Intermodal Logistics Centre at Enfield
Environmental Assessment

CHAPTER 4

PROJECT DESCRIPTION

- October 2005

Contents

4. Project Description

This Chapter satisfies the Director-General's requirements and those of the EP&A Regulation in that it provides a full description of the proposed facilities and their associated operations for which project approval is being sought. The description of the proposal is based on the layout developed by Sydney Ports Corporation (Sydney Ports) and describes the general location, configuration and proposed operations of the Intermodal Logistics Centre (ILC) at Enfield. Approval is being sought for construction works comprising:

- *Demolition, relocation or removal of former railway buildings and structures;*
- *Earthworks and drainage including the levelling of the site, formation of landscape mounds and detention basins and removal of unsuitable materials, where required.*

Approval is also being sought for the construction and operation of:

- *An Intermodal Terminal for the loading and unloading of containers between road and rail and short term storage of containers;*
- *Rail sidings, railway lines and associated works to connect to the existing freight rail line and a noise barrier located on railway land;*
- *Warehousing, for the packing and unpacking of containers and short-term storage of cargo;*
- *Empty container storage facilities, for the storage of empty containers for later packing or transfer by rail;*
- *Light Industrial / Commercial Area fronting Cosgrove Road. This development would generally be complementary to operations at the proposed Intermodal Logistics Centre;*
- *A Community and Ecological Area which would provide the prospect of incorporating ecological enhancement and community opportunities. The area would serve as a buffer between operations on the site and residences to the south of the site;*
- *Access works, comprising, construction of a road bridge over the new Enfield Marshalling Yards for access to Wentworth Street and an upgrade of the existing entrance to Cosgrove Road; and*
- *Construction of internal roads, administrative buildings, diesel and LPG storage and fuelling, container washdown area, vehicle maintenance shed and installation of site services including all utilities, stormwater and sewerage.*

4.1 Background

4.1.1 Description of the Site and its Context

The proposed Intermodal Logistics Centre (ILC) site is the former Enfield Marshalling Yards site, located at Strathfield South, an inner western suburb of Sydney, approximately 15km by road from the Sydney Central Business District and 18km by rail from Port Botany (see **Figure 1-1**). It covers an area of about 60 hectares (ha), is approximately 0.5km in width and over 2 km in length, extending from the intersection of the Hume Highway and Roberts Road in the north, through to the intersection of Punchbowl Road and Cosgrove Road in the south. The only current access to the site is located from Cosgrove Road. **Figure 4-1a** indicates the site location and its adjacent roads and land uses. **Figure 4-1b** shows detailed land use on the existing site.

The proposed ILC site is formed principally by three separate parcels of land shown in **Table 4-1** and on **Figure 4-1b**. The current land uses comprise a compound operated by the Toll Group in the centre of the site, the DELEC facility and the wheel lathe area operated by Pacific National to the north-east of the site to service rolling stock, and a site operated by Australian Temporary Fencing (ATF) Pty Ltd, located near the entrance to Cosgrove Road. The remainder of the site has been vacant since 1993, following the decommissioning of the former marshalling yard's operations. There are a number of unused buildings and structures on the site and the remaining land area has no current use except for storage of rail related equipment and machinery. Approximately 5% of the site is paved or built-up, with the remainder of the site covered by low vegetation, stockpiles of excavated material, railway ballast and internal roads.

In addition, part of the proposed development, including construction of connections to the existing freight rail network, a noise wall and construction of a road bridge over the new Enfield Marshalling Yards for access to Wentworth Street, will be undertaken on land owned by Railcorp. The land owned by Railcorp which forms part of the development site is described as:

- Lot 15 of DP1007302 (for noise wall construction and northern rail connection);
- Lot 1 DP 950438 and Lot 15 DP 1007302 (for southern rail connection); and
- Lot 3 of DP1006861and Lot 15 of DP 1007302 (for Road bridge).

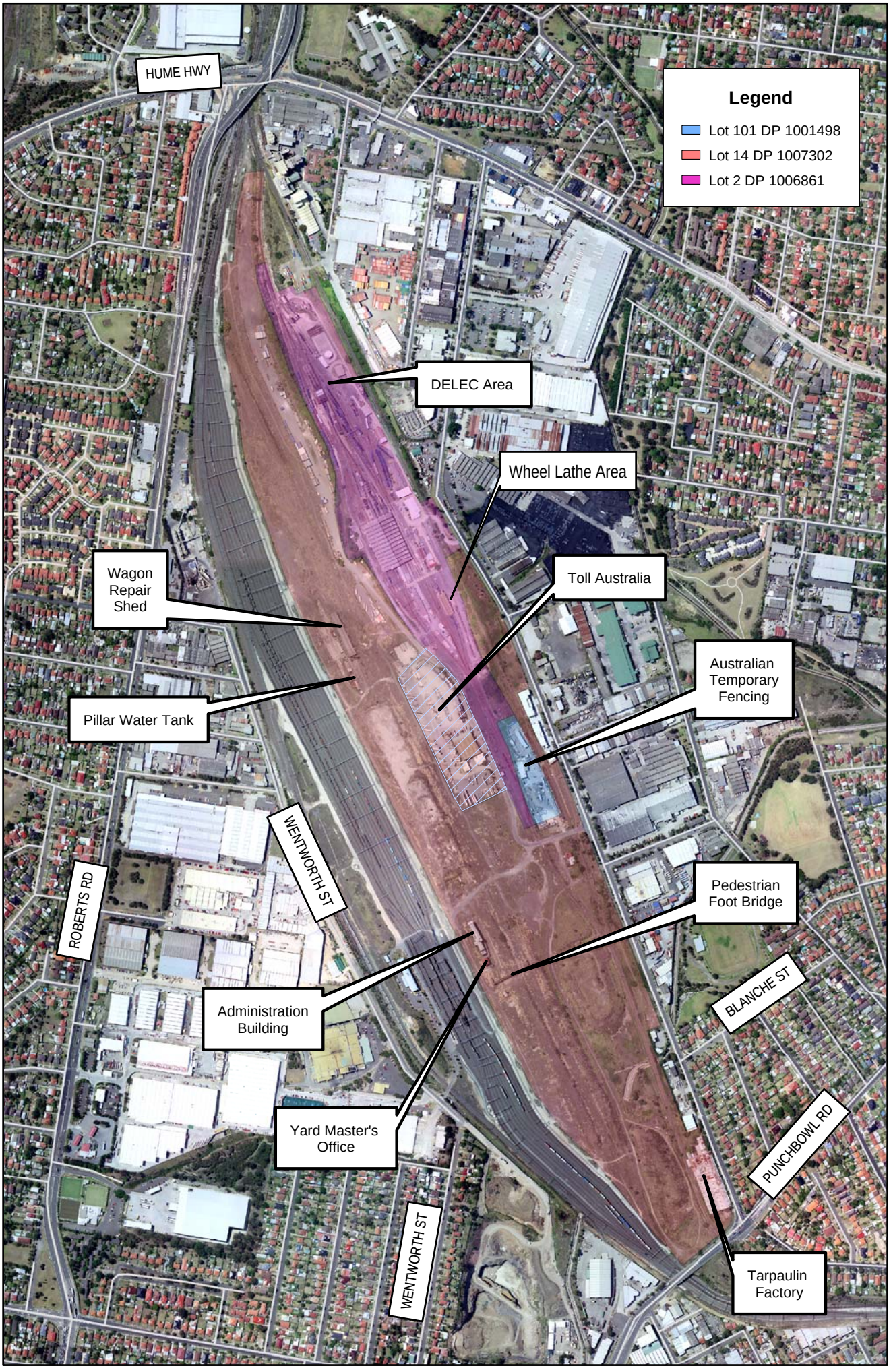
A small area of land (part of DP 242426) for the freight rail connection is on land owned by Strathfield Council.

Intermodal Logistics Centre at Enfield

N

0 250 500
Metres

Figure 4-1a
Site and Surrounding Land Use



A4; Source: Topographic data supplied by SPC, Air photos BY SPC;Projection: MGA 56; File Name:EN01709_Ad_002a.mxd

Intermodal Logistics Centre at Enfield

N

0 100 200
Metres

Figure 4-1b
On site Land Use

4.1.2 Surrounding Land Use

The neighbouring suburbs include Strathfield to the north, South Strathfield to the east, Chullora and Greenacre to the west and Belfield to the south east. The land use in the immediate vicinity of the site reflects the historical influence of the former Enfield Marshalling Yards as a transport hub for the region. A summary of typical land use surrounding the site is provided below and is illustrated in **Figure 4-1a**, while a more detailed description is provided in Chapter 14 – Land Use.

Table 4-1: Description of Existing Site Land Use

Site Name	Location	Description	Current Activity
DELEC site	Adjacent to Cosgrove Rd, covering an area of about 11ha	Used as a Rolling Stock Maintenance Centre Part Lot 2 DP 1006861 Currently on short term lease. The development on this site forms part of the project	Maintenance facility operated by Pacific National
Wheel Lathe area	South of the DELEC site adjacent to Cosgrove Road, covering an area of about 1ha	Used for servicing bogeys Part Lot 2 DP 1006861 Currently on lease and its operation to be retained. The site is not part of the proposed development	Operational workshop run by Pacific National
ATF Pty Ltd	Off Cosgrove Road, adjacent to existing entrance, covering an area of about 1ha	Lot 101, DP 1001498 Currently on short term lease and development on this site forms part of the project	Storage area for fence hire company
Part, former Enfield Marshalling Yards Includes area leased to Toll Holdings	Centre of the site, covering an area of about 47ha	Formerly used as a marshalling yard Lot 14 DP1007302 The site forms the main area proposed for development Toll area is currently under long term lease and is not part of the proposed development	This land is currently vacant, with the exception of that leased to Toll in the centre of the site.

Surrounding land use comprises:

- East: North of Blanche Street, Cosgrove Road is bordered on both sides by commercial and light industrial development as far as the Hume Highway. Residential properties line Cosgrove Road to the south east, and south of Blanche Street;

- West: Railway operations including the existing freight lines and marshalling yards owned by RailCorp and the Pacific National terminal at Chullora are located to the west and north west of the site. A range of industrial/commercial facilities is located along Wentworth Street, including the Energy Australia Distribution Centre, vehicle repair shops and various industrial premises. A concrete batching plant is present at the north western end of Wentworth Street, and the Old Enfield Brick Pit, currently operating as a landfill site, is located at the south western end of Wentworth Street. Land to the north west of Roberts Road, opposite the new Enfield Marshalling Yards, is predominantly residential. Chullora Public School is located west of Roberts Road on Norfolk Road, and Coxs Creek Nature Reserve is located to the west of the site;
- North: Weston Milling, Western Containers and other industrial / commercial facilities lie immediately to the north of the site. Strathfield Golf course, Strathfield High School and Rookwood Cemetery lie to the north of the site, beyond the Hume Highway. Residential development is located directly to the north of the site beyond the Hume Highway; and
- South: Land beyond Punchbowl Road is a mix of industrial/commercial along the railway line with residential development further afield. Belmore North Public School and Belmore North Boys High School are both located on Burwood Road, adjacent to the railway line.

4.1.3 Transport Links (Road and Rail Network)

Access to the site can be gained from the M4 Motorway and Centenary Drive from the north, Hume Highway from the north east and north west, and Punchbowl and Roberts Roads from the south leading from the M5 Motorway. The site is well located in terms of accessibility to the local and regional network and the proposed land use matches the existing land use for the area.

The site has major road links to all Sydney regions with the Hume Highway within 1km of the key access / egress point to the site, providing direct links to the inner city and south-western regions including Bankstown and Liverpool. Roberts Road connects the site with the southern and north western areas of Sydney, as well as with the M4 Motorway to Sydney's west and the M5 Motorway to Sydney's south west. The existing freight railway line to the Enfield Marshalling Yards provides a direct freight rail connection with Port Botany, approximately 18km away, which would be the primary origin or destination of freight handled at the ILC.

Enfield is located between two metropolitan railway lines, the Inner West Line and the Bankstown Line. The closest stations are Belmore and Lakemba on the Bankstown Line, which are both approximately 2.3km from the proposed site entrances on Cosgrove Road and Wentworth Street respectively. Several other stations are marginally further from the site, notably Strathfield, which is served by Inner West, Northern, South, Western, Regional and Intercity trains.

4.2 General Layout and Operation of the ILC

4.2.1 Layout

The general layout for the proposed ILC is shown in **Figures 4-2a-d**. **Figure 4-2a** shows the layout in full, while separate details are shown in **Figure 4-2b** (land use), **Figure 4-2c** (road and rail infrastructure and indicative circulation paths) and **Figure 4-2d** (landscaped areas).

The details of the various components are shown in the following sections.

4.2.2 Operation

The import and export cycle of containers associated with the ILC and estimates of the numbers of containers associated with each component of the transport chain is shown in **Figure 4-3.**

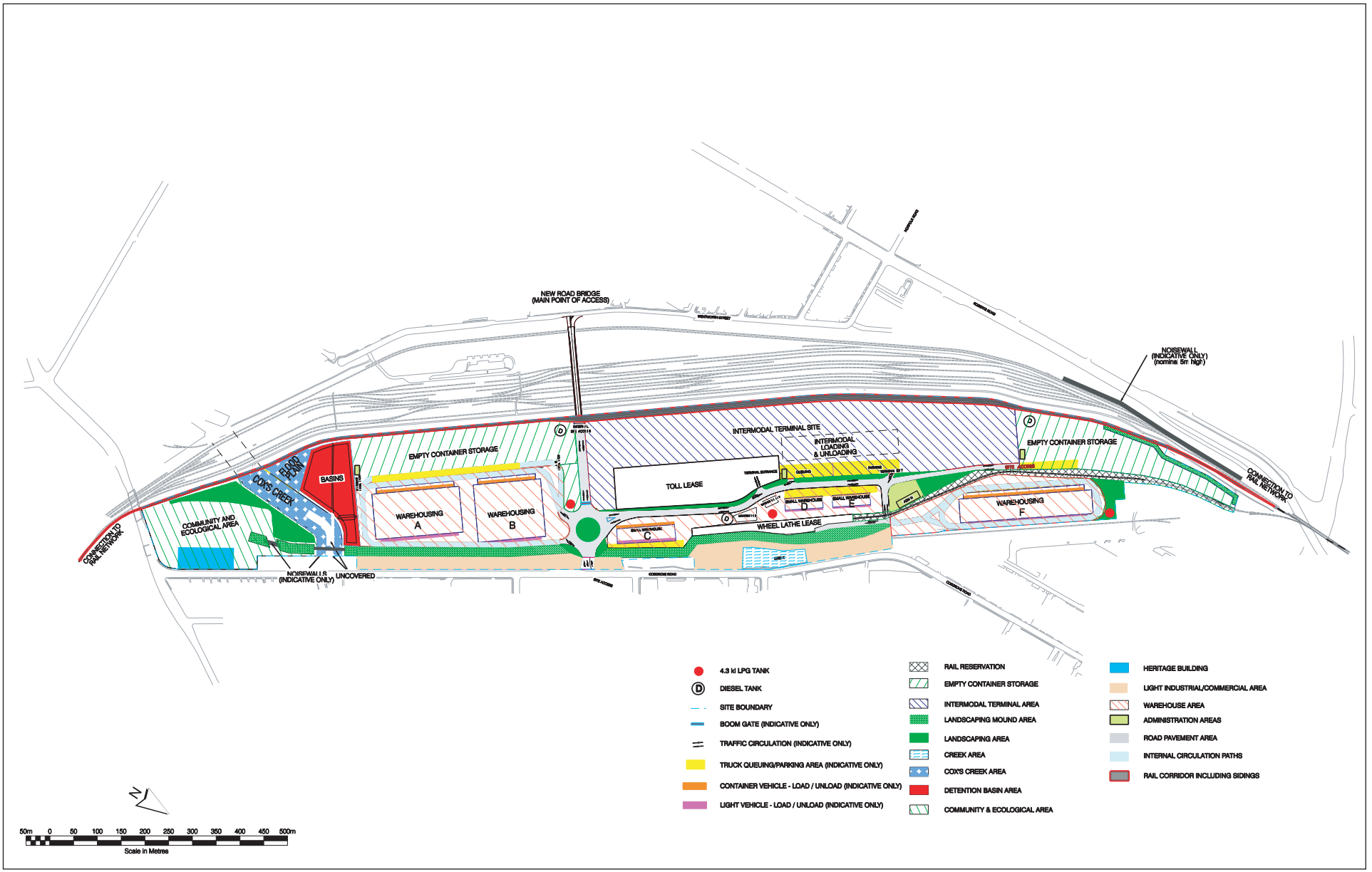
The ILC is designed to handle 300,000 TEU per annum. It is anticipated that the site would have a first year throughput of 100,000 TEUs and that it would reach its capacity within 8 to10 years of operation. At full capacity throughput is anticipated to be approximately 150,000 TEUs inbound from Port Botany and approximately 150,000 TEUs outbound to the Port. A detailed break down of these numbers shows that, of the approximate 150,000 TEUs sent to Enfield from Port Botany annually (in-bound movement), an estimated:

- 50,000 full TEUs would be sent to the on-site logistic centre warehouses and the contents unpacked and dispatched by light trucks to the inner and middle western Sydney catchment area. The 50,000 empty TEUs would be moved internally to the empty container depots from the on-site warehouses; and
- 100,000 full TEUs would be sent by articulated truck to off-site importers. From those 100,000 full TEUs, 90,000 empty TEUs would be returned to the empty container depot from those importers and 10,000 empty TEUs would return to the empty container depots (leakage).

