MOOREBANK

LOGISTICS PARK

MOOREBANK PRECINCT WEST

STAGE 2

URBAN DESIGN DEVELOPMENT REPORT

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1.1 EXECUTIVE SUMMARY

The Moorebank Precinct West 2 represents a milestone in the development of SIMTA's Moorebank Logistics Park, a logistics and warehousing facility which will act as a key component of the future of NSW logistics and freight transport, reducing demand for containerised freight via road, creating jobs and related economic benefits in South-West Sydney, and reducing industry carbon emissions.

This Urban Design Development Report aims to establish a set of detailed objectives and indicative design parameters, performance benchmarks and minimum standards for the development of the site, creating a facility which is efficient in its intended operations while responding to local and regional requirements, including the amenity of neighbouring residential areas. The development will integrate into surrounding land uses and existing developments through use of considered structures and design, the existing landform and vegetation, to create a facility that is not only a vital infrastructure link, but is also an employment generating, functional and environmentally sustainable amenity that serves the broader community.

These objectives will be achieved by, where possible, incorporating best practice ecologically sustainable design initiatives, water sensitive urban design including water storage and reuse, urban heat island mitigation strategies, landscape design sympathetic to the surrounding vegetation, as well as a range of passive and active measures employed in the design of buildings and logistics operations.

This report has been compiled to support the design in accordance with the Conditions of Consent, as set out in the approved Development Application (SSD 7709) issued by the Independent Planning Commission, as required under Condition B52. Compliance with the conditions will result in a development that will showcase industrial architecture and logistics design, coupled with leading technology and sustainable initiatives, unified by high quality urban and streetscape elements set around a considered and consistent framework of appropriately proportioned buildings, public domain and extensive landscaping.

FIGURE 1.1 - Regional Context Plan
1.2 BACKGROUND

Reid Campbell have been appointed by SIMTA to develop an Urban Design Development Report for the proposed Moorebank Intermodal Terminal Facility Development.

This report has been developed to address and provide detailed objectives for the design and operations of the development and define place specific Urban Design Principles, incorporating those outlined in the conditions of consent, specifically responding to the key issues:

- B48 – Urban Heat Island Mitigation
- B49 – Ecologically Sustainable Development (ESD)
- B57 – Landscape Design

The design documentation included as part of, and supporting, this report has been prepared at a concept stage, per Condition B54.

The Project site is centred on an approximately 220 hectares (ha) area of Commonwealth-owned land previously occupied by the Department of Defence School of Military Engineering (SME) and other minor Defence units. The Project site is adjacent to the Southern Sydney Freight Line (SSFL), the East Hills Rail Line, the M5 Motorway and Moorebank Avenue.

The Project involves the development of an intermodal freight terminal facility at Moorebank in south-west Sydney, linked to the interstate rail network. The Project includes associated commercial infrastructure (warehousing), a rail link connecting the Project site to the (SSFL) and road entry via a connection point to Moorebank Avenue. The Project proponent is Sydney Intermodal Terminal Alliance (SIMTA).

An Intermodal Terminal (IMT) is a location for the interchange of freight between one mode of transport and another. The Project is intended to interchange freight between road and rail, and service freight movements to and from Sydney’s west and south-west.

Sydney’s need for additional interstate IMT infrastructure is driven by the following:

- Continued strong growth in containerised freight, with throughput at Port Botany, a critical gateway for the movement of national freight, forecast to increase by 72.4% by 2032-33 (BITRE, Containerised and non-containerised trade through Australian Ports to 2032-33, December 2014), creating a bottleneck. As a result, more freight needs to be moved to and from Port Botany by rail;
- Capacity constraints within the current and planned IMT network in Sydney as well as limited land zoned and service land available for the development of industrial facilities in the greater Sydney region;
- Heavy road congestion around Port Botany and on the M5 Motorway, which is projected to worsen with the anticipated growth in freight, creating high social and environmental costs for the state.

The above issues are expected to have significant economic and environmental impacts associated with road congestion in the Sydney GMA (Greater Metropolitan Area), and will add substantial costs to the national and regional freight supply chain. The Moorebank IMT would handle a significant proportion of the expected growth in containerised freight, including increased rail freight, thereby responding to and alleviating Sydney’s increasing road congestion, particularly along the M4 and M5. The Project is well located, considering two-thirds of container freight from Port Botany is bound for Western Sydney.

The project includes development of warehousing facilities adjacent to the IMT site, enabling immediate packing and unpacking of containers, and loading onto road vehicles and interstate freight rail for dispersion, improving the efficiency of the logistics supply chain for locally destined goods, thereby supporting the cost competitiveness of rail transport against road.

Overall, it is envisaged the Project would boost the role of the national rail freight network’s role in moving goods through the Sydney region, with potential
The Development is expected to act as a strategic contribution to the Greater Sydney metropolitan area, generating a number of economic, social and environmental benefits for the community and economy, of which the key strategic urban design benefits are:

1. The removal of heavy vehicles from the inner-urban area of Greater Sydney and a corresponding improvement in the urban environment.
2. Improved ecological biodiversity and water way health of a valuable Green Grid connection along the George’s River.

These key strategic urban design benefits are further aided by the following social, environmental and economic benefits which act as drivers for the development:

**Social**
- Reducing road traffic and associated noise along key road freight routes between Moorebank and Port Botany and interstate;
- Creation of jobs locally within the fast growing South-West Sydney district;
- Reduced costs associated with road damage, congestion and accidents;

**Environmental**
- Reduced road congestion: up to 3,000 fewer truck journeys every day once the terminal is operating at capacity, equating to 1.05 million less truck journeys per year, with an estimated annual abatement of more than 110,000 tCO2 in transport-related emissions, by moving freight by rail rather than road;
- Projected reduction in greenhouse gas emissions of over 2.4 million tCO2-e over forty years (based on a comparison of a “No Build” and “Tier 2 Improved Efficiency” Scenarios);
- The installation of a 12-30MW solar array to warehouse roofing (across both East and West precincts), reducing operational energy costs, as part of the Clean Energy Finance Corporation investment agreement;

**Economic**
- $11 billion in economic benefits over a 30-year operational period for the Project, including $120 million a year for the South-Western Sydney economy, through improved productivity, reduced operating costs and job creation;
- Enabling the efficient movement of freight around Australia, considering expected growth of interstate freight;
- 6,800 jobs created, between construction and long term operation of the facility.

The development of the Project is intended to increase intermodal capacity in Sydney, and would have a number of flow-on benefits across the freight sector and the NSW economy. By providing increased intermodal capacity in Sydney, it is envisaged the unit costs of transporting containers by rail for these markets would be reduced, and this would lead to an increase in the share of freight movements by rail.

The Project, by providing increased intermodal capacity in South-Western Sydney and increasing the share of freight movement by rail, creates a number of benefits and key contributions for the local community, freight sector and state economy. This Document aims to outline the Urban Design strategies that are synonymous with these philosophies wherever achievable.

**1.5 COMPLIANCE MATRIX**

Refer to the Table of Compliance Matrix (Appendix 4.1) for conditions of consent and where these can be found in relation to relevant documentation.
URBAN DESIGN DEVELOPMENT REPORT
CORE DESIGN PHILOSOPHIES
2.1 CONCEPT MASTERPLAN

The vision for the SIMTA design is intended to shape the planning, design and management of the future development, including all components of the Intermodal Terminal Facility described in section 1.1. The broad vision of the SIMTA design is to:

- Develop an IMT that is a vital infrastructure component for Sydney’s future economic and productivity growth, connected through a well-considered Rail Link to the Southern Sydney Freight Line (SSFL);
- Develop an intelligently designed built-environment, providing a high-quality employment zone to attract businesses and job creating industries, incorporating best practice design and sustainability measures, creating a strong integration with adjacent industry, land use, and the local community;
- Create an employment area with adjacent naturally vegetated areas that will respond to the Sydney Green Grid, that also has a strong urban character and sense of place;
- Encourage visual and access links to allow integration with existing local industrial areas and other land uses;
- Manage the water cycle and incorporate Water Sensitive Urban Design principles and practices where possible, to mitigate impact and improve amenity of Georges River as part of Sydney’s Hydrological Grid;
- Incorporate best practice environmental planning and design, particularly techniques for conserving the consumption of energy and water in all buildings, ancillary facilities and operating structures, including the control and/or mitigation of noise and emissions;
- Provide visual connections between public domain and vegetation/ground-corridors;
- Provide a high level of safety and security to the development as well as the community populating surrounding lands;
- Create a well-connected and legible street network;
- Incorporate quality development where businesses enjoy high levels of accessibility and are supported by an attractive public domain and amenity that is functional, pedestrian friendly and efficient; and
- Encourage the provision of transport links.

FIGURE 2.1 - MPW Masterplan overlay on satellite image of site

FIGURE 2.2 - MPW site analysis sketch displaying building siting, and ventilation corridors along warehouse frontages.

FIGURE 2.3 - MPW access strategy

FIGURE 2.4 - Landscape and ecological corridor diagram.
2.2 (B48) URBAN HEAT ISLAND MITIGATION

The development will be designed and operated to assist in meeting Urban Heat Island Mitigation principles and achieve a decrease in overall site temperature in comparison to neighbouring industrial developments.

The Urban Heat Island (UHI) effect refers to heat generated from building materials absorbing the sun’s heat and radiating this heat amongst the surrounding area.

SIMTA’s Urban Heat Island Mitigation Strategy (UHIMS) has been developed for the entire MPW Stage 2 site. A more detailed UHIMS report has been prepared by Integral Group, dated 21.11.2019, which is available in Appendix 4.4.

Design Vision

Through considered design initiatives the development aims to reduce overall site temperatures in comparison to neighbouring industrial developments, reducing electricity consumption and increasing worker and public amenity via environmentally efficient means. This Project aims to contribute to State-wide objectives of cooling the Western Sydney via a combination of landscaping design, cool building technologies and methodologies of design.

Design Principles

The general principles included in Integral Group’s UHIMS report are:

• Ample shade tree planting and vegetation ground cover;
• Use of ‘cool’ building and paving materials with high albedo surfaces;
• Green spaces;
• Energy efficient building design (4-star Green Star equivalent);
• WSUD – Refer to Section 3.9.

The Urban Heat Island Effect is a major concern for all significant developments, as it can drastically increase operating costs and reduce amenity. The Urban Heat Island Mitigations Strategies, as shown in Integral Group’s UHIMS Report, will achieve a reduction in ground temperature of 4°C, compared to neighbouring industrial developments, complying with condition B48.

Flood Plot Data Interpretation (Refer Figure 2.6)

Flood plot charts have been used by Integral Group to display the comparison between air temperatures of two scenarios per chart (see Figure 2.6). The charts show the temperature at each hour of every day during the year of the first scenario, relative to the second scenario – acting as a control. When the hour is coloured blue, this represents a cooler temperature for the first scenario, while a red colour represents a warmer temperature. The more blue seen through the middle of the chart (6am-6pm) the cooler the first scenario (in this case, the MPW site) is in comparison to the second scenario.
2.3 (B49) ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Australia’s National Strategy for Ecologically Sustainable Development (1992) defines ecologically sustainable development as: ‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’.

Design Vision

The Project will utilise ESD principles throughout the development life-cycle through integration of economic, environmental and social considerations in project decision making. Well designed and planned buildings, promotion of energy efficient equipment, sustainable practices and operations, and intelligent waste minimisation and recycling will combine to reduce energy and resource consumption within the development.

Design Principles

**Passive solar design**
- Where layout planning permits, building orientations have been designed to utilise considered solar access principles;
- Warehouses have been orientated where feasible with the overall development requirements to face internally, mitigating noise pollution, and with roofs oriented to support solar capture from the Northern sun;
- Office buildings will be designed and orientated where feasible and reasonably practicable to take advantage of Northern solar aspects;
- Building design will aim to incorporate overhanging eaves and awnings to reduce midday sun penetrating the building to reduce UV and heat absorption, whilst allowing the winter sun to and warm the building;
- Warehousing will utilise similar principles where feasible and reasonably practicable, via initiatives such as cooling through cross ventilation (as per below) and balancing of openings to promote air flow;
- Use of awnings for shading and cooling of working spaces and protection of openings from harsh weather. See Figure 2.9 for shading installed at the Moorebank Eastern Precinct.

**Use of energy efficient plant and equipment**
- To be compliant with SIMTA’s internal Environment Management System’s Plan;
- Will be addressed in more detail per tenant requirements.

**Use of renewable energy sources**
- Solar panels are to be installed for the warehouses where feasible and reasonably practical, with a minimum coverage of 30% of roof surface area being sought;
- The solar panels will be visually unobtrusive, likely to be installed on the available roof space of the warehouses;
- See Figure 2.8 for an example of these installations at the Moorebank Eastern Precinct.

**Cross-ventilation**
- Cross ventilation will be an objective of the site layout via promotion of open spaces between buildings, permeable facades (openings and vents) and select orientation considerate of overall site layout (see Figure 2.7).

**Selection of materials with lower energy manufacturing requirements where feasible and reasonable, including recycled materials.**
- Co-located concrete crushing plant to reuse demolished materials as aggregate;
- Consideration made to low embodied energy materials as part of the CEFC agreement;
- As part of the Sustainability Initiatives of the CEFC Agreement, material substitution and composition may result in savings of up to 500,000 tonnes of concrete and 55,000 tonnes of steel (Arcadis, MLP Sustainability Strategy Summary Report, 14 July 2017);
- Long span timber, as a structural material, was considered to replace steel in some instances, however was determined as not viable due to engineering deficiencies created at the scale of the development and the intensive operational requirements imposed by the industrial use.

**Use of locally sourced materials to reduce impacts associated with transport where practicable.**
- Importation of site fill from local sources as an environmentally sustainable initiative (e.g. Westconnex Projects circa 20km distance) is an improvement to the base case (e.g. quarry sourced fill, typically approximately 100km).

**Rainwater capture and reuse**
- All buildings are to be provided with water recycling and reuse tanks;
- Stormwater collection, on-site detention systems and overland flow paths to mitigate on-site and localised flooding as per engineer’s specifications and requirements under the consent.

**Water efficient fixtures and fittings promotion**
- All tap fittings and irrigation systems to be fitted with efficient tap fittings to help minimise water use throughout the development where possible.

**Waste minimisation and recycling**
- Working with end users to promote and develop best practice in their operations.

**Remediation**
- The development reinstates previously contaminated Defence land, and reconstitutes it for industrial and commercial uses, generating employment and environmental benefits.

**Green Star Certification**
- Warehouse design, construction and operation to utilise energy efficient building design (4-star Green Star equivalent).

**ISCA Certification**
- The development will register for a ‘design’ and ‘as-built’ rating under the Infrastructure Council of Australia (ISCA) rating tool for development infrastructure.

[FIGURE 2.8 - Solar Panels installed at development East Warehouse 1. Alone, this installation generates 4,800MWh per year, or the equivalent of powering more than 7,300 homes.]

Ecologically Sustainable Development is a key component of an efficient and sustainable development. The ESD principles outlined above will have a major impact on the future of the development, and will help it to perform as an example of sustainable industrial design through reduced energy and resource consumption during construction and operation.
2.4 (B57) LANDSCAPE DESIGN

The landscape philosophies for the design have been developed by Groundlink Landscape Architects in response to the Conditions of Consent, and this report should be read in conjunction with their design information. Detailed Landscape Drawings and Design Report at Appendix 4.3.

**Design Vision**

SIMTA's development recognises the existing natural landscape attributes of the site and surrounding area and seeks to integrate components of the development to improve and enhance these where possible.

The key provisions of the Site's landscape design are:
- Provide for visitor and worker amenity;
- Visually integrate the built form with the existing waterways and bushland;
- Integrate the existing ecology with the stormwater system design set out in the revised stormwater design drawings (condition B4);
- Mitigate the visual impacts of buildings and infrastructure through urban tree canopy provision;
- Provide a working environment safe from projected flood levels.

**Design Principles**

**Native Species**
- Use of native species to blend proposed landscaping in the development with that of the existing area;
- Promote native fauna natural habitats;
- Blend the site into the surrounding bushland;
- The Southern fill area will be topsoiled and hydro-seeded with native grasses.

**Interconnected Greenways**
- Cycle paths and walkways connecting workplaces through public space to recreational areas and bushland.

**Green Streets**
- Tree planting and landscaping along roads, further detailed in Section 2.4;
- Linking landscape features to bulk form creating a uniform development and considered urban environment that integrates with the landscaping.

**Urban Tree Canopy**
- Providing planting of canopy trees as per conditions B4 and B8(b);
- Utilising canopy trees to mitigate visual impacts of buildings and infrastructure.
- Landscaped areas, including canopy trees, between loading docks were considered as part of the design to further integrate the warehouses and landscaping. However due to the operational nature of the development, and industry standard tenant safety requirements for employees, assessments found this not to be a viable strategy and therefore have not been included. The project's expert landscape consultants have instead focused on implementing quality landscaping that avoids insularity and tokenistic approaches to integration, promoting quality and connectivity instead.

The development is located within Sydney's South-West Green Grid District, and though the site is not included as part of any priority precinct, the design is intended to support connection of the Eastern side of the George's River to the potential focus area of the Casula foreshore link, providing an improved amenity connection for the greater South-Western Sydney area.

The landscape design serves to integrate the development with the surrounding environment by using tree, shrub and groundcover species that are local to the area to create ecological opportunities and links to the surrounding context, and providing amenity for both users and neighbouring residences. The proposed tree planting has been designed with the intent of creating a uniform canopy cover throughout the area. Proposed plant species have been selected for their site-suitability with many species selected from Liverpool City Council's recommended plant list.

**Inclusion of OSDs**

The design seeks support from the Independent Peer Review for condition B8(f) with regards to On-Site Detention basins, and their exclusion from landscape calculations. The design intends to include OSD-5 within these calculations given its proximity, adjacent the relevant warehousing area included in this application, and presents the following benefits as a result:
- Being included within landscape calculations, the OSD will have to adhere to the same conditions and requirements;
- Increased treatment in the form of trees and planting will improve visual amenity, allowing the OSDs to act as a visual buffer to neighbouring sensitive receivers;
- Integration of the biodiversity area ecological corridor with the development as a public amenity through quality landscape treatment.

OSD-3, 4, 6 and 8 do not contribute directly to the amenity and landscape integration of the MWH Stage 2 warehouse area, and as such shall be considered in subsequent stages of development, where co-located with areas relevant to urban amenity.

**PLANT IMAGES**

**FIGURE 2.10 - Preliminary landscape concept design sketch - OSD and outlet in foreground.**

**FIGURE 2.11 - Selection of local plant species to be included in landscape treatment (Ground link).**

**FIGURE 2.12 - Preliminary design sketch of landscape bays within meandering path.**
3.1 INDUSTRIAL DEVELOPMENT & INTERMODAL TERMINAL

The overarching purpose of the development is to produce an IMT with associated commercial infrastructure. The industrial developments will be reserved for tenants with high levels of import/export of goods. These warehouses will be serviced by separate access roads, reducing overflow to the precinct internal roads.

