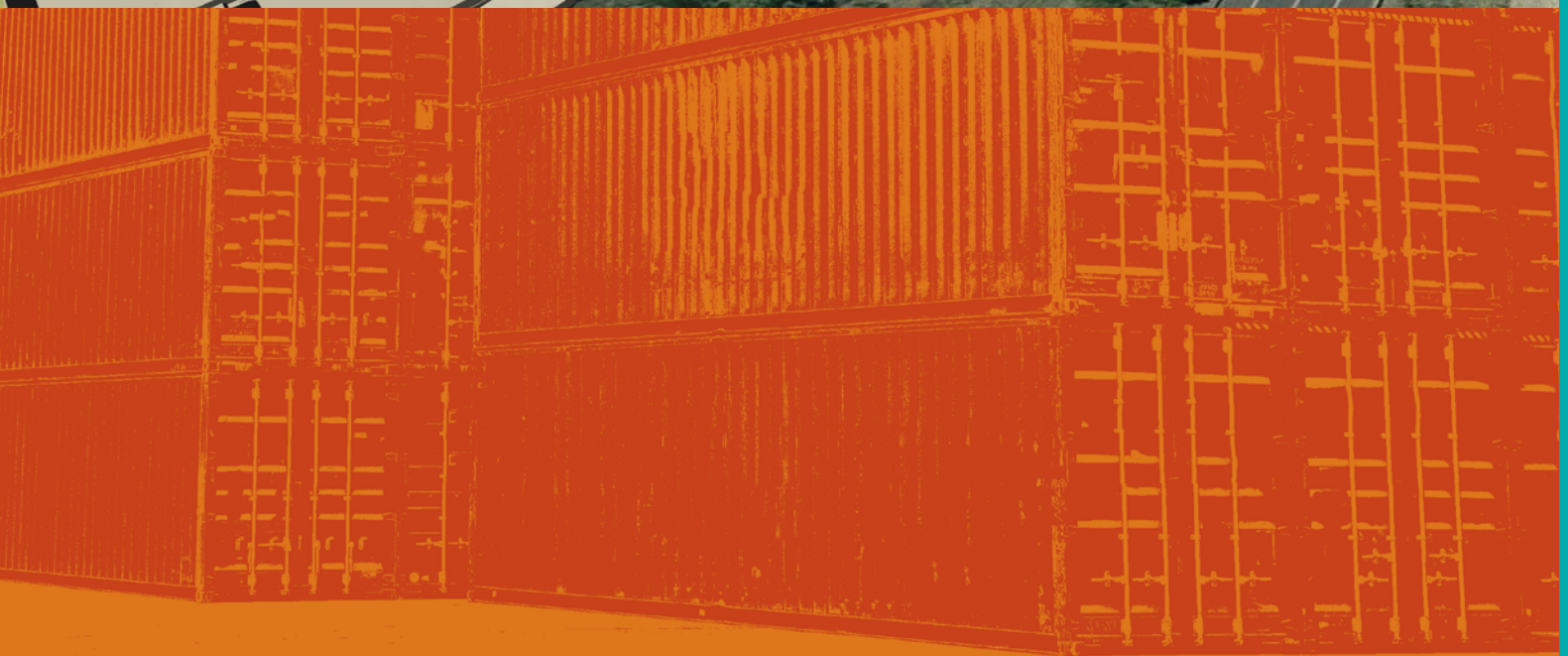
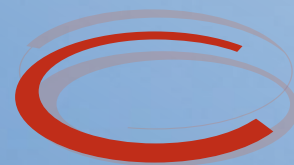


Appendix D Visual and Urban Design Assessment





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MOOREBANK INTERMODAL TERMINAL

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

REVISED PROJECT REPORT

NS-1128

ISSUE B

23.02.2015



Cover Image: View of Casula Powerstation from Carroll Park, looking south.

This page: View over the Project site from Carroll Park, looking east.



MOOREBANK INTERMODAL LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT REVISED PROJECT REPORT

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Goods train on the Southern Sydney Freight Line viewed from St Andrews Park

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S1 EXECUTIVE SUMMARY

S1 INTRODUCTION

This Landscape Character and Visual Impact Assessment (LCVIA) report identifies and evaluates the landscape character and visual impacts of the revised Project, including an analysis of views from key vantage points and proposed management and mitigation measures to address the visual impact of the Project.

S2 THE PROJECT

The Moorebank Intermodal Terminal Project ('the Project') involves the development of freight terminal facilities linked to Port Botany and the interstate freight rail network. The Commonwealth Department of Finance and Deregulation (DoFD) is the proponent for the Project. When completed, the Project would include:

- an import/export (IMEX) freight terminal where freight to and from Port Botany is handled
- an interstate freight terminal where freight is received or handled prior to distribution outside the Sydney metropolitan region
- a warehousing development.

The revised Project is proposed to be phased in its development with both construction and operational phases, which are likely to overlap at certain times. Five project development phases have been identified and detailed in this LCVIA.

S3 THE SITE AND ITS CONTEXT

The Project is situated on land in the Sydney suburb of Moorebank, NSW. The Project site is approximately 220 hectares (ha) in area, and is located within a locality that includes the residential suburbs of Casula, Wattle Grove and North Glenfield, as well as industrial, commercial and land occupied by the Department of Defence (DoD). The Project would provide connectivity to Port Botany by rail, and would connect to major regional and interstate roads and highways via the M5 and Hume Highway.

S4 LANDSCAPE CHARACTER

The landscape character surrounding the proposed Project site is typical of the district, being generally flat to gently undulating with adjoining slopes. There are large areas of development, interspersed by patches of parkland, public open space and riparian corridors. Four landscape character zones are identified within the report:

- fragmented vegetation
- riparian corridor
- residential development
- light industrial/commercial development.

Within the site, the Project is shown to have the greatest impact on fragmented vegetation due to expected requirements for removal, with a lesser impact on the surrounding residential areas due to the presence of screening vegetation and topography. A moderate/low impact rating is recorded on the riparian corridor along the Georges River and surrounding industrial/commercial zones due to the limited magnitude of the changes within these areas. The Project fits within a wider context of commercial and industrial built form present within the locality.

S5 VISUAL IMPACT ASSESSMENT

The proposed Project would lead to an increase in the scale, height and bulk of structures within the site. The locations identified as those with the greatest potential to be visually impacted by some aspect of the Project are:

1. *Southern section of Leacock Regional Park*
2. *Leacock Regional Park and associated residential properties backing onto the parklands*
3. *Carroll Park and associated residential properties backing onto the park*
4. *Central section of Georges River Casula Parklands (northern rail alignment option only)*
5. *St Andrews Park and associated residential properties near the park and along the eastern edge of roads parallel to the Southern Sydney Freight Line.*
6. *Junction of M5 South Western Motorway and Moorebank Avenue.*

Assessment suggests that there is a moderate/high potential visual impact to a limited number of Casula based residential properties who overlook the site due to distance, existing visual barriers and topography. The greatest visual impact would be on the public parks and associated residential properties that are situated on the elevated land west of the Georges River. Direct views over the development will be available from properties directly adjacent to Leacock Park and Carroll Park. The most prominent views of the Project would be at localised site boundaries and public parks overlooking the site.

S6 MITIGATION

Mitigation strategies have been investigated as part of the concept design process. These have included elements such as:

- Retention of vegetation on site along the Georges River and establishment of this into a conservation zone to provide a visual buffer and screening of project infrastructure.
- The inclusion of landscaping zones (including existing vegetation retention) where possible on the site complying with the local planning instrument building height requirements.
- The inclusion of setbacks along the northern and southern site boundaries.

Mitigation strategies appropriate for detailed design include:

Reduction

- Maximising the integration of terminal facilities and the associated commercial and warehousing precincts by providing screening.
- Where possible retain existing native trees along Moorebank Avenue to mitigate visual impact and provide a layered approach along the streetscape.
- Consideration of the use of lower, more frequent light poles where possible to mitigate light spill effects and ambient light impacts.
- Integration of car parking, planting and signage to present as one cohesive address.
- Consideration of localised earth mounding.

Alleviation

- Choice of finishes and materials based on limiting the amount of contrast with the surrounding landscape with the preferred use of muted colours.
- On site planting of suitable vegetation species at a range of heights.
- Utilise opportunities to commence early rehabilitation and supplementary planting of endemic species to the conservation zone on the western boundary.
- Encouraging higher buildings fronting Moorebank Avenue and Anzac Road to provide a visual buffer from the terminal operations beyond.

Off site mitigation measures are not recommended.

1.0

Introduction



1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The purpose of this Technical Paper and the overall Environmental Impact Statement (EIS) is to seek approval for the Moorebank revised Project design under both the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a controlled action; and the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act), as a Stage 1 state significant development (SSD).

In seeking approval, the Department of Finance and Deregulation (DoFD) is looking to establish a staged approval process, whereby successive stages of development on the Project Site would be subject to further environmental assessment and separate planning approval once further detailed Project information is developed. That is, the DoFD is currently seeking approval for the Project 'concept' (i.e. the broad parameters of the Project), sufficient to satisfy both:

- a Stage 1 SSD development application under the NSW EP&A Act
- Commonwealth EPBC Act requirements for the Project, in relation to impacts of the proposed controlled action on matters protected under the EPBC Act (which comprise listed threatened specials and communities and impacts on the environment by a Commonwealth agency).

This Technical Paper and the EIS assess the impacts of all five proposed development stages of the Project (Early works, Phase A, Phase B, Phase C and Project Full Build) to a concept level, but with more detailed assessment of matters protected under the EPBC Act. Both construction and operation phase impacts have been assessed and are presented.

Impacts from the project and appropriate mitigation measures would be confirmed following detailed design and during subsequent development application processes.

This Technical Paper has been prepared by CLOUSTON Associates to address environmental impact assessment requirements of both the Commonwealth Government under the EPBC Act (the 'Final EIS Guidelines'); and the NSW Government under the EP&A Act ('the Director-General's Requirements (DGRs)'). Table 01 identifies these requirements and indicates where they are addressed in the paper.

EPBC Act – Final EIS Guidelines	
Requirement	Where addressed in the technical paper
Provide a detailed analysis and describe the changes to visual amenity on the proposed site and surrounding areas resulting from construction and operation of the facility.	Part 3.0 - Visual Impact Assessment

NSW EP&A Act - DGRs	
Requirement	Where addressed in the technical paper
Identify and evaluate the visual impacts of the development including an analysis of views from key vantage points	Part 3.0 - Visual Impact Assessment
Propose management/mitigation measures to address the visual impact of the Project	Part 4.0 - Mitigation Recommendations
Analyse and describe the contribution and impacts of the proposed facility on light spill at the local scale and to sensitive receptors	A brief summary is covered under Part 4.0 - Mitigation Recommendations. A detailed light spill analysis has been undertaken as a separate technical assessment.

Table 01 - EPBC Act and DGR Requirements

This assessment is an independent report and is based on a professional analysis of the landscape and the Project at the time of writing. The future and potential viewers (visual receptors) themselves have not been consulted about their perceptions; the analysis and conclusions are based solely on a professional assessment of the anticipated impacts, based on a best practice methodology.

Landscape Character and Visual Impact Assessment (LCVIA) are separate but closely linked process that operates within the overall framework of an EIS. It aims to ensure that all possible effects of change and development on the landscape, views and visual amenity are taken into account.

The two overall components of LCVIA are:

- Landscape effects assessment - deals with changes to landscape as a resource. It is concerned with issues like protected landscapes, the contribution of landscape character to sense of place and quality of life, and the way that change may affect individual components of the landscape;
- Visual effects assessment - concerned with how the surroundings of individuals or groups of people may be specifically affected by change in the landscape both quantitatively and qualitatively.

Judgement as to the significance of the effects are arrived at by a process of reasoning, based upon analysis of the baseline conditions, identification of receptors and assessment of their sensitivity, and the degree and nature of the changes that may result from the Project.

Report structure

The LCVIA is structured into five parts:

1.0 - Introduction
Introductory section that describes the existing site and the Project.
2.0 - Landscape Character Assessment
An analysis of the existing landscape that identifies landscape character zones according to their topography, drainage and urban form. Includes an assessment of likely impacts based on sensitivity and magnitude criteria.
3.0 - Visual Impact Assessment
An analysis of the existing visual environment including public and private domain, identifying key viewer locations. This is followed by the identification and analysis of visual impacts on key viewpoints of the Project based on sensitivity and magnitude criteria.
4.0 - Mitigation Recommendations and Conclusions
Conclusion on overall impact and discussion of the means by which the visual impacts identified can be precluded, reduced or offset. This is followed by a conclusion on the report's findings.
5.0 - Appendices

Terms used within this report

The following provides a brief explanation of the terms and abbreviations commonly used in LCVIA reports and which appear in this report:

View: The sight or prospect of some landscape or scene.

Visual Amenity: The measure of the visual quality of a site or area experienced by residents, workers or visitors. It is the collective impact of the visual components which make a site or an area pleasant to be in.

Viewshed: The area which the Project is visible to the human eye from a fixed vantage point.

Visual Receptor: the public or community at large who would have views of the Project site either by virtue of where they live and/or work or from transport routes, paths, lookouts and the like.

Duration: The length of time the visual receptor is exposed to the view.

Magnitude of change: A quantitative assessment of the change in compositional elements of the view.

Quantum of view: The openness of the view and the angle of the view to the visual receptor.

Visual Impact Rating: Determined by cross referencing sensitivity with magnitude.

Landscape Character: A distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another.

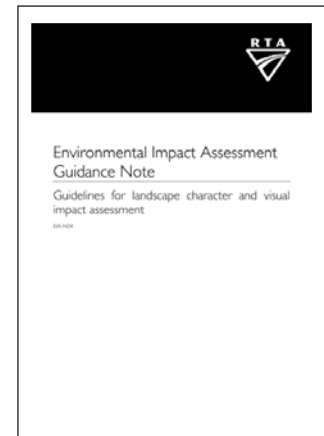
1.2 METHODOLOGY

Landscape Character and Visual Impact Assessment is by its nature not an exact science and consequently is subject to varied methodologies both in Australia and overseas. Potentially subjective assessment material and differences of opinion about how to best assess visual characteristics, qualities, degrees of alteration and viewer sensitivity often arise. As a consequence, and as identified by the NSW Land and Environment Court, the key to a robust process is to explain clearly the criteria upon which an assessment is made.

This report has adopted the Guidelines for Landscape Character and Visual Impact Assessment as published by the Roads and Maritime Service, RMS.

Key components of the LCVIA methodology include:

- **Site analysis and identification of landscape character zones** - Based on desk top and field analysis, the natural environment is identified and described as well as the human intervention and shaping of that environment, including settlements and the interaction between place and community.
- **Assessment of landscape character impacts** - The impact of the development and associated infrastructure on each zone is identified and assessed. Impacts are based on the sensitivity of the landscape character zone to change and the magnitude of the development within that landscape.
- **Assessment of the visibility of the Project** - Based on desk top and site analysis, the extent of the development that is visible is defined.
- **Identification of key viewpoints** - Based on desktop and field analysis, a schedule of key viewpoints is developed. The final list of receptors does not represent the entire number of receptors likely to be visually impacted by the Project, but rather gives an indication of the typical range of views that receptors will have.
- **Assessment of visual impacts** - The unmitigated impact of the development on each representative viewpoint is assessed. Impacts are based on a composite of the sensitivity of the view and magnitude of the development in that view, before any mitigation strategy has been put in place.
- **Development of mitigation strategy** - Principles and strategies are developed to mitigate landscape character and visual impacts in the ongoing development of the design.



1.2.1 Impact Ratings

The overall impact rating of the Project on any given visual receptor or landscape character is based on themes of magnitude and sensitivity. The relevance of magnitude and sensitivity for each assessment type is described below.

1.2.2 Landscape Character

Sensitivity - the degree to which a particular landscape type can accommodate change arising from a development, without detrimental effects on its character. This includes factors such as:

- existing land use
- the pattern and scale of the landscape
- visual enclosure, openness of views and distribution of visual receptors
- the value placed on the landscape.

Magnitude - the magnitude of the effects of the development within the landscape. Consideration is given to existing built form in the landscape and how closely the development matches this in bulk, scale and form. Magnitude is a study of the scale or degree of change to the landscape resource, the nature of the effect and its duration including whether it is permanent or temporary.