Approximately 150,000 TEUs per year would be processed through the ILC and returned to Port Botany by rail. Of the approximately 150,000 TEUs returning to the port (outbound movement), an estimated:

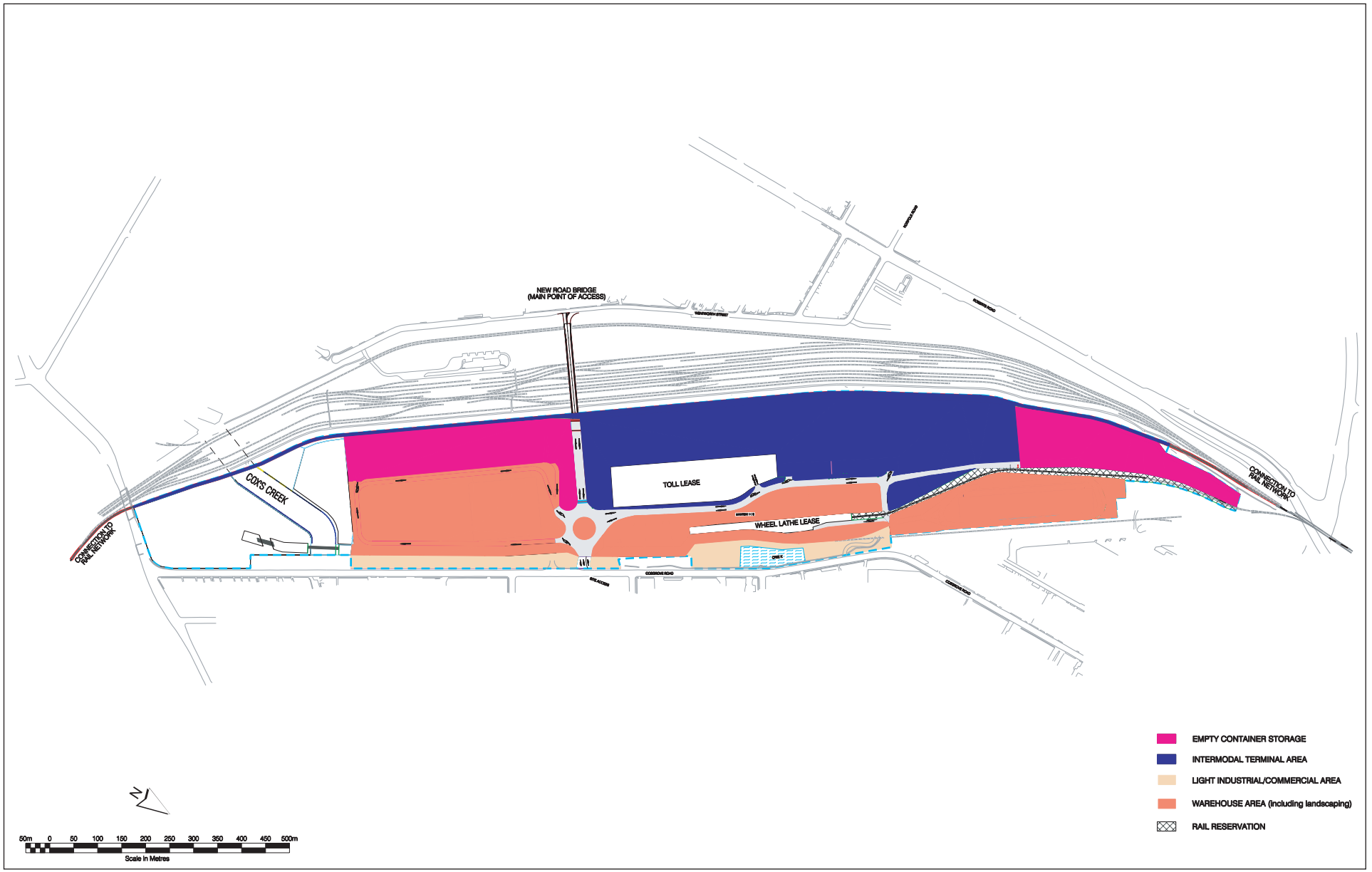
- 60,000 full TEUs would be supplied by off-site exporters;
- 80,000 empty TEUs would be returned to the port directly from the empty container depots; and
- 10,000 empty TEUs would be transferred to the warehouses from the empty container depots, where they would be filled with goods brought to Enfield, prior to returning to the port.

Some containers will only be processed one way through the ILC. Containers may arrive from outside the catchment area and be sent to the port, and some containers arriving from the port may pass through the ILC and leave the market catchment area without returning. This volume is estimated to be about 5,000 TEU per year in each direction, and is referred to as “leakage”.