Design Vision
- An attractive site comprised of buildings with high level architectural treatment, creating a better place to work and utilise;
- Using intelligent design, reduce the bulk and massing of industrial buildings, thereby providing a high level of user and environmental amenity within the site;
- Reduce congestion inefficiencies on Sydney’s arterial roads and motorways;
- An accessible, legible and connected industrial site.

Design Principles
The development is currently at a concept stage of design, and is subject to tenant refinements. The Design Principles listed throughout this document will guide the prospective design teams to realise the vision for the development.

Parking
The warehouse and office land uses have been designed to allow for the following parking requirements, which are outlined in the EIS and align with Roads and Maritime recommendations:
- Warehouse – 1/300m²
- Office – 1/40m²
- Retail – 1/20m²

Car parking will include landscape bays every 6-8 bays, or alternative carpark landscaping (such as linear planting between rows of car parking) to provide adequate shade, as required under Condition B68(c).

Parking is shown indicatively, and detailed design will include compliance with the relevant codes, as listed in Condition B86.

Truck Access
The warehouses, internal road, and access roads have been designed to allow for Super B-Doubles, A-Doubles and commercial vehicles related to the industrial function of the estate, increasing flexibility of use per tenant requirements, and planning for longevity of infrastructure.

Container Wash-Down Facility
The Container Wash-Down Facility has been indicatively located on the Architectural drawings. Detailed design will include compliance with the relevant conditions (B187).

3.2 FREIGHT VILLAGE

A range of ancillary support facilities to meet the needs of employees and visitors are proposed within SIMTA’s site, in an 800m² building and associated parking/landscaping referred to as the ‘Freight Village’.

While these facilities will principally cater for staff and visitors to the intermodal facility, it is intended that they may also be accessible and available to the wider community.

The ancillary facilities are anticipated to include:
- Site management and security offices;
- Retail and business service centre, potentially including a convenience store, bank, and post office;
- Meeting rooms/conference facilities available for hire by individual tenants;
- Sleeping facilities for drivers;
- A café/restaurant.

The composition of these facilities will be based on demand and will be privately operated by individual tenants. The Freight Village will receive architectural treatment which will allow it to stand out as a significant place within the precinct, while also providing a relatable scale to the user, relative to the bulk of the surrounding industrial buildings.

Heritage Items
A selection of heritage items have been identified and recommended for adaptive re-use and reinterpretation on the site (Liberty Industrial, Moorebank Intermodal Terminal: Options for Mitigation Report, 8 December 2016). It is not yet possible to confirm the exact location, orientation or configuration of these items, examples including the STRARCH Hangar and CUST Hut, however it has been considered to re-use, display or reinterpret them in the Freight Village, where they will have maximum exposure to the majority of users of the site.
3.3 STREETSCAPE & PUBLIC INTERFACE

Streetscape design initiatives aim to ensure appropriate scale, placement and character of elements throughout primary interface areas. The streetscape architecture will be developed with a focus on areas of SIMTA’s site that will have a positive impact on the presentation of the overall development. These areas will primarily include the Moorebank Avenue frontage, the main Estate Road, Internal roads, a number of bio-retention basins (where visible), and boundary and buffer zones. Building and built form architecture at key frontages will display high quality architectural treatments.

Design Vision

The streetscape and public interface have been designed in such a way that they align with the principles of the Sydney Green Grid and Greener Places, complemented by the site’s landscape design principles. The streetscape and public interfaces of the development will align with these principles by:

- Maintaining access to open spaces where practical and safe;
- Promoting active living, by providing landscaped cycle ways and walkways;
- Conservation and maintenance of existing natural environments; and
- Utilising OSS’s as visual connectors for the development.

Design Principles

Moorebank Avenue Frontage

- Scale and visual screening, and a buffer zone along the IMT boundary will be a key design considerations which will be addressed primarily through the landscape concept for the Moorebank Avenue frontage as demonstrated in the EIS.
- The site entrance at Moorebank Avenue, for the purpose of facilitating the primary access driveway into the site, includes a variation to the 18m setback, to be agreed to by the Planning Secretary per Condition B63(a) (Refer Appendix 4.2 - PIWW-RCG-AR-DWG-0191 for details).
- The access road wrapping the locomotive traverser has setbacks at the North and South corners of approximately 3.1m and 9.2m respectively, with the traverser itself setback at least 7.2m and 13.2m (Refer to PIWW-RCG-AR-DWG-0191 in Appendix 4.2 for details);
- The locomotive traverser is in-ground infrastructure, which would have little visual impact on the streetscape. Vegetation screening within the landscape area detailed above would further mitigate any possible visual impact.
- To compensate for loss of landscape setback at the Northern end of the IMT, increased landscaping has been applied along the extent of the Eastern boundary to maintain an 18m average, as specified in the MPW Stage 2 - Response to Submissions Report (Arcadia, July 2017) (Refer to PIWW-RCG-AR-DWG-0100/0101 in Appendix 4.2 for details);
- Key nodal points along Moorebank Avenue, specifically at vehicle entry zones will include feature planting to highlight the arrival experience and embellish the native planting character established elsewhere along the road frontage.

Internal Roads (Estate Road and Internal Roads)

- Consistent with the planting proposed to the Moorebank Avenue frontage and the boundary and buffer zones, the proposed landscape design to the internal access road will consist predominantly of endemic canopy trees of Eucalyptus species and uniform dense screen planting of native shrubs and ground covers at lower levels;
- Screening of buildings, shade provisions to pedestrian areas and visual diversity and interest will be paramount in species selection, placement and density.

Bio-retention Basins

- Whilst achieving the primary function for any requirement for water filtration and bio-retention, the planting proposed to the basins are to remain consistent with the overarching site wide objectives of uniform species use, endemic planting character, native landscape language and a variety of experiences and visual amenity from sites across the George’s River.

Boundary Treatment

- The landscape planting proposed to the development boundaries shall be consistent with the endemic surrounding bushland species, evident locally, and in doing so provide a strong and unifying tree canopy structure that links the site holistically and provides the essential scale of planting necessary to compliment the developments built form.

The streetscape and public interface has been designed to align with the Sydney Green Grid and Greener Places documents. Maintaining access to open spaces, promoting landscaped cycle/walkways and maintaining existing natural environments through intelligent architectural treatment and landscape
**3.4 ACCESS STRATEGY & ROAD CONNECTIVITY**

SIMTA’s site has a frontage onto Moorebank Avenue, with primary access provided via an intersection at the location of the existing Anzac Road/Moorebank Avenue intersection.

SIMTA’s design includes a road network that will support the various land uses on the site, including an Intermodal Terminal, Warehouse and Distribution Facilities, and supporting administration, amenity and other general uses in a zone known as the ‘Freight Village’.

The following access strategy has been adopted:
- The Northern access point on Moorebank Avenue will be the key site access. A new signalled intersection is proposed with full access permitting all movements; and
- Access to buildings and facilities within the Western Precinct will be via this intersection and a series of internal roads as described below.

The main access points into SIMTA’s site are proposed to comply with emergency services requirements.

The proposed road network comprises the following:
- Moorebank Avenue Frontage: The major connection to the SIMTA site for vehicular access as well as pedestrian and cyclist entry and exit;
- Estate Road: The major access road into the SIMTA site with a 22m road reserve, including a single carriageway of two dedicated 7m wide traffic lanes, integrated pedestrian and bicycle path and landscape buffer;
- Internal Roads: Service roads for heavy vehicles to access warehouse and distribution facilities with a 14m road reserve and a 3m integrated pedestrian and bicycle path and landscape strip on either side.

As indicated in the Sydney Green Grid and Greener Places documents, interconnecting open spaces and built environments is important for encouraging healthy living and improved working environments. A pedestrian and cycling network will be included in the detailed planning of the site and a provision for shared pedestrian and cycle paths within the Estate Road and Internal Road reserves. Additionally, provision for future connections to the Casula Railway Station via the Estate Road shared cycle path have been considered to promote connectivity to the local area.

The proposed internal road layout has been designed to provide maximum flexibility to lot layouts, simple and safe access to facilities and a coherent and considered hierarchy to integrate with the urban design philosophies of the precinct.
3.5 BUILDING SITING & SETBACKS

A key element in maintaining visual character is the visibility of the development when viewed from the public domain. The streetscape is an important and prominent interface within the development between built form, landscaped areas, open space and the roads themselves. The proposed design principles for building siting and setbacks in this regard have been prepared in consideration of local planning policies and the intended varied nature of uses across the site.

Design Vision

- To define building envelopes within each land use type by specifying minimum setbacks consistent with local planning policy;
- Provide attractive streetscapes and quality landscaped settings around the built form;
- To permit where practical, setbacks to be integrated within landscaped areas, assuming the integration of environmentally sustainable measures and streetscape elements to achieve a satisfactory level of attractiveness from the view of the public domain;
- Provide an appropriate visual presentation of the built form with respect to bulk and scale; and
- Clearly define and reinforce public domain areas through the integration of sufficient amenity and landscaping with natural vegetation.

Design Principles

The following setbacks shall apply:

- 18m of the front property boundary to Moorebank Avenue, excluding at the Anzac Road/Moorebank Avenue Interchange (see Section 3.3 for details);
- 5m of the front property boundary to the Estate Road;
- 2.5m of the front property boundary from Internal Roads; and
- Statutory setbacks as mandated by NCC shall apply where possible with non-compliances addressed on a case-by-case basis.

Office Siting

- Offices have been sited to maximise a Northern aspect where achievable;
- To mitigate the bulk scale of warehouse built forms from the street frontage, offices have been sited adjacent to access routes, providing a "stepping stone" of scale.

Warehouse Siting

- Warehouses have been sited so their primary operational functions are internally facing, to mitigate adverse effects on the amenity of the rest of the development and neighbouring sensitive receivers;
- Where achievable, docks have been located to face North or South which, when combined with appropriate shading, minimises direct sunlight to external operational areas;
- Warehouses have been sited away from the Estate Road where achievable, to minimise bulk and scale at the street frontage.

LEGEND

- 18m SETBACK
- 5m SETBACK
- 2.5m SETBACK

FIGURE 3.6 - Development setbacks

FIGURE 3.7 - Preliminary sketch displaying building setback strategy to mitigate the bulk form of industrial buildings at the street frontage.
### 3.6 BUILDING MATERIAL & DESIGN

**Better Placed (May 2017) developed by GANSW covers a number of principles that focus on enhancing the urban environment to create better places, spaces and buildings. These, as well as industry standard and architect driven principles, aim to establish the precincts design vision.**

**Design Vision**
- To establish a system for building quality and uniformity along major internal roads and public interfaces;
- To promote a whole-of-development consideration to visual attractiveness, quality, environment and safety;
- To encourage the use of various building materials that create visual appeal and interest through well considered facade articulation; and
- To establish a colour palette that is suitable for purpose and integrates with the existing site character and natural environment.

**Design Principles**

All buildings on the site will receive similar high quality treatment in facades and finishes, including warehouses and adjacent offices and dock offices, terminal facilities and the Freight Village.

The warehouse planning provided in the Architectural drawings (appendix 4.2) are provided as an indicative guide. The precinct Design Vision will guide future design teams, and the designs will likely carry a degree of variation dependent on future tenant requirements. The exact size and layout will be finessed to align with market demand and any subsequent detail design will be covered in future applications.

**Articulation**
- Prominent building facades fronting public interface areas and main internal roads may consist of a variety of building materials and colours.
- Preliminary design includes facades which consist of a base structure of dado panel precast with metal cladding above, utilising alternating colours and cladding material orientation to visually break up the warehouse bulk;
- Provide visual relief in facade design and elemental articulation where there is significant visual exposure from adjoining sites and the public domain;
- Building forms are to be articulated using roofs and eaves, articulation to long walls and promoting an attractive public interface and reduction of bulk and scale.

**Colour Selections**
- Where possible, buildings will follow a development colour palette, unless tenant corporate colours can be used to highlight entries or building focal points without detracting from the stated objectives;
- The dominance of materials will be softened over time when landscaping is expected to be at full maturity;
- The use of precast paneling provides a neutrally coloured appearance to the development and a sense of balance, framing and bordering more irregular and varying patterns on the metal sheeting above. This neutralizing will be encouraged in building design using whites, greys and darker highlighting tones;
- Materials will be chosen to comply with the precinct UHIMS, and will be specified during Construction Certificate submissions.

**Building Materials**
- Building materials will reflect the robustness of industrial and business park developments, i.e. concrete and steel;
- Office area and Freight Village external facades will vary in material palette, but generally could include such combinations as precast concrete panels, fibre cement sheet wall cladding and prefinished aluminium cladding with performance glazing in aluminium framing;
- Highlight features sparingly introduced to either accentuate key aspects or blend corporate brand identity initiatives with architectural designs may include use of products such as natural timber, stones, bricks etc;
- As noted in 2.3 – Ecologically Sustainable Design, long span timber has been considered for warehouse design, however it has been determined as not being a viable option.

**Focal Points**
- High quality materials should be used at building entry or focal points to create better visual amenity and promote user wayfinding; and

**Recycled Materials**
- Materials that are recycled or considered of high environmental sustainability standard are encouraged to be used where practical and possible;
- Refer to 2.3 – Ecologically Sustainable Design for further information on principles guiding recycled materials.

**Shading**
- Buildings should provide effective sun shading to windows, wall surfaces and building entries through the use of design elements such as overhang eaves and awnings;

**Access**
- Office and staff parking are given separate entrances from warehouse loading docks where possible to create a safe working environment and help reduce and breakdown the visual impact to the site. These will be complemented with landscape treatments and will be facilitated by ancillary staff amenities;
- Pedestrian and vehicle access points shall be well lit;
- Office entrances should face, or be visible from, the Estate Road;
- Documentation will be provided to the Certifying Authority to confirm compliance, in regards to access, with the Disability Discrimination Act 1992, and relevant Australian Standards and the Building Code of Australia (BCA/NCC) - to be detailed during detailed design.

SIMTA will seek to maintain a high quality of architecture when developing each individual tenancy, using articulation, materiality colour, focal points, shading and access. The aim will be to create a high quality environment for the precinct with uniform design presence, not only with the built form, but via the landscaped elements and how the built form and landscaping are read in conjunction with one another.

Documentation will be provided to the Certifying Authority to confirm that all buildings will be designed and constructed, including external walls, in accordance with the relevant requirements of the BCA/NCC - to be detailed during detailed design.

![FIGURE 3.8 - Industrial building design displaying the outlined design principles.](image-url)
3.7 SCREENING & FENCING

The design includes a vision to create a visual flow of spaces and land use, however, there is a responsibility to create a safe space for all users of the facility, through separation of spaces via fencing and screening. ‘Safer by design’ principles have also contributed to the design of fencing and screening in the public domain. Refer to 3.10 for further details.

**Design Vision**
- Creating a separation between public use domain and private commercial space using lightweight and unobtrusive fencing and screening;
- Providing an audio-visual break from the bulk infrastructure and warehousing for public amenities and adjacent residential zones.

**Design Principles**

**Site Fencing**
- Light weight palisade fencing to create a physical, but not visual, barrier between public domain and the industrial activities on tenant lots;
- Palisade fencing should be selected to be visually unobtrusive, yet create the required barrier, refer Figure 3.8 for examples.
- Perimeter and OSD basin fences higher than 1.2m, as part of detailed design, are to be transparent and dark in colour, but not constructed of chain wire, to provide visual amenity per Condition B69.

**Lightweight Screens**
- Visual barriers comprising of lightweight louvre screening, or slat fencing, will be used to separate visually obtrusive areas (such as waste holding and plant equipment) from the rest of the development. Refer Figure 3.8 for examples.

**Retaining Walls**
- Materials and colours must be of a natural appearance, and incorporate landscaping, per Condition B73.

The proposed screening and fencing will create separation between public and private use within the precinct, and an audio-visual break between the industrial zones, and public amenities and neighbouring residences, while remaining unobtrusive through intelligent material selection and design, and maintaining a safe space for users of the facility.

**Noise Wall**

Condition B129 (and B74) requires the development to include a 5m high noise wall along the Western boundary of the Estate Road. This report has received qualified endorsement from the Independent Peer Review Report to exclude this requirement, citing the following:
- The noise wall forms a solid barrier between the areas of visual and urban amenity and nodal points of the development with that of the bio-diversity area and the landscaped detention basins, effectively eradicating these potential benefits;
- The treatment of the OSDs, if included as part of landscape area, will include canopy trees and medium ground cover, which will provide visual amenity in place of the wall;

Refer to the Independent Peer Review Report (Appendix 4.5) for further details.

From an urban design perspective, it is recommended that the design not include a noise wall, as required by the Conditions of Consent.

**FIGURE 3.9 - Industrial design fencing, retaining and noise wall examples.**
3.8 SIGNAGE & WAYFINDING

Signage and lighting throughout the entire development will be a critical component of achieving a consistent identity and address, but will also be paramount to ensure safety, security and efficient way finding at all hours of operations.

Design Vision
• To provide adequate signage and lighting throughout the development to enhance the quality and experience of the occupants and users, particularly with regard to open space, public domain and general amenity;
• Develop a uniquely identifiable, marketable and appropriate character for SIMTA’s site through the creation of signage packages both precinct-wide and by land use;
• Use of signage that promotes and enhances safety, security and efficient way-finding for pedestrians, cyclists and vehicles at all hours of operation;
• Use of signage that actively contributes to the safety and amenity of the entire estate, and is sympathetic to any natural and modified landscape and vegetation during the day time and night time; and
• Use of signage that is of a high quality of design and construction, and considers longevity and environmental sustainability where possible.

Design Principles
• Operational Lighting and Signage will comply with Conditions B76, B77 and B78, and will be detailed during Construction Certificate;
• Built forms such as offices and warehouses will act as wayfinding nodes through the use of distinct colour and design, see Figure 3.11;
• Signage within each land use precinct will be designed to integrate with building scale and relevant access and egress areas;
• Freestanding signage will be integrated within landscape where possible;
• Lighting is to be designed and managed to mitigate light spill impacts on fauna, habitat and any adjoining developments or residences, but must be maintained to a level sufficient for operational standards and site safety;
• Design and lux of any internal or spot lighting shall be designed to avoid off-site or traffic safety impacts such as reflection and glare; and
• Signage fronting Moorebank Avenue is to be designed to complement the architectural character of the built form, the landscape treatments, the sites natural character, and to provide a unique SIMTA identity.

The design includes uniquely identifiable signage and wayfinding, to achieve a consistent identity for the precinct, and ensuring safe, secure and efficient wayfinding at all hours of operation. Integrated and managed signage and lighting will mitigate light spill and increase the amenity for all users of the development, and neighbouring residences, through considered sustainable design.

FIGURE 3.10 - Indicative signage elevations. Refer to Appendix 4.2 for Signage Location Plan.