1.2.3 Visual Impact

Sensitivity - each visual receptor type has an inherent and varied sensitivity to change in the visual scene based on their personal context in which the view is being experienced. This will have a direct bearing on the perception of visual impact experienced by the receptor and qualifies the quantitative impacts.

Magnitude - the magnitude of the visual effects of the development within the landscape. A series of quantitative assessments are studied, including distance from development, quantum of view, duration of view and magnitude of change.

1.2.4 Overall Impact Rating

The severity of visual and landscape impacts is calculated using matrix Table 02 - based on a combination of magnitude and sensitivity.

		Magnitude					
		High	High to Moderate	Moderate	Moderate to Low	Low	Negligible
Sensitivity	High	High Impact	High Impact	Moderate-high	Moderate-high	Moderate	Negligible
	High to Moderate	High Impact	Moderate-high	Moderate-high	Moderate	Moderate	Negligible
	Moderate	Moderate-high	Moderate-high	Moderate	Moderate	Moderate-low	Negligible
	Moderate to Low	Moderate-high	Moderate	Moderate	Moderate-low	Moderate-low	Negligible
	Low	Moderate	Moderate	Moderate-low	Moderate-low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Table 02: Overall Impact Rating as a combination of Sensitivity and Magnitude.

Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

1.3 THE PROJECT

The Moorebank Intermodal Terminal Project (the Project) involves the development of approximately 220 hectares (ha) of land at the Project site for the construction and operation of an Intermodal Terminal and associated infrastructure, facilities and warehousing. The Project includes a rail link connecting the Project site to the Southern Sydney Freight Line (SSFL) and road entry and exit points from Moorebank Avenue.

1.3.1 The Project Site

The Project is situated on land in the Sydney suburb of Moorebank, NSW (refer Figure 01). The Project site is approximately 220 hectares (ha) in area, and is located within a locality that includes the residential suburbs of Casula, Wattle Grove and North Glenfield, as well as industrial, commercial and Department of Defence (DoD) land (refer Figure 02). The Project would provide connectivity to Port Botany by rail, and would connect to major regional and interstate roads and highways via the M5 and Hume Highway.

The site is currently an army base, primarily associated with the School of Military Engineering, utilised by the Australian Army. The site also contains the RAE museum and golf club. Multiple ancillary facilities and buildings to the RAE School and the Steele Barracks are located on site including parade grounds, recreation facilities and plant training areas.

North of the site are the existing Moorebank industrial developments of Amiens and Yulong. The residential suburb of Wattle Grove is located to the east, with Casula residential area to the west of the site, separated by the Georges River and SSFL. Land uses immediate to the site include industrial, public recreation, residential, national parks and nature reserves.

To the east of Moorebank Avenue is an area of land occupied by DoD which consists of a number of buildings used for logistics and warehousing. The Sydney Intermodal Terminal Alliance (SIMTA) proposes to develop this site into additional Intermodal warehousing. This development has not been assessed further within this report.

1.3.2 Project Staging

The Project is proposed to be phased (staged) in its development, as summarised in Table 03. The proposed indicative phasing includes both construction and operational phases, which are likely to overlap at certain times. For the purposes of assessment of the Project, five project development phases have been identified and detailed in this report. These are indicative only, but illustrate the type of construction and operation activities that would occur over time at the Project site.

The Project would likely commence in 2015 with the Early Works development phase and would progress with concurrent construction and operation through to the Project Full Build Phase (operation of full IMEX terminal, warehousing and interstate terminal) by approximately 2030.



Figure 01 - Site context (not to scale)

Source: Google Earth

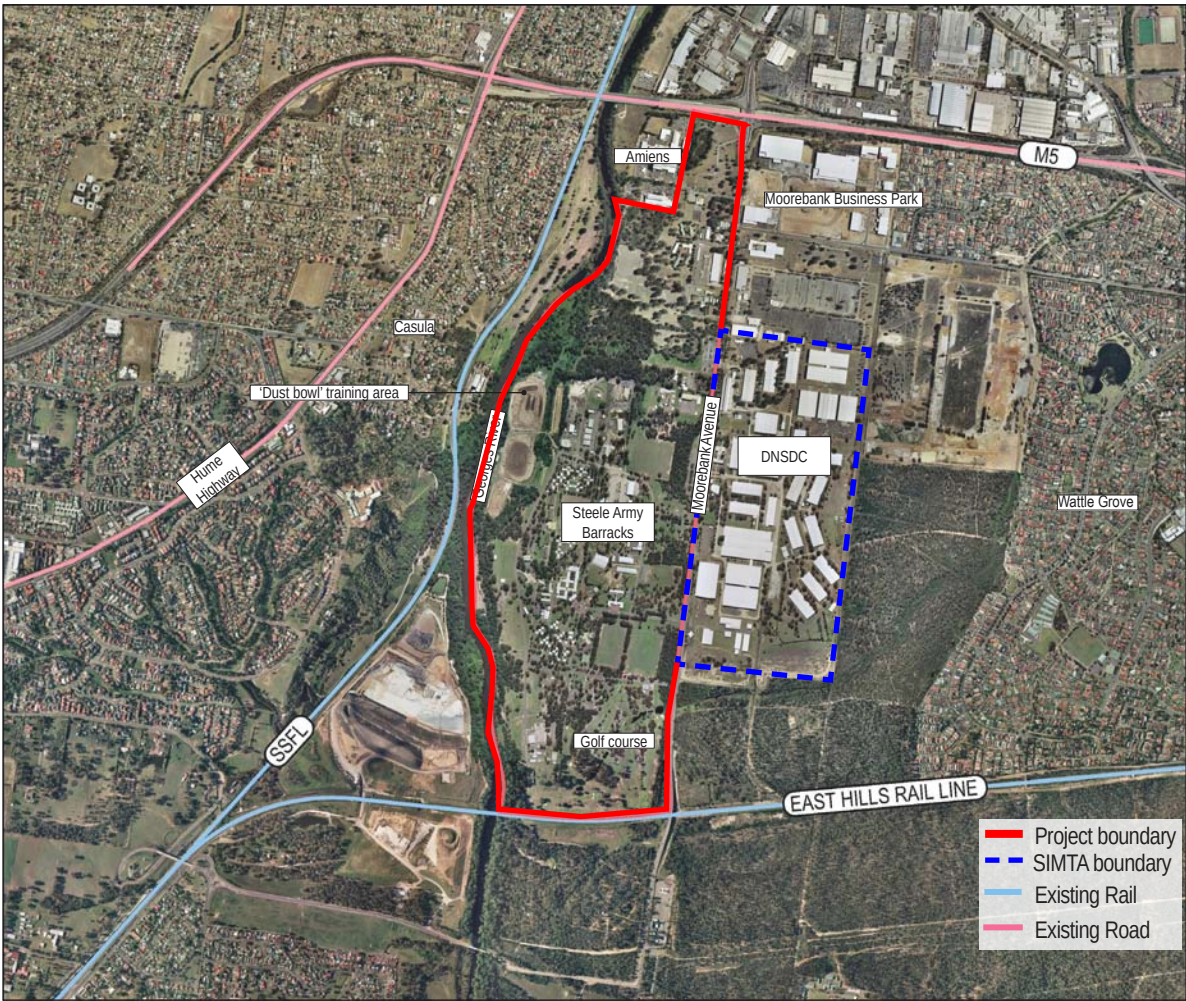


Figure 02 - Site location (not to scale)

Source: Google Earth

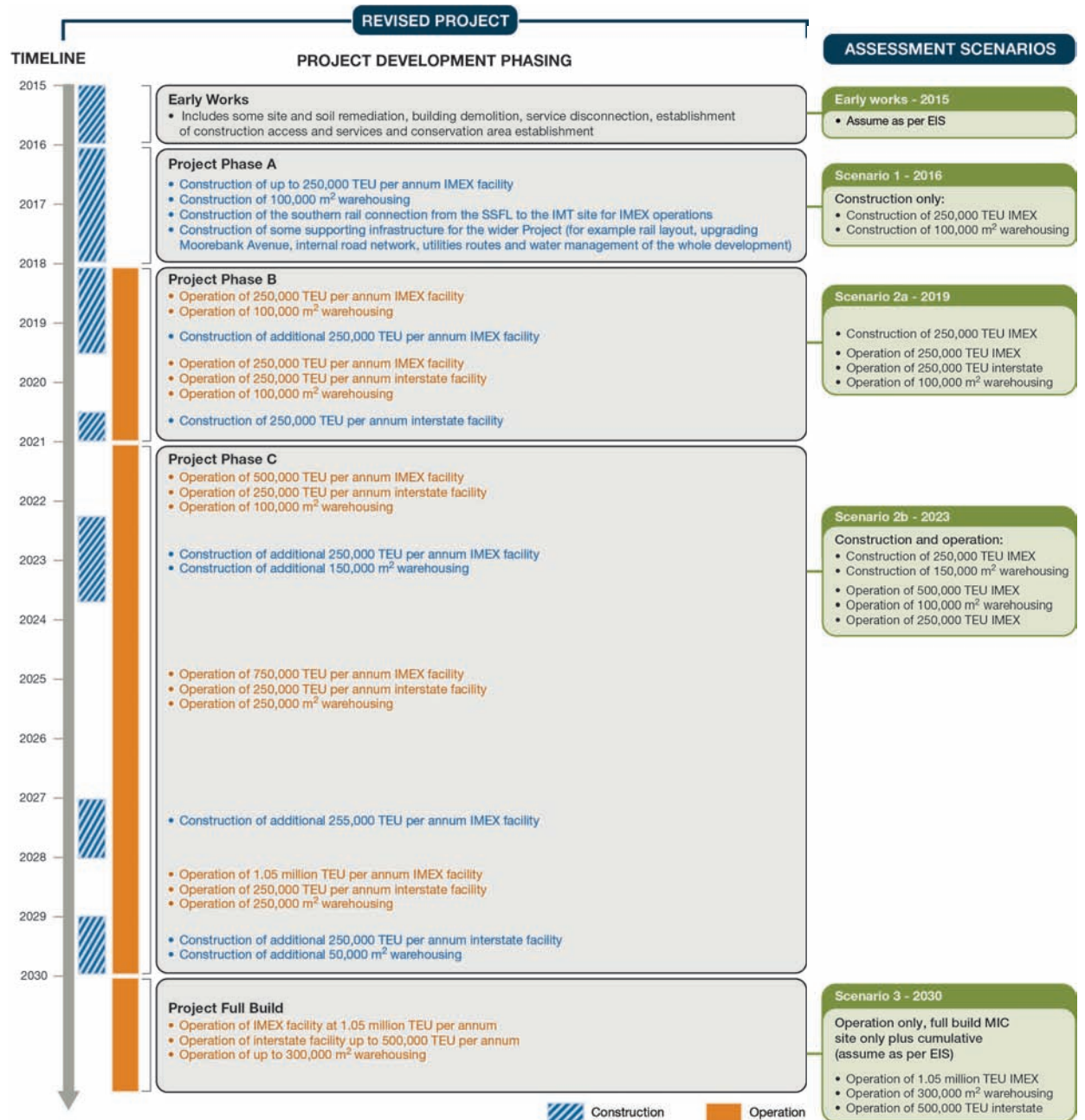


Table 03 - Project Staging

1.3.3 Project Elements

The key features/components of the Project comprise:

- an IMEX freight terminal – designed to handle up to 1.05 million TEU per annum (525,000 TEU inbound and 525,000 TEU outbound) of IMEX containerised freight to service 'port shuttle' train services between Port Botany and the Project;
- an Interstate freight terminal – designed to handle up to 500,000 TEU per annum (250,000 TEU inbound and 250,000 TEU outbound) of interstate containerised freight to service freight trains travelling to and from regional and interstate destinations; and
- warehousing facilities – with capacity for up to 300,000 square metres (m2) of warehousing to provide an interface between the Project and commercial users of the facilities such as freight forwarders, logistics facilities and retail distribution centres.

The Project is intended to connect to the SSFL, which was commissioned in January 2013 within the Main South Railway Line corridor. The SSFL connects Port Botany to west and south-western Sydney, and would provide a direct route for freight trains from Port Botany to the Project site.

The rail access would be from the south-western corner of the Project site, passing through the Glenfield Landfill site (owned by Glenfield Waste Services) and crossing the Georges River and floodplain.

Building and Infrastructure Height Restrictions

The Warehousing Precinct is proposed to be controlled by a combination of building height restrictions and a maximum floor space ratio. There will be a setback control of 7.5m along the northern and southern boundaries. The lighting poles will be 30m high, the gantries 27.7m high and a 21m height restriction will be placed on warehousing - see Section S1.

No buildings will be permitted within the landscape buffer between the site and the Georges River.

Loaded containers would be stacked to a height of 13m or five containers (2.6 m high per container). Empty containers would typically be stacked separately from loaded containers in the storage yard and the first available container picked for export. Empty storage containers would be stacked to a height of 20.8 m or eight containers (2.6 m per container).

Road Access to the site

Freight trucks would access the Project site from Moorebank Avenue, via the M5 Motorway. Trucks would then access the M7 Motorway and Hume Highway by the M5 Motorway. An upgrade to the northern end of Moorebank Avenue would enable safe and efficient access to the Project site.

Conservation Zone

A conservation area is to be established on the western edge of the project site adjacent to the Georges River through a process of conservation of existing vegetation, rehabilitation of degraded habitat and re-vegetation of bare areas close to the riverbank to create a largely continuous vegetated area along the river. The aim will be to provide an area that is protected and managed so as to:

- minimise the clearing of existing vegetation within the Project development
- minimise clearing associated with construction plant and equipment
- maintain ongoing conservation management to maximise habitat value.

Construction Activities

Activities during the construction period will include:

- clearing of the development area of the site prior to construction
- temporary fencing, lighting and builders' compounds
- earthworks, infrastructure installation
- road and rail building
- stockpiling of materials.

During these processes, large construction cranes will be used as well as other construction equipment. Additional sources of visual impact during construction, such as the establishment of hoardings and construction fencing would tend to create highly localised visual impacts, primarily along Moorebank Avenue.

Although the construction activities would be temporary, they would potentially occur on site for periods of a few years at a time for each stage, as identified in Table 03.