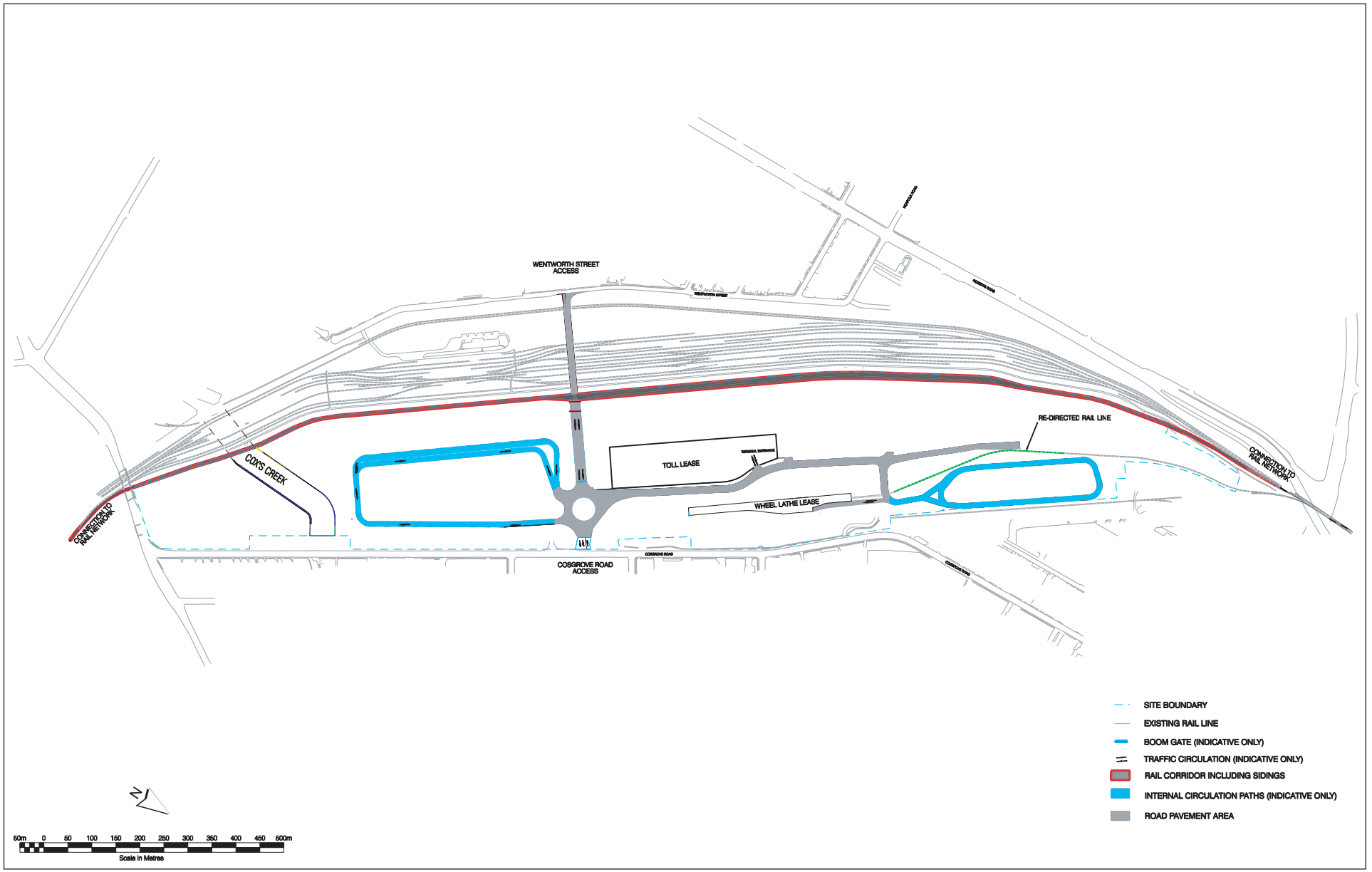
Intermodal
Logistics Centre
at Enfield

Figure 4-2a
Concept Design Layout



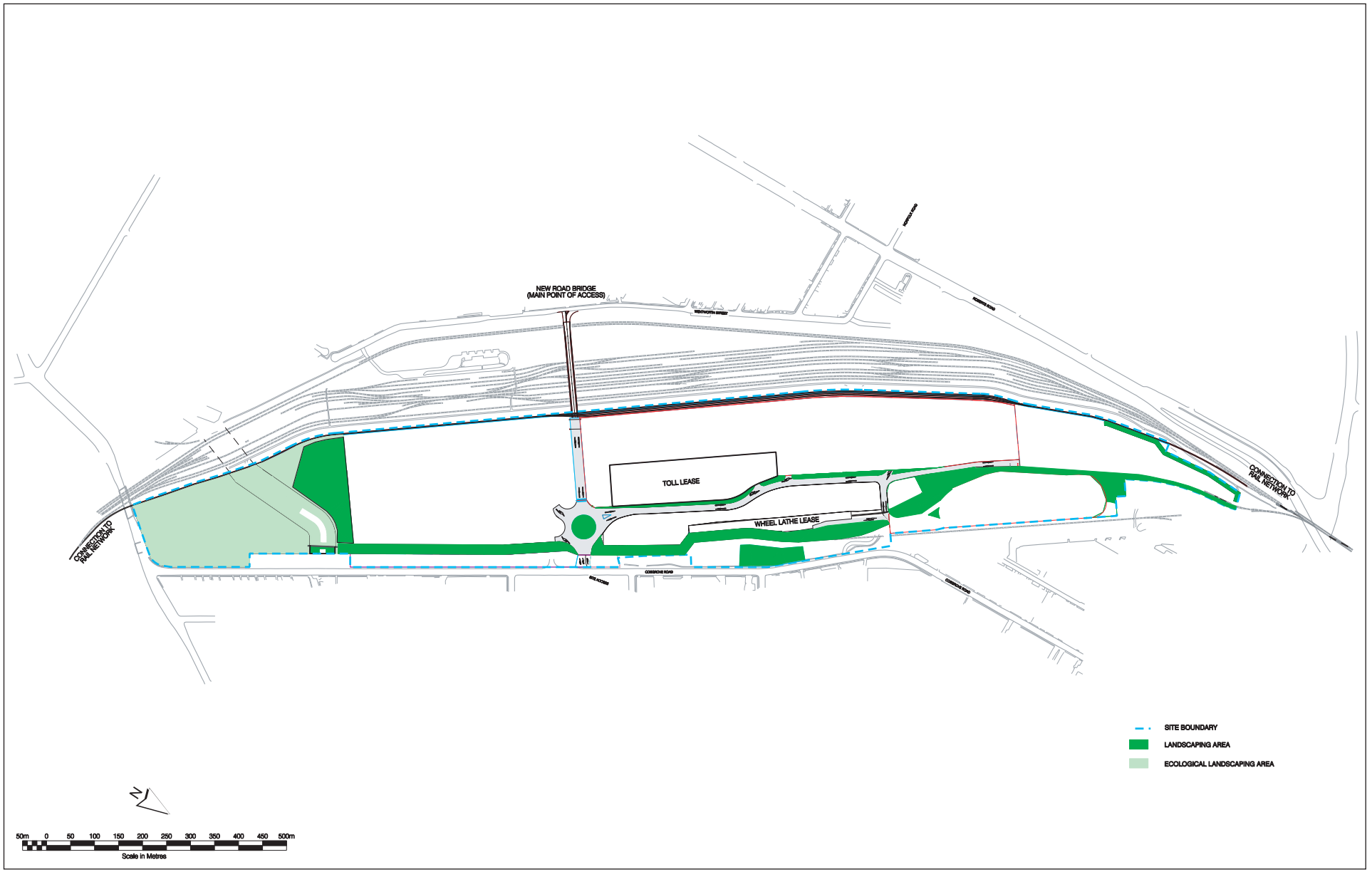
Intermodal Logistics Centre at Enfield

Figure 4-2b
Design Layout - Land Use



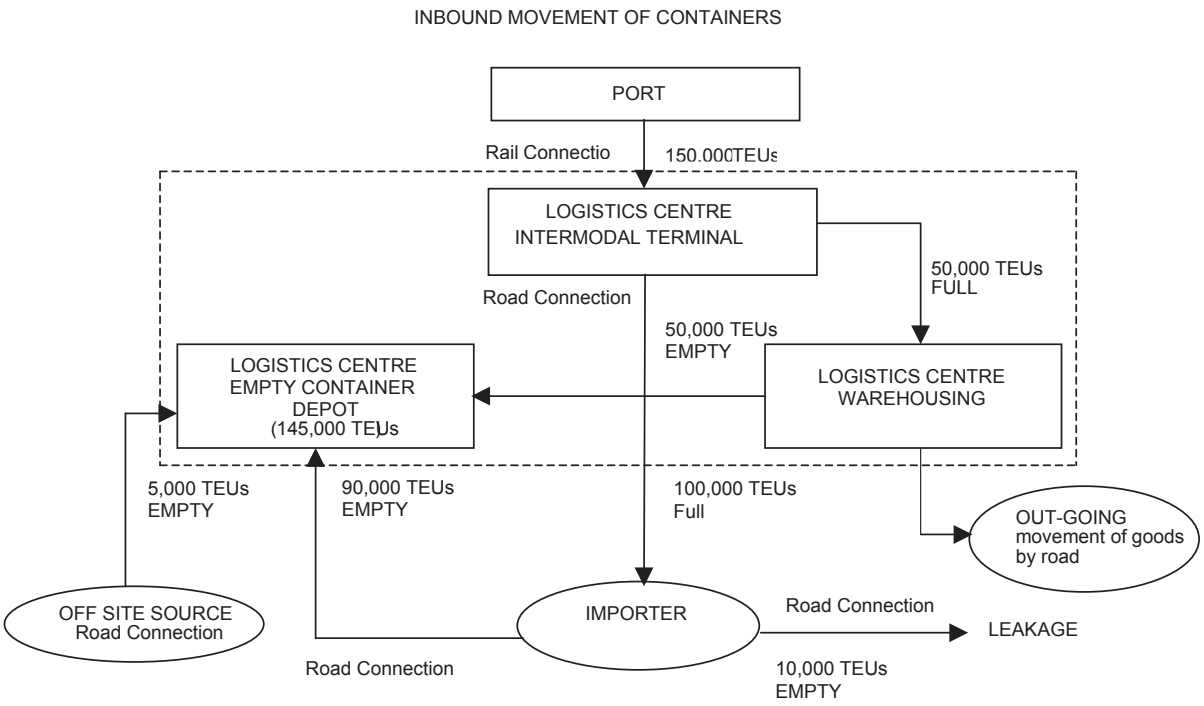
Intermodal Logistics Centre at Enfield

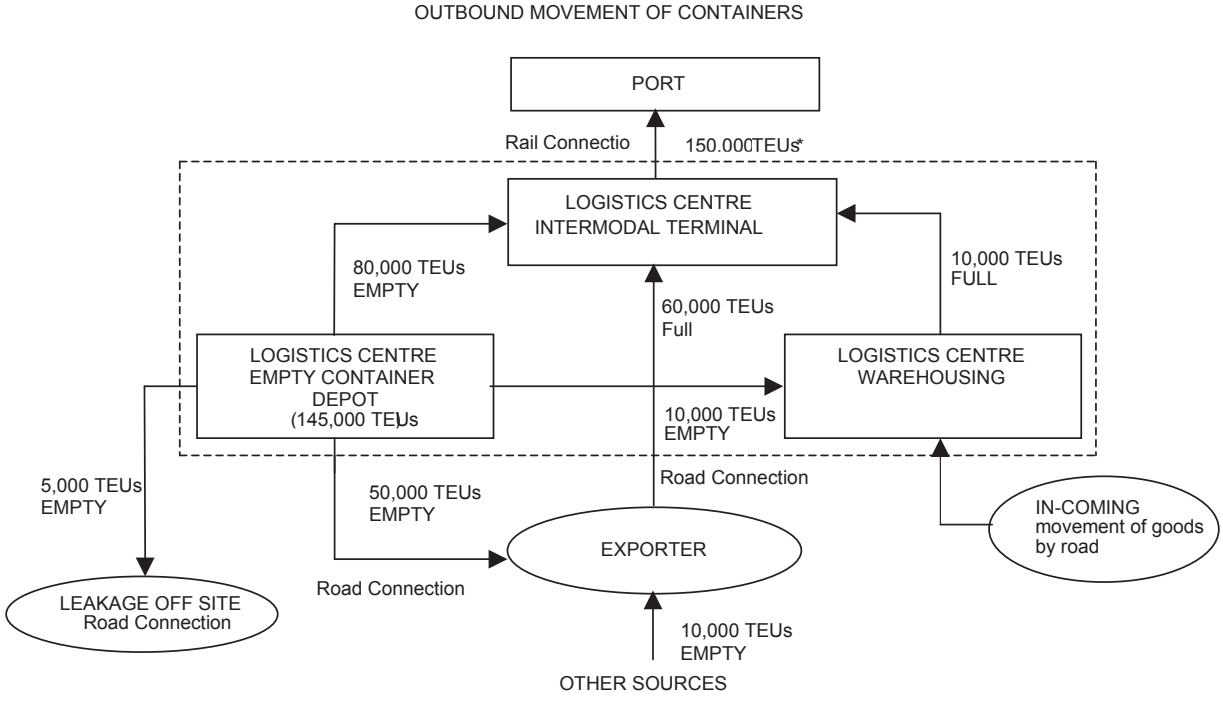
Figure 4-2c
Design Layout - Infrastructure



Intermodal
Logistics Centre
at Enfield

Figure 4-2d
Design Layout - Landscape





*N.B. Occasional regional deliveries of empties

Intermodal
Logistics Centre
at Enfield

Figure 4-3
Movement of Containers

4.3 The Intermodal Terminal and its Operation

4.3.1 Physical Description

The Intermodal Terminal would occupy an area of approximately 12ha located in the centre of the ILC site, adjacent to the Toll site. The majority of the terminal would comprise a flat paved surface for the short-term storage (generally less than 5 days) of containers. These containers would be stacked in block-like assemblages to a maximum height of five containers (approximately 13m).

The railway line would run along the western border of the site and would have two (approximately) 920m rail sidings adjacent to the Terminal. An empty container storage area would be present at the northern end of the terminal, while the southern boundary would be bordered by an internal, elevated site access road, as depicted in **Figures 4-2a** and **Figure 4-2c.**

The main site administration building will be located on the eastern side of the intermodal area, as shown in **Figure 4-2a**. It comprises a two-storey building with a total floor area of about 1,000m^2. Its plan and elevation drawings are shown in **Figure 4-4a**.

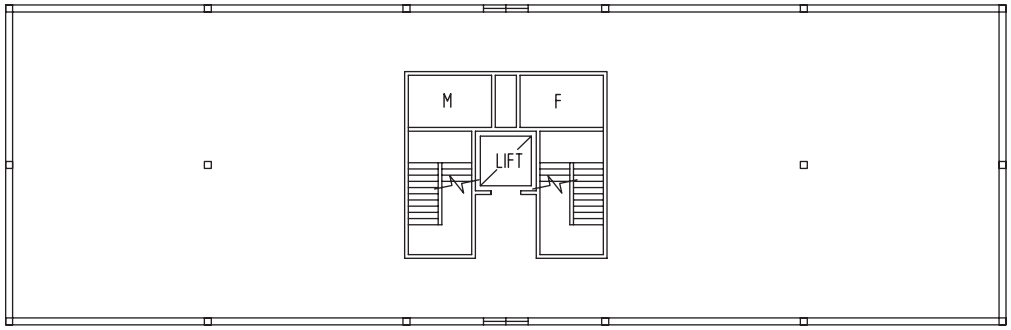
Trucks would enter the terminal via the internal road network on the eastern side of the existing Toll lease site. They would then enter a queuing area directly adjacent to the Toll site while awaiting processing, using an access control system such as a vehicle booking system (VBS). Following processing the trucks would move north to a parking area where they would park while waiting to enter the loading/unloading area. The loading/unloading area runs parallel to the queuing/parking area along its western frontage (see **Figure 4-2a**).

Three smaller administration buildings would be located on the site, one each near the empty container storage areas and one adjacent to the intermodal terminal loading and unloading area (**Figure 4-2a**). Each would be a single storey building, with a floor area of about 200m^2 and comprising office space and some staff amenities. The plan and elevation of these buildings is shown in **Figure 4-4b**.The administration building design will generally be consistent with the requirements of the Strathfield DCP No 27 – Industrial Development.

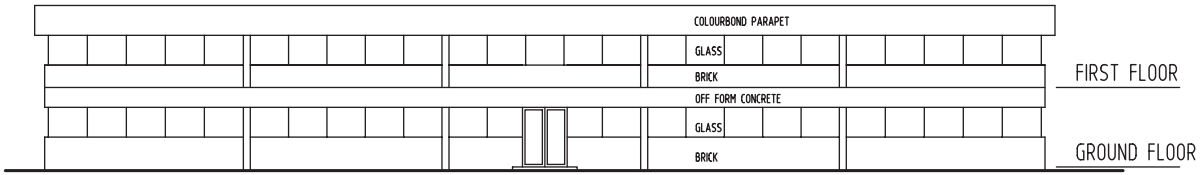
Access controls would ensure that truck movements are managed to ensure trucks:

- Proceed to correct queuing areas;
- Gain access to the site at appropriate time slots; and
- Are loaded and organised to achieve maximum operational efficiency.

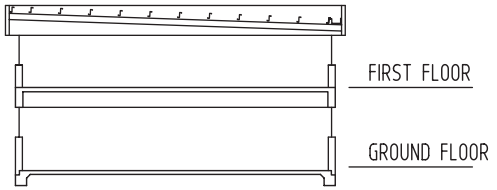
CONSTRUCTION SCHEDULE	
ROOF	COLORBOND METAL SHEETING
WALLS	BRICK, GLASS, OFF FORM CONCRETE
FLOORS	CONCRETE



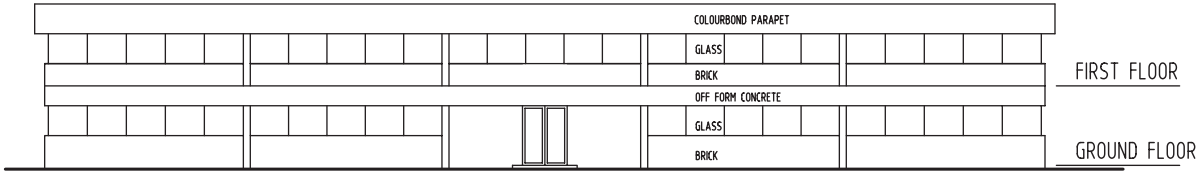
ADMINISTRATION BUILDING FLOOR PLAN



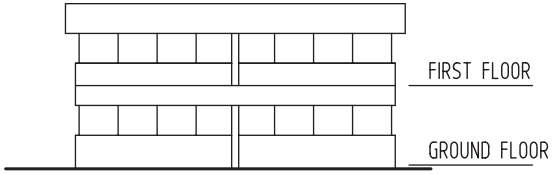
WESTERN ELEVATION



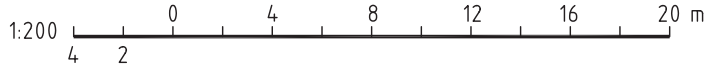
TYPICAL SECTION



EASTERN ELEVATION



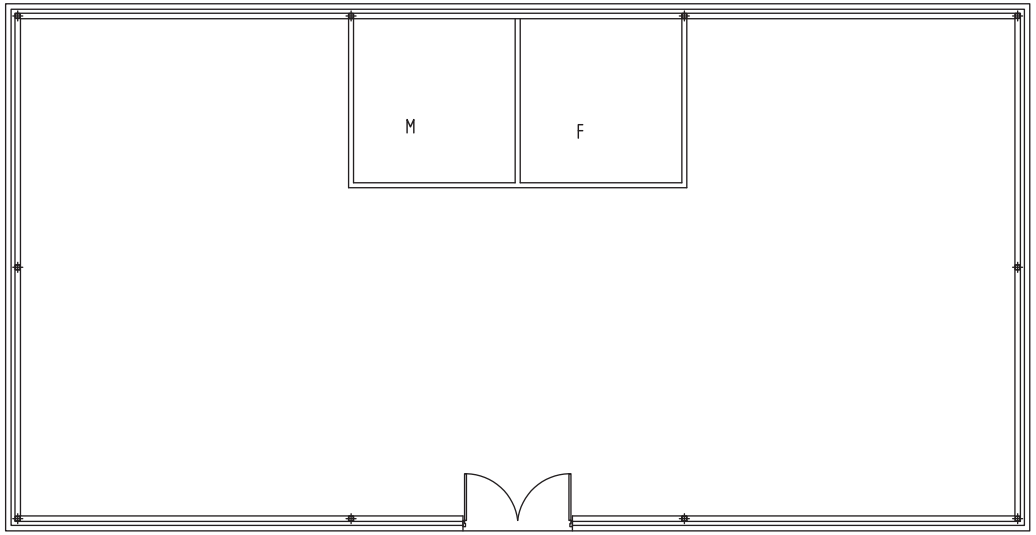
NORTH & SOUTH ELEVATION



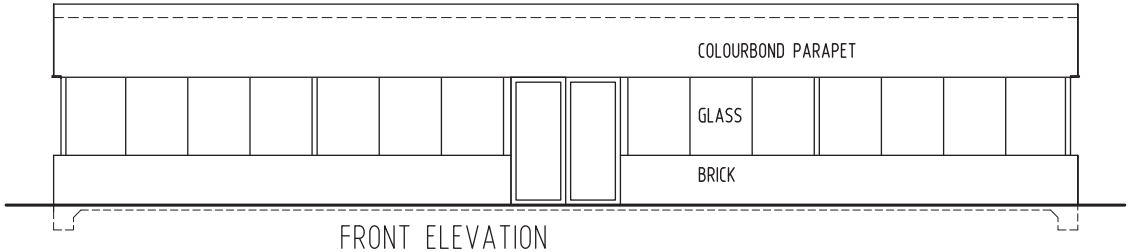
Intermodal Logistics Centre at Enfield

Figure 4-4a
Plan and Elevation of Administration Building

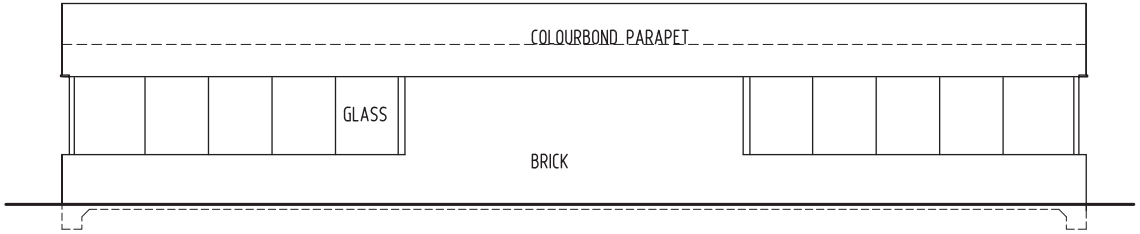
CONSTRUCTION SCHEDULE	
ROOF	COLORBOND METAL SHEETING
WALLS	BRICK, GLASS
FLOORS	CONCRETE

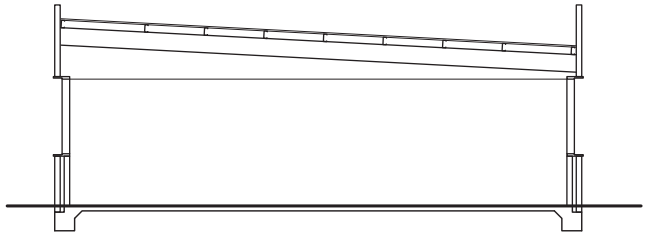


SMALL ADMIN. BUILDING FLOOR PLAN

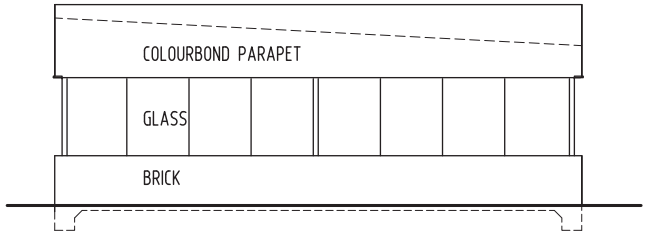


FRONT ELEVATION



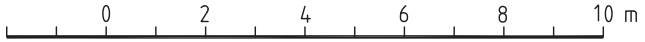


TYPICAL SECTION



SIDE ELEVATION

1:200



2 1

Intermodal Logistics Centre at Enfield

Figure 4-4b
Plan and Elevation of Small Administration Buildings

4.3.2 Operational Description

The function of the Intermodal Terminal would be the transfer of container freight to and from rail and to facilitate the movement of containers by rail to and from the site. Operations would involve the unloading of containers from rail onto stacks within the Intermodal Terminal, onto inter-terminal vehicles for transport to the warehouses within the Intermodal Logistics Centre, or onto trucks for transport off-site. The ILC would operate 24 hours a day, seven days a week.

Containers loaded onto rail for transport to Port Botany would be transported to the Intermodal Terminal from the warehouse or empty storage areas within the Intermodal Logistics Centre or via trucks from off-site. Approximately 40-50% of containers leaving the ILC by rail for Port Botany would be export (full) containers, while the remainder would be empty containers bound for export and repacking at other ports.

Figure 4-5 shows predicted growth in container volumes at the ILC. At its maximum throughput of 300,000 TEUs per year, the terminal is anticipated to generate between 10-20 train movements per day (each movement is a one way trip). The average is most likely to be 16 per day. Train movements would generally be a shuttle service between Port Botany and the ILC.

