Construction Environmental Management Plan

Warehouse and Distribution Centre – Compass 2

Lot 1 Eastern Creek Drive, Eastern Creek, NSW
SSD-30923027

DOCUMENT TRACKING

Version No.	Document Number	Detail	Prepared By	Approved By	Date
Rev 1	J1863220201.T4	Draft issued to client for review	M. Williams	R. Johnson	01/02/2022
Rev 2	J1863220208.T4	Final issued to client	M. Williams	R. Johnson	08/02/2022

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1 Introduction

1.1 Background

This Construction Environmental Management Plan (CEMP) has been prepared by Aspect Environmental Pty Ltd (Aspect), on behalf of Qanstruct Limited (Qanstruct) for Charter Hall Holdings Pty Limited (Charter Hall), for the construction and operation of the Compass 2 Warehouse and Distribution Centre (the Project).

This CEMP has been prepared with reference to the Environmental Impact Statement (Willowtree Planning, December 2021) and SSD-30923027 Planning Secretary's Environmental Assessment Requirements (SEARs) which were issued on 8 November 2021. The CEMP defines the environmental management framework for construction of the Project.

The Project comprises earthworks, construction and operation of warehouse facility at Lot 1 Eastern Creek Drive, Eastern Creek, NSW (Lot 1 DP 1274322) and associated infrastructure and includes access to Honeycomb Drive via 31 Honeycomb Drive, Eastern Creek (Lot 271 DP 1198561).

The location of the Project site is indicated by the red outline on Figure 1-1.

Figure 1-1: Site context - Source: EIS, Willowtree Planning, December 2021

1.2 Project Description

The key components of the Project are described below:

- Site preparation works, including cut and fill bulk earthworks and construction of retaining walls
- Provision of site infrastructure, including utilities and an easement for high voltage cables
- Construction of a single warehouse facility, with ancillary offices, comprising of up to (but not restricted to):
  - 25,400 m^2 of total warehouse area
  - 1,300 m^2 main office area
  - 500 m^2 forklift charging room
  - 450 m^2 two storey dock office
  - 12 loading docks and
  - provision of rooftop solar panels.

- Storage of Class 2 and Class 3 dangerous goods
- Provision of separate light and heavy vehicle access, including heavy vehicle access to Honeycomb Drive
- 165 onsite car parking spaces
- Approximately 4,295 m^2 of landscaping
- 24 hours per day, 7 days per week operation hours.

The site layout is shown in Figure 1-2.

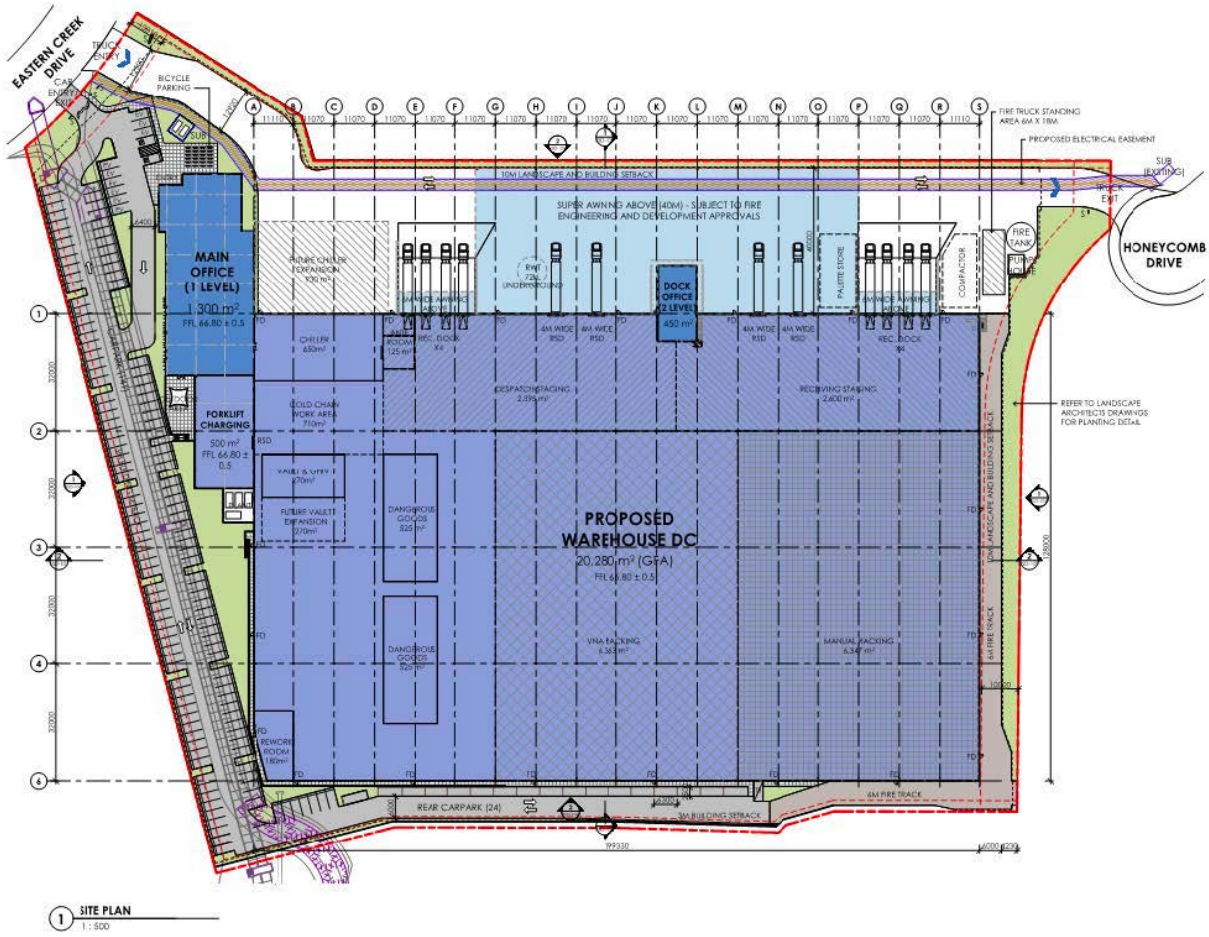

Figure 1-2: Site layout – source: EIS, Willowtree Planning, December 2021

1.2.1 Construction Phasing

The phases and duration of works are outlined in **Table 1-1**.

Table 1-1: Construction phasing

Project Phase	Proposed Construction Activities	Duration
Phase 1	Bulk earthworks and civil works, including piling	6 months
Phase 2	Construction of warehouse building	6 Months
Phase 3	Initial fit out of the warehouse and ancillary offices, including installation and commissioning of operational plant and equipment	9 months

The duration of the construction phases shown in the table is approximate and it is likely that construction phases will overlap.

1.2.2 Construction Hours

Construction works are to take place during standard construction hours:

- Monday to Friday: 7am - 6pm
- Saturday: 8am - 1pm
- Sundays or Public Holidays: no work.

Works outside these hours would generally be limited to delivery of materials or plant and equipment required by the NSW Police Force or other authorities for safety reasons, or where required in emergency to avoid the loss of lives, property or to prevent environmental harm.

Where required, and where reasonable to do so, conduct of out-of-hours works would be advised to Council.

1.2.3 Key personnel Contact Details

The emergency contact details (24 hours 7 days a week) for key project personnel are included in Table 1-2.

Table 1-2: Emergency 24-hour Project contact details

Role	Name	Contact Details
Site Manager	TBC	Mobile - TBC Email - TBC
Construction Manager	TBC	Mobile - TBC Email - TBC

1.3 CEMP Context

The purpose of this CEMP and associated Sub-Plans is to set out the performance standards and appropriate management measures and practices that Qanstruct will apply during the construction phase of the Project.

1.4 CEMP Objectives

The objectives of this CEMP are to:

- Identify the roles and responsibilities of key personnel
- Provide guidelines for undertaking the construction works in compliance with the CoC and other applicable regulatory requirements
- Prescribe project specific mitigation measures that protect human and ecological values and manage the potential impacts of the works on the environment
- Detail environmental management practices for the management, implementation and monitoring of the Project.

This CEMP has been designed to comply with Project Planning Approval (SSD-30923027), the EIS (Willowtree Planning, December 2021), project Contract documentation as well as other applicable State and Federal legislation.

All Qanstruct personnel, sub-contractors and visitors are required to comply with the requirements of this CEMP at all times.

1.5 Environment policy

WHS Management System
Environment Policy
June 30, 2020

Qanstruct
Partner of choice

Environment Policy

Qanstruct recognises that environmental conversation is one of the important issues of our community. We recognise the importance of maintaining a high standard of environmental case in conducting our activities. From design and supply, installation, construction, commissioning, and maintenance.

Qanstruct will:

- Ensure ongoing compliance with all relevant statutory and other obligations, standards, specifications, and codes of practice as well as the requirements of ISO 14001 standard.
- Ensure that the resources needed to maintain and continually improve the environmental management system are available.
- Direct and support persons to contribute to the effectiveness of the environmental management system, as well as other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.
- Manage our diverse activities in preventing or minimising pollution and impacts on visual amenity, air, water, land, flora, fauna, and cultural and heritage values.
- Strive to improve resource consumption efficiency and minimising waste generation in our services, also implement recycling of materials.
- Enhance organisation's capability by competent, empowered and engaged employees at all levels through the company.
- Consult and communicate with employees and subcontractors and other relevant interested parties in matters relating to the quality, health, safety, and environment.
- Identify, report, investigate and resolve all non-conformances and incidents and take appropriate action and place new controls to prevent recurrence.

To comply with our policy, our staff will receive adequate induction and training to enable them to follow our systems and procedures.

This policy will apply to all employees and contractors and is reviewed periodically to ensure it remains relevant to the operations and activities of Qanstruct.

Approved By:

Managing Director

Date: 13.7.2020

WHS Management System Qanstruct Policy

2 Community and Stakeholder Engagement

2.1 Community Communication

A Stakeholder Communications Plan (SCP) has been established by Qanstruct for the Project for implementation throughout the construction works. The SCP outlines the most effective communication methods to enable effective communication with the community and assist the Project team to deliver the Project with minimal disruption.

2.2 Complaints Management

Community complaints and enquiries shall be logged with Qanstruct and are to be responded to in accordance with the communications strategy. Complaints and enquiries may be received via:

- Qanstruct email address that is published on all communications material, including project site signage
- 1300 number that is published on all communications material, including Project site
- Face to face interactions with Project personnel.

Complaints will be recorded in the Project complaint register.

3 Environmental Management Framework

3.1 Project Organisational Structure

All personnel including consultants, contractors, sub-contractors and all other personnel associated with undertaking construction works on the Project, ultimately report to Qanstruct, the Principal Contractor.

Qanstruct is responsible for monitoring the environmental performance of the Project and verifying compliance with the conditions of consent (CoC), this CEMP and Sub-Plans.

3.2 Roles and Responsibilities

All Project personnel are responsible for the implementation of this CEMP and have the responsibility to stop works if there is the potential for a safety or environmental incident to occur.

Roles, and responsibilities for environmental management of the Project are outlined in Table 3-1.

Table 3-1: Project roles and responsibilities

Role	Responsibility
Project Manager	Approve the CEMP and subsequent revisions
	Oversee the implementation and maintenance of the CEMP and Sub-Plans
	Verify works proceed with all necessary environmental approvals / permits in place
	Confirm that all project personnel receive environmental induction and training
	Promptly notify Charter Hall of any significant environmental incident
	Ensure all non-conformance events are investigated and corrected
	Monitor and report on overall environmental management performance
	Review and acknowledge periodic environmental inspection reports
	Initiate project meetings as required or directed, in which environmental items are discussed as appropriate
	Identify and allocate Project resources to implement the requirements of the CEMP and Sub-Plans
	Ensure relevant environmental expectations expressed by the Charter Hall and/ or regulatory authorities are communicated to the Project team
Site Manager/ HSSE Officer	Provide advice where required in relation to environmental issues associated with the Project
	Inform all personnel including sub-contractors of the requirement to conform with the CEMP and CoC
	Confirm that all necessary environmental controls are implemented and maintained for the duration of the Project
	Complete daily site inspections to monitor and verify mitigation measures are implemented and effective
	Monitor weather conditions to prepare the Project for high winds or other extreme weather events
	Provide regular environmental inspection and progress reports to the Project Manager
	Monitor environmental compliance with the CEMP
	Facilitate the environmental induction and training (toolbox talks) of employees and subcontractors (as required)
	Complete and maintain all necessary environmental documentation for the contract (as required)

Role	Responsibility
	Conduct environmental incident investigations and implement corrective action responses in consultation with the Project Manager
All personnel	Implement and comply with the requirements of this CEMP
	Report all environmental incidents, hazards, non-compliances and near misses to the Principal Contractor immediately
	Attend all required environmental awareness, induction and training sessions
	Stop work or otherwise mitigate the effects of an activity that is causing significant, uncontrolled or unexpected environmental harm

3.3 Legal and Compliance Requirements

3.3.1 SSD 30923027 Development Consent

To be included upon receipt of development consent.

3.3.2 Regulatory Framework

The regulatory framework for the Project is outlined in Table 2-1, which identifies relevant legislative instruments, their key objectives and relevance to the Project, including legislative and voluntary obligations, permits and licences.

Table 3-2: Legislative and other requirements relevant to the Project

Legislation	Key Project Requirements	Activity/ Aspect
Environment Planning and Assessment Act 1979	Establishes a system of environmental planning and assessment of proposed developments in NSW. The Project must comply with the CoC.	All
Environment Protection and Biodiversity Conservation Act 1999	Requirements in relation to protection and management of nationally and internationally important flora, fauna, ecological communities, and heritage places.	Threatened species and ecological environments
Biodiversity Conservation Act 2016	Comply with conservation requirements for any identified threatened species.	Threatened species and ecological environments
Protection of the Environment Operations Act 1997	The handling, storage and disposal of all waste streams on site is to be implemented in accordance with the POEO Act. Aims to aid the protection, restoration and enhancement of the quality of the NSW environment, including emissions to air. Identifies activities for which an Environment Protection Licence is required.	of discharges or emissions to air, land and water
Heritage Act 1977 National parks and Wildlife Act 1974	Protection and recording of Indigenous and European heritage values, relics, artefacts, places and other finds/remains.	Earthmoving/ - excavation works – identifying unexpected finds
Protection of the Environment Operations (Noise Control) Regulation 2017	Comply with the requirements of the POEO (Noise Control) Regulation to mitigate the impacts of noise and vibration on sensitive receivers and the environment	Management and mitigation of noise and vibration produced during construction works.

Legislation	Key Project Requirements	Activity/ Aspect
Protection of the Environment Operations (Clean Air) Regulation 2021	Identifies criteria for air quality objectives and emissions.	Management of any dust and air pollution emissions produced by works to promote air quality.
Protection of the Environment Operations (Waste) Regulation 2014	Handling, storage, transport and disposal of all waste streams to be undertaken with consideration for the requirements within the POEO (Waste) Regulation. Aims to protect human health and the environment. Identifies the thresholds for Environment Protection Licences.	Management of waste discharge to air, land, water in accordance with thresholds set by the regulation.
Contaminated Land Management Act 1997	Remediation requirements for management of contaminated lands.	May be applicable in the event of any unexpected find of contaminants/ contamination
State Environmental Planning Policy 55	Remediation of contamination lands and consent requirements.	May be applicable in the event of any unexpected find of contaminants/ contamination.
Bluebook reference from CSWMP – Landcom Managing the effects of Urban Stormwater (Vol. 1)	Soil and erosion controls for managing surface water flows onsite and reducing potential for erosion and sedimentation leaving site.	Management surface water flows onsite.

Where updated or revised versions of guidelines, protocols, standards or policies, or a replacement of them are available, the most recent versions should be applicable to this Plan.

The CEMP will be explained to all contractors, as outlined in Section 2.7, and a copy will be maintained onsite during construction works.

3.4 Training and Awareness

All personnel including sub-contractors are required to attend a compulsory site induction that includes an environmental component prior to commencement of works onsite.

The environmental induction will include, but not be limited to, an overview of:

- Relevant details of the CEMP including purpose and objectives
- Key environmental issues
- Specific environmental management requirements and responsibilities
- Incident response and reporting requirements.

Short-term visitors to site for purposes such as deliveries will be required to undertake a visitor's induction and be accompanied by inducted personnel.

A record of all inductions will be maintained onsite.

Toolbox talks will also be used to review management procedures and identify / discuss daily site conditions and raise environmental awareness. Site inductions and toolbox talks will highlight specific environmental requirements and activities being undertaken at the worksite each day.

A record of issues covered in daily toolbox meetings will be maintained onsite.

4 Environmental Mitigation Measures

Environmental mitigation measures to be implemented during construction of the Project to enable compliance with the CoC, performance measures and criteria are documented in the aspect specific CEMP Sub-Plans. These include:

- Appendix A - Unexpected Finds Protocols
- Appendix B - Construction Soil and Water Management Sub-Plan
- Appendix C - Construction Air Quality Management Sub-Plan
- Appendix D - Construction Noise and Vibration Management Sub-Plan
- Appendix E - Construction Waste Management Sub-Plan and
- Appendix F - Construction Traffic Management Sub-Plan.

The identified mitigation measures are consistent with those identified in the EIS (Willowtree Planning, December 2021) and reflect current accepted industry guidelines and practice.

5 Inspections, Monitoring and Reporting

5.1 Environmental Inspections

5.1.1 Daily Observations

A daily pre-start on plant and equipment will be undertaken and any leaks or excessive emissions reported to the HSSE Officer.

Site environmental controls will be inspected daily by the HSSE Officer or their delegate.

5.1.2 Site Inspections

Qanstruct will complete weekly environmental inspections of the Project. The purpose of these inspections is to:

- Verify compliance with CoC
- Determine conformance with the mitigation measures detailed within the CEMP Sub-Plans
- Review the performance and effectiveness of environmental controls
- Identify any non-conformances or potential non-conformances against the requirements of this CEMP and the respective Sub-Plans
- Document observations and track performance.

Any corrective actions undertaken will be documented and maintained onsite to verify their being actioned and closed out.

5.2 Environmental Monitoring

Environmental monitoring will be undertaken to assist in the management of the following:

- Construction of the Project in accordance with environmental approvals
- Compliance with all relevant legislative requirements
- The minimisation of potential environmental incidents
- Effectiveness of environmental controls
- Implementation of this CEMP.

Monitoring requirements are included in the relevant CEMP Sub-Plans. Where relevant, the Sub-Plan will provide detail on the following:

- Responsibility for monitoring
- Relevant standards applicable to the monitoring
- Monitoring technique and location
- Frequency of monitoring
- Data management, review and distribution.

5.3 Environmental Auditing

Qanstruct will undertake an internal HSSE audit of the Project. Audits will involve a review of all environmental documents, records and reports to verify compliance with the CEMP.

Key environmental and procedural aspects to be covered by the audit may include:

- Environmental mitigation measures presented in the CEMP Sub-Plans
- Adherence to reporting procedures
- Complaint and incident management
- Legislative requirements.

Environmental and construction records include:

- Complaint records
- Incident, non-conformance and corrective action reporting
- Communications with stakeholders
- Monthly waste management reporting
- CEMP audit documentation.

Records of auditing and reporting will be maintained to demonstrate compliance.

5.4 Non-conformance, Non-compliance, and Actions

5.4.1 Non-conformance

A non-conformance is defined as a failure to fulfil a requirement of this CEMP or a Sub-Plan.

These are not recorded as non-compliances as there may be activity-specific justification for a change in implementation of the requirements of the management plan.

Where a non-conformance is also considered to represent a possible non-compliance, it is to be recorded as a potential non-compliance. Depending upon the nature of the non-conformance, the non-conformance may require reporting to the DPIE as an incident.

It is the responsibility of all personnel to report non-conformances to their Site Supervisor and/or the Site Manager. The Site Manager will investigate non-conformances, log corrective actions, and delegate responsibility for corrective actions within assigned timeframes.

5.4.2 Non-compliance

A non-compliance is defined as "*an occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with this consent but is not an incident*".

Potential non-compliances with the CoC can be identified by anyone and are to be reported to the HSSE Officer as a potential non-compliance. Whether the occurrence, set of circumstances, or development requires to be notified to the DPIE as a non-compliance is the responsibility of the project management team.

Non-compliance with the CoC shall be investigated to determine the root cause and any corrective and/or preventative actions arising. This will be reported to the Project Manager in a Non-Conformance/NCR and any corrective and/or preventative actions will be recorded within the Project Register.

DPIE will be notified in writing to compliance@planning.nsw.gov.au within seven days after the Project becomes aware of any non-compliance. The 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, the reasons for the non-compliance (if known), and what actions have been, or will be, undertaken to address the non-compliance.

5.5 Environmental Reporting

Reporting requirements for the Project include:

- Incident reports
- Non-compliance report (NCR)
- Inspection reports
- Internal audit reports.

5.6 Environmental Emergency

An environmental emergency is any event that causes or has the potential to cause material harm to the environment.

Qanstruct have nominated an emergency contact and an alternate contact that are available 24-hours a day, seven days a week. The Site Emergency Contact has the authority to stop and direct works. Emergency contact details are included in Table 5-1.

Table 5-1: Emergency contact details

Contact Name	Telephone Number	Address
Ambulance	000	N/A
Fire Brigade	000	N/A
Police	000	N/A
NSW EPA Pollution Hotline	131 555	N/A
Ministry of Health	(02) 9391 9000	N/A
SafeWork NSW	13 10 50	N/A
Blacktown City Council	Customer Contact Centre for NSW residents: (02) 9839 6000	Administration Centre 62 Flushcombe Road 2148
Rural Fire Service	(02) 9603 7077	Cnr Alderney St and Townson Ave, Minto 2566
Blacktown Hospital	(02) 9881 8000	8 Blacktown Rd, Blacktown NSW 2148
Principal's Representative	Contact details to be confirmed	Contact details to be confirmed
Qanstruct PM	Contact details to be confirmed	Nominated 24-hour contact
HSSE Officer	Contact details to be confirmed	Back-up 24-hour contact

5.7 CEMP Review and Revision Process

The Project Manager and HSSE officer will bi-annually review the adequacy of the environmental mitigation measures within this CEMP and Sub-Plans, as well as the effectiveness of their implementation to determine whether they are still applicable to the activities being carried out onsite.

References

Compass 2 Warehouse & Distribution Centre Lot 1 DP1274322 within Blacktown, Noise and Vibration Impact Assessment RWDI # 2201656, 10 December 2021.

Appendix A - Unexpected Finds Protocols

Unexpected Finds Protocol Contamination

1 Background

A Preliminary Site Investigation was undertaken by JBS&G Australia Pty Ltd (JBS&G) on 30 November 2021 (Appendix 23 of the Draft EIS – Willowtree, December 2021) to address Condition 16 (Contamination and Remediation) of the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Development.

The Preliminary Site Investigation concluded that no further contamination assessment is necessary under SEPP 55. However, an Unexpected Finds Protocol for contamination should be included in the CEMP.

2 Unexpected Finds Protocol

It is acknowledged that previous investigations of the site have been undertaken to assess the identified contaminants of potential concern in selected parts of the site. However, ground conditions between previous sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations during site works.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should asbestos be identified (or any other unexpected potentially hazardous substance), the protocol on Figure 1 should be followed.

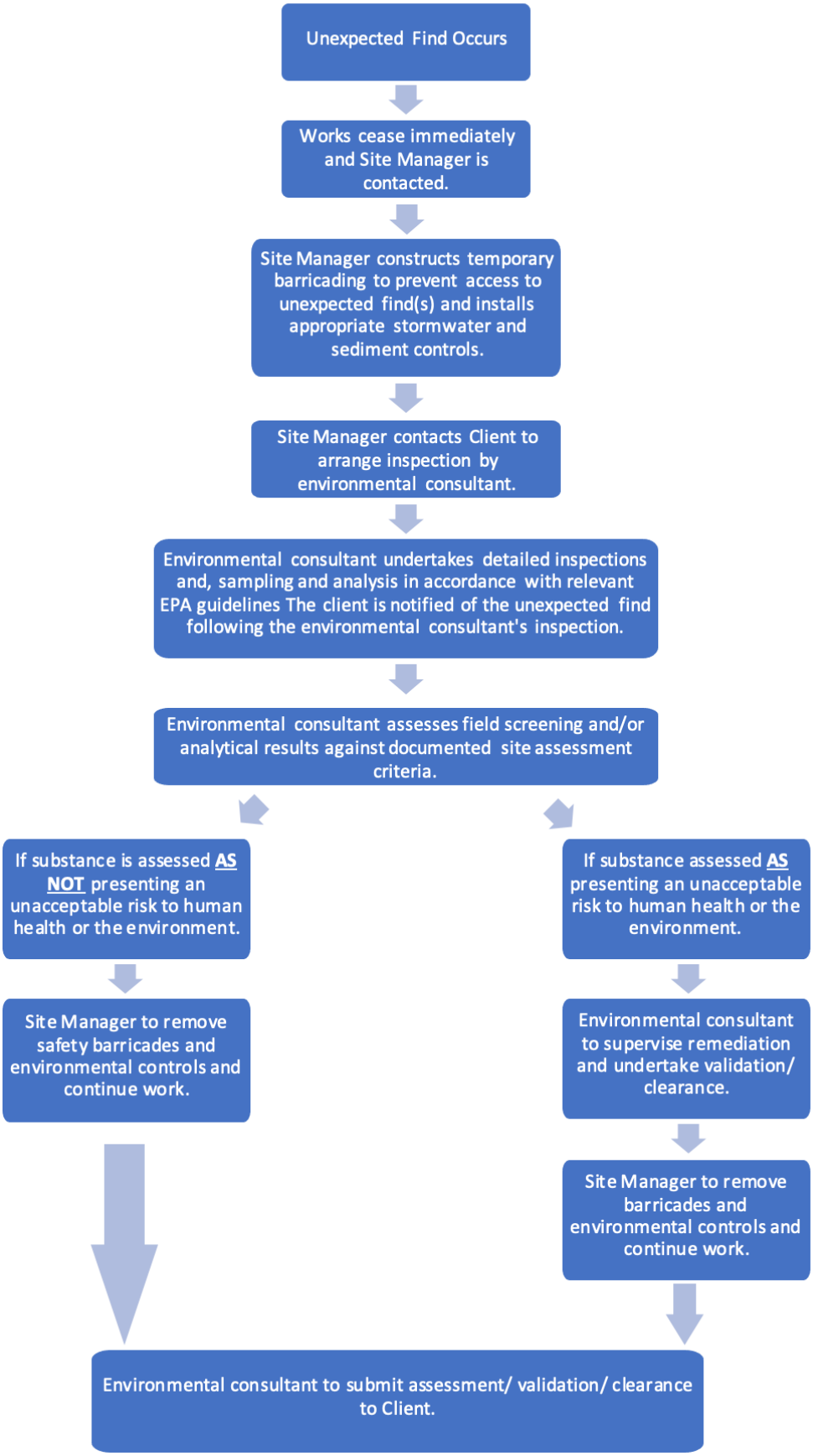

Figure 1 Unexpected Finds Protocol for Contamination

Unexpected Finds Protocol
Aboriginal and non-Aboriginal Heritage

1 Background

An Aboriginal Cultural Heritage Assessment was undertaken by Kelleher Nightingale Consulting (KNC) on 25 November 2021 (Appendix 25 of the EIS – Willowtree, December 2021) to address Condition 18 (Aboriginal Cultural Heritage) of the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Development. The assessment concluded that no Aboriginal objects, archaeological sites or areas of Aboriginal archaeological potential were identified within the boundaries of the Project site during the assessment.

An Aboriginal Heritage Impact Permit (AHIP) was issued for the Stage 2 Basin area in 2018 and remains valid until 2028. This existing AHIP (AHIP number C0003358) allows for impact to identified Aboriginal heritage and Aboriginal objects within the AHIP area. Charter Hall Holdings has confirmed with the AHIP holder that the Development may use the existing AHIP.

An Unexpected Finds Protocol for Aboriginal and Non-Aboriginal heritage is to be included in CEMP.

2 Unexpected Finds Protocol

This protocol has been developed to provide a consistent method for Qanstruct to manage unexpected Aboriginal and non-Aboriginal heritage items that may be discovered during construction of the Project.

This protocol applies to all construction activities associated with the Project.

Should an unexpected Aboriginal or non-Aboriginal heritage item, or skeletal remains be discovered, the protocol on Figure 1 should be followed.

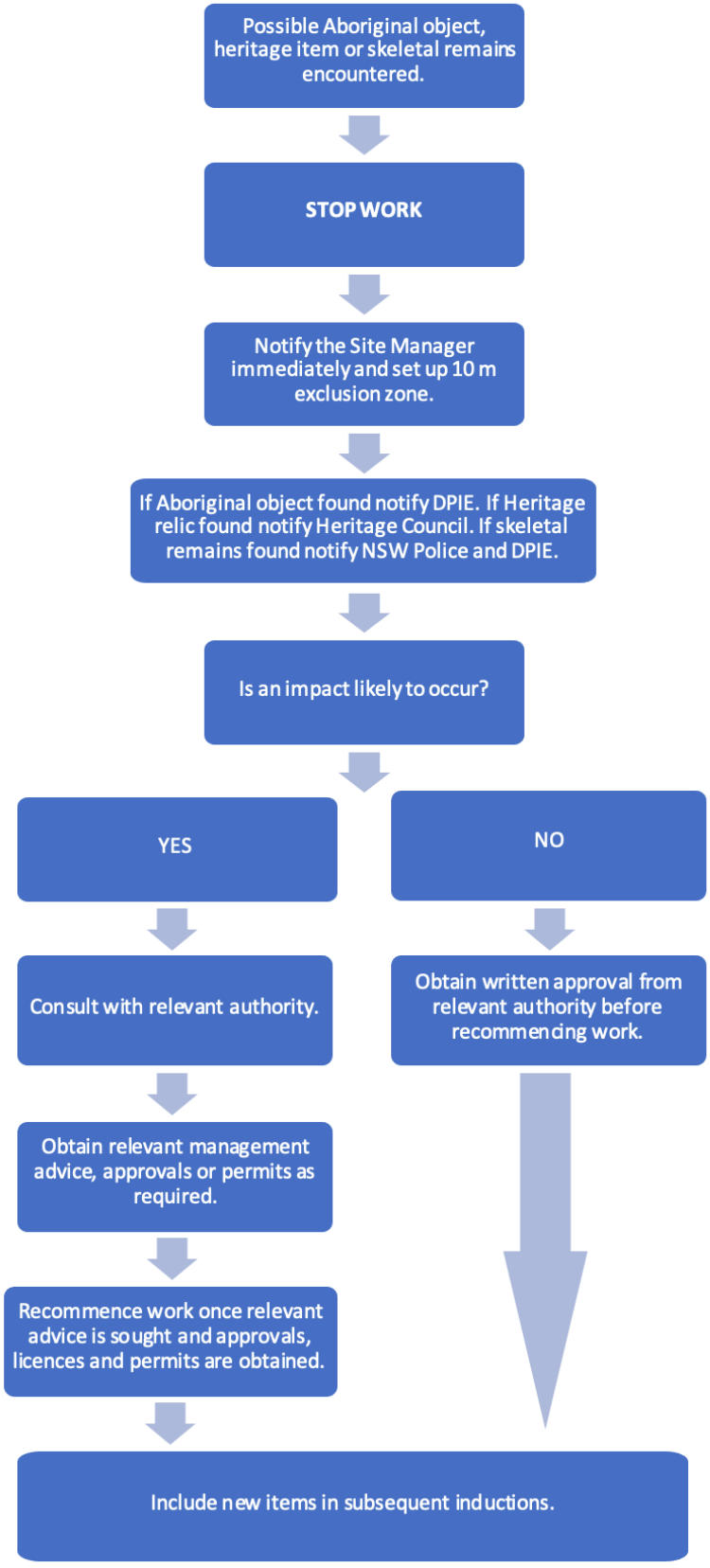

Figure 1 Unexpected Finds Protocol for Aboriginal and non-Aboriginal heritage

Appendix B - Construction Soil and Water Management Sub-Plan

Construction Soil and Water Management Sub-Plan

Warehouse and Distribution Centre – Compass 2

Lot 1 Eastern Creek Drive, Eastern Creek, NSW

SSD-30923027

DOCUMENT TRACKING

Version No.	Document Number	Detail	Prepared By	Approved By	Date
Rev 1	J1863220201.T1	Draft issued to client for review	A. Wiltshire	M. Williams	01/02/2022
Rev 2	J1863220208.T3	Final issued to client	A. Wiltshire	M. Williams	08/02/2022

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1 Introduction

1.1 Background

This Construction Soil and Water Management Sub-Plan (CSWMP) has been prepared by Aspect Environmental Pty Ltd (Aspect), on behalf of Qanstruct Limited (Qanstruct) for Charter Hall Holdings Pty Limited (Charter Hall), for the construction and operation of the Compass 2 Warehouse and Distribution Centre (the Project).

This CSWMP is a Sub-Plan of the Construction Environmental Management Plan (CEMP) and has been prepared with reference to the Environmental Impact Statement (Willowtree Planning, December 2021) for SSD 30923027.

The Project comprises earthworks, construction and operation of warehouse facility at Lot 1 Eastern Creek Drive, Eastern Creek, NSW (Lot 1 DP 1274322) and associated infrastructure and includes access to Honeycomb Drive via 31 Honeycomb Drive, Eastern Creek (Lot 271 DP 1198561).

The location of the Project is indicated by the red outline on Figure 1-1.