Figure 3A Indicative concept layout - Scenario 1 (Phase A) Source: Parsons Brinckerhoff



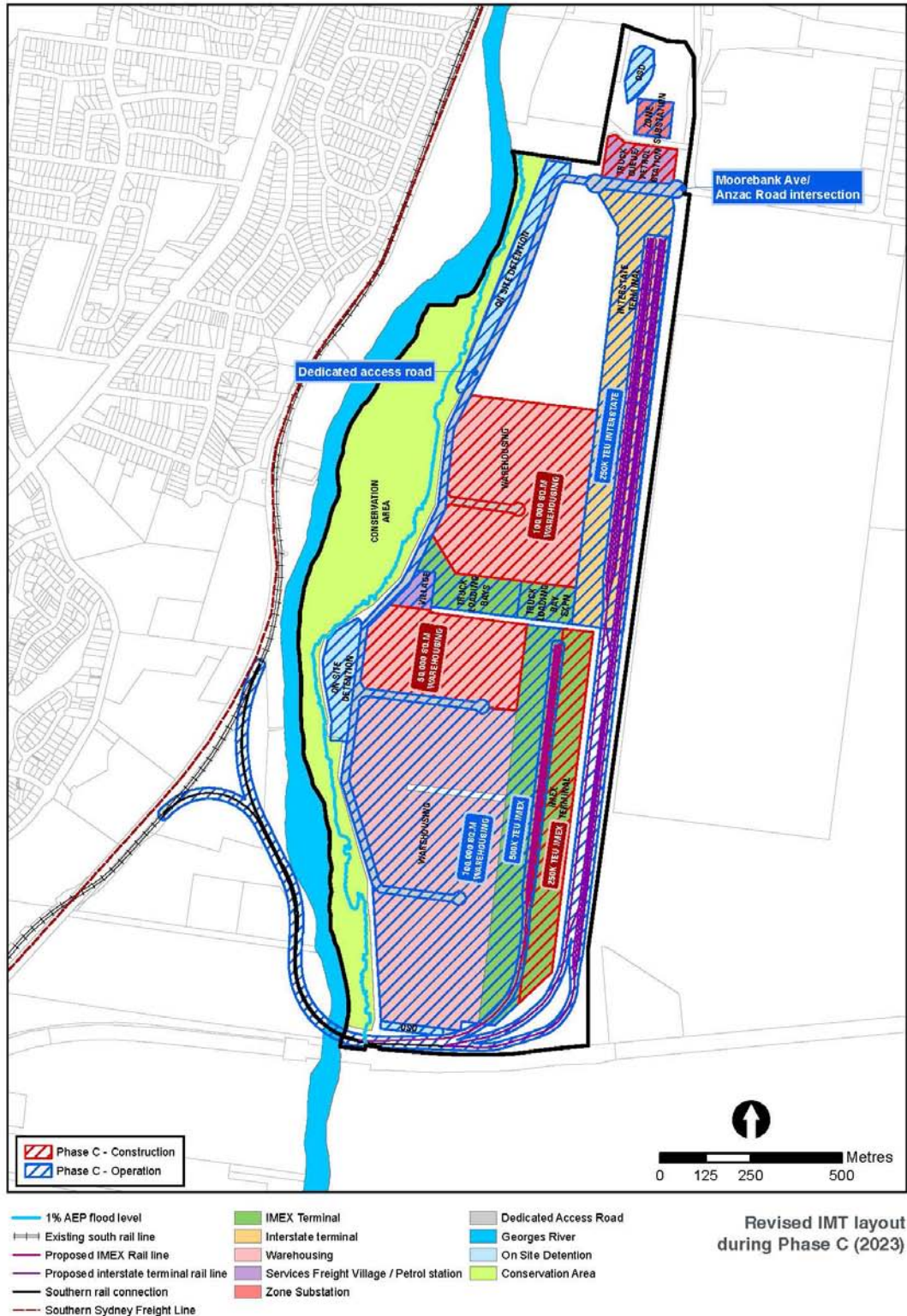


Figure 3C Indicative concept layout - Scenario 2b (Phase C) Source: Parsons Brinckerhoff



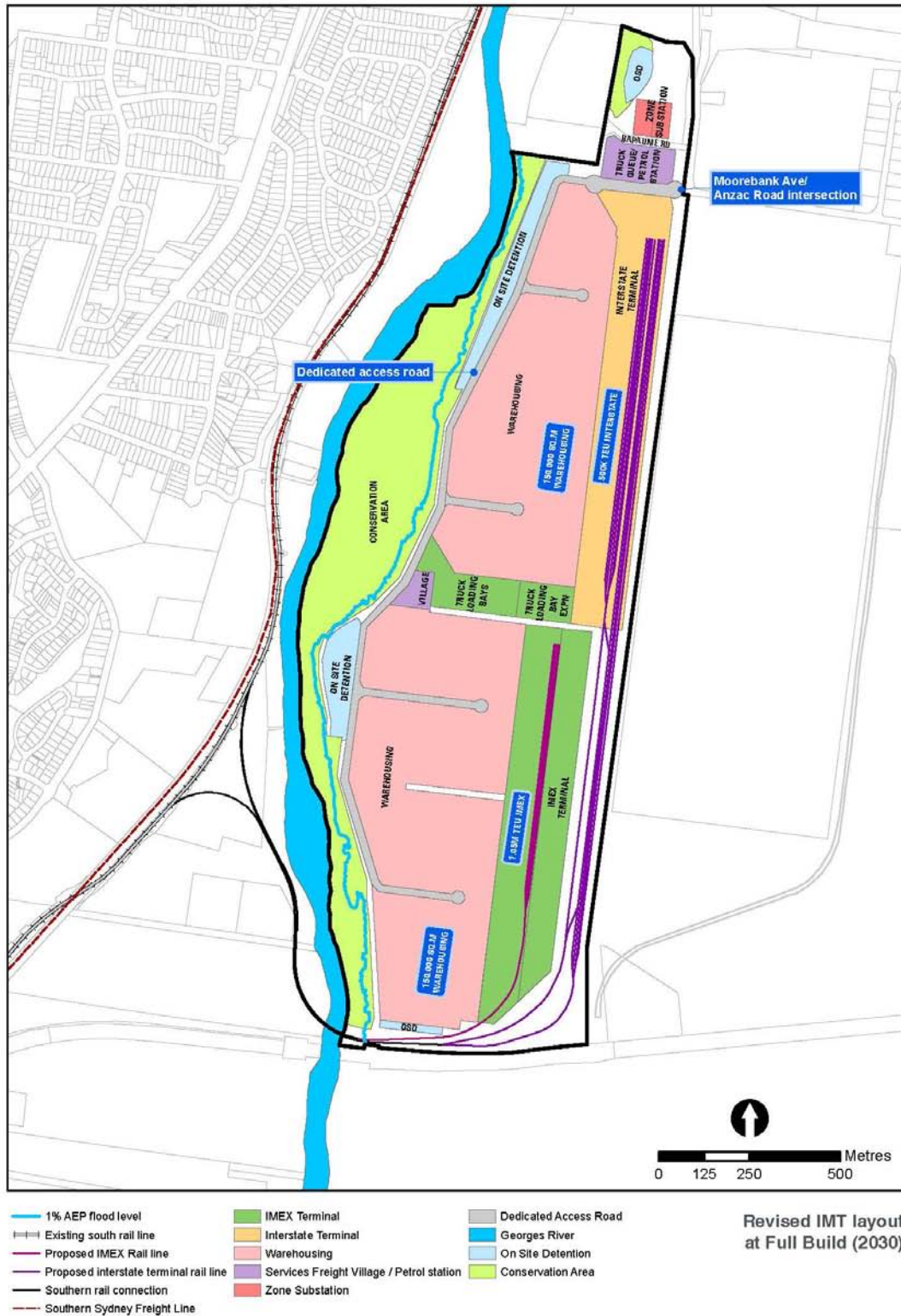


Figure 3E Indicative concept layout - Full Build Source: Parsons Brinckerhoff



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2.0

Landscape Character Assessment

Georges River

CLOUSTON associates



2.0 LANDSCAPE CHARACTER ASSESSMENT

2.1 EXISTING LANDSCAPE CHARACTER

The site is largely cleared, accommodating Defence buildings of varying sizes and uses. The site is zoned SP2 (Defence) as per the Liverpool Local Environment Plan 2008. Buildings associated with the Army Base range from single storey dwellings to storage facilities for plant machinery approximately 15m high. The buildings are surrounded by open lawn areas with some ornamental shrub and tree planting. Some parts of the site have been used as training facilities and are scarred, containing no vegetation. One such example is the plant and equipment training area called the 'dust bowl' which sits on the western boundary of the site.

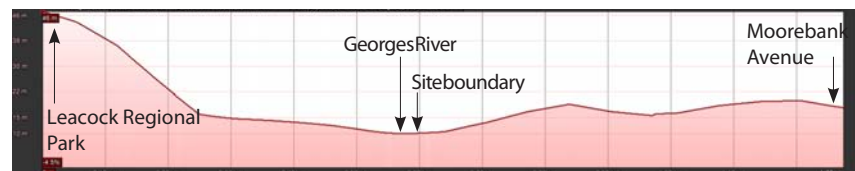
A golf course is present in the southern section of the site which is mainly open in character with patches of mature trees. To the north of the site is the Amiens light industrial area with a small pond, falling just outside the site boundary (refer Figure 02).

The landscape condition along Moorebank Avenue is well maintained with many mature street trees appearing in sound condition as well as lawns and footpaths that have been kept tidy and free from rubbish.

Immediately to the west of the site lies the Georges River. The shoreline of the river is heavily vegetated, particularly along the eastern bank. The riparian vegetation is well established, providing a wildlife corridor and a buffer for the protection of soil stability, water quality and aquatic habitats. Riparian vegetation along the site boundary is dense but follows a narrow corridor generally 25 metres wide. Further west beyond the Georges River and the passenger/freight rail line marks a transition to the low density residential suburb of Casula and commercial properties along the Hume Highway. A number of major road and rail corridors also exist to the north, west and south (refer Figure 02).

2.1.1 Topography

The site is generally flat to gently undulating, with the elevation over the majority of the site ranging from approximately 12.5 to 16.0m above Australian Height Datum (AHD). A terrace abuts the Georges River on the western boundary at a much lower elevation than the rest of the site. The terrace is well defined by a sharp change in elevation of approximately 6m and is the location of the current plant and equipment training ground - the 'dustbowl'. To the west of the Georges River, the ground rises steeply towards Leacock Regional Park, as shown in the indicative cross section S2 below.



Section S2- Indicative section across the site (east to west)

Source: Google Earth

2.1.2 Vegetation

Patches of remnant vegetation exist across the site with higher densities of trees along the Georges River riparian vegetation corridor and within the north west corner of the site. The vegetation serves as an informal visual buffer between areas of the site and screens views into the site from surrounding viewpoints.

The vegetation on site ranges from endemic stands of mature native vegetation (15 - 25m tall) to mature introduced species planted in avenues or as features. Native vegetation communities found within the site include stands of:

- Alluvial Woodland (part of the River-Flat Eucalypt Forest on Coastal Floodplains)
- Riparian Forest (part of the River-Flat Eucalypt Forest on Coastal Floodplains)
- Castlereagh Swamp Woodland and
- Castlereagh Scribbly Gum Woodland.

The core of the study area has low vegetation cover consisting chiefly of a mixture of planted and remnant indigenous and introduced trees within areas of cleared and disturbed land. The vegetation mostly obscures the current facilities from surrounding viewpoints but some filtered views of buildings are offered and higher buildings can be seen above the canopy in places.

2.2 LANDSCAPE CHARACTER ZONES

To enable the assessment of impacts on landscape character, landscape character zones have been determined for the site. Landscape character zones are defined as having a distinct, recognisable and consistent pattern of elements, be it natural (soil, vegetation, landform) and/or human built form, distinguishing one landscape different from another.

The Project site and surrounds have been assessed and four landscape character zones have been established. These include:

1. Fragmented vegetation
2. Riparian corridor
3. Residential development
4. Commercial/Light Industrial development

Further description of these zones and their properties is provided in the following pages and shown in Figure 05.

The overall impact rating of the Project on any given landscape character zone is based on themes of magnitude and sensitivity as described within the Methodology section of this report. The severity of these impacts is calculated using Table 02.

		Magnitude					
		High	High to Moderate	Moderate	Moderate to Low	Low	Negligible
Sensitivity	High	High Impact	High Impact	Moderate-high	Moderate-high	Moderate	Negligible
	High to Moderate	High Impact	Moderate-high	Moderate-high	Moderate	Moderate	Negligible
	Moderate	Moderate-high	Moderate-high	Moderate	Moderate	Moderate-low	Negligible
	Moderate to Low	Moderate-high	Moderate	Moderate	Moderate-low	Moderate-low	Negligible
	Low	Moderate	Moderate	Moderate-low	Moderate-low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Table 02: Overall Impact Rating as a combination of Sensitivity and Magnitude.

Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

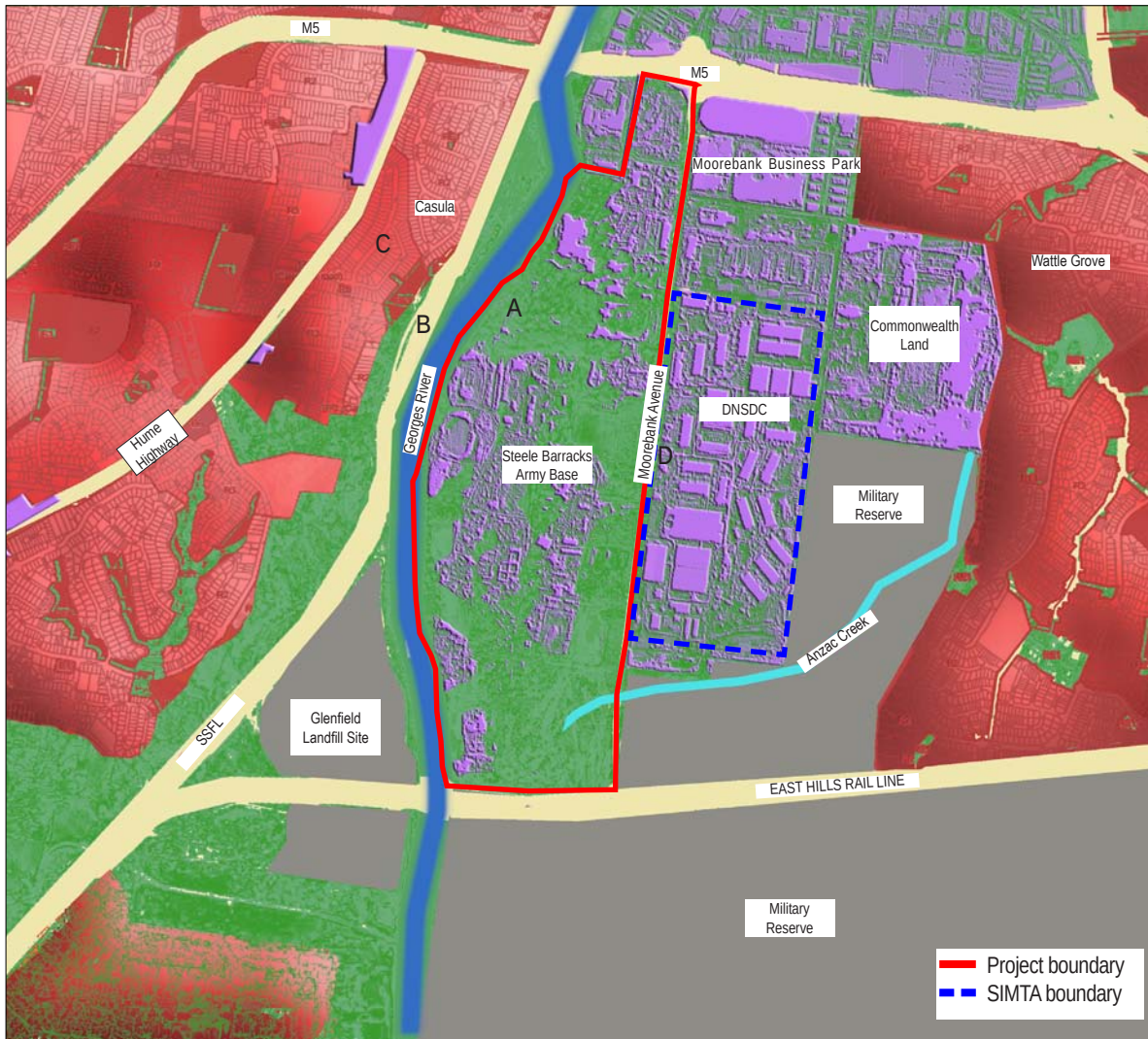


Figure 05 Landscape Character Zones (not to scale)

KEY

	Landscape Character Zone 1 - Fragmented vegetation		Transport Corridor
	Landscape Character Zone 2 - Riparian corridor		Creek
	Landscape Character Zone 3 - Residential development		Other land use
	Landscape Character Zone 4 - Commercial/Light industrial development		
A	Location of landscape character photo (as provided in each zones description below)		

2.2.1 Landscape character zone 1 - Fragmented Vegetation



Photo A - Typical fragmented vegetation within the site

This zone within the site is characterised by fragmented vegetation cover consisting chiefly of a mixture of planted and remnant indigenous and introduced trees within areas of cleared and disturbed land. Vegetation communities listed as endangered under the *Threatened Species Conservation Act 1995* (TSC) in this character zone include (see Figure 04):

- Castlereagh Swamp Woodland found in small patches in low-lying areas in the east of the site.
- Castlereagh Scribbly Gum Woodland primarily in the east of the site along Moorebank Avenue.

Botanical surveys of the site recorded the presence of two threat-listed species of plant:

- *Persoonia nutans* - listed as Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC) and TSC Act.
- *Grevillea parviflora* subsp. *parviflora* (listed as Vulnerable under the EPBC Act and TSC Act).

Table 04 summarises the landscape character elements for this zone.