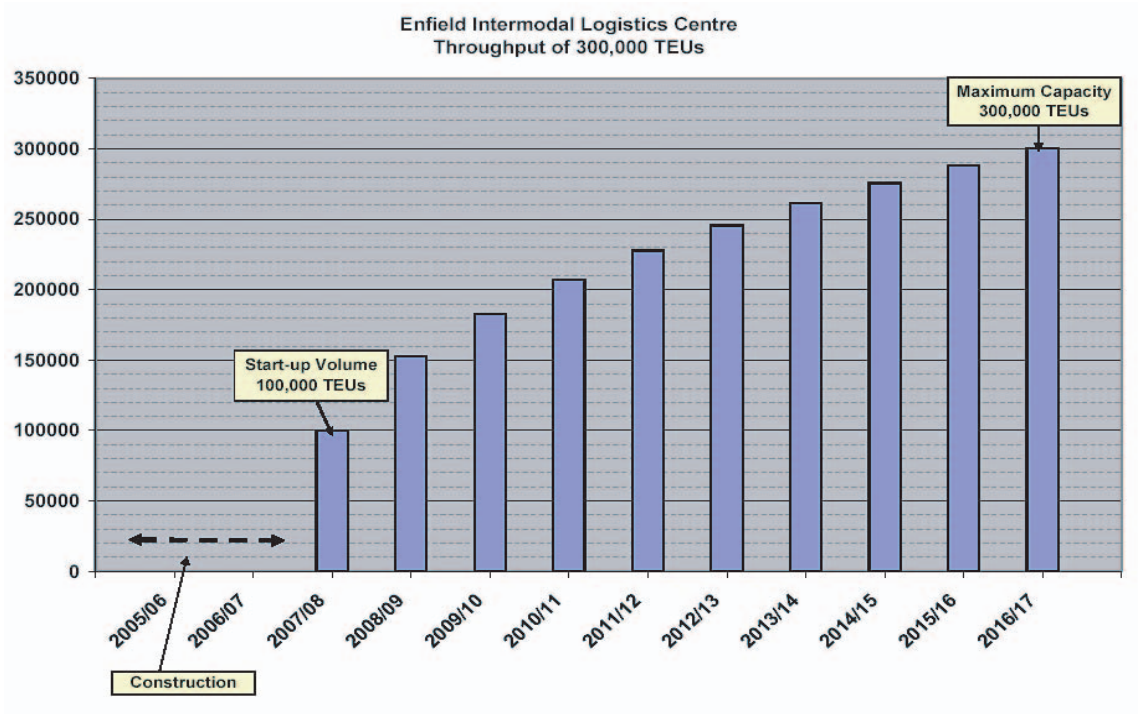
Typically, two trains of about 600m each would travel in a cycle of two hours unload/load time at the terminals at Port Botany and Enfield with a 30 minute travel time between these two points. In addition, there would be an occasional, longer train bound for rural NSW. It could range in length from 900m to 1,500m and would arrive at Enfield to load empty containers. The railway line and sidings are of sufficient length to manage trains of these lengths while loading/unloading is undertaken, without the train extending into the existing freight network line. This is achieved by breaking longer trains into two sections using the new sidings, wholly within the site.

Equipment used to move containers within the terminal and to load/unload containers would generally include equipment such as inter-terminal vehicles (ITVs), gantry cranes, forklifts and / or reach stackers, as shown in **Figure 4-6** and described in **Table 4-2**.

Table 4-2: Possible Equipment to be used on the Intermodal Terminal Site.

Typical Equipment Type	Typical Equipment Use	Typical Equipment Numbers
Gantry cranes	Loading and unloading containers to / from rail	3
Forklifts / Reach stackers	Moving containers around the terminal and loading / unloading to/from trucks and inter-terminal vehicles. Can also be used to load/unload containers to/from trains.	3 container forklifts 2 reach stackers

Gantry cranes would be restricted to the rail sidings area. ITVs, forklifts and reach stackers would work on all paved areas.



Intermodal Logistics Centre at Enfield

Figure 4-5
Predicted Growth in Container Volumes at the Proposed ILC

Intermodal Logistics Centre at Enfield

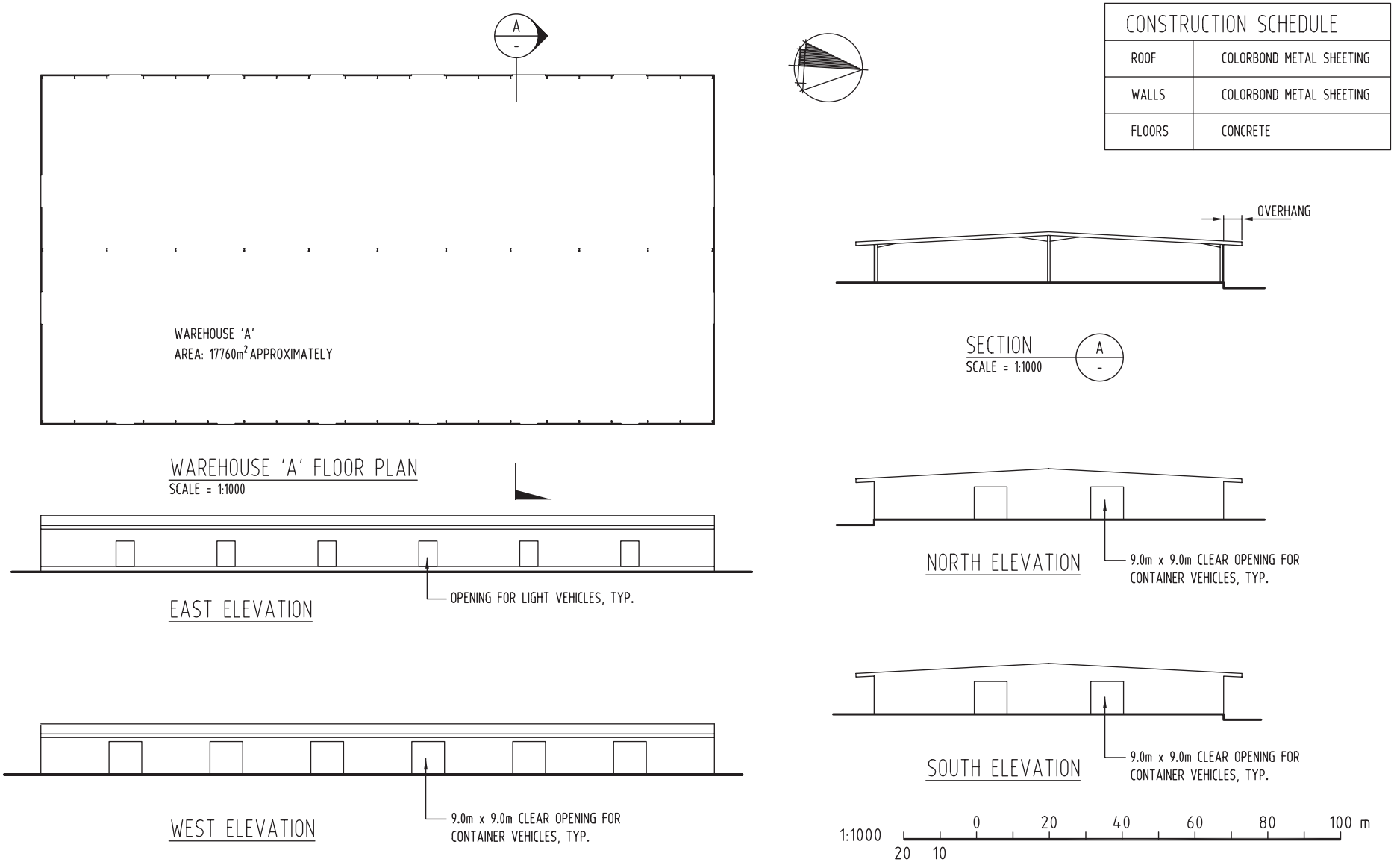
Figure 4-6
Gantry Crane, Reach Stacker and Forklift

4.4 The Proposed Warehousing and its Operations

4.4.1 Physical Description

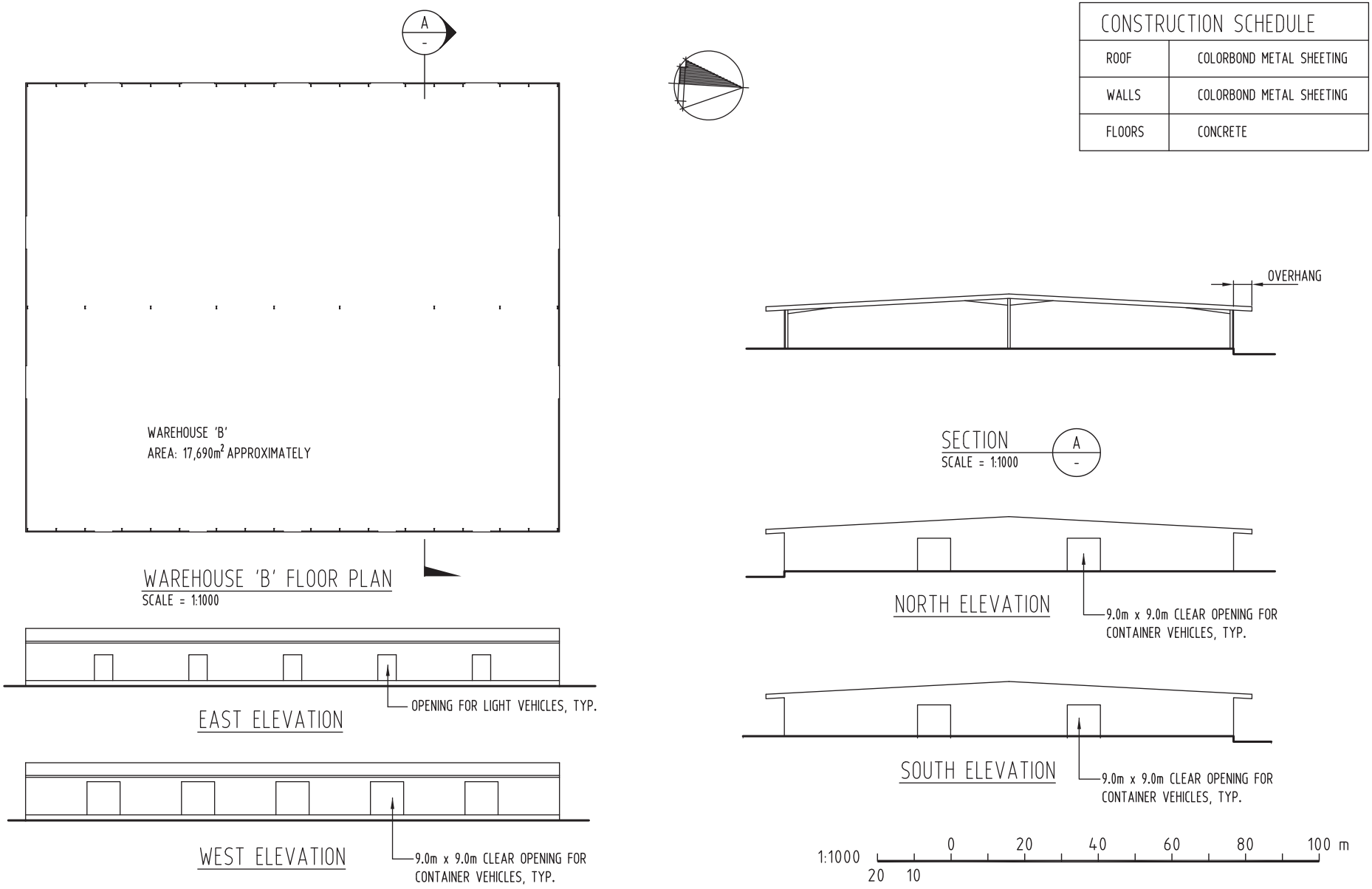
There would be up to six warehouses on the site. Warehouse designs and built form would be consistent with Strathfield Council requirements in its DCP No 27 for Industrial Development. Indicative locations for the warehouses are shown on the concept plan in **Figure 4-2a.** Concept drawings showing the plan and elevation of the warehouses are shown in **Figure 4-7.** All warehouses require a wall height clearance of 10m, with the top of the roof being no more than 12m. Approximate maximum warehouse sizes and location in relation to the site are provided below:

- Two large warehouses A and B, each covering an area of 17,500m^2 are proposed along the south - eastern fringe of the site adjacent to Cosgrove Road. External to the eastern facades and western facades of the warehouses would be possible queuing areas and loading/unloading areas for light vehicles (east) and container vehicles (west) respectively. A 4.3kL LPG tank for refuelling warehouse forklifts would be located at the northern end of Warehouse B;
- One relatively small, rectangular warehouse (C), covering an area of approximately 4,000m^2 would be located adjacent to the roundabout, east of the Toll area. This building is notionally provided with a queuing area along its eastern façade and loading/unloading areas along its eastern and western facades for light vehicles and container vehicles;
- Two warehouses (D and E), covering an area each of 2,000m^2 are proposed east of the Intermodal Terminal, running parallel to the internal access road. A 4.3kL LPG tank for refuelling warehouse forklifts would be located south east of warehouse D. Both warehouses would be serviced by a queuing area along the western façade. Loading/unloading areas for container vehicles would notionally be established along their western façades and for light vehicles along their eastern facades; and
- One large warehouse (F), 14,000m^2 in size is proposed adjacent to Cosgrove Road towards the north-eastern end of the site. A 4.3 kL LPG tank for refuelling warehouse forklifts would be located at the north east corner of the building. A queuing area would service the warehouse along its western façade, while a notional loading/unloading area may be established along the western fringe for container vehicles and along the eastern fringe for light vehicles.



