investigate construction activities and respective control measures.<br>If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies.<br>Implement relevant responses and undertake immediate review to avoid such occurrence in future. |

The contingency plan outlines the most effective methods to ensure that each item identified within the Monitoring Program is adhered to, resulting in the impacts to the wider community being minimised. It also represents the efforts undertaken to continually improve CTMP and ensure that the process being utilised are indeed best practice.

### 7.3 Communications Strategy

A Community Consultation Strategy (CCS) for the Project has been developed to detail how the Proponent and their contractors will engage and interact with relevant stakeholders and the community. The CCS will form part of the CEMP and will be applicable to all works undertaken on site. All communications (including notification, consultation and complaints and enquiry handling) related to construction traffic management shall be undertaken in accordance with the CCS.

Where necessary, the following procedures (consistent with the CCS) will be utilised to notify residents and the community (including local schools), of any potential disruptions to routes:

| **Potential Impact or Issue** | **Method of Contact/Consultation** | **Timeframe** |
|---|---|---|
| Known Traffic Route Disruption | Email, Text Message or Letterbox drop – notifying of expected commencement, duration, affected hours and contact phone number.<br>Variable Message Signs | No less than 24 hours prior to the activity |
| Emergency Event | Email, Text Message or Letterbox drop – notifying of expected commencement, duration, affected hours and contact phone number. | As soon as possible. |

All communication activities will be undertaken by and the responsibility of the appointed Communications and Community Liaison Representative at the direction of the Proponent.

## Ross Nettle

**From:** Andy Karklins <Andy.Karklins@blacktown.nsw.gov.au>
**Sent:** Thursday, 10 March 2022 2:29 PM
**To:** Ross Nettle
**Cc:** Nadeem Shaikh
**Subject:** RE: CTMP Light Hose Business Hub - Bulk Earthworks and Infrastructure (21077)

Good afternoon Ross

We have reviewed the attached Construction Traffic Management Plan for Light Horse Business Hub, Eastern Creek - TCP prepared by Transport and Traffic Planning Associates. It appears to be in order based on the information provided. It is the project managers responsibility to implement the traffic control measures as identified in the TMP.

Regards

Blacktown City Council

**Andy Karklins**
**Traffic Management Officer**

9839 6305

Andy.Karklins@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

Follow us on social media

**From:** Nadeem Shaikh
**Sent:** Thursday, 10 March 2022 11:56 AM
**To:** Andy Karklins <Andy.Karklins@blacktown.nsw.gov.au>
**Subject:** FW: CTMP Light Hose Business Hub - Bulk Earthworks and Infrastructure (21077)

Hi Andy
Please respond to the CTMP request.
Thanks

Blacktown City Council

**Nadeem Shaikh**
**Coordinator Traffic Management**

9839 6017
0409 735 657
Nadeem.Shaikh@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

## Ross Nettle

**From:** Alexander Coates <Alexander.Coates@transport.nsw.gov.au>
**Sent:** Friday, 18 March 2022 2:38 PM
**To:** Ross Nettle
**Subject:** CTMP Bulk Earthworks & CTMP Demolition and Clearing

Transport for NSW (TfNSW), Greater Sydney Division has reviewed the CTMP (Bulk Earthworks & Demolition and Clearing) and endorse the proposed temporary construction arrangements, subject to the following conditions:

- While noted in Section 7.2, Truck and staff movements must be continually reviewed in order to ensure that there is no queuing on public roads that could cause traffic and/or safety issues. In particular the northbound right turn bay from Walgrove Rd to the site access must be monitored to ensure there is no 'spill over' queueing into the through lanes from the turning bay.

Endorsement of the CTMP is not an approval to the type of traffic management or delineation devices used, nor is it an approval to any traffic guidance schemes (TGS) depicted within the CTMP. It is assumed that the proponent has used type approved devices and has developed its TGS's in accordance with the relevant Australian Standards and Guidelines.

The Proponent must apply and obtain approval from the Transport Management Centre for a Road Occupancy Licence (ROL) for any required lane closures and/or Speed Zone Authorisations as part of the ROL that may impact the state road network or is within 100m of traffic signals, as well as any other permits that Council may require. The ROL process will review the setups and provide permits based on days and times that are appropriate for the level of impact that may be caused as a result of the TGS.

The proponent is to ensure local residents, businesses, schools and other stakeholders in the affected area as well as emergency service organisations are notified of the changes associated with the CTMP, prior to its implementation.

Please ensure this CTMP is shared and adhered to by all contractors. If the CTMP changes, please forward a copy to Developments.CJP@transport.nsw.gov.au for further review and endorsement.

**Alex Coates**

Operations Planning Manager

Customer Journey Planning

Greater Sydney

**Transport for NSW**

25 Garden Street, Eveleigh NSW 2015

OFFICIAL

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# 8.0 Consultation

This CTMP has been submitted for the consideration of TfNSW, Blacktown City Council and the M7 operator and their responses are provided overleaf.

# Appendix A

## Concept Plan

## DEVELOPMENT DATA

| | |
|---|---|
| OVERALL SITE AREA | 344,013m² |
| LOT 8 (RESIDUAL) - ESTATE BIO-BASIN/OSD | 21,511m² |
| ACCESS ROAD RESERVE (PART OF LOT 11) | 22,076m² |
| TOTAL DEVELOPABLE AREA (LOT 1 TO 7) | 300,426m² |
| TOTAL BUILDING AREA | 165,500m² |
| FLOOR SPACE RATIO | 55.1% |

| DEVELOPABLE LOT | W/H AREA | OFFICE AREA | TOTAL |
|---|---|---|---|
| LOT 1<br>SITE AREA (48,059m² ) | 19,000 | 1,000 | 20,000 |
| LOT 2<br>SITE AREA (34,141m² ) | 16,900 | 800 | 17,700 |
| LOT 3<br>SITE AREA (41,112m² ) | 23,200 | 1,200 | 24,400 |
| LOT 4<br>SITE AREA (38,686m²) | 21,400 | 1,000 | 22,400 |
| LOT 5<br>SITE AREA (44,193m²) | 24,700 | 1,300 | 26,000 |
| LOT 6<br>SITE AREA (38,406m²) | 20,000 | 1,000 | 21,000 |
| LOT 7<br>SITE AREA (55,829m²) | 32,400 | 1,600 | 34,000 |
| TOTAL | 157,600 | 7,900 | 165,500 |

### CARPARK PROVISIONS

| | |
|---|---|
| TOTAL CARPARK REQUIRED<br>RMS - Warehouse: 1 space/300sqm<br>Office: 1 space/40sqm | 723 spaces |
| TOTAL CARPARK PROVIDED | 782 spaces |

LEGENDS

- ESTATE SITE BOUNDARY
- LIMIT OF WORKS

Client

Western Sydney Parklands Trust

# Light Horse Interchange Business Hub
# Eastern Creek NSW [SSD 9667]

## Concept Masterplan

1:3000@ A3 or 1:1500@A1

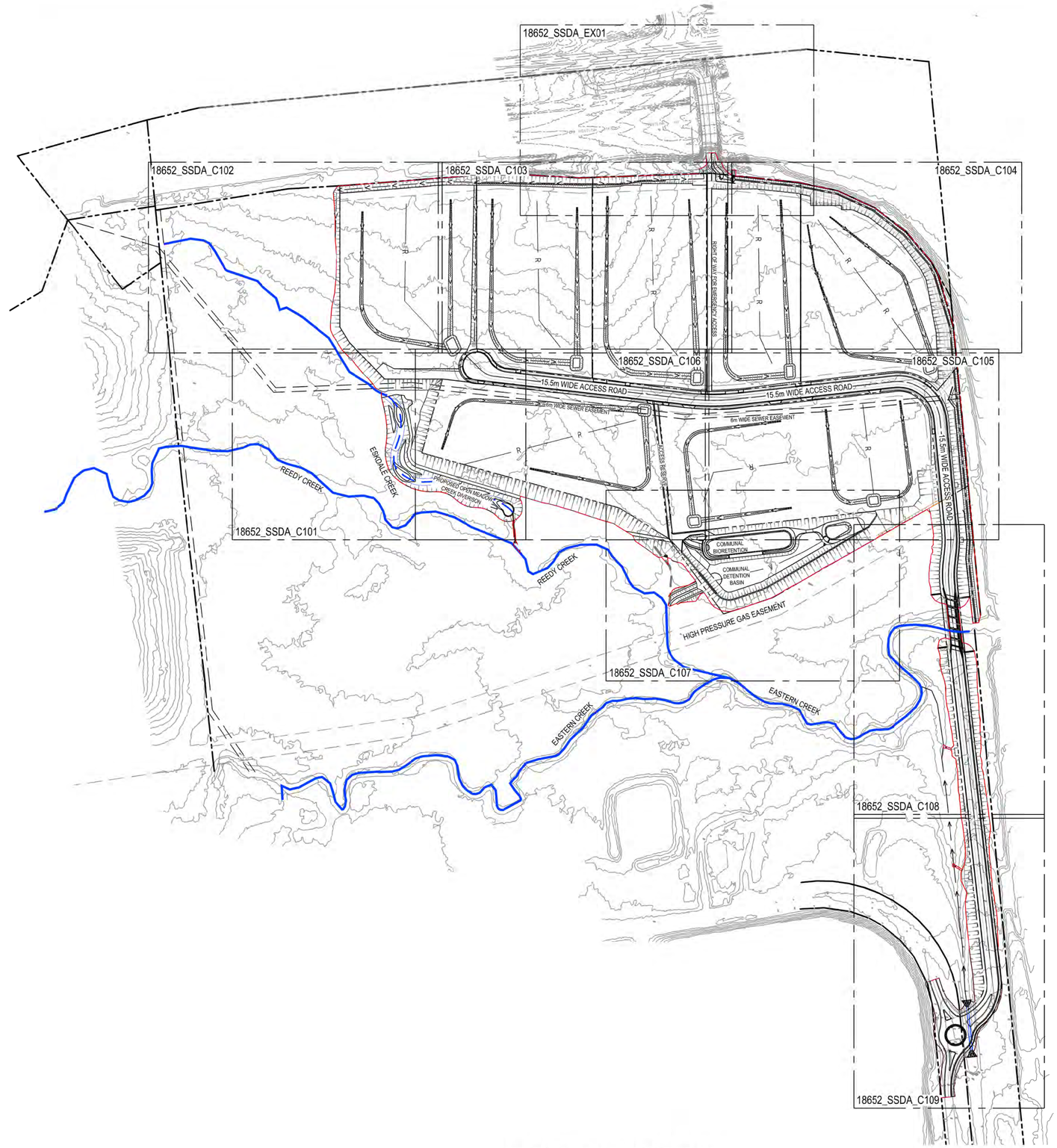
**DATE** May, 2020 **DRAWING NUMBER** 10935_MP100[P9]

nettletontribe

May 13, 2020 - 9:40pm N:\10935-Lighthouse Interchange\2 AutoCAD\10935_MP100 - CONCEPT MASTERPLAN.dwg

# Appendix B

## Road Construction Plans




## LEGEND

- PROPOSED LIMIT OF WORK
- SITE/ LOT BOUNDARY
- PROPOSED RIDGE LINE
- PROPOSED VALLEY LINE
- PROPOSED SUBSOIL LINE
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- PROPOSED LINTEL ONGRADE & SAG PITS
- PROPOSED PIT TAG (LINE LETTER / PIT NUMBER)
- EXISTING STORMWATER PIPE
- PROPOSED STORMWATER PIPE
- PROPOSED BATTER LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- PROPOSED COLLECTION LINE
- PROPOSED RETAINING WALL
- PROPOSED DESIGN SPOT LEVEL
- PROPOSED CATCH DRAIN
- PROPOSED FLUSHING POINT (FP)
- PROPOSED INTERMEDIATE RISER (IR)
- PROPOSED CULVERT
- PROPOSED PERMEABLE PIPE

0 50 100 150 200 250 300m
60 40 20
SCALE 1:3000

# GENERAL ARRANGEMENT PLAN

SCALE 1:3000

**ISSUED FOR APPROVAL**

Western Sydney Parklands Trust

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
|---|---|---|---|---|
| 05 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
| 04 | ISSUED FOR APPROVAL | IK | NW | 13.12.2019 |
| 03 | ISSUED FOR APPROVAL | MS | NW | 09.04.2019 |
| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
| 01 | PRELIMINARY | IK | NW | 29.03.2019 |

Client: WESTERN SYDNEY PARKLANDS TRUST

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henry&hymas

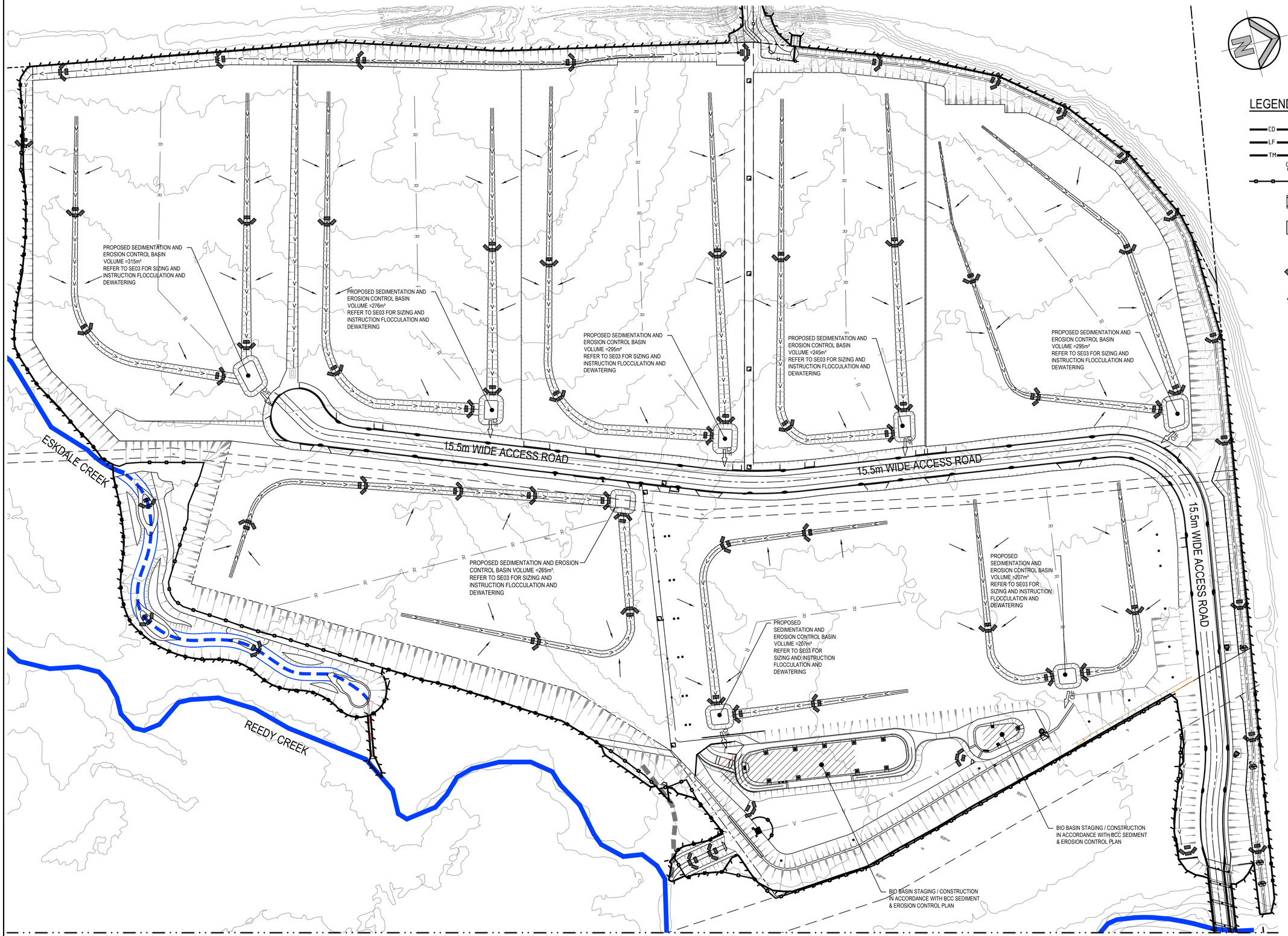
Project: LIGHT HORSE INTERCHANGE BUSINESS HUB
EASTERN CREEK, NSW (SSD9667)

Title: GENERAL ARRANGEMENT PLAN

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | 1:3000 |

Drawing number: 18652_SSDA_C100

Revision: 05




## LEGEND

- CD CD — CATCH DIVERSION DRAIN
- LF LF — LOW FLOW DIVERSION DRAIN
- TM TM — TRAFFIC MANOEUVRING
- OF — OVERLAND FLOW PATH
- PROPOSED SEDIMENTATION FENCE
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STABILISED SITE ACCESS
- PROPOSED STOCKPILE LOCATION
- PROPOSED HAYBALE FILTER
- GEOTEXTILE INLET FILTER
- PROPOSED MESH & GRAVEL INLET FILTER

## SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH BLACKTOWN CITY COUNCIL SPECIFICATIONS AND LANDCOM'S "SOIL AND CONSTRUCTION" MANUAL.
- ALL PERIMETER & SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTH WORKS AND/OR CLEARING.
- THE SEDIMENT & EROSION CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS ALSO THE CONTRACTORS RESPONSIBILTY TO PREPARE THEIR OWN SEDIMENT AND EROSION CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING.
- FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS & SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED & MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
- ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE LOCATION.
- ALL TOPSOIL IS TO BE STOCKPILED ON SITE FOR REUSE (AWAY FROM TREES AND DRAINAGE LINES). MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
- ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS.
- ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
- UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY COUNCIL SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, EROSION PROOF WITHIN 14 DAYS.
- EROSION AND SILT PROTECTION MEASURES ARE TO BE MAINTAINED AT ALL TIMES.

## NOTE:

- THE SEDIMENT AND EROSION MEASURES SHOWN ON THIS PLAN ARE FOR THE OVERALL SUBDIVISION EARTHWORKS STAGE AND ARE GENERAL IN NATURE. SPECIFIC DETAILS WILL NEED TO BE PROVIDED AT THE DA STAGE FOR EACH INDIVIDUAL PAD.
- ENSURE ALL GRATED PITS ARE PROTECTED WITH MESH AND GRAVEL INLET FILTERS.

0 25 50 75 100 125m
25 15 5
SCALE 1:1250

# SEDIMENT AND EROSION CONTROL PLAN

SCALE 1:1250

**ISSUED FOR APPROVAL**

Western Sydney Parklands Trust

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
|---|---|---|---|---|
| 05 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
| 04 | ISSUED FOR APPROVAL | IK | NW | 13.12.2019 |
| 03 | ISSUED FOR APPROVAL | MS | NW | 09.04.2019 |
| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
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Client: WESTERN SYDNEY PARKLANDS TRUST

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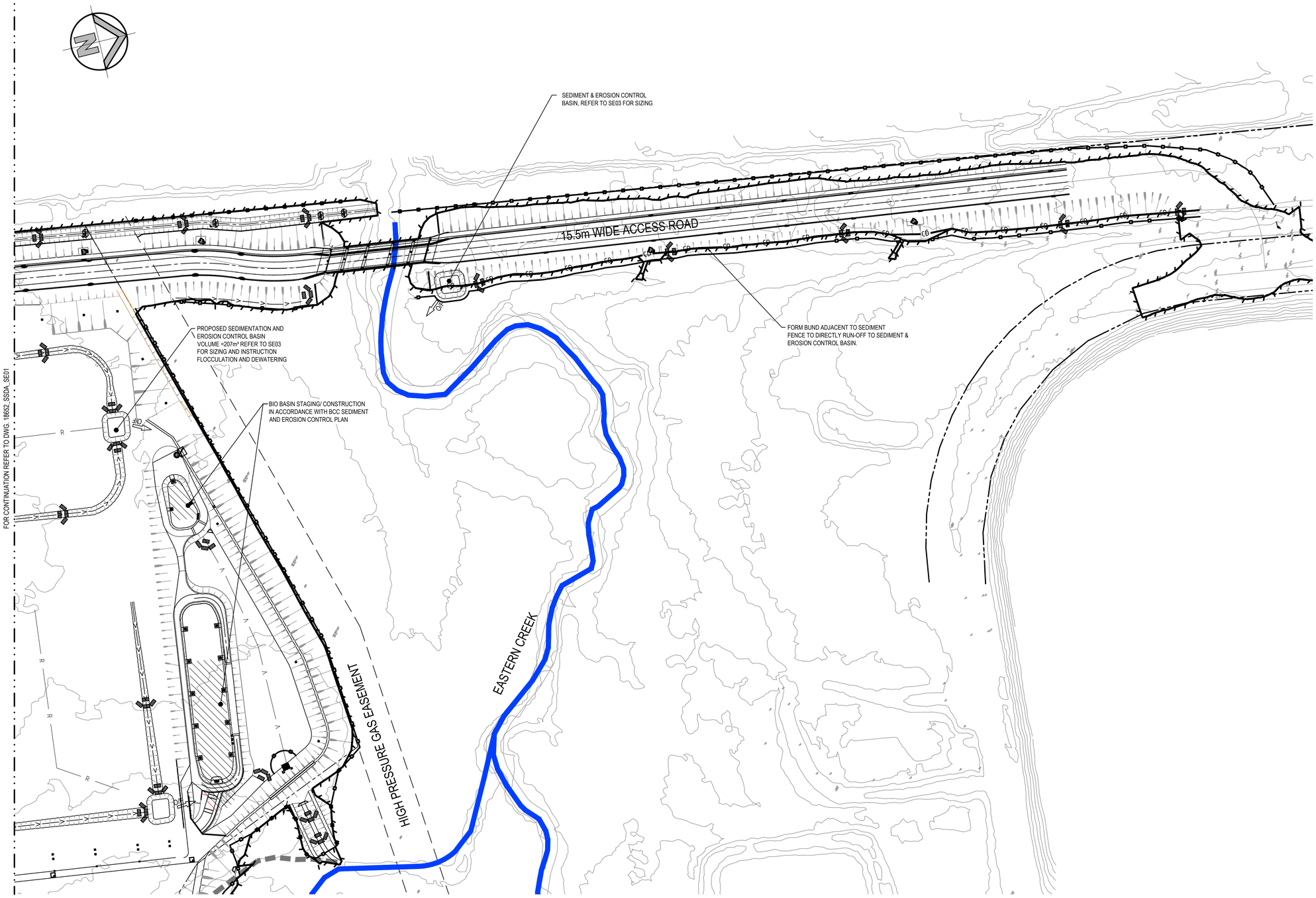
Project: LIGHT HORSE INTERCHANGE BUSINESS HUB
EASTERN CREEK, NSW (SSD9667)

Title: SEDIMENT AND EROSION CONTROL PLAN
SHEET 1 OF 2

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | 1:1250 |

Drawing number: 18652_SSDA_SE01

Revision: 05




## LEGEND

- CATCH DIVERSION DRAIN
- LOW FLOW DIVERSION DRAIN
- TRAFFIC MANOEUVRING
- OVERLAND FLOW PATH
- PROPOSED SEDIMENTATION FENCE
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STABILISED SITE ACCESS
- PROPOSED STOCKPILE LOCATION
- PROPOSED HAYBALE FILTER
- GEOTEXTILE INLET FILTER
- PROPOSED MESH & GRAVEL INLET FILTER

## SEDIMENT & EROSION CONTROL NOTES

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## NOTE:

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- ENSURE ALL GRATED PITS ARE PROTECTED WITH MESH AND GRAVEL INLET FILTERS.

## SEDIMENT AND EROSION CONTROL PLAN

SCALE 1:1250

0 25 50 75 100 125m

25 15 5

SCALE 1:1250

**ISSUED FOR APPROVAL**

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
|---|---|---|---|---|
| 05 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
| 04 | ISSUED FOR APPROVAL | IK | NW | 13.12.2019 |
| 03 | ISSUED FOR APPROVAL | MS | NW | 09.04.2019 |
| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
| 01 | ISSUED PRELIMINARY | IK | NW | 29.03.2019 |

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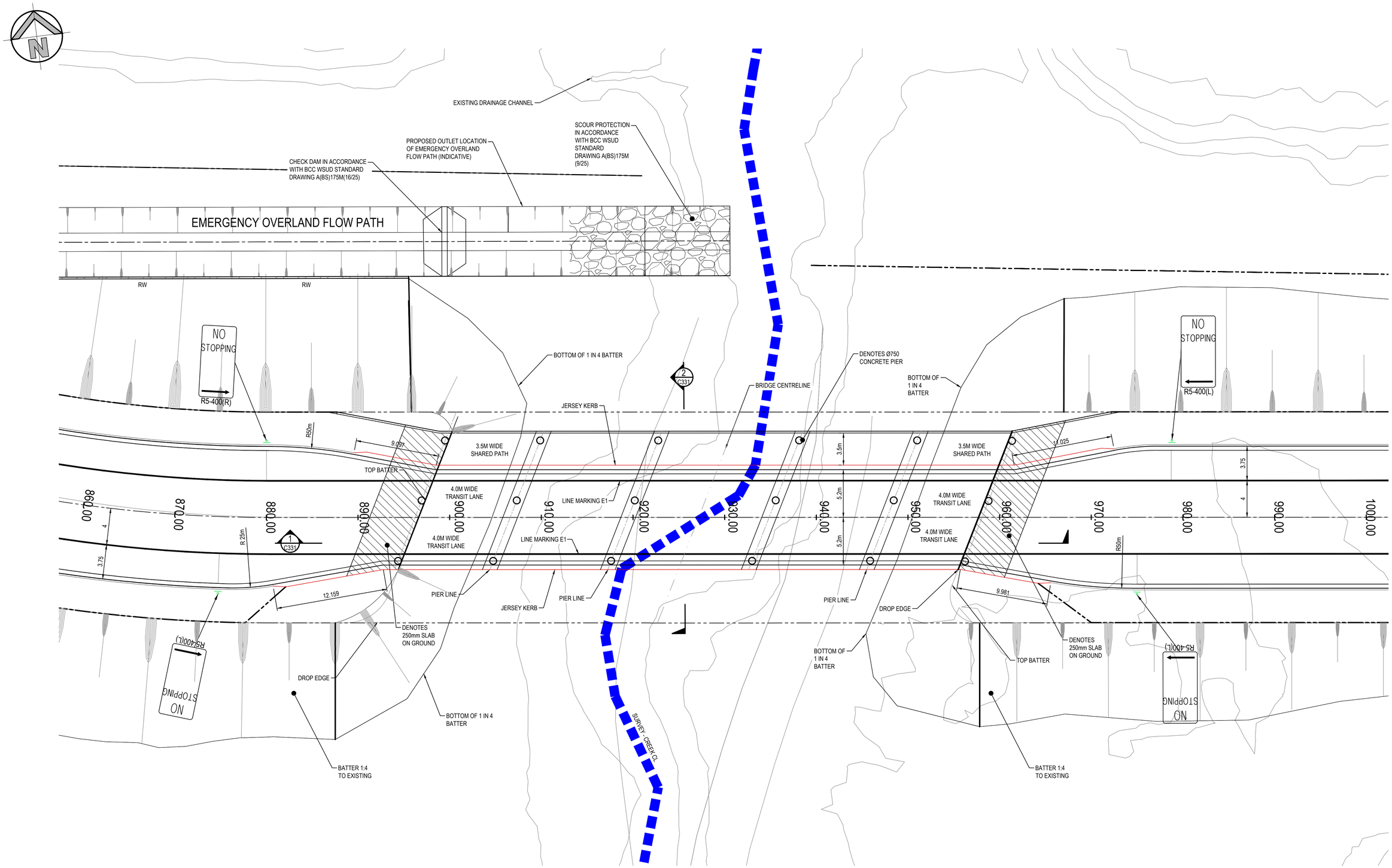
Project: LIGHT HORSE INTERCHANGE BUSINESS HUB EASTERN CREEK, NSW (SSD9667)

Title: SEDIMENT AND EROSION CONTROL PLAN SHEET 2 OF 2

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | 1:1250 |

Drawing number: 18652_SSDA_SE02

Revision: 05




## BRIDGE CONCEPT PLAN

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

**ISSUED FOR APPROVAL**

Western Sydney Parklands Trust

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
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| 05 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
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| 03 | ISSUED FOR APPROVAL | MS | NW | 09.04.2019 |
| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
| 01 | PRELIMINARY | IK | NW | 04.04.2019 |

Client: WESTERN SYDNEY PARKLANDS TRUST

Architect: NETTLETONTRIBE

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henry&hymas

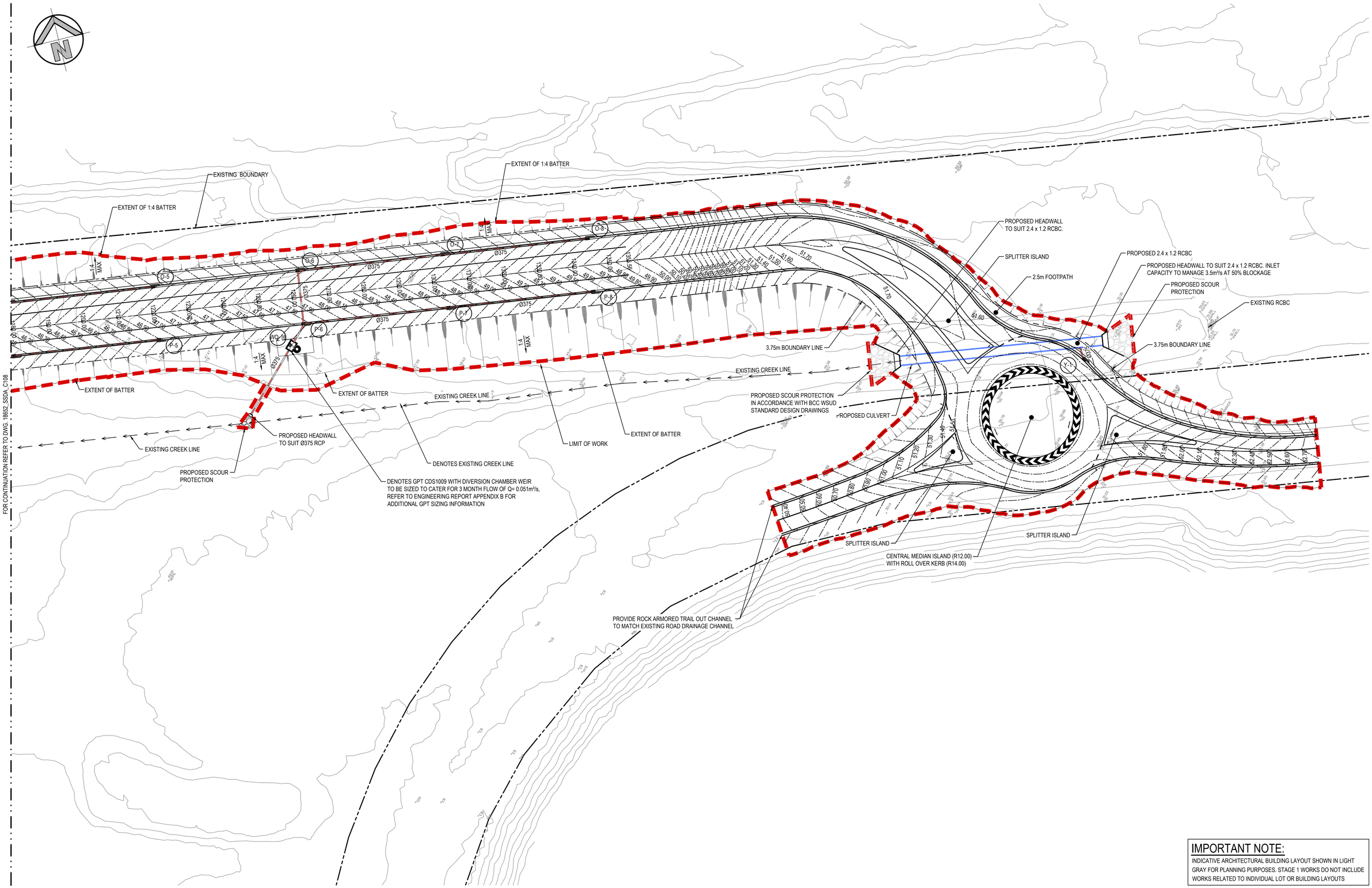
Project: LIGHT HORSE INTERCHANGE BUSINESS HUB EASTERN CREEK, NSW (SSD9667)

Title: BRIDGE CONCEPT PLAN

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | 1:200 |

Drawing number: 18652_SSDA_C330

Revision: 05




0 10 20 30 40 50m

10 8 6 4 2

SCALE 1:500

## DETAIL PLAN

SCALE: 1:500

**IMPORTANT NOTE:**

INDICATIVE ARCHITECTURAL BUILDING LAYOUT SHOWN IN LIGHT GRAY FOR PLANNING PURPOSES. STAGE 1 WORKS DO NOT INCLUDE WORKS RELATED TO INDIVIDUAL LOT OR BUILDING LAYOUTS

**ISSUED FOR APPROVAL**

Western Sydney Parklands Trust

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
|---|---|---|---|---|
| 05 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
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| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
| 01 | PRELIMINARY | IK | NW | 29.03.2019 |

Client: WESTERN SYDNEY PARKLANDS TRUST

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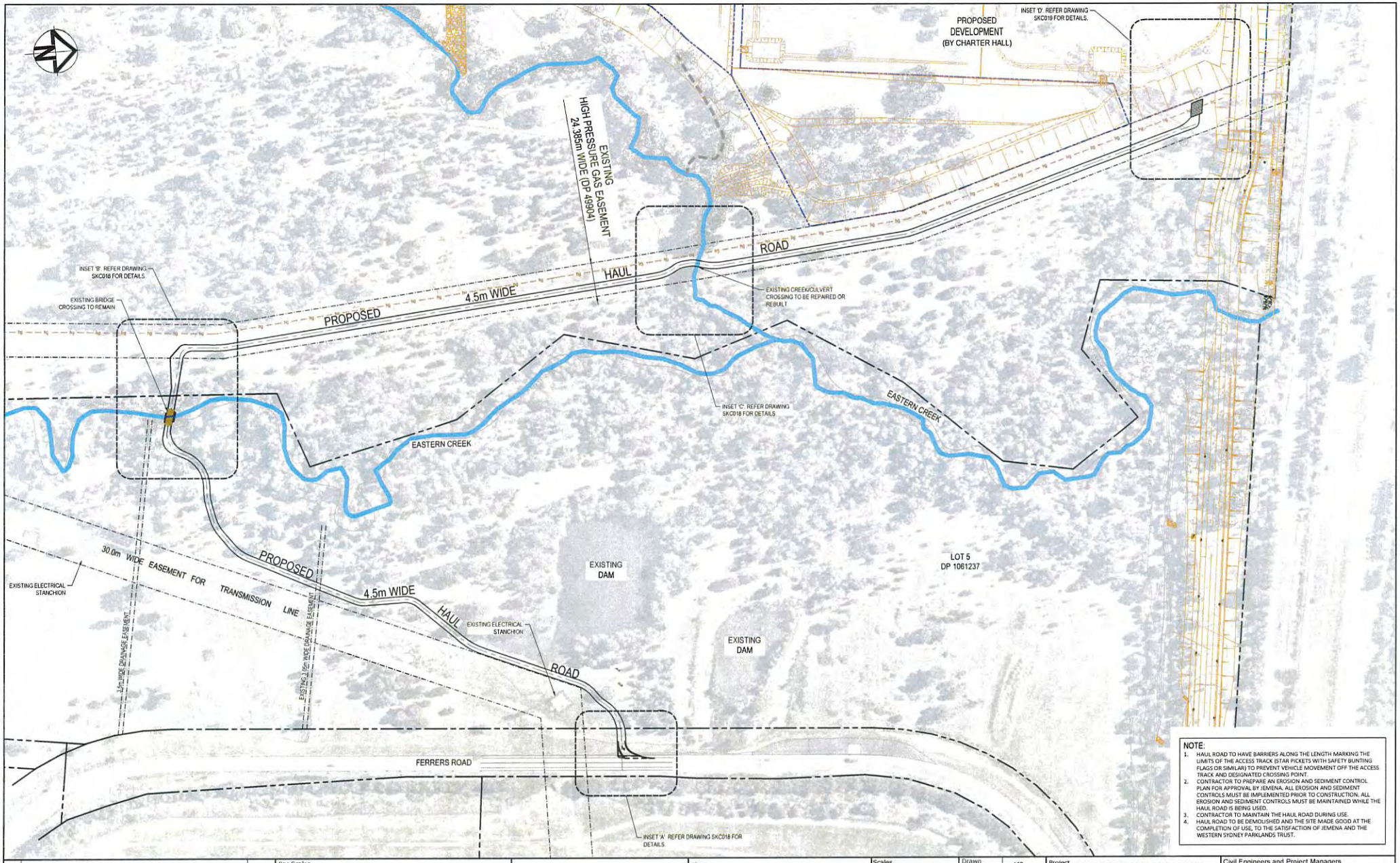
Project: LIGHT HORSE INTERCHANGE BUSINESS HUB
EASTERN CREEK, NSW (SSD9667)

Title: DETAIL PLAN
SHEET 9 OF 9

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | 1:500 |

Drawing number: 18652_SSDA_C109

Revision: 05




NOTE:
1. HAUL ROAD TO HAVE BARRIERS ALONG THE LENGTH MARKING THE LIMITS OF THE ACCESS TRACK (STAR PICKETS WITH SAFETY BUNTING FLAGS OR SIMILAR) TO PREVENT VEHICLE MOVEMENT OFF THE ACCESS TRACK AND DESIGNATED CROSSING POINT.
2. CONTRACTOR TO PREPARE AN EROSION AND SEDIMENT CONTROL PLAN FOR APPROVAL BY JEMENA. ALL EROSION AND SEDIMENT CONTROLS MUST BE IMPLEMENTED PRIOR TO CONSTRUCTION. ALL EROSION AND SEDIMENT CONTROLS MUST BE MAINTAINED WHILE THE HAUL ROAD IS BEING USED.
3. CONTRACTOR TO MAINTAIN THE HAUL ROAD DURING USE.
4. HAUL ROAD TO BE DEMOLISHED AND THE SITE MADE GOOD AT THE COMPLETION OF USE, TO THE SATISFACTION OF JEMENA AND THE WESTERN SYDNEY PARKLANDS TRUST.

| Issue | Description | Date |
|---|---|---|
| P2 | ISSUED FOR INFORMATION | 27-01-22 |
| P1 | ISSUED FOR INFORMATION | 20-01-22 |

Bar Scales

0 25 50 75 100 125m

1 : 1250 @ A1 1 : 2500 @ A3

100mm on Original

Client: Charter Hall

| Scales | 1 : 1250 @ A1 | Drawn | ASD |
|---|---|---|---|
| | | Designed | ASD |
| Grid | MGA2020 | Checked | DS |
| Height Datum | AHD | Approved | |

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Project: LIGHTHORSE INTERCHANGE BUSINESS HUB EASTERN CREEK

Title: PROPOSED HAUL ROAD PLAN

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

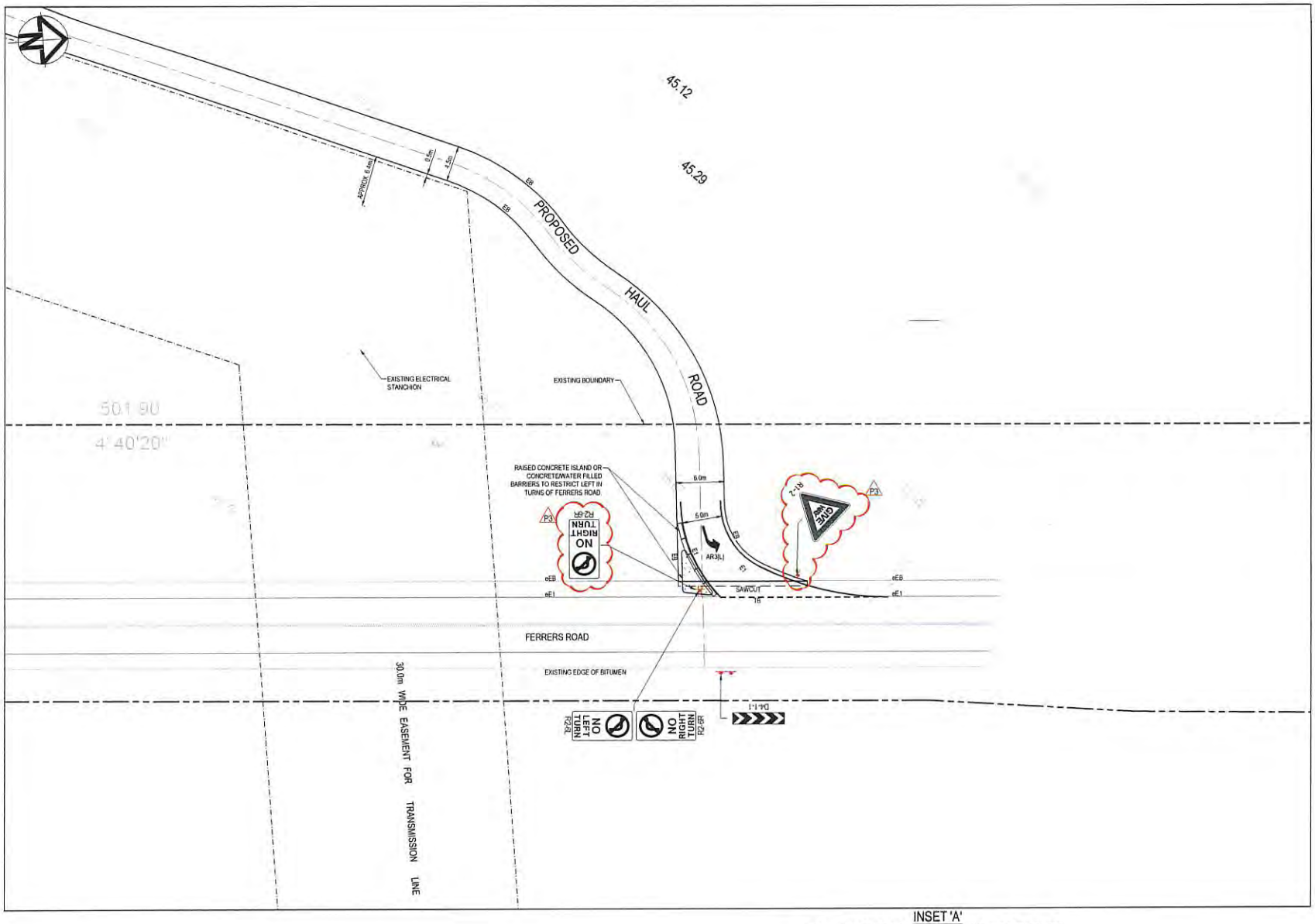
Status: FOR INFORMATION ONLY NOT FOR CONSTRUCTION

A1

Project - Drawing No.: 20-795-SKC018

Issue: P2

F:\20-795 Lighthorse\6.0 Drgs\Civil\Sketches\20-795-SKC018-PROPOSED HAUL ROAD PLAN.dwg




INSET 'A'
(SYD MOTORSPORT PARK LAYOUT REMOVED)
SCALE 1:250

LEGEND

- EXISTING BOUNDARY
- EXISTING EASEMENT
- SC — PAVEMENT SAWCUT
- EB — EDGE OF BITUMEN
- eEB — EXISTING EDGE OF BITUMEN
- PROPOSED SIGN POST LOCATION
- E1 — LINEMARKING - EDGE LINE
- eE1 — LINEMARKING - EXISTING EDGE LINE
- TB — LINEMARKING - GIVE WAY LINE
- AR3(L) — LINEMARKING - PAVEMENT ARROW

NOTE:
REFER TO DRAWING SKC017 FOR OVERALL HAUL ROAD LAYOUT

| Issue | Description | Date |
|---|---|---|
| P3 | ISSUED FOR INFORMATION | 02-02-22 |
| P2 | ISSUED FOR INFORMATION | 27-01-22 |
| P1 | ISSUED FOR INFORMATION | 20-01-22 |

100mm on Original

Bar Scales
0 5 10 15 20 25m
1 : 250 @ A1 1 : 500 @ A3

Client: Charter Hall

| | | | |
|---|---|---|---|
| Scales | 1 : 250 @ A1 | Drawn | ASD |
| | | Designed | ASD |
| Grid | MGA2020 | Checked | DS |
| Height Datum | AHD | Approved | |

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Project: LIGHTHORSE INTERCHANGE BUSINESS HUB EASTERN CREEK

Title: PROPOSED HAUL ROAD INSET PLAN

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel 02 9439 1777
Fax 02 9923 1055
www.atl.net.au
info@atl.net.au

Status: FOR INFORMATION ONLY NOT FOR CONSTRUCTION
A1

Project - Drawing No.: 20-795-SKC019
Issue: P3

F:\20-795 Lighthorse\6.0 Drgs\Civil\Sketches\20-795-SKC020-PROPOSED HAUL ROAD INSET PLAN.dwg

RETAIN EXISTING SHOULDER FOR LARGER EMERGENCY VEHICLE TURNING MANEUVERS

LINE MARKING FOR 3.5m SHARED PATH

EXISTING EDGE OF BITUMEN

EXISTING EDGE OF BITUMEN

EXISTING BRIDGE

3.5m

EXISTING EDGE OF BITUMEN

RETAIN EXISTING FENCES AND GATE

3.5m

TRANSITION TO EXISTING PAVEMENT TO FUTURE DETAILS

EXISTING BRIDGE 4.8m CLEARANCE APPROXIMATELY

CONNECT PROPOSED SHARED PATH TO EXISTING CYCLEWAY.

FENCE SECTION ALTERED TO ALLOW ACCESS TO AND FROM M7 CYCLEWAY, REFER INSET

LINE MARKING FOR 3.5m SHARED PATH

EXISTING BRIDGE 4.8m CLEARANCE APPROXIMATELY

3.5m

EXISTING BRIDGE 4.8m CLEARANCE APPROXIMATELY

EXISTING BRIDGE

LIMITS OF WORK

EXTEND EXISTING ACCESS WAY TO INTERNAL RIGHT OF WAY

TRANSITION TO EXISTING PAVEMENT TO FUTURE DETAILS

TRANSITION SHARED PATH TO SOUTH SIDE OF EXISTING ACCESS WAY EXTENSION

INSTALL LOW HEIGHT CONVENTIONAL GATE FOR ACCESS BY M7 SERVICE VEHICLE ONLY.

MINOR RETAINING WALL TO ACCESS WAY AND SHARED PATH, REFER TO DETAIL

CONNECT 3.5M SHARED PATH TO INTERNAL SHARED PATH PROVIDE BOLLARD TREATMENT TO PREVENT VEHICLE ACCESS.

NEW "NO ACCESS" & "AUTHORISED VEHICLES EXCEPTED" SIGNPOSTING

LINE DENOTES HANDRAIL TO ARCHITECT'S SPECIFICATIONS

7.6m WIER WITH CONCRETE CUT OF WALL. WEIR LEVEL TBC

PROPOSED TRAPEZOIDAL CHANNEL
BASE WIDTH = 2m
BATTERS = 1 IN 4 MAX.
TOP WIDTH = 7.6m
DEPTH = 0.7m
MIN. SLOPE = 0.5%

NEW "CAUTION, SHARED ZONE" SIGN

LOCKABLE GATE

NEW "CAUTION, SHARED ZONE" SIGN

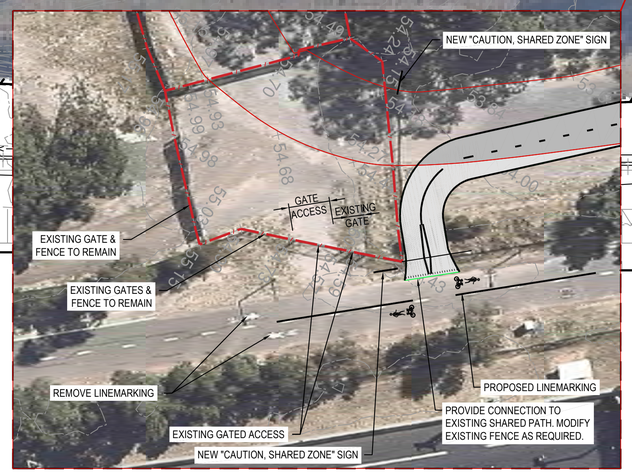
6m WIDE RIGHT OF WAY

FOR CONTINUATION REFER TO DWG. 18652_SSDA_C103

FOR CONTINUATION REFER TO DWG. 18652_SSDA_C104

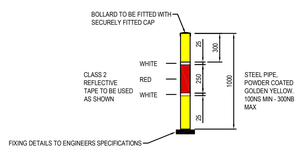
## EXTERNAL WORKS PLAN

SCALE: 1:500



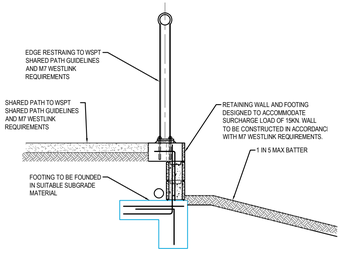

## INSET

SCALE: 1:250




## BOLLARD MARKING DETAIL

SCALE: 1:20




## RETAINED EDGE - SHARED PATH

SCALE: 1:20

SCALE 1:250

SCALE 1:500

**ISSUED FOR APPROVAL**

| REVISION | AMENDMENT | DRAWN | DESIGNED | DATE |
|---|---|---|---|---|
| 07 | ISSUED FOR APPROVAL | IK | NW | 22.04.2020 |
| 06 | ISSUED FOR APPROVAL | IK | NW | 21.01.2020 |
| 05 | ISSUED FOR APPROVAL | IK | NW | 13.12.2019 |
| 04 | ISSUED FOR APPROVAL | MS | NW | 15.11.2019 |
| 03 | ISSUED FOR APPROVAL | MS | NW | 09.04.2019 |
| 02 | ISSUED FOR CO-ORDINATION | IK | NW | 05.04.2019 |
| 01 | PRELIMINARY | IK | NW | 29.03.2019 |

Western Sydney Parklands Trust

Client: WESTERN SYDNEY PARKLANDS TRUST

NETTLETONTRIBE

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henry&hymas

Project: LIGHT HORSE INTERCHANGE BUSINESS HUB
EASTERN CREEK, NSW (SSD9667)

Title: EXTERNAL WORKS PLAN
WALLGROVE ROAD

| Drawn | Designed | Date |
|---|---|---|
| M.Stimova | L.Caha | FEB 2019 |
| Checked | Approved | Scale @A1 |
| N.Wetzlar | A.Francis | AS NOTED |

Drawing number: 18652_SSDA_EX01

Revision: 07

# Appendix C

## SIDRA Results

# MOVEMENT SUMMARY

## Site: 2 [Brabham Dr & GWH AM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 140 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | | | |
| 1 | L2 | 64 | 36.1 | 67 | 36.1 | 0.340 | 39.7 | LOS C | 10.2 | 82.9 | 0.77 | 0.69 | 0.77 | 32.2 |
| 2 | T1 | 347 | 9.9 | 365 | 9.9 | 0.340 | 34.5 | LOS C | 11.0 | 83.4 | 0.77 | 0.67 | 0.77 | 39.3 |
| 3 | R2 | 113 | 12.0 | 119 | 12.0 | * 0.695 | 75.1 | LOS F | 8.3 | 64.0 | 1.00 | 0.84 | 1.08 | 25.5 |
| Approach | | 524 | 13.6 | 552 | 13.6 | 0.695 | 43.9 | LOS D | 11.0 | 83.4 | 0.82 | 0.71 | 0.84 | 34.5 |
| East: Great Western Highway | | | | | | | | | | | | | | |
| 4 | L2 | 96 | 11.3 | 101 | 11.3 | 0.100 | 16.4 | LOS B | 2.4 | 18.6 | 0.42 | 0.70 | 0.42 | 50.8 |
| 5 | T1 | 462 | 11.9 | 486 | 11.9 | * 0.697 | 65.5 | LOS E | 11.0 | 85.0 | 1.00 | 0.84 | 1.05 | 30.8 |
| 6 | R2 | 202 | 8.2 | 213 | 8.2 | 0.707 | 78.9 | LOS F | 7.5 | 56.3 | 1.00 | 0.83 | 1.11 | 28.1 |
| Approach | | 760 | 10.8 | 800 | 10.8 | 0.707 | 62.8 | LOS E | 11.0 | 85.0 | 0.93 | 0.82 | 0.99 | 31.4 |
| North: Doonside Road | | | | | | | | | | | | | | |
| 7 | L2 | 331 | 6.5 | 348 | 6.5 | 0.716 | 44.9 | LOS D | 29.0 | 213.9 | 0.90 | 0.85 | 0.90 | 38.2 |
| 8 | T1 | 600 | 6.1 | 632 | 6.1 | * 0.716 | 33.8 | LOS C | 29.0 | 213.9 | 0.83 | 0.77 | 0.83 | 38.9 |
| 9 | R2 | 268 | 19.3 | 282 | 19.3 | 0.527 | 62.3 | LOS E | 8.7 | 71.0 | 0.94 | 0.80 | 0.94 | 29.4 |
| Approach | | 1199 | 9.2 | 1262 | 9.2 | 0.716 | 43.2 | LOS D | 29.0 | 213.9 | 0.87 | 0.80 | 0.87 | 36.2 |
| West: Great Western Highway | | | | | | | | | | | | | | |
| 10 | L2 | 433 | 9.1 | 456 | 9.1 | 0.391 | 11.5 | LOS A | 8.3 | 62.6 | 0.35 | 0.71 | 0.35 | 54.8 |
| 11 | T1 | 696 | 6.2 | 733 | 6.2 | 0.726 | 57.0 | LOS E | 17.8 | 131.2 | 0.98 | 0.84 | 1.00 | 33.6 |
| 12 | R2 | 362 | 8.5 | 381 | 8.5 | * 0.692 | 69.3 | LOS E | 12.7 | 95.3 | 1.00 | 0.84 | 1.03 | 25.3 |
| Approach | | 1491 | 7.6 | 1569 | 7.6 | 0.726 | 46.8 | LOS D | 17.8 | 131.2 | 0.80 | 0.80 | 0.82 | 35.2 |
| All Vehicles | | 3974 | 9.5 | 4183 | 9.5 | 0.726 | 48.4 | LOS D | 29.0 | 213.9 | 0.85 | 0.79 | 0.87 | 34.6 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 232.7 | 219.0 | 0.94 |
| North: Doonside Road | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 235.3 | 222.3 | 0.94 |
| West: Great Western Highway | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P4 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 245.7 | 235.9 | 0.96 |
| All Pedestrians | | 150 | 158 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 237.9 | 225.7 | 0.95 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

## Site: 2 [Brabham Dr & GWH PM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 140 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | | | |
| 1 | L2 | 170 | 9.4 | 179 | 9.4 | 0.818 | 58.4 | LOS E | 29.6 | 216.9 | 0.99 | 0.92 | 1.06 | 27.9 |
| 2 | T1 | 611 | 2.6 | 643 | 2.6 | * 0.818 | 52.7 | LOS D | 29.6 | 216.9 | 0.97 | 0.91 | 1.05 | 32.2 |
| 3 | R2 | 102 | 5.8 | 107 | 5.8 | 0.702 | 77.0 | LOS F | 7.6 | 55.6 | 1.00 | 0.84 | 1.10 | 25.5 |
| Approach | | 883 | 4.3 | 929 | 4.3 | 0.818 | 56.6 | LOS E | 29.6 | 216.9 | 0.98 | 0.90 | 1.06 | 30.5 |
| East: Great Western Highway | | | | | | | | | | | | | | |
| 4 | L2 | 132 | 9.6 | 139 | 9.6 | 0.130 | 12.6 | LOS A | 2.5 | 19.3 | 0.33 | 0.68 | 0.33 | 54.1 |
| 5 | T1 | 1074 | 5.2 | 1131 | 5.2 | 0.736 | 50.2 | LOS D | 23.5 | 172.0 | 0.97 | 0.85 | 0.98 | 36.0 |
| 6 | R2 | 467 | 2.9 | 492 | 2.9 | * 0.822 | 74.5 | LOS F | 17.5 | 125.7 | 1.00 | 0.90 | 1.16 | 29.4 |
| Approach | | 1673 | 4.9 | 1761 | 4.9 | 0.822 | 54.0 | LOS D | 23.5 | 172.0 | 0.93 | 0.85 | 0.98 | 34.5 |
| North: Doonside Road | | | | | | | | | | | | | | |
| 7 | L2 | 300 | 7.2 | 316 | 7.2 | 0.697 | 49.7 | LOS D | 24.5 | 181.7 | 0.93 | 0.85 | 0.93 | 36.2 |
| 8 | T1 | 478 | 5.6 | 503 | 5.6 | 0.697 | 35.7 | LOS C | 24.5 | 181.7 | 0.82 | 0.76 | 0.82 | 38.1 |
| 9 | R2 | 405 | 8.3 | 426 | 8.3 | * 0.798 | 65.7 | LOS E | 14.1 | 105.5 | 0.95 | 0.88 | 1.10 | 29.2 |
| Approach | | 1183 | 6.9 | 1245 | 6.9 | 0.798 | 49.5 | LOS D | 24.5 | 181.7 | 0.89 | 0.82 | 0.94 | 34.1 |
| West: Great Western Highway | | | | | | | | | | | | | | |
| 10 | L2 | 358 | 11.6 | 377 | 11.6 | 0.362 | 19.9 | LOS B | 12.1 | 93.0 | 0.55 | 0.75 | 0.55 | 47.6 |
| 11 | T1 | 654 | 3.4 | 688 | 3.4 | * 0.816 | 64.6 | LOS E | 18.1 | 130.2 | 0.99 | 0.88 | 1.10 | 31.2 |
| 12 | R2 | 129 | 20.7 | 136 | 20.7 | 0.734 | 84.4 | LOS F | 5.0 | 41.1 | 1.00 | 0.83 | 1.20 | 22.2 |
| Approach | | 1141 | 7.9 | 1201 | 7.9 | 0.816 | 52.8 | LOS D | 18.1 | 130.2 | 0.85 | 0.84 | 0.94 | 33.6 |
| All Vehicles | | 4880 | 6.0 | 5137 | 6.0 | 0.822 | 53.1 | LOS D | 29.6 | 216.9 | 0.91 | 0.85 | 0.97 | 33.4 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 232.7 | 219.0 | 0.94 |
| North: Doonside Road | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 235.3 | 222.3 | 0.94 |
| West: Great Western Highway | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P4 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 245.7 | 235.9 | 0.96 |
| All Pedestrians | | 150 | 158 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 237.9 | 225.7 | 0.95 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

## Site: 1 [Wallgrove Rd & GWH AM

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 140 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wallgrove Road | | | | | | | | | | | | | | |
| 1 | L2 | 290 | 30.0 | 305 | 30.0 | 0.269 | 10.8 | LOS A | 4.8 | 42.4 | 0.30 | 0.67 | 0.30 | 61.4 |
| 2 | T1 | 443 | 5.0 | 466 | 5.0 | 0.422 | 44.0 | LOS D | 12.8 | 93.2 | 0.86 | 0.75 | 0.86 | 36.7 |
| 3 | R2 | 488 | 5.0 | 514 | 5.0 | * 0.836 | 74.3 | LOS F | 18.5 | 135.0 | 1.00 | 0.92 | 1.17 | 24.2 |
| Approach | | 1221 | 10.9 | 1285 | 10.9 | 0.836 | 48.2 | LOS D | 18.5 | 135.0 | 0.78 | 0.80 | 0.85 | 35.9 |
| East: Great Western Highway | | | | | | | | | | | | | | |
| 4 | L2 | 59 | 5.0 | 62 | 5.0 | 0.059 | 16.2 | LOS B | 1.5 | 10.6 | 0.41 | 0.68 | 0.41 | 48.4 |
| 5 | T1 | 611 | 5.0 | 643 | 5.0 | 0.554 | 52.9 | LOS D | 13.7 | 100.2 | 0.94 | 0.78 | 0.94 | 40.4 |
| 6 | R2 | 62 | 5.0 | 65 | 5.0 | 0.182 | 71.0 | LOS F | 2.1 | 15.3 | 0.95 | 0.73 | 0.95 | 24.4 |
| Approach | | 732 | 5.0 | 771 | 5.0 | 0.554 | 51.5 | LOS D | 13.7 | 100.2 | 0.90 | 0.77 | 0.90 | 39.3 |
| North: Rooty Hills Road South | | | | | | | | | | | | | | |
| 7 | L2 | 354 | 15.0 | 373 | 15.0 | 0.642 | 46.5 | LOS D | 21.2 | 167.4 | 0.89 | 0.84 | 0.89 | 29.4 |
| 8 | T1 | 635 | 2.5 | 668 | 2.5 | * 0.841 | 63.9 | LOS E | 23.7 | 169.6 | 1.00 | 0.96 | 1.14 | 31.0 |
| 9 | R2 | 66 | 2.5 | 69 | 2.5 | 0.444 | 73.6 | LOS F | 4.7 | 33.5 | 0.99 | 0.77 | 0.99 | 34.8 |
| Approach | | 1055 | 6.7 | 1111 | 6.7 | 0.841 | 58.7 | LOS E | 23.7 | 169.6 | 0.96 | 0.91 | 1.05 | 30.8 |
| West: Great Western Highway | | | | | | | | | | | | | | |
| 10 | L2 | 10 | 5.0 | 11 | 5.0 | 0.008 | 9.4 | LOS A | 0.1 | 0.8 | 0.21 | 0.63 | 0.21 | 62.7 |
| 11 | T1 | 1076 | 2.5 | 1133 | 2.5 | * 0.846 | 49.8 | LOS D | 38.0 | 271.4 | 0.99 | 0.94 | 1.06 | 41.6 |
| 12 | R2 | 470 | 5.0 | 495 | 5.0 | * 0.715 | 40.0 | LOS C | 10.6 | 77.2 | 0.99 | 0.84 | 1.02 | 46.8 |
| Approach | | 1556 | 3.3 | 1638 | 3.3 | 0.846 | 46.6 | LOS D | 38.0 | 271.4 | 0.99 | 0.91 | 1.04 | 43.3 |
| All Vehicles | | 4564 | 6.4 | 4804 | 6.4 | 0.846 | 50.6 | LOS D | 38.0 | 271.4 | 0.91 | 0.86 | 0.97 | 37.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wallgrove Road | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 236.8 | 224.3 | 0.95 |
| P1B | Slip/ Bypass | 50 | 53 | 37.6 | LOS D | 0.1 | 0.1 | 0.92 | 0.92 | 194.8 | 204.3 | 1.05 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Great Western Highway | | | | | | | | | | | | |
| P2 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 241.1 | 229.9 | 0.95 |
| P2B | Slip/ Bypass | 50 | 53 | 37.6 | LOS D | 0.1 | 0.1 | 0.92 | 0.92 | 194.8 | 204.3 | 1.05 |
| North: Rooty Hills Road South | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 236.0 | 223.3 | 0.95 |
| West: Great Western Highway | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 239.3 | 227.5 | 0.95 |
| P4B | Slip/ Bypass | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 221.4 | 204.3 | 0.92 |
| All Pedestrians | | 350 | 368 | 56.6 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 223.5 | 216.8 | 0.97 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 1 [Wallgrove Rd & GWH PM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wallgrove Road | | | | | | | | | | | | | | |
| 1 | L2 | 394 | 10.0 | 415 | 10.0 | 0.423 | 25.5 | LOS B | 14.9 | 113.2 | 0.61 | 0.78 | 0.61 | 55.2 |
| 2 | T1 | 690 | 5.0 | 726 | 5.0 | * 0.841 | 63.2 | LOS E | 25.6 | 187.0 | 1.00 | 0.95 | 1.13 | 30.8 |
| 3 | R2 | 251 | 5.0 | 264 | 5.0 | * 0.859 | 84.8 | LOS F | 9.9 | 72.6 | 1.00 | 0.94 | 1.32 | 22.2 |
| Approach | | 1335 | 6.5 | 1405 | 6.5 | 0.859 | 56.1 | LOS D | 25.6 | 187.0 | 0.89 | 0.90 | 1.01 | 35.0 |
| East: Great Western Highway | | | | | | | | | | | | | | |
| 4 | L2 | 247 | 10.0 | 260 | 10.0 | 0.243 | 17.2 | LOS B | 7.0 | 53.3 | 0.46 | 0.72 | 0.46 | 46.5 |
| 5 | T1 | 1381 | 5.0 | 1454 | 5.0 | * 0.839 | 50.2 | LOS D | 34.9 | 255.0 | 0.97 | 0.90 | 1.03 | 41.9 |
| 6 | R2 | 321 | 5.0 | 338 | 5.0 | 0.507 | 63.1 | LOS E | 10.5 | 76.5 | 0.95 | 0.81 | 0.95 | 26.2 |
| Approach | | 1949 | 5.6 | 2052 | 5.6 | 0.839 | 48.1 | LOS D | 34.9 | 255.0 | 0.90 | 0.86 | 0.94 | 39.4 |
| North: Rooty Hills Road South | | | | | | | | | | | | | | |
| 7 | L2 | 66 | 5.0 | 69 | 5.0 | 0.085 | 28.2 | LOS B | 2.6 | 19.1 | 0.59 | 0.70 | 0.59 | 37.1 |
| 8 | T1 | 514 | 5.0 | 541 | 5.0 | 0.627 | 52.5 | LOS D | 16.7 | 121.9 | 0.96 | 0.81 | 0.96 | 34.2 |
| 9 | R2 | 106 | 5.0 | 112 | 5.0 | 0.726 | 77.5 | LOS F | 7.9 | 57.8 | 1.00 | 0.85 | 1.12 | 33.9 |
| Approach | | 686 | 5.0 | 722 | 5.0 | 0.726 | 54.0 | LOS D | 16.7 | 121.9 | 0.93 | 0.81 | 0.95 | 34.3 |
| West: Great Western Highway | | | | | | | | | | | | | | |
| 10 | L2 | 17 | 10.0 | 18 | 10.0 | 0.017 | 14.8 | LOS B | 0.4 | 2.9 | 0.37 | 0.65 | 0.37 | 58.7 |
| 11 | T1 | 785 | 5.0 | 826 | 5.0 | 0.666 | 43.2 | LOS D | 24.1 | 176.0 | 0.92 | 0.81 | 0.92 | 44.4 |
| 12 | R2 | 486 | 20.0 | 512 | 20.0 | * 0.847 | 76.0 | LOS F | 18.7 | 153.5 | 1.00 | 0.92 | 1.20 | 34.4 |
| Approach | | 1288 | 10.7 | 1356 | 10.7 | 0.847 | 55.2 | LOS D | 24.1 | 176.0 | 0.94 | 0.85 | 1.02 | 39.7 |
| All Vehicles | | 5258 | 7.0 | 5535 | 7.0 | 0.859 | 52.7 | LOS D | 34.9 | 255.0 | 0.91 | 0.86 | 0.98 | 37.6 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wallgrove Road | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 236.8 | 224.3 | 0.95 |
| P1B | Slip/ Bypass | 50 | 53 | 31.6 | LOS D | 0.1 | 0.1 | 0.92 | 0.92 | 188.8 | 204.3 | 1.08 |
| East: Great Western Highway | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P2 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 241.1 | 229.9 | 0.95 |
| P2B | Slip/ Bypass | 50 | 53 | 31.6 | LOS D | 0.1 | 0.1 | 0.92 | 0.92 | 188.8 | 204.3 | 1.08 |
| North: Rooty Hills Road South | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 236.0 | 223.3 | 0.95 |
| West: Great Western Highway | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 239.3 | 227.5 | 0.95 |
| P4B | Slip/ Bypass | 50 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 | 221.4 | 204.3 | 0.92 |
| All Pedestrians | | 350 | 368 | 54.9 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 221.7 | 216.8 | 0.98 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 3 [Brabham Dr & Huntingwood Dr AM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | | | |
| 1 | L2 | 123 | 18.7 | 129 | 18.7 | 0.355 | 4.6 | LOS A | 2.6 | 20.0 | 0.42 | 0.44 | 0.42 | 54.2 |
| 2 | T1 | 553 | 8.7 | 582 | 8.7 | 0.355 | 4.4 | LOS A | 2.6 | 20.0 | 0.43 | 0.48 | 0.43 | 55.5 |
| 3 | R2 | 255 | 9.0 | 268 | 9.0 | 0.355 | 10.2 | LOS A | 2.5 | 19.0 | 0.45 | 0.57 | 0.45 | 54.8 |
| Approach | | 931 | 10.1 | 980 | 10.1 | 0.355 | 6.0 | LOS A | 2.6 | 20.0 | 0.43 | 0.50 | 0.43 | 55.1 |
| East: Huntingwood Drive | | | | | | | | | | | | | | |
| 4 | L2 | 90 | 18.9 | 95 | 18.9 | 0.339 | 7.2 | LOS A | 1.7 | 14.6 | 0.70 | 0.83 | 0.71 | 52.9 |
| 5 | T1 | 49 | 34.7 | 52 | 34.7 | 0.339 | 7.9 | LOS A | 1.7 | 14.6 | 0.70 | 0.83 | 0.71 | 52.6 |
| 6 | R2 | 62 | 40.3 | 65 | 40.3 | 0.339 | 13.9 | LOS A | 1.7 | 14.6 | 0.70 | 0.83 | 0.71 | 52.0 |
| Approach | | 201 | 29.4 | 212 | 29.4 | 0.339 | 9.5 | LOS A | 1.7 | 14.6 | 0.70 | 0.83 | 0.71 | 52.6 |
| North: Brabham Drive | | | | | | | | | | | | | | |
| 7 | L2 | 383 | 10.4 | 403 | 10.4 | 0.487 | 6.2 | LOS A | 3.8 | 28.2 | 0.69 | 0.65 | 0.69 | 52.4 |
| 8 | T1 | 649 | 5.1 | 683 | 5.1 | 0.487 | 6.6 | LOS A | 3.8 | 28.2 | 0.71 | 0.68 | 0.72 | 54.8 |
| 9 | R2 | 24 | 16.7 | 25 | 16.7 | 0.487 | 12.9 | LOS A | 3.6 | 26.5 | 0.72 | 0.69 | 0.73 | 52.6 |
| Approach | | 1056 | 7.3 | 1112 | 7.3 | 0.487 | 6.6 | LOS A | 3.8 | 28.2 | 0.70 | 0.67 | 0.71 | 53.9 |
| West: Huntingwood Drive | | | | | | | | | | | | | | |
| 10 | L2 | 36 | 52.8 | 38 | 52.8 | 0.324 | 8.9 | LOS A | 1.4 | 12.4 | 0.67 | 0.82 | 0.70 | 48.5 |
| 11 | T1 | 93 | 19.4 | 98 | 19.4 | 0.324 | 7.5 | LOS A | 1.4 | 12.4 | 0.67 | 0.82 | 0.70 | 52.3 |
| 12 | R2 | 65 | 24.6 | 68 | 24.6 | 0.324 | 13.5 | LOS A | 1.4 | 12.4 | 0.67 | 0.82 | 0.70 | 53.1 |
| Approach | | 194 | 27.3 | 204 | 27.3 | 0.324 | 9.8 | LOS A | 1.4 | 12.4 | 0.67 | 0.82 | 0.70 | 52.0 |
| All Vehicles | | 2382 | 11.9 | 2507 | 11.9 | 0.487 | 6.9 | LOS A | 3.8 | 28.2 | 0.59 | 0.63 | 0.60 | 54.2 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 3 [Brabham Dr & Huntingwood Dr PM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Brabham Drive | | | | | | | | | | | | | | |
| 1 | L2 | 113 | 21.2 | 119 | 21.2 | 0.443 | 6.1 | LOS A | 3.7 | 28.0 | 0.74 | 0.58 | 0.74 | 52.6 |
| 2 | T1 | 682 | 4.4 | 718 | 4.4 | 0.443 | 5.9 | LOS A | 3.7 | 28.0 | 0.74 | 0.62 | 0.74 | 54.3 |
| 3 | R2 | 115 | 12.2 | 121 | 12.2 | 0.443 | 12.2 | LOS A | 3.4 | 25.3 | 0.75 | 0.67 | 0.75 | 54.4 |
| Approach | | 910 | 7.5 | 958 | 7.5 | 0.443 | 6.7 | LOS A | 3.7 | 28.0 | 0.74 | 0.62 | 0.74 | 54.1 |
| East: Huntingwood Drive | | | | | | | | | | | | | | |
| 4 | L2 | 256 | 4.7 | 269 | 4.7 | 0.865 | 15.1 | LOS B | 10.2 | 75.6 | 0.92 | 1.24 | 1.70 | 48.4 |
| 5 | T1 | 160 | 6.3 | 168 | 6.3 | 0.865 | 15.3 | LOS B | 10.2 | 75.6 | 0.92 | 1.24 | 1.70 | 47.0 |
| 6 | R2 | 219 | 9.1 | 231 | 9.1 | 0.865 | 21.1 | LOS B | 10.2 | 75.6 | 0.92 | 1.24 | 1.70 | 47.1 |
| Approach | | 635 | 6.6 | 668 | 6.6 | 0.865 | 17.2 | LOS B | 10.2 | 75.6 | 0.92 | 1.24 | 1.70 | 47.7 |
| North: Brabham Drive | | | | | | | | | | | | | | |
| 7 | L2 | 81 | 28.4 | 85 | 28.4 | 0.304 | 5.1 | LOS A | 2.0 | 15.3 | 0.47 | 0.47 | 0.47 | 52.7 |
| 8 | T1 | 649 | 6.0 | 683 | 6.0 | 0.304 | 4.8 | LOS A | 2.0 | 15.3 | 0.49 | 0.49 | 0.49 | 55.8 |
| 9 | R2 | 16 | 25.0 | 17 | 25.0 | 0.304 | 11.1 | LOS A | 1.9 | 14.3 | 0.50 | 0.50 | 0.50 | 53.7 |
| Approach | | 746 | 8.8 | 785 | 8.8 | 0.304 | 5.0 | LOS A | 2.0 | 15.3 | 0.49 | 0.48 | 0.49 | 55.5 |
| West: Huntingwood Drive | | | | | | | | | | | | | | |
| 10 | L2 | 43 | 23.3 | 45 | 23.3 | 0.294 | 8.0 | LOS A | 1.4 | 11.0 | 0.73 | 0.85 | 0.73 | 48.6 |
| 11 | T1 | 44 | 11.4 | 46 | 11.4 | 0.294 | 7.6 | LOS A | 1.4 | 11.0 | 0.73 | 0.85 | 0.73 | 51.8 |
| 12 | R2 | 77 | 11.7 | 81 | 11.7 | 0.294 | 13.3 | LOS A | 1.4 | 11.0 | 0.73 | 0.85 | 0.73 | 53.0 |
| Approach | | 164 | 14.7 | 173 | 14.7 | 0.294 | 10.4 | LOS A | 1.4 | 11.0 | 0.73 | 0.85 | 0.73 | 51.7 |
| All Vehicles | | 2455 | 8.1 | 2584 | 8.1 | 0.865 | 9.1 | LOS A | 10.2 | 75.6 | 0.71 | 0.76 | 0.91 | 52.6 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 4 [Brabham Dr & Ferrers Rd AM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Peter Brock Drive | | | | | | | | | | | | | | |
| 5 | T1 | 40 | 19.4 | 42 | 19.4 | 0.106 | 7.5 | LOS A | 0.5 | 4.2 | 0.61 | 0.72 | 0.61 | 52.3 |
| 6 | R2 | 31 | 22.4 | 33 | 22.4 | 0.106 | 13.3 | LOS A | 0.5 | 4.2 | 0.61 | 0.72 | 0.61 | 53.8 |
| Approach | | 71 | 20.7 | 75 | 20.7 | 0.106 | 10.0 | LOS A | 0.5 | 4.2 | 0.61 | 0.72 | 0.61 | 53.0 |
| North: Brabham Drive | | | | | | | | | | | | | | |
| 7 | L2 | 131 | 23.9 | 138 | 23.9 | 0.123 | 4.2 | LOS A | 0.6 | 5.3 | 0.19 | 0.42 | 0.19 | 55.7 |
| 9 | R2 | 623 | 7.7 | 656 | 7.7 | 0.380 | 9.5 | LOS A | 2.6 | 19.5 | 0.20 | 0.59 | 0.20 | 53.5 |
| Approach | | 754 | 10.5 | 794 | 10.5 | 0.380 | 8.6 | LOS A | 2.6 | 19.5 | 0.20 | 0.56 | 0.20 | 53.9 |
| West: Ferrers Road | | | | | | | | | | | | | | |
| 10 | L2 | 679 | 8.0 | 715 | 8.0 | 0.259 | 3.8 | LOS A | 1.5 | 11.4 | 0.16 | 0.41 | 0.16 | 55.8 |
| 11 | T1 | 45 | 8.3 | 47 | 8.3 | 0.259 | 3.7 | LOS A | 1.5 | 11.2 | 0.16 | 0.41 | 0.16 | 57.3 |
| Approach | | 724 | 8.0 | 762 | 8.0 | 0.259 | 3.8 | LOS A | 1.5 | 11.4 | 0.16 | 0.41 | 0.16 | 55.8 |
| All Vehicles | | 1549 | 9.8 | 1631 | 9.8 | 0.380 | 6.4 | LOS A | 2.6 | 19.5 | 0.20 | 0.50 | 0.20 | 54.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 4 [Brabham Dr & Ferrers Rd PM (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Peter Brock Drive | | | | | | | | | | | | | | |
| 5 | T1 | 70 | 6.8 | 74 | 6.8 | 0.223 | 8.7 | LOS A | 1.2 | 9.3 | 0.71 | 0.82 | 0.71 | 51.2 |
| 6 | R2 | 73 | 15.6 | 77 | 15.6 | 0.223 | 14.8 | LOS B | 1.2 | 9.3 | 0.71 | 0.82 | 0.71 | 52.9 |
| Approach | | 143 | 11.3 | 151 | 11.3 | 0.223 | 11.8 | LOS A | 1.2 | 9.3 | 0.71 | 0.82 | 0.71 | 52.1 |
| North: Brabham Drive | | | | | | | | | | | | | | |
| 7 | L2 | 21 | 7.9 | 22 | 7.9 | 0.018 | 3.9 | LOS A | 0.1 | 0.7 | 0.14 | 0.41 | 0.14 | 56.3 |
| 9 | R2 | 756 | 6.0 | 796 | 6.0 | 0.447 | 9.4 | LOS A | 3.5 | 25.9 | 0.17 | 0.59 | 0.17 | 53.7 |
| Approach | | 777 | 6.1 | 818 | 6.1 | 0.447 | 9.2 | LOS A | 3.5 | 25.9 | 0.17 | 0.58 | 0.17 | 53.7 |
| West: Ferrers Road | | | | | | | | | | | | | | |
| 10 | L2 | 788 | 6.0 | 829 | 6.0 | 0.309 | 4.0 | LOS A | 1.9 | 14.3 | 0.27 | 0.44 | 0.27 | 55.4 |
| 11 | T1 | 28 | 14.3 | 29 | 14.3 | 0.309 | 4.0 | LOS A | 1.9 | 14.0 | 0.27 | 0.44 | 0.27 | 56.6 |
| Approach | | 816 | 6.3 | 859 | 6.3 | 0.309 | 4.0 | LOS A | 1.9 | 14.3 | 0.27 | 0.44 | 0.27 | 55.4 |
| All Vehicles | | 1736 | 6.6 | 1827 | 6.6 | 0.447 | 7.0 | LOS A | 3.5 | 25.9 | 0.26 | 0.54 | 0.26 | 54.4 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 5 [Ferrers Rd & The Horsley Dr AM - Vol Red (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: The Horsley Drive | | | | | | | | | | | | | | |
| 5 | T1 | 916 | 25.6 | 964 | 25.6 | 0.376 | 4.8 | LOS A | 9.1 | 77.4 | 0.35 | 0.32 | 0.35 | 56.3 |
| 6 | R2 | 405 | 9.7 | 426 | 9.7 | * 0.920 | 62.1 | LOS E | 21.7 | 164.4 | 1.00 | 1.10 | 1.32 | 32.2 |
| Approach | | 1321 | 20.7 | 1391 | 20.7 | 0.920 | 22.4 | LOS B | 21.7 | 164.4 | 0.55 | 0.56 | 0.65 | 45.8 |
| North: Ferres Road | | | | | | | | | | | | | | |
| 7 | L2 | 701 | 8.9 | 738 | 8.9 | 0.836 | 34.7 | LOS C | 28.9 | 218.0 | 0.92 | 1.02 | 0.97 | 40.5 |
| 9 | R2 | 24 | 47.1 | 25 | 47.1 | 0.136 | 56.9 | LOS E | 1.3 | 13.2 | 0.92 | 0.72 | 0.92 | 30.1 |
| Approach | | 725 | 10.2 | 763 | 10.2 | 0.836 | 35.4 | LOS C | 28.9 | 218.0 | 0.92 | 1.01 | 0.97 | 40.1 |
| West: The Horsley Drive | | | | | | | | | | | | | | |
| 10 | L2 | 89 | 19.1 | 94 | 19.1 | * 0.943 | 70.3 | LOS E | 48.4 | 390.8 | 1.00 | 1.15 | 1.30 | 28.3 |
| 11 | T1 | 1163 | 17.7 | 1224 | 17.7 | * 0.943 | 63.7 | LOS E | 48.6 | 392.1 | 1.00 | 1.15 | 1.30 | 32.1 |
| Approach | | 1252 | 17.8 | 1318 | 17.8 | 0.943 | 64.1 | LOS E | 48.6 | 392.1 | 1.00 | 1.15 | 1.30 | 31.9 |
| All Vehicles | | 3298 | 17.3 | 3472 | 17.3 | 0.943 | 41.1 | LOS C | 48.6 | 392.1 | 0.80 | 0.88 | 0.97 | 38.3 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: The Horsley Drive | | | | | | | | | | | | |
| P2 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 223.9 | 220.5 | 0.98 |
| North: Ferres Road | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 216.3 | 210.6 | 0.97 |
| All Pedestrians | | 100 | 105 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 220.1 | 215.6 | 0.98 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 5 [Ferrers Rd & The Horsley Dr PM - Vol Red (Site Folder: General)]

165 Wallgrove Road & 475 Ferres Road, Eastern Creek
Site Category: Light Horse Business Hub
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site User-Given Phase Times)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: The Horsley Drive | | | | | | | | | | | | | | |
| 5 | T1 | 1459 | 6.5 | 1536 | 6.5 | 0.680 | 8.5 | LOS A | 28.7 | 212.4 | 0.53 | 0.49 | 0.53 | 53.8 |
| 6 | R2 | 458 | 38.9 | 482 | 38.9 | *0.962 | 63.7 | LOS E | 25.4 | 236.7 | 0.92 | 1.04 | 1.38 | 31.5 |
| Approach | | 1917 | 14.2 | 2018 | 14.2 | 0.962 | 21.7 | LOS B | 28.7 | 236.7 | 0.62 | 0.62 | 0.73 | 46.0 |
| North: Ferres Road | | | | | | | | | | | | | | |
| 7 | L2 | 811 | 14.1 | 854 | 14.1 | 0.743 | 12.7 | LOS A | 25.6 | 200.5 | 0.65 | 0.78 | 0.65 | 50.3 |
| 9 | R2 | 135 | 43.2 | 142 | 43.2 | 0.572 | 56.4 | LOS D | 7.9 | 75.5 | 0.97 | 0.81 | 0.97 | 30.3 |
| Approach | | 946 | 18.3 | 996 | 18.3 | 0.743 | 18.9 | LOS B | 25.6 | 200.5 | 0.70 | 0.78 | 0.70 | 46.6 |
| West: The Horsley Drive | | | | | | | | | | | | | | |
| 10 | L2 | 30 | 55.0 | 32 | 55.0 | *0.804 | 64.3 | LOS E | 16.2 | 137.6 | 1.00 | 0.98 | 1.15 | 29.4 |
| 11 | T1 | 488 | 21.3 | 514 | 21.3 | *0.804 | 56.3 | LOS D | 16.7 | 138.0 | 1.00 | 0.96 | 1.14 | 34.0 |
| Approach | | 518 | 23.3 | 545 | 23.3 | 0.804 | 56.7 | LOS E | 16.7 | 138.0 | 1.00 | 0.96 | 1.14 | 33.7 |
| All Vehicles | | 3381 | 16.7 | 3559 | 16.7 | 0.962 | 26.3 | LOS B | 28.7 | 236.7 | 0.70 | 0.72 | 0.79 | 43.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: The Horsley Drive | | | | | | | | | | | | |
| P2 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 223.9 | 220.5 | 0.98 |
| North: Ferres Road | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 216.3 | 210.6 | 0.97 |
| All Pedestrians | | 100 | 105 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 220.1 | 215.6 | 0.98 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# Appendix D