FIGURE 3.11 - Sketch images of indicative wayfinding strategy, using offices and tenant colours as wayfinding nodes.
3.9 WATER SENSITIVE URBAN DESIGN

A number of water sensitive urban design initiatives are proposed to be implemented as part of SIMTA’s development to ensure that any set treatment targets are met.

**Design Vision**

The design aims to, as much as possible, mitigate water consumption, run-off and pollution commonly associated with large developments. The design includes proposals to meet the following:

- Reduced water consumption;
- Minimising run-off pollution into the George’s River;
- Extended on site detention to deal with 1:100 year rainfall.

Refer to the relevant sections of the Stormwater Development Design Report by Costin Roe for detailed Stormwater Management Objectives and technical details.

**Design Principles**

**Stormwater Quantity Management (Refer to SDDR Section 4)**

- Mitigating the impact of urban development on existing drainage system by limiting post-development discharge within the receiving waters to the pre-development peak, and to ensure no affectation of upstream, downstream or adjacent properties, as per the consent conditions;
- Attenuation of stormwater runoff from the development is proposed to be managed via a series of measures including detention tanks and open basins provided in strategic locations for each of the development catchments;
- Sizing of the basin systems has been completed using DRAINS modelling software in accordance with the Liverpool City Council Policy for the 1 in 1-year ARI to 1 in 100-year ARI storms for various durations.

**Stormwater Quality Management (Refer to SDDR Section 5)**

- Water quality and pollutant reduction are achieved through a treatment train of proprietary gross pollutant traps and natural bio-retention systems (see Figure 3.13);
- Gross Pollutant Traps serve as pre-treatment for removal of course/medium solids;
- GPT’s have been included as part of the Stormwater design at the inlet to each OSD. Refer Figure 3.12 and Civil Engineers design for further details;
- Bio-retention cells will be included in each On-Site Detention Basin, allowing water to receive nutrient treatment via a filtration media.

**Frequent Flow Management**

- Targeting post development duration of stream forming flows between 3.5-5.0 times the pre-development duration using a Stream Erosion Index.

**Flood Management and Large Rainfall Events**

- All buildings are sited 500mm above the 1% AEP design flood level of the Georges River;
- Flood storage compensation has been provided where filling in localised pre-developed flood affected areas occurs;
- Stormwater detention measures have been included to manage pre and post development runoff (Refer SDDR Section 4);
- Overflow flow paths to manage runoff in large storm events have been made including achieving at least 150mm freeboard to building levels from the flow paths.

**Rainwater Re-use**

- Rainwater tanks will be included in the design for each warehouse, the freight village, and the IMT;
- Rainwater tanks may be used to collect roof water from the site’s warehouses and stored to meet demand for irrigation, internal non-potable uses and the container wash down facility;
- Rainwater tanks also provide stormwater treatment through settling and harvesting in addition to their main purpose of providing alternative source of water for non-potable water uses.

**Integrated Landscaping**

- The landscape design will integrate with the stormwater systems and drainage infrastructure to maximise visual amenity.

The stormwater infrastructure has been designed to target pollutants and mitigate potential adverse impacts on the natural water cycle and receiving waters of the developments stormwater design, as well to maximise rainwater re-use, through a myriad of intelligent design decisions. Refer to Costin Roe’s Stormwater Development Design Report and design drawings for further information on compliance with conditions and detailed design.
3.10 OPEN SPACE AND PUBLIC DOMAIN

In consideration of the scale of the proposed development, an important element will be the quality of open space and public domain areas and their integration with other land uses.

Although the detailed layout and design of open space and public domain areas will be the subject of any future application, this section is intended to describe the vision for public spaces to ensure appropriateness of the future design and integration with operational facilities on SIMTA’s site.

Design Vision

- To provide high quality public open space and public domain areas in and around prominent internal developments;
- To emphasise clear road networks and the interface between land uses;
- To integrate public open spaces and landscape with natural vegetation and water sensitive urban design;
- To create a ‘business park’ or ‘campus’ experience throughout the site, while maintaining the security provisions of a bonded site;
- Develop a framework that is flexible whilst controlling consistency of quality and scale of public spaces as the development evolves in the future;
- Provide safe and efficient circulation for pedestrian, cyclists and vehicles;
- Promote a high quality landscape corridor along streetscapes.

Design Principles

- High quality landscape treatments should be applied to Moorebank Avenue and all internal roads;
- Water sensitive urban design principles should be integrated within landscape zones where possible;
- Consider where appropriate the use of acoustic buffers between built form and public/open spaces;
- Separate all heavy traffic from main employee parking zones for developments on the site;
- Provide safe and secure public access through the development, integrating with the Green and Hydrological Grids;
- Utilise the DSD’s as a form of landscaping to improve the amenity of the site;
- Utilise ‘safer by design’ principles in line with NSW Police ‘Crime Prevention Through Environmental Design’ strategies to minimise the likelihood of crime and increase user safety.

The quality of public domain and open space within the development will be managed through future applications, to be integrated with the operational facilities of the site while providing a high quality and safe environment. The design principles outlined provide an appropriate guideline for the development of a safe, efficient and high quality industrial precinct.

FIGURE 3.14 - Development East Display Suite outdoor space, an example of the integration of public domain.

FIGURE 3.15 - Sketch design of MPW Freight Village with outdoor public domain amenity and visual connection to the Bio-diversity Area.
The development will use a large amount of resources during construction, as well as energy during operation. It is therefore imperative that intelligent sustainable practices are utilised to minimise that resource usage, and mitigate its effects.

The design principles outlined in 2.2 Urban Heat Island Mitigation and 2.3 Ecological Sustainable Design will be adhered to throughout building and estate design.

Warehouse 1 in the Moorebank East Precinct, tenanted by Target, can be used as an example of the high level of renewable energy inclusion in the design. The 3MW project is among the largest roof-mounted solar arrays in the world, and is expected to deliver 4800MWh of energy per year, the equivalent of powering more than 7300 homes. Warehouses on the East and West precinct together will have installed on them the equivalent of a 12-30MW solar array.

**Design Vision**
- Achieve the completion of the development, minimising resource input where possible;
- Reduce operational resource costs through intelligent design and decision making.

**Design Principles**

**Energy**
- As recommended by the UHIMS, solar panels will be installed for the warehouses, where practicable. The solar panels will be visually unobtrusive, installed only on the available North facing roof space of the warehouses and within the approved building height restrictions;
- Warehouses will be designed as to give maximum access to the Northern sun, maximising solar panel efficiency.

**Water**
- All principles outlined in 2.3 Ecologically Sustainable Design, and 3.9 Water Sensitive Urban Design in regards to water are to be adhered to;
- OSDs have been designed and sited as part of the Stormwater Management Plan to maintain the volume of site water entering the George’s River, while controlling its intensity;
- Rainwater tanks are required to meet the water conservation controls set by Liverpool Council’s Liverpool Development Control Plan (2008) for development in Moorebank Defence Lands and also to satisfy sustainability building requirements.

**Waste**
- The development will work with end users to develop strategies of best practice to minimise waste;
- Each facet of the facility should be effectively designed to minimise construction waste during staging;
- Tenancies will be encouraged to promote efficient and sustainable waste segregation practices, in line with corporate initiatives implemented in modern industry;
- As noted in 2.3 - Ecologically Sustainable Development, resource waste will be minimised during construction by recycling demolished material as aggregate, and utilising fill from local sources.

The design includes a variety of principles with the aim of minimising resource input during both construction and operation. These principles outlined tie in with the core design philosophies of the Conditions of Consent - UHIMS, ESD and Landscape Design, and will reduce energy consumption during construction, and produce energy for the precinct through the usage of solar panels, reduce water usage through recycling, and reduce waste through sustainable practice and operation. These sustainable principles align with the objectives of the Conditions of Consent.
MOOREBANK

LOGISTICS PARK

MOOREBANK PRECINCT WEST
STAGE 2
URBAN DESIGN DEVELOPMENT REPORT

APPENDIX
CONTENTS

4.1  COMPLIANCE MATRIX
4.2  REVISED ARCHITECTURAL DRAWINGS
4.3  REVISED LANDSCAPE DESIGN DRAWINGS
4.4  URBAN HEAT ISLAND MITIGATION STRATEGIES MODELLING
4.5  INDEPENDENT PEER REVIEW REPORT
4.6  GANSW EVIDENCE OF CONSULTATION
### 4.1 COMPLIANCE MATRIX

<table>
<thead>
<tr>
<th>Ref</th>
<th>Requirement</th>
<th>Document Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16</td>
<td>The maximum GFA's for the following uses apply:</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>(a)</td>
<td>215,000m² for the warehousing and distribution facilities, and</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>90,000m² for the freight village.</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>A21</td>
<td>The siting, design and construction of premises available to the public are to ensure an appropriate level of accessibility so that all people can enter and use these premises. Access is to meet the requirements of the Disability Discrimination Act 1992, relevant Australian Standards and Building Code of Australia (BCA).</td>
<td>Section 3.8 - To be detailed during detailed design. N/A at this stage.</td>
</tr>
<tr>
<td>A23</td>
<td>At new buildings and structures, and any alterations or additions to existing buildings and structures, that are part of the development, must be designed and constructed in accordance with the relevant requirements of the BCA.</td>
<td>Section 3.8 - To be detailed during detailed design. N/A at this stage.</td>
</tr>
<tr>
<td>A24</td>
<td>The external walls of all buildings including additions to existing buildings must comply with the relevant requirements of the BCA.</td>
<td>Section 3.8 - To be detailed during detailed design. N/A at this stage.</td>
</tr>
<tr>
<td>A28</td>
<td>Where conditions of this consent require consultation with an identified party, the Applicant must:</td>
<td>UOCR Appendix 4.6</td>
</tr>
<tr>
<td>(a)</td>
<td>Consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval, and</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Provide details of the consultation undertaken in the document submitted to the Planning Secretary including:</td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>The outcome of that consultation, matters resolved and unresolved (and the justification for matters remaining unresolved); and</td>
<td></td>
</tr>
<tr>
<td>(ii)</td>
<td>Details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.</td>
<td></td>
</tr>
<tr>
<td>A35</td>
<td>All detailed design drawings required to be submitted under this consent must be at or above 50% design completion, with the percentage design stated on the drawings.</td>
<td>UOCR requires concept level design. N/A at this stage.</td>
</tr>
<tr>
<td>B2</td>
<td>Prior to commencement of construction, the Applicant must submit revised Development Layout Drawings to the Planning Secretary for approval. The revised Development Layout Drawings must be at a scale of approximately 1:2000 at A1 showing the key development elements including but not limited to estate infrastructure, internal roads, warehouse and associated carpark footprints, the freight village, intermodal terminal facility including the rail line and rail line carpark footprints, the freight village, intermodal terminal facility including the rail line and rail line vehicle access roads. The revised Development Layout Drawings must show the site, construction and operational boundaries and demonstrate:</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Provision of a riparian corridor, comprising the following:</td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>A buffer zone to the most inland of:</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td></td>
<td>- 40 metres from the top of bank, as surveyed by a registered surveyor</td>
<td>PWW-RCG-AR-DWG-0101</td>
</tr>
<tr>
<td></td>
<td>- 1.0% AEP flood extent, excluding the localised depression at the existing major east-west drainage channel</td>
<td></td>
</tr>
<tr>
<td>(ii)</td>
<td>An additional 10 metre extension to the buffer zone established in (i) above, where native vegetation is located on or within 10 metres east of the buffer.</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>The siting of biofiltration retention areas and QDF basins (with the exception of outfalls to the Georges River and associated maintenance access) are outside the riparian corridor and outside the warehouse footprints.</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>(c)</td>
<td>No construction or operation works would take place inside biodiverse offset areas;</td>
<td>PWW-RCG-AR-DWG-0101</td>
</tr>
<tr>
<td>(d)</td>
<td>Compliance with the landscaped setbacks specified in Condition B53;</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>(e)</td>
<td>Compliance with the percentage of landscaped area specified in Condition B66(a) within the warehouse and freight village area and truck waiting area and emergency truck storage area to be developed under MPW Stage 2;</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>(f)</td>
<td>A setback of 8 to 12 m has been provided around the north, south and western perimeters of the development area to accommodate fill batter slopes of a maximum of 1:V in 4H:</td>
<td>PWW-RCG-AR-DWG-0100</td>
</tr>
<tr>
<td>(g)</td>
<td>A minimum 3 m wide maintenance access has been provided between the fill slopes and the riparian corridor, the ABB site and at the southern end of the development area, for ongoing maintenance works.</td>
<td>PWW-RCG-AR-DWG-0101</td>
</tr>
<tr>
<td>(h)</td>
<td>Provision of a controlled overland flow path through the MPW Stage 2 site as required under Condition B11 for conveyance of the major stormwater discharge from the MPE site to the Georges River.</td>
<td>PWW-COS-C-DWG-0461 and 0465</td>
</tr>
</tbody>
</table>

Note: MPE stormwater discharge is captured within the East/West Culvert.
The bushfire asset protection requirements are within the development area, to comply with the minimum requirements of AS 2890.3:2015 Parking and Arterial Road Design Part 6A: Paths for Walking and Cycling (Australasian Road Management and Engineering Association, 2017).

(a) The bushfire asset protection requirements are within the development area, to comply with the minimum requirements of AS 2890.3:2015 Parking and Arterial Road Design Part 6A: Paths for Walking and Cycling (Australasian Road Management and Engineering Association, 2017).

(b) Keep accurate records of the source, volume and type of fill imported to, and material removed from, the site.

(c) Select materials with lower energy manufacturing requirements.

(d) Use locally sourced materials to reduce impacts associated with transport.

(e) Use locally indigenous species.

(f) Be visually unobtrusive and sit within the final landform and landscaping;

(g) Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.

(h) Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.

(i) Be visually unobtrusive and sit within the final landform and landscaping;

(j) Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.

(k) Be visually unobtrusive and sit within the final landform and landscaping;

(l) Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.

The bushfire asset protection requirements apply to:

- Perimeter fill batters must be stabilised with vegetation.
- Use locally sourced materials to reduce impacts associated with transport.
- Use locally indigenous species.
- Be visually unobtrusive and sit within the final landform and landscaping;
- Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.

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- Use locally sourced materials to reduce impacts associated with transport.
- Use locally indigenous species.
- Be visually unobtrusive and sit within the final landform and landscaping;
- Be integrated with the stormwater system design set out in the Revised Stormwater Design Drawings required under Condition B4.
The mitigation measures, management strategies and abatement opportunities undertaken to maintain fuel efficiency.

- Feasible, for m that are not active would be minimised, while retaining
  - The use of shields on luminaire lighting to minimise brightness effects
  - Asymmetric light distribution-type floodlights would be selected as part of the proposed lighting design (i.e. the light is directed specifically to the task with minimal direct light spill to the surrounding area)
  - Low reflection pavement surfaces would be considered to reduce brightness
  - The quantity of light and energy consumption in parts of the Proposal site that are not active would be minimised, while retaining safe operation

Detailed Design and Operation

10A Naming of roads would consider previous School of Military Engineering (SME) street names

Detailed Design

11A The following mitigation measures would be implemented, where reasonable and feasible, for management of GHG emissions as part of the operation of the Proposal:

- Energy efficiency design aspects would be incorporated wherever practicable to reduce energy demand
- Fuel efficiency of the operation plant/equipment would be assessed prior to selection, and where practical, equipment with the highest fuel efficiency and which uses lower GHG intensive fuel (e.g. biodiesel) would be used
- Energy-efficient guidelines for operational work would be considered and implemented where appropriate and regular maintenance of equipment would be undertaken to maintain fuel efficiency
- Methods to reduce losses from industrial processes (refrigerants and SF6) would be investigated during detailed design
- Consideration would be given to undertake further investigation and implementation of cost-effective abatement opportunities
- Outdoor lighting Standards Australia, 1997; and
- The use of shields on luminaire lighting to minimise brightness effects
- Low reflection pavement surfaces would be considered to reduce brightness
- The quantity of light and energy consumption in parts of the Proposal site that are not active would be minimised, while retaining safe operation

Operation

15A In addition to features included in the current design, the following mitigation measures (where feasible and reasonable) would be implemented to reduce the potential for urban heat island effects:

- Solar panels on roofs of warehouses.
- Cool roofs (selection of materials higher albedo ratings (ratio of irradiance reflected to the irradiance received))
4.2 REVISED ARCHITECTURAL DRAWINGS
ESTATE ROAD SITE 2B
LANDSCAPING
2.5m WIDE
MEANDERING SHARED CYCLE/FOOT PATH
REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR CANOPY TREES AND LANDSCAPE TREATMENT TO PROVIDE AUDIO/VISUAL BUFFER TO NEIGHBOURING RESIDENTIAL AREAS
WAREHOUSE 2B
CAR PARK
LANDSCAPING
5m SETBACK
MAX 1V:4H BATTER
10m BUFFER ZONE TO RIPARIAN CORRIDOR (CoC B2(a)(ii))
EXISTING GROUND LINE
3m WIDE ACCESS PATH
ROAD CORRIDOR
INDICATIVE TENANT FENCE LOCATION ALONG ROAD CORRIDOR BOUNDARY
5m NOISE WALL PER ENG. DESIGN

SITE 1A
LANDSCAPING
10m BUFFER ZONE TO RIPARIAN CORRIDOR (CoC B2(a)(ii))
WAREHOUSE 1A
5m SETBACK
INDICATIVE TENANT FENCE LOCATION ALONG ROAD CORRIDOR BOUNDARY
ROAD CORRIDOR APPROXIMATE EXTENT OF MAX 1V:4H BATTER
5m NOISE WALL PER ENG. DESIGN

PIWW-RCG-AR-DWG-
NOTES
1. REFER TO CIVIL ENGINEERS DETAIL FOR SURFACE LEVELS
2. REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR CANOPY TREES AND LANDSCAPE TREATMENT TO PROVIDE AUDIO/VISUAL BUFFER TO NEIGHBOURING RESIDENTIAL AREAS
3. REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR CANOPY TREES AND LANDSCAPE TREATMENT TO PROVIDE AUDIO/VISUAL BUFFER TO NEIGHBOURING RESIDENTIAL AREAS
4. REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR CANOPY TREES AND LANDSCAPE TREATMENT TO PROVIDE AUDIO/VISUAL BUFFER TO NEIGHBOURING RESIDENTIAL AREAS
5. REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR CANOPY TREES AND LANDSCAPE TREATMENT TO PROVIDE AUDIO/VISUAL BUFFER TO NEIGHBOURING RESIDENTIAL AREAS

MOOREBANK PRECINCT 
WEST STAGE 2
POST APPROVALS - ROAD SECTION 01
POST APPROVALS - ROAD SECTION 02
NOTES:

- SIGNAGE NOT TO INCLUDE ANY GENERAL ADVERTISING OR MOVING/FLASHING SIGNS
- NO WEST FACING BUILDING SIGNAGE VISIBLE FROM RESIDENCES TO BE ILLUMINATED
- NO INTERNAL SIGNAGE VISIBLE FROM RESIDENCES TO BE ILLUMINATED
- TO OCCUPY NO MORE THAN 10% OF A FACADE OR WALL OF A BUILDING
4.3 REVISED LANDSCAPE DESIGN DRAWINGS
**PROPOSED PLANT SCHEDULE**