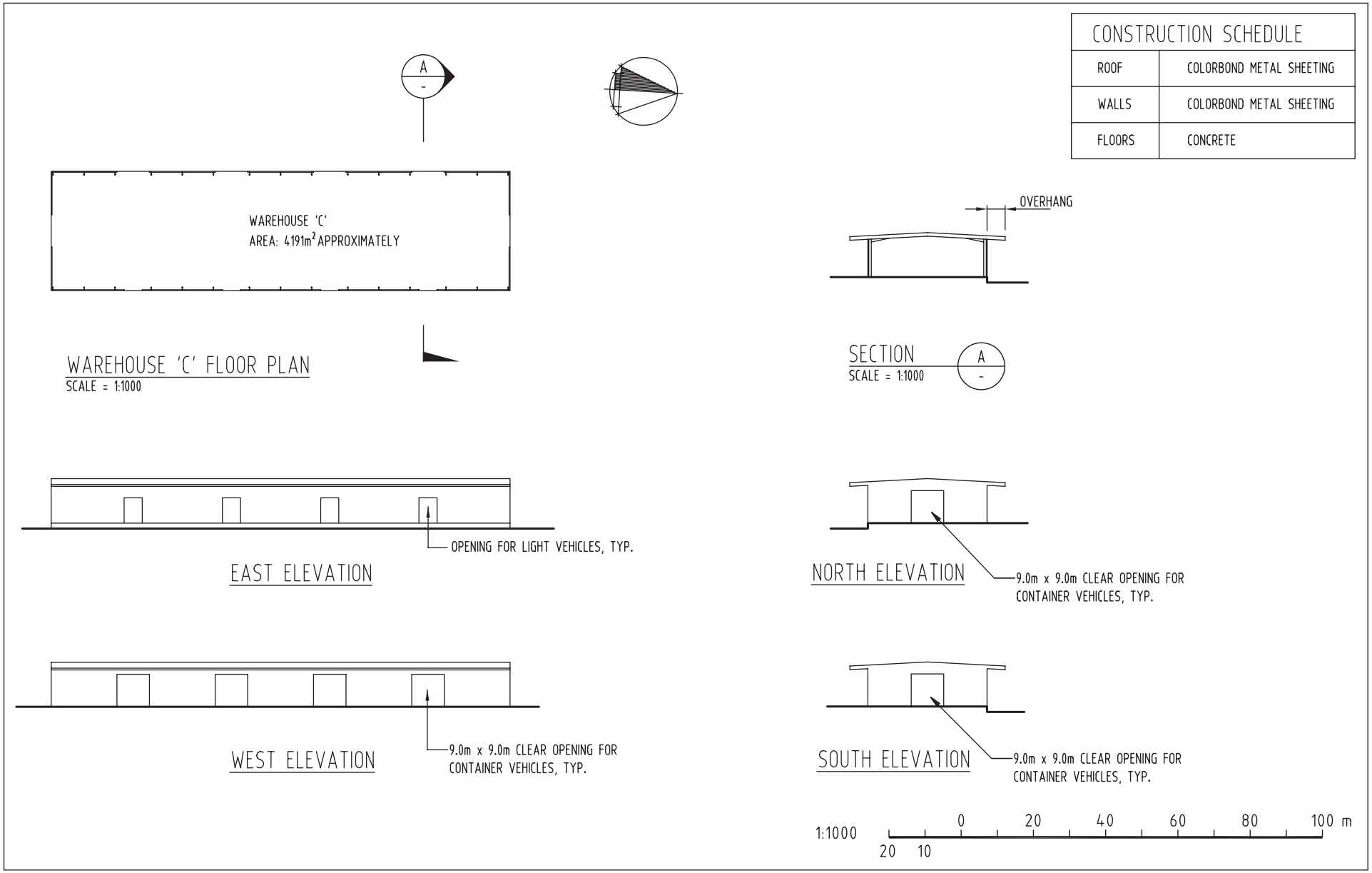
Intermodal Logistics Centre at Enfield

Figure 4-7a
Plans and Elevations of Warehouse Building "Warehouse A"



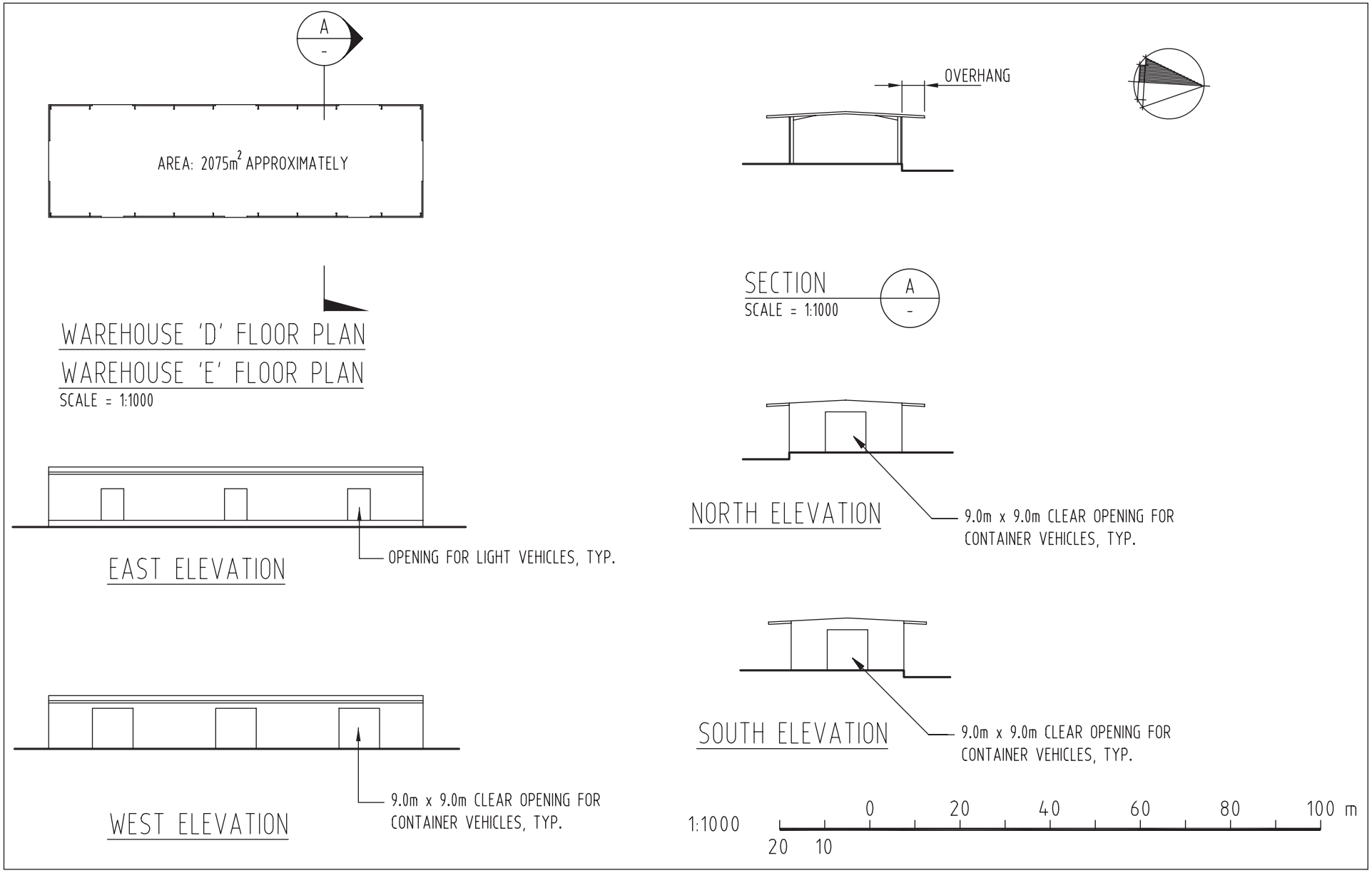
Intermodal Logistics Centre at Enfield

Figure 4-4b
Plans and Elevations of Warehouse Buildings "Warehouse B"



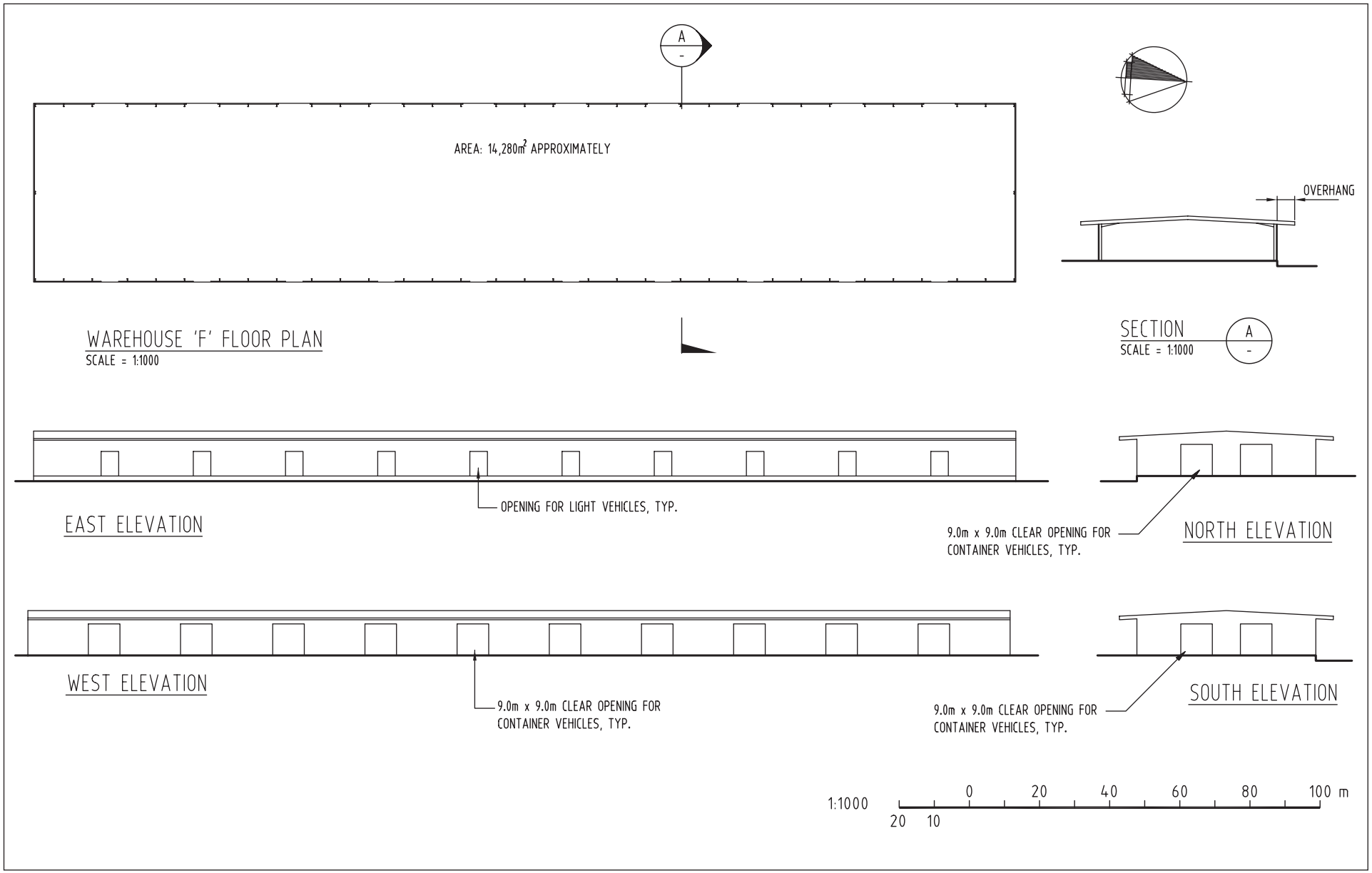
Intermodal Logistics Centre at Enfield

Figure 4-7c
Plans and Elevations of Warehouse Buildings "Warehouse C"



Intermodal Logistics Centre at Enfield

Figure 4-7d
Plans and Elevations of Warehouse Buildings "Warehouse D-E"



Intermodal Logistics Centre at Enfield

Figure 4-7e
Plans and Elevations of Warehouse Buildings "Warehouse F"

4.4.2 Operational Description

The containers from the port are generally destined for industrial areas and distribution centres located within the inner and middle western area of Sydney. Containers would be transferred to/from the on-site warehousing for unpacking / packing. For example, within the warehouses, non-containerised freight would be packed into empty containers and internally transferred to the Intermodal Terminal for subsequent transport to Port Botany via rail, or containers would arrive at the Intermodal Terminal by rail and be transferred to the warehousing for unpacking.

Unpacked freight would be removed from site via light trucks and other vehicles as non-containerised freight. Equipment used for movement of materials around the warehouses is shown in **Table 4-3**. Forklifts used in warehouses would be LPG driven.

Table 4-3: Equipment at warehouses.

Typical Equipment Type	Typical Equipment Use	Typical Equipment Numbers
Forklifts (for all warehouses)	Moving containers and pallets of material around the warehouse and loading / unloading to/from trucks and inter-terminal vehicles.	4 large forklifts 40 small forklifts

Warehouses would operate 24 hours a day, seven days a week.

4.5 The Empty Container Storage Facilities

4.5.1 Physical Description

Two empty container storage areas would be constructed as part of the Proposal, one to the north (approximately 4ha) and one to the south (approximately 5ha) of the Intermodal Terminal. Internal access roads would be constructed as depicted in **Figure 4-2a** and **Figure 4-2c** to connect the empty container store areas to the Intermodal Terminal and warehouse areas.

To the east of the Toll area and midway between the two empty container areas will be:

- A container maintenance activity shed, approximately 8m high, covering an area of 400m^2; and
- A dual 15m x 10m wash down facility. This wash down bay would be large enough to deal with two containers or two items of plant at the same time.

Plan and elevation drawings of the maintenance activity shed and the washdown facility are shown in **Figure 4-8** and **Figure 4-9** respectively.

4.5.2 Operational Description

Empty containers would primarily come from the warehouse areas via ITVs and off-site via truck.

Empty container storage facility would operate 24 hours a day, seven days a week. Empty containers could be stored up to 6 containers high (approximately 16m). Equipment used throughout the empty storage site would include forklifts, as indicated in **Table 4-4**.

Table 4-4: Equipment used at empty container depots.

Typical Equipment Type	Typical Equipment Use	Typical Equipment Numbers
Forklifts	Moving containers around the facility and loading / unloading to/from trucks and inter-terminal vehicles.	6 (2 in the northern site, 4 in the southern)

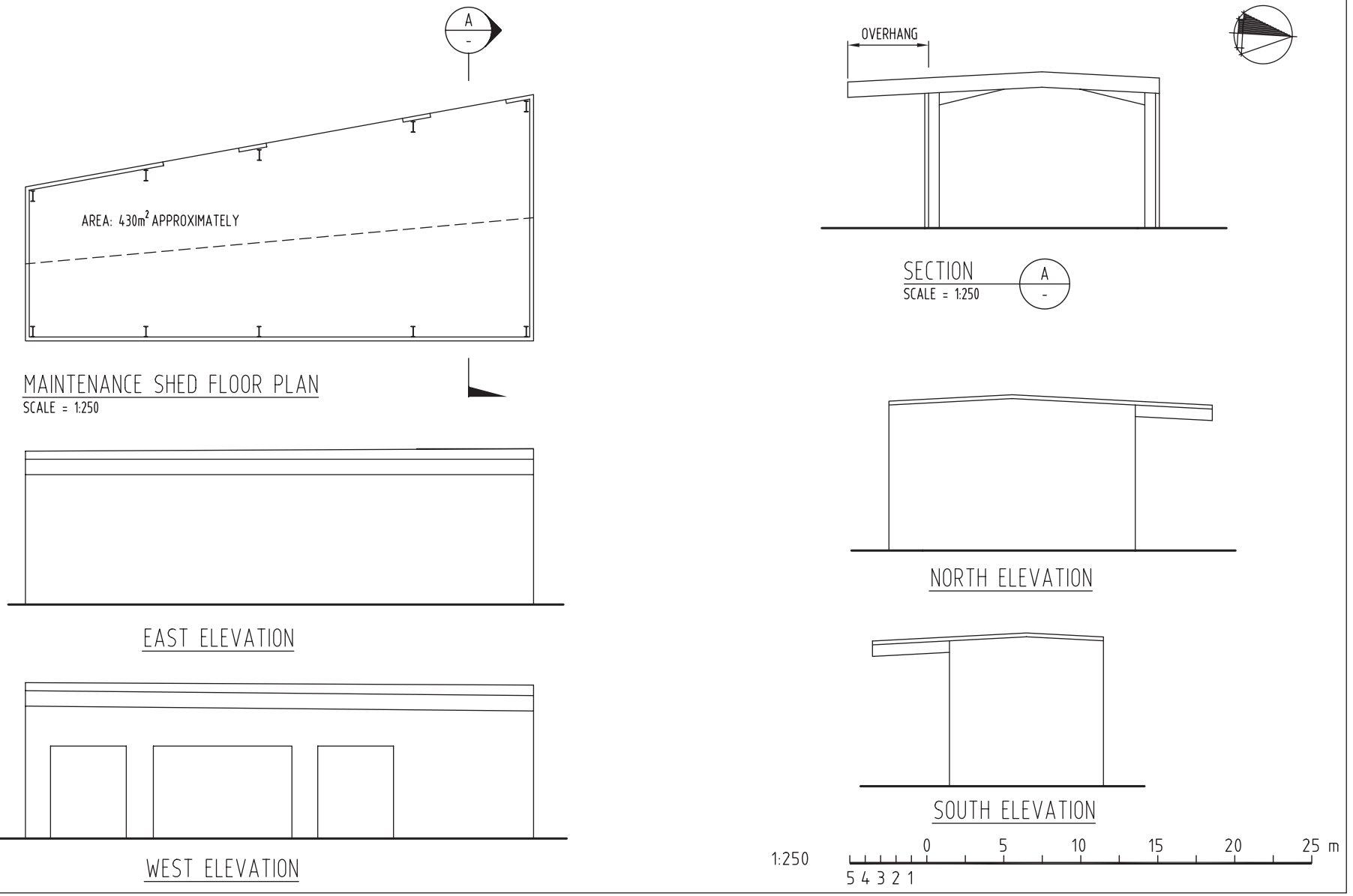
4.6 The Light Industrial / Commercial Area

Approximately 3ha of land along the eastern edge of the site, adjacent to Cosgrove Road, is proposed for light industrial / commercial development. This area would be developed to provide for commercial growth centred on the ILC and add to the land use of the existing streetscape. Ideally the usage of this area would complement the ILC operations (eg use by freight forwarders, customs agents, light manufacturing), but usage would ultimately be linked to market demands. Development for commercial and light industrial use would be consistent with existing land uses on the western side of Cosgrove Road and would provide for a strip of light industrial / commercial use along the street frontage. The proposed development area is about 3ha, with building heights no more than 10m. At two storeys, the gross floor area of the Light Industrial/Commercial Area would be no more than 30,000m^2.