## Work Program

| **LIGHT VEHICLE MOVEMENTS** | | 2021 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DEC | | | | JAN | | | | FEB | | | | MAR | | |
| Task / Milestone | Stage | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Remediaition | Stage 1 | 4 | 4 | 4 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | | | |
| Demo/Clearing | | | | | | | | | | | | | | 10 | 12 | 12 |
| Bulk Earthworks | | | | | | | | | | | | | | | | |
| Bridge Construction | | | | | | | | | | | | | | | | |
| Acess Switch | Stage 2 | | | | | | | | | | | | | | | |
| External Road | | | | | | | | | | | | | | | | |
| Internal Road Inc Services | | | | | | | | | | | | | | | | |
| Bio Basin | | | | | | | | | | | | | | | | |
| **TOTAL PER WEEK** | | 4 | 4 | 4 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 |
| **TOTAL IN & OUT PER WEEK** | | 8 | 8 | 8 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 24 | 24 |

| **HEAVY VEHICLE MOVEMENTS** | | 2021 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DEC | | | | JAN | | | | FEB | | | | MAR | | |
| Task / Milestone | Stage | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Remediaition | Stage 1 | 6 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 15 | 10 | 10 | 2 | | | |
| Demo/Clearing | | | | | | | | | | | | | | 5 | 10 | 10 |
| Bulk Earthworks | | | | | | | | | | | | | | | | |
| Bridge Construction | | | | | | | | | | | | | | | | |
| Acess Switch | Stage 2 | | | | | | | | | | | | | | | |
| External Road | | | | | | | | | | | | | | | | |
| Internal Road Inc Services | | | | | | | | | | | | | | | | |
| Bio Basin | | | | | | | | | | | | | | | | |
| **TOTAL PER WEEK** | | 6 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 15 | 10 | 10 | 2 | 5 | 10 | 10 |
| **TOTAL IN & OUT PER WEEK** | | 12 | 12 | 4 | 4 | 4 | 4 | 4 | 4 | 30 | 20 | 20 | 4 | 10 | 20 | 20 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2022 | | | | | | | | | | | |
| | APR | | | | MAY | | | | JUN | | | | JUL | | | | AU | |
| 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 |
| 10 | | | | | | | | | | | | | | | | | | |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | 6 | 6 | 6 | 6 | 8 | 8 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 10 | 10 |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 5 | 5 | 5 | 5 | 5 | 5 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 10 | 12 | 12 | 12 | 12 | 19 | 19 | 23 | 23 | 23 | 23 | 28 | 28 | 28 | 28 | 28 | 28 | 26 | 26 |
| 20 | 24 | 24 | 24 | 24 | 38 | 38 | 46 | 46 | 46 | 46 | 56 | 56 | 56 | 56 | 56 | 56 | 52 | 52 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2022 | | | | | | | | | | | |
| | APR | | | | MAY | | | | JUN | | | | JUL | | | | AU | |
| 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 |
| 10 | | | | | | | | | | | | | | | | | | |
| | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 8 | 8 | 8 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 0 | 0 | 5 | 5 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 25 | 25 |
| 10 | 1804 | 1804 | 1804 | 1804 | 1804 | 1804 | 1809 | 1813 | 1828 | 1828 | 1832 | 1832 | 1832 | 1832 | 1832 | 1832 | 1837 | 1837 |
| 20 | 3608 | 3608 | 3608 | 3608 | 3608 | 3608 | 3618 | 3626 | 3656 | 3656 | 3664 | 3664 | 3664 | 3664 | 3664 | 3664 | 3674 | 3674 |

| JG | | SEP | | | | OCT | | | | NOV | | | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 8 | 8 | 8 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 6 | 6 | 6 | 6 | |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 8 | 5 | 5 | 5 | 5 | 5 | 5 | |
| | | | | | | 5 | 5 | 5 | 5 | 5 | 5 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | | | | | | | | | | | | | | 5 | 5 | 5 | 5 | 5 |
| 24 | 24 | 24 | 24 | 24 | 24 | 31 | 29 | 29 | 29 | 27 | 27 | 29 | 29 | 32 | 32 | 32 | 32 | 21 |
| 48 | 48 | 48 | 48 | 48 | 48 | 62 | 58 | 58 | 58 | 54 | 54 | 58 | 58 | 64 | 64 | 64 | 64 | 42 |

| JG | | SEP | | | | OCT | | | | NOV | | | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 |
| 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| 12 | 12 | 10 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| 25 | 25 | 25 | 20 | 20 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | 5 | 5 | 10 | 10 | 10 | 10 | |
| | | | | | | 0 | 0 | 5 | 10 | 10 | 10 | 20 | 20 | 20 | 25 | 25 | 30 | 30 |
| | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 10 |
| 1837 | 1837 | 1835 | 1824 | 1824 | 1824 | 1822 | 1822 | 1817 | 1822 | 1822 | 1822 | 1827 | 1827 | 1832 | 1837 | 1837 | 1842 | 1840 |
| 3674 | 3674 | 3670 | 3648 | 3648 | 3648 | 3644 | 3644 | 3634 | 3644 | 3644 | 3644 | 3654 | 3654 | 3664 | 3674 | 3674 | 3684 | 3680 |

| 2023 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | | | FEB | | | | MAR | | | | APR | | | | |
| 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| 6 | 6 | 6 | | | | | | | | | | | | | |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 | 8 | 5 | 5 | |
| 5 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 5 | | | | | |
| 21 | 26 | 26 | 20 | 20 | 20 | 20 | 20 | 13 | 13 | 13 | 8 | 8 | 5 | 5 | |
| 42 | 52 | 52 | 40 | 40 | 40 | 40 | 40 | 26 | 26 | 26 | 16 | 16 | 10 | 10 | |

| 2023 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | | | FEB | | | | MAR | | | | APR | | | | |
| 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| 1800 | 1800 | 1800 | | | | | | | | | | | | | |
| 30 | 30 | 25 | 25 | 25 | 20 | 20 | 20 | 20 | 10 | 10 | 10 | 5 | 5 | 5 | |
| 10 | 10 | 10 | 20 | 20 | 20 | 10 | 10 | 10 | 5 | 5 | | | | | |
| 1840 | 1840 | 1835 | 45 | 45 | 40 | 30 | 30 | 30 | 15 | 15 | 10 | 5 | 5 | 5 | |
| 3680 | 3680 | 3670 | 90 | 90 | 80 | 60 | 60 | 60 | 30 | 30 | 20 | 10 | 10 | 10 | |

# Appendix E

## Traffic Control Plans

**Compliance Notes:**

1. Plans Scale 1:500
2. A or B size signs are to be used
3. 700mm cones are required with retroreflective bands
4. Cone spacing is in accordance with AGTTM-19
5. Appropriate PPE is to be worn for the conditions
6. Traffic Controllers to use radios when verbal communication is required
7. Any site specific conditions to be noted
8. All signs subject to +25%, -10% tolerances
9. Sign checks are required every hour
10. Any active Traffic Controllers to have escape route and 1.5 D sight site distance at their location
11. Drawn IAW AS 1742.3 2009, TCAWS V5 2018 & AGTTM-19

Designed by: Ronak Gandhi

License No: TCT 0063633

Signature:

Date: 23/09/2021

**Legend**

- Vehicle Egress
- Vehicle Ingress
- Work Area

ALLROAD GROUP

Client: AWJ

Site Specific Notes:

Long Term Works
Heavy Vehicles

Modifications are to be marked on the plan. Only current Work Zone Traffic Management card holders can amend TGSs

Project: **Walgrove Road**

Work Location: 165 Wallgrove Rd, Eastern Creek, NSW 2766

Drawing No: ARG 21-1142 TGS

Page: 01 of 01

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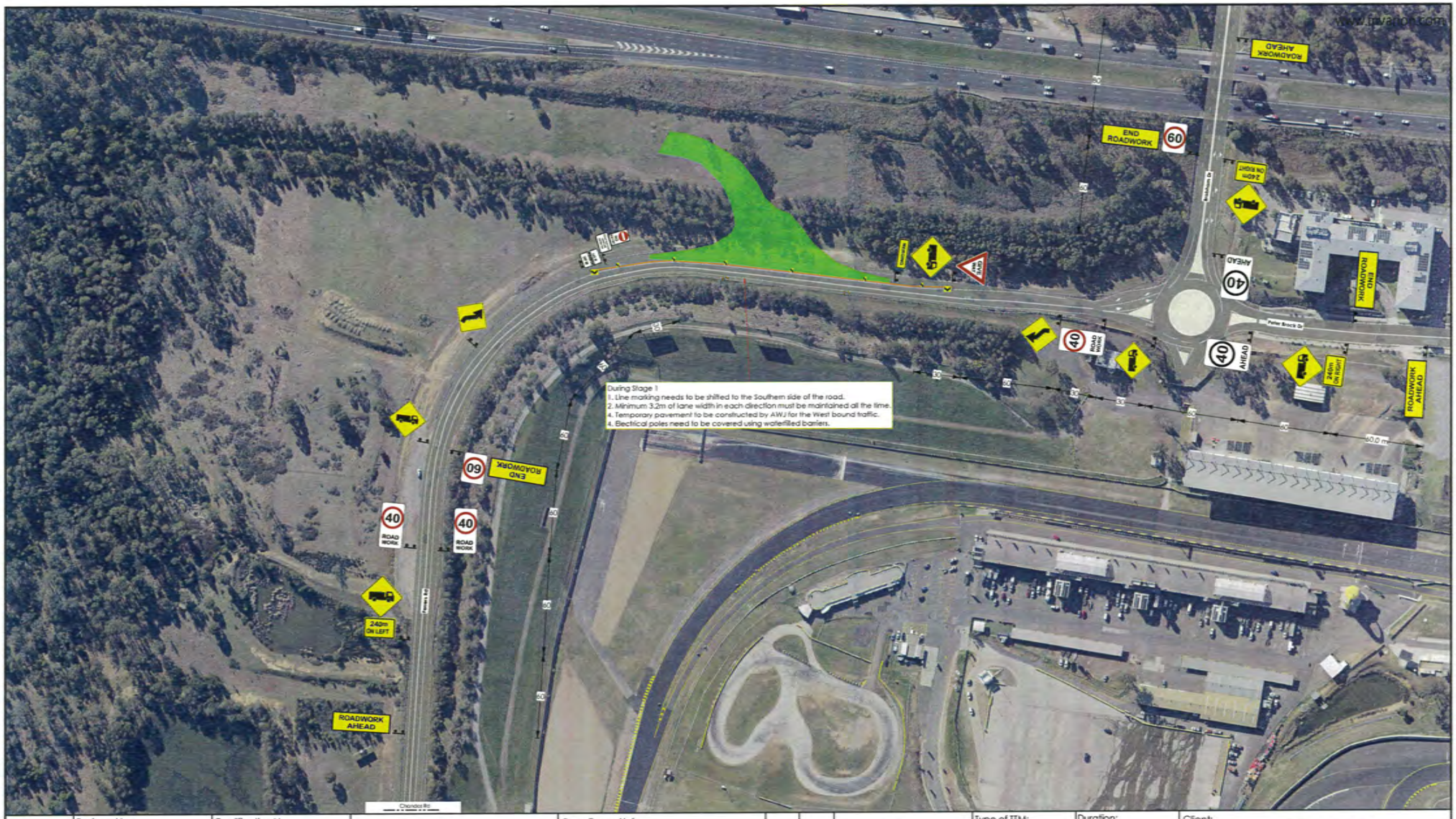



Alfroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- Barrier End Treatments
- Concrete Barriers
- Water Filled Barrier
- Work Area

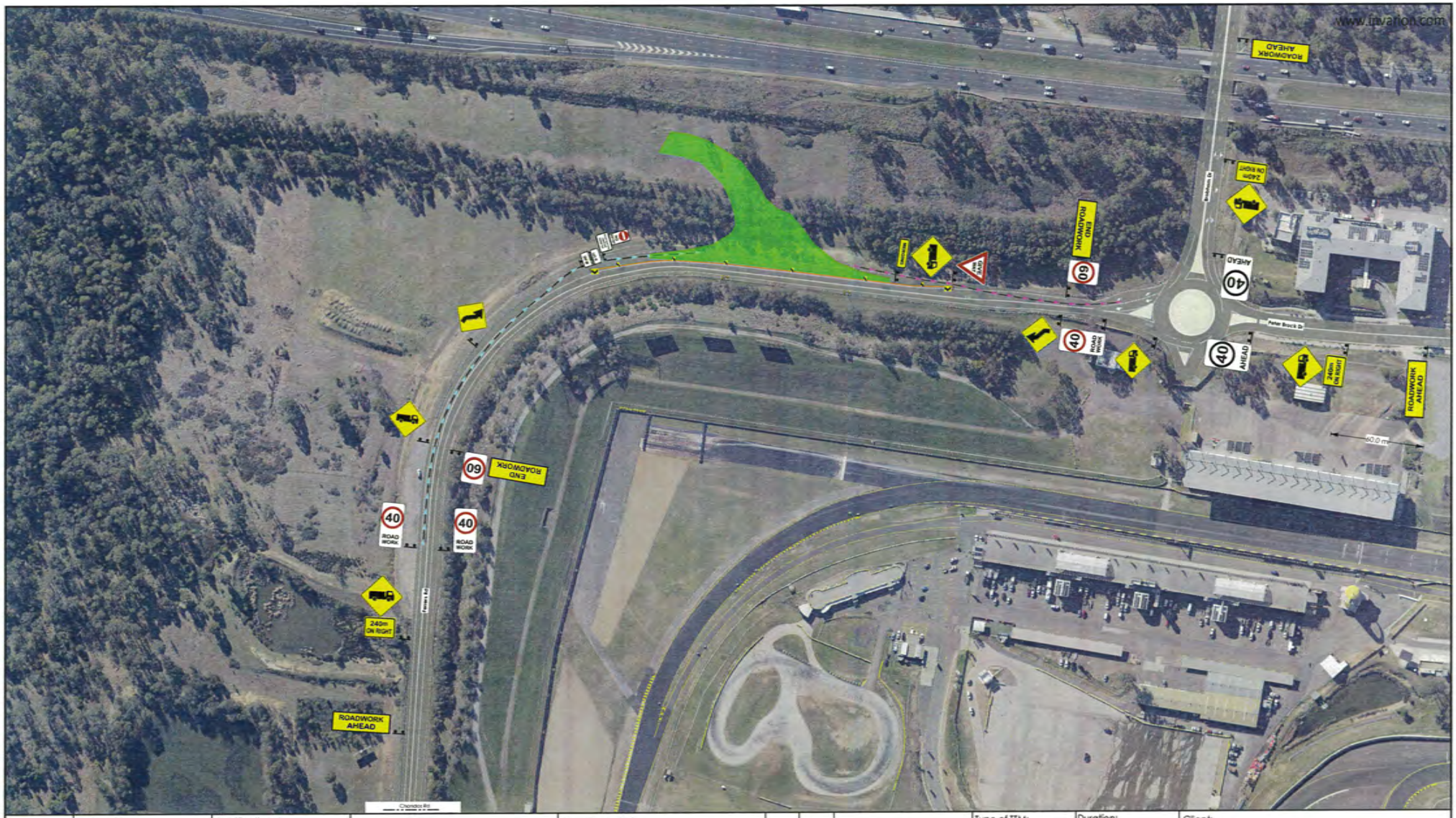
**Compliance Notes:**

1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

| REVISION | REV | Description |
|---|---|---|
| | 00 | sent to client |
| | 01 | Rev. 2 |

| | |
|---|---|
| Review Date: | 07/03/2022 |
| ROL No: | Not Applied |
| Sign Type: | Permanent |
| Type of TTM: | Static Works |
| Duration: | Long Term |
| TTM Set-up: | Lateral Shift |
| Shift TTM Inspections: | after installation -> everyday |
| Speed Limit: | 60km/h & |
| Traffic Volume: 724 AM Peak 816 PM Peak | Est. Queue Length: N/A |
| Map Reference: SIX Maps | Scale: 1:500 |

| | |
|---|---|
| Client: | AWJ |
| Project Description: | Light Horse Business Hub Stage 1 |
| Work Location: | 475 Ferrers Rd, Eastern Creek, NSW 2766 |
| Drawing No: ARG 21-1757 TGS | Issue Date: 07/02/2022 |




| | | | | | |
|---|---|---|---|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 | **Legend:** Barrier End Treatment; Concrete Barriers; Vehicle Egress; Vehicle Ingress; Water Filled Barrier; Work Area | **Compliance Notes:** 1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019 2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3 3. Sign Spacing Austroads TTM, Part 3: Table 2.2 4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3 5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13 6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4 7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2 | REVISION | REV: 00 — Description: sent to client; REV: 01 — Description: Rev. 2 | Type of TTM: Static Works; Duration: Long Term; TTM Set-up: Vehicle Movement Plan; Shift TTM Inspections: after installation -> everyday |
| Role: Traffic Planner | | | | Review Date: 07/03/2022; Speed Limit: 60km/h & | |
| Signature: | | | | ROL No: Not Applied; Traffic Volume: 724 AM Peak 816 PM Peak; Est. Queue Length: N/A | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... | | | Sign Type: Permanent; Map Reference: SIX Maps; Scale: 1:500 | |

Altroad Group Pty Ltd

Client: AWJ

Project Description: Light Horse Business Hub Stage 1

Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766

Drawing No: ARG 21-1758 TGS

Issue Date: 07/02/2022

Allroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- Barrier End Treatments
- Concrete Barriers
- Work Area

**Compliance Notes:**

1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

| REVISION | REV | Description |
|---|---|---|
| | 00 | sent to client |
| | 01 | Rev. 2 |

| | |
|---|---|
| Review Date: | 07/03/2022 |
| ROL No: | Not Applied |
| Sign Type: | Permanent |
| Type of TTM: | Static Works |
| Duration: | Long Term |
| TTM Set-up: | Lateral Shift |
| Shift TTM Inspections: | after installation -> everyday |
| Speed Limit: | 60km/h & |
| Traffic Volume: 724 AM Peak 816 PM Peak | Est. Queue Length: N/A |
| Map Reference: | SIX Maps |
| Scale: | 1:500 |

Client: AWJ

Project Description: Light Horse Business Hub Stage 2

Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766

| Drawing No: | Issue Date: |
|---|---|
| ARG 21-1759 TGS | 07/02/2022 |

Designed by: Ronak Gandhi
Qualification No: TCT 0063633
Role: Traffic Planner
Signature:
Implementer Name: .....
Implementer Qualification No: TCT.....

Allroad Group Pty Ltd

**Legend:**

- Barrier End Treatments
- Concrete Barriers
- Vehicle Egress
- Vehicle Ingress
- Work Area

**Compliance Notes:**

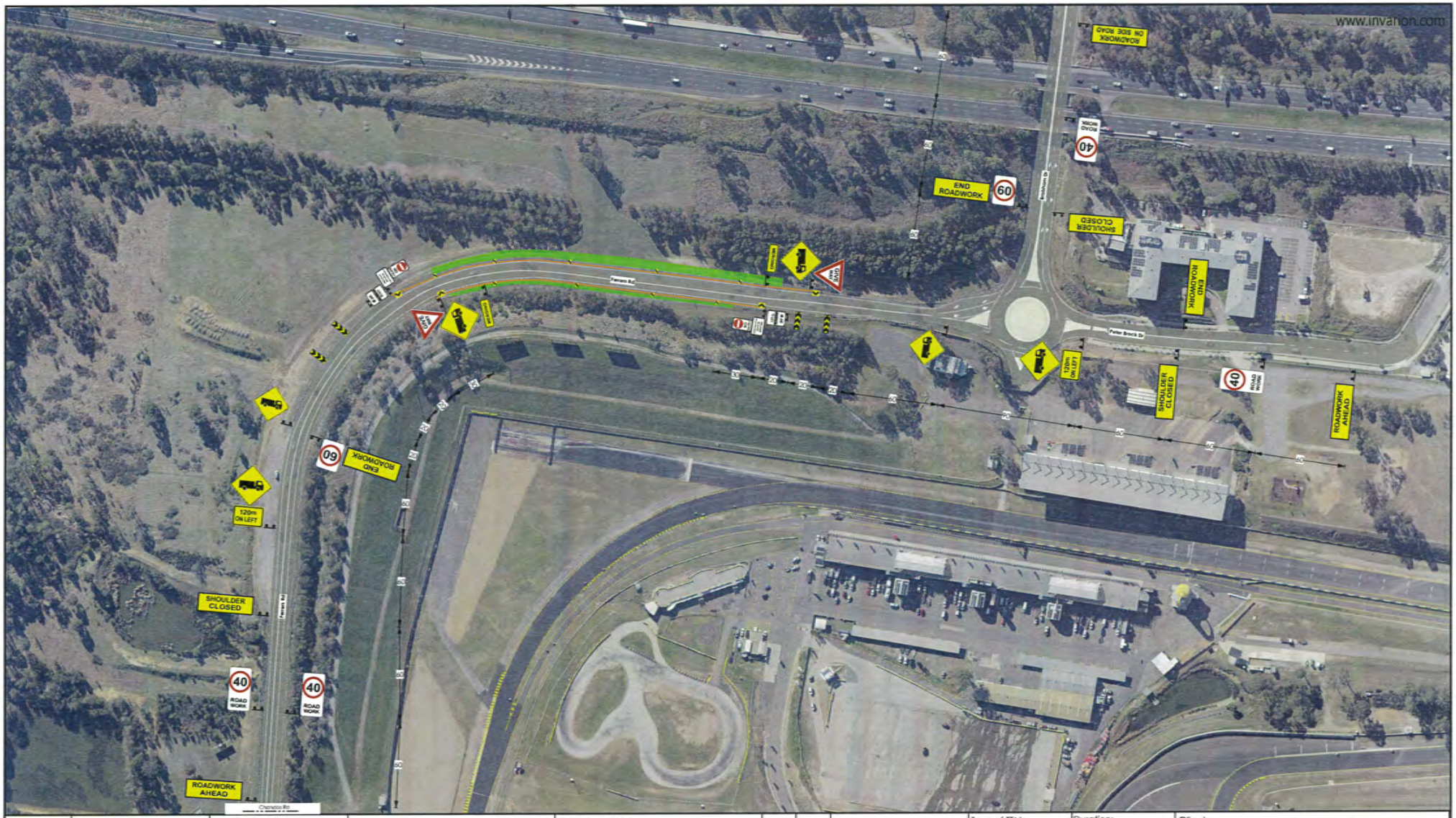
1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

| REVISION | REV | Description |
|---|---|---|
| | 00 | sent to client |
| | 01 | Rev. 2 |

Review Date: 07/03/2022
ROL No: Not Applied
Sign Type: Permanent

Type of TTM: Static Works
Duration: Long Term
TTM Set-up: Vehicle Movement Plan
Shift TTM Inspections: after installation -> everyday
Speed Limit: 60km/h &
Traffic Volume: 724 AM Peak, 816 PM Peak
Est. Queue Length: N/A
Map Reference: SIX Maps
Scale: 1:500

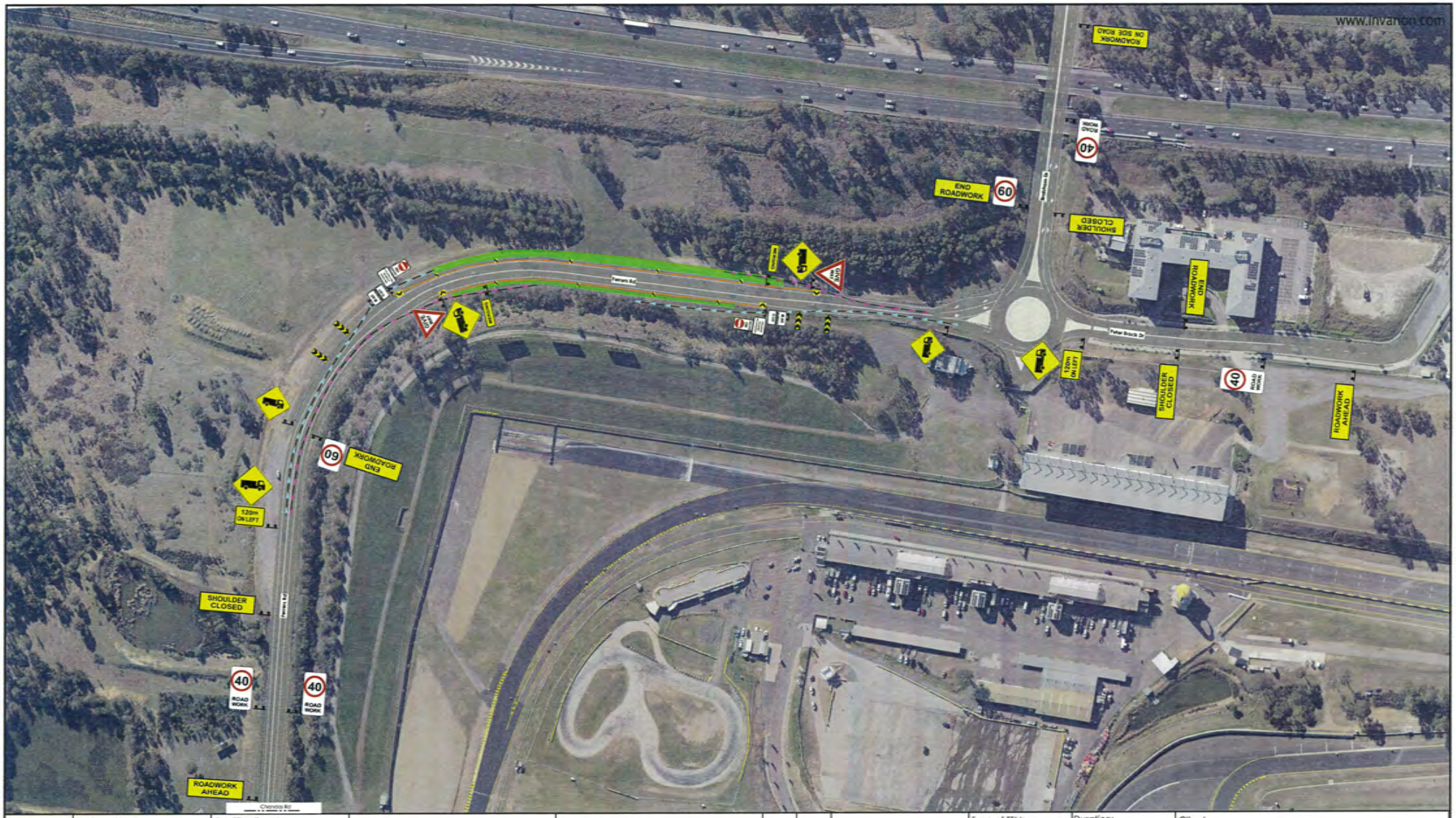
Client: AWJ
Project Description: Light Horse Business Hub Stage 2
Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766
Drawing No: ARG 21-1760 TGS
Issue Date: 07/02/2022




| | | | | | |
|---|---|---|---|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 | **Legend:** Concrete Barriers; Work Area | **Compliance Notes:** 1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019 2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3 3. Sign Spacing Austroads TTM, Part 3: Table 2.2 4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3 5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13 6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4 7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2 | REVISION | REV: 00 sent to client; 01 Rev. 2 | Type of TTM: Static Works | Duration: Long Term |
| Role: Traffic Planner | | | | TTM Set-up: Shoulder Closure | |
| Signature: | | | | Shift TTM Inspections: after installation -> everyday | |
| | | | | Review Date: 07/03/2022 | Speed Limit: 60km/h & |
| Implementer Name: ..... | Implementer Qualification No: TCT..... | | | ROL No: Not Applied | Traffic Volume: 724 AM Peak, 816 PM Peak — Est. Queue Length: N/A |
| | | | | Sign Type: Permanent | Map Reference: SIX Maps — Scale: 1:500 |

Allroad Group Pty Ltd

| | |
|---|---|
| Client: AWJ | |
| Project Description: Light Horse Business Hub Stage 3 | |
| Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766 | |
| Drawing No: ARG 21-1761 TGS | Issue Date: 07/02/2022 |




Allroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- Concrete Barriers
- Vehicle Egress
- Vehicle Ingress
- Work Area

**Compliance Notes:**

1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

| REVISION | REV | Description |
|---|---|---|
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| | 01 | Rev. 2 |

| | |
|---|---|
| Review Date: | 07/03/2022 |
| ROL No: | Not Applied |
| Sign Type: | Permanent |

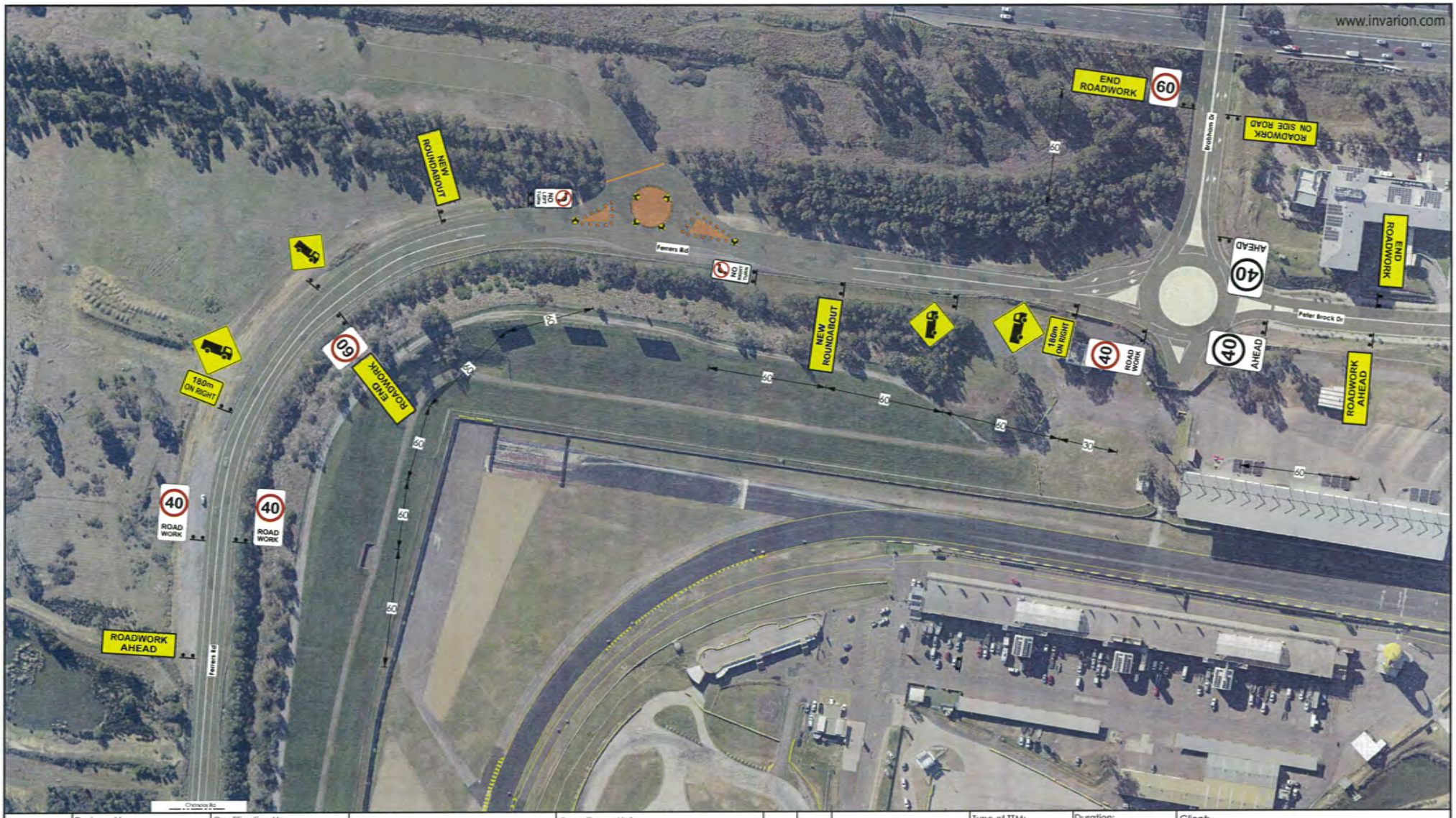
| | | |
|---|---|---|
| Type of TTM: Static Works | Duration: Long Term | |
| TTM Set-up: Vehicle Movement Plan | | |
| Shift TTM Inspections: after installation -> everyday | | |
| Speed Limit: 60km/h & | | |
| Traffic Volume: 724 AM Peak, 816 PM Peak | Est. Queue Length: N/A | |
| Map Reference: SIX Maps | Scale: 1:500 | |

Client: AWJ

Project Description: Light Horse Business Hub Stage 3

Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766

| Drawing No: | Issue Date: |
|---|---|
| ARG 21-1762 TGS | 07/02/2022 |




| | | | | | |
|---|---|---|---|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 | **Legend:** | **Compliance Notes:** | **REVISION** | |
| Role: Traffic Planner | | ● Bollard<br>▬ Concrete Barriers<br>● T - Top Bollard<br>▭ Water Filled Barrier<br>▭ Work Area | 1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019<br>2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3<br>3. Sign Spacing Austroads TTM, Part 3: Table 2.2<br>4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3<br>5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13<br>6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4<br>7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2 | REV: 00 — Description: sent to client<br>REV: 01 — Description: Rev. 2 | Type of TTM: Static Works<br>Duration: Long Term<br>TTM Set-up: Outside Work Hours<br>Shift TTM Inspections: after installation -> everyday |
| Signature: | | | | Review Date: 07/03/2022 | Speed Limit: 60km/h & |
| Implementer Name: ..... | Implementer Qualification No: TCT..... | | | ROL No: Not Applied | Traffic Volume: 724 AM Peak 816 PM Peak<br>Est. Queue Length: N/A |
| | | | | Sign Type: Permanent | Map Reference: SIX Maps<br>Scale: 1:500 |

Allroad Group Pty Ltd

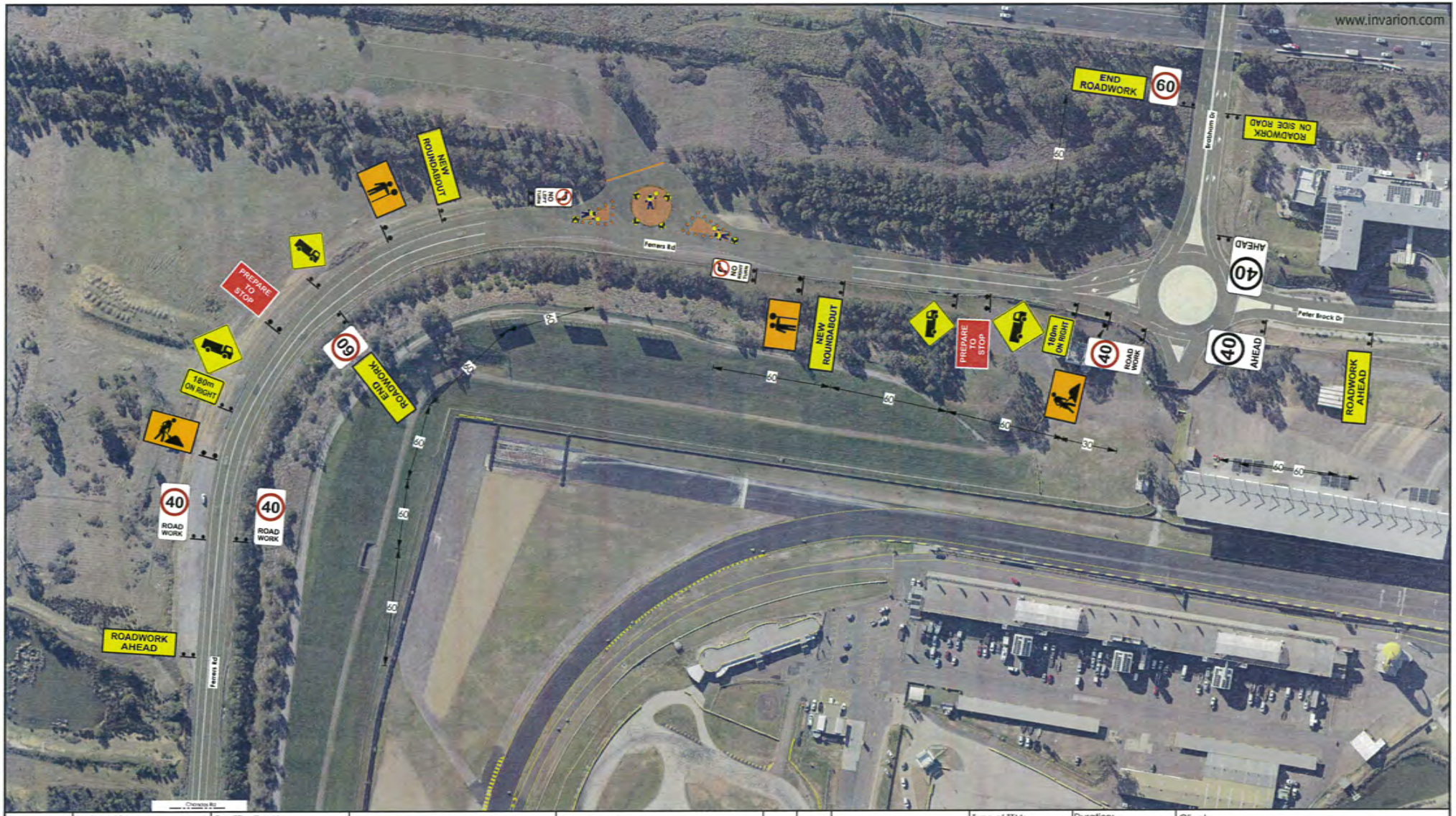
Client: AWJ

Project Description: Light Horse Business Hub Stage 4 (Outside Work Hours)

Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766

Drawing No: ARG 21-1763 TGS

Issue Date: 07/02/2022




Allroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- 3x Traffic Controllers
- Bollard
- Concrete Barriers
- T - Top Bollard
- Water Filled Barrier
- Work Area

**Compliance Notes:**

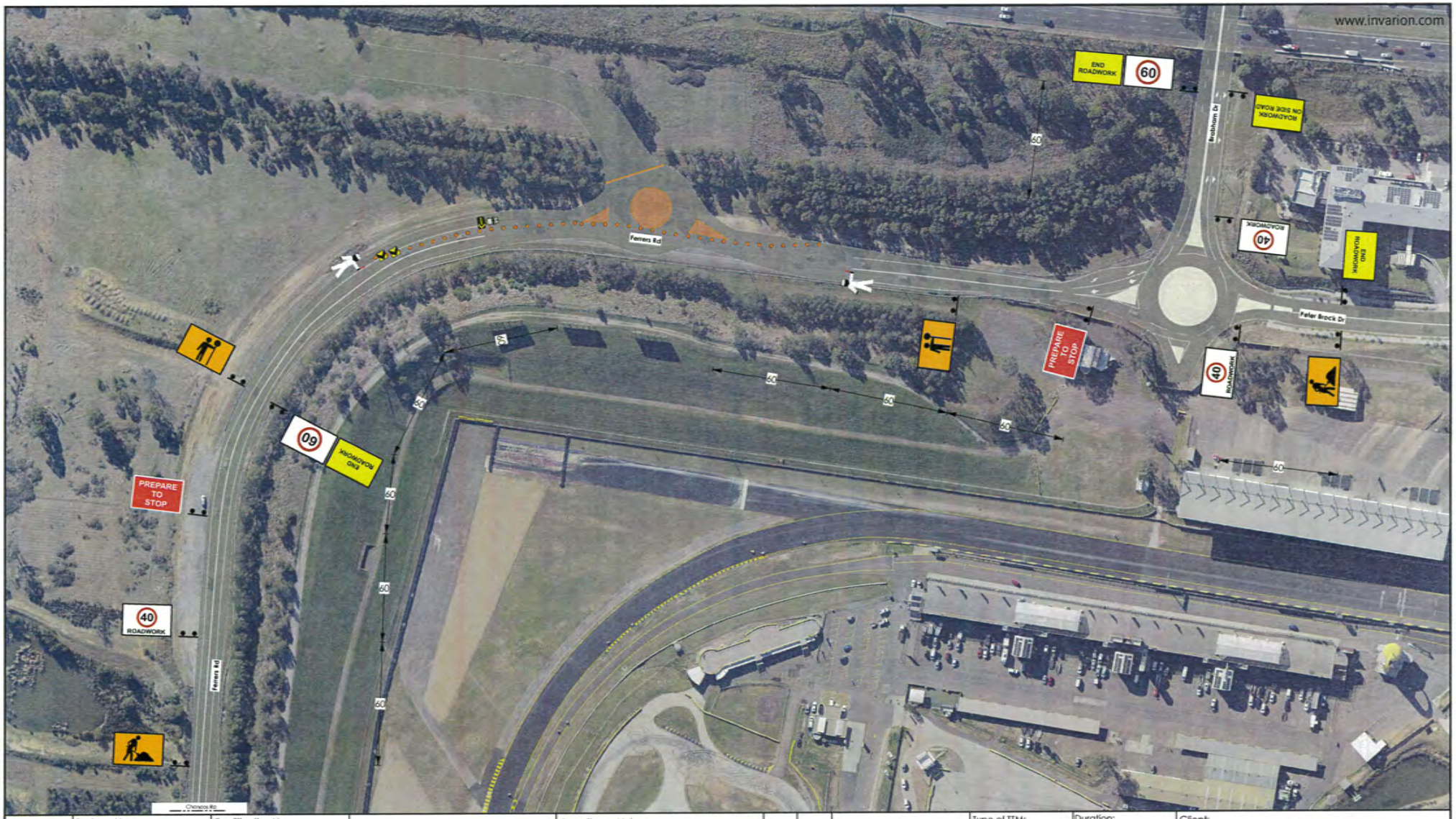
1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

**REVISION**

| REV | Description |
|---|---|
| 00 | sent to client |
| 01 | Rev. 2 |

| | |
|---|---|
| Review Date: | 07/03/2022 |
| ROL No: | Not Applied |
| Sign Type: | Permanent |
| Type of TTM: | Static Works |
| Duration: | Long Term |
| TTM Set-up: | Within Work Hours |
| Shift TTM Inspections: | after installation -> everyday |
| Speed Limit: | 60km/h & |
| Traffic Volume: (724 AM Peak, 816 PM Peak) | |
| Est. Queue Length: | N/A |
| Map Reference: | SIX Maps |
| Scale: | 1:500 |

| | |
|---|---|
| Client: | AWJ |
| Project Description: | Light Horse Business Hub Stage 4 (Within Work Hours) |
| Work Location: | 475 Ferrers Rd, Eastern Creek, NSW 2766 |
| Drawing No: | ARG 21-1767 TGS |
| Issue Date: | 07/02/2022 |




Allroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: | |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- Concrete Barriers
- Cones
- Work Area

**Compliance Notes:**

1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

| REVISION | REV | Description |
|---|---|---|
| | 00 | sent to client |
| | 01 | Rev. 2 |

| | |
|---|---|
| Review Date: | 07/03/2022 |
| ROL No: | Not Applied |
| Sign Type: | Permanent |

| | | |
|---|---|---|
| Type of TTM: Static Works | Duration: Long Term | |
| TTM Set-up: Stop/ Slow Control | | |
| Shift TTM Inspections: after installation -> everyday | | |
| Speed Limit: 60km/h & | | |
| Traffic Volume: 724 AM Peak 816 PM Peak | Est. Queue Length: N/A | |
| Map Reference: SIX Maps | Scale: 1:500 | |

| | |
|---|---|
| Client: AWJ | |
| Project Description: Light Horse Business Hub Stage 5 | |
| Work Location: 475 Ferrers Rd, Eastern Creek, NSW 2766 | |
| Drawing No: ARG 21-1767 TGS | Issue Date: 07/02/2022 |

Allroad Group Pty Ltd

| | |
|---|---|
| Designed by: Ronak Gandhi | Qualification No: TCT 0063633 |
| Role: Traffic Planner | |
| Signature: R.H.Gandhi | N |
| Implementer Name: ..... | Implementer Qualification No: TCT..... |

**Legend:**

- Vehicle Egress

**Compliance Notes:**

1. All TGSs in accordance with TM - TCWS V6.0 & Austroads Guide to Temporary Traffic Management 2019
2. Recommended Taper Lengths TM - TCWS V6.0, Table 7-3
3. Sign Spacing Austroads TTM, Part 3: Table 2.2
4. Recommended Sight Distances to Devices Austroads TTM, Part 3: Table 2.3
5. Traffic Controller min. Sight Distance TM - TCWS V6.0, Table 5-13
6. Estimated Queue Length & Sign Spacing Austroads TTM, Part 3: Table 4.3 & 4.4
7. Cone and Bollard spacing TM - TCWS V6.0, Table 6-2

**REVISION**

| REV | Description |
|---|---|
| 00 | sent to client |
| 01 | |

| | |
|---|---|
| Review Date: | 03/04/2022 |
| ROL No: | N/A |
| Sign Type: | Permanent |
| Type of TTM: | Static Works |
| Duration: | Long Term |
| TTM Set-up: | Heavy Vehicle Movements |
| Shift TTM Inspections: | after installation -> everyday |
| Speed Limit: | 60km/h |
| Traffic Volume: 724 AM Peak 816 PM Peak | |
| Est. Queue Length: | N/A |
| Map Reference: | SIX Maps |
| Scale: | 1:500 |

| | |
|---|---|
| Client: | AWJ |
| Project Description: | LHBH |
| Work Location: | 475 Ferrers Rd, Eastern Creek, NSW 2766 |
| Drawing No: | ARG 22-314 TGS |
| Issue Date: | 03/03/2022 |

# Annexure E- Construction Noise and Vibration Plan

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# LIGHT HORSE BUSINESS HUB

## Construction Noise and Vibration Management Plan

**Prepared for:**

Charter Hall
Level 20, 1 Martin Place
Sydney NSW 2000

SLR Ref: 610.30501-R01
Version No: -v1.0
October 2021

# PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

# BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Charter Hall (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

# DOCUMENT CONTROL

| Reference | Date | Prepared | Checked | Authorised |
|---|---|---|---|---|
| 610.30501-R01-v1.0 | 8 October 2021 | Steven Luzuriaga<br>Joshua Ridgway | Aaron Miller | Aaron Miller |
| | | | | |
| | | | | |
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Appendix A Acoustic Terminology

# 1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Charter Hall to prepare a Construction Noise and Vibration Management Plan (CNVMP) for construction works associated with the development of the Light Horse Business Hub (LHBH) located adjacent to the Light Horse Interchange in Eastern Creek, NSW.

The CNVMP addresses the potential noise and vibration impacts associated with the construction of the development and details the mitigation and management procedures for dealing with potential impacts. Construction noise and vibration impacts were previously assessed for Western Sydney Parklands Trust (WSPT) as part of the *Light Horse Interchange Business Hub SSDA Noise Impact Assessment* prepared by SLR in March 2019 (the NIA).

This CNVMP was prepared by a suitably qualified and experienced acoustics consultant and member of the Australian Acoustical Society (MAAS). SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC). Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in **Appendix A**.

# 2 Development Overview

The development site is located to the southeast of the Light Horse Interchange, adjacent to the M4 and M7 Motorways. The development will consist of twelve warehouses situated across seven lots, along with associated offices, hardstands, parking and landscaping.

The development site is surrounded primarily by other commercial/industrial estates, along with the Sydney Motorsport Park to the east. A small number of isolated residential receivers are located to the north of the development site adjacent to Pikes Lane on Western Sydney Parkland Trusts land, and a suburban residential area is located to the northwest.

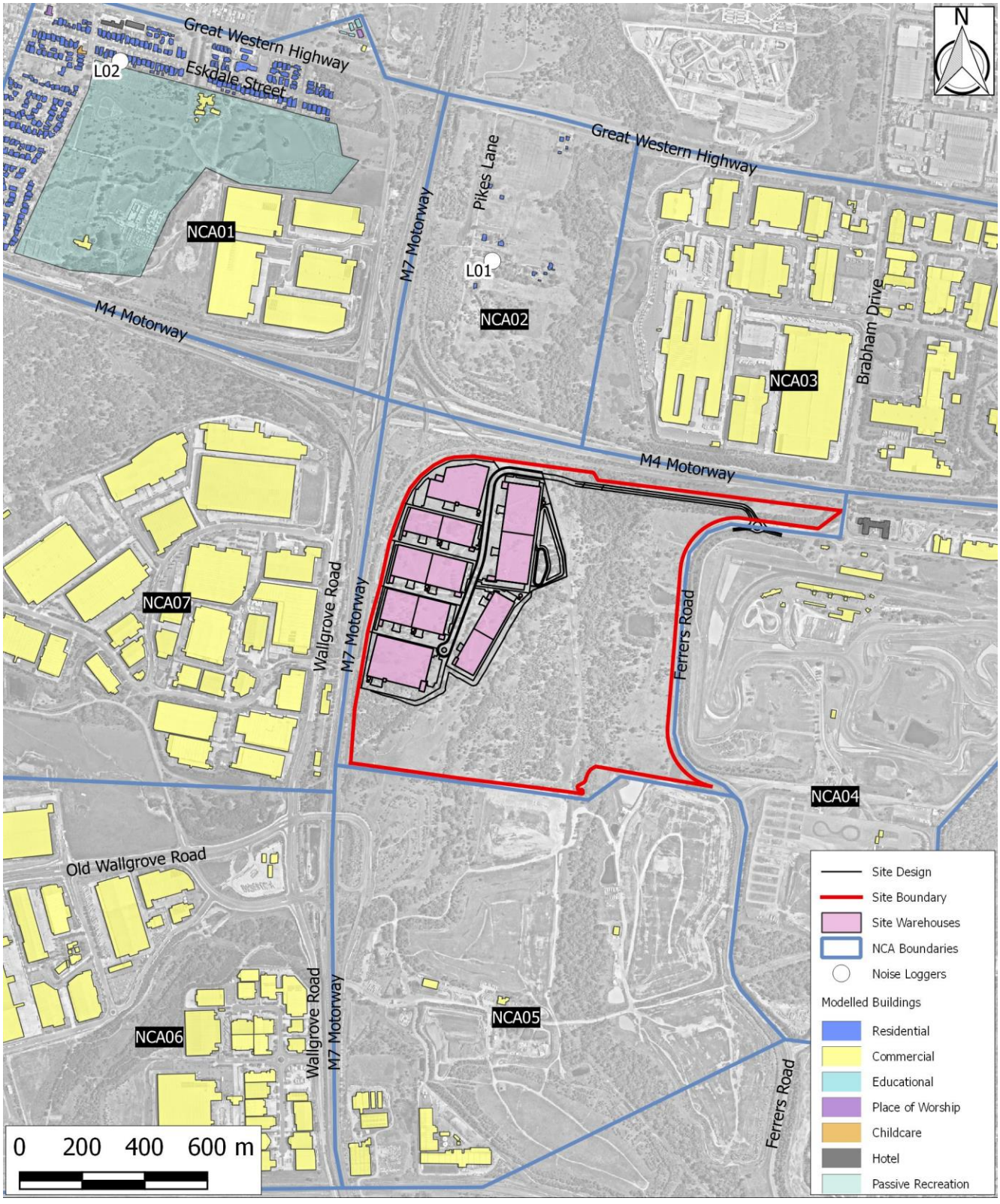
The project would allow for the future use of the site as a business hub with industrial, warehousing and distribution centre land uses. The project includes:

- establishment of up to 165,500 $m^2$ of gross floor area for general industrial, light industrial, warehouse and distribution centres and ancillary office land uses; and
- conceptual development levels, footprints and building envelopes for Lots 1-7, roads, parking, site access and landscape design.

The Concept Proposal for LHBH obtained Development Consent (SSD 9667), on 31 August 2020 from the Department of Planning, Industry and Environment (DPIE). The locations of the development, surrounding receivers and noise catchment areas (NCA) are shown in **Figure 1**.

In accordance with condition B21, construction of any relevant stage of works must not commence until this CNVMP is approved by the Planning Secretary.

## Figure 1 Development Location and Sensitive Receivers Areas



# 3 Statutory Requirements

This CNVMP has been prepared to accompany the Construction Environmental Management Plan (CEMP) for the development of the LHBH. The conditions of consent, standards and guidelines relevant to this CNVMP are outlined in the following sections.

## 3.1 Development Consent

Conditions for the LHBH are specified in the DPIE Development Consent SSD 9667, dated 31 August 2020. The conditions relevant to this CNVMP are in Schedule 3 of SSD 9667, and are reproduced in **Table 1**.

**Table 1 Development Consent Conditions**

<table>
<tr><th>Development Consent</th><th>Comments</th></tr>
<tr><td colspan="2">Noise</td></tr>
<tr><td>Hours of Work<br>B17. The Applicant must comply with the hours detailed in Table 3, unless otherwise agreed in writing by the Planning Secretary.<br>Table 3 Hours of Work
<table>
<tr><th>Activity</th><th>Day</th><th>Time</th></tr>
<tr><td>Earthworks and Construction</td><td>Monday – Friday<br>Saturday</td><td>7 am to 6 pm<br>8 am to 1 pm</td></tr>
</table></td><td>Refer to Section 6.2</td></tr>
<tr><td>B18. Works outside of the hours identified in condition B17 may be undertaken in the following circumstances:<br>a) works that are inaudible at the nearest sensitive receivers;<br>b) works agreed to in writing by the Planning Secretary;<br>c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or<br>d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.</td><td>Refer to Section 6.2</td></tr>
<tr><td>Construction Noise Limits<br>B19. The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in the Appendix 2.</td><td>Refer to Section 5.1</td></tr>
</table>

| Development Consent | Comments |
|---|---|
| **Construction Noise and Vibration Management Plan** | |
| B20. The Applicant must prepare a Construction Noise and Vibration Management Plan for the Stage 1 development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must:<br>a) be prepared by a suitably qualified and experienced noise expert;<br>b) be approved by the Planning Secretary prior to the commencement of construction of each stage of the Stage 1 development;<br>c) describe procedures for achieving the noise management levels in EPA's *Interim Construction Noise Guideline* (DECC, 2009) (as may be updated or replaced from time to time);<br>d) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;<br>e) include strategies that have been developed with the community for managing high noise generating works;<br>f) describe the community consultation undertaken to develop the strategies in condition B20(e); and<br>g) include a complaints management system that would be implemented for the duration of the development. | **This CNVMP**<br>Refer to **Section 1**<br>Refer to **Section 2**<br>Refer to **Section 7**<br>Refer to **Section 7**<br>Refer to **Section 7**<br>Refer to **Section 7** and Appendix B<br>Refer to **Section 9** |
| B21. The Applicant must:<br>a) not commence construction of any relevant stage until the Construction Noise and Vibration Management Plan required by condition B20 is approved by the Planning Secretary; and<br>b) implement the most recent version of the Construction Noise and Vibration Management Plan approved by the Planning Secretary for the duration of construction. | Refer to **Section 2**<br>Refer to **Section 13** |
| B22. Vibration caused by construction at any residence or structure outside the site must be limited to:<br>a) for structural damage, the latest version of *DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures* (German Institute for Standardisation, 1999); and<br>b) for human exposure, the acceptable vibration values set out in the *Environmental Noise Management Assessing Vibration: a technical guideline* (DEC, 2006) (as may be updated or replaced from time to time). | Refer to **Section 5.4** |
| B23. The limits in conditions B22 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan, approved as part of the CEMP required by condition C2 of this consent. | Refer to **Section 5.4** |

| Development Consent | Comments |
|---|---|
| **Environmental Management** | |
| **Management Plan Requirements**<br>C1. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:<br>a) detailed baseline data;<br>b) details of:<br>(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);<br>(ii) any relevant limits or performance measures and criteria; and<br>(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;<br>c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;<br>d) a program to monitor and report on the:<br>(i) impacts and environmental performance of the development; and<br>(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;<br>e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;<br>f) a program to investigate and implement ways to improve the environmental performance of the development over time;<br>g) a protocol for managing and reporting any:<br>(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);<br>(ii) complaint;<br>(iii) failure to comply with statutory requirements; and<br>h) a protocol for periodic review of the plan.<br>*Note: the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans* | **This CNVMP**<br>Refer to **Section 4**<br>Refer to **Section 3**<br>Refer to **Section 5**<br>Refer to **Section 7**<br>Refer to **Section 8**<br>Refer to **Section 10**<br>Refer to **Section 13**<br>Refer to **Section 9** and **Section 10**<br>Refer to **Section 13** |
| **Appendices** | |
| **Appendix 2 - Noise Impacts**<br>1. Management measures, source control, path controls and receptor control measures will be incorporated into the Construction Management Plan (CMP) to minimise noise emissions and avoid unacceptable impacts. | Refer to **Section 7** |
| **Appendix 4 – Noise Receiver Locations** | Refer to **Figure 1** |

## 3.2 Relevant Standards and Guidelines

The standards and guidelines relevant to the development are listed in **Table 2**. The guidelines aim to protect the community and environment from excessive noise and vibration impacts that may result from construction of the development.

**Table 2 Construction Noise and Vibration Standards and Guidelines**

| Guideline/Policy Name | Where Used |
|---|---|
| Environment Protection Authority (EPA) (2009) *Interim Construction Noise Guideline* (ICNG) | Assessment of noise impacts on sensitive receivers. |
| Roads and Maritime Services (2016) *Construction Noise and Vibration Guideline* (CNVG) | Assessment and management protocols for noise and vibration impacts. |
| Environment Protection Authority (EPA) (2006) *Assessing Vibration: a technical guideline* | Assessment of vibration impacts on sensitive receivers. |
| British Standard Institution (BSI) (1993) *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* (BS 7385) | Assessment of vibration impacts (structural damage) to sensitive structures. |
| German Institute for Standardisation (Deutsches Institut für Normung) (2016) *DIN 4150 – Structural vibration - Effects of vibration on structures* (DIN 4150) | Assessment of vibration impacts (structural damage) to sensitive structures. |

# 4 Existing Noise Environment

Unattended noise monitoring was completed at the nearest residential receivers on Pikes Lane, Eastern Creek (NCA02) and Eskdale Street, Minchinbury (NCA01) in December 2018 to measure the existing ambient noise environment of the area. This baseline noise monitoring was undertaken by SLR as part of the NIA.

The measured data was processed with reference to the NSW *Noise Policy for Industry* (NPfI) and the data was filtered to remove extraneous noise events and periods affected by adverse weather conditions, based on Bureau of Meteorology automated weather station data (Horsley Park AWS 67119). A summary of the background noise monitoring locations and results are provided in **Table 3** and **Table 4**, and presented in **Figure 1**.

Further information regarding the baseline noise assessment, including methodology and detailed data is provided in the NIA.

**Table 3 Ambient Noise Monitoring Locations**

| Noise Monitoring Location ID | Location Address | Representative Receiver Area | Monitoring Dates | Location Details |
|---|---|---|---|---|
| L01 | 51 Pikes Lane, Eastern Creek | NCA02 | 6 December 2018 to 17 December 2018 | Noise logger deployed in open area adjacent to residence entrance driveway. |
| L02 | 60 Eskdale Street, Minchinbury | NCA01 | 6 December 2018 to 14 December 2018 | Noise logger deployed in rear yard (southern side) of residence. |

**Table 4 Summary of Ambient and Background Noise Levels**

| Location ID | Address | Measured Noise Level (dBA)[1] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Daytime | | Evening | | Night-time | |
| | | RBL | LAeq | RBL | LAeq | RBL | LAeq |
| L01 | 51 Pikes Lane, Eastern Creek | 47 | 52 | 47 | 51 | 41 | 52 |
| L02 | 60 Eskdale Street, Minchinbury | 41 | 50 | 43 | 50 | 38 | 46 |

Note 1: The Rating Background Levels (RBLs) and Ambient (LAeq) noise levels have been obtained from the measured data using the calculation procedures outlined in the NPfI.

Note 2: NPfI time periods – Day: 7:00 am to 6:00 pm Monday to Saturday, 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: the remaining periods.

# 5 Construction Noise and Vibration Criteria

## 5.1 Noise Guidelines

### 5.1.1 Interim Construction Noise Guideline

The NSW *Interim Construction Noise Guideline* (ICNG) is used to assess and manage impacts from construction noise on residences and other sensitive land uses in NSW.

The ICNG contains procedures for determining project specific Noise Management Levels (NMLs) for sensitive receivers based on the existing background noise in the area. The 'worst-case' noise levels from construction of a project are predicted and then compared to the NMLs in a 15-minute assessment period to determine the likely impact of the project.

The NMLs are not mandatory limits, however, where construction noise levels are predicted or measured to be above the NMLs, feasible and reasonable work practices to minimise noise emissions are to be investigated.

#### Residential Receivers

The ICNG approach for determining NMLs at residential receivers is shown in **Table 5**.

**Table 5 ICNG NMLs for Residential Receivers**

| Time of Day | NML $L_{Aeq(15minute)}$ | How to Apply |
|---|---|---|
| Standard Construction Hours<br>Monday to Friday<br>7:00 am to 6:00 pm<br>Saturday<br>8:00 am to 1:00 pm<br>No work on Sundays or<br>public holidays | RBL[1] + 10 dB | • The noise affected level represents the point above which there may be some community reaction to noise<br>• Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level<br>• The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly Noise Affected<br>75 dBA | • The Highly Noise Affected (HNA) level represents the point above which there may be strong community reaction to noise<br>• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account:<br>  • Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences<br>  • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |

| Time of Day | NML $L_{Aeq(15minute)}$ | How to Apply |
|---|---|---|
| Outside Standard Construction Hours | RBL + 5 dB | • A strong justification would typically be required for works outside the recommended standard hours<br>• The proponent should apply all feasible and reasonable work practices to meet the noise affected level<br>• Where all feasible and reasonable practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community. |

Note 1: The RBL is the Rating Background Level and the ICNG refers to the calculation procedures in the NSW *Industrial Noise Policy* (INP). The INP has been superseded by the NSW EPA *Noise Policy for Industry* (NPfI).

### 'Other Sensitive' Land Uses and Commercial Receivers

The ICNG NMLs for 'other sensitive' non-residential land uses are shown in **Table 6**. The ICNG references AS 2107 for criteria for other sensitive receivers which are not listed in the guideline.

### Table 6 Construction Noise Management Levels at 'Other Sensitive' Land Uses

| Land Use | Noise Management Level $L_{Aeq(15minute)}$ (Applied when the property is in use) |
|---|---|
| Classrooms at schools and other education institutions | External noise level 55 dBA[1] |
| Hospital wards and operating theatres | External noise level 55 dBA[1] |
| Places of Worship | External noise level 55 dBA[1] |
| Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants) | External noise level 65 dBA |
| Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion) | External noise level 60 dBA |
| Community centres | Refer to the recommended 'maximum' internal levels in AS 2107 for specific uses |
| Commercial | External noise level 70 dBA |
| Industrial | External noise level 75 dBA |

Note 1: External noise level derived from 45 dBA internal NML. A conservative estimate of the difference between internal and external noise levels of 10 dBA was adopted.

### Sleep Disturbance

In accordance with Condition B17, works will be undertaken during standard daytime construction hours. Where works are required during the night-time period and are approved under Condition B18, the following sleep disturbance criteria would apply.

A method for assessing sleep disturbance is contained in the NPfI. Although the NPfI sleep disturbance criteria relates to industrial noise, it is also considered relevant for reviewing potential impacts from construction noise as a screening criteria to identify the need for further assessment. The NPfI notes that a detailed maximum noise level assessment should be undertaken where a project results in night-time noise levels which exceed 52 dBA $L_{AFmax}$ or the prevailing background level plus 15 dB, whichever is the greater.

For the LHBH development, the existing night-time RBL plus 15 dB has been adopted as the sleep disturbance screening level.

### 5.1.2 NML Summary

A summary of the NMLs adopted for the project are presented below in **Table 7**. Further information regarding the NMLs is provided in the NIA.

**Table 7 Project Specific Noise Management Levels (dBA)**

| Receiver Type | NCA[2] | NML ($L_{Aeq(15minute)}$ – dBA) | | | | Sleep Disturbance Screening Level (RBL+15 dB) ($L_{Amax}$ dBA) |
|---|---|---|---|---|---|---|
| | | Standard Construction Hours (RBL+10dB) | Out of Hours[5] (RBL+5dB) | | | |
| | | Daytime | Daytime[3] | Evening | Night-time | Night-time |
| Residential | NCA01 | 51 | 46 | 46[1] | 43 | 53 |
| Residential | NCA02 | 57 | 52 | 52 | 46 | 56 |
| Educational | NCA01 | 55 | 55 (when in use) | | | - |
| Place of Worship | NCA01 | 55 | 55 (when in use) | | | - |
| Passive Recreation | NCA01 | 60 | 60 (when in use) | | | - |
| Child Care (play areas) | NCA01 | 65 (internal 55[4]) | 65 (when in use) | | | - |
| Child Care (sleep areas) | NCA01 | 50 (internal 40[4]) | 50 (when in use) | | | - |
| Hotel (sleep areas) | NCA01/04 | 50 (internal 40[4]) | 50 (when in use) | | | - |
| Commercial | Various | 70 | 70 (when in use) | | | - |
| Industrial | Various | 75 | 75 (when in use) | | | - |

Note 1: Where the evening RBL is higher than the daytime RBL, the daytime RBL has been adopted.

Note 2: No residential receivers are located in NCA03 to NCA07.

Note 3: Daytime out of hours is 7 am to 8 am and 1 pm to 6 pm on Saturday, and 8 am to 6 pm on Sunday and public holidays.

Note 4: Internal Noise level. It should be conservatively assumed that these receivers have operable windows, therefore a conservative estimate of the difference between internal and external noise levels of 10 dBA should be adopted.

Note 5: In accordance with Condition B17, works will be undertaken during standard daytime construction hours. Where out of hours works are required and are approved under Condition B18, the out of hours NMLs would apply.

## 5.2 Construction Road Traffic Noise Guidelines

The potential impacts from construction traffic on public roads are assessed under the NSW EPA *Road Noise Policy* (RNP) and Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG).

To assess noise impacts that may result from construction traffic, an initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2 dB with the addition of construction traffic at nearby residential and other sensitive receivers. Where road traffic noise levels are increased by more than 2 dBA, further assessment is required using the RNP base criteria shown in **Table 8**.

**Table 8 RNP Criteria for Assessing Construction Vehicles on Public Roads**

| Road Category | Type of Project/Land Use | Assessment Criteria (dBA) | |
|---|---|---|---|
| | | Daytime (7 am - 10 pm) | Night-time (10 pm - 7 am) |
| Freeway/ arterial/ sub-arterial roads | Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments | $L_{Aeq(15hour)}$ 60 (external) | $L_{Aeq(9hour)}$ 55 (external) |
| Local roads | Existing residences affected by additional traffic on existing local roads generated by land use developments | $L_{Aeq(1hour)}$ 55 (external) | $L_{Aeq(1hour)}$ 50 (external) |

Based on the NIA, the proposed construction traffic is predicted to result in a minimal increase (ie <1 dBA) in the overall traffic noise levels along the construction vehicle routes to the development. As such, construction traffic noise have not been addressed further in this plan.

## 5.3 Construction Ground-borne Noise Guidelines

Construction works can cause ground-borne noise impacts in nearby buildings when vibration generating equipment is in use. Vibration can be transmitted through the ground and into the structure of nearby buildings, which can then create audible noise impacts inside buildings. The ICNG provides evening and night-time ground-borne noise NMLs for residences to protect the amenity and sleep of residents. The ICNG ground-borne noise NMLs are:

- Evening $L_{Aeq(15minute)}$ 40 dBA
- Night-time $L_{Aeq(15minute)}$ 35 dBA

The NMLs only apply where internal ground-borne noise levels are higher than noise transmitted through the air. This situation can occur where buildings near to construction works have high performing facades which attenuate the airborne component or where sensitive internal areas do not have facades which face the construction works.

The majority of receivers are sufficiently distant from the works for ground-borne noise impacts to be minimal. Due to the surface nature of the construction works for the development, airborne noise levels would typically be dominant over the ground-borne component where receivers are located near to construction works. As such, ground-borne noise has not been addressed further in this plan.

## 5.4 Vibration Guidelines

The effects of vibration from construction works can be divided into three categories:

- Those in which the occupants of buildings are disturbed (human comfort)
- Those where building contents may be affected (building contents)
- Those where the integrity of the building may be compromised (structural or cosmetic damage).

### 5.4.1 Human Comfort Vibration

People can sometimes perceive vibration impacts when vibration generating construction works are located close to occupied buildings.

Vibration from construction works tends to be intermittent in nature and the EPA's *Assessing Vibration: a technical guideline* (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The 'preferred' and 'maximum' VDVs for human comfort impacts are shown in **Table 9**.

**Table 9 Vibration Dose Values for Intermittent Vibration**

| Building Type | Assessment Period | Vibration Dose Value[1] ($m/s^{1.75}$) | |
|---|---|---|---|
| | | Preferred | Maximum |
| Critical Working Areas (eg operating theatres or laboratories) | Day or night-time | 0.10 | 0.20 |
| Residential | Daytime | 0.20 | 0.40 |
| | Night-time | 0.13 | 0.26 |
| Offices, schools, educational institutions and places of worship | Day or night-time | 0.40 | 0.80 |
| Workshops | Day or night-time | 0.80 | 1.60 |

Note 1: The VDV accumulates vibration energy over the daytime and night-time assessment periods, and is dependent on the level of vibration as well as the duration.

### 5.4.2 Effects on Building Contents

People perceive vibration at levels well below those likely to cause damage to building contents. For most receivers, the human comfort vibration criteria are the most stringent and it is generally not necessary to set separate criteria for vibration effects on typical building contents.

Exceptions to this can occur when vibration sensitive equipment, such as electron microscopes, are located in buildings near to construction works. No such items of equipment have been identified in the project area.

### 5.4.3 Structural and Cosmetic Damage Vibration

If vibration from construction works is sufficiently high it can cause damage to structural elements of affected buildings. The levels of vibration required to cause cosmetic damage tend to be at least an order of magnitude (10 times) higher than those at which people can perceive vibration.

Examples of damage that can occur includes cracks or loosening of drywall surfaces, cracks in supporting columns and loosening of joints. Structural damage vibration limits are contained in British Standard BS 7385 and German Standard DIN 4150. In accordance with condition B22 the German Standard DIN 4150 have been adopted for the LHBH development.

#### *DIN 4150*

German Standard DIN 4150 provides guideline vibration limits for different buildings and buried pipework. Damage is not expected to occur where the values are complied with and the values are generally recognised to be conservative. The DIN 4150 values for buildings and structures are shown in **Table 10**.

**Table 10 DIN 4150 Guideline Values for Short-term Vibration on Structures**

| Group | Type of Structure | Guideline Values Vibration Velocity (mm/s) | | | | |
|---|---|---|---|---|---|---|
| | | Foundation, All Directions at a Frequency of | | | Topmost Floor, Horizontal | Floor Slabs, Vertical |
| | | 1 to 10 Hz | 10 to 50 Hz | 50 to 100 Hz | All frequencies | All frequencies |
| 1 | Buildings used for commercial purposes, industrial buildings and buildings of similar design | 20 | 20 to 40 | 40 to 50 | 40 | 20 |
| 2 | Residential buildings and buildings of similar design and/or occupancy | 5 | 5 to 15 | 15 to 20 | 15 | 20 |
| 3 | Structures that, because of their particular sensitivity to vibration, cannot be classified as Group 1 or 2 **and** are of great intrinsic value (e.g. heritage listed buildings) | 3 | 3 to 8 | 8 to 10 | 8 | 20[1] |

Note 1: It may be necessary to lower the relevant guideline value markedly to prevent minor damage.

The site is adjacent to the M4 and M7 motorways. DIN 4150 states that for civil engineering structures such as reinforced concrete constructions used as abutments or block foundations, a value of 80 mm/s shall be used as a guideline value, provided no hazards arise as a result of soil mechanical processes in the ground.

#### 5.4.3.1 Heritage Items

Heritage buildings and structures should be considered on a case-by-case basis but as noted in BS 7385 should not be assumed to be more sensitive to vibration, unless structurally unsound. Where a heritage building is deemed to be sensitive, the more stringent DIN 4150 Group 3 guideline values in **Table 10** can be applied.

Some Aboriginal and Non-Aboriginal heritage items have been identified in the heritage reports for the site. Where these items are not being removed or demolished as part of the project, vibration monitoring must be undertaken on structures within the minimum working distances of vibration intensive equipment.

### 5.4.4 Minimum Working Distances for Vibration Intensive Works

Minimum working distances for typical vibration intensive construction equipment are provided in the Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG) and are shown in **Table 11**. The minimum working distances are for both cosmetic damage (from BS 7385 and DIN 4150) and human comfort (from the NSW EPA Vibration Guideline). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

**Table 11 Recommended Minimum Working Distances from Vibration Intensive Equipment**

| Plant Item | Rating/Description | Minimum Distance | |
|---|---|---|---|
| | | Cosmetic Damage | Human Response (NSW EPA Guideline) |
| | | Heritage Items (DIN 4150, Group 3)[2] | |
| Vibratory Roller | <50 kN (1–2 tonne) | 11 m | 15 m to 20 m |
| | <100 kN (2–4 tonne) | 13 m | 20 m |
| | <200 kN (4–6 tonne) | 15 m | 40 m |
| | <300 kN (7–13 tonne) | 31 m | 100 m |
| | >300 kN (13–18 tonne) | 40 m | 100 m |
| | >300 kN (>18 tonne) | 50 m | 100 m |
| Small Hydraulic Hammer | 300 kg (5 to 12 t excavator) | 5 m | 7 m |
| Medium Hydraulic Hammer | 900 kg (12 to 18 t excavator) | 15 m | 23 m |
| Large Hydraulic Hammer | 1,600 kg (18 to 34 t excavator) | 44 m | 73 m |
| Vibratory Pile Driver | Sheet piles | 5 m to 40 m | 20 m |
| Piling Rig – Bored | ≤ 800 mm | 5 m | 4 m |
| Jackhammer | Hand held | 3 m | 2 m |

Note 1: Criteria reference from Roads and Maritime CNVG.

Note 2: Criteria reference from DIN 4150.

The minimum working distances are indicative and will vary depending on the particular item of equipment and local geotechnical conditions. The distances apply to cosmetic damage of typical buildings under typical geotechnical conditions.

For works with large vibratory rollers or hydraulic hammers adjacent to the M4 and M7 Motorway structures a minimum working distance of 25 m shall be applied to meet the vibration criteria detailed in DIN 4150.

# 6 Construction Works

## 6.1 Construction Activities

The NIA assessed noise impacts from general construction activities required for the development. The activities and equipment are listed in **Table 12**. Sound power levels for the typical operation of construction equipment used in the modelling have been taken from verified test data and global standards that form part of SLR's noise database.

**Table 12 Sound Power Levels for Construction Equipment**

| ID | Construction Activity | Equipment | Operating minutes in 15-min period[2] | No of items in same location | Sound Power Level LWA (dB) | |
|---|---|---|---|---|---|---|
| | | | | | Item | Activity |
| W.001 | Site Clearing and Earthworks | Dozer | 15 | 1 | 100 | 116 |
| | | Dump Truck (approx. 15 tonne) | 15 | 2 | 100 | |
| | | Excavator (25 tonne) | 15 | 1 | 102 | |
| | | Front End Loader | 15 | 1 | 112 | |
| | | Grader | 15 | 1 | 108 | |
| | | Roller – Vibratory (12 tonne)[1] | 15 | 1 | 105 | |
| W.002 | Construction of Roadways | Bitumen Spray Truck | 15 | 1 | 100 | 111 |
| | | Line Marking Plant | 15 | 1 | 98 | |
| | | Paving Machine | 15 | 1 | 104 | |
| | | Roller – Vibratory (12 tonne)[1] | 15 | 1 | 109 | |
| W.003 | Paving Works including Concrete Pours | Concrete Mixer Truck | 7.5 | 1 | 106 | 112 |
| | | Concrete Pump | 7.5 | 1 | 106 | |
| | | Concrete Vibrator | 15 | 1 | 102 | |
| | | Paving Machine | 15 | 1 | 104 | |
| | | Roller – Vibratory (12 tonne)[1] | 15 | 1 | 109 | |
| W.004 | Construction of Warehouse and Office Buildings | Elevated Working Platform | 15 | 2 | 97 | 107 |
| | | Flatbed Truck | 15 | 1 | 100 | |
| | | Hand Tools (Electric) | 15 | 4 | 96 | |
| | | Mobile Crane (100 tonne) | 15 | 1 | 101 | |
| W.005 | Landscaping and Finishing Works | Hydromulching Equipment | 15 | 1 | 97 | 102 |
| | | Skidsteer Loaders (approx. 0.5 tonne) | 15 | 1 | 97 | |
| | | Light Vehicle (Ute/4WD) | 15 | 1 | 98 | |

Note 1: In accordance with the ICNG, for activities identified as particularly annoying (such as jackhammering, rock breaking and power saw operations), a 5 dB 'penalty' is added to the source sound power level when predicting noise using the quantitative method.

Note 2: This refers to the amount of time in minutes that individual items of equipment would be in use for during the worst-case 15 minute assessment period, based on site observations. Some items of plant, such as Concrete Pumps, are not typically used in a continuous manner.

## 6.2 Hours of Construction

In accordance with Condition B17, the construction activities associated with the project will only be undertaken during the following hours:

- 7:00 am to 6:00 pm, Mondays to Fridays
- 8:00 am to 1:00 pm on Saturdays;
- at no time on Sundays or Public Holidays.

In accordance with Condition B18, works outside of the hours identified in condition B17 may be undertaken in the following circumstances:

- works that are inaudible at the nearest sensitive receivers;
- works agreed to in writing by the Planning Secretary;
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

## 6.3 Construction Noise Predictions

A summary of the NIA predicted noise levels (without additional mitigation) for each of the closest residential receivers for the various work activities is presented in **Table 13**.

A qualitative description of the NML exceedance bands is given below, noting that the impact of these potential exceedances would depend on the period in which they were to occur:

- Noise levels 1 to 10 dB above NML – impact would typically be marginal to minor
- Noise levels 11 dB to 20 dB above NML – impact would typically be moderate
- Noise levels >20 dB above NML – impact would typically be high

For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver, as the noise levels presented in this report are based on each scenario occurring at the site boundary.

**Table 13 Predicted Worst-Case Construction Airborne Noise Levels**

| NCA | Receiver Type | Period | NML | Predicted Noise Level - $L_{Aeq(15\ minutes)}$ (dBA) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | W.001 | W.002 | W.003 | W.004 | W.005 |
| NCA01 | Residential | Daytime – Standard Hours | 51 | 46 | 41 | 42 | 37 | 32 |
| | | Daytime – OOH | 46 | 46 | 41 | 42 | 37 | 32 |
| | | Evening | 46 | 46 | 41 | 42 | 37 | 32 |
| | | Night-time | 43 | 46 | 41 | 42 | 37 | 32 |
| | Childcare | When in use | 50 | 39 | 34 | 35 | 30 | <30 |
| | Educational | When in use | 55 | 43 | 38 | 39 | 34 | <30 |
| | Place of Worship | When in use | 55 | 43 | 38 | 39 | 34 | <30 |
| | Hotel | When in use | 50 | 42 | 37 | 38 | 33 | <30 |
| | Passive Recreation | When in use | 60 | 45 | 40 | 41 | 36 | 31 |
| | Commercial | When in use | 70 | 51 | 46 | 47 | 42 | 37 |
| NCA02 | Residential | Daytime – Standard Hours | 57 | 55 | 50 | 51 | 46 | 41 |
| | | Daytime – OOH | 52 | 55 | 50 | 51 | 46 | 41 |
| | | Evening | 52 | 55 | 50 | 51 | 46 | 41 |
| | | Night-time | 46 | 55 | 50 | 51 | 46 | 41 |
| NCA03 | Commercial | When in use | 70 | 61 | 56 | 57 | 52 | 47 |
| NCA04 | Hotel | When in use | 50 | 58 | 53 | 54 | 49 | 44 |
| | Commercial | When in use | 70 | 57 | 52 | 53 | 48 | 43 |
| NCA05 | Commercial | When in use | 70 | 44 | 39 | 40 | 35 | 30 |
| NCA06 | Commercial | When in use | 70 | 47 | 42 | 43 | 38 | 33 |
| NCA07 | Commercial | When in use | 70 | 56 | 51 | 52 | 47 | 42 |

Note 1: Green cell colour indicates noise levels 1 to 10 dB above NML; Yellow cell colour indicates noise levels 11 to 20 dB above NML; Red cell colour indicates noise levels >20 dB above NML.

### 6.3.1 Summary of Findings

The predicted noise levels in **Table 13** and the outcomes of the NIA identify the following:

- Construction airborne noise levels up to 58 dBA are predicted at the nearest sensitive receivers.
- No exceedances of the NMLs during daytime standard hours are predicted at any of the surrounding residential receivers during any of the works. No residential receivers are predicted to be Highly Noise Affected (>75 dBA).
- Minor exceedances of the Out of Hours NMLs of up to 9 dBA are predicted at the nearest residential receivers during W.001 (site clearing and earthworks), W.002 (construction of roadways), and W.003 (paving works including concrete pours). However, it is understood that generally these works would not be conducted outside of standard construction hours. Sleep disturbance impacts are therefore not anticipated.

- Minor exceedances of the NMLs of up to 8 dBA at the hotel in NCA04 are predicted during W.001 (site clearing and earthworks), W.002 (construction of roadways), and W.003 (paving works including concrete pours).
- No exceedances of the NMLs are predicted at other sensitive receivers during any period during any of the works.

Implementation of feasible and reasonable construction noise mitigation measures will be undertaken where exceedances of the NMLs are predicted. Construction noise and vibration mitigation measures are discussed in **Section 7**.

## 6.4 Construction Vibration

Vibration intensive items of plant proposed for use during the construction of the development would include vibratory rollers. These items of equipment are proposed to be used during site clearing and earthworks (W.001), construction of roadways (W.002), and paving works including concrete pours (W.003).

The nearest existing vibration sensitive receivers to the development construction works are commercial receivers located over 100 m to the west of the development. As such, there are no vibration sensitive receivers located within the minimum working distances outlined in **Table 11**. The separation distance between the works location and the nearest vibration sensitive receivers is considered sufficient to mitigate potential vibration generated from the site and specific vibration mitigation measures are not required.

Where large vibratory rollers or hydraulic hammers are proposed to be used within 25 m of M4 or M7 Motorway structures vibration monitoring should be undertaken to verify that vibration levels do not exceed the criteria detailed in **Section 5.4.3**. Alternatively, smaller vibratory rollers or hydraulic hammers can be used without vibration monitoring where works are more than 10 m from these structures.

As noted in **Section 5.4.3.1**, some Aboriginal and Non-Aboriginal heritage items have been identified in the heritage reports for the site. Where these items are not being removed or demolished as part of the project, vibration monitoring must be undertaken on structures within the minimum working distances of vibration intensive equipment.

# 7 Mitigation and Management Measures

The ICNG acknowledges that due to the nature of construction works it is inevitable that there will be impacts where construction is near to sensitive receivers. The impacts during construction of the project are predicted to be relatively minor. Notwithstanding, all feasible and reasonable mitigation measures will be implemented by the project to minimise the potential impacts as far as practicable. The measures relevant to the project are detailed in **Table 14**.

As detailed in **Section 6.3**, no exceedances of the NMLs during daytime standard hours are predicted at any of the surrounding residential receivers during any of the works and no receivers are predicted to be Highly Noise Affected (>75 dBA). As such, it is considered that there are no high noise generating works near sensitive receivers and consent conditions B20 e) and f) do not require specific measures to be implemented. Regardless, community notification has been undertaken in accordance with the Community Consultation and Complaints Handling section within the CEMP. A copy of the Consultation Summary Report is provided in **Appendix B**.

**Table 14 Environmental Management Controls for Construction Noise and Vibration**

| Measure | Person Responsible | Timing / Frequency | Reference / Notes |
|---|---|---|---|
| **Project Planning** | | | |
| Use quieter and less vibration emitting construction methods where feasible and reasonable. | Project Manager | Ongoing | Best practice |
| Works will be completed during standard daytime construction hours outlined in **Section 6.2**. | | | |
| Truck routes to site should be limited to major roads. | | | |
| **Scheduling** | | | |
| Respite offers should be considered where high noise and vibration generating activities are near receivers. As a guide, work should be carried out in blocks that do not exceed three hours, with a minimum respite period of one hour between each block. | Project Manager/ Communications and Community Liaison Representative | Ongoing | Best practice |
| Consult with the affected community to determine the need for respite periods. | | | |
| **Site Layout** | | | |
| Compounds and worksites will be designed to promote one-way traffic and minimise the need for vehicle reversing. | Project Manager | Ongoing | Best practice |
| Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography. | | | |
| Equipment that is noisy will be started away from sensitive receivers | | | |

| Measure | Person Responsible | Timing / Frequency | Reference / Notes |
|---|---|---|---|
| **Training** | | | |
| Training will be provided to all personnel on noise and vibration requirements for the project. Inductions and toolbox talks to be used to inform personnel of the location and sensitivity of surrounding receivers. | Project Manager | Ongoing | Best practice |
| **Plant and Equipment Source Mitigation** | | | |
| Where practicable, tonal reversing alarms (beepers) will be replaced with non-tonal alarms (squawkers) on all equipment in use (subject to occupational health and safety requirements). | Project Manager | Ongoing | Best practice |
| Noisy equipment will be sited behind structures that act as barriers, or at the greatest distance from the noise-sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise. | | | |
| Noise generating equipment will be regularly checked and effectively maintained, including checking of hatches/enclosures regularly to ensure that seals are in good condition and doors close properly against seals. | | | |
| Dropping materials from a height will be avoided. | | | |
| Loading and unloading will be carried out away from noise sensitive areas, where practicable. | | | |
| Trucks will not queue outside residential properties. Truck drivers will avoid compression braking as far as practicable. | | | |
| Truck movements will be kept to a minimum, i.e. trucks are fully loaded on each trip. | | | |
| **Screening** | | | |
| Where possible, install purpose-built screening or enclosures around long-term fixed plant that has the potential to impact nearby receivers | Project Manager | Ongoing | Best practice |
| Site layout should take advantage of existing screening from local topography, where possible. Position site huts, maintenance sheds and/or shipping containers between noisy equipment and the affected receivers. | | | |
| **Community Consultation** | | | |
| Notifications will be provided to the affected community where high impacts are anticipated or where out of hours works are required, in accordance with the CEMP. Notification will be a minimum of 24 hours. | Communications and Community Liaison Representative | Ongoing | Best practice |
| Where complaints are received, work practices will be reviewed and feasible and reasonable practices implemented to minimise any further impacts. Refer to **Section 9**. | | | |

| Measure | Person Responsible | Timing / Frequency | Reference / Notes |
|---|---|---|---|
| **Monitoring** | | | |
| Noise and/or vibration monitoring will be conducted (as appropriate) in response to any complaints received to verify that levels are not substantially above the predicted levels. | Environmental Coordinator | Ongoing | Best practice |
| Refer to **Section 8** for full details of monitoring requirements. | | | |
| **Vibration** | | | |
| If vibration generating works are required within the minimum cosmetic damage working distances and considered likely to exceed the criteria:<br>• Different construction methods with lower source vibration levels will be investigated and implemented, where feasible<br>• Attended vibration measurements will be undertaken at the start of the works to determine actual vibration levels at the item. Works will cease if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria. | Environmental Coordinator | Ongoing | Best practice |
| Where works are required within the cosmetic damage minimum working distances, building condition surveys will be completed before and after the works to ensure no cosmetic damage has occurred. | | | |

# 8 Monitoring

Construction noise and vibration impacts were previously assessed for the project as part of the NIA. Project specific NMLs have been established, as outlined in **Section 5**.