Figure 1-1: Site context - Source: EIS, Willowtree Planning, December 2021

1.2 CSWMP Purpose and Context

This CSWMP has been prepared to manage potential soil and water impacts for the Project. The CSWMP has been prepared with reference to the mitigation measure A12 detailed in Appendix E of the EIS (Willowtree Planning, 2021) with the purpose of providing a set of site management procedures to control the severity and extent of soil erosion and pollutant transport during the construction of the Project. These mitigation measures have been prepared in response to the nature, scale and extent of potential soil and water impacts identified in the EIS (Willowtree Planning, December 2021).

The CSWMP should be read in conjunction with the following documentation:

- *Preliminary Erosion and Sediment Control Plan* (Preliminary ESCP) (drawing ref. CO13003.13-SSDA20-B and CO13003.13-SSDA25-B), prepared by Costin Roe Consulting and included as **Appendix A**
- *Acid Sulfate Soil and Salinity Management Plan* (ASSSMP), prepared by WSP and included as **Appendix B**.

In addition, this CSWMP has been prepared to reflect the relevant requirements of *Managing Urban Stormwater - Soils and Construction Volume 1 "The Blue Book"* (Landcom 2004).

All personnel will undertake soil and water management in accordance with this CSWMP, including the PESCP and ASSSMP, and the guidelines in Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004).

2 Existing Environment

2.1.1 General Site Conditions

The Project site was previously used for grazing stock, and more recently for stockpiling and storage of fill during the adjacent regional detention system construction and site level adjustments occurred during these works.

The geology underlying the Project site comprises Bringelly Shale from the Triassic Wianamatta Group, and includes shale, carbonaceous claystone, laminite, lithic sandstone and rare coal rock types (Colquhoun, et al., 2021).

Site elevations range from approximately 60 mAHD to 70 mAHD. Higher elevation is located in the north and north-west portion of the site, with a low-lying area extending from the south-west into the central portion of the site and along the eastern boundary. Water has been noted to pond on the ground surface in the low-lying areas.

There are no watercourses or riparian land located in the Project site. The nearest natural water body, a small tributary of Eastern Creek, was previously located on the site, however, this appears to have been filled in to allow for development of the site. Reedy Creek is located approximately 900 m south-east of the site. A stormwater retention basin and stormwater overflow area are located immediately to the east of the site, and an underground stormwater drainage channel runs from Eastern Creek Drive in the south-west, along the southern site boundary. Stormwater will either continue north along the eastern site boundary to the stormwater retention basin or be discharged from the off-site stormwater overflow outlet adjacent to the south-east corner of the site.

2.1.2 Soils and Contamination

eSpade mapping shows the Project site is located in an area of moderate probability of land salinity. Soil investigations indicate soils are generally non-saline to moderately saline. The underlying residual clays are predominantly slightly to moderately saline. The deeper weathered siltstone was found to be generally moderately saline. The subsurface in the down gradient south-east corner of the site was generally more saline than the up gradient north-west.

Testing indicates that soils on the site are generally highly sodic, which reduces the ability of colloids to bind together and increases the risk of soil erosion. Soil salinity does not present a significant risk of corrosion to shallow structures.

The Project site has previously been used for agricultural/grazing purposes, which is one of the activities listed in Table 1 of SEPP 55 guidelines. However, the proposed commercial/industrial land use of the site will be less sensitive than the former agricultural landuse. Site investigations confirmed that contaminants assessed were either below the laboratory reporting limit or the adopted site criteria, including below the ecological investigation/screening levels.

The site is mapped as being in an area of extremely low probability of occurrence of acid sulfate soils (ASS) (ASRIS, 2020). There is the possibility of encountering Potential ASS (PASS) in the portion of the site where a former farm dam, former detention basin and associated drainage lines were situated.

2.1.3 Groundwater

During investigations carried out by WSP (WSP, 2021x), groundwater was encountered at levels between 60.01 m AHD and 63.28 m AHD. Water quality observations determined groundwater to be moderately saline to saline, with an electrical conductivity between 18,745µS/cm and 24,700µS/cm.

The proposed final ground level is 66.8 m AHD and there are requirements for shallow excavations of up to 2.0 m, accounting for site levelling and foundation improvements.

There is no registered beneficial use of groundwater within a 500 m radius of the site.

Perched water may also be encountered within granular material above cohesive soil layers; more likely directly following periods of heavy rainfall.

2.1.4 Rainfall and Flooding

Meteorological data was obtained from the BOM (BoM, 2021) weather station at Horsley Park Equestrian Centre AWS (BOM Station No. 67119) approximately 5 km south of the Project, which indicates that the Development site has a mean monthly rainfall range of 36.4 mm - 118.3 mm, with maximum rainfall typically occurring in February and March.

For flooding and large rainfall events, local runoff and overland flow paths including the overland flow from Eastern Creek Drive report to the adjacent regional detention system, the Eskdale Creek Basin. Key flow paths to the basin system are from the north, south and west. Discharge from the basin is eastward toward Eastern Creek, on the eastern side of the M7 Motorway.

3 Mitigation Measures

Table 4-1 identifies the mitigation measures that will be adopted to manage potential soil and water impacts during the construction of the Project.

Table 3-1: Construction soil and water mitigation measures

ID	Mitigation Measure	Timing	Responsibility
General			
SW01	Contractors will confirm that all soil and water management works are undertaken as detailed in the Preliminary Erosion and Sediment Control Plan (Preliminary ESCP) (Costin Roe, 2021) included in Appendix A of this CSWMP, and following the guidelines outlined in *Managing Urban Stormwater, Soils and Construction (2004) "The Blue Book"*.	Pre-construction and construction	Project Manager Site Manager/ HSSE Officer
SW02	All personnel to participate in an induction prior to commencing works on site, and will be informed of their responsibilities in minimising the potential for soil erosion and pollution at the Project site.	Pre-construction and construction	Project Manager Site Manager/ HSSE Officer
Site disturbance			
SW03	Where practicable, the extent of site disturbance will be kept as low as possible and as recommended below: - Construction areas – limited to up to 5 metres from the edge of any essential construction activity, as generally indicated on the engineering plans - Access areas – limited to a maximum width of 5 metres - Remaining areas – restricted access, for essential management works only.	Construction	Project Manager Site Manager/ HSSE Officer
SW04	Identification and management of potential acid sulfate soils (PASS) will be in accordance with the procedures outlined in Section 5 of the Acid Sulfate Soil and Salinity Management Plan (ASSSMP) (WSP, 2021) included in Appendix B of this CSWMP.	Construction	Site Manager/ HSSE Officer
Erosion and sediment control			
SW05	Sediment and erosion controls should be installed prior to the commencement of any works and maintained throughout the course of construction until disturbed areas have been revegetated/ established.	Pre-construction and construction	Project Manager
SW06	Clearly visible barrier fencing shall be installed as shown in the Preliminary ESCP and elsewhere at the discretion of the site superintendent to assist in traffic control and minimise unnecessary site disturbance. Vehicle access to the site shall be limited to essential construction traffic and shall enter the site by the stabilised access point(s) only.	Construction	Site Manager/ HSSE Officer All personnel
SW07	Soil material will be replaced in the same order it is removed from the ground. It is particularly important that all subsoils are buried, and topsoils remain on the surface at the completion of works.	Construction	Site Manager/ HSSE Officer
SW08	The amount of time land is exposed should be minimised though development and/or works phases, where possible. Particular care should be taken to avoid allowing soils to desiccate and crack, since these soils are then vulnerable to tunnel erosion after heavy rainfall.	Construction	Site Manager/ HSSE Officer
SW09	Notwithstanding SW08, the timeframe from the conclusion of land shaping to the completion of final stabilisation works should be less than 20 working days.	Construction	Site Manager/ HSSE Officer

ID	Mitigation Measure	Timing	Responsibility
SW10	Land recently established with grass species will be watered regularly until effective cover is properly established and plants growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.	Construction	Site Manager/ HSSE Officer
SW11	Where practicable, foot and vehicle traffic will be minimised from all recently established areas.	Construction	All personnel
SW12	Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as low a gradient as practical, but no steeper than: - 2H:1V where slope length is less than 7 m - 2.5H:1V where slope length is 7-10 m - 3H:1V where slope length is 10-12 m - 4H:1V where slope length is 12-18 m - 5H:1V where slope length is 18-27 m - 6H:1V where slope length is greater than 27 m.	Construction	Site Manager/ HSSE Officer
SW13	Soil compaction should be verified through geotechnical supervision and field and laboratory testing.	Construction	Site Manager/ HSSE Officer
SW14	All earthworks, including waterways/drains/spillways and their outlets, will be constructed to maintain stability in the design storm event at a minimum.	Construction	Site Manager/ HSSE Officer
SW15	Earthworks surfaces should be shaped to avoid ponding of surface water and discharged to relatively erosion resistant areas (e.g. garden beds mixed with gypsum, existing well vegetated areas with ample topsoil and stony elevated areas) away from dispersive soils.	Construction	Site Manager/ HSSE Officer
SW16	Exposed dispersive subsoils should be treated as soon as possible to protect them from rainfall and surface water.	Construction	Site Manager/ HSSE Officer
SW17	Runoff from areas of dispersive soils should not be discharged directly to waterways or stormwater drains.	Construction	Site Manager/ HSSE Officer
SW18	Stockpiles will not be located within 5 m of hazard areas, including likely areas of high velocity flows, such as waterways, paved areas and driveways. Silt/sediment fences and appropriate stabilisation of stockpiles are to be provided as detailed in the Preliminary ESCP in Appendix A.	Construction	Site Manager/ HSSE Officer
SW19	Sediment fences will: - be installed where shown on drawings, and elsewhere at the discretion of the Site Manager to contain coarser sediment fraction (including aggregated fines) as near as possible to their source - have a catchment area not exceeding 720 m^2, a storage depth (including both settling and settled zones) of at least 0.6 m, and internal dimensions that provide maximum surface area for settling - provide a return of 1 m upslope at intervals along the fence where catchment area exceeds 720 $m^2$to limit discharge reaching each section to 10 litres/second in a maximum 20-year t_c discharge.	Construction	Site Manager/ HSSE Officer
SW20	Sediment removed from any trapping device will be disposed of in locations where further erosion and/or consequent pollution to downslope lands and waterways is avoided.	Construction	Site Manager/ HSSE Officer
SW21	Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (ie the catchment area has been permanently landscaped and/or water has been treated, and sediment retained, diverted or otherwise stabilised. Stormwater inlets	Construction	Site Manager/ HSSE Officer

ID	Mitigation Measure	Timing	Responsibility
	will be protected with diversion bunding and/or filter fabric during construciton.		
SW22	Temporary soil and water management structures will be removed only after the Project site is stabilised, or progressively as upstream portions of the site are stabilised or replaced with permanent built surfaces.	Construction	Project Manager
SW23	The controls included in the preliminary ESCP are expected to be reviewed and updated as the design, staging and construction methodology is further developed for the Project.	Construction	Project Manager Site Manager/ HSSE Officer
Inspections, records and reporting			
SW24	Weather conditions and forecasts will be monitored daily and reported to the Site Manager/ HSSE Officer to assist in appropriate planning for adverse weather events.	Construction	All personnel
SW25	A site inspection will be undertaken by the Site Manager/HSSE Officer on the following occasions: - weekly (may be undertaken in conjunction with the weekly inspection detailed in the CEMP) - immediately following rainfall events in excess of 5mm in any 24-hour period - prior to a rostered day off, long weekend or other period of extended closure. The inspection will include: - recording the condition of the sediment control devices - recording maintenance requirements (if any) - recording approximate volumes of sediment removed form sediment retention systems, where applicable - Sediment disposal details, where applicable. A signed copy of the inspection notes/checklist should be kept on file and a duplicate forwarded to the Project Manager for their records.	Construction	Site Manager/ HSSE Officer
SW26	Any complaints relating to soil and water will be investigated in accordance with the requirements of the CEMP. Where applicable, reasonable remedial actions will be implemented.	Construction	Project Manager Site Manager/ HSSE Officer

Appendix A - Preliminary Erosion and Sediment Control Plan (Costin Roe Consulting, 2021)

STATE SIGNIFICANT DEVELOPMENT APPLICATION
PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE, EASTERN CREEK, NSW, 2766

DRAWING LIST

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.
   ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
   ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
   REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.
4. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
5. UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
6. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

ELECTRONIC INFORMATION NOTES:

1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.
4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

SITE LOCATION PLAN
NTS

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA10

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Consulting Engineers ACN 003 696 446
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Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: DRAWING LIST & LOCALITY PLAN

DRAWING No: C013003.13-SSDA10 ISSUE: B

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LTS DATED 13.11.20.

- DENOTES SILT FENCE
- DENOTES DIVERSION DRAIN
- OVERLAND FLOW DIRECTION
- DENOTES SITE BOUNDARY
- STABALISED CONSTRUCTION ENTRANCE

DUST CONTROL NOTES:

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE DUST CONTROL MEASURES ARE APPLIED AND MAINTAINED IN ACCORDANCE WITH THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN.
2. THE APPLICATION OF LIQUID BASED DUST SUPPRESSION MEASURES MUST BE SUCH THAT SEDIMENT LADEN RUNOFF RESULTING FROM SUCH MEASURES DOES NOT CREATE A TRAFFIC OR ENVIRONMENTAL HAZARD. (EG USING HAY BALES)
3. DUST GENERATION ASSOCIATED WITH WIND EROSION TO BE CONTROLLED USING WATER TRUCKS, DUST SUPPRESSING FOG, MIST GENERATORS, SEALANT PLACED OVER THE SOIL, SURFACE ROUGHENING OR RE-VEGETATION.
4. THE FOLLOWING ACTIVITIES SHALL BE ADOPTED, IF NECESSARY, TO MANAGE DUST CONTROL ON SITE:
   - LIMITING THE AREA OF SOIL DISTURBANCE AT ANY GIVEN TIME
   - REPLACING TOPSOIL AFTER COMPLETION OF EARTHWORKS.
   - PROGRAMMING WORK TO MINIMISE THE LIFE OF STOCKPILES.
   - TEMPORARILY STABILISING LONG-TERM STOCKPILES.
   - GRAVELLING UNSEALED ACCESS AND HAUL ROADS.
   - MINIMISING TRAFFIC MOVEMENT ON EXPOSED SURFACES.
   - LIMITING VEHICULAR TRAFFIC TO 15km/h.
   - RETAINING EXISTING VEGETATION AS WIND BREAKS.
5. OIL, LANDFILL GAS CONDENSATE OR ANY CONTAMINATED LEACHATE OR STORMWATER IS NOT TO BE USED FOR DUST SUPPRESSION.

SEDIMENT CONTROL BASIN NOTES:

1. TYPE D BASIN IS REQUIRED.
2. VOLUME OF THE BASINS SHALL BE AS NOMINATED ON DRAWING. NOMINAL POND LOCATIONS AND NOMINAL DIMENSIONS.
3. SEDIMENT BUILD UP TO NOT EXCEED 33% TOTAL CAPACITY OF BASIN.
4. DEWATERING OF BASIN TO BE PERFORMED TO THE BOTTOM OF THE SEDIMENT SETTLING ZONE FOLLOWING ACHIEVEMENT OF WQO's. MANAGEMENT OF DOSAGE AND DISCHARGE TO BE ACHIEVED WITHIN 5 DAYS OF THE INITIAL RAINFALL EVENT.
5. FOLLOWING DEWATERING PER NOTE 4, WATER LEVEL TO BE MAINTAINED AT 20% CAPACITY AFTER A FOUR DAY SETTLING PERIOD FOLLOWING A STORM EVENT.
6. WATER TO BE DOSED WITH GYPSUM TO ACCELERATE SETTLEMENT OF SUSPENDED SOLIDS AS REQUIRED.
7. GYPSUM DOSAGE RATE TO BE APPLIED AT APPROX. 32kg PER 100 CUBIC METRE OF COLLECTED RUNOFF.
8. THE USE OF ALUM (OR ANY OTHER ALTERNATIVE) AS A FLOCCULANT IS NOT RECOMMENDED. ALUM OR ANY OTHER FLOCCULANT IS TO BE USED ONLY FOLLOWING CONSULTATION WITH AND ACCEPTANCE FROM COUNCIL ESC OFFICERS.
9. DISCHARGE FROM POND IS PERMISSIBLE WHEN THE WATER PH IS 6.5-8.5 AND IS CLARIFIED TO AT OR BELOW A TSS OF 50mg/L. CLARIFICATION WOULD GENERALLY BE ACHIEVED IN 36-72 HOURS WITH THE USE OF GYPSUM. CORRELATION TESTS MUST BE UNDERTAKEN ON SITE TO ENSURE THIS IS ACHIEVED.
10. DEWATERING SHALL BE DONE IN SUCH A MANNER AS TO REMOVE THE CLEAN WATER (BEING WATER WITHIN THE ADOPTED CRITERIA) WITHOUT REMOVING OR DISTURBING THE SEDIMENT THAT HAS SETTLED. THE PUMP INTAKE PIPE IS NOT TO REST ON THE SETTLED SEDIMENT LAYER.
11. IF WATER EXCEEDS TSS OF 50mg/L DURING DEWATERING, PUMPING IS TO CEASE. RECORDS ARE TO BE KEPT (ON-SITE AT ALL TIMES) OF ALL MEASUREMENT PRIOR TO, DURING AND AFTER DISCHARGE. RECORDS TO BE MADE AVAILABLE TO COUNCIL OFFICERS UPON REQUEST.
12. PROVIDE SECURITY FENCE TO BASIN FOR SAFETY.

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. 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, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C013003.13-SSDA25.

SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK'. CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 85th PERCENTILE INTENSITY (32.2mm).

APPROXIMATE AREA OF DISTURBED SITE = 4.83ha

SEDIMENT BASIN 1:

CATCHMENT AREA	= 4.83ha
REQUIRED BASIN VOLUME	= 1165m³
BASE DIMENSIONS (L X W)	= 20.0m x 28.0m
TOP DIMENSIONS (L X W)	= 29.0m x 37.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.50m
PROVIDED BASIN VOLUME	= 1205m³

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS. COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

NOTES:
1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

EASTERN CREEK DRIVE
HONEYCOMB DRIVE
PROPOSED EXTENSION OF HONEYCOMB DRIVE
STABILISED SITE ENTRY REFER TO DRAWING SSDA25 FOR DETAILS
SILT FENCE ONLY
PROVIDE CROSSING OVER DIVERSION DRAIN AS DETAILED ON DRG SSDA25.
KERB INLET PIT PROTECTOR REFER TO DRAWING SSDA25 FOR DETAIL. TYPICAL
DIVERSION DRAIN
ALL SITE RUNOFF TO BE DIRECTED TO SEDIMENT BASIN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ON-SITE ADJUSTMENT TO ESC MEASURES ARE MADE & SITE RUNOFF IS DIRECTED TO THE SEDIMENT BASIN.
ONGOING CIVIL EARTHWORKS
LOT 1
4002
DP 1243178
4001
DP 1243178
DP 1198561
SITE BOUNDARY
PROVIDE SILT FENCE WITH CATCH DRAIN. REFER TO DETAILS ON DRAWING SSDA25
NOMINAL STOCKPILE LOCATION T.B.C ON SITE
DIVERSION DRAIN REFER TO DETAIL ON DRG SSDA25. PROVIDE NOMINAL 0.5% FALL ON PAD TO DIVERSION DRAIN. TYPICAL
SEDIMENT BASIN REFER TO NOTES
EMERGENCY OVERFLOW WEIR 5.5m WIDE, 150mm DEEP
CLEAN WATER TO BE PUMPED TO EXISTING POND.
EXISTING BASIN
EXISTING BASIN

EROSION AND SEDIMENT CONTROL PLAN
SCALE 1:500

5m 0 10 20 30 40 50m
SCALE 1:500 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA20

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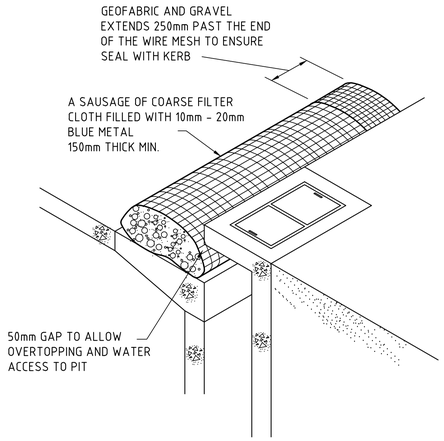
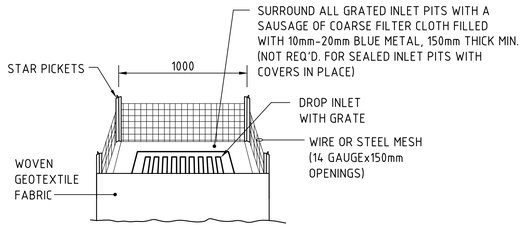
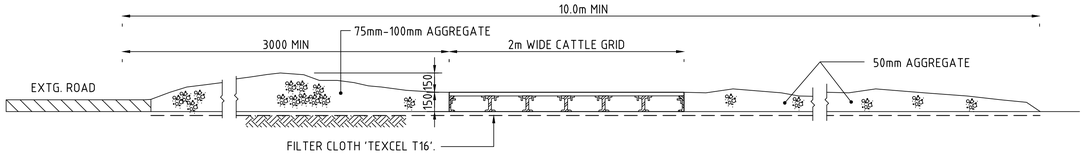
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
DRAWING No: C013003.13-SSDA20
ISSUE: B



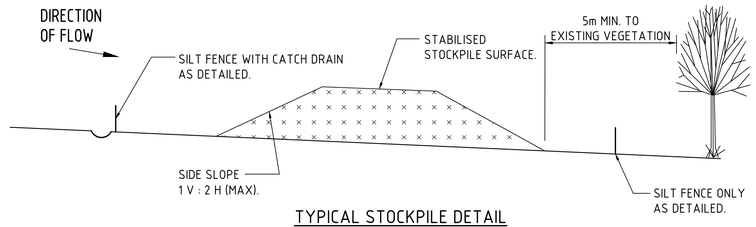
KERB INLET CONTROL
NTS



GRATED INLET PIT FILTER DETAIL
N.T.S



SECTION 1:20 1 (SSDA20) : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'
CAN BE MODIFIED TO INCLUDE A WHEEL BATH

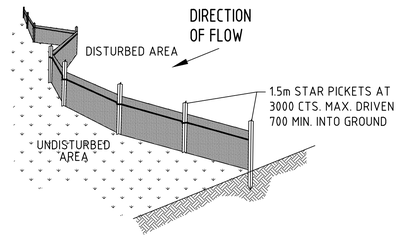


TYPICAL STOCKPILE DETAIL
N.T.S.

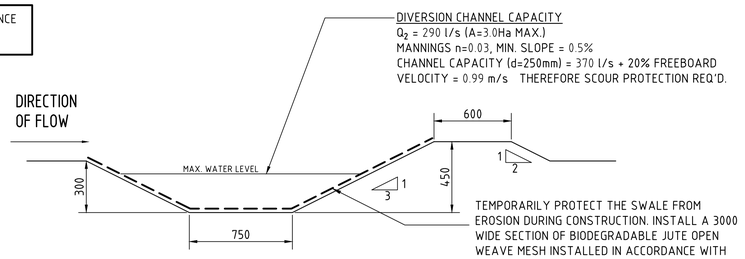
NOTE : ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.

STOCKPILE NOTES

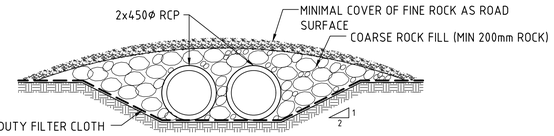
1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



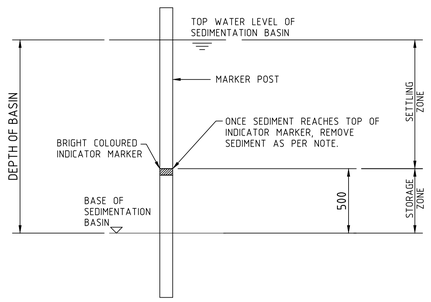
TYPICAL SILT FENCE DETAIL
N.T.S.
PROVIDE 1m RETURNS AT 30m INTERVALS.
TYPICAL



DIVERSION DRAIN SECTION
SCALE 1:20



TYPICAL CROSSING OVER DIVERSION CHANNEL
SCALE 1:20



SEDIMENT STORAGE MARKER
SCALE 1:20

NOTES:

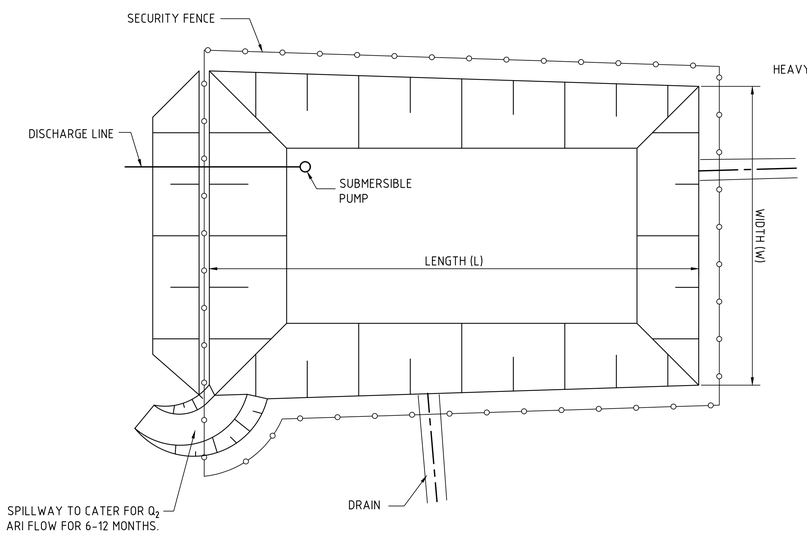
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.

MINIMISE DISTURBED AREAS.

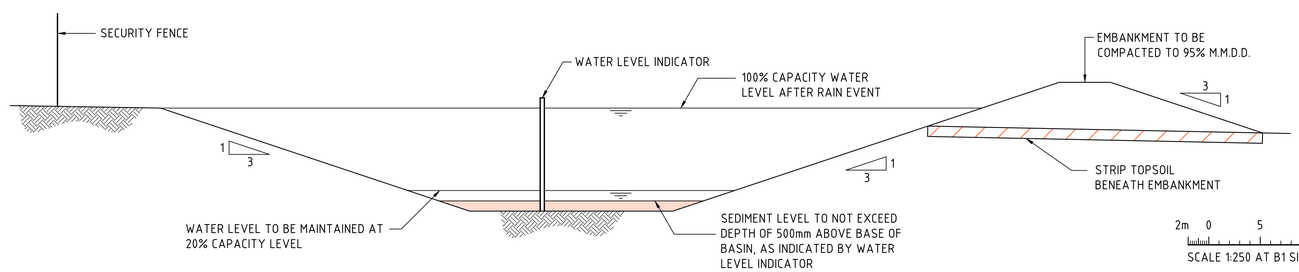
ROADS & FOOTPATHS TO BE SWEPT DAILY.

1.2m TURF TO BE PLACED BEHIND KERBS.

DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE CEMP.



TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250



TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE SHEET

500mm 0 1 2 3 4 5m
SCALE 1:50 AT B1 SIZE SHEET

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hill

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA 25

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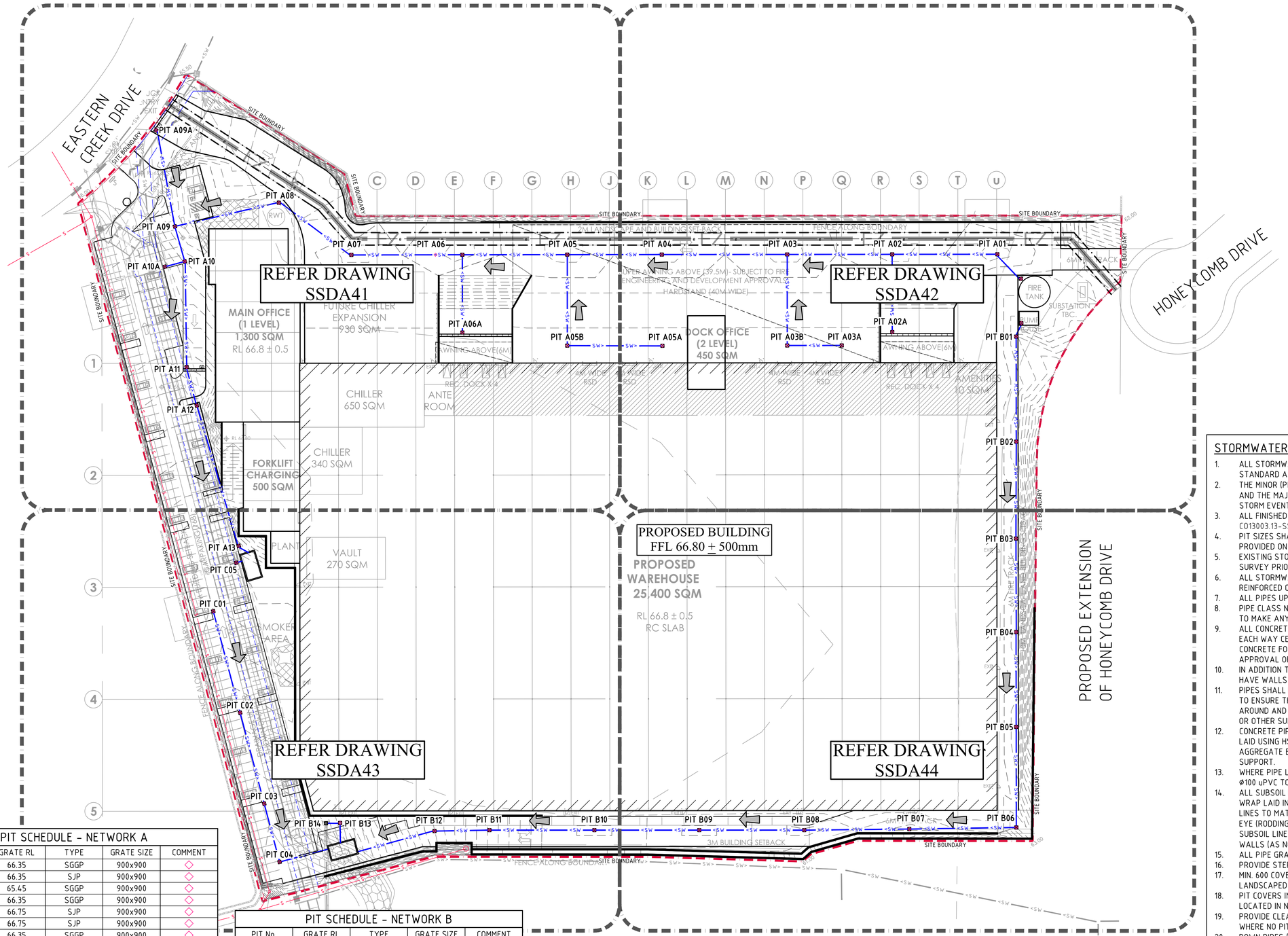
DRAWING TITLE: EROSION AND SEDIMENT CONTROL DETAILS

DRAWING No: C013003.13-SSDA25 ISSUE: B



LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LTS DATED 13.11.20.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- ROOFWATER LINE
- SUBSOIL LINE
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3:2018 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS C013003.13-SSDA51 TO SSDA54.
4. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
5. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
6. ALL STORMWATER PIPES Ø375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
7. ALL PIPES UP TO AND INCLUDING Ø300 TO BE uPVC GRADE SN8 UNO.
8. PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
9. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
10. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
11. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
12. CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
13. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Ø100 uPVC TO EACH SIDE OF PIPE.
14. ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
15. ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
16. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
17. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
18. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
19. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
20. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
21. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.
22. WHERE CONNECTION TO EXISTING INGROUND DRAINAGE SYSTEMS, OPEN SWALES, CHANNELS OR ANY OTHER EXISTING SYSTEM, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION AND INVERT ON SITE AT THE BEGINNING OF THE CONSTRUCTION PERIOD. REFER ANY VARIANCE FROM DOCUMENTATION OR SURVEYS TO THE ENGINEER FOR CLARIFICATION.

PIT SCHEDULE - NETWORK A

PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT A01	66.35	SGGP	900x900	◇
PIT A02	66.35	SJP	900x900	◇
PIT A02A	65.45	SGGP	900x900	◇
PIT A03	66.35	SGGP	900x900	◇
PIT A03A	66.75	SJP	900x900	◇
PIT A03B	66.75	SJP	900x900	◇
PIT A04	66.35	SGGP	900x900	◇
PIT A05	66.35	SGGP	900x900	◇
PIT A05A	66.75	SJP	900x900	◇
PIT A05B	66.76	SJP	900x900	◇
PIT A06	66.35	SGGP	900x900	◇
PIT A06A	65.42	SJP	900x900	◇
PIT A07	66.35	SGGP	900x900	◇
PIT A08	66.66	SJP	900x900	◇
PIT A09	66.19	SGGP	900x900	◇
PIT A09A	65.89	GD/SGGP	900x900	◇
PIT A10	66.01	SGGP	900x900	◇
PIT A10A	65.76	SGGP	900x900	◇
PIT A11	65.39	GD/SGGP	900x900	◇
PIT A12	65.12	SGGP	900x900	◇
PIT A13	64.82	SGGP	900x900	◇

PIT SCHEDULE - NETWORK B

PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT B01	66.32	SGGP	900x900	◇
PIT B02	66.20	SGGP	900x900	◇
PIT B03	66.33	SGGP	900x900	◇
PIT B04	66.33	SGGP	900x900	◇
PIT B05	66.33	SGGP	900x900	◇
PIT B06	66.27	SGGP	900x900	◇
PIT B07	66.45	SGGP	900x900	◇
PIT B08	66.45	SGGP	900x900	◇
PIT B09	66.45	SGGP	900x900	◇
PIT B10	66.45	SGGP	900x900	◇
PIT B11	66.12	SGGP	900x900	◇
PIT B12	65.60	SJP	900x900	◇
PIT B13	64.44	SJP	900x900	◇
PIT B14	64.25	SJP	900x900	

PIT SCHEDULE - NETWORK C

PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT C01	64.58	SGGP	900x900	◇
PIT C02	64.34	SGGP	900x900	◇
PIT C03	64.12	SGGP	900x900	◇
PIT C04	64.05	SGGP	900x900	◇
PIT C05	64.73	SGGP	900x900	◇

STORMWATER DRAINAGE KEY PLAN

SCALE 1:500

NOTES:

ALL SURFACE INLET PITS & ROOFWATER COLLECTION PITS DENOTED WITH ◇ TO BE FITTED WITH OCEANPROTECT OCEANGUARD OG200 PIT INSERTS.