Building designs and built form are to be consistent with Strathfield Council requirements in DCP 27 for Industrial Development and existing industrial developments along Cosgrove Road.

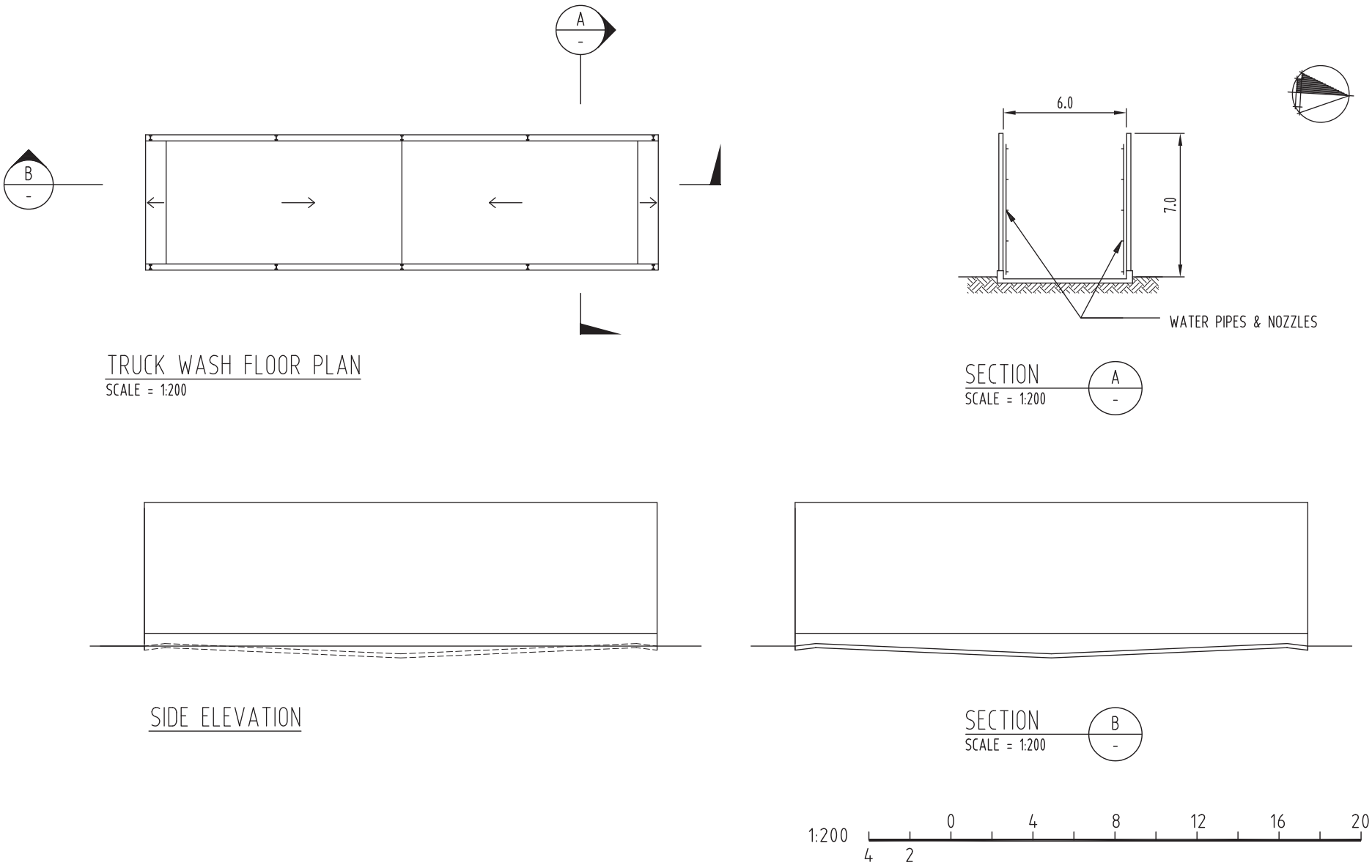
An ethylene gas pipeline runs parallel to Cosgrove Road, behind the proposed light industrial / commercial area. This pipeline forms a constraint to the site development and is a key reason for identifying the Cosgrove Road frontage for a discrete, separate land use that can be contained on the eastern side of the pipeline.

The hours of operation of Light Industrial / Commercial Area would be subject to the nature of the operations on the site. For the purposes of the EA, it was assumed that these facilities would operate 7am to 7pm, 7 days a week.



Intermodal Logistics Centre at Enfield

Figure 4-8
Plans and Elevations of Maintenance Shed Areas



Intermodal Logistics Centre at Enfield

Figure 4-9
Plan of Washdown Area

4.7 The Community and Ecological Area

The Community and Ecological Area has been incorporated into the proposed development to provide an opportunity to enhance the site's ecological value and community amenity. The site is currently a highly modified and degraded landscape. The development of the Intermodal Logistics Centre provides the opportunity for ecological improvements and community benefits. These improvements have the potential to link to other projects in the area. The Community and Ecological Area lies south of Coxs Creek, covers an area of about 5ha and would incorporate the following:

- Revegetation of the existing spoil stockpile, replacing weed species with species endemic to the area; and
- Habitat for the threatened Green and Golden Bell Frog.

It is also possible that access for the community to the area would be available under supervised conditions. The future use for the Tarpaulin Factory is undecided. It will therefore be stabilised against further deterioration and its on-site use, removal or relocation decided at a later time. Its usage would be subject to a separate development application. The area would act as a buffer zone for nearby residential properties on Cosgrove Road and south of Punchbowl Road. Establishment of the Community and Ecological Area could provide potential benefits for wildlife and for the community.

4.8 Access to the Site

Some off-site works, relating mainly to road and rail traffic and access points, would be required to facilitate the efficient operation of the Intermodal Logistics Centre.

4.8.1 Road Access and Bridge Works

Two road access points to the site are proposed. The key entry point would be at Wentworth Street to the west of the site. This entry point would be linked to the site via an overbridge across the new Enfield Marshalling Yards and the dedicated freight line. This would link via the internal road system to the secondary access point at Cosgrove Road on the eastern side of the site. The access at Cosgrove Road would be configured to ensure that heavy vehicles are only able to enter or leave the site to or from the northern end of Cosgrove Road. The majority of the movement to and from the site would be via the western (Wentworth Street) entrance.

The western access point was selected to obtain the optimum clearance height above the new Enfield Marshalling Yards. The east to west alignment was chosen due to its direct route to the central part of the site to minimise travel distances to and from any one part of the operations. Access to Cosgrove Road was located to align with the road bridge to the west, as close as possible to the existing Cosgrove Road access.

Measures to control access to the site will be based on the operational needs of the ILC tenants. It is expected that the access control to the site will be augmented from time to time, based in response to changes in security status of the site. When required, east / west traffic flow will be able to be

controlled by boom gates (positioned as shown in **Figure 4-2a)**, controlled remotely (eg using CCTV) or via standard traffic control measures (eg staffed control point). Access control and site security will be managed by the lessees of the various operational sites. The nature and configuration of individual leases will be determined as part of the detailed design phase of the ILC.

These measures provide the flexibility for traffic, bicycles and pedestrians to flow east and west via the roundabout, and allows for closure of one or both directions as may be required from time to time. North and south access including pedestrians would be controlled at the access points of the various operational sites located along the internal roads (refer to **Figure 4-2a** and **Figure 4-2c**).

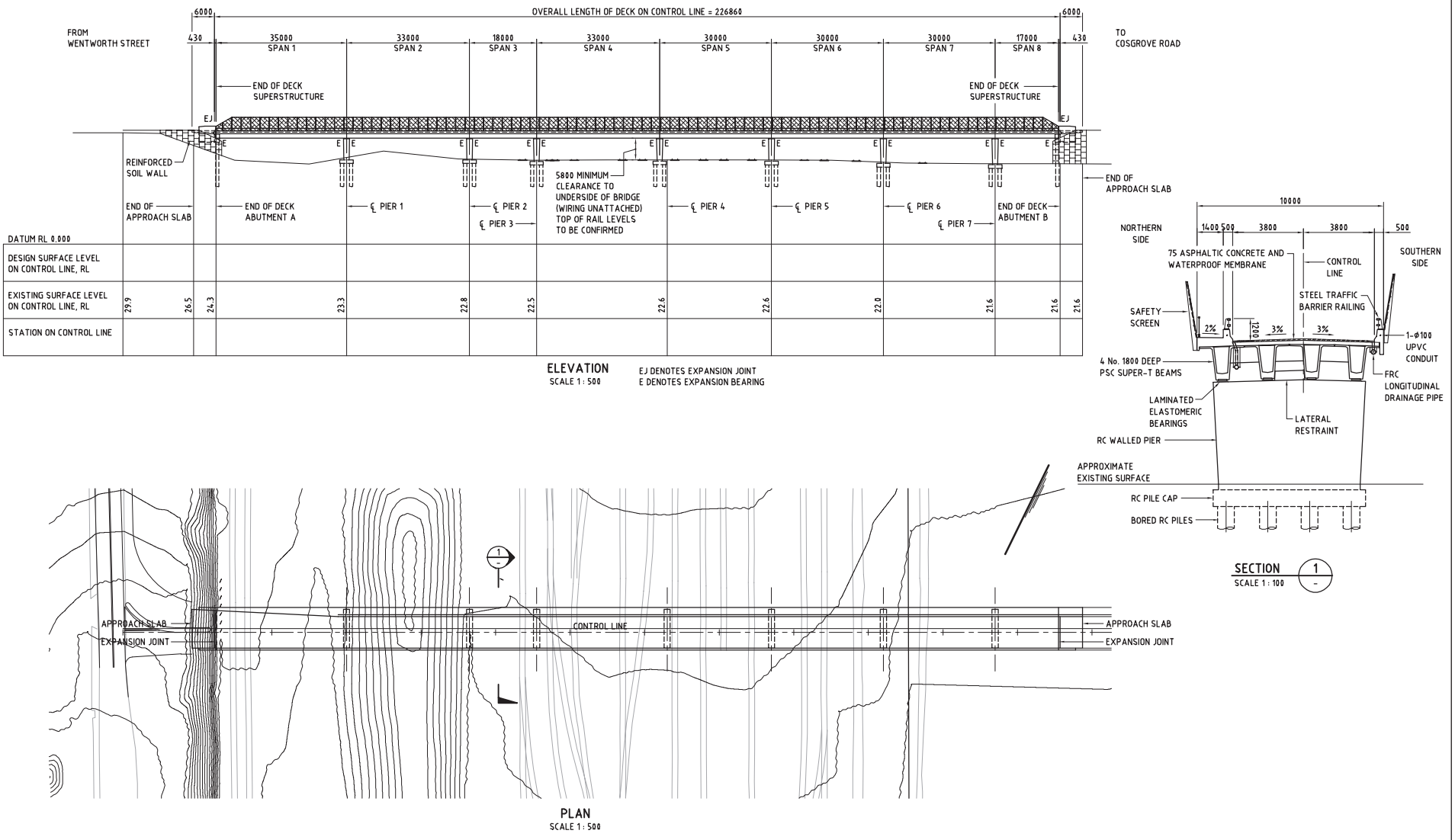
An overpass bridge would be constructed across the existing dedicated freight line and marshalling yards to provide access to the site from Wentworth Street. RailCorp has consented via a Deed of Agreement to the construction and use of the bridge over the dedicated freight rail line and new Enfield Marshalling Yards, and the bridge design would be in accordance with the requirements of RailCorp. A concept for the bridge design is shown in section in **Figure 4-10**. The bridge concept took into account the following:

- The position and clearance requirements for the main railway line;
- The position and clearance requirements of the marshalling yard tracks, internal access roads, turnouts and overhead structures; and
- The position and clearance for the proposed rail tracks for the ILC.

The bridge would be at grade with Wentworth Street, and would be ramped at its eastern end to connect to the lower site level. It would be approximately 240m long with spans of about 35m length, a cross section of approximately 10m and a minimum clearance of 5.8m from the railway. The preferred structure features precast “Super Tee” girders, which are well suited for the range of spans required and can be lifted into position with minimum disturbance to rail operations. Reinforced soil walls would retain the approach embankment on the eastern side. As well as trucks delivering or picking up from the ILC, employees in motor vehicles or on foot will be able to cross the bridge. Employee cycle access would also be provided on the bridge.

4.8.2 Rail Access and Intermodal Sidings

The proposal includes the introduction of a railway through-line that would extend along the western side of the whole site and would have two rail sidings, approximately 920m long, adjacent to the Intermodal Terminal. This rail line and associated signalling and other infrastructure would allow containers to be loaded / unloaded from trains within the Intermodal Terminal area. The proposed railway line would connect at both ends with the existing dedicated freight rail line between Port Botany and Enfield. The southern link would be south of the Punchbowl Road underpass and the northern link would be just south of the Hume Highway**.** The turnouts that link each end of the site are already in existence and no alterations or upgrades to the existing dedicated freight rail line would be required as part of the proposed ILC.



Intermodal Logistics Centre at Enfield

Figure 4-10
Plan and Elevation of Bridge

The majority of the trains delivering containers to the Intermodal Terminal would be approximately 600m in length. Given that it is proposed to introduce dual rail sidings, it would be possible for two trains to gain access to the terminal site at one time. Consultation with rail operators has indicated that the capacity exists for longer trains (destined for rural areas) to collect empty containers from the ILC and head north from the site. These trains can be held at the Intermodal Terminal sidings by breaking the train into two parts, thus ensuring trains are not extending into the through rail line. Regulatory issues for the operation of trains and measures to manage the gradient on the site will be considered at detailed design stage. It should be noted that the majority of rail movements will involve trains entering and exiting the Intermodal Terminal from the south.

In addition the remains of the former bridge abutment on RailCorp land underneath Punchbowl Road will need to be removed to allow for the rail connection. Similarly, the rail connection between the existing turnout at both ends of the ILC site are within the rail reserve, but not on Sydney Ports land. These connections will be designed and constructed in accordance with the requirements of RailCorp.

4.9 Site Landscaping

The existing landscape is highly disturbed and largely dominated by derelict rail buildings, stockpiles and haulage roads. The site is far from its natural state and has been subject to extensive human disturbance over the past 90 years.

A landscaping master plan for the site has been prepared by EDAW-Gillespies. It is further discussed in Chapter 16 – Visual Impacts and Landscape and is provided in detail in Appendix I – Landscape and Urban Design. The design intent in the plan is to integrate the site into the surrounding residential and industrial areas, to mitigate any impacts using vegetation, and to use structures and landform to create a functional and environmentally suitable amenity that serves the wider community. Landscape treatments for the site have been divided into six main areas:

- Community and ecological area;
- Buffer / screening planting;
- Acoustic mounding and walling;
- Internal landscaped areas;
- Cosgrove Road edge and entry treatments; and
- Wentworth Street Entry.

The overall planting strategy is to re-introduce native species into the site, using species from the Cooks River / Castlereagh Ironbark Forest community where suitable. It is also proposed to introduce new Green and Golden Bell Frog habitat.