The NMLs are not mandatory limits, however, in the event construction noise levels are predicted to be above the NMLs, feasible and reasonable work practices are to be investigated to minimise noise emissions. Noise and/or vibration monitoring may be required in response to any formal complaints received to verify that levels are not substantially above the predicted levels.

Should monitoring be required in the case of receipt of a complaint regarding noise or vibration, monitoring will be conducted by suitably qualified specialists. The location and extent of attended monitoring will be determined in consultation with project staff and would be dependent on the activities taking place.

Noise monitoring will take place during the expected noisiest construction periods and be representative / indicative of any impact across all potentially affected sensitive receivers.

Vibration monitoring will be undertaken with geophones installed by an acoustic consultant at the closest points of the sensitive structure to the vibration intensive works to continuously monitor vibration for the duration of the works. Should the works location change, the geophones will be relocated to remain at the closest point of the structure to the works.

All items of acoustic and vibration instrumentation utilised will be designed to comply with applicable guidelines and carry current calibration certificates.

A monitoring report will be prepared after each monitoring survey which will be to the site manager and Charter Hall for review. Monitoring reports will be provided to the relevant regulatory authorities after review, unless otherwise agreed by the relevant regulatory authorities. Monitoring reports should include the following details, at a minimum:

- Noise/vibration monitoring/measurement locations
- Date, time and length of noise monitoring/measurements
- Weather conditions during the measurements
- Name and position of personnel undertaking measurements
- Construction activities being undertaken during measurements
- Locations of construction equipment and distance from monitoring location
- Measured $L_{Aeq}$ and $L_{Amax}$ noise levels during construction works (for each activity) along with a comparison to the predicted noise levels (noise monitoring only)
- Measured $L_{A90}$ background noise level in absence of the construction works (noise monitoring only)
- Measured vibration levels during construction works (for each activity) along with a comparison to the relevant vibration criteria (vibration monitoring only)
- Measured vibration levels and relevant details of any of exceedance of the warning vibration level or vibration limits (vibration monitoring only)
- Measured background vibration level in absence of the construction works (vibration monitoring only)
- Operator observations noting any extraneous noise/vibration sources or other points of relevance.

# 9 Complaints Management

Complaints will be able to be made via a dedicated contact telephone number which will be included on the site signage. Responses will be provided to the complainant within 24 hours.

Information recorded in the complaints register with respect to each complaint will include:

- Date and time of complaint
- Name, address and telephone number of complainant
- Nature of complaint
- Response actions taken to date.

A report of complaints will be provided to the relevant regulatory authorities every three months throughout the construction of the project, or as otherwise agreed by the relevant regulatory authorities.

Preliminary investigations into the complaint will commence within 48 hours of the complaint receipt and adequate measures to identify and manage will be considered and implemented. Where required, noise monitoring will be undertaken as per **Section 8**.

# 10 Contingency Plan

In the event that a non-compliance with the noise conditions is identified, the Contractor will implement the following Contingency Plan:

- The Contractor will report any non-compliance to the relevant regulatory authorities within five working days.
- The Contractor will identify an appropriate course of action with respect to the identified impact(s), in consultation with specialists and the relevant regulatory authorities, as necessary.
- The Contractor will notify affected landholders and tenants at the location of the exceedance within five working days and provide them with details of actions taken, including noise or vibration monitoring results (if applicable), until it can be shown that the site is complying with the noise and vibration criteria.
- The Contractor will, on request, submit the proposed course of action to the relevant regulatory authorities for approval.
- The Contractor will implement the approved course of action.

# 11 Internal Audits

Periodic internal audits will be conducted to ensure that the development consent conditions and commitments and environmental management controls outlined in this CNVMP are being properly implemented. Audit reports will be used to inform of any corrective actions.

# 12 Roles and Responsibilities

Overall roles and responsibilities relating to the project are outlined in the overarching CEMP. The key responsibilities specifically for noise and vibration management are as follows:

## 12.1 Contractor's Project Manager

- Ensuring appropriate resources are available for the implementation of this CNVMP;
- Assessing data from inspections and providing project-wide advice to ensure consistent approach and outcomes are achieved;
- Providing necessary training for project personnel to cover noise and vibration management;
- Reviewing and update of this CNVMP;
- Commissioning a suitably qualified consultant to install and maintain noise and vibration monitors and ensuring that the environmental coordinator undertakes any attended noise and vibration measurements required by this CNVMP;
- Assessing and (as required) mitigating risks of elevated noise and vibration levels before commencing works each day and ensuring that the appropriate controls are implemented and effective;
- Reviewing weather forecasts and current observations of meteorological conditions (as recorded at Horsley Park AWS);
- Ceasing works in the event of excessive noise and vibration generation due to noise enhancing weather conditions or inadequately controlled construction activities (e.g. strong winds blowing from the noise source to nearby receivers, temperature inversions, etc.); and
- In the event that a noise or vibration complaint is received, implementing the procedure outlined in **Section 9**.

## 12.2 Environmental Coordinator

- Coordinating noise and/or vibration monitoring program (as required);
- Review that control measures are working in accordance with the CNVMP; and
- Identifying and reporting noise and vibration emissions incidents.

## 12.3 All Workers on Site

- Observing any noise and vibration emission control instructions and procedures that apply to their work;
- Taking action to prevent or minimise noise and vibration emission incidents; and
- Identifying and reporting noise and vibration emission incidents.

# 13 Review and Improvement of Noise Management Plan

This CNVMP will be reviewed, and if necessary, updated in the following circumstances:

- Significant changes to the equipment, machinery and plant operated within the site.
- Where it is identified via monitoring that the performance of the project is not meeting the objectives of the CNVMP
- At the request of the relevant regulatory authority or other relevant government agency.

All employees and contractors will be informed of any revisions to the CNVMP by Site Management during toolbox talks. The most recent version of the CNVMP as approved by the Planning Secretary, will be implemented for the duration of construction works.

# APPENDIX A

Acoustic Terminology

## 1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x $10^{-5}$ Pa.

## 2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

| Sound Pressure Level (dBA) | Typical Source | Subjective Evaluation |
|---|---|---|
| 130 | Threshold of pain | Intolerable |
| 120 | Heavy rock concert | Extremely noisy |
| 110 | Grinding on steel | |
| 100 | Loud car horn at 3 m | Very noisy |
| 90 | Construction site with pneumatic hammering | |
| 80 | Kerbside of busy street | Loud |
| 70 | Loud radio or television | |
| 60 | Department store | Moderate to quiet |
| 50 | General Office | |
| 40 | Inside private office | Quiet to very quiet |
| 30 | Inside bedroom | |
| 20 | Recording studio | Almost silent |

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

## 3. Sound Power Level

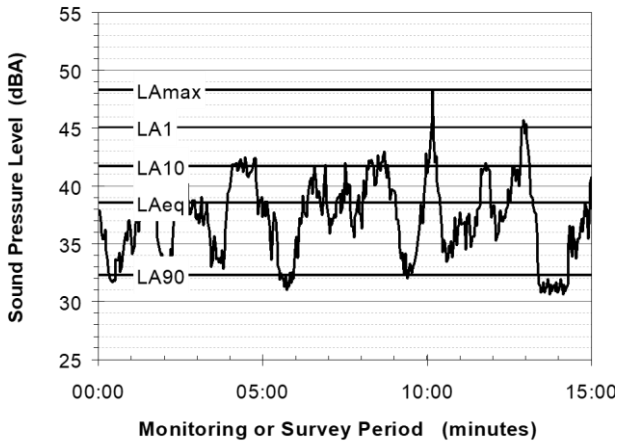
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit $10^{-12}$ W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

## 4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.




Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

## 5. Frequency Analysis

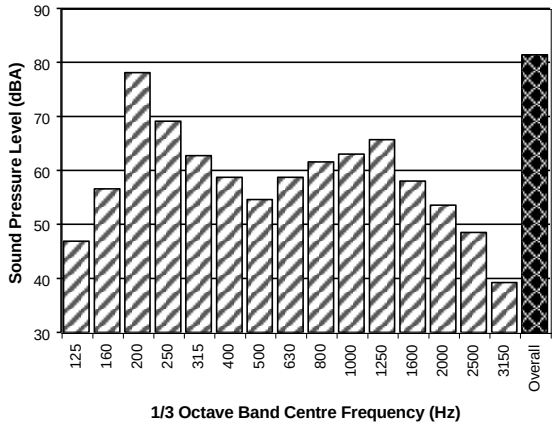
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.




## 6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

## 7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level ($10^{-9}$ m/s). Care is required in this regard, as other reference levels may be used.

## 8. Human Perception of Vibration

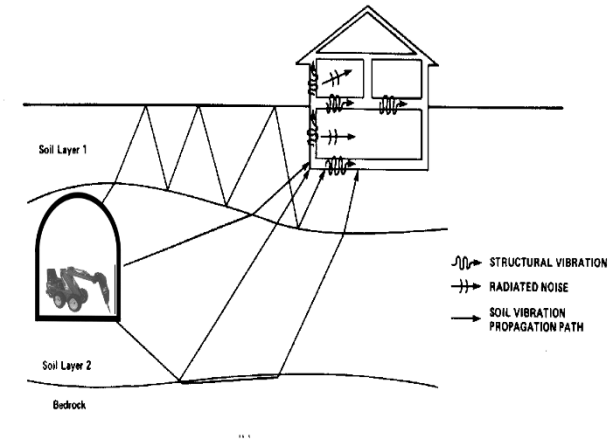
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

## 9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.




The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

# APPENDIX B

CNVMP Consultation
Summary Report

# Memorandum

| | | | |
|---|---|---|---|
| **To:** | Dane Segail | **At:** | AT&L |
| **From:** | Kate McKinnon | **At:** | SLR Consulting Australia Pty Ltd |
| **Date:** | 15 October 2021 | **Ref:** | 660.30136.00000-M01-v1.0-20211015.docx |
| **Subject:** | Light Horse Business Hub<br>CNVMP Consultation Summary Report | | |

SLR Consulting were engaged by Charter Hall (The Developer) to undertake consultation with relevant stakeholders regarding the Construction Noise and Vibration Management Plan (CNVMP) prepared for the Light Horse Interchange Business Hub, an approved development including:

A Concept Proposal for:

- establishment of up to 165,500m2 of gross floor area for general industrial, light industrial, warehouse and distribution centres and ancillary office land uses; and
- conceptual development levels, footprints and building envelopes for Lots 1-7, roads, parking, site access and landscape design.

And Stage 1 works for:

- demolition of existing structures;
- remediation of the site;
- site preparation and bulk earthworks;
- construction of road access and internal roads and installation of essential infrastructure services;
- flood and stormwater management infrastructure works; and
- subdivision of the site into 11 Torrens title lots, including seven future development lots and four lots comprising the stormwater detention basin, access road reserve and residual land to remain within Western Sydney Parklands.

The site is located at 165 Wallgrove Road & 475 Ferrers Road, Eastern Creek and is legally described as Part Lot 10 DP 1061237 and Part Lot 5 DP 804051. The development was approved under SSD 9667 with consultation on the CNVMP forming condition B20 (e) and (f) of the consent.

Conditions B20 (e) and (f) of SSD 9667 state:

*B20. The Applicant must prepare a Construction Noise and Vibration Management Plan for the Stage 1 development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must*

*…*

*(e) include strategies that have been developed with the community for managing high noise generating w orks; and*

*(f) describe the community consultation undertaken to develop the strategies in condition B20(e).*

To satisfy these conditions, SLR Consulting undertook a consultation campaign to notify and consult with potential sensitive receivers surrounding the site.

## 1 Consultation Campaign – Methodology and Outcomes

Potential receivers were identified within the CNVMP as properties within proximity to the site, including residential receivers to the north and a hotel located to the east. It is noted that the CNVMP concluded that the approved development was unlikely to result in high noise generating works that would impact on surrounding receivers, however consultation was still undertaken, taking a precautionary approach and undertaken in accordance with the Community Consultation Strategy (CCS) which forms part of the Construction Environmental Management Plan (CEMP) for the Project.

For the purposes of consultation, all properties in proximity to the site were identified as Stakeholders and were notified of the development and invited to engage via formal letter, delivered via Australia Post. Identified properties are included in **Attachment 1**. The engagement letter sought to introduce Charter Hall and SLR Consulting and their role in the approved development and provide general awareness among the local community about the proposal and specific information with respect to the CNVMP. The correspondence included a summary of the approved development, including a site plan and outlined proposed strategies to manage high noise generating works, including:

- The establishment of a construction phoneline upon commencement of works, for the receipt of comment or complaint relating to the project, with respect to noise or any other impact experienced. Phoneline details to be distributed by mail to surrounding land occupiers prior to the commencement of works.

- The notification of surrounding land occupiers of upcoming high noise generating works via letterbox drop prior to the event (noting these events are not expected to occur)

Stakeholders were invited to participate in consultation regarding the strategies and provided contact details should they have any queries with respect to the development. A copy of the engagement letter is included at **Attachment 2**.

This method of engagement was chosen as most effective for reaching geographically targeted community stakeholders given the reliability of the postal service. Alternative methods of contact (such as door knocking or community drop in sessions) were not considered given the COVID 19 Pandemic. The engagement options offered within the mail out correspondence were designed to accommodate various preferences, abilities and willingness to engage in the consultation process.

The options included phone or email address provided for written submissions. It is considered that the method of engagement was appropriate in both scale and form, allowing for the sharing of information with the raising of awareness for surrounding Stakeholders to the proposed strategies for managing high noise generating works, whilst acknowledging that these works are not expected to occur in the course of the project's construction. The approach taken provided information and avenues for comment and obtaining further information whilst respecting the privacy of surrounding landholders.

No contact or response was received from Stakeholders following the mail out campaign.

The consultation required under B20 (e) and (f) of SSD 9667 is concluded. Should you have any questions please contact the undersigned.

Kind Regards,

Kate McKinnon
Associate - SLR Consulting

Checked/
Authorised by: DT

Attachment 1: List of Mail Out Stakeholders

Attachment 2: Engagement Letter (Copy)

**Attachment 1: List of Mailout Stakeholders**

| Street Address | Suburb | State | Postcode |
|---|---|---|---|
| 1 PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 45 PIKES LANE | Eastern Creek | NSW | 2766 |
| 47 PIKES LANE | Eastern Creek | NSW | 2766 |
| 2 WONDERLAND DRIVE | Eastern Creek | NSW | 2766 |
| 65 HUNTINGWOOD DRIVE | Huntingwood | NSW | 2148 |
| 51 PIKES LANE | Eastern Creek | NSW | 2766 |
| 55 PIKES LANE | Eastern Creek | NSW | 2766 |
| 28 WALLGROVE ROAD | Minchinbury | NSW | 2770 |
| 1 WONDERLAND DRIVE | Eastern Creek | NSW | 2766 |
| 41 PIKES LANE | Eastern Creek | NSW | 2766 |
| 733 GREAT WESTERN HIGHWAY | Eastern Creek | NSW | 2766 |
| 5 PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 25 PIKES LANE | Eastern Creek | NSW | 2766 |
| 39 PIKES LANE | Eastern Creek | NSW | 2766 |
| 10 INTERCHANGE DRIVE | Eastern Creek | NSW | 2766 |
| 18 PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 10 PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 14 PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 3 ALSPEC PLACE | Eastern Creek | NSW | 2766 |
| 5 WONDERLAND DRIVE | Eastern Creek | NSW | 2766 |
| 7 WILLIAM DEAN STREET | Eastern Creek | NSW | 2766 |
| 60 WALLGROVE ROAD | Minchinbury | NSW | 2770 |
| 400 FERRERS ROAD | Eastern Creek | NSW | 2766 |
| 12A PETER BROCK DRIVE | Eastern Creek | NSW | 2766 |
| 71-73 HUNTINGWOOD DRIVE | Eastern Creek | NSW | 2766 |
| 715 GREAT WESTERN HIGHWAY | Eastern Creek | NSW | 2766 |
| 711 GREAT WESTERN HIGHWAY | Eastern Creek | NSW | 2766 |
| 100 WALLGROVE ROAD | Eastern Creek | NSW | 2766 |
| 9 INTERCHANGE DRIVE | Eastern Creek | NSW | 2766 |
| 13 INTERCHANGE DRIVE | Eastern Creek | NSW | 2766 |

5 October 2021

660.30165.00000-L01-v1.0-20211005.docx

**Attention: The Occupier**

## Community and Stakeholder Consultation - Noise and Vibration
## Light Horse Interchange Business Hub

To whom it may concern,

This letter has been prepared by SLR Consulting on behalf of Charter Hall. Charter Hall are undertaking development approved under SSD-9667 for:

A Concept Proposal for:

- establishment of up to 165,500m2 of gross floor area for general industrial, light industrial, warehouse and distribution centres and ancillary office land uses; and
- conceptual development levels, footprints and building envelopes for Lots 1-7, roads, parking, site access and landscape design.

And Stage 1 works for:

- demolition of existing structures;
- remediation of the site;
- site preparation and bulk earthworks;
- construction of road access and internal roads and installation of essential infrastructure services;
- flood and stormwater management infrastructure works; and
- subdivision of the site into 11 Torrens title lots, including seven future development lots and four lots comprising the stormwater detention basin, access road reserve and residual land to remain within Western Sydney Parklands.

At 165 Wallgrove Road & 475 Ferrers Road, Eastern Creek, legally described as Part Lot 10 DP 1061237 and Part Lot 5 DP 804051. A plan identifying the proposed development area is attached.

We are writing to you today to introduce ourselves, outline the likely noise impacts of the proposed development and identify ways you can obtain further information, raise questions or make comments.

As part of the Conditions of Consent for SSD-9667, the developer is required to prepare a Construction Noise and Vibration Management Plan (CNVMP), inclusive of strategies developed to mitigate the impact of high noise generating works on the surrounding area. In developing these strategies, Charter Hall are seeking to engage with the land users and occupiers surrounding the development. SLR Consulting have been engaged to undertake this consultation. Investigations undertaken to inform the CNVMP have revealed that the proposed development is unlikely to result in high noise generating works or impacts to the surrounding area. It is proposed however that the following strategies be adopted to manage unforeseen noise impacts arising from the development:

**SLR Consulting Australia Pty Ltd** Level 1, The Central Building, UoW Innovation Campus North Wollongong NSW 2500 Australia
**T:** +61 2 4249 1000 **E:** wollongong@slrconsulting.com
www.slrconsulting.com ABN 29 001 584 612

- The establishment of a construction phoneline upon commencement of works, for the receipt of comment or complaint relating to the project, with respect to noise or any other impact experienced. Phoneline details to be distributed by mail to surrounding land occupiers prior to the commencement of works.

- The notification of surrounding land occupiers of upcoming high noise generating works via letterbox drop prior to the event (noting these events are not expected to occur)

If you would like to provide feedback or have queries relating to the above or would like a copy of the CNVMP, please contact the undersigned utilising the following contact details:

**Contact: Kate McKinnon – Associate SLR Consulting**

**Ph: 02 4249 1010**

**Email: kmckinnon@slrconsulting.com**

Yours sincerely

KATE MCKINNON
Associate – Environmental Assessment and Management

Checked/
Authorised by: DT

Client
NSW GOVERNMENT
Western Sydney Parklands Trust

Project
Light Horse Interchange Business Hub
Eastern Creek NSW [SSD 9667]

Locality Plan

NTS@ A3/A1

DATE Sept, 2021 DRAWING NUMBER 10935_MP001[P2]

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nettletontribe

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# Annexure F– Aboriginal Cultural Heritage Plan

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EXTENT

HERITAGE ADVISORS
TO AUSTRALIA AND
THE ASIA PACIFIC

# Light Horse Interchange Business Hub, Eastern Creek, NSW (SSD 9667)

## Aboriginal Cultural Heritage Management Plan

Prepared for Western Sydney Parklands Trust

June 2021 - Version 2

Sydney
Melbourne
Brisbane
Perth

extent.com.au

## Document Control Page

CLIENT: Western Sydney Parklands Trust

PROJECT: Aboriginal Cultural Heritage Management Plan

SITE NAME: Light Horse Interchange Business Hub, Eastern Creek, NSW (SSD 9667)

| EXTENT HERITAGE PTY LTD INTERNAL REVIEW/SIGN OFF | | | | | | |
|---|---|---|---|---|---|---|
| **WRITTEN BY** | **DATE** | **VERSION** | **REVIEWED** | **EDITED** | **EDIT LEVEL** | **APPROVED** |
| Ryan Taddeucci | 10.3.21 | 1 | Madeline Shanahan | 19.3.21 | Technical/QA | 19.3.21 |
| Ryan Taddeucci | 18.6.21 | 2 | Coral Hardwick | 26.6.21 | QA and minor edits | 15.7.21 |

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## Abbreviations

| Acronyms | Glossary |
|---|---|
| ACHAR | Aboriginal Cultural Heritage Assessment Report |
| ACHMP | Aboriginal Cultural Heritage Management Plan |

| Acronyms | Glossary |
|---|---|
| AHD | Australian Height Datum |
| AHIMS | Aboriginal Heritage Information Management System |
| ASIRF | Aboriginal Site Impact Recording Forms |
| DECCW | Department of Environment Climate Change and Water (now Heritage NSW - DPC) |
| EIS | Environmental Impact Statement |
| EP&A Act | Environmental Planning and Assessment Act, 1979 |
| Heritage NSW – DPC | Heritage NSW – Department of Premier Cabinet |
| Ka | 1,000 years ago |
| MCoA | Minister's Conditions of Approval |
| NPW Act | National Parks & Wildlife Act, 1974 |
| OEH | Office of Environment and Heritage (now Heritage NSW - DPC) |
| RAP | Registered Aboriginal Party |
| SSD | State Significant Development |

# Executive Summary

Western Sydney Parklands Trust intends to redevelop part of 475 Ferrers Road, Eastern Creek and 165 Wallgrove Road, Eastern Creek (hereafter referred to as the 'subject area') to accommodate industrial and light industrial land use activities. The proposed development was determined to be a State Significant Development (SSD 9667) and was issued the Secretary's Environmental Assessment Requirements (SEARs) on 7 November 2018. In accordance with the requirements of the SEARs, Extent Heritage was commissioned by WSPT, to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) of the subject area.

The ACHAR resulted in the identification of nine Aboriginal sites registered on Aboriginal Heritage Information Management System (AHIMS) database:

- LHIBH BS (AHIMS ID 45-5-5285)
- LHIBH Eskdale Creek terrace (AHIMS ID 45-5-5283)
- LHIBH Eastern Creek terrace (AHIMS ID 45-5-5284)
- IF1 (AHIMS ID 45-5-2564)
- IF2 (AHIMS ID 45-5-2565)
- LIBH AS1 (AHIMS ID 45-5-5183)
- LIBH AS2 (AHIMS ID 45-5-5185)
- EC6 (Eastern Creek) (AHIMS ID 45-5-0756)
- WSP17 (AHIMS ID 45-5-3264)

The ACHAR assessed LHIBH Eskdale Creek terrace (AHIMS ID 45-5-5283) and LHIBH Eastern Creek terrace (AHIMS ID 45-5-5284) as being of high archaeological significance. The remaining sites were assessed as being of low archaeological significance. An assessment of impacts was completed, and it was identified that LHIBH Eastern Creek terrace (AHIMS ID 45-5-5284) would not be impacted by the proposed development. As a result, salvage excavations were recommended at LHIBH Eskdale Creek terrace (AHIMS ID 45-5-5283).

Approval for the Project was granted by the Minister for Planning and Public Spaces on 31 August 2020, under Division 4.7 of the Environmental Planning and Assessment Act 1979 (Minister's Conditions of Approval [MCoA] SSD-9667). Condition B24 of this approval notes that an Aboriginal Heritage Management Plan (ACHMP) (this document) is needed. In accordance with the recommendations of the ACHAR and the requirements of the MCoA SSD-9667 this ACHMP includes the following:

- Processes, timing, and methods for maintaining Aboriginal community consultation through the remainder of the project.
- Descriptions and procedures for development impact mitigation, including archaeological salvage, to be undertaken in advance of proposed development.
- Description and methods of post-excavation analysis of chronological, soil, and environmental samples that will be recovered as part of the archaeological mitigation of development impacts.
- Procedures for the long-term curation of Aboriginal cultural materials recovered as part of the project.
- Processes for reviewing, monitoring, and updating the ACHMP as the project progresses.

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# 1. Introduction

## 1.1 Project Description

Western Sydney Parklands Trust intends to redevelop part of 475 Ferrers Road, Eastern Creek and 165 Wallgrove Road, Eastern Creek (hereafter referred to as the 'subject area') to accommodate industrial and light industrial land use activities (Figure 1 and Figure 2). Key features of this are the demolition of existing structures and bulk earthworks, the creation of approximately 29.5 hectares of developable industrial zoned land and its associated access roads, bridge crossings, estate road, estate basin and infrastructure, as well as the realignment of Eskdale Creek. Approval for the Project was granted by the Minister for Planning and Public Spaces on 31 August 2020, under Division 4.7 of the *Environmental Planning and Assessment Act 1979* (Minister's Conditions of Approval [MCoA] SSD-9667). Condition B24 of this approval notes that an Aboriginal Heritage Management Plan (ACHMP) (this document) is needed (Table 1).

This document provides guidance on the process and management of Aboriginal cultural heritage in the post-approval phase of the Project. It further outlines the processes and timeframes associated with Aboriginal consultation, and any off-site heritage measures that may be required as part of the project.

## 1.2 Purpose of the ACHMP

The purpose of this plan is to define the rationale, policies and procedures to be implemented for management and mitigation of known, and as yet unknown, Aboriginal objects, sites and/or deposits during the construction phase of the Project.

### 1.2.1 Objectives

The overall objectives of this ACHMP are to:

- Present overall heritage management principles and guidelines for the design and construction phase of the Project;
- Summarise potential impacts on identified heritage sites arising from the Project;
- Describe how measures will be implemented to prevent or mitigate Aboriginal heritage impacts;
- Provide specific guidelines for the mitigation of known heritage sites that will be directly and indirectly impacted by the Project;
- Provide specific guidelines and procedures for unexpected finds and possible discovery of human remains;
- Provide procedures for consultation with the Aboriginal community including Registered Aboriginal Parties (RAPs) timeframes and processes; and
- Outline an effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented.
- Fulfil the requirements of the Project Approval issued by DPE (Table 1)

The draft ACHMP will be provided to the RAPs for the Project for a 21-day review period. Comments and recommendations made by the RAPs (Appendix 1) are included in this document.

Table 1. Project Approval conditions and where this report addresses them.

| Condition | Location in this Report |
|---|---|
| B24. Before the commencement of any clearing or construction works, the Applicant must prepare an ACHMP for the development to protect and manage aboriginal heritage within the site. The plan must form part of the CEMP required by Condition C2 and must: | Entire report. |
| (a) be prepared by a suitably qualified and experienced expert in consultation with the Registered Aboriginal Parties; | This report was written by Extent Heritage Pty Ltd (Document Control Page cover page for specific authorship details). Section 5.2 provides details regarding consultation with the RAPs |
| (b) be submitted to the satisfaction of the Planning Secretary prior to construction of any part of the development; | See Document Distribution and Control for details regarding this task. |
| (c) address the recommendations within the Aboriginal Cultural Heritage Assessment Report prepared by Extent Heritage dated February 2020. | The Aboriginal Cultural Heritage Assessment Report (ACHAR) (Extent Heritage 2020) recommended the preparation of this ACHMP. Therefore, this entire report has been prepared to meet this requirement. |

### 1.2.2 Approach

This ACHMP is designed to articulate how the conditions of planning approval, statements of commitment and relevant legislative requirements are to be met as design and construction of this Project occurs. The ACHMP is an operational document to guide the specific heritage mitigation measures.

## 1.3 Limitations

This report is based on existing and publicly available environmental and archaeological information, previous investigations of the study area, and the findings of the ACHAR. It did not include any independent verification of the results or interpretations of externally sourced reports (except where archaeological investigation indicated inconsistencies). The Aboriginal Heritage Information Management System (AHIMS) data was provided to Extent Heritage by Heritage NSW – Department of Premier Cabinet (DPC). Information in the archaeological assessment report reflects the scope and the accuracy of the AHIMS site data, which in some instances is limited.

This report does not address historical archaeological heritage, built heritage or landscape components (Condition B28 and B29 of MCoA SSD-9667).

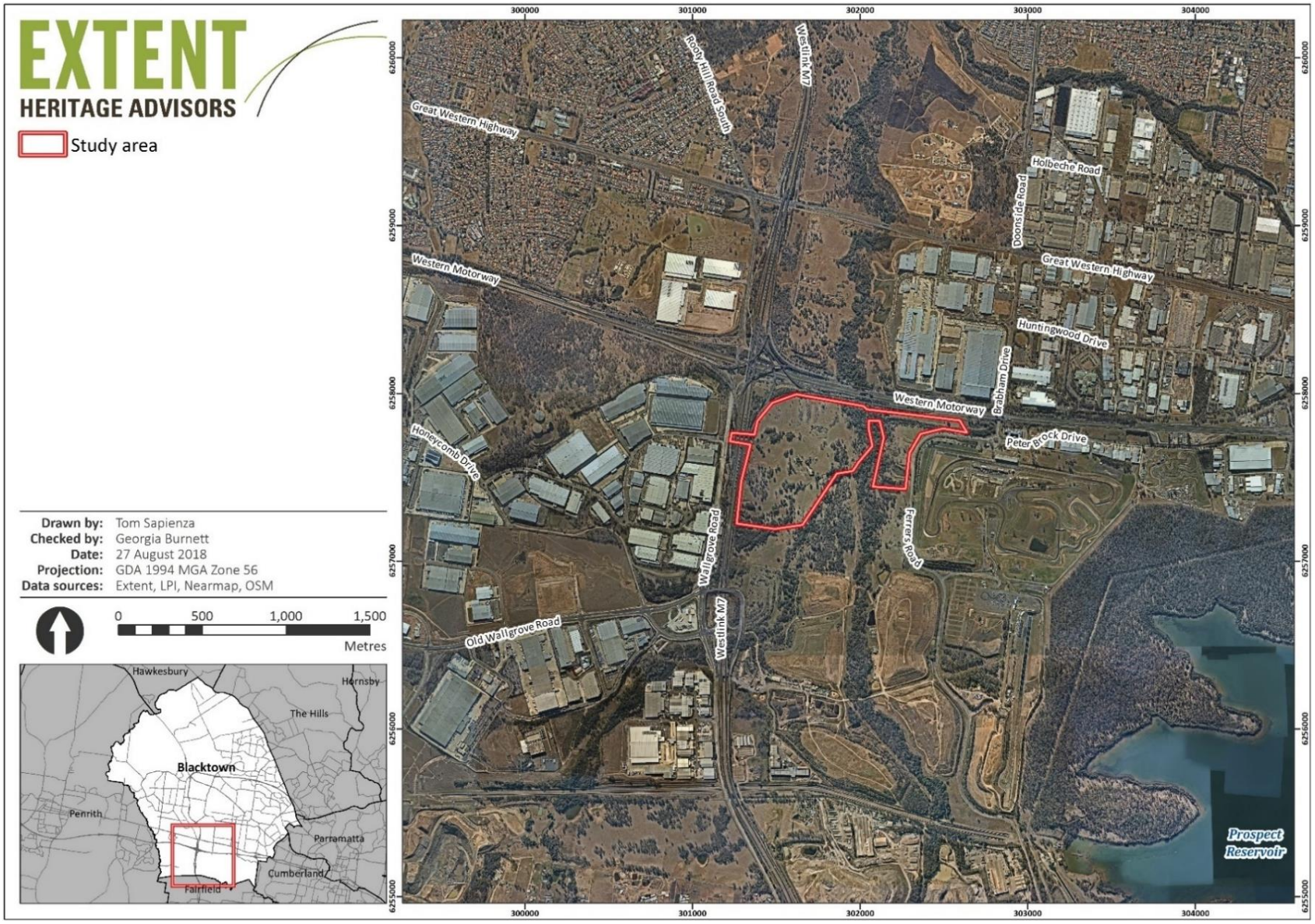



Figure 1. The subject area.

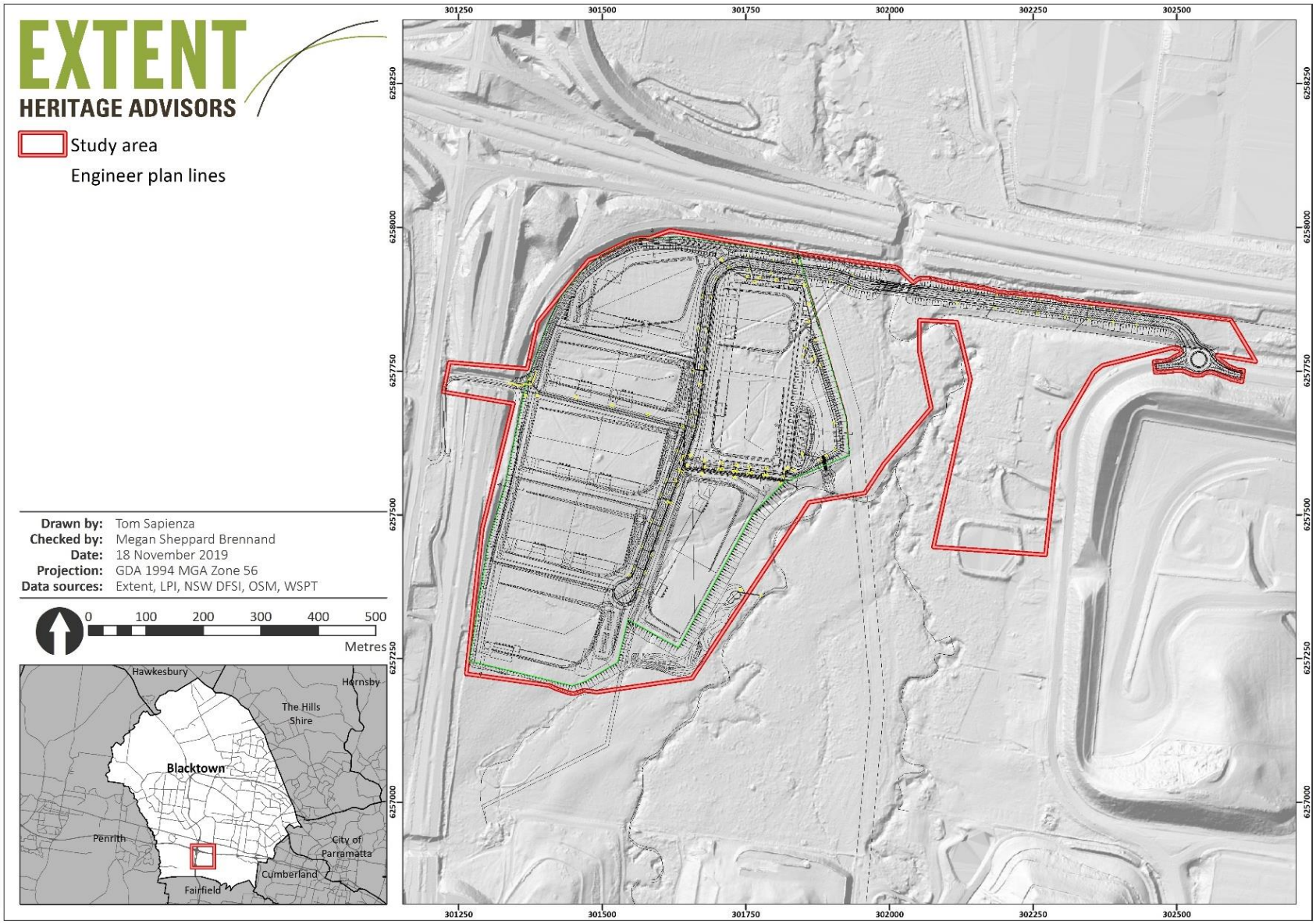



Figure 2. The proposed development. Source: WSPT (April 2019).

# 2. Legislative and Regulatory Requirements

## 2.1 Key Environmental Legislation

Aboriginal heritage is protected and managed under the following legislation:

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999;*
- *Commonwealth Native Title Act, 1993*
- *NSW National Parks and Wildlife Act 1974;*
- *NSW Heritage Act 1977; and*
- *NSW Environmental Protection and Assessment Act 1979.*

*The National Parks & Wildlife Act, 1974* (NPW Act) provides blanket protection for Aboriginal objects (material evidence of indigenous occupation) and Aboriginal places (areas of cultural significance to the Aboriginal community) across NSW.

*The Environmental Planning and Assessment Act, 1979* (EP&A Act) requires that environmental impacts are considered in land-use planning, including impacts on Indigenous heritage. Where Project approval is to be determined under Division 4.7 of the Act, further approvals under the *National Parks & Wildlife Act, 1974* are not required. In those instances, management of Aboriginal heritage follows the applicable Aboriginal assessment guidelines, any relevant EIS recommendations and the MCoA developed for the Project.

## 2.2 Approvals, Permits, Licences

Approval of a project under Division 4.7 of the EP&A Act removes the requirement to obtain certain statutory approvals including:

- The requirement to obtain an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974.*

## 2.3 Guidelines and Standards

The ACHMP has been developed using best practice heritage guidelines and standards. These guidelines and standards, established by the Heritage NSW – DPC, were developed to guide the assessment, conservation and mitigation of Aboriginal heritage in New South Wales. Many of the guidelines are designed to obtain permits and approvals under the *National Parks and Wildlife Act 1974.*

Not all guidelines are applicable for Division 4.7 project approvals (such as Aboriginal community consultation guidelines); however, they are useful documents to guide the general direction of assessment of the significance of heritage sites; and their conservation and mitigation.

Relevant guidelines include:

- *Due Diligence Code of Practise for the Protection of Aboriginal Objects* in New South Wales (Department of Environment Climate Change and Water [DECCW] 2010a) [the Due Diligence Code].

- *Code of Practice for Archaeological Investigation of Aboriginal Objects* in New South Wales (DECCW 2010b) [the Code of Practice].
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010c) [the Consultation Requirements].
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) [the Guide].

# 3. Identified Aboriginal Heritage Sites

## 3.1 Background

Extent Heritage was commissioned by WSPT, to prepare an ACHAR of the subject area in advance of proposed development. The ACHAR included:

- Comprehensive Aboriginal stakeholder consultation completed in accordance with the Consultation Requirements.
- A search of AHIMS database to identify previously recorded Aboriginal heritage sites within the subject area.
- An archaeological survey to relocate known Aboriginal heritage sites and to identify any previously unknown Aboriginal heritage sites by project archaeologist(s) and Aboriginal community members.
- A test excavation program to determine if any subsurface Aboriginal objects are present within the study area.

In addition, as part of the document finalisation process, consultation was undertaken with the RAPs (Section 5.2), and any information provided in relation to tangible and/or intangible cultural heritage is included here.

## 3.2 Assessment Results

The ACHAR resulted in the identification of nine AHIMS registered sites:

- LHIBH BS (AHIMS ID 45-5-5285)
- LHIBH Eskdale Creek terrace (AHIMS ID 45-5-5283)
- LHIBH Eastern Creek terrace (AHIMS ID 45-5-5284)
- IF1 (AHIMS ID 45-5-2564)
- IF2 (AHIMS ID 45-5-2565)
- LIBH AS1 (AHIMS ID 45-5-5183)
- LIBH AS2 (AHIMS ID 45-5-5185)
- EC6 (Eastern Creek) (AHIMS ID 45-5-0756)
- WSP17 (AHIMS ID 45-5-3264)

**LHIBH BS**

*Small, low-density artefact scatters and isolated finds*

Low-density distribution (<10 artefacts/0.25m$^2$) of cultural material across the study area, present on a variety of upper, mid, and lower slope landforms, and occasionally in association with low-order drainage lines and tributaries of Eastern, Eskdale and Reedy Creek. Cultural material is present both on the partly-eroded ground surface, or in shallow, duplex topsoils of the Blacktown and South Creek soil landscapes. Historical development, drainage management works and erosional processes have caused localised disturbance to underlying soils, but has not completely removed evidence for Aboriginal occupation.

This low-density distribution of background material reflects an ephemeral or transient use of much of the study area in the past.

**LHIBH Eskdale Creek terrace**

*Artefact, PAD*

Elevated terrace of varying depth (between 500 and 900mm) above Eskdale Creek, characterised by deep, fine sandy clay alluvium overlying fine sandy clay with increasing clay content and ironstone staining at depth. Artefact densities within the Eskdale Creek terrace are broadly comparable with the rest of the study area; however, a discrete, highly localised ~100m$^2$ patch of increased artefact density centred on TP151 was identified. The main artefact concentrations typically occurred between 100 and 500mm below the current land surface (between 46.3 and 45.9m AHD), with peaks at 200 and 300mm below ground surface. These levels broadly date to within the last 3,000 years.

The localised patch is considered to reflect a focus of intense, but perhaps short-lived, visitation of the study area in the past, within which heat treatment of raw materials occurred.

**LHIBH Eastern Creek terrace**

*Artefact, PAD*

Elevated, flat terrace above Eastern Creek, characterised by moderately deep, fine sandy clay alluvium, to depths of 500mm. Artefact densities within the Eastern Creek terrace are broadly comparable with the rest of the study area; however, a discrete, highly localised ~100m$^2$ patch of increased artefact density centred on TP57 was identified. Artefact concentrations typically occurred between 0 and 400mm below the current land surface (between 45.1 and 44.7m AHD), with peaks at 200 and 300mm below ground surface. These levels broadly date to within the last 4,000 years.

The localised patch is considered to reflect a focus of intense, but perhaps short-lived, visitation of the study area in the past, where the manufacture of stone artefacts occurred.

**IF2**

*Isolated find*

An isolated white chert flake on the eroded edge of a minor drainage line in the area to the west of the ex-RAAF transmission station.

**IF1**

*Isolated find*

An isolated red-brown silcrete flake exposed in a dirt track just west of the ex-RAAF transmission station.

**EC6 (Eastern Creek)**

*Artefact scatter*

A total of 35 artefacts located on two dam walls in the south east of the study area. Majority of the artefacts recorded were silcrete with some chert.

**WSP17**

*Artefact scatter*

A total of eight artefacts located along a dirt track (20m x 20m) in the north east of the study area immediately adjacent to M4. 200m west of Eastern Creek on a hill slope. Surrounding area quite disturbed with clay, ploughing, animal grazing and dams.

**Eastern Creek 1**

*Artefact scatter*

A total of 11 artefacts were recorded, 9 silcrete, 1 chert and 1 indurated mudstone. The artefacts were found in exposures either side of the drainage line <100m from creek. Very disturbed

**EC 11**

*Artefact scatter*

Ten artefacts (nine silcrete and one indurated mudstone) found in a 3m x 3m area, on a haul road immediately adjacent to study area and on a flat rise adjacent to Eastern Creek tributary.

### 3.2.1 The Archaeological Resource

Based on the archaeological investigations undertaken to date, the archaeological resource of the study area conforms well with the model of Aboriginal occupation for the south western Cumberland Plain. Systematic archaeological excavation identified several Aboriginal archaeological sites within the study area and recovered 276 lithics (made up of 253 artefacts and 23 heat shatter fragments) from the excavation of 66.25m$^2$. The study area is dominated by a low-density distribution (<10 artefacts) of cultural material across the site on a variety of upper, mid, and lower slope landforms. Cultural material is present both on the ground surface or in shallow duplex topsoils. This background reflects an ephemeral or transient use of the region in the past. For management purposes, this background scatter has been registered as a single AHIMS site on the AHIMS database, LHIBH BS (AHIMS ID 45-5-5285) and incorporates a large proportion of the low-density scatter sites and isolated finds, and artefacts recovered from test excavation, within the study area.

Within this broader background, two landforms of archaeological interest were identified along elevated terrace landforms adjacent to Eskdale and Eastern Creeks and have subsequently been registered as AHIMS sites on the DPIE AHIMS database ('LHIBH Eskdale Creek terrace' AHIMS ID 45-5-5283 and 'LHIBH Eastern Creek terrace' AHIMS ID 45-5-5284). Overall, when considering these landforms, an artefact density was identified that is broadly comparable with the wider study area (<10 artefacts). However, two discrete and highly localised ~100m$^2$ patches of increased artefact density were identified at each location, centred on TP151 and TP57 respectively. These sites are considered to reflect foci of intense, but perhaps short-lived, visitation of the study area in the past.

These two high-density artefact foci provide a number of interesting observations about the past use of the region. Of note is the dominance of silcrete raw materials and the presence of backed artefacts, which is suggestive of a late Holocene occupation; as well as evidence for heat treatment along Eskdale Creek (TP151) and manufacture and production of backed blades, elongated flakes and other tools along Eastern Creek (TP57). A suite of OSL ages from both sites suggest that formation of the terrace

deposits likely began in the LGM approximately 26,000 years ago; but with little evidence of occupation until the late Holocene (3-4,000 years ago), as the soil profile developed and human populations intensified with improved climate relative to that prevailing during the early-mid Holocene.

Unsurprisingly, the sites located and excavated during the fieldwork program conform well to the accepted site patterning of the south western Cumberland Plain, and the predictive modelling for the site is broadly in agreement with the accepted model of settlement, but with some caveats. Predictive modelling undertaken before excavation highlighted areas within 200m of major third- and fourth-order creeklines as having high and very high archaeological potential; and that sites of increased density and complexity would be located within these zones. However, targeted archaeological excavation undertaken for this project found that low-lying areas adjacent to Eastern Creek, and at the confluence of Reedy and Eskdale Creek below 44m AHD recovered little, if any, artefactual material. It is plausible that areas below 44m AHD were subjected to periodic, high-energy flooding rendering them periodically unsuitable for occupation. Alternatively, it may have been the case that the soil deposits below these elevations—and which may have contained physical remains of Aboriginal occupation—have been scoured away by flooding. Other studies have noted a preference for more complex and extensively used sites on elevated terraces and levees above major watercourses, and we suggest here a tangible elevation of 44m AHD as an appropriate flood consideration benchmark for future studies in the Eastern Creek locality. In addition to the low-lying areas of Eskdale Creek not being conducive to occupation, there has been disturbance to this creek line in the past to allow for the surrounding floodplain to drain or dry and therefore improve its suitability for agricultural purposes. This alteration would have resulted in significant change to the hydrology of Eskdale and Reedy Creeks, which would account for the deep incision and channel widening evident along the lower reaches of Reedy Creek and the establishment of Eskdale Creek as a more permanent waterbody.

Systematic archaeological survey and test excavation of the study area provides an understanding of the archaeological resource and its significance, as well as raising additional questions on the nature and use of the area by Aboriginal people in the past. Specifically, the excavations demonstrated the presence of two source-bordering alluvial terraces along Eskdale and Eastern Creek, within which discrete ~100m$^2$ patches formed key locales of Aboriginal visitation and occupation over the last 4,000 years. The nature of the cultural assemblage suggests intense but short-lived occupation, with a focus on the exploitation of locally available stone resources for artefact and tool production. Certain raw lithic material improvement strategies in the form of heat treatment were also employed on site, especially along Eskdale Creek. Though both source-bordering terrace landforms began forming in the LGM, in drier and windier conditions, the findings demonstrate little evidence for Aboriginal occupation until the late Holocene, as the soil profile developed and population intensified with improved climatic conditions.

Along with other regional findings of work at Riverstone (AHMS 2016), the assemblage here lends strong support to Aboriginal populations exploiting and using levee banks and locally elevated areas along the Eastern Creek corridor from the late Holocene (<5,000ka); and it is therefore considered these deposits, while unique, are ultimately representative of other similar sites in the region. It is considered, however, that additional information on the nature, size and integrity of these foci of occupation may be obtained through further investigation and analysis of the material evidence of these sites, and as such these discrete ~100m$^2$ areas are still considered to contain significant research potential. In addition, despite the modification of the study area by Defence in the past, these source-bordering terrace deposits are on the banks of some of the few permanent and large rivers within the Cumberland Plain, and have aesthetic significance not typically found for these types of site.

In contrast, the remainder of the study area is dominated by a low-density distribution of cultural material (<10 artefacts) in the form of small artefact scatter sites and isolated artefacts, and reflects an ephemeral or transient use of the wider area in the past. Such sites have limited research potential (typically restricted to only the technological attributes of the artefact assemblage), limited stratigraphic integrity, and are representative of other sites in the south western Cumberland Plain; and as such are considered of low archaeological significance.

### 3.2.2 Cultural Values

While no formal written feedback from the Aboriginal stakeholders has been received regarding cultural significance to date, several on-site discussions identified the discrete patches of high-density cultural material as being of importance to the RAPs. More broadly, sites of increased artefact density and/or complexity are frequently identified as being of cultural significance to local Aboriginal stakeholders.

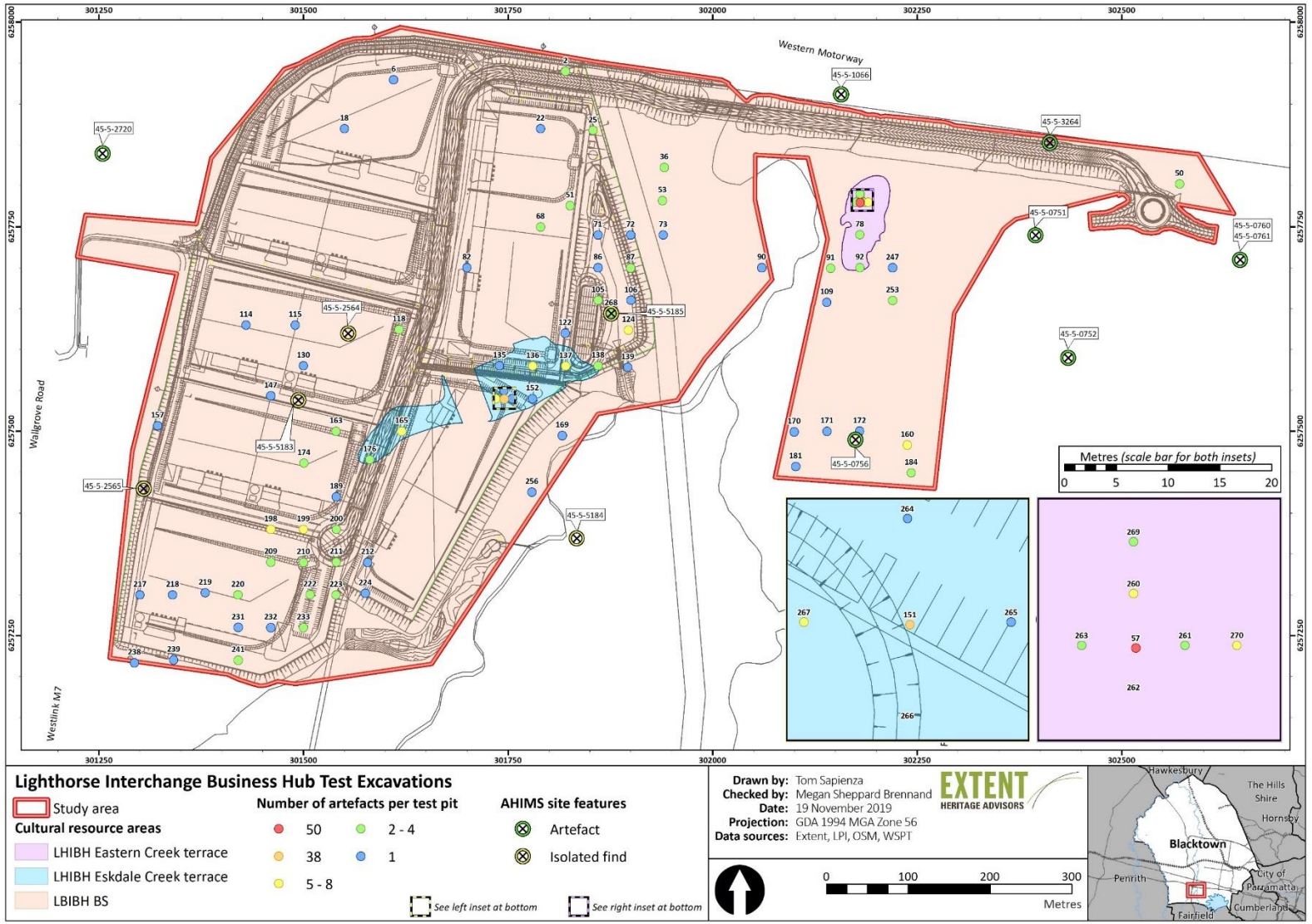



Figure 3. Archaeological resources identified within the subject area.

# 4. Project Impacts

## 4.1 Evaluation of Impacts

Western Sydney Parklands Trust intends to redevelop the study area to accommodate industrial and light industrial land use activities. This is in accordance with the *State Environmental Planning Policy (Western Sydney Parklands) 2009*, the Western Sydney Parklands Trust Plan of Management 2030 and the Western Sydney Parklands Trust Plan of Management 2020 supplement.

An indicative concept masterplan and subdivision plan have been prepared for the study area and illustrates indicative building development areas and works. Key features of the concept proposal are:

- **Land use and built form:** indicative building envelopes are provided for the future construction of largescale industrial-style buildings including:
    - Approximately 157,000m$^2$ floorspace to accommodate a range of industrial and light industrial land use activities, which could include advanced manufacturing, freight and logistics and warehouse and distribution facilities.
    - Approximately 8,000m$^2$ floorspace comprising ancillary offices to support the primary industrial and light industrial use.
- **Landscaping:** the front setbacks of the future industrial lots will be landscaped to complement the architectural design of the future industrial buildings and present an attractive appearance within the streetscape. Additional landscaping will be provided within the rear and side setbacks where required to provide visual screening of the proposed buildings from the surrounding road network.
- **Transport, access and car parking:** primary vehicle access to the development site is proposed from Ferrers Road. Any new roads and road improvement works required to service the proposed development will be designed to address Blacktown City Council requirements and facilitate their dedication as part of the industrial subdivision. A secondary access point for lighter vehicles (i.e. excluding B-double trucks) may be provided via the existing Wallgrove Road entry/exit driveway, however this is for emergency only.
- **Stormwater management and flooding:** a comprehensive stormwater management system will be provided to manage the quality and quantity of water flows across the site, including mitigation measures to address potential flooding risk and avoid adverse impacts to the development potential of the upstream and downstream properties.
- **Biodiversity:** the site contains scattered trees and more concentrated areas of vegetation along the riparian corridors and within the south-western corner which will be assessed in further detail during the preparation of the SSDA. The final concept masterplan, the EIS and the BDAR address the removal of vegetation, including any biodiversity off-set requirements.
- **Bushfire protection measures:** the site is identified as Vegetation Category 2 bushfire prone land and the final concept masterplan and EIS addresses the required bushfire protection measures to avoid risk and provide adequate safety for future building occupants and fire-fighting personnel (Peterson Bushfire 2019). This involves including defendable space, consideration of ember protection for building works, access and egress for emergency response, perimeter access and internal roads, and accessibility of reticulated water supply and hydrant provisions for fire-fighting.

- **Utility services:** the final siting and design of the proposed industrial subdivision will incorporate the existing easements for high-pressure gas and sewer, as well as any required augmentation of existing utility services to service the proposed development.

The detailed proposal will include the following early site works:

- **Demolition and remediation:** removal of existing buildings and structures and completion of any site remediation works required to ensure the site is suitable for its intended use as a business hub.
- **Bulk earthworks:** cut and fill details for the future building pad sites to facilitate the future development of the site as an industrial business hub.
- **Infrastructure:** provision of roads, utility services, stormwater works and flood mitigation(if required) measures required to facilitate the future development of the site as a business hub.
- **Subdivision:** creation of development lots, public roads, easements/restrictions, etc to facilitate the leasing and development of individual lots to accommodate industrial and light industrial land use activities, including freight and logistics and warehouse and distribution centres.

## 4.2 Potential Aboriginal Heritage Impact

Development for uses in accordance with the plan will likely result in impacts to the ground surface resulting from demolition works, cutting, levelling and fill works, installation of services and infrastructure, as well as landscaping and revegetation works. These works, with perhaps the exception of some minor landscaping and revegetation works, would likely result in the removal of much, or all, of the upper soil profile.

Based on the proposed development above, the greatest impacts to the Aboriginal heritage resource of the study area would result from the construction of large-scale industrial style buildings and associated roads and landscaping, in the western half of the study area between the Westlink M7 and Eskdale Creek. This would include impacts to 100% of the Eskdale Creek terrace landform (equivalent to 12,851m$^2$) and its associated patch of high density cultural material and would also include impacts to a large portion of the low density background scatter, which is present across much of the rest of the study area (Figure 3).

It was initially considered that there would be considerable impacts to the Aboriginal cultural resource of the eastern half of the study area, from the proposed construction of the flood mitigation infrastructure. However, through design progression the eastern portion of the study area has been largely avoided. Therefore, there will be no impact to the Eastern Creek terrace landform (equivalent to 4,798 m$^2$) and its associated patch of high-density cultural material.

Other proposed works within the study area have the potential to cause localised impacts to the low-density background scatter present across the site. These include construction of an OSD basin and access road (northern boundary), and realignment of Eskdale Creek.

At present, there is potential for small portions of the background scatter (equivalent to 157,487m$^2$ or 29% of the deposit) to be conserved as part of the proposed development, in areas designated as passive open space, environmental conservation, and/or riparian corridor.

# 5. Aboriginal Archaeological Management Plan

## 5.1 General Approach

To implement a consistent and clear framework for the Aboriginal cultural heritage management for the subject area, this ACHMP proposes a strategic approach to manage Aboriginal heritage for the subject area which puts in place measures for the investigation, assessment and management of unexpected finds throughout the course of the development.

The following mitigation policies and procedures should be adopted as part of the overall management of the site's archaeological resource.

### 5.1.1 Prior to Construction

- An Aboriginal cultural heritage awareness induction should be included in the general site induction for all staff and contractors involved in the works, so that all personnel involved are aware of heritage and archaeological requirements.
- The heritage induction should be formulated to include information on the Aboriginal archaeological and cultural resource of the subject area, its cultural values, archaeological sensitivity zones, and protocols that apply to their protection.
- Salvage excavation program must be completed within any locations of high archaeological significance to be impacted by the proposed works.

### 5.1.2 During Construction

- In order to implement relevant Aboriginal cultural heritage controls, the Project Archaeologist should be regularly involved in the Project team communication about the progress of development within the subject area. Depending on the nature of impact, activities in accordance with Section 6 should be implemented, which may include archaeological excavation. This should include documented inspections by specialised staff (heritage architect, arborist, environmental officer and/or the Project archaeologist) to ensure mitigation measures are working effectively, and to ensure timely decision making and timely delivery of advice in the event of any unexpected changes to the Project, or unexpected archaeological discoveries.
- In the event that suspected or known Aboriginal object/s are identified, the unexpected finds procedures as defined in this document must be implemented. This would likely involve all works in the area to cease, while the find is managed.

### 5.1.3 Post Construction

- Within 12 months of the construction being completed, a report summarising any archaeological excavations and/or monitoring undertaken during the works must be developed and lodged with Heritage NSW – DPC. Further details of this report are presented in Section 6.5.

## 5.2 Aboriginal Community Consultation

The engagement and involvement of the Aboriginal community is an important part of the heritage management processes of the Project. Formal Aboriginal consultation commenced in 2018 during the completion of the ACHAR. The process resulted in the identification of 21 stakeholder organisations

who registered an interest in the Project. Consultation with these (21) Aboriginal stakeholders should continue throughout the course of the Project. Consultation includes the following (Table 2):

1. **Liaison and development of the ACHMP** – the RAPs has been provided with a copy of the draft ACHMP for their review and feedback, prior to its adoption. Comments have been received and incorporated, where relevant. A period of 21 days will be provided for stakeholder review, or when comments from all RAPs are received. This phase has been completed, with changed made throughout the document, as well as the specific discussions in Appendix 1.
2. **Involvement in archaeological investigation and/or mitigations** – all RAPs with appropriate OH&S and insurance requirements will be asked to tender for works on the project, and were successful afforded the opportunity to participate in the mitigation works outlined in this ACHMP.
3. **Provision of post-excavation reports** – Any reports prepared to document the results of mitigation works will be provided to the RAPs for their records.

Table 2: Aboriginal community consultation tasks and timeframes for the Project.

| Task | Details | Timeframe (estimate) | Dates (estimate) |
|---|---|---|---|
| **Liaison and development of the ACHMP** | The RAPs will be provided with a copy of the ACHMP for their feedback and review, prior to its implementation | 3 weeks | **24 June 2021 - 15 July 2021** |
| **Review of updated ACHMP** | RAPs will be provided with a copy of the updated ACHMP for their feedback and review, prior to its endorsement | 1 week | **Varies**<br><br>**Over course of the Project** |
| **Involvement in archaeological mitigation works** | Timeframes will vary depending on the type of mitigation (collection, monitoring, salvage excavation) and the work area. | Varies<br><br>Over course of the Project | **Varies**<br><br>**Over course of the Project** |
| **Final Reporting** | Finalised versions of archaeological reports will be provided to the RAPs in digital format (or hardcopy where specifically requested). | Varies<br><br>Over course of the Project | **Varies**<br><br>**Over course of the Project** |

The ACHMP was distributed to RAPs on 24 June 2021 for a 21 day review period, ending on 15 July 2021. Three responses were received:

- Kamilaroi Yankuntjatjara Working Group: KYWG support the findings and management recommendations of the ACHMP. KYWG reiterated their close connection to country and the significance of waterways and burial sites. KYWG wish for an interpretation plan to be undertaken for this development, with examples including native gardens, art, design, digital display, yarning circles and an app (digital).
- A1 Indigenous Services emailed in support of the ACHMP.
- Muragadi indicated an issue in the consultation section, with the incorrect number of registered parties included. This was amended and has been included in the final report.

## 5.3 Hierarchical Management Actions

With types of impact broadly defined based on current knowledge (Section 3), the strategic approach proposed includes the following hierarchical management options, each of which will be further described in Section 6.

### 5.3.1 Areas of High Archaeological Significance

Currently, **two areas of high archaeological significance** have been identified within the subject area. Where avoidance of impact in these areas is unfeasible, minimising such impact through development design and controls should be prioritised, and appropriate heritage mitigation measures should be implemented. This may include a staged program of archaeological salvage excavation.

### 5.3.2 Areas of Moderate Archaeological Significance

Currently, **no areas of moderate archaeological value or potential** have been identified within the subject area, however, this may require revision as work is undertaken and cultural material (if present) is identified and assessed. Should such deposits be identified, the development should consider re-design and/or modifications to avoid impact.

Where avoidance of impact is unfeasible, minimising such impact through development design and controls should be prioritised, and appropriate heritage mitigation measures should be implemented. This may include a staged program of archaeological salvage excavation.

### 5.3.3 Areas of Low Archaeological Significance

An area of low archaeological significance has been identified across the majority of the subject area (Figure 3). The procedure for discovery of possible human remains and unexpected finds procedure as outline in Condition B26 and B27 of MCoA SSD-9667 should be implemented for this area.

# 6. Methods and Procedures

## 6.1 General

This section provides information relating to the overarching archaeological methodology, team, timeframes and other requirements to meet the strategic Aboriginal heritage approach outlined in Section 5.

The methodologies are also based on the type of impact (direct or indirect) and the type of construction techniques. The construction methodologies include demolition of existing structures, piling and excavation. Indirect impacts may include vehicle movement, spoil removal, site facilities establishment, and other logistical activities.

## 6.2 Areas of High – Moderate Archaeological Significance

The ACHAR resulted in the identification of **two areas of high archaeological significance** (LHIBH Eskdale Creek terrace and LHIBH Eastern Creek terrace). Based on the current design plans, only LHIBH Eskdale Creek terrace will be impacted by the proposed works.

Any areas identified as of high archaeological significance should be subject to development avoidance and/or additional heritage mitigation. As a default, additional heritage mitigations would consist of further sub-surface (salvage) archaeological excavation. However, other types of mitigation may be considered instead or, and/or in addition to such works, where agreed by the Project Archaeologist and the RAP. Any mitigation that does not consist of sub-surface (salvage) archaeological excavation must be correlated to the cultural values and/or material culture of the subject area.

**Research Objectives**

In the event that sub-surface (salvage) archaeological excavation is undertaken, the following research objectives should form the focus of the work:

- Using fine resolution excavation and environmental analyses to further characterise the archaeological deposits relating to the past Aboriginal occupation of the Eskdale and Eastern Creek alluvial terraces. This includes a greater understanding of resource exploitation; technological attributes (e.g., heat treatment); identification of any change through time in spatial and chronological phases of activity; and site formation processes.
- To obtain the largest possible assemblage of Aboriginal objects, for detailed documentation and long-term curation, within the spatial limits of the development footprint and the financial/time constraints of the project.
- To allow greater cultural association between the site and the Aboriginal stakeholders (i.e., a form of ‘cultural salvage’) through involvement in the excavation, and options for the interpretation of the results, should the community decide that this is appropriate.
- To ensure that the development can proceed with a minimised risk of unknown or unexpected significant Aboriginal objects/features being harmed during construction.
- To further supplement the existing knowledge of past Aboriginal activities along this portion of the Eastern Creek corridor.

**Archaeological salvage program**

Overall, we propose to undertake up to 100m$^2$ of open area excavation, with a series of hold points, in the Eskdale Creek terrace landform within the impact footprint. This number provides an equitable balance between the volume of archaeological material that may be recovered, compared with the costs and time to undertake such works.

The area would be up to 10 x 10m is size (equating to a maximum of 100m$^2$) and centred on TP151. It is considered that this approach is similar in extent, approach and methodology to other sites in the Cumberland Plain (that usually undertake open area excavations in 100m$^2$ (10 m x 10 m) increments (e.g. ENSR AECOM, 2008; Jo McDonald Cultural Heritage Management, 2005; Staib, 2002, Williams et al., 2014; O'Connell Street Public School site (undertaken as part of a SSD [SSD 15/7372], Extent 2018), Moorebank Intermodal Terminal (also a SSD [SSD 6766], Extent in prep), Fernadell Precinct, Pitt Town (AHIP no. 1129099; Williams et al., 2014), Tarro-Beresfield water main renewal (AHIP no. C0000616) and 21 Hassall Street, Parramatta (AHIP no. C0001505).

It should be noted that an assessment conducted by Ecoplanning (2019) reported a low contamination risk across the site (EIS). The Eskdale Creek terrace landform is located ~50m southeast of a hydrocarbon leak detected from two underground storage tanks in the former army compound. The horizontal extent of the leak is constrained to the immediate surrounds of the tanks (<2 m) due to the high plasticity clay soils. Additionally, there was bonded asbestos containing material detected at the former army compound, and in topsoil around the impacted buildings. There was no asbestos noted during the excavation of TP151 (within the Eskdale Creek landform) in the test excavation, and there is little potential for it to be present in this wider area, which is located ~35m from the nearest structure with asbestos recorded. The Eskdale Creek terrace is located outside the area of concern assessed by Environmental Earth Sciences in 2018, and there appears to be no threat of contamination within the salvage area.

The excavation would be conducted with a series of hold points to determine whether to continue expanding the salvage area, or whether to cease the archaeological program. For this consideration, the following criterion will be adopted:

- The identification of any features of archaeological interest, such as hearths, burnt clay features, shell middens or burials;
- The potential to recover significant artefact densities reflective of occupation must be obtainable. Based on regional information above, it is considered that >30 artefacts/m² on average would be needed to achieve these aims, and as such this is the limit at which further archaeological works would be considered.
- Artefacts of potential great antiquity, typologically dated to the Pleistocene (>10,000 years ago (ka));
- Artefacts manufactured of unusual or rare raw stone materials—those exotic to the region, and which may provide further information on trade and exchange between Aboriginal populations;
- Unusual or rare artefact tool types and formal tools, such as Bondi points, shell artefacts, core tools, burin blades, hammerstones, ground edge implements etc, or those with potential to retain usewear/residue for further analysis; and/or
- Aboriginal objects made during or shortly after the period of European contact, such as worked glass, worked flint etc.

It will be for the Excavation Director in consultation with the RAP representatives present on site during the fieldwork and WSPT to determine whether these thresholds are met and prompt the requirement for further expansion of archaeological works.

The proposed salvage works would adopt the following methods:

- Excavation would consist of contiguous 1m$^2$ test pits totalling up to 100m$^2$ of targeted manual excavation undertaken as a series of hold points. At each hold point, the above criteria would be considered, and only where the triggers continue to be met would work proceed. The decision to continue would be made by the Excavation Director, in consultation with RAPs present on site and WSPT. The initial hold point would be at 25m$^2$ (5 m x 5 m) centred on the area of archaeological interest, the next hold points would be at 36m$^2$, 49m$^2$, and 81m$^2$.
- All excavation would be undertaken manually, using shovels and trowels, etc, by a team of archaeologists and Aboriginal stakeholders.
- Excavations would be undertaken in 50mm spits, with Australian Height Datum (AHD) heights being obtained every fourth spit, to ensure vertical integrity. Excavations would to extend to either the geological substrate, or until three consecutive cultural sterile spits are encountered.
- Each test pit would be given an alphanumeric label for identification purposes. A standard site recording form would be used for each spit of each excavation unit (1m$^2$). Details would include site name, date, site recorder, spit number and depth, description of finds, description of soil, sketch plan of excavation (if relevant to show features) and a bucket tally.
- Sediment from each 50mm spit would be bucketed separately and wet-sieved through 3mm mesh. Any Aboriginal objects recovered from the sediments would be retained in a plastic bag with the relevant pit alpha-numeric code written upon it.
- Soil samples may be collected for description, sedimentological, palaeo-environmental and chronological analysis where such analysis is considered likely to contribute significant information. Radiocarbon and/or OSL samples would be taken in areas where Aboriginal objects are found, and generally try to bracket the deposit (to provide a maximum and minimum age), as well as provide further understanding on the formation history of the deposits. Material for radiocarbon analysis may also be undertaken opportunistically if archaeological features containing charcoal or other dateable material are evident.
- If dangerous material, such as asbestos or contaminated soils, is encountered, the extent of the salvage could be amended. This would be at the discretion of the Excavation Director, in consultation with the RAPs present on site and WSPT.

If discrete high-density artefact concentrations or cultural features, such as hearths, are revealed during the excavation, these will be excavated and recorded (by photography and planning). The locations of in situ artefacts in such features may also be individually recorded.

Excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders present on site and WSPT as the conditions in the field and nature of the excavations develop.

## 6.3 Areas of Low Archaeological Significance

The procedure for discovery of possible human remains and unexpected finds procedure as outline in Condition B26 and B27 of MCoA SSD-9667 should be implemented for areas of low-nil archaeological potential (Figure 3).

## 6.4 Post Excavation Analysis

If archaeological excavations were to occur, post excavation analysis would be required to appropriately document the archaeological and cultural findings of the field program. The post-excavation analysis would be designed to address the research objectives and specific research questions, along with other relevant questions that may arise based on the results of the excavation. Results of analysis would be presented in relation to comparative site data where possible and where useful in addressing the research questions.

Post-excavation analysis may include (but not be limited to):

- Lithic Analysis: cataloguing of all cultural material recovered, including measurements, weight, raw material, reduction and tool identification. A program of conjoin analysis, and investigation of usewear/residue analysis may also be considered.
    - It is recommended that a programme of conjoining using the Minimum Analytic Nodule methodology is applied to a maximum of three suspected knapping floors with a total maximum of 300 stone artefacts. This would provide a good sample of the knapping events and the opportunity to understand reduction behaviour and post-depositional movement. It would place a clear limit on the extent of analysis required.
    - It is recommended that usewear analysis using a x20 stereo microscope with oblique lighting is limited to complete or broken tools. With an upper cap of usewear analysis on a maximum of 100 tools.
    - It is recommended that residue analysis is limited to formal tools that have the greatest potential to retain residue, based on their typology and preservation conditions. With an upper cap of residue analysis on a maximum of 20 tools.
- Geomorphology: collection of soil samples excavation to assist in understanding the site formation and post-depositional disturbance.
    - It is recommended that the allowance for limited additional soil micromorphological analysis and or palaeo-environmental analysis, and only in circumstances where it would build on or clarify earlier analysis.
    - It is recommended that the allowance is limited to analysis of up to a maximum of three soil or environmental samples.
- Palaeo-environmental: this analysis can utilise the material from the geomorphological samples and should include the investigation of pollen and phytoliths to understand the past vegetation and climate of the region prior to, and during periods of Aboriginal visitation and occupation.
    - It is recommended that the allowance for limited additional palaeo-environmental analysis, and only in circumstances where it would build on or clarify earlier analysis.
    - It is recommended that the allowance is limited to analysis of up to a maximum of three soil or environmental samples.
- Chronology: OSL and/or radiocarbon samples should be collected during the program, and should bracket any cultural materials recovered from each open area excavation to provide a strong chronology for the deposit. Radiometric dating would be limited to the dating of any Aboriginal hearths encountered during the salvage, up to a maximum of three conventional C14 dates.

The aim of this work is to both adequately document, analyse and record the cultural deposits and assemblages for future generations, and to build upon the findings of the archaeological test excavation analysis.

## 6.5 Reporting

Each area investigated, salvaged and/or mitigated in some way would have a brief interim or compliance report developed. This avoids the need to undertake detailed and time-consuming post excavation analysis before or during the construction. Post excavation analysis would be ongoing throughout the Project, and at, or nearing, completion of the Project, a detailed report on all archaeological works would be compiled.

The following general approach would apply to all reporting:

- A short summary.
- Describe Aboriginal consultation undertaken during the project.
- Provide details of the Aboriginal objects which were partially or completely harmed (i.e., recovered through the excavations) during the works.
- Provide a description of the methods and results of the any excavations.
- Comment on the effectiveness of the mitigation measures (i.e., salvage excavations).
- Comment on the effectiveness of any management plan if in place.
- The current and proposed long term location of any Aboriginal objects recovered.
- Details the results of any analysis of recovered Aboriginal objects.
- Ensure the necessary Aboriginal Site Impact Recording Forms (ASIRF) are lodged with Heritage NSW – DPC at completion of the project.

## 6.6 Storage of Archaeological Material Collected

The mitigation program may result in artefactual material and the long-term curation of this material needs to be ensured. This will be developed in consultation with the RAPs, but is likely to include (in preferential order):

- Re-burial on site, in an appropriate location in the vicinity of the subject area;
- Lodged with a RAP under a Care and Control Agreement; or
- Deposition with the Australian Museum.

The following general approach would apply to artefact storage:

- During the Project, all archaeological materials would be stored with the Project Archaeologist for analysis and documentation. Storage and labelling would be undertaken in accordance with Australian Museum collection policies, since these currently form the most rigorous curation methods.
- Towards the end of the Project, the Project Archaeologist would undertake steps to determine the long term storage of any archaeological material collected, with a focus on the preferential order outlined above.
- Once the archaeological materials have been situated in their long term storage location, a site card should be lodged with the AHIMS database. The site card should lodge all relevant information about the archaeological materials, including where it was found/recovered, relevant reports associated with it, and its final storage location.

## 6.7 Discovery of Potential Human Remains Procedures

During construction works, it is possible that previously possible human remains may be discovered. Refer to Appendix 2 for the Possible Discovery of Human Remains Procedure.

## 6.8 Unexpected Finds Procedures

During construction works, it is possible that previously unknown Aboriginal objects or sites may be discovered. Refer to Condition B26 and B27 of MCoA SSD-9667 and Appendix 3 for the Unexpected Finds Procedures.

# 7. Risk Assessment

## 7.1 Basis for Assessment

The key construction activities and potential impacts on Aboriginal archaeology are summarised in Table 3 3. The risk assessment is based on (1) the likelihood of an impact occurring as a result of a proposed activity; and (2) the consequences of the impact if the event occurs. The risk matrix, and definition of likelihood and consequence are provided in Table 3 and Table 4.

Table 3: Key construction activities, risks and impacts.

| Activity | Potential Impact | Residual Risk | | |
|---|---|---|---|---|
| | | Consequence | Likelihood | Risk |
| Demolition work results in physical disturbance of Aboriginal sites/objects. | Damage to Aboriginal archaeological resources. Non-compliance with development consent conditions. | Moderate | Unlikely | Medium |
| Construction work results in physical disturbance of Aboriginal sites/objects. | Damage to Aboriginal archaeological resources. Non-compliance with development consent conditions. | Moderate | Unlikely | Medium |
| Construction work results in disturbance of previously unidentified of Aboriginal sites/objects, or skeletal remains. | Inadvertent damage, destruction or removal of Aboriginal archaeological resources. | Moderate | Unlikely | Medium |
| | Failure to notify and properly manage discovered objects. | Moderate | Unlikely | Medium |

Table 4: Risk matrix

| Likelihood | Consequence | | | | |
|---|---|---|---|---|---|
| | Insignificant | Minor | Moderate | Major | Severe |
| Almost Certain | Medium | High | High | Extreme | Extreme |
| Likely | Medium | Medium | High | High | Extreme |
| Possible | Low | Medium | Medium | High | High |
| Unlikely | Low | Low | Medium | Medium | High |
| Rare | Low | Low | Low | Medium | Medium |
| Extreme | Intolerable - Risk reduction is mandatory wherever practicable. Residual risk can only be accepted if endorsed by senior management. | | | | |
| High | Intolerable or tolerable if managed to as low as reasonably practicable - Senior management accountability | | | | |

| | |
|---|---|
| Medium | Tolerable if managed to as low as reasonably practicable - Management responsibility |
| Low | Tolerable - Maintain systematic controls and monitor |

Table 5: Classification of Likelihood and Consequence.

| Likelihood | Description |
|---|---|
| Almost Certain | The event is expected to occur in most circumstances.<br>This event could occur at least once during a project of this nature.<br>91-100% chance of occurring during the Project |
| Likely | The event will probably occur in most circumstances.<br>This event could occur up to once during a project of this nature.<br>51-90% chance of occurring during the Project |
| Possible | The event could occur but not expected.<br>This event could occur up to once every 10 projects of this nature.<br>11-50% chance of occurring during the Project |
| Unlikely | The event could occur but is improbable.<br>This event could occur up to once every 10-100 projects of this nature.<br>1-10% chance of occurring during the Project |
| Rare | The event may occur only in exceptional circumstances.<br>This event is not expected to occur except under exceptional circumstances (up to once every 100 projects of this nature).<br>Less than 1% chance of occurring during the Project |
| **Consequence** | **Description** |
| Insignificant | Minor disturbance of archaeological resources. No damage to Aboriginal sites/objects or historical relics. |
| Minor | Moderate disturbance of archaeological resources or repairable damage to Aboriginal sites/objects or historical relics. |
| Moderate | Considerable damage to Aboriginal sites/objects or historical relics. |
| Major | Major damage to Aboriginal sites/objects or historical relics. |

## 7.2 Risk Management

The following risk management measures will be implemented to minimise potential impact to Aboriginal archaeological resources (Table 6). The measures identified are based on:

- Anticipated impacts to archaeological resources;
- Assessed scientific (archaeological) significance, and (where known) overall heritage significance;
- Legislative requirements and the planning approval framework; and
- Recommendations in previous reports.

Overarching mitigation policies and procedures for the risk management measures outlined below are provided in Section 5.

Table 6: Risk Management Measures.

| Activity | Risk Management Measure |
|---|---|
| Demolition or construction work results in physical disturbance of Aboriginal sites/objects. | All staff, contractors and other relevant personnel carrying out activities with potential to disturb subsurface cultural deposits must undertake a project induction to ensure that they have an understanding and are aware of the Aboriginal archaeological issues which may affect the activity.<br><br>Mitigation measures and procedures from this ACHMP will be included in relevant activity or area specific Work Method Statements, where required. |
| Discovery of possible human remains | If human remains are uncovered, all works in the area would cease and project would follow procedures outlined in Appendix 2. |
| Discovery of previously unidentified Aboriginal or historical archaeological resources. | In the case of unexpected Aboriginal objects or historical archaeological relics being uncovered by the works, immediately stop all works that would impact on the find and follow the procedure detailed in Appendix 3. |

# 8. Compliance Management

All project personnel, sub-contractors, consultants and visitors will receive training in environmental and heritage obligations during the site inductions and toolbox talks. Training will include an archaeological awareness component to reinforce the importance of heritage issues and the management measures that will be implemented. Specific archaeological awareness training will cover:

- Protection of identified Aboriginal sites and archaeological resources;
- Adherence to approval conditions and any consultation requirements with RAPs;
- The means of identifying Aboriginal archaeological resources and the roles of personnel with regard to archaeological management measures.

Records would be kept of all personnel undertaking the site induction and training, including the contents of the training, date and name of trainer/s.

Key staff will undertake more comprehensive training relevant to their position and/or responsibility. This training may be provided as 'toolbox' training or at a more advanced level by the Site/Environmental Manager or delegated representatives.

## 8.1 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, and compliance with this ACHMP.

The planned audit process is detailed in the relevant Environmental Management Plan.

## 8.2 Reporting and Review

Reporting will be undertaken by an appointed officer and will include a staged Performance Report/Review. Each report will detail relevant training, inspections, monitoring and auditing undertaken for the reporting period relating to archaeological management on the Project.

This ACHMP will be updated every six months or as required.

# 9. Review and Improvement

## 9.1 Continual Improvement

Continual improvement of this plan will be achieved by the continual evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement. The continual improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management which leads to improved environmental performance;
- Determine the root cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions; and
- Document any changes in procedures resulting from process improvement.

## 9.2 Plan Update

This plan would be updated and revised as necessary every six months from finalisation, until the completion of the ground disturbance phase of the Project.

Changes to this plan will be approved by the client and in consultation with RAPs (if required) and documented in the document control section for each revision. A copy of the updated plan and changes will be distributed to all RAPs.

# References

AHMS. 2016. Aboriginal Cultural Heritage Assessment Report 81 Riverstone Parade Riverstone NSW. Prepared for Riverstone Parade Pty Ltd.

Extent Heritage (2020) Aboriginal Cultural Heritage Assessment Report Light Horse Interchange Business Hub, Eastern Creek, NSW (SSD 9667). Unpublished Report to Western Sydney Parklands Trust.

# Appendix 1: Aboriginal Community Consultation

| ACHMP Review | | | | |
|---|---|---|---|---|
| All RAPs | Various | 21.06.2021 | Emailed all registered RAPs a copy of the ACHMP for review. ACHMP feedback required by 15 July 2021. | Coral Hardwick |
| Kamilaroi Yankuntjatjara Working Group | Kadibulla Khan | 01.07.2021 | Kadibulla emailed in support of the ACHMP, further highlighting the significance of waterways and burial locations. | Coral Hardwick |
| A1 Indigenous Services | Carolyn Hickey | 04.07.2021 | Carolyn emailed in support of the ACHMP. | Coral Hardwick |
| Muragadi | Darleen | 05.07.2021 | Darleen emailed some issues with the consultation section of the report (including incorrect registered group numbers). This was amended and conveyed to Darleen by return email. | Coral Hardwick |
| All RAPs | Various | 12.07.2021 | Coral emailed all registered RAPs to remind them that the draft ACHMP review period ends 15 July 2021. | Coral Hardwick |

## Coral Hardwick

**From:** philip khan <philipkhan.acn@live.com.au>
**Sent:** Thursday, 1 July 2021 3:34 PM
**To:** Coral Hardwick
**Subject:** Re: Lighthorse Business Hub ACHMP Review

Dear Coral,

Thank you for your ACHA for Light Horse Interchange Business Hub. Aboriginal people have walked this land for tens of thousands of years and continue to do so. We have had as spiritual connection to this land since long ago. Our ancestors passed their knowledge to the younger generations and so on. We hold lore and kingship within our community, we have a belief system one practiced for tens of thousands of years, some still practiced today. We did not just hunt and gather we utilised the land through craftsmanship, our tools were made of organic materials. Our way of giving back to mother earth our way of conservation. Our water ways are highly significant to us as we follow the water ways, utilised them for fishing, bathing, drinking water, healing etc. we looked to the skies for guidance. Our burials are still unfound and we need to be aware of them, as they are highly significant to our people. Interpretation plans, is there a plan in place other wise some ways you can incorporate culture in interpretation is through native gardens, art work, design, digital display, yarning circles and or an app are some examples. We would like to agree ACHA and support your report, we look forward to working with you on this project.

Kind Regards

Kadibulla Khan

## Coral Hardwick

**From:** Carolyn .H <cazadirect@live.com>
**Sent:** Sunday, 4 July 2021 8:52 PM
**To:** Coral Hardwick
**Subject:** Re: Lighthorse Business Hub ACHMP Review
**Attachments:** A1.PL2022.pdf; A1.WC2022.pdf


Contact: Carolyn Hickey
M: 0411650057
E: Cazadirect@live.com
A: 10 Marie Pitt Place, Glenmore Park, NSW 2745
ACN: 639 868 876
ABN: 31 639 868 876

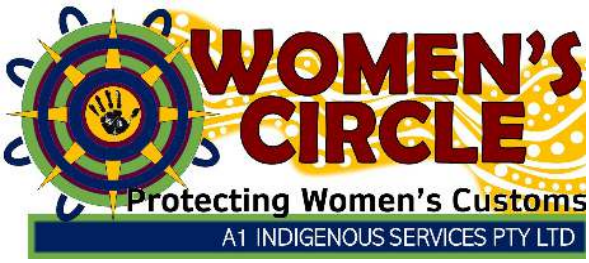

Hi,
I have reviewed the document and support the Information for the ACHMP.

A1 would like to be involved in any future Meetings and field work.

I am a traditional custodian with over 20 years experience in helping preserve Aboriginal cultural heritage on projects.
I hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and values that exist in the project area.
**I have attached A1 Indigenous Services Insurances.**

We would like the Proponent to consider including **A1's, Kawalkan youth and the Women's Circle Employees** for all future field work.