5m 0 10 20 30 40 50m

SCALE 1:500 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
REVISED FOR UPDATED ARCHITECTURALS	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT '21		B1	AS SHOWN	C013003.13-SSDA40

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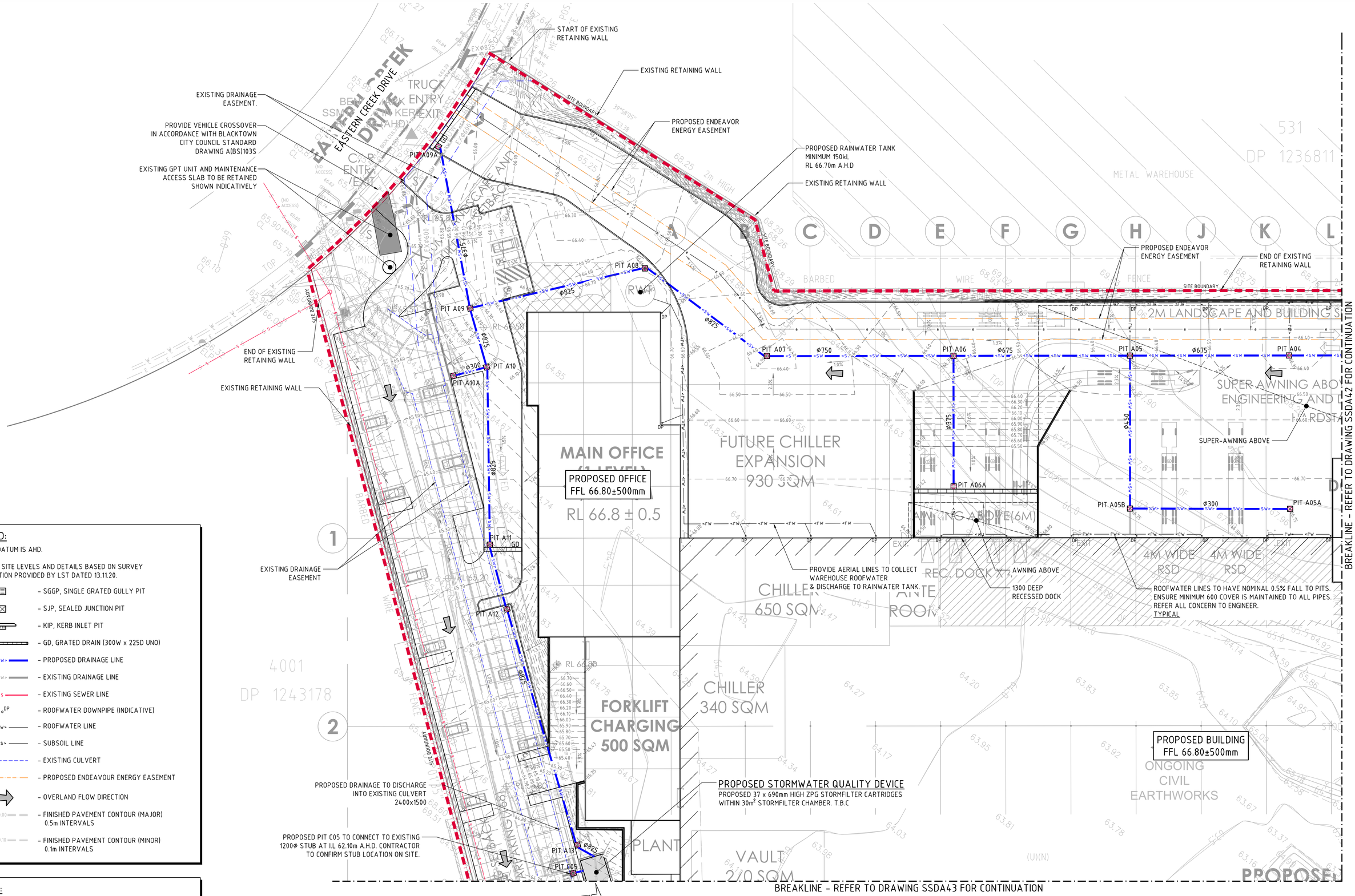
DRAWING TITLE: STORMWATER DRAINAGE KEY PLAN

DRAWING No. C013003.13-SSDA40 ISSUE B



LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LST DATED 13.11.20.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
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- EXISTING DRAINAGE LINE
- EXISTING SEWER LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- ROOFWATER LINE
- SUBSOIL LINE
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTES:

1. REFER TO DRAWING SSDA40 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING SSDA40 FOR PIT SCHEDULE.
3. ALL SURFACE INLET PITS & ROOFWATER COLLECTION PITS TO BE FITTED WITH OCEANPROTECT OCEANGUARD OG200 PIT INSERTS.

STORMWATER DRAINAGE PLAN - SHEET 1

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

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ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA41

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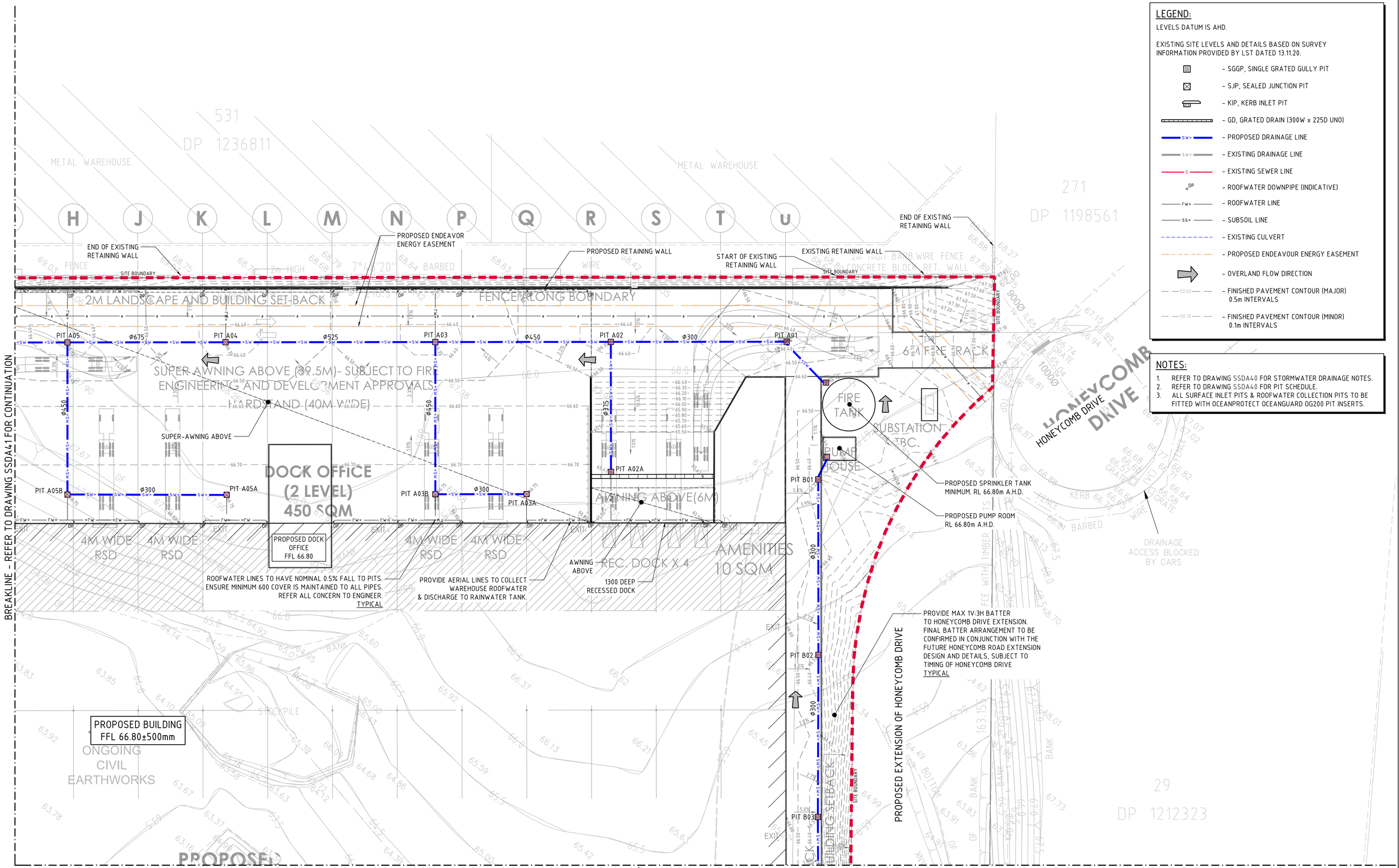
DRAWING TITLE: STORMWATER DRAINAGE PLAN SHEET 1

DRAWING No. C013003.13-SSDA41 ISSUE B



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- ROOFWATER LINE
- SUBSOIL LINE
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTES:

1. REFER TO DRAWING SSDA40 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING SSDA40 FOR PIT SCHEDULE.
3. ALL SURFACE INLET PITS & ROOFWATER COLLECTION PITS TO BE FITTED WITH OCEANPROTECT OCEANGUARD OG200 PIT INSERTS.

STORMWATER DRAINAGE PLAN - SHEET 2

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
REVISED FOR UPDATED ARCHITECTURALS	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT '21		B1	AS SHOWN	C013003.13-SSDA42

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DRAWING TITLE: STORMWATER DRAINAGE PLAN SHEET 2

DRAWING No: C013003.13-SSDA42 ISSUE: B

BREAKLINE - REFER TO DRAWING SSDA41 FOR CONTINUATION

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LST DATED 13.11.20.

- SGGP, SINGLE GRATED GULLY PIT
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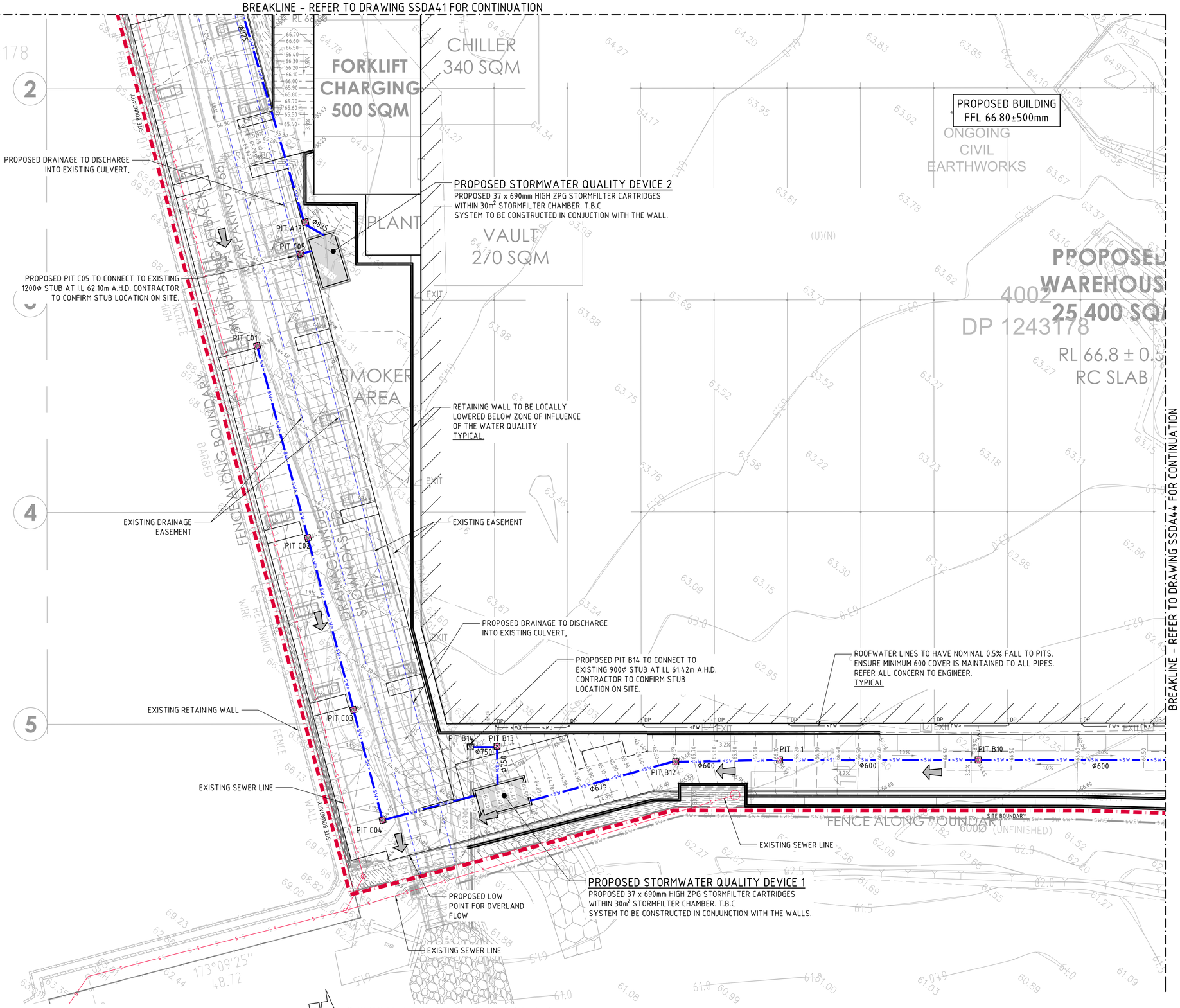
- ROOFWATER LINE
- SUBSOIL LINE
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTES:

1. REFER TO DRAWING SSDA40 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING SSDA40 FOR PIT SCHEDULE.
3. ALL SURFACE INLET PITS & ROOFWATER COLLECTION PITS TO BE FITTED WITH OCEANPROTECT OCEANGUARD OG200 PIT INSERTS.



STORMWATER DRAINAGE PLAN - SHEET 3

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
REVISED FOR UPDATED ARCHITECTURALS	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT '21		B1	AS SHOWN	C013003.13-SSDA 43

CONSULT AUSTRALIA

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DRAWING TITLE: STORMWATER DRAINAGE PLAN SHEET 3

DRAWING No: C013003.13-SSDA43

ISSUE: B

BREAKLINE - REFER TO DRAWING SSDA42 FOR CONTINUATION

BREAKLINE - REFER TO DRAWING SSDA43 FOR CONTINUATION

PROPOSED BUILDING
FFL 66.80±500mm

ONGOING
CIVIL
EARTHWORKS

PROPOSED
WAREHOUSE
25,400 SQM

4002
DP 1243178

RL 66.8 ± 0.5
RC SLAB

STOCKPILE

PIT B02
PIT B03
PIT B04
PIT B05
PIT B06
PIT B07
PIT B08
PIT B09
PIT B10

Φ300
Φ375
Φ450
Φ525
Φ600

6M FIRE TRACK

10M LANDSCAPE AND BUILDING SETBACK

3M BUILDING SETBACK

SITE BOUNDARY

PROPOSED EXTENSION OF HONEYCOMB DRIVE

PROVIDE MAX 1V:3H BATTER TO HONEYCOMB DRIVE EXTENSION. FINAL BATTER ARRANGEMENT TO BE CONFIRMED IN CONJUNCTION WITH THE FUTURE HONEYCOMB ROAD EXTENSION DESIGN AND DETAILS, SUBJECT TO TIMING OF HONEYCOMB DRIVE
TYPICAL

PROVIDE MAX 1V:3H BATTER TO PROPOSED RETAINING WALL

PROPOSED RETAINING WALL

EXISTING EASEMENT

FINAL ARRANGEMENT AT BOUNDARY TO BE CONFIRMED IN CONJUNCTION WITH THE FUTURE HONEYCOMB ROAD EXTENSION DESIGN AND DETAILS, SUBJECT TO TIMING OF HONEYCOMB DRIVE.
TYPICAL.

ROOFWATER LINES TO HAVE NOMINAL 0.5% FALL TO PITS. ENSURE MINIMUM 600 COVER IS MAINTAINED TO ALL PIPES. REFER ALL CONCERN TO ENGINEER.
TYPICAL

PIPE AND PITS B06 TO B10 TO BE INSTALLED IN CONJUNCTION WITH RETAINING WALL CONSTRUCTION.

PROPOSED RETAINING WALLS

ALONG BOUNDARY

OPEN PIT

OVERFLOW POND

OVERFLOW POND

CONC PAD

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LST DATED 13.11.20.

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- EXISTING SEWER LINE
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- ROOFWATER LINE
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- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTES:

1. REFER TO DRAWING SSDA40 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING SSDA40 FOR PIT SCHEDULE.
3. ALL SURFACE INLET PITS & ROOFWATER COLLECTION PITS TO BE FITTED WITH OCEANPROTECT OCEANGUARD OG200 PIT INSERTS.

FINISHED LEVELS PLAN - SHEET 4

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
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ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT
PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA44

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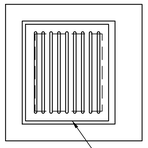
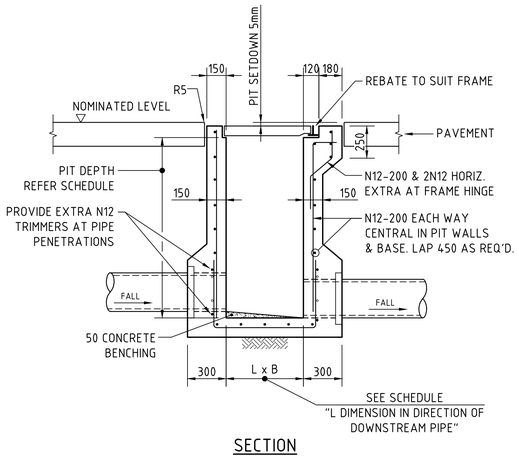
DRAWING TITLE
STORMWATER DRAINAGE PLAN
SHEET 4

DRAWING No C013003.13-SSDA44

ISSUE B

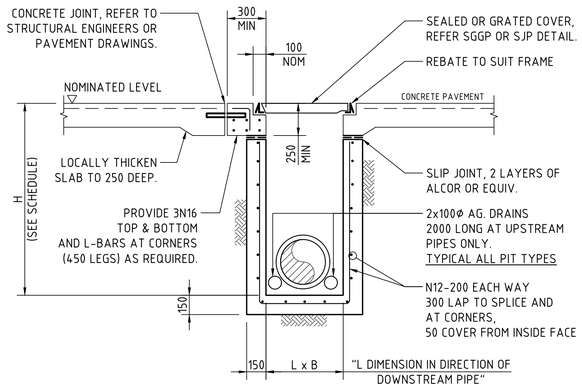


PLAN
SCALE 1:20



SECTION
SCALE 1:20

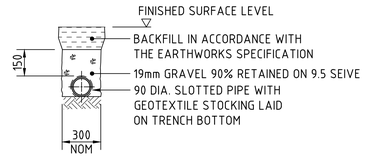
SINGLE GRATED GULLY PIT - SGGP



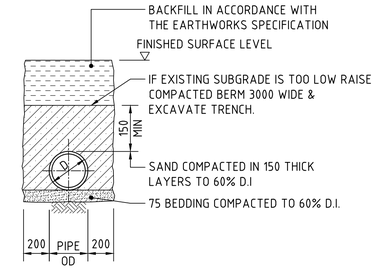
SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB

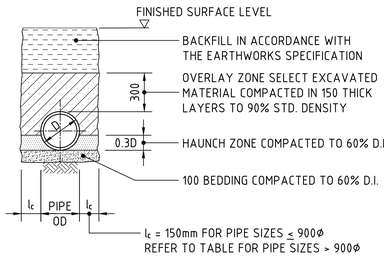
(ADOPT IN CONCRETE PAVEMENT FOR SGGP's & SJP's,
WHERE PITS ARE LOCATED IN THE CORNER OF SLAB
PANELS OR ADJACENT TO SLAB PANEL JOINTS)



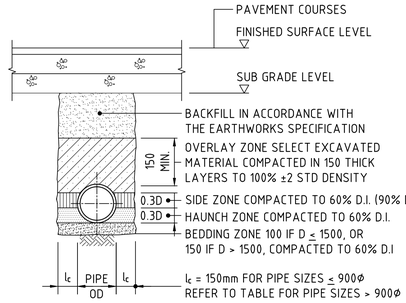
SUPPORT TO AGRICULTURAL DRAIN
SCALE 1:20



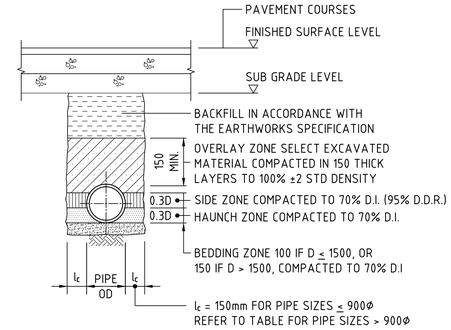
SUPPORT TO uPVC PIPES
SCALE 1:20



TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS
SCALE 1:20



TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤ 1350, MAX FILL = 4.0m
D > 1350, MAX FILL = 3.0m

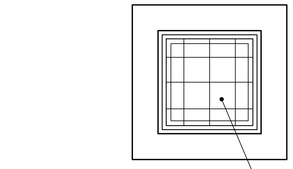


TYPE HS3 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤ 1050, MAX FILL = 6.0m
D > 1050, MAX FILL = 4.8m

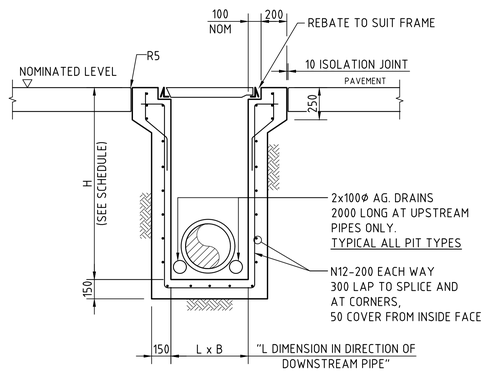
BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 50
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE WIDTH	
PIPE SIZE (mm)	l_c (mm)
≤ 900Ø	150
1050Ø	175
1200Ø	200
1350Ø	225
1500Ø	250
1650Ø	275
1800Ø	300
ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800Ø	

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
9.5	100 TO 50
2.6	100 TO 30
0.60	50 TO 15
0.075	25 TO 0
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725	

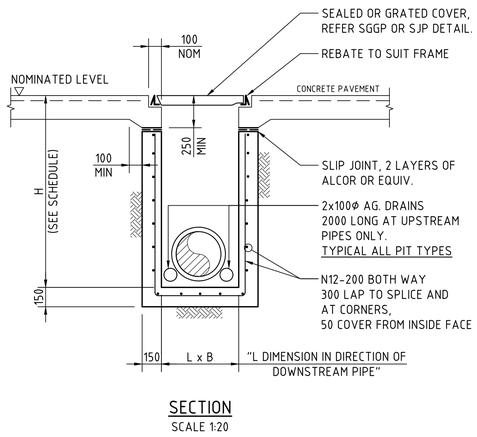


PLAN
SCALE 1:20



SECTION
SCALE 1:20

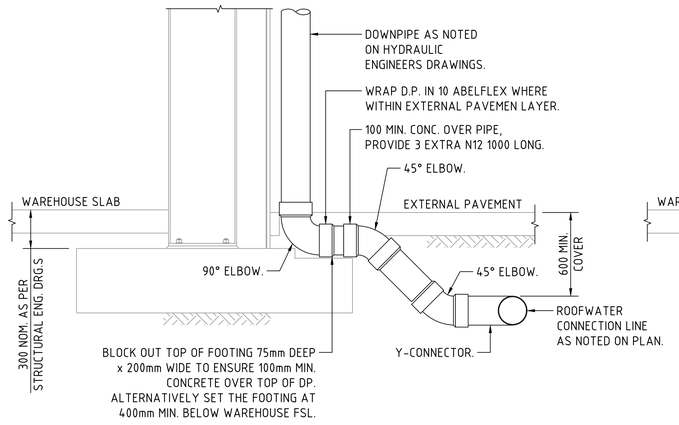
SEALED PIT - SJP



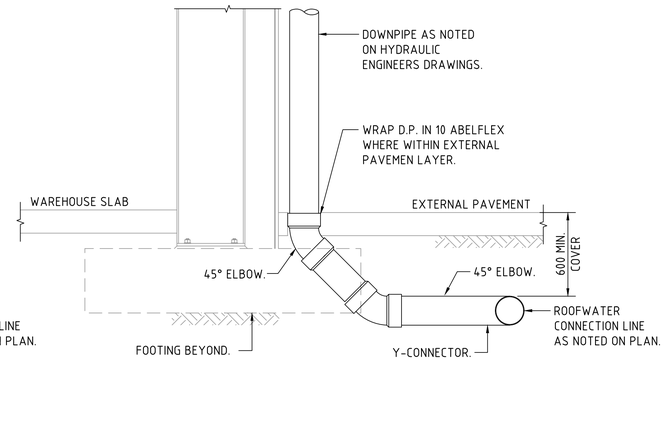
SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's, WHERE
JOINTS ARE NOT LOCATED WITHIN PROXIMITY OF THE GRATE)



DOWNPIPE TURN-UP DETAIL A
(AT FOOTING LOCATION)
SCALE 1:20



DOWNPIPE TURN-UP DETAIL B
(CLEAR OF FOOTING)
SCALE 1:20

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
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ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hill

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA 45

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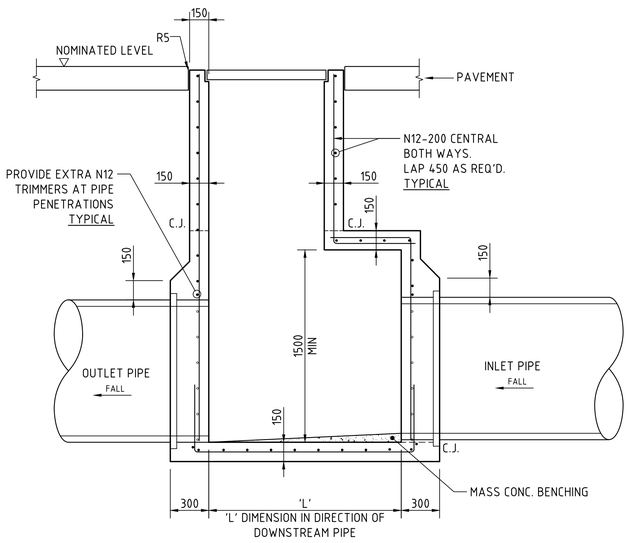
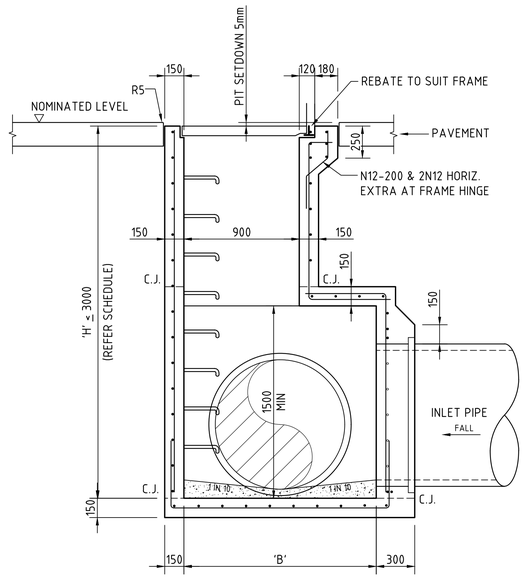
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 1

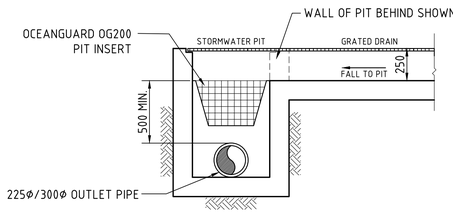
DRAWING No: C013003.13-SSDA45 ISSUE: B



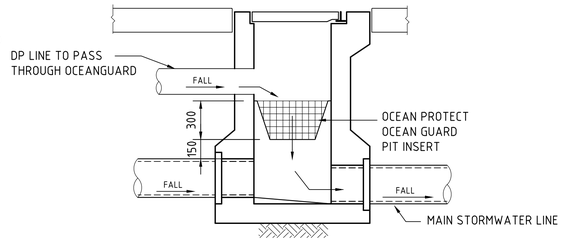
LONG SECTION
SCALE 1:20



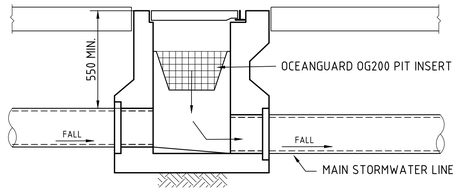
CROSS SECTION
SCALE 1:20



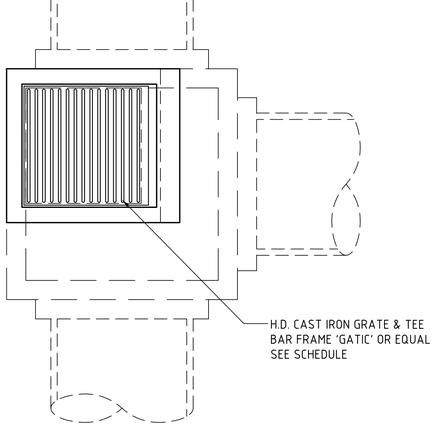
GRATED DRAIN/STORMWATER PIT WITH
OCEANGUARD CONFIGURATION
SCALE 1:20



ROOFWATER/STORMWATER PIT WITH
OCEANGUARD CONFIGURATION
SCALE 1:20



STORMWATER PIT WITH OCEANGUARD
CONFIGURATION
SCALE 1:20



PLAN
SCALE 1:20

TAPERED SINGLE GRATED GULLY PIT - SGGP

SUBSOIL NOT SHOWN
FOR CLARITY

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

AMENDMENTS	DATE	ISSUE

ARCHITECT
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CLIENT
Charter Hall

PROJECT
PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA 46

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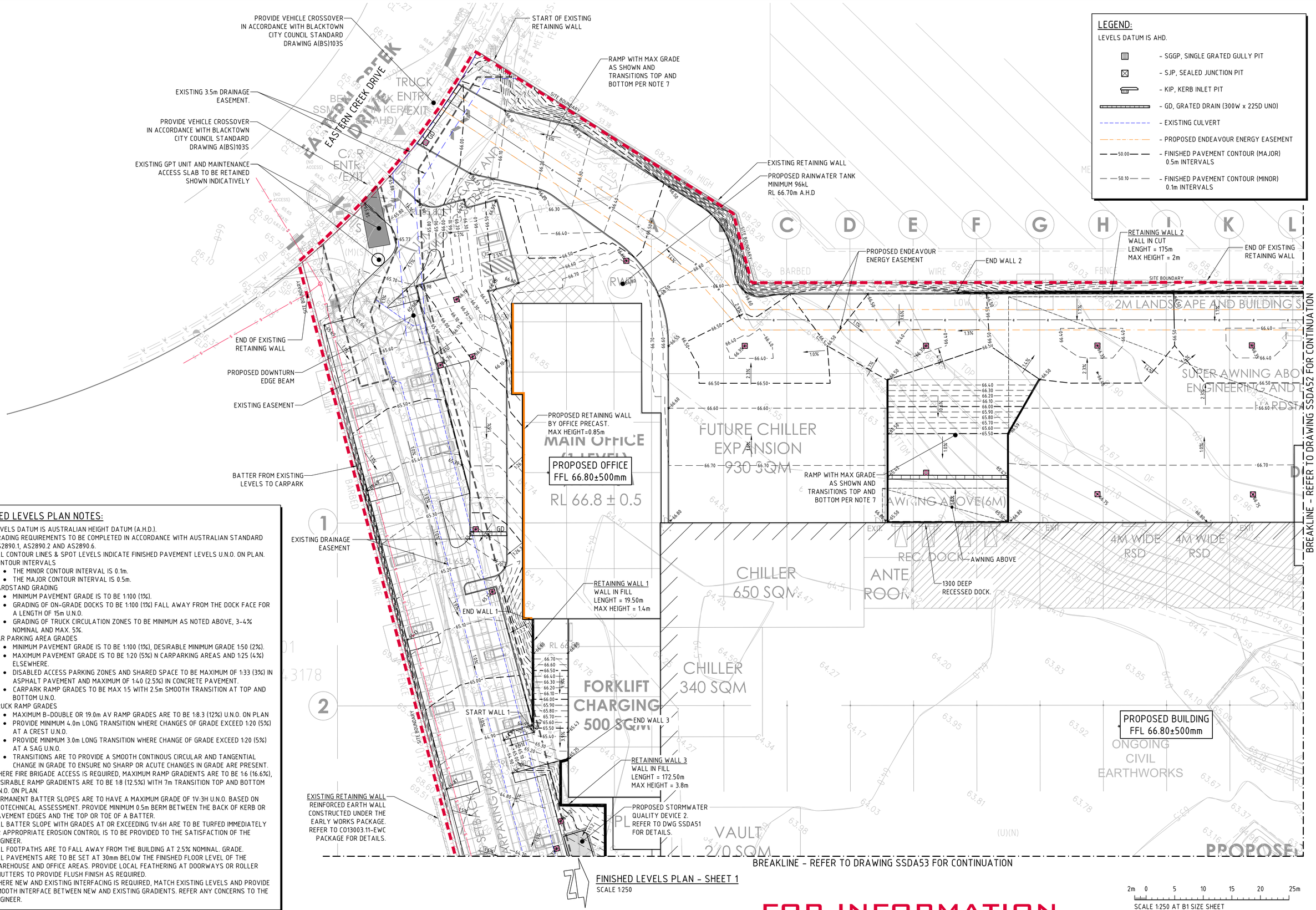
DRAWING TITLE
STORMWATER DRAINAGE DETAILS
SHEET 2

DRAWING No C013003.13-SSDA46
ISSUE B



FINISHED LEVELS PLAN NOTES:

1. LEVELS DATUM IS AUSTRALIAN HEIGHT DATUM (A.H.D.).
2. GRADING REQUIREMENTS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890.1, AS2890.2 AND AS2890.6.
3. ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
4. CONTOUR INTERVALS
   - THE MINOR CONTOUR INTERVAL IS 0.1m.
   - THE MAJOR CONTOUR INTERVAL IS 0.5m.
5. HARDSTAND GRADING
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%).
   - GRADING OF ON-GRADE DOCKS TO BE 1:100 (1%) FALL AWAY FROM THE DOCK FACE FOR A LENGTH OF 15m U.N.O.
   - GRADING OF TRUCK CIRCULATION ZONES TO BE MINIMUM AS NOTED ABOVE, 3-4% NOMINAL AND MAX. 5%.
6. CAR PARKING AREA GRADES
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%), DESIRABLE MINIMUM GRADE 1:50 (2%).
   - MAXIMUM PAVEMENT GRADE IS TO BE 1:20 (5%) N CARPARKING AREAS AND 1:25 (4%) ELSEWHERE.
   - DISABLED ACCESS PARKING ZONES AND SHARED SPACE TO BE MAXIMUM OF 1:33 (3%) IN ASPHALT PAVEMENT AND MAXIMUM OF 1:40 (2.5%) IN CONCRETE PAVEMENT.
   - CARPARK RAMP GRADES TO BE MAX 1:5 WITH 2.5m SMOOTH TRANSITION AT TOP AND BOTTOM U.N.O.
7. TRUCK RAMP GRADES
   - MAXIMUM B-DOUBLE OR 19.0m AV RAMP GRADES ARE TO BE 1:8.3 (12%) U.N.O. ON PLAN
   - PROVIDE MINIMUM 4.0m LONG TRANSITION WHERE CHANGES OF GRADE EXCEED 1:20 (5%) AT A CREST U.N.O.
   - PROVIDE MINIMUM 3.0m LONG TRANSITION WHERE CHANGE OF GRADE EXCEED 1:20 (5%) AT A SAG U.N.O.
   - TRANSITIONS ARE TO PROVIDE A SMOOTH CONTINOUS CIRCULAR AND TANGENTIAL CHANGE IN GRADE TO ENSURE NO SHARP OR ACUTE CHANGES IN GRADE ARE PRESENT.
8. WHERE FIRE BRIGADE ACCESS IS REQUIRED, MAXIMUM RAMP GRADIENTS ARE TO BE 1:6 (16.6%), DESIRABLE RAMP GRADIENTS ARE TO BE 1:8 (12.5%) WITH 7m TRANSITION TOP AND BOTTOM U.N.O. ON PLAN.
9. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H U.N.O. BASED ON GEOTECHNICAL ASSESSMENT. PROVIDE MINIMUM 0.5m BERM BETWEEN THE BACK OF KERB OR PAVEMENT EDGES AND THE TOP OR TOE OF A BATTER.
10. ALL BATTER SLOPE WITH GRADES AT OR EXCEEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
11. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL. GRADE.
12. ALL PAVEMENTS ARE TO BE SET AT 30mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS. PROVIDE LOCAL FEATHERING AT DOORWAYS OR ROLLER SHUTTERS TO PROVIDE FLUSH FINISH AS REQUIRED.
13. WHERE NEW AND EXISTING INTERFACING IS REQUIRED, MATCH EXISTING LEVELS AND PROVIDE SMOOTH INTERFACE BETWEEN NEW AND EXISTING GRADIENTS. REFER ANY CONCERNS TO THE ENGINEER.