4.10 On-site Structures and Components

4.10.1 Structures on the Site

The site contains a number of buildings and structures, all of which are owned by Sydney Ports. The removal of many of these are covered under a separate Development Approval (DA Number 0304/365 dated 23 June 2004) from Strathfield Council. These demolition works have commenced. Those remaining on-site and not covered by the development approval described above are shown in **Table 4-5**. These remaining structures are subject to the current proposal and it is intended that they be maintained on-site for further usage, relocated to another site for adaptive re-use or recorded and demolished. A number of these items have heritage value, and the heritage impacts of the proposed use of these items is discussed in Chapter 15 – Heritage.

Table 4-5: Remaining Buildings and Structures

Structure	Location	Description	Proposed Outcome
The Administration Building	Centre of the abandoned former Enfield Marshalling Site	20th Century Multicoloured brick building with metal casement windows, glazed two storey lobby an prominent entrance tower	Record and demolish
The Tarpaulin Factory	Corner of Punchbowl and Cosgrove Road	An assemblage of two 19thCentury prefabricated cast and wrought iron single bay buildings that were once in Central Station.	Retain. Future use yet to be decided. Structure will be stabilised against further deterioration or re-site to rail heritage organisation.
Yard Master's Office	Western fringe of the site, towards the southern end of the yard	Two storey brick building, almost square in form. Dates from early 1900s.	Record and demolish.
Pillar Water Tank	Centre of the site		Record and re-site to appropriate display location on ILC site or to rail heritage organisation.
Steel Pedestrian Bridge	South of the Yard Master's office	80 metres in length	Record and re-site to rail heritage organisation or to appropriate display location on ILC site.
Transhipment (Wagon Repair) Shed and Gantry Crane	Adjacent to the Administration building in the centre of the site	Post and beam timber structure, 80m in length and 10m wide, with attached gantry crane	Re-use of some of the wood in landscaping (ie benches) and dismantle and relocate remainder. Gantry crane is to be recorded and resited to an appropriate display location on the site.
The DELEC site structures and wheel lathe area	Eastern side of the site	Office building, amenities building, wheel lathe shed turntable, fuel storage tanks, DELEC platform, washing down and cleaning areas.	Demolish DELEC buildings and structures. Retain wheel lathe area for continued use.

Table 4-5 also provides a summary of the intended proposals for each of the on-site structures identified. Structures on the Toll lease and Wheel Lathe areas will be unaffected.

4.10.2 Internal Roads

The proposal would involve the construction of new road infrastructure within the Intermodal Logistics Centre to enable vehicle movements between the Intermodal Terminal, warehouses and empty container storage areas without vehicles having to travel off-site.

The primary site access road runs east-west across the Intermodal Logistics Centre connecting to both Wentworth Street and Cosgrove Road. A roundabout would be constructed along this road approximately 50m into the site from Cosgrove Road. The roundabout would provide access to all parts of the site via internal access roads, and facilitate uninterrupted entry into the southern and northern ends of the internal access roads, thus avoiding any potential delays at the entrances to the site at Cosgrove Road and Wentworth Street.

The proposed internal access road heading north from the roundabout would provide new access to the Toll and Wheel lathe areas and access to the Intermodal Terminal, northern container area and warehouse facilities. The road would also be used to depart from the Intermodal Terminal after container transfer / pick up. This road would be constructed as a two-way paved road, allowing two-way vehicular traffic movement within the site (see **Figure 4-2c**).

Other internal access roads would be marked to connect the Intermodal Terminal with the northern and southern empty container depots. At the southern end of the site, this would require construction of an underpass under the proposed Wentworth Street overbridge. At the northern end of the site, an internal access road would link the Intermodal Terminal and the northern warehouse area. Details of the internal layout are provided in **Figure 4-2c**. Trucks would move into the transfer areas in the terminal and empty container areas and circulate around warehouses and queue in areas marked in **Figure 4-2a**.

Car parking would be provided at the various work sites to meet Council and RTA requirements. It is expected that there would be up to 300 car spaces and these would accommodate the highest forecast workforce numbers during weekday operations. Parking locations are shown in **Figure 4-2a**.

4.10.3 The DELEC Rail Line

One operational rail siding remains on the site, running in a north west / south east direction adjacent to Cosgrove Road. This line services the DELEC site and branches from the main line at the Hume Highway (the northern extent of the Intermodal Terminal). Only the section of line connecting the north of the site and the wheel lathe would be retained. The rail line south of the wheel lathe area will be removed.

The section of rail line north of the wheel lathe area currently runs through the area proposed for warehousing and it would therefore be relocated as part of this proposal. The sole purpose of this line would be for access to the wheel lathe site from the north. The section of line contained within the site

would be relocated approximately 15m west of its existing location and would then curve gradually east to connect with the wheel lathe area, as shown in **Figure 4-2c**.

4.10.4 Services

Water Supply and Sewerage

Details of existing water supply infrastructure are provided in Appendix L – Site Sewer and Water Investigations. The ILC site is bound on all sides by Sydney Water owned infrastructure and services. The site in its present configuration has connections to both water and sewer mains located along the Cosgrove Road boundary.

The site has three major trunk mains passing through it. Two of the mains are reservoir supply lines located deep below the surface in tunnels, and building over these mains would be permissible. The mains are located to the south and north of the site. The third main runs directly through the centre of the site.

Full details of existing sewerage services are supplied in Appendix L – Site Sewer and Water Investigations. The site is crossed in the southern sector by a Sydney Water sewer main. The main is located in the Coxs Creek area of the site and is a large capacity trunk line. Building over this main is not possible in its current configuration. The area would be used for landscaping purposes and allowance has been made for continued access to the main by providing a noise wall where a noise mound would otherwise have been placed.

The site has several opportunities for connection and discharge to the Sydney Water sewer mains and these would be investigated at the detailed design stage of the project.

Lighting

Levels of lighting would be different for each area within the Intermodal Logistics Centre. The highest volume of lighting would be provided for the Intermodal Terminal where container stacking takes place (approximately 50 lux), to approximately 25 lux for container storage areas. A preliminary lighting design was undertaken (described in Appendix I – Visual Assessment) to enable assessment of light spill impacts from the site.

The preliminary design suggests that the light towers in the Intermodal Terminal and empty container areas are expected to be 25 metres tall and placed on an 80m grid. The installation would be designed to meet ASNZS 4282 - Control of Obtrusive Effects of Outdoor Lighting.

Lighting would also be designed to minimise light spill through the use of directional lighting and appropriate landscape treatments. In terms of road and bridge lighting, this would be designed to meet the relevant standard for minor public roads, and to the requirements of rail organisations.

4.10.5 Utilities

Existing services and utilities are described in Appendix L – Utilities, Services and Energy Assessment.

Electrical

Energy Australia utilities are located on Norfolk Road, Wentworth Street and Cosgrove Road, and a line enters the ILC site near Pilcher Street. Energy Australia also has overhead high voltage transmission lines that run across the northern end of the site and just north of Punchbowl Road. Provision for various lines and easements will be required during detailed design.

Railway Signalling

A major buried signalling cable route runs along the western boundary of the ILC, a buried cable is located just north of Punchbowl Road and a cable runs east west across the site near Hope Street. Provisions for removal or protection of these cables will be required during detailed design.

Ethylene Gas Pipeline

An ethylene gas pipeline runs at a 1m depth north to south parallel to Cosgrove Road generally in a 1 metre wide easement. The pipeline crosses from east to west of the rail track immediately north of Punchbowl Road and passes through a fenced facility before crossing back to the east north of the tarpaulin factory. The pipeline continues north until it leaves the site at the existing entry to the DELEC site.

The pipeline does not affect any of the proposed ILC works, nor do the proposed works affect the pipeline. However, it would need to be considered in the detailed design of the Light Industrial / Commercial land proposed along Cosgrove Road

4.10.6 Drainage, Flood and Stormwater Management

The site is located within the Cooks River Catchment, which covers approximately 10,000ha of mainly residential and industrial land. The ILC site is one of the largest single use industrial areas within the Cooks River Catchment. The Proposal would create large areas of impervious hardstand surface, resulting in an increase in rainfall run-off. Furthermore, earthworks would result in some modification of natural catchment flows.

Existing stormwater infrastructure on the site comprises underground pipes which transport stormwater from Wentworth Street to Cosgrove Road, under the site. Coxs Creek, a tributary of the Cooks River, runs under the site for a distance and then emerges as an open, concrete lined, channel part of the way across the site. The other pipes discharge into unnamed creeks that are open for a short distance and then become culverts under Cosgrove Road.

Management of stormwater runoff from hardstand areas would involve construction and operation of a stormwater detention system(s). These are addressed in detail in Appendix D – Hydrology and Hydraulics. A detention basin would be constructed at the southern end of the site, immediately north

of Coxs Creek, reflecting the natural gradient and surface water flows on the site (as shown on **Figure 4-2a**). The detention system would also be used to treat run off prior to discharge. Overspill from the detention basin would run to the existing floodway, running east-west along the northern boundary of the Community and Ecological Area. The detention basin would be designed to ensure post-development peak flows do not exceed pre-development peak flows. Land proposed to be developed for part of the northern warehousing area is at a lower elevation than the rest of the site. Stormwater from this area could be diverted into a smaller unnamed natural drainage line that runs under Cosgrove Road. Detention and/or treatment of this stormwater will also be provided. Detailed trunk drainage, stormwater detention / treatment systems would be determined during the detailed design process.

4.10.7 Fuel Supply

Three storage tanks of diesel fuel for re-fuelling locomotive engines and on-site equipment will be included as part of the Proposal (see **Figure 4-2a**). Two tanks, one at either side end of the Intermodal Terminal sidings will be approximately 25,000 litres each (7.5m long x 2.2m diameter, approximately 2.5m high) and the third tank, located near the maintenance building, on the eastern side of the Toll lease site, would be about 10,000 litres (3.2m long x 2.2m diameter, approximately 2.5m high). Total diesel storage on site would be up to 60,000 litres. Three LPG tanks (maximum size 4.3 kL) would also be located on the site (see **Figure 4-2a**). All storage tanks will be above ground and provided with bunding in accordance with statutory requirements.

4.10.8 Chemical Storage

Dangerous goods on the site would be limited to the transport of containers through the Intermodal Terminal area. Consideration of dangerous goods storage within the warehousing areas on site would be up to individual warehouse operators or lessees, who would be responsible for fulfilling all legislative requirements associated with the storage of dangerous goods.

4.11 Site Operation

The site would operate 24hours a day, seven days a week.

4.11.1 Workforce

It is estimated that the operational phase of the intermodal terminal and warehouse sites would generate employment for about 510 people (**Table 4-6**). Peak employment would be during the weekday shifts where it is estimated that about 290 people would be employed. Employment would be required in the following areas:

- Logistics Centre Warehousing for packing and unpacking of cargo and for general management and administration;
- Loading/unloading to operate and supervise loading and unloading of trains;
- General Staff, ie Site Manager, Inventory Control, Warehouse Manager;
- Rail operations for operation and loading/unloading of containers to trains;

- Administration Staff for warehouses, Intermodal Terminal and empty container facilities;
- Empty Depots for the movement of containers;
- AQIS and Customs staff to monitor movement of containers from port to rail and rail to port.

4.11.2 Emergency Response and Incident Management

An Emergency Response and Incident Management Plan would be prepared prior to the commencement of operations of the ILC. This plan would provide detailed methods for the identification of emergencies and specific measures to be undertaken for managing and mitigating any impacts resulting from emergencies or accidents at the ILC. These are described in more detail in Chapter 20 – Hazards and Risk.

4.12 Construction

4.12.1 Overview of Staging and Program

The construction of the Enfield ILC is expected to begin by mid 2006, subject to the determination and approval of the EIS and receipt of all other necessary approvals required for the awarding a contract. The overall design and construction of the ILC would take approximately 27 months, with the proposed intermodal and empty container sites possibly able to operate from mid to late 2007, and the full operation including warehousing operating from mid to late 2008. The construction of the ILC would involve five key stages as described below in **Table 4-7**. An indicative construction program is provided in **Figure 4-11**. The successful construction contractor would develop the detailed construction program, but it should be noted that some stages could run in parallel. **Table 4-7** describes the key stages associated with the construction of the proposed Intermodal Logistics Centre.

4.12.2 Methods of Construction and Key Construction Stages

An indicative construction methodology outlining the key activities in each stage is outlined below.

Stage 1 – Site Preparation

The first stage of construction would involve preparation of the internal haul roads and remediation of contaminated land. **Figure 4-12** shows existing stockpile locations and indicative locations of sealed haul roads. Suitable materials available on site in the existing stockpiles would be utilised as base for the haul roads. Haul roads would be sealed to assist in reducing dust emissions during construction.

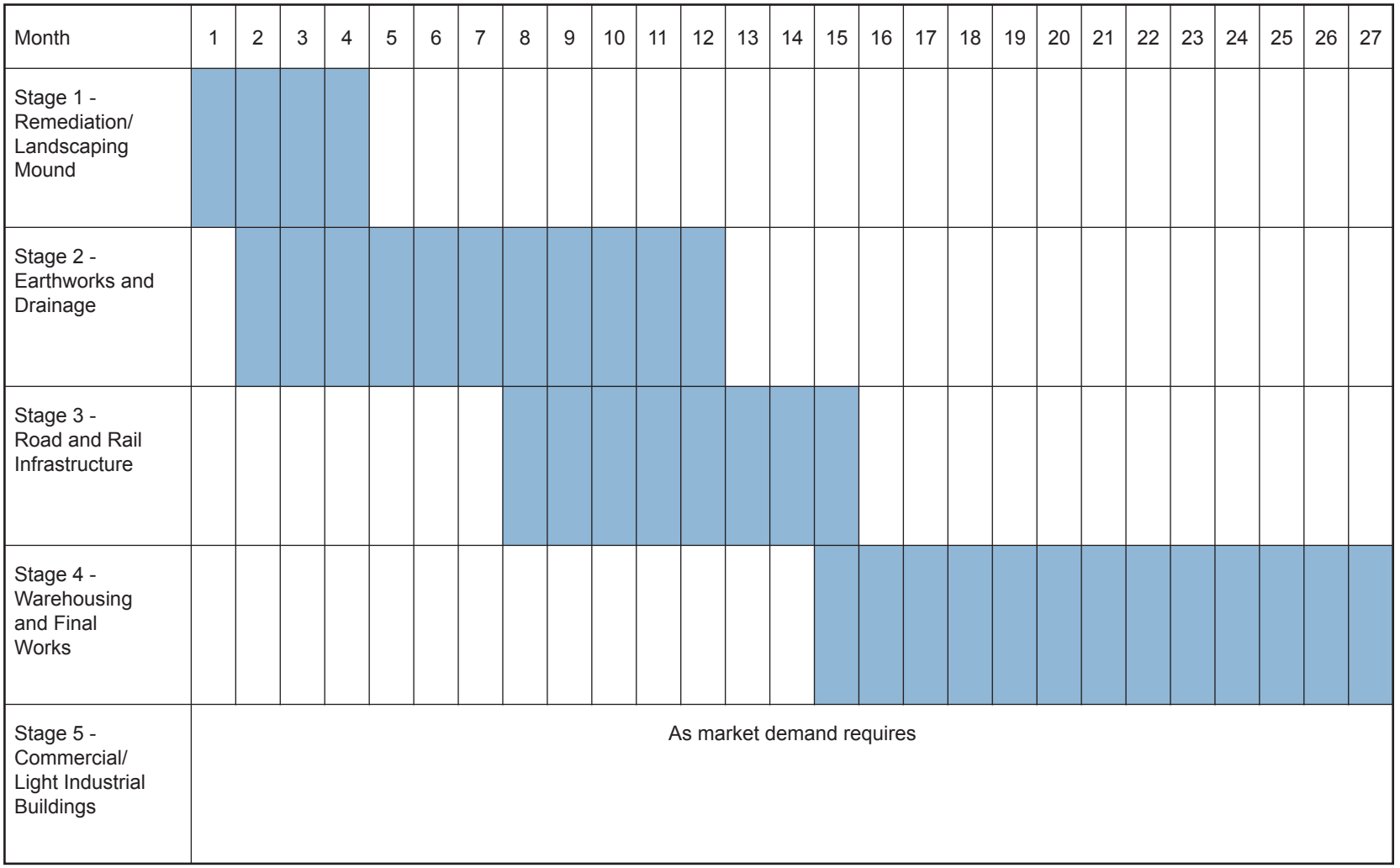
The remediation of soil containing Total Petroleum Hydrocarbons (TPH) and asbestos from the Wagon repair Shed will comprise the removal of soil to a DEC licensed facility, due to the levels of asbestos on the site. The remediation of soil from the DELEC facility will involve landfarming to allow removal of TPHs. Some small areas on the DELEC facility with soil containing asbestos and heavy metals will aslo be sent to a DEC licensed facility. All remediation works will be carried out pursuant to SEPP 55. This is discussed in Chapter 9 and Appendix C – Site Contamination Issues.