**The Kawalkan Youth Program** is a designed program created to employ young indigenous youths between the ages of (18-29) year




**The Women's Circle** was created with the need to always have Experienced Indigenous Women present in all field work.
To aim for not only gender equality in the workplace but, to help identify and protect any women's sacred places.

**OUR MISSION**

**Building strength in aboriginal families, communities, and services**.

It is our mission to commit to an innovative approach to a better future for indigenous employment.

Giving our people the opportunity to gain employment in a culturally sensitive work environment also giving them the opportunity to work on country and continue the tradition of protecting and passing down

**Cultural knowledge from one generation to the next – continuing the importance of keeping culture**.

Please feel free to contact me on details supplied

Kind Regards,
Carolyn Hickey
Managing Director

INSURANCES ARE ATTACHED
Kind regards
Carolyn Hickey

## Coral Hardwick

**From:** jesse johnson <muragadi@yahoo.com.au>
**Sent:** Monday, 5 July 2021 12:34 PM
**To:** Coral Hardwick
**Subject:** Re: Lighthorse Business Hub ACHMP Review
**Attachments:** BRW9C305B451BEF_003611.pdf

Hi Coral
I was just reading through the reports for the above project, and I noticed that we are not on the letter as being registered for the project. We did register, can you give me a call on 0490051102
Thanks
Darleen

On Thursday, 24 June 2021, 02:44:49 pm AEST, Coral Hardwick <chardwick@extent.com.au> wrote:

Dear All,

Thank you for your ongoing involvement in the Aboriginal heritage assessment for the proposed Light Horse Interchange Business Hub. As you will be aware, the Aboriginal Cultural Heritage Assessment (ACHA) report for this project was drafted in 2019. Since distribution of the survey and test excavation ACHA reports, Extent Heritage has been commissioned to develop an Aboriginal Cultural Heritage Management Plan (ACHMP) for the development.

Please find the link below to the draft ACHMP report for your review and input. The link is live for a three weeks, please let me know if you need another one sent. If you wish to provide input and/or comment, please can you do so by the **15 July 2021**. Once comments have been received, the document will be modified and finalised.

https://we.tl/t-DImefilgzH

Kind Regards,

Coral Hardwick

**Coral Hardwick** | BA (Hons), MRes (Macquarie University)
Heritage Advisor
T 02 9555 4000 | M 0436 333 686
chardwick@extent.com.au
extent.com.au
Connect with us on:

# Appendix 2: Procedure for Unexpected Finds – Human Skeletal Remains

# Procedure for Discovery of Possible Human Skeletal Remains

## Purpose

This procedure details the actions to be taken when possible human skeletal material (remains) are found during construction activities.

## Scope

This section outlines the procedure for handling human remains in accordance with the Skeletal Remains: Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977 (NSW Heritage Office 1998) and the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997); and the relevant NSW legislation.

## Procedure

In the event that possible human skeletal material (remains) are encountered during construction, the following steps shall be taken:

- STOP ALL WORK in the vicinity of the find (≤50 m) and immediately notify the relevant Site Supervisor, who will immediately notify the Environment Manager and the Project Manager. The Site Supervisor will demark the area to protect the possible human skeletal material (remains), and inform all site personnel of restricted access to the area of discovery until further notice.
- The Environment Manager is to record the details, take photos of the find and its context (without causing further excavation or disturbance) and notify the Project Archaeologist and the NSW Police.
- All directions dictated by the NSW Police, in discussion with the Project Archaeologist (where relevant), must be followed.
- In the event that the human remains are considered archaeological, and NSW Police release the finds location, the Environment Manager must contact Heritage NSW - DPC on 02 9995 6864. Notification should provide a verbal description of the remains as well as the burial context.
- All directions dictated by the Heritage NSW - DPC, in discussion with the Project Archaeologist (where relevant), must be followed. This may include the need to engage technical specialist (e.g. Forensic Anthropologist), and liaison with the RAPs, to recover the remains.
- Work is not to commence in the area unless authorised in writing by OEH and/or the NSW Police.

# Appendix 3: Procedure for Unexpected Finds – Aboriginal Heritage

# Procedure for Discovery of Unexpected Finds – Aboriginal Heritage

## Purpose

This procedure details the actions to be taken when a previously unidentified and/or potential Aboriginal heritage item/object/site is found during construction activities.

## Scope

This section outlines the procedure for managing unexpected finds in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010) and the Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011); and the relevant NSW legislation.

## Procedure

In the event that a potential heritage artefact/item/object/site is encountered during construction the following steps shall be taken.

- STOP ALL WORK in the vicinity of the find and immediately notify the relevant Site Supervisor. The Supervisor will then notify the Environment Manager and the Project Manager, and demark the area to protect the find.
- The Environment Manager is to record the details, take photos of the find and ensure that the area is adequately protected from additional disturbance.
- The Environment Manager contacts the Project Archaeologist to notify them of the location of the find.
- All instructions provided by the Project Archaeologist are to be followed. This may include:
    - The find is not a potential Aboriginal object: work can recommence.
    - The find is a potential Aboriginal object: appropriate approvals and/or mitigation measures require implementation.
    - The find is a potential historical relic: appropriate approvals and/or mitigation measures require implementation.
- Work is not to commence in the area unless authorised in writing by the Project Archaeologist.

## Management measures

**Community collection**

The RAPs will be provided with an opportunity to collect the identified Aboriginal object, and any other Aboriginal objects that may be identified during the collections. The location and context of recovered objects will be recorded. Artefacts will be removed from site and analysed as part of salvage excavation reporting being undertaken separately.

### Artefact analysis, storage, and long-term management

Any recovered artefacts will be analysed in accordance with the salvage methodology outlined in the ACHMP. Any Aboriginal objects that are removed from the land by actions authorised by MCoA SSD-9667 will be moved as soon as practicable to the temporary storage location at the offices of Heritage Consultant engaged to complete the salvage excavations under MCoA SSD-9667.

While in temporary storage, artefacts will be stored in a locked storage cupboard. Aboriginal objects under temporary storage will not be subject to future harm. Objects will be stored until agreement is reached about the long-term management of Aboriginal objects in consultation with the RAPs.

Any Aboriginal objects recovered during salvage excavations, community collection activities and/or the proposed development works conducted under MCoA SSD-9667, will be managed consistently with the previously retrieved Aboriginal objects from the Project site.

### Salvage reporting

Details regarding the identification, recording and collection of any Aboriginal objects will be included within the Aboriginal Cultural Heritage Salvage Report prepared in accordance with the requirements of the ACHMP.

# Annexure G - Landscape Plan

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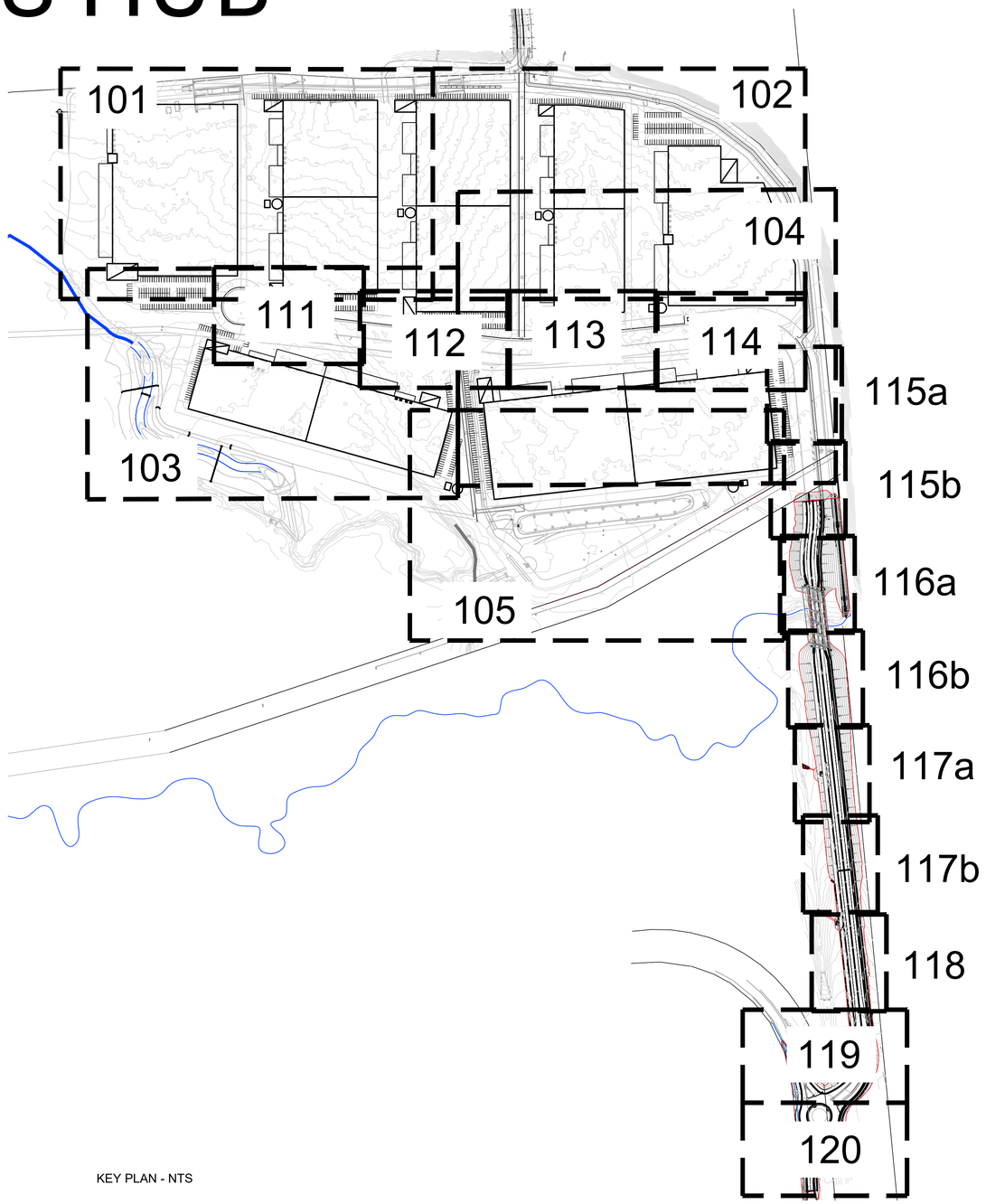
# LIGHT HORSE BUSINESS HUB

## Eastern Creek, NSW

## FOR APPROVAL

| Drawing Schedule | | |
|---|---|---|
| | | |
| **DWG #** | **DRAWING TITLE** | **SCALE** |
| 001 | Cover Sheet | NTS |
| 002 | Legend | NTS |
| 051 | Plant Schedule | NTS |
| | | |
| 100 | Landscape Master Plan | 1:1500 |
| 101 | Landscape Plan | 1:500 |
| 102 | Landscape Plan | 1:500 |
| 103 | Landscape Plan | 1:500 |
| 104 | Landscape Plan | 1:500 |
| 105 | Landscape Plan | 1:500 |
| 111 | Landscape Plan | 1:200 |
| 112 | Landscape Plan | 1:200 |
| 113 | Landscape Plan | 1:200 |
| 114 | Landscape Plan | 1:200 |
| 115 | Landscape Plan | 1:200 |
| 116 | Landscape Plan | 1:200 |
| 117 | Landscape Plan | 1:200 |
| 118 | Landscape Plan | 1:200 |
| 119 | Landscape Plan | 1:200 |
| 120 | Landscape Plan | 1:200 |
| | | |
| 501 | Landscape Details - Softworks | As Shown |
| 502 | Landscape Details - Softworks | As Shown |
| 511 | Landscape Details - Hardworks | As Shown |
| | | |
| 601 | Sections | As Shown |




KEY PLAN - NTS

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LANDSCAPE ARCHITECT

| DATE | DESCRIPTION | REV | DATE | DESCRIPTION | REV |
|---|---|---|---|---|---|
| 15/12/21 | FOR APPROVAL | A | - | - | - |
| 03/02/22 | FOR APPROVAL | B | - | - | - |
| - | - | - | - | - | - |
| - | - | - | - | - | - |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

REVISIONS

CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

COVER SHEET — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

| | | | |
|---|---|---|---|
| SCALE | 1:500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

001 — DRAWING NO.

B — REV.

A1

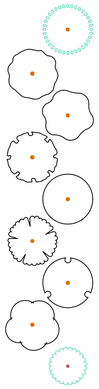
GENERAL:

- Boundary
- Lot Boundary
- Limit of Works
- Built Form
- Proposed Street Trees
  Species and Symbols vary.
  Refer to plant schedule
- Proposed Tree
  Species and Symbols vary.
  Refer to plant schedule
- P1 — Insitu Concrete Path
  Saw cut joints, no tooled edges.
  Refer to Civil Plans for Detail
- P2 — Decomposed Granite Path
- TD1 — Hardwood Timber Deck
- TURF — Turf
- SE — Steel Edge

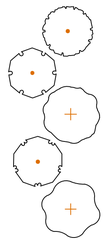
SOFTSCAPE:

refer to Drawing 051 for
plant schedule and detail

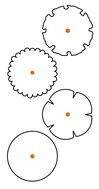
TREE PLANTING:



| | |
|---|---|
| ACA DEC | Acacia decurrens / Green Wattle |
| ACA IMP | Acacia implexa / Hickory Wattle |
| ACA PMT | Acacia parramattensis / South Wales Wattle |
| COR MAC | Corymbia maculata / Spotted Gum |
| EUC MOL | Eucalyptus moluccana / Gum-topped Box |
| EUC TER | Eucalyptus tereticornis / Forest Red Gum |
| EXO AUC | Exocarpos cupressiformis / Cherry Ballart |
| MEL WH2 | Melaleuca decora / White Feather Honey Myrtle |
| IND AUS | Indigofera australis / Australian Indigo |



| | |
|---|---|
| ANG FBN | Angophora floribunda / Rough-barked Apple |
| BAC MYR | Backhousia myrtifolia / Cinnamon Myrtle |
| CAS GLC | Casuarina glauca / Swamp Oak |
| MEL WH3 | Melaleuca decora / White Feather Honey Myrtle |
| MEL NOD | Melaleuca nodosa / Prickly-leaved paperbark |



| | |
|---|---|
| COR MA2 | Corymbia maculata / Spotted Gum |
| EUC AMP | Eucalyptus amplifolia / Cabbage Gum |
| EUC CRE | Eucalyptus crebra / Narrow-leaved Ironbark |
| EUC MO2 | Eucalyptus moluccana / Gum-topped Box |

| | |
|---|---|
| ACA PM2 | Acacia parramattensis / South Wales Wattle |
| ANG FB2 | Angophora floribunda / Rough-barked Apple |
| CAS GL2 | Casuarina glauca / Swamp Oak |
| EUC AM2 | Eucalyptus amplifolia / Cabbage Gum |
| EUC TE2 | Eucalyptus tereticornis / Forest Red Gum |
| MEL MUL | Melaleuca linariifolia / Flaxleaf Paperbark Multi-Trunk |

MASS PLANTING

- MATRIX 1
- MATRIX 2
- MATRIX 3
- MATRIX 4 - SWALE
- MATRIX A
- MATRIX B
- MATRIX C
- WETLAND MATRIX
- HYDROSEED - MIX 1
- HYDROSEED - MIX 2
- HYDROSEED - WETLAND BATTER
- MASS JUNCUS

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LANDSCAPE ARCHITECT

| DATE | DESCRIPTION | REV |
|---|---|---|
| 15/12/21 | FOR APPROVAL | A |
| 03/02/22 | FOR APPROVAL | B |
| - | - | - |
| - | - | - |
| - | - | - |
| - | - | - |

| DATE | DESCRIPTION | REV |
|---|---|---|
| - | - | - |
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| - | - | - |

REVISIONS

CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

LEGEND — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

| | | | |
|---|---|---|---|
| SCALE | 1:500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

002 — DRAWING NO.

B — REV.

A1

**PLANT SCHEDULE:**

**TREE PLANTING**

| Code | Botanical Name | Common Name | Installation Size | Mature Size (m2) | QTY |
|---|---|---|---|---|---|
| ACA DEC | Acacia decurrens | Green Wattle | 40lt | 15 x 5 | 24 |
| ACA IMP | Acacia implexa | Hickory Wattle | 40lt | 10 x 7 | 39 |
| ACA PM2 | Acacia parramattensis | South Wales Wattle | 100lt | 10 x 7 | 8 |
| ACA PMT | Acacia parramattensis | South Wales Wattle | 40lt | 10 x 7 | 16 |
| ANG FBN | Angophora floribunda | Rough-barked Apple | 100lt | 20 x 10 | 47 |
| BAC MYR | Backhousia myrtifolia | Cinnamon Myrtle | 40lt | 8 x 4 | 53 |
| CAS GLC | Casuarina glauca | Swamp Oak | 100lt | 10 x 6 | 32 |
| COR MAC | Corymbia maculata | Spotted Gum | 100lt | 30 x 10 | 76 |
| EUC AMP | Eucalyptus amplifolia | Cabbage Gum | 100lt | 20 x 8 | 23 |
| EUC CRE | Eucalyptus crebra | Narrow-leaved Ironbark | 40lt | 25 x 10 | 13 |
| EUC MOL | Eucalyptus moluccana | Gum-topped Box | 100lt | 20 x 6 | 26 |
| EUC TER | Eucalyptus tereticornis | Forest Red Gum | 100lt | 35 x 12 | 81 |
| EXO AUC | Exocarpos cupressiformis | Cherry Ballart | 40lt | 10 x 6 | 18 |
| IND AUS | Indigofera australis | Australian Indigo | 300mm | 2 x 2 | 12 |
| MEL MUL | Melaleuca linariifolia | Flaxleaf Paperbark Multi-Trunk | 100lt | 10 x 4 | 6 |
| MEL NOD | Melaleuca nodosa | Prickly-leaved paperbark | 40lt | 3 x 2.5 | 28 |
| MEL WHM | Melaleuca decora | White Feather Honey Myrtle | 40lt | 8 x 5 | 15 |

**MASS PLANTING**

MATRIX ONE

| Code | Botanical Name | Common Name | Installation Size | Mature Size (m2) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 10/m2 | | |
| Ar | Aristida ramosa | Purple wiregrass | 150mm | 0.6, 0.6 | 1 | 81 |
| Ca | Centella asiatica | Asiatic Pennywort | 150mm | 0.2 x 1 | 1 | 81 |
| Lf | Lomandra filiformis | Wattle Mat Rush | 150mm | 0.5 x 0.3 | 2 | 162 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 0.3 x 0.3 | 2 | 162 |
| Oa | Oplismenus aemulus | Basket Grass | 150mm | 0.3 x 0.3 | 3 | 242 |
| Od | Ozothamnus diosmifolius | Rice Flower | 150mm | 2 x 1.2 | 1 | 81 |

MATRIX TWO

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 10/m2 | | |
| Ar | Aristida ramosa | Purple wiregrass | 150mm | 0.6 x 0.6 | 2 | 2997 |
| Ba | Brunoniella australis | Blue trumpet | 150mm | 0.3 x 0.3 | 2 | 3029 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1 | 3 | 4544 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 0.3 x 0.3 | 1 | 1515 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 0.6 x 0.5 | 2 | 3029 |

MATRIX THREE

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 10/m2 | | |
| Cr | Cymbopogon refractus | Barbed-wire Grass | 150mm | 1 x 1 | 1 | 2063 |
| Cg | Cyperus gracilis | Slender sedge | 150mm | 0.3 x 0.5 | 2 | 4126 |
| Dl | Dianella longifolia | Dianella | 150mm | 0.8 x 0.5 | 1 | 2063 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1 | 4 | 8253 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 0.8 x 0.5 | 2 | 4126 |

MATRIX FOUR - SWALE

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 5/m2 | | |
| Ca | Carex appressa | Tall Sedge | 150mm | 1.3 x 1 | 0.5 | 2615 |
| Dr | Dianella revoluta | Spreading Flax Lily | 150mm | 1 x 0.6 | 0.5 | 2615 |
| Ea | Eleocharis acuta | Spike Sedge | 150mm | 0.6 x 0.5 | 1 | 5229 |
| Fn | Ficinia nodosa | Knobby Club Rush | 150mm | 1 x 0.8 | 0.5 | 2615 |
| Jk | Juncus kraussii | Sea Rush | 150mm | 0.8 x 0.6 | 0.5 | 2615 |
| Ju | Juncus usitatus | Sawgrass Sedge | 150mm | 0.8 x 0.6 | 0.3 | 1569 |
| Oo | Ottelia ovalifoliA | Swamp Lily | 150mm | 0.2 x 0.6 | 0.5 | 2615 |
| Pl | Poa labillardieri | Tussock Grass | 150mm | 1.3 x 1 | 1 | 5229 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 0.6 x 0.5 | 0.2 | 1046 |

MATRIX A

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 6/m2 | | |
| Am | Arthropodium milleflorum / Pale Vanilla Lily | | 150mm | 1.3, 0.3 | 1.0 | 4270 |
| Hv | Hardenbergia violacea / Lilac Vine | | 150mm | 2, 1.5 | 1.0 | 4270 |
| Hdiff | Hibbertia diffusa / Wedge Guinea Flower | | 150mm | 0.3, 0.5 | 1.5 | 6405 |
| Ll | Lepidosperma laterale / Sword-sedge | | 150mm | 1.5, 2 | 0.5 | 2135 |
| Lf | Lomandra filiformis / Wattle Mat Rush | | 150mm | 150mm, 0.3, 0.3 | 1.0 | 4270 |
| Ms | Microlaena stipoides / Weeping Grass | | 150mm | 150mm, 0.7, 0.5 | 0.5 | 2135 |
| Ta | Themeda australis / Kangaroo Grass | | 150mm | 150mm, 1.5, 1 | 0.5 | 2135 |

MATRIX B

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 6/m2 | | |
| Bs | Bursaria spinosa | Australian Blackthorn | 150mm | 150mm, 2, 2 | 0.5 | 95 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 150mm, 0.3, 0.3 | 3 | 572 |
| Od | Ozothamnus diosmifolius | Rice Flower | 150mm | 150mm, 2, 1.2 | 0.5 | 95 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 150mm, 0.7, 0.5 | 1 | 191 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 150mm, 0.8, 0.5 | 1 | 191 |

MATRIX C

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| | | | | Spacing - 6/m2 | | |
| Dl | Dianella longifolia | Dianella | 150mm | 1 x 1 | 1 | 548 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1.2 | 3 | 1643 |
| Ll | Lomandra longifolia | Mat Rush | 150mm | 0.3 x 1 | 1 | 548 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 0.8 x 0.5 | 1 | 548 |

WETLAND MATRIX

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| Ca | Carex appressa | Tall Sedge | 150mm | 1.3 x 1 | 0.5 | 1698 |
| Dr | Dianella revoluta | Spreading Flax Lily | 150mm | 1 x 0.6 | 0.5 | 1698 |
| Ea | Eleocharis acuta | Spike Sedge | 150mm | 0.6 x 0.5 | 1 | 3395 |
| Fn | Ficinia nodosa | Knobby Club Rush | 150mm | 1 x 0.8 | 0.5 | 1698 |
| Jk | Juncus kraussii | Sea Rush | 150mm | 0.8 x 0.6 | 0.5 | 1698 |
| Ju | Juncus usitatus | Sawgrass Sedge | 150mm | 0.8 x 0.6 | 0.3 | 1019 |
| Oo | Ottelia ovalifolia | Swamp Lily | 150mm | 0.2 x 0.6 | 0.5 | 1698 |
| Pl | Poa labillardieri | Tussock Grass | 150mm | 1.3 x 1 | 1 | 3395 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 0.6 x 0.5 | 0.2 | 679 |

HYDROSEED - MIX 1

| | Botanical Name | Common Name | | Mature Size (m) | | AREA m2 |
|---|---|---|---|---|---|---|
| | | | | | | 6026 |
| | Aristida vagans | Threeawn Speargrass | | 0.8 x 0.5 | | |
| | Bursaria spinosa | Australian Blackthorn | | 2 x 2 | | |
| | Centella asiatica | Asiatic Pennywort | | 0.2 x 1 | | |
| | Commelina cyanea | Scurvy Weed | | 0.2 x 0.5 | | |
| | Echinopogon ovatus | Hedgehog Grass | | 0.7 x 0.3 | | |
| | Entolasia marginata | Bordered panic grass | | 0.8 x 0.4 | | |
| | Eustrephus latifolius | Wombat Berry | | 6 x 6 | | |
| | Lomandra filiformis | Wattle Mat Rush | | 0.5 x 0.3 | | |
| | Microlaena stipoides | Weeping Grass | | 0.3 x 0.3 | | |
| | Oplismenus aemulus | Basket Grass | | 0.3 x 0.3 | | |
| | Ozothamnus diosmifolius | Rice Flower | | 2 x 1.2 | | |
| | Pratia purpurascens | White root | | 0.2 x 1 | | |
| | Rubus parvifolius | Australian Raspberry | | 2 x 1.5 | | |
| | Solanum prinophyllum | Forest Nightshade | | 0.5 x 0.3 | | |
| | Themeda australis | Kangaroo Grass | | 0.7 x 0.5 | | |

HYDROSEED - MIX 2

| | Botanical Name | Common Name | | Mature Size (m) | | AREA m2 |
|---|---|---|---|---|---|---|
| | | | | | | 18905 |
| | Aristida vagans | Threeawn speargrass | | 0.8 x 0.5 | | |
| | Centella asiatica | Asiatic Pennywort | | 0.2 x 1 | | |
| | Lomandra filiformis | Wattle Mat Rush | | 0.5 x 0.3 | | |
| | Microlaena stipoides | Microlaena stipoides / Weeping Grass | | 0.3 x 0.3 | | |
| | Oplismenus aemulus | Basket Grass | | 0.3 x 0.3 | | |
| | Ozothamnus diosmifolius | Rice Flower | | 2 x 1.2 | | |

HYDROSEED - WETLAND BATTER

| | Botanical Name | Common Name | | Mature Size (m) | | AREA m2 |
|---|---|---|---|---|---|---|
| | | | | | | 6195 |

MASS JUNCUS

| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
|---|---|---|---|---|---|---|
| Ju | Juncus usitatus | Sawgrass Sedge | TUBE | 1.3 x 0.5 | 6 | 37170 |

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LANDSCAPE ARCHITECT

| DATE | DESCRIPTION | REV |
|---|---|---|
| 15/12/21 | FOR APPROVAL | A |
| 03/02/22 | FOR APPROVAL | B |
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REVISIONS

| DATE | DESCRIPTION | REV |
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CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

PLANT SCHEDULE — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

| | | | |
|---|---|---|---|
| SCALE | AS SHOWN @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

051 — DRAWING NO.

B — REV.

A1

LOT 5
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 4
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 3
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 2
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

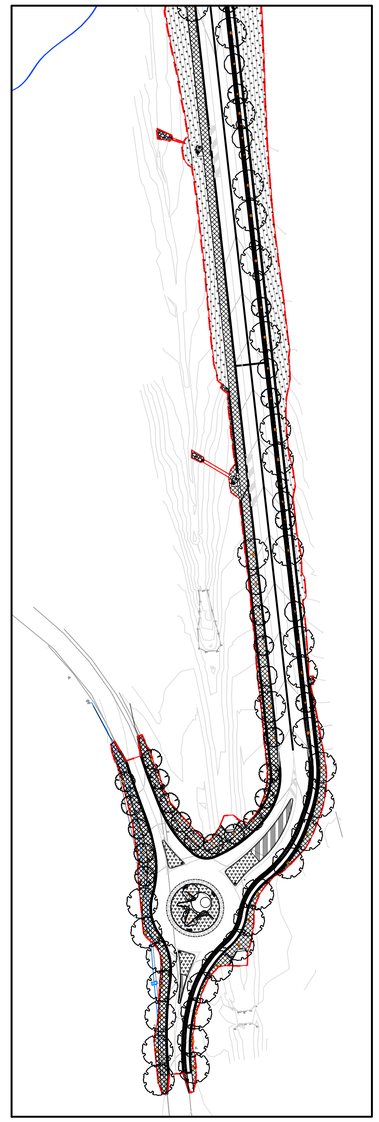
LOT 1
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 6
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 7
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

REFER TO VMP FOR CREEK REALIGNMENT WORKS

REFER TO INSET 1 FOR CONTINUATION



INSET 1

1:1500
15 0M 15 30 75M

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LANDSCAPE ARCHITECT

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| DATE | DESCRIPTION | REV | DATE | DESCRIPTION | REV |
| 15/12/21 | FOR APPROVAL | A | - | - | - |
| 03/02/22 | FOR APPROVAL | B | - | - | - |
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CLIENT: CHARTER HALL

CIVIL ENGINEER: AT&L

PROJECT: LIGHT HORSE BUSINESS HUB

DRAWING TITLE: LANDSCAPE PLAN

DRAWING PURPOSE: FOR APPROVAL

DRAWING INFORMATION

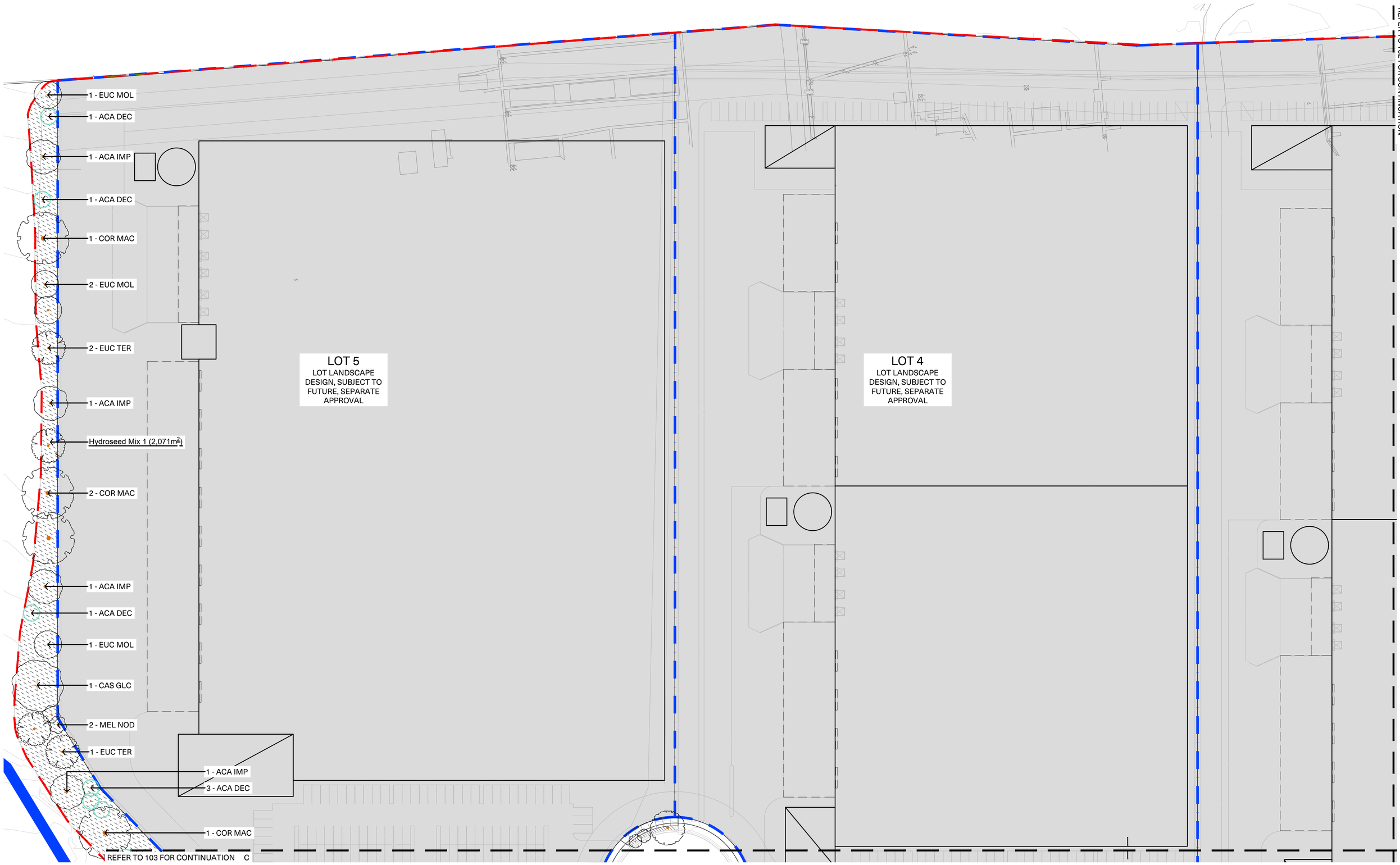
| | | | |
|---|---|---|---|
| SCALE | 1:1500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

NORTH

DRAWING NO.: 100

REV.: B

A1




1:500
5 0M 5 10 25M

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LANDSCAPE ARCHITECT

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| DATE | DESCRIPTION | REV | DATE | DESCRIPTION | REV |
| 15/12/21 | FOR APPROVAL | A | - | - | - |
| 03/02/22 | FOR APPROVAL | B | - | - | - |
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CLIENT: CHARTER HALL
CIVIL ENGINEER: AT&L
PROJECT: LIGHT HORSE BUSINESS HUB
DRAWING TITLE: LANDSCAPE PLAN
DRAWING PURPOSE: FOR APPROVAL

| DRAWING INFORMATION | | | |
|---|---|---|---|
| SCALE | 1:500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

NORTH
DRAWING NO.: 101
REV.: B

A1

REFER TO 101 FOR CONTINUATION

1 - ANG FBN
1 - EUC TER
1 - EUC MOL
2 - EUC AMP
1 - COR MAC
1 - EUC MOL
1 - ACA PMT
1 - EUC MOL
2 - COR MAC
1 - EUC TER
2 - ACA PMT
1 - ANG FBN
1 - EUC AMP
1 - ACA PMT
2 - EUC TER
1 - ACA PMT
2 - EUC MOL
1 - ANG FBN
1 - EUC TER
1 - COR MAC
1 - ACA PMT
1 - COR MAC

Matrix 4 - Buffer
1183 Am
1183 Arm
2365 Ci
2365 Ca
473 Cr
2365 Cg
473 Du
473 Dl
4730 Dr
2365 Ds
473 Ll
473 Wg

LOT 3
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 2
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

LOT 1
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

REFER TO 104 FOR CONTINUATION

REFER TO 104 FOR CONTINUATION

1:500
5 0M 5 10 25M

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| DATE | DESCRIPTION | REV |
|---|---|---|
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LANDSCAPE ARCHITECT | REVISIONS

CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

LANDSCAPE PLAN — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

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|---|---|---|---|
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| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

102 — DRAWING NO.

B — REV.

A1

REFER TO 101 FOR CONTINUATION

1 - ACA DEC
1 - EUC MOL
1 - ACA IMP
1 - ACA DEC
1 - COR MAC
2 - CAS GLC

2 - MEL NOD
1 - ACA IMP
1 - EUC MOL
2 - ACA DEC
1 - CAS GLC
3 - MEL NOD
2 - EUC TER

Hydroseed Mix 1 (1,665m$^2$)

1 - EUC TER
3 - BAC MYR
1 - ANG FBN

2 - CAS GLC

2 - ANG FBN

3 - BAC MYR
1 - ACA IMP

2 - ANG FBN

3 - MEL WH3
1 - CAS GLC
3 - BAC MYR
2 - MEL NOD
1 - CAS GLC
1 - EUC TER

1 - CAS GLC
5 - BAC MYR

1 - MEL NOD
1 - ANG FBN
1 - EUC TER
1 - MEL NOD
1 - CAS GLC

3 - BAC MYR
1 - ANG FBN
2 - MEL NOD
1 - EUC TER
1 - CAS GLC
3 - BAC MYR

1 - MEL NOD
2 - ANG FBN

1 - EUC TER
1 - MEL NOD
2 - CAS GLC

1 - ANG FBN
1 - EUC TER
3 - BAC MYR
2 - MEL NOD

3 - ANG FBN
1 - CAS GLC

Hydroseed Mix 2 (8,611m$^2$)

REFER TO 111 FOR DETAILED STREET PLAN

REFER TO 112 FOR DETAILED STREET PLAN

REFER TO 104 FOR CONTINUATION

REFER TO 105 FOR CONTINUATION

REFER TO VMP FOR CREEK REALIGNMENT WORKS

LOT 6
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

1:500
5 0M 5 10 25M

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DRAWING TITLE

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DRAWING PURPOSE

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DRAWING INFORMATION

NORTH

103
DRAWING NO.

B
REV.

A1

REFER TO 102 FOR CONTINUATION

1 - COR MAC

REFER TO 102 FOR CONTINUATION

1 - EUC MOL

1 - EUC TER

Matrix 4 - Buffer
523 Ca
523 Dr
1046 Ea
523 Fn
523 Jk
314 Ju
523 Oo
1046 Pl
209 Ta

1 - COR MAC

1 - ANG FBN

1 - COR MAC

2 - EUC MOL

1 - EUC AMP

2 - ACA PMT

2 - EUC TER

LOT 1
LOT LANDSCAPE DESIGN, SUBJECT TO FUTURE, SEPARATE APPROVAL

1 - COR MAC

1 - EUC CRE

REFER TO 113 FOR DETAILED STREET PLAN

REFER TO 114 FOR DETAILED STREET PLAN

REFER TO 115A FOR DETAILED STREET PLAN

REFER TO 103 FOR CONTINUATION

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5 0M 5 10 25M

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DRAWING TITLE

FOR APPROVAL
DRAWING PURPOSE

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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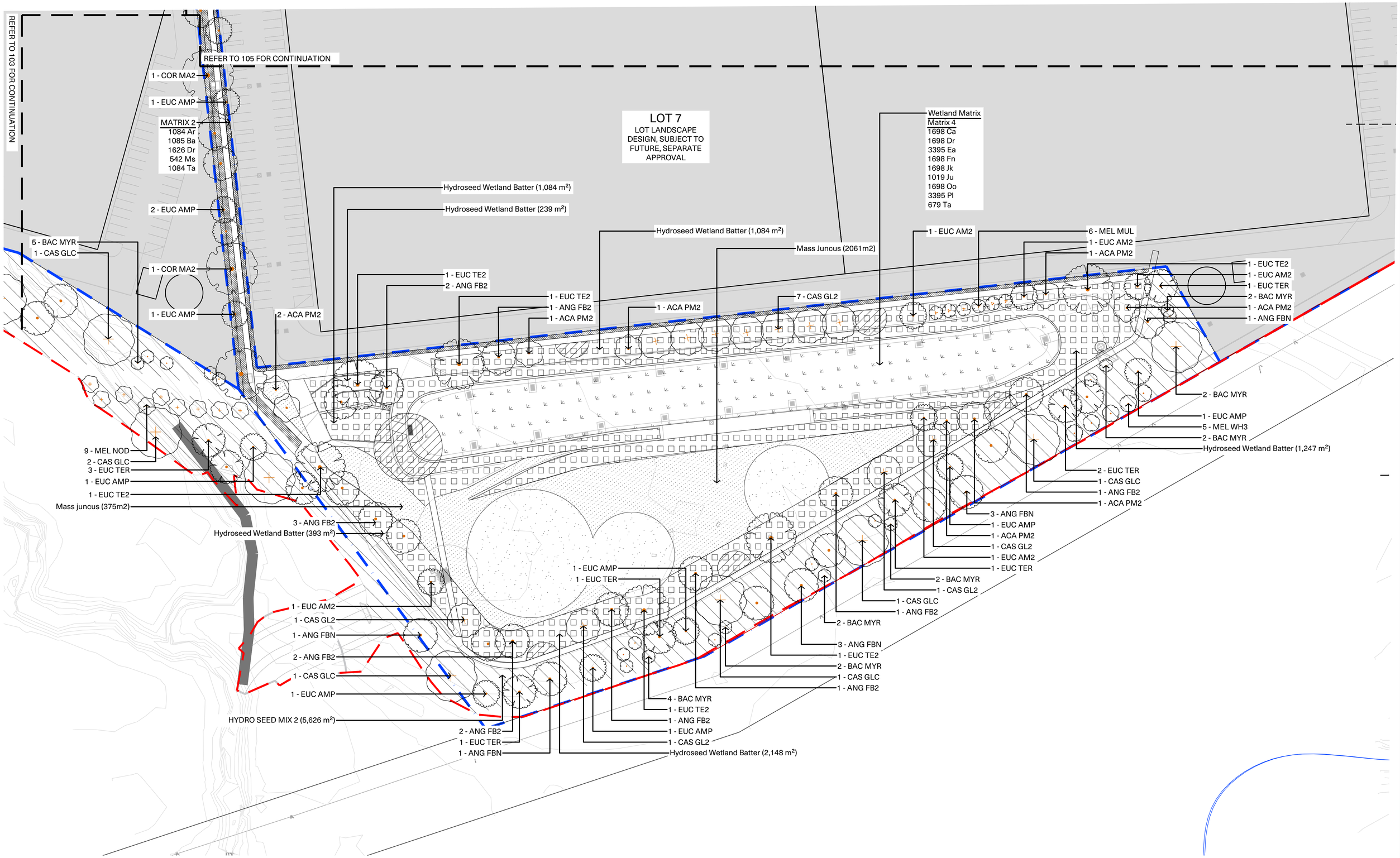
DRAWING INFORMATION

NORTH

104
DRAWING NO.

B
REV.

A1

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5 0M 5 10 25M

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LANDSCAPE ARCHITECT

| DATE | DESCRIPTION | REV |
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REVISIONS

CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

LANDSCAPE PLAN — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

| | | | |
|---|---|---|---|
| SCALE | 1:500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

105 — DRAWING NO.

B — REV.

A1

1 ANG FBN

2 BAC MYR

MATRIX 1
17 Av
17 Ca
34 Lf
51 Ms
51 Oa
17 Od

1 ANG FBN

MATRIX 1
9 Av
9 Ca
17 Lf
26 Ms
26 Oa
9 Od

2 - BAC MYR

MATRIX 1
11 Av
11 Ca
22 Lf
33 Ms
33 Oa
11 Od

1 - MEL WH3

MATRIX 1
23 Av
23 Ca
45 Lf
68 Ms
68 Oa
23 Od

MATRIX 1
18 Av
18 Ca
37 Lf
55 Ms
55 Oa
18 Od

3 - BAC MYR

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC TER

1 - EUC AMP

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - ACA PMT

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ANG FBN

1 - COR MAC

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

MATRIX 2
135 Ar
135 Ba
203 Dr
68 Ms
135 Ta

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC MOL

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC AMP

MATRIX 2
29 Ar
29 Ba
44 Dr
15 Ms
29 Ta

1 - EUC TER

MATRIX 2
12 Ar
12 Ba
18 Dr
6 Ms
12 Ta

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ANG FBN

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - EUC MOL

REFER TO 112 FOR CONTINUATION

1:200
2 0M 2 4 10M

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| DATE | DESCRIPTION | REV |
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CHARTER HALL | AT&L | LIGHT HORSE BUSINESS HUB | LANDSCAPE PLAN | FOR APPROVAL

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
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NORTH | 111 | A

LANDSCAPE ARCHITECT | REVISIONS | CLIENT | CIVIL ENGINEER | PROJECT | DRAWING TITLE | DRAWING PURPOSE | DRAWING INFORMATION | NORTH | DRAWING NO. | REV.

A1

REFER TO 111 FOR CONTINUATION

REFER TO 113 FOR CONTINUATION

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ACA DEC

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ANG FBN

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - COR MAC

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ACA IMP

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC MOL

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ACA IMP

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - ACA IMP

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC MOL

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - EUC MOL

MATRIX 2
6 Ar
6 Ba
10 Dr
3 Ms
6 Ta

1 - COR MAC

1 - EUC AMP

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - EUC MOL

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - ANG FBN

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

MATRIX 2
210 Ar
210 Ba
315 Dr
105 Ms
210 Ta

3 - BAC MYR

MATRIX 2
72 Ar
72 Ba
108 Dr
36 Ms
72 Ta

1 - ACA PMT

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - COR MAC

MATRIX 2
40 Ar
72 Ba
108 Dr
36 Ms
72 Ta

1 - EUC AMP

MATRIX 2
64 Ar
64 Ba
96 Dr
32 Ms
64 Ta

1 - EUC AMP

MATRIX 2
6 Ar
6 Ba
8 Dr
3 Ms
6 Ta

1 - ACA DEC

1:200
2 0M 2 4 10M

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LANDSCAPE ARCHITECT

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REVISIONS

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LIGHT HORSE BUSINESS HUB

PROJECT

LANDSCAPE PLAN

DRAWING TITLE

FOR APPROVAL

DRAWING PURPOSE

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DRAWING INFORMATION

NORTH

112

DRAWING NO.

A

REV.

A1

REFER TO 112 FOR CONTINUATION

REFER TO 114 FOR CONTINUATION

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg

1 - ACA IMP
1 - COR MAC
1 - EUC MOL
1 - ACA IMP
1 - ACA IMP
1 - COR MAC
1 - EUC TER

1 - EXO AUC
1 - EUC TER
1 - ACA DEC
1 - ACA IMP
1 - IND AUS
1 - EUC MOL
1 - EXO AUC
1 - COR MAC
1 - ACA DEC
1 - MEL WH2
1 - ACA IMP
1 - ACA PMT
1 - EXO AUC
1 - EXO AUC
1 - EXO AUC
1 - ACA PMT
1 - ACA IMP
1 - IND AUS

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg

MATRIX 3
120 Cr
240 Cg
120 Dl
480 Dr
240 Wg

1:200
2 0M 2 4 10M

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| DATE | DESCRIPTION | REV |
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LANDSCAPE ARCHITECT

REVISIONS

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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DRAWING INFORMATION

NORTH

113
DRAWING NO.

A
REV.

A1

REFER TO 113 FOR CONTINUATION

REFER TO 115 FOR CONTINUATION

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - ACA IMP

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - COR MAC

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - MEL WH2

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - EUC MOL

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - ACA IMP

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - COR MAC

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - EUC TER

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - ACA IMP

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - MEL WH2

1 - ACA DEC
1 - COR MAC

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - EXO AUC

1 - ACA DEC

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg
1 - MEL WH2

1 - IND AUS

1 - ACA DEC
1 - EUC TER

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg

1 - EXO AUC

MATRIX 3
100 Cr
200 Cg
100 Dl
400 Dr
200 Wg

1 - EXO AUC

1 - ACA IMP

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg

1 - IND AUS

1 - EUC MOL
1 - EXO AUC

1 - ACA IMP

MATRIX 3
3 Cr
7 Cg
3 Dl
14 Dr
7 Wg

1 - ACA DEC

MATRIX 3
70 Cr
139 Cg
70 Dl
278 Dr
139 Wg

1 - IND AUS

1 - IND AUS

MATRIX 3
70 Cr
139 Cg
70 Dl
278 Dr
139 Wg

1 - COR MAC

1 - ACA DEC

1 - ACA DEC
1 - MEL WH2

1 - COR MAC

1 - ACA PMT

1 - ACA IMP

1 - IND AUS

MATRIX 3
3 Cr
6 Cg
3 Dl
12 Dr
6 Wg

MATRIX 3
3 Cr
6 Cg
3 Dl
12 Dr
6 Wg

1 - EXO AUC

1 - ACA DEC

MATRIX 3
3 Cr
6 Cg
3 Dl
12 Dr
6 Wg

1 - MEL WH2

1 - IND AUS

MATRIX 3
55 Cr
110 Cg
55 Dl
221 Dr
110 Wg

MATRIX 3
3 Cr
6 Cg
3 Dl
12 Dr
6 Wg

1 - EXO AUC

1 - COR MAC

1 - ACA PMT

1:200
2 0M 2 4 10M

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LANDSCAPE ARCHITECT

| DATE | DESCRIPTION | REV |
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REVISIONS

CHARTER HALL
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LIGHT HORSE BUSINESS HUB
PROJECT

LANDSCAPE PLAN
DRAWING TITLE

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| | | | |
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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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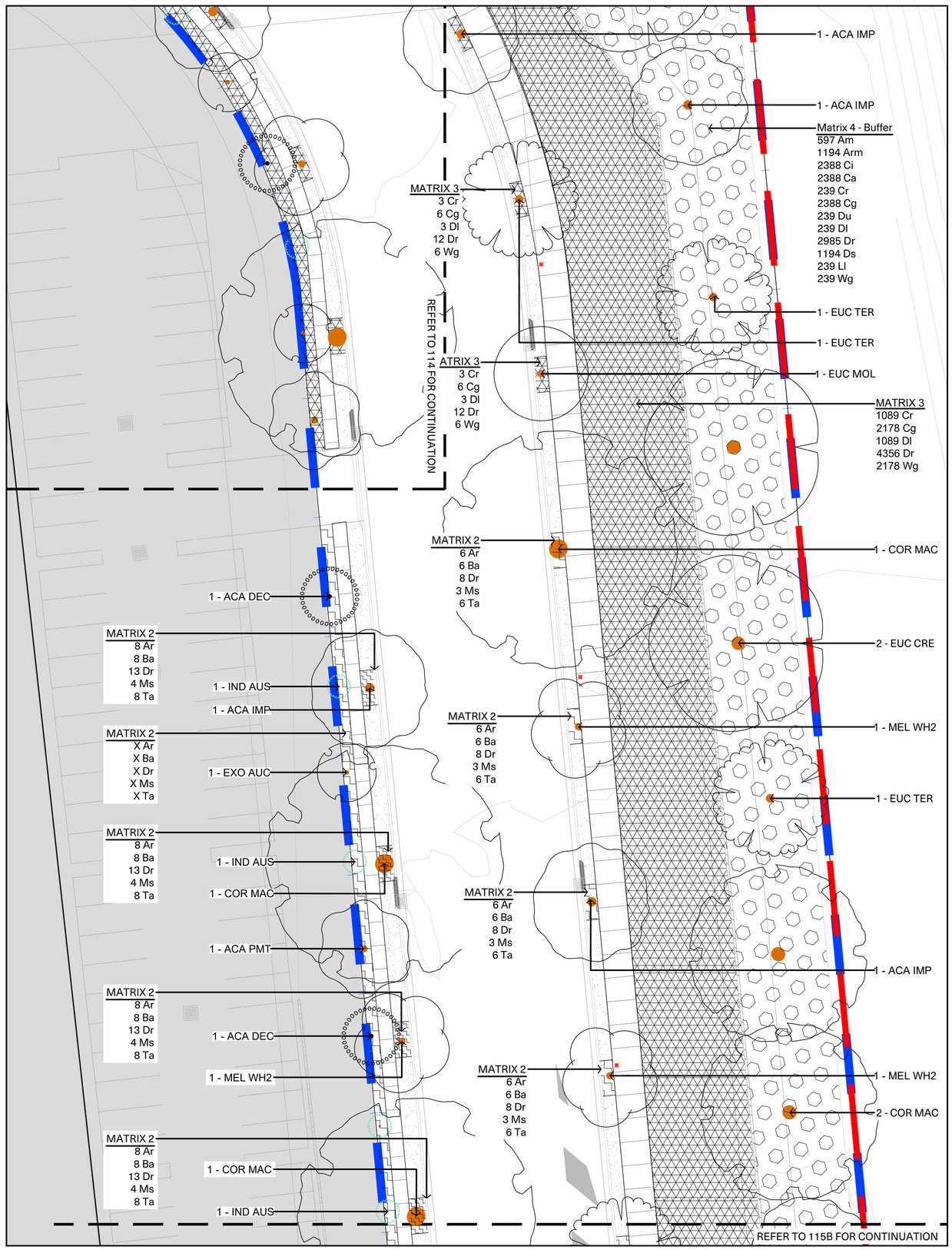
DRAWING INFORMATION

NORTH

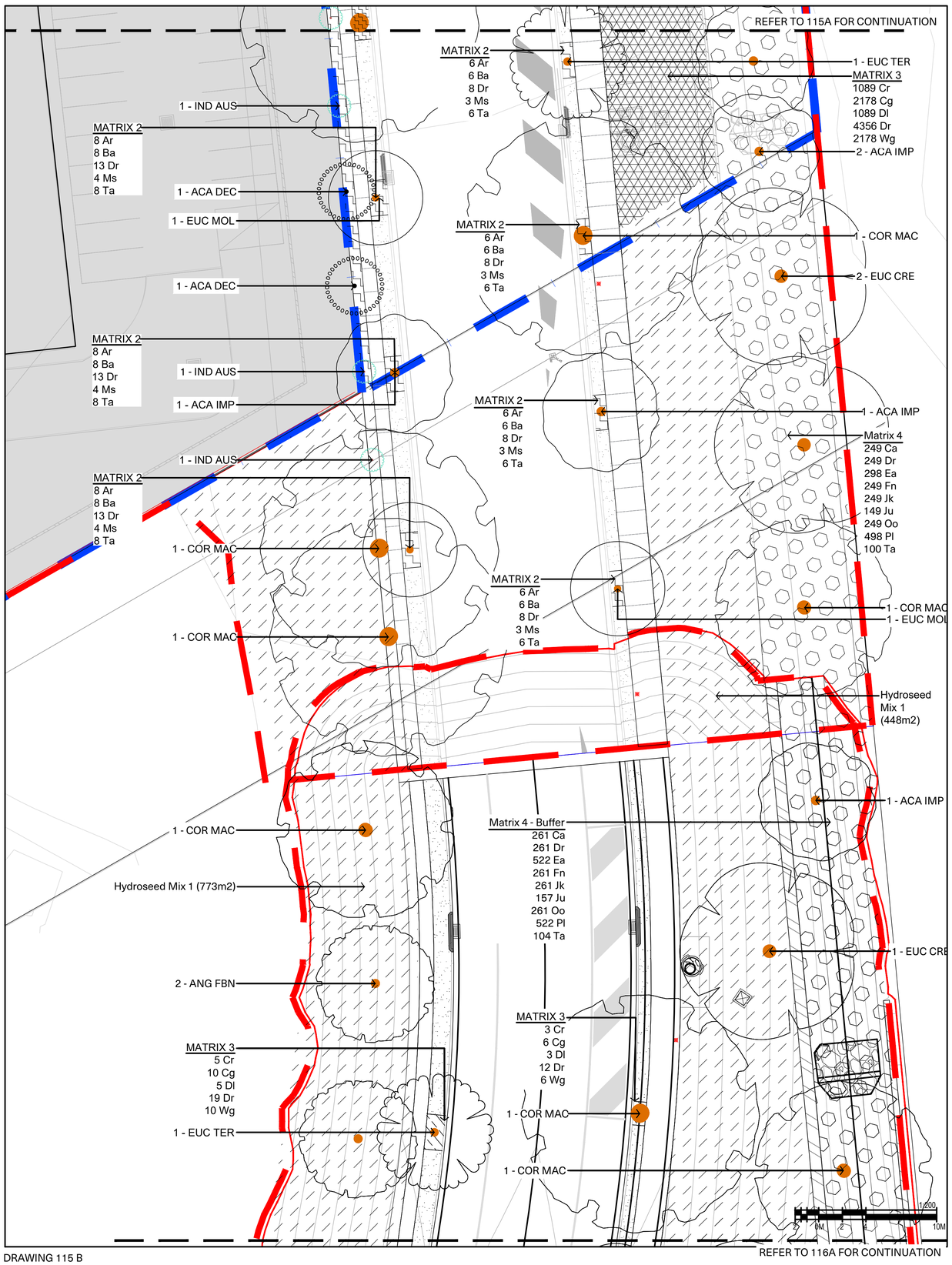
114
DRAWING NO.

A
REV.

A1




DRAWING 115 A




DRAWING 115 B

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DRAWING INFORMATION

NORTH

115 — DRAWING NO.

A — REV.

A1

REFER TO 115B FOR CONTINUATION

1 - ACA DEC
2 - ACA IMP
1 - COR MAC
1 - COR MAC
2 - EUC TER
Hydroseed
Mix 1 (767m2)
1 - ACA DEC

1 - EUC MOL
Hydroseed Mix 1 (1
4 - EUC CRE
1 - EUC MOL
1 - COR MAC
3 - EUC CRE
1 - EUC TER
Matrix 4 - Buffer
261 Am
521 Arm
1042 Ci
1042 Ca
104 Cr
1042 Cg
104 Du
104 Dl
1303 Dr
521 Ds
104 Ll
104 Wg

DRAWING 116A

REFER TO 116A FOR CONTINUATION

1 - EUC TER
1 - ACA PMT
1 - EUC TER
Hydroseed - Mix 2 (1037m2)
MATRIX A
304 Am
304 Hv
456 Hd
152 Ll
304 Lf
152 Ms
152 Ta
2 - COR MAC

1 - COR MAC
MATRIX A
87 Am
87 Hv
131 Hd
44 Ll
87 Lf
44 Ms
44 Ta
1 - ACA IMP
Hydroseed - Mix 2 (1197m2)
1 - COR MAC
2 - EUC TER
2 - EUC TER
1 - COR MAC

REFER TO 117A FOR CONTINUATION

DRAWING 116B

1:200
2 0M 2 4 10M

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CHARTER HALL | AT&L | LIGHT HORSE BUSINESS HUB | LANDSCAPE PLAN | FOR APPROVAL

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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| JOB NO. | | APPROVED BY | CH |

NORTH | 116 | A

LANDSCAPE ARCHITECT | REVISIONS | CLIENT | CIVIL ENGINEER | PROJECT | DRAWING TITLE | DRAWING PURPOSE | DRAWING INFORMATION | NORTH | DRAWING NO. | REV.

A1

REFER TO 116B FOR CONTINUATION

MATRIX A
107 Am
107 Hv
107 Hd
54 Ll
107 Lf
54 Ms
54 Ta

1 - ACA IMP

Hydroseed - Mix 1 (677m2)

1 - EUC TER

MATRIX A
398 Am
398 Hv
597 Hd
199 Ll
398 Lf
199 Ms
199 Ta

1 - COR MAC

1 - EXO AUC

1 - ACA IMP

1 - EXO AUC

2 - COR MAC

Hydroseed - Mix 2 (1003m2)

DRAWING 117A

REFER TO 117B FOR CONTINUATION

REFER TO 117A FOR CONTINUATION

1 - COR MAC

2 - EXO AUC

Hydroseed - Mix 2 (320m2)

MATRIX A
107 Am
107 Hv
107 Hd
54 Ll
109 Lf
55 Ms
55 Ta

1 - EUC TER

Hydroseed - Mix 2 (632m2)

MATRIX A
398 Am
398 Hv
597 Hd
199 Ll
398 Lf
199 Ms
199 Ta

1 - COR MAC

1 - ACA IMP

1 - EUC TER

2 - COR MAC

1:200
2 0M 2 4 10M

DRAWING 117B

REFER TO 118 FOR CONTINUATION

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LIGHT HORSE BUSINESS HUB
PROJECT

LANDSCAPE PLAN
DRAWING TITLE

FOR APPROVAL
DRAWING PURPOSE

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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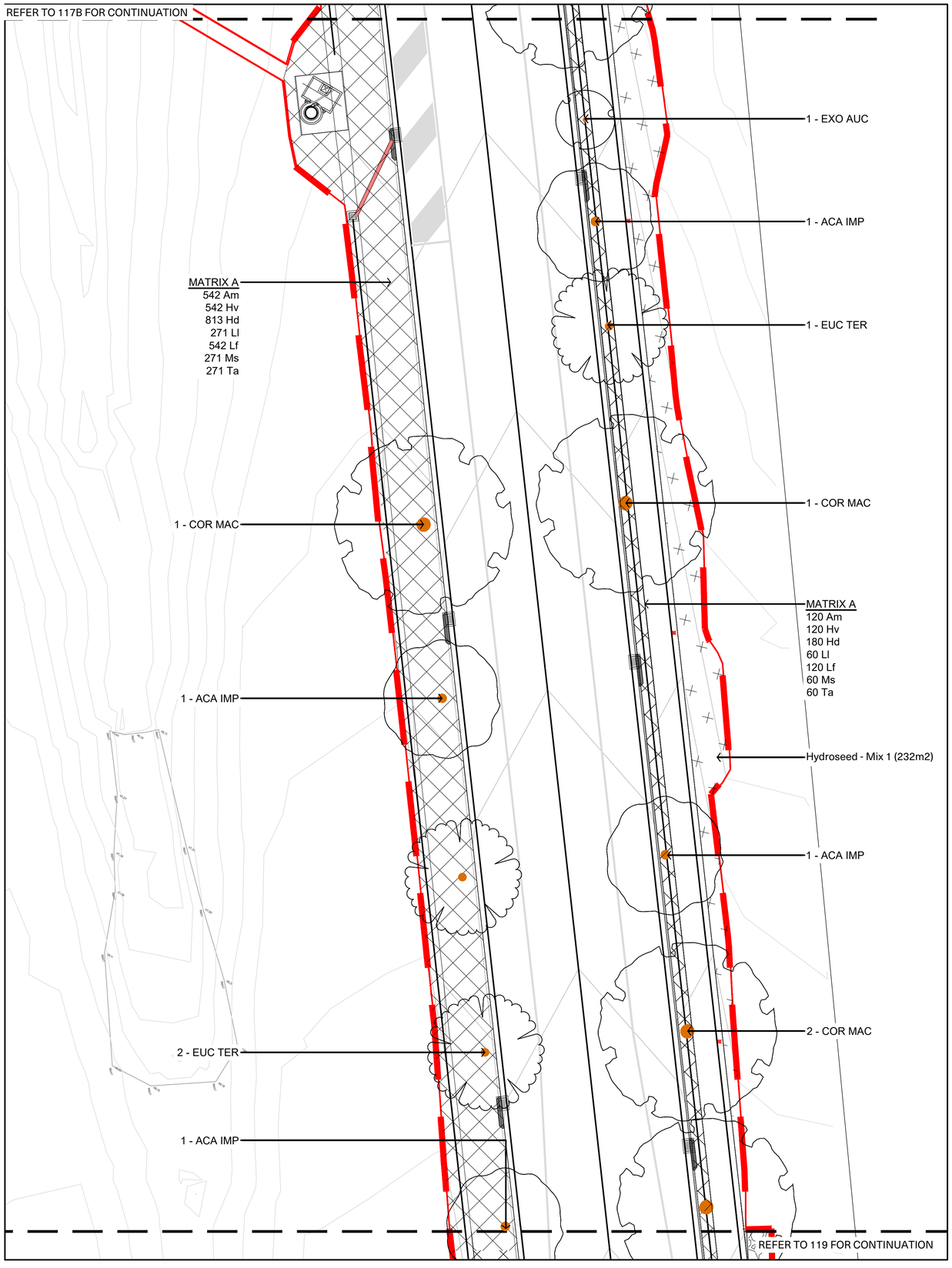
DRAWING INFORMATION

NORTH

117
DRAWING NO.

A
REV.

A1




1:200
2 0M 2 4 10M

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CHARTER HALL | AT&L | LIGHT HORSE BUSINESS HUB | LANDSCAPE PLAN | FOR APPROVAL

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NORTH | 117 | A

LANDSCAPE ARCHITECT | REVISIONS | CLIENT | CIVIL ENGINEER | PROJECT | DRAWING TITLE | DRAWING PURPOSE | DRAWING INFORMATION | NORTH | DRAWING NO. | REV.

A1

REFER TO 118 FOR CONTINUATION

1 - COR MAC

MATRIX A
988 Am
988 Hv
1482 Hd
494 Ll
988 Lf
494 Ms
494 Ta

1 - EUC TER

10 - EUC TER

1 - EUC TER

MATRIX A
120 Am
120 Hv
180 Hd
60 Ll
120 Lf
60 Ms
60 Ta

MATRIX A
296 Am
296 Hv
444 Hd
148 Ll
296 Lf
148 Ms
148 Ta

5 - EUC TER

MATRIX A
480 Am
480 Hv
720 Hd
240 Ll
480 Lf
240 Ms
240 Ta

MATRIX B
84 Bs
504 Ms
84 Od
168 Ta
168 Wg

MATRIX C
54 Dl
162 Dr
54 Ll
54 Wg

8 COR MAC

MATRIX C
117 Dl
351 Dr
117 Ll
117 Wg

5 - EUC TER

REFER TO 120 FOR CONTINUATION

1:200
2 0M 2 4 10M

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CLIENT: CHARTER HALL

CIVIL ENGINEER: AT&L

PROJECT: LIGHT HORSE BUSINESS HUB

DRAWING TITLE: LANDSCAPE PLAN

DRAWING PURPOSE: FOR APPROVAL

| DRAWING INFORMATION | | | |
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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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| JOB NO. | | APPROVED BY | CH |

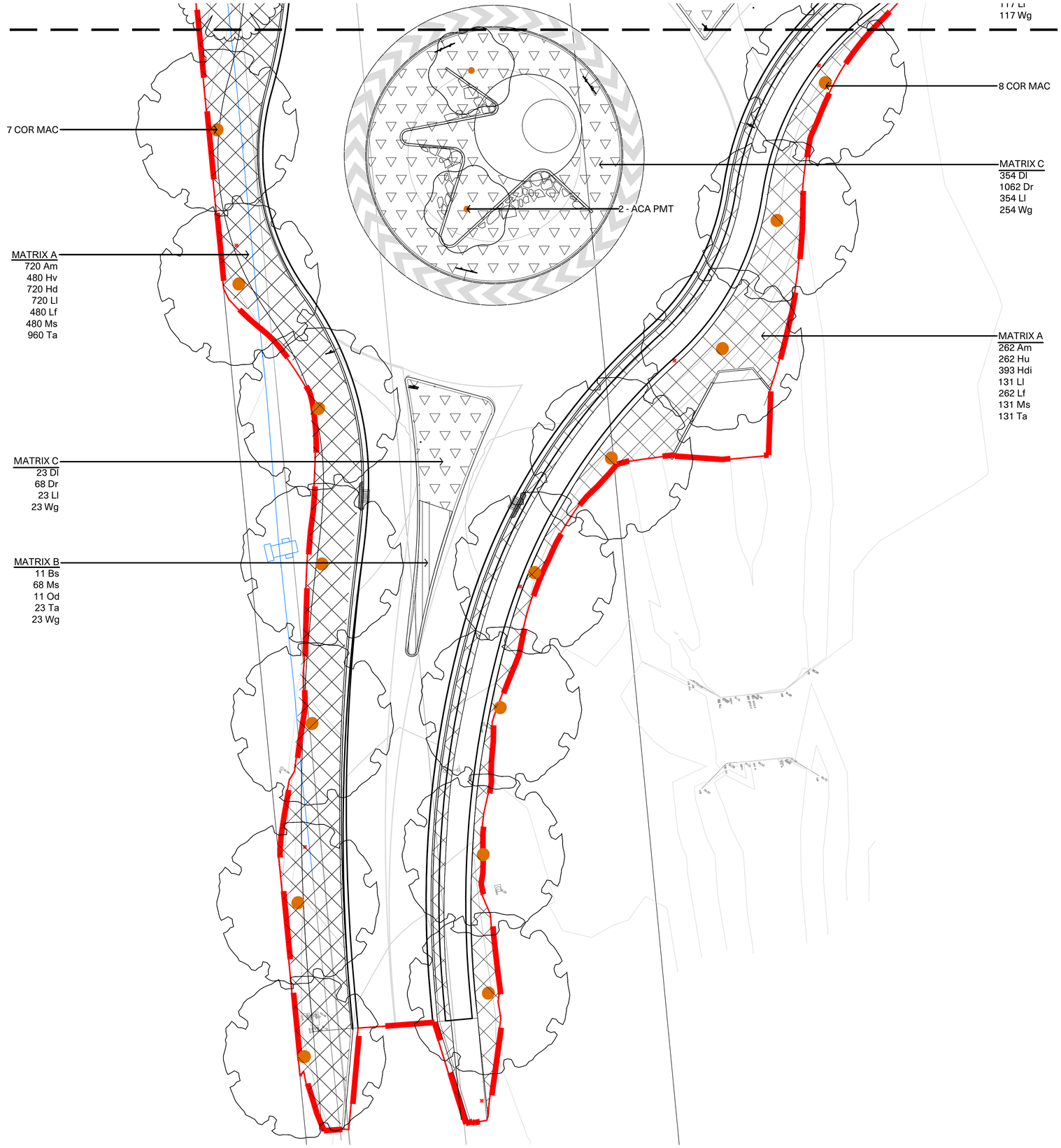
NORTH

DRAWING NO.: 119

REV.: A

A1

REFER TO 119A FOR CONTINUATION




1:200
2 0M 2 4 10M

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REVISIONS

CHARTER HALL

CLIENT

AT&L

CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB

PROJECT

LANDSCAPE PLAN

DRAWING TITLE

FOR APPROVAL

DRAWING PURPOSE

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| SCALE | 1:500 @ A1 | DRAWN BY | PS |
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DRAWING INFORMATION

NORTH

120

DRAWING NO.

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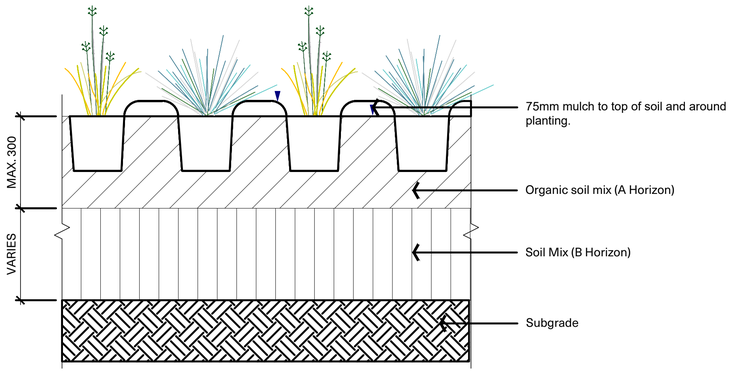
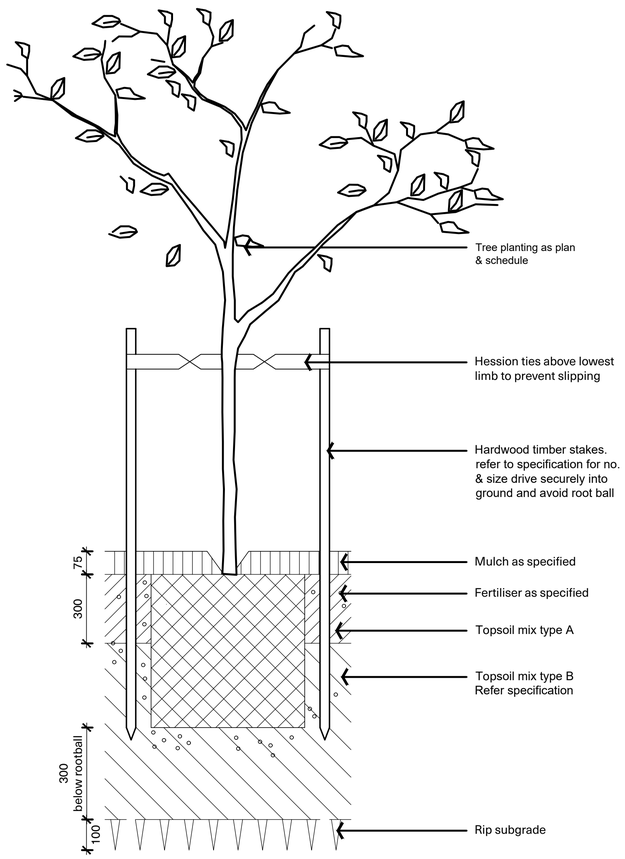
REV.

A1




1 MASS PLANTING ON GRADE
1:10 @ A1 TYPICAL SECTION







2 TURF PLANTING ON GRADE
1:10 @ A1 TYPICAL SECTION

3 TREE PLANTING ON GRADE
1:10 @ A1 TYPICAL SECTION

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LANDSCAPE ARCHITECT

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REVISIONS

CHARTER HALL — CLIENT

AT&L — CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB — PROJECT

DETAILS - SOFTWORKS — DRAWING TITLE

FOR APPROVAL — DRAWING PURPOSE

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| SCALE | AS SHOWN @ A1 | DRAWN BY | PS |
| DATE | 2/02/2022 | CHECKED BY | JH |
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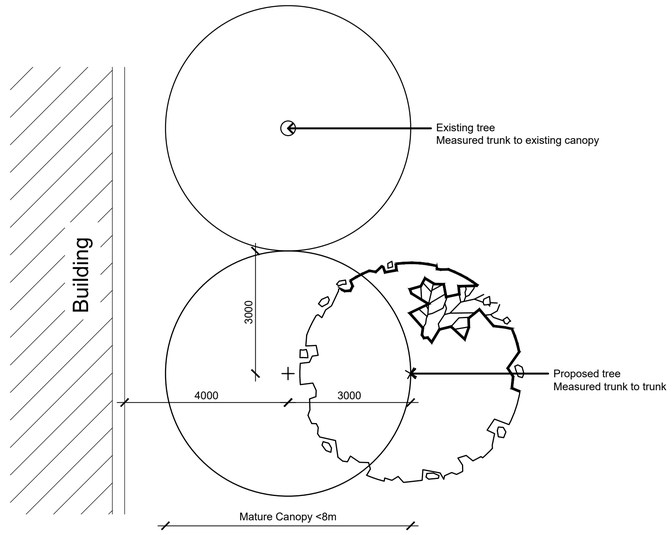
DRAWING INFORMATION

NORTH

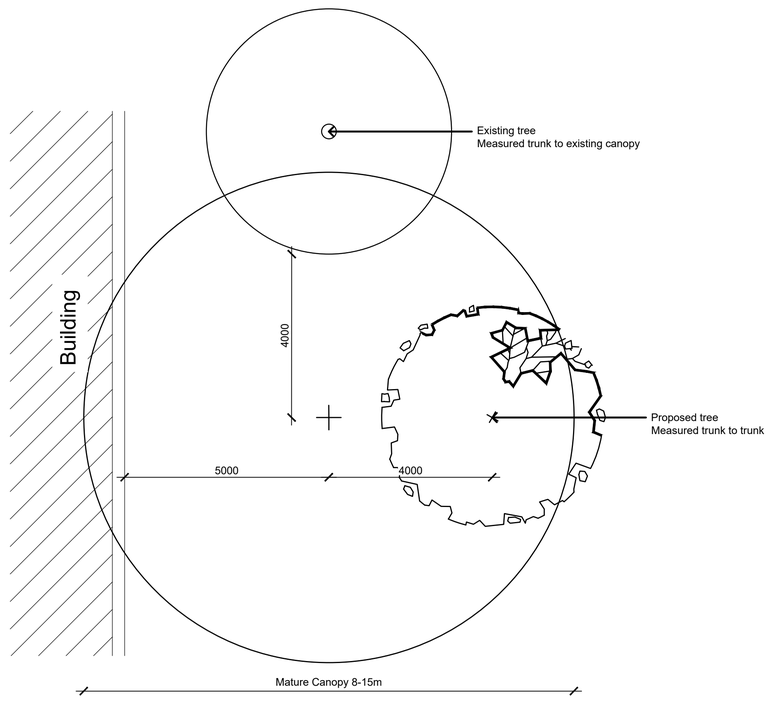
501 — DRAWING NO.

B — REV.

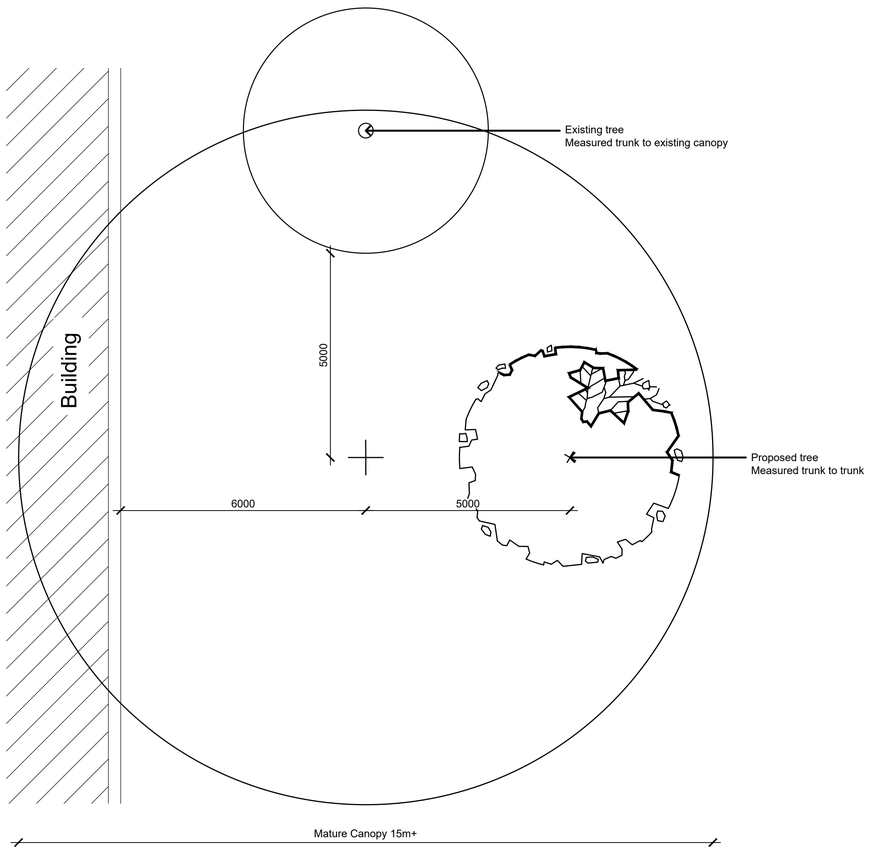
A1




1 MATURE TREE SPACING DETAIL - MATURE CANOPY <8m
1:75 @ A1 TYPICAL PLAN




2 MATURE TREE SPACING DETAIL - MATURE CANOPY 8-15m
1:75 @ A1 TYPICAL PLAN




3 MATURE TREE SPACING DETAIL - MATURE CANOPY >15m
1:75 @ A1 TYPICAL PLAN

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| REVISIONS | | | | | |
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CHARTER HALL — CLIENT
AT&L — CIVIL ENGINEER
LIGHT HORSE BUSINESS HUB — PROJECT
DETAILS - SOFTWORKS — DRAWING TITLE
FOR APPROVAL — DRAWING PURPOSE

| DRAWING INFORMATION | | | | NORTH | DRAWING NO. | REV. |
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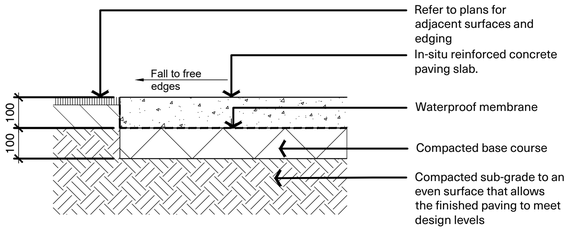
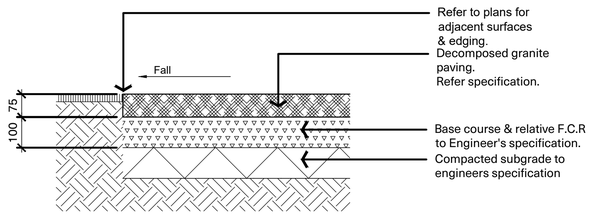
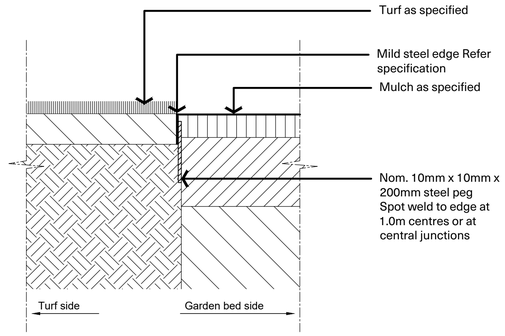



1 INSITU CONCRETE PAVING
1:10 @ A1 TYPICAL SECTION




2 DECOMPOSED GRANITE PAVING
1:10 @ A1 TYPICAL SECTION




3 MILD STEEL GARDEN EDGE
1:10 @ A1 TYPICAL SECTION

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CHARTER HALL
CLIENT

AT&L
CIVIL ENGINEER

LIGHT HORSE BUSINESS HUB
PROJECT

DETAILS
DRAWING TITLE

FOR APPROVAL
DRAWING PURPOSE

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| SCALE | AS SHOWN @ A1 | DRAWN BY | PS |
| DATE | 3/02/2022 | CHECKED BY | JH |
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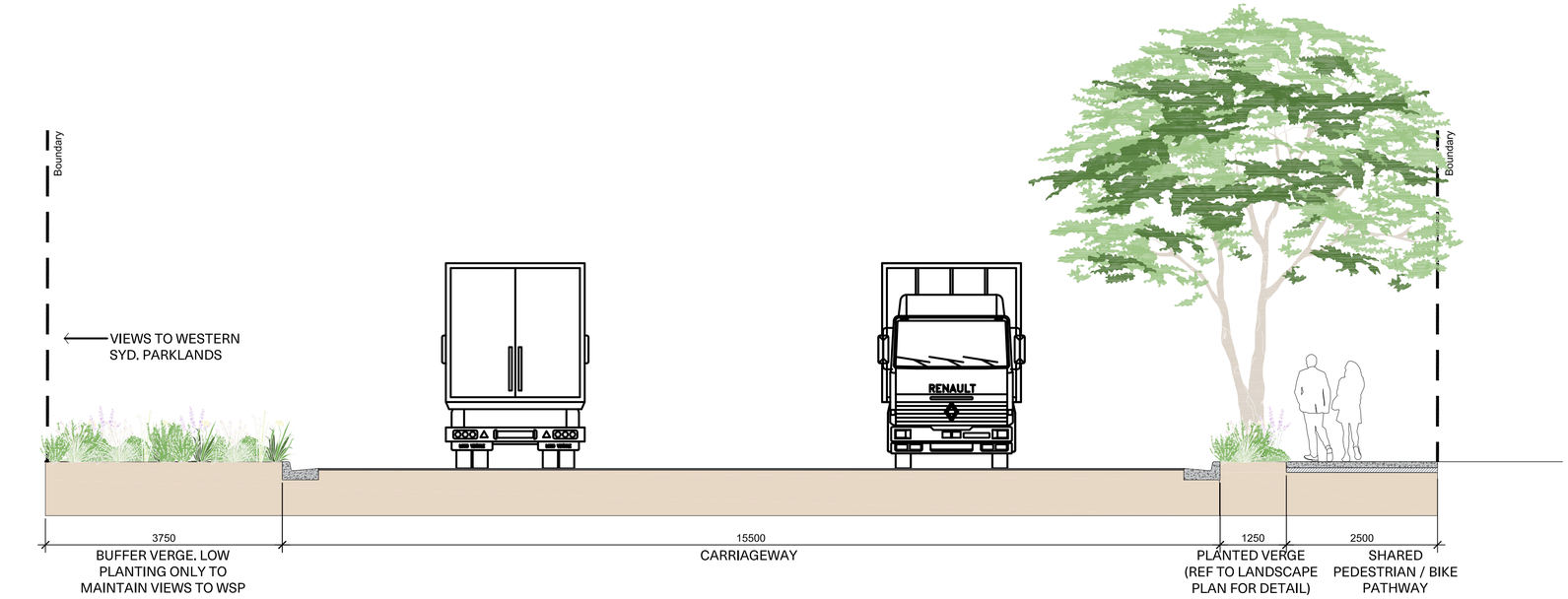
DRAWING INFORMATION

NORTH

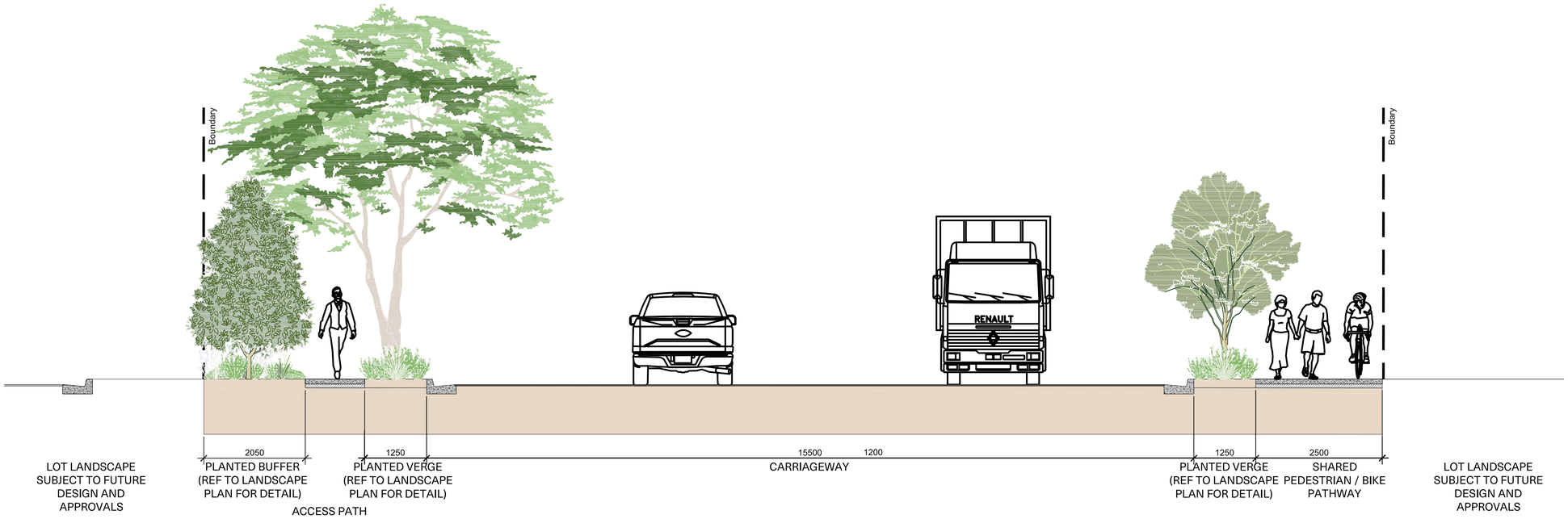
511
DRAWING NO.