FINISHED LEVELS PLAN - SHEET 1
SCALE 1:250

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
REVISED FOR UPDATED ARCHITECTURALS	12.11.21	B
ISSUED FOR PRELIMINARY	29.10.21	A

AMENDMENTS	DATE	ISSUE

ARCHITECT: [watch this SPACE design]

CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA 51

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DRAWING TITLE: FINISHED LEVELS PLAN SHEET 1

DRAWING No: C013003.13-SSDA51 ISSUE: B

LEGEND:

LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- 50.00 – FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 – FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTE:

1. REFER TO DRAWING SSDA51 FOR FINISHED LEVEL NOTES

BREAKLINE - REFER TO DRAWING SSDA51 FOR CONTINUATION

EXISTING RETAINING WALL

SITE BOUNDARY

RETAINING WALL 2
WALL IN CUT
LENGHT = 175m
MAX HEIGHT = 2m

PROPOSED ENDEAVOUR ENERGY EASEMENT

START OF EXISTING RETAINING WALL

END OF EXISTING RETAINING WALL

EXISTING RETAINING WALL

START WALL 2

RAMP WITH MAX GRADE AS SHOWN AND TRANSITIONS TOP AND BOTTOM PER NOTE 7 ON DRAWING SSDA51

PROVIDE VEHICLE CROSSOVER IN ACCORDANCE WITH BLACKTOWN CITY COUNCIL STANDARD DRAWING A(BS)103S

2M LANDSCAPE AND BUILDING SET-BACK

FENCE ALONG BOUNDARY

SUPER AWNING ABOVE (R2.5M)- SUBJECT TO FIRE ENGINEERING AND DEVELOPMENT APPROVALS

HARDSTAND (40M WIDE)

SUPER-AWNING ABOVE

RAMP WITH MAX GRADE AS SHOWN AND TRANSITIONS TOP AND BOTTOM PER NOTE 7 ON DRAWING SSDA51

DOCK OFFICE (2 LEVEL) 450 SQM

AWNING ABOVE(6M)

4M WIDE RSD

REC. DOCK

AMENITIES 10 SQM

AWNING ABOVE

1300 DEEP RECESSED DOCK.

PROPOSED DOCK OFFICE RL 66.80m A.H.D.

FIRE TANK

SUBSTATION TBC.

PUMP HOUSE

PROPOSED SPRINKLER TANK MINIMUM. RL 66.80m A.H.D.

PROPOSED PUMP ROOM RL 66.80m A.H.D.

DRAINAGE ACCESS BLOCKED BY CARS

HONEYCOMB DRIVE

PROVIDE MAX 1V:3H BATTER TO HONEYCOMB DRIVE EXTENSION. FINAL BATTER ARRANGEMENT TO BE CONFIRMED IN CONJUNCTION WITH THE FUTURE HONEYCOMB ROAD EXTENSION DESIGN AND DETAILS, SUBJECT TO TIMING OF HONEYCOMB DRIVE TYPICAL

PROPOSED EXTENSION OF HONEYCOMB DRIVE

PROPOSED BUILDING FFL 66.80±500mm

ONGOING CIVIL EARTHWORKS

STOCKPILE

BREAKLINE - REFER TO DRAWING SSDA54 FOR CONTINUATION

FINISHED LEVELS PLAN - SHEET 2
SCALE 1:250

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

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CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT '21		B1	AS SHOWN	C013003.13-SSDA52

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DRAWING TITLE: FINISHED LEVELS PLAN SHEET 2

DRAWING No: C013003.13-SSDA52 ISSUE: B

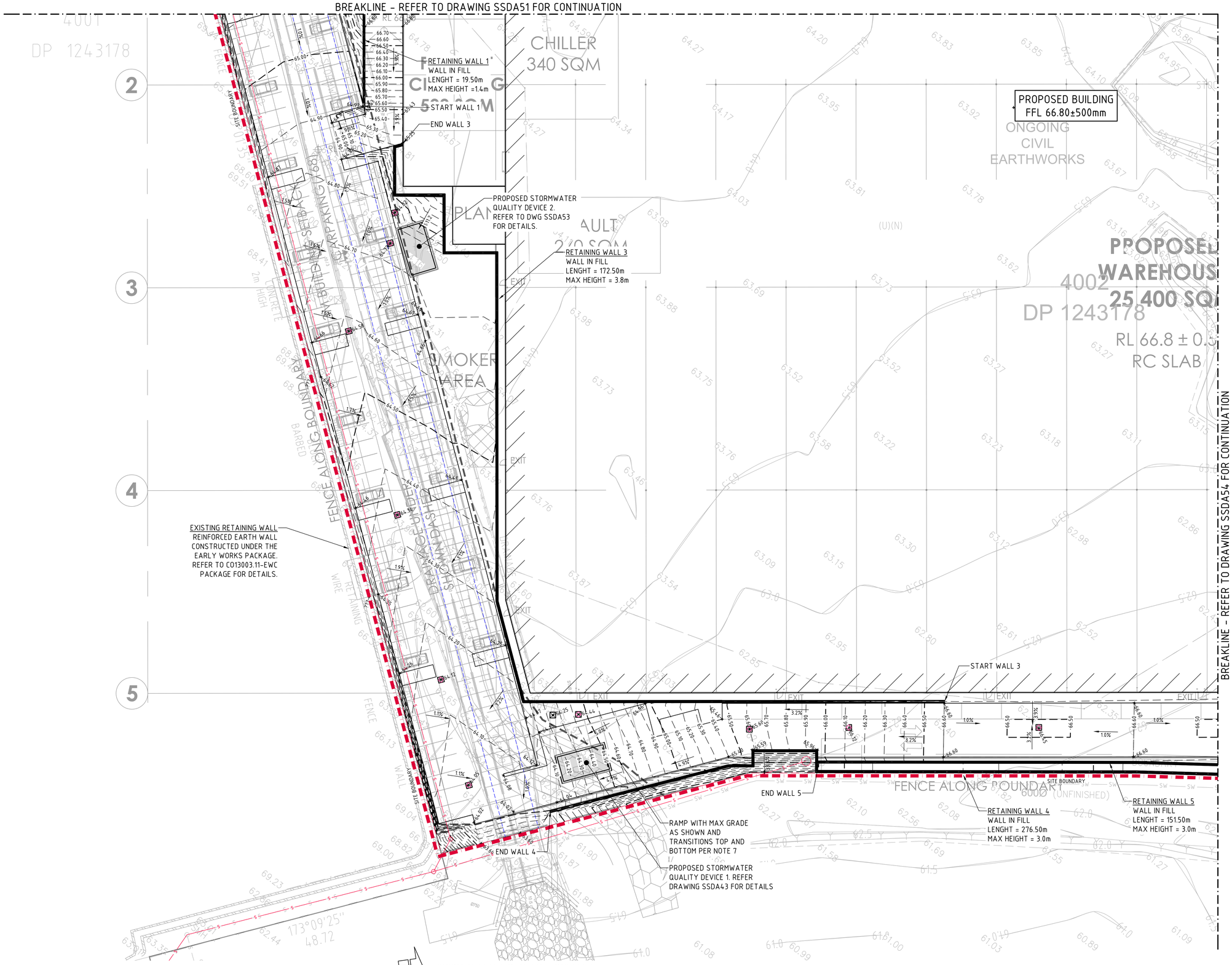
LEGEND:

LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- 50.00 – FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 – FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTE:

1. REFER TO DRAWING SSDA51 FOR FINISHED LEVEL NOTES



FINISHED LEVELS PLAN – SHEET 3

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
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ISSUED FOR PRELIMINARY	29.10.21	A

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CLIENT: Charter Hall

PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT '21		B1	AS SHOWN	C013003.13-SSDA 53

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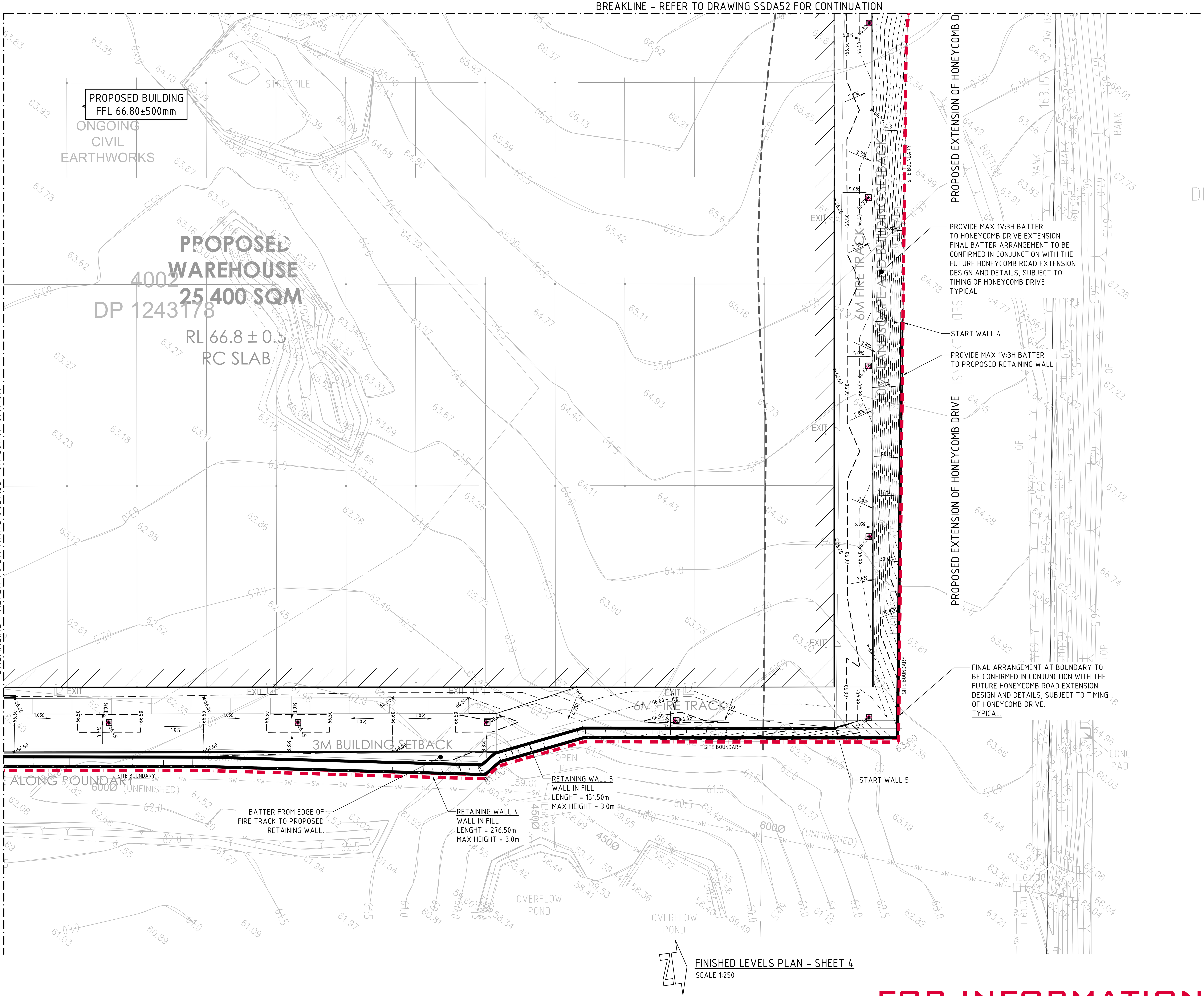
DRAWING TITLE: FINISHED LEVELS PLAN SHEET 3

DRAWING No: C013003.13-SSDA53 ISSUE: B



FINISHED LEVELS PLAN - SHEET 4
SCALE 1:250

LEGEND:
LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- EXISTING CULVERT
- PROPOSED ENDEAVOUR ENERGY EASEMENT
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

NOTE:
1. REFER TO DRAWING SSDA51 FOR FINISHED LEVEL NOTES

5m 0 10 20 30 40 50m
SCALE 1:500 AT B1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
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ISSUED FOR PRELIMINARY	29.10.21	A

ARCHITECT: [watch this SPACE design]
CLIENT: Charter Hall
PROJECT: PROPOSED INDUSTRIAL DEVELOPMENT
PROJECT NERIO, EASTERN CREEK DRIVE
EASTERN CREEK, NSW, 2766

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
S.M.	J.W.	OCT' 21		B1	AS SHOWN	C013003.13-SSDA 54

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DRAWING TITLE: FINISHED LEVELS PLAN SHEET 4
DRAWING No: C013003.13-SSDA54
ISSUE: B

Appendix B – Acid Sulfate Soil and Salinity Management Plan (WSP, 2021)

Charter Hall Pty Ltd c/o Tactical Group

Acid Sulfate Soil and Salinity Management Plan

Compass 2 Warehouse & Distribution Centre - Lot 1 Eastern Creek Drive, Eastern Creek NSW

DECEMBER 2021

Question today
Imagine tomorrow
Create for the future

Acid Sulfate Soil and Salinity Management Plan
Compass 2 Warehouse & Distribution Centre - Lot 1 Eastern Creek Drive, Eastern Creek NSW

Charter Hall Pty Ltd c/o Tactical Group

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Sydney NSW 2000
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Sydney NSW 2001

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REV	DATE	DETAILS
0	1 December 2021	Initial issue
1	3 December 2021	Final

	NAME	DATE	SIGNATURE
Prepared by:	Matthew Miklos Jerome Reyes	30 November 2021	
Reviewed by:	Julie Porter	30 November 2021	
Approved by:	Matthew Miklos	3 December 2021	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Table of contents

List of appendices

Abbreviations

AASS	Actual acid sulfate soils
AHD	Australian Height Datum
ASS	Acid sulfate soils
ASSMAC	Acid Sulfate Soils Management Advisory Committee
ASSSMP	Acid Sulfate Soils and Salinity Management Plan
ASS Manual	*Acid Sulfate Soil Manual* (ASSMAC 1998)
CEMP	Construction environmental management plan
CFA	Continuous flight augering
CRS	Chromium-reducible sulfur
GMP	Groundwater management plan
GPT	Gross pollutant trap
LGA	Local government area
mbgl	Metres below ground level
m AHD	Metres Australian Height Datum
NEPC	National Environment Protection Council
NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM) (2013 amendment)
PASS	Potential acid sulfate soils
pH_{FOX}	Field pH peroxide
PPE	Personal protective equipment
SCR	Selective catalytic reduction
SDS	Safety data sheet
sPOCAS	Suspension peroxide oxidation combined acidity and sulfur
S_{POS}	Peroxide oxidisable sulfur
SSD	State significant development
S_{TOS}	Total oxidisable sulfur
TPA	Total potential acidity
TRH	Total recoverable hydrocarbons
TSA	Total sulfidic acidity
VENM	Virgin excavated natural material

1 Introduction

1.1 Project background

WSP Australia Pty Ltd (WSP) was engaged by Charter Hall Holdings Pty Limited (Charter Hall) care of Tactical Group Pty Limited (Tactical) for the provision of selected environmental, geotechnical and waste consulting services. The overall engagement is associated with the proposed warehouse and distribution centre development (named 'Project Compass 2') at the property legally described as Lot 1 in Deposited Plan (DP) 1274322, or Lot 1 Eastern Creek Drive, Eastern Creek NSW (the site). Tactical has been appointed by Charter Hall to the role of project superintendent for the proposed development.

Charter Hall has acquired the site and in order to progress the project, Charter Hall needs to gain approval from the Development Consent Authority (DCA). As the proposed development is considered a State Significant Development (SSD), the development consent application process is subject to the NSW Government Planning Secretary's Environmental Assessment Requirements (SEARs), which requires an Environmental Impact Statement (EIS) to be prepared. The overall EIS comprises numerous disciplines, reports and plans – this report is one of the required components.

1.2 Description of the proposed development

The site is currently vacant and disused. WSP understands that the proposed development (herein collectively referred to as *'the development'*) is to generally involve the construction and full-time operation of a warehouse and distribution centre at the site and more specifically will include:

- minor earthworks involving cut and fill works;
- site preparation works and servicing;
- construction and occupation of warehouse, main office, ancillary office, dock office, loading docks, carparking, forklift charging room facilities; and,
- establishment of external hardstands and landscaping.

A plan of the proposed development at the site provided to WSP by Tactical and has been included as Figure 1, Appendix A.

1.3 Purpose of this plan

The primary purpose of this *Acid Sulfate Soils and Salinity Management Plan (ASSSMP)* is to assist Charter Hall with addressing the relevant SEARs for acid sulfate soils and salinity. This is to be achieved by understanding their presence, extent and potential impacts on the proposed development, and provide options for their management in a property development context.

1.4 Objective of this plan

The overarching objectives of this ASSSMP are twofold and include:

- evaluation of the existing acid sulfate soils and salinity information from both publicly available sources and investigations conducted previously at the site in the context of the proposed development; and,

— preparation of this management plan which includes a guide and options on the identification, treatment and management of potential acid sulfate soils and salinity for the proposed development.

1.5 Relevant SEARS compliance table

The specific and relevant SEAR that has been addressed with this plan is described in Table 1.1.

Table 1.1 Relevant SEARs compliance table

Key issue no. & description	Issue & assessment requirements	How it is addressed	Section of this report
Issue 12. Ground and Water Conditions	Provide an assessment of salinity and acid sulfate soil impacts	This Acid Sulfate Soil and Salinity Management Plan provide an evaluation of, and management measures to minimise potential impacts on the proposed development	Entire report/ management plan

1.6 What is acid sulfate soil?

Acid Sulfate Soil (ASS) is the generic name given to soils and sediments which are rich in iron sulfides (pyrite). They have formed naturally, commonly in estuarine areas along the east coast of Australia as well as other parts of the continent and throughout the world. If permanently deprived of oxygen (e.g. if kept underwater), the sulfidic minerals in ASS cause no environmental harm and the materials are referred to as potential acid sulfate soils (PASS).

Coastal ASS occurs predominantly below 5 metres Australian Height Datum (AHD) and up to 10 m AHD in some estuarine environments. If exposed to atmospheric oxygen (through excavation or drainage for instance), the sulfidic minerals in the soil oxidise and can produce excess sulfuric acid leading to a significant drop in the soil pH, to pH 4 or less. Such soils are referred to as actual acid sulfate soils (AASS).

The potential impacts of acid sulfate soils are generally associated with earthworks, drilling, drainage and dewatering activities and include:

— Degradation of the receiving environment through reduced pH of groundwater and waterways.

— Death of aquatic flora and fauna.

— Undesirable odours and staining of soils.

— Development of geotechnical unsuitable materials.

— Development of aggressive soil to concrete or steel structures.

The field indicators of ASS include:

— Iron staining on any drain surfaces.

— Unusually clear or milky green water discharging from the site.

— Jarosite horizons or mottling due to iron in the subsurface.

— Corrosion of concrete or steel structures.

— Presence of any sulfurous odours.

1.7 What is salinity?

Urban salinity is caused by the mobilisation of salts in the soil profile by surface water or groundwater. Salts naturally occur in soil from sources such as weathering of rock and soil, soils formed on old sea beds, salt lakes or other saline soils, or from the ocean via wind and rain.

Development can cause changes to surface water or groundwater flows and cause salt to accumulate in areas of the site it might not otherwise. When the water table rises close to the surface, it can carry dissolved salts that are normally locked in the soil and rock profile to the surface.

Highly saline soils can reduce or preclude vegetation growth, can produce aggressive soil conditions which may be detrimental to concrete and steel or other building materials and can be highly prone to the erosive effects of water and wind.

2 Previous relevant investigations

WSP reviewed two reports pertaining to the site as part of this ASSSMP. Findings relevant to the salinity and acid sulfate soils risk associated with the development are summarised below.

WSP 2021, Environmental Due Diligence Assessment – Phase I and Phase II, Eastern Creek Drive Lot 4002 Eastern Creek Drive, Eastern Creek NSW 2766

The objective of the investigation was to identify and assess potential environmental risks and issues at the site in the context of proposed acquisition and development of a 25,000 m^2 warehouse with ancillary offices, loading dock and car parking.

The scope of works comprised a desktop study to review the environmental setting, history and environmental regulatory status. An intrusive investigation was also completed comprising the excavation of 10 test pits, drilling of 5 boreholes and laboratory analysis of soil samples, of which 10 samples were selectively analysed for salinity parameters (including aggressiveness and erosion risks). Information obtained from the desktop review is provided in Section 3.

The investigation identified that the site is underlain by fill comprising reworked natural silty clay and sandy clay to a maximum depth of 2.5 metres below ground level (mBGL). This fill was underlain by natural silty clay and sandy clay to a maximum depth of 4.6 mBGL, underlain by extremely weathered siltstone to the maximum investigation depth of 5.0 mBGL.

The findings of the salinity component of the investigation are summarised as follows:

- Subsoil (0.1 – 4.6 mBGL) conductivity ranged from 178 – 550 µS/cm indicating generally non-saline or slightly-saline conditions. One exception was sample TP06_0.3 which had an EC of 550 µS/cm; this is considered 'moderately saline';
- Siltstone (1.0 - 5.0 mBGL) conductivity ranged from 233 – 568 µS/cm indicating generally 'slightly-saline' to 'moderately saline' conditions;
- Sulfate concentrations ranged from 30 mg/kg to 280 mg/kg, indicating sulfate concentrations which are non-aggressive towards concrete;
- Chloride concentrations ranged from 80 mg/kg to 500 mg/kg, indicating chloride concentrations that are non-aggressive towards steel piles;
- pH levels ranged from 5.1 to 7.8 which shows slightly acidic to neutral soil conditions that have a low to moderate level of aggressiveness towards concrete and non-aggressiveness towards steel piles;
- CEC levels ranged from 12.4 m_{eq}/100g to 16.1 m_{eq}/100g; this is consistent with the observed clay content of the soils;
- Exchangeable sodium percentage (ESP) results were calculated to range from 27.5% to 44.7%. The three samples were collected from each of the lithology types encountered on Site. The three samples tested indicated highly sodic (>15%) soils; these were collected from varying depths downslope from the highest point on Site. This suggests that soils will be prone to erosion if not appropriately stabilised during construction.

The report concluded that soil at the surface was generally non-saline to moderately saline. The underlying residual clays were predominantly ranked slightly to moderately saline. The deeper weathered siltstone was found to generally be moderately saline. The subsurface in the down gradient south-east corner of the site was generally more saline than the up gradient north-west.

Soil salinity can impact upon plant growth, suitability of surface water bodies as habitat and affect construction materials and site infrastructure.

Soil testing for ESP indicated that soils on the site were generally highly sodic. Soil sodicity reduces the ability of colloids to bind together and thus increases the risk of soil erosion.

It was recommended that deeper structures (including footings, piles and service trenches) extending into the siltstone lithology should have salinity resistant materials incorporated into their design however, salinity did not present a significant risk of corrosion to shallow structures.

WSP 2021, Eastern Creek Geotechnical Investigation, Geotechnical Interpretive Report

WSP was engaged to undertake a limited geotechnical investigation at the site part of its due diligence assessment context of proposed acquisition of the site. The objective of the investigation was to identify likely geotechnical conditions and potential constraints that would apply to a proposed warehouse development.

The scope of works comprised:

- Review of relevant and available information;
- Drilling of five boreholes to 5 mBGL or auger refusal; and
- Laboratory testing on selected samples in accordance with AS 1289 *Methods of testing soils for engineering purposes*. Four samples were tested for soil aggressivity suite (pH, sulfate and chlorides).

Fill thickness encountered across the site ranged from 0.3 m (in borehole BH01) to 2.5 m (in borehole BH02). Based on site observations cut material from elsewhere on site is being used to fill the southern portion of the lot associated with this investigation to form a platform for future construction. Filling to date suggests an average fill depth of 0.5 m and maximum fill depth of approximately 2.9 m could be encountered at the southern portion of the site.

Natural material was encountered in each borehole, starting from 0.3 mBGL (in borehole BH01) to 2.5 mBGL (in borehole BH02). The natural material typically comprised stiff to very stiff, medium and medium to high plasticity, sandy or silty clay, which was inferred to be alluvial soil. Residual soil (derived from weathered rock) transitioning into extremely weathered rock (inferred as Bringelly Shale) was encountered in all boreholes from, on average, approximately 2.5 mBGL, however, in borehole BH02, weathered rock was encountered at 4.6 mBGL due to the deeper fill profile.

Groundwater was not encountered in any boreholes during the fieldwork. Possible perched water was encountered in borehole BH02 at 2.5 mBGL (fill/alluvium boundary), however, further drilling did not yield any additional evidence of a water table at this location.

The soil results for soil aggressivity are summarised in Table 2.1.

Table 2.1 Geotechnical interpretive report chemical laboratory test results

BOREHOLE ID	SAMPLE DEPTH (mBGL)	pH	SULPHATE (SO_4^{2-}) (mg/kg)	CHLORIDE (mg/kg)
BH01	1.50-1.95	5.8	160	180
BH02	1.50-1.95	7.3	70	370
BH04	2.50-2.95	7.8	140	910
BH05	1.50-1.95	5.5	140	130

An assessment of chemical test results was undertaken to provide a durability assessment in accordance with AS 2159 – 2009 Piling – Design and installation. Based on the chemical laboratory test results an exposure classification for concrete and steel of “non-aggressive” was recommended in accordance with AS 2159-2009.

An exposure classification was also assessed in accordance with AS 3600 – 2009 Concrete structures. In accordance with AS 3600-2009, an exposure classification of B1 was recommended for buried concrete.

3 Site setting

3.1 Site description

Details of the site location, ownership, zoning and current site use are provided in Table 2.1 below (refer to Figure 1, Appendix A for a Site location plan and Figure 2, Appendix A for a Site layout plan).

Table 3.1 Summary of site identification and setting

Site address	Lot 1, Eastern Creek Drive, Eastern Creek NSW, 2766
Site Identification	Lot 1 in DP 1274322
Local government area	Blacktown City Council
Zoning	WSEA – SEPP (Western Sydney Employment Area) 2015
Local planning instrument	Blacktown Local Environmental Plan 2015
Current site use	Vacant land currently under development with earthworks taking place on the Site and on the site to the east
Potential site use	Warehouse and distribution centre
Surrounding site uses	The following surrounding land uses were observed: — North – Logistical warehouses and industrial properties with Wonderland Drive beyond. — East – Eastern portion of Lot 1 undergoing earthworks with industrial properties (including a pharmaceuticals company) beyond. — South – A vacant lot with Old Wallgrove Road beyond. Eastern Creek Drive with commercial properties, including a construction equipment supply company and an IT company, are located to the south-east. — West – Commercial warehouse of unknown use with further warehouses beyond.

3.2 Topography and surface hydrology

The natural topography of the surrounding area is generally level with an approximate elevation of 60 m Australian Height Datum (AHD).

At the time of the site inspection during previous investigations (WSP, 2021a) the north-west corner of the site was approximately 3 m higher in elevation than the south-east corner and the site sloped down towards the south-east.

The nearest natural water body, a small tributary of Eastern Creek, was previously located on the site, however, this appears to have been filled in to allow for development of the site. Reedy Creek is located approximately 900 m south-east of the site.

3.3 Soils and geology

Review of the 'Penrith 1:100 000 Geological Map' indicates the site is underlain by the Cambrian aged Wianamatta Group Bringelly Shale consisting of shale, carbonaceous claystone, claystone, laminate, fine to medium grained sandstone and rare coal and tuff.

A search of the Australian Soil Resource Information System (ASRIS) (www.asris.csiro.au) conducted during the WSP 2021a investigation indicated an extremely low probability of occurrence of acid sulfate soils (ASS) at the site.

A search of the eSpade land salinity maps (https://www.environment.nsw.gov.au/eSpade2WebApp) conducted during the WSP 2021a investigation indicated a moderate likelihood of salinity.

3.4 Hydrogeology

A search of the WaterNSW Continuous Water Monitoring Network database conducted on 26 November 2021 indicated no registered groundwater bores are located within a 500 m radius of the site.

3.5 Environmental Sensitivity

The following relate to environmental sensitivity for the area:

- The site is within a predominantly industrial area with no current residential properties identified within 500 m of the site.
- The nearest natural water body, a small tributary of Eastern Creek, has previously run through the site to a small dam that was located near the south-western corner of the site. Both of these surface water features have been subsequently infilled. Reedy Creek is located approximately 900 m south-east of the site.
- There is no registered beneficial use of groundwater within a 500 m radius of the site.
- The site is located within an area of extremely low probability of occurrence of acid sulfate soils (ASRIS, 2020).
- The site is located in an area of moderate probability of land salinity (eSpade).

4 Conceptual hydrogeological model

Urban salinity is caused by the mobilisation of salts in the soil profile by surface water or groundwater. Salts naturally occur in soil from sources such as weathering of rock and soil, soils formed on old sea beds, salt lakes or other saline soils, or from the ocean via wind and rain.