Landscape Character Elements

Element	Description
Topography	Semi-cleared gently undulating landform
Hydrology	Natural gullies draining into riparian areas
Geology	No exposed features
Ecology/vegetation	Fragmented remnant vegetation - patches with some denser stands
Land use	Military training
Built form	No built form
Spatial	Primarily open in character with interrupted views

Table 04 - Landscape character elements for fragmented vegetation

Description of Sensitivity

Fragmented vegetation on the site is set within a partially degraded and altered landscape. The majority of vegetation located in this character zone is of a moderate ecological rating with small areas of highly rated ecological importance. The presence of endangered/vulnerable vegetation communities and two threatened species listed under the TSC Act has lead to a moderate/high sensitivity rating for this landscape zone.

Description of Magnitude

The proposed terminal will require the clearing of a portion of vegetation located within this character zone (see Figure 04). The Project is deemed as having a moderate/high magnitude rating within this zone.

Sensitivity	MODERATE/HIGH
Magnitude	HIGH
Overall Landscape Character Impact Rating	HIGH

From Table 02, using a combination of sensitivity and magnitude ratings.

2.2.2 Landscape character zone 2 - Riparian Corridor



Photo B - Georges River, looking east

The Georges River riparian corridor is located along the western boundary of the main Project site, flowing north towards Lake Moore and Chipping Norton Lake. Anzac Creek moves through the south eastern section of the site, but does not contain riparian vegetation.

Riparian Forest and Alluvial Woodland (both considered part of the River-Flat Eucalypt Forest on Coastal Floodplains community) are found within the site in this character zone. Riparian Forest is found in the wettest areas on the lower banks of the Georges River. Alluvial Woodland occurs on the drier high alluvial terraces. Both vegetation types are considered to be part of the River-Flat Eucalypt Forest, occurring on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner. It is listed as Endangered ecological community under the TSC Act.

Table 05 summarises the landscape character elements for this zone.

Landscape Character Elements

Element	Description
Topography	Mostly flat.
Hydrology	Natural gullies draining into riparian areas, river corridor and creeks
Geology	No obvious/exposed geological features. Quaternary alluvial deposits.
Ecology/vegetation	Primary native stands of vegetation with some understory, cleared in locations
Land use	None
Built form	No dwellings
Spatial	Primarily enclosed in character with more distant views from clearings

Table 05 - Landscape character elements for riparian corridor

Description of Sensitivity

This landscape character zone forms a distinctive edge to the western boundary of the site. Due to the presence of endangered communities listed under the TSC Act this landscape has a high sensitivity, although in this case, the impact of the development on this character zone is minimal, leading to a moderate/low sensitivity rating in the context of the Project.

Description of Magnitude

The preliminary design retains the riparian corridor along the western boundary of the site, maintaining the vegetation containing the most important habitat on the site. The rail link connecting the Project site with the SSFL will be located in this character zone and will involve the construction of a bridge and associated rail infrastructure. The magnitude of the Project within this landscape zone is relatively small and hence unlikely to significantly affect the character of the whole zone. The riparian corridor may be bolstered by new planting associated with the establishment of the conservation zone. The Project is given a moderate/low magnitude rating within this landscape character zone.

Sensitivity	MODERATE/LOW
Magnitude	MODERATE/LOW
Overall Landscape Character Impact Rating	MODERATE/LOW

From Table 02, using a combination of sensitivity and magnitude ratings.

2.2.3 Landscape character zone 3 - Residential Development



Photo C - Typical residential property within the suburb of Casula

This character type is found to the east and west of the Project site, concentrated within the suburbs of Casula and Wattle Grove.

Residential development in the area is typified by double and some single storey detached properties. Vegetation is limited to patches of public open space, private gardens and street tree planting. The density of built form blocks the majority of views towards the site, limiting visual accessibility to receptors at the edge of the residential development on elevated ground.

Table 06 summarises the landscape character elements for this zone.

Landscape Character Elements

Element	Description
Topography	Mostly cleared undulating landform
Hydrology	Drainage networks
Geology	No obvious geological features
Ecology/vegetation	Sparse/dotted tree cover - disconnected
Land use	Semi-urban. Residential
Built form	Higher density of residential properties
Spatial	Primarily open in character with distant views from higher elevations

Table 06 - Landscape character elements for residential development

Description of Sensitivity

This landscape zone constitutes a moderate density of residential development. A limited number of receptors have visual connections to the Project site and built form screens most long distance views. This zone is capable of absorbing moderate change without altering its character and is described as having a moderate sensitivity to change.

Description of Magnitude

The scale and bulk of the proposed development is of a similar magnitude to existing elements within the wider study area, but of an increased scale and bulk when compared to buildings within this character zone. The Project is deemed to have a moderate magnitude within this landscape zone.

Sensitivity	MODERATE
Magnitude	MODERATE
Overall Landscape Character Impact Rating	MODERATE

From Table 02, using a combination of sensitivity and magnitude ratings.

2.2.4 Landscape character zone 4 - Commercial/Light Industrial



Photo D - Department of Defence Facility adjacent to Moorebank Avenue

Light industrial and commercial development is found to the north, east and on the site. Within the site, development constitutes buildings associated with the School of Military Engineering and other minor Moorebank units. To the east, the land is occupied by the Defence Storage Distribution Centre (DNSDC). The commercial/light industrial areas of Moorebank Business Park are located directly to the north of the site.

Development consists primarily of larger buildings including warehouses and storage facilities up to 15m in height. Sparse and fragmented vegetation is scattered through this character zone. Built form and the flat nature of the local terrain limit the majority of views towards the site.

Table 07 summarises the landscape character elements for this zone.

Landscape Character Elements

Element	Description
Topography	Mostly cleared, level landform
Hydrology	Drainage networks
Geology	No obvious geological features
Ecology/vegetation	Sparse/dotted tree cover - disconnected
Land use	Commercial, light industrial, administration and training and some major infrastructure
Built form	Large, multistory buildings of varying heights.
Spatial	Primarily open in character with distant views from higher elevations

Table 07 - Landscape character elements for commercial/light industrial development

Description of Sensitivity

This landscape zone constitutes a high level of urban development with associated infrastructure and numerous large commercial and industrial buildings. Within the site a lower density of industrial buildings exist, related to its use as an army barracks. This landscape character has few sensitive receptors and a high ability to absorb change, leading to a low sensitivity to change.

Description of Magnitude

Buildings within the site will be demolished and replaced by the proposed Project and associated infrastructure. The scale and bulk of the proposed development is of a similar magnitude to existing infrastructure elements within the wider study area, but of an increased scale when compared to existing on-site buildings. The Project is deemed to have a moderate/low magnitude within this landscape zone.

Sensitivity	LOW
Magnitude	MODERATE/LOW
Overall Landscape Character Impact Rating	MODERATE/LOW

From Table 02, using a combination of sensitivity and magnitude ratings.

2.3 LANDSCAPE CHARACTER IMPACTS

The landscape character immediately surrounding the proposed Project site is typical of the district with large areas of residential, commercial and industrial development. These areas are broken by patches of parkland, public open space and riparian corridors. The impact of the Project on landscape character varies over the four character zones, depending on the landscape's sensitivity and the magnitude of the Project within the landscape - see Table 08.

From a landscape character perspective, the Project is shown to have the greatest impact on fragmented vegetation within the site (high), requiring the permanent clearing of land and removal of a portion of this character zone. Several protected vegetation species/communities will be affected. The area of vegetation to be cleared within this zone totals approximately 50 hectares. It has been proposed to replace some of this lost vegetation with new planting within a conservation area to the west of the site, assisting in mitigating the impact of the Project on this landscape zone.

The riparian corridor is shown to have a moderate/low sensitivity to change despite the presence of valuable ecological habitat. The design of the facility includes the retention of the majority of this landscape zone, assisting in reducing its sensitivity to change. This has led to a moderate/low overall impact rating. The new rail bridge across the Georges River will, however, be a noticeable addition within this character zone.

Residential development surrounding the Project site receives a moderate overall impact rating due to the number of potential visual receptors within this character zone, coupled with the fact that the Project would see an increase in the scale and bulk of development within the local area.

The Project fits within a wider context of commercial and industrial built form, including the nearby centres of Amiens and Yulong to the north. This reduces the commercial and light industrial character zones sensitivity to change, resulting in an impact rating of moderate/low.

Rail Alignment

The southern rail alignment crosses the Glenfield landfill site. This area is zoned as Public Recreation within the Liverpool LEP 2008. Currently the site has a low sensitivity to change due to its degraded landscape character, although overtime it is likely to be re-vegetated and may become an area of public open space with high amenity value. The presence of existing rail infrastructure to the east and south of the landfill site will assist in reducing the magnitude of any landscape character impacts associated with the new rail spur in the future.

Summary of Landscape Character impacts

	Fragmented Vegetation	Riparian Corridor	Residential Development	Commercial/ Light Industrial
Sensitivity	Moderate/High	Moderate/Low	Moderate	Low
Magnitude	High	Moderate/Low	Moderate	Moderate/Low
Overall Rating	High	Moderate/Low	Moderate	Moderate/Low

Table 08 - Summary Landscape Character Impact Rating Table

Appendix D Visual and Urban Design Assessment



CLOUSTON associates

3.0

Visual Impact Assessment

Carroll Park looking east



3.0 VISUAL IMPACT ASSESSMENT

3.1 EXISTING VISUAL ENVIRONMENT

3.1.1 Private domain

The site is principally visible from a number of residential properties located next to Leacock Regional Park, properties backing onto Carroll Park and properties backing onto St Andrews Park, as well as properties that back onto the SSFL near Lakewood Crescent. Views towards the site from other properties within the suburb of Casula are blocked by a combination of built form and topography.

3.1.2 Public domain

The site is principally visible from high points along the M5 South Western Motorway and along the length of Moorebank Avenue. It is also visible from parts of minor local roads Marsh Parade, Lakewood Crescent, St Andrew Boulevard and Leacocks Lane. Parks from which the site is visible from include Carroll Park, St Andrew Park and Leacock Regional Park to the west. Direct views north into the site are offered from the East Hills Line rail corridor south of the Project.

Figure 06 provides a summary of the visual catchment of the existing site.

In summary, visual accessibility into the site is highest at the following locations:

- from parks and selected residences on elevated ground to the west of the site
- along Moorebank Avenue
- from the M5 freeway overpass.

Multiple entries to the site are allocated along the length of Moorebank Avenue (refer Photo E and Figure 06) from roads including Jacquinot Road, Chatham Avenue, Bapaume Road and Ypres Road. Car parking facilities are also provided along Moorebank Avenue within the site boundary.



Photo E - Moorebank Avenue looking south

3.2 VISUAL CATCHMENT ANALYSIS

Prior to preparing the detailed visual receptor analysis, a desktop study was conducted using aerial mapping to identify a visual catchment zone and key receptors that may be visually impacted by the Project. Figure 06 indicates the Zone of Theoretical Visibility (ZTV) as defined and created by topography, street layout, existing buildings and existing vegetation. This is for the existing site as it currently stands, without taking into account the proposed development.

3.2.1 Viewer Description

The types of viewers which currently have visual access to the site include combined open space and residential receptors backing onto and surrounding Carrolls Park, Leacock Nature Reserve and St Andrews Park located on the western boundary. Other significant receptors identified include public road and transportation corridor receptors at the intersection of the M5 South Western Motorway and Moorebank Avenue, as well as road users along Moorebank Avenue. Public road corridor receptors also exist looking west along Anzac Rd in the suburb of Wattle Grove. Here filtered, oblique views of the site are offered. No residential receptors were identified within the suburb of Wattle Grove.

Residential receptors are limited by the nature of the topography and vegetation, restricting views into the site to a limited number of properties.

3.2.2 Viewer Analysis

During a visit to the site, a final list of eight key receptor sites with the potential to be visually impacted by some element of the Project were selected (refer Figure 07 and 7B). The final list does not represent the entire number of receptors likely to be visually impacted, but rather provides a representation of the range of viewers potentially impacted by the Project. Each selected viewpoint represents a group of receptors within that immediate area.

The locations identified are:

1. Southern section of Leacock Regional Park
2. Leacock Regional Park and associated residential heritage properties backing onto the parklands.
3. Carroll Park and associated residential properties backing onto the park.
4. Casula Powerhouse Arts Centre
5. Georges River Casula Parklands
6. St Andrews Park and associated residential properties surrounding the park, as well as properties that back onto the SSFL.
7. Junction of M5 South Western Motorway and Moorebank Avenue.
8. Moorebank Avenue heading south.

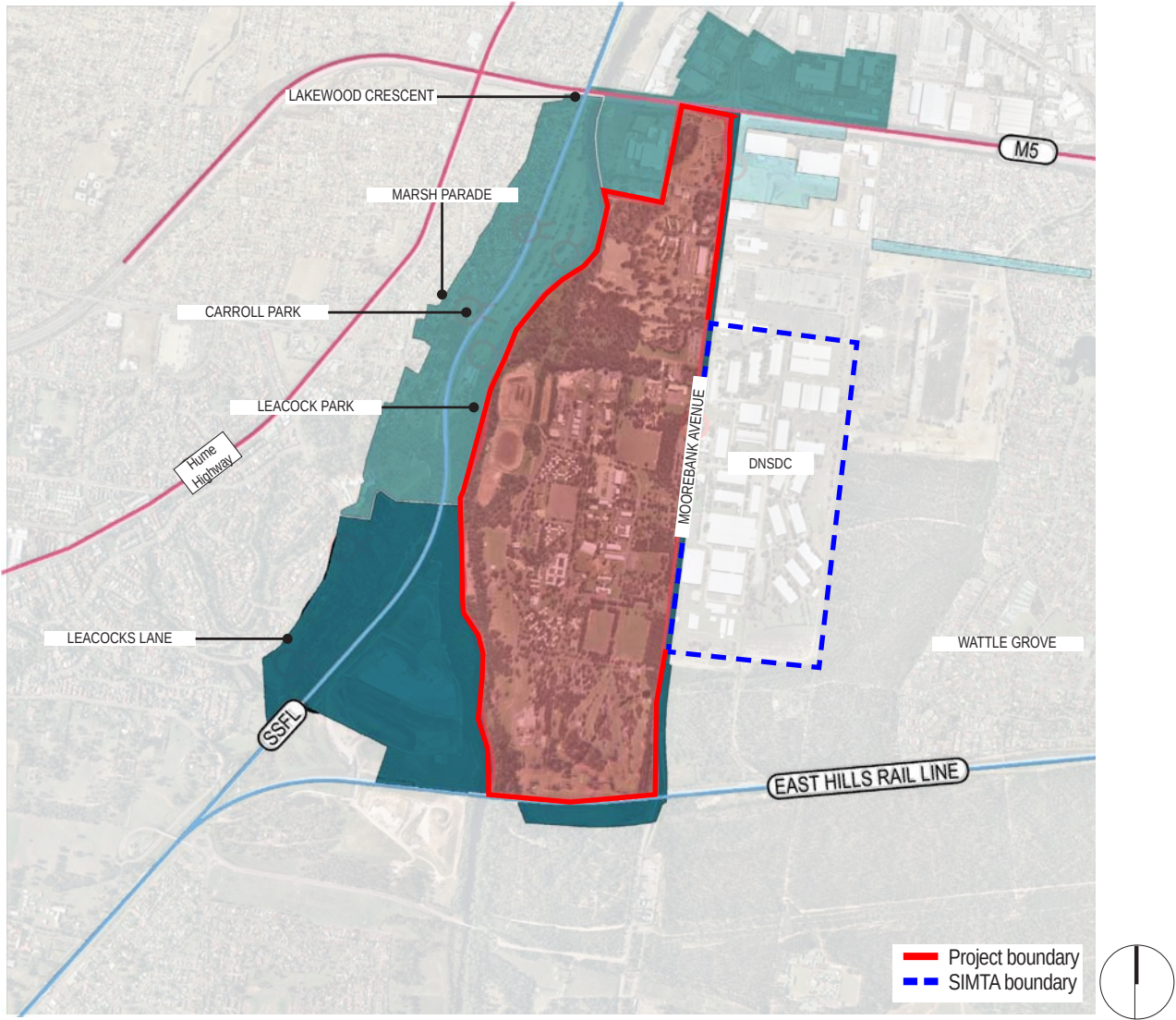


Figure 06 Zone of Theoretical Visibility (ZVT) for the existing site

KEY

- Visual Catchment within the site
- Existing rail
- Existing major roads

Visual Catchment outside the site (Approximated)

- Direct views of the site
- Filtered views of the site
- Heavily filtered/screened views of the site

NB: Catchment analysis for the existing site was prepared prior to the site visit. It does not consider the placement of individual built elements within the masterplan of the proposed development.