<table>
<thead>
<tr>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>NATIVE</th>
<th>EXPECTED CANOPY SPREAD</th>
<th>EXPECTED MATURE HEIGHT</th>
<th>INSTALL SIZE</th>
<th>DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trees</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acacia dealbata</td>
<td>Black Wattle</td>
<td>✓</td>
<td>3-10m</td>
<td>8-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Acacia decora</td>
<td>Parakatea</td>
<td>✓</td>
<td>3-10m</td>
<td>8-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Acacia dumosa</td>
<td>Narrow-leaved</td>
<td>✓</td>
<td>3-10m</td>
<td>8-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Angophora Thứ</td>
<td>Grub Apple</td>
<td>✓</td>
<td>10-15m</td>
<td>15m</td>
<td>3m centres</td>
<td></td>
</tr>
<tr>
<td>Carissa carandas</td>
<td>Flowering Gums</td>
<td>✓</td>
<td>2-7m</td>
<td>10m</td>
<td>3m centres</td>
<td></td>
</tr>
<tr>
<td>Corymbia rossii</td>
<td>Scorchbush</td>
<td>✓</td>
<td>5-10m</td>
<td>8-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Correa darwinii</td>
<td>Orange Bell</td>
<td>✓</td>
<td>3-6m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>5m centres</td>
</tr>
<tr>
<td>Eucalyptus saligna</td>
<td>White Bottlebrush</td>
<td>✓</td>
<td>2-7m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus globulus</td>
<td>Silver Bluegum</td>
<td>✓</td>
<td>2-7m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus robusta</td>
<td>Coast Grey Gum</td>
<td>✓</td>
<td>5-10m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus gigantea</td>
<td>Tree Leaved Stringy Bark</td>
<td>✓</td>
<td>8-10m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus citriodora</td>
<td>Narrow-leaved Ironbark</td>
<td>✓</td>
<td>2-7m</td>
<td>10-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus robusta</td>
<td>Eucalyptus Gummiflora</td>
<td>✓</td>
<td>12-15m</td>
<td>10-15m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus regnans</td>
<td>Snappy Gum, Scribbly Gum</td>
<td>✓</td>
<td>5-10m</td>
<td>15-20m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Eucalyptus siderophloia</td>
<td>Mugga, Red Ironbark</td>
<td>✓</td>
<td>3-6m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Prostanthera cymosa</td>
<td>Eastern Mistletoe</td>
<td>✓</td>
<td>2-7m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Melaleuca decora</td>
<td>White Cloud Tree</td>
<td>✓</td>
<td>6-10m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Melaleuca linarioides</td>
<td>Plate-leaved Paperbark</td>
<td>✓</td>
<td>2-7m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
<tr>
<td>Allocasuarina coriacea</td>
<td>Pinnaefolia</td>
<td>✓</td>
<td>2-7m</td>
<td>&gt;10m</td>
<td>140mm-150L</td>
<td>3m centres</td>
</tr>
</tbody>
</table>

| **Shrubs**      |             |        |                         |                         |              |         |
| Acacia decora  | Golden Piccy Mosaic | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Acacia dealbata | White Tinsley | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Acacia dealbata | Silver Wattle | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Acacia dealbata | Sickle Wattle | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Banksia speciosa | Birthday Candle | ✓ | N/A | 5m | 160-200mm | 3m centres |
| Banksia speciosa | Snowflakes | ✓ | N/A | 1.2m | 160-200mm | 3m centres |
| Callistemon citrinus | White-Aspen | ✓ | N/A | 1m | 160-200mm | 3m centres |
| Callistemon citrinus | 'Canberra' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Callistemon citrinus | 'Maccabe' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Conostylis sellowiana | 'Tall Bells' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Conostylis sellowiana | 'Narrow Leaf' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | Scaevola | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | 'Purpulita' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus robusta | 'Narrow Leaf' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | 'Reverence' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | 'Aurea' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | 'Sunrise' | ✓ | N/A | 3m | 160-200mm | 3m centres |
| Eucalyptus siderophloia | 'Tall Flame' | ✓ | N/A | 3m | 160-200mm | 3m centres |

**BIODIVERSITY SCHEDULE**

<table>
<thead>
<tr>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>NATIVE</th>
<th>EXPECTED CANOPY SPREAD</th>
<th>EXPECTED MATURE HEIGHT</th>
<th>INSTALL SIZE</th>
<th>DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grasses and Groundcovers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angelica stolonifera</td>
<td>Kangaroo Grass</td>
<td>✓</td>
<td>N/A</td>
<td>1m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Archichloa arenicola</td>
<td>Matamat</td>
<td>✓</td>
<td>N/A</td>
<td>1m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Austrochloa nigra</td>
<td>Victory</td>
<td>✓</td>
<td>N/A</td>
<td>0.7m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Chamaelea conjugata</td>
<td>Blue Flax Lily</td>
<td>✓</td>
<td>N/A</td>
<td>0.6m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Chorisoneura superba</td>
<td>Blue Flax Lily, Spreading Flax Lily</td>
<td>✓</td>
<td>N/A</td>
<td>0.8m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Chromolaena odorata</td>
<td>Nightshade, Hairy Catnip</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Chlorophyllum trichocarpum</td>
<td>'Promethea Gold'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea borbonica</td>
<td>Perennial Banksia</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea microphylla</td>
<td>'Serrata'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea microphylla</td>
<td>'Tetton'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea microphylla</td>
<td>'Shy Red'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea microphylla</td>
<td>'Eagles' Red'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
<tr>
<td>Hakea microphylla</td>
<td>'Tall Red'</td>
<td>✓</td>
<td>N/A</td>
<td>0.5m</td>
<td>150mm</td>
<td>6/m²</td>
</tr>
</tbody>
</table>

**BIO-RETENTION SPECIES LIST**

<table>
<thead>
<tr>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>NATIVE</th>
<th>EXPECTED CANOPY SPREAD</th>
<th>INSTALLATION SIZE</th>
<th>DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grasses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austrochloa nigra</td>
<td>Matamat</td>
<td>✓</td>
<td>0.8m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.8m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.7m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.6m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.5m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.4m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.3m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.2m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.15m</td>
<td>150mm</td>
<td>4/m²</td>
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<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
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<td>Eriophorum</td>
<td>✓</td>
<td>0.05m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
<tr>
<td>Austrochloa vaginata</td>
<td>Eriophorum</td>
<td>✓</td>
<td>0.02m</td>
<td>150mm</td>
<td>4/m²</td>
</tr>
</tbody>
</table>

*Note: All species are included as per the project requirements.*
**LANDSCAPE DESIGN STATEMENT**

The Moondarra Precinct Stage 2 Proposal involves the development of a distribution terminal facility including warehouses and distribution facilities, service yard, landscaping, screening and associated works east of Moorebank Avenue. The Proposal also includes a flood diversion weir. The Proposal includes a revegetation conservation area.

The focus of the proposed landscape works includes:
- The integration of the Moondarra Avenue foreshore.
- Landscape works associated with internal roads.
- The use of natural and recycled materials.
- Landscape works interface with the revegetation conservation areas.

When the site is bounded to the south with existing vegetation communities, the landscape design serves to integrate the development with the environment and the surrounding context. The proposed tree planting has been designed with the intent of creating a uniform canopy cover throughout the area. Proposed screen planting is provided on both sides of the noise wall to minimise visual and auditory impact.

Perimeter fill batters must be stabilised with vegetation as per Condition B2(f) and B66 (a), (b) and SSD 7709.

Given that the site is bounded to the south with existing vegetation communities, the landscape design serves to integrate the development with the environment and the surrounding context. The proposed tree planting has been designed with the intent of creating a uniform canopy cover throughout the area. Proposed screen planting is provided on both sides of the noise wall to minimise visual and auditory impact.

Perimeter fill batters must be stabilised with vegetation as per Condition B2(f) and B66 (a), (b) and SSD 7709.

Existing native vegetation— including canopy trees and understory planting — is to be retained where feasible in the 10m expanse of buffer zone. The mixing of native species should continue to the right of the proposed site with the initial plans conservation zones in the conservation areas. There will include plant species consistent with the Caremark Park Standard such as Eucalyptus diversicolor and Eucalyptus globulus.

Landscape setbacks from the EASTER PAVILION to warehouse carparks are as per Condition B63 A.03 1:100.

1. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

2. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

3. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

4. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

5. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

6. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

7. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

8. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

9. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

10. Canopy tree planting density is 1 canopy tree per 30m² of landscape area as per Condition B63 A.03 1:100.

**LEGEND**

- Proposed Canopy Tree Planting, in accordance with Council Plan Standard (Refer to Plant Schedules on drawing PIWW-GNK-LN-DWG-001)
- MPW Site Boundary
- MPW Stage 2 Operational Boundary
- Landscape setback as per Condition B63 A.03 1:100
- Moondarra Boulevard
- Landfill Buffer
- Asset protection Zone setback
- Lot Boundary
- Type of Bank
- Conservation Area (Refer to Biodiversity Assessment Report)
- 15m Buffer Zone
- Existing Erosion Counter
- Noise Wall
- Top of Bank
- LOT BOUNDARY
- LIMIT OF 1:100 YEAR FLOOD EXTENT
- MOOREBANK BIO-DIVERSITY OFFSET AREA
- LANDSCAPE SETBACK
- MPW OPERATIONAL BOUNDARY
- MPW SITE BOUNDARY
- ASSET PROTECTION ZONE SETBACK
- NOISE WALL
- STORMWATER CHANNEL
- ESTATE ROAD
- SHIFTER WAREHOUSE
- LOADING DOCK
- QUEUE
- GEORGES RIVER
- FSL 16.50
- SUBJECT TO FUTURE
Screen planting around office providing visitor and worker amenity as per CONSERVATION AREA REFER TO BIODIVERSITY ASSESSMENT REPORT

Given that the site is bounded to the south with existing vegetation communities, landscape design concerns may be taken into account with the surrounding environment by using the school and playground systems that can be used to create shade and protection for students and staff. The proposed stormwater channel will be designed to be sympathetic to the natural drainage patterns of the surrounds.

The landscaping of the building facades will maintain planting organisation along the vehicular entry/exit area to ensure visual impact through the surrounding environment.

1. Screen planting around office providing visitor and worker amenity as per Australian standards and other codes as applicable, together with those particular of the work shall take place in accordance with Supplementary Tree Planting to be implemented as indicated to reinforce visual mitigation as per Condition B63 (a) SSD 7709.

2. Proposed secure sight lines through planting to incorporate ‘Safety by Design’ principles as per Condition B57 (a) SSD 7709.

3. Tree and shrub planting necessary removing from Casula as per Condition B57 (a) SSD 7709.

4. Proposal for planting associated with internal roads, intermodal terminal facility including warehouses and distribution facilities, stormwater, drain ag and all other areas as per Condition B57 (a) SSD 7709.

5. Canopy tree planting around perimeter of site for visual mitigation as per Condition B57 (a) SSD 7709.
Existing native vegetation – including canopy trees and understorey planting will be conserved in the buffer zone. The existing planting will be supplemented with new trees as per Condition B63 (b) SSD 7709 to reinforce the existing ecological community present in the Conservation Area. Supplementary tree planting to be implemented as indicated to reinforce condition B64 SSD 7709.

The focus of the proposed landscape works includes:
- Design principles as per Condition B57 (b) SSD 7709
- Landscape works associated with proposed warehouses, stormwater and intermodal terminal facility including warehouses and distribution facilities
- The integration of the Moorebank Avenue frontage
- Landscape works interface with the vegetation conservation areas.

The positioning of the built forms has maximised planting opportunities along the road profile. The landscape works will be designed to integrate with the road, existing infrastructure and vegetation conservation areas. The landscaping has been designed for a life of at least 40 years and is consistent with the current vegetation condition and design principles.

The landscaping scheme will be designed in accordance with the requirements of the Landscaping Code and the environmental assessment study. The proposed landscape works will be developed to meet the requirements of the Landscaping Code and the environmental assessment study.

The proposed landscape works will be designed to meet the requirements of the Landscaping Code and the environmental assessment study. The proposed landscape works will be developed to meet the requirements of the Landscaping Code and the environmental assessment study.

The landscape design scheme will be designed to integrate with the existing vegetation and road network, and to meet the requirements of the Landscaping Code and the environmental assessment study. The proposed landscape works will be developed to meet the requirements of the Landscaping Code and the environmental assessment study.

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3. Proposed Landscape Area

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2. The proposed planting scheme for Moorebank Avenue consists of a variety of native and non-native species to create a visually appealing and functional landscape. The selection of plants is based on their ability to thrive in the local climate and soil conditions. The inclusion of drought-tolerant species is also considered to minimize water usage.

3. Proposed Landscape Area

MOOREBANK AVENUE LANDSCAPE PLAN - INSET 1

SCALE: 1:1000 (1:2000 @ A3)

MOOREBANK AVENUE LANDSCAPE PLAN - INSET 2

SCALE: 1:1000 (1:2000 @ A3)
Proposed canopy tree planting around perimeter of site for visual mitigation as per Planting within the conservation area is restricted to areas disturbed during the construction of the OSD overflow channel illustrated on this drawing. The proposed plant selections are local species which will integrate the infrastructure with the existing landscape. The selected species are also appropriate for the fluctuating hydrology of the channel. This will create ecological connections in the landscape.

Proposed plant species have been selected for their site suitability with many species selected from Liverpool City Council’s recommended plant list.

Canopy tree planting density at 1 canopy tree per 30m.
DESIGN STATEMENT

Areas of existing vegetation within the conservation area are, where possible, retained. In areas that are clear of vegetation, enhancements are created taking the new levels of the internal road to the conservation area.

Trees are to be planted with species that are native within the conservation area. This will serve to enhance the habitat of the conservation area with species common to vegetation found within the area.

Proposed poor species have been selected for site suitability with many species selected from Liverpool City Council’s recommended plant list.

Proposed secure sight lines through planting to incorporate ‘Safety by Design’.

Proposed mixtures of native canopy trees as per Condition B2c SSD 7709.

Anzac Road

5.

Dichondra repens

Eucalyptus sideroxylon

Dianella caerulea

Lot Boundary

Asset protection Zone setback

Landscape setback as per Condition B2 (a), (f), (g) and

MMW Stage 2 Operational Boundary

TOP OF BANK

ASSET PROTECTION ZONE SETBACK

LIMIT OF 1:100 YEAR FLOOD EXTENT

MOOREBANK BIO-DIVERSITY OFFSET AREA

LANDSCAPE SETBACK

MPW SITE BOUNDARY

Cumberland Plain Woodland (Refer to Plant Schedules

Proposed Canopy Tree Planting in accordance with

North

WAREHOUSE LAYOUTS

provisions as per Condition B2c SSD 7709.

Proposed Canopy Tree Planting in accordance with

provisions as per Condition B2c SSD 7709.

Anzac Road

2.5m wide landscaped bay every 6-8 car spaces to provide shade as per

3. Proposed Canopy Tree Planting in accordance with

4. Proposed Canopy Tree Planting in accordance with

30

9.

1. Proposed secure sight lines through planting to incorporate ‘Safety by Design’

principles as per Condition B57 (b) SSD 7709

2. Proposed Canopy Tree Planting to incorporate ‘Safety by Design’

principles as per Condition B2c SSD 7709

3. Proposed Canopy Tree Planting to incorporate ‘Safety by Design’

principles as per Condition B2c SSD 7709

4. Proposed Canopy Tree Planting to incorporate ‘Safety by Design’

principles as per Condition B2c SSD 7709

5. Proposed Canopy Tree Planting to incorporate ‘Safety by Design’

principles as per Condition B2c SSD 7709

6. Proposed Canopy Tree Planting to incorporate ‘Safety by Design’

principles as per Condition B2c SSD 7709


due to the mitigation of views

proposed

Serves to enhance the habitat of the conservation area with species common to vegetation found within the area.

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The warehouses have been located to provide opportunities for landscaping and screen planting along the western edges of the facade, responding to visual receptors to the Casula industrial area. New planting will be introduced along the warehouse western edges of the facade to reinforce the existing ecological buffer zone. These will include plants consistent with the Cumberland Plain Woodland such as Eucalyptus tereticornis and Eucalyptus punctata. The existing planting will be supplemented with new trees and understorey planting to be retained where feasible to do so in the 10m extension of the buffer zone.

The proposed landscape works are designed to reinforce the existing ecological buffer zone and provide environmental mitigation. The warehouses have been designed to address the potential for visual and environmental impacts as per Condition B72 and B74 SSD 7709. Extent of planting is to be addressed in further detail at Detailed Documentation stage.

Proper Canopy Tree Planting

Proposed Canopy Tree Planting in accordance with Compliant Canopy Tree Schedule and Plant Schedules and per SSD 7705 SSD 2021

1. Trees sized and located to provide a canopy gap of at least 5m per Condition B72 and B74 SSD 7709

2. Proposed canopy tree planting to be designed in accordance with the ‘Safety by Design’ principles as per Condition B72 and B74 SSD 7709

3. Proposed Canopy Tree Planting to provide necessary screening from Casula as per B71 SSD 7709

4. Ensure the planting along the warehouse western edges is carried out to ensure visual screening as per Condition B72 and B74 SSD 7709

5. Ensure canopy tree plantings are carried out to ensure visual screening as per Condition B72 and B74 SSD 7709

6. Ensure Canopy Tree Planting is to be carried out in accordance with the ‘Safety by Design’ principles as per Condition B72 and B74 SSD 7709

7. Ensure Canopy Tree Planting is to be carried out in accordance with the Cumberland Plain Woodland such as Eucalyptus tereticornis and Eucalyptus punctata.

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DESIGN STATEMENT

The warehouses have been located to provide opportunities for landscaping and access planning along the eastern slopes of the Boulevard, expanding to visual thresholds to the south of the Boulevard and to the west of the Estate Road. This strategy provides opportunities for connecting built forms with the surrounding tapestry of hills and woodland. The proposed landscaping aims to ensure views of large trees, adding shade and amenity to the land-based areas and reducing the built form effect in these areas.

A variety of hard and soft - small and large - are proposed to create a landscape in the proposed landscape works.