B
REV.

A1




1 Access Road from Ferrers Road
1:50 @ A1
SECTION




2 Site Road
1:50 @ A1
SECTION

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| DATE | DESCRIPTION | REV |
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| DATE | DESCRIPTION | REV |
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CHARTER HALL
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LIGHT HORSE BUSINESS HUB
PROJECT

LANDSCAPE SECTIONS
DRAWING TITLE

FOR APPROVAL
DRAWING PURPOSE

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| SCALE | AS SHOWN @ A1 | DRAWN BY | PS |
| DATE | 03/02/2022 | CHECKED BY | JH |
| JOB NO. | | APPROVED BY | CH |

DRAWING INFORMATION

NORTH

601
DRAWING NO.

A
REV.

A1

# 0259 LANDSCAPE – MAINTENANCE

## 1. GENERAL

### 1.1 RESPONSIBILITIES

**General**

Requirement: Provide landscape maintenance of the contract area during the Defects Liability Period and (if applicable) maintenance period.

**Performance**

Extent of maintenance:

- Weeding of lawn, garden bed areas, and pavement in the areas of weeding the drainage basin, the riparian corridor along the relocated creek, the buffer landscape areas, the lots and streets.
- Supply and spreading of fertiliser to lawn, garden bed areas and pots.
- Supply and installation of mulch to existing garden bed areas and pots.
- Pruning, trimming and tree surgery.
- Adjustment of tree stakes and ties.
- Insect and disease control of lawn, shrubs and trees.
- Mowing and edge trimming to all lawn areas including collection and removal of clippings.
- Diagnosis of cause of dead or failed plants and recommendations for corrective actions.
- Replacement of dead or failed plants and lawns.
- Maintenance of irrigation systems.
- Removal of rubbish and debris in garden areas.
- Removal of leaves, mulch and organic debris from pavement and drains.
- Keeping a log book of maintenance activities.
- Providing monthly reports.

Maintenance period: 12 months or as required by any DA consent conditions.
Maintenance procedures: As documented, and to the SELECTIONS Maintenance schedule.

### 1.2 THE SITE

**Site restrictions**

Site limitations: Comply with the following restrictions on the use of the site: As required by any DA consent conditions or Developer / Owner guidelines.
Entry permits: Make available, to persons entering designated secure areas, valid entry permits. Make sure these persons comply with conditions of entry.

**Secure areas**

Secure area visitors: At least 10 working days before entry is required, submit the full name, address, and date and place of birth of persons required to enter designated secure areas.
- Purpose of submission: Review by Superintendent or site manager.

**Protection of persons and property**

Temporary works: Provide and maintain required guards, fencing, footpaths, signs and lighting.
Accessways, services: Do not obstruct or damage footpaths, drains and watercourses or other existing services in use on or adjacent to the site.
Property: Do not interfere with or damage property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

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**Rectification**

Accessways, services: Rectify immediately any obstruction or damage to footpaths, drains and watercourses or other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

## 1.3 GENERAL CONDITIONS

**Contractor and staff**

Representative: Nominate a senior partner/personnel experienced in maintenance nursery practices and horticulture, to be responsible for taking and carrying out instruction, and reporting to the principal.

All maintenance work is to be carried out by a qualified Bush Regenerator or suitably qualified landscape contractor.

**Special instructions**

Priority: If instructed by the principal attend to certain areas and procedures as a priority. Obtain approval for additional costs.

**Notice**

Inspection: Provide two days' notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Each site maintenance visit.
- Work affecting public access or amenity, excluding public road closures which are to comply with council and developer requirements

Water restrictions: Provide immediate notification of any new restrictions that affect performance of maintenance in accordance with the Contract.

**Reporting**

Monthly report: Submit regular reports by the last Friday of each month, Monthly reports schedule and as follows:

- General status of the works.
- Soil test results included as required for the fertilising programs.
- Any plant replacement requirements.
- Irrigation operation schedules and water consumption.
- The time period of the report and the conditions during that time
- qualifications and experience of contractors
- seed certification and local provenance
- initial and any replacement plantings and propagation materials. Dates of planting of each species

  For replacement plants, following the guidelines in section 3.3 Plant Replacement which include but are not limited to the requirement for replacement species to:
  - Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
  - Of the same species and variety (or approved alternative) and of the closest commercially available size
  - Any new species must still be from the local native vegetation community being emulated and local provenance.
  - the replacement planting must not decrease species diversity

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- any agreed changes to plantings, species etc during the reporting period
- weed cover percentage
- watering requirements
-

Incident reports: Report immediately, verbally and confirmed in writing, any disturbance or incidence affecting or likely to affect the scheduling of the works.

**Log book**

Records: Log the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Availability: Upon request.

**Replacement plants**

Species: Provide written certification that all plant material is true-to-species and type, and free of disease and fungal infection. Replacement plants must:

- Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
- Of the same species and variety (or approved alternative) and of the closest commercially available size
- Any new species must still be from the local native vegetation community being emulated and local provenance.
- the replacement planting must not decrease species diversity

**Coordination with others**

Other contractors: Coordinate work with other contractors to minimise conflicting activities and delays. If disturbances to planned works are unavoidable, make arrangements to work around them.

## 2. GENERAL

### 2.1 FERTILISER

General

Type: Proprietary fertilisers, delivered to the site in sealed bags and marked to show manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Fertiliser schedule

| Fertiliser Key | Location | N:P:K Ratio | Application Rate |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## 3. EXECUTION

### 3.1 GENERAL

**Weeding**

Z hhglqj vkrxog eh xqghuwdnhq z lwklq wkh gudlqdjh edvlq duhd/wkh ulsdubdq fruulgrudorqj wkh uhorfdwhg fuhhn/ wkh exiihuolqgvfdsh duhdv/wkh orw dqg vwhhw1

Requirement: Remove unwanted broadleaf plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly.

- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at fortnightly intervals.

Vigorous ground covers: Keep 200 mm clear from the base of any shrub or tree. Remove as follows:
- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Apply as follows:
- To the manufacturer's recommendations and the material data and safety data sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has adequate soil moisture.
- Avoid windy days or if rain is likely to follow within 12 hours.

**Insect and disease control**

Requirement: Control any insects or diseases affecting the lawn and garden bed areas as follows:
- Identify the problem.
- Execute the correct treatment until the problem has been eliminated.
- Apply hazardous material out of normal working hours.
-
- Protect staff and public from exposure to hazardous materials.

**3.2 GRASS SURFACES**

**Mowing and trimming**

Preparation: Remove litter and fallen branches before mowing.

Grass height: Consistent with the growth habit of the grass variety and maintained at 25 mm to 40 mm throughout the year. Do not remove more than one third of the grass height at any one time.

Program: Weekly during the mowing season, November to March, and at fortnightly intervals during April to October. Do not mow during wet conditions.

Raking: Once every month before mowing during the mowing season, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees or shrubs.

Clippings distribution: Evenly distribute over the mown areas or remove from the mown areas or site as directed. Do not spread evenly over the planted and mulched areas if these areas are to remain grass and weed free.

Non-selective herbicide: Make sure application does not exceed the area limits of normal manual trimming. Repair any damage from overuse or over spray.

**Fertilising**

Program:
- Regular application: Each September and April.
- Additional application: Each November and February at reduced rates.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 to 6.5.

pH testing program: Two year schedule starting in the first year of the contract, or for the duration of the Defects Liability Period (whichever is greater).

Application: Spread as follows:
- Dry: Crush lumps and broadcast dry material by hand or mechanically when the lawn is dry.

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- Spray: Acceptable.
- Prevent fertiliser from leaching to adjoining planted beds, particularly those with sensitive native trees and shrubs.

**Topdressing**

Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.
Program: as required by DA consent conditions, and approved management plans.
Topdressing material for remediation of depressions or irregularities: Apply coarse or medium texture soil, to AS 4419, suitable for application to turf or grass seeded areas.

**Renovation**

Established lawns of sandy soil profile: Renovate by dethatching or verticutting.
Program: Annually during the maintenance period, timing the season appropriate to the species, unless required otherwise by any approved management plans.

**3.3 TREES AND SHRUBS**

**Pruning and trimming**

General: Prune to reflect the natural growth, flowering and regrowth habit of the individual species.
Program generally: Spring and Summer and on a spot basis as required.
Shrubs: Prune after flowering.
Hedge trimming: Schedule trimming at times that maintains the character and design of hedges. Allow up to three times per season.

Tip Pruning:

- Purpose: To encourage development of new shoots during the active growing season.
- Method: Removal of the top 25 mm or growing tip of each branch.
- Restriction: Do not remove buds before the flowering season in those plants that have terminal flowers.

Radical pruning:

- Purpose: To maintain a hedge or formal shape or when a particular problem, growth habit, damage,
- or disease requires branch removal.

Tree pruning:

- Purpose: to eliminate diseased or damaged growth, avoid inter-branch contact and thin out crowns in a natural manner.
- Maintain sight lines to signs and lights.
- Maintain visibility for personal security.

Tree branch removal:

- To AS 4373.
- Give notice and engage a suitably qualified arborist.

**Fertilising**

Fertilising program: Base the program on soil testing results.

Soil testing:
Test soil as follows:

- At the start of the contract.

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- Take samples from a cross section of planting beds.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 to 6.5.

Program:

- Regular application: Each September and March.
- Sensitive native species: Apply fertiliser at an appropriate dosage.

Trees:

- Fertiliser type: Appropriate to the species, determined by a suitably qualified person or in accordance with any approved management plans.
- Dose: Appropriate to the species, determined by a suitably qualified person or in accordance with any approved management plans.
- Application: Apply pill to the root zone to the supplier's recommendations, or (if not specified) at a distance from the trunk equal to the spread of the foliage. Make holes 400 mm deep to take the pill, equally spaced around the plant and backfill with sand.

Micro nutrients: Apply 1 kg of urea in 20 litres of water per 100 m2, through a hose proportioner every four weeks during Summer.

**Stakes and ties**

Generally: If plants are not self-supporting or if stakes are damaged, stake or re-stake the plants as follows:

- Drive three hardwood stakes placed diagonally with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well developed systems and no longer require support, remove stakes and ties.

**Plant replacements**

General: Before replacement, diagnose cause of plant failure and report findings. If failure is due to species incompatibility with site conditions, recommend alternative species. Replace all evergreen plants that have died or lost 50% of their normal foliage cover. Provide replacement plants as follows:

- Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
- Of the same species and variety (or approved alternative) and of the closest commercially available size
- Any new species must still be from the local native vegetation community being emulated and local provenance.
- the replacement planting must not decrease species diversity
- With a balanced root system in relation to the size of the plant and conducive to successful transpiration. Inspect the root conditions of plants by knocking plants from their containers.
- Without signs of having been stressed at any stage during their development due to inadequate watering, excessive shade/sunlight, suffered physical damage or have restricted habit due to growth in nursery rows.
- Grown in final containers for not less than twelve (12) weeks.

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**3.4 TREES AND SHRUBS**

Grass and planted areas

Generally: Maintain a vigorous healthy appearance.

Application rates: Soak to a depth of 150 mm for grass areas and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings. Confirm soaked depth and record in the log book.

Timing: Water at times of day to minimise water evaporation loss. Do not water during the hottest period of Summer days.

Water restrictions: Coordinate the water supply and conform to legislation and restrictions applying at the time.

**Hand watering**

General: Manually water all lawn and planting areas in the absence of an irrigation system or until the proposed irrigation system is fully operational.

**Irrigation**

Irrigation system program: Adjust to suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors, of seasons, evaporation, exposure, topography, local authority restrictions.
- Adjustment or shut down during and after periods of prolonged heavy rains.
- Water supply and watering regime of legislation and restrictions applying at the time.

Equipment maintenance: Conform to the following:

- Check all components for proper operation.
- Obtain approval to repair or replace damaged component with equivalent parts.
- Flush any dirt or foreign matter from the system and clear all blockages.
- System maintenance: Conform to the Irrigation system maintenance schedule.

**Programming**

Automated systems: Program to coincide with optimum periods of water pressure and water absorption.

Public access: Do not inconvenience persons occupying the site by water spray or by blocking normal pedestrian or traffic flow.

**3.5 MULCHING**

**General**

Clean up: Remove all mulching materials from lawn or paved areas and maintain a clean and tidy appearance when viewed on a weekly basis.

Requirement: Maintain a minimum depth as follows:

- 75 mm for organic mulch.
- 50 mm for inorganic mulch.

Top up: Areas of excessive wear with mulch to match existing.

Appearance: Keep mulched areas clean and tidy with no soil disturbance evident on the surface of the mulch.

**3.6 INCIDENTAL WORKS**

**Supplementary works**

General: Execute the following:

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- Removal of waste from maintenance work.
- Removal of leaf litter fortnightly ~~during leaf fall~~ in site areas excluding the buffer areas, drainage basin and realigned creek.
- Wash paving on completion of herbicide application.

**Furniture, signage and barriers**

Scope: All fixed and movable features noted in the record drawings.

Furniture and pots:

- Move and relocate as required for maintenance of the area.
- Repair or replace items damaged by the maintenance contract staff. Signage: Maintain sight line visibility.

**Drains**

General: Inspect and clean all drainage structures and pit covers and make sure they are in proper working order. Remove all organic debris.

Frequency: As required so that all overflow drains are cleared when observed at fortnightly intervals.

## 4. EXECUTION

### 4.1 GENERAL

These schedules assume the contract is tendered on a Schedule of Rates basis. For private development works use of this schedule is optional, at the Superintendent's discretion.

**Schedule of rates schedule**

| Item | Unit | Quantity | Rate | Total |
|---|---|---|---|---|
| Preliminaries/establishment (one off cost) | Item | | | |
| Mowing and edge trimming | Item | | | |
| Watering | Item | | | |
| Irrigation Repair | Item | | | |
| Manual Watering | Item | | | |
| Fertiliser: Lawn | $m^2$ | | | |
| Fertiliser: Garden/pot | $m^2$ | | | |
| Fertiliser: Trees | No | | | |
| Weeding | Item | | | |
| Insect and disease control | Item | | | |
| Pruning and trimming | Item | | | |
| Plant replacement: In lawn areas: 150 mm | No | | | |
| Plant replacement: In lawn areas: 5 litre | No | | | |
| Plant replacement: In lawn areas: 15 litre | No | | | |
| Plant replacement: In lawn areas: 25 litre | No | | | |
| Plant replacement: In lawn areas: 35 litre | No | | | |
| Plant replacement: In lawn areas: 75 litre | no | | | |

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| | | | | |
|---|---|---|---|---|
| Plant replacement: In lawn areas: 100 litre | No | | | |
| Plant replacement: In lawn areas: 200 litre | No | | | |
| Plant replacement: In garden areas: 150 mm | No | | | |
| Plant replacement: In garden areas: 5 litre | No | | | |
| Plant replacement: In garden areas: 15 litre | No | | | |
| Plant replacement: In garden areas: 25 litre | No | | | |
| Plant replacement: In garden areas: 35 litre | No | | | |
| Plant replacement: In garden areas: 75 litre | No | | | |
| Plant replacement: In garden areas: 100 litre | No | | | |
| Plant replacement: In garden areas: 200 litre | no | | | |
| Staking and tying | item | | | |
| Mulching: Pine bark graded | $m^3$ | | | |
| Mulching: Pine flake | $m^3$ | | | |
| Mulching: Crushed gravel | $m^3$ | | | |
| Lawn renovation | item | | | |
| Topdressing | $m^3$ | | | |
| Incidentals (including protective clothing) | Item | | | |

**Labour rates schedule**

| Item | Ordinary time $ per hour | Overtime $ per hour |
|---|---|---|
| Additional labour charge: Labourer | $ | $ |
| Additional labour charge: Tradesman | $ | $ |

### 4.2 MAINTENANCE REPORT

**Monthly reports schedule**

| Item | Action |
|---|---|
| Plant material | Replace failed plants |
| | Additional planting |
| | Treat for disease or insect attack |
| | Tree surgery |
| | Fertilising generally |
| | Fertilising for specific nutrient deficiencies |
| | Thin out planting |
| | Pruning/trimming |

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| | |
|---|---|
| Turf | Returfing |
| | Seeding |
| | Treat for disease |
| | Topdressing |
| | Weeding |
| | Mowing/trimming |
| Soil | Erosion/bank stabilisation |
| | Additional soil |
| | Soil conditioner |
| | Weeding |
| Mulch | Top up mulch |
| Rubbish Removal | Generally remove bottles, paper, cigarette butts etc. |
| | Remove leaf, litter from path and paved areas |
| Irrigation | Replace parts |
| | Repair |
| | Clean out |
| | Adjust |
| | Clean out subsurface drains |
| Paving and pathways | Repair dips, hollows, irregularities |
| | Remove stains and graffiti |
| | Replace sections of uplift |
| | Clear main pathway drains of debris |
| | Weeding |
| Fencing | Repair fencing |
| Bench/seat | Repair loose or damaged parts |
| Bollard | Reinstate in original position |
| Lighting | Replace blown lamps and damaged diffusers |
| Barriers | Replace broken or dislocated palings or rails |

### 4.3 MAINTENANCE PROCEDURE

**Maintenance schedule**

| **WEEK** | **SPRING (Sept, Oct, Nov)** | **SUMMER (Dec, Jan, Feb)** | **AUTUMN (Mar, Apr, May)** | **WINTER (Jun, Jul, Aug)** |
|---|---|---|---|---|
| 1 | Mow and trim lawns | Mow lawns; weed | Mow lawns | Weed |
| 2 | Weed, trim and adjust trees and shrubs | Weed, mow lawns trim and adjust trees and shrubs | Weed, mow lawns trim and adjust trees and shrubs | Mow and trim lawns. Trim and adjust trees and shrubs |
| 3 | Mow and fertilise lawns; treat plant material for insects and disease | Mow lawns; weed; treat plant material for insects and disease | Mow and trim lawn | Weed |
| 4 | Weed; top dress, condition lawns | Weed; mow and trim lawns; issue | Weed; mow lawns; issue | Mow lawns; issue maintenance |

| | | | | |
|---|---|---|---|---|
| | and over sow bare patches; issue maintenance report | maintenance report | maintenance report | report |
| 5 | Fertilise all trees and shrubs in garden beds; mow and trim lawns | Mow lawns; weed | Mow lawns | Mow lawns |
| 6 | Weed; inspect mulch for deficiencies in cover; check and adjust irrigation | Mow lawns; check and adjust irrigation | Weed; inspect mulch for deficiencies in cover; check and adjust irrigation | Mow and trim lawns; treat for insects and disease; check and adjust irrigation |
| 7 | Reinstate mulch as required; treat plant material for insects and disease; mow lawns | Mow lawns; weed | Reinstate mulch as required; mow, trim and fertilise lawns | Weed |
| 8 | Weed; inspect condition of paving and furniture; issue maintenance report | Mow and trim lawns; inspect condition of paving & furniture; issue maintenance report | Weed; inspect condition of paving and furniture; issue maintenance report | Mow lawns; Inspect condition of paving and furniture; issue maintenance report |
| 9 | Mow and trim lawns | Mow lawns; treat plant material for insects and disease | Mow lawns | Weed |
| 10 | Weed; mow lawns | Mow and top dress lawns | Weed; treat plant material for insects and disease | Mow and trim lawns |
| 11 | Mow and fertilise lawns; trim and adjust trees and shrubs | Mow lawns; trim and adjust lawns; weed | Mow and trim lawns; trim and adjust trees and shrubs | Prune back trees and shrubs after flowering |
| 12 | Weed; mow lawns; treat plant material for insects and disease | Mow, trim & fertilise lawns | Weed | Mow lawns; treat plant material for insects and disease |
| 13 | Check and adjust irrigation; mow lawns; issue maintenance | Check and adjust irrigation; mow lawns; weed; issue | Check and adjust irrigation; mow lawns; weed; issue | Check and adjust irrigation; weed; issue maintenance |

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| | | | | |
|---|---|---|---|---|
| | report | maintenance report | maintenance report | report |

### 4.4 IRRIGATION

**Irrigation system maintenance schedule**

| Item | Frequency |
|---|---|
| Filters – mainline | Monthly |
| Electrical source output (auto system) | Monthly |
| Controller (automatic systems) | Monthly |
| Operation – progression - Station to Station. | Weekly |
| Proper activation of valves | Monthly |
| Proper timing of stations | 6 Monthly |
| Proper time and day readings | Weekly |
| Exterior appearance | 6 Monthly |
| Valve operation | 6 Monthly |
| Open, close completely (weeping) | Weekly |
| Sprinkler operation | Weekly |
| Rotaries – clogged nozzles | 2 Monthly |
| Plant obstructed pattern | 2 Monthly |
| Arc coverage | 2 Monthly |
| Radius adjustment | 2 Monthly |
| Pop-up action | 2 Monthly |
| Riser seal leaks | 2 Monthly |
| Set to grade | 2 Monthly |
| Coverage pressure | 2 Monthly |
| Rotational speed | 2 Monthly |
| Clogged screens | 2 Monthly |
| Head damage | 2 Monthly |
| Piping | 2 Monthly |
| Leaks – broken or cracked pipe | As Needed |
| Bad solvent welds, bad threaded | As Needed |
| Connection | As Needed |
| Clogged pipe | As Needed |

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# LIGHT HORSE BUSINESS PARK

## Master Plan for Approval

February 2022
REV. B

YERRABINGIN

WE ARE YERRABINGIN. WE WALK TOGETHER.

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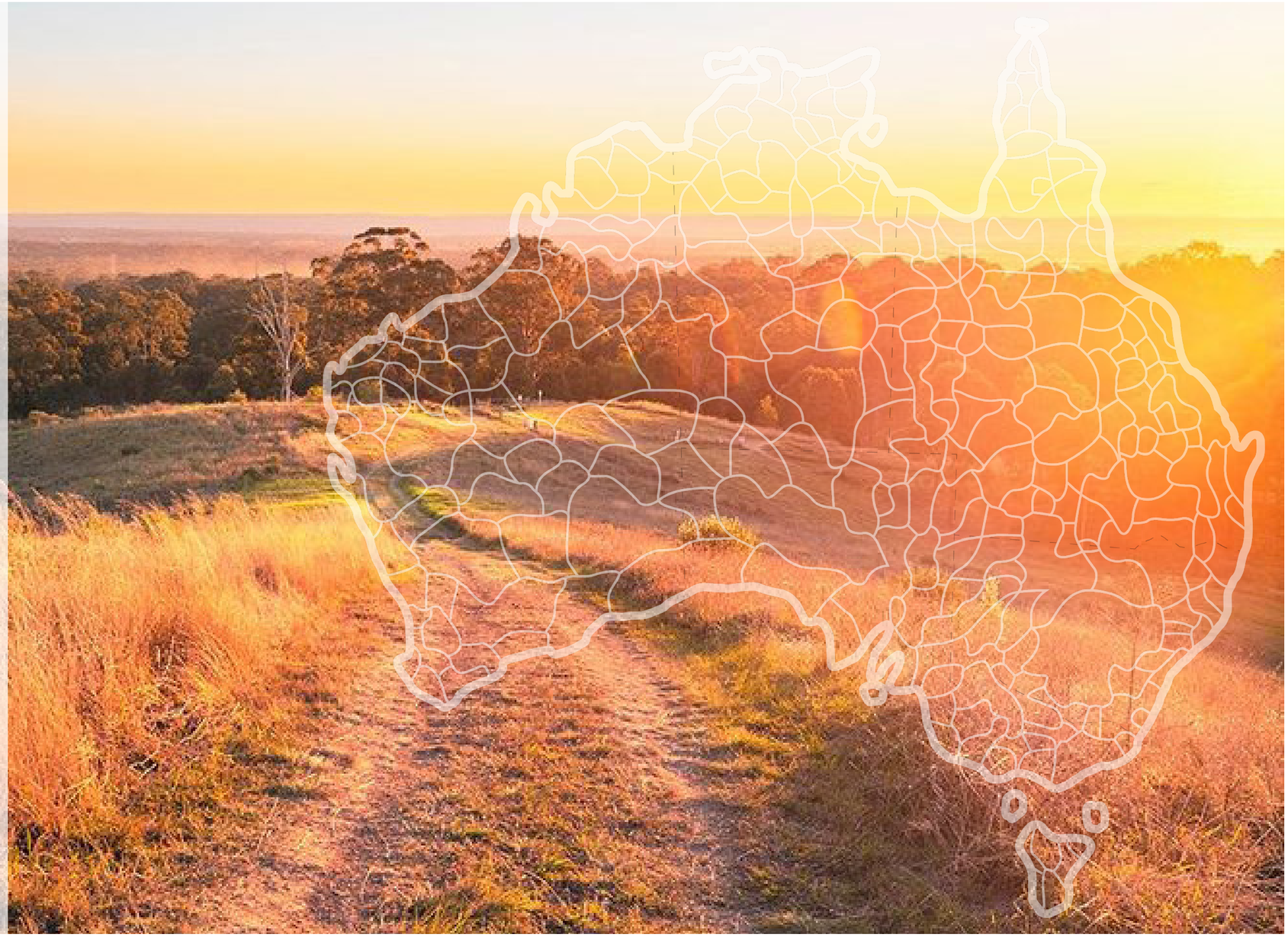
# 1.0 COUNTRY

# 1.1 ACKNOWLEDGMENT OF COUNTRY

We acknowledge the Darug people as the Traditional Custodians of the Country that Light Horse Business Hub is located. We recognise their continuing connection to the land and thank them for protecting this Country and its ecosystems We pay our respects to Elders past and present, and extend that respect to all First Nations people today.

Country is Our Mother, Our Teacher, Our Library, Our Kin. It sustains inspires and surrounds us. The experience of Country is both individual and collective, both new and familiar. From her we learn, share and flourish. Continuing to care for country is central to our being, our identity. Country is a responsibility, not a right and is there for all who respect and cherish her. Today we may not always be able to see Country instantly, but if we call to it, we can always sense her and again feel her embrace.

Country is living, constantly changing and evolving. Many ecosystems exist across different realms of Country including both living and non-living elements" (NSWGA Connecting to Country Framework). The Light Horse Business Hub will respect and celebrate all facets of Country through the foundation of the landscape design and ongoing management of the site.



# 1.2 DESIGNING WITH COUNTRY

## ELEMENTS OF DESIGNING WITH COUNTRY (NSWGA)

The landscape design approach for the Light Horse Business Hub has been considered within the context of the NSW Government Architects Office's Connecting to Country Framework.

The Elements of Designing with Country are addressed through design to ensure the environmental and social wellbeing of the site in a way that will provide an enduring legacy for the site and community.

**NATURE**

Nature is Country. Caring for Country must guide design interventions. Preservation, restoration and remembering the natural landscape and allowing that to inform all future  occupation.

**PEOPLE**

Support and Provide through the local community through Social initiatives embedded in the design.

**DESIGN**

Design to respond to the local vernacular. drawing on and being inspired by Country, People and Customs.

# 2.0 CONDITIONS OF CONSENT RESPONSE

# 2.1 CONSENT CONDITIONS

## DEVELOPMENT CONSENT SSD-9667

| | | | |
|---|---|---|---|
| PART B CONDITIONS TO BE MET IN FUTURE DEVELOPMENT APPLICATIONS | | | |
| LANDSCAPING | | | |
| B9 | Landscaping must be consistent with the key principles and plant species described in the Landscape Plans titled Job Number SS18-3892, prepared by Site Image dated 7 May 2020. | The developed landscape plan has build upon the principles and species outlined in the previously approved plans. These have been further developed to increase the use of endemic species from local plant communities and maximise tree canopy coverage to thus reduce the impact of the Urban Heat Island Effect. | Drawings 100 -106 - Landscape Plan<br>Schedules 051 - Plant Schedule |
| B10 | Landscaping must screen any acoustic barrier referenced in condition B13 of Schedule 2, blank walls or loading docks from any nearby sensitive receiver with a mix of shrub planting and trees and be provided to the satisfaction of the consent authority. | As per the Noise and Vibration Assessment completed for the SSDA, there are no specific operational noise mitigation measures required for the site.<br>Planting at a range of sizes and types has been proposed to perimeters of the site, adjacent to buildings and on the site and property boundaries to help reduce the scale and bulk of the development and to mitigate and noise resulting from operations. | Section 6.2 of the Noise and Vibration Assessment (SSDA Submission)<br><br>Refer to Drawings 100 -106 for the complete set of developed Landscape Documentation including planting plans and schedules. |
| B11 | Future development must be consistent with the Heritage Interpretation Plan referenced in Condition B28 of Schedule | This plan has been developed with reference to the Heritage Interpretation plan and takes in to consideration recommendations mate. | |

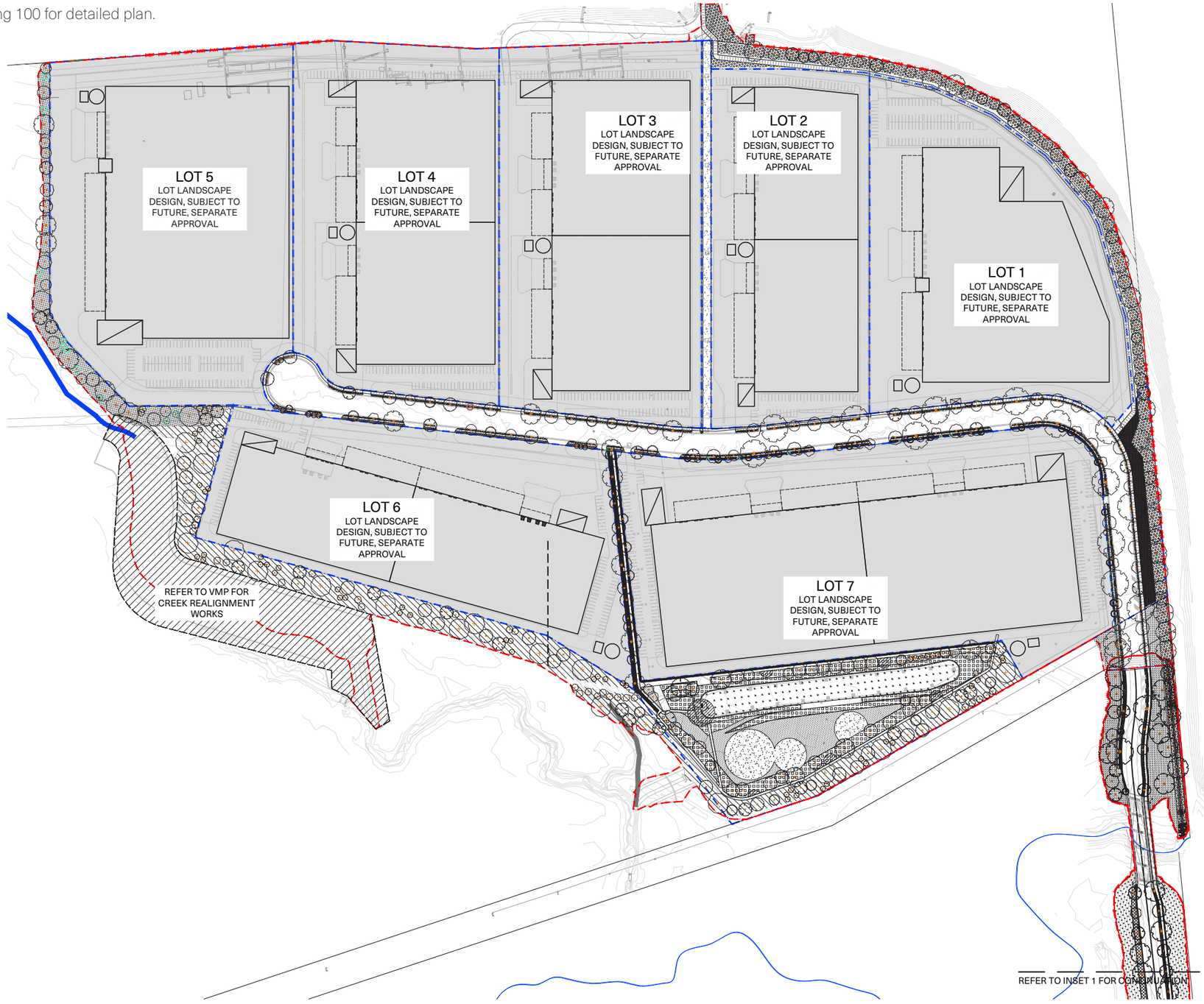
| | | | |
|---|---|---|---|
| PART B SPECIFIC ENVIRONMENTAL CONDITIONS | | | |
| LANDSCAPING | | | |
| B49 | Prior to clearing for construction, the Applicant must prepare a Landscape Plan (LP) for Stage 1 for landscape buffer areas, street planting and the estate basin in consultation with the Environment, Energy and Science Group to the satisfaction of the Planning Secretary. The Landscape Plan must form part of the CEMP in accordance with Condition C2. The Plan must: | | |
| | (a) detail local native species to be used in landscaping, pot sizes, planting densities, locations and use of trees to reduce urban heat island effects; | Refer to attached documentation and plant schedule for detail | Drawings 100 -106 - Landscape Plan<br>Schedules 051 - Plant Schedule |
| | (b) detail the species to be planted within the bio-retention area, including bank areas; and | | |
| | (c) describe the monitoring and maintenance procedures to ensure the on-going success of the landscaping works and measures to replace any plant loss. | | |
| B50 | The Applicant must: | | |
| | (a) not commence construction until the Landscape Plan is approved by the Planning Secretary. | | |
| | (b) must implement the most recent version of the Landscape Plan approved by the Planning Secretary; and | | |
| | (c) maintain the landscaping and vegetation on the site in accordance with the approved Landscape Plan required by Condition B49 for the life of the development. | | |
| | | | |

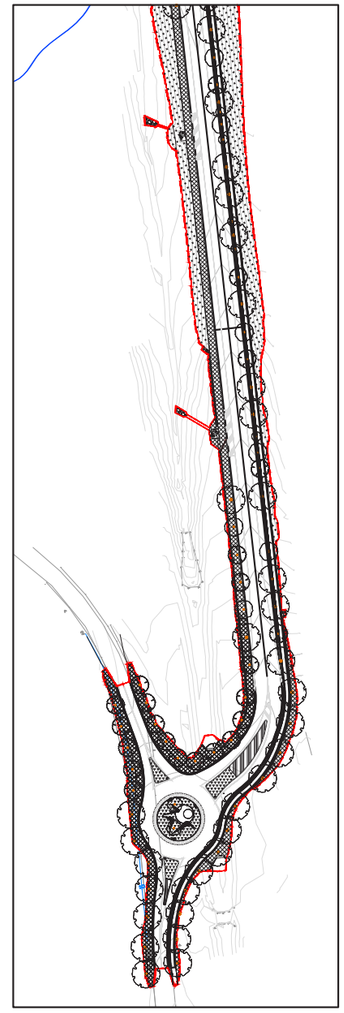
| APPENDIX 2: APPLICANT'S MANAGEMENT AND MITIGATION MEASURES | | | |
|---|---|---|---|
| Biodiversity | | | |
| 4 | A Landscape Plan shall be prepared prior to the commencement of the Stage 1 works for the landscape buffer areas on the site, street planting and trees in the estate basin (Lot 8) and include: | | |
| | a. native vegetation community (or communities) that occur or once occurred in the locality | | |
| | b. list of local native species to be used in the landscaping from the relevant native vegetation community or communities rather than plant non-local natives or exotic species | Refer to plant species and detail outlined in section 4 of this report for detail | |
| | c. quantity and location of plantings | Refer to plant schedule for detail | Drawings 100 -106 - Landscape Plan<br>Schedules 051 - Plant Schedule |
| | d. tree planting to be maximised to reduce the urban heat island effect | | |
| | e. pot size of the local native trees to be planted - advanced and established local native trees preferably with a plant container pot size of 100 liters, or greater for local native tree species which are commercially available. Other local native tree species which are not commercially available may be sourced as juvenile sized trees or pre- grown from provenance seed | Refer to plant schedule for detail | Drawings 100 -106 - Landscape Plan<br>Schedules 051 - Plant Schedule |
| | f. area/space required to allow the planted trees to grow to maturity | Refer to landscape and planting plan for detail.<br>Note that the majority of planting has been proposed as a 'matrix' style approach which allows appropriate spacing to be determined for each planting type based on a % coverage of the total area. | Drawings 100 -106 - Landscape Plan<br>Schedules 051 - Plant Schedule |
| | g. plant maintenance regime. The planted vegetation must be regularly maintained and watered for 12 months following planting. Should any plant loss occur during the maintenance period the plants should be replaced by the same plant species. Note: only the street trees and trees in the estate basin (Lot 8) are part of the Stage 1 works - separate landscape plans will be prepared as part of the future development for Lots 1 to 7. landscaping, pot sizes, planting densities, locations and use of trees to reduce urban heat island effects; | Refer to Section 5 of this report for the maintenance specification and schedule | Section 5: Maintenance<br>0259 LANDSCAPE – MAINTENANCE Specification |
| 5 | The seven hollow bearing trees identified within the BDAR are to be salvaged and reused within the realigned Eskdale Creek, the landscape buffer or the surrounding Parklands. Where practical, native tree trunks (greater than approximately 25-30cm in diameter and 3m in length) must be salvaged and re-used as part of the site works, such as in the landscape buffers and realigned Eskdale Creek area. For tree trunks that are unable to be used to enhance habitat on the site, the Applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including the National Parks and Wildlife Services and Blacktown City Council prior to any native vegetation clearing commencing and before mulching and/or disposing of the trees by other means. | Noted. This approach remains the same in the revised plans | |
| Heritage | | | |
| 2 | 2. A Heritage Interpretation Strategy (HIS) is to be developed by a heritage specialist to identify the interpretive values of the study area, and specifically Aboriginal heritage values across the study area, and to provide direction for potential interpretive installations and devices. This strategy should be made available for consultation and feedback with relevant stakeholders and RAPs. Following consultation and feedback on the strategy, a Heritage Interpretation Plan (HIP) will refine the strategy with content (visual and textual) and design details in order to allow the implementation stage. The outcomes of these reports must be undertaken prior to the issue of the occupation certificate (or equivalent). the interpretation strategy and interpretation plan must include consideration of three main components identified though the ACHAR process: a. input and feedback from the RAPs. b. the historical record of the study and its immediate environs. c. the past cultural and environmental landscape, once informed by further works recommended to be undertaken as part of the AHMP. | The HIS has been reviewed. Once the interpretation Plan has been finalised these considerations will be integrated within the landscape | |

# 3.0 LANDSCAPE MASTER PLAN

# 3.1 LANDSCAPE MASTER PLAN

*Refer to Drawing 100 for detailed plan.



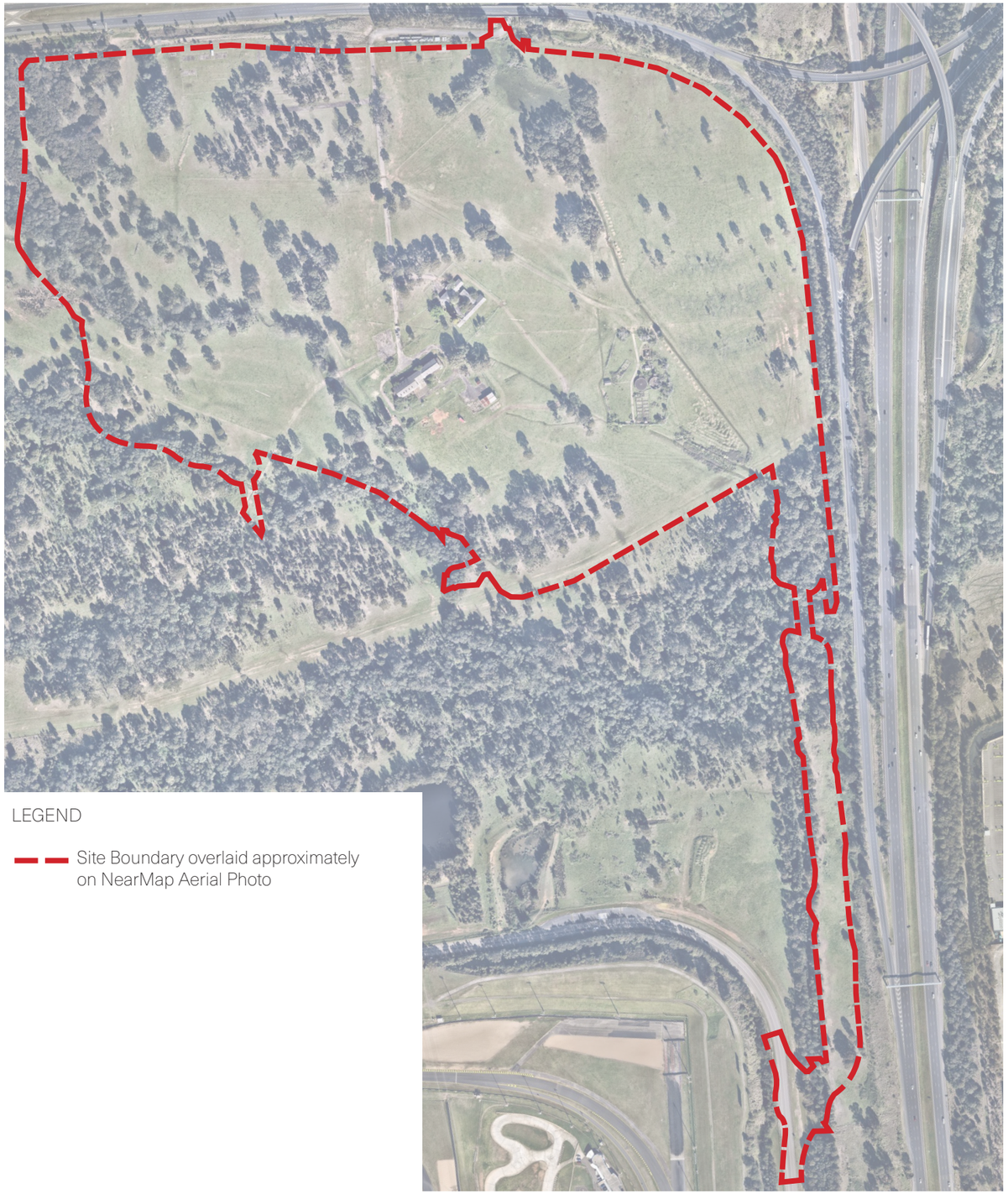



INSET 1



YERRABINGIN

# 3.2 EXISTING LANDSCAPE



LEGEND

Site Boundary overlaid approximately on NearMap Aerial Photo

**Site description**

The site comprises 39.38 ha of unzoned land located at 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek. The M4 borders the northern boundary of the site, with the WSP continuing along the alignment of Eastern Creek further to the north and the Huntingwood industrial precinct located to the north-east. The M7 and Wallgrove Road border the site to the west, with the Eastern Creek industrial precinct located west of Wallgrove Road and forming part of the Western Sydney Employment Area (WSEA). The Sydney Motorsport Park and Sydney Dragway are located east of the site, with Prospect Reservoir located further east. Western Sydney Parklands Trust vacant land to the south and east of the site and Waste Management facility further south.

**Environmental overview (from VMP)**

The remnant native vegetation was previously degraded by upper strata clearing to create pastureland. The site contains three watercourses, Eastern, Reedy and Eskdale Creeks where linear tracts of native vegetation are concentrated. “There are intact pockets of higher quality vegetation adjacent to Eastern Creek and in the south-western corner of the site. Riparian vegetation adjacent to the creeks varies from very good along Eastern Creek, good along Reedy Creek and degraded along Eskdale Creek.” (Towle & Tippler, 2019).

**Existing Vegetation**

The proposed Master Plan will see the regrading of the site to allow for development. As a result existing vegetation will be removed (defined by the BDAR and addressed as part of SSDA approval)

Replacement trees of the same species will be proposed to replace the existing trees and understory level species from endemic vegetaton communities.

All removed material should also be assessed by a Restoration Ecologist for re-use opportunities. The BDAR recommends that HBT’s are salvaged as part of the project and utilised in the Eskdale Creek realignment works.

Any additional vegetative material can be utilised as mulch for future use on site.

**Seed Collection**

Seed collection is addressed as part of the Vegetation Management Plan, prepared in accordance with Condition B33. Seed propagation is proposed to be used for VMP areas only.

We have been advised by the Bush Regeneration Contractor completing seed collection and propagation, that seed collection quantities are not likely to allow for planting works outside of the VMP areas, however seed/propagation material will be collected from areas that have been approved for clearing on the site and seed/propagation material will be collected from as close as possible to the site and from the same general habitat (same soil type etc).

**Top Soil**

Site won topsoil (suitably ameliorated) is proposed to be re-used for all landscaping works, only supplemented where QTY is not sufficient.

Topsoil from areas of native vegetation to be cleared will be collected for re-use, including within the Eskdale Creek realignment, landscape buffers and site earthworks where practical.

The following is outlined in the VMP:

As per Development Consent Biodiversity measure (5) in Appendix 2, where vegetation is approved for removal, both in the VMP area and the development footprint, tree hollows, root balls and large pieces of wood (i.e., greater than approximately 25-30 cm diameter and 2-3 meters in length) should be translocated into the VMP areas on the same day of removal.

# 3.3 LANDSCAPE TYPOLOGIES

LEGEND

- Site Boundary
- Lot Boundary
- Built form
- Streets
- Buffer / Open Space
- Basin
- Lots

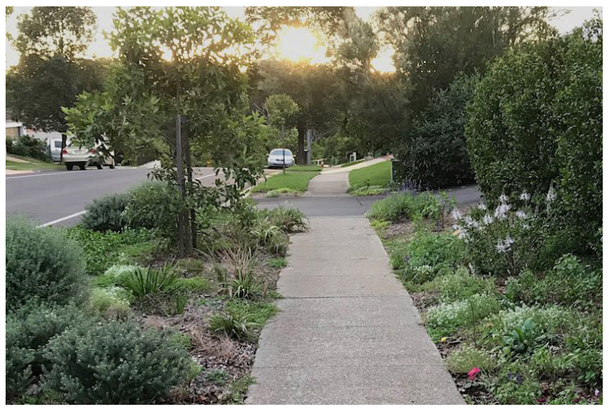
**PROJECT VISION**

A range of landscape types exist across the site. Each typology requires a specific design solution, however as a whole can convey a joint narrative for the project. The landscape for the Light Horse Business Hub will:

- Be considered as a whole rather than a collection of separate lots
- Be a celebration of local, endemic plant communities as a cross section across the site
- Provide the ability to forage, learn and converse with other site occupants/

BASIN

LOTS



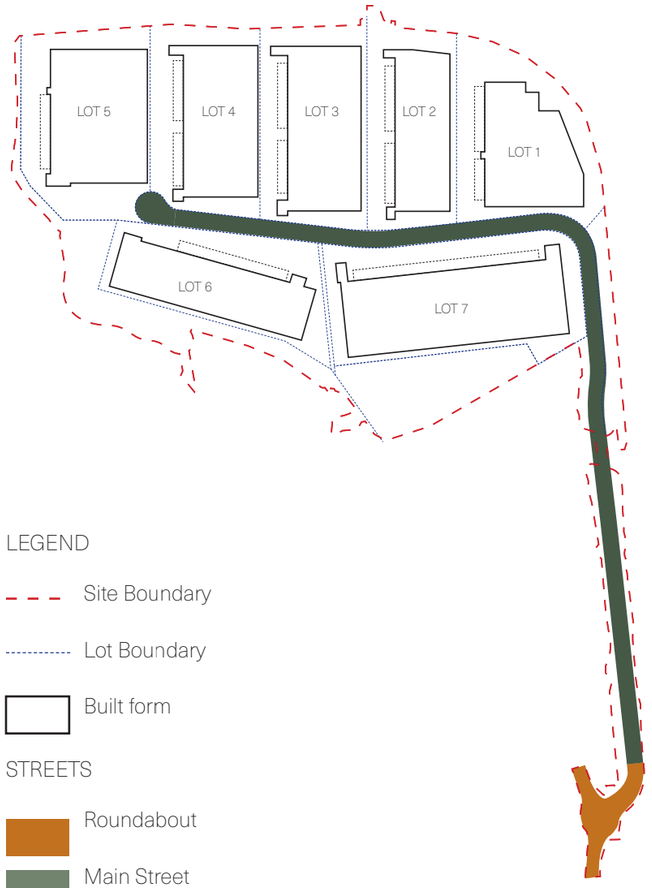
STREETS

BUFFER

# STREETS

The Main Street of the Business Hub represents the address of the precinct as well as the entry experience for each of the individual businesses. The street presents and opportunity to explore and celebrate the objectives and principles of the precinct in an exemplarary manner. The streets should:

- Encourage people to come to the street and to dwell and engage with it as a landscape opportunity
- Provide cooling opportunities to mitigate the Urban Heat Island Effect
- Provide clear and legible circulation and way finding.

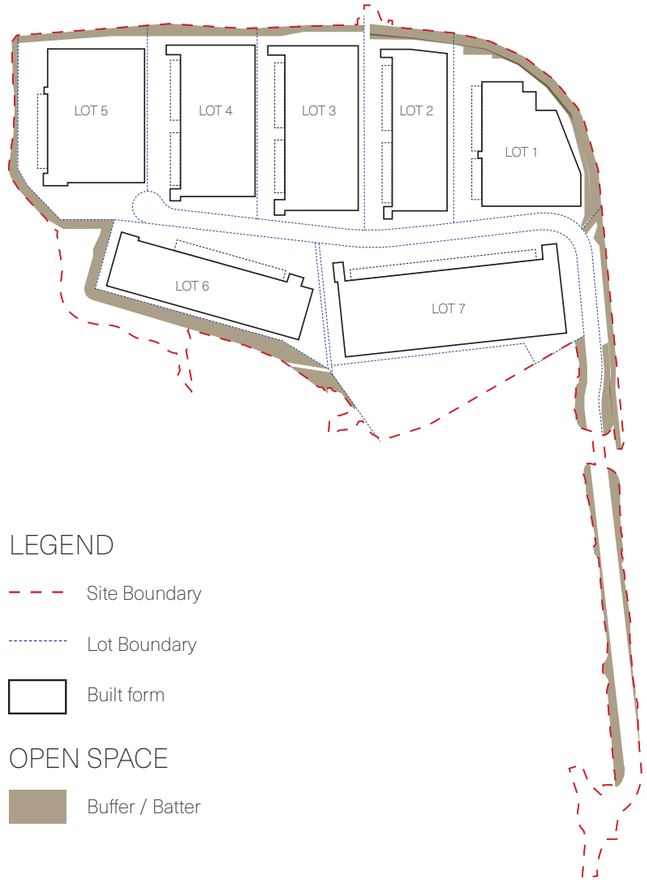


# BUFFER

The buffer landscape serves the role of softening the impact of the development on the surounding landscape from an audio and visual perspective.

The buffer forms a green ring that encompasses the site. It is primarily native or endemic to the area and seeks to stitch the Light Horse Business Hub into the surrounding landscape in a seemless manner. Similar and appropriate species will continue into the site. The buffer landscape will

- Utilise landscape to visually screen the development from the surrounding areas
- Landscape at a variety of scales to assist with noise mitigation
- Endemic species to provide habitat for terrestrial and avian species



# BASIN

The site basin and rerouted creekline forms the largest concentratoin of open space within the site and therefore provides an opportunity for social and environmental initiatives. Planting in this area should reflect the historic riparian quality of the area. This zone will maximise tree canopy and minimise run off from the site through use of transevaporation ponds and varying plant species. The basin area will also provide opportunities for gathering, movement and circulation paths and lookouts will further reinforce this space as a destination for the site. The basin and creek line area should:

- Encourage gathering and occupation
- Reinforce the environmental initiatives of the site
- Provide an opportunity for passive learning

LEGEND

Site Boundary

Lot Boundary

Built form

OPEN SPACE

Basin

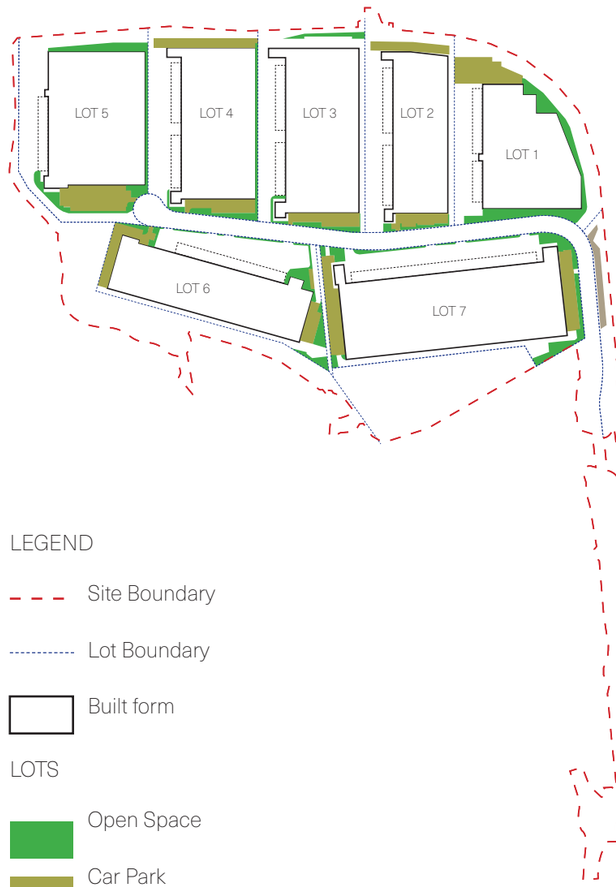
Creek

# LOTS

The site lots will relfect the unique character of each of the tennants will utilising landscape as a consistent element to tie the site together.

A narrative relating to the endemic plant species of the area will be conveyed through each of the lots with key species selected for each. This will be further reinforced through the building colour palette. Additional interventions to be considered for the lots include:

- Establishing a clear circulation network and gathering spaces so site inhabitants can occupy the open space within the lots
- Integrate interpretation and the planting narrative through the selection of a totem or marker to identity each lot
- Maximise tree canopy to reduce the impacts of the Urban Heat Island Effect




LEGEND

Site Boundary

Lot Boundary

Built form

LOTS

Open Space

Car Park

Vehicle Circulation

# 4.0 PLANTING

# 4.1 LANDSCAPE PLANTING APPROACH

Extent of tree clearing, and removal of existing vegetation defined by the BDAR and addressed as part of SSDA approval. To achieve the outcomes of the project, the site requires changing levels across the site as a whole, which therefore requires clearing to occur. The Master Plan cannot be amended at this stage.

The plant selection for the project is informed by the local endemic vegetation communities. Species from these communities are used across the site to reflect the historic vegetation while also providing habitat for terrestrial and avian animals.

As identified in the VMP, species from the plant communities of Shale Plains and River-Flat Eucalypt Forest are proposed as the predominant vegetation for the site. Several planting matricies have been designed to enure diversity for environmental and aesthetic benefit.

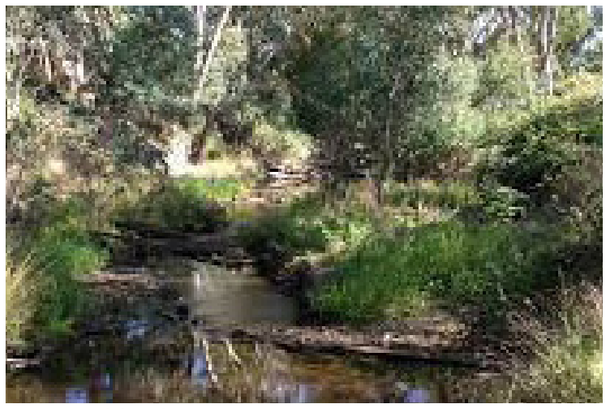
To ensure the proposed site planting thrives, a plant maintenance regime has been established (outlined in part 5 of this report) The planted vegetation must be regularly maintained and watered for 12 months following planting. Should any plant loss occur during the maintenance period the plants should be replaced by the same plant species to maintain the same level of biodiversity

Detail on the species and their use across the site is outlined on the following pages.

Where possible, planting should occur during the optimal time for native species (autumn, or as recommended by the supply nursery), however planting timing will ultimately be governed by construction timeframe.

1. RIVER FLAT EUCALYPT FOREST

3. SHALE PLAINS



4. WATER COURSE

5. ENTRY FEATURE

# PLANT SCHEDULE

**PLANT SCHEDULE:**

**TREE PLANTING**

| Code | Botanical Name | Common Name | Installation Size | Mature Size (m2) | QTY |
|---|---|---|---|---|---|
| ACA DEC | Acacia decurrens | Green Wattle | 40lt | 15 x 5 | 24 |
| ACA IMP | Acacia implexa | Hickory Wattle | 40lt | 10 x 7 | 39 |
| ACA PM2 | Acacia parramattensis | South Wales Wattle | 100lt | 10 x 7 | 8 |
| ACA PMT | Acacia parramattensis | South Wales Wattle | 40lt | 10 x 7 | 16 |
| ANG FBN | Angophora floribunda | Rough-barked Apple | 100lt | 20 x 10 | 47 |
| BAC MYR | Backhousia myrtifolia | Cinnamon Myrtle | 40lt | 8 x 4 | 53 |
| CAS GLC | Casuarina glauca | Swamp Oak | 100lt | 10 x 6 | 32 |
| COR MAC | Corymbia maculata | Spotted Gum | 100lt | 30 x 10 | 76 |
| EUC AMP | Eucalyptus amplifolia | Cabbage Gum | 100lt | 20 x 8 | 23 |
| EUC CRE | Eucalyptus crebra | Narrow-leaved Ironbark | 40lt | 25 x 10 | 13 |
| EUC MOL | Eucalyptus moluccana | Gum-topped Box | 100lt | 20 x 6 | 26 |
| EUC TER | Eucalyptus tereticornis | Forest Red Gum | 100lt | 35 x 12 | 81 |
| EXO AUC | Exocarpos cupressiformis | Cherry Ballart | 40lt | 10 x 6 | 18 |
| IND AUS | Indigofera australis | Australian Indigo | 300mm | 2 x 2 | 12 |
| MEL MUL | Melaleuca linariifolia | Flaxleaf Paperbark Multi-Trunk | 100lt | 10 x 4 | 6 |
| MEL NOD | Melaleuca nodosa | Prickly-leaved paperbark | 40lt | 3 x 2.5 | 28 |
| MEL WHM | Melaleuca decora | White Feather Honey Myrtle | 40lt | 8 x 5 | 15 |

**MASS PLANTING**

| MATRIX ONE | | | | | | |
|---|---|---|---|---|---|---|
| Code | Botanical Name | Common Name | Installation Size | Mature Size (m2) | QTY / m2 | QTY |
| | | | | Spacing - 10/m2 | | |
| Ar | Aristida ramosa | Purple wiregrass | 150mm | 0.6, 0.6 | 1 | 81 |
| Ca | Centella asiatica | Asiatic Pennywort | 150mm | 0.2 x 1 | 1 | 81 |
| Lf | Lomandra filiformis | Wattle Mat Rush | 150mm | 0.5 x 0.3 | 2 | 162 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 0.3 x 0.3 | 2 | 162 |
| Oa | Oplismenus aemulus | Basket Grass | 150mm | 0.3 x 0.3 | 3 | 242 |
| Od | Ozothamnus diosmifolius | Rice Flower | 150mm | 2 x 1.2 | 1 | 81 |

| MATRIX TWO | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 10/m2 | | |
| Ar | Aristida ramosa | Purple wiregrass | 150mm | 0.6 x 0.6 | 2 | 2997 |
| Ba | Brunoniella australis | Blue trumpet | 150mm | 0.3 x 0.3 | 2 | 3029 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1 | 3 | 4544 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 0.3 x 0.3 | 1 | 1515 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 0.6 x 0.5 | 2 | 3029 |

| MATRIX THREE | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 10/m2 | | |
| Cr | Cymbopogon refractus | Barbed-wire Grass | 150mm | 1 x 1 | 1 | 2063 |
| Cg | Cyperus gracilis | Slender sedge | 150mm | 0.3 x 0.5 | 2 | 4126 |
| Dl | Dianella longifolia | Dianella | 150mm | 0.8 x 0.5 | 1 | 2063 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1 | 4 | 8253 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 0.8 x 0.5 | 2 | 4126 |

| MATRIX FOUR - SWALE | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 5/m2 | | |
| Ca | Carex appressa | Tall Sedge | 150mm | 1.3 x 1 | 0.5 | 2615 |
| Dr | Dianella revoluta | Spreading Flax Lily | 150mm | 1 x 0.6 | 0.5 | 2615 |
| Ea | Eleocharis acuta | Spike Sedge | 150mm | 0.6 x 0.5 | 1 | 5229 |
| Fn | Ficinia nodosa | Knobby Club Rush | 150mm | 1 x 0.8 | 0.5 | 2615 |
| Jk | Juncus kraussii | Sea Rush | 150mm | 0.8 x 0.6 | 0.5 | 2615 |
| Ju | Juncus usitatus | Sawgrass Sedge | 150mm | 0.8 x 0.6 | 0.3 | 1569 |
| Oo | Ottelia ovalifoliA | Swamp Lily | 150mm | 0.2 x 0.6 | 0.5 | 2615 |
| Pl | Poa labillardieri | Tussock Grass | 150mm | 1.3 x 1 | 1 | 5229 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 0.6 x 0.5 | 0.2 | 1046 |

# PLANT SCHEDULE

| MATRIX A | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 6/m2 | | |
| Am | Arthropodium milleflorum / Pale Vanilla Lily | | 150mm | 1.3, 0.3 | 1.0 | 4270 |
| Hv | Hardenbergia violacea / Lilac Vine | | 150mm | 2, 1.5 | 1.0 | 4270 |
| Hdiff | Hibbertia diffusa / Wedge Guinea Flower | | 150mm | 0.3, 0.5 | 1.5 | 6405 |
| Ll | Lepidosperma laterale / Sword-sedge | | 150mm | 1.5, 2 | 0.5 | 2135 |
| Lf | Lomandra filiformis / Wattle Mat Rush | | 150mm | 150mm, 0.3, 0.3 | 1.0 | 4270 |
| Ms | Microlaena stipoides / Weeping Grass | | 150mm | 150mm, 0.7, 0.5 | 0.5 | 2135 |
| Ta | Themeda australis / Kangaroo Grass | | 150mm | 150mm, 1.5, 1 | 0.5 | 2135 |

| MATRIX B | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 6/m2 | | |
| Bs | Bursaria spinosa | Australian Blackthorn | 150mm | 150mm, 2, 2 | 0.5 | 95 |
| Ms | Microlaena stipoides | Weeping Grass | 150mm | 150mm, 0.3, 0.3 | 3 | 572 |
| Od | Ozothamnus diosmifolius | Rice Flower | 150mm | 150mm, 2, 1.2 | 0.5 | 95 |
| Ta | Themeda australis | Kangaroo Grass | 150mm | 150mm, 0.7, 0.5 | 1 | 191 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 150mm, 0.8, 0.5 | 1 | 191 |

| MATRIX C | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | Spacing - 6/m2 | | |
| Dl | Dianella longifolia | Dianella | 150mm | 1 x 1 | 1 | 548 |
| Dr | Dichondra repens | Dichondra | 150mm | 0.1 x 1.2 | 3 | 1643 |
| Ll | Lomandra longifolia | Mat Rush | 150mm | 0.3 x 1 | 1 | 548 |
| Wg | Wahlenbergia gracilis | Sprawling Bluebell | 150mm | 0.8 x 0.5 | 1 | 548 |

| HYDROSEED - WETLAND BATTER | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | | Mature Size (m) | | AREA m2 |
| | | | | | | 6195 |

| MASS JUNCUS | | | | | | |
|---|---|---|---|---|---|---|
| | Botanical Name | Common Name | Installation Size | Mature Size (m) | QTY / m2 | QTY |
| | | | | | | |
| Ju | Juncus usitatus | Sawgrass Sedge | TUBE | 1.3 x 0.5 | 6 | 37170 |

# 4.2 STREETS

*Refer to Drawing 100 for detailed plan.

INSET 1

# PLANTING DESIGN CONCEPT - STREETS

LEGEND

- Site Boundary
- Lot Boundary
- Built form

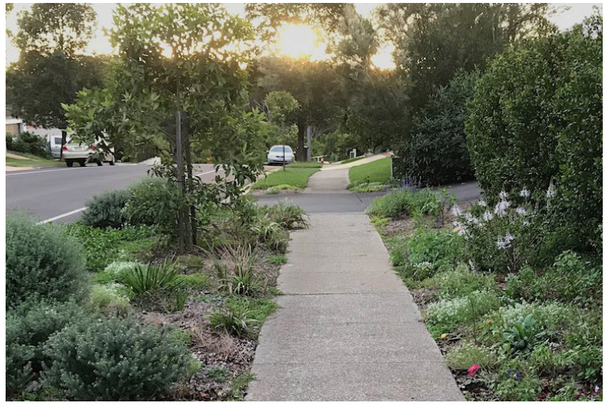
STREET TREE PLANTING:

- Double Row of Trees between public and private lots
- Tree planting to road verge.
- Tall trees and shrubs for habitat and road cooling
- Meadow. Grass embankment, grouped trees to reveal views

The Streetscape is the public facing experience of the development. As such it should exemplify the established narrative and ethos of the development.

Tree planting is to be maximised on both sides of the road to ensure shading of the road and surrounding areas as a means to mitigate the impact of the Urban Heat Island Effect. Planting is to be located under trees and against boundary and fence lines where possible to help screen and soften the scale of the development.

Tree species proposed for to be planted along the streets are to comprise a mix of local native provenance species and reflect the chosen relevant local native vegetation community.



# PLANT IMAGERY - STREETS

## Shale Plains & River Flat Eucalypt Forest species

TREES

Melaleuca decora

Angophora floribunda

Corymbia maculata

Eucalyptus tereticornis

Acacia decurrens

Acacia parramattensis

Backhousia myrtifolia

Eucalyptus amplifolia

Eucalyptus moluccana

Exocarpus cupressiformis

Acacia implexa

Indigofera australis

GROUND COVERS

Oplismenus aemulus

Aristida vagans

Themeda australis

Microlaena stipoides

Cymbopogon refractus

Cyperus gracilis

Lomandra filiformis

Microlaena stipoides

Brunoniella australis

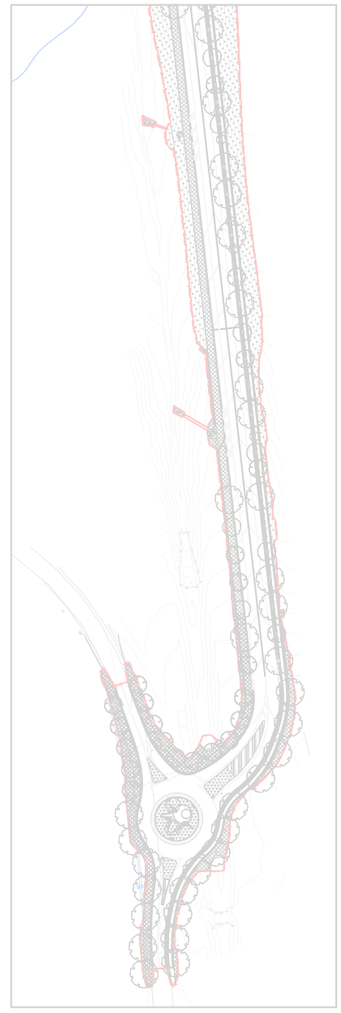
Aristida ramosa

Dianella longifolia

Wahelnbergia gracilis

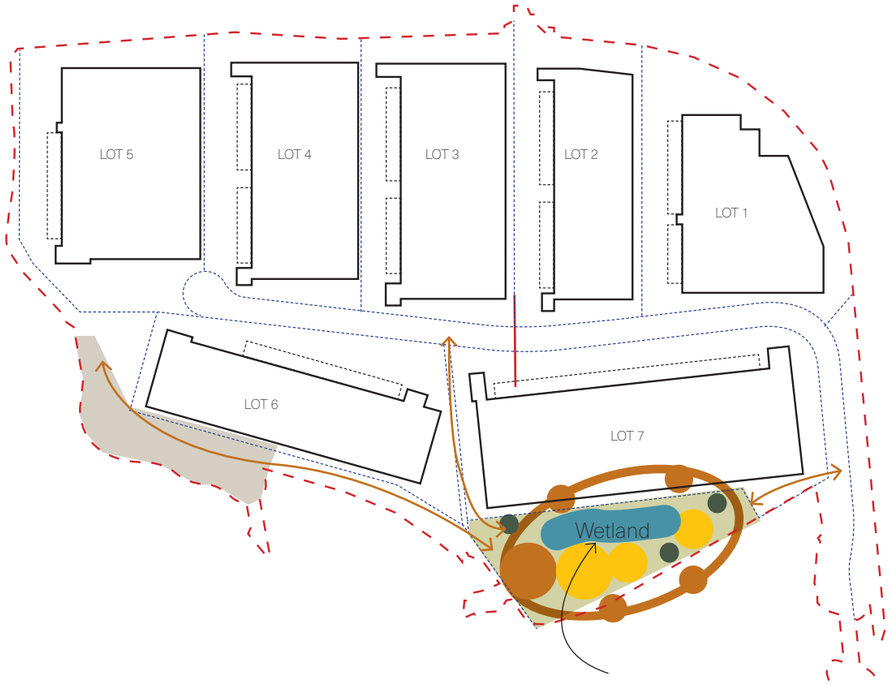
# 4.3 DRAINAGE BASIN

*Refer to Drawing 100 for detailed plan.



INSET 1

# DESIGN CONCEPT - BASIN

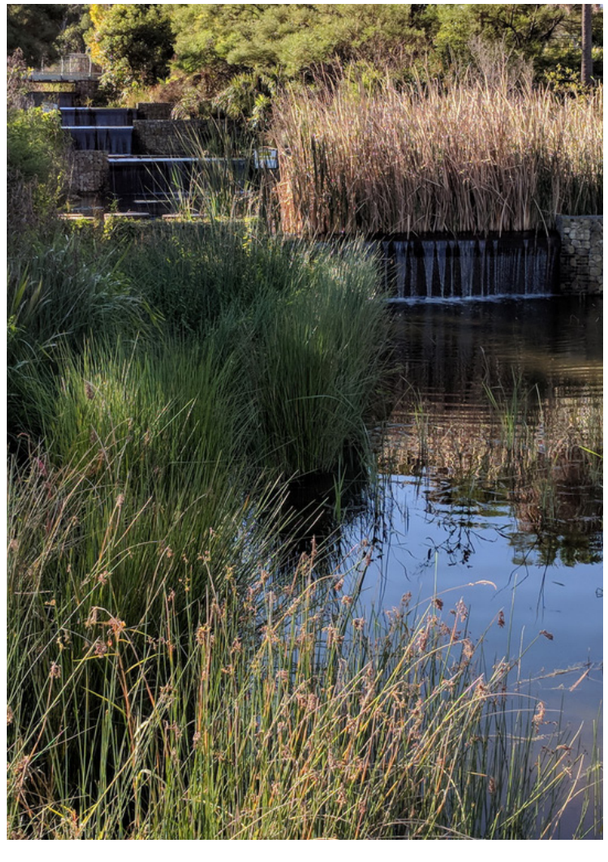



LEGEND

- Site Boundary
- Lot Boundary
- Built form
- Circulation Loop
- Access Paths
- Seating / Gathering nodes
- Permanent Water Body
- Trans-evaporation vegetation
- Turf
- Refer to VMP for Creek Realignment Works
- Potential location for Hollow Bearing trees

The drainage basin provides significant amenity for this site. This area is proposed to be used for environmental benefit but also as a social opportunity for gathering, exercise and respite.

Site path networks will connect to this space and a circuit that encompasses the basin is proposed. Multiple seating or activity nodes will be located along the path with viewing opportunities across the space. This space and the proposed vegetation will be designed to withstand inundation. Large reed beds will funtion as trans evaporation ponds to hold and discharge water without increasing site run off.



# PLANT IMAGERY - BASIN

TREES

Eucalyptus amplifolia

Eucalyptus tereticornis

Angophora floribunda

Acacia parramattensis

Casuarina glauca

Melaleuca linariifolia

Corymbia maculata

BASIN

Carex appressa

Dianella revoluta

Eleocharis acuta

ficinia nodosa

Juncus kraussii

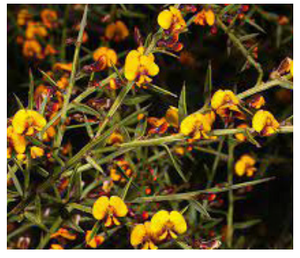
Juncus usitatus

Ottelia ovalifolia

Poa labillardieri

Themeda australis

BATTERS



Daviesia ulicifolia

Dianella longifolia

Lomandra filiformis

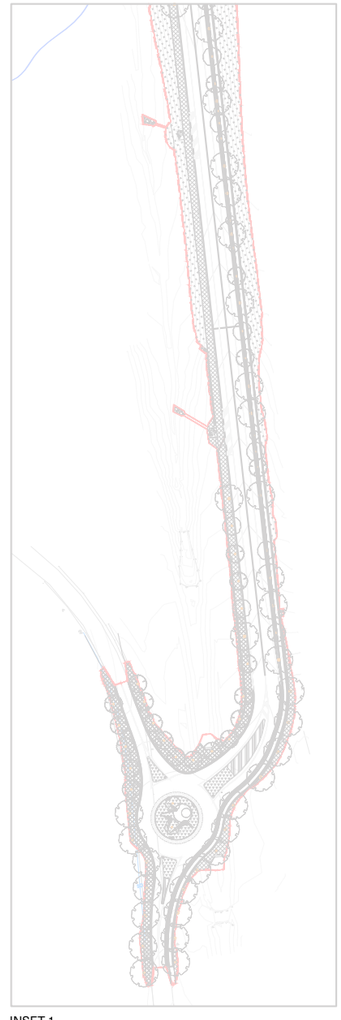
Lomandra longifolia

Melaleuca erubescens

Microlaena stipoides

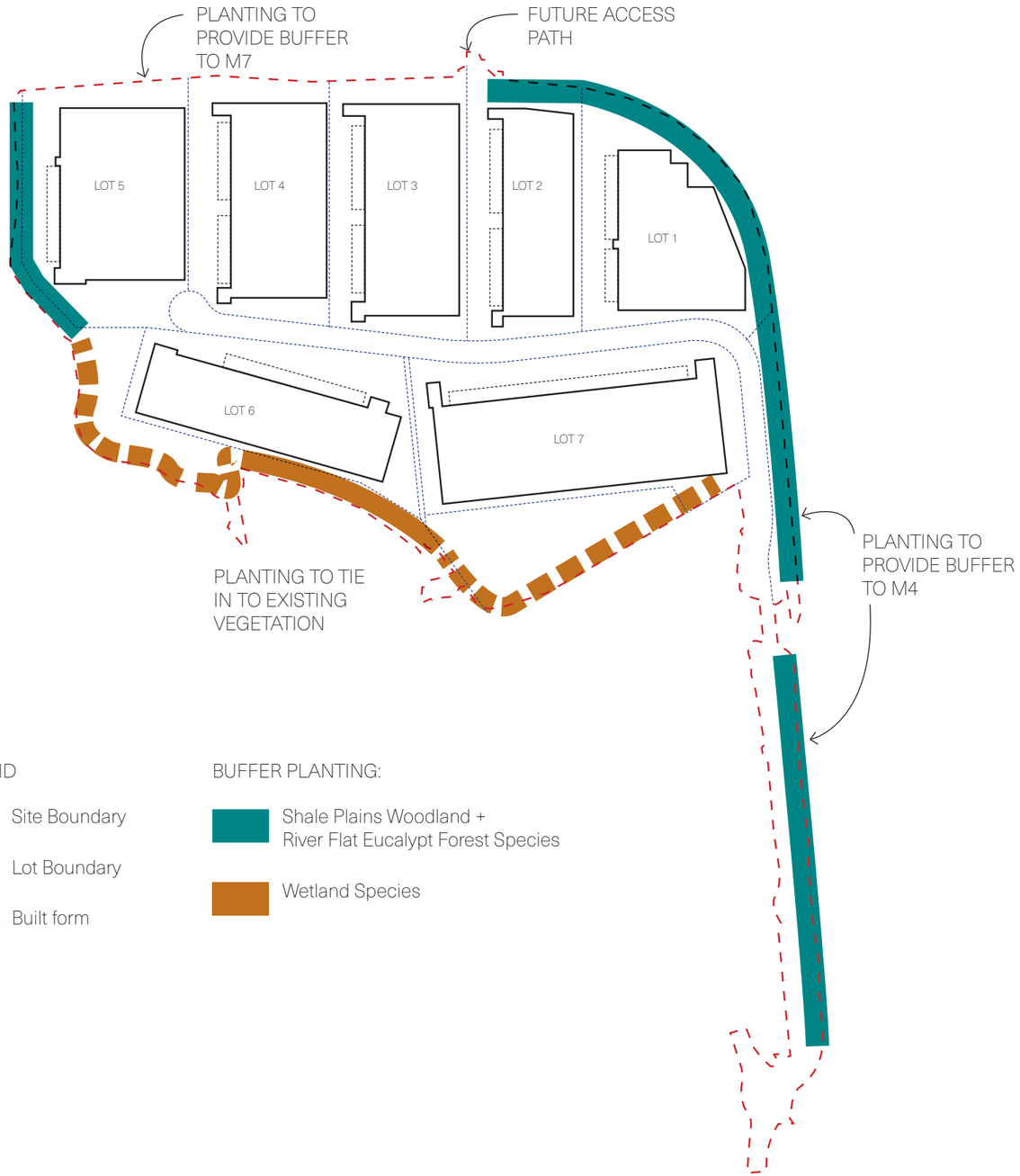
# 4.4 BUFFER

*Refer to Drawing 100 for detailed plan.



INSET 1

# DESIGN CONCEPT - BUFFER




A vegetated buffer is proposed to surround the development. The buffer will consist of a range of planting types (trees, shrubs, ground covers) which will function as a visual and noise barrier between the site and surrounding areas.

The buffer planting will also ensure the batters created from benching and site works are stabilised and become environmental and aesthetic amenity for the development.

Due to access and gradient of the batters, the planting will be applied via spray seeding. Seed stock will be sourced from site or seed to match species found naturally on site will be utilised to ensure the endemic species may be returned to the area.

Where the gradients allow, tree planting will be utilised for canopy coverage, biodiversity and to mitigate the Urban Heat Island Effect.

# PLANT IMAGERY - BUFFER

**Shale Plains & River Flat Eucalypt Forest species**

TREES

Eucalyptus amplifolia

Eucalyptus tereticornis

Acacia decurrens

Acacia implexa

Acacia parramattensis

Angophora floribunda

Melaleuca decora

Backhousia myrtifolia

Corymbia maculata

Eucalyptus moluccana

Casuarina glauca

Melaleuca nodosa

MASS PLANTING

Centella asiatica

Centella asiatica

Lomandra filiformis

Microlaena stipoides

Oplismenus aemulus

Ozothamnus diosmifolius

Indigofera australis

Dichopogon fimbriatus

Arthropodium milleflorum

+ MORE

Dodonea viscosa

Bursaria spinosa

Aristida vagans

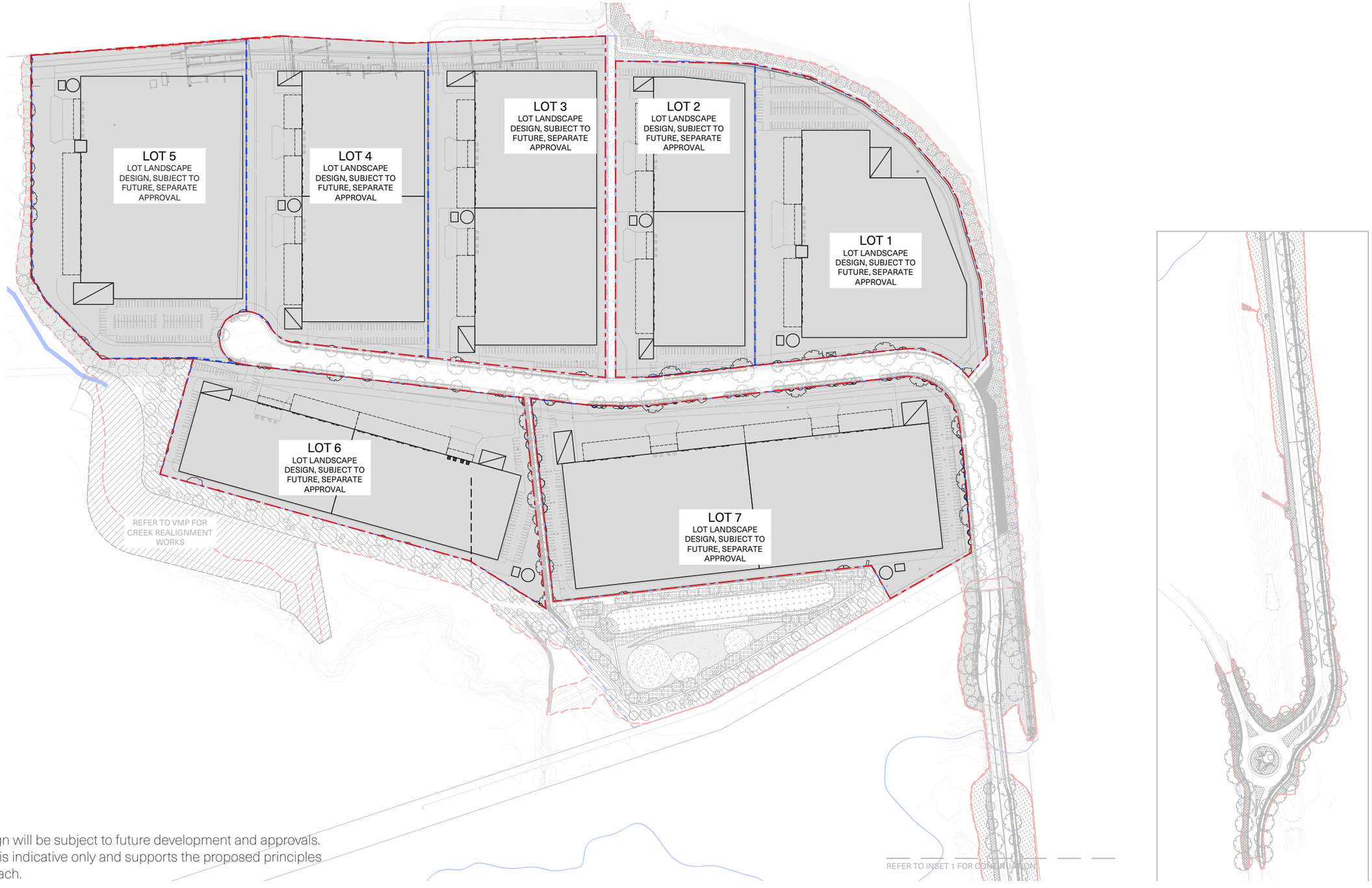
Dianella longifolia

Wahelnbergia gracilis

Cymbopogon refractus

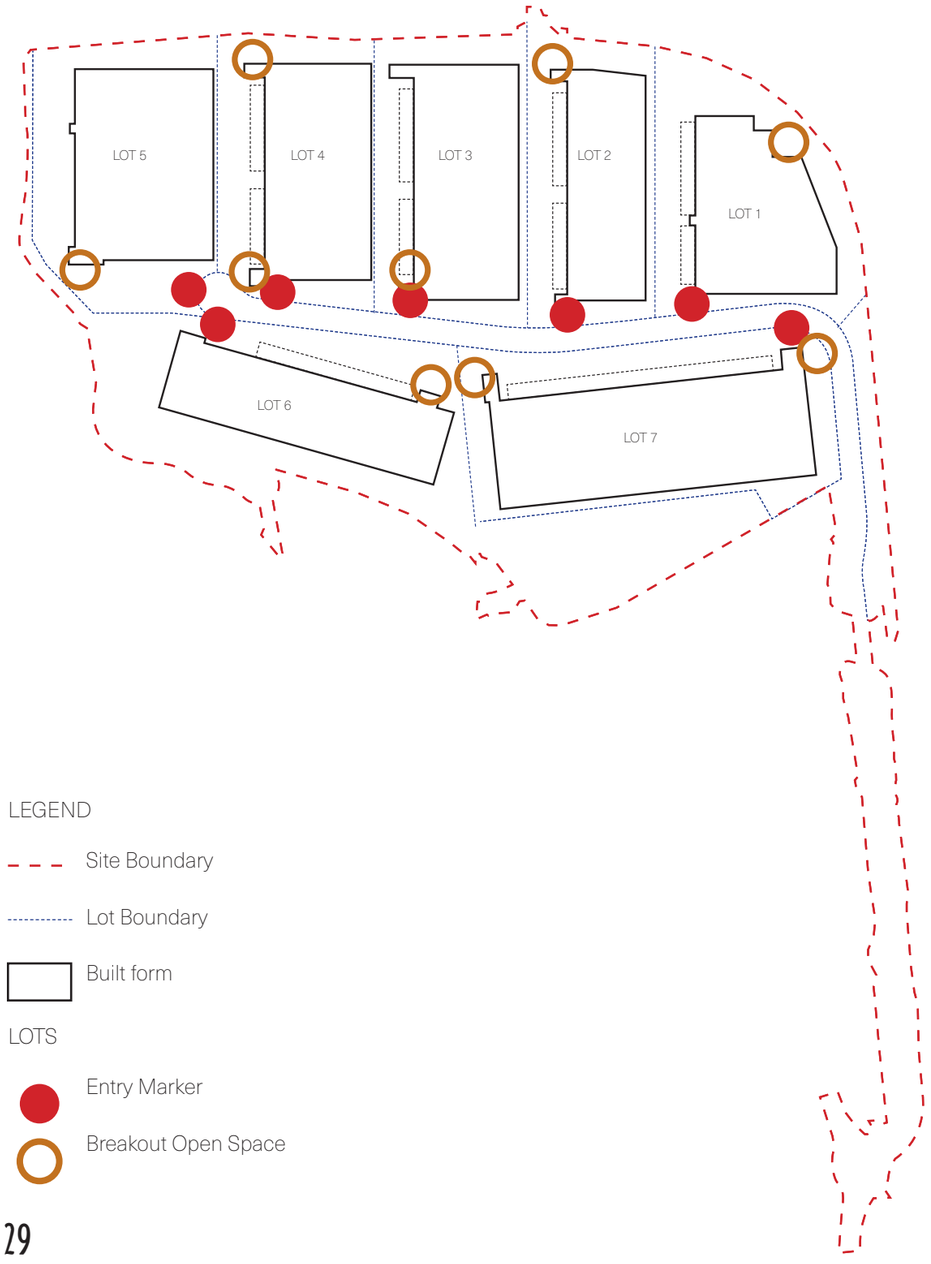
Themeda australis

# 4.5 LOTS




*Detailed lot design will be subject to future development and approvals. Design as shown is indicative only and supports the proposed principles and design approach.