3.3 VISUAL ASSESSMENT

A detailed photographic survey was undertaken at each selected viewpoint (refer Figure 07 and 7B). An assessment of the expected visual impact for each Project development phase and concept layout was then conducted. The results are summarised within the following tables which include a description of the current view followed by a discussion of the visual impacts of the Project on that view.

Each phase of construction is analysed in the table, followed by the operational phase. The overall impact rating of the Project on any visual receptor is based on themes of magnitude and sensitivity as described with the Methodology section of this report. The severity of these impacts are calculated using Table 02.

For the three development phases (Scenario 1 - Phase A, Scenario 2 - Phase B and Scenario 2b - Phase C) one overall impact rating is given. This is a collective impact rating for all three stages and takes into account parts of the Project that are already operational at the conclusion of each phase.

For a detailed description of the assessment criteria and impact ratings used, see Appendix A.

		Magnitude					
		High	High to Moderate	Moderate	Moderate to Low	Low	Negligible
Sensitivity	High	High Impact	High Impact	Moderate-high	Moderate-high	Moderate	Negligible
	High to Moderate	High Impact	Moderate-high	Moderate-high	Moderate	Moderate	Negligible
	Moderate	Moderate-high	Moderate-high	Moderate	Moderate	Moderate-low	Negligible
	Moderate to Low	Moderate-high	Moderate	Moderate	Moderate-low	Moderate-low	Negligible
	Low	Moderate	Moderate	Moderate-low	Moderate-low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Table 02: Overall Impact Rating as a combination of Sensitivity and Magnitude.
Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

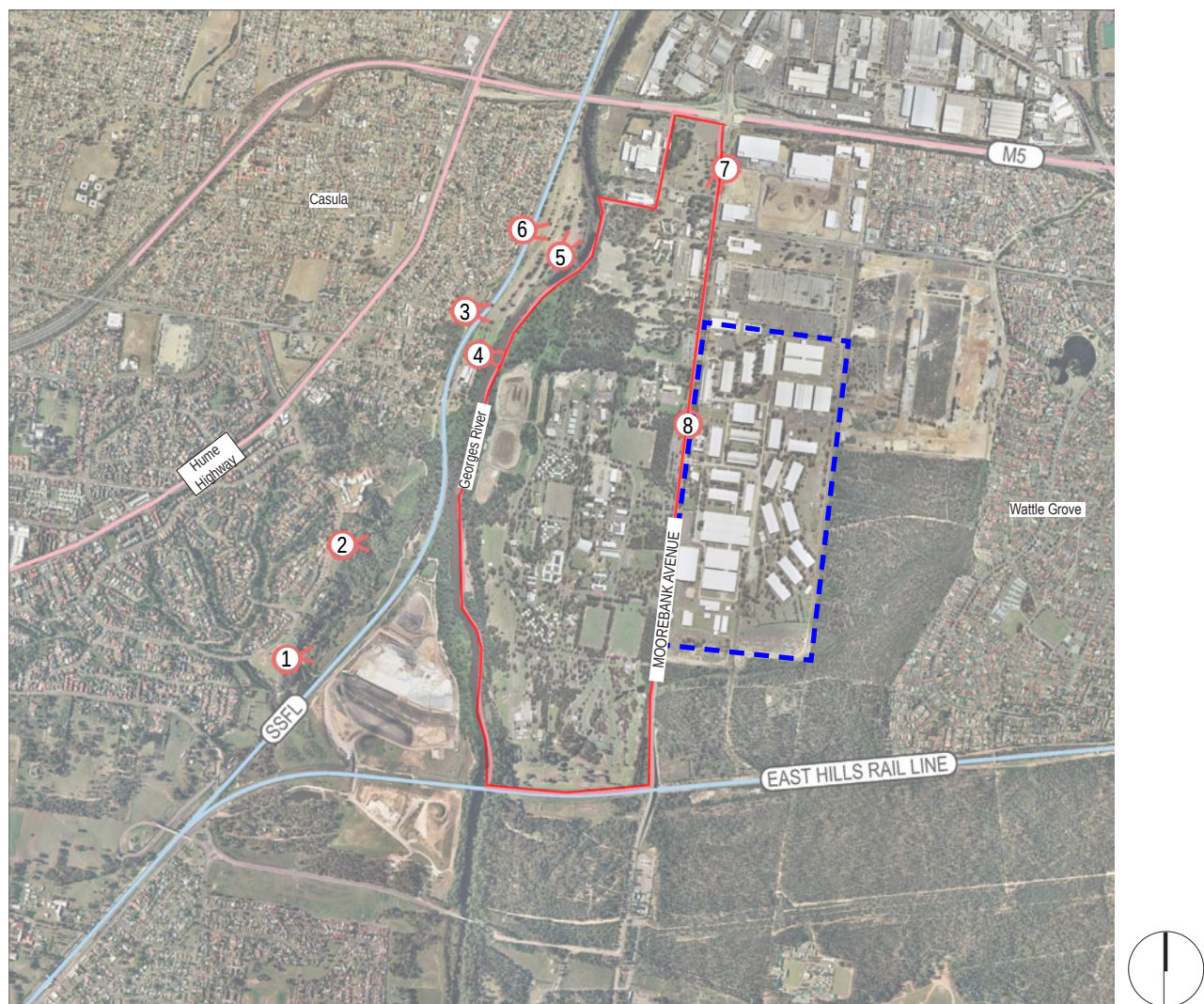


Figure 07 Viewpoint locations and direction of view

KEY

- ① Viewpoint 1 - Southern section of Leacock Regional Park
- ② Viewpoint 2 - Leacock Regional Park and associated residential heritage properties within the parklands
- ③ Viewpoint 3 - Carroll Park and associated residential properties backing onto the park
- ④ Viewpoint 4 - Casula Powerhouse Arts Centre
- ⑤ Viewpoint 5 - Georges River Casula Parklands
- ⑥ Viewpoint 6 - St Andrews Park and associated residential properties surrounding the park
- ⑦ Viewpoint 7 - Junction of M5 South Western Motorway and Moorebank Avenue
- ⑧ Viewpoint 8 - Moorebank Avenue heading south

- Project Boundary
- - - SIMTA Boundary
- Existing Rail
- Existing Road

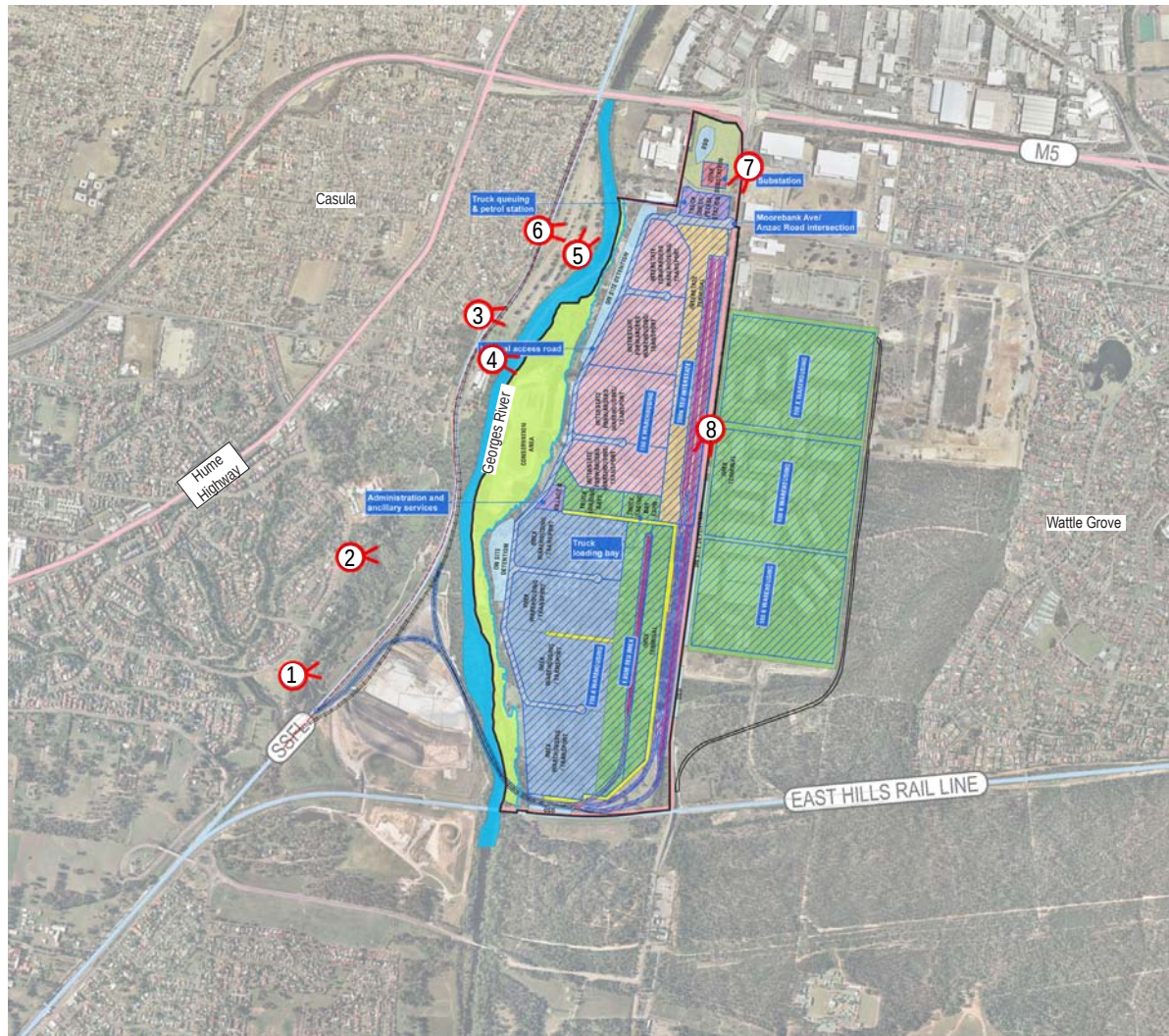


Figure 7B - Viewpoint locations overlaid on indicative concept layout. Source: Parsons Brinckerhoff

KEY

Existing Rail
Existing Road

- ① Viewpoint 1 - Southern section of Leacock Regional Park
- ② Viewpoint 2 - Leacock Regional Park and associated residential heritage properties within the parklands
- ③ Viewpoint 3 - Carroll Park and associated residential properties backing onto the park
- ④ Viewpoint 4 - Casula Powerhouse Arts Centre
- ⑤ Viewpoint 5 - Georges River Casula Parklands
- ⑥ Viewpoint 6 - St Andrews Park and associated residential properties surrounding the park
- ⑦ Viewpoint 7 - Junction of M5 South Western Motorway and Moorebank Avenue
- ⑧ Viewpoint 8 - Moorebank Avenue heading south

VIEWPOINT 1

Location: Southern section of Leacock Regional Park

Distance to main Project boundary - 870m

Number of residential properties likely to be impacted: 0

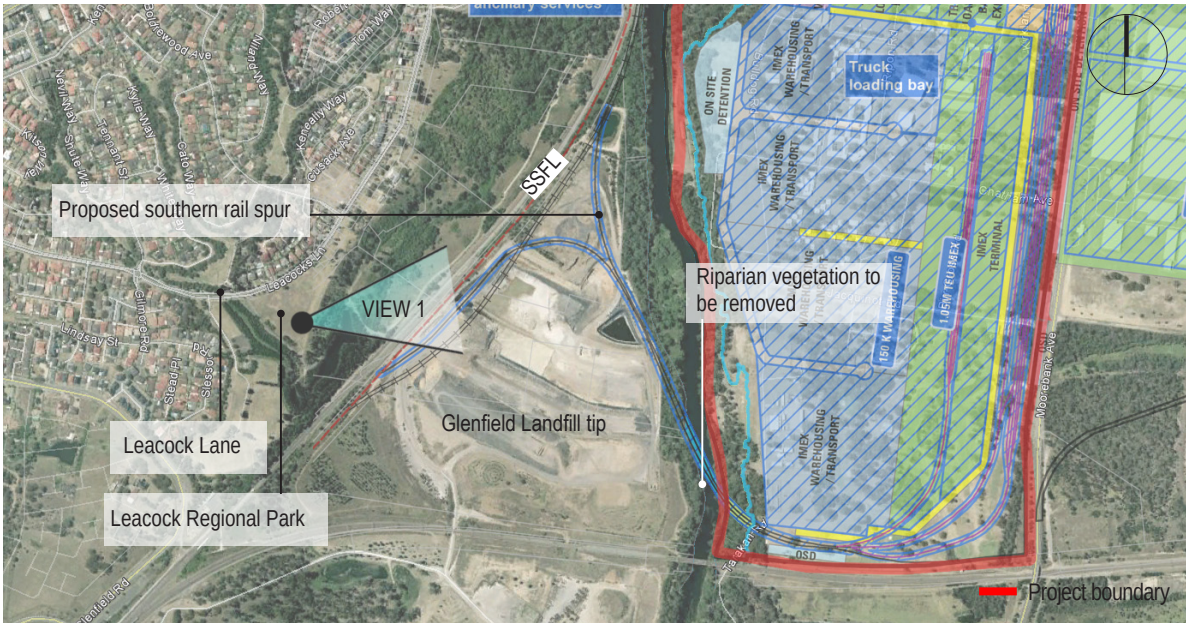


Figure 08 - viewpoint 1 location map



View 1 - Existing view east from southern end of Leacock Regional Park

Description	Current View
This viewpoint is located in Leacock Regional Park, a public open space area. A grassed slope leads up from Leacock Lane to a ridge overlooking the site. The park is frequented by dog walkers and local residents. There are no residential properties within the park.	As shown in view 1, current views are primarily of riparian vegetation in the middle distance with no views of any site buildings due to screening by vegetation. In the foreground of the view is the SSFL and the Glenfield landfill (not within the Project site). Distant vegetation is visible at the rear of the foreground treeline.