LANDSCAPE PLAN - WAREHOUSES 2A & 2B

SCALE: 1:1000 @ A1 (1:2000 @ A3)

PLANT IMAGES

Eucalyptus sideroxylon
Coriaria maculata
Corymbia furlaniifolia
Corymbia maculata

KEY PLAN

LEGEND

1. Screen planting around offices, providing solar and urban amenity, as per Condition B77 (a) and B78 as per SSD 7709
2. Proposed fence height through planting to incorporate stability by Design principles as per Condition B77 (b) SSD 7709
3. Proposed Concrete Planting provided for amenity screening from roads as per SSD 7709
4. Monitoring survey for recreational and vehicular activities as per SSD 7709
5. Canopy tree planting around perimeter of site for visual mitigation as per Condition B57 (a) SSD 7709
6. Existing trees to be retained where feasible and provided to do so, shall be retained on site within the buffer zone: or external to the buffer zone. The existing trees on site will be replaced in accordance with Condition B61 as per SSD 7709
7. Tree & Landscape setback from the BOUNDARY to warehouse south as per Condition B63 SSD 7709
8. Permanent x-listed species must be included with vegetation as per Condition B57 (f) SSD 7709
9. Building (including existing and new development) planning – to be assessed within the context of the proposed set back. The existing plan will be replaced in accordance with Condition B61 SSD 7709
10. Tree & Landscape setback from the BOUNDARY to warehouse north as per Condition B63 SSD 7709
11. Canopy tree planting inside up to 10m of warehouse as per SSD 7709
12. Canopy tree planting along sides of the road and to maintain visual and amenity standards as per B77 and B78 SSD 7709. Exact location of planting to be addressed in further detail at Detailed Documentation stage
DESIGN STATEMENT

The warehouses have been located to provide opportunities for landscaping and screen planting along the western edges of the facades responding to visual receptors in the zone of development. This arrangement allows for maximum planting along the western side of the industrial road. This landscaping provides opportunities for screening built forms from the surrounding urban context. The proposed planting areas comprise a mix of both small and large tree species and a variety of tree forms – both small and large – are proposed to create a hierarchy in the proposed landscape works.

A variety of trees: small and large - are proposed to create a hierarchy in the proposed landscape works.

Proposed Canopy Tree Planting in accordance with Condition B57 (e) SSD 7709

Existing trees to be retained where feasible and practical to do so. Supplementary tree planting is to be addressed in further detail at Detailed Documentation stage.

Existing Riparian Corridor

The warehouses have been located to provide opportunities for landscaping and screen planting along the western edges of the facades, and understorey planting commensurate with the local plant communities in the buffer zone. The existing planting will be supplemented with new trees present in the conservation area. These will include plants consistent with the variety of tree forms – both small and large – are proposed to create a hierarchy in the proposed landscape works.

The warehouses have been located to provide opportunities for landscaping and screen planting along the western edges of the facades responding to visual receptors in the zone of development. This arrangement allows for maximum planting along the western side of the industrial road. This landscaping provides opportunities for screening built forms from the surrounding urban context. The proposed planting areas comprise a mix of both small and large tree species and a variety of tree forms – both small and large – are proposed to create a hierarchy in the proposed landscape works.

A variety of trees: small and large - are proposed to create a hierarchy in the proposed landscape works.
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Project Address: Moorebank Avenue, Moorebank, NSW

MOOREBANK PRECINCT WEST STAGE 2

LANDSCAPE AREAS PLAN 2
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MOOREBANK PRECINCT WEST STAGE 2
Project Manager

1:200 @ A1 (1:400 @ A3)

PROPOSED CANOPY PLANTING PROVIDING NECESSARY SCREENING FROM CASULA AS PER CONDITION B57 (E) SSD 7709

MEANDERING PATHWAYS FOR RECREATIONAL AND VARIED WALKING EXPERIENCES AS PER CONDITION B60 SSD 7709

SCREEN PLANTING AROUND OFFICE PROVIDING VISTOR AND WORKER AMENITY AS PER CONDITION B57 (A) AS PER SSD 7709

0 1 2 3 4 5m

LANDSCAPING

Estate Road

OSD

SITE 1A

WAREHOUSE 1A

SITE 2B

CMH PARK

CVY - WH 1A

CVY - WH 1B

CVY - WH 3A

IMT FACILITY

Estate Road

WAREHOUSE 2A

WAREHOUSE 2B

WAREHOUSE 3B

PROPOSED CANOPY PLANTING PROVIDING NECESSARY SCREENING FROM CASULA AS PER CONDITION B57 (E) SSD 7709

MEANDERING PATHWAYS FOR RECREATIONAL AND VARIED WALKING EXPERIENCES AS PER CONDITION B60 SSD 7709

SCREEN PLANTING AROUND OFFICE PROVIDING VISTOR AND WORKER AMENITY AS PER CONDITION B57 (A) AS PER SSD 7709

0 1 2 3 4 5m

LANDSCAPING

Estate Road

OSD
PROPOSED SECURITY SCREEN PLANTING TO INTEGRATE SAFETY BY DESIGN PRINCIPLES AS PER CONDITION B57 SSD 7709 - SENSITIVE AREAS

SCREEN PLANTING PROVIDING VISITOR AND WORKER AMENITY AS PER CONDITION B57 SSD 7709

LOCAL LANDSCAPE SETBACK FROM MOOREBANK WITH MINIMUM 10M LANDSCAPED WIDTH OF 10M AS PER CONDITIONS B55 & B57 SSD 7709

MEANDERING PATHWAYS FOR RECREATIONAL AND MIXED WALKING EXPERIENCES AS PER CONDITIONS B55 SSD 7709

ROAD SECTION 03 - MOOREBANK AVE TO TERMINAL

SCALE: 1:200 @ A1 (1:400 @ A3)
OUTLINE LANDSCAPE SPECIFICATION

General
Maintenance shall mean the care and maintenance of the landscape works by accepted horticultural practice as modifying any defects, disfigurements or deficiencies apparent in the landscape works under normal use. The landscape contractor shall attend the site on a weekly basis to maintain the landscape works for the full term approved at GCC stage of the maintenance period (commencing from practical completion).

Rubish Removal
During the term of the maintenance period the Landscape Contractor shall undertake rubbish removal from the site on a weekly basis to ensure the site remains in tidy condition.

Weed Eradication
Weed growth that may occur in, planted or mulched areas is to be removed using environmentally acceptable methods i.e. non-chemical methods backhoes, e.g. Roundup, applied in accordance with the manufacturer’s directions) or hand weeding.

Tree Replacement
Trees shall show signs of healthy vigorous growth and be free from disease and not exhibit signs of stress prior to handover to the client. Any trees or plant that die or fail to thrive, are damaged or stunted will be replaced. Replacement material shall have the same maintenance period extended in accordance with the landscape contract conditions. Trees and plant materials shall be sourced from reputable suppliers to site. Should the condition fail from the approved sample the Superintendent reserves the right to reject the tree/plant.

Pest Management
Selective spraying may be required during the period of establishment to provide a balanced canopy structure. These activities shall be carried out to the best horticultural and industry practice. All pesticide requirements to be removed from site.

Irrigation
A low volume drip irrigation system may be installed at the discretion of the Developer. Position of control box, solenoids and filtration shall be selected by the landscape architect. Controllers shall be mounted on a stable wall, power reel, or formed and constructed concrete based pedestal mount. Performance specifications to be provided by landscape architect, normally 2400L per day to plant areas each week during establishment (depending on weather conditions). After establishment, irrigation rates can be decreased in certain areas of the landscape depending on the species.

Watering
Implement an appropriate hand watering regime in areas not irrigated in association with current watering programme to maintain plant health and vigour. The program shall reflect seasonal conditions and plant species.

Frequency: weekly as required.

Drainage
All landscape areas are to have positive drainage to SW systems. If areas of poor drainage are identified on site then this should be brought to the site superintendent’s attention. Install agg lines if required.

Soils
Horizon A - Garden beds on natural ground
A sandy loam to clay loam topsoil mix designed for general purpose, e.g. landscape garden beds planting of grasses, woody plants, ground cover. Suitable for high intensity requirements for maintain an optimum growth, and can be relocated by compaction by machinery and other traffic. However textured soils in this specification may require engineered solutions where excessive wear is anticipated. Note: that organic soil content should not be more than 20% for fine leaved grasses and should not be used below 250mm.

Horizon B - Garden beds on soil
This specification describes the formation of an open granular well drained growing media with a saturated density of less than 2400 kg/m3 (2.4kg/L) for use in in-situ applications, including roofs with an expectation of longevity. It is a topsoil formulation to be used in the surface 500mm of all on-site installations including planter boxes, containers and garden beds. In association with a selected growing media or suitable growing media it promotes soil aeration and water infiltration, preventing ponding and waterlogging. This media may be used in conjunction with a select range of synthetics to increase water retention and nutrient delivery. In all cases the soil shall be designed and delivered to suit project specific conditions. Physical properties of the planting media is to be assessed using the methodology of AS 3745.

Cultivation
All garden beds to be cultivated to a minimum depth of 150mm and tree pits to the depth of the root ball only. If additonal such as gypsum are required contact the site superintendent to carry out cultivation into the top 100mm of soil.

Planting
Planting to be carried out in accordance with site specifications. Contractor to prepare site for planting including eradicating, grading, leveling, excavation. Excavate a hole for each plant large enough to provide root space, and not less than 100m away from the root system of the plant. For tree planting each hole shall be dug with a shovel, backhoe or similar tool. Individual holes shall be excavated to allow root system to sit flat on the excavated hole and 400mm to each side of the root ball. Basalt planting boxes with existing soil and topsoil as described in section ‘Soil’. I tree shall be set plants, with the root ball set slightly below the final soil level.

Matching
The Landscape Contractor shall supply and install 10mm Pine Bark Bark to all garden beds shown on the landscape plans, to a depth of 50mm. All mulch to be free of any deleterious material and foreign matter. Basalt to a depth of 50mm with mulch as specified,600mm to free of any woody material impregnated with CCA or similar toxic treatment. Maintain water retention rings around trees. Top up mulch levels prior to handover to client.

Turfing
Requires a sandy loam 'free underlay' topsoil mix designed to provide moderate resistance to compaction in public and other amenity turf areas subject to moderate levels of pedestrian traffic. The blend provides superior water holding capacity but is not suited to active recreational or sporting field use.

Pest and Disease Control
The Landscape Contractor shall spray for pests and disease infestations when the pest and fungal attack has been positively identified and when their populations have increased to a point that becomes detrimental to plant growth. Apply all pesticides to manufacturer’s directions.

Frequency: weekly inspection

Fertilisation
Packets shall be in the form intended to uniformly release plant food elements for a period of approximately nine months equal to 1200g/kg. Packets shall be applied at the time of planting to the base of the plant. 500mm minimum from the root collar at a rate of two packets per 3000m² of top growth to a maximum of 6 packets per tree. Generically inputs for signs of nutrient deficiencies (paling of leaves, failure to thrive), and adopt fertiliser regime to suit. Fertiliser should be applied at the beginning and the end of the (summer) growing season.
4.4 URBAN HEAT ISLAND MITIGATION
STRATEGIES MODELLING
Introduction

Integral Group built a model of the MPW site based on the local weather data, using the Grasshoper software and Urban Weather Generator engine, to compare it to the neighbouring industrial sites and measure the impact of the UHI Mitigation Strategies suggested in the condition B48.

Several strategies were modelled by Integral Group to get a more realistic understanding of the strategies achieving the outcomes specified in the condition of consent – a 4°C degree decrease in temperature compared to neighbouring industrial developments.

The UHI model considers the site and adjacent conservation area, as shown by the yellow outline above.
Implementation

Next mitigation strategies from the condition B48 have been incorporated in the design:

- **Shade tree planting** – tree canopies intercept and dissipate the incoming solar radiation through reflection, absorption and transmittance. The obstruction of solar radiation from the street trees, results in a smaller Sky View Factor and a decrease in the UHI effect. The site benefits from 12% tree canopy shading based on a 1-per-30 tree spacing which will increase shading, cooling and energy saving. This has been captured in the UHI model.

- **WSUD** – bio-retention system, such as On-Site Detention (OSD) have the ability to increase infiltration and evapotranspiration. The evapotranspiration component of the site OSD is not able to be captured in the UHI model due to software limitations, and will provide an additional benefit to the results presented. The benefit of vegetative coverage associated with OSD are captured in the model and results.

- **Vegetation ground cover** – will reduce energy use by lowering surrounding air temperatures, thereby reducing demand on cooling systems, as well as reduce site stormwater runoff due to increased infiltration, thereby reducing flood impacts and increase groundwater input. Vegetative ground cover has been captured in the model and represents 22% of the site area (including the conservation area).

- **Use of ‘cool’ building and pavement materials** (i.e. those with high reflectivity in the infrared spectrum) – will reflect incident solar energy back into the atmosphere and reduce energy use by lowering surrounding air temperatures, thereby reducing demand on cooling systems. All roofs on the site will receive a cool-roof treatment (albedo of 0.65)

The Green Roofs strategy has not been included in the design, as it is not a suitable and applicable design for the industrial project.
Site Context / Weather Data

- The project site is the new Moorebank Precinct West
- This analysis uses local weather data from the Holsworthy weather station
Methodology

• Integral Group has analyzed the Moorebank Precinct West Stage 2 Site using the state-of-the-art Urban Heat Island analysis tool.

• The model is built in Grasshopper and uses the Urban Weather Generator (created by MIT) to predict UHI conditions based on a variety of site inputs.
Modeling Inputs

Currently Model includes following UHI Mitigation Strategies:

- 43% of site is Vegetation
  - 7.5% OSD
  - 12.5% landscaping and trees
  - 23% Conservation Area
- High Albedo Roof (0.65)
- High Albedo Wall (0.45)
- Energy efficient building design (4-star Green Star equivalent)
- Building Overhangs providing localized Shading

Additional Key Parameters in model:

- 18% of site is Building footprint
- 39% of site is Hard Surfaces (concrete and asphalt)
UHI, Surface and Canopy Temperature

When discussing Urban Heat Island, there are two predominant temperatures that are considered:

1. **Surface Temperature** – this is the temperature of the surface, often captured by satellite images and also called Land Surface Temperature. Typical Intensity can vary by +/- 10°C due to UHI effects.

2. **Canopy Temperature** – when looking at models of urban areas, climate scientists will typically model the air temperature within the urban canopy (the height capped by the tallest buildings). It has a smaller Intensity, given the nature of air temperature, and can vary by +/- 1 to 2°C due to UHI effects.

The following data has been pulled from a UHI study performed by Azevedo et al 2016 at the School of Geography, Earth and Environmental Sciences, University of Birmingham found the following correlation between Land Surface Temperature (LST) and Canopy Air Temperature: a 1°C difference in UHI Canopy Temperature correlated to approximately a 4°C difference in UHI Surface Temperature.
UHI Mitigation Strategies Impact on Surface Temperature

Integral Group have built a model of the MPW site to show the benefit of adding UHI Mitigation Strategies.

Similar to the modelling results of MPE, this chart shows the temperature difference for each hour of the year for a design with no UHI MS versus a design including UHI MS.

Appendix C provides additional detail on how to interpret these flood plots.

The blue band throughout the centre of the graph indicates that there is a 1°C temperature reduction in canopy temperature for most hours throughout the year between 6am and 6pm due to the inclusion the UHI MS. This 1°C canopy temperature reduction correlates to a 4°C reduction in Surface Temperature.
Integral Group have built a model of the DJLU site, including the landscape, tree and building coverage, and compared it to the MPW site with the UHI Mitigation Strategies.

Similar to the modelling results of MPE, the light pink colour in the graph demonstrates that the MPW site performs $1^\circ\text{C}$ warmer than DJLU over summer months.

Note that DJLU is not an ideal ‘peer’ site due to a significantly different site usage.
The Goodman site layout is more similar to MPW, and is good comparison point for the MPW site performance. Our site has a large amount of landscaping and less hardscape and building mass. This results in some hours of increased temperature during the day (because there is no mass to absorb the incoming solar radiation) and reduced temperatures at night (while Goodman is releasing building heat back into the environment).

Overall our site is typically cooler than Goodman.
Sensitivity Analysis (Greenfield Site vs Developed Site)

A sensitivity analysis has been undertaken at the outset to determine which means of measurement should be applied. Based on the modelling efforts (including full tree and grass coverage of the site with no buildings) and referenced literature, a 4°C Canopy Temperature reduction is not achievable. However, the 1°C canopy temperature reduction correlates to a 4°C surface temperature reduction which aligns with the project goals.

This correlation is based on the study by Azevedo et al 2016 described on slide 6.
Conclusion

1. The modelling shows that the Mitigation strategies that have been incorporated into the MPW Stage 2 design have contributed to achieving a 4°C reduction in surface temperature.

2. Current MPW Stage 2 design achieves 4°C reduction in comparison to the neighbouring industrial site, based on the examined and modelled strategies.

3. A further sensitivity analysis shows that there are diminishing returns in further increasing the density of vegetation across the site. Hence, no additional vegetation is required, as the current landscaping presents sufficient reduction.
Appendix A – UHIMS Implementation and Materials

The UHI modelling compared a ‘business-as-usual’ development against this project implementing best practices. **The results of the analysis indicate that the implementation of UHIMS can reduce canopy air temperature by up to 1°C compared to a ‘business-as-usual’ design without UHIMS.**

<table>
<thead>
<tr>
<th>UHI Models</th>
<th>Business-as-Usual</th>
<th>MPW Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof Area</td>
<td>224,500 m²</td>
<td>224,500 m²</td>
</tr>
<tr>
<td>Roof Albedo</td>
<td>0.15</td>
<td>0.65</td>
</tr>
<tr>
<td>Reference Material</td>
<td>Standard Coloured Metal Albedo 0.15</td>
<td>Colorbond Coolmax Albedo 0.77</td>
</tr>
<tr>
<td>Tree / Landscape Coverage</td>
<td>Same as Design</td>
<td>12% tree + 22% landscape UHI Site boundary includes conservation area</td>
</tr>
<tr>
<td>Site Hardscape</td>
<td>Albedo 0.10 (Site Average)</td>
<td>Albedo 0.19 * (Site Average)</td>
</tr>
<tr>
<td>Reference Material</td>
<td>Asphalt Concrete (0.05 – 0.10 albedo)</td>
<td>Light Colour concrete (0.25-0.40 albedo)</td>
</tr>
</tbody>
</table>

*Design Hardscape albedo was calculated on the following materials:
63% of hardscape is asphalt with an albedo of 0.10
37% of hardscape is concrete with an albedo of 0.35

Appendix B – Urban Heat Physics

Solar Reflectance = Albedo;
Solar Reflectance Index (SRI): metric combining reflectance and emittance

Description of “cool” materials and colour:
High albedo, or reflective, surfaces that reflect most of the light and heat that hits the surface. These surfaces are known as cool surfaces and can help to mitigate the urban heat island effect. Cool surfaces include cool (white) roofs, light pavements and roads. Alternatively, high albedo surfaces like asphalt roads absorb heat and radiate that heat to the surrounding areas.

Specialist paints used for cool roofs has the technology to maximise sun and heat reflection. Not all cool roof products are white there are many products which use darker pigments that still maintain a high solar reflectance.

General Description of Glare
A detailed glare assessment has not been included in this study. Generally: Higher reflective roofs contribute to glare, and is most problematic when taller buildings overlook the rooftops from the south.

Higher albedo paving materials are typically much lower reflectivity than are cool roofs:

High albedo pavement: 0.15 to 0.40;   High albedo roofing: >0.65
Appendix C – Flood Plot Data Review

Flood plots are a useful way to graph data across an entire year.