Development of bushland for urban use can change the movement of surface and groundwater resulting in a change in the way salts and other minerals interact. When the water table rises close to the surface, it carries dissolved salts that are normally locked in the soil and rock profile to the surface. The development is located in an urban expansion area. Significant development in the area commenced in the early 2000's with significant commercial /industrial development occurring to the north of the site predominantly comprising the construction of large warehousing. Between 2009 and 2014 further urban expansion had occurred to the west, east and south of the site. During 2020 land clearing across the site and immediately surrounding area had occurred. Based on the historical aerial photograph review, the development site had surrounding area has been stripped of natural vegetation striped between 2000 and 2020.

The Sydney Central Basin Groundwater Source is the only groundwater source expected within the Study area. The groundwater source is expected to be a shallow unconfined to semi-confined aquifer within porous and fractured siltstone and shale bedrock.

Recharge is expected to be primarily through the infiltration of rainfall. The low permeable natural clays and rock underlying the Project site are expected to slow the infiltration of rainfall, as the very low permeability of the rock and it's weathered residuum tend to preferentially shed rainfall as overland stormwater flow.

Localised ephemeral perched groundwater may be encountered on less permeable layers within the soil profile or at the soil-rock interface during times of heavy or extended rainfall. Rainfall infiltration is expected to occur favourably through localised areas of interbedded siltstone and minor sandstone, exploiting permeable and porous layers and localised fractures as vertical flow paths.

Existing stormwater infrastructure directs stormwater from Eastern Creek Drive and the local area to either the stormwater retention basin or to the stormwater overflow area located immediately to the east of the Site. The retention basin is expected to have limited connectivity with the groundwater.

The development is not expected to cause long term changes to groundwater levels and is therefore not expected to affect known or potential salinity affected areas.

The current hydrogeological model would temporarily alter during construction. Potential influences include:

— Interception of groundwater during excavation activities

— A change of natural drainage patterns as a consequence of construction.

Given that these changes would be temporary no significant impact on soil salinity is anticipated.

5 Management of PASS

5.1 Identification of PASS

As described in earlier Sections of this plan, the site has a probability rating of ASS presence being 'Extremely Low Probability of Occurrence' (ASRIS, 2021). There is however the possibility of encountering PASS in the portion of the site where a former farm dam, former detention basin and associated drainage lines were historically situated – refer to Figure 2 showing a plan of these areas (herein referred to as the *'higher risk PASS area'*).

During the proposed development works at the site (excavation and/or disturbance of soils in the former farm dam area) the preliminary visual checking of PASS will be based on material type, colour and consistency. Grey to dark grey and black, clays, silts and sands are generally suspected to be PASS.

ASS screening should be undertaken should one or more of the following indicators be identified during excavation works (from the National Acid Sulfate Soil Guidance [DAWR,2018]):

- presence of unripe muds (soft, sticky and can be squeezed between fingers, blue grey or dark greenish grey mud);
- presence of silty sands or sands (mid to dark grey);
- presence of bottom sediments (dark grey to black for example monosulfidic black oozes);
- peat or peaty soils;
- coffee rock horizons; or
- sulfurous smell for example hydrogen sulfide or 'rotten egg' gas.

A protocol for field screening is provided in Appendix B. Soils that record field a pH of below 6, following oxidation with peroxide (H_2O_2) (pH_{FOX}), should be managed as PASS and must be treated to mitigate the risk of acid generation. Other indicators of PASS, during the field peroxide test, that also assist in determination of ASS risk include the following:

- Change in colour of the soil from grey tones to brown tones.
- Effervescence.
- The release of sulfur smelling gases such as sulfur dioxide or hydrogen sulphide.
- A lowering of the soil pH by at least one unit.

Where confirmation of the PASS status is desired, or a liming rate is required, samples should be submitted to the laboratory for the chromium reducible sulfur (CRS) suite.

5.2 Management during excavation

WSP recommends the following measures to manage PASS risk (if encountered) during excavations at the site:

- Minimise excavations within the higher risk PASS area to the extent practicable.
- Any soils excavated which exhibit one or more ASS indicators should be screened by peroxide field screening method within the shift that it is excavated, for assessment of suitability for reuse. Otherwise it should be assumed to be PASS and be transported to the acid sulfate soil treatment compound, or a licenced waste receiver for treatment, within 24 hours of excavation. Refer to Section 5.5 for more details on the compound.
- Former farm dam sediments (if encountered) should be screened by peroxide field screening method within the shift that it is excavated, for assessment of suitability for reuse. Otherwise it should be assumed to be PASS and be

transported to the acid sulfate soil treatment compound, or a licenced waste receiver for treatment, within 24 hours of excavation.

- Any material that screening shows to be a potential risk should be transported to the acid sulfate soil treatment compound and managed in accordance with the protocol in Section 5.5, or otherwise disposed of to a licenced waste receiver able to treat the acid sulfate soil.
- Daily inspection of the worksite by an environmental consultant should be undertaken, to measure pH of stockpiles, embankments and of surface water puddles to check that acid-affected soils are not forming or being distributed around the site.
- Additional information on the treatment protocol for PASS is provided in Sections 5.5 to 5.8.

5.3 Reuse of treated PASS

Surplus soil generated from the excavation and construction activities will be retained on site where possible.

Provided the treatment process is conducted in accordance with the procedure outlined in Sections 5.5 to 5.8 and validation testing confirms the potential acidity has been mitigated, the material would be suitable (from an ASS perspective) for the planned reuse. It will also be necessary to assess the soil for its suitability with respect to compliance with land use criteria. Further considerations for reuse include the geotechnical suitability and the revegetation potential of the final surface. A thin layer of fresh topsoil may be needed to optimise revegetation in any landscaped areas, or dedicated topsoil imported to the site, depending on the nutrient status, texture and pH of the treated soil.

5.4 Transfer to landfill

The transport or transfer of any soil or treated ASS/PASS soil from the site to the landfill (if offsite disposal is required) will be via the public road network. As such, all truck loads must be covered and sediment managed so that no offsite pollution occurs.

No offsite transport or disposal is to occur without appropriate waste classification, and materials should be transported only to facilities licensed to accept the material. All offsite transport is to be carried out by transporters holding appropriate licenses for the waste classification and in accordance with the requirements of the NSW EPA (2014) W*aste Classification Guidelines – Part 1: Classifying Waste* and NSW EPA (2014) *Waste Classification Guidelines – Part 4: Acid Sulfate Soils.*

Appropriate tracking documentation should be maintained and reconciled with landfill records.

5.5 Treatment compound setup and process

ASS treatment should occur in a designated ASS treatment area or compound appropriately set up to receive, treat and store the volumes of spoil anticipated during the works. It would be expected that the compound would include the following:

- An unloading area.
- An untreated stockpile storage area.
- Treatment pad or bay(s).
- Treated stockpile area.
- Loadout area.
- Leachate collection system and storage tanks.

— Suitable bunding.

A treatment pad should be prepared in general accordance with Figure 5.1, as per the *Queensland Acid Sulfate Soil Technical Manual* (Dear et al. 2002). An impermeable layer and leachate collection system are required. The treatment pad should be located at least 40 m from any waterway and if possible, placed in a topographically high area to avoid inundation following heavy rain.

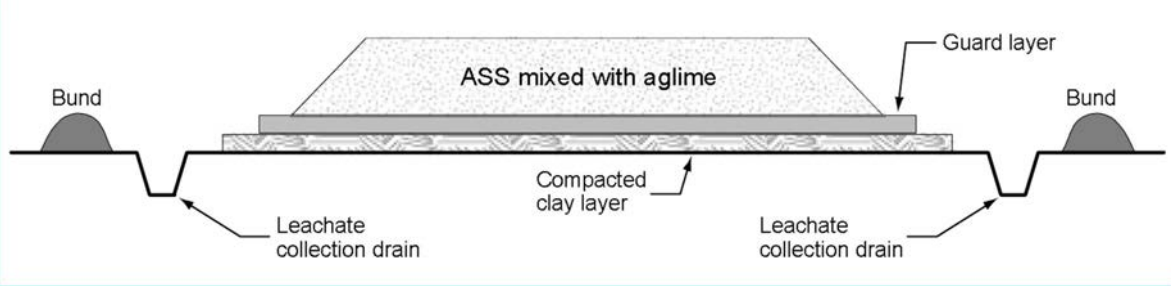

Figure 5.1 Cross-section of typical treatment pad (from Dear et al. 2002)

Soil for treatment should be either:

— Spread in thin (<200 mm) layers on the impervious pad, the required lime spread and then incorporated by rotary hoe / road stabiliser or similar or.

— Required lime spread evenly and distributed through the use of bulk bags with an open chute on one end over a low levelled stockpile and then thoroughly mixed with the aid of an excavator bucket or front-end loader. Due to the small volumes of spoil anticipated, in lieu of the use of a pugmill or allu bucket typically used for mixing of large soil volumes, the mixing approach may require more than a single pass to achieve the same homogenous blend.

Mixing by standard excavator bucket is not considered a suitable treatment / mixing technique.

5.6 Process management and verification testing

A stockpile register will be maintained by the contractor that allows for tracking of material from source, through the treatment process, to the disposal location. To facilitate the tracking process and ensure risks of PASS oxidising are managed, the following protocol should be implemented:

— Stockpiles should be kept to a (nominal) maximum of 100 m^3.

— Field screening of soil received from the worksite must occur within 48 hours of excavation and will comprise:

  — Four field samples collected from each quarter of the stockpile. Each sample should be a composite of five grab samples from the quarter of the stockpile being assessed. The samples will be screened using the field peroxide method (Appendix B).

  — Field screening results assessed and actioned as follows:

    — If all result show field pH peroxide (pH_{FOX}) >6, then the soil considered very low risk of being acid sulfate soil and suitable for onsite reuse or otherwise suitable for waste classification testing.

    — If one or more results show pH_{FOX} <6, submit a composite of the four samples for testing at the laboratory by CRS method.

    — This will provide confirmation that the soils are not acid sulfate generating or otherwise provide a treatment liming rate.

— Where test results show treatment is necessary, the recommended liming rate will be applied, and the lime mixed thoroughly before verification testing occurs. Note: under the DAWR, 2018 guidance the liming rate should be based on the net acidity excluding the acid neutralising capacity (ANC).

- Verification will include:
  - Collection of four samples for field screening as above.
  - If all screening results show no further liming required, then a composite will be formed for laboratory verification testing (and if offsite disposal is intended, waste classification analysis – see Section 7).
  - If laboratory results confirm that no further lime is required, the material will be considered appropriately treated and suitable for onsite reuse or offsite disposal (pending waste classification testing):
    - Note that the protocol for assessing whether sufficient lime has been applied, in accordance with DAWR, 2018, is to determine the added ANC by subtracting the untreated soil ANC from the treated soil ANC and using this figure for the purpose of acid base accounting. See below:
      - Net Acidity = TAA + S_{Cr} + NAS – (ANC after treatment – ANC before treatment.
      - Successful treatment requires the Net Acidity to be ≤ 0.
  - If further liming is required this will be applied, mixed and the verification testing repeated.
  - Records of the testing and verification works will be maintained throughout the works.

Care should be taken during the process not to over-lime the soil.

5.7 Lime storage

Lime should be added by hand (with appropriate PPE) at the rates specified in the laboratory transcripts, followed by careful but thorough mixing for the full depth of the stockpile, making sure that no dust is generated.

Relatively small quantities of lime are expected to be needed onsite and so it is recommended that it is stored in bags in an undercover area with adequate runoff and stormwater diversions. This will mitigate the risk of seepage from the lime presenting an environmental risk during heavy rain. Having lime provided in bags will also assist in more accurate measuring out of lime in accordance with laboratory recommended liming rates.

A current Safety Data Sheet (SDS) for the lime should be held onsite.

5.8 Leachate management

Leachate generated in the ASS treatment area needs to be collected and tested prior to discharge by any method. The recommended management of this water is that the pH be adjusted to ensure it is within an acceptable range for water (nominally considered to be 6.5 to 9) and the water used as dust suppression in the stockpile area.

If the water requires disposal offsite, or re-infiltration to groundwater, it must first be tested for a wider suite of analytes.

6 WASTE DISPOSAL

It is understood that all surplus soil generated from the construction activities will be retained on site where possible, which is the preferred option for waste management. However, the following sections have been included should offsite waste disposal be required.

6.1 Waste Classification

Disposal of virgin excavated PASS and co-mingled PASS with non-virgin material (fill) will be in accordance with the following guidelines:

- NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classifying Waste*.
- NSW EPA (2014) *Waste Classification Guidelines – Part 4: Acid Sulfate Soils.*

Any facility accepting untreated PASS must be licensed to accept the material in accordance with NSW EPA (2014) guidelines. Evidence from the landfill demonstrating their approval to accept untreated PASS should be obtained prior to dispatching any materials. Comingled PASS and fill, or PASS and grout cannot be disposed of untreated. This material will require excavation, onsite treatment for PASS, waste classification and then disposal in accordance with the waste classification at a landfill licenced to accept it.

The following protocols should be followed to ensure that the material is appropriately classified for disposal assuming the facility is licensed to accept the material as stated.

6.2 Disposal of untreated potential acid sulfate soil

NSW EPA (2014) *Waste Classification Guidelines – Part 4: Acid Sulfate Soils* allows for disposal of PASS directly below the water table at facilities licenced to accept untreated PASS.

6.3 Disposal of treated PASS

The most likely disposal option will be a general solid waste landfill licensed to receive treated ASS and contaminant-impacted soil. The following requirements consistent with PASS disposal 'above the water table' must be adhered to:

- The material is to be treated as per the protocol in Section 5.
- The material is to be classified for waste disposal in accordance with Step 5 of the NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classifying Waste.*
- When the classification has been established, the soil should be disposed of to a landfill that can lawfully accept that class of waste.

Prior arrangements should be made with the occupier of the landfill to ensure that it is licensed to accept the waste. The landfill should be informed that the material has been treated in accordance with the neutralising techniques outlined in the ASS Manual and that the waste has also been classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classifying Waste*.

6.4 Disposal of actual acid sulfate soil

Where AASS is encountered, or PASS is excavated and not disposed of within the 24-hour time restriction, it must be treated prior to disposal (see Section 5). It cannot be disposed of untreated (as PASS).

Treatment can either occur on within the site, or at a facility licenced to treat ASS.

7 SALINITY MANAGEMENT

The project is not expected to cause significant changes to groundwater levels and is therefore not expected to worsen known or potential salinity affected areas. Salinity management strategies are described in the following subsections with further details available in:

— WSROC 2003, *Western Sydney Salinity Code of Practice*.

— DIPNR 2003, *Building in a saline environment.*

— DIPNR 2003, *Roads and Salinity*.

— DIPNR 2004, *Waterwise parks and gardens.*

— DLWC 2002, *Site Investigations for Urban Salinity*.

7.1 Management of erosion

Soil erosion during construction on the site will require careful management. Following construction, erosion risks post-development are expected to be minimal given that approximately 95% of the site surface will comprise concrete hardstand and/or warehouse roofing. Surface water runoff from the site is to be diverted into lined stormwater drains. Levels of erosion should be able to be maintained within normally acceptable levels by adopting effective soil erosion and sedimentation control practices, including:

— Plan for soil and water management concurrently with engineering design and in advance of any earthworks.

— Minimise the area and duration of soil exposure by staged development and controlled clearing.

— Stockpile stripped soil for reuse and protect from erosion.

— Control stormwater run-off by diverting clean run-off from stripped areas, minimising slope gradient, length and run-off velocities.

— Trap soil and water pollutants using silt traps, sediment basins, perimeter banks, silt fences and nutrient traps as appropriate.

— Quick rehabilitation of disturbed areas.

Use of construction materials must also take into consideration salinity impact to proposed materials, adopting guidance from Australian Standards and Council Engineering Design Specifications.

All personnel on the site involved with earthworks, land clearing or construction should be made fully aware of the issues associated with Urban Salinity. Sediment and erosion control plans must take into account saline soils.

7.2 Management of stormwater and drainage

The following principles should be considered in development of the project:

— The design and layout of retaining walls, underground services and stormwater should have minimal cut.

— Adequate surface drainage should be installed and maintained during construction.

— Implementation of measures to avoid the infiltration of stormwater during construction.

— Designing stormwater detention ponds and stormwater to reduce infiltration.

— Minimise the disturbance to natural drainage patterns.

— Avoidance of water collecting in low lying areas such as along batters and embankments, depressions or trenches. This can lead to salt mobilisation through saturated zones and can lead to concentration of salts at the surface where evaporation is occurring.

— minimise water use onsite.

7.3 Management of dispersive (sodic) soils

The following management recommendations are made to address the vulnerability of the site to dispersive (those that are subsequently highly prone to erosion) soils.

7.3.1 Potential Treatments

Soil compaction reduces dispersion potential. Compaction of clays should be specified to be close to the maximum dry density and at a moisture content 1% to 2% above Optimum Moisture Content to reduce tunnel erosion potential.

In areas where the proposed development is susceptible to dispersion (e.g. steep batter slopes), soils may need to be treated using chemical amelioration. Gypsum, for example, is effective in reducing the dispersion potential of soils. Gypsum increases the electrolyte concentration in the soil and displaces sodium with calcium in the clay structure.

7.3.2 Potential infrastructure design and construction approaches

In almost all cases, tunnel and surface erosion results from the surface disturbance of soil allowing rainwater or stormwater to come into contact with dispersible subsoils. Changes to hydrology, including concentrating flow in culverts, runoff from hardstand areas, ponding of rainfall and land contouring increases the risk of tunnel erosion. Typical activities that increase the risk of exposing dispersive subsoils to rainfall and stormwater include:

— the removal of topsoil;

— soil excavation and ground profiling;

— trenching and supply of services;

— road and culvert construction; and

— the construction of dams and detention basins.

7.3.3 Earthworks Design

Some of the risks presented by a potentially dispersive site can be managed through earthworks design.

The risk of dispersion can be reduced by minimising the extent and depth of areas of cut within areas of potentially dispersive soils and instead designing these areas to be at grade or in fill.

Areas of fill should be filled with non-dispersive soils unless the dispersive soils are designed by a geotechnical engineer to be encapsulated within non-dispersive soils.

Following construction, soil dispersion post-development is expected to be minimal given that approximately 95% of the site surface will comprise concrete hardstand and/or warehouse roofing.

Landscape areas should be designed at gradients of less than 20% unless specifically designed in consultation with a geotechnical engineer.

7.3.4 Utility and Drainage Design

Give preference to design of at-ground or above-ground utilities which avoid the need for trenching through areas of potentially dispersive soils. Any trenching that is required for services should be designed to avoid long runs down slope which could increase the chances of tunnel erosion occurring.

Drainage design should avoid use of table drains, trenched pipes and culverts in areas containing dispersive soils. Runoff from areas of dispersive soils should not be designed to discharge directly to waterways or stormwater drains where it may adversely water quality.

7.3.5 Potential non-structural control measures

A construction management plan should be prepared in advance of the start of construction identifying the hazards associated with dispersive soils and construction practices to mitigate their impact.

Sediment and erosion controls should be installed prior to the commencement of any works and maintained throughout the course of construction until disturbed areas have been revegetated/ established.

The amount of time land is exposed should be minimised though staged development and/or staged working where possible. Particular care should be taken to avoid allowing soils to desiccate and crack, since these soils are then vulnerable to tunnel erosion after heavy rainfall.

Soil compaction should be verified through geotechnical supervision and field and laboratory testing.

Stockpiling of dispersive soil should be avoided where possible. Stockpiles should be protected from surface and rainwater.

Earthworks surfaces should be shaped to avoid ponding of surface water and discharged to relatively erosion resistant areas (e.g. garden beds mixed with gypsum, existing well vegetated areas with ample topsoil and stony elevated areas) away from dispersive soils.

Exposed dispersive subsoils should be protected as soon as possible to protect them from rainfall and surface water.

Runoff from areas of dispersive soils should not be discharged directly to waterways or stormwater drains.

Topsoil should not be removed or land re-profiled unless this forms part of the final earthworks design.

8 RESPONSIBILITIES

A copy of this ASSSMP should be made available for all relevant personnel working on the project and a copy should be kept on site for reference during construction. The recommendations of the ASSSMP should be referenced in conjunction with the construction environmental management plan (CEMP) as well as other works plans to include safe work method statements (SWMS).

Prior to commencement of works, all field staff will be inducted to the site and will be made familiar with their obligations under the site management plans and associated environmental and worker health and safety requirements. Any staff involved in sediment excavation and/or handling will be made familiar with the procedures discussed in this ASSSMP.

Table 8.1 details stakeholders' responsibilities while involved with the Project.

Table 8.1 Summary of responsibilities

POSITION/ ORGANISATION	REPORTS TO	SUMMARY OF RESPONSIBILITIES
Contractor	Tactical	— Prepare or commission project management plans (including construction environmental management plan (CEMP) and occupational health and safety management plan. — Induct all staff involved in excavation works in the ASSSMP requirements. — Ensure works and subcontractor works are undertaken in compliance with this ASSSMP. — Ensure routine compliance monitoring and associated reporting is carried out.
Environmental consultant (EC) - to be advised	Contractor	— Provide environmental consulting services as required. — Maintain and update this ASSSMP as required. — Assist with verification of treatment and waste classification works. — Prepare the environmental and validation documentation associated with the works (as needed).

9 MONITORING AND REPORTING

Table 9.1 provides a summary of the recommended monitoring and reporting activities required to manage ASS during the construction process.

Table 9.1 Summary of recommended monitoring and reporting activities

ACTIVITY	PARAMETER	RESPONSIBILITY	FREQUENCY
MONITORING			
Monitoring of disturbed soil for ASS	Visual observations, Field pH, pH_{FOX}, CRS suite if required.	EC	Daily
Screening of excavation spoil and verification testing of treated material	Field pH, pH_{FOX}, CRS suite if required.	EC	Within 48 hrs of excavation
Monitoring of leachate collection sump from ASS storage or treatment areas	pH for reuse as dust suppression in the treatment compound	site supervisor or engineer or other nominated, trained personnel	Daily for pH (during ASS treatment)
Monitoring of leachate collection sump from ASS storage or treatment areas	Laboratory suite for reinjection if water can't be reused as dust suppression in the stockpile area.	EC	Batch-based
Water quality surrounding dewatering works	pH and other field parameters	EC	Weekly (during ASS treatment)
TREATMENT VERIFICATION TESTING			
PASS treatment verification	Field pH, pH_{FOX}, CRS suite.	EC	Batch-based

10 Limitations

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The Conclusions are reflective of the current Site conditions and cannot be regarded as absolute without further extensive intrusive investigations, outside the scope of the services set out in the Agreement and are indicative of the environmental condition of the Site at the time of preparing the Report. As a general principle, vertical and horizontal soil or groundwater conditions are not uniform. No monitoring, common or intrusive testing or sampling technique can eliminate the possibility that monitoring or testing results or samples taken, are not totally representative of soil and / or groundwater conditions encountered at the Site. It should also be recognised that Site conditions, including subsurface conditions can change with time due to the presence and concentration of contaminants, changing natural forces and man-made influences.

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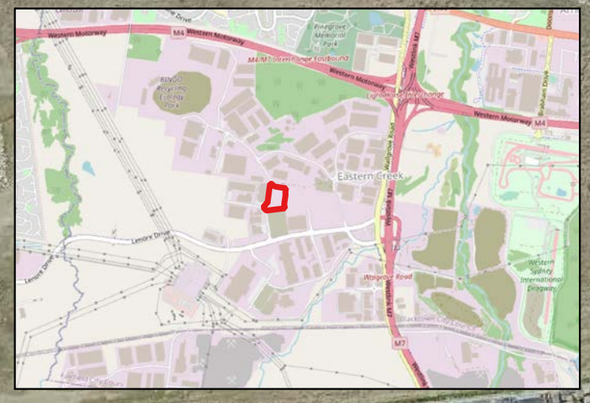
Appendix A

FIGURES

TP01
TP03
TP04
BH01
BH05
TP02
TP06
TP05
BH02
TP08
BH04
TP09
BH03
TP07



Legend

- Site boundary
- Test pit location (WSP 2021a environmental investigation)
- Borehole location (WSP 2021b geotechnical investigation)

Data source: © Metropmap 2021

20 0 20 40 m

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Figure 1.
Historical Investigation Locations
Compass 2 Warehouse & Distribution Centre
Lot 1 Eastern Creek Drive, Eastern Creek NSW

Legend

- Site location

Acid Sulfate Soils

Risk

- High probability of occurrence
- Low probability of occurrence
- No known occurrence
- Not assessed

Data source: © NSW Government & Department of Planning, Industry & Environment 1998

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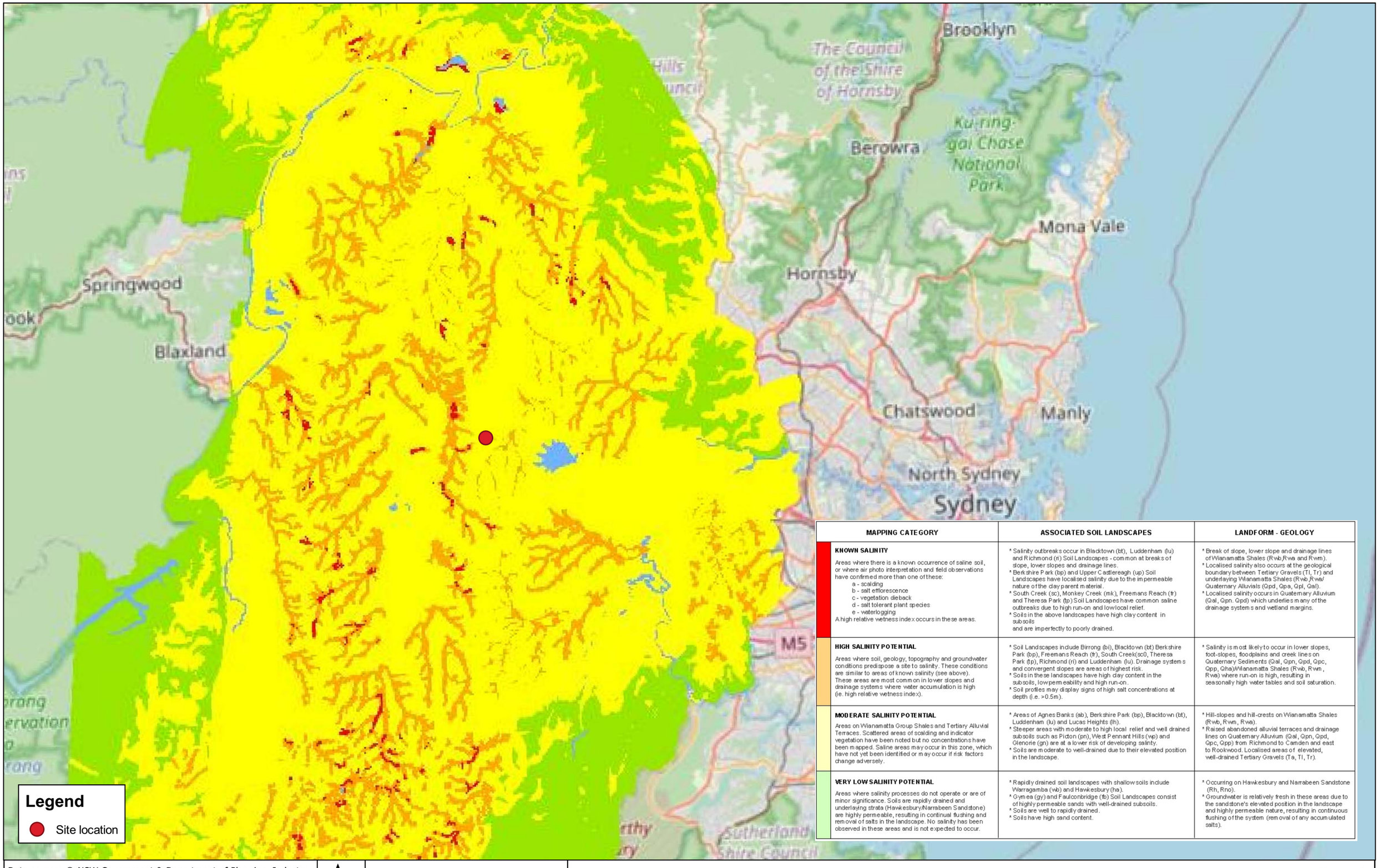
Figure 2.
Acid Sulfate Soil Risk Map
Compass 2 Warehouse & Distribution Centre
Lot 1 Eastern Creek Drive, Eastern Creek NSW



MAPPING CATEGORY	ASSOCIATED SOIL LANDSCAPES	LANDFORM - GEOLOGY
KNOWN SALINITY Areas where there is a known occurrence of saline soil, or where air photo interpretation and field observations have confirmed more than one of these: a - scalding b - salt efflorescence c - vegetation dieback d - salt tolerant plant species e - waterlogging A high relative wetness index occurs in these areas.	* Salinity outbreaks occur in Blacktown (bt), Luddenham (lu) and Richmond (ri) Soil Landscapes - common at breaks of slope, lower slopes and drainage lines. * Berkshire Park (bp) and Upper Castlereagh (up) Soil Landscapes have localised salinity due to the impermeable nature of the clay parent material. * South Creek (sc), Monkey Creek (mk), Freemans Reach (fr) and Theresa Park (tp) Soil Landscapes have common saline outbreaks due to high run-on and low local relief. * Soils in the above landscapes have high clay content in subsoils and are imperfectly to poorly drained.	* Break of slope, lower slope and drainage lines of Wianamatta Shales (Rwb,Rwa and Rwm). * Localised salinity also occurs at the geological boundary between Tertiary Gravels (Tl, Tr) and underlaying Wianamatta Shales (Rwb,Rwa/ Quaternary Alluvials (Qpd, Qpa, Qpl, Qal). * Localised salinity occurs in Quaternary Alluvium (Qal, Qpn, Qpd) which underlies many of the drainage systems and wetland margins.
HIGH SALINITY POTENTIAL Areas where soil, geology, topography and groundwater conditions predispose a site to salinity. These conditions are similar to areas of known salinity (see above). These areas are most common in lower slopes and drainage systems where water accumulation is high (ie. high relative wetness index).	* Soil Landscapes include Birrong (bi), Blacktown (bt) Berkshire Park (bp), Freemans Reach (fr), South Creek(sc0, Theresa Park (tp), Richmond (ri) and Luddenham (lu). Drainage systems and convergent slopes are areas of highest risk. * Soils in these landscapes have high clay content in the subsoils, low permeability and high run-on. * Soil profiles may display signs of high salt concentrations at depth (i.e. >0.5m).	* Salinity is most likely to occur in lower slopes, foot-slopes, floodplains and creek lines on Quaternary Sediments (Qal, Qpn, Qpd, Qpc, Qpp, Qha)/Wianamatta Shales (Rwb, Rwm, Rwa) where run-on is high, resulting in seasonally high water tables and soil saturation.
MODERATE SALINITY POTENTIAL Areas on Wianamatta Group Shales and Tertiary Alluvial Terraces. Scattered areas of scalding and indicator vegetation have been noted but no concentrations have been mapped. Saline areas may occur in this zone, which have not yet been identified or may occur if risk factors change adversely.	* Areas of Agnes Banks (ab), Berkshire Park (bp), Blacktown (bt), Luddenham (lu) and Lucas Heights (lh). * Steeper areas with moderate to high local relief and well drained subsoils such as Picton (pn), West Pennant Hills (wp) and Glenorie (gn) are at a lower risk of developing salinity. * Soils are moderate to well-drained due to their elevated position in the landscape.	* Hill-slopes and hill-crests on Wianamatta Shales (Rwb, Rwn, Rwa). * Raised abandoned alluvial terraces and drainage lines on Quaternary Alluvium (Qal, Qpn, Qpd, Qpc, Qpp) from Richmond to Camden and east to Rookwood. Localised areas of elevated, well-drained Tertiary Gravels (Ta, Tl, Tr).
VERY LOW SALINITY POTENTIAL Areas where salinity processes do not operate or are of minor significance. Soils are rapidly drained and underlaying strata (Hawkesbury/Narrabeen Sandstone) are highly permeable, resulting in continual flushing and removal of salts in the landscape. No salinity has been observed in these areas and is not expected to occur.	* Rapidly drained soil landscapes with shallow soils include Warragamba (wb) and Hawkesbury (ha). * Gymea (gy) and Faulconbridge (fb) Soil Landscapes consist of highly permeable sands with well-drained subsoils. * Soils are well to rapidly drained. * Soils have high sand content.	* Occurring on Hawkesbury and Narrabeen Sandstone (Rh, Rno). * Groundwater is relatively fresh in these areas due to the sandstone's elevated position in the landscape and highly permeable nature, resulting in continuous flushing of the system (removal of any accumulated salts).

Data source: © NSW Government & Department of Planning, Industry & Environment 2002

0 5 10 km

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Figure 3.
Salinity Potential Map
Compass 2 Warehouse & Distribution Centre
Lot 1 Eastern Creek Drive, Eastern Creek NSW

Appendix B

FIELD PEROXIDE METHOD

B1 Soil Field Tests

Adapted from WQA, 2018 *National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual* (**Error! Reference source not found.**).

This Appendix provides information on how to perform field pH tests and interpret their results. It is important to note that, while a useful exploratory tool, field tests are indicative only. They cannot be used as a substitute for laboratory analysis to determine the presence or absence of acid sulfate soils (ASS).

Further laboratory analysis is also neededto quantify the acidity and other hazards.

Details on the laboratory analyses required for ASS are provided in the *National Acid Sulfate Soils Identification and Laboratory Methods Manual* (Sullivan et al., 2018).