VISUAL IMPACT

Phase	Impact
Early Works	Existing riparian vegetation along the Georges River corridor and the retained conservation zone will assist in screening a substantial amount of the ground based construction activities such as demolition and truck movements.
Scenario 1 Project Phase A	There would potentially be views of the top of construction equipment such as cranes and views of crane gantries, lights and building structures as they are constructed. There would also be extensive views of the construction of the rail connection from the SSFL to the Project site and associated removal of vegetation. Existing rail infrastructure is already visible within the view and will reduce the visual impact of the new rail spur.
Scenario 2A Project Phase B	The second half of IMEX will be established. The tops of cranes and other construction equipment may be visible from this viewpoint. Half the IMEX and a portion of the warehousing will be operational. The tops buildings (21m), lighting columns (30m) and some gantries (27.7m) may be visible above the tree canopy. Long freight trains will also be visible crossing the rail spur into the Project site.
Scenario 2B Project Phase C	Much of the site will have already been constructed and the majority of the IMEX and Interstate will be operational. The tops of warehouses, lighting columns and some gantries may be visible above the tree canopy. Construction equipment associated with additional warehousing may also be visible from this viewpoint. Long freight trains will be visible crossing the rail spur into the Project site.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	Views of the development will be partially screened by retained riparian vegetation running along the Georges River (refer photomontage 1). The tops of warehouse buildings (21m), lighting columns (30m) and some of the crane gantries (27.7m) may be visible above the tree canopy. Vegetation planted as part of the rehabilitation works within the conservation zone along the full length of the site would initially provide little screening from this viewpoint. Over time, as rehabilitation vegetation reaches mature height, this planting may provide some screening of the development. Properties behind this viewpoint (to the west of Leacock Lane) will not have views of the Project due to the nature of the topography. The relatively low elevation of this location reduces the visual impact in this area. The new rail spur will be visible in the foreground, behind the current SSFL track. Long freight trains will be visible crossing into the Project site. The existence of current rail infrastructure of a similar scale and bulk to the proposed, assists in reducing the magnitude of the changes from this viewpoint and therefore reduces the level of visual impact of the new rail crossing.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR	
Early Works		1	M	M	L	L	L	M	MODERATE/LOW
Development Phases		1	M	M	L	L	M/L	M	MODERATE
Operational Phase		1	M	M	L	M	M/L	M	MODERATE

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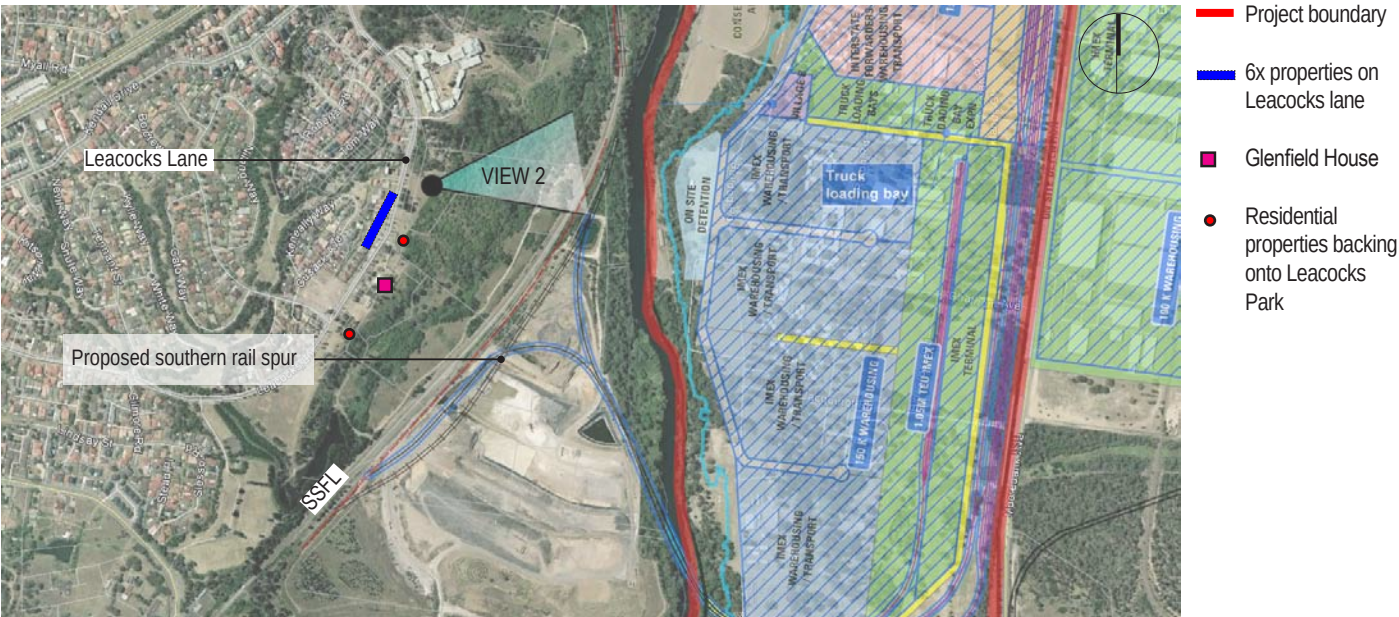


Photomontage 1 - Potential view east from Leacock Regional Park - indicative only, subject to detailed design



VIEWPOINT 2

Location: Leacock Regional Park and associated residential properties backing onto the parkland.
Distance to main Project boundary - 460m
Number of residential properties likely to be impacted: 3 (an additional 6 double storey properties on Leacocks Lane may have views over the site from their second storey windows)



View 2 - Existing view east from Leacock Regional Park

Description	Current View
An elevated section of park situated on a ridgeline overlooking the site. Large areas of grassland and scattered shrubs/trees. Three residential properties back onto the park, including the heritage listed Glenfield house.	As shown in view 2, current views are far reaching and extensive over the site and beyond, towards the horizon. The view is primarily of vegetation in the foreground, middle and far distance, with several water towers seen towards the horizon. There are no views of buildings within the site.

VISUAL IMPACT

Phase	Impact
Early Works	Existing riparian vegetation along the Georges River corridor and the retained conservation zone will assist in screening a substantial amount of the ground based construction activities such as demolition and truck movements.
Scenario 1 Project Phase A	There would be clear views of tall construction equipment such as cranes above the treeline as warehousing is constructed in the southern portion of the site. There may be the noticeable removal of vegetation in the middle distance, as it is cleared in the main portion of the site. The southern rail spur will not be visible.
Scenario 2A Project Phase B	The second half of IMEX will be established. The tops of cranes and other construction equipment may be visible from this viewpoint. Half the IMEX and a portion of the warehousing will be operational. The tallest parts of the gantries, container stacks, lighting columns and warehouses will be visible above the tree line from Leacocks Park and associated residential properties. The southern rail spur will not be visible.
Scenario 2B Project Phase C	Much of the site will have already been constructed and be fully operational. The tallest parts of the gantries, container stacks, lighting columns and warehouses will be visible above the tree line. Construction equipment and vegetation removal associated with additional warehousing will also be visible from this viewpoint. The southern rail spur will not be visible.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	Sections of the parkland have direct and extensive views over the site and proposed development. Three properties (including the heritage listed Glenfield House) are located within close proximity to the parkland. These properties would have views over the development, although existing tree planting within their gardens would assist in screening some views. Six double storey properties along Leacocks Lane may have views over the development from their second storey windows, although access to these properties for assessment was not possible. Foreground vegetation along the Georges River will screen views of the lower sections of buildings, railway tracks and gantries. Due to the elevated nature of this viewpoint compared to viewpoint 1, the tallest parts of the gantries, container stacks, lighting columns and warehouses will have increased visibility above the tree line. Vegetation planted as part of the rehabilitation works in the conservation zone would provide little screening during the early operational stages but once established, may offer a greater level of screening of the Project from this viewpoint.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early Works		2	M	M	M/H	L	L	M	MODERATE/LOW
Development Phases		2	M	M/H	M/H	M/H	M/H	M/H	MODERATE/HIGH
Operational Phase		2	M	M/H	M/H	M/H	M/H	M/H	MODERATE/HIGH

VIEWPOINT 3

Location: Carroll Park and associated residential properties backing onto the park and along Buckland Road and Marsh Parade
Distance to main Project boundary - 250m

Number of residential properties likely to be impacted: 28 (a further 16 properties along Buckland Road and Marsh Parade may have filtered views from second storey windows)

- Project boundary
- Residential properties with direct views
- Residential properties with filtered views

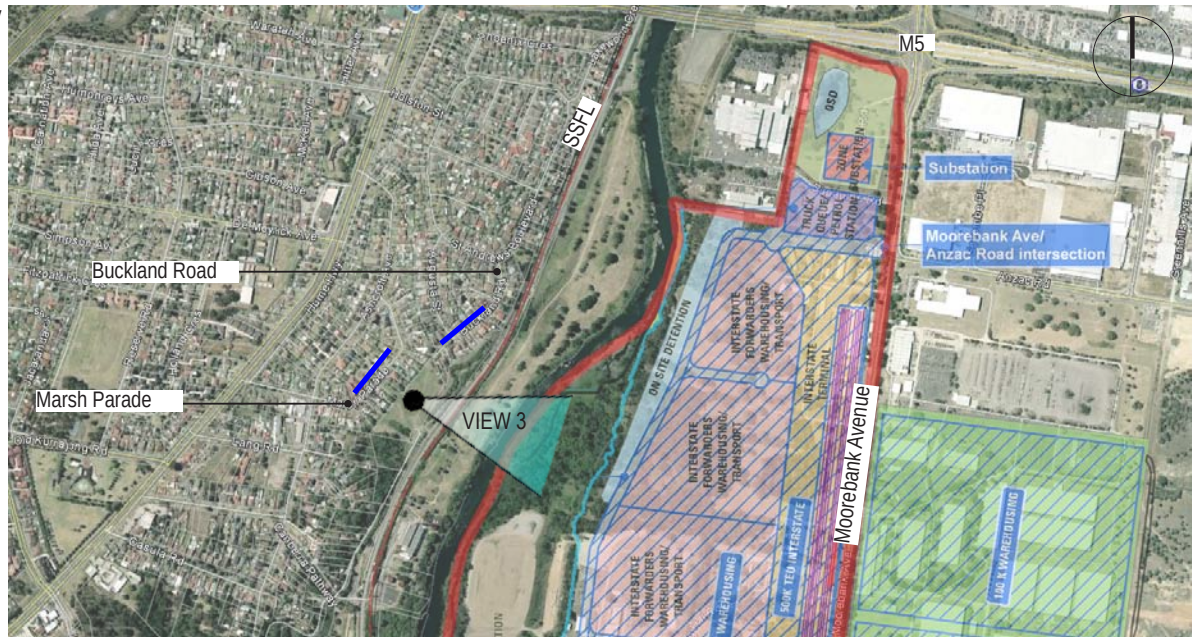


Figure 8C - viewpoint 3 location map



View 3 - Existing view east from Carroll Park

Description	Current View
An area of public open space, sloping steeply down to the east to the SSFL railway line with residential properties backing onto the park.	As shown in view 3, there are extensive views over the Project site, dominated by vegetation in the mid and far distance. The SSFL is visible in the foreground (not within the Project site), with a significant band of riparian vegetation associated with the Georges River corridor behind. The exposed earth of the plant and equipment training area, the 'dust bowl', is visible behind this to the right, partially screened by the foreground trees. Several low rise buildings are visible through the trees within the site. Two distant towers are also visible in the far distance.

VISUAL IMPACT

Phase	Impact
Early Works	Existing riparian vegetation along the Georges River corridor and the retained conservation zone will assist in screening a substantial amount of the ground based construction activities such as demolition and truck movements.
Scenario 1 Project Phase A	There would be oblique views of the top of construction equipment to the south of this viewpoint, associated with the construction of warehousing and part of the IMEX facility within the southern portion of the Project site. The central portion of the Project site (directly in front of this viewpoint) will not be developed until phase 2b and will remain mostly unchanged. The southern rail spur will not be visible from this viewpoint.
Scenario 2A Project Phase B	Additional warehousing and the second half of the IMEX will be established and so the tops of cranes and other construction equipment will be visible above the foreground treeline to the south of this viewpoint. Half the IMEX and a portion of the warehousing will be operational. The tallest parts of the gantries, container stacks, lighting columns and warehouses will be visible above the tree line from upper sections of the park and residential properties backing onto the park. The southern rail spur will not be visible.
Scenario 2B Project Phase C	Construction equipment associated with additional warehousing will be clearly visible directly in front of this viewpoint. The tallest parts of the gantries, container stacks, lighting columns and warehouses will be visible above the tree line from upper sections of the park and residential properties backing onto the park. The southern rail spur will not be visible.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	Elevated above the site, the upper section of the park and residential properties backing onto the park will have direct views over the development (refer photomontage 2). Properties along Marsh Parade and Buckland Road may have filtered views of the site from their second storey windows, although access to individual properties for assessment was not possible. Foreground riparian vegetation along the Georges River will assist in screening views of the lower sections of buildings. Parts of the gantries, container stacks, lighting columns and warehousing will be visible above the tree line. Vegetation planted as part of the rehabilitation works in the conservation zone would provide little screening during the early operational stages but once established, may offer a greater level of screening of some of the Project elements. The southern rail spur will be obscured by vegetation and will not be visible from this viewpoint.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR	
Early Works		3	H	M	M/H	L	L	M/H	MODERATE/LOW
Development Phases		3	H	H	M/H	M/H	M/H	M/H	MODERATE/HIGH
Operational Phase		3	H	H	M/H	M/H	M/H	M/H	MODERATE/HIGH



Photomontage 2 - Potential view east from Carroll Park - indicative only, subject to detailed design



3.0 VISUAL IMPACT ASSESSMENT

VIEWPOINT 4

Location: Casula Powerhouse Arts Centre
Distance to main Project boundary - 120m
Number of residential properties likely to be impacted: 0



Figure 8D - viewpoint 4 location map



View 4 - Existing view east from Casula Powerhouse Arts Centre

3.0 VISUAL IMPACT ASSESSMENT

Description	Current View
A public arts centre, situated on flat ground elevated above the banks of the Georges River. Casula Rail Station is located immediately to the west of the Powerhouse building, with the riparian vegetation of the Georges River corridor to the east. The Georges River Casula Parklands spread along the river bank to the north of the Arts Centre.	As shown in view 4, the current view from the northern edge of the building extends over the Georges River Casula Parklands with the SSFL visible to the west and views of the Georges River available to the east, heavily screened by riparian vegetation along the river's banks. Glimpses into the site, including several shed buildings are available, heavily screened by vegetation on either side of the river.

VISUAL IMPACT

Phase	Impact
Early Works	Retained vegetation within the conservation zone and along the Georges River will assist in blocking views of all ground based construction activities such demolition and truck movements.
Scenario 1 Project Phase A	There may be a slight removal of vegetation in the middle distance, as it is cleared for internal access roads. Works to rehabilitate the conservation zone may also be visible. The southern rail spur will not be visible from this viewpoint.
Scenario 2A Project Phase B	The majority of development at this stage will occur in the southern and central section of the Project site. There will be negligible change from this viewpoint during this stage.
Scenario 2B Project Phase C	The tops of construction equipment associated with additional warehousing may be visible from this viewpoint. The very tallest parts of the gantries, container stacks, lighting columns and warehouses might potentially be visible above the tree line.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	The Powerhouse Arts Centre and surrounding land sit at a similar elevation to the Project site with views towards the development heavily screened by riparian vegetation along both sides of the Georges River. Views of the tops of elements such as gantries and lighting columns may be visible above the treeline, although the vegetation planted as part of the rehabilitation works in the conservation zone will offer a greater level of screening of the Project from this viewpoint as it matures.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early works		4	H	M	M/H	L	L	M/H	MODERATE/LOW
Development Phases		4	H	L	L	L	L	M	MODERATE/LOW
Operational Phase		4	H	L	L	L	L	M	MODERATE/LOW

VIEWPOINT 5

Location: Georges River Casula Parklands

Distance to main Project boundary - 110m

Number of residential properties likely to be impacted: 0



Figure 8E - viewpoint 5 location map



View 5 - Existing view from central section of Georges River Casula Parklands, looking north

Description	Current View
The parklands (formerly the Casula Powerhouse golf course) stretch north from the Powerhouse Arts Centre, bounded to the west by the SSFL and to the east by the Georges River.	The SSFL and new Powerhouse access road are clearly visible on the western edge of the view, while the M5 bridge over the Georges River can be identified in the middle distance - refer view 5. The parklands are a mix of maintained grassland interspersed with clumps of mature trees and shrubs, increasing in density along the riparian corridor.