Annual air temperature (dry bulb) is shown at right as an example.

UHI has been assessed by comparing the difference in air temperature between two different scenarios.

The chart below compares the air temperature at each hour between a urban model with UHIMS against one without UHIMS. Each blue pixel represents an hour of the year where the model with UHIMS is cooler than the model without. Red pixels represent an hour of warmer temperature.

Model with UHIMS has some warmer night time hours, but infrequently during summer

Model with UHIMS shows cooler daytime temperatures. This is due to higher surface reflectivity.

Warmer afternoons and evenings
Cooler mornings
Cooler winter midday
Warmer summer midday
## Response to Independent Review Issues - Urban Heat Island Mitigation

<table>
<thead>
<tr>
<th>Item</th>
<th>Reviewer Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“This is an important aspect of the master plan scheme and - given the large areas of warehouse roof and hardstand - this will be an obvious area of scrutiny. On the face of it warehousing projects will always be associated with UHI impacts. When I read this page, I’m not clear what the master plan specifically offers.”</td>
<td>The implementation of UHIMS is covered in detail in the MPW UHIMS Modelling report. The report quantifies the benefit of implementing UHIMS over ‘business-as-usual’ design, and compares the design to adjacent sites. The results presented in this report are in draft format, and are in the process of being finalized based on the latest site layout. Integral has added “Appendix A – UHIMS Implementation and Materials” to the modelling report that more clearly defines the business-as-usual baseline, and the strategies implemented on this site to minimize the impact of UHI.</td>
</tr>
<tr>
<td>2</td>
<td>“The 5 bullet points are positive, but I wanted more (spatialised) information on where these things occur within the master plan”</td>
<td>Integral has amended page 3 (“Implementation”) of the modelling report to more clearly show where UHIMS are implemented, and quantified the implementation of each UHIMS.</td>
</tr>
<tr>
<td>3</td>
<td>“what high albedo material means when it comes to large roofs and areas of hardstand. Is it white to reflect light and heat? Doesn’t this add to glare? Won’t the hardstand still radiate heat?”</td>
<td>Integral has added “Appendix B – Urban Heat Physics” to the modelling report to describe the relationship between albedo and colour. A detailed glare study has not been performed, and general feedback on glare is provided. The hardstand will absorb less heat (due to higher albedo) reducing the impact of UHI.</td>
</tr>
<tr>
<td>4</td>
<td>“The blue/red graphs need explanation.”</td>
<td>Integral has added “Appendix C – Flood Plot Data Review” to the modelling report</td>
</tr>
<tr>
<td>5</td>
<td><em>Additional Report Updates for clarity</em></td>
<td>We have clarified that DJLU is not an ideal ‘peer’ site due to a significantly different site usage.</td>
</tr>
</tbody>
</table>
4.5 INDEPENDENT PEER REVIEW REPORT

During the development of this Urban Design Development Report, Matthew Pullinger [FRAIA, Registered Architect: 6226] was engaged to author an Independent Peer Review Report, as required under Condition B55 of the consent. The report author was actively involved in the refinement of the urban and landscape design strategies detailed in the UDDR over a period of approximately 5 months, as detailed below:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 July 2019</td>
<td>Introduction to project and requirements</td>
</tr>
<tr>
<td>8 July 2019</td>
<td>Email response outlining issues to be considered in UDDR</td>
</tr>
<tr>
<td>25 July 2019</td>
<td>Project team workshop 1</td>
</tr>
<tr>
<td>22 October 2019</td>
<td>Draft UDDR received</td>
</tr>
<tr>
<td>24 October 2019</td>
<td>Response to draft UDDR documentation</td>
</tr>
<tr>
<td>4 November 2019</td>
<td>Revised UDDR and design drawings received</td>
</tr>
<tr>
<td>6 November 2019</td>
<td>Project team workshop 2</td>
</tr>
<tr>
<td>15 November 2019</td>
<td>Final UDDR and design drawings received</td>
</tr>
<tr>
<td>13 December 2019</td>
<td>Peer review report finalised</td>
</tr>
</tbody>
</table>
Mr Mark Griffiths  
Development Manager  
Qube Holdings  
L27, 45 Clarence Street  
SYDNEY NSW 2000

Mark.Griffiths@qube.com.au

Dear Mark,

Urban Design and Landscape - Independent Peer Review Report

01 Background and Purpose

On 11 November 2019, the Independent Planning Commission granted development consent for a State Significant Development application referred to as Moorebank Precinct West Stage 2. The project forms the latest stage in the development of a significant intermodal freight terminal at Moorebank in Sydney’s west.

This peer review report serves to address a series of related conditions of approval, which accompanied the development consent.

The central and most relevant conditions of consent, B55 and B56, have been copied from the Development Consent (in italics) as follows:

Urban Design and Landscape Independent Peer Review


B56 The review must:

(a) be undertaken by an expert(s) in urban design and landscaping (for example, a member of the State Design Review Panel);

(b) include an assessment of the Revised Landscape Design Drawings, Revised Architectural Drawings and supporting documentation against the objectives and urban design principles established in the Urban Design Development Report and all relevant conditions, stating whether the drawings demonstrate achievement of the objectives and urban design principles and that all relevant conditions of this consent have been satisfied; and

(c) include comments justifying conclusions reached in the assessment.
02 Report Authorship

This Urban Design and Landscape Independent Peer Review Report has been prepared by Matthew Pullinger. Matthew is an award-winning architect and urban designer whose interest and experience lies in the design of the city and urban centres, urban transport systems, recreational and cultural precincts, commercial office buildings and also in the design of mixed use residential projects.

Matthew has worked on strategic projects at all scales and in public policy supporting good design in the built environment.

Matthew is a Past President of the Australian Institute of Architects (NSW) and an inaugural member of the NSW State Design Review Panel formed in April 2018.

03 Report Structure and Methodology

This report has been structured to directly address the requirements of conditions B55 and B56, and in doing so also further considers and addresses other relevant conditions of consent to the extent these relate to urban design and landscape design.

Where the requirements of a particular condition of consent are directly addressed in this report, the specific condition has been referenced using its identifying number (for example B55).

This report is to be read in conjunction with the Moorebank Precinct West Stage 2 Urban Design Development Report (UDDR), dated 15 November 2019, authored by architects and urban designers Reid Campbell.

In turn, the UDDR has been prepared to address conditions of consent B52 and B53, which require a considered and coordinated design approach - effectively a 'master plan' - to address a wide range of environmental and development issues (B48, 49, 57, B59-B74, and B75-B81).

Ultimately, the resolved design objectives and strategies identified by the UDDR are documented in the Revised Landscape Design Drawings (prepared by Ground Ink) and Revised Architectural Drawings (prepared by Reid Campbell) - each dated 22 November 2019. These revised drawing sets require the approval of the Planning Secretary prior to the commencement of permanent built works on site.

Generally, this peer review report follows the structure of the UDDR and moves from more strategic and metropolitan urban design issues towards increasingly site specific urban design, landscape and site planning issues.

Each design issue is discussed in terms of the opportunities and constraints present in the project, and considers the resulting design strategies that have been developed in response to the site and project requirements.

The author of this report was engaged in July 2019, receiving a project briefing at that time. The author provided preliminary urban design and landscape design advice, which subsequently influenced the development of the Urban Design Development Report (UDDR) and accompanying landscape and architectural design documentation.
The report author was actively involved in the refinement of urban design and landscape design strategies over the period of approximately 5 months as noted below:

- **6 July 2019**  Introduction to project and requirements
- **8 July 2019**  Email response outlining issues to be considered in UDDR
- **25 July 2019**  Project team workshop 1
- **22 October 2019**  Draft UDDR received
- **24 October 2019**  Response to draft UDDR documentation
- **4 November 2019**  Revised UDDR and design drawings received
- **15 November 2019**  Final UDDR and design drawings received
- **13 December 2019**  Peer review report finalised

**04 Metropolitan Context and Project Benefits**

The Moorebank Precinct West Stage 2 project is a major logistics and warehousing facility, playing a pivotal role in the future of freight logistics and transport for NSW.

Comprising a direct heavy rail freight link with existing container facilities at Port Botany, the project will distribute containers from ships via rail to the Moorebank site in western Sydney, where warehousing and logistics facilities will enable their forward distribution across the metropolitan area and elsewhere within NSW and the eastern seaboard, primarily via the arterial road network, including the M5 and M7 motorways.

The direct benefits to metropolitan Sydney and NSW include not only more efficient freight distribution, associated employment and economic benefits - key objectives of strategic metropolitan planning - but also specifically through reduced demand for road-based containerised freight conveyed through inner-urban streets and roads.

Upon completion, the project reduces the need for up to 3,000 heavy vehicle journeys every day along over 30km of inner-urban streets and roads. This equates to over a million fewer truck movements every year.

The corresponding reductions in carbon emissions and inner-urban congestion attributable to the project are significant and closely aligned with environmental and amenity objectives described in all metropolitan planning documents and policies.

The strategic urban design case in support of the project is clear and particularly strong.

**05 Regional Context and Landscape Setting**

The project is situated within an approximately 220 hectare site, formerly controlled by the Commonwealth Department of Defence, strategically valuable due to its direct access to the Southern Sydney Freight Line and the M5 motorway.

Located within the western Sydney basin in an area forming part of the original Cumberland Plain Woodland ecological community, the site benefits from approximately 3km of sensitive riparian frontage to the Georges River, which forms the western site boundary. The site’s eastern boundary is formed by the existing Moorebank Avenue.

The site is approximately 5km south of the major urban centre of Liverpool. Approximately 2km to the east lies the residential suburb of Wattle Grove. To the east, across the Georges River, is the residential suburb of Casula. South of the site is the extensive Commonwealth Department of Defence land holdings, comprising Holsworthy Barracks.
Within this regional context the project presents an inherent tension between the demands of a major warehousing and logistics facility, and the site’s ecological and biodiversity values, along with its sensitive riparian landscape setting on the Georges River.

This tension is resolved in large part by the siting and design strategies deployed to balance the operational requirements for large format warehouse structures and the extensive hardstand necessary for accommodating heavy vehicle access and movement, situated within an ecologically valuable riparian setting.

06 Urban Design Strategies and Site Planning

The predominant siting and design strategy guiding the project has been to establish a clear distinction between the ‘operational’ and ‘conservation’ components of the project.

Generally, the western, river-edge portion of the site - which includes flood affected areas - has been designed to accommodate conservation and biodiversity functions. Adjacent to this conservation area, additional open space has been provided for water sensitive urban design (WSUD), and stormwater detention and treatment prior to discharge into the Georges River system.

The western-most estate road is then configured to strongly delineate between operational logistics and warehousing functions to the east, and conservation, biodiversity and WSUD functions to the west.

Alternative potential design strategies - such as a more integrated or mixed approach to operational and conservation areas - were considered, but discounted after careful evaluation.

Conceptually, a more integrated or mixed arrangement of operational and conservation areas appealed strongly to the design team. However, the sensitive ecological, hydrological and biodiversity values of large portions of the site were found to be incompatible with the operational requirements for large format warehousing and associated hardstand. Similarly, the incorporation of sufficient space within the operational areas of the site to achieve meaningful conservation values was not possible without eroding the functional relationships and efficient performance of the logistics and warehousing facility.

On this basis, the adopted siting and design strategy is considered to be the most optimal approach to resolving the inherent tension implicit within the project, and also contributes to satisfactorily addressing conditions of consent B48, B49, B57, B59, B60, B67 and B68.

07 Contribution to Sydney’s ‘Green Grid’

The NSW Government Architect has recently published a series of significant design policy documents - Better Placed, Greener Places and the Green Grid - that collectively focus attention on the ongoing expansion and strengthening of Sydney’s Green Grid - a network of open space and hydrological systems that traverse the extent of greater metropolitan Sydney.

In the immediate vicinity of the site, the Georges River is the major ecological and recreational corridor linking other natural assets, such as the land associated with Holsworthy Barracks, with adjacent urban areas, including connecting to the city of Liverpool, which lies approximately 5km to the north of the site.

The project presents an important opportunity to further strengthen the recreational, ecological and physical links between these natural assets and at the same time deliver a distinctive sense of place and memorable character to the project.

The creation within the site of significant open space for conservation and WSUD functions, along with the provision of additional contiguous open space associated with
well-vegetated car parks and shaded outdoor space providing amenity for workers and visitors to the facility all positively contribute to the policy objectives set out in Better Placed, Greener Places and the Green Grid.

On this basis, the UDDR describes appropriately detailed landscape design strategies, which are further documented in the Revised Landscape Design Drawings are considered to satisfactorily address condition of consent B57.

08 Detailed Landscape Design Response

The detailed landscape design response outlined within the UDDR is predicated upon a series of inter-related objectives, which include:

- Provision of high levels of amenity for workers and visitors
- Visual integration of built form within the landscape setting and urban tree canopy
- Integration of areas for conservation and water cycle management

The specific design response to achieve these objectives has been structured around sound landscape design principles including the following:

- Use of native vegetation species to improve conservation and biodiversity values
- Establishment of linkages to facilitate movement within and beyond the site
- Creation of new, well-vegetated access roads and streets
- Introduction of extensive new open space areas with corresponding tree canopy

The use of locally indigenous plant species, consistent with the ecological communities of the endangered Cumberland Plain Woodland, is strongly supported and is evident throughout the UDDR and Revised Landscape Design Drawings.

The provision of useful, open space at least equivalent in area to 15% of the total area of the proposed warehouses has been situated to the west of the warehouses in a configuration that creates a meaningful and contiguous new extent of urban tree canopy. In this location the new vegetated open space will also mediate between the ‘operational’ and ‘conservation’ functions of the project and incorporate space allocated to WSUD functions.

Similarly, upon maturity, the proposed vegetation will envelope the large format warehouses and positively assist to integrate these large structures into their landscape setting, a strategy that will also minimise visual impacts of built form when viewed from Casula, west of the Georges River.

The establishment of a meaningful area of large canopy trees is fundamental to the creation of a distinctive and memorable character for the facility, and the proposed strategy is supported.

Casula Station is approximately 200m from the western boundary of the site. However, in its existing configuration it is approximately 5km from the station by the most convenient road connection and an approximately 7km walk. The proposed provision for direct pedestrian access to Casula Station via a proposed bridge across the Georges River is supported.

Other pedestrian and cycle connections have been provided in the landscape design facilitating access across the site from north to south along both the Georges River frontage and also along Moorebank Avenue. Additional connections link east to west and align with the provision for pedestrian connection across the river to Casula Station.
A generous landscape setback regime, consistent with condition of consent B63, has been applied along Moorebank Avenue and the internal estate road network.

The detailed site and landscape planning locates the warehouse office structures and the freight village - places where workers and visitors are most likely to congregate - to maximise their engagement with, and relationship to, highly amenable, accessible and useful open space, also incorporating the necessary cycle parking, shaded meal break areas, lighting and the provision of drinking fountains.

On this basis, the UDDR outlines appropriately detailed landscape design strategies, which are further resolved and documented in the Revised Landscape Design Drawings, and are considered to satisfactorily address conditions of consent B57, B58, B59-62, B63, B64, B65, B66, B67 and B68.

Additionally, condition of consent B68 (a) requires the support of the independent peer reviewer in order for areas nominated as on site detention basins (OSD) to contribute to soft landscaping area calculations.

Given that the nominated conservation areas and OSD basins are co-located, generally on the western side of the internal estate road, and together form a contiguous pattern of open space, the inclusion of OSD basins within the calculations for landscape open space is supported.

The conditions of consent B69-74 relate to the detailed design of retaining walls, fencing and noise walls across the project. The specific requirements of these conditions have been carefully referenced and incorporated into the project documentation, the UDDR and Revised Landscape Design Drawings.

In the case of condition B74 (and also referred to in condition B129), there is a requirement for a 5m high noise barrier to be constructed along the western boundary of the internal estate road.

While this noise wall has been incorporated within the UDDR and the Revised Landscape Design Drawings, and has been designed to minimise visual and amenity impacts, the need for a noise wall and the compromises it creates to quality site planning was questioned through the peer review process.

Given the closest sensitive receivers are residential uses located in Casula, set a minimum of approximately 250m to the west, the effectiveness of the required noise barrier is questioned.

More relevant to the question of urban and landscape design quality is that the required noise wall serves to physically and visually sever the relationship between ‘operational’ and ‘conservation’ functions, diminishing the benefits that would otherwise be derived from the two functions being connected.

The independent peer review supports the deletion of condition of consent B74 (and B129) subject to alternative noise mitigation strategies - potentially delivered through landscape design - being demonstrated to be effective.
09  Urban Heat Island Mitigation

The extent of proposed warehouse roofing, coupled with associated hardstand areas for heavy vehicle movement and on-grade car parking represent a significant proportion of the total project site area, and will inevitably contribute to a local increase in the urban heat island effect at the site. This is an issue common to all similar industrial facilities.

Condition of consent B48 seeks to limit any increase in ambient air temperature when measured at ground level. It does so by targeting a 4°C comparative reduction in temperature when measured against the surface temperature of a typical industrial facility in the same locality.

Consequently, a comprehensive urban heat island mitigation strategy has been developed and incorporated into the project documentation. This strategy has been supported by the involvement of a specialist consultant.

The resolved urban heat island mitigation strategy deploys a series of measures including:

- Extensive areas of tree canopy, vegetated ground cover and green open space
- Building, roofing and paving materials with high albedo surfaces
- Energy efficient and passive environmental building design
- Water sensitive urban design

The potential introduction of green roofs was considered, but given the significant extent of roof area of the warehouse buildings, and the associated establishment and maintenance obligations, this was deemed prohibitive.

A related project commitment to incorporate a minimum of 30% of the warehouse building roof area for a photovoltaic solar array further diminished the benefit of introducing green roofs.

The possible application of smaller extents of green roofs was also considered, noting any such smaller extent of green roof would be emblematic of the importance of the issue, rather than convincingly mitigating against it. For this reason, smaller extents of green roofs were ultimately discounted in favour of the measures noted above.

The key findings of the specialist consultant’s report suggest the 4°C comparative reduction in surface temperatures will be achieved through the adopted measures.

On this basis, the UDDR outlines appropriately detailed landscape and architectural design strategies, which are further documented in the Revised Landscape Design Drawings and Revised Architectural Drawings, and which are considered to satisfactorily address condition of consent B48.

10  Ecologically Sustainable Development

A series of sound, ecologically sustainable development principles, further supported with commitments to achieve recognised sustainability performance ratings, underpins the design of the project.
The sustainability measures applied to the project include:

- Passive environmental design considerations, including natural ventilation
- Incorporation of renewable energy systems
- Selection of materials with lower embodied energy and higher recycled content
- Locally sourced materials
- Rainwater harvesting and reuse
- Water efficiency
- Waste management and minimisation
- 4 star Green Star design and as-built rating
- Infrastructure Council of Australia (ICSA) sustainability rating

Large format warehouse structures are inherently structurally efficient, optimising internal volume with long, lightweight structural spans. Consequently, the traditional configuration for this building type is finely tuned and highly efficient.