B2 Soil field test equipment

It is important that prior to conducting the field tests, the appropriate testing equipment is obtained. For a basic set up the following items are required:

- pH meter and electrode (charged and calibrated).
- At least 2 buffer solutions (for example pH 4.0 and pH 7.0).
- Centrifuge tubes or beakers – wide, unbreakable, heat resistant and clear (for example Falcon 50 mL polypropylene).
- Centrifuge tube or jar rack marked with soil sample depths – use a separate rack for pHF tests and pH_{FOX} tests in case they bubble over.
- Stirrers for centrifuge tubes.
- 30% hydrogen peroxide (H2O2) pH adjusted to 4.5–5.5.
- Storage bottle for H2O2.
- Sodium hydroxide (NaOH) to raise pH of peroxide to 4.5–5.5 (pH 5.5 ideal).
- Deionised (DI) water.
- Squirt bottle for DI water.
- Tissues.
- Gloves and safety glasses.
- Protective clothing.
- Bucket to collect used soil and hydrogen peroxide.
- Bucket and brush to clean tubes for next sample.
- Recording sheets.
- Excess water for rinsing.
- First aid kit – especially eye wash solutions.
- 1 M hydrochloric (HCl) acid to test for shell presence.

B2.1 Conducting field tests – some considerations

When the analytical results are reported, both the field test results and informative soil profile descriptions will aid the interpretation of the laboratory results and help provide abetter understanding of the soil properties and behaviour on the site, especially with respect to the acidity hazard.

When performing pH_F tests, soil samples must be analysed as soon as possible after sampling. If Reduced Inorganic Sulfur (RIS) are present, they are often capable of rapid oxidation causing substantially lowered pH_F values. Delayed determinations of pH_F may provide results that do not faithfully represent pH conditions in the field at the time of sampling.

The rate of reaction in the pH_{FOX} test is temperature dependent and can take up to an hour to complete under cold conditions. It is important to allow sufficient time for the reaction to occur, especially in cool weather.

Field pH tests should be performed on site, however, there are many areas (for example wetlands) where performing field tests in situ can prove difficult (for example too wet, mosquito problems). In such situations, samples should be preserved (for example kept on dry ice), taken to a suitable location for the conduct of field tests and the delay in time between sampling and 'field' analysis recorded with the field test results.

B2.2 On-site chemical and material safety precautions

B2.2.1HYDROGEN PEROXIDE

Care needs to be taken when using hydrogen peroxide (H_2O_2) in the field. Hydrogen peroxide (30%) is used as the primary reagent in the pH_{FOX} test. The concentration is 10 times stronger than the peroxide commonly found in household medicine cabinets. The reaction of peroxide with soil containing RIS may produce sulfurous gases and generate heat in excess of 90 °C.

Caution: 30% hydrogen peroxide is a strong oxidising agent and should be handled carefully with appropriate eye and skin protection. This test is suitable for experienced operators only.

The peroxide when first received may have a pH of 3.5 or lower. Chemical companies commonly put stabilisers in the peroxide to prevent it from decomposing and releasing oxygen by keeping the pH low. The pH required for the pH_{FOX} is pH 4.5–5.5; this may be obtained by adding sodium hydroxide (NaOH; pH14).

Since both of these chemicals are highly corrosive and many of the long-term side effects are not fully known, it is recommended the following precautions are taken when performing field tests.

Always:

- Use gloves, safety glasses, laboratory coat or protective clothes.
- Conduct pH peroxide test in a well-ventilated area.
- Use test tubes capable of withstanding rapid heat changes and high temperatures.
- Avoid skin and eye contact with peroxide.
- Label all peroxide bottles with safety data information.

B2.2.2 Other chemicals

Several other chemicals are used in the field when sampling suspected ASS materials. Buffering solutions and potassium chloride (KCl) solutions are used to calibrate and maintain pH meters and care should be exercised when using these substances. Follow the appropriate safety directions on Safety Data Sheets (SDS).

Hydrochloric acid (HCl) is used when performing tests to assess the presence of carbonates in soil material (see Field carbonate test). Hydrochloric acid is strongly acidic and is very corrosive to the skin, therefore, caution is required when using it. Again, follow the appropriate directions outlined in the SDS.

Store HCl separately from buffer solutions as HCl gas may slowly diffuse through the plastic bottles and alter the buffer solutions.

B2.3 Field pH tests

B2.3.1 Introduction

The pH_F and pH_{FOX} tests have been developed for rapid assessment in the field for the likelihood of ASS. These tests are easy to conduct, quick, and have a minimum set-up cost. The field tests have been developed to give reasonable indication for many soils (provided the tests are performed properly). Although these field tests may provide an indication of ASS presence, they are purely qualitative, indicative, and do not give quantitative measures of the amount of acid that has been or could be produced through the RIS oxidation process.

Field pH tests should be part of any ASS investigation. The field pH tests (both pH_F and pH_{FOX}) should be conducted at 0.25 m intervals on the soil profile, ensuring at least one test per soil layer/horizon.

It is recommended that field tests be conducted on-site. If the tests cannot be performed in the field, tests should be conducted as soon as possible, ensuring appropriate sample and preservation procedures are observed (see the Sample handling, transport and storage section in Section **Error! Reference source not found.** for further details) and delays between sampling and the 'field' analysis are recorded with the results.

Samples suspected of containing monosulfides should undergo field pHtesting immediately.

The field pH tests outlined below are from the Queensland Acid Sulfate Soils Investigation Team (QASSIT) Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004).

B2.3.2 Field pH test (pH_F) – NSM-1.1

The procedure for the pH_F is outlined below:

1. Calibrate battery powered field pH meter according to manufacturer's instructions.
2. Prepare the centrifuge tubes in a tube rack. Mark the rack with the depths to identify the top and bottom of the profile. Use separate racks for the pH_F and pH_{FOX} tests to prevent cross contamination from violent pH_{FOX} reactions.
3. Conduct tests at intervals on the soil profile of 0.25 m, or at least one test per soil layer/horizon, whichever is lesser.
4. For each layer place approximately half a teaspoon of soil into each of the pH_F and pH_{FOX} tubes. It is important the two sub-samples come from the same depth and are similar in characteristics. For example, do not take half a teaspoon of grey mud from the 0–0.25 m depth for one test and then select half a teaspoon from the same depth layer that has yellow mottles for the othertest.
5. Place enough deionised (DI) water in the pHF test tube to make a paste similar to 'grout mix' or 'white sauce'; stir the soil:water paste to ensure all soil 'lumps' are removed (demineralised water can be substituted; never use tap water). Water must be added to the soil samples within 10 min of sampling to reduce the risk of RIS oxidation; monosulfidic material may start to oxidise in less than 5 min, substantially affecting pHF results.
6. Immediately place the pH spear point electrode into the soil:water paste, ensuring the spear point is completely submerged. Never stir the paste with the electrode as this may damage the semi-permeable glass membrane.
7. Measure the pHF with the calibrated pH meter.
8. Wait for the reading to stabilise and record the pH measurement.

9 All measurements should be recorded on a data sheet.

B2.3.3 Field pH peroxide test (pH_{FOX}) – NSM-1.2

It is recommended that 30% hydrogen peroxide (H_2O_2) be used in the pH_{FOX} test.

Hydrogen peroxide (30%) is highly corrosive and care should be taken when handling and using the peroxide. Safety glasses and gloves should be worn when handling and using peroxide. All chemical bottles should be clearly labelled and Safety Data Sheets (SDS) should be kept with the chemicals at all times. Appropriate health and safety precautions should be adhered to. Peroxide should be kept in the fridge when not in use.

The procedure for the field pH peroxide test (pH_{FOX}) is outlined below:

1 Adjust the pH of the H_2O_2 to between 4.5 and 5.5 before going into the field. While stirring, add a few drops of dilute NaOH and regularly check the pH with a calibrated electrode until the correct range is reached. Allow the peroxide to stand for 15 min and then recheck the pH. As H_2O_2 degrades over time, only buffer small quantities at a time and refrigerate when not in use.

2 Calibrate battery powered field pH meter according to manufacturer's instructions.

3 Prepare heat-resistant centrifuge tubes in a tube rack. Mark the rack with the depths to identify the top and bottom of the profile. Use separate racks for the pH_F and pH_{FOX} tests to prevent cross contamination from violent pH_{FOX} reactions.

4 Conduct pH_{FOX} tests at intervals on the soil profile of 0.25 m or at least one per horizon, whichever is lesser.

5 To the pH_{FOX} tube, prepared while sampling for pH_F, add sufficient 30% H_2O_2 (at room temperature) to cover the soil, then stir the mixture.

6 Rate the reaction of soil and peroxide using the reaction scale in Table B.1.

7 Allow approximately 15 min for any reactions to occur. The reaction may be rapid and vigorous if substantial RIS is present. If the reaction is violent and the soil:peroxide mix may overtop the tube, use a wash bottle to add small amounts of deionised or demineralised water to cool and calm the reaction. Do not add too much water as this may dilute the mixture and affect the pH value.

8 Add a further 1–2 mL of H_2O_2, mix, allow to react for 15 min and rate the reaction. Continue this process until the soil:peroxide mixture reaction has slowed. This will ensure most of the RIS have reacted.

9 If there is no initial reaction, individual tubes containing the soil:peroxide mixture can be placed in direct sunlight. This may encourage the initial reaction to occur.

10 Wait for the soil:peroxide mixture to cool. This may take up to 10 min as the reaction can exceed 90 °C. Check the temperature rating of the pH meter and probe as high temperatures can damage the electrode and result in inaccurate readings. A more accurate pH is recorded if a temperature probe is used, however, this may be impractical in some field situations.

11 Place the spear point pH electrode into the soil:peroxide mixture, ensuring the spear point is completely submerged. Never stir the paste with the electrode as this may damage the semi- permeable glass membrane.

12 Measure the pH_{FOX} with the calibrated pH meter.

13 Wait for the reading to stabilise and record the pH_{FOX} measurement.

14 All measurements should be recorded on a data sheet.

B2.3.4 Rating soil reactions of the pH_{FOX} test

Table B.1 indicates the reaction scale for pH_{FOX} tests. The rate of the reaction generally indicates the level of RIS present, but depends also on texture and other soil constituents. A soil containing very little RIS may only have a slight reaction

(L), however a soil containing high levels of RIS (remember the exact level of RIS cannot be determined using the pH_{FOX} test) is more likely to have an extreme/volcanic reaction (X–V), although there are exceptions. This rating scale alone should not be used to identify ASS. It is not a very reliable feature in isolation as there are other factors including manganese and organic acids which may trigger reactions. Reactions with organic matter tend to be more 'frothing' and do not tend to generate as much heat as sulfidic reactions. Manganese reactions can be quite extreme, but do not tend to lower the pH_{FOX}.

Table B.1 Soil reaction rating scale for the pH_{FOX} test

REACTION SCALE	RATE OF REACTION
L	Low reaction
M	Medium reaction
H	High reaction
X	Extreme reaction
V	Volcanic reaction

Source: DER (2015a).

B2.3.5 Interpretation of field PH tests

The pH_F test can help identify Actual ASS. While a pH_F of less than or equal to 4 is indicative of the presence of Actual ASS, it is not conclusive of the presence of ASS on its own, as naturally occurring, non ASS soils such as many organic soils (for example peats) and heavily leached soils may also have pH_F less than or equal to 4. To identify as an Actual ASS, other evidence must be presented that indicates that the low pH_F has been mainly caused by the oxidation of RIS. Such information includes the presence of jarosite in the soil layer/horizon, or the location of other Actual ASS or PASS materials within or in the nearby vicinity to the sampling location.

The difference between the pH_F and the pH_{FOX} is helpful in the preliminary identification of PASS. Combined the pH_F and pH_{FOX} results can be a useful aid with soil sample selection for laboratory analysis during Stage 2 of the field site investigations.

The pH_{FOX} result when compared to the pH_F result can give an indication of the presence of RIS in the sample. To ensure accurate results both of these tests must be conducted in the field as soon as possible after the sample is collected as the pH of the soil sample can change relatively quickly with time (hours to days) even when recommended sample preservation techniques are employed. For example, it is not unusual for soil pH test carried out at a laboratory to differ considerably (that is greater than a pH unit) from soil pH test measured in the field after even one day of storage, and as such, a laboratory determination of pH_F at a later date cannot be relied upon to represent field conditions at the time of sampling.

Soil field pH_F and pH_{FOX} tests whilst useful exploratory tools, however, are not determinative and cannot be substituted for laboratory analysis for either the identification of ASS materials and quantification of the acidity hazards these materials pose. A recent review of the utility of these field tests in Western Australia indicated that these tests only accurately identified ASS materials in 60 to 80 per cent of cases (DER 2015a).

A comparison of pH_F and pH_{FOX} test results can often give a strong indication of the presence of ASS. The greater the drop in pH from pH_F following the addition of peroxide, the greater the likelihood of PASS, although there are exceptions. A combination of a large difference between the two pH tests, a strong reaction with peroxide and a low pH after peroxide oxidation (that is pH_{FOX} less than 3) strongly indicates the presence of PASS.

However, it is important to note that the definitive confirmation of either the presence or absence of PASS materials in the field can only be accomplished by appropriate laboratory testing.

Table B.2 and Table B.3 provide some guidance on the interpretation of pH_F and pH_{FOX} test results, respectively.

Table B.2 Interpretation of some pH_F test ranges

pH VALUE	RESULTS	COMMENTS
pHF ≤ 4, jarosite not observed in the soil layer/horizon	May indicate an AASS indicating previous oxidation of RIS or may indicate naturally occurring, non ASS soils.	Generally, not conclusive as naturally occurring, non ASS soils, such as many organic soils (for example peats) and heavily leached soils, often also return pHF ≤ 4.
pHF ≤ 4, jarosite observed in the soil layer/horizon	The soil material is an AASS.	Jarosite and other iron precipitate minerals in ASS such as schwertmannite require a pH < 4 to form and indicate prior oxidation of RIS.
pHF > 7	Expected in waterlogged, unoxidised, or poorly drained soils.	Marine muds commonly have a pH > 7 which reflects a seawater (pH 8.2) influence. Oxidation of samples with H2 O2 can help indicate if the soil materials contain RIS.

Source: Adapted from DER (2015a).

Table B.3 Interpretation of pH_{FOX} test results

pH VALUE AND REACTION	RESULT	COMMENTS
Strong reaction of soil with H_2O_2 (that is X or V)	Useful indicator of the presence of RIS but cannot be used alone	Organic rich substrates such as peat and coffee rock, and soil constituents like manganese oxides, can also cause a reaction. Care must be exercised in interpreting these results. Laboratory analyses are required to confirm if appreciable RIS is present
pH_{FOX} value at least one unit below field pH_F and strong reaction with H_2O_2 (that is X or V)	May indicate PASS	The difference between pHF and pHFOX is termed the ΔpH. Generally, the larger the ΔpH the more indicative of PASS. The lower the final pHFOX the better the likelihood of an appreciable RIS content. For example, a change from pHF of 8 to pHFOX of 7 (that is a ΔpH of 1) would not indicate PASS, however, a unit change from pHF of 3.5 to pHFOX of 2.5 would be indicative of PASS. Laboratory analyses are required to confirm if appreciable RIS is present.
pH_{FOX} < 3, large ΔpH and a strong reaction with H_2O_2 (that is X or V)	Strongly indicates PASS	The lower the pH_{FOX} below 3, the greater the likelihood that appreciable RIS is present. A combination of all three parameters – pH_{FOX}, ΔpH and reaction strength – gives the best indication of PASS. Laboratory analyses are required to confirm that appreciable RIS is present
A pH_{FOX} 3–4 and Low, Medium or Strong reaction with H_2O_2	Inconclusive	RIS may be present; however, organic matter may also be responsible for the decrease in pH. Laboratory analyses are required to confirm the presence of RIS

pH VALUE AND REACTION	RESULT	COMMENTS
pH_{FOX} 4–5	Inconclusive	RIS may be present in small quantities, or poorly reactive under rapid oxidation, or the sample may contain shell/ carbonate which neutralises some or all acid produced on oxidation. Equally, the pH_{FOX} value may be due to the production of organic acids with no RIS present. Laboratory analyses are required to confirm if appreciable RIS is present
pH_{FOX} > 5, small or no ΔpH, but Low, Medium or Strong reaction with H_2O_2	Inconclusive	For neutral to alkaline pHF with shell or white concretions, the fizz test with 1 M HCl can be used to identify the presence of carbonates. Laboratory analyses are required to confirm if appreciable RIS is present and further testing is required to confirm that effective self-neutralising materials are present

Source: Adapted from DER (2015a).

Appendix C - Construction Air Quality Management Sub-Plan

Construction Air Quality Management Sub-Plan

Warehouse and Distribution Centre – Compass 2

Lot 1 Eastern Creek Drive, Eastern Creek, NSW

SSD-30923027

DOCUMENT TRACKING

Version No.	Document Number	Detail	Prepared By	Approved By	Date
Rev 1	J1863220130.T1	Draft issued to client for review	J. Jenkins	M. Williams	30/01/2022
Rev 2	J1863220208.T1	Final issued to client	J. Jenkins	M. Williams	08/02/2022

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1 Introduction

This Construction Air Quality Management Sub-Plan (CAQMP) has been prepared by Aspect Environmental Pty Ltd (Aspect), on behalf of Qanstruct Limited (Qanstruct) for Charter Hall Holdings Pty Limited (Charter Hall), for the construction and operation of the Compass 2 Warehouse and Distribution Centre (the Project).

This CAQMP is a Sub-Plan of the Construction Environmental Management Plan (CEMP) and has been prepared with reference to the Environmental Impact Statement (Willowtree Planning, December 2021) and relevant SSD 30923027 conditions of consent (CoC).

The Project comprises earthworks, construction and operation of warehouse facility at Lot 1 Eastern Creek Drive, Eastern Creek, NSW (Lot 1 DP 1274322) and associated infrastructure and includes access to Honeycomb Drive via 31 Honeycomb Drive, Eastern Creek (Lot 271 DP 1198561).

The location of the Project site is indicated by the red outline on Figure 1-1.

2 Existing Environment

2.1 Meteorological Conditions

Meteorological conditions can have a large impact on air quality. In periods of high wind and dry weather, there is a greater potential for dust and volatiles to be generated and transported offsite.

2.1.1 Wind

Wind data obtained from nearby Penrith Lakes AWS show similar patterns of wind speed and wind direction over a 5-year period, with south-westerly winds prevailing (Figure 3-1).

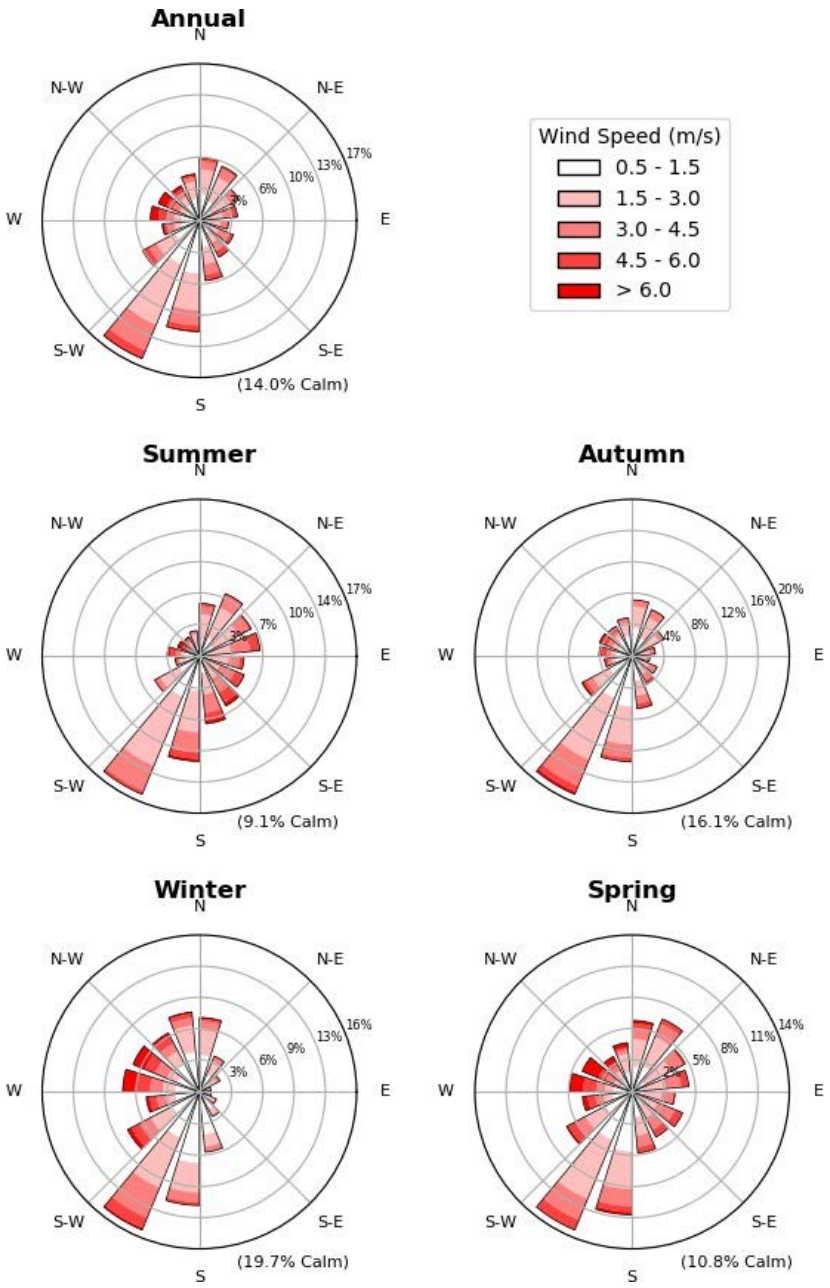

Figure 2-1 Penrith Lakes AWS Wind Roses, 2015-2019 (Source: RWDI, 2021)

2.1.2 Local Ambient Air Quality

Air quality monitoring is conducted at the nearby St Marys Air Quality Monitoring Station (AQMS). The St Marys AQMS is operated by the NSW Department of Planning Industry and Environment (DPIE) and is located approximately 7.6 kms northwest from the Project. A summary of air quality monitoring data for 2018 against the NSW Environmental Protection Agency (EPA) air quality criteria is provided in Table 2-1 for total suspended particulates (TSP) and PM_{10} particulate matter. The results indicate local ambient air quality is below the relevant NSW EPA air quality criteria.

Table 2-1 Ambient air quality monitoring concentrations in proximity to the Project

Pollutant	Averaging Period	Concentration (µg/m^2)	NSW EPA Air Quality Criteria (µg/m^2)
Total Suspended Particulates	Annual	48.5	90
Particulate Matter ≤10µm (PM_{10})	Annual	19.4	25
	24-hour	47.6	50

2.2 Sensitive Receivers

The Project is located within an industrial and commercial precinct with the nearest residential receivers located approximately 1.5 km to the north and 2.4 km to the west (Figure 3-2). Further, the nearest childcare facility (Little Graces Childcare Centre) is located 600 m southeast from the Project. A risk assessment of potential dust impacts to nearby receivers was undertaken as part of the Air Quality Assessment (RWDI, 2021). Due to the significant distance between the Project and sensitive receivers, an assessment of air quality impacts was not considered necessary.

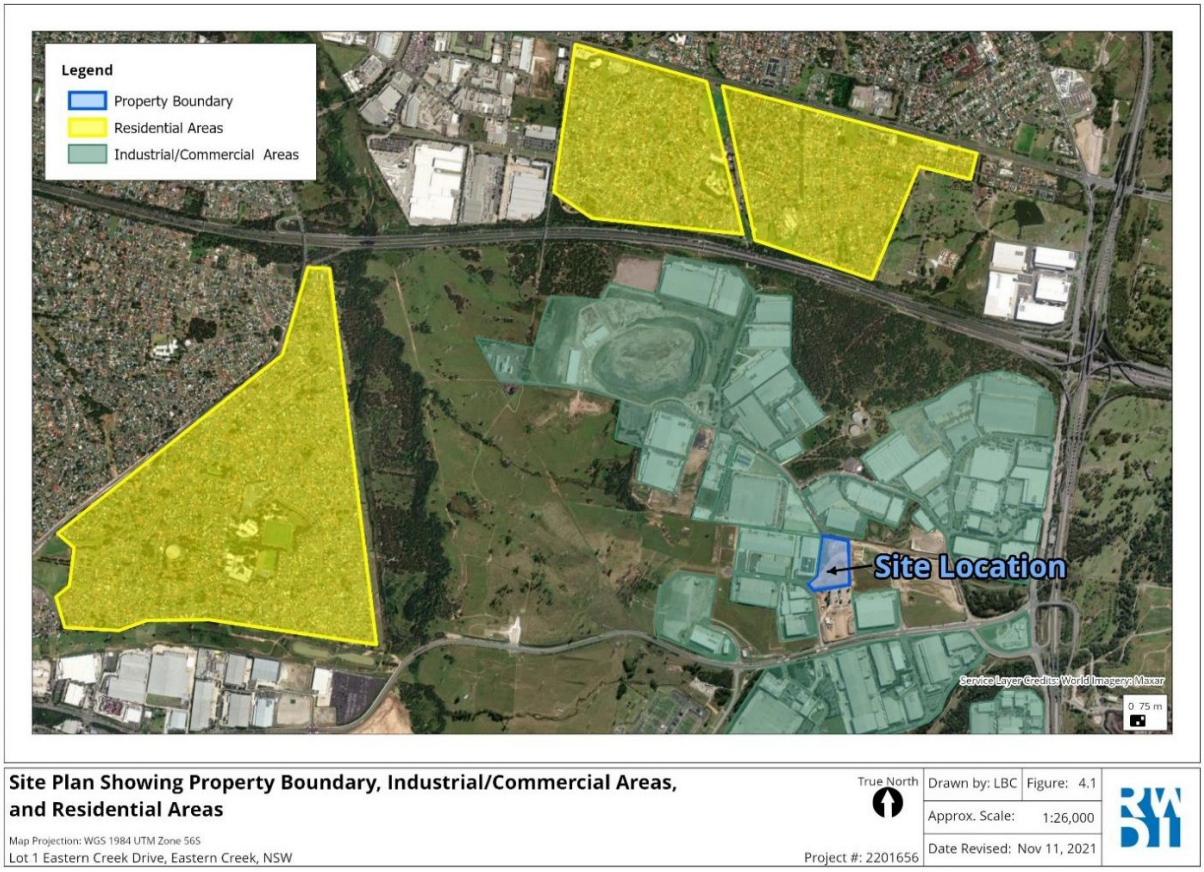

Figure 2-2 Closest residential receivers to the Project (Source: RWDI, 2021)

3 Environmental Aspects and Impacts

3.1 Air Emissions

3.1.1 Air Emissions Sources

Section 6.1.10.1 of the EIS (Willowtree, December 2021) identifies likely sources of air emissions during construction of the Project. The activities which have the potential to have the greatest impact on air quality are identified in Table 4-1.

Table 3-1 Potential sources of air emissions

Activity	Air Emission Cause	Potential Impact
Site clearing and enabling works	- Establishment of environmental controls - Removal of any existing vegetation and stripping of topsoil - Stockpiling activities	- Dust generation - Vehicle emissions
Earthworks and retaining wall construction	- Bulk earthworks and civil works, including piling	- Dust generation - Vehicle emissions
Construction of internal road network	- Concrete and asphalt paving works	- Vehicle emissions

During earthworks, which includes movement of material and truck movements along haul roads (wheel-generated dust), there is likely to be short-term periods of elevated dust levels.

3.1.2 Air Emission Types

The particle size distributions considered for management, based on the location, scale, nature and extent of construction activities are:

- PM10 (particles less than 10 micrometres in diameter) – for assessment against health-based criteria
- TSP (total suspended particles, generally up to 100 micrometres in diameter) – for assessment against predominantly nuisance-based criteria and
- Deposited dust particles – for assessment of dust nuisance.

3.2 Risk Assessment

As identified in Section 6.1.10 of the EIS (Willowtree, December 2021), assessment of potential dust impacts concludes that the Project has a low risk of both dust deposition and human health impacts from construction activities if dust mitigation measures are implemented. Air quality mitigation measures are identified in Section 4.

4 Mitigation Measures

The air quality mitigation measures to be implemented for the Project are identified in **Table 4-1**.

Table 4-1 Air quality mitigation measures

ID	Mitigation Measure	Timing	Responsibility
AQ 1	A shaker grid and wheel wash bay to be implemented onsite and a water cart to be used during excavation works to minimise and manage generation of dust.	During construction	Site Manager
AQ 2	Remove, suppress, stabilise or cover materials that have a potential to produce dust as soon as possible, unless being used onsite.	When required	Site Manager
AQ 3	During periods of unsuitable weather (high winds and high temperatures), avoid or minimise dust generating activities where possible, or increase frequency of dust suppression activities.	When required	Site Manager
AQ 4	Avoid unnecessary idling and switch off engines when in periods of inactivity.	During construction	Site Manager
AQ 5	Trucks and plant used onsite to be regularly serviced/ maintained to minimise exhaust emissions.	When required	All personnel
AQ 6	Monitor weather conditions and stop works if dust generation is excessive.	Daily	Site Manager
AQ 7	Use water-assisted dust sweeper(s) on the access and local roads, as necessary.	When required	Site Manager
AQ 8	Vehicles and trucks entering and exiting site are to be covered to prevent escape of materials during transport.	During construction	All personnel

Appendix D - Construction Noise and Vibration Management Sub-Plan

Construction Noise and Vibration Management Sub-Plan

Warehouse and Distribution Centre – Compass 2

Lot 1 Eastern Creek Drive, Eastern Creek, NSW
SSD-30923027

DOCUMENT TRACKING

Version No.	Document Number	Detail	Prepared By	Approved By	Date
Rev 1	J1863220131.T2	Draft issued to client for review	D McKone C Stanley	M Williams	31/01/2022
Rev 2	J1863220208.T2	Final issued to client	D McKone C Stanley	M Williams	08/02/2022

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1 Introduction

1.1 Background

This Construction Noise and Vibration Management Sub-Plan (CNVMP) has been prepared by Aspect Environmental Pty Ltd (Aspect), on behalf of Qanstruct Limited (Qanstruct) for Charter Hall Holdings Pty Limited (Charter Hall), for the construction and operation of the Compass 2 Warehouse and Distribution Centre (the Project).

This CNVMP is a Sub-Plan of the Construction Environmental Management Plan (CEMP) and has been prepared with reference to the Environmental Impact Statement (Willowtree Planning, December 2021) for SSD 30923027.

The Project comprises earthworks, construction and operation of warehouse facility at Lot 1 Eastern Creek Drive, Eastern Creek, NSW (Lot 1 DP 1274322) and associated infrastructure and includes access to Honeycomb Drive via 31 Honeycomb Drive, Eastern Creek (Lot 271 DP 1198561).

The location of the Project is indicated by the red outline on Figure 1-1.

Figure 1-1: Site context - Source: EIS, Willowtree Planning, December 2021

1.2 CNVMP Purpose and Context

This CNVMP has been prepared to manage potential noise and vibration impacts for the Project. The CNVMP has been prepared with reference to the Noise and Vibration Impact Assessment (NVIA) Compass 2 Warehouse & Distribution Centre (RWDI#2201656, 10 December 2021) prepared by RWDI Australia Pty Ltd (RWDI). The NVIA was prepared to address the SSD-30923027 Planning Secretary's Environmental Assessment Requirements (SEARs) which were issued on 8 November 2021.

1.3 Construction Activities and Equipment

The NVIA assessed potential noise and vibration impacts associated with the Project and the supporting road network and considered construction activities and equipment (Table 1-1).

Table 1-1: Construction activities and equipment requirements

Construction Stage	Description	Equipment Requirements
Stage 1	Site clearing	Large excavators, dozers, loaders and trucks
Stage 2	Bulk earthworks	Large excavators, dozers, loaders and trucks It is estimated that approximately 60 truck movements will be required per day during this period.
Stage 3	Road and hardstand construction	Road and hardstand construction equipment including loaders, graders, backhoes, rollers and asphalt pavers will be used to construct the hardstands, internal driveways and parking areas. Piling rigs will be used during this phase.
Stage 4	Warehouse construction	Concrete trucks, concrete pumps, forklifts, cranes, hand tools and other equipment

1.4 Construction Hours

In accordance with the Interim Construction Noise Guideline (DECC, 2009) (ICNG), the Project working hours are:

- Monday to Friday 7am to 6pm
- Saturday 8am to 1pm
- Sunday and Public holidays – no work.

Works outside these hours would generally be limited to delivery of materials or plant and equipment required by the NSW Police Force or other authorities for safety reasons, or where required in emergency to avoid the loss of lives, property or to prevent environmental harm.

Where required, and where reasonable to do so, conduct of out-of-hours works would be advised to Council.

2 Noise and Vibration Management Levels

2.1 Receiver Locations

The site boundary and receiver locations are shown on Figure 2-1.