# ENTRY AND GATHERING

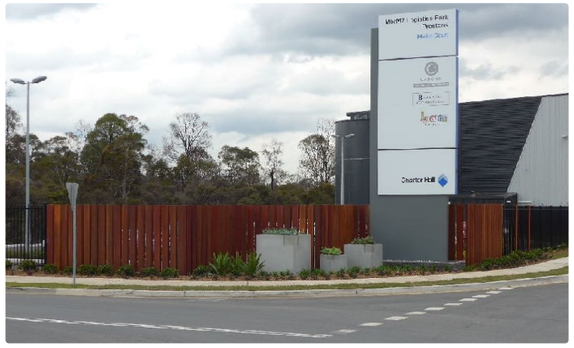



LEGEND

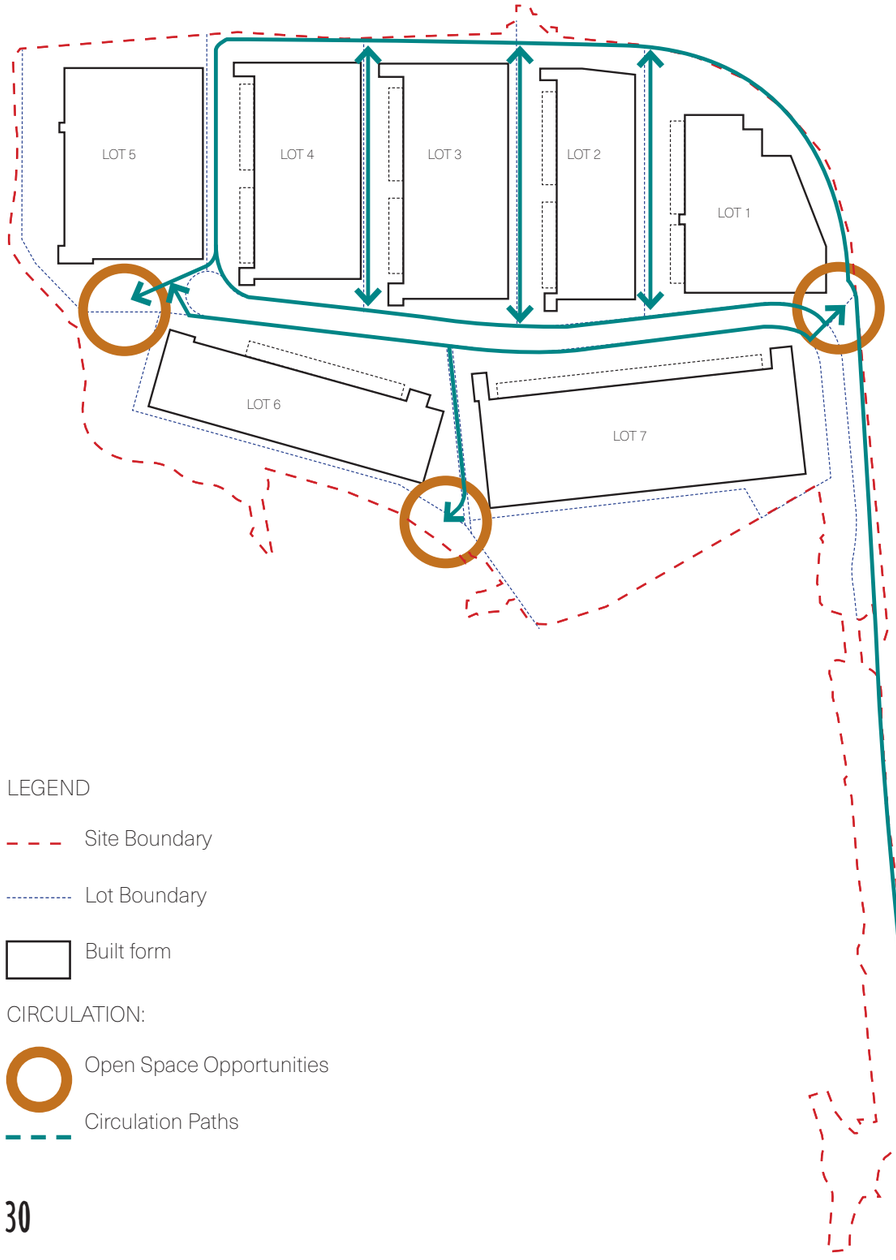
- Site Boundary
- Lot Boundary
- Built form

LOTS

- Entry Marker
- Breakout Open Space



# CIRCULATION




LEGEND

Site Boundary

Lot Boundary

Built form

CIRCULATION:

Open Space Opportunities

Circulation Paths

# 5.0 MAINTENANCE

## 0259 LANDSCAPE – MAINTENANCE

### 1. GENERAL

### 1.1 RESPONSIBILITIES

**General**

Requirement: Provide landscape maintenance of the contract area during the Defects Liability Period and (if applicable) maintenance period.

**Performance**

Extent of maintenance:

- Weeding of lawn, garden bed areas, and pavement in the areas of weeding the drainage basin, the riparian corridor along the relocated creek, the buffer landscape areas, the lots and streets.
- Supply and spreading of fertiliser to lawn, garden bed areas and pots.
- Supply and installation of mulch to existing garden bed areas and pots.
- Pruning, trimming and tree surgery.
- Adjustment of tree stakes and ties.
- Insect and disease control of lawn, shrubs and trees.
- Mowing and edge trimming to all lawn areas including collection and removal of clippings.
- Diagnosis of cause of dead or failed plants and recommendations for corrective actions.
- Replacement of dead or failed plants and lawns.
- Maintenance of irrigation systems.
- Removal of rubbish and debris in garden areas.
- Removal of leaves, mulch and organic debris from pavement and drains.
- Keeping a log book of maintenance activities.
- Providing monthly reports.

Maintenance period: 12 months or as required by any DA consent conditions.
Maintenance procedures: As documented, and to the SELECTIONS Maintenance schedule.

### 1.2 THE SITE

**Site restrictions**

Site limitations: Comply with the following restrictions on the use of the site: As required by any DA consent conditions or Developer / Owner guidelines.
Entry permits: Make available, to persons entering designated secure areas, valid entry permits. Make sure these persons comply with conditions of entry.

**Secure areas**

Secure area visitors: At least 10 working days before entry is required, submit the full name, address, and date and place of birth of persons required to enter designated secure areas.
- Purpose of submission: Review by Superintendent or site manager.

**Protection of persons and property**

Temporary works: Provide and maintain required guards, fencing, footpaths, signs and lighting.
Accessways, services: Do not obstruct or damage footpaths, drains and watercourses or other existing services in use on or adjacent to the site.
Property: Do not interfere with or damage property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

LIGHT HORSE BUSINESS HUB
02 SITE, URBAN AND OPEN SPACES 0259 Landscape – maintenance

**Rectification**

Accessways, services: Rectify immediately any obstruction or damage to footpaths, drains and watercourses or other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.
Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

### 1.3 GENERAL CONDITIONS

**Contractor and staff**

Representative: Nominate a senior partner/personnel experienced in maintenance nursery practices and horticulture, to be responsible for taking and carrying out instruction, and reporting to the principal.
All maintenance work is to be carried out by a qualified Bush Regenerator or suitably qualified landscape contractor.

**Special instructions**

Priority: If instructed by the principal attend to certain areas and procedures as a priority. Obtain approval for additional costs.

**Notice**

Inspection: Provide two days' notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Each site maintenance visit.
- Work affecting public access or amenity, excluding public road closures which are to comply with council and developer requirements

Water restrictions: Provide immediate notification of any new restrictions that affect performance of maintenance in accordance with the Contract.

**Reporting**

Monthly report: Submit regular reports by the last Friday of each month, Monthly reports schedule and as follows:

- General status of the works.
- Soil test results included as required for the fertilising programs.
- Any plant replacement requirements.
- Irrigation operation schedules and water consumption.
- The time period of the report and the conditions during that time
- qualifications and experience of contractors
- seed certification and local provenance
- initial and any replacement plantings and propagation materials. Dates of planting of each species

  For replacement plants, following the guidelines in section 3.3 Plant Replacement which include but are not limited to the requirement for replacement species to:
  - Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
  - Of the same species and variety (or approved alternative) and of the closest commercially available size
  - Any new species must still be from the local native vegetation community being emulated and local provenance.
  - the replacement planting must not decrease species diversity

- any agreed changes to plantings, species etc during the reporting period
- weed cover percentage
- watering requirements
-

Incident reports: Report immediately, verbally and confirmed in writing, any disturbance or incidence affecting or likely to affect the scheduling of the works.

**Log book**

Records: Log the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Availability: Upon request.

**Replacement plants**

Species: Provide written certification that all plant material is true-to-species and type, and free of disease and fungal infection. Replacement plants must:

- Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
- Of the same species and variety (or approved alternative) and of the closest commercially available size
- Any new species must still be from the local native vegetation community being emulated and local provenance.
- the replacement planting must not decrease species diversity

**Coordination with others**

Other contractors: Coordinate work with other contractors to minimise conflicting activities and delays. If disturbances to planned works are unavoidable, make arrangements to work around them.

## 2. GENERAL

### 2.1 FERTILISER

General

Type: Proprietary fertilisers, delivered to the site in sealed bags and marked to show manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Fertiliser schedule

| Fertiliser Key | Location | N:P:K Ratio | Application Rate |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## 3. EXECUTION

### 3.1 GENERAL

**Weeding**

Z hhglqj vkrxog eh xqghuwdnhq z lwklq wkh gudlqdjh edvlq duhd/wkh ulsdubq frulgrudorqj wkh uhorfdwhg fuhhn/ wkh exiihudqgvfdsh duhdv/wkh orzw dqg vwhhvw1

Requirement: Remove unwanted broadleaf plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly.

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- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at fortnightly intervals.

Vigorous ground covers: Keep 200 mm clear from the base of any shrub or tree. Remove as follows:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Apply as follows:

- To the manufacturer's recommendations and the material data and safety data sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has adequate soil moisture.
- Avoid windy days or if rain is likely to follow within 12 hours.

**Insect and disease control**

Requirement: Control any insects or diseases affecting the lawn and garden bed areas as follows:

- Identify the problem.
- Execute the correct treatment until the problem has been eliminated.
- Apply hazardous material out of normal working hours.
-
- Protect staff and public from exposure to hazardous materials.

### 3.2 GRASS SURFACES

**Mowing and trimming**

Preparation: Remove litter and fallen branches before mowing.

Grass height: Consistent with the growth habit of the grass variety and maintained at 25 mm to 40 mm throughout the year. Do not remove more than one third of the grass height at any one time.

Program: Weekly during the mowing season, November to March, and at fortnightly intervals during April to October. Do not mow during wet conditions.

Raking: Once every month before mowing during the mowing season, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees or shrubs.

Clippings distribution: Evenly distribute over the mown areas or remove from the mown areas or site as directed. Do not spread evenly over the planted and mulched areas if these areas are to remain grass and weed free.

Non-selective herbicide: Make sure application does not exceed the area limits of normal manual trimming. Repair any damage from overuse or over spray.

**Fertilising**

Program:

- Regular application: Each September and April.
- Additional application: Each November and February at reduced rates.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 to 6.5.

pH testing program: Two year schedule starting in the first year of the contract, or for the duration of the Defects Liability Period (whichever is greater).

Application: Spread as follows:

- Dry: Crush lumps and broadcast dry material by hand or mechanically when the lawn is dry.

- Spray: Acceptable.
- Prevent fertiliser from leaching to adjoining planted beds, particularly those with sensitive native trees and shrubs.

**Topdressing**

Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.
Program: as required by DA consent conditions, and approved management plans.
Topdressing material for remediation of depressions or irregularities: Apply coarse or medium texture soil, to AS 4419, suitable for application to turf or grass seeded areas.

**Renovation**

Established lawns of sandy soil profile: Renovate by dethatching or verticutting.
Program: Annually during the maintenance period, timing the season appropriate to the species, unless required otherwise by any approved management plans.

**3.3 TREES AND SHRUBS**

**Pruning and trimming**

General: Prune to reflect the natural growth, flowering and regrowth habit of the individual species.
Program generally: Spring and Summer and on a spot basis as required.
Shrubs: Prune after flowering.
Hedge trimming: Schedule trimming at times that maintains the character and design of hedges. Allow up to three times per season.

Tip Pruning:

- Purpose: To encourage development of new shoots during the active growing season.
- Method: Removal of the top 25 mm or growing tip of each branch.
- Restriction: Do not remove buds before the flowering season in those plants that have terminal flowers.

Radical pruning:

- Purpose: To maintain a hedge or formal shape or when a particular problem, growth habit, damage,
- or disease requires branch removal.

Tree pruning:

- Purpose: to eliminate diseased or damaged growth, avoid inter-branch contact and thin out crowns in a natural manner.
- Maintain sight lines to signs and lights.
- Maintain visibility for personal security.

Tree branch removal:

- To AS 4373.
- Give notice and engage a suitably qualified arborist.

**Fertilising**

Fertilising program: Base the program on soil testing results.

Soil testing:
Test soil as follows:

- At the start of the contract.

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- Take samples from a cross section of planting beds.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 to 6.5.

Program:

- Regular application: Each September and March.
- Sensitive native species: Apply fertiliser at an appropriate dosage.

Trees:

- Fertiliser type: Appropriate to the species, determined by a suitably qualified person or in accordance with any approved management plans.
- Dose: Appropriate to the species, determined by a suitably qualified person or in accordance with any approved management plans.
- Application: Apply pill to the root zone to the supplier's recommendations, or (if not specified) at a distance from the trunk equal to the spread of the foliage. Make holes 400 mm deep to take the pill, equally spaced around the plant and backfill with sand.

Micro nutrients: Apply 1 kg of urea in 20 litres of water per 100 m2, through a hose proportioner every four weeks during Summer.

**Stakes and ties**

Generally: If plants are not self-supporting or if stakes are damaged, stake or re-stake the plants as follows:

- Drive three hardwood stakes placed diagonally with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well developed systems and no longer require support, remove stakes and ties.

**Plant replacements**

General: Before replacement, diagnose cause of plant failure and report findings. If failure is due to species incompatibility with site conditions, recommend alternative species. Replace all evergreen plants that have died or lost 50% of their normal foliage cover. Provide replacement plants as follows:

- Be of the same growth form (i.e. a tree with a tree, a shrub with a shrub etc)
- Of the same species and variety (or approved alternative) and of the closest commercially available size
- Any new species must still be from the local native vegetation community being emulated and local provenance.
- the replacement planting must not decrease species diversity
- With a balanced root system in relation to the size of the plant and conducive to successful transpiration. Inspect the root conditions of plants by knocking plants from their containers.
- Without signs of having been stressed at any stage during their development due to inadequate watering, excessive shade/sunlight, suffered physical damage or have restricted habit due to growth in nursery rows.
- Grown in final containers for not less than twelve (12) weeks.

**3.4 TREES AND SHRUBS**

Grass and planted areas

Generally: Maintain a vigorous healthy appearance.

Application rates: Soak to a depth of 150 mm for grass areas and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings. Confirm soaked depth and record in the log book.

Timing: Water at times of day to minimise water evaporation loss. Do not water during the hottest period of Summer days.

Water restrictions: Coordinate the water supply and conform to legislation and restrictions applying at the time.

**Hand watering**

General: Manually water all lawn and planting areas in the absence of an irrigation system or until the proposed irrigation system is fully operational.

**Irrigation**

Irrigation system program: Adjust to suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors, of seasons, evaporation, exposure, topography, local authority restrictions.
- Adjustment or shut down during and after periods of prolonged heavy rains.
- Water supply and watering regime of legislation and restrictions applying at the time.

Equipment maintenance: Conform to the following:

- Check all components for proper operation.
- Obtain approval to repair or replace damaged component with equivalent parts.
- Flush any dirt or foreign matter from the system and clear all blockages.
- System maintenance: Conform to the Irrigation system maintenance schedule.

**Programming**

Automated systems: Program to coincide with optimum periods of water pressure and water absorption.

Public access: Do not inconvenience persons occupying the site by water spray or by blocking normal pedestrian or traffic flow.

**3.5 MULCHING**

**General**

Clean up: Remove all mulching materials from lawn or paved areas and maintain a clean and tidy appearance when viewed on a weekly basis.

Requirement: Maintain a minimum depth as follows:

- 75 mm for organic mulch.
- 50 mm for inorganic mulch.

Top up: Areas of excessive wear with mulch to match existing.

Appearance: Keep mulched areas clean and tidy with no soil disturbance evident on the surface of the mulch.

**3.6 INCIDENTAL WORKS**

**Supplementary works**

General: Execute the following:

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- Removal of waste from maintenance work.
- Removal of leaf litter fortnightly ~~during leaf fall~~ in site areas excluding the buffer areas, drainage basin and realigned creek.
- Wash paving on completion of herbicide application.

**Furniture, signage and barriers**

Scope: All fixed and movable features noted in the record drawings.

Furniture and pots:

- Move and relocate as required for maintenance of the area.
- Repair or replace items damaged by the maintenance contract staff. Signage: Maintain sight line visibility.

**Drains**

General: Inspect and clean all drainage structures and pit covers and make sure they are in proper working order. Remove all organic debris.

Frequency: As required so that all overflow drains are cleared when observed at fortnightly intervals.

## 4. EXECUTION

### 4.1 GENERAL

These schedules assume the contract is tendered on a Schedule of Rates basis. For private development works use of this schedule is optional, at the Superintendent's discretion.

**Schedule of rates schedule**

| Item | Unit | Quantity | Rate | Total |
|---|---|---|---|---|
| Preliminaries/establishment (one off cost) | Item | | | |
| Mowing and edge trimming | Item | | | |
| Watering | Item | | | |
| Irrigation Repair | Item | | | |
| Manual Watering | Item | | | |
| Fertiliser: Lawn | $m^2$ | | | |
| Fertiliser: Garden/pot | $m^2$ | | | |
| Fertiliser: Trees | No | | | |
| Weeding | Item | | | |
| Insect and disease control | Item | | | |
| Pruning and trimming | Item | | | |
| Plant replacement: In lawn areas: 150 mm | No | | | |
| Plant replacement: In lawn areas: 5 litre | No | | | |
| Plant replacement: In lawn areas: 15 litre | No | | | |
| Plant replacement: In lawn areas: 25 litre | No | | | |
| Plant replacement: In lawn areas: 35 litre | No | | | |
| Plant replacement: In lawn areas: 75 litre | no | | | |

| | | | | |
|---|---|---|---|---|
| Plant replacement: In lawn areas: 100 litre | No | | | |
| Plant replacement: In lawn areas: 200 litre | No | | | |
| Plant replacement: In garden areas: 150 mm | No | | | |
| Plant replacement: In garden areas: 5 litre | No | | | |
| Plant replacement: In garden areas: 15 litre | No | | | |
| Plant replacement: In garden areas: 25 litre | No | | | |
| Plant replacement: In garden areas: 35 litre | No | | | |
| Plant replacement: In garden areas: 75 litre | No | | | |
| Plant replacement: In garden areas: 100 litre | No | | | |
| Plant replacement: In garden areas: 200 litre | no | | | |
| Staking and tying | item | | | |
| Mulching: Pine bark graded | $m^3$ | | | |
| Mulching: Pine flake | $m^3$ | | | |
| Mulching: Crushed gravel | $m^3$ | | | |
| Lawn renovation | item | | | |
| Topdressing | $m^3$ | | | |
| Incidentals (including protective clothing) | Item | | | |

**Labour rates schedule**

| Item | Ordinary time $ per hour | Overtime $ per hour |
|---|---|---|
| Additional labour charge: Labourer | $ | $ |
| Additional labour charge: Tradesman | $ | $ |

### 4.2 MAINTENANCE REPORT

**Monthly reports schedule**

| Item | Action |
|---|---|
| Plant material | Replace failed plants |
| | Additional planting |
| | Treat for disease or insect attack |
| | Tree surgery |
| | Fertilising generally |
| | Fertilising for specific nutrient deficiencies |
| | Thin out planting |
| | Pruning/trimming |

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| | |
|---|---|
| Turf | Returfing |
| | Seeding |
| | Treat for disease |
| | Topdressing |
| | Weeding |
| | Mowing/trimming |
| Soil | Erosion/bank stabilisation |
| | Additional soil |
| | Soil conditioner |
| | Weeding |
| Mulch | Top up mulch |
| Rubbish Removal | Generally remove bottles, paper, cigarette butts etc. |
| | Remove leaf, litter from path and paved areas |
| Irrigation | Replace parts |
| | Repair |
| | Clean out |
| | Adjust |
| | Clean out subsurface drains |
| Paving and pathways | Repair dips, hollows, irregularities |
| | Remove stains and graffiti |
| | Replace sections of uplift |
| | Clear main pathway drains of debris |
| | Weeding |
| Fencing | Repair fencing |
| Bench/seat | Repair loose or damaged parts |
| Bollard | Reinstate in original position |
| Lighting | Replace blown lamps and damaged diffusers |
| Barriers | Replace broken or dislocated palings or rails |

### 4.3 MAINTENANCE PROCEDURE

**Maintenance schedule**

| WEEK | SPRING (Sept, Oct, Nov) | SUMMER (Dec, Jan, Feb) | AUTUMN (Mar, Apr, May) | WINTER (Jun, Jul, Aug) |
|---|---|---|---|---|
| 1 | Mow and trim lawns | Mow lawns; weed | Mow lawns | Weed |
| 2 | Weed, trim and adjust trees and shrubs | Weed, mow lawns trim and adjust trees and shrubs | Weed, mow lawns trim and adjust trees and shrubs | Mow and trim lawns. Trim and adjust trees and shrubs |
| 3 | Mow and fertilise lawns; treat plant material for insects and disease | Mow lawns; weed; treat plant material for insects and disease | Mow and trim lawn | Weed |
| 4 | Weed; top dress, condition lawns | Weed; mow and trim lawns; issue | Weed; mow lawns; issue | Mow lawns; issue maintenance |

| | | | | |
|---|---|---|---|---|
| | and over sow bare patches; issue maintenance report | maintenance report | maintenance report | report |
| 5 | Fertilise all trees and shrubs in garden beds; mow and trim lawns | Mow lawns; weed | Mow lawns | Mow lawns |
| 6 | Weed; inspect mulch for deficiencies in cover; check and adjust irrigation | Mow lawns; check and adjust irrigation | Weed; inspect mulch for deficiencies in cover; check and adjust irrigation | Mow and trim lawns; treat for insects and disease; check and adjust irrigation |
| 7 | Reinstate mulch as required; treat plant material for insects and disease; mow lawns | Mow lawns; weed | Reinstate mulch as required; mow, trim and fertilise lawns | Weed |
| 8 | Weed; inspect condition of paving and furniture; issue maintenance report | Mow and trim lawns; inspect condition of paving & furniture; issue maintenance report | Weed; inspect condition of paving and furniture; issue maintenance report | Mow lawns; Inspect condition of paving and furniture; issue maintenance report |
| 9 | Mow and trim lawns | Mow lawns; treat plant material for insects and disease | Mow lawns | Weed |
| 10 | Weed; mow lawns | Mow and top dress lawns | Weed; treat plant material for insects and disease | Mow and trim lawns |
| 11 | Mow and fertilise lawns; trim and adjust trees and shrubs | Mow lawns; trim and adjust lawns; weed | Mow and trim lawns; trim and adjust trees and shrubs | Prune back trees and shrubs after flowering |
| 12 | Weed; mow lawns; treat plant material for insects and disease | Mow, trim & fertilise lawns | Weed | Mow lawns; treat plant material for insects and disease |
| 13 | Check and adjust irrigation; mow lawns; issue maintenance | Check and adjust irrigation; mow lawns; weed; issue | Check and adjust irrigation; mow lawns; weed; issue | Check and adjust irrigation; weed; issue maintenance |

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# Annexure H– Vegetation Management Plan

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# Lighthorse Interchange Business Hub VMP

## Charter Hall

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## DOCUMENT TRACKING

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Template 2.8.1

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## Abbreviations

| Abbreviation | Description |
|---|---|
| BC Act | NSW Biodiversity Conservation Act 2016 |
| BC | Blacktown Council |
| CPW | Cumberland Plain Woodland |
| DA | Development Application |
| DAWE | Department of Agriculture, Water and the Environment |
| DPIE | The Department of Planning, Industry and Environment |
| EEC | Endangered Ecological Community |
| CEEC | Critically Endangered Ecological Community |
| FW | Freshwater Wetland vegetation community |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 |
| GTA | General Terms of Agreement |
| HBT | Hollow Bearing Trees |
| LGA | Local Government Council |

| Abbreviation | Description |
|---|---|
| NOW | NSW Office of Water |
| RFEF | River-Flat Eucalypt Forest vegetation community |
| TOB | Top of Bank |
| TSC Act | NSW Threatened Species Conservation Act 1995 |
| WSP | Western Sydney Parklands |
| VB | Vegetated Buffer |
| VMP | Vegetation Management Plan |

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# 1. Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Charter Hall to prepare a Vegetation Management Plan (VMP) to accompany the design of the Light Horse Interchange Business Hub approved development application (SSD-9667, 2020) by Western Sydney Parklands Trust to the Minister for Planning and Public Spaces. The proposed development is classified as a State Significant Development (SSD) under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and meets the criteria in Clause 5 of Schedule 2 in State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP).

The Western Sydney Parklands Trust (the Applicant) submitted a Concept Proposal to establish up to 165,000 square metres ($m^2$) of gross floor area (GFA) for general and light industrial, warehouse and distribution and ancillary offices and a Stage 1 Development Application (DA) for site preparation works and subdivision in the Blacktown local government area (LGA).

The site falls within the Blacktown LGA and is identified as Part Lot 10 DP 1061237 and Part Lot 5 DP 804051. The site is located 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek; and geographically located 33 kilometres (km) west of the Sydney CBD covering approximately 39.38 hectares (ha). It is adjacent to the Light Horse Interchange, which is a transport interchange linking two major motorways, the M4 Western Motorway (the M4) and the M7 Westlink Motorway (the M7).

The Decision Notice approves the development of "seven industrial lots and associated infrastructure as a business hub for industrial and light industrial land use activities at the intersection of the M4 Western Motorway and the M7 Westlink Motorway, Eastern Creek, NSW" (DAWE, 2020).

The Decision Notice stipulates EPC regulations that state "the approval holder complies with Conditions C2-C4 of Schedule 3 of the NSW Development Consent, for the preparation and implementation of a Construction Environmental Management Plan, as it relates to the prevention, avoidance and mitigation of impacts to protected matters. The approval has effect until 31 October 2040" (DAWE, 2020) Conditions C2-C4 outline a Construction Environmental Management Plan and stipulates in C3 (d) that a Vegetation Management Plan must comply with Condition B33. These conditions are tabulated in **Table 1.** Table 2 outlines SSDA Condition of Consent B33, Table 3 contains Additional consent condition and Table 4 contains EPBC conditions applicable to the VMP.

The site is not located near any sensitive residential land uses. The nearest residential zoned land approximately 1.2 km from the northwestern boundary. The site forms part of the Western Sydney Parklands (WSP) which is a 27 km open space corridor covering 5,280 ha providing a range of passive and active recreation facilities to the public **(**Figure 1**).**

This VMP comprises the three conservation areas within the Stage 1 development, totalling 2.13 ha **(**Figure 1**).**

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## 1.1. Consent conditions

As per the SSDA approval, a VMP is required as a component of a Construction Environment Management Plan (CEMP). In addition, as per Annexure A – Conditions of approval, Part A (5) of the EPBC approval, *"The approval holder must comply with Conditions C2-C4 of Schedule 3 the NSW Development Consent, for the preparation and implementation of a Construction Environmental Management Plan, as it relates to the prevention, avoidance and mitigation of impacts to protected matters*." (DAWE, 2020)

Table 1 details the SSDA consent conditions C1 to C4 and where this report addresses these requirements as they relate to the VMP.

**Table 1: SSDA consent conditions C1 through C4**

| Item | Section |
|---|---|
| C1. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: | |
| (a) detailed baseline data; | 1, 2 |
| (b) details of: | |
| (I) the relevant statutory requirements (including any relevant approval, licence or lease conditions); | 1 |
| (ii) any relevant limits or performance measures and criteria; and | 1 |
| (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; | 1 |
| (c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; | 1 |
| (d) a program to monitor and report on the: | |
| (i) impacts and environmental performance of the development; and | 4.4 |
| (ii) effectiveness of the management measures set out pursuant to paragraph (c) above; | 4.2 |
| (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; | 3.5, 4.3 |
| (f) a program to investigate and implement ways to improve the environmental performance of the development over time; | 3.5, 4.3 |
| (g) a protocol for managing and reporting any: | |
| (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); | 4.3, 4.4 |

| Item | Section |
|---|---|
| (ii) complaint; | 4.3, 4.4 |
| (iii) failure to comply with statutory requirements; and | 4.3, 4.4 |
| (h) a protocol for periodic review of the plan. | 4.4 |
| ***Note:*** *the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans* | |
| **CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN** | |
| C2. The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of Condition C1 and to the satisfaction of the Planning Secretary. | |
| C3. As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:<br>(a) Construction Traffic Management Plan (see Condition B1);<br>(b) Erosion and Sediment Control Plan;<br>(c) Construction Noise Management Plan (see Condition B20);<br>**(d) Vegetation Management Plan (see Condition B33);**<br>(e) Construction and Demolition Waste Management Plan (see Condition B38);<br>(f) Landscape Plan (see Condition B49); and<br>(g) Community Consultation and Complaints Handling. | This report addresses the VMP requirement |

Table 2 details the SSDA consent condition B33 and where this report addresses these requirements.

**Table 2: SSDA Condition of Consent B33**

| Item | | Section |
|---|---|---|
| i | Prior to clearing for construction, the Applicant must prepare a Vegetation Management Plan (VMP) for the Stage 1 development. The Vegetation Management Plan must be prepared in consultation with the Environment, Energy and Science Group and the Natural Resources Access Regulator, to the satisfaction of the Planning Secretary" (DPIE, 2020) | This report, 2.5, 3.1.4, 3.1.7, Table 17 |

| Item | | Section |
|---|---|---|
| (b) | measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth | As per the letter [Appendix G] provided by Northrop Engineering (2021), during the design development the bridge engineers have taken the following steps to address this:<br>• Minimised the footprint of the substructure by providing columns founded directly on piles which enables us to eliminate any requirement for a large concrete pile cap at the base of the structure.<br>• Individual columns have been used instead of blade walls to minimise the area of concrete under the structure and promote the penetration of light through the substructure.<br>• Optimised the thickness of the superstructure such that the beams do not encroach unnecessarily below the road surface level.<br>• Precast concrete construction has been used for the bridge beams to minimise the need for formwork under the bridge and to promote decreased construction time and impact. |
| (c) | details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone | Addressed separately in drawing 18652_SSDA_C101(08) **[Appendix E]** at:<br>https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT |
| (d) | details of: | |
| ((i) | revegetation works along the realigned Eskdale Creek and Reedy Creek within the site, including | 3.3. |
| (ii) | plant species and densities | 3.4., **Appendix A** |
| (iii) | native seed collection and | 3.1.3. |
| (iv) | propagation and translocation of juvenile native plants and | 3.1.4. |
| (v) | hollow-bearing trees on the site (where feasible); | 3.1.5., Figure 2 |
| (e) | details of: | |
| (i) | topsoil and, | 3.1.2. |
| (ii) | weed management measures; | 3.5. |
| (f) | performance indicators and completion criteria, including criteria for triggering remedial action, if necessary; and | 4.4. |
| (g)(i) | a maintenance schedule and monitoring schedule | 5.1. |

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Further, in Appendix 2 of the SSDA, additional specifications are provided. Table 3 details where in this report these requirements are addressed.

**Table 3: Additional consent conditions**

| Item | Section |
|---|---|
| ***Stormwater and Flooding*** | |
| *p. A Positive Covenant shall be provided for a Vegetation Management Plan over part of Lot 9 for the area covered by the Riparian Protection Zone identified under Henry & Hymas plan 18652_SSDA_C101(08)* **[Appendix E]** *to ensure ongoing maintenance for the redirected Eskdale Creek.* | The VMP boundary shown in this report is consistent with this requirement |
| ***Biodiversity*** | |
| *2. A Vegetation Management Plan (VMP) will be prepared to protect and restore the riparian corridors along parts of Eastern Creek, Reedy Creek and the realigned Eskdale Creek. The plan will include:* | This document |
| ***scaled plan which locates the watercourses****; top of highest bank;* ***existing native vegetation along*** *the creeks;* ***the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creek (measured from the top of the highest bank); the boundary of the site; the development footprint; the area of riparian land/riparian vegetation that will be temporarily disturbed or permanently removed by the project*** *and proposed asset protection zones* | Figures 1, 2, 3, 4, 7, 10, 13<br>TOB assumed at 6 monthly storm events |
| *details on the native vegetation communities and plant species that currently occur along Eastern Creek, Reedy Creek and Eskdale Creek* | 2.4 |
| *details on the local native plant species (trees, shrubs and groundcovers) to be planted – a diversity of local native species is to be planted. The plan will demonstrate that the plant species consist of local native species.* | 3.2, **Appendix A** |
| *details on the location and number of trees and other plants that are to be planted* | 3.2. |
| *plants are to be propagated from locally sourced seeds to ensure genetic integrity with seeds collected from native trees and other native vegetation to be removed on the site, where possible, including Plant Community Type (PCT) 849 (Cumberland Plain Woodland) and* ***PCT 835 (River River-flat Eucalypt Forest).*** *The juvenile plants will be removed and replanted to locations on the where plants from these PCTs would naturally occur. The juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. The plants will be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and should be maintained until established* | 3.1.3, 3.1.4<br>Prior clearing of vegetation not part of VMP, however guidance included in 2.5, 3.1.4, 3.1.7 |
| *details on topsoil removal and reuse. Topsoil from areas of native vegetation to be cleared will be collected for re-use, including within the Eskdale Creek realignment, landscape buffers and site earthworks where practical* | 3.1.2 |
| *details on replacement tree hollows and/or nest boxes including their location will be provided prior to any loss of existing trees hollows.* | VMP applies to post development works |

| Item | Section |
|---|---|
| | however, see 3.1.5, 3.1.6. and 3.1.7 |
| *details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical* | See response to condition B33(b) in Table 2 |
| *plant maintenance regime - riparian vegetation should be regularly maintained and watered for 12 months following planting. Should any plant loss occur during the maintenance period the plants should be replaced by the same plant species* | 3.5, 4.3 |

Table 4 includes relevant EPBC conditions that apply to the VMP.

**Table 4: EPBC condition applicable to VMP**

| Condition | Detail | Section |
|---|---|---|
| **To compensate for the significant residual impact of clearing** 0.97 ha of CPW and 9.83 ha of GHFF foraging habitat within the action area, the approval holder must, prior to the commencement of the action, retire 253 like-for-like ecosystem credits comprised of 42 like-for-like ecosystem credits for PCT 849 and **211 like-for-like ecosystem credits for PCT 835. All like-for-like ecosystem credits must be retired in accordance with clauses 6.2 and 6.6A of the Biodiversity Conservation Regulation 2017 (NSW).** ***Note: The requirements under Condition 3 are not in addition to offsets required by Condition B30 (a, b) of the NSW Development Consent.*** | | 3.1.8 |
| **Compliance records** | | |
| The approval holder must maintain accurate and complete compliance records. If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request. *Note: Compliance records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the Department's website or through the general media.* | | Section 4 |
| Annual compliance reporting | | |
| | a. publish each compliance report on the website within 60 business days following the relevant 12 month period; | Section 4 |

| Condition | Detail | Section |
|---|---|---|
| The approval holder must prepare a compliance report for each 12-month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must: | d. exclude or redact sensitive ecological data from compliance reports published on the website; and | Section 4 |
| | e. where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within five business days of publication. *Note: Compliance reports may be published on the Department's website.* | Section 4 |
| **Reporting non-compliance** | | |
| The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify | a. any condition which is or may be in breach; | 4.3 |
| | b. a short description of the incident and/or non-compliance; and | 4.3 |
| | c. the location (including co-ordinates), date, and time of the incident and/or non-compliance. | 4.3 |
| The approval holder must provide to the Department the details of any incident or noncompliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying: | a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; | 4.3 |
| | b. the potential impacts of the incident or non-compliance; and | 4.3 |
| | c. the method and timing of any remedial action that will be undertaken by the approval holder. | 4.3 |

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## 1.2. VMP aims and objectives

The development consent broadly outlines that the Vegetation Management Plan (VMP) will "protect and restore the riparian corridors along parts of Eastern Creek, Reedy Creek and the realigned Eskdale Creek. It also specifically states in 1.3 (e) of Table 3 of the SSDA will *"promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)."* This is in keeping with the objects of the EP&A Act, including the encouragement of Ecologically Sustainable Development (ESD) as stated in Table 3 of the SSDA (DPIE, 2020).

This VMP is also consistent with the Natural Resources Access Regulator (NRAR) guidelines. Under these guidelines, the VMP must *"provide a stable watercourse and riparian corridor which will emulate local native vegetation communities"* and the term of maintenance "*should extend for a minimum of two years after the completion of works"* (DPIE-OW, 2021).

Table 5 lists the objectives of this VMP.

**Table 5: VMP objectives**

| Objectives | Approach |
|---|---|
| Improve water quality and riparian vegetation | Slow water speed using strategically placed debris or structures |
| | Revegetation of creek bed and banks |
| Improve ecological health and integrity | Control woody weeds and pasture grasses |
| | Revegetating with native species |
| | Maximisation of biodiversity and ecological functions |
| | Revegetate with native terrestrial and wetland species using appropriate species |
| | Maintenance weed control |
| Maintain and enhance habitat values | Protect existing native vegetation |
| | Weed control |
| | Increase native plant cover |
| | Increase habitat for native fauna |
| Ensure stable bed and banks of creeks | 'Soft engineering' approach with a focus on planting locally native species, slowing flows in the creek and attenuating peak and high frequency flows |

**Figure 1: Location map**

# 2. Description of environment

## 2.1. Site description

The overall site comprises 39.38 ha of unzoned land located at 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek legally described as part Lot 10 in DP 1061237 and part Lot 5 in DP 804051. The M4 borders the northern boundary of the site, with the WSP continuing along the alignment of Eastern Creek further to the north and the Huntingwood industrial precinct located to the north-east. The M7 and Wallgrove Road border the site to the west, with the Eastern Creek industrial precinct located west of Wallgrove Road and forming part of the Western Sydney Employment Area (WSEA). The Sydney Motorsport Park and Sydney Dragway are located east of the site, with Prospect Reservoir located further east. Western Sydney Parklands Trust vacant land to the south and east of the site and Waste Management facility further south. The VMP area is 2.1 ha within the overall site area **(**Figure 1**).**

## 2.2. Environmental overview

The remnant native vegetation was previously degraded by upper strata clearing to create pastureland. Cattle grazing was identified during the site visit, but it is understood that cattle have now been removed from the development area in preparation for construction works. The site contains three watercourses, Eastern, Reedy and Eskdale Creeks where linear tracts of native vegetation are concentrated. “There are intact pockets of higher quality vegetation adjacent to Eastern Creek and in the south-western corner of the site. Riparian vegetation adjacent to the creeks varies from very good along Eastern Creek, good along Reedy Creek and degraded along Eskdale Creek.” (Towle & Tippler, 2019). Water quality within the creeks ran clear with a slight blue-green alga present; probably due to cattle defecate and cattle cadavers in the waterway. “Eastern and Reedy Creeks were assessed as highly sensitive fish habitat due to the presence of permanent flows, deep pools and woody debris. Eskdale Creek was considered unlikely to support viable populations of fish due to its highly degraded nature and intermittent flows” (Henry & Hymas, 2019) **(**Figure 1**).**

## 2.3. Management history

The site and surrounding area were previously used as agricultural lands from 1819 until 1941. In 1941 the Wallgrove Army Camp was established. Remnant structures remaining were not considered to have heritage significance. The site has been assessed as having a high likelihood of containing archaeological items of Aboriginal significance however none are found within the VMP areas. The site is affected by two infrastructure easements; a high-pressure gas pipeline managed by Jemena and sewer mains managed by Sydney Water (Henry & Hymas, 2019), however they are not present in the VMP areas.

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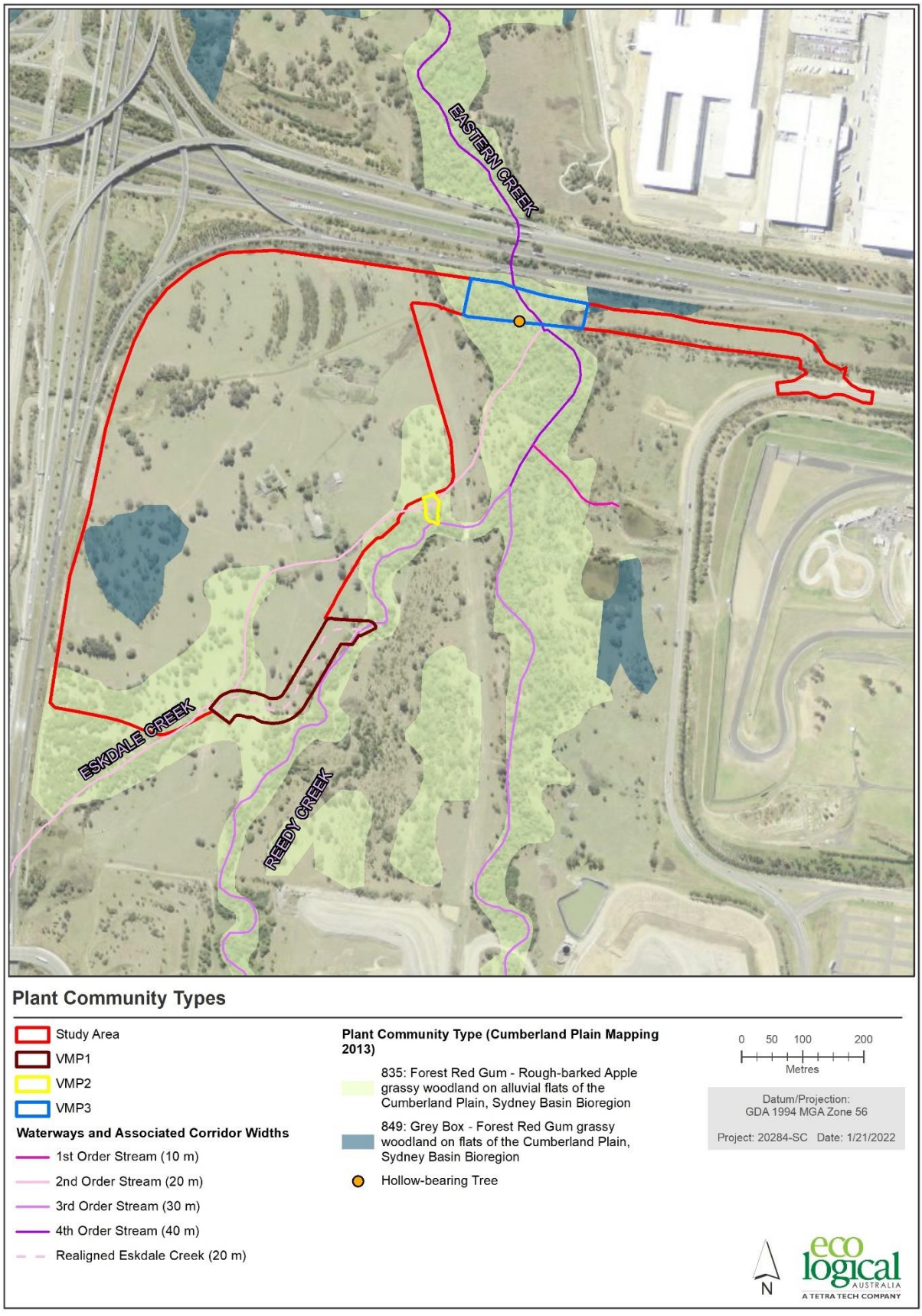


**Figure 2: Plant Community Types**

## 2.4. Vegetation communities

The site contains approximately 9.83 ha of native vegetation, including two Plant Community Types (PCTs), the Grey Box and Forest Red Gum which comprise two threatened ecological communities being the Cumberland Shale Plains Woodland (CPW) and the River-Flat Eucalypt Forest (RFEF) (DPIE[1], 2021) **(**Figure 2**).**

Where present, the native vegetation within the VMP area is comprised mostly of River-flat Eucalypt Forest (RFEF) PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland.

### 2.4.1. PCT 835 Forest Red Gum

River-flat Eucalypt Forest (RFEF) PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, forms a component of the endangered ecological community River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions (RFEF), which is listed on Schedule 3 of the BC Act. RFEF is not listed under the EPBC Act (ELA 2020).

Woodland vegetation across areas of lower elevation within the subject land and in proximity to Eskdale, Reedy and Eastern Creeks were identified as PCT 835, and the equivalent 'Alluvial woodland' as described by Tozer (2003). The three VMP areas fall within PCT 835. Generally, this PCT consists of a grassy woodland dominated by Forest Red Gum *(Eucalyptus tereticornis)* with Cabbage Gum *(Eucalyptus amplifolia)*, Broad-leaved Apple *(Angophora subvelutina)*, Rough-barked Apple *(Angophora floribunda)* and Swamp Oak *(Casuarina glauca),* as well as River Oak *(Casuarina cunninghamiana).* Several smaller tree species including Black Wattle *(Acacia decurrens),* Parramatta Wattle *(Acacia parramattensis),* Melaleuca linariifolia *(Flax-leaved Paperbark*), Prickly-leaved Tea Tree (*Melaleuca styphelioides*) and Paperbark *(Melaleuca decora)* formed a variable sub-canopy within the VMP areas. A sparse shrub layer was also present within the VMP areas and comprised Blackthorn *(Bursaria spinosa subsp. spinosa).* In VMP 3, exotic shrub species present at low densities included African Olive *(Olea europaea subsp. cuspidata),* Broad-leaved Privet *(Ligustrum lucidum)* and Small-leaved Privet *(Ligustrum sinense).* A grassy understorey was generally present throughout the VMP areas.

The trend is compacted exotic pasture with sparse scattered native canopy alongside pristine canopy along creeks where the VMP's are located. Creek understory is sparse, and groundcover is mostly exotic on clay soils. A summary of observations is captured below.

#### *2.4.1.1. Vegetation Management Plan area 1 (VMP 1)*

The southern extreme and northern extreme of the VMP area lie in two adjacent creeks, viz, Eskdale and Reedy Creeks respectively. Vegetation at the southern Eskdale Creek comprises dense canopy with a mix of exotics and natives partially colonising creek edges. Bank soils are partially unvegetated due to previous disturbance by cattle. In the Northern extreme, Reedy Creek RFEF canopy is less dense but in better condition. There is no middle story and sparse groundcover favoured exotics.

Soils are clay based and while water is clear, the presence of blue-green algae indicates nutrients gravitating from the surrounds. The planned connecting mid-section between Eskdale and Reedy Creeks comprise exotic pasture with scattered native canopy along the eastern boundary.

The typical current condition of the VMP1 area is shown in Figure 3**.**

**Figure 3: VMP 1 typical partially unvegetated and previously disturbed understory condition**

### *2.4.1.2. Vegetation Management Plan area 2 (VMP 2)*

The southern end of the VMP area (picture below) includes a small portion of Reedy Creek and extends northward into pristine RFEF canopy. Banks are stable - held together by exotic grasses. The southern boundary of the creek is dominated by exotic grasses on flat, compacted soils commonly used by vehicles.

The northern section follows the trend of pristine RFEF canopy alongside creeks comprising Forest Red Gum (*Eucalyptus tereticornis*), Cabbage Gum (*E. amplifolia*), (*Melaleuca decora*) and River Oak (*Casuarina cunninghamiana*). A *Bursaria spinosa* mid-story was more successful in the northern side where light penetrated more due to clearing.

The typical current condition of the VMP2 area is shown in Figure 4**.**

**Figure 4: VMP2 Typical service road use alongside canopy creek**

### *2.4.1.3. Vegetation Management Plan area 3 (VMP 3)*

VMP 3 comprised dense pristine canopy and dense groundcover that effectively stabilised banks. The canopy comprised a mixture of mature Forest Red Gum (*Eucalyptus tereticornis*) and River Oak (*Casuarina cunninghamiana*). Casuarinas grew closer to the creek and dominated areas behind the Eucalypts which grew from about 1.5m from the top of channel. Groundcover favoured exotics slightly, however, native diversity was included herbaceous natives and grasses.

Soils were clay based and water was clear due to densely vegetated embankments. Water was dark brown within the creek due to thick decomposing leaf litter.

The typical current condition of the VMP3 area is shown in Figure 5**.**

**Figure 5: VMP3 typical established canopy feeding nutrient rich creek**

### 2.4.2. PCT 849: Grey Box Grey Box

Cumberland Shale Plains Woodland (CPW) PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, forms a component of the critically endangered ecological community Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW), which is listed on Schedule 2 of the Biodiversity Conservation Act 1999 (EPBC Act) and an Endangered Ecological Community (EEC) under the NSW Biodiversity Conservation Act 2016 (BC Act) (ELA 2020).

CPW is found on soils that are primarily derived from Wianamatta Shale and throughout the driest part of the Sydney Basin. The canopy is composed of trees with a mature height of approximately 20 metres (m), which can vary between 10 - 30 m.

The dominant canopy trees of CPW are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), with *Acacia decurrens* (Black Wattle) and *Acacia implexa* (Hickory Wattle) also occurring.

The dominant canopy trees of CPW are Eucalyptus moluccana (Grey Box) and E. tereticornis (Forest Red Gum), with E. crebra (Narrow-leaved Ironbark), Corymbia maculata (Spotted Gum) and E. eugenioides (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by Bursaria spinosa (Blackthorn), with Acacia decurrens (Black Wattle) and Acacia implexa (Hickory Wattle) also occurring.

The native ground layer species included Dichondra repens (Kidney Weed), Brunoniella australis (Blue Trumpet), Desmodium varians (Slender Tick-trefoil), Cheilanthes sieberi ssp. sieberi (Poison Rock Fern), Lomandra filiformis (Wattle Mat-rush), L. multiflora (Many-flowered Mat-rush), Dianella longifolia (Blueberry Lily), Wahlenbergia gracilis (Australian Bluebell), Oxalis perennans (Wood-sorrel), Tricoryne elatior (Yellow Rush-lily), Euchiton sphaericus (Star Cudweed) and Stackhousia viminea (Slender Stackhousia). It is common to find abundant Themeda triandra (Kangaroo Grass) and Microlaena stipoides var. stipoides (Weeping Meadow Grass) at the ground layer, along with a range of other native grasses present including Aristida ramosa (Purple Wiregrass), A. vagans (Three-awned Spear Grass), Dichelachne micrantha (Shorthair Plumegrass), Eragrostis leptostachya (Paddock Lovegrass), Cymbopogon refractus (Barbed-wire Grass) and Chloris ventricosa (Plump Windmill Grass).

No CPW was identified in the VMP area, however it is found on higher ground adjacent to the VMP area and species from this community may be suited to the VMP area.

### 2.4.3. Aquatic macrophytes

Aquatic macrophytes were only found in the Eskdale creek in VMP 1. The native species included Slender knotweed (*Persicaria decipiens*), Duckweed (*Lemna disperma*) Swamp Lily (*Ottelia ovalifolia*), Common Spike Rush (*Eleocharis acutus*) and Eel Grass (*Vallisneria spiralis*).

Construction works as well as increased flows into the VMP areas from the surrounding development may increase the amount of suitable habitat for this community found on the VMP area.

## 2.5. Fauna

No definite feral animals or habitat were observed within the VMP areas; however, rabbit warrens were detected in the greater study area. Thus, it is possible that feral animals may traverse the VMP area.

Cattle was identified during the site visit, however it is understood that domesticated animals have now been removed from the site in preparation for construction works.

Other fauna observed:

- native Water Striders *(Aquarius remiges)*
- Small fish (possibly) Gambusia
- Tadpoles

Prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows. If hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

All fauna relocation must be performed as per the Fauna Relocation Plan (ELA 2021).

## 2.6. Habitat features

Habitat types present in the VMP areas include:

- cleared, grazed open pasture with isolated second growth native canopy individuals
- native vegetation along creekline
- aquatic habitat through the creeks

## 2.7. Drainage and Hydrology

The site generally slopes downward toward the northeast (in the direction of Eastern Creek), with elevations at the site ranging from 54 metres above Australian Height Datum (mAHD) to 42 mAHD. Given the majority of the site is currently unsealed and covered with vegetation it is expected that the great majority of precipitation would infiltrate into the underlying soil and recharge the upper aquifer, or infiltrate into creeks onsite (Cooper, 2020).

The site is traversed by three creeks, Eskdale, Reedy and Eastern Creeks. Surface water flows onsite occur in two natural channels which run generally southwest to northeast (Reedy Creek and Eskdale Creek). Both creeks flow into Eastern Creek which constitutes the eastern site boundary. The creeks are affected by the 100-year Average Recurrence Interval (ARI) flood event (Cooper, 2020). Council's flood mapping defines the areas adjacent to Reedy and Eastern Creeks as high flood risk. While the developed areas onsite, including the detention basin, will be filled to raise it above the probable maximum flood (PMF) event, bushland corridor will therefore be subjected to previous flooding directed into a lower lying channel (DPIE, 2020). The development will increase the volume and velocity of water, and negatively impact embankments and existing erosion stabilising vegetation (BMT, 2019) **(**Figure 6**).**

The proponent has planned works that relate only to the realignment of Eskdale Creek. Eskdale Creek is a 2$^{nd}$ Order Creek according to Strahler Stream Order (DPIE, 2018) and requires a 20m Vegetation Riparian Zone on either side of the channel. Eskdale Creek connects to Reedy Creek (VMP 1 area). Reedy Creek is a 3rd Order Stream according to Strahler Stream Order (DPIE, 2018) and thus requires a 30m

Vegetation Riparian Zone on either side of the channel as stipulated by the NSW Office of Water, now NRAR (OoW, 2012).

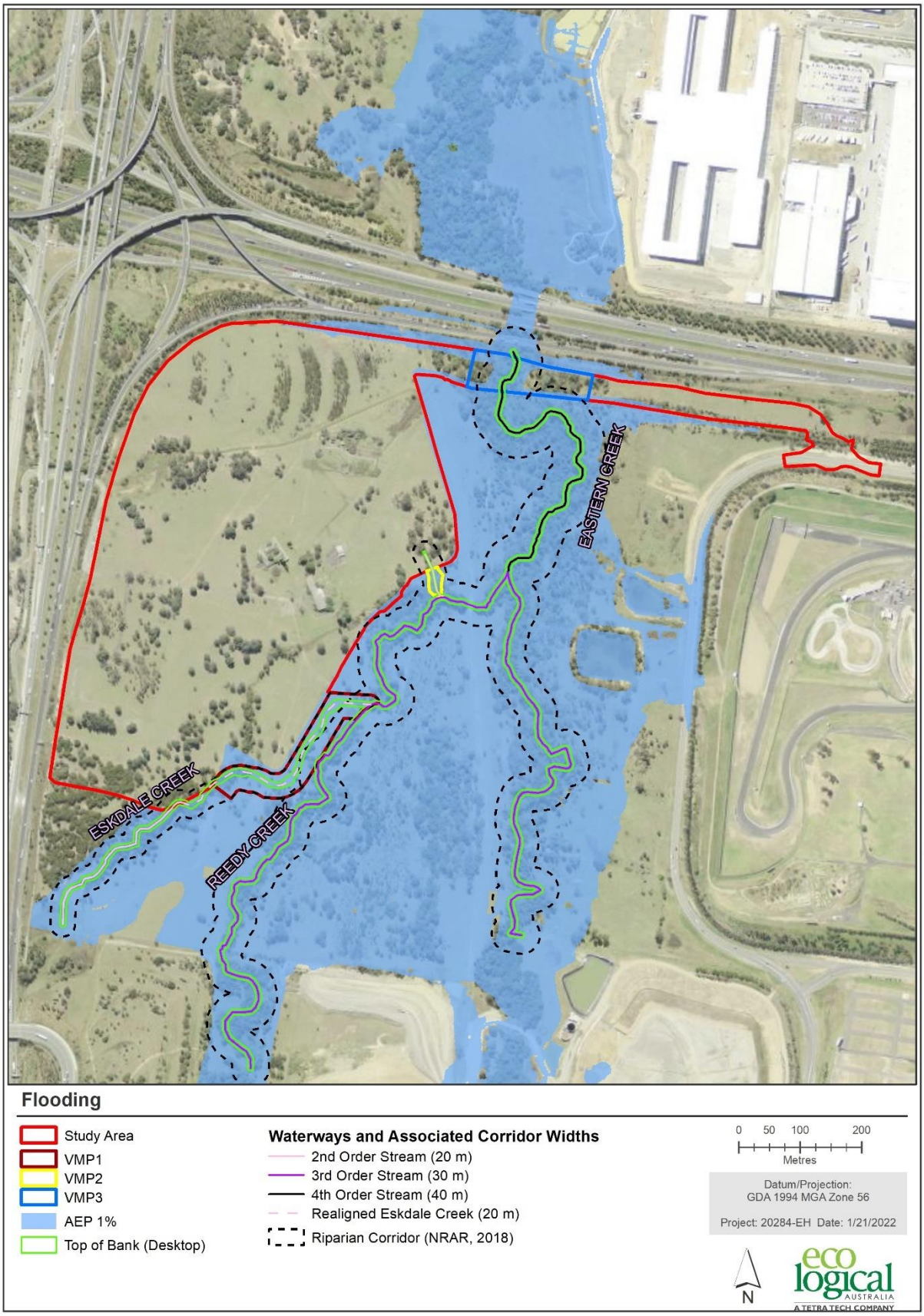


**Figure 6: Flood mapping**

## 2.8. Climate

The climate of the VMP area is typical of Western Sydney, which experiences warm to hot summers and cool to mild winters. Intermittent to extended droughts interspersed with extreme weather events have prevailed in the local area in recent years and are expected to continue.

## 2.9. Soils

Cumberland Plain Woodland soils are clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates (Cooper, 2020). Based on NSW Department of Minerals and Energy (1991) - 1:100,000 Penrith Geological Series Sheet 9030, the majority of the site is underlain by Quaternary deposits of fine-grained sand, silt and clay. The north-western corner of the site is underlain by Bringelly Shale of Wianamatta Group, consisting of shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff (Cooper, 2020).

The 1:100,000 Sydney Geological information indicates that the site underlain by:

- Triassic aged Bringelly Shale of the Wianamatta Group, comprising Shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff and;
- Quaternary aged Alluvium, comprising Fine-grained sand, silt and clay (Tofler, 2019).

Soils with high clay content naturally bind tightly due to its tiny particle size i.e., <2 µm (Ding et.al 2019) and compact easily, especially when wet, and restrict root development. The use of machinery that spreads the weight of the vehicle is recommended to reduce compaction that affects the later revegetation phases. It is also recommended that soils are inspected post construction prior to revegetation by a qualified restoration ecologist and proper preparation is undertaken. Compaction within the VMP area, especially after disturbance, inhibits future success of the site (Department of Planning, 2021):

*Sites with a history of soil disturbance will be extremely slow to recover characteristics of Cumberland Plain Woodland, if at all, and that experimentation with alternative restoration technologies is required.*

In the VMP area, grazing and vehicles have compacted soils.

## 2.10. Salinity

The site is situated in an area of moderate to high salinity potential. In general, salinity is most likely to occur on lower slopes, foot-slopes and along creek lines (Cooper, 2020).

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# 3. Management works

The three VMP areas within the Stage 1 development are summarised in **Table 6.** The location and condition of the individual VMP areas are summarised in Section 2.4.1 under the appropriate Plant Community Type (PCT). The Management Zones (MZ) within each VMP will be managed similarly.

**Table 6: VMP areas and proportion of total**

| VMP | Total Area ($m^2$) | %age of total VMP area |
|---|---|---|
| VMP 1 | 12,709 | 59 |
| VMP 2 | 877 | 4 |
| VMP 3 | 7,809 | 37 |
| **Total** | **21,395** | **100** |

Management works will be confined within the VMP areas depicted in Figure 1. Revegetation and bush regeneration works are to be implemented by experienced bush regeneration contractors with team leaders having a minimum TAFE Certificate II in Land Management or equivalent, and membership of the Association of Australian Bush Regenerators or the necessary prerequisite qualifications and experience for membership.

In-stream works are to be implemented by bush regeneration, landscape or civil contractors who have demonstrated experience in construction of engineered structures in sensitive riparian environments.

A project specific, comprehensive environmental and OH&S plan is to be prepared by the contractors prior to undertaking works and all staff are to be inducted to the site by the lead supervisor. A Restoration Ecologist is to be appointed by the developer or their representative to oversee, monitor and report on the site. The Restoration Ecologist must be suitably qualified and have sufficient expertise in the regeneration/revegetation of native vegetation communities.

## 3.1. Preliminary works

### 3.1.1. Fencing and signage

The VMP area site is to be fenced prior to any construction or in-stream works as per legislation (EPAA, 2021). As per SSDA, Section 11 states: "*Prior to the commencement of any construction or other surface disturbance the Applicant must install and maintain suitable erosion and sediment control measures on-site, in accordance with the relevant requirements of the Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom, 2004) guideline and the Erosion and Sediment Control Plan included in the CEMP required by condition C2".* The proponent is thus responsible for fencing as per the following sections.

#### *3.1.1.1. Construction Fencing*

Construction fencing is to be constructed around the work area to ensure no unauthorised construction access to the VMP area. Where construction fencing cannot be setup at the VMP boundary then flagging may be required as well to delineate the VMP boundary.

#### *3.1.1.2. Information Signage*

Informational signage must be installed around the site as needed to convey works underway and conservation areas. The exact information and location of these signs will be determined during implementation works. At minimum this signage should identify, at all access points to the site, that the management zones are being managed for conservation.

#### *3.1.1.3. Sediment fencing*

Sediment fencing is designed to contain runoff. It is understood that all sediment controls will be at the edge of development works, approximately 5m off the edge of the VMP area. Sediment fencing will be setup such that no sediment enters the VMP area.

Regular monitoring of the sediment fence will be required. Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until to VMP areas are identified as vegetated and stable. If works are carried out in the vicinity of a sediment fence, fences must be monitored at the end of each day worked in that area. Where works occur close to fencing, In the event of damage, the fence will need to be replaced or repaired with immediate effect.

Monitoring of the sediment fences should occur prior to forecasted rain and following rain to ensure the sediments fences are correctly installed and working.

Impacts as a result of damaged sediment fences must be assessed by a Restoration Ecologist and reported as an incident as per **Section 4.3.**

### 3.1.2. Soil Preparation

The success of survival, and reduced future costs, depend heavily on soil preparation during the development phase. Compaction and upturned soil profiles hamper later stages of revegetation and site establishment. It is highly advisable to use machinery with weight distributed evenly to reduce on ground pressure.

It is assumed that all areas of civil construction will be left in a suitable condition for revegetation by the civil contractor. This means that these areas will be shaped and levelled with suitable topsoil and ameliorants added and then ripped and cultivated to a light friable consistency.

Furthermore, environmental hygiene is highly recommended to prevent the introduction or the transfer of pathogens or noxious/WoNS seed. Safe Work Method Statements (SWMS) need to incorporate these measures for machinery and all pedestrians including work teams, reporters etc.

Soil studies in Western Sydney have identified considerable chemical change in soils between the A and B horizons. The B horizons are highly sodic and are prone to deflocculation, erosion and water logging. B horizon soils also significantly reduce the success of revegetation works.

Hence, areas where excavation works will be undertaken to a level at or below the B horizon, they will be required to be treated in the following way:

- Stockpile topsoil and A horizon
- Excavate to a level 300 mm below finished surface level
- Place stockpiled A horizon and topsoil on top of B horizon soils, minimum depth of 200 mm
- Water, allow weed seed to germinate and spray with herbicide

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- Place a minimum of 100 mm of topsoil (from stockpile or imported) and ameliorants on top of replaced A horizon and topsoil
- Jute or mulch as required.

This treatment is to be applied to areas of fill including riprap, battering and diverted creek lines.

In addition, in any areas of new earthworks ripping to a depth of 200mm will be required to de-compact the topsoil. If haul roads or any areas of significant traffic are present, these may require deeper ripping and/or the installation of additional topsoil. If suitable soil exists in development footprint, it may be preferentially used however assessed by a restoration prior to removal.

### 3.1.3. Seed collection and species substitution

Provenance seed should be collected with consideration to availability of diverse species and future impacts of climate change. Where planting is required, seed must be collected from local provenance species. The final species selection will depend on several factors, however risk can be minimised by proactive planning. Species selection should be determined by a suitably qualified and experienced restoration ecologist or bush regenerator.

Seed collection requires a significant lead time and is opportunistic depending on climactic conditions. It is recommended that the proponent engages a bush regenerator early to collect seed and maximise opportunities to collect and nurture juvenile site natives where possible for planned revegetation works post construction. Native seed should be collected from removed native vegetation and from local native plant species within the study area wherever possible. Native juveniles from the construction area can be translocated and grown either onsite or in a nursery. Plants should be harvested during ideal growing conditions. These works should be overseen by a Restoration Ecologist.

Due to historical clearing, very little remnant bush with high diversity remains on site or in the immediate area. Restored areas may be a likely source of provenance. . Locations of native seed sources include:

- Onsite native vegetation approved for removal
- Onsite native vegetation to be retained
- Appropriate Western Sydney Parklands sites viz.,
    - Restored Riparian Corridors along Eastern Creek, Ropes Creek and South Creek and their respective tributaries or in patches (e.g., Nurragingy Reserve)
- Other authorised suitable locations in Western Sydney

The selection of plant species should consider species that provide food for native fauna.

Suitable species for RFEF from BioNet and Western Sydney Parklands Design Manual are listed specific to MZ's in **Appendix A.**

### 3.1.4. Preservation of native vegetation and associated guidance

The relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist.

The BDAR states, with specific reference to trees, that appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing and building demolition to mitigate and avoid potential harm or injury to all native fauna, particularly one the threatened Southern Myotis. Pre-clearance surveys must identify if native fauna species are occupying vegetation prior to demolition and to conduct demolition works in a staged manner which allows fauna to relocate themselves or with assistance from a supervising ecologist (Henry & Hymas, 2019). These protocols should include, as a minimum, soft-felling techniques and clearing supervision where habitat trees (including hollow-bearing trees and stags) are to be removed.

Soft-felling techniques as part vegetation clearing encourage fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft-felling techniques should be adaptive depending on site-specific conditions but typically would include:

- marking all habitat trees to be cleared;
- removal of ground-layer and mid-storey vegetation (under-scrubbing) around the habitat trees;
- tapping/nudging of habitat trees by heavy machinery 24 hrs prior to the proposed removal of the habitat trees;
- 'Slow drop' of habitat trees, involving the gentle lowering of habitat trees with hollows intact;
- inspection of lowered habitat trees and capture and release of any fauna species present. Injured fauna are to be taken to WIRES or a veterinary clinic.

All juvenile plants are to be translocated prior to the commencement of any earthworks and clearing of native vegetation. A Restoration Ecologist will assess VMP areas and provide a best practice plan for implementation of clearing/trimming, harvesting and nurturing harvest as well relocating harvested specimen.

The RE will provide a methodology for removal of individuals and strategic thinning of preserved vegetation. A bush regenerator will be engaged to identify, remove and translocate native juveniles to other areas of the VMP and thin remaining trees as directed by the methodology. The plants will be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and should be maintained until revegetation works. Harvested plants may be grown onsite or at a selected nursery depending on the outcomes of the assessment.

Where trees are being retained within the VMP area, these may require protective barriers during works as directed by an arborist. As per Development Consent Biodiversity measure (5) in Appendix 2, where vegetation is approved for removal, both in the VMP area and the development footprint, tree hollows, root balls and large pieces of wood (i.e., greater than approximately 25-30 cm diameter and 2-3 metres in length) should be translocated into the VMP areas on the same day of removal.

All removed material should also be assessed by a Restoration Ecologist for re-use opportunities. Reuse of removed vegetation include seed collection and cuttings, protection and shelter, habitat and erosion controls.

### 3.1.5. Hollow Bearing Trees (HBT)

As per the Section 6.1.1 of the BDAR, all hollow bearing trees within the subject land including seven hollow bearing trees (indicated in Figure 4) would be cleared as part of the SSD proposal (Henry &

Hymas, 2019). The BDAR recommends that HBT's are salvaged as part of the project and utilised in the Eskdale Creek realignment works. One HBT borders the VMP 3 southern boundary **(**Figure 2**).** The Project Ecologist will be required to ensure it is repurposed in the realigned VMP area. The BDAR recommends that, as a first option, "cleared hollow-bearing trees should be stood upright with their base buried to create hollow bearing stags…" (Henry & Hymas, 2019, p.63).

Prior to felling and clearing HBT's, the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site. The felling and translocation should occur on the same day and prior to the release of any native fauna found using the tree hollows.

### 3.1.6. Alternatives for unused material

As per the mitigation measure in the Development Consent, where tree trunks cannot be used for habitat enhancement onsite, the applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing of the trees by other means.

### 3.1.7. Nest boxes

Prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes. This will need to be identified in a Nest Box Management Plan which will be informed by the pre-clearance survey. Nest boxes may be installed in the VMP area at least a month prior to clearance works. If suitable trees are not identified in the VMP, then additional areas which will be managed for conservation may be required.

Based on the results of the pre-clearing survey, The Nest Box Management Plan should identify:

- the size
- type
- number,
- and location of nest boxes to be installed.

The Nest Box Management Plan must ensure that:

- replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing
- the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows
- if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

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### 3.1.8. Feral animal control

Feral animals may impact on the achievement of performance criteria. It is likely the baiting or shooting of rabbits, and/or foxes and the destruction of warrens are required. Deer have been the concern of Local Land Services regional feral control. Any control will need to be determined by the bush regeneration contractor and undertaken in consultation with Local Land Services and monitoring undertaken annually.

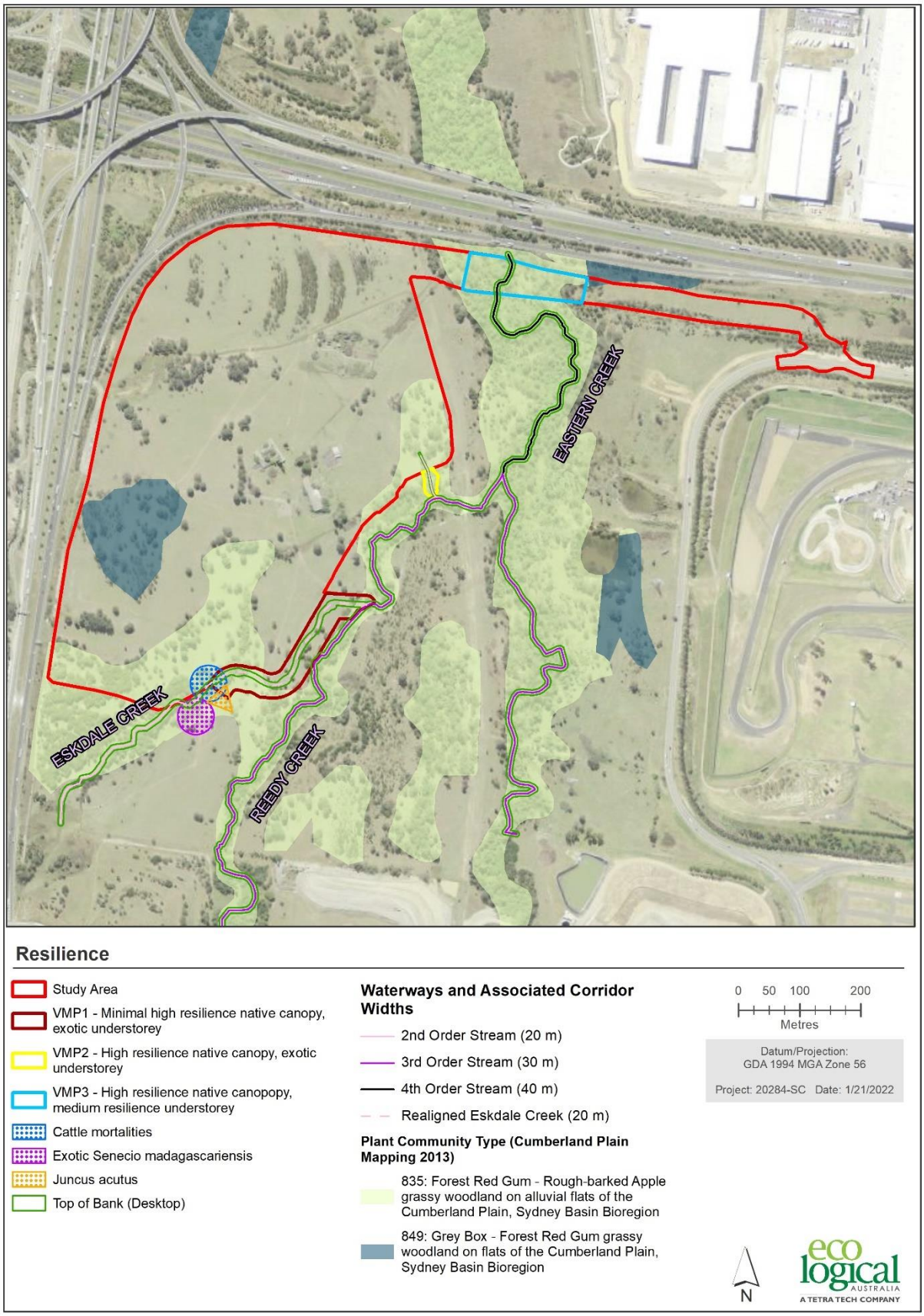


**Figure 7: Resilience map and threats**

## 3.2. Vegetation Management Plan areas

The three VMP areas of the site are detailed in the following sections. Management treatments within each VMP area are detailed in **Section 3.3.**

### 3.2.1. Vegetation Management Plan area 1 (VMP 1)

VMP 1 is a 1.27 ha area located to the south of the study area **(**Figure 1**).** The intended VMP falls mostly into cleared land with the existing creek to southeast. This area comprises approximately 10% of established native canopy, low/no mid story, and a completely exotic groundcover layer.

Much of the existing canopy falls within the Outer Riparian Zone and can be retained. A few Eucalypts, Red Gum *(E. tereticornis)*, Cabbage Gum (*E. amplifolia)* and Red Ironbark (*E. fibrosa)*, can be found in the pasture. In the western portion of the VMP area, in the creek, the dominant canopy are paperbarks (*Melaleuca sp.)* and River She-oak (*Casuarina cunninghamiana*). The midstory was dominated by Native Blackthorn *(Bursaria spinosa)* interspersed with occasional Lantana (*Lantana camara)* and Small Leaved Privet (*Ligustrum sinense*). The creek was slightly native dominant comprising species like Slender-knotweed (*Persicaria decipiens*), Duckweed (*Lemna disperma*) Swamp Lily (*Ottelia ovalifolia*), Common Spike Rush (*Eleocharis acutus*) and Eel Grass (*Vallisneria spiralis*). The water did display some blue-green algae and features patches of Kikuyu *(Cenchrus clandestinus)* and Wandering trad (*Tradescantia fluminensis*).

Exotic natives of concern included a large area of Spiny Rush (*Juncus acutus*) extending into the VMP area and Fireweed (*Senecio madagascariensis*) slightly outside of the VMP area.

Treatments for specified MZ's are synchronous across all VMP areas as detailed in **Section 3.3.** Individual areas for management zones are tabulated below in Table 7**.**

**Table 7: VMP 1 area and proportion of total**

| Zone | Management Zones | VMP 1 Total | Grand Total | %age of G/Total |
|---|---|---|---|---|
| 1 | Deep water pool | ***502*** | 502 | 100 |
| 2 | Marsh and Low Flow | ***893*** | 1099 | 81 |
| 3 | Channel | ***1427*** | 4068 | 35 |
| 4 | Batter | ***3964*** | 9540 | 42 |
| 5 | Bench | ***530*** | 530 | 100 |
| 6 | Rip rap | ***738*** | 1001 | 74 |
| 7 | Outer Riparian Zone | ***4655*** | 4655 | 100 |
| | **Grand Total** | ***12709*** | **21395** | **59.4** |

VMP 1 totals 12,709m$^2$, includes all the 7 MZ's and totals 59% of the total across the 3 VMP areas **(**Figure 10**).**

**Figure 8: Typical exotic grass dominance and occasional native canopy in VMP 1**

**Figure 9: Southern inlet extreme including Juncus risk**

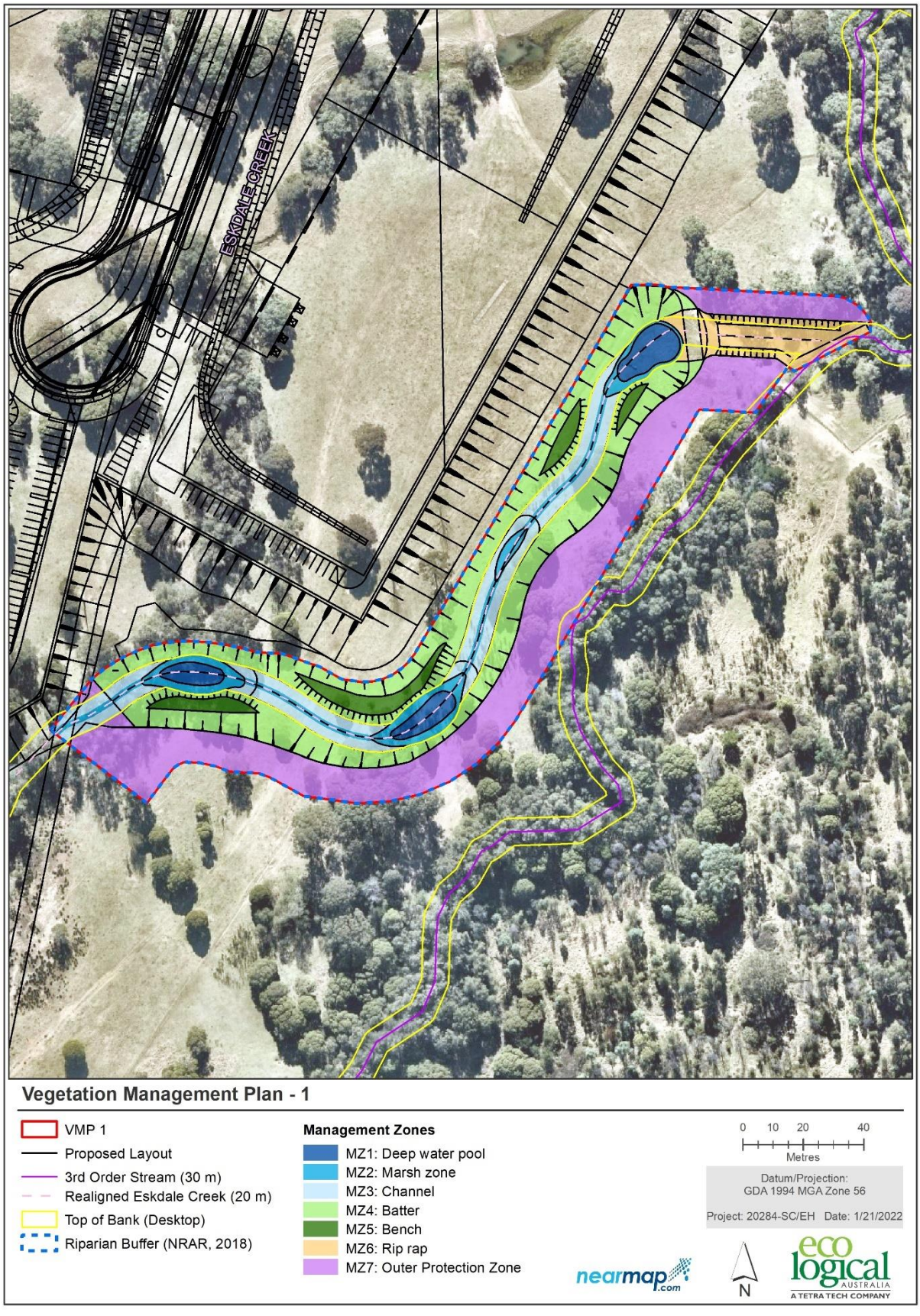


**Figure 10: VMP 1 management area**

### 3.2.2. Vegetation Management Plan area 2 (VMP 2)

VMP 2 is a 0.08 ha area located on the eastern boundary near the middle of the study area **(**Figure 1**).** This small area is dominated by native Eucalypts including Red Gum *(E. tereticornis)*, Cabbage Gum (*E. amplifolia)* and Red Ironbark (*E. Fibrosa)*. The midstory was dominated by Native Blackthorn *(Bursaria spinosa*) however occasional Lantana (Lantana camara) and Small Leaved Privet (*Ligustrum sinense*) were found. The area is flanked by open pasturelands and a *Casuarina/Melaleuca* dominated creek to the south of it. The groundcover is completely exotic comprising pasture grasses.

VMP 2 is a stormwater outflow and will be required to be kept open to maintain release of flow. The outlet to Reedy Creek must be connected via natural amenity such as a pool or eddy. The natural amenity is to match the existing level and natural meander of Reedy Creek. Access to inner zones is available on the outer flanking batters. Any access to maintain stormwater flow should minimise vegetation impact and rehabilitate if required.

Treatments for specified MZ's are synchronous across all VMP's as detailed in **Section 3.3.** Individual areas for management zones are tabulated below in Table 8**.**

**Table 8: VMP 2 area and proportion of total**

| Zone | Management Zones | VMP 2 Total | Grand Total | %age of G/Total |
|---|---|---|---|---|
| 1 | Deep water pool | - | 502 | - |
| 2 | Marsh and Low Flow | ***91*** | 1099 | 8 |
| 3 | Channel | - | 4068 | - |
| 4 | Batter | ***679*** | 9540 | 7 |
| 5 | Bench | - | 530 | - |
| 6 | Rip rap | ***107*** | 1001 | 11 |
| 7 | Outer Riparian Zone | - | 4655 | - |
| | **Grand Total** | ***877*** | **21395** | **4.1** |

VMP 2 totals 877m$^2$, includes 3 MZ's and totals 4% of the total across the 3 VMP's **(**Figure 13**).**

**Figure 11: Typical established creek canopy flanked by exotic grasses (North)**

**Figure 12: Regenerated shrubs alongside creek in exotic grass flank (South)**

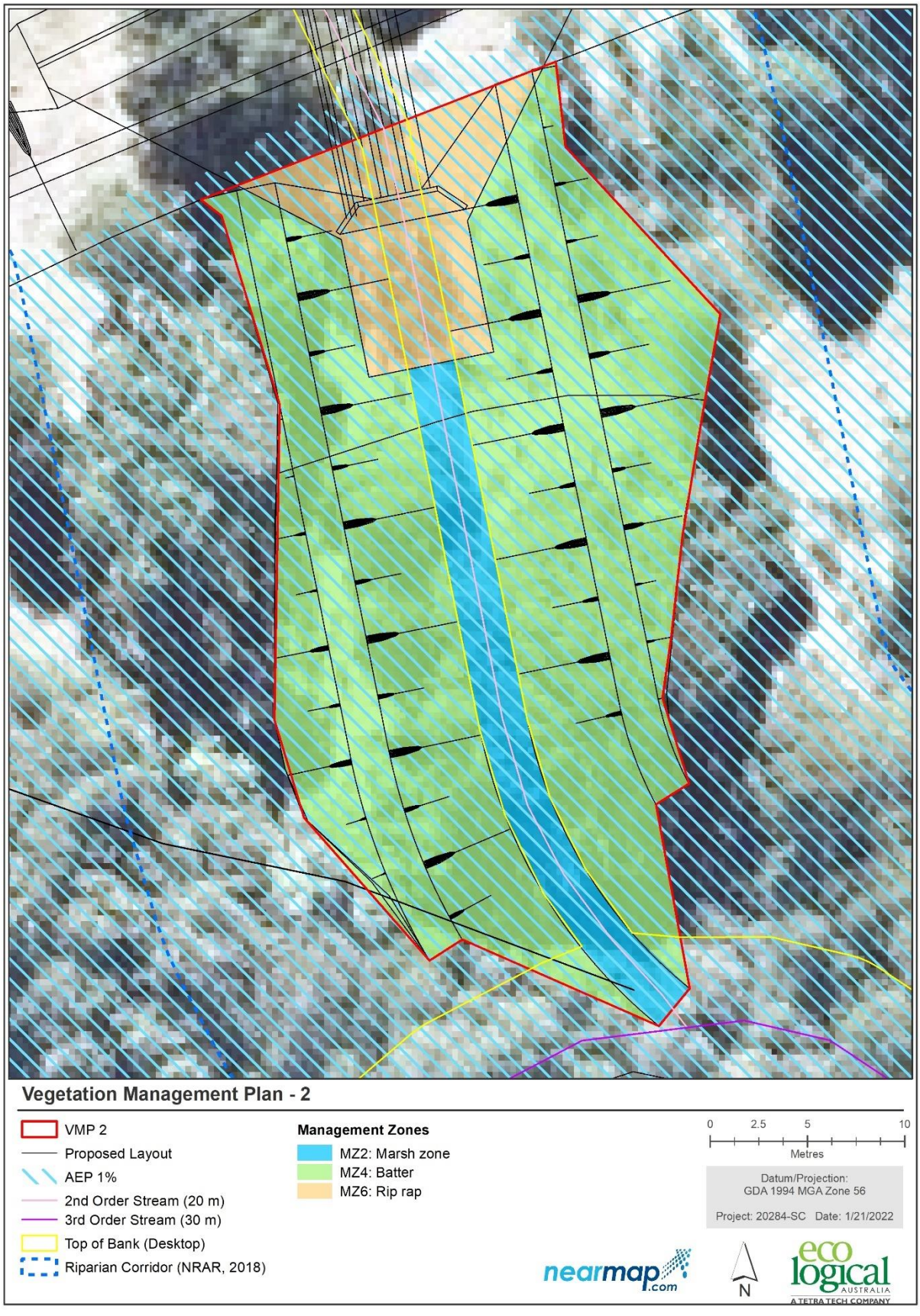


**Figure 13: VMP 2 management area**

### 3.2.3. Vegetation Management Plan area 3 (VMP 3)

VMP 3 is an approximate 0.8 ha area located on the northern boundary that runs parallel to the M4 Highway **(Figure 1).** The area is highest at the roadside and drops drastically into a swale along the road. The swale empties to the west into Eastern Creek which runs under the middle of the VMP area.