Additionally, the primary volume of each warehouse is designed adopting passive design principles, which maximise natural ventilation and cross ventilation. This building type does not rely on a conditioned internal environment. Eave overhangs and awnings associated with building entries create shade at the building perimeter for improved worker amenity and indoor environment.

A combination of opaque and translucent roofing material achieves high levels of natural light within the primary warehouse volume and is augmented with highly energy efficient lighting systems.

Although emerging technologies for long span cross laminated timber were considered (and are not discounted in future detailed design stages), they are less likely to achieve a cost benefit threshold for viability.

The primary structural solution for the warehouse buildings is therefore most likely to be based on steel framing, and the potential exists to specify high recycled content steel from locally based suppliers.

The commitment to achieve 4 star Green Star ratings in design and operation will incentivise more sustainable decisions during the detailed design of each warehouse.

A significant contribution made by the project towards the sustainability agenda is the commitment to instal a minimum of 30% of the total warehouse roof area as a photovoltaic array, to generate renewable energy for use within the facility and potentially for export to the electricity grid.

The commitment to achieve a recognised sustainability rating for each of the warehouse buildings, and for the associated infrastructure, through the Green Star and ICSA rating tools, will further drive the sustainability performance of detailed design solutions.

On this basis, the UDDR outlines appropriately detailed architectural design strategies, which are further documented in the Revised Architectural Drawings, and which are considered to satisfactorily address conditions of consent B49, B50 and B51.
11 Conclusion

In undertaking an independent peer review and in preparing this report, the author is satisfied of the strategic urban design merit presented by the project and notes the significant metropolitan-wide social, economic and environmental benefits derived from the project, particularly those offered by reducing heavy vehicles on the inner-urban street and road network, and the commitment to on-site renewable energy generation.

The site planning and urban structure adopted within the project is clear and compelling, organising the site into ‘operational’ and ‘conservation’ areas, with a positive relationship and interface within and beyond the site.

Importantly, the site planning, and particularly the configuration of the conservation areas, WSUD areas and the additional open space provide adjacent to the warehousing each directly contribute to the strengthening of Sydney’s ‘Green Grid’ improving the ecological values of the site and the Georges River.

Beyond these strategically valuable benefits, the detailed requirements of the various conditions of consent have been carefully considered through the design process and preparation of the UDDR, Revised Landscape Design Drawings and Revised Architectural Drawings.

In each case, the author is satisfied the urban design principles established in the UDDR address the detail of the relevant conditions, and further, is satisfied the corresponding drawings demonstrate achievement of the stated objectives and urban design principles.

A simple compliance matrix follows:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B48</td>
<td>Urban Heat Island Mitigation (UHIM)</td>
</tr>
<tr>
<td>B49, 50, 51</td>
<td>Ecologically Sustainable Development (ESD)</td>
</tr>
<tr>
<td>B52, 53, 54</td>
<td>Urban Design Development Report, Revised Landscape Design and Architectural Drawings</td>
</tr>
<tr>
<td>B55, 56</td>
<td>Urban Design and Landscape Independent Peer Review</td>
</tr>
<tr>
<td>B57</td>
<td>Landscape Design</td>
</tr>
<tr>
<td>B58</td>
<td>Design Criteria</td>
</tr>
<tr>
<td>B59, 60, 61, 62</td>
<td>Staff and Visitor Facilities</td>
</tr>
<tr>
<td>B63, 64, 65, 66, 67, 68</td>
<td>Landscaping</td>
</tr>
<tr>
<td>B69, 70, 71, 72, 73, 74</td>
<td>Noise Walls, Retaining Walls and Fencing</td>
</tr>
<tr>
<td>B75</td>
<td>Urban Design and Landscaping Supporting Information</td>
</tr>
<tr>
<td>B76</td>
<td>Lighting</td>
</tr>
<tr>
<td>B77, 78</td>
<td>Signage</td>
</tr>
<tr>
<td>B79</td>
<td>Building Floor Levels</td>
</tr>
<tr>
<td>B80, 81</td>
<td>Rainwater Re-use</td>
</tr>
</tbody>
</table>

As a consequence, this independent peer review report concludes that all relevant conditions of consent have been satisfied.

Please feel free to contact the author on 0413 990 052 should you wish to discuss any issues raised in this report.

Regards,

Matthew Pullinger FRAIA
Registered Architect: 6226
4.6 GANSW EVIDENCE OF CONSULTATION
CONSULTATION

This report has been prepared in consultation with Government Architects New South Wales (GANSW), as outlined in Table 1-1. Supplementary Information to support the consultation undertaken and endorsement provided is included.

Table 1-1 Consultation Summary

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>DATE</th>
<th>PERSON CONTACTED</th>
<th>CONSULTATION CONTEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GANSW</td>
<td>23/10/2019</td>
<td>GANSW Representative</td>
<td>Introduction to project and the role of the GANSW</td>
</tr>
<tr>
<td></td>
<td>28/10/2019</td>
<td>SIMTA Representative</td>
<td>Confirmation of request and advised that GANSW are having an internal meeting to discuss and will advise SIMTA</td>
</tr>
<tr>
<td></td>
<td>29/10/2019</td>
<td>SIMTA Representative</td>
<td>Advised that consultation is to be discussed with DPIE regarding State Design Review Panel</td>
</tr>
<tr>
<td></td>
<td>7/01/2020</td>
<td>GANSW Representative</td>
<td>Submitted email with consultation advise to GANSW</td>
</tr>
<tr>
<td></td>
<td>9/01/2020</td>
<td>GANSW Representative</td>
<td>Follow up call</td>
</tr>
<tr>
<td></td>
<td>10/01/2020</td>
<td>GANSW Representative</td>
<td>Follow up call</td>
</tr>
<tr>
<td></td>
<td>13/01/2020</td>
<td>GANSW Representative</td>
<td>Follow up call . GANSW returned email and advised that GANSW will provide advice on the 16th January 2020</td>
</tr>
<tr>
<td></td>
<td>16/01/2020</td>
<td>SIMTA Representative</td>
<td>Received advise stating GANSW wants to review the UDDR and Independent Reviewer- Landscape credentials.</td>
</tr>
<tr>
<td></td>
<td>21/01/2020</td>
<td>GANSW Representative</td>
<td>Sent copies of the UDDR and Independent Reviewer’s updated CV</td>
</tr>
<tr>
<td></td>
<td>23/01/2020</td>
<td>GANSW Representative</td>
<td>Follow up email</td>
</tr>
<tr>
<td></td>
<td>31/01/2020</td>
<td>GANSW Representative</td>
<td>Follow up email. GANSW returned call and advised will provide direction mid-week 05/02/20</td>
</tr>
<tr>
<td></td>
<td>06/02/2020</td>
<td>GANSW Representative</td>
<td>Provided advise on GANSW Consultation preferred actions.</td>
</tr>
<tr>
<td></td>
<td>07/02/2020</td>
<td>GANSW Representative</td>
<td>Follow up call regarding date of presentation</td>
</tr>
<tr>
<td></td>
<td>11/02/2020</td>
<td>SIMTA Representative</td>
<td>GANSW advised that advise will be provided shortly.</td>
</tr>
<tr>
<td></td>
<td>17/02/2020</td>
<td>SIMTA Representative</td>
<td>GANSW sent Calendar Invite for presentation on the 25/02/20. Replied that an earlier date would be preferable.</td>
</tr>
<tr>
<td></td>
<td>18/02/2020</td>
<td>SIMTA Representative</td>
<td>GANSW sent updated Calendar invite for presentation of the 03/03/20</td>
</tr>
<tr>
<td></td>
<td>27/02/2020</td>
<td>GANSW Representative</td>
<td>GANSW requested that specified attendees be included in the Calendar Invite.</td>
</tr>
<tr>
<td></td>
<td>16/03/2020</td>
<td>SIMTA Representative</td>
<td>Received formal correspondence from NSW Government Architects dated 16 March 2020 raising issues and queries</td>
</tr>
<tr>
<td></td>
<td>06/04/2020</td>
<td>GANSW Representative</td>
<td>Comprehensive response from SIMTA responding to all issues raised in correspondence dated 16 March 2020</td>
</tr>
<tr>
<td></td>
<td>06/04/2020</td>
<td>SIMTA Representative</td>
<td>GANSW advised that a response will be provided after Easter</td>
</tr>
<tr>
<td>Date</td>
<td>Role</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>14/04/2020</td>
<td>GANSW Representative</td>
<td>Follow up email</td>
<td></td>
</tr>
<tr>
<td>14/04/2020</td>
<td>SIMTA Representative</td>
<td>GANSW advised that a review will be undertaken by 15/4/2020 and respond with a timeframe</td>
<td></td>
</tr>
<tr>
<td>17/04/2020</td>
<td>GANSW Representative</td>
<td>Follow up email</td>
<td></td>
</tr>
<tr>
<td>20/04/2020</td>
<td>SIMTA Representative</td>
<td>GANSW advised that a response will be provided by 23/4/2020.</td>
<td></td>
</tr>
<tr>
<td>23/04/2020</td>
<td>SIMTA Representative</td>
<td>GANSW provided a response to SIMTA’s UDDR response.</td>
<td></td>
</tr>
<tr>
<td>24/04/2020</td>
<td>SIMTA Representative</td>
<td>SIMTA reviewed GANSW’s response and considers consultation closed.</td>
<td></td>
</tr>
</tbody>
</table>
Dear Richard,

Following the Urban Design Development Report Presentation for the Moorebank Logistics Park, Moorebank Precinct West- Stage 2 on 3 March 2020, please find a summary of observations and recommendations in response to the following conditions of consent and the material reviewed:

- Urban Heat Island Mitigation B48
- Ecologically Sustainable Development B49-51
- Urban Design and Landscaping B52-B54
- Urban Design and Landscape Independent Peer Review B55-B56
- Landscape Design B57
- Design Criteria B58
- Staff and visitor facilities B59-B62
- Landscaping B63-B68
- Noise Walls, Retaining Walls and Fencing B69-B74
- Urban Design and Landscaping Supporting information B75

The material reviewed included:
- Urban Design Development Report Revision 1/November 2019 -Simta, Tactical Group and Reid Campbell

We note that the Environment Impact Statement was reviewed by GANSW in 2017 and a number of recommendations pertaining to the urban design and landscape components of the scheme were made. We acknowledge that many of these recommendations have been addressed and commend the team accordingly.

**Contribution to Sydney’s Green Grid**

The Georges River is identified as a major Green Grid Corridor in the South District Plan. The Georges River shapes the landscape and character of the Moorebank precinct and the greater Metropolitan area. As the District grows, more people will be looking to use the waterways for recreation, meaning this asset will assume an even greater significance. The truncation of the Georges River foreshore and bank profile by the
proposed on-site detention (OSD) outlet channel will impact on ecological health and habitat within the foreshore environment. The OSD channel will also impact on contiguous access for people and wildlife. Inhibiting access to Georges River foreshore is not considered an appropriate response and is not supported. The precinct as a whole including the conservation area and the design of the OSD outlet should support public access.

Recommendation
- Provide opportunities for foreshore access for walking and cycling
- Protect and enhance the landscape and scenic quality of the Georges River foreshore by minimizing the impact of the OSD channel
- Ensure the design of the OSD channel and the landscape and planting design of the conservation zone supports public access along the Georges River foreshore
- Seek to reduce the potential impact of the development in the land/water interface environment

Urban design strategies and site planning

Whilst the siting and design strategy clearly delineates between the ‘operational’ and ‘conservation’ components of the project, it is evident that the dedicated conservation area will be compromised by the scale of the proposed OSD outlet channel design. The width of the proposed stormwater channel has the potential to impact on the conservation attributes including habitat restoration, biodiversity and connectivity for both people and wildlife. The OSD outlet channel severs the conservation zone in three locations. The detailed treatment of the channel design is not clear in the drawing package – (Moorebank Precinct West – Stage 2 Urban Design Development Report Revision 3/December 2018 Appendix)

Recommendation
- Provide a detailed section through the OSD stormwater channel illustrating channel bank gradient, overall width of the channel and proposed planting and bioremediation strategy.
- Provide detailed information describing how the proposed scheme improves the health and amenity of the Georges River

Urban heat island mitigation (B48)

The condition states that the Development must be designed and operated to meet UHIM principles and to achieve a 4 degree decrease in temperature compared to neighboring industrial developments. The drawings indicate the bulk of vegetative cover for Moorebank Precinct West Stage 2 is located within the conservation area and associated foreshore. There are minimal additional tree planting / heat mitigation measures located within the operational area of the development.

Within Moorebank Precinct West Stage 2 approximately one third of the site is identified as conservation area (green cover). When applying this green cover measure across all stages of the development, it is evident that the overall percentage of green cover will reduce considerably.

Given the operational constraints of the development and the limited opportunity to introduce trees to mitigate against urban heat, there is merit in exploring green roofs as a potential solution to the broad range of issues the scheme is trying to address:
Recommendation:
- Introduce green roofs to the remaining roof space not dedicated to photovoltaic panels to: provide insulation; support heat mitigation in response to associated hardstand; mitigate the visual impact of the extensive warehouse roofing areas from Casula; provide a substitute for trees given the operational constraints of the intermodal logistics park
- Provide additional evidence to verify that the proposed development in its entirety can achieve a 4 degree decrease in temperature
- Provide a detailed planting schedule for the conservation area to ensure there is a suitable mix of species (grasses, trees and shrubs) aligned with the Riverine environment. This will also assist in improving views of buildings and infrastructure particularly when viewed from Casula.

Ecologically Sustainable Development (ESD)
We commend the sound ESD principles and sustainability measures applied to the project with further commitments to achieve recognized performance rating through Green Star and ISCA rating tools. These should be conditioned.

Landscape Design
The detailed landscape design response is predicated upon the following objectives:
- Provide for visitor and worker amenity
- safer by design principles
- use of locally indigenous species
- landscape planning integrated with stormwater design,
- mitigate the visual impacts of building and infrastructure particularly when viewed from Casula

The generous landscape setback to both Moorebank Avenue and Estate Road is commended, as is the provision of accessible, high amenity outdoor spaces as well as end of journey facilities.

Due to the scale of the development it is unlikely that the visual impact of the building and infrastructure will be mitigated solely by the proposed canopy planting to the west of the Warehouses. An integrated planting strategy incorporating both the operational and conservation area is recommended to ensure that the maximum benefit of the ‘borrowed’ landscape effected by the conservation area is realised. This integrated planting strategy will serve to assist with mitigation of the visual impacts from Casula as well as heat mitigation.

The use of locally indigenous plants which are consistent with the ecological communities of the endangered Cumberland Plain Woodland and the riparian vegetation associated with the Georges River is highly supported.

Recommendations
- Provide detailed planting schedule for the conservation area to ensure that proposed species will serve to expand the landscape context for the overall site.
- Provide detailed sections through on-site detention ponds verifying that the proposed bank profiles will support macrophyte planting and function as a bioremediation wetland
- Ensure that all street trees and car park trees are installed at a minimum size of a 100l to create a landscape impact from the outset.
- Enable worker and visitor access for walking and cycling to the Georges River foreshore to support worker amenity and opportunity for lunchtime strolling
- Further describe circulation strategy to illustrate how contiguous pedestrian and cycle access is being achieved in accordance with the principles of the Green Grid
- Provide further detail on the pedestrian and cycle connection to Casula Station across the Georges River to the Moorebank Intermodal
- Provide site specific soil, drainage and planting specification in accordance with Australian Standard noting that a large proportion of the planting will be on compacted sub-base
- Ensure that 100 l trees are procured well in advance to ensure quality and size
- Provide detailed tree replacement strategy
- Provide arborist report in relation to tree planting across the site (Refer to GANSW letter 22 May 2017 Comment on the EIS)

Noise Walls

There is a requirement for a 5m high noise barrier to be constructed along the western boundary of the internal estate road to mitigate sound. The proposed noise wall will compromise the urban design strategy to ensure a positive relationship between the operational and conservation functions of the development. The wall will physically and visually cut this relationship between the two functions diminishing the benefit that would have been derived from the two functions being connected. The foundation and footings of the wall will also limit tree planning opportunities which has the potential to impact on the trees negating the visual impact of the wall. The scale of the wall will impact cool breezes from the river corridor.

Recommendation:
- Review noise study and requirements to determine overall necessity of noise barrier
- Explore alternative options for noise mitigation to ensure quality site planning including but not limited to landscape design

Visual Impacts

We note that updated proposed views were not presented. GANSW had initial concerns about a number of the views as presented in the original application. The importance of views to neighbouring suburbs is important.

Recommendation
- Provide updated views to illustrate impacts from the public domain and to all surrounding residents.

Please contact myself or Jane Threlfall if you would like to discuss further or require clarifications.

Regards

Barbara Schaffer
Principal Design and Green Infrastructure
Dear Richard,

Please find below GANSW comments, following our review of the Draft Urban Design and Landscape Independent Peer Review Report for Moorebank Precinct West Stage 2.

The Urban Design Development Report

Condition B53

The Urban Design Development Report must be developed in consultation with the Government Architect NSW (GANSW) and provide detailed objectives for design and operation of the development and define place specific urban design principles incorporating those outlined in Conditions B48, B49 and B57. Details of the consultation are to be submitted as part of the Urban Design Development Report.

Urban Design and Landscape Independent Peer Review

Condition B55

An independent peer review report must be submitted with the Urban Design Development Report and Revised Landscape Design Drawings and Revised Architectural Drawings and supporting documentation.

Condition B56

The review must be:

(a) undertaken by an expert(s) in urban design and landscaping (for example a member of the State Design Review Panel)

(b) include an assessment of the Revised landscape design drawings revised architectural drawings and supporting documentation against the objectives and urban design principles established in the Urban Design Development Report
and all the relevant conditions, stating whether the drawings demonstrate
achievement of the objectives and urban design principles and that all relevant
conditions of this consent have been satisfied and
(c) include comments justifying conclusions reached in the assessment

Urban Design Development Report

The independent peer review report notes that Matthew Pullinger was engaged by the
proponent in July 2019. The report notes that the author provided preliminary urban
design advice to the proponent and assisted the proponent in the refinement of the
scheme for Moorebank Stage 2 West. We note that this may call into question the
independence of the review. We recommend in future, that an independent review is
taken by appropriately qualified professionals that have no prior involvement with the
project.

In our view and consistent with design review processes run by GANSW, anyone involved
in design development of a project cannot also provide independent review of the
project.

We note and accept that Matthew Pullinger has appropriate urban design and
architectural expertise. However, landscape design expertise is also a requirement of the
condition. We are concerned that without landscape design expertise the report does
not meet the condition. Furthermore, the report would benefit from this input.

Some areas of the report regarding landscape elements are not adequately covered, e.g.:
the landscape design of the OSD channel and ponds and how these elements could be
integrated to enhance the overall amenity of the development.

GANSW recommend that an independent landscape architect from the GANSW State
Design Review Panel is engaged to satisfy the conditions of the consent.