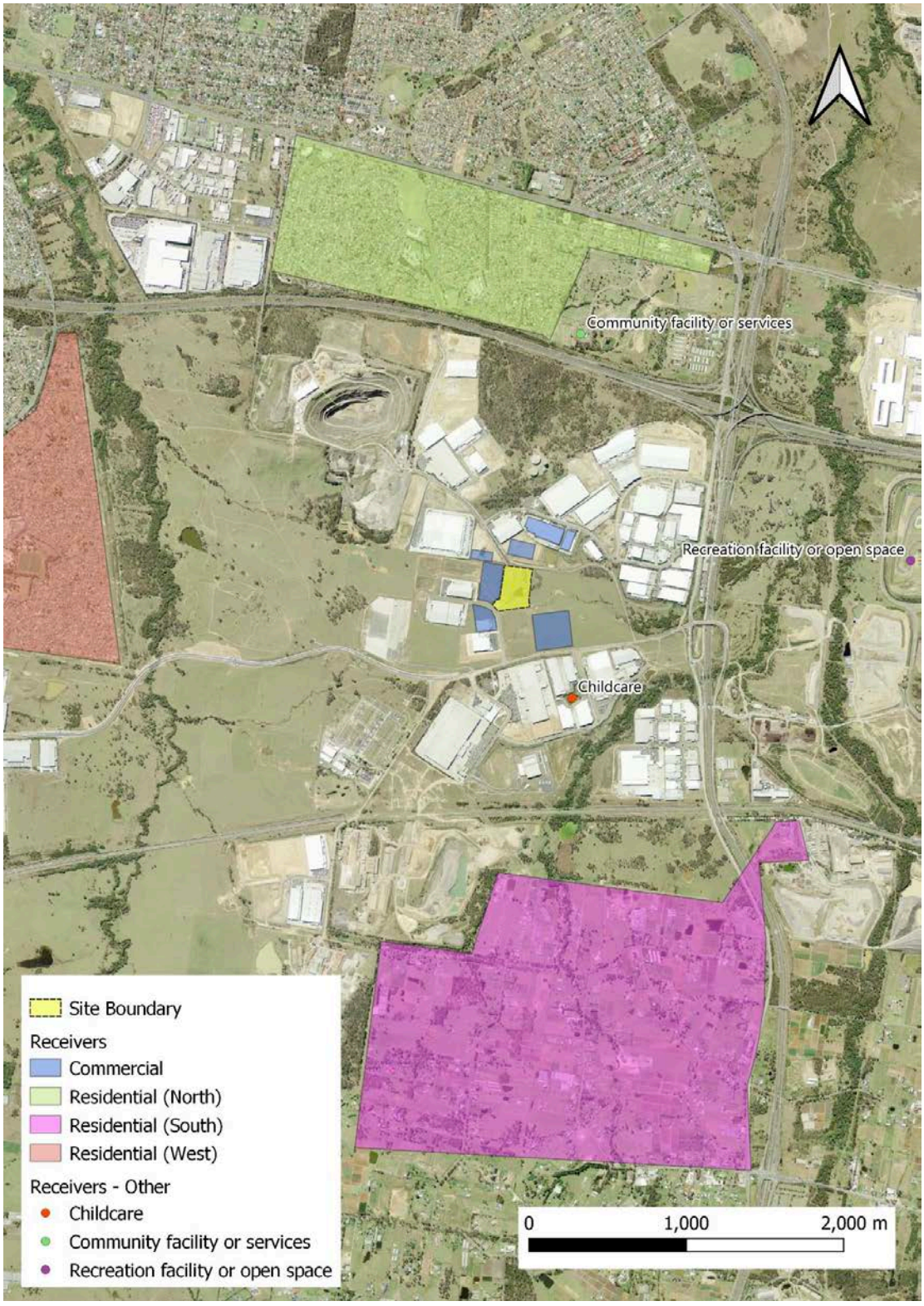

Figure 2-1: Site boundary and receiver locations - source: EIS, Willowtree Planning, December 2021

2.2 Existing Background Noise Levels

The Project is located within an industrial area and is surrounded by existing or developing industrial premises. The surrounding motorway and road network carries a significant volume of heavy vehicle traffic. Site background noise levels are predominated by traffic, including heavy vehicles, on the local road network and nearby M7 and M4 Motorways.

Given the remote location of residential receivers in relation to the Project, ambient noise monitoring is not considered necessary. Baseline noise levels are characterised by commercial, light industrial and traffic noise.

2.3 NSW EPA Interim Construction Noise Guideline 2009

Section 1.5 of the ICNG identifies the key steps for managing noise impacts from construction. These steps are outlined in Table 2-1 with references to where in this CNVMP the requirements have been addressed. This CNVMP has been prepared to be consistent with the guidelines contained in the ICNG.

Table 2-1: ICNG key requirements

Requirement	Referenced in this CNVMP	How Addressed
Identify sensitive land uses that may be affected	Section 1.2	Residential and non-residential receivers most potentially affected by noise from the construction of the Project have been identified.
Identify hours for the proposed construction works	Section 1.4	Construction hours are as per the CoC.
Identify noise impacts at sensitive land uses	Section 2.2	Background noise levels established through noise monitoring at residential receivers for the Project of NMLs.
	Section 2.4	NMLs established for residential and non-residential land uses.
	Section 2.5	Construction plant items and associated noise levels established for a number of scenarios. Noise levels at sensitive receivers predicted and compared to NMLs.
Select and apply the best work practices to minimise noise impacts	Section 3	Mitigation measures have been identified and developed in consideration of the ICNG, development consent and final compilation of mitigation measures from the RtS.

2.4 Site Specific Noise Management Levels

The NVIA recommended site specific construction NMLs for receivers in the area; these are provided in Table 2-2.

Table 2-2: Site specific construction NMLs

Location	Construction Noise Management Levels (NMLs) – $L_{Aeq,15min}$				Highly Noise Affected Noise Level $L_{Aeaq,15min}$
	Day Standard Hours [1]	Day OOH	Evening OOH [2]	Night OOH [3]	
Residential	45	40	35	35	75
Industrial	75 external	-	-	-	-
Community facility	60 external	-	-	-	-
Childcare	55 external	-	-	-	-

Note:

1. Standard hours (7am - 6pm Monday to Friday, 8am - 1pm Saturday with no work on Sundays or public holidays

2. Evening OOH (6pm -10pm)
3. Night OOH (10pm – 7am)

Noise management levels have been determined following consideration of Table 2 and Table 3 of the ICNG for noise at sensitive land uses (other than residential).

A management level L_{Aeq15} of 45dB(A) is applicable for internal noise levels at the childcare centre (approximately 500 m to the south of the Project) and 75dB(A) for external noise levels for adjacent industrial and commercial premises.

The Australian Standard AS2436-2010 Guide to noise and vibration control on construction, demolition, and maintenance sites (the Standard) provides guidance for noise control on construction, maintenance and demolition sites, and for the preparation of noise and vibration management plans, work method statements and environmental impact studies. Section 4 of the Standard supports the ICNG as the relevant policy or guideline in relation to carrying out detailed noise impact assessments in NSW (refer to Section 2.3).

2.5 Predicted Construction Noise Levels

Sound power levels for typical construction equipment were modelled using the CONCAWE noise prediction algorithm in the SoundPLAN V8.2 modelling package, and converted to $L_{Aeaq,15min}$ noise emissions, to be able to assess against the NMLs. Predicted construction noise levels are identified in Table 2-3.

Table 2-3: Construction noise sources

Phase	Equipment	Operating minutes in 15-min period	No. of Items	Sound Power Level (dB)		
				Maximum Item (SWL)	L_{Aeq} Activity	L_{Amax} Activity
Site clearing	Excavator – Breaker [1]	7.5	1	124	118	120
	Excavator (20-30T)	15	4	100		
	Loader	15	3	106		
	Dozer	15	3	110		
	Graders	15	2	108		
	Watercart	15	1	98		
	Truck and dog	15	10	98		
Bulk earthworks	Excavator – Breaker [1]	7.5	1	124	121	124
	Excavator (20-30T)	15	5	100		
	Loader	15	5	106		
	Dozer	15	4	110		
	Graders	15	4	108		
	Watercart	15	1	98		
Road and hardstand construction	Loader	15	1	106	116	119
	Graders	15	2	108		
	Backhoe (7.5t)	15	3	102		
	Watercart	15	1	98		
	Road profiler	15	1	107		

Phase	Equipment	Operating minutes in 15-min period	No. of Items	Sound Power Level (dB)		
				Maximum Item (SWL)	L_{Aeq} Activity	L_{Amax} Activity
	Asphalt paver	15	1	111		
	Truck and dog	15	5	98		
Warehouse construction	Concrete truck / Pump	7.5	3	106	111	119
	Crane truck	15	2	100		
	Forklift	15	3	101		
	Hand tools	7.5	5	97		

2.6 Predicted Construction Noise Impacts

The NVIA assessed predicted noise impacts associated with the Project. The typical $L_{Aeq,15}$ minute noise levels at the surrounding noise sensitive receivers are provided in Table 2-4 for each of the construction activities and are representative of the noisiest construction periods allowing for the simultaneous operation of noise intensive construction plant in close proximity.

No exceedances are predicted at any receivers during all construction stages.

Table 2-4: Predicted construction noise impacts

Stage	Receiver	Noise Level (NMLs) – $L_{Aeq,15min}$		
		NML Day Standard Hours	Worst-Case Predicted	Exceedance
Site establishment and clearing	North	45	28	-
	South	45	29	-
	West	45	25	-
	Industrial	75	57	-
	Community facility	60	25	-
	Childcare	45	31	-
Bulk excavation	North	45	31	-
	South	45	32	-
	West	45	28	-
	Industrial	75	60	-
	Community facility	60	28	-
	Childcare	45	34	-
Road and hardstand construction	North	45	26	-
	South	45	27	-
	West	45	23	-
	Industrial	75	55	-
	Community facility	60	23	-
	Childcare	45	29	-
Warehouse construction	North	45	21	-
	South	45	22	-
	West	45	18	-

Stage	Receiver	Noise Level (NMLs) – $L_{Aeq,15min}$		
		NML Day Standard Hours	Worst-Case Predicted	Exceedance
	Industrial	75	50	-
	Community facility	60	18	-
	Childcare	45	24	-

2.7 Potential Construction Vibration Impacts

The NIVA did not assess vibration impacts, however, this plan has considered vibration intensive plant that may be used during construction:

- Vibration compactor/ rollers
- High-energy impact compaction equipment and
- Jackhammers.

2.7.1 Vibration Safe Working Distances

Table 2-5 identifies typical safe working distance. These working distances are associated with structural damage (DIN 4150-3) and human comfort (NSW EPA Assessing Vibration: A Technical Guideline) regarding vibration intensive activities.

Table 2-5: Vibration safe working distances

Plant Item	Rating/Description	Safe Working Distance (m)			
		Pipework and Infrastructure (DIN 4150-3)	Buildings used for commercial purposes, industrial buildings, and buildings of similar design (DIN 4150-3)	Dwellings and buildings of similar design and/or occupancy (DIN 4150-3)	Human Comfort (Assessing Vibration guideline)
Vibratory compactor/ roller	< 50 kN (Typically 1-2 tonnes)	1 m	2 m	6 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	1 m	2 m	8 m	20 m
	< 200 kN (Typically 4-6 tonnes)	1 m	3 m	15 m	40 m
	< 300 kN (Typically 7-13 tonnes)	1 m	4 m	19 m	100 m
	> 300 kN (Typically 13-18 tonnes)	1 m	4 m	25 m	100 m
	> 300 kN (> 18 tonnes)	1 m	1 m	31 m	100 m
High Energy Impact Compaction[1]	100 kW Tractor (Towing Equipment)	2 m	3 m	10 m	50 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	1 m	1 m	3 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	1 m	2 m	9 m	23 m

Plant Item	Rating/Description	Safe Working Distance (m)			
		Pipework and Infrastructure (DIN 4150-3)	Buildings used for commercial purposes, industrial buildings, and buildings of similar design (DIN 4150-3)	Dwellings and buildings of similar design and/or occupancy (DIN 4150-3)	Human Comfort (Assessing Vibration guideline)
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	1 m	4 m	24 m	73 m
Vibratory Pile Driver	Sheet piles	1 m	1 m to 4 m	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	1 m	1 m	2 m	n/a
Jackhammer	Handheld	1 m	1 m	1 m	Avoid contact with structure

Notes:

1. Data as presented in Appendix N of the MPW Stage 2 Environmental Impact Statement Noise and Vibration Assessment (Wilkinson Murray, October 2016).

The nearest residential receiver (north of the M4 Motorway) and a childcare facility (south of site) are located approximately 1.5 km and 600 m respectfully from the Project site, which is well beyond the safe working distances presented in Table 2-5. Therefore, it is not expected that vibration or cosmetic damage, or human comfort criteria will be exceeded at the nearest affected residential or childcare facility receivers.

3 Mitigation Measures

Table 3-1 identifies the mitigation measures that will be adopted to manage noise and vibration impacts.

Table 3-1: Noise and vibration mitigation measures

ID	Mitigation Measure	Timing	Responsibility
NV1	Site entrance signage to include - the approved hours of work and 24-hour contact phone number for any inquiries, including construction/ noise complaints.	During construction	Project Manager
NV2	Notification to potentially affected people and Blacktown City Council regarding construction commencement to occur at least 7 days prior to commencement.	Prior to construction	Project Manager
NV3	Noise or vibration complaints will be investigated. Where applicable feasible and reasonable, remedial actions will be implemented.	At all times	Project Manager
NV4	Where feasible, plant and equipment should be selected, operated and maintained to minimise noise and vibration, including: • Select plant and equipment based on least noise and vibration emission levels • Use of noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including excavators and trucks • Maintenance, repair or replacement of plant and equipment if it is suspected that predicted sound power levels are exceeded • Use of silenced generators and compressors • Use of non-tonal movement alarms in place of reversing beepers, or alternatives such as reversing cameras and proximity alarms, unless tonal alarms are mandated by legislation • Maintain plant in good condition • Operated plant with engine covers and hatches closed as instructed by the manufacture • Operated in an efficient manner.	Construction	All personnel
NV5	Where feasible and reasonable, the following work practices will be adopted to minimise noise and vibration: • Throttle down or switch off plant when not in use • Adhere to speed limits and other signposted instructions • Noise-emitting plant to be directed away from sensitive receivers • Adhere to the safe working distances identified in the CNVMP for vibration intensive plant • To be included in Toolbox talks - noise from the works and how it can be reduced • Where there are complaints from an identified work activity, review and implement where feasible and reasonable, additional actions to those described above to minimise noise output.	Pre-construction & Construction	Contractor
NV6	Construction vehicles operated to minimise construction noise impacts. The following will occur: • Toolbox talks for drivers and operators • No use of compression brakes on the site or on nearby roads • Prevent vehicles and plant queuing and idling outside the site prior to the morning start time • Issue pre-determined delivery times to suppliers.	Construction	Site Manager All personnel
NV7	If NMLs will be exceeded or are likely to be exceeded, stationary noise sources will be enclosed or shielded (work health and safety of workers will need to be assessed). Structures can also be used to shield receptors where practical.	Construction	Contractor

ID	Mitigation Measure	Timing	Responsibility
NV8	All general construction work and activity will occur during the following periods: • 7am to 6pm Mondays to Fridays, inclusive • 7am to 1pm Saturdays and • at no time on Sundays or public holidays.	Construction	All personnel
NV9	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: (a) 9am to 12pm, Monday to Friday (b) 2pm to 5pm Monday to Friday and (c) 9am to 12pm, Saturday.	Construction	All personnel
NV10	Construction vehicles (heavy) are not to arrive at the site outside of the construction hours of work.	Construction	All personnel

4 Monitoring and Reporting

Given the remote location of sensitive receivers, the significant road network and other industrial uses in the area, attended noise monitoring will only be conducted in response to a complaint. Monitoring would occur at the site boundary approximate to the direction of where the complaint originated and calculated back to the origin of the complaint.

If noise generating works are shown to exceed the required noise criteria, or if noise complaints are received, additional mitigation will be implemented for these activities, to ensure compliance, such as:

- Alternate work methodologies
- Alternative plant with lower noise
- Plant and machinery will be checked and verified for noise levels and appropriate exhaust / fittings / noise attenuators will be considered and
- Acoustic screenings.

If vibration is found to be excessive, management measures will be implemented to meet vibration criteria. Management measures may include modification of construction methods such as using smaller equipment, enhancing safe working distances and if necessary, time restrictions for the most excessive vibration activities.

References

IEC 61672-1 2013 'Electroacoustics - Sound Level Meters'.

ISO 3744:2010 'Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane'.

ISO 3746:2010 'Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane'.

AS ISO 6393:2019 'Earth-moving machinery - Determination of sound power level - Stationary test conditions'.

ISO 6395:2008 'Earth-moving machinery - Determination of sound power level - Dynamic test conditions'.

ISO 9614-1:1993 ‘Acoustics - Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points’.

Compass 2 Warehouse & Distribution Centre Lot 1 DP1274322 within Blacktown, Noise and Vibration Impact Assessment RWDI # 2201656, 10 December 2021.

Appendix E - Construction Waste Management Sub-Plan

Design
for a better
future /

FEBRUARY 2022

PROJECT NERIO – WAREHOUSE & DISTRIBUTION CENTRE
LOT 1 DP1274322, EASTERN CREEK
CONSTRUCTION WASTE MANAGEMENT PLAN

Question today
Imagine tomorrow
Create for the future

PROJECT NERIO – WAREHOUSE & DISTRIBUTION CENTRE
LOT 1 DP1274322, EASTERN CREEK
Construction Waste Management Plan

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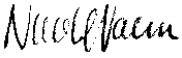
REV	DATE	DETAILS
A	09/02/2022	Construction Waste Management Plan

	NAME	DATE	SIGNATURE
Prepared by:	Nicole Naim	09/02/2022	
Reviewed by:	Laurence Gamble	09/02/2022	
Approved by:	Valentina Petrone	09/02/2022	

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1 INTRODUCTION

Client:	*Charter Hall*
Development Type:	*Commercial (Warehouse)*
Proposed Works:	*Construction and associated works*

The following Construction Waste Management Plan (CWMP) has been prepared for the proposed construction and associated works at Lot 1 Eastern Creek Drive, Eastern Creek.

This CWMP has been prepared based on the Blacktown Development Control Plan 2015 (Part G, Site Waste Management and Minimisation, Section 3) and current best practice waste management methodology and technologies commonly available in Australia.

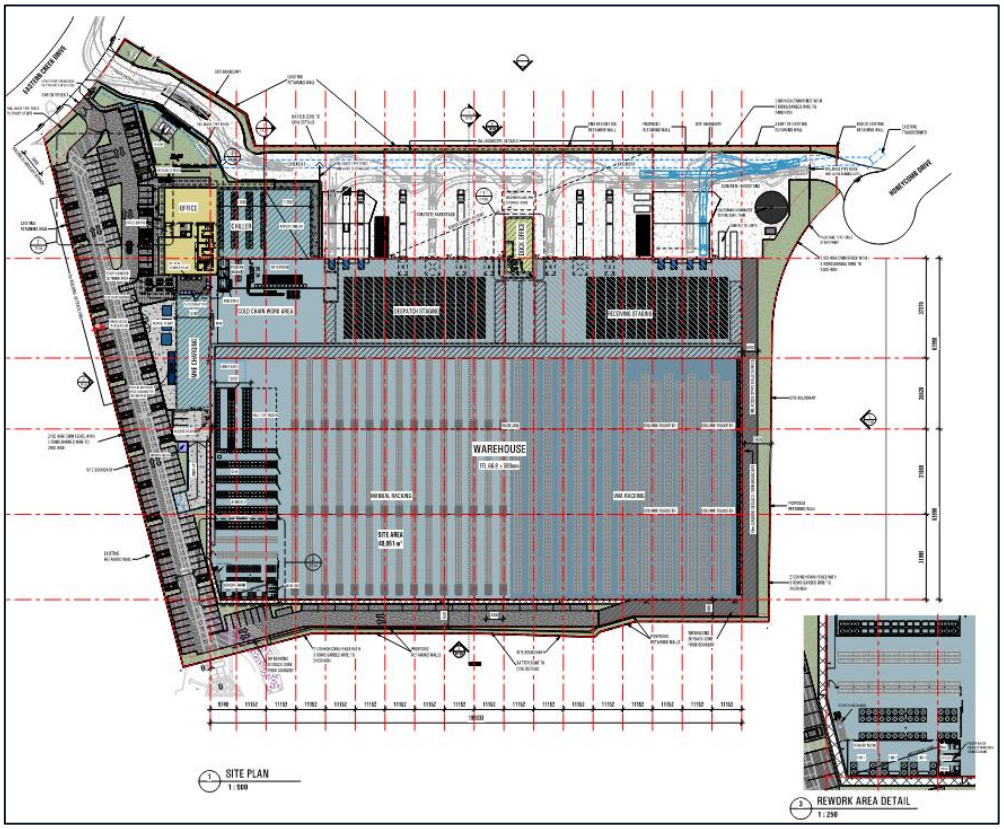
1.1 PROJECT DESCRIPTION

The proposed development includes the construction and 24/7 operation of a warehouse and distribution centre at Lot 1 Eastern Creek Drive, Eastern Creek, comprising:

- Minor earthworks involving cut and fill works;
- Site preparation works and servicing;
- Warehouse, main office, ancillary office, dock office, loading docks, carparking, forklift charging room; and
- External hardstands and landscaping;

A site plan is provided below for context. Further design drawings are provided in Appendix A.

Figure 1 Site Plan



2 WASTE MANAGEMENT PLAN

The following Construction Waste Management Plan (CWMP) is provided as a high-level summary of typical construction waste operations, to be incorporated into the site's Construction and Environmental Management Plan (CEMP) as appropriate. Should construction operations significantly differ in practice, the principal construction contractor will be responsible for documenting any significant departures from the CWMP.

As per the Blacktown Development Control Plan 2015 (Part G, Site Waste Management and Minimisation, Section 3) requirements, this CWMP includes detail of:

- The type and estimated volume of waste to be generated during demolition and construction and respective recycling, reuse and disposal methods;
- Location and space allocated for the storage of demolition and construction waste or materials; and
- Waste collection point(s) for the site.

Maximised diversion of construction waste from landfill should be targeted for this development, to be achieved through appropriate material separation practices. The specific re-use, removal or treatment of construction waste will be undertaken by third parties as appropriate.

Information as shown is not intended to form the sole basis of any construction works, and is subject to change pending the preferred operations of the principal construction contractor.

2.1 CONSTRUCTION PHASE

Construction works will generally generate waste through the erection and finishing of the development (i.e. construction waste). CEMP (to be prepared by others) will incorporate include the construction and demolition (C&D) waste strategy in line with the head contractor's program and trades scheduling.

Most waste products generated throughout construction works can be readily recycled or reused, and include steel framing, damaged glazing, cladding and roof sheeting, plasterboard linings, timber features and framing, metals, concrete and rubble. Metal and plastic piping and conduits, cabling and floor finishes (tiling) should also be recovered.

Accurate materials estimation and ordering, offsite prefabrication of framing modules and fitout components, and monitoring and review of specifications and onsite construction and fitout operations will minimise the potential volume of construction waste to be generated in the first instance.

Wherever possible, construction waste will be stored and sorted on-site, including on-site collection zones for each waste stream. Any waste skips be stored in public places will be done so in accordance with Council policy.

Subcontractors and other site personnel should be educated regarding requirements for recovery of waste. This will assist in maximising recovery of resources from C&D waste on-site, and minimise the cost and environmental impacts of waste being disposed to landfill.

2.2 WASTE SYSTEMS

A detailed waste strategy should be considered by the principal contractor prior to commencement. As per standard industry practice, a minimum 80% diversion rate from landfill for waste generated from construction activities should be targeted across the subject site.

For the purpose of this assessment, demolition waste has been considered through the following activities:

- **Building Erection:** Construction of new buildings form (i.e. warehouse, office) throughout the site.
- **Paving:** Solid paving of additional surfaces throughout the site (i.e. carpark, loading dock, etc.)
- **Landscaping:** Landscaped areas and vegetation throughout the site.

Of these construction works, corresponding waste streams have been considered under the following general categories:

- **Construction Streams:** Waste debris incurred from the construction of new buildings onsite (i.e. concrete, timber, plasterboard, etc.).
- **Packaging Streams**: Waste volumes generated through general material packaging (cardboard, shrink wrap, pallets, etc.).
- **Domestic Streams:** Regular municipal waste streams (garbage, commingles, etc.) generated through activities of trades staff on site.
- **Hazardous:** Any additional waste that has substantial or potential threats to public health or the environment.

A general overview of the expected waste stream profile per development activity is provided in Table 1 below.

Table 1 Waste Systems

Waste Stream	Site Element (per Demolition Plan)	Building Erection	Paving	Landscaping
Demolition Streams	Excavation Material	✓	✓	✓
	Concrete	✓	✓	
	Plasterboard	✓		
	Metals	✓		
	Glass	✓		
	Ceramics	✓		
	Fines	✓		
	Vegetation cuttings	✓		✓
Packaging Streams	Cardboard packaging	✓		
	Plastics packaging	✓		
	Wood packaging	✓		
	Metallic packaging	✓		
	Mixed packaging	✓		
Domestic Streams	Domestic General Waste	✓	✓	✓
	Domestic Commingles	✓	✓	✓
Hazardous	Chemical	✓	✓	✓

2.2.1 CONSTRUCTION WASTE STREAMS

All wastes generated throughout construction activities are to be effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values. As a guiding principle, waste should be managed in accordance with waste hierarchy, as to maximise waste diversion from landfill.

In the context of the subject works, the approach of the waste hierarchy can be generally considered as:

- **Re-use (Onsite)**: Direct and immediate re-use of materials onsite as part of subsequent construction activities.
- **Re-use (Offsite)**: Re-use of materials offsite under separate construction activities unrelated to the subject development.
- **Recycle**: Volumes sent to an off-site facility to be recycled into new products and/or on-sold for further use.
- **Dispose**: Volumes sent to landfill / cleanfill for end disposal. Materials not harnessed for any further use.

Aspirational waste stream separation is summarised in Table 2 below. Information as shown is provided for discussion only and should not be used as the basis of any construction works or waste reporting.

Table 2 Construction Waste – Aspirational Stream Separation

Waste Stream	Typical Receptacle	Notes:
Excavation Material	Skips	**Re-Use (Onsite)**: Re-apply onsite as fill. **Re-Use (Offsite)**: Transported to a C&D waste recycler for recovery as fill under separate use.
Concrete / Ceramics / Fines	Skips	**Re-Use (Onsite)**: Crush on-site for application as fill / gravel. **Recycle**: Transported to a C&D waste recycler for crushing / recycling into recovered products.
Plasterboard	Skips	**Re-Use (Onsite)**: Crush on-site for application as fill / gravel. **Recycle**: Transported to a C&D waste recycler for crushing / recycling into recovered products.
Metals	Skips	**Recycle**: Transported to a metals waste recycler for crushing / recycling into recovered products.
Glass	Skips	**Recycle**: Transported to a glass waste recycler for crushing / recycling into recovered products.
Vegetation Cuttings	Skips / Bagged	**Re-Use (Onsite)**: Mulch onsite & apply to any existing green areas **Recycle**: Transported to a C&D waste recycler for mulching / recycling into recovered products.

2.2.2 PACKAGING STREAMS

Packaging waste streams will be generated through material procurement and consumption. These streams will be collected under a separate system to the construction streams by suitably licensed private contractors.

A high level overview of reuse, recycle and disposal opportunities for each packaging waste stream is provided in Table 4 below.

Table 3 Packaging Waste Streams

Waste Stream	Typical Receptacle	Notes:
Cardboard Packaging	Bins	**Recycle:** Volumes transported to a cardboard plant for recycling into recovered products.
Plastics Packaging	Bins	**Recycle:** Volumes transported to a plastics plant for recycling into recovered products.

Waste Stream	Typical Receptacle	Notes:
Wood Packaging	Bins / Loose (Pallets)	**Re-Use (Onsite):** Re-use pallets throughout general operations instead of ordering new. **Re-Use (Offsite):** institute a take-back system with equipment suppliers, such that any pallets are immediately returned to the delivery vehicle once received. **Recycle**: Transported to a C&D waste recycler for mulching / chipping / recycling into recovered products.
Metallic Packaging	Skips / Bins	**Recycle:** Volumes transported to a metals plant for recycling into recovered products.
Mixed Packaging	Skips / Bins	**Recycle:** Separate packaging into individual streams and recycle per the above. **Dispose**: Volumes sent to landfill.

2.2.3 DOMESTIC STREAMS

Domestic waste streams will be generated through activities of trades staff on site. These streams will be collected under a separate system to the demolition streams, either through a Council service (subject to negotiations with Council) or suitably licensed private contractors.

A high level overview of reuse, recycle and disposal opportunities for each domestic waste stream is provided in Table 4 below.

Table 4 Domestic Waste Streams

Waste Stream	Typical Receptacle	Notes:
General Waste (Garbage)	Bins	**Dispose**: Volumes sent to landfill.
Commingled Recycling	Bins	**Recycle**: Volumes sent to a material recovery facility for sorting into individual components (hard plastics, paper/cardboard, glass, metals) and subsequent processing.

2.2.4 HAZARDOUS STREAMS

Chemical and hazardous waste will be managed , stored, and collected in accordance with appropriate standards. Storages areas will only be accessible by authorised personnel.

The management of any hazardous / chemical waste is **not** addressed in this report. This report should **not** be relied upon for any detail regarding hazardous / chemical waste management.

2.3 WASTE COLLECTION

Waste collection will be undertaken by private collection contractors on an as-required basis. Vehicle sizes and on-site access will be in accordance with the Construction Traffic Management Plan prepared by Ason Group (*Preliminary Construction Traffic Management Plan: Compass 2 Warehouse & Distribution Centre, Eastern Creek*, dated February 2022).

The principal contractor will be responsible for positioning waste stockpiles / bins / skips throughout the site such that collections can be readily undertaken. WSP anticipate that collection vehicles will generally be undertaken by Heavy Rigid Vehicles (12.5m length, 4.5m operating height) or smaller.

2.4 WASTE GENERATION

Construction waste generation rates per week are shown in Table 5 and a waste generation assessment in 0. As a high level estimate, the waste generation rates and methodologies of the document *Handbook of Recycled Concrete and Demolition Waste* (Pacheco-Torgal et al., 2013) have been adopted. Note that this is **not** intended as a comprehensive list of materials and volumes, and that this methodology accounts for new buildings (warehouse / office structures) **only**.

In absence of a detailed material supply schedule, waste volumes associated with paving and landscaping works are not estimated below. As a general rule of thumb, approximately ~2-5% of the total materials ordered to undertake these works are typically wasted.

Values as shown are provided as estimates only and should not be used as the sole basis of any equipment procurement or waste reporting.

Table 5 Construction Waste Generation Rates

Waste Stream	Generation Rate * (m^3 waste / m^2 construction)	Composition * (% of total volume)
Concrete	0.0025 - 0.0075	10 – 30%
Plasterboard	0.005 - 0.00625	20 – 25%
Mixed C&D Waste (metals, glass, ceramics, fines, etc.)	0.0025 - 0.00375	10 – 15%
SUBTOTAL – CONSTRUCTION STREAMS	**0.01 - 0.0175**	**40 - 70%**
Cardboard packaging	0.00025 - 0.001	1 – 4%
Plastics packaging	0.0005 - 0.00075	2 – 3%
Wood packaging	0.00625 - 0.01125	25 – 45%
Metallic packaging	0.0005 - 0.00175	2 – 7%
Mixed packaging	0 - 0.00025	0 – 1%
SUBTOTAL – PACKAGING STREAMS	**0.0075 - 0.015**	**30 – 60%**
GRAND TOTAL	**~ 0.025**	**100%**

** Waste generation rates & material composition of 'Lightwood Construction: Non Residential' adopted for the purpose of this analysis.*

Table 6 Construction Waste Generation Assessment

Waste Stream	Total Building Footprint *	Waste Volume (m^3))
Concrete	23,450m^2	59 - 176
Plasterboard		117 - 147
Mixed C&D Waste (metals, glass, ceramics, etc.)		59 - 88
SUBTOTAL – CONSTRUCTION STREAMS		**235 - 410**
Cardboard packaging	23,450m^2	6 - 23
Plastics packaging		12 - 18
Wood packaging		147 - 264
Metallic packaging		12 - 41
Mixed packaging		0 - 6
SUBTOTAL – PACKAGING STREAMS		**176 - 352**
GRAND TOTAL		**~ 581**

** Building footprint includes the total 21,700m^2 warehouse GFA (including warehouse, forklift charging and freezer) and total 1,750m^2 office area 9including dock office and main office).*

** Building footprint excludes additional paving and landscaping of the site.*

3 SUPPLIER CONTACT INFORMATION

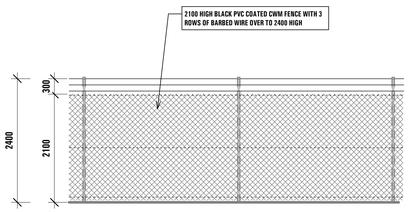
A complimentary listing of contractors and equipment suppliers is provided below for your reference. You are not obligated to procure goods/services from these companies. This is not, nor is it intended to be, a complete list of available suppliers. WSP does not warrant (or make representations for) the goods/services provided by these suppliers.