The canopy is completely native consisting of a mix of Red Gum *(E. tereticornis)*, Cabbage Gum (*E. amplifolia)* and Red Ironbark (*E. Fibrosa)* from the road edge to the southern boundary. Along the swale and Eastern creek, Paperbarks (*Melaleuca sp.)* are scattered between the more abundant River She-oaks (*Casuarina cunninghamiana*). The midstorey is dominated by clumps of Native Blackthorn *(Bursaria spinosa*) sometimes draped with Old Man's Beard (*Clematis aristata*). Where clumps are less dense or not established, individual Lantana (*Lantana camara*) and Small Leaved Privet (*Ligustrum sinense*) were found.

The groundcover comprises an almost equal mix of natives and exotics. Natives includes Kidney Weed *(Dichondra repens*), Twining Glycine *(Glycine clandestina),* Grassland Wood-sorrel *(Oxalis perennans)* and grasses comprising Wiry Panic Grass (*Entolasia stricta*), Basket Grass (*Oplismenus hirtellus*) and Weeping grass (*Microlaena stipoides var. stipoides*).

As part of bridge construction works, **Table 3** stipulates that the proponent *"[to] minimise vegetation clearing and [to] maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical".*

Clearing and thinning within VMP3 extent is detailed in **Appendix G.** Northrop have approached their building design specifically to minimise the footprint, time and impact.

Prior to construction works, a guiding methodology will be created from a pre-clearance survey so that expendable vegetation and crown thinning can commence without compromising bank stability (**Section 3.1.4)**. Hollow Bearing Trees providing habitat for fauna must be approached as described in **Sections 3.1.5, 3.1.6 and 3.1.7.**

A bush regenerator must be engaged to implement the results of the Restoration Ecologist's assessment, i.e., the identification, removal and translocation of suitable native juveniles to other areas of the VMP.

Any tree mortality because of thinning must be reported to as per **Section 4.3** as an incident and rectified accordingly.

At the time of compiling this document, final tracks and trails were not available. WSPT will provide pedestrian and cycle connectivity under the M4 motorway in the future.

The exotics included Bridal creeper (*Asparagus asparagoides*), Blackberry (*Rubus fruticosus*) Couch (*Cynodon dactylon*), Kikuyu *(Cenchrus clandestinus)*, Guinea grass (*Megathyrsus maximus)* and Wandering Jew (*Tradescantia fluminensis*).

The water in the swale was clear however browning with the high level of decomposing leaf litter from the overhead canopy.

Treatments for specified MZ's are synchronous across all VMP's as detailed in **Section 3.3.** Individual areas for management zones are tabulated below in Table 9**.**

**Table 9: VMP 3 area and proportion of total**

| Zone | Management Zones | VMP 3 Total | Grand Total | %age of G/Total |
|---|---|---|---|---|
| 1 | Deep water pool | - | 502 | 0 |
| 2 | Marsh and Low Flow | ***115*** | 1099 | 10 |
| 3 | Channel | ***2641*** | 4068 | 67 |
| 4 | Batter | ***4897*** | 9540 | 50 |
| 5 | Bench | - | 530 | 0 |
| 6 | Rip rap | ***156*** | 1001 | 16 |
| 7 | Outer Riparian Zone | - | 4655 | 0 |
| | Grand Total | ***7809*** | **21395** | **36.5** |

VMP 3 totals 7,809m$^2$, includes 4 MZ's and totals approximately 37% of the total across the 3 VMP's **(**Figure 16**).**

**Figure 14: Typical dense established canopy in VMP 3**

**Figure 15: Mixed native/exotic vegetated banks and nutrient rich water from decomposing foliate**

**Figure 16: VMP 3 management area**

## 3.3. Management Zone methodologies

Three VMP sites have been divided into seven vegetation management zones based on appropriate restoration treatments, specifically establishment revegetation specifications **(**Table 10**).**

It is assumed that all zones, except for Management Zone: Outer Riparian Zone, will be constructed. It is therefore expected that the final level VMP areas will have to be completely revegetated. A delay in establishment works will increase the probability of weed establishment and increase the need for Primary and Secondary weed management works.

All management zones, except for Management Zone 7, is completely engineered. Suitable species for RFEF should be a primary guide as tabulated in **Appendix A**, however, appropriate species from CPW or other native macrophyte lists may also be considered to suit site conditions.

There are seven management zones.

- Management Zone 1: Deep Water Pool (MZ1)
- Management Zone 2: Marsh and Low Flow (MZ2)
- Management Zone 3: Channel (MZ3)
- Management Zone 4: Batter (MZ4)
- Management Zone 5: Bench (MZ5)
- Management Zone 6: Riprap (MZ6)
- Management Zone 7: Outer Riparian Zone (MZ7)

**Table 10: Management Zone areas**

| Zone | Management Zones | VMP 1 | VMP 2 | VMP 3 | MZ Total |
|---|---|---|---|---|---|
| 1 | Deep water pool | 502 | | | ***502*** |
| 2 | Marsh and Low Flow | 893 | 91 | 115 | ***1099*** |
| 3 | Channel | 1427 | | 2641 | ***4068*** |
| 4 | Batter | 3964 | 679 | 4897 | ***9540*** |
| 5 | Bench | 530 | | | ***530*** |
| 6 | Rip rap | 738 | 107 | 156 | ***1001*** |
| 7 | Outer Riparian Zone | 4655 | | | ***4655*** |
| | **Grand Total** | **12709** | **877** | **7809** | **21395** |

### 3.3.1. Management Zone 1: Deep Water Pool (MZ1)

MZ1 encompasses approximately **0.05 ha** of deep water constructed within the lowest part of the channel to a depth of 1.5m from MZ2. It is found only in the VMP 1 area.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or

spraying to address these weeds. A delay in Primary Works may allow for woody weed establishment and require additional weed control techniques like “cutting and painting” or “frilling” (drilling and filling).

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush *(Juncus acutus) and Fireweed (Senecio madagascariensis)* further upstream. There is a high risk of establishment by these weeds during the VMP maintenance period.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive©, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable for prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 4 plants per $m^2$ for submerged macrophytes, 2 per $m^2$ for emerging macrophytes and floating macrophytes. This totals 8 plants across a three tier aquatic strata square metre as shown in **(**Table 11**).** This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A**.

Maintenance works within the deep water will require specialised approaches. Regular maintenance visits post establishment works will control inlets to avoid weed introduction.

**Table 11: Macrophyte density and numbers**

| MZ1 | Stratum | Density (m2) | Number |
|---|---|---|---|
| Deep Water Pool | Submerged | 4 | 2,008 |
| | Emergent | 2 | 1,004 |
| | Floating | 2 | 1,004 |
| **Total** | | **8** | **4,016** |

Treatments include:

- Primary Weed treatment
- Ripping of soils
- Jute mat installation
- Infill revegetation using submerged, emergent and floating RFEF Freshwater macrophytes
- Regular hand weeding/spot spraying of weed growth post revegetation
- Irrigating at establishment to encourage rapid establishment of plants (if watercourse detained)
- Ongoing specialised weed maintenance

Overall native macrophytes and riparian species will reinstate the native riparian vegetation throughout the creekline as identified in **Appendix A**, with revegetation densities as identified in Table 14**.**

### 3.3.2. Management Zone 2: Marsh and Low Flow (MZ2)

Zone 2 encompasses approximately **0.1 ha** and runs the length of the centre of the channel approximately 52 cm above MZ1. This MZ will be entirely constructed in all VMP areas. This comprises the reshaping of channels and batters and scraping away the Organic Horizon that may contain any native seed.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or spraying to address these weeds. A delay in Primary Works may allow for woody weed establishment and require additional weed control techniques like “cutting and painting” or “frilling” (drilling and filling).

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush *(Juncus acutus) and Fireweed (Senecio madagascariensis)* further upstream. The risk of post establishment is highly likely.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive©, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 6 plants per $m^2$ with emerging macrophytes as shown in Table 11**.** This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A**.

Maintenance works and planting within the deep water will require specialised approaches. Regular visits post establishment works will be required control inlets to avoid weed introduction.

Exotic richness and abundance are expected to increase as the contract period matures as fast-growing exotic generalists replace pasture grasses on disturbed soils. Litter and weeds can be reduced using densely vegetated ripraps and drain socks, respectively.

All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14**.**

### 3.3.3. Management Zone 3: Channel (MZ3)

Zone 3 encompasses approximately **0.44 ha** comprising the base of the riparian channel above MZ1 and 2 and contains the 1-in-20-year flooding extent. The meandering channel has been constructed to slow ephemeral flood velocities.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Ephemeral conditions in the channel increase risk of weed establishment. Primary works will include techniques like hand weeding or spraying to address these weeds.

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush *(Juncus acutus) and Fireweed (Senecio madagascariensis)* further upstream. The risk of post establishment is highly likely.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive©, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable for prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 6 plants per $m^2$ with emerging macrophytes as shown in Table 11**.** This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A.**

Regular visits post establishment works will be required to control inlets to avoid weed introduction.

In VMP 1, at the western inflow of the channel, the zone has been temporarily extended beyond the diversion point through the Outer Riparian Zone until final plans have been completed. Following 100% jute installation, 100% of this zone is expected to require revegetation of ephemeral species to reinstate the native riparian vegetation throughout the creekline with revegetation densities as identified in Table 14. It is recommended that soils are irrigated prior to planting and that the irrigation regime must commence directly after planting.

As with MZ2, maintenance works will require regular visits controlling inlets to avoid weed introduction, development impacts and litter. Management measures include coir logging at the inflow point, a temporary (or permanent) riprap and an additional filtration protection using dense vegetation within the riprap. Failure to manage inflow will compromise all Channel, Low flow and Marsh, and Deep-Water Pool works and revegetation.

In VMP 3, vegetation clearing is prescribed for increased light as part of the construction phase. A Restoration Ecologist must be consulted. Prior to construction works, a guiding methodology will be created from a pre-clearance survey so that expendable vegetation and crown thinning can commence without compromising bank stability (**Section 3.1.4)**. Hollow Bearing Trees providing habitat for fauna must be approached as described in **Sections 3.1.5, 3.1.6 and 3.1.7.**

Treatments include:

- Primary weed treatment

- Ripping of soils
- Jute mat installation
- Infill revegetation using ephemeral sedges and rushes
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14**.**

### 3.3.4. Management Zone 4: Batter (MZ4)

Zone 4 comprises approximately **0.93 ha** of Batters over the three VMP areas above the 1-in-20-year flood extent.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or spraying to address these weeds.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using an indiscriminate herbicide with follow-up required if further germination of weeds occurs.

Given that the batters will be completely engineered, it is expected that 100% of the area will be mulched at 100mm depth. Post-mulching, 100% of this zone is expected to require full strata revegetation to establish suitable native CPW community groundcover as listed in **Appendix A**, with revegetation densities as identified in Table 14**.**

Establishment and maintenance of natives is crucial to ensure maximum native cover intended to outcompete expected consistent exotic influx.

Treatments include:

- Primary works
- Grid ripping of soils
- Mulch installation
- Infill revegetation for all strata
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from suitable RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14**.**

### 3.3.5. Management Zone 5: Bench (MZ5)

Zone 5 encompasses approximately **0.05 ha** comprising the benches designed to fortify bends against erosivity of flows within the Batter.

This MZ will be prepared as part of the Batters including Primary and Secondary Weed works, ripping of soils and mulch installation. However, denser planting will be required to strengthen areas where flow inertia is most likely to stress banks. It is recommended that staggered Casuarina's and Melaleucas are planted in this area with supportive, complementary groundstory.

Casuarina leachates from fresh leaves, litter and understorey soil are rich in phenolics and exhibit phytotoxic effects (Batish & Singh, 1998), however complementary species are recommended in Table 12 below. It is expected that 100% of the zone will be revegetated as per proportions depicted in **Table 6.** Ongoing weed treatment will be required along the length of the zone.

**Table 12: Species complementary to Casuarinas in conjunction with WSPT species list**

| Lower canopy | Understory | |
|---|---|---|
| ***Melaleuca sp.*** | ***Graminoids*** | ***Forbs*** |
| Melaleuca decora* | Carex appressa* | Commelina cyanea* |
| Melaleuca linariifolia* | Juncus usitatus | Persicaria decipiens* |
| Melaleuca styphelioides* | Lomandra filiformis subsp. filiformis | Solanum prinophyllum* |
| | Lomandra multiflora subsp. multiflora | Viola hederacea* |
| | Microlaena stipoides | |

* Common to RFEF

Treatments include:

- Primary works
- Grid ripping of soils
- Mulch installation
- Infill revegetation for all strata
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from suitable RFEF species as per the recommended planting list included in **Appendix A**, with revegetation densities as identified in Table 14**.**

### 3.3.6. Management Zone 6: Rock riprap (MZ6)

Zone 6 encompasses approximately **0.1 ha** comprising a rock layer designed to slow underflow and filter water. Revegetation is required to create a naturalised filtration system.

It is imperative that ongoing weed maintenance control weed infestations within the channel and along the rock batters. This area must be revegetated as a final stage of the VMP once rip rap is deemed settled and secured for greater water filtration and fauna habitat. Post planting, maintenance will continue and be supported by infill planting to maintain revegetation densities as per Table 14**.**

Treatments include:

- Ongoing Weed Maintenance
- Infill planting

Suitable species from any list provided in the VMP may be referenced with revegetation densities as identified in Table 14**.**

### 3.3.7. Management Zone 7: Outer Riparian Zone (MZ7)

MZ7 is an outer **0.5** ha embankment within the Riparian Area. This area will be an extension of the batter. It is recommended that for Stage 1, riprap might be needed at the westernmost extent to control inflow impacts. Dense vegetation planting is recommended to further filter inflow of exotic seed, sediment and litter. The impact of civil work can be minimised by protecting trees with sediment fencing.

Approximately 10-15% of this zone is covered by native canopy, however the shrub and ground layer are mostly exotic. The treatment of MZ6 will be repeated in this zone and vegetation will comply with suitable native CPW community groundcover as listed in **Appendix A**, with revegetation densities as identified in Table 14**.**

Primary works will include woody shrub control using chain sawing, “Cut and paint” and “Frilling” (drilling and filling) methods of any juvenile woody weeds. Secondary works will ensure all woody regeneration and exotic grasses are eradicated. Exotic grasses will require at least 3 sprays to reduce competition on revegetation. Grid ripping to a minimum of 300mm will commence under the supervision of a qualified Restoration Ecologist to ensure no damage to tree roots or crown.

Grid ripping must be followed directly by mulch installation to avoid soil desiccation, nutrient loss, decrease of microbial activity, and water and wind erosion. The entire area will be mulched at 100mm depth.

All plantings need to be from suitable RFEF species as per the recommended planting list included in **Appendix A**, with revegetation densities as identified in Table 14**.** Suitable CPW species may also be considered. An irrigation regime will be required to ensure plant establishment

## 3.4. Revegetation and treatments

Revegetation works are required within all zones, except MZ 6, in the establishment phase. Thereafter, infill planting will take place in Year 1. An additional allocation of 10% for each year should be allowed for to accommodate loss due to herbivory, natural attrition and vandalism.

Revegetation works will include planting of native groundcover, grass, shrub and canopy species using tube stock and Hiko/Viro cells. All planting that is undertaken must use local provenance stock, preferentially with seed collected from the development footprint or native vegetation on-site**.** Planting should be undertaken in Autumn or Spring and irrigation will be required at least until establishment but likely periodically through the first few years.

Mulch can be derived from vegetation removed from the development area, if available. Alternately, mulch should be comprised of un-composted wood (preferably wood waste), with a particle size of 15 mm to 40 mm, with no fines, and good air-filled porosity. Mulch should not contain any weed seeds, nor be derived from diseased trees or from any part of the tree lower than 1 m above the ground. Mulch, where required, should be installed to a depth of approximately 100mm.

Jute matting is to be used instead of mulch in areas of high erosional potential. Jute matting should be heavy weight, no less than 750gsm/$m^2$, 100% biodegradable jute fibres keyed in at the top of slope and

draped to the bottom. Jute must be pegged with at least 3 x 150 mm pins per m2 and strips should overlap 300mm in the direction of water flow.

Proportions of jute matting, and mulch have been estimated in Table 13.

**Table 13: Revegetation treatments**

| Zone | Description | Tubestock revegetation area (m²) | Jute Matting (%) | Mulch | Jute Matting (m²) | Mulch (m²) |
|---|---|---|---|---|---|---|
| 1 | Deep Water Pool | 502 | 100% | 0% | 502 | - |
| 2 | Marsh and Low Flow | 1,096 | 100% | 0% | 1,096 | - |
| 3 | Channel | 4,079 | 100% | 0% | 4,079 | - |
| 4 | Batter | 9,540 | 0% | 100% | - | 9,540 |
| 5 | Bench | 530 | 0% | 100% | - | 530 |
| 6 | Riprap | 1,001 | 0% | 0% | - | - |
| 7 | Outer riparian zone | 4,647 | 0% | 100% | | 4,647 |
| **Totals** | **-** | **21,395** | **64%** | **27%** | **11,855** | **14,717** |

Revegetation areas for each zone are shown in Table 14.

**Table 14: Revegetation density and numbers**

| Zone | Description | Revegetation Area (m²) | Revegetation densities (m²) * | | | | Totals |
|---|---|---|---|---|---|---|---|
| | | | Tree | Shrub | Herbs / scramblers | Sedge | |
| 1 | Deep Water Pool | 502 | - | - | - | 8.00 | 4,016 |
| 2 | Marsh and Low Flow | 1,096 | - | - | - | 6.00 | 6,576 |
| 3 | Channel | 4,367 | - | - | - | 6.00 | 24,474 |
| 4 | Batter | 9,252 | 1/6 | 1/3 | 1.00 | 5.00 | 62,010 |
| 5 | Bench | 530 | 1/3 | 1/3 | 1.00 | 5.00 | 3,533 |
| 6 | Riprap | - | - | - | - | 3.00 | 3,003 |
| 7 | Outer riparian zone | 4,647 | 1/6 | 1/3 | 1.00 | 6.00 | 34,853 |
| **Totals** | **-** | **20,394** | **2,493** | **4,810** | **14,429** | **116,301** | **138,465** |

## 3.5. Maintenance

Primary works will be required to remove any woody noxious or WoNS either by chain sawing or hand removal like “Cutting and painting” or “Frilling” (drilling and filling), in MZ7. All other zones are expected to attract colonising exotics like grass and herbaceous weeds post-civil works.

Secondary works will follow with the treatment of re-emerging exotics using brushcutting, spraying and hand weeding or de-seeding. The unmanaged area outside the VMP, particularly an established

infestation of Spiny Rush (Juncus acutus) upstream, and further west, Fire Weed (*Senecio madagascariensis*) poses a threat to VMP works.

The entire site will require ongoing maintenance to control weed regrowth from the soil seed bank for many of the weed species. Maintenance work is to be undertaken by a qualified bush regeneration contractor(s) to meet the performance criteria in **Section 4.4**.

Due to the overwhelming perimeter to area ratio of the site, the VMP area will receive high nutrient levels due to fertiliser and animal waste. The VMP areas will also be impacted by herbicide use. Similarly, given the surrounding exotic dominance and expected development outside of the VMP area, a regular maintenance regime will be required to maintain the site. Ongoing exotic seed influx is expected. It is recommended that visits occur weekly to reduce exotic competition and promote native polycarpy.

Maintenance will be undertaken for a minimum 24 months after practical completion. Practical completion refers to the completion of all civil works, soil preparation, initial weed control and establishment planting.

Maintenance of sediment fencing must be adhered to as prescribed in Section 3.1.1.3.

If the objectives identified in Table 5 or the performance criteria outlined in **Section 4.4** are not met, the maintenance period may need to be extended until they have been met.

### 3.5.1. Infill revegetation

During the maintenance period, any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity as prescribed in Table 18**.**

Details on maintenance replanting should be documented in the half-yearly and annual progress reports **(Section 4.2).** Any new species must still be from the community being emulated and local provenance.

Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.

## 3.6. Adaptive management

As this is a long-term project commencing into an adapting climate, and therefore, changing local conditions, an adaptive management approach is required. VMP implementation should be undertaken by suitably qualified contractors with extensive experience in Cumberland Plain Restoration. The successful contractor will learn from and respond to successful and unsuccessful techniques used on the site. In its simplest form, this may include the substitution of species identified in **Appendix A** for advanced direct seeding techniques and specialised planting methods in place of traditional planting techniques.

The success of the works will be determined by meeting the performance criteria identified in **Section 4.4**. Contractors have the flexibility to implement different techniques to those specified here providing legislation, best practice methods and performance criteria are met. Any major departures from the VMP or change to performance criteria must be approved in writing by DAWE and DPIE.

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# 4. Monitoring and reporting

The VMP recommends the following program for Monitoring and Reporting that ensures adequate data with regards to vegetation establishment success.

Monitoring and reporting are required to validate compliance to the VMP and to conditions of consent. Information gained through the monitoring and reporting process will identify results of works against criteria in Table 16 and Table 17. Reasons must be provided for successes and failures. The bush regeneration contractor and the proponent will be required to monitor vegetation over the contract period.

The aim of monitoring is to measure the effectiveness of the control actions being undertaken to achieve the desired outcome. It will also identify non-conformance and provide the land manager with the information to plan corrective actions. Information derived from the results of monitoring will also be used in adaptive management (i.e., learning from experience to inform future priorities and work plans). For example, seasonal changes promote booms of certain weed species that ought to be anticipated and treated before they seed.

## 4.1. Photo points and quadrats

Several photo monitoring points will be established across the site to provide a visual reference of changes in the vegetation and performance of stream works. This will be undertaken prior to the commencement of works and at the beginning of each summer season. The marking and preparation of quadrats, practical completion photographs, coordinates and data collection is essential for accurate data collection. The lead supervisor will:

- Set up photo points and quadrats across the three VMP's as indicated in Table 15.

**Table 15: Photo points and quadrats**

| VMP | | VMP 1 | | VMP 2 | | VMP 3 | |
|---|---|---|---|---|---|---|---|
| Zone | Description | P/points | Quads | P/points | Quads | P/points | Quads |
| 1 | Deep Water Pool | 1 | | | | | |
| 2 | Marsh and Low Flow | 1 | | 1 | | 1 | |
| 3 | Channel | 2 | 2 | | | 2 | 1 |
| 4 | Batter | 2 | 2 | 1 | 1 | 2 | 2 |
| 5 | Bench | 1 | | | | | |
| 6 | Riprap | 1 | | | | 1 | |
| 7 | Outer riparian zone | 2 | 1 | | | | |
| **Total** | | **10** | **5** | **2** | **1** | **6** | **3** |

- mark the photo point and quadrat with a six-foot star picket and map the location of each;
- take a digital photo of each photo point and quadrat with the whole length of the star picket visible in the photo to act as a reference point; and
- organise the digital photos logically with each image labelled with a unique reference number indicating the location of the photo point, the direction of the photo and the date the photo is taken

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- Quadrats will span 10m x 10m and contain strata coverage, exotic and native species' names and density

## 4.2. Reporting

It is recommended that the following reports are produced:

- One baseline report at end of establishment period that confirms conclusion of establishment and commencement of maintenance period.
- One 6 monthly progress report during the first year of maintenance
- One 12-month annual report during the first year of maintenance
- One final report to close the VMP contract period with consent authorities.

It is assumed that each report will include all VMP areas, however if works are staged then additional reports may be required. The final report also initiates handover to the long-term land manager. The VMP areas will be included into the broader, long term WSP land management initiative.

Reports must be completed by contracted party within a reasonable period (for instance 45 business days) following the relevant 12-month period. Compliance reports may be published on the Department's website. The approval holder must publish the report within 60 days following the relevant 12-month period. Published reports are to exclude or redact sensitive ecological data, however, the full compliance report must be sent to DAWE within five business days of publication. Reports will also need to be shared with DPIE.

The reporting should identify and provide details on any plant losses and replacement planting. Monitoring is recommended with any future planned maintenance works.

Reports should include:

- works carried out, including a measure of effort (e.g., number of hours, change in weed densities, etc.) and other relevant information (e.g., weed species targeted, areas worked, dominant techniques used, etc.)
- site conditions, including quantification of native and exotic cover and diversity for each zone and survival of revegetation.
- any observations, such as the occurrence of new weed species
- a description (quadratic data) of any problems or issues encountered (e.g., threatened species, rates of regeneration, etc), and how they were overcome
- a summary of how the site-specific objectives and performance criteria have been met (or not). If these have not been met, further explanation and a proposed response may be necessary.
- relevant maps

This annual report will highlight the effectiveness of the program and identify any changes needed to improve (i.e., changes to weed control techniques, types of herbicides used or weed priority) weed management. Annual reporting will be crucial for future maintenance to determine whether the actions being implemented are having the desired effect or if alternative weed control techniques (for the particular weed species) are required.

## 4.3. Commencement of reporting

As per Part B of the Decision Notice, a report must be produced for each 12-month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. Each report must be published on the DAWE website within 60 days of the relevant 12-month period. A confirmatory email must be sent to DAWE (DAWE, 2020).

Besides the reports identified, additional reporting will commence in the event of:

- an incident
- non-compliance with conditions
- non-compliance with commitments,

Where relevant, notification to the department must be executed within two days.

Reports must contain:

- a short description of the incident and/or non-compliance; and
- the location (including co-ordinates), date, and time of the incident and/or non-compliance.
- any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;
- the potential impacts of the incident or non-compliance; and
- the method and timing of any remedial action that will be undertaken by the approval holder.

## 4.4. Performance criteria

The progress and compliance with the VMP will be monitored and reviewed after the establishment maintenance period. Annual reports will be submitted to DPIE. If required, reporting will be followed by a site visit to discuss. The performance criteria are shown in Table 16 and Table 17**.** Where non-performance occurs and is not immediately rectified a 'stop the clock' notice on the maintenance period may be issued by DPIE until the non-performance is rectified. In the case of performance criteria not being met due to extreme acts of nature (e.g., fire, flooding) or vandalism, discussions may be held with DPIE to consider alternative performance criteria.

In addition, the following performance criteria will need to be achieved by the end of the establishment year:

- No more than 5% of pasture grasses and herbaceous weeds within the VMP area
- No bare areas >1m² or erosion from exposed surface
- Species richness after the initial establishment maintenance period no less than 60% of the BioNet Benchmark conditions for vegetation communities present on site (Table 18).

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**Table 16: Establishment performance criteria**

| Establishment |
|---|
| Completion of all tasks outline in the VMP to end of establishment period |
| Project Ecologist oversees implementation of clearing/trimming, relocating, harvesting and nurturing harvest |
| Nest box implementation undertaken |
| No more than 5% exotic cover at the end of the period, with all adult seeding noxious weed individuals to be controlled and no establishment of new priority species |
| Revegetation is to be undertaken with a minimum of 80% of the benchmark levels for species diversity as provided in Table 18 |
| Native vegetation planted as per Table 14 |
| At the end of the period, a minimum of 80% survival rate of each vegetation strata planted in each zone (e.g., tree, shrub and groundcover) |
| In VMP 2 area, the outlet to Reedy Creek connected via natural amenity matching the existing level and natural meander of Reedy Creek |
| Monitoring and reporting undertaken in accordance with Section 4.3 |
| No bare areas >1m² or erosion from exposed surface |
| Maintenance replanting is to replace plants by the same species, or where that species is not available, with the same growth form (i.e., tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance; |

**Table 17: Maintenance period performance criteria**

| Year 1 and 2 |
|---|
| Commencement of all tasks outlined in the VMP or evidence of planning for their implementation. |
| Native vegetation no less than 40% of zone by the end of Year 1 and no less than 75% of zones by the end of Year 2 |
| No more than 5% exotic cover at the end of each year, with all adult seeding noxious weed individuals to be controlled and no establishment of new priority species |
| No less 80% survival rate of each vegetation strata planted in each zone (e.g., tree, shrub and groundcover) at the end of each year |
| Maintenance replanting is to replace plants by the same species, or where that species is not available, with the same growth form (i.e., tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance; |
| Any localised plant failure within planting areas is addressed with no area larger than 1 m x 1 m without surviving plants at the end of each maintenance year; |

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| Year 1 and 2 |
|---|
| Monitoring and reporting undertaken in accordance with Section 4.3 |
| Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion. |

**Table 18: Average BioNet PCT densities and cover**

| PCT ID and Scientific name | Vegetation Community | Species richness | | | Cover (%) | | |
|---|---|---|---|---|---|---|---|
| | | Canopy | Shrub | Groundcover | Canopy | Shrub | Groundcover |
| PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion | River Flat Eucalypt Forest | 4 | 8 | 22 | 22 | 22 | 75 |
| PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | Cumberland Plain Woodland | 5 | 8 | 26 | 53 | 16 | 67 |

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# 5. Staging

## 5.1. Implementation Schedule

The VMP period will commence post-civil works. An untimed establishment period, assumed to be six-months, will precede a maintenance implementation period of 24 months or until authorities deem the required objectives for the VMP area as identified in met, whichever is longer.

An indicative implementation schedule has been provided in Table 19.

Responsibilities have been identified as below:

| Key | Civil Construction activities (Civil contractor) |
|---|---|
| | Vegetation Management Works (Bush regenerator contractor) |

## 5.2. Adaptive management

As this is a long-term project that will be implemented over several years, an adaptive management approach will be implemented that enables the successful contractor to learn from and respond to successful and unsuccessful techniques used on the site. In its simplest form this may include the substitution of species identified in the planting table or for undertaking advanced direct seeding techniques in place of manual planting techniques for revegetation.

The success of the works will be determined by meeting the performance criteria identified in Table 16 and Table 17**.** Contractors have the flexibility to implement different techniques to those specified here providing that performance criteria are met. Any major departures from the VMP or proposed changes to performance criteria must be approved in writing by DPIE.

The Restoration Ecologist and/or the Project Ecologist play an integral role in monitoring site conditions and climatic variances. In particular, the ecologist will need to provide plans for clearance and trimming, juvenile native harvesting and nurturing as well as finding suitable locations and successful planting. Constant monitoring and reporting will allow the ecologists to provide strategic advice that achieves performance criteria and a stable environment as quickly as possible.

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**Table 19: Implementation schedule**

| Treatment | Prelim | Estab | Maintenance | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year 1 | | | | Year 2 | | | |
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Civil works** | | | | | | | | | | |
| Install Construction Fencing | | | | | | | | | | |
| Install sediment fencing | | | | | | | | | | |
| Install information signage | | | | | | | | | | |
| Feral animal control | | | | | | | | | | |
| **Plans** | | | | | | | | | | |
| Pre-clearance survey | | | | | | | | | | |
| Removal and transplant methodology | | | | | | | | | | |
| Tree protection | | | | | | | | | | |
| Nest Box Management Plan | | | | | | | | | | |
| **Revegetation preparation** | | | | | | | | | | |
| Seed collection, cleaning, storage | | | | | | | | | | |
| Juvenile native harvesting and nurturing | | | | | | | | | | |
| **Other** | | | | | | | | | | |
| Native clearing within VMP | | | | | | | | | | |
| Translocation of HBT, logs and root balls | | | | | | | | | | |
| Nest box implementation | | | | | | | | | | |
| **Revegetation** | | | | | | | | | | |
| Site Preparation | | | | | | | | | | |
| Jute Matting / Mulch | | | | | | | | | | |
| Tubestock, supply and install | | | | | | | | | | |
| Plant harvested stock | | | | | | | | | | |
| Irrigation | | | | | | | | | | |

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| Treatment | Prelim | Estab | Maintenance | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year 1 | | | | Year 2 | | | |
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Weed Control** | | | | | | | | | | |
| Establishment | | | | | | | | | | |
| Maintenance | | | | | | | | | | |
| **Associated works** | | | | | | | | | | |
| Monitoring & Reporting | | | | | | | | | | |

| Key | |
|---|---|
| | Construction activities |
| | Vegetation management works |

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# Appendix A Stratified native species list

- Existing instream species

| Client zones | Stratum | Genus and Species | Common name |
|---|---|---|---|
| **Deep water pools and deep marsh zone** | | Baumea articulata | Jointed Twig-rush |
| | | Cycnogeton procerum | Water Ribbons |
| | | Eleocharis acuta | Common Spike Rush |
| | | Lemna disperma | Common Duckweed |
| | | Ottelia ovalifolia | Swamp Lily |
| | | Schoenoplectus validus | River Club-rush |
| | | Vallisneria nana | Eel Weed |
| **Shallow marsh zone and Low flow** | | Carex appressa | Tall Sedge |
| | | Carex inversa | Knob Sedge |
| | | Cyperus gracilis | Sedge |
| | | Elatine gratioloides | Waterwort |
| | | Eleocharis acuta | Common Spike-rush |
| | | Eleocharis cylindrostachys | Drooping Spike-rush |
| | | Isolepis inundata | Swamp Club-rush |
| | | Juncus usitatus | Common Rush |
| | | Paspalum distichum | Water Couch |
| | | Persicaria decipiens | Slender knotweed |
| | | Schoenoplectus validus | Club-rush |
| **Channel - Ephemeral zone** | | Austrostipa ramosissima | Stout Bamboo Grass |
| | | Carex appressa | Sedge |
| | | Cyperus gracilis | Slender Sedge |
| | | Cyperus laevis | Herb |
| | | Juncus usitatus | Common Rush |
| | | Lomandra filiformis | Wattle Mat-rush |
| | | Lomandra multiflora | Many-flowered Mat-rush |
| | | Persicaria decipiens | Slender knotweed |
| **Outer Riparian Zone and Batter** | **Tree** | Acacia floribunda | White Sally Wattle |
| | | Acacia implexa | Hickory Wattle |
| | | Acacia parramattensis | Parramatta Wattle |
| | | Angophora floribunda | Rough-barked Apple |
| | | Angophora subvelutina | Broad-leaved Apple |
| | | Eucalyptus amplifolia | Cabbage Gum |

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| Client zones | Stratum | Genus and Species | Common name |
|---|---|---|---|
| | | Eucalyptus moluccana | Gum Topped Box |
| | | Eucalyptus tereticornis | Forest Red Gum |
| | | Melaleuca decora | Paperbark |
| | | Melaleuca linariifolia | Flax-leaved Paperbark |
| | | Melaleuca styphelioides | Prickly-leaved Tea Tree |
| | **Shrub** | Acacia falcata | Sickle Wattle |
| | | Breynia oblongifolia | Breynia, Coffee Bush |
| | | Bursaria spinosa | Blackthorn |
| | | Dodonaea viscosa | Wedge-leaf Hop Bush |
| | | Melaleuca linariifolia | Paperbark |
| | | Ozothamnus diosmifolius | White Dogwood |
| | | Trema tomentosa var. aspera | Native Peach, |
| | **G/covers** | Centella asiatica | Pennywort, |
| | | Commelina cyanea | Commelina |
| | | Dichondra repens | Kidney Weed |
| | | Einadia hastata | Berry Saltbush |
| | | Einadia trigonos | Fishweed |
| | | Geranium solanderi | Native Geranium |
| | | Goodenia hederacea | Ivy Goodenia |
| | | Hardenbergia violacea | Purple Twinning Pea |
| | | Pratia purpurascens | Whiteroot |
| | | Wahlenbergia gracilis | Australian Bluebell |
| | **Grasses** | Austrodanthonia tenuior | Wallaby Grass |
| | | Austrostipa ramosissima | Stout Bamboo Grass |
| | | Carex appressa | Sedge |
| | | Cymbopogon refractus | Barbed Wire Grass |
| | | Cyperus gracilis | Sedge |
| | | Dianella revoluta | Blue Flax-lily |
| | | Dichelachne micrantha | Shorthair Plume Grass |
| | | Echinopogon caespitosus | Tufted Hedgehog Grass |
| | | Echinopogon caespitosus var. caespitosus | Bushy Hedgehog Grass |
| | | Echinopogon ovatus | Forest Hedgehog Grass |
| | | Echinopogon ovatus | Hedgehog Grass |
| | | Entolasia marginata | Bordered Panic |
| | | Entolasia marginata | Right-angle Grass |
| | | Imperata cylindrica var. major | Blady Grass |

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| Client zones | Stratum | Genus and Species | Common name |
|---|---|---|---|
| | | Lomandra filiformis subsp. filiformis | Wattle Mat-rush |
| | | Lomandra multiflora subsp. multiflora | Many-flowered Mat Rush |
| | | Microlaena stipoides | Weeping Grass |
| | | Microlaena stipoides var. stipoides | Weeping Rice Grass |
| | | Oplismenus aemulus | Basket Grass |
| | | Poa labillardierei | Tussock Grass |
| | | Themeda triandra (australis) | Kangaroo Grass |
| **Bench** | **Tree** | Melaleuca decora | Paperbark |
| | | Melaleuca linariifolia | Flax-leaved Paperbark |
| | | Melaleuca styphelioides | Prickly-leaved Tea Tree |
| | **Shrub** | Acacia falcata | Sickle Wattle |
| | | Breynia oblongifolia | Breynia, Coffee Bush |
| | | Bursaria spinosa | Blackthorn |
| | | Dodonaea viscosa | Wedge-leaf Hop Bush |
| | | Melaleuca linariifolia | Paperbark |
| | | Ozothamnus diosmifolius | White Dogwood |
| | | Trema tomentosa var. aspera | Native Peach, |
| | U/story | Carex appressa | Sedge |
| | | Commelina cyanea | Commelina |
| | | Juncus usitatus | Common Rush |
| | | Lomandra filiformis subsp. filiformis | Wattle Mat-rush |
| | | Lomandra multiflora subsp. multiflora | Many-flowered Mat Rush |
| | | Microlaena stipoides | Weeping Grass |
| | | Persicaria decipiens | Slender knotweed |
| | | Solanum prinophyllum | Forest Nightshade |
| | | Viola hederacea | Ivy-leaved Violet |

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# Appendix B Stratified weed species list

| Type | Scientific name | Common name |
|---|---|---|
| Trees | *None* | None |
| Shrub/ canopy | *Lycium ferocissimum* | African Box Thorn |
| | *Olea europaea subsp. cuspidata* | African Olive |
| | *Ligustrum lucidum* | Large-leaved Privet |
| | *Ligustrum sinense* | Small-leaved Privet |
| | *Rubus fruticosus sp. agg* | Blackberry Complex |
| Vines | *Araujia sericifera* | Moth vine |
| | *Asparagus asparagoides* | Bridal Creeper |
| | *Vicia sativa subsp. sativa* | Common Vetch |
| G/covers | *Alternanthera pungens* | Khaki weed |
| | *Anagallis arvensis* | Scarlet Pimpernel |
| | *Aster subulatus* | Wild Aster |
| | *Brassica* | Mustard Weed |
| | *Bromus catharticus* | Prairie grass |
| | *Chenopodium album* | Fat Hen |
| | *Chloris gayana* | Rhodes Grass |
| | *Conyza* | Fleabane |
| | *Cirsium vulgare* | Spear Thistle |
| | *Juncus acutus* | Spiny Rush |
| | *Lantana camara* | Lantana |
| | *Ligustrum lucidum* | Large Leaved Privet |
| | *Ligustrum sinense* | Small leave Privet |
| | *Pavonia hastata* | Pink Pavonia |
| | *Plantago* | Lamb's tongue |
| | *Malvaceae sylvestris* | Common Mallow |
| | Myriophyllum aquaticum | Parrot's Feather |
| | *Onopordum* | Cotton Thistles |
| | *Paspalum dilatatum* | paspalum |
| | *Pennisetum clandestinum* | Kikuyu grass |
| | *Setaria sphacelata* | Pigeon Grass |
| | *Sonchus oleraceus* | Sow Thistle |
| | *Trifolium spp.* | Clover |
| | *Tradescantia fluminensis* | Wandering Jew |
| | *Verbena Bonariensis* | Purple Top |

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| Type | Scientific name | Common name |
|---|---|---|
| | *Rubus fruticosis* | Blackberry |
| | *Solanum nightshade* | Blackberry nightshade |
| | *Cirsium vulgare* | Spear Thistle |
| | *Sida rhombifolia* | Paddy's Lucerne |
| | *Eragrostis curvula* | African Love grass |
| | *Cenchrum clandestina* | Kikuyu |
| | *Acetosa saggitata* | Turkey Rhubarb |
| | *Acetosella vulgaris* | Sheep Sorrel |
| | *Ageratina adenophora* | Crofton Weed |
| | *Bidens pilosa* | Cobbler's Pegs |
| | *Brassica fruticulosa* | Twiggy Turnip |
| | *Brassica rapa* | Wild Turnip |
| | *Conyza sumatrensis* | Fleabane |
| | *Ehrharta erecta* | Panic Veldtgrass |
| | *Euphorbia peplus* | Spurge |
| | *Hypericum perforatum* | St John's Wort |
| | *Hypochaeris radicata* | Cats Ear |
| | *Juncus acutus* | Spiny Rush |
| | *Lactuca serriola* | Prickly Lettuce |
| | *Lotus suaveolans* | Hairy Bird's Foot Trefoil |
| | *Medicago polymorpha* | Burr Medic |
| | *Modiola caroliniana* | Red-flowered Mallow |
| | *Oxalis corniculata* | Yellow Wood Sorrel |
| | *Paspalum dilatatum* | Paspalum |
| | *Romulea rosea* | Onion Grass |
| | *Rumex crispus* | Curled Dock |
| | *Setaria parviflora* | Slender pigeon grass |
| | *Sida rhombifolia* | Paddy's Lucerne |
| | *Taraxacum officinale* | Dandelion |
| | *Trifolium repens* | White Clover |
| | *Verbena bonariensis* | Purpletop |
| Epiphytes | *Amyema gaudichaudii* | Mistletoe |

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# Appendix C Response to NRAR

*The Natural Resources Access Regulator (NRAR) recommends the following:*

*1. In accordance with Condition of consent B33 (c) a 40m vegetated riparian zone is required around Eskdale Creek re-alignment works. It is unclear this has been provided from the Figures in the Vegetation Management Plan and there is a concern a smaller distance has been provided especially on the northern side. NRAR requests clarification on the measurements of the vegetated riparian zone widths around Eskdale Creek re-alignment and show if there are any offsets provided (Baker, 2021).*

The VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 and as such has not been changed. This includes a 40m riparian corridor for Eskdale Creek. Drawings can be found in Appendix J LHIBH, Eastern Creek, NSW Civil Engineering works at: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190809T033959.700%20GMT, in drawing 18652_SSDA_C101. **[Appendix E in this document]**,
Appendix H at
https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190801T061220.585%20GMT

# Appendix D Response to EES

The Environment, Energy and Science Group (EES) has provided the following comments on the draft VMP:

## TABLE 2 – SSDA CONDITION OF CONSENT B33

*Table 2 requires that prior to clearing for construction the Applicant must prepare a Vegetation Management Plan (VMP) and that the plan must include:*

*(a) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth*
*(b) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone.*

*Table 2 indicates (b) and (c) are "addressed separately" but no details are provided in Table 2 on where these are addressed. For clarity it is recommended the VMP identifies where (b) and (c) are addressed.*

(a) Addressed in Section 9.3.3, last paragraph. Refer to **Appendix G** for the Northrop letter concerning light and moisture penetration.

(b) The VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 and drawing 18652_SSDA_C101(08) **[Appendix E]** specifically includes a 40m riparian corridor for Eskdale Creek. See:
https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT

Drawings can also be found in Appendix J LHIBH, Eastern Creek, NSW Civil Engineering works at:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190809T033959.700%20GMT,

And Appendix H at:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190801T061220.585%20GMT

Table 2 has been updated.

## TABLE 3 ADDITIONAL CONSENT CONDITIONS

*Table 3 indicates the VMP will include a scaled plan which locates the watercourse and the top of highest bank and the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creak (measured from the top of highest bank) and it refers to Figures 1, 2,3, 4, 7, 10, 13 (page 4) but these figures do not show the top of the highest bank or the riparian corridor widths.*

*Table 3 indicates the VMP will include "details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and*

*light to penetrate under the bridge structure where practical". Table 3 indicates this requirement is "addressed separately" (page 5) but no details are provided as to where it is addressed. EES recommends the VMP provides details on where this is to be addressed.*

Figures 1 to 4 have been amended to include Top of Bank and riparian corridor widths.

Table 3 has been updated.

### TRANSLOCATION OF JUVENILE PLANTS

*EES previously recommended any juvenile native plants that are to be removed as part of the development are translocated to the riparian corridors, Bushland Corridor and landscape buffer areas. The Response to Submission Addendum (RtSA) confirmed that juvenile trees and shrubs will be translocated into areas managed by the VMP wherever possible. Table 3 in the VMP under 'item' indicates that the VMP will include that the juvenile plants will be removed and replanted to locations where plants from these PCTs would naturally occur and that the juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. Table 3 indicates sections 3.1.3 and 3.1.4 deal with this item and it also states, "prior clearing of vegetation not part of VMP". EES notes that Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species.*

An assessment by a restoration ecologist in VMP 3 (construction of bridge crossing) is included prior to construction works in Sections 3.1.4, 3.2.3 and 3.3.3. Additionally, Sections 2.9 and 3.1.3 supportively include the approval of a Restoration Ecologist for soil readiness post construction and suitable species selection, respectively. A bush regenerator has been included to implement the details of the plan.

### FIGURES 1 - 4

*EES notes the key to Figures 1-4 includes stream order. It is recommended the key is amended to also include the associated riparian corridor widths for each stream order 1-4 and a note is included that the width of the Vegetation Riparian Zone (VRZ) is to be measured from the top of the highest bank on both sides of the watercourses in accordance with the Natural Resources Access Regulator (NRAR) (2018) Guidelines for controlled activities on waterfront land riparian corridors.*

The Top of Bank and riparian widths have been included in Figures 1 – 4. As per 18652_SSDA_C101(08), channels are 9m wide and low flow is 2.5m wide indicated in **Appendix E.**

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT

### 2.5 FAUNA

*Section 2.5 of the draft VMP indicates no feral animals were observed within the VMP areas but it refers to rabbit warrens and cattle being present. It also states, "all fauna relocation must be performed as per the Wildlife Management Plan". EES recommends the VMP outlines that:*

- *prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows*
- *if hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.*

Additional management actions included in the relevant subsections of Section 3.1.

### 2.7 DRAINAGE AND HYDROLOGY

*Section 2.7 indicates Reedy Creek is a 2nd order stream according to Strahler Stream Order and it requires a 20m VRZ on either side of the channel as stipulated by the NSW Office of Water, now NRAR (NRAR 2012). Based on Figures 1, 2, 3 and 4 in the draft VMP Reedy Creek appears to be a third order stream and not a 2nd order stream. The BDAR for this SSD also states that "Reedy Creek is classified as a third order stream" (see section 2.1.3 of the BDAR).*

*In accordance with the NSW Office of Water the Guidelines (2012) for riparian corridors on waterfront land and the NRAR (2018) Guidelines for controlled activities on waterfront land riparian corridors, third order streams require a 30m wide VRZ (measured from the top of the highest bank) on both sides of the. If Reedy Creek is a third order stream the VMP needs to be amended accordingly.*

Reedy Creek is, in fact, a 3rd order stream and this has been corrected in the VMP. However, the VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 as B33 (c) which stipulates a 40m riparian corridor, and the approved drawing thereof in drawing 18652_SSDA_C101(08) **[Appendix E].** The complete set of drawings can also be located at:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT

### 3.1.1.3 SEDIMENT FENCING

*Section 3.1.1.3 of the VMP states regular monitoring of the sediment fence will be required. It is recommended this section details whether the inspections of the sediment fencing will be conducted daily/weekly etc and/or prior to and following rainfall events etc. It is recommended monitoring of the sediment fences occurs prior to forecast rain and following rain to ensure the sediments fences are correctly installed and working.*

*Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until to VMP areas are identified as vegetated and stable.*

Sediment fencing addressed as advised in Section 3.1.1.3.

### 3.1.3 SEED COLLECTION AND SPECIES SUBSTITUTION

*EES in its submission on the RtSA recommended the location of all native seed sources should be identified in the VMP but Section 3.1.3 does not specifically address this. Also the RtSA confirmed that seed collection from the cleared vegetation is to form part of the works outlined within the VMP but*

*Section 3.1.3 in the VMP does not state that seed is also to be collected from remnant native vegetation that have been approved for removal as part of this SSD.*

*EES previously recommended that the proponent commences collecting native seed from the site where vegetation is to be removed and/or sourcing local native plant species particularly trees and/or growing local trees as soon as possible, so the trees to be planted are advanced in size to assist improve the urban tree canopy and local biodiversity.*

*A bush regenerator should be engaged to collect native seed from the areas that have been approved to be cleared and developed and to propagate local native provenance plants so that plants are available (including advanced trees) for replanting in the VMP area and elsewhere on the site.*

Native remnant stock addressed in Section 3.1.4. A bush regenerator and restoration ecologist has been included as well. However, the precise location of all native seed sources will depend on a number of factors including the timing and staging of works. While as much material as possible will be collected on-site, some seed will need to be sourced from reputable local providers.

Seed collection has been clarified in Section 3.1.3 however, the staging of works will determine the viability of this seed. Advanced stock trees are not recommended in the VMP at this time as they will not establish as quickly as tubestock and may be less suited to the site conditions.

### 3.1.4 PRESERVATION OF NATIVE VEGETATION

*As noted above Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species. The plants should be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and the plants should be maintained (watering and weeding etc) until established.*

*The VMP should include details on the total number of trees that have been approved to be removed and how many of these trees can be sawn into 2-3m lengths and appropriately relocated into the three VMP Conservation Areas. The VMP should include a Table and a Figure which identifies trees approved for removal including hollow bearing trees.*

*Comparing Figure 4.3 in the BDAR with Figure 4 in the draft VMP shows there are hollow bearing trees in proximity to the VMP3 area.*

Section 3.1.4 includes a Restoration Ecologist to do a pre-clearance survey, compile a methodology for clearance and trimming, juvenile native harvesting and nurturing harvested stock until revegetation implementation.

### REUSE AND REMOVED TREES

*The VMP indicates that where vegetation is approved for removal, both in the VMP area and the development footprint, large pieces of wood (i.e. greater than 6 cm in diameter) should be stockpiled for later use in the VMP area (see Section 3.1.4). The '6cm in diameter' is assumed to be a typographic error for '60 cm in diameter'*

*EES encourages and supports the salvage and reuse of tree trunks, tree hollows and root balls from trees that have been approved for removal to enhance habitat in the VMP conservation areas and elsewhere in the Western Sydney Parklands. However, EES recommends the project reuses tree trunks (greater than approximately 25-30cm in diameter and 2-3m in length) within the VMP area. EES notes the Development Consent (dated 31 August 2020) for SSD-9667 includes the salvage and reuse of native tree trunks (greater than approximately 25-30 cm in diameter and 3m in length) as a Biodiversity mitigation measure (5) in Appendix 2 (Applicant's Management and Mitigation Measures).*

*The 'relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist and it is recommended the VMP outlines this.*

*Also the VMP should outline as per the mitigation measure in the Development Consent that where tree trunks are unable to be used to enhance habitat on the site, the Applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing of the trees by other means. It is recommended the VMP includes a separate section to address this.*

Section 3.1.4 adopts the ESS recommended log diameter size and length. The Project Ecologist has been included in overseeing the salvage and reuse works.

Addressed as advised in Section 3.1.6

#### REUSE OF TREE HOLLOWS

*EES recommends the VMP includes a separate section on the salvage and reuse of tree hollows that have been approved for removal. The BDAR for this SSD notes all hollow bearing trees within the subject land including seven hollow bearing trees would be cleared as part of the SSD proposal (section 6.1.1 of the BDAR). The BDAR recommends that the hollow bearing trees are salvaged as part of the project and utilised in the Eskdale Creek realignment works but the VMP does not address this.*

*The VMP should outline that prior to felling and clearing hollow bearing trees the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site on the same day that the tree hollows are removed and prior to the release of any native fauna found using the tree hollows.*

Addressed in Section 3.1.4, 3.1.5 and 3.1.7 as advised.

### 3.1.5 NEST BOXES

*EES previously recommended for this SSD that prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Section 3.1.5 of the VMP states any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes and this will need to be identified in a nest box management plan. It is unclear when the nest box management plan is to be prepared but the plan should provide details on:*

- *the size, type, number, and location of nest boxes to be installed based on the results of the pre-clearing survey.*

*The VMP and Nest Box Management Plan should outline:*

- *replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing*
- *the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows*
- *if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.*

Addressed in Section 3.1.7 as advised.

### 3.3 MANAGEMENT ZONE METHODOLOGIES

*Section 3.3 notes the three VMP sites have been divided into seven vegetation management zones. Table 9 indicates the seventh management zone 7 – the Outer Riparian Zone (MZ7) applies to VMP 1 only. It is noted in Section 3.3.7 that final plans have not been developed for this area and management requirements and performance criteria may need to be updated when this is complete but it unclear when the final plans are to be developed for MZ7.*

Addressed in Section 3.3.7. The zone is an extension of the batter and will be given the same treatment and revegetation as the batters.

### 3.5 MAINTENANCE

*The maintenance section of the VMP should add:*

- *any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity and cross link to Table 15 (performance criteria) on page 43.*
- *Details on maintenance replanting should be documented in the half-yearly and annual progress reports (see section 4.2 of VMP). Any new species must still be from the community being emulated and local provenance.*
- *Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion*.

Addressed in Section 3.5 and performance criteria as advised.

### 4.2 REPORTING

*The reporting should identify and provide details on any plant losses and replacement planting.*

Addressed in Section 4.2 as advised.

### 5.1 IMPLEMENTATION SCHEDULE

*Section 5.1 lists the responsibilities that have been identified and this includes Vegetation Management Works (Bush Regenerator contractor) but it does include the Restoration Ecologist that is referred to in Sections 2.9; 3; 3.1.1.3; 3.1.3; 3.1.4; and 3.3.7 of the VMP. It is recommended Section 5.1 is amended to include this detail.*

Addressed in Section 5.2 as advised.

### TABLE 17 SCHEDULE

*Table 2 requires that prior to clearing for construction the Applicant must prepare a VMP. EES notes that Table 3 indicates that prior clearing of vegetation is not part of the VMP, but it is unclear how the site clearing ties in with the VMP and it is recommended the VMP includes details on this.*

*Table 17 lists seed collection and clearing under 'Revegetation' but seed collection should be undertaken prior to any clearing of vegetation. Seed collected prior to clearing should be propagated so that plants are available for revegetating the VMP areas and elsewhere on the site and it is recommended Table 17 specifies this.*

Schedule revised to include pre-clearance survey, plans and clearing timing.

Seed collection addressed in 3.1.3 and in the schedule.

### APPENDIX A – STRATIFIED NATIVE SPECIES LIST

*Some plant species in Appendix A have a star next to them but there is no key provided to identify what this means.*

Asterisks have been removed from table.

# Appendix E – 18652_SSDA_C101_08

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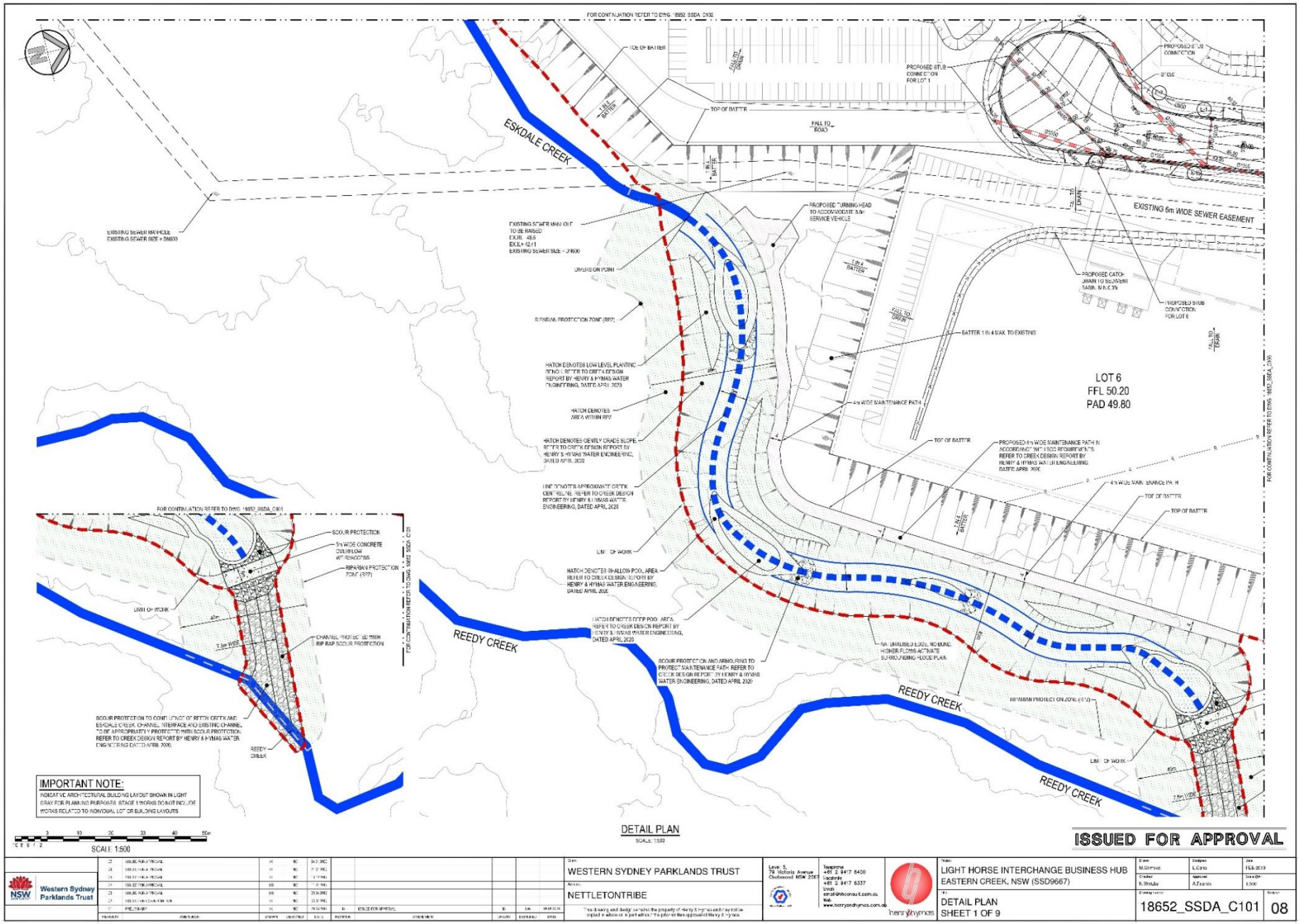
ESKDALE CREEK
REEDY CREEK
REEDY CREEK
REEDY CREEK
EXISTING 6m WIDE SEWER EASEMENT
LOT 6
FFL 50.20
PAD 49.80
PROPOSED TURNING HEAD TO ACCOMMODATE 8.8m SERVICE VEHICLE
PROPOSED STUB CONNECTION FOR LOT 1
PROPOSED STUB CONNECTION FOR LOT 6
PROPOSED CATCH-DRAIN TO SURROUNDING SWALE, MIN 0.3%
BATTER 1 IN 4 MAX. TO EXISTING
TOP OF BATTER
TOE OF BATTER
FALL TO ROAD
FALL TO SWALE
EXISTING SEWER MANHOLE EXISTING SEWER SIZE = DN600
EXISTING SEWER MAIN OUT TO BE RAISED EXIST. 48.6 EXIST+0.41 EXISTING SEWER SIZE = DN600
DRAINS ON POINT
RIPARIAN PROTECTION ZONE (RPZ)
HATCH DENOTES LOW LEVEL PLANTING WITHIN RPZ TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
HATCH DENOTES AREA WITHIN RPZ
HATCH DENOTES GENTLY GRADE SLOPE. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
LINE DENOTES APPROXIMATE CREEK CENTRELINE. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
LIMIT OF WORK
HATCH DENOTES SHALLOW POOL AREA. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
HATCH DENOTES DEEP POOL AREA. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
SCOUR PROTECTION AND ARMOURING TO PROTECT MAINTENANCE PATH. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
4m WIDE MAINTENANCE PATH
PROPOSED 4m WIDE MAINTENANCE PATH IN ACCORDANCE WITH LSCD REQUIREMENTS. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING, DATED APRIL 2020
RIPARIAN PROTECTION ZONE (RPZ)
FOR CONTINUATION REFER TO DWG 18652_SSDA_C101
SCOUR PROTECTION
5m WIDE CONCRETE OVERFLOW APPROACHES
RIPARIAN PROTECTION ZONE (RPZ)
CHANNEL PROTECTED WITH RIP RAP SCOUR PROTECTION
SCOUR PROTECTION TO CONFLUENCE OF BETTS CREEK AND ESKDALE CREEK CHANNEL INTERFACE AND EXISTING CHANNEL TO BE APPROPRIATELY PROTECTED WITH SCOUR PROTECTION. REFER TO CREEK DESIGN REPORT BY HENRY & HYMAS WATER ENGINEERING DATED APRIL 2020.
IMPORTANT NOTE:
INDICATIVE ARCHITECTURAL BUILDING LAYOUT SHOWN IN LIGHT GRAY FOR PLANNING PURPOSES. STAGE 1 WORKS DO NOT INCLUDE WORKS RELATED TO INDIVIDUAL LOT OR BUILDING LAYOUTS
SCALE: 1:500
DETAIL PLAN
SCALE: 1:500
ISSUED FOR APPROVAL
WESTERN SYDNEY PARKLANDS TRUST
NETTLETONTRIBE
LIGHT HORSE INTERCHANGE BUSINESS HUB
EASTERN CREEK, NSW (SSD9667)
DETAIL PLAN
SHEET 1 OF 9
18652_SSDA_C101
08

# Appendix F NRAR letter

Contact: Natural Resources Access Regulator
Phone: 1800 633 362
Email: nrar.enquiries@nrar.nsw.gov.au

Our ref: DOC21/317894, V15/3875-6#4

7 December 2021 Attention: Tom Game

Email: Tom.Game@charterhall.com.au

Dear Tom,

**Re: Light Horse Interchange Business Hub Eastern Creek Vegetation Management Plan (SSD 9667)**

Thank you for giving the Natural Resources Access Regulator (NRAR) the opportunity to review the Light Horse Interchange Business Hub Eastern Creek Vegetation Management Plan (SSD 9667).

The Natural Resources Access Regulator (NRAR) recommends the following:

1. In accordance with Condition of consent B33 (c) a 40m vegetated riparian zone is required around Eskdale Creek re-alignment works. It is unclear this has been provided from the Figures in the Vegetation Management Plan and there is a concern a smaller distance has been provided especially on the northern side. NRAR requests clarification on the measurements of the vegetated riparian zone widths around Eskdale Creek re-alignment and show if there are any offsets provided.

Should you have any further queries in relation to this submission please do not hesitate to contact the Natural Resources Access Regulator's Service Support Team at nrar.servicedesk@dpie.nsw.gov.au.

Yours Sincerely

**Tim Baker**
**Senior Water Regulation Officer**
**Water Regulatory Operations**
**Natural Resources Access Regulator**

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150 | LOCKED BAG 5022, Parramatta, NSW 2124
nrar.servicedesk@dpie.nsw.gov.au | https://www.dpie.nsw.gov.au/nrar

# Appendix G – Northrop letter

– Level 1, 215 Pacific Highway

Charlestown NSW 2290

02 4943 1777

newcastle@northrop.com.au

ABN 81 094 433 100 16

December 2021

SY201519

Tom Game

Level 20, No.1 Martin Place

Sydney, NSW, 2000

Dear Tom,

**Re: Light Horse Interchange Business Hub Bridge**

The intent of this letter is to address the requirements condition clause B33 (b) Vegetation management plan which requires that the bridge design includes “measures to minimise vegetation clearing for the bridge construction over Eastern Creek and to maximise opportunities for light and moisture penetration underneath the bridge to encourage native plat growth”.

During the design development we have strived to achieve this in the following manner:

- We have minimised the footprint of the substructure by providing columns founded directly on piles which enables us to eliminate any requirement for a large concrete pile cap at the base of the structure.
- Individual columns have been used instead of blade walls to minimise the area of concrete under the structure and promote the penetration of light through the substructure.
- We have optimised the thickness of the superstructure such that the beams do not encroach unnecessarily below the road surface level.
- Precast concrete construction has been used for the bridge beams to minimise the need for formwork under the bridge and to promote decreased construction time and impact.

Should you require anything further please do not hesitate to contact us.

Yours sincerely,

**Richard Officer**
Associate | Senior Structural Engineer BEng
MIEAust CPEng NER

| | | Date |
|---|---|---|
| Prepared by | RO | 16/12/2021 |

SY201519 / 16 December 2021 / Revision A
Y:\SYDNEY 2020\SY201519 Lighthorse Interchange Bridge\1. Project Management and Proposal docs\SY201519_Northrop Response Vegetation Management Plan.docx



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# Appendix H -ESS Response

Our ref: DOC21/1056739
Your ref: SSD-9667

Mr Tom Game

Charter Hall

Dear Mr Game

**Subject: EES comments on post approval draft Vegetation Management Plan for Light Horse Interchange Business Hub – 165 Wallgrove Road and 475 Ferrers Road Easter Creek - SSD-9667**

Thank you for your email of 19 November 2021 requesting comments on the post approval draft Vegetation Management Plan (VMP) this State Significant Development (SSD).

The Environment, Energy and Science Group (EES) has reviewed the draft VMP and provides its recommendations and comments at Attachment A. EES considered that the consultation required with EES under condition consent B33 has now been completed and no further consultation is required.

If you have any queries regarding this matter, please do not hesitate to contact Janne Grose,

Senior Conservation Planning Officer on 02 8837 6017 or at janne.grose@environment.nsw.gov.au

Yours sincerely

S. Harrison

08/12/21

Susan Harrison

**Senior Team Leader Planning Greater Sydney Branch Environment, Energy and Science**

CC: William Hodgkinson , Planning and Assessment Group

**Attachment A Subject: EES comments on post approval draft Vegetation Management Plan for Light Horse Interchange Business Hub – 165 Wallgrove Road and 475 Ferrers Road Easter Creek - SSD-9667**

The Environment, Energy and Science Group (EES) has reviewed the draft Vegetation Management Plan (VMP) for this SSD and provides the following comments.

**Table 2 – SSDA Condition of Consent B33**

Table 2 requires that prior to clearing for construction the Applicant must prepare a Vegetation Management Plan (VMP) and that the plan must include:

(b) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth
(c) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone.

Table 2 indicates (b) and (c) are "addressed separately" but no details are provided in Table 2 on where these are addressed. For clarity it is recommended the VMP identifies where (b) and (c) are addressed.

**Table 3 Additional consent conditions**

Table 3 indicates the VMP will include a scaled plan which locates the watercourse and the top of highest bank and the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creak (measured from the top of highest bank) and it refers to Figures 1, 2,3, 4, 7, 10, 13 (page 4) but these figures do not show the top of the highest bank or the riparian corridor widths.

Table 3 indicates the VMP will include "details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical". Table 3 indicates this requirement is "addressed separately" (page 5) but no details are provided as to where it is addressed. EES recommends the VMP provides details on where this is to be addressed.

**Translocation of Juvenile Plants**

EES previously recommended any juvenile native plants that are to be removed as part of the development are translocated to the riparian corridors, Bushland Corridor and landscape buffer areas. The Response to Submission Addendum (RtSA) confirmed that juvenile trees and shrubs will be translocated into areas managed by the VMP wherever possible. Table 3 in the VMP under

'item' indicates that the VMP will include that the juvenile plants will be removed and replanted to locations where plants from these PCTs would naturally occur and that the juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. Table 3 indicates sections 3.1.3 and 3.1.4 deal with this item and it also states, "prior clearing of vegetation not part of VMP". EES notes that Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species.

**Figures 1 - 4**

EES notes the key to Figures 1-4 includes stream order. It is recommended the key is amended to also include the associated riparian corridor widths for each stream order 1-4 and a note is included that the width of the Vegetation Riparian Zone (VRZ) is to be measured from the top of the highest bank on both sides of the watercourses in accordance with the Natural Resources Access Regulator (NRAR) (2018) Guidelines for controlled activities on waterfront land riparian corridors.

**2.5 Fauna**

Section 2.5 of the draft VMP indicates no feral animals were observed within the VMP areas but it refers to rabbit warrens and cattle being present. It also states, "all fauna relocation must be performed as per the Wildlife Management Plan". EES recommends the VMP outlines that:

- prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows
- if hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

**2.7 Drainage and Hydrology**

Section 2.7 indicates Reedy Creek is a 2nd order stream according to Strahler Stream Order and it requires a 20m VRZ on either side of the channel as stipulated by the NSW Office of Water, now NRAR (NRAR 2012). Based on Figures 1, 2, 3 and 4 in the draft VMP Reedy Creek appears to be a third order stream and not a 2nd order stream. The BDAR for this SSD also states that "Reedy Creek is classified as a third order stream" (see section 2.1.3 of the BDAR).

In accordance with the NSW Office of Water the Guidelines (2012) for riparian corridors on waterfront land and the NRAR (2018) Guidelines for controlled activities on waterfront land riparian corridors, third order streams require a 30m wide VRZ (measured from the top of the

highest bank) on both sides of the. If Reedy Creek is a third order stream the VMP needs to be amended accordingly.

#### 3.1.1.3 Sediment fencing

Section 3.1.1.3 of the VMP states regular monitoring of the sediment fence will be required. It is recommended this section details whether the inspections of the sediment fencing will be conducted daily/weekly etc and/or prior to and following rainfall events etc. It is recommended monitoring of the sediment fences occurs prior to forecast rain and following rain to ensure the sediments fences are correctly installed and working.

Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until to VMP areas are identified as vegetated and stable.

### 3.1.3 Seed collection and species substitution

EES in its submission on the RtSA recommended the location of all native seed sources should be identified in the VMP but Section 3.1.3 does not specifically address this. Also the RtSA confirmed that seed collection from the cleared vegetation is to form part of the works outlined within the VMP but Section 3.1.3 in the VMP does not state that seed is also to be collected from remnant native vegetation that have been approved for removal as part of this SSD.

EES previously recommended that the proponent commences collecting native seed from the site where vegetation is to be removed and/or sourcing local native plant species particularly trees and/or growing local trees as soon as possible, so the trees to be planted are advanced in size to assist improve the urban tree canopy and local biodiversity.

A bush regenerator should be engaged to collect native seed from the areas that have been approved to be cleared and developed and to propagate local native provenance plants so that plants are available (including advanced trees) for replanting in the VMP area and elsewhere on the site.

### 3.1.4 Preservation of native vegetation

As noted above Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species. The plants should be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and the plants should be maintained (watering and weeding etc) until established.

The VMP should include details on the total number of trees that have been approved to be removed and how many of these trees can be sawn into 2-3m lengths and appropriately relocated into the three VMP Conservation Areas. The VMP should include a Table and a Figure which identifies trees approved for removal including hollow bearing trees.

Comparing Figure 4.3 in the BDAR with Figure 4 in the draft VMP shows there are hollow bearing trees in proximity to the VMP3 area.

**Reuse and removed trees**

The VMP indicates that where vegetation is approved for removal, both in the VMP area and the development footprint, large pieces of wood (i.e. greater than 6 cm in diameter) should be stockpiled for later use in the VMP area (see Section 3.1.4). The '6cm in diameter' is assumed to be a typographic error for '60 cm in diameter'

EES encourages and supports the salvage and reuse of tree trunks, tree hollows and root balls from trees that have been approved for removal to enhance habitat in the VMP conservation areas and elsewhere in the Western Sydney Parklands. However, EES recommends the project reuses tree trunks (greater than approximately 25-30cm in diameter and 2-3m in length) within the VMP area. EES notes the Development Consent (dated 31 August 2020) for SSD-9667 includes the salvage and reuse of native tree trunks (greater than approximately 25-30 cm in diameter and 3m in length) as a Biodiversity mitigation measure (5) in Appendix 2 (Applicant's Management and Mitigation Measures).

The 'relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist and it is recommended the VMP outlines this.

Also the VMP should outline as per the mitigation measure in the Development Consent that where tree trunks are unable to be used to enhance habitat on the site, the Applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing

of the trees by other means. It is recommended the VMP includes a separate section to address this.

**Reuse of Tree hollows**

EES recommends the VMP includes a separate section on the salvage and reuse of tree hollows that have been approved for removal. The BDAR for this SSD notes all hollow bearing trees within the subject land including seven hollow bearing trees would be cleared as part of the SSD proposal (section 6.1.1 of the BDAR). The BDAR recommends that the hollow bearing trees are salvaged as part of the project and utilised in the Eskdale Creek realignment works but the VMP does not address this.

The VMP should outline that prior to felling and clearing hollow bearing trees the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site on the same day that the tree hollows are removed and prior to the release of any native fauna found using the tree hollows.

**3.1.5 Nest Boxes**

EES previously recommended for this SSD that prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Section 3.1.5 of the VMP states any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes and this will need to be identified in a nest box management plan. It is unclear when the nest box management plan is to be prepared but the plan should provide details on:

- the size, type, number, and location of nest boxes to be installed based on the results of the pre-clearing survey.

The VMP and Nest Box Management Plan should outline:

- replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing
- the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows
- if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

**3.3 Management Zone methodologies**

Section 3.3 notes the three VMP sites have been divided into seven vegetation management zones. Table 9 indicates the seventh management zone 7 – the Outer Riparian Zone (MZ7) applies to VMP 1 only. It is noted in Section 3.3.7 that final plans have not been developed for this area and management

requirements and performance criteria may need to be updated when this is complete but it unclear when the final plans are to be developed for MZ7.

### 3.5 Maintenance

The maintenance section of the VMP should add:

- any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity and cross link to Table 15 (performance criteria) on page 43.

- Details on maintenance replanting should be documented in the half-yearly and annual progress reports (see section 4.2 of VMP). Any new species must still be from the community being emulated and local provenance.
- Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.

### 4.2 Reporting

The reporting should identify and provide details on any plant losses and replacement planting.

### 5.1 Implementation Schedule

Section 5.1 lists the responsibilities that have been identified and this includes Vegetation Management Works (Bush Regenerator contractor) but it does include the Restoration Ecologist that is referred to in Sections 2.9; 3; 3.1.1.3; 3.1.3; 3.1.4; and 3.3.7 of the VMP. It is recommended Section 5.1 is amended to include this detail.

### Table 17 Schedule

Table 2 requires that prior to clearing for construction the Applicant must prepare a VMP. EES notes that Table 3 indicates that prior clearing of vegetation is not part of the VMP, but it is unclear how the site clearing ties in with the VMP and it is recommended the VMP includes details on this.

Table 17 lists seed collection and clearing under 'Revegetation' but seed collection should be undertaken prior to any clearing of vegetation. Seed collected prior to clearing should be propagated so that plants are available for revegetating the VMP areas and elsewhere on the site and it is recommended Table 17 specifies this.

**Appendix A – Stratified native species list**

Some plant species in Appendix A have a star next to them but there is no key provided to identify what this means.

End of Submission

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# Annexure I - Fauna Relocation Plan

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# Light Horse Interchange – Eskdale Creek Realignment and Fauna Relocation Plan

## Charter Hall

ecological AUSTRALIA
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## DOCUMENT TRACKING

| | |
|---|---|
| **Project Name** | Light Horse Interchange – Eskdale Creek Realignment and Fauna Relocation Plan |
| **Project Number** | 18440 |
| **Project Manager** | David Bonjer |
| **Prepared by** | Jemima Kenworthy |
| **Reviewed by** | Deanne Hickey, Ian Dixon |
| **Approved by** | Deanne Hickey, Ian Dixon |
| **Status** | **Final** |
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### ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Charter Hall

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Template 2.8.1

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# Abbreviations

| Abbreviation | Description |
|---|---|
| BDAR | Biodiversity Development Assessment Report |
| DPIE | NSW Department of Planning, Industry and Environment |
| ELA | Eco Logical Australia |
| VMP | Vegetation Management Plan |

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# 1. Introduction

## 1.1. Consent conditions

Eco Logical Australia (ELA) was engaged by Charter Hall to prepare a Fauna Relocation Plan to minimise the potential impacts of creek realignment on residing fauna within Eskdale Creek. This plan fulfils the requirements outlined in the State Significant Development (SSD-9667) consent conditions, provided by NSW Department of Planning, Industry and Environment (DPIE).

The SSD conditions fulfilled by this plan are as below:

*A Fauna Relocation Plan shall be prepared by a suitably qualified and experienced ecologist prior to filling the existing Eskdale Creek. The Plan must include:*

1. *Native fauna species known to inhabit and/or use the creek which require transfer from the creek;*
2. *Methodology proposed to transfer the fauna;*
3. *Location and suitability of the proposed relocation sites, and;*
4. *Potential impacts of relocating the fauna to the relocation sites.*

## 1.2. Background information

The Light Horse Interchange Business Hub development is located 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek, adjacent to the Light Horse Interchange linking the M4 and M7 Motorways. The site is a part of the Western Sydney Parklands (WSP).

The proposed development footprint (Figure 1) covers approximately 30 hectares and will include general industrial, light industrial, warehouse and distribution centres land uses (Figure 9) (DPIE 2020), requiring a variety of excavation and civil works, vegetation clearing and the diversion of Eskdale Creek into Reedy Creek to accommodate the development.

A Creek Realignment Design Report has been prepared by Henry & Hymas (2020), outlining the diversion method and the conceptual creek design for the proposed constructed section. The impacts on flora and fauna have been assessed in the Biodiversity Development Assessment Report (BDAR) prepared by Ecoplanning (2019). A Vegetation Management Plan (VMP) has been prepared by Eco Logical Australia, along with this Fauna Relocation Plan.

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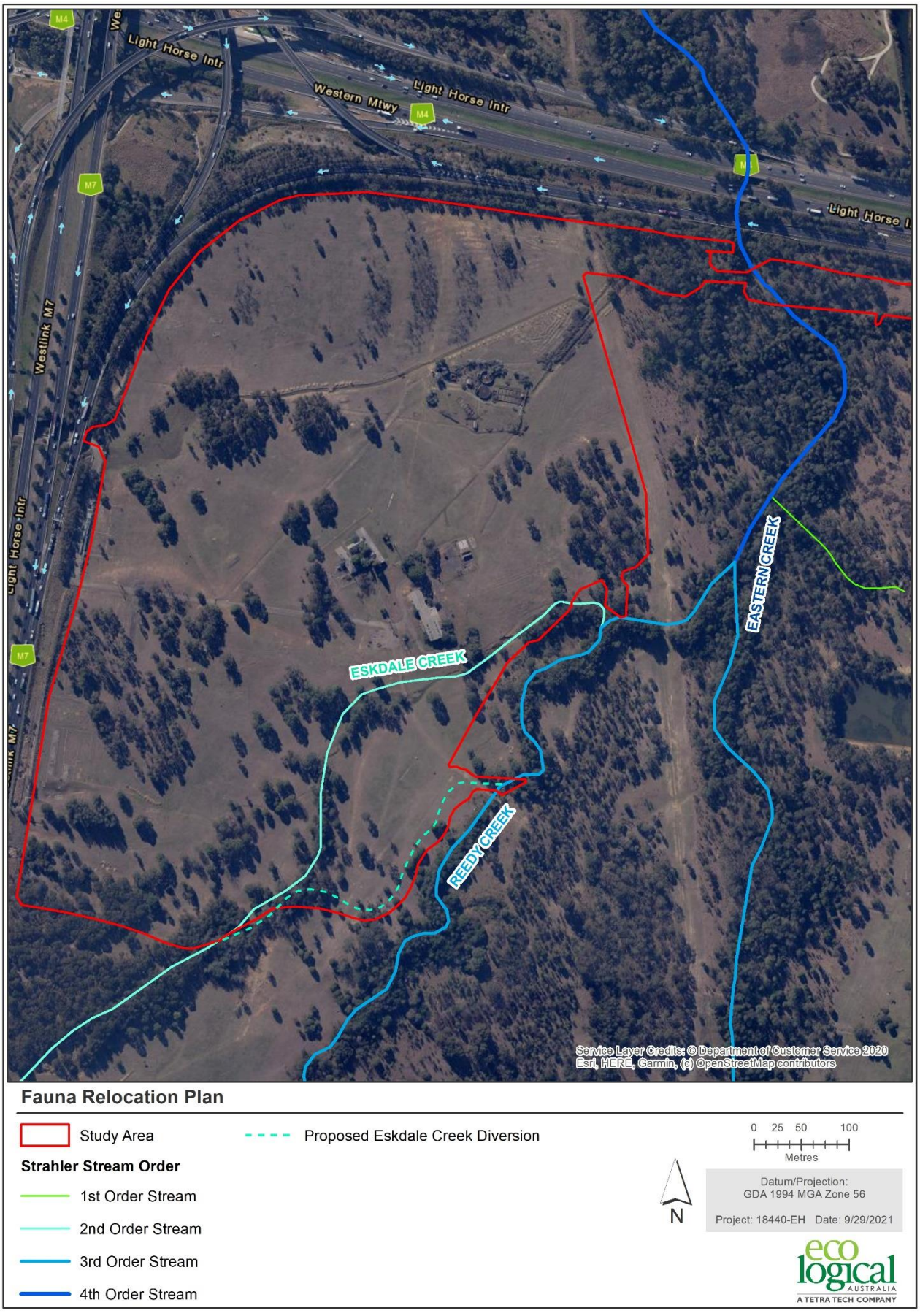


**Figure 1: Location of Eskdale Creek**

# 2. Eskdale Creek realignment supervision

The relocation of fauna prior to and during creek diversion aims to reduce injury or death to aquatic and semi-aquatic fauna during the works. To minimise the impacts on fauna, the following tasks have or will occur:

- A pre-construction survey to assess the extent of realignment works and the currently available habitat for fauna, to inform this Fauna Relocation Plan
- Preparation of a Fauna Relocation Plan (this report) outlining the fauna relocation method to be undertaken during realignment works
- Creek filling supervision and fauna relocation by a suitably qualified ecologist as detailed in this report
- Compliance report summarising diversion works and aquatic fauna relocation

## 2.1. Pre-construction survey

The pre-construction survey was conducted prior to creek realignment to identify the extent of works, the current habitat, the species present or likely to be present and potential fauna relocation sites. This survey was undertaken by ELA ecologist, Adam Halliday on 15 September 2021. Example photos of the site are provided in Figures 2 – 7.

Eskdale Creek lies in the centre of low-lying swamp flats, with heavily eroded banks from cattle use and slumping (Figure 2). The section of the Eskdale Creek within the impact area is approximately 300 m long and was on average 0.5 – 1 m deep.

During the pre-construction survey, a number of tadpoles and small fish were observed. Frogs and crickets could be heard whilst surveying the creek. No threatened fauna species were observed during the survey or are expected to occur. Fauna species considered likely to inhabit the creek are listed in Table 1.

**Table 1: Likely fauna species inhabiting Eskdale Creek**

| Native / Pest | Species |
|---|---|
| **Native** | • *Anguilla australis* (Shortfin Eel)<br>• *Chelodina longicollis* (Eastern Long-necked Turtle)<br>• *Crinia signifera* (Common Eastern Froglet)<br>• *Limnodynastes peronii* (Striped Marsh Frog)<br>• *Litoria peronii* (Peron's Tree Frog)<br>• *Philypnodon grandiceps* (Flathead Gudgeon)<br>• *Litoria fallax* (Eastern Dwarf Tree Frog) |
| **Pest** | • *Gambusia affinis* (Mosquito Fish)<br>• *Carassius auratus* (Wild Goldfish)<br>• *Cyprinus carpio* (Carp)<br>• *Gambusia holbrooki* (Plague Minnow) |

Eskdale Creek contains a variety of native flora, including but not limited to Slender Knotweed (Persicaria decipiens), Duckweed (Lemna minor), Swamp Lily (Ottelia ovalifolia) and Spikerush (Eleocharis acuta)

(Figure 5). Other flora species observed include Parrot Feather (Myriophyllum aquaticum) and algae throughout (Figure 6).

Canopy cover surrounding the creek appears healthy throughout. The canopy consists of River She-Oak (*Casuarina cunninghamiana*), Narrow-leaved Paperbark (*Melaleuca linariifolia*), Forest Red Gum (*Eucalyptus tereticornis*), Cabbage Gum (*Eucalyptus amplifolia*) and Red Ironbark (*Eucalyptus fibrosa*). The lower shrub layer is dominated by Native Blackthorn (*Bursaria spinosa*) and Boxthorn (*Lycium ferocissimum*).