Table 4-6: Summary of Total On-site Staff Requirements – Intermodal, Empty Container and Warehousing Facilities

Shift 1	**Logistics Centre Warehousing**	**Loading / Unloading from Trains, Trucks and Warehouse**	**General Staff**	**Rail Operations**	**Administration Staff (normal office hours only)**	**Empty Depots**	**Intermodal Facility Road Operations**	**AQIS / Customs**	**Total**
Weekdays	75	10	8	12	142	19	24	4	**294**
Saturdays	44	6	8	12	0	19	20	4	**113**
Sundays	23	4	8	12	0	19	16	4	**86**
Shift 2	**Logistics Centre Warehousing**	**Loading / Unloading from Trains, Trucks and Warehouse**	**General Staff**	**Rail Operations**	**Administration Staff (normal office hours only)**	**Empty Depots**	**Intermodal Facility Road Operations**	**AQIS / Customs**	**Total**
Weekdays	35	10	8	12	0	9	16	0	**90**
Saturdays	20	6	8	12	0	9	12	0	**67**
	10	4	8	12	0	9	8	0	**514**

Table 4- 7: Indicative Key Construction Phases

Phase	Description of activities
Stage 1 – Remediation/Landscaping Mound	■ Removal of contaminated material/land-farming on-site; ■ Removal of unsuitable material from site; ■ Construction of all internal sealed haul roads; ■ Construction of the stormwater detention basins; ■ Construction of landscaping mounds including associated earthworks; ■ Construction of off-site noise barrier; and ■ Preparation of light industrial/commercial area along Cosgrove Road.
Stage 2 – Detailed earthworks and drainage	■ Site grading including cut and fill works to level site; ■ Construction of retaining walls/embankments; ■ Site stabilisation works; ■ Construction of stormwater trunk drainage system; ■ Development of Community and Ecological Area (details to be determined); and ■ Relocation of services.
Stage 3 – Road and rail infrastructure, intermodal and empty container storage areas	■ Construction of off-site access points (Overbridge); ■ Construction of reinforced earth wall for road embankment; ■ Northern Bridge to empties area; ■ Installation of services; ■ Relocation of existing rail access to wheel lathe; ■ Construction of new railway line and sidings; and ■ Pave intermodal area, container storage areas and internal roads.
Stage 4 – Warehousing and final works	■ Construct warehouses, administration and maintenance buildings; ■ Pavement areas; and ■ Final landscaping.
Stage 5 – Commercial / Light Industrial buildings	■ Construct buildings along Cosgrove Road for commercial / light industrial and ancillary retail / refreshment uses



Intermodal Logistics Centre at Enfield

Figure 4-11
Indicative Construction Program

A4; Source: Topographic data supplied by SPC, Air photos BY SPC;Projection: MGA 56; File Name:EN01709_Ad_004.mxd

Intermodal Logistics Centre at Enfield

N

0 100 200

Metres

Figure 4-12
Sealed Haul Roads and Mounds

Other materials unsuitable for use on site during construction would be sorted from stockpiles using excavators. This material would then be transported off site for disposal. The majority of unsuitable material is located in stockpile 5, approximately 37,000m^3 of the 132,000m^3 in this stockpile. Stockpile 5 is shown in **Figure 4-12**. The remaining suitable material in stockpile 5 would be used as fill or for the proposed landscaping acoustic mound, which would be constructed along the eastern perimeter of the Intermodal Logistics Centre site along Cosgrove Road as shown in **Figure 4-2a**. The mound would have a cross section above the proposed finished level for the site of about 17m wide by 2 to 5m high.

A portion of stockpile 3 would be utilised for filling the area proposed for light industrial / commercial use along Cosgrove Road. The acoustic barriers would be constructed as soon as possible during this stage, although the south eastern noise walls would be constructed at the same time as the landscaping mound in this area.

A landscaping acoustic mound proposed for the north western extremity of the site would have a cross section above the proposed finished level for the site of 10m wide by 2.5m high. The acoustic barrier on the north western side of the project, on RailCorp land, will be constructed as early as possible in this stage of construction.

Stormwater detention basins would also be constructed during Stage 1 and would require excavation and introduction of a clay layer or plastic lining material. The detention basins would capture runoff and sediment during both construction and operational phases of the Proposal. Suitable erosion control measures will be employed to ensure control of runoff water to Coxs Creek during the construction of the detention basins.

A number of railway structures exist on the site. These items would be relocated off-site, recorded and demolished or retained and reused on site.

Stage 1 works are anticipated to take about 14 weeks to complete.

Stage 2 – Earthworks and Drainage

Earthworks are required primarily to level, manipulate or remove existing stockpiles to create appropriate site levels. Existing stockpiles are numbered and their locations are shown in **Figure 4.12**.

Design levels for the site have been determined to maximise the reuse of stockpiled material. The grading of the site is dictated by the constraints imposed by the rail sidings and operating requirements for container handling equipment. Grading of the Intermodal Logistics Centre would be relatively uniform (0.5% - 0.9% longitudinal grade) running north to south. The materials in the stockpiles along the western site boundary (stockpiles 1, 2 and 3) are predominantly suitable for engineered fill. However, the largest stockpile (5) which is located north of the Coxs Creek trunk drain contains about 132,000m^3 of mixed ash, ballast, shale and refuse materials. The volume of each stockpile and the future use of material from each stockpile are summarised in **Table 4-8**.

Earthworks would be undertaken working through the site from north to south. This would be the most efficient and effective way of preparing a relatively flat site, suitable for the introduction of pavement material. A cut to fill volume of about 360,000m^3 is required, which would involve the reuse of stockpiles 1, 2 and 3 to minimise removal of fill and to provide a relatively flat site that drains primarily south into the stormwater detention basins.

Table 4-8: Stockpile volumes and likely future use

Stockpile	Volume (m^3)	Proposed Use
1	37,701	To be used primarily for on-site fill
2	92,342	To be used primarily for on-site fill
3	33,762	To be used primarily for on-site fill
4	94,603	To be retained on-site and vegetated as part of the Community and Ecological Area
5	132,457	Unsuitable material (37,000 m^3) to be sorted and removed from site to an appropriate landfill facility and material suitable for re-use would contribute to proposed landscaping mound areas.

A retaining wall or battered embankment would be constructed to allow for the relocation of the existing rail access to the Wheel Lathe area.

Stage 2 works would take about 44 weeks to complete.

Stage 3 – Road and Rail Infrastructure, Intermodal and Empty Container Storage Areas

Road works to be undertaken during this stage include construction of the site access points, including:

- Wentworth Street Access – construction of an overbridge across the Marshalling Yards to connect the internal roads to Wentworth Street. The preferred bridge structure features precast "Super Tee" girders, which can be lifted into position with minimum disturbance to rail operations; and
- Cosgrove Road Access – would be located in the vicinity of the existing access point on Cosgrove Road, between Pilcher and Hope Streets, enabling access to and from the Hume Highway.

The main railway line and two rail sidings would be constructed along the western boundary of the site. The rail sidings would be constructed in concrete chases cast in-situ with the main railway line on sleepers and ballast. Construction of the railway line and sidings would require the use of track laying machinery and a concrete pump.

Pavement works undertaken, as part of this stage of construction would cover the area proposed for the Intermodal Terminal, Warehouse and Empty Container Storage Areas and the internal roads. The Intermodal Terminal would be paved with flexible pavement materials and would have an asphalt concrete seal capable of withstanding a loading of 50Kpa. Pavement for the internal roads would be flexible with an asphaltic concrete seal designed to the specified equivalent standard axles (ESA). Pavement works for the Intermodal Terminal and roads would be undertaken simultaneously. Materials for pavement works would be brought to the site.

Stage 3 construction activities are anticipated to take about 32 weeks to complete.

Stage 4 – Warehousing and Final Works

Warehouses would be constructed utilising cranes and piling equipment. In addition, a number of administration and maintenance buildings would be constructed. Construction of the warehouses would take approximately 52 weeks to complete. This stage of the works may overlap with Stage 3 works.

Pavement works associated with the warehouses and administration buildings would be undertaken utilising flexible pavement with asphaltic concrete seal capable of withstanding loading/unloading operations and designed to the specified Equivalent Standard Axles (ESA).

Final landscaping works would be undertaken as part of the overall site finishing works.

Stage 5 – Light Industrial / Commercial along Cosgrove Road

Developments along Cosgrove Road would be undertaken as market demand requires. It is possible that some works may be undertaken during Stage 4, depending on requirements. Separate approvals for construction of the buildings and associated works would be required prior to their construction.

4.12.3 Major Plant and Equipment

The type of plant and equipment used for construction would depend on the activities and actual construction methods adopted by the contractor. For modelling purposes, assumptions were made of the major plant and equipment likely to be used during the key construction phases. These are indicated in **Table 4-9.**

4.12.4 Origin and Destination of Materials

The main origin and destination of material varies for material coming on to the site (construction material) and material being taken off-site (contaminated and other spoil material) is yet to be determined, but materials would be predominantly delivered via main arterials and motorways. For assessment purposes, it was assumed that the key material would come from / go to the following locations:

- Concrete. Various locations including Lakemba (south west of the site) with access via Roberts Road or Punchbowl Road; Greenacre west of site or Strathfield (north east of the site) with access via Hume Highway; or Smithfield (north west of site) with access via M4 Motorway;
- Asphalt was sourced from the general area of Seven Hills and Greenacre;
- Pipes were sourced from various locations including Camellia, Emu Plains and Rooty Hill.

Table 4-9: Major plant and equipment

Phase	Activity	Major items of plant and equipment
Stage 1	Sealed haul roads	Grader, roller (drum), water cart, trucks, dozer
	Stormwater detention ponds	Dozer, compactor (sheep's foot), excavator, water cart and trucks
	Removal / land-farming contaminated material	Excavators (x2), water carts (x2), dozer and trucks
	Removal of unsuitable material from stockpiles, landscaping mounds / acoustic barriers, prepare light industrial / commercial area	Dozers (x3), excavators (x3), water carts (x3), compactors (sheep's foot) (x2), articulated truck (x2) (on site) and trucks (off site)
Stage 2	Earthworks	Dozer (x3), excavators (x2), water carts (x4), compactors (sheep's foot) (x3), articulated trucks (x2) and scrapers (x3)
	Stormwater trunk drainage system	Excavators (x2), water cart, rollers (drum) (x2), backhoe and crane
	Relocation of services	Excavator, backhoe and trucks
	Retaining walls / embankments	Excavator, roller, dozer and trucks
Stage 3	Off-site access works	Roadworks - Graders (x2), rollers (drum) (x2), water carts (x2), excavator, backhoe, trucks and asphalting machines – Overbridge - Cranes (x2), piling equipment (cast in-situ), excavator, backhoe, trucks and concrete pumps.
	Reinforced earth wall for road embankment	Dozer, excavator, compactor (sheep's foot), roller (drum), water cart, trucks, light crane and Franna crane
	Northern bridge	Dozer, piling equipment (cast in-situ), excavator, crane, backhoe, trucks and concrete pumps
	Install services and relocate rail line	Excavator, backhoe, trucks and rail machinery
	Railway line and sidings	Excavator, dozer, grader, trucks, concrete pump and rail machinery
	Container pavement works	Graders (x3), rollers (drum) (x3), water carts (x3), backhoe, trucks, concrete kerb machines and asphalting machines
	Internal road pavement works	Graders (x2), rollers (drum) (x2), water carts (x2), backhoe, trucks, concrete kerb machines and asphalting machines
Stage 4	Warehousing and administration areas	Crane (x2), piling equipment (cast in-situ), grader, excavator, water cart, trucks and concrete pumps
	Warehouse pavement works	Grader, roller (drum), water cart, backhoe, trucks, concrete kerb machines and asphalting machines
	Final landscaping	Backhoes, bobcats and minor smaller equipment
Stage 5	Commercial / Light Industrial buildings	Construction of buildings only would be subject to separate applications.

Spoil (contaminated and other) would be sent to Glenmore Park (west along the M4 Motorway). The anticipated routes would be along Roberts Road to Hume Highway, continuing on to the Cumberland Highway or north past the Hume Highway towards the Great Western Highway and the north on to Cumberland Highway. Heavy construction traffic would be restricted to arterial routes and would not be allowed to traverse residential areas.

In accordance with the resource management principles of the *Waste Avoidance and Resource Recovery Act, 2001*, materials and products with recycled content would be considered for use, wherever they are cost and performance competitive.

4.12.5 Construction Works

Hours and Workforce

The normal construction working hours would be between 7am and 6pm Monday to Saturday and no work on Sundays or public holidays. This is generally considered as "daytime" working hours and is in line with working hours of other construction projects around Sydney.

Any work outside normal hours would be subject to separate approval of the relevant consent authority. Local residents would be informed of the timing and duration prior to any works.

Working hours outside of these normal hours may be required in circumstances such as:

- Relocation of utility services for off-site roadworks during hours of reduced traffic;
- Preparation of road diversions during the off peak hours and off site road works in off peak hours;
- Time critical activities such as joint cutting in concrete hardstand areas;
- Delivery of bulky items or wide loads during off peak hours to minimise disruption;
- Works not audible at residences.

The adopted construction methods would aim to minimise work required outside the normal working hours.

The construction workforce profile has been derived from similar warehousing, bond store and quarantine operations. This was estimated to average 150 to 170 workers for 12 months continuous construction, with a peak of 240 workers for 2 months.

Construction Traffic

Construction traffic is expected to occur over 27 months, during which time construction would vary depending on the construction stage. As a worst case, it was assumed that all staff would be on site at any one time. Due to the hours of work and relative isolation of the site, car occupancy of 1.5 was assumed. Based on these assumptions, peak generation traffic of 150-170 vehicles per day to and from the site is expected for construction staff.

Construction Site Traffic Management

Direct impacts on existing traffic would be restricted to offsite road works and work adjacent to trafficked lanes. These activities may require lane closures to allow the work to be carried out safely and effectively.

Construction activities lasting more than a few days would be physically separated from traffic by portable rigid safety barriers. Shorter duration localised works would normally be protected by lighter safety cones.

Approach signage and appropriate barrier tapers would be used to warn motorists of lane closures, changed traffic conditions and temporary speed limits. Planning and notification will be undertaken in accordance with local government and Roads and Traffic Authority (RTA) requirements. Activities that impact on the substantial proportion of road width, such as roadmarking at intersections, would normally be undertaken at night when traffic volumes are low. The extent of impact would depend on the location and type of external roadworks.

Construction Site Work Site Management

Work site compounds would be located at appropriate locations on the construction site. Typically, the site compounds would comprise:

- Offices and meeting rooms for site personnel;
- Amenity and first aid facilities;
- Storage for light equipment and tools;
- Material storage areas;
- Communication facilities; and
- Parking areas.

Fencing with security points to control access would enclose the site compounds. Electricity, water and other utility services supplied to the compound would be obtained from the existing utilities adjacent to the compound. Appropriate security lighting would also be provided around the compounds.