Table 7 Supplier Contact List

Service Type	Contractor / Supplier Name	Phone	Website
Private Waste Collectors (C&D Waste)	Bingo Bins	1300 424 646	www.bingoindustries.com.au
	Transwaste Skips	(02) 9746 8333	www.transwaste.com.au
	Brown Brothers Skip Bins	(02) 9999 6466	www.brownbrosbins.com.au
	Cobra Waste Solutions	1300 484 448	www.cobrawaste.com.au
Off-Site Recycling Facilities	Bingo Recycling Centre Auburn	1300 424 646	www.bingoindustries.com.au
	SUEZ Resource Recovery Centre, Auburn	13 13 35	www.suez.com.au
	Benedict Recycling, Girraween	(02) 9062 4288	www.benedict.com.au
	Greenwood Landfill & Waste Recovery Facility, St Ives	(02) 9450 2288	

APPENDIX A

SITE PLANS



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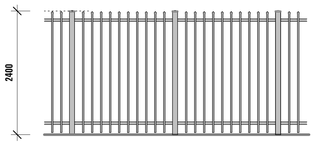
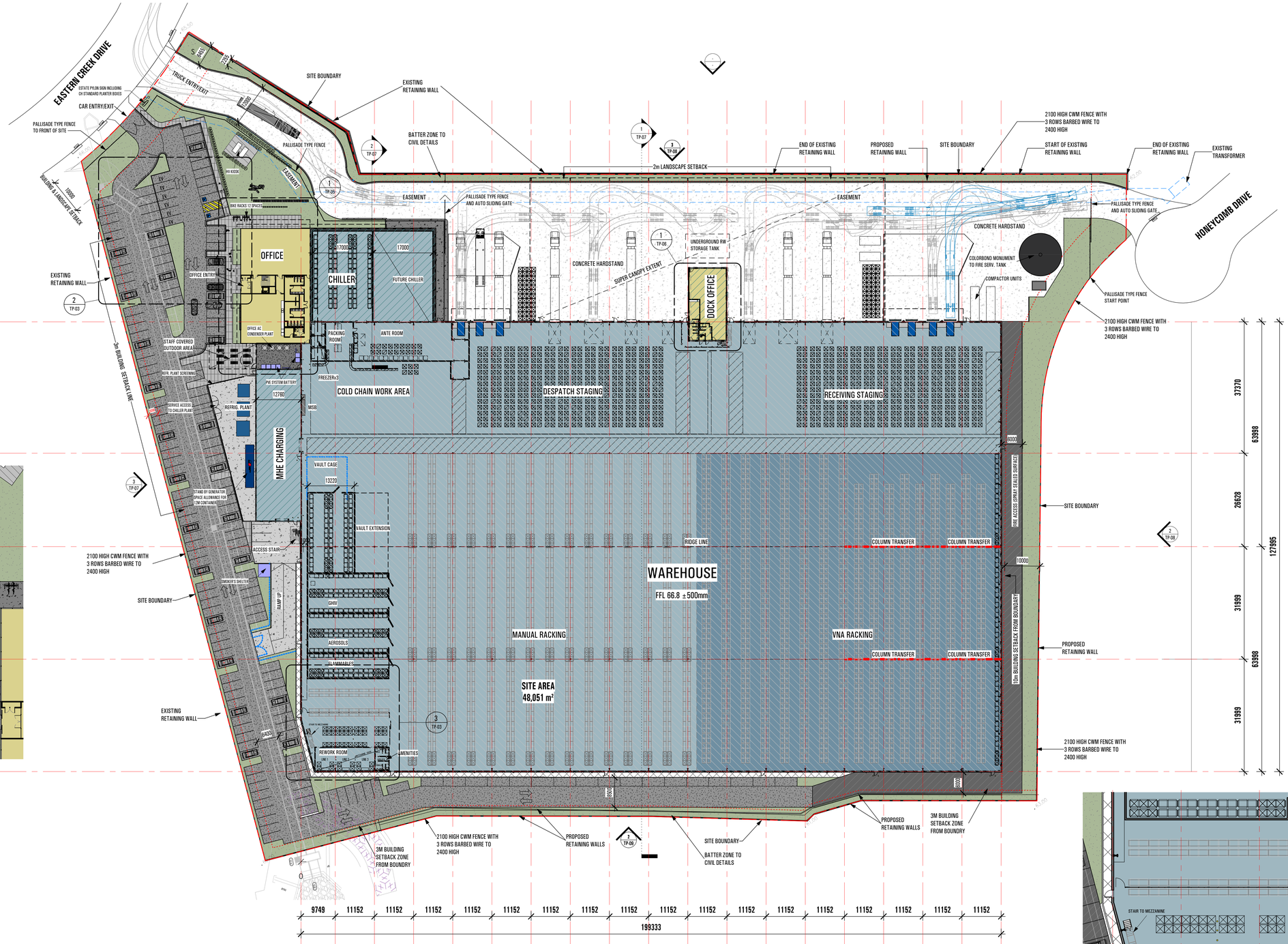


FENCING - 02 (PALISADE)
1 : 50

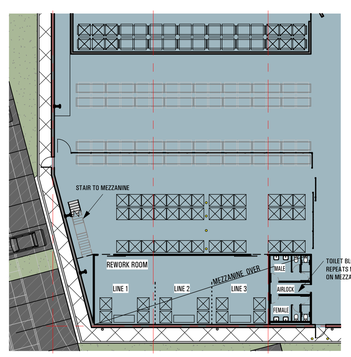
2 CAR PARK DETAIL
1 : 250



1 SITE PLAN
1 : 500

GROSS BUILDING AREAS

WAREHOUSE	25,400 M²
FORKLIFT CHARGING	500 M²
FREEZER	920 M²
2 STOREY DOCK OFFICE	450 M²
2 STOREY MAIN OFFICE	1,300 M²
TOTAL	28,570 M²
CAR PARKING SPACES	184 NO.
SITE AREA	48,051 M²
SITE EFFICIENCY	59.5%



3 REWORK AREA DETAIL
1 : 250

PROJECT NERIO
LOT 1, EASTERN CREEK DRIVE, EASTERN CREEK NSW.

Charter Hall

SHEET NAME:		SITE PLAN		
JOB NO.	4387-21	SCALE: As indicated	@B1 SIZED SHEET	PROJECT NORTH
Drawing No:	TP-03	ISSUE DATE:	3/02/2022	
REVISION:	B	DRAWN BY:	FF	

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Appendix F - Construction Traffic Management Sub-Plan

Preliminary Construction Traffic Management Plan

Compass 2 Warehouse & Distribution Centre, Eastern Creek

10/02/2022
P1570r01

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Document Control

Project No	1570
Project	Compass 2 Warehouse & Distribution Centre, Eastern Creek
Client	Charter Hall
File Reference	P1570r05v1 Prelim CTMP_Compass 2 Warehouse & Distribution Centre, Eastern Creek

Revision History

Revision No.	Date	Details	Author	Approved by
-	07/12/2021	Draft	S. Bandaranayake	R. Butler-Madden
I	10/02/2022	Issue	S. Bandaranayake	R. Butler-Madden

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contents continued

Figures

Tables

1 Introduction

1.1 Overview

Ason Group has been engaged by Charter Hall to prepare this Preliminary Construction Traffic Management Plan (CTMP) to support the application in relation to State Significant Development (SSD) 30927027. The SSD relates to a proposed industrial development named Compass 2 Warehouse & Distribution Centre, located at Lot 1 (DP1274322) Eastern Creek Drive, Eastern Creek (the Site).

This Preliminary CTMP details the proposed construction management strategies to provide for the safe and efficient completion of the works while minimising construction traffic impacts on the surrounding road network and public road network users.

From the outset, it is noted that the future CTMP, once implemented, will be designed to be updated over time as additional details in regard to the construction methodologies are revised / finalised as is standard in any major construction project. All such updates would be completed in consultation with Blacktown City Council (Council) in whose Local Government Area (LGA) the Site lies; and / or with the relevant authorities such as Transport for NSW (TfNSW) where special road occupancy or the like are required.

Importantly, Ason Group has been responsible for the preparation of this Preliminary CTMP, which has been prepared with reference to all available information in regard to the project, and all relevant CTMP preparation guidelines. The implementation of the recommendations and strategies detailed in this CTMP are the strict responsibility of the future Builder and / or the designated construction Project Manager once appointed.

1.2 Proposed Development and Staging

In summary, the application relates to the construction and 24/7 operation of a warehouse and distribution centre at Lot 1 Eastern Creek Drive, Eastern Creek, comprising:

- minor earthworks involving cut and fill works;
- site preparation works and servicing;
- warehouse, main office, ancillary office, dock office, loading docks, carparking, forklift charging room;
- external hardstands and landscaping;

The SSD Proposal is reproduced at a reduce scale in **Figure 1**.

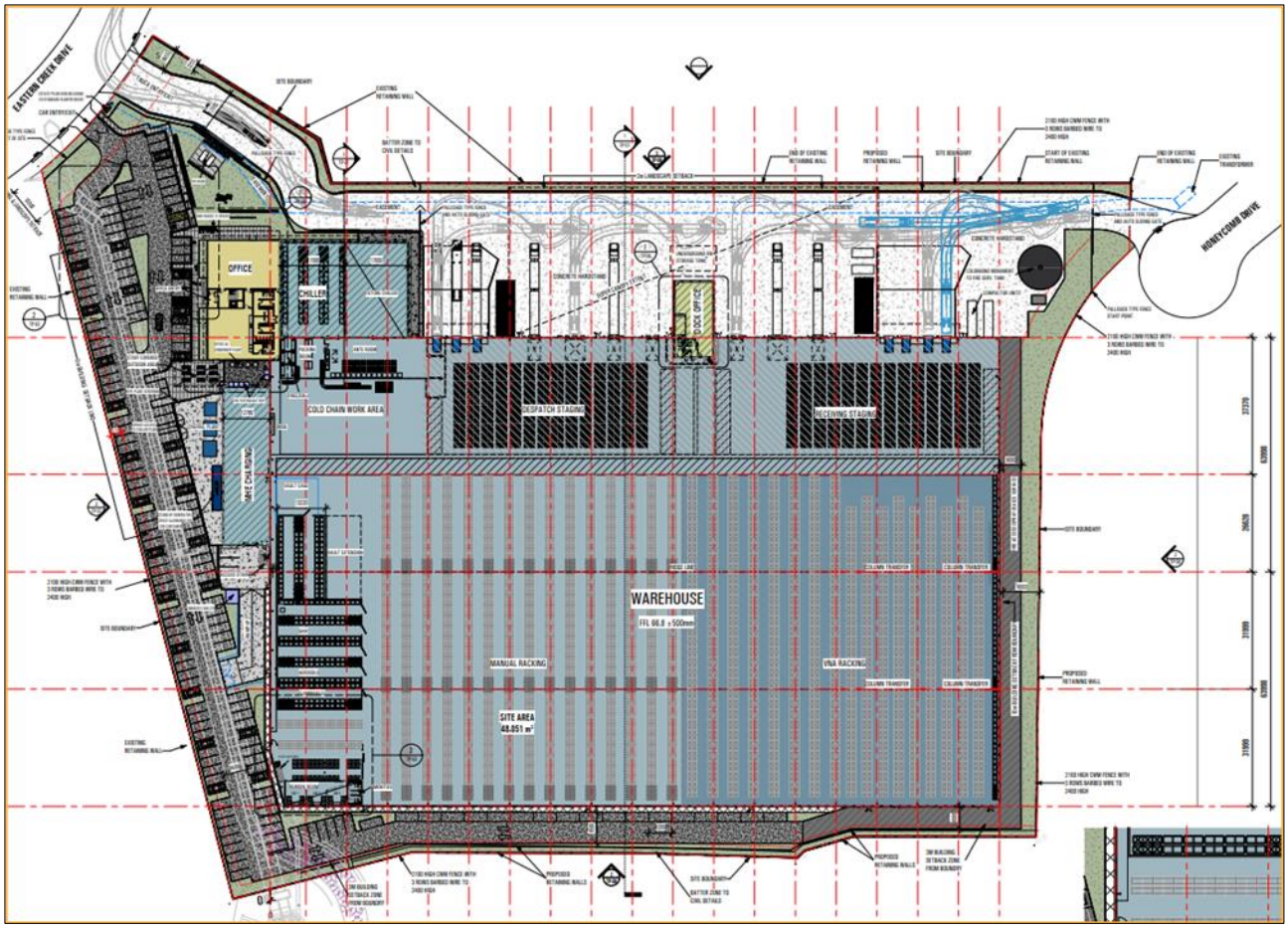

Figure 1: SSD Proposal

2 The Site

2.1 Site Location

The Site is comprised of a single Lot (refer to **Table 1**) and is located at Eastern Creek Drive, Eastern Creek.

TABLE 1: SITE DESCRIPTION

Address	Title	Area (Ha)
Lot 1	Lot 1 / DP 1274322	4.81

The Site is shown in its sub-regional context in **Figure 2**.

Currently, the site has access points onto Eastern Creek Drive. Eastern Creek Drive connects to Old Wallgrove Road, to the south of the Site. From Old Wallgrove Road, access is available east to the Westlink M7 Motorway, and Wallgrove Road; subsequently leading to the M4 motorway and Great Western Highway to the north.

2.2 Road Network

Key roads in the vicinity of the Site are shown in Figure 2 and summarised below:

TABLE 2: ROAD NETWORK

Road Name	Jurisdiction	Road Classification	Number of Lanes	Speed Limit
Eastern Creek Drive	Council	Local Road	2 undivided	50km/h
Wonderland Drive	Council	Local Road	2 divided	50km/h
Honeycomb Drive	Council	Local Road	2 divided	50km/h
Old Wallgrove Road	TfNSW	Collector Road	4 divided	80km/h
Wallgrove Road	TfNSW	Collector Road	4 divided	70km/h
Westlink M7 Motorway	TfNSW	Arterial Road	4 divided	100km/h
M4 Motorway	TfNSW	Arterial Road	8 divided	100km/h

Further to the above, it is clear that the Site is well located in regard to immediate access to the local and sub-regional road network. **Figure 3** shows the Site context with specific reference to the current TfNSW Restricted Access Vehicle (RAV) routes, which allow for up to 25m/26m B-Double combinations.

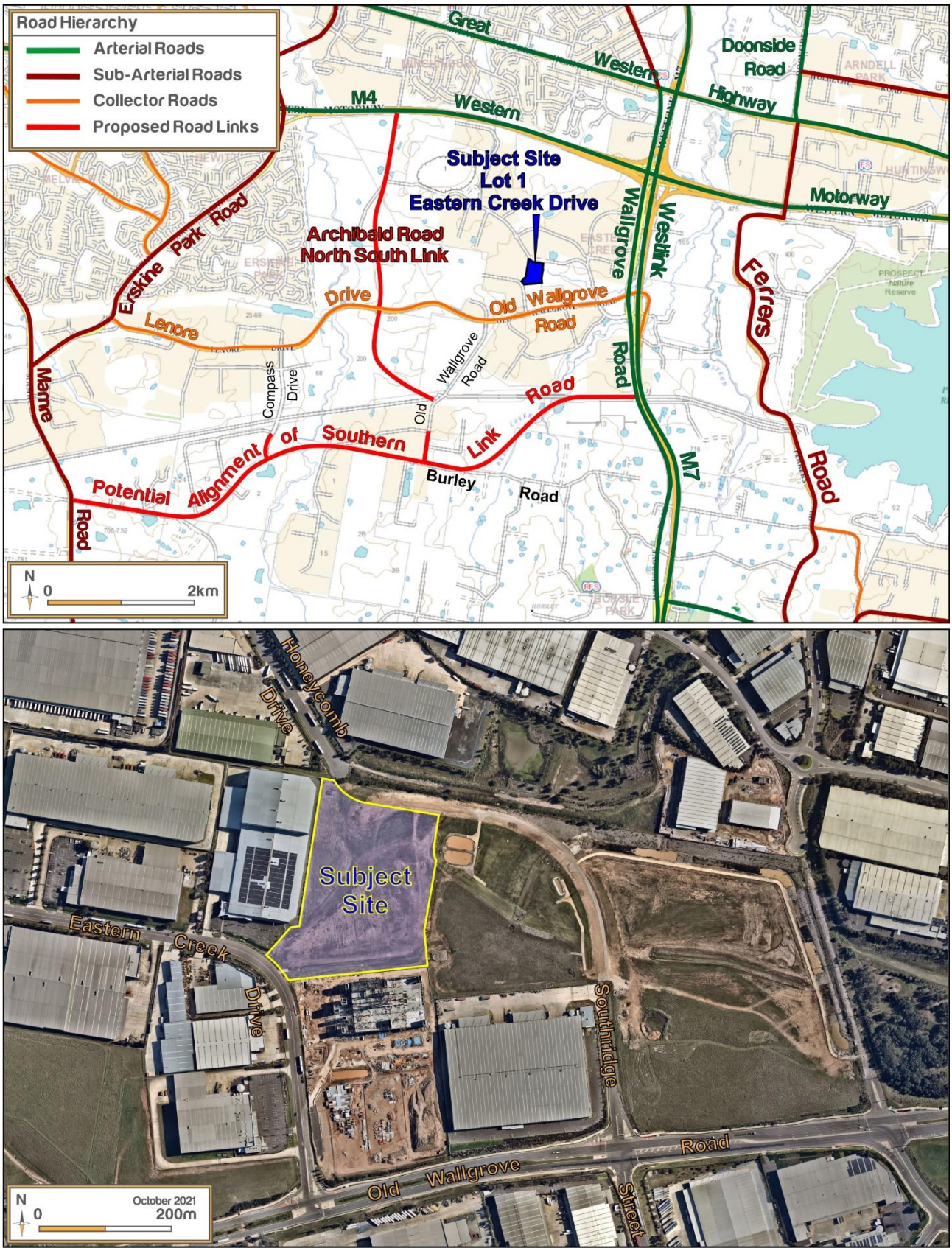

Figure 2: Site context and Road Hierarchy

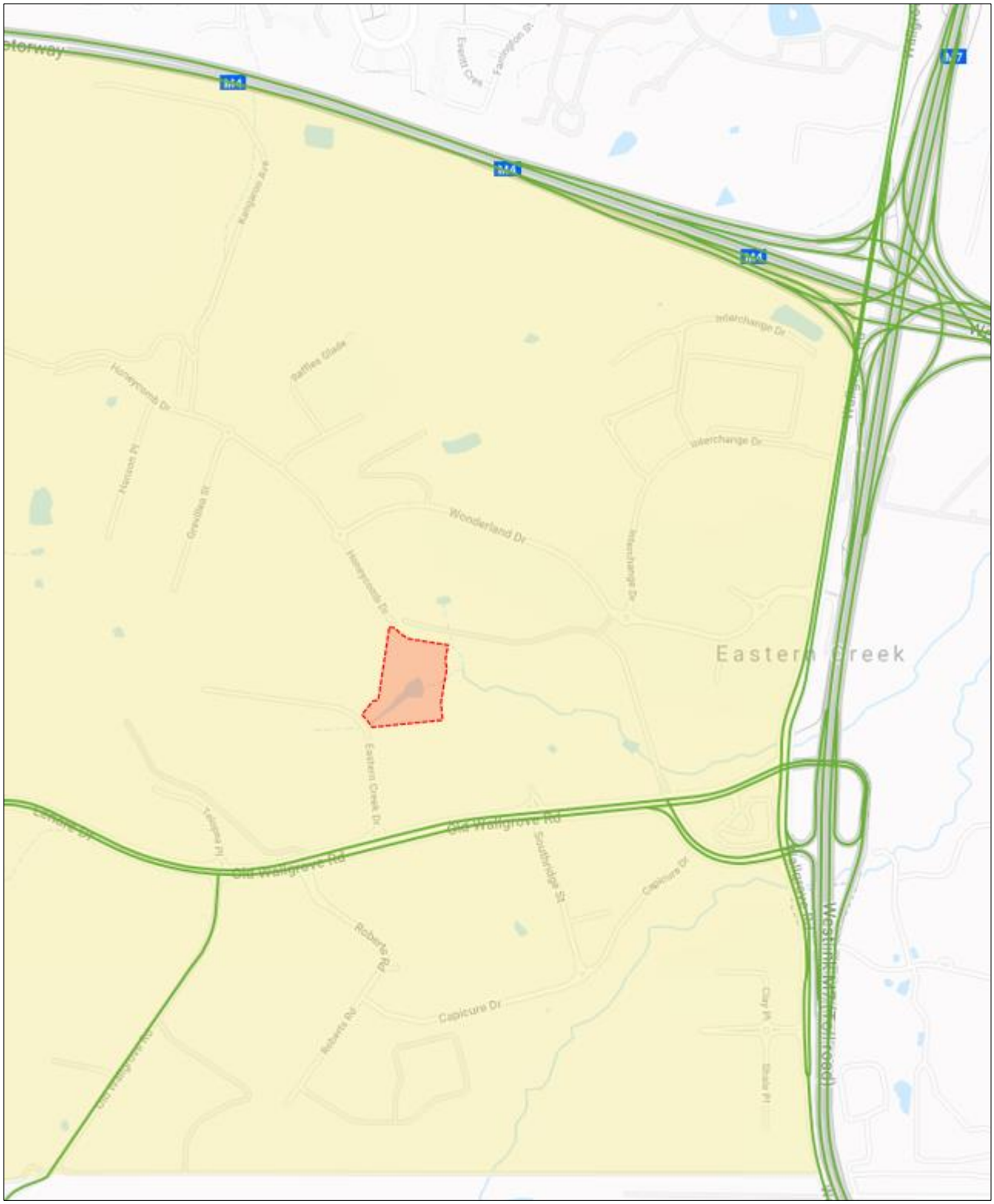

Figure 3: TfNSW Approved 25/26m B-Double Routes

3 Overview of Construction Works

3.1 Staging and Duration of Works

While there is no Contractor engaged for the project, the staging and duration of works has been based on similar developments in the wider area, for the purposes of the Prelim CTMP. Based on this, it is anticipated that construction works for the preliminary stages would commence in mid-2022 and be completed over a duration between 1-2 years, subject to authority approvals and inclement weather delays.

The following summarises key aspects of the construction phases:

- Demolition works are anticipated to have a duration for 6-10 weeks.
- Excavation activities would continue for 6-12 months.
- General Construction works are estimated to continue concurrently to excavation activities for 12 months.

3.2 Construction Hours

The type of work being undertaken will remain consistent throughout the duration of construction and associated activities. All works are expected to be undertaken within the following hours:

- Monday to Friday (other than Public Holidays): 7:00am – 6:00pm.
- Saturday: 8:00am – 1:00pm
- Sunday & Public Holidays: No works to be undertaken.

Any work to be undertaken outside of the standard construction hours will be required to obtain an Out of Hours (OOH) approval; any such works would necessarily be undertaken in accordance with the appropriate OOH protocols and approval processes.

3.3 Site Access

3.3.1 Construction Vehicle Access

All construction vehicles will enter and depart the Site from / to Eastern Creek Drive by way of Old Wallgrove Road to the south of the Site.

It is anticipated that the largest vehicle accessing the Site would be a 19.6m Truck & Dog combination.

The following **Figure 4** shows the indicative Site access location and **Figure 5** details the likely key access strategy into the routes between the Site and the regional road network.

Figure 4: Indicative Vehicle Access Plan

3.3.2 Emergency Vehicle Access

Emergency vehicle access to and from the Site will be available at all times while the Site is occupied by construction workers; emergency protocols during the works will be developed by the Project Manager for inclusion within the final CTMP.

3.3.3 Pedestrian Access

There are currently no pedestrian facilities or footpaths along Eastern Creek Drive adjacent to the Site. However, the grassed verge on both sides of the road remains usable for any pedestrian that may wish to use it.

Further to the above, while there is no expectation of pedestrians crossing the future construction access road, pedestrian safety will be managed through the provision of appropriate signage and pedestrian barriers. Construction personnel will also be able to access the Site by foot via a secure access gate along the access road, though with all construction staff (and vehicle) parking to be provided within the Site there is again little potential for such pedestrian demand.

3.4 Construction Vehicle Access Routes

As discussed, all construction vehicles will enter and exit the Site via Eastern Creek Drive.

It is anticipated that all heavy vehicles will access Site via the following routes:

- Arrival Trips:
  - Route 1: From Wallgrove Road, westbound along Old Wallgrove Road and right into Eastern Creek Drive, continue along Eastern Creek Drive and right into the Site.
  - Route 2: From Westlink M7 Motorway, westbound along Old Wallgrove Road and right into Eastern Creek Drive, continue along Eastern Creek Drive and right into the Site.
  - Route 3: From M4 Motorway, southbound along Wallgrove Road, right into Old Wallgrove Road and right into Eastern Creek Drive, continue along Eastern Creek Drive and right into the Site.
- Departure Trips:
  - Route 1: From the Site, left onto Eastern Creek Drive, then left onto Old Wallgrove Road then left to travel north or right to travel south on Wallgrove Road.
  - Route 2: From the Site, left onto Eastern Creek Drive, then left onto Old Wallgrove Road then right onto Westlink M7 Motorway to travel south, or right onto Mini Link Road and left onto Westlink M7 Motorway to travel north.
  - Route 3: From the Site, left onto Eastern Creek Drive, left onto Old Wallgrove Road, then left to onto Wallgrove Road, turn left to continue west or turn right to continue east on M4 motorway.

These routes are shown in **Figure 5**.

A copy of the approved routes will be distributed by the Project Manager to all drivers as part of their induction process.

In the event that an oversized or over-mass vehicles is required to travel to and / or from the Site, a permit from TfNSW and / or the National Heavy Vehicle Register (NHVR) will be required prior to arrival to the site. Notwithstanding, this CTMP relates to general construction which does not seek the use of oversize vehicles; a separate application would be submitted if such access is required.

3.5 Fencing Requirements

Security fencing will be erected along the entire boundary of the Site and will be maintained for the duration of the construction works to ensure that unauthorised persons are kept out of the Site. The fencing will either be ATF or 2.4m chain wires.

Site access gates would be provided at the access driveway which would remain closed at all times outside of the permitted construction hours.

3.6 Materials Handling

All material loading will be undertaken wholly within the Site, and all construction equipment, materials and waste will similarly be strictly kept within the Site.

While not anticipated, should any materials handling (or other constructed related activity) be required from the public roadway (i.e. Eastern Creek Drive or Honeycomb Drive) then prior approval shall be sought and obtained from the appropriate authorities.

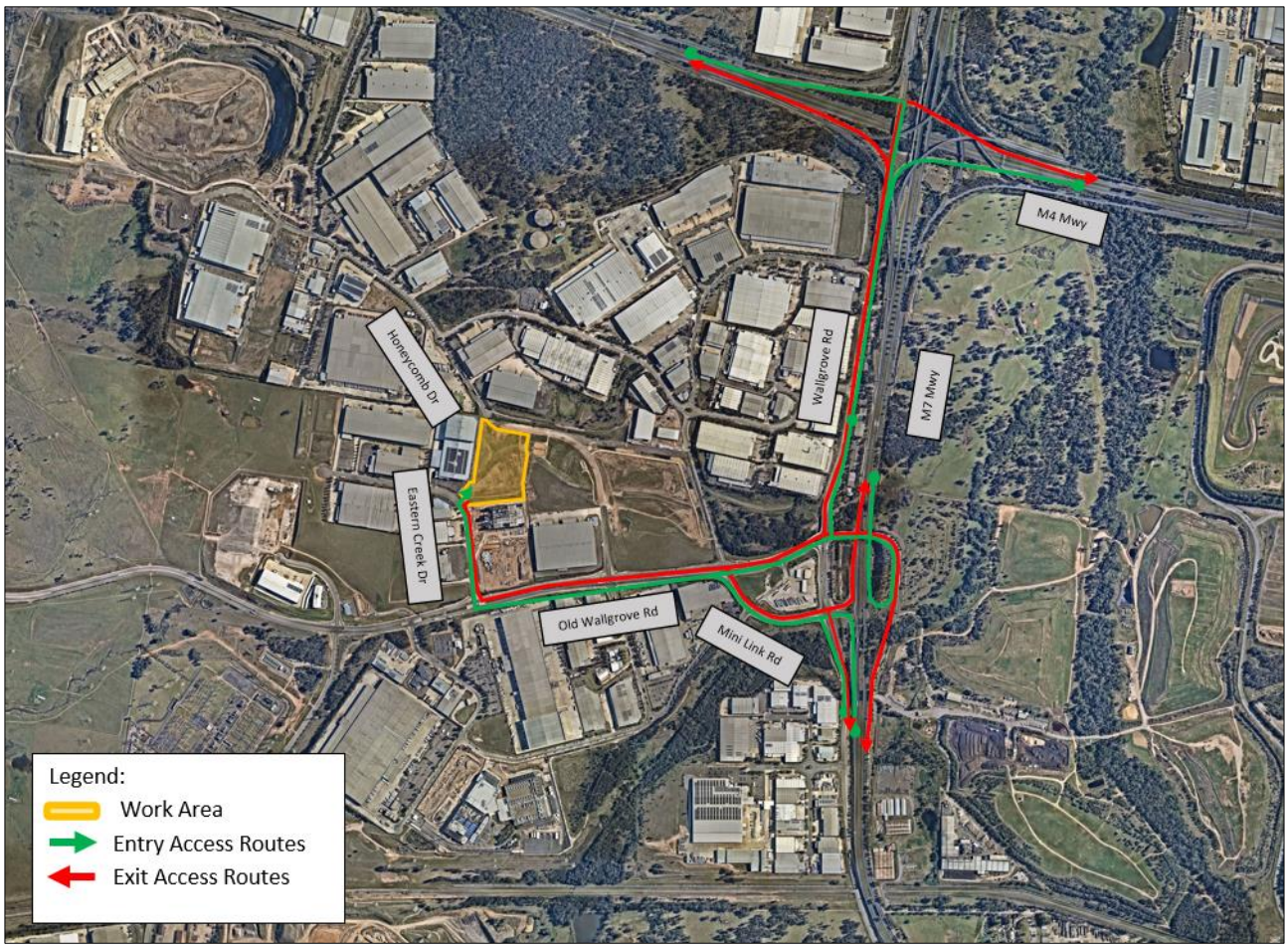

Figure 5: Construction Vehicle Routes

3.7 Additional Site Management

Although it is not expected, in the event that any Site construction traffic management outside of that described in the implemented CTMP is required, the Project Manager will be required to notify adjacent properties of any temporary traffic restrictions (or the like) at least fourteen (14) days in advance.

3.8 Road Occupancy

It is anticipated that some road occupancy will be required to facilitate construction of site access crossovers.

Road occupancy permits will necessarily be procured prior to starting construction works, while a detailed site-specific Traffic Guidance Scheme (TGS) would be prepared in consultation with Council and TfNSW to ensure traffic along Eastern Creek Drive would continue to operate adequately during any such occupancy period.

4 Assessment of Traffic & Transport Impacts

4.1 Construction Vehicle Traffic Generation

4.1.1 Heavy Vehicles

In lieu of a Contractor being onboard at this early stage, the specific construction requirements are not fully understood. Therefore, this section will need to be updated prior to implementation of the future CTMP. However, for the purposes of this assessment it is anticipated that the SSD Proposal would generate less traffic volumes than the Proposal itself once operational.

4.1.2 Light Vehicle Movements

With respect to the potential impacts of light vehicle traffic, the overwhelming majority of trips would occur in the short workforce arrival and departure periods, being (based on the proposed construction hours) 6:30am – 7:00am and 6:00pm – 6:30pm respectively; as such, any light vehicle movements would occur outside of the existing (commuter) peak periods in the local network. while unknown at this stage, it likely that a Site of this size could require up to a maximum of 50 staff onsite at any one time.

4.2 Vehicle Management

4.2.1 Principles

In accordance with TfNSW requirements, all vehicles transporting loose materials would have the entire load covered and/or secured to prevent any large items, excess dust or dirt particles depositing onto the roadway during travel to and from the Site.

Further to covering/securing the load to prevent deposits onto the roadway, a Shaker Grid is proposed and installed at the point of vehicle egress to minimise the risk of dirt tracking out onto Eastern Creek Drive.

4.2.2 Construction Staff Parking

All construction staff and contractors will be required to park wholly within the Site, noting that there will be significant area available (at all times) to meet the peak parking demand.

5 Traffic Control

5.1 Traffic Control

The RMS guide “Traffic Control at Worksites” (TCAW) manual contains standard traffic guidance schemes (TGS) for a range or work activities. The manual’s objective is to maximise safety by ensuring traffic control at worksites complies with best practice.

The RMS TCAW outlines the requirements for a Vehicle Movement Plan (VMP) for construction works such as proposed; a VMP is a diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream. A VMP should also show travel paths for trucks at key points on routes remote from the work site such as places to turn around, accesses, ramps and side roads.

Regarding construction work on roads with an average daily total (ADT) in excess of 1,500 vehicles, approach speeds of between 60 km/hr and 80 km/hr, with truck movements > 20 veh/shift, and sight distance is less than 2d, (where d equals the posted speed limit and in this instance the sight distance is required to be up to 120 metres), it would be expected for the following to be required by the RMS TCAW:

- A detailed Traffic Control Plan (TCP) with Traffic controllers.
- A VMP.
- Warning Signs required during shifts.

5.2 Authorised Traffic Controller

An authorised Traffic Controller(s) is to be present on-site throughout the proposed works. Responsibilities of the Traffic Controller will include:

- The supervision of all construction vehicle movements into and out of site at all times,
- The supervision of all loading and unloading of construction materials during the deliveries in the construction phase of the project, and
- Pedestrian management, to ensure that adverse conflicts between vehicle movements and pedestrians do not occur, while maintaining radio communication with construction vehicles at all times.

6 Monitoring & Communication Strategies

6.1 Development of Monitoring Program

The development of a program to monitor the effectiveness of this CTMP shall be established by the Project Manager and should consider scheduled reviews as well as additional reviews should construction characteristics be substantially changed (from those outlined in the Final CTMP). All and any reviews of the CTMP should be documented, with key considerations expected to include:

- Tracking heavy vehicle movements against the estimated heavy vehicle flows during the works.
- The identification of any shortfalls in the CTMP, and the development of revised strategies / action plans to address such issues.
- Ensuring that all TGS 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 to ensure all loads are departing the Site covered as outlined within this CTMP.

6.2 Communications Strategy

A Communications Strategy shall be established by the Project Manager for implementation throughout the construction works; this strategy will outline the most effective communication methods to ensure adequate information within the community and assist the Project Team to ensure the construction works have minimal disruption on the road network. The Communications Strategy will include:

- The erection of appropriate signage providing advanced notice of works and any traffic control measures to be implemented.
- Written notices to surrounding landowners (and tenants) likely to be directly affected by the works, prior to commencement.

Ongoing communication is also required so that all stakeholders are kept up to date of works and potential impacts.