Key items to be addressed include:
- the integration of the OSD basins within a landscape setting
- the design of the OSD channels to ensure bioremediation components
- integration of the conservation zone with the operations zone

Please contact myself or Olivia Hyde if you would like to discuss further or require
clarifications.

Regards

Barbara Schaffer
Principal Design and Green Infrastructure
<table>
<thead>
<tr>
<th>Comment Number</th>
<th>GANSW Comment (16/03/2020)</th>
<th>SIMTA Response (03/04/2020)</th>
<th>GANSW Response (23/4/2020)</th>
<th>Date Comment Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The truncation of the Georges River foreshore and bank profile by the OSD outlet channel will impact on ecological health and habitat within the foreshore environment. The OSD channel will also impact on contiguous access for people and wildlife.</td>
<td>Disagree that the OSD “truncates” the foreshore/bank profile. The MPW Concept Plan and subsequent Development under MPW Stage 2 has been approved by PAC and IPC on 03/06/2016 and 11/11/2019, respectively. Two of the channels follow existing drainage lines and cross presently disturbed minimal to low vegetated areas (firefighting training area and earthmoving and excavation training area respectively). The ecological health and habitat have been assessed by an ecologist and protection and conservation measures required under the biobanking agreement for the precinct have been identified in a biodiversity management implementation plan. Channel design and implementation is addressed under condition B4 Stormwater Design Development Report, which has been independently reviewed by a stormwater expert. Stormwater designs have considered fauna access under predominantly low-flow conditions and provides for the inclusion of habitat structures within the channel to facilitate fauna crossing. The bank grade on the channels will not be prohibitive to fauna crossing. Ecological habitat values and management provisions have been assessed and approved by DPIE under B154, Construction Flora and Fauna Management Plan. The plan includes recommendations in fencing design to allow fauna access along the entirety of the conservation area. This will further be considered prior to Operations, where an Operational Flora and Fauna Management Plan is required per B160. With regards to contiguous access for people, refer to Comment 3. Generally, the conservation areas will only be accessible to estate management employees for monitoring and maintenance activities, with emergency services being an exception.</td>
<td>We are concerned that these elements have not been designed in collaboration with a landscape architect. This should be considered in the review of the stormwater design development report. SIMTA’s Response: Noted. Considered this comment closed. 24/4/20</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The precinct as a whole including the conservation area and the design of the OSD outlet should support public access.</td>
<td>Refer to Comment 3</td>
<td>SIMTA’s Response: Referring to GANSW’s response in comment 3. We considered this comment closed. 24/4/20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Provide opportunities for foreshore access for walking and cycling</td>
<td>The Biobanking Agreement has not been established to permit passive recreational activity. It is not the intent to provide foreshore access for walking and cycling. Please find the below extract of The Biobanking Agreement ID 341 Section 3.5 Permissible Development identifies the following uses.</td>
<td>Noted. This represents a lost opportunity. Potential to explore during the assessment of MPW Stage 3 or future stages. SIMTA’s Response: Noted. Considered this comment closed. 24/4/20</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Protect and enhance the landscape and scenic quality of the Georges River foreshore by minimizing the impact of the OSD channel</td>
<td>The development will not hinder the use of the waterway. This site was previously Defence Land and access was not previously allowed therefore no change to access. The orientation of the channels has been intentionally designed at an angle that minimizes the opportunity to look Design impacts could benefit from input from landscape architect. This should be considered in the review of the stormwater design development report.</td>
<td>24/4/20</td>
<td></td>
</tr>
<tr>
<td>Comment Number</td>
<td>GANSW Comment (16/03/2020)</td>
<td>SIMTA Response (03/04/2020)</td>
<td>GANSW Response (23/04/2020)</td>
<td>Date Comment Closed</td>
</tr>
<tr>
<td>----------------</td>
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</tr>
<tr>
<td>1</td>
<td>through a vegetation gap to the site beyond, and instead maintain a visual amenity of a contiguous vegetated buffer. The location impacts of OSD’s was approved by DPIE under the MPW Concept Plan SSD 5066 and MPWS2 SSD 7709 therefore the location has been fully assessed and approved and construction management plans required, for example the Construction Soil and Water Management Plan and the Stormwater Design Development Report. Both of which have required review by an expert in the field and have been endorsed by the Environmental Representative.</td>
<td>SIMTA’s Response: Noted. Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ensure the design of the OSD channel and the landscape and planting design of the conservation zone supports public access along the Georges River foreshore.</td>
<td>Refer to Comment 3. foreshore access is not possible or permissible under the Biobanking Agreement. Planting requirements within the Biobanking Agreement are specific. Vegetation to be planted would comprise either Riparian Forest community type or Alluvial Woodland community (on the upper terraces. These communities would each have a blend of canopy, understory and ground cover species to replicate the natural serial progression between the riverbank and floodplain terraces.</td>
<td>Noted</td>
<td>24/4/20</td>
</tr>
<tr>
<td>7</td>
<td>Seek to reduce the potential impact of the development in the land/water interface.</td>
<td>Refer to Comment 1 and 4, location of OSDs approved by DPIE under the MPW Concept Plan SSD 5066 and MPWS2 SSD 7709 therefore the location has been fully assessed and approved. Such stormwater outlet structures are permissible within the riparian zones on waterfront land and are designed to work with the natural drainage systems.</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td><strong>Urban Design Strategies and Site Planning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Whilst the siting and design strategy clearly delineates between the ‘operational’ and ‘conservation’ components of the project, it is evident that the dedicated conservation area will be compromised by the scale of the proposed OSD outlet channel design. The width of the proposed stormwater channel has the potential to impact on the conservation attributes including habitat restoration, biodiversity and connectivity for both people and wildlife.</td>
<td>Refer to Comment 1 and 4, location of OSD’s approved by DPIE under the MPW Concept Plan SSD 5066 and MPWS2 SSD 7709 therefore the location has been fully assessed and approved.</td>
<td>SIMTA’s Response: Noted. Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>9</td>
<td>The OSD outlet channel severs the conservation zone in three locations. The detailed treatment of the channel design is not clear in the drawing package – (Moorebank Precinct West – Stage 2 Urban Design Development Report Revision 3/December 2018 Appendix)</td>
<td>Refer to Comment 1, 3 and 4, location of OSD’s approved by DPIE under the MPW Concept Plan SSD 5066 and MPWS2 SSD 7709 therefore the location has been fully assessed and approved.</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>10</td>
<td>Provide a detailed section through the OSD stormwater channel illustrating channel bank gradient, overall width of the channel and proposed planting and bioremediation strategy.</td>
<td>Refer to Comment 1, 3 and 4, location of OSD’s approved by DPIE under the MPW Concept Plan SSD 5066 and MPWS2 SSD 7709 therefore the location has been fully assessed and approved. DPIE are reviewing and approving the Construction Soil and Water Management Plan (approved) and the Stormwater Design Development Report.</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>11</td>
<td>Provide detailed information describing how the proposed scheme improves the health and amenity of the Georges River</td>
<td>Refer to Comment 1 and 10</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td><strong>Urban Heat Island Mitigation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>There are minimal additional tree planting / heat mitigation measures located within the operational area of the development.</td>
<td>Refer to Condition B68. Designs have been implemented as per the condition B68. The following minimum landscaping requirements apply: (a) 15% of the warehouse area landscaped at ground level, 10% of which must be soft landscaping, excluding the OSD basins unless they are accepted as contributing to soft landscaping in the peer review report required under Condition B55; (b) 1 canopy tree per 30 m2 of landscaped area; and (c) a 2.5 m wide landscaped bay every 6-8 car spaces to provide shade within carpark areas or alternative carpark landscaping accepted as providing adequate shade in the peer review report required under Condition B55.</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>13</td>
<td>Introduce green roofs to the remaining roof space not dedicated to photovoltaic panels to: provide insulation; support heat mitigation in response to associated hardstand; mitigate the visual impact of the extensive warehouse roofing areas from Casula; provide a substitute for trees given the operational constraints.</td>
<td>The project has been designed around cool roof surfaces. Replacing these with green roofs would not substantially reduce any urban heat island, as the project already reflects the majority of incident solar energy striking these surfaces. The project will meet code mandated insulation levels. Green Roofs are not necessary to provide minimum insulation level.</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
</tbody>
</table>

**Urban Design Strategies and Site Planning**

- **8** Whist the siting and design strategy clearly delineates between the ‘operational’ and ‘conservation’ components of the project, it is evident that the dedicated conservation area will be compromised by the scale of the proposed OSD outlet channel design. The width of the proposed stormwater channel has the potential to impact on the conservation attributes including habitat restoration, biodiversity and connectivity for both people and wildlife.

- **9** The OSD outlet channel severs the conservation zone in three locations. The detailed treatment of the channel design is not clear in the drawing package – (Moorebank Precinct West – Stage 2 Urban Design Development Report Revision 3/December 2018 Appendix)

- **10** Provide a detailed section through the OSD stormwater channel illustrating channel bank gradient, overall width of the channel and proposed planting and bioremediation strategy.

- **11** Provide detailed information describing how the proposed scheme improves the health and amenity of the Georges River

**Urban Heat Island Mitigation**

- **12** There are minimal additional tree planting / heat mitigation measures located within the operational area of the development.

- **13** Introduce green roofs to the remaining roof space not dedicated to photovoltaic panels to: provide insulation; support heat mitigation in response to associated hardstand; mitigate the visual impact of the extensive warehouse roofing areas from Casula; provide a substitute for trees given the operational constraints.
<table>
<thead>
<tr>
<th>Comment Number</th>
<th>GANSW Comment (16/03/2020)</th>
<th>SIMTA Response (03/04/2020)</th>
<th>GANSW Response (23/04/2020)</th>
<th>Date Comment Closed</th>
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</thead>
<tbody>
<tr>
<td>14</td>
<td>Provide additional evidence to verify that the proposed development in its entirety can achieve a 4 degree decrease in temperature</td>
<td>Please refer to the “Urban Heat Island Mitigation Strategies Modelling” Report which documents our methodology and results showing that we meet the 4°C temperature reductions. We have outlined two scenarios to demonstrate compliance: Scenario 1: Business as Usual vs Design We have modelled the site with, and without UHI mitigation strategies. The impact of these strategies was a 1°C reduction in canopy temperature across the site. This is shown and described on page 8. Scenario 2: Our Site vs Neighbouring Site We have modelled an adjacent site to compare urban heat island impacts on both sites. We have identified Goodman as peer site. Our site, with the implementation of UHIMS, shows is shown to have a 1°C cooler canopy temperature than our neighbouring site. This is shown and described on page 10. Calculating 4 degrees: Page 7 outlines our methodology that the 1°C canopy temperature changes we have calculated correspond to 4°C difference in UHI Surface Temperature. Canopy temperatures are used for measurement and calculation, whereas Surface Temperature is the perceived temperature felt by people.</td>
<td>Noted SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>15</td>
<td>Provide a detailed planting schedule for the conservation area to ensure there is a suitable mix of species (grasses, trees and shrubs) aligned with the Riverine environment. This will also assist in improving views of buildings and infrastructure particularly when viewed from Casula</td>
<td>Refer to the Landscape Plans provided</td>
<td>Noted SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>16</td>
<td>We commend the sound ESD principles and sustainability measures applied to the project with further commitments to achieve recognized performance rating through Green Star and ISCA rating tools. These should be conditioned</td>
<td>Noted</td>
<td></td>
<td>16/3/2020</td>
</tr>
<tr>
<td>17</td>
<td>An integrated planting strategy incorporating both the operational and conservation area is recommended to ensure that the maximum benefit of the ‘borrowed’ landscape effected by the conservation area is realised.</td>
<td>A Biobanking Agreement is in place for conversation area (supported by the Biodiversity Management Implementation Plan) and a Landscape Vegetation Management Plan will be required for the Operational Area. Areas deemed appropriate for landscaping have been outlined and have made it clear in the documents and presentation that there are restrictions with planting in the operational areas. Landscape quantitative outcomes as required under the consent conditions would be achieved, as would additional planting and management of vegetation withing the conservation area and riparian zone. This includes removal of woody weeds and establishment of both Riparian Forest and Alluvial Woodland community types relevant to topography. The intended outcomes are improved continuity of relevant community types and improved habitat outcomes for local fauna.</td>
<td>Noted SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
</tr>
<tr>
<td>18</td>
<td>Provide detailed planting schedule for the conservation area to ensure that proposed species will serve to expand the landscape context for the overall site.</td>
<td>Refer to comment 17</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>19</td>
<td>Provide detailed sections through on-site detention ponds verifying that the proposed bank profiles will support macrophyte planting and function as a bioremediation wetland</td>
<td>DPIE are reviewing and approving the Construction Soil and Water Management Plan (approved) and the Stormwater Design Development Report.</td>
<td>Noted SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>20</td>
<td>Ensure that all street trees and car park trees are installed at a minimum size of a 100 to create a landscape impact from the outset.</td>
<td>We acknowledge that advanced tree specimens will be beneficial in providing instant impact and amenity; however, we should recognise that some specimens – particularly the indigenous species – will be difficult to obtain in an advanced size unless procured in the near future. We would recommend a diverse planting schedule consisting of a range of species and installation sizes. Where possible, trees will be installed at a larger size to provide instant impact. Suggest a potential range of pot sizes for tree planting ranging from 200mm pots to 200 litre with a preference for larger specimens in key locations such as the site entry and areas where sight lines for driver visibility and safety are important.</td>
<td>Ensure procurement of mature species happens in a time fashion. Would be good to gain clarity on proposed location of mature species. Provide detailed plan SIMTA’s Response: Detailed plan is not currently available. But will be provided at a detailed design stage. Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>21</td>
<td>Enable worker and visitor access for walking and cycling to the Georges River foreshore to support worker amenity and opportunity for lunchtime strolling</td>
<td>Refer to Comment 3, foreshore access is not possible due to Biobanking Agreement.</td>
<td>Noted SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>22</td>
<td>Further describe circulation strategy to illustrate how contiguous pedestrian and cycle access is being achieved in accordance with the principles of the Green Grid</td>
<td>CoC B59 (a) and (b) require pedestrian and cycle paths to be provided through the site, connecting Moorebank Avenue, the rail terminal office, warehouses and the freight village, and must be integrated with existing and planned footpaths or cycleways within the locality. Architectural drawings in Appendix 4.2 show a 2.5m shared path complying with Condition B59 connecting through MPW Stage 2 and into planned road works at the Anzac Road/Moorebank Avenue interchange. The cycling/pedestrian path network has been designed with consideration of the Sydney Green Grid, including but not limited to: 1.4 – Increase Access to Open Space: interconnected network of open space providing increased livability; improved connections around industrial areas; 1.5 – Promote Healthy and Active Living: providing increased opportunity for cycling/walking through the Moorebank Industrial area.</td>
<td>Key principle of Sydney Green Grid is to provide continuous access along major waterways. Noted that elements of the Grid policy have been addressed, however public access along the Georges River should be considered in future stages.</td>
<td>24/4/20</td>
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<td>23</td>
<td>Provide further detail on the pedestrian and cycle connection to Casula Station across the Georges River to the Moorebank Intermodal</td>
<td>Provision has been made for the connection which is compliant with Condition B2 (j) – further detail is not required as part of the application.</td>
<td>Noted</td>
<td>24/4/20</td>
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<td>24</td>
<td>Provide site specific soil, drainage and planting specification in accordance with Australian Standard noting that a large proportion of the planting will be on compacted sub-base</td>
<td>Plant schedule has been provided on landscape plans as has a site-specific construction detail.</td>
<td>Noted</td>
<td>24/4/20</td>
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<td>25</td>
<td>Ensure that 100 l trees are procured well in advance to ensure quality and size</td>
<td>Refer to Comment 24</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>26</td>
<td>Provide detailed tree replacement strategy</td>
<td>Refer to Comment 24</td>
<td>SIMTA’s Response: Considered this comment closed. 24/4/20</td>
<td>24/4/20</td>
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<td>27</td>
<td>Provide arborist report in relation to tree planting across the site (Refer to GANSW letter 22 May 2017 Comment on the EIS)</td>
<td>The approved MPWS2 SSD 7709 Consent does not require this action.</td>
<td>Noted</td>
<td>24/4/20</td>
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<td>28</td>
<td>Review noise study and requirements to determine overall necessity of noise barrier. Explore alternative options for noise mitigation to ensure quality site planning including but not limited to landscape design.</td>
<td>Noted. It is intended that the Noise Wall be removed as per SIMTA’s long term aspirations and as supported and recommended by the Peer Review. Further noise studies will be undertaken in the future as part of a modification. Considered this comment closed.</td>
<td>Noted</td>
<td>3/4/20</td>
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<td>28</td>
<td>Provide updated views to illustrate impacts from the public domain and to all surrounding residents</td>
<td>Visual Impacts are approved by DPIE under MPWS2 SSD 7709. The built form retains the same envelopes and are generally in accordance with the Visual Impact Assessment submitted as part of SSD 7709 (height the same, generally same lengths and widths, slightly different siting within Warehouse Area).</td>
<td>Noted. Does a further visual impact study need to be undertaken due to different siting.</td>
<td>24/4/20</td>
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<td>29</td>
<td>The report notes that the author provided preliminary urban design advice to the proponent and assisted the proponent in the refinement of the scheme for Moorebank Stage 2 West. We note that this may call into question the independence of the review. We recommend in future, that an independent review is taken by appropriately qualified professionals that have no prior involvement with the project.</td>
<td>Appears to be a mis-understanding. Matt Pullinger was only engaged in his role as an Independent Peer Reviewer for MPWS2 UDDR, never as part of the design team or have been involved in other parts of the Moorebank Precinct Projects. This is the only involvement Matt Pullinger has with the project as the Independent Reviewer of the UDDR. Matt Pullinger is member of the State Design Review Panel he is thereby an appropriate qualified professional.</td>
<td>27/4/2020</td>
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<td>30</td>
<td>We note and accept that Matthew Pullinger has appropriate urban design and architectural expertise. However, landscape design expertise is also a requirement of the condition. We are concerned that without landscape design expertise the report does not meet the condition. Furthermore, the report would benefit from this input.</td>
<td>As per condition B56, there is no requirement for GANSW to comment on the credentials of the independent peer reviewer. SIMTA has engaged an expert in urban design and landscaping (for example, a member of the State Design Review Panel) as required under B56a. This will be determined upon Departments review, if required.</td>
<td>27/4/2020</td>
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<td>31</td>
<td>Some areas of the report regarding landscape elements are not adequately covered, e.g.: the landscape design of the OSD channel and ponds and how these elements could be integrated to enhance the overall amenity of the development.</td>
<td>This has been considered in the approved CSWMP and SDDR. Inputs from an ecologist has been considered in the design phase, this has been provided to the Department for consideration as per condition B35.</td>
<td>27/4/2020</td>
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<td>32</td>
<td>GANSW recommend that an independent landscape architect from the GANSW State Design Review Panel is engaged to satisfy the conditions of the consent</td>
<td>Refer to Comment 30.</td>
<td>27/4/2020</td>
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