The creek banks are dominated by exotic grasses and weeds which have been heavily grazed overtime and species such as Fire Weed (*Senecio madagascariensis*) are prevalent. Other weeds such as Lantana and Privet become more dominant where Eskdale Creek meets Reedy Creek downstream.

It is possible that other terrestrial fauna (e.g., birds, possums) may be present during clearing and realignment works. Hence, ELA recommend that an ecologist be present during the duration of clearing and alignment at Eskdale Creek to handle terrestrial fauna appropriately, should it be needed. Further recommendations for site works are made in Section 3 of this report.

Figure 2: Eroded and trampled banks

Figure 3: Weeds prevalent downstream

Figure 4: Long pool and riparian vegetation

Figure 5: Tree clearing, grazing and bank slumping

Figure 6: Algae and macrophytes

Figure 7: Shallow pool

## 2.2. Fauna handling and relocation method

To ensure fauna can be captured efficiently during dewatering works, ELA suggests that the following methodology be adhered to during creek diversion works:

a. The construction of the new swampy meadow/chain-of-ponds system as per the design by Henry & Hymas (2020) (Appendix A)
b. The portion of Eskdale Creek to be diverted is cut off, with flows stopped at either end
c. The water is pumped out of the creek and irrigated overland
d. During dewatering or pools, the aquatic ecologist capture and relocate fauna and inspect shallow areas to confirm no aquatic fauna are trapped.

Fauna relocation will only be performed by a person with the following licenses/approvals: Section 37 *Fisheries Management Act 1994* (for fish); Biodiversity Conservation Licence – *Biodiversity Conservation Act 2016* (for turtles, frogs) and an Animal Research Authority (issued by the Secretary's Animal Care & Ethic Committee).

During dewatering and infilling, all observed animals in the creek should be rescued by hand or with hand nets and placed in an appropriately sized container (see specifications below). All uninjured fauna will be relocated into a pool at a nearby release site, as per Section 2.2.4.

Any sick, diseased or critically injured fauna will be euthanised on site. Shocked, orphaned or slightly injured fauna will be monitored prior to release at the relocation site. If they are not mobile, advise will be sought from a nearby veterinarian or wildlife carer. Euthanasia of slightly injured animals should only be undertaken by or upon instruction of a veterinarian. Fauna should be handled in a manner suitable for each species, as outlined in sections 2.2.1 – 2.2.3 of this plan. Fauna groups are not to be mixed in the same container.

Risks to fauna during the relocation are:

- Accidental burying in sediment – mitigated by slow earthworks procedure
- Stress from poor water conditions during dewatering, handling and transport – mitigated by staged dewatering of each pool, short holding time in containers, aeration devices in containers and selection of equal or better host waterbody
- Oversupply of fish in host water body – mitigated by spreading large number across several sites (e.g., no more than 50 eels at one site)
- Predation by other fauna during dewatering (wetland birds) or at release site – mitigated by staged dewatering of pools under supervision, and slow mixing of water at release site to allow fish to adapt.

### 2.2.1. Turtles

Turtles are to be handled in the following way:

- Turtles should be picked up by gripping them firmly on each side of the shell, without turning them upside down.
- Turtles are to be stored in a covered, shaded plastic tub, with a moist hessian material on the bottom for grip.

- Uninjured turtles can be released at the relocation site by lowering them gently into shallow water.
- Any critically injured reptiles (e.g., fractured shell or crushed body) will require immediate euthanasia as per our animal ethics approval.

### 2.2.2. Fish

Fish are to be handled in the following way:

- All fish should be captured using scoop nets. Gloves are to be worn if handling the fish for any reason.
- Dissolved oxygen concentration will drop rapidly as water volume decreases, especially in warm water or if lots of fish are present. Larger bodied fish should be targeted first. Wetland birds will scavenge for small fish in the shallows (e.g., Gambusia). Most small fauna will likely remain uncaptured until the water becomes very shallow. Eels are best captured by large hand nets in water <30 cm deep, although they burrow into mud. When the water is extremely low, fish may head towards the intake pump or deepest water. This area should be monitored to intercept fauna.
- Once captured, fish will be placed carefully in large plastic bins or tubs, with an appropriate amount of creek water, lid and aerator. Whilst waiting for transport to the relocation site, containers should be stored in the shade unless temperatures are mild and/or for a short duration (<1 hour).
- Water from the receiving waterbody should be mixed slowly over 5 - 10 minutes with the tank water to allow fish to acclimatise to the new water quality. Care should be taken when releasing fauna not to also transfer weeds or invasive species (e.g. Carp eggs and Gambusia). Transfer animals via hand nets, rather than tipping the tub with water. Eels can be released on land a few metres from edge and pointed towards the water.
- Any injured or deceased fish should be isolated in different containers from the fish to be relocated.
- Pest, sick or diseased fish are not to be relocated. They are to be euthanised in accordance with our animal ethics approval and disposed of at a licensed waste facility.

### 2.2.3. Amphibians

Amphibians are to be handled in the following way:

- All amphibians should be handled using sterile nitrile gloves to prevent any transfer of chemicals from the hands of the ecologist or any bacteria from the frog to the handler. Frogs should be caught by cupping the hands over the animal and closing the hands around them.
- All individuals should be inspected in the hand for obvious injuries to the skin, limbs or eyes.
- Frogs should be placed in a damp small plastic bag or container, with openings allowing for air to enter and exit, but without allowing the animal to potentially escape. Water should not be added to the container, but instead damp soil or vegetation. This will allow the frogs' skin to keep moist, improving respiration, but not become over-hydrated, which it can when submerged for extended periods. Without adequate ventilation to the plastic bag or container, frogs can expire from carbon-monoxide accumulation.

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- Individual frogs should be placed in separate bags or containers (unless found together), to prevent the spread of disease (i.e., Chytrid fungus).
- If uninjured, amphibians can be relocated to a moist location. If injured, they should be taken to a veterinarian client.

### 2.2.4. Fauna relocation

Three sites have been chosen as possible relocation and release locations for any fauna captured from Eskdale Creek. Where possible, travel time to the release location should be minimised to avoid fauna stress and injury due to movement and changes in temperature. Thus, relocation of fauna into the nearest site (Site 1 or 3) is preferable as the travel time is minimal (Table 2). The relocation sites were also chosen due to easy vehicle access, parking and a small distance from the road to the creek.

The three possible relocation sites have been mapped in Figure 8. Fauna should be relocated into pools within the host creek. Pools should be large enough to accommodate additional fish, especially predatory eels. Additional release sites may be needed to avoid placing stress on hosting waterbodies.

**Table 2: Possible fauna relocation sites**

| Relocation Site | Latitude / Longitude | Travel Time from Eskdale Creek | Direction from Eskdale Creek |
|---|---|---|---|
| Eastern Creek Site 1 (upstream from site) | -33.832917, 150.862028 | Approx. < 10 minutes | South |
| Eastern Creek Site 2 (upstream from site) | -33.837000, 150.861250 | Approx. < 15 minutes | South |
| Eastern Creek Site 3 (downstream from site) | -33.798573, 150.860702 | Approx. < 10 minutes | North |

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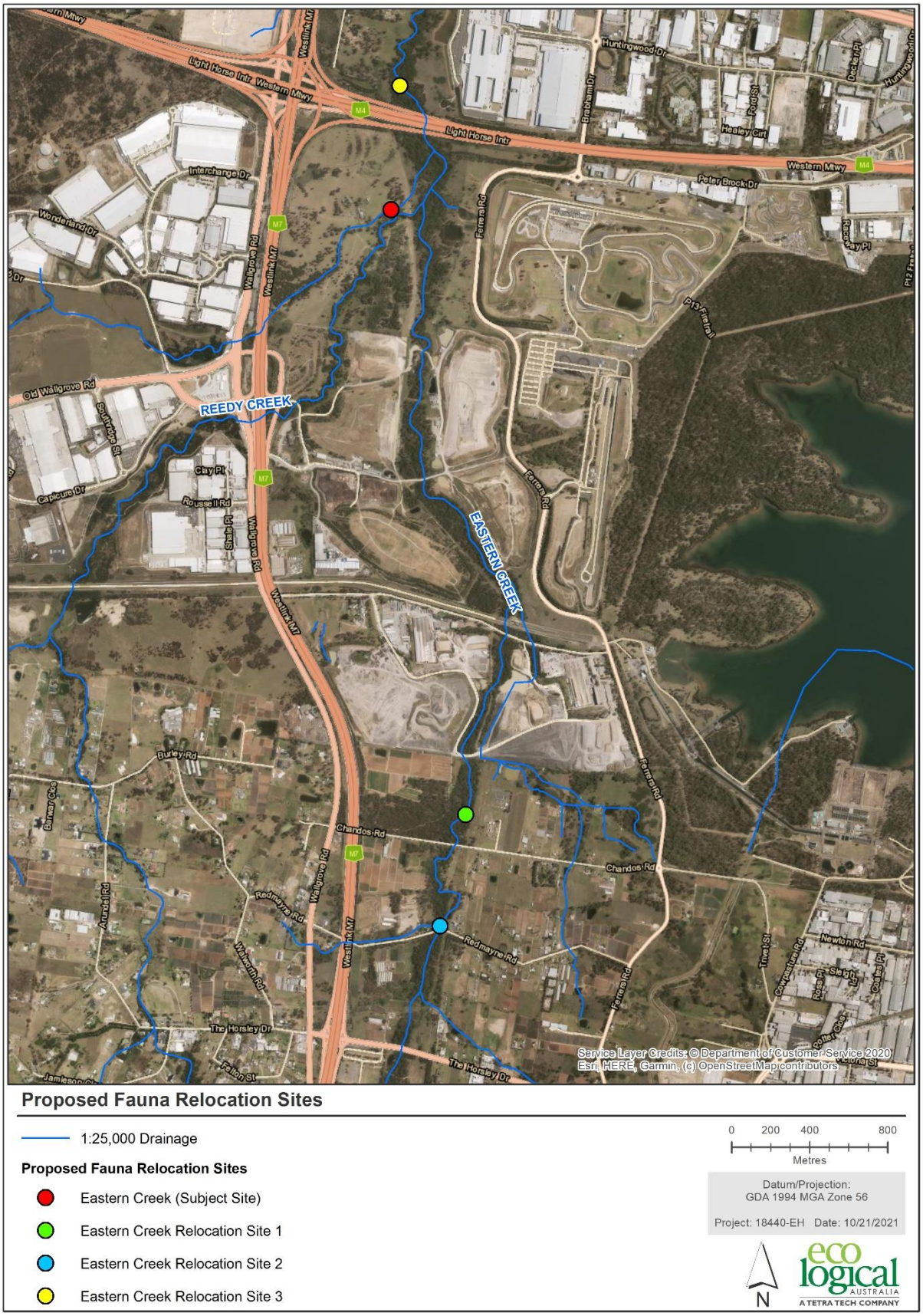


**Figure 8: Proposed fauna relocation sites**

# 3. Recommendations

As per the BDAR prepared by Ecoplanning (2019), pre-clearance protocols should be implemented when vegetation is being cleared onsite. As such, ELA recommends that an ecologist conduct a pre-clearance survey prior to clearance to identify habitat features onsite. ELA understands that seven hollow bearing trees were identified during the surveys associated with the BDAR (Ecoplanning, 2019). These trees, along with any other identified habitat features should be marked with high visibility spray paint and left undisturbed until all other vegetation onsite is cleared, at which point trees with habitat features can be removed under the direct supervision of a qualified ecologist. Having an ecologist present minimises the chance of fauna injury and the need for veterinarian assistance during works.

The pre-construction survey observed several weed species around Eskdale Creek. ELA suggest that where vegetation is to be removed, weeds be pulled from the ground, bagged and disposed of at a licensed waste facility unless managed under another environmental plan. This will minimise weed seed dispersal and the spread of weeds during earthworks onsite.

# 4. Reporting

Following the creek realignment supervision and fauna relocation, a brief summary report will be provided to the client. The report will outline the methodology, results of the creek realignment supervision, including any fauna found and relevant details (e.g., euthanasia, relocation). The following attributes will be recorded for all fauna relocated:

- Species
- Number of individuals
- Capture protocol used
- Injuries observed
- Treatment given and fate of animal (if taken to a veterinarian or wildlife carer)
- Release site
- Photographs
- Recommendations to earthworks team following relocation
- Any other applicable notes.

Any injuries to animals during clearance will also be reported as per our animal ethics authority.

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# 5. References

Eco Logical Australia 2021. *Vegetation Management Plan (VMP), Light Horse Interchange Business Hub.*

Ecoplanning 2019. *Biodiversity Development Assessment Report (BDAR), Light Horse Interchange Business Hub*.

Henry & Hymas 2020. *Creek Realignment Design Report Light Horse Interchange Business Hub, Eastern Creek State Significant Development Application (SSD 9667).*

NSW Department of Planning, Industry and Environment 2020. *Light Horse Interchange Business Hub, Eastern Creek State Significant Development Assessment SSD-9667*

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# 6. Appendix

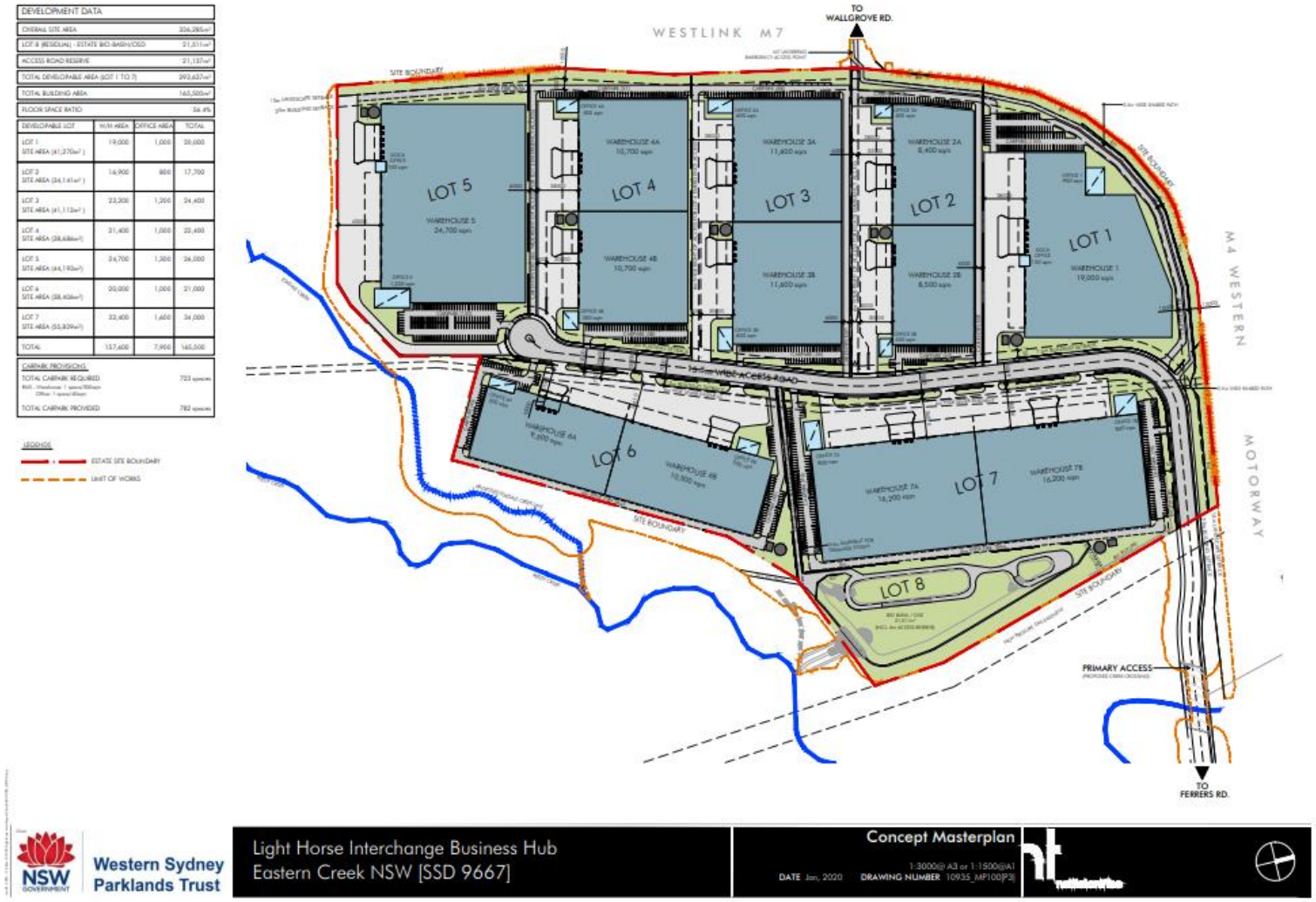


**Figure 9: Concept Masterplan, Light Horse Interchange Business Hub (Source: Nettleton Tribe Architects, 2020)**

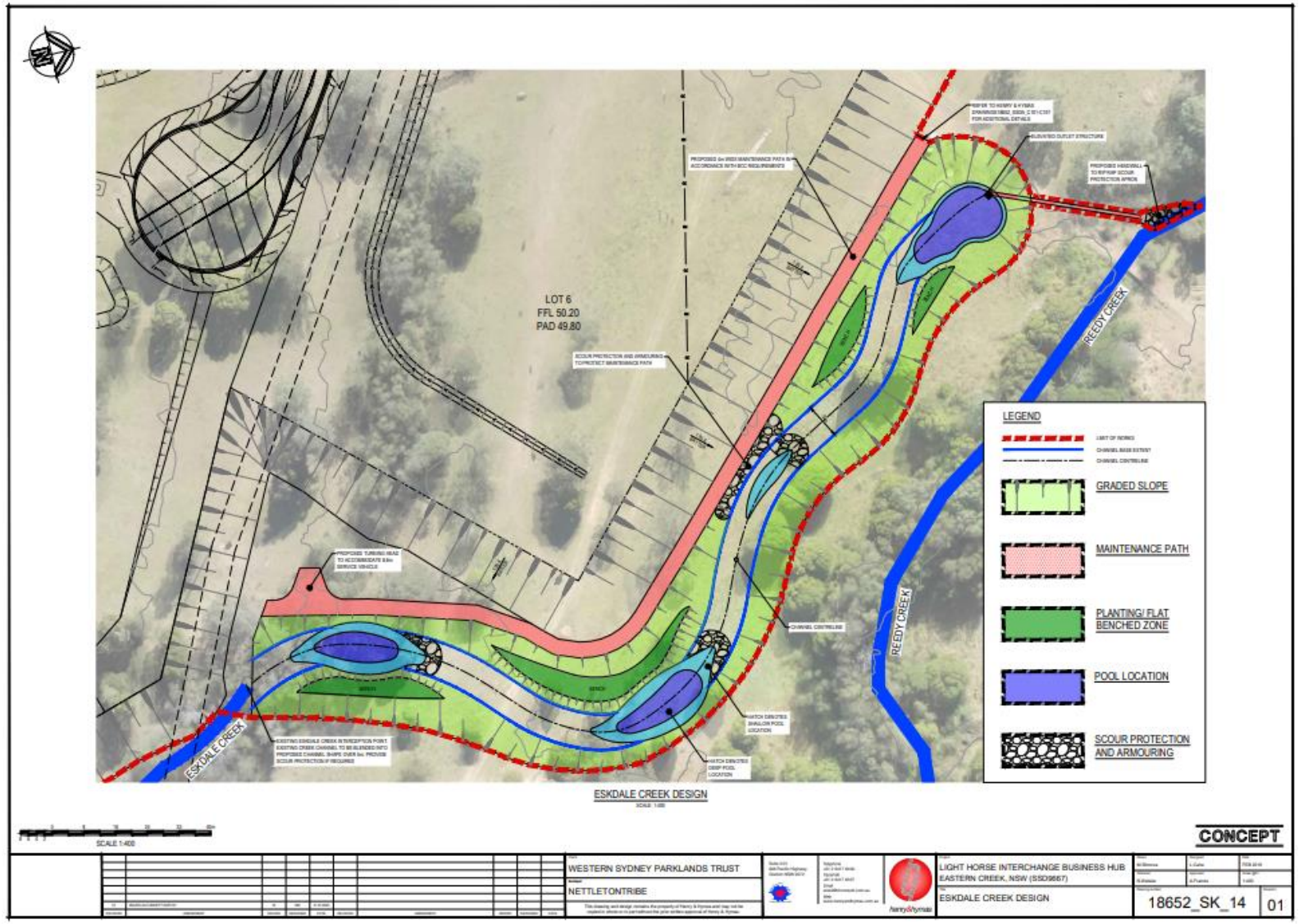


**Figure 10: Eskdale Creek design (Source: Henry & Hymas,**

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# Annexure J - Demolition and Waste Management Plan

# Construction and Demolition Waste Management Plan

**Property**

165 Wallgrove Road & 475 Ferrers Road, Eastern Creek

**Client**

AWJ Civil

155 Newton Rd,

Wetherill Park NSW 2164

**Version**

CH1252_D9648

October 2021

# Document Details

| | | | |
|---|---|---|---|
| Project No. | CH1252 | Document No. | D9648 |
| Title | Construction and Demolition Waste Management Plan | | |
| Site Address | 165 Wallgrove Road & 475 Ferrers Road, Eastern Creek | | |
| SSDA | SSD - 9667 | | |
| Prepared For | AWJ | | |
| File Name | CH1252_D9648_C&DWMP | | |

Document Revision History

| Version 1 | Type | Prepared By | Date Issued |
|---|---|---|---|
| 1.0 | Construction and Demolition Waste Management Plan | Mia Smith | 8/10/2021 |

Document Distribution

| Version | Soft Copy | Printed Copy | Recipient |
|---|---|---|---|
| 1.0 | 1 | | Domenic Gerace (AWJ) |

The undersigned confirm that this document and all associated attachments relate to the Site under investigation and have been reviewed and checked for errors, omissions and inaccuracies.

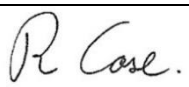
| Name | Signature | Position | Date |
|---|---|---|---|
| Richard Case |  | Director | 08/10/2021 |

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Figure 1 Site Location

Figure 2 Site Layout

# 1.0 Introduction

## 1.1 Background

Compliance Health & Environmental Consulting Pty Ltd (CHEC) has prepared this Construction and Demolition Waste Management Plan (C&DWMP) on behalf of AWJ for Charter Hall. The C&DWMP was developed in response to conditions of consent from State Significant Development Application 9667 provided by the Minister for Planning for the Light Horse Interchange Business Hub (LHIBH).

## 1.2 Site Description

The site is identified as Part Lot 10 DP 1061237 and Part Lot 5 DP 804051, located at 165 Wallgrove Road & 475 Ferrers Road, Eastern Creek within the Blacktown City Council Area. The Site is largely unused pastoral land that was occupied by the Australian Defence Forces until the 1990's. Several buildings remain in the area of the former Army compound, including, accommodation building, warehouse and storage sheds. The Site also contains a Waste treatment plant and underground petroleum storage system.

Refer to **Figure 1** – Site Location and **Figure 2** – Site Layout.

## 1.3 Development Overview

Western Sydney Parklands Trust, in partnership with Charter Hall, to construct the LHIBH. The development will consist of 165,500m$^2$ of gross floor area for general industrial, light industrial, warehouse and distribution centres and ancillary office land located east of the M7 and south of the M4 Motorways

Stage 1 works will involve:

- Demolition of existing structures
- Remediation of the site
- Site preparation and bulk earthworks
- Construction of road access and internal roads and
- Installation of essential infrastructure services;
- Flood and stormwater management infrastructure works; and
- Subdivision of the site into 11 Torrens title lots, including seven future development lots and four lots comprising the stormwater detention basin, access road reserve and residual land to remain within Western Sydney Parklands.

# 2.0 C&DWMP Framework

This C&DWMP has considered the Waste Management Plan prepared by pitt&sherry in 2019 that accompanied the development application. Specifically, Sections 3 for the demolition / excavation stage and Section 4 for the Construction stage. Construction must not commence until this plan has been reviewed and approved by the Minister.

This plan will outline the procedures necessary to manage the waste being generated from development of the proposed business hub for the duration of construction works. The Plan will identify all potential wastes and appropriate methods to avoid, reduce or reuse wastes that are likely to be generated by the construction activities.

The specific objectives of this C&DWMP are as follows:

- To minimise resource requirements and construction waste through reuse and recycling, and the efficient selection of resources
- To maximise reuse or recycling of demolition waste either on site or at an appropriately licensed facility
- To assist contractors to develop systems for waste management that ensure waste is transported and disposed of in a lawful manner
- To provide guidance in regard to space, storage, amenity and management of waste
- To minimise risks associated with waste management at all stages of construction

## 2.1 Relevant Legislation

Table 1 Legislation that applies to this C&DWMP

| | |
|---|---|
| Protection of the Environment Operations Act 1997 | The Protection of the Environment Operations Act 1997 (POEO Act) is administered by the NSW Environmental Protection Authority (EPA) and provides for a system of environmental protection licences for scheduled development work and activities, as well as the ability to issue environmental protection notices for pollution and waste management. Environmental offences.<br>The POEO Act and POEO (Waste) Regulations 2014 specify the legal requirements for the management of waste. There are serious offences under the POEO Act for the unlawful transportation and deposition of waste |
| Waste Avoidance and Resource Recovery Act 2001 | The Waste Avoidance and Resource Recovery Act 2001 (WARR) provides the legislative framework to manage resource recovery in NSW and under which the Waste Avoidance and Resource Recovery Strategy can be implemented. |
| POEO(UPSS) Regulation, 2019 | Demolition activities at the Site will require the removal and management of Underground Petroleum Storage Systems (UPSS). This process must be undertaken in accordance with the POEO(UPSS) Regulation, 2019 and Australian Standard AS4967-2008. |

## 2.2 SSD Conditions

The following table summarises the relevant conditions as per the SSDA – 9667 Schedule 3 – Conditions of Consent for Stage 1 and where these matters are addressed within the C&DWMP.

Table 2 Consent Conditions

| Condition | Comments | Reference |
|---|---|---|
| A10. | All demolition must be carried out in accordance with Australian Standard AS 2601-2001 The Demolition of Structures. (Standards Australia, 2001) | Section 3.4 – Demolition Waste |
| B38 | Prior to the commencement of construction, the Applicant must prepare a Construction and Demolition Waste Management Plan for the development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must:<br>(a) detail the quantities of each waste type generated during construction and the proposed reuse, recycling and disposal locations; and<br>(b) be implemented for the duration of construction works | (a) Section 3.4 and 3.5 - Waste – Recycle and Disposal Estimates<br>(b) Section 2.0 – Framework |
| B39 | The Applicant must:<br>a. not commence construction until the Construction and Demolition Waste Management Plan is approved by the Planning Secretary.<br>b. implement the most recent version of the Construction and Demolition Waste Management Plan approved by the Planning Secretary | Section 2.0 – Framework |
| B41 | All waste materials removed from the site must only be directed to a waste management facility or premises lawfully permitted to accept the materials | Section 3.3 – Waste Handling and Storage |
| B42 | The Applicant must assess and classify all liquid and non-liquid wastes to be taken off site in accordance with the latest version of EPA's Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014) and dispose of all wastes to a facility that may lawfully accept the waste | Section 3.3 – Waste Handling and Storage<br><br>Section 4.1 – Waste Management Compliance & Reporting |
| B43 | Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal | Section 3.3 – Waste Handling and Storage |

# 3.0 Identification and Management of Waste

## 3.1 Waste Generating Activities

The following activities have been identified to potentially generate waste during Stage 1 of the development and will require some form of management during demolition, Remediation and civil construction. Different types of waste generated during the demolition and construction phases for Stage 1 will be classified and allocated to be either re-used, recycled or disposed, minimising the amount of off-site waste disposal.

### 3.1.1 Building Asbestos Removal

Buildings at the Site have been reported as containing asbestos materials that will require removal prior to demolition. Specifically, these have been identified as:

| | |
|---|---|
| Warehouse Building | Fibre cement roof sheeting and fibre cement eaves<br>Bituminous membrane on ground slab |
| Accommodation Building | Fibre cement roofing and fibre cement eaves<br>Vinyl Floor Tiles |
| Storage Sheds | Fibre cement roofing<br>Fibre cement ceiling and Vinyl floor tiles |
| Sewage Treatment Area | Fibre cement walls, eaves and roofing |

### 3.1.2 Building & Pavement Demolition

Subsequent to the clearance of asbestos materials, demolition will be undertaken in the following areas:

| | |
|---|---|
| Warehouse Building | Brick walls, concrete flooring, timber, glass, Plastics, SMF and metal |
| Accommodation Building | Brick walls, timber, plasterboard, glass, plastics, SMF and metal |
| Storage Sheds | Concrete, Metal |
| Sewage Treatment Area | Contaminated soil, concrete and steel. |
| External Pavement | Concrete, bitumen steel |
| UPSS Infrastructure | Steel, contaminated Soil, concrete |

### 3.1.3 Site Remediation

Site remediation will be undertaken in accordance with the RAP (WSP, 2021). The scope is likely to include the following waste generating activities:

| | |
|---|---|
| Soil Stockpiles | Contaminated Soil – Asbestos<br>Contaminated Soil – PAH (Asphalt) |
| Compound Area | Fibre cement fragments,<br>Contaminated Soil - Asbestos |
| UPSS Decommissioning | Flammable tanks<br>Contaminated Soil - Hydrocarbon |

### 3.1.4 Civil Construction

Construction will include services installation, cut to fill excavation, fill importation and construction material importation. During this process, potential wastes that are likely to be generated include:

| | |
|---|---|
| Bulk Excavation | Soils/ rock cut and placed<br>Imported engineered Fill |
| Excavation - Unexpected finds | Contaminated Soil – Asbestos / PAH/ hydrocarbons / heavy metals / PFAS<br>Non-compactible Soil<br>Landfills – General Waste |
| Services Installation | Surplus aggregates<br>Off Spec Recycled products<br>Material Offcuts and breakage |

## 3.2 Waste Hierarchy

The key framework underpinning waste management policy and practice in Australia is the waste management hierarchy, which ranks the ways of dealing with waste in order of preferences. It ranks strategies in order of preference from avoiding the creation of waste as the most desired outcome, and disposal as the least desired outcome.

Reuse and recycling ensures resources are kept in the circular economy, decreasing the need for virgin materials. If reuse and recycling are not viable options, energy recovery is considered in order to return energy to the community. This hierarchy will be implemented throughout demolition and civil works to prioritise reuse, recycling and/or reprocessing:

Waste generated through the demolition and construction phase will be assessed and classified in accordance with the NSW EPA Waste Classification Guidelines 2014. Where waste cannot be avoided, reduced, reused or recycled it will be classified allowing for appropriate and responsible disposal

## 3.3 Waste Handling and Storage

All waste is to assessed in accordance with the Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014) by a suitably qualified contaminated land consultant. As per condition B41 all waste that cannot be reused at the Site will be removed and directed to a waste management facility or premises lawfully permitted to accept the materials. Any waste generated on site will be stored in an environmentally safe manner that prevents, unauthorised access or an uncontrolled release, in accordance with the POEO Act. This waste will only be stored on a temporary basis until it can be handled by appropriately licensed contractors.

Liquid wastes generated from the decommissioning of the UPSS system will be tested by a suitably qualified person to determine the appropriate containment and transport methods. Where necessary liquid waste will be transported in vehicles certified to carry flammable liquids. Where liquids from the UPSS decommissioning cannot be transferred directly to a licenced transporter, they will be stored in appropriate containers in bunded areas until transported off-site. Bunded areas will have the capacity to hold 110 per cent of the liquid waste volume for bulk storage

UPSS infrastructure will be degassed and certified as non-flammable prior to transport in accordance with methods provided in AS4976-2008. In the event that dangerous goods require temporary onsite storage, the following measures must be implemented:

- All dangerous goods will be sores and handled strictly in accordance with all relevant standards and Work Health and Safety Regulation 2017.
- The transport of and any hazardous and/or industrial and/or Group A waste from the site will be conducted strictly in accordance with any requirements that may be specified by the EPA in relation to the transport of those wastes
- An emergency procedure for chemical spills and other potential incidents shall be developed before work commences

Any waste produced outside of the facility will not be accepted at the site for storage, treatment, processing, reprocessing, or disposal.

## 3.4 Demolition Waste.

All demolition must be carried out in accordance with Australian Standard AS 2601-2001 The Demolition of Structures. (Standards Australia, 2001). The NSW EPA Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities (2012) states that, it is a stakeholder's responsibility to 'minimise construction and demolition wastes and maximise resource recovery of materials.' As required by Consent B38(a), estimates for the quantity of waste and where they will be taken to be recycled, reused or disposed of have been provided by the demolition contractor Central Civil as part of their demolition plan. These estimates are provided by Table 3 below.

Table 3 – Demolition Disposal Estimates

| Material Type | Estimated Quantity | Off-Site Recycle | Disposal |
|---|---|---|---|
| Green Waste | 80t | Bingo – Eastern Creek | |
| Asbestos & other Hazardous Material | 58t | | Bingo or Suez – Eastern Creek |
| Bricks | 1385t | Sustainable Resource Centre – Fairfield City Council – Wetherill Park | |
| Concrete | 3794t | Sustainable Resource Centre – Fairfield City Council – Wetherill Park | |
| Timber | 154t | Bingo – Eastern Creek | |
| Plasterboard & Glass | 42t | | Bingo – Eastern Creek |
| Metals | 150t | Sell & Parker – Kings park, St Marys | |
| Liquid | ~2000L | Toxfree | |

## 3.5 Remediation & Civil Construction Waste

Estimates of wastes associated with civil works and how they will be reused, recycled or disposed of is as follows

Table 4 – Demolition Disposal Estimates

| Type of Waste Generated | Reuse ($m^3$) | Recycle ($m^3$) | Disposal ($m^3$) | Method of management or waste facility to be used |
|---|---|---|---|---|
| Excavated Material – Cut to Fill | 50,000 | | | Reuse portion as required as on-site fill. Stockpile soil and reuse for landscaping if deemed suitable. |
| Excavated Soil – UPSS / off spec fill | | 1000 | | Send to recycling facility where there may be geotechnical constraints and where chemical concentration s allow, otherwise retained in containment cell. |
| Excavated Soil – Contaminated | 2000 | | 500 | Contaminated Soils may be contained and managed on site in accordance with long term management plan. Disposed at Bingo or Suez where soils exceed management limits. |
| Timber (off-cuts, studs, etc) | | 20 | 5 | Separated on site and provided to timber recyclers such as D&R Henderson. Non-recyclable treated timber sent to Genesis Landfill |
| Concrete | | 235 | | Genesis Eastern Creek / Bingo, or Concrete Recyclers (Group) |
| Containers (cans, plastic, glass) | | 5 | | Sent to SITA Wetherill Park for recycling |
| Paper/Cardboard | | 5 | 1 | Sent to Kurnell Landfill or Randwick Recycling Centre for recycling. |

# 4.0 Environmental Reporting and Auditing

## 4.1 Waste Management Compliance & Reporting

The owner of the waste generated at the development and engaged contractors will be required to actively manage their responsibilities for waste management to ensure any material moved offsite is transported in accordance with the requirements of the Protection of the Environment Operations Act (1997). All records demonstrating lawful disposal of waste must be retained and kept readily accessible for inspection by regulatory authorities such as Council, OEH or WorkCover NSW.

Central Civil will conduct the removal of asbestos material, which will occur in the first instance with the affected areas taped off and sign posted accordingly "Asbestos Removal in Progress". A bin or truck will be provided, lined with 200-micron black plastic and asbestos removal will commence by the suitably qualified personnel. Any friable asbestos and all hazmat will be removed by 'Class -A' Asbestos removal licenced contractors using the "Wet Method" and transported to an approved tip site with the dockets made available.

All waste materials intended for reuse at the site must be assessed by a suitably qualified contaminated land consultant to determine if the materials comply with land use suitability criteria prescribed by National Environmental Protection Measure (NEPC,2013). Where material does not comply with land use suitability thresholds, a decision will need to be made to dispose off-site or retain on site in a managed area. All off site disposal should be accompanied by a Soil Export Classification undertaken in accordance with the POEO (Waste) Regulation, 2014 and the Waste Classification Guidelines, 2014.

Should contaminated material be retained onsite, a determination must be made by a suitably qualified contaminated land consultant for what management measures need to be implemented. This process may also require consent from the certifying authority for the development. The measures may range from physical barriers, pathway intervention techniques and/or site controls to prevent the material posing a risk to future occupants, the surrounding environment or any other sensitive receptor.

At the completion of any remedial work that requires on site containment, a validation report accompanied by a Long-Term Environmental Management Plan should be provided by the contaminated land consultant.

## 4.2 Complaints

The Project Manager in conjunction with Charter Hall are responsible for ensuring that the appropriate management response and handling procedures are instigated and carried through in the event of an environmental complaint. The induction and toolbox talks should be used to ensure all site employees and contractors are aware of and understand their obligations for incident response. All employees and contractors who take receipt of a complaint, either verbal or written, are to immediately notify the Project Manager, who will then contact the relevant authority and maintain an environmental complaint register at the Site at all times

## 4.3 Construction Site Access

Existing vehicle access is available via Wallgrove Road and an underpass below the M7 Motorway during the demolition stage. When construction is complete vehicular access will be provided via a new access road and roundabout intersection from Ferrers Road. The access road has been designed to accommodate full access and manoeuvrability of B Double heavy vehicles. The existing road access via the M7 underpass will provide for a secondary emergency access only.

## 4.4 Construction Hours

Construction hours for the development will be in accordance with Condition B17 as shown below in table 4. Under condition B18, work can only be undertaken outside of these hours in the following circumstances:

(a) works that are inaudible at the nearest sensitive receivers;

(b) works agreed to in writing by the Planning Secretary;

(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or

(d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm

Table 5 Construction Work Hours

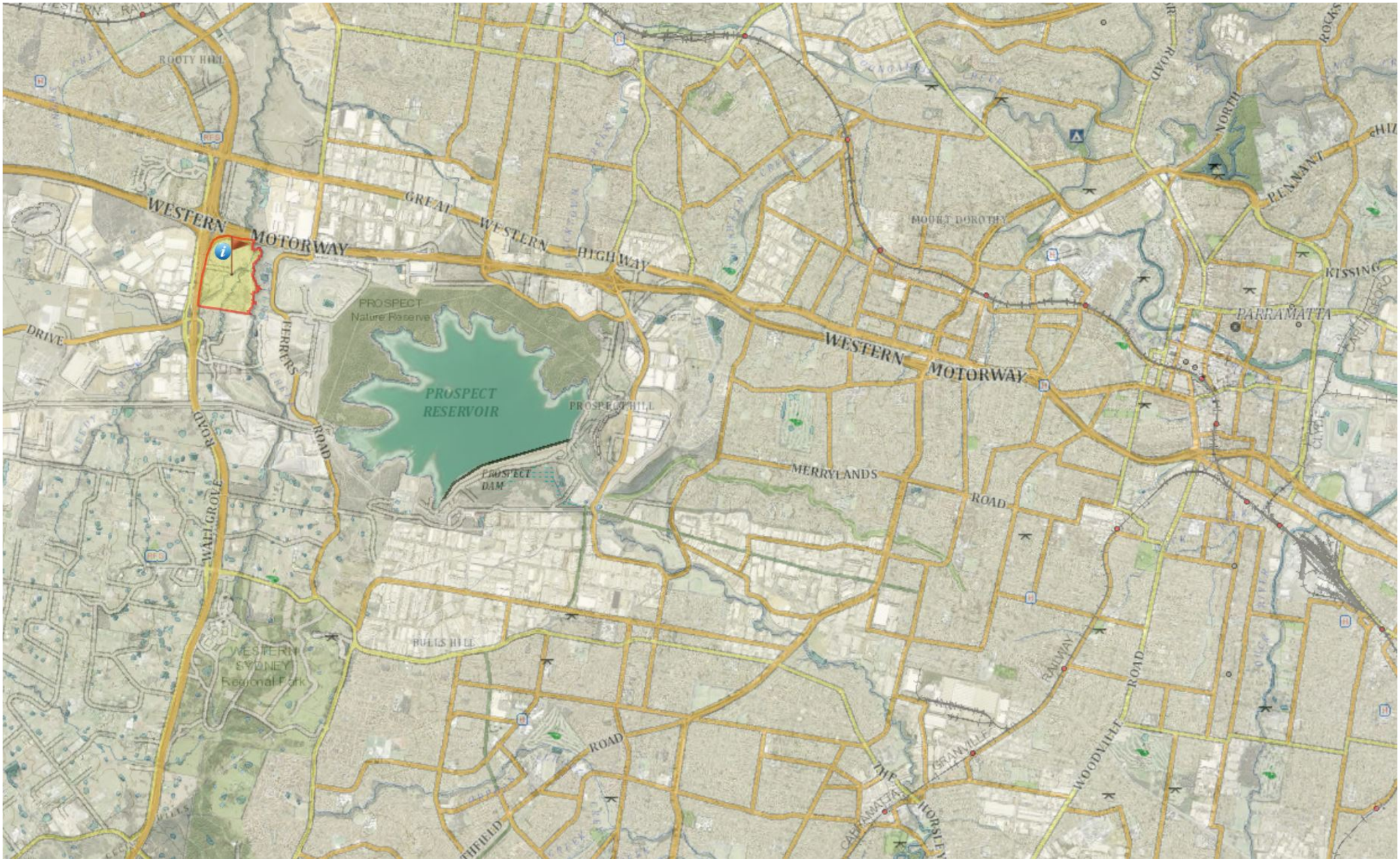
| Activity | Day | Time |
|---|---|---|
| Earthworks and Construction | Monday -Friday<br>Saturday | 7am to 6pm<br>8am to 1pm |

## 4.5 Regulatory Authority Contact Details

Table 6 – Regulatory Authorities

| Authority | Contact | Contact Info |
|---|---|---|
| Department of Planning and Environment (DPE) | Compliance Unit | 1300 305 695 |
| Environmental Protection Authority (EPA) | Environment Line | 131 555 |
| Safework NSW | Incident Notification Hotline | 131 050 |

Figure 1 – Site Location



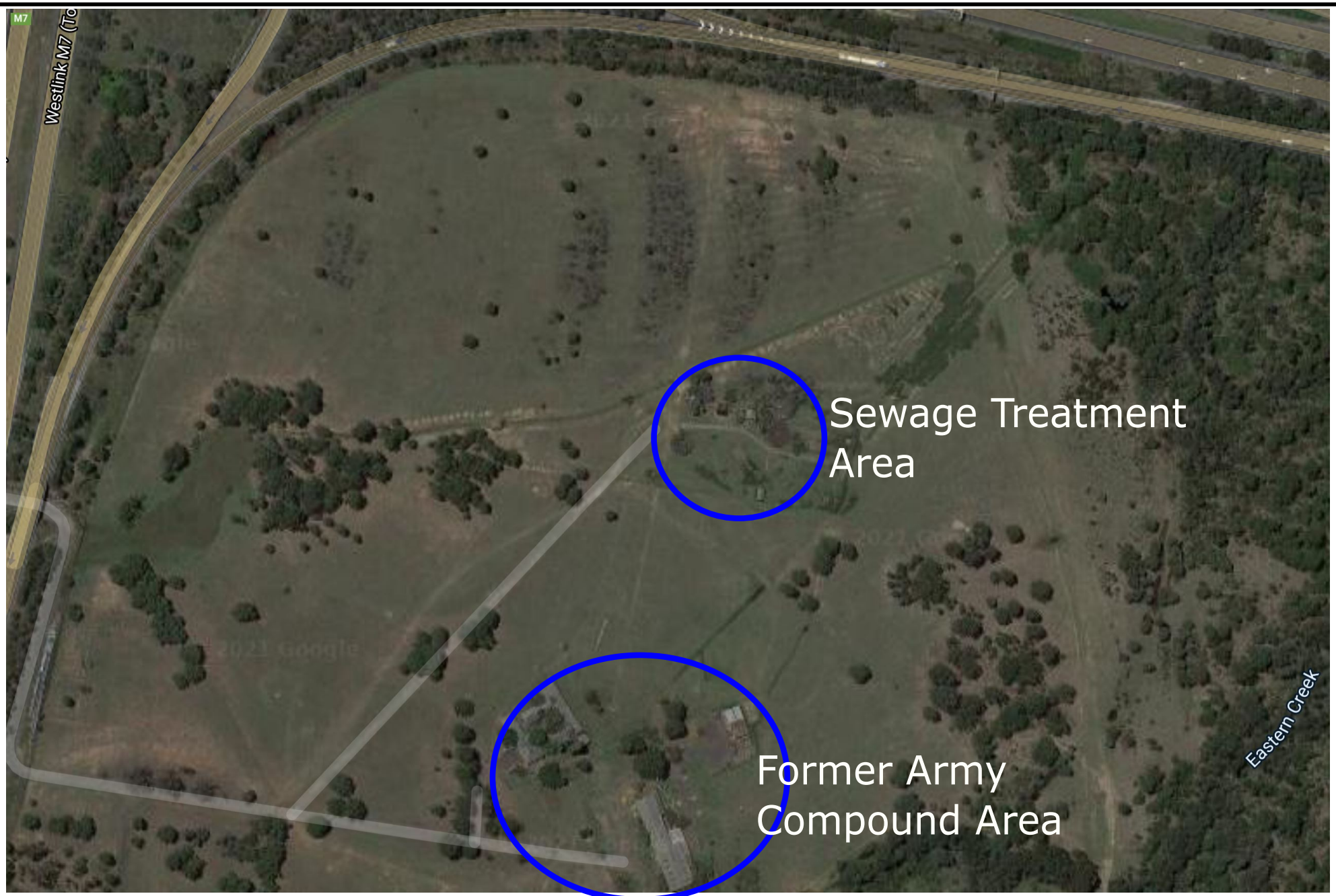

Site Location

N

CHEC
Compliance Health & Environmental Consulting

| | | | |
|---|---|---|---|
| Title: Site Location | | | |
| Site Address: Lighthorse Interchange | Project No.: CH1252 | Figure No.: 1 | Date: 08/10/2021 |
| Client: AWJ Civil Pty Ltd | Scale: NTS | Compiled: RC | Revision: Rev. 1 |

Figure 2 – Site Layout




Site Location

N

CHEC
Compliance Health & Environmental Consulting

| | | | |
|---|---|---|---|
| Title: Site Layout | | | |
| Site Address: Lighthorse Interchange | Project No.: CH1252 | Figure No.: 2 | Date: 08/10/2021 |
| Client: AWJ Civil Pty Ltd | Scale: NTS | Compiled: RC | Revision: Rev. 1 |

# Annexure K - Community Consultation Plan

# LIGHT HORSE INTERCHANGE BUSINESS HUB

## Community Consultation Strategy

**Prepared for:**

Charter Hall

SLR Ref: -R01
Version No: -v0.1
November 2021

# PREPARED BY

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# BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Charter Hall (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

# DOCUMENT CONTROL

| Reference | Date | Prepared | Checked | Authorised |
|---|---|---|---|---|
| 660.30136.00000-R01-v0.2 | 8 November 2021 | Kiera Plumridge | Dan Thompson | |
| 660.30136.00000-R01-v0.1 | 19 October 2021 | Kiera Plumridge | Dan Thompson | |
| | | | | |

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## APPENDICES

Appendix A Consultation Register

# 1 Introduction

## 1.1 Background

The Light Horse Interchange Business Hub (LHIBH) is an industrial business hub located within the Western City Parklands (WSP) in the City of Blacktown local government area (LGA), approximately 33 km west of the Sydney CBD (see **Figure 1**). The site is adjacent to the junction of the M4 Western Motorway and M7 Westlink Motorway at 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek (Lot 10 DP 1061237 and Lot 5 DP 804051).

Western Sydney Parklands Trust (WSPT) (the Proponent), lodged State Significant Development (SSD) application SSD-9667 with the Department of Planning, Industry and Environment (DPIE) for the LHIBH a concept proposal for the tagged development of the site, and a detailed proposal for the first stage of development works and as granted development consent for SSD-9667 on 31 August 2021. Whilst WSPT are the Proponent for SS-9667, it should be noted that Charter Hall (the Developer) are responsible for the development of the site.

This Community Communication Strategy (CCS) has been prepared on behalf of the Developer and in accordance with Condition C3(g) and supporting conditions within the Development Consent, identifying relevant stakeholders, key issues, and the communication methods. Specifically, it details how the Developer, and their contractors will engage and interact with relevant stakeholders and the community. The CCS integrates with the Construction Environmental Management Plan (CEMP) and associated suite of documents to provide a comprehensive guide and benchmark for the construction process that aligns with the Development Consent conditions.

## 1.2 Purpose

The CCS includes the following key aspects:

- Identification of consultation triggers and methods with adjacent landowners and residents, key stakeholders, relevant agencies, and the wider community
- The tools and actions to be undertaken throughout the construction program to disseminate information through notification of relevant stakeholders
- Enquiry and Complaint management protocols; and
- Monitoring and feedback mechanisms.

The CCS will be updated as the project progresses to account for variations in the construction program and methodology and modifications to SSD-9667, along with changes in stakeholder situation that impacts on stakeholder interests, with these articulated through the feedback mechanisms.

SSD-9667 contains the following conditions of relevance to this CCS used to benchmark the contents:

- C1 – Management Plan Requirements
- C3 (g) – Community Consultation and Complaints Handling as part of the Construction Environmental Management Plan
- C8 and C9 – Revision of Strategies, Plans, and Programs; and
- C12 – Access to Information.

The details of these conditions are identified within **Table 1** below, along with a cross reference to the relevant section of this CCS.

**Table 1 Relevant Conditions of Consent**

| Condition Number | Condition Detail | Report Reference |
|---|---|---|
| C1 – Management Plan Requirements | Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:<br>(a) detailed baseline data;<br>(b) details of:<br>(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);<br>(ii) any relevant limits or performance measures and criteria; and<br>(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;<br>(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;<br>(d) a program to monitor and report on the:<br>(i) impacts and environmental performance of the development; and<br>(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;<br>(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;<br>(f) a program to investigate and implement ways to improve the environmental performance of the development over time;<br>(g) a protocol for managing and reporting any:<br>(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);<br>(ii) complaint;<br>(iii) failure to comply with statutory requirements; and<br>(h) a protocol for periodic review of the plan.<br>Note: the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans | a) Refer to Project CEMP<br>b) Table 1, Sections 4 & 5<br>c) Section 4<br>d) Section 5<br>e) Section 4.6<br>f) Section 5.3<br>g) Section 5.2<br>h) Refer to Project CEMP |
| C3 (g) – Community Consultation and Complaints Handling as part of the Construction Environmental Management Plan | As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:<br>(g) Community Consultation and Complaints Handling. | This CCS Document |

| Condition Number | Condition Detail | Report Reference |
|---|---|---|
| C8 and C9 – Non-Compliance Notification | The Planning Secretary must be notified in writing to via the Major Projects website within seven days after the Applicant becomes aware of any non-compliance.<br><br>A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. | Section 5.3<br>Refer to Project CEMP |
| C12 – Access to Information | At least 48 hours before the commencement of construction until the completion of all works under this consent, the Applicant must:<br>(a) make the following information and documents (as they are obtained or approved) publicly available on its website:<br>(i) the documents referred to in condition A1 of Schedule 2 and A2 of Schedule 3 of this consent;<br>(ii) all current statutory approvals for the development;<br>(iii) all approved strategies, plans and programs required under the conditions of this consent;<br>(iv) the proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged;<br>(v) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;<br>(vi) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;<br>(vii) a summary of the current stage and progress of the development;<br>(viii) contact details to enquire about the development or to make a complaint;<br>(ix) complaints register, updated monthly;<br>(x) the Compliance Report of the development;<br>(xi) audit reports prepared as part of any Independent Audit of the development and the Applicant's response to the recommendations in any audit report;<br>(xii) any other matter required by the Planning Secretary; and<br>(b) keep such information up to date, to the satisfaction of the Planning Secretary. | Section 4.3.1 |

## 1.3 Community Communications Strategy Scope

The CCS applies to works undertaken by the Developer and their engaged contractors. This CCS outlines the method, triggers and timing of consultation, notification and complaints and queries handling required in the course of the construction of the development and arising from the requirements of the relevant consent conditions outlined in **Table 1**.

## 1.4 Project Description

SSD-9667 was approved on 31 August 2021, granting approval for the Light Horse Interchange Business Hub (LHIBH) comprising the following:

- Concept Proposal for the staged redevelopment of the site as an industrial business hub with 157,600 sqm of industrial and light industrial floorspace and 7,900 sqm ancillary office floorspace; and
- Detailed Proposal for the first stage of development which will include demolition works, remediation, site preparation and bulk earthworks, roadworks, site infrastructure and subdivision of the site.

The development, as approved under SSD-9667 is outlined in **Table 2** below:

**Table 2 Approved Development**

| Application Number | Development Description |
|---|---|
| SSD-9667 | Concept Proposal for:<br>• Establishment of up to 165,500 $m^2$ of gross floor area for general industrial, light industrial, warehouse and distribution centres and ancillary office land uses; and - conceptual development levels, footprints and building envelopes for Lots 1-7, roads, parking, site access and landscape design<br>Stage 1 works for:<br>• Demolition of existing structures;<br>• Remediation of the site;<br>• Site preparation and bulk earthworks;<br>• Construction of road access and internal roads and installation of essential infrastructure services;<br>• Flood and stormwater management infrastructure works; and<br>• Subdivision of the site into 11 Torrens title lots, including seven future development lots and four lots comprising the stormwater detention basin, access road reserve and residual land to remain within Western Sydney Parklands. |

The site works will be undertaken by a primary contractor and multiple sub-contractors. All contractors involved in delivering the project will be required to comply with the approved CCS.

The project involves construction activities including:

- Site establishment
- Vegetation clearing
- Site construction access
- Demolition of existing buildings
- Site remediation

- Sediment erosion control works
- Bulk earthworks; and
- Construction of civil infrastructure including access roads and utilities.

**Figure 1** below identifies the site masterplan.

## Figure 1 Site Masterplan

# 2 Key Stakeholders and Potential Issues

## 2.1 Key Stakeholders

The key stakeholders likely to require consultation, notification and or likely to raise comment or complaint in the course of the construction of the project include (but are not limited to):

- Adjacent or nearby property owners or occupiers
- Local Council (Blacktown City Council)
- State Government Departments, Offices or Agencies, including:
  - Environmental Protection Authority
  - Fire and Rescue NSW
  - WaterNSW
  - NSW Rural Fire Service
  - NSW Department of Industry – Crown Lands and Water
  - Department of Planning Industry and Environment, specifically the:
    - Greater Sydney, Place and Infrastructure, Central Western Team
    - Industry Assessment
    - Environment, Energy and Science Group including Office of Environment and Heritage
    - Natural Resource Access Regulators and Water Group
  - Transport for NSW (TfNSW) and Westlink M7
- Utility and Services Providers, including:
  - Jemena Gas Networks
  - Endeavour Energy
  - Telstra
  - NBN
  - Sydney Water; and
- Other Interested Parties.

## 2.2 Previous Consultation

The Proponent and their representatives, as well as the Developer and their representatives have previously undertaken consultation with agencies, the community, and stakeholders during the development of the Project. Details of this consultation are included in the EIS (Urbis, 2019).

In response to public notification of the proposal, a total of 19 submissions were received, including three submissions from the general public and 16 submissions from government or public authorities. In response to the issues raised, the Proponent made minor amendments to the proposal and provided additional technical information, which informed a Response to Submissions Report (Urbis, 2020).

For more information, refer to the Department of Planning and Environment's Major Project Assessments webpage at: https://www.planningportal.nsw.gov.au/major-projects/project/10631.

Consultation has also been undertaken to date with relevant stakeholders to satisfy conditions of SSD-9667 and to inform the preparation of management plans required under the Consent. Record of this consultation, where relevant is included within the management plans located within the Project CEMP.

## 2.3 Potential Issues and Strategies

The Developer is committed to ongoing proactive consultation with the community and stakeholders while understanding the importance of addressing potential issues and minimising construction related impacts. **Table 3** outlines potential project issues that are likely or known to be of interest or concern to the community and stakeholders. The table also details communications related measures and strategies that the Proponent will undertake to manage and mitigate impacts. Where an incident or non-compliance arises relating to environmental management and beyond the scope of matters relating to consultation, the CEMP identifies management and mitigation measures to address those matters, with reference to be made to Section 3.5 of outlining Incident and Non-Compliance Response and Handling Procedure.

**Table 3 Issue Identification and Mitigation**

| Potential Issue | Potential Key Impacts | Mitigation Strategy |
|---|---|---|
| Construction Traffic | A temporary increase in traffic movements may be experienced associated with the import of fill material, the movement of construction machinery to and from the site and the movement of workers light vehicles. | The CEMP and supporting Construction Traffic Management Plan identify specific mechanisms to manage and mitigate these impacts. |
| Stormwater, Sediment Control, Erosion, Water Quality | High rainfall events could result in localised flooding.<br>Construction could result in impacts to local water quality, associated with sediment laden runoff. | The CEMP and supporting Erosion and Sediment Control Plan identify specific mechanisms to manage and mitigate these impacts in accordance with the relevant Council standards and commitments within the SSD approvals package. |
| Waste Management | Earthworks, demolition, and construction waste present at the site during works. | The CEMP and supporting Demolition and Waste Management Plan identify specific mechanisms to manage and mitigate these impacts. |
| Removal of Flora and Fauna | The project approval requires the clearance of flora and fauna to facilitate the development, with the associated potential for impacts on safety of immediately adjacent receivers, along with biodiversity and visual amenity. | The CEMP and supporting Vegetation Management Plan for the Stage 1 development and Fauna Relocation Plan identify specific mechanisms to manage and mitigate these impacts. |

| Potential Issue | Potential Key Impacts | Mitigation Strategy |
|---|---|---|
| Noise and Vibration | Truck, machinery, and light vehicle movements within, to and from the site, along with civil works have potential to result in negative impacts associated with noise and vibration. | Sensitive receivers and affected stakeholders will be consulted prior to actions likely to generate high levels of noise or vibration in accordance with Section 4 of this Strategy.<br>Up to date information on current and proposed works will be accessible to stakeholders and the wider public on the project web page.<br>Additionally, should any works be likely to generate impacts beyond those identified within the approval's documentation consultation would be undertaken with the applicable managing agency.<br>The CEMP and supporting Construction Noise and Vibration Management Plan for the Stage 1 development contain specific measures to manage these impacts. These management plans have been informed by commitments contained within the SSD approvals package, EPA standards and guidelines. |
| Aboriginal Heritage | There is the potential for encountering items of Aboriginal Heritage during excavation. | Monitoring of works by appropriately qualified personnel, along with the implementation of an unexpected finds protocol in consultation with Aboriginal Stakeholders and Heritage Division of the Department of Planning, Industry and Environment<br>The CEMP and supporting Aboriginal Cultural Heritage Management Plan identify specific mechanisms to manage and mitigate these impacts. |
| Hazardous Goods and Contamination | There is the potential for environmental incidents relating to the hazardous goods and contamination on site during construction. | The CEMP and supporting Unexpected Contamination Procedure identify specific mechanisms to manage and mitigate these impacts. |
| Misinformation and Misunderstanding | Lack of project awareness within the wider community may result in complaints being raised by those unaware of the extent of the approval, with these complaints not directed through the appropriate project hotline.<br>Unauthorised release of project information by the project team to the media, stakeholders or the community has potential to impact on project perception in the community. | The CCS includes measures at Section 4.3 to provide regular updates in plain language, supported by imagery to stakeholders and the wider community through public and private media.<br>Contact details including the hotline details will be provided on site, the project web page and in all information issued. Information on project works, reporting and compliance is to be maintained and updated on the project website. |

| Potential Issue | Potential Key Impacts | Mitigation Strategy |
|---|---|---|
| Emergency Event | Unforeseen emergency with the potential to impact on the community either directly, or indirectly through out of hours activities that may generate additional traffic or noise. | The CCS includes measures at Section 4.4 to provide updates in emergency events, with the CEMP identifying specific mechanisms to manage and mitigate these impacts from an environmental management perspective. |

# 3 Communications and Community Liaison Representative

The Developer have nominated a Communications and Community Liaison Representative (CCLR) who will provide the community and stakeholders with a single point of contact for all aspects of the project, responsible for receiving and disseminating information requests and complaints, along with addressing any interface issues. The CCLR will also facilitate property access should it be required.

The CCLR will be available for contact by local residents and the community at all reasonable times to answer any questions and address any concerns relating to the project. The CCLR will have up-to-date information on:

- Emerging stakeholders
- Planned construction activities
- Planned traffic arrangements
- Current landowner discussions with members of staff
- Planned community and stakeholder consultation
- Complaints or enquiries received
- Duties and accountabilities of staff; and
- Commitments to stakeholders made by the Proponent.

The CCLR will be responsible for recording, actioning and provided response to comments, queries or complaints received with relation to the construction of the project and will maintain the consultation register.

The contact details for the CCLR will be included within this CCS when confirmed by the Developer.

# 4 Community and Stakeholder Engagement

## 4.1 Objectives

The key objectives of the strategy are to meet the requirements of Condition C3 (g) of SSD-9667 and:

- Keep the local community and key stakeholders informed of the progress of works relating to the Project
- Ensure that enquires and complaints received from the community or key stakeholders are addressed and responded to in a timely and effective manner
- Inform relevant parties in advance of potential disturbances and events likely to cause impact
- Be good neighbours and members of the local community throughout the duration of the project's lifespan
- Providing an open two communications channel to allow ongoing, iterative engagement; and
- Seek opportunities for improvement throughout the project.

## 4.2 Conduct

In their communications and consultation with the community and key stakeholders, the Proponent and their representatives will comply at all times with the requirements of the *Privacy and Personal Information Protection Act 1998 (NSW)* and the *Privacy Act 1988 (Cth)*.

## 4.3 Communication, Management, and Mitigation Tools

A range of tools and techniques will be used to inform and engage with the community and stakeholders regarding the project. **Table 4** below provides an overview of the mechanisms to be utilised to notify and consult with local community and key stakeholders and measures to mitigate potential issues throughout the development.

## Table 4 Communication Management and Mitigation Tools

| Tool/ Technique | Description | Person Responsible | Audience | Frequency/timing | Specifications |
|---|---|---|---|---|---|
| Consultation Meetings | Meetings held to notify, discuss, or consult on matters arising of relevance to community and or key stakeholders.<br><br>Meetings to be held either face to face or on virtual platform(s) | CCLR | The wider community and key stakeholders. | Meetings to be held on an as needs basis dependant on matters to be discussed and appropriate timing of discussions | Details and matters to be discussed to be tailored to the purpose and aims of the meeting.<br><br>Record of conversation (informal) or minutes of meeting (formal) to be recorded, retained by the CCLR and provided to all attendees following the meetings. A record of the discussion shall be included in the consultation register and actioned as required. |
| Consultation Register | Recording community and stakeholder interactions (including notification, consultation, queries, comments, and complaints), along with associated remedial actions as required. | CCLR | The wider community and key stakeholders. | Project duration | The maintenance of the consultation register is required to satisfy the requirements of Condition C1, C3 (g), and C12 (ix) of SSD-9667. The register will be continually updated to record community engagement, including information provided by the Proponent, feedback received, and remedial action undertaken where required. |
| Agency Meetings | Meetings with agencies to discuss matters relevant to their agency | CCLR and/or the Proponent | Relevant Agency | As required. | Meetings will be held as required to address matters relevant to specific agencies including the satisfaction of conditions of consent. These shall be undertaken either directly by the proponent or facilitated by the CCLR at the Proponent's discretion. |

| Tool/ Technique | Description | Person Responsible | Audience | Frequency/timing | Specifications |
|---|---|---|---|---|---|
| Notification Letterbox Drop | Letters would be provided to specific receivers identified as being potentially affected by construction. This may be undertaken in tandem with door knocking. | CCLR | Landowners and occupiers of the immediate area. | As required for the project duration. | Letter box drop details to be recorded in the consultation register.<br>Timing of construction activity to be identified along with relevant contact details. |
| Email and phone | Where agreed to by the stakeholder and contact details provided, contact is made via email, phone and/or text message to notify or respond to query or complaint | CCLR | The wider community and key stakeholders. | As required for the project duration. | With the stakeholder's consent, contact details shall be utilised to provide notification or further contact to respond to query or complaint.<br>Recorded contact details are to kept private and used exclusively for the purpose of consultation on the project. |
| On Site Signage | Project information details. | Site Foreman and Management Staff | Visitors to the site and residents of the immediate area. | Project duration. | Contain key project contact details including the hotline and web page, along with relevant project and safety information. |
| Project Information and Complaints Number | Phone number to be contacted should information on the project be required or complaint lodged. | CCLR | The wider community and key stakeholders. | Project duration. | Phone number to be included on site signage, the web page, and all project information material.<br>Feedback provided to be incorporated into the consultation register and actioned as required. |
| Staff and Visitor Induction and Training | Project information details. | Site Foreman and Management Staff | Staff and visitors to the site. | Project duration. | Key project safety information, contact details, emergency procedures and site information. |

| Tool/ Technique | Description | Person Responsible | Audience | Frequency/timing | Specifications |
|---|---|---|---|---|---|
| Toolbox and Prestart Meetings | Project information details. | Site Foreman and Management Staff | Staff and visitors to the site. | Project duration. | Task specific safety information, emergency procedures and relevant project updates. All staff and subcontractors to be made aware of external and internal communications procedures |
| Website | A web page shall be established for the project | The Proponent | The wider community and key stakeholders. | Project duration. | Website address and phone number located on site signage and all project information material.<br>Web page to provide all details outlined in **Section 4.3.1** below. |

### 4.3.1 Project Website

The Proponent will establish a website to be accessible from at least 48 hours prior to commencement of construction until the completion of all works approved under SSD-9667.

The following information will be made available on the website and updated monthly or more frequently when necessary and as required by SSD-9667 Condition C12:

- The documents referred to in condition A1 of Schedule 2 and A2 of Schedule 3 of the consent
- All current statutory approvals for the development
- All approved strategies, plans and programs required under the conditions of this consent
- The proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged
- Regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent
- A comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs
- A summary of the current stage and progress of the development
- Contact details to enquire about the development or to make a complaint
- Complaints register, updated monthly
- The compliance report of the development
- Audit reports prepared as part of any independent audit of the development and the applicant's response to the recommendations in any audit report; and
- Any other matter required by the planning Secretary.

The Developer is responsible for keeping such information up to date, to the satisfaction of the Planning Secretary.

## 4.4 Notification Procedure

Where notification is required pursuant to Condition(s) of SSD-9667, notification shall be undertaken within the timeframes outlined within the Consent. Where notification is required due to a potential impact or issue, notification shall be undertaken in accordance with **Table 5** below.

**Table 5 Notification of Potential Impact or Issue**

| Potential Impact or Issue | Method of Contact/Consultation | Timeframe |
|---|---|---|
| High noise generating work | Email, Text Message or Letterbox drop – notifying of expected commencement, duration and affected hours | No less than 24 hours prior to the activity |
| Vibration intensive activity | Email, Text Message or Letterbox drop – notifying of expected commencement, duration and affected hours | No less than 24 hours prior to the activity |

| Potential Impact or Issue | Method of Contact/Consultation | Timeframe |
|---|---|---|
| Traffic management disruption | Email, Text Message or Letterbox drop – notifying of expected commencement, duration and affected hours<br>Variable Message Signs | No less than 24 hours prior to the activity |
| Respite offerings | Email or phone calls will be undertaken to determine whether respite is required and appropriate scheduling and duration for respite periods | No less than 24 hours prior to the activity |
| Emergency Event | Email, Text Message or Letterbox drop – notifying of expected commencement, duration and affected hours | As soon as possible |

## 4.5 Complaints Procedure

The Developer is committed to the timely and effective management of enquiries and complaints relating to construction activities for the project. To this end, the following complaints procedure will be adhered to, enabling the receipt, and recording of enquiries and complaints, along with the methods of response and resolution of issues raised.

The complaints handling procedure outlined below and illustrated in **Figure 2**.

### 4.5.1 Receiving and Recording Enquiries and Complaints

The Developer will establish a Project email address and phone number for the receipt of enquiries and complaints relating to the development. The email account will be regularly monitored to receive and respond to customer feedback and enquiries. The phone number will be available for contact from the commencement of works. The CCLR will manage the phoneline from the commencement of the project until the completion of works. Where calls are received during hours of construction work (including out of hours works) all calls will be answered by the CCLR. Where calls are received outside of hours of construction works the caller will be invited to leave a message. All approaches from the community and stakeholders will be registered in the project's consultation register. The facilities established for receiving enquiries and complaints about the project during construction are shown in **Table 6**.

**Table 6 Enquires and Complaints Facilities**

| Facility | Purpose | Detail |
|---|---|---|
| Phone number | A contact phone number and associated contact name (the CCLR) for questions/enquiries and the lodgement of complaints relating to the development. | The contact details for the CCLR will be included within this CCS when confirmed by the Developer. |
| Email Address | An email address for questions/enquiries and the lodgement of complaints relating to the development. | The contact details will be included within this CCS when confirmed by the Developer. |
| Postal Address | A postal address for the receipt of questions/enquiries and the lodgement of complaints relating to the development. | The contact details will be included within this CCS when confirmed by the Developer. |

| | | |
|---|---|---|
| In person verbal | Verbal enquiries and complaints can be made formally during meetings or may be made informally where staff interact with members of the public in informal settings. | Where enquiry or complaint is made face to face to persons other than the CCLR, staff will immedicably notify the Contractor's Project Manager who will then contact the CCLR. Record of the conversation (including the recording of contact details with consent) will be made by the staff member and provided to the CCLR immediately |

The Developer has established a consultation register to record all complaints and enquiries received by the above means. The consultation register will be maintained on a regular basis. The consultation register shall include the following details for all complaints or enquiries received:

- Date and time of complaint or enquiry
- Method by which the complaint or enquiry was made
- Name, address, contact telephone number of complainant (if no such details were provided, a note to that effect)
- Nature of complaint or enquiry
- Action taken in response including follow up contact with the complainant
- Any monitoring to confirm that the complaint or enquiry has been satisfactorily resolved; and
- If no action was taken, the reasons why no action was taken by you.

An excerpt of the consultation register is included at **Appendix A**.

### 4.5.2 Responding to and Resolving Enquiries and Complaints

Where a complaint or enquiry is received the CCLR will attempt to provide an immediate response, if possible, via phone or email. Where a complaint or enquiry cannot be responded to immediately the CCLR will assess and prioritise the submission and provide the complainant or enquirer with a follow up verbal response on what action is proposed within two hours during construction works (including night and weekend works) and 24 hours at other times. Where a complaint or enquiry cannot be resolved by the initial or follow-up verbal response, a written response will be provided to the complainant or enquirer within ten days.

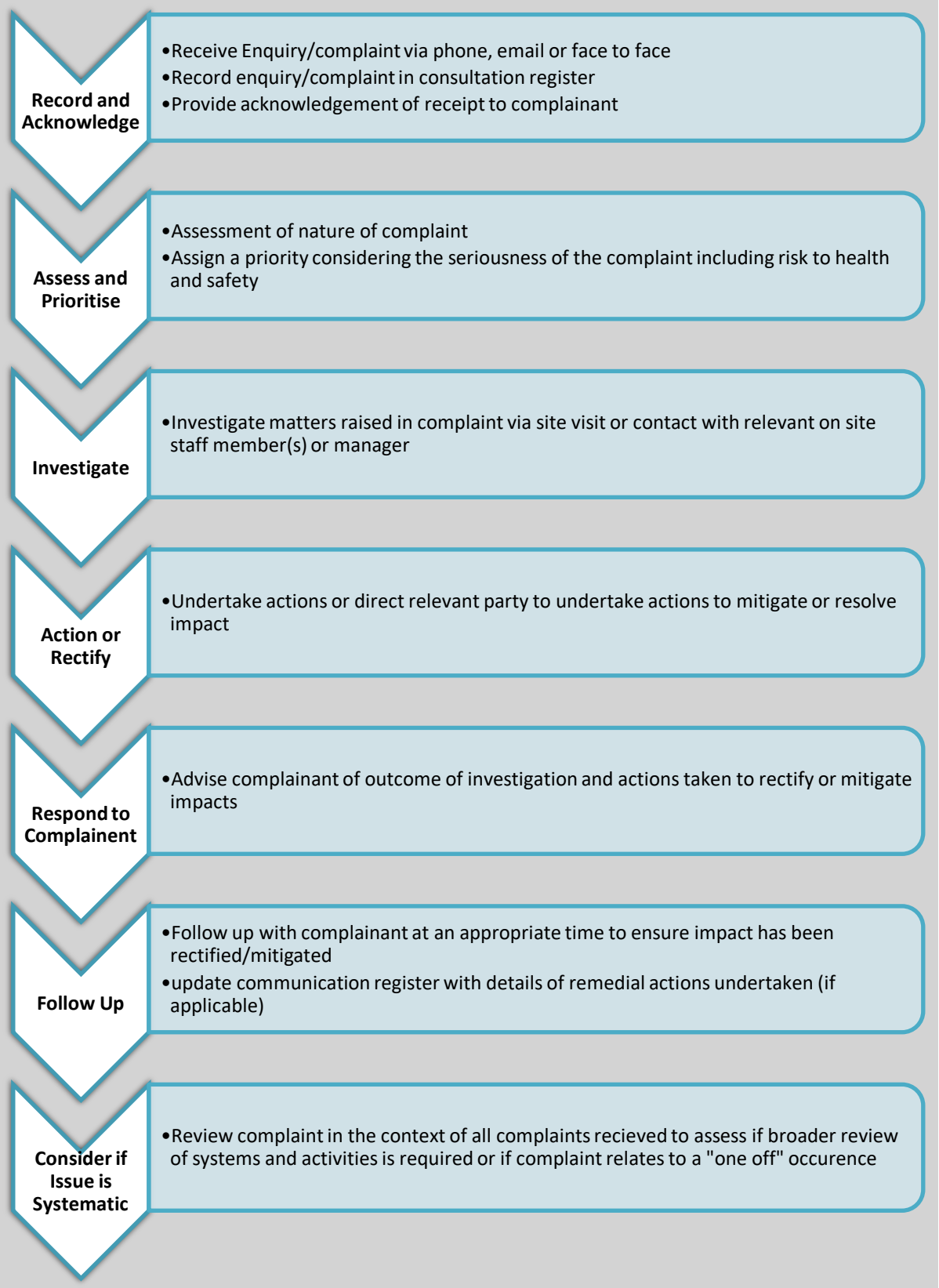
In the event of a complaint, the CCLR will assess whether the complaint is founded or unfounded and if necessary, delegate the resolution of the issue to the project manager for action or to the relevant project engineer. The CCLR will oversee the rectification of the issue and respond to the complainant once the issue has been resolved.

In the event of an enquiry, the CCLR will endeavour to provide an immediate response where they are in possession of the relevant information. Where more specific or detailed information is required, the CCLR will liaise with the project manager or relevant project engineer to obtain the information required to respond to the enquiry and provide this information to the enquiring party once in hand.

Where the above protocol is unsuccessful in resolving complaints, mediation may be undertaken at the discretion of the Proponent to facilitate negotiation between affected parties. This shall be performed with the assistance of the ER and potentially via an independent person (mediator) appointed by the Proponent as required.

A summary of complaints and enquiries will be provided on a monthly basis to the ER for inclusion in their monthly report, with records made publicly available.

## Figure 2 Complaints Handling Procedure



### 4.5.3 Unreasonable Complainant Conduct

The NSW Ombudsman provides guidelines which define unreasonable complaint conduct as:

> *"…any behaviour by a current or former complainant which, because of its nature or frequency, raises substantial health, safety, resource or equity issues for the parties to a complaint."*

Whilst it is not envisioned that the project will attract complainants that exhibit this behaviour, where a complainant is seen to potentially have a negative impact on the CCLR or project team's health, safety, resourcing or equity of service, The Proponent shall adhere to the procedures and practices outlined within the NSW Ombudsman's "*Managing Unreasonable Complainant Conduct Practice Manual 2nd Edition"*.

## 4.6 Contingency Management Plan

In accordance with Condition C1(e) of the SSD-9667 consent, a contingency management plan has been developed to outline the management of unpredicted impacts and their consequences. Details of these events, their severity and response are detailed in **Table 7** below:

## Table 7 Contingency Management Plan

| Key Element | Trigger/ Response | Condition Green | Condition Amber | Condition Red |
|---|---|---|---|---|
| Submission | Trigger | General feedback/comment (no complaint or query). | Enquiry made by formal or informal channels. | Complaint made by formal or informal channels. |
| | Response | Acknowledge receipt and record in consultation register. No further response required. | Acknowledge receipt and record in consultation register. Direct enquiry to relevant person for actioning and response within 5 days. | Acknowledge receipt and record in consultation register. Respond to complaint immediately, if possible, if not direct enquiry to relevant person for actioning and provide complainant with a follow up verbal response on what action is proposed within two hours during construction works (including night and weekend works) and 24 hours at other times. |
| Media | Trigger | Positive story in print, online, radio or television. | Neutral or advisory story in print, online, radio or television. | Negative story in print, online, radio or television. |
| | Response | Record in consultation register and advise the proponent media/marketing team.<br>No further response required. | Record in consultation register and advise the proponent media/marketing team.<br>No further response required. | Record in consultation register and advise the proponent Project Team for further action and response.<br>Contact relevant person for actioning and response within 48 hours |
| Unscheduled Event | Trigger | Event occurring outside of plan or schedule without impact or potential impact. | Event occurring outside of plan or schedule with minor impact or potential impact. | Event occurring outside of plan or schedule with major impact or potential impact. |

| Key Element | Trigger/ Response | Condition Green | Condition Amber | Condition Red |
|---|---|---|---|---|
| | Response | No response required.<br>Identify opportunities for improvement to manage potential future events. | Contact relevant person for actioning and response within 48 hours. Acknowledge in consultation register.<br>Identify opportunities for improvement to manage potential future events. | Contact relevant person for actioning and response immediately. Acknowledge in consultation register.<br>Identify opportunities for improvement to manage potential future events. |
| Political Interest | Trigger | General or non-specific enquiry by Local, State or Federal political representative. | Enquiry or complaint relating to minor issue by Local, State or Federal political representative. | Enquiry or complaint relating to major issue by Local, State or Federal political representative. |
| | Response | Community consultation team in conjunction with The Proponent Project Team to prepare and provide response or assign response task to relevant staff member for comment.<br>Record in consultation register. | Community consultation team in conjunction with the proponent Project Team to prepare and provide response within 48 hours.<br>Record in consultation register. | Community consultation team in conjunction with the proponent Project Team to prepare and provide response within 24 hours.<br>Record in consultation register. |

# 5 Monitoring, Reporting and Evaluation

Monitoring, reporting, and evaluation will be undertaken to measure the effectiveness of community consultation, stakeholder engagement and responses to complaints and enquiries. Opportunities for improvement will be sought on a continuous basis, with an annual review of the CCS undertaken to formalise these incremental improvements.

## 5.1 Monitoring

The performance of this strategy will be monitored monthly based upon an assessment of the following data:

- Total number of monthly complaints
- Review of number of monthly complaints relating to lack of consultation/misinformation/confusion
- Review of number of monthly enquiries relating to information previously disseminated to the community through other channels
- Monthly review of enquiries or complaints of a similar nature or theme indicative of underlying systematic issues with the project or communication strategy; and
- Response timeframes, including initial acknowledgement and the response to enquiries or remediation of issue(s).

The parameters of monitoring and performance criteria are outlined in **Table 8** below.

**Table 8 Summary of Monitoring Data**

| Monitoring Parameter | Rationale | Performance Criteria | Monitoring Frequency |
|---|---|---|---|
| Total number of complaints | The number of complaints received in total is indicative of the community's satisfaction with the project. | A reduction in number of complaints, baseline determined by number of complaints received in preceding months. | Monthly |
| Number of complaints relating to lack of consultation/misinformation/ confusion | Number of complaints relating to lack of consultation/ misinformation/ confusion is indicative of the effectiveness and clarity of communication tools utilized. | A reduction in number of complaints, baseline determined by number of complaints received in preceding month. | Monthly |
| Number of enquiries relating to information previously disseminated | Number of enquiries relating to information previously disseminated is indicative to the effectiveness of the delivery of information. | A reduction in number of enquiries, baseline determined by number of enquiries received in preceding month. | Monthly |
| Number of complaints/enquiries within defined categories based on theme or subject | A large number of complaints or enquiries relating to a single issue may be indicative of a systematic issue to be addressed as a priority. | A reduction in number of complaints, baseline determined by number of complaints received in preceding month. | Monthly |

| Monitoring Parameter | Rationale | Performance Criteria | Monitoring Frequency |
|---|---|---|---|
| Response timeframes | Response to enquiries and complaints should be timely to ensure effective responsiveness and rectification of issues and to encourage trust within the community. | Enquiries and complaints acknowledged within 48 hours. Urgent enquiries and complaints responded to within 48 hours of receipt, non-urgent enquiries and complaints responded to within 5 days. | Monthly |

## 5.2 Reporting

A monthly community consultation summary will be made publicly available on the project web page and shall include:

- A summary of community consultation activities undertaken within the preceding month; and
- A summary of all enquiries and complaints received within the preceding month, including details of response and/or remediation activities.

## 5.3 Evaluation and Review

Review of this strategy shall be undertaken in accordance with the provisions of the Project CEMP.

Where performance criteria are not being satisfied, review of this strategy and its implementation will be undertaken by the CCLR and changes to the strategy may be made to rectify the short fall. Where systematic issues are identified associated with construction activities, the project manager will be advised, and immediate rectification of the issue will be requested.

This strategy will be reviewed in accordance with Condition C5 of SSD-9667 and where necessary updated or revised in accordance with Condition C6 of SSD-9667.

# 6 References

NSW Ombudsman (2012) *Managing Unreasonable Complainant Conduct Practice Manual 2nd Edition.*

Charter Hall (2021). *Construction Environmental Management Plan*.

Urbis (2019) *Environmental Impact Statement Lighthorse Interchange Business Hub, Eastern Creek.*

Urbis (2020) *Response to Submissions and Preferred Project Report.*

# APPENDIX A

Consultation Register

| Date | Time | Responsible Party | In/Out | Initial Communication Method/Tool | Contact Name/ Organisation | Contact Details | Documentation Location (if applicable) | Communication Type: Complaint/ Enquiry/ Communication | Summary of Issues/ Details | Action Taken | Further Action/ Monitoring to Confirm Resolution |
|---|---|---|---|---|---|---|---|---|---|---|---|
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# Annexure L– Contamination Unexpected Finds

## Contamination

In the event that previously unidentified contamination that has not been included in this RAP is uncovered during the remediation works, the following procedures must be implemented:

1) The workers that encounter the potential contamination must stop work immediately and notify their supervisor. The supervisor must then immediately notify the principal contractor representative. Work must cease in this area until further assessed and advice by a suitably qualified person (e.g. Environmental Consultant or Occupational Hygienist).

2) If the encountered contamination presents an immediate risk to human health or the environment (e.g. ruptured oil drum or friable asbestos), controls must be immediately implemented to isolate/barricade the area, contain and prevent further release of the contaminant. Workers initiating such controls must be suitably competent and wearing suitable PPE, which should be stored on-site. Chemical spill kits should also be stored on-site.

3) The principal contractor representative is to immediately notify an Environmental Consultant/Occupational Hygienist to undertake preliminary assessment of the potential contamination. Based on the findings of the preliminary assessment, further sampling and investigation may be required.

4) Once confirmed that a contamination risk has been identified, the principal contractor representative is to verbally advise the client of the unexpected find. Written notification should follow, which will provide relevant information relating to any special recommendations to Site workers/employees, further sampling, investigation and remediation that may be required.

5) If required, the principal contractor representative must notify any relevant regulatory authorities (e.g. SafeWork NSW, NSW EPA, etc.) of the contamination incident as soon as practicable.

6) Based on the findings of the preliminary assessment and any further investigations undertaken, a remediation strategy or RAP may be required to be prepared by the Environmental Consultant/Occupational Hygienist.

7) If remediation is required, the client must notify relevant regulatory authorities (as required) of the planned commencement and completion dates and details of the remediation strategy to be adopted. Any information/reports relating to assessment, investigation or remediation of the unexpected contamination must be included as part of this notification.

8) Any material identified as contaminated must be managed in accordance with the Remediation Action Plan unless the site has been validated and the Site Audit Statement has been obtained as per condition B47 of the Development Consent. In the event that unexpected contamination is found, after the Site Audit Statement is issued, all contamination must be disposed off-site, with the disposal location and results of testing submitted to the Planning Secretary, prior to its removal from the site.

9) The client has a responsibility to keep regulatory authorities updated throughout the duration of any remedial works. If validation testing/validation programs are required on completion of the remediation works, a validation report will be prepared by the Environmental Consultant/Occupational Hygienist or alternatively be incorporated into the final validation report for the overall remediation works. Copies of the validation results and clearance reporting must be provided by the client to all relevant parties.

## Unexploded Ordinance

WSP notes that the information provided to date (specifically Appendix G of the EES 2019 RAP) indicates that the site presents a low risk of possessing unexploded ordnance (UXO). However, should potential UXO be identified during works, the following procedure should be followed:

1) If a suspect UXO item is found - DO NOT TOUCH, disturb or tamper with the item in any way. This includes making any attempt to move the item to a 'safe' location.

2) Carefully note the appearance of the item and the location. Take a photograph if it is possible to do so without further approaching or disturbing the item.

3) If possible, mark the location so that it can be found later. Coloured tape or paint make easily recognised marker material. Note the route to the item.

4) Inform the property owner, park ranger, prime contractor, site foreman or supervisor of the find.

5) Inform the Police that a possible ammunition item has been found. They will instigate a request for Defence personnel to attend and dispose of the item During each incident of identification of potential UXO all of the following should be collected for incorporation into the final validation report:

— Photographic evidence of the potential UXO and approximate GPS location (if safe to do so).

— Details of correspondence as per the above UXO protocol.

— Details of Emergency Services and Department of Defence site attendance.

— Resolution of the

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