VISUAL IMPACT

Phase	Impact
Early Works	There will be no views of early works from this viewpoint.
Scenario 1 Project Phase A	There will be no views of Phase A works from this viewpoint.
Scenario 2A Project Phase B	There will be no views of Phase 2A works from this viewpoint.
Scenario 2B Project Phase C	The very tops of construction equipment associated with additional warehousing may be visible above the foreground treeline.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	As the parklands sit at a similar elevation to the Project site, views towards the Project will be blocked by the conservation zone and existing riparian vegetation along the Georges River.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early Works		5	H	N	N	N	N	M/H	NEGLIGIBLE
Development Phases		5	H	N	N	N	N	M/H	NEGLIGIBLE
Operational Phase		5	H	N	N	N	N	M/H	NEGLIGIBLE

VIEWPOINT 6

Location: St Andrews Park and residential properties backing onto the park as well as properties along Buckland Road, St Andrews Boulevard and Lakewood Crescent.
Distance to main Project boundary - 290m
Number of residential properties likely to be impacted: 31
(a further 23 properties along the western side of St Andrews Boulevard may have direct views of the tops of construction cranes from second storey windows. There is also the potential for views of the very tops of some Project elements from the second storey of these properties)

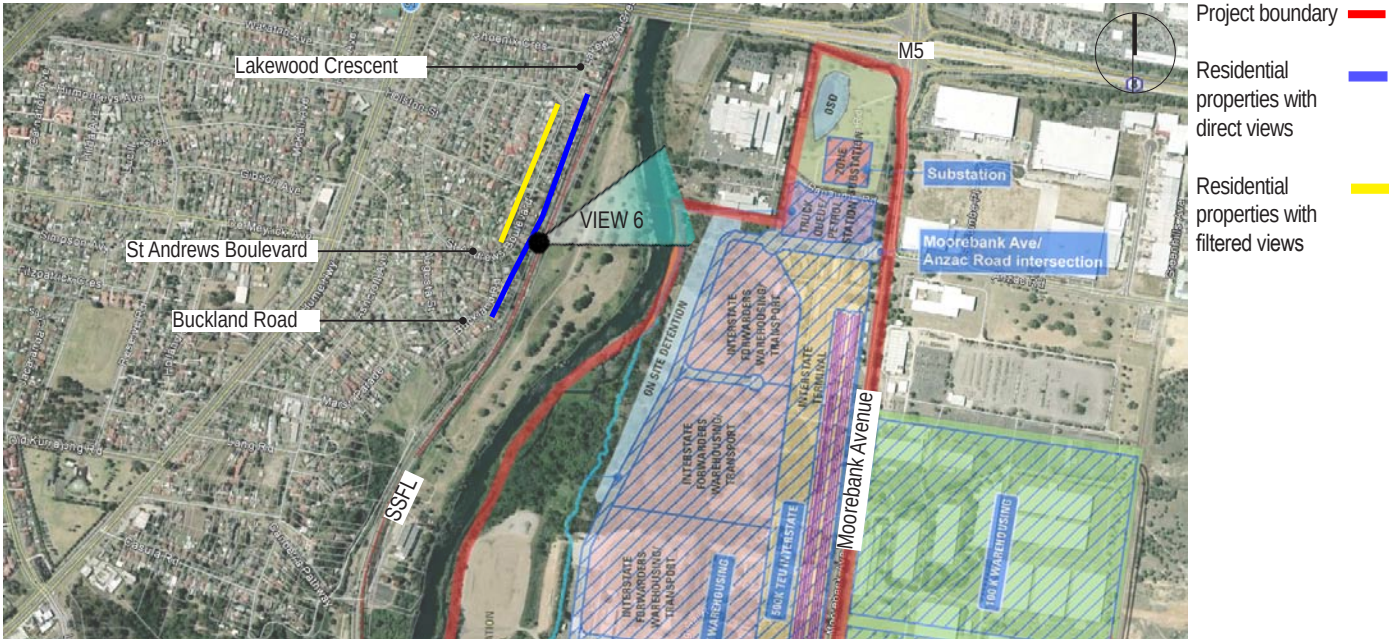


Figure 8F - viewpoint 6 location map



View 6 - Existing view east from St Andrews Park

Description	Current View
St Andrews Park and associated residential properties surrounding the park as well as properties on the eastern and western side of roads backing onto the SSFL.	The SSFL is clearly visible in the foreground of this view, with the Georges River Casual Parklands (formerly the Casula Powerhouse golf course) behind. In the middle distance, the view is dominated by a thick wall of tall vegetation (approx 25m high) associated with the Georges River corridor - refer view 6.

VISUAL IMPACT

Phase	Impact
Early Works	Retained vegetation within the conservation zone and along the Georges River will assist in screening views of the majority of ground based construction activities such as demolition and truck movements.
Scenario 1 Project Phase A	There may potentially be views of equipment associated with the construction of the internal access road, heavily screened by foreground vegetation. There will be no views of other Phase A works from this viewpoint.
Scenario 2A Project Phase B	There will be no views of Phase 2A works from this viewpoint.
Scenario 2B Project Phase C	Construction equipment associated with additional warehousing may be visible above the foreground treeline. The tops of operational warehousing may be visible to the south of this viewpoint.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	The park and nearby residential properties sit at a similar elevation to the Project site, with views towards the main part of the development blocked by the conservation zone along the Georges River. The second storey of properties along the western edge of St Andrews Boulevard may have direct views of the very tops of gantries, container stacks and lighting poles, protruding over the vegetation screen running along the Georges River. Access to individual properties was not possible for assessment.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early works		6	H	M/L	L	L	L	M/H	MODERATE/LOW
Development Phases		6	H	L	M/L	L	L	M/H	MODERATE/LOW
Operational Phase		6	H	L	M/L	L	L	M/H	MODERATE/LOW

VIEWPOINT 7

Location: Junction of M5 and Moorebank Avenue, looking south

Distance to main Project boundary - 10m

Number of residential properties likely to be impacted: 0



Figure 8G- viewpoint 7 location map



View 7 - Existing view along Moorebank Avenue looking south

Description	Current View
A busy intersection between the M5 motorway and Moorebank Avenue (1km further north to viewpoint 8).	This view looks south down Moorebank Avenue with a pavement, lighting and transmission poles on the eastern side. The road is flanked by dense tree planting, screening views of buildings behind. Both sides of the road are fenced and a warehouse building (not within the site) is visible on the left, behind trees - refer view 7.

VISUAL IMPACT

Phase	Impact
Early Works	Some early works activities may be visible from this location, depending on the amount of vegetation removed from the western edge of Moorebank Avenue. Currently vegetation in this location blocks views into the site.
Scenario 1 Project Phase A	Moorebank Avenue will be widened from a two lane to four lane road as far as Anzac Parade. A new intersection will be built, linking Moorebank Avenue to the Project's primary internal access road. The northern section of the site will remain undeveloped. Increased construction traffic on Moorebank Avenue and the surrounding road network may be highly visible.
Scenario 2A Project Phase B	The interstate terminal will be established requiring the removal of vegetation along the western side of Moorebank Avenue. Clear and direct views of construction equipment may be afforded from this viewpoint. Once operational, rail infrastructure, freight trains and stacked containers will be highly visible from the road. Construction traffic on Moorebank Avenue and the surrounding road network will be highly visible.
Scenario 2B Project Phase C	Much of the Project site will have already been constructed and the interstate will be fully operational. Construction equipment associated with additional warehousing construction may be visible from this viewpoint, behind other site buildings. Rail infrastructure, freight trains and stacked containers will be highly visible from the road.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	Moorebank Avenue will be significantly wider in this location, altering the visual context from a minor transit way to a major road. Removal of mature vegetation along the western edge of the road will impact the visual amenity of the road corridor. Rail infrastructure, trains and stacked containers will be highly visible (refer Photomontage 5). The low sensitivity of visual receptors on Moorebank Avenue and the short duration of the view experienced by motorists has assisted in reducing the level of visual impact once construction is complete.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early Works		7	H	M	L	M	M	L	MODERATE/LOW
Development Phases		7	H	H	L	H	H	L	MODERATE/HIGH
Operational Phase		7	H	H	L	M/H	M/H	L	MODERATE



Photomontage 5 - Potential view south along Moorebank Avenue (indicative only, subject to detailed design)



VIEWPOINT 8

Location: Moorebank Avenue looking south west (1km further south than viewpoint 7)
Distance to main Project boundary - 5m
Number of residential properties likely to be impacted: 0



Figure 8H - viewpoint 6 location map



View 8 - Existing view along Moorebank Avenue looking south

Description	Current View
Moorebank Avenue - a moderately trafficked road	This view looks towards the Project site from a point along Moorebank Avenue. In the foreground an existing car park is visible as well as lighting and transmission poles. Several individual trees are also visible in the foreground. A dense wall of vegetation is visible to the rear of the car park, blocking all views further into the site - refer view 8.

VISUAL IMPACT

Phase	Impact
Early Works	There are unlikely to be any views of early works activities from this viewpoint.
Scenario 1 Project Phase A	There may be views of construction equipment associated with the construction of warehousing and part of the IMEX facility in the southern section of the Project site.
Scenario 2A Project Phase B	The interstate terminal will be established requiring the removal of vegetation along the western side of Moorebank Avenue. Clear and direct views of construction equipment may be afforded from this viewpoint. Once operational, rail infrastructure, freight trains and stacked containers will be highly visible in close proximity to the road. Construction traffic on Moorebank Avenue and the surrounding road network will be highly visible.
Scenario 2B Project Phase C	Much of the Project site will have already been constructed and the interstate will be fully operational. Construction equipment associated with additional warehousing construction may be visible from this viewpoint, behind other site buildings. Rail infrastructure, freight trains and stacked containers will be highly visible from the road.

Operational Phase - Project Full Build	
Scenario 3 Project Phase C	The removal of mature vegetation along the western edge of the road will impact the visual amenity of the road corridor. Rail infrastructure, trains and stacked containers will be highly visible (refer Photomontage 6). The low sensitivity of visual receptors on Moorebank Avenue and the short duration of the view experienced by motorists has assisted in reducing the level of visual impact once construction is complete.

			QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
RECEPTOR TYPE	RECEPTOR IDENTIFICATION	VIEWPOINT NUMBER	DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Early Works		8	H	M	L	M	M	L	MODERATE/LOW
Development Phases		8	H	H	L	H	H	L	MODERATE/HIGH
Operational Phase		8	H	H	L	H	M/H	L	MODERATE

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Photomontage 6 - Potential view south along Moorebank Avenue (indicative only, subject to detailed design)



3.0 VISUAL IMPACT ASSESSMENT

3.4 VISUAL IMPACT SUMMARY

The foregoing assessment of eight key viewpoints is representative of a wide range of visual receptors surrounding the Project site. Visual impacts during the full life cycle of the Project range from negligible to moderate/high.

3.4.1 Early Works

The most visually prominent activities associated with the early works are likely to include:

- establishment of construction facilities
- demolition or relocation of existing buildings, structures and contaminated buildings not being removed as part of the MUR Project or the site rehabilitation;
- relocation of trees, including hollow bearing trees (i.e. those that provide ecologically important roosting habitats)
- establishment of the conservation area within the plant and equipment operation training area (dust bowl) including seed banking and planting.

As seen in table 9A, the early works will have a limited impact on visual amenity. Of the eight viewpoints studied, seven receive a moderate/low impact rating and one negligible. Existing riparian vegetation along the Georges River corridor and the retained conservation zone will assist in screening a substantial amount of the ground based early works activities for viewpoints located west of the river. Receptors on Moorebank Avenue (viewpoints 7 and 8) may notice an increase in site traffic and diversions, although the low sensitivity and short duration of view for these receptors limits the severity of any impacts.

3.4.2 Development Phase

All three development phases (A, B and C) have been analysed and collated into a single impact rating which includes the completed operational elements of the Project at each stage. Impacts range from negligible to moderate/high. Visual impacts during the development phase will include:

- clearing of development area of the site prior to construction
- temporary fencing, lighting and builders' compounds
- earthworks, infrastructure installation
- road and rail building
- stockpiling of materials
- tall construction cranes and other construction equipment

No receptors have received an impact rating of high. For receptors west of the Georges River, retained vegetation along the river and within the conservation zone assists in screening ground construction activities and construction of low new buildings. Moderate/high impacts are recorded for many viewpoints due to their high sensitivity to visual change (private residences and public parks) and the impact of tall construction equipment that will be seen above the treeline during construction of both the IMEX and interstate facility.

3.0 VISUAL IMPACT ASSESSMENT

3.4.3 Operational Phase

Once the facility is fully operational, the visual impact for receptors along Moorebank Avenue reduces as construction machinery is removed (refer Figure 10).

The greatest visual impact of the completed development will be on the public parks and residential properties that are situated on the elevated topography sloping west from the Georges River, as well as the residential properties backing onto the SSFL. Direct views over the entire development are limited to the properties directly adjacent to Leacock and Carroll Park, where views are not blocked by garden vegetation or other built form. The development is also potentially visible from the second storey of a small number of properties to the west of Leacocks Lane, although these properties could not be accessed for assessment.

EARLY WORKS

RECEPTOR TYPE	VIEWPOINT NUMBER	QUANTITATIVE ASSESSMENT						COMBINED IMPACT RATING
		DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS	RECEPTOR SENSITIVITY	
Public park	1	M	M	L	L	L	M	Moderate/Low
Public park	2	M	M	M/H	L	L	M	Moderate/Low
Public park / Residential properties	3	H	M	M/H	L	L	M/H	Moderate/Low
Public Facility	4	H	L	L	L	L	M	Moderate/Low
Public park	5	H	N	N	N	N	M/H	Negligible
Public park / Residential properties	6	H	M/L	L	L	L	M/H	Moderate/Low
Public road	7	H	M	L	M	M	L	Moderate/Low
Public road	8	H	M	L	M	M	L	Moderate/Low

Table 9A - Early Works Visual Impact Summary Table

DEVELOPMENT PHASE S

RECEPTOR TYPE	VIEWPOINT NUMBER	QUANTITATIVE ASSESSMENT					RECEPTOR SENSITIVITY	COMBINED IMPACT RATING
		DISTANCE	QUANTUM OF VIEW	DURATION	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS		
Public park	1	M	M	L	L	M/L	M/H	Moderate
Public park	2	M	M/H	M/H	M/H	M/H	M/H	Moderate/High
Public park / Residential properties	3	H	H	M/H	M/H	M/H	M/H	Moderate/High
Public Facility	4	H	L	L	L	L	M	Moderate/Low
Public park	5	H	N	N	N	N	M/H	Negligible
Public park / Residential properties	6	H	L	M/L	L	L	M/H	Moderate/Low
Public road	7	H	H	L	H	H	L	Moderate/High
Public road	8	H	H	L	H	H	L	Moderate/High

OPERATIONAL PHASE

Public park	1	M	M	L	M	M/L	M/H	Moderate
Public park	2	M	M/H	M/H	M/H	M/H	M/H	Moderate/High
Public park / Residential properties	3	H	H	M/H	M/H	M/H	M/H	Moderate/High
Public Facility	4	H	L	L	L	L	M	Moderate/Low
Public park	5	H	N	N	N	N	M/H	Negligible
Public park / Residential properties	6	H	L	M/L	L	L	M/H	Moderate/Low
Public road	7	H	H	L	M/H	M/H	L	Moderate
Public road	8	H	H	L	M/H	M/H	L	Moderate

Table 9B - Development and Operational Phase Visual Impact Summary Table

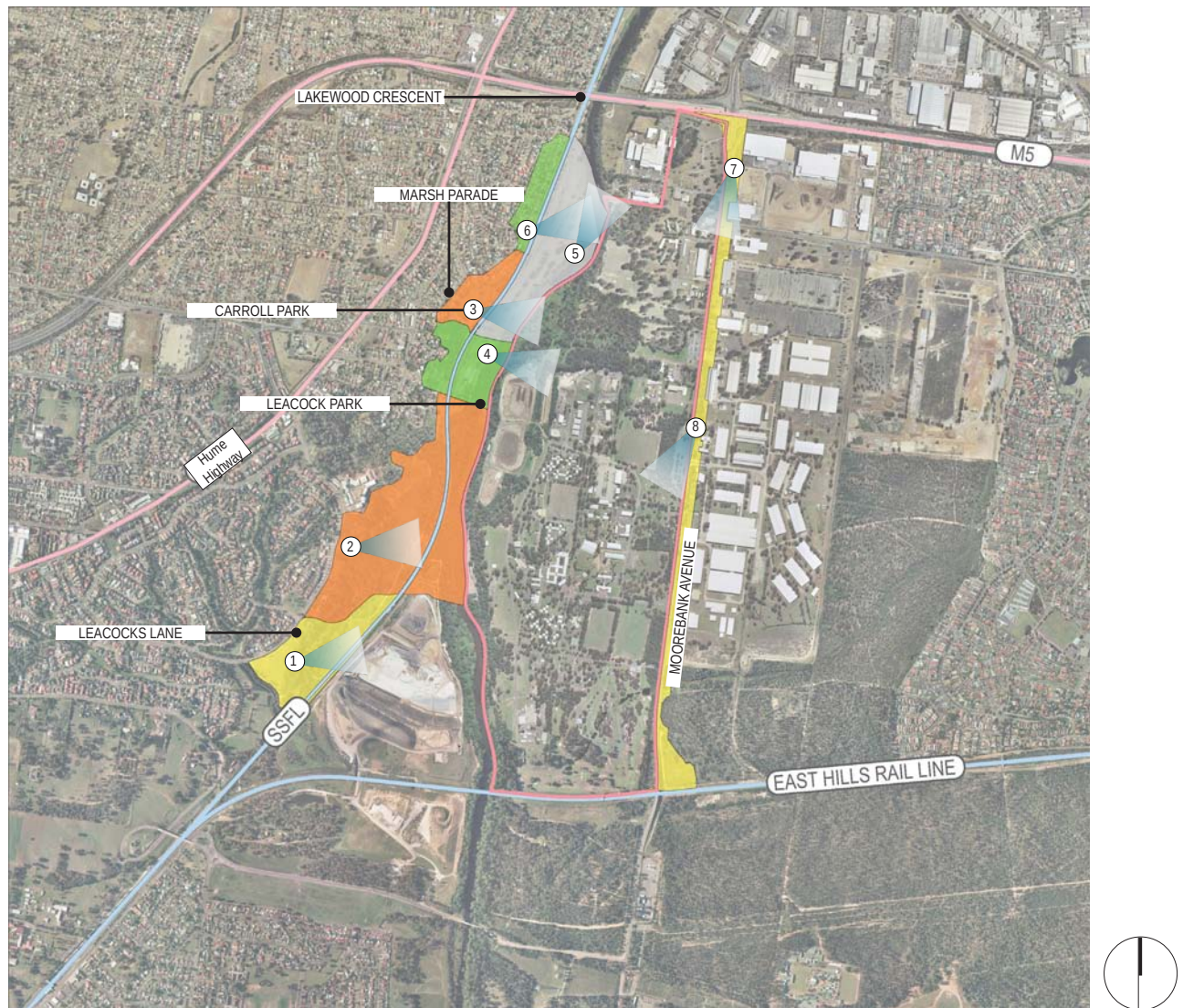


Figure 10 Summary of Visual Impacts - Operation Phase Project Full Build

KEY

- Existing rail
- Existing major roads

- Negligible Impact
- Moderate/Low Impact
- Moderate Impact
- Moderate/High Impact

- Viewpoint

Table 9C - Operational Phase Visual Impact Summary Table

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4.0

Mitigation Recommendations and Conclusion

The 'dustbowl' training area

4.0 MITIGATION AND CONCLUSION

4.1 MITIGATION

Effective mitigation measures for any form of potential visual impact are those that entail:

- avoidance
- reduction
- alteration
- off site mitigation
- off site compensation.

Mitigation measures have been considered during the concept design process and reflected in the current concept plan. Current and suggested additional mitigation measures for the detailed design stage, including all rail access options, are discussed below and illustrated in Figure 11.

4.1.1 Avoidance

The Project has been subject to significant regional analysis and is based on a site that has a long history of industrial activity. The proposed terminal is of state and national importance and its location is central to its functionality, so avoidance measures have not been considered appropriate.

4.1.2 Reduction

The principal forms of reduction are associated with refinements and modifications that address the siting, bulk and articulation of built form, minimising building and lighting pole heights where possible.

Concept Design measures already included:

- Siting of designed elements so to avoid the removal of large stands of vegetation currently obscuring and filtering views into the site (in particular along Moorebank Avenue).

Detailed Design measure to be considered:

- Align and locate car parks to minimise visual impacts from the public domain or residents
- Building and car park siting to permit and equate tree planting, especially along road fronts
- Refinements to building siting and alignment of infrastructure locations to assist in retaining significant existing vegetation such as individual tree specimens or groups of trees
- Maximising the integration of terminal facilities and warehousing precincts by providing screening, breakout space for public and staff, and visual relief, as well as aiding way-finding throughout the site.
- Where possible retain existing native trees along Moorebank Avenue to mitigate visual impact as well as providing additional native trees to the carpark areas to maximise the opportunity for shade and to provide a landscape frontage that is scaled to complement the new development.
- Landscaping along Moorebank Avenue is of particular importance and must provide visual relief from the industrial appearance of the rail infrastructure. The detailed landscape strategy should provide a layered approach along the streetscape.

- Consider the use of lower, more frequent light poles where possible to mitigate light spill effects and ambient light impacts.
- Integration of car parking, planting and signage to present as one cohesive address.
- Consider localised earth mounding and provide native canopy trees to internal landscape areas on the western side of the new buildings to mitigate visual impacts from the residential area.

4.1.3 Alleviation

Options to alleviate impacts are usually associated with detailed design features such as materials, finishes, articulation, reflectivity, planting character and the like. The principle forms of mitigation applicable to this project at detailed design stage include:

Concept Design measures already included:

- Minimising vegetation clearing on the rest of the site.

Detailed Design measures to be considered:

- Choice of finishes and materials based on limiting the amount of contrast with the surrounding landscape with the preferred use of muted colours.
- On site planting of suitable vegetation species at a range of heights.
- Utilise opportunities to commence early rehabilitation and supplementary planting of endemic species to the conservation zone on the western boundary and to commence early screen planting at the junction of Moorebank Avenue and M5 South Western Motorway to mitigate visual impact.

4.1.4 Off Site Mitigation

Any attempt to provide mitigation in the way of screening vegetation off site such as within the public domain in Carroll, Leacock and St Andrews Parks runs a risk of limiting existing regional views and the value to the community. It is recommended that this is not pursued.

4.1.5 Off Site Compensation

Given the nature of the proposed on site mitigation measures outlined in 'Alleviation', the resultant visual impact is considered not to be of a level of significance to warrant any off site compensation.

4.1.6 Lighting

Placement of lighting columns and the specification of suitable lighting levels that would ensure minimal light spillage to surrounding residential areas. An assessment should be made (potentially in consultation with affected residents at a stage when detailed impact assessment has been completed) to establish whether selected street trees could assist in mitigating the impacts of floodlighting from the site.

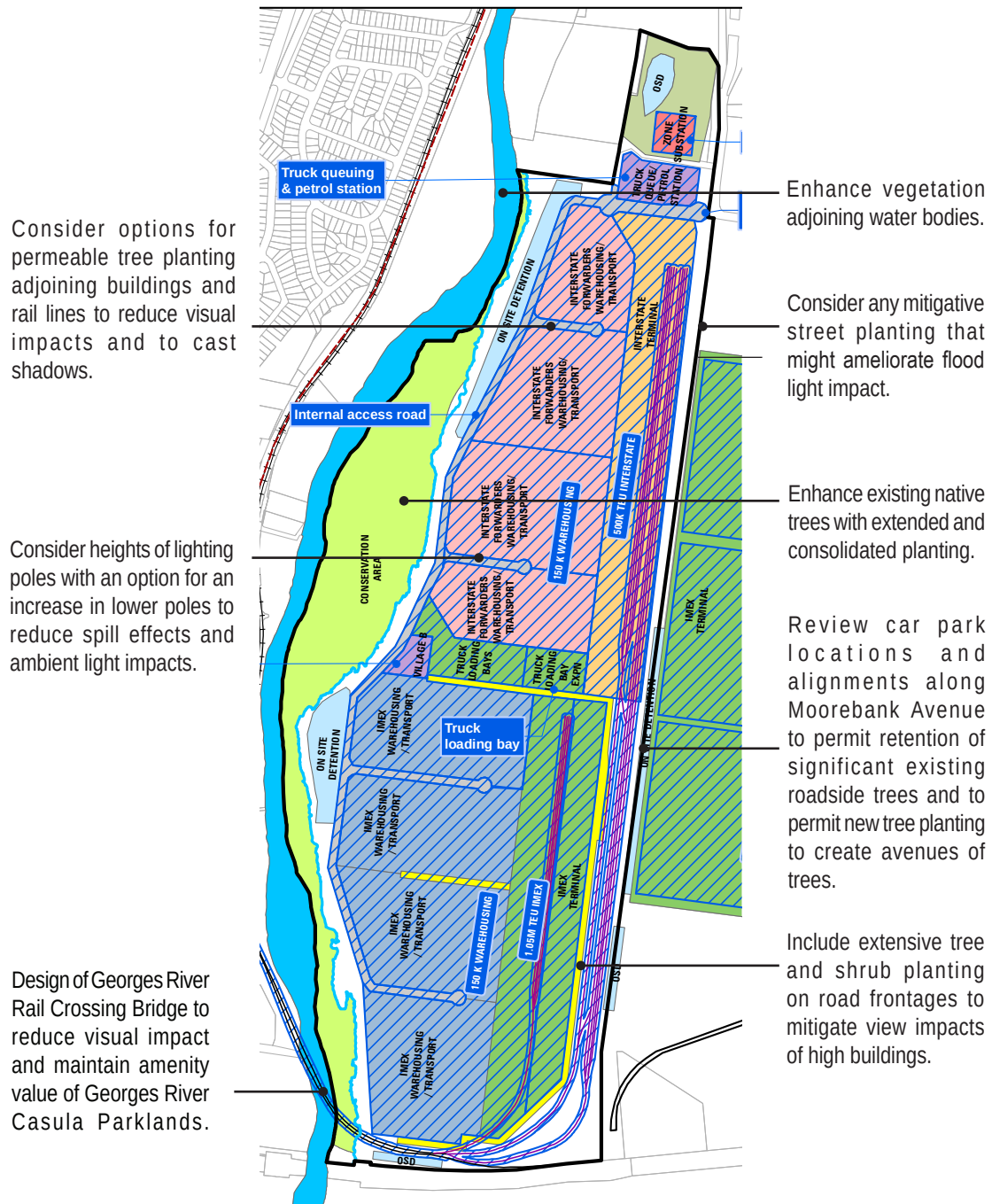


Figure 11 - Mitigation Recommendations

CONCLUSION

4.2 CONCLUSION

4.2.1 Landscape Character Impacts

The impact of the Project on landscape character varies over the studied character zones with the greatest impact shown to be on the fragmented vegetation within the site. The clearing of vegetation will affect the look and feel of this character zone, although the proposed replacement of some of this lost vegetation within the conservation area will assist in mitigating the impact. The riparian corridor is mostly unaffected by the development and should retain its distinct character.

The Project would see an increase in the scale and bulk of development within the local area, with a certain level of impact on residential and commercial areas. The Project, however, generally fits within a wider context of large scale built form, especially along Moorebank Avenue. This assists in reducing the commercial, residential and light industrial developments sensitivity to change, resulting in a relatively low landscape character impact for these areas.

4.2.2 Visual impacts

The proposed Moorebank Intermodal Terminal is a significant development, covering a large operational area and involving a proposed increase in the scale, height and bulk of the buildings within the site. The visual impacts are, however, limited to a relatively small area surrounding the development due to the nature of the topography and presence of screening vegetation along the Georges River.

The abundance of tall, mature vegetation along the Georges River riparian corridor and the retention and rehabilitation of this as a conservation corridor, assists in blocking views of lower Project elements (such as roads, rail infrastructure and warehousing) from the residential suburb of Casula.

During construction, tall construction cranes are likely to be the most visible element of the Project and potentially visible from all the key viewpoints studied in this report. Other sources of visual impact during construction, such as the establishment of hoardings and construction fencing will tend to create highly localised visual impacts, primarily along Moorebank Avenue.

The phasing of the construction process means that visual impacts will gradually increase over time as elements of the Project become operational. Project Phase A is associated with the largest level of vegetation clearing. By the end of phase A, half of the IMEX facility will be operational and lighting poles, gantries and warehousing will be visible to visual receptors west of the Georges River. By Phase C, a large proportion of the site will be operational and the only additional visual impacts are likely to be construction cranes associated with the building of the final portion of the IMEX and additional warehousing.

In summary the major impacts of the Project for the studied receptors will comprise:

- scale, height and bulk of the proposed buildings, especially light towers
- increase in the scale of Moorebank Avenue to a four lane road

Lesser impacts will include:

- areas of rail infrastructure, trains and containers
- car parks and adjoining roads
- light spill from light towers
- movement of freight trains across the Glenfield landfill site.

The greatest visual impact of the completed development will be on the public parks and associated residential properties that are situated on the elevated topography sloping west from the Georges River. These will have clear views over the site and the taller project elements such as lighting towers and gantries.

4.2.3 Lighting impact

A separate study will be conducted into the impact of the proposed lighting on the surrounding area by a lighting specialist. The proposed lighting poles are 30m high and likely to be visible from all but viewpoint 5 and 6. Lighting has been considered within the mitigation section of this report.

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5.0

Appendices



5.0 APPENDIX A - VISUAL IMPACT RATING TABLE

An explanation of the rating categories used to determine the level of visual impact at each viewpoint

Magnitude of change	H M/H M M/L L N	Magnitude of change is a quantitative assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the magnitude of change is low. If the development radically changes the nature or composition of the elements in the view, the magnitude of change is high. Distance from the development will accentuate or moderate the scale and variety of visible elements in the overall view and hence influence this rating: Elements within the view will be greatly at odds with existing features in the landscape Elements within the view will be largely at odds with existing features in the landscape Elements within the view will be at odds with existing features in the landscape Elements within the view will be partly at odds with existing features in the landscape Elements and composition of the view will remain largely unaltered . No view of the development from this location.
Summary of Ratings	From H to N	A summary rating that combines all of the quantitative ratings. This is rated either high, moderate to high, moderate, moderate to low, low or none, where none implies no visible change based on the above criteria and high implies significant visible change in terms of the combined quantitative criteria
QUALITATIVE ASSESSMENT DEFINITIONS		
Receptor sensitivity	H M/H M M/L L	Each visual receptor type has an inherent and varied sensitivity to change in the visual scene based on their personal context in which the view is being experienced. This will have a direct bearing on the perception of visual impact experienced by the receptor and qualifies the quantitative impacts: Residential (R): view from dwelling or garden may be experienced regularly over extended periods of time; residents may have chosen the location specifically for the view and/or develop a strong familiarity and association with the view and have high sensitivity to change Public Reserve (PD) Parks, Reserves, Public walkways: the purpose of visiting and using reserves largely relates to an enhanced sense of wellbeing. Receptor is more sensitive to both positive and negative visual experiences, especially where the reserve is the destination for leisure and relaxation. Public Roads/Transport (T): the view experienced can be important to the driver/passenger but is sometimes a brief experience and the driver is usually focused on the road. Commercial Property (C) - Work: view can enhance the work or education experience but focus of activity is not principally on the view. Semi-Private property (P) - Work/Education/Service provider: view can enhance the work or education experience but focus of activity is not principally on the view.
Comments		Written summary of the key visual impacts, both quantitative and qualitative.
SUMMARY		
Combined Rating	H M/H M M/L L	The nature of the visual impact may be beneficial or adverse, based on a transparent professional assessment of the combined totals of qualitative and quantitative ratings and comments as outlined above: Highly adverse. Moderately to Highly adverse. Moderately adverse. Slightly adverse. Neutral or Beneficial.

5.0 APPENDIX A - VISUAL IMPACT RATING TABLE

Receptor Description		The location of the visual receptor.
Photo Location		The photo reference of the viewpoint
QUANTITATIVE ASSESSMENT DEFINITIONS		
Distance	H M L	The effect the development has on the view relating to the distance between the development and the visual receptor. The distances are from the approximate centre of the site and categorised as: H Within 100 - 300 metres- high impact. M 300 to 1000 metres - high to moderate impact. L Further than 1000 metres - low impact.
Quantum of view	H M/H M M/L L N	The Quantum of view relates to the openness of the view and the angle of the view to the visual receptor. A development located in the direct line of sight has a higher impact than if it were located obliquely at the edge of the view. Whether the view of the development is filtered by vegetation etc. also affects the impact, as does the nature of the view (panoramic, restricted etc.). A small element within a panoramic view has less impact than the same element within a restricted or narrow view. The effects can be categorised as: H A direct view of the development or its presence (sometimes in a very narrow or highly framed view), where the development occupies the greater proportion of the view cone. M/H A direct view of the development within a panoramic view where the development occupies a large proportion of the view cone. M A direct view of the development or its presence in a broader view where the development occupies a moderate proportion of the view cone. M/L A direct or slightly oblique view of the development within a broad or panoramic view cone L An oblique, highly filtered or largely obscured view of the development. N No view of the development site from this location.
Duration	H M/H M M/L L	The length of time the visual receptor is exposed to the view. The duration of view affects the impact of the development on the viewer - the longer the exposure the more detailed the impression of the proposed change in terms of visual impact: H Significant part of the day - high impact: usually residential property. M/H 5 minutes to several hours - high to moderate impact: often from a garden or park or commercial property and work places. M 10 seconds to 1 minute - moderate impact: usually from a road/driveway entrance, walking past or entrance to commercial property. M/L 5 to 10 seconds - moderate to low impact: often from a road or walking past. L 1 to 5 seconds - low impact: usually from a road or railway

CLOUSTON associates



The Project site as viewed from Carroll Park.

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