

Chapter 6 Project development and alternatives



Contents

	Page number
6. Project development and alternatives	6-1
6.1 Overview of Project development	6-2
6.2 The 'no build' alternative	6-3
6.3 Why is an expansion/upgrade of Port Botany not a feasible alternative?	6-4
6.4 Why has the search for a feasible IMT site focused on western and south-western Sydney?	6-4
6.5 Alternative sites for an IMT	6-5
6.5.1 Do other planned or existing IMT sites meet the Project objectives?	6-5
6.6 Selection of the Project site as preferred	6-16
6.7 Project site layout and functionality options	6-16
6.7.1 Identification and selection process	6-16
6.7.2 Initial technical options	6-18
6.7.3 Shortlisted technical options	6-24
6.7.4 Comparative assessment of shortlisted technical options	6-30
6.7.5 Selection of the preferred technical options: Options A1/A2	6-35
6.8 Optimising the preferred option	6-35
6.8.1 Concept masterplanning and design development	6-35
6.8.2 Further review of site layouts	6-36
6.8.3 Further review of Project development phasing	6-37

List of tables

		Page number
Table 6.1	Relevant Commonwealth EIS Guidelines and NSW SEARs	6-1
Table 6.2	Strategic assessment of existing and planned IMT sites relative to Commonwealth Project objectives	6-11
Table 6.3	Key initial technical options considered	6-20
Table 6.4	Comparative assessment of shortlisted technical options against the environmental, technical and economic criteria	6-30

List of figures

		Page number
Figure 6.1	Overview of Project options identification and assessment process	6-2
Figure 6.2	Capacity of planned and existing IMT network	6-6
Figure 6.3	Technical options identification and selection	6-18
Figure 6.4	Option A1 and A2 – indicative only	6-25
Figure 6.5	Option B1 – indicative only	6-27
Figure 6.6	Option C1 – indicative only	6-29

6. Project development and alternatives

Chapter 6 outlines the process through which the Moorebank Intermodal Terminal (IMT) Project (the Project) has been developed to date and the feasible alternatives to carrying out the Project. These include not proceeding with the Project, alternative sites, assessment of alternative site layout and functionality options (at the Project site) and selection of a preferred concept layout.

This chapter focuses on the relevant requirements detailed in the Commonwealth Department of the Environment (DoE) Guidelines and the Secretary for the NSW Department of Planning & Environment (NSW DP&E)'s Environmental Assessment Requirements (NSW SEARs) for this EIS, which are detailed in Table 6.1 below.

Table 6.1 Relevant Commonwealth EIS Guidelines and NSW SEARs

Requirement	Where addressed
Commonwealth EIS Guidelines under the Commonwealth Environment Protection Biodiversity Conservation Act 1999 (EPBC Act)	
<ul style="list-style-type: none"> • Consequences of not proceeding with the action. 	Section 6.2 (this chapter).
<ul style="list-style-type: none"> • Any feasible alternatives to the action to the extent reasonably practicable should be described in detail, including: <ul style="list-style-type: none"> > if relevant, the alternative of taking no action; 	Sections 6.2 to 6.7 (this chapter).
<ul style="list-style-type: none"> > the alternative of locating the facility elsewhere in the Sydney geographical area; 	Section 6.5 and section 6.6 (this chapter).
<ul style="list-style-type: none"> > the alternative of a lower impact development including layout options that avoid direct impacts and maintain connectivity within the landscape for matters protected under the EPBC Act; 	As discussed with DoE during consultations in January 2013, lower impact options in the form of import/export (IMEX) only and interstate only layout options were considered early in the options assessment process (refer to section 6.7, this chapter), but were dismissed as not feasible as they would not meet the identified Commonwealth objectives for the Project. Therefore, no detailed environmental assessment of these options was undertaken.
<ul style="list-style-type: none"> > a comparative description of the impacts of each alternative on the matters protected by controlling provisions of Part 3 of the EPBC Act for the action; 	The criteria developed for the multi-criteria analysis of layout options (refer to section 6.7, this chapter) broadly considered these matters. However, as discussed with DoE during consultations in January 2013, the alternatives assessment was undertaken prior to release of the EIS Guidelines; therefore, retrospective and more detailed assessment relative to these matters is not considered reasonably practicable.
<ul style="list-style-type: none"> > sufficient detail to make clear why any alternative is preferred to another; and 	Sections 6.2 and 6.7 (this chapter).
<ul style="list-style-type: none"> > short, medium and long-term advantages and disadvantages of the options should be discussed. 	Section 6.7.4 (this chapter).

Requirement	Where addressed
NSW SEARs under the NSW <i>Environmental Planning and Assessment Act 1979 (EP&A Act)</i>	
<ul style="list-style-type: none"> An analysis of feasible alternatives to carrying out the development, having regard to its objectives, including the consequences of not carrying out the development. 	Sections 6.2 to 6.7 (this chapter).

6.1 Overview of Project development

The Project objectives are addressed in Chapter 1 – *Introduction*, and the need for the Project is addressed in Chapter 3 – *Strategic context and need for the Project*. Subsequent steps in the process, including the identification and assessment of alternatives, are described in the following sections of this chapter.

Figure 6.1 provides an overview of the relevant steps in the Project development process and where in the chapter they are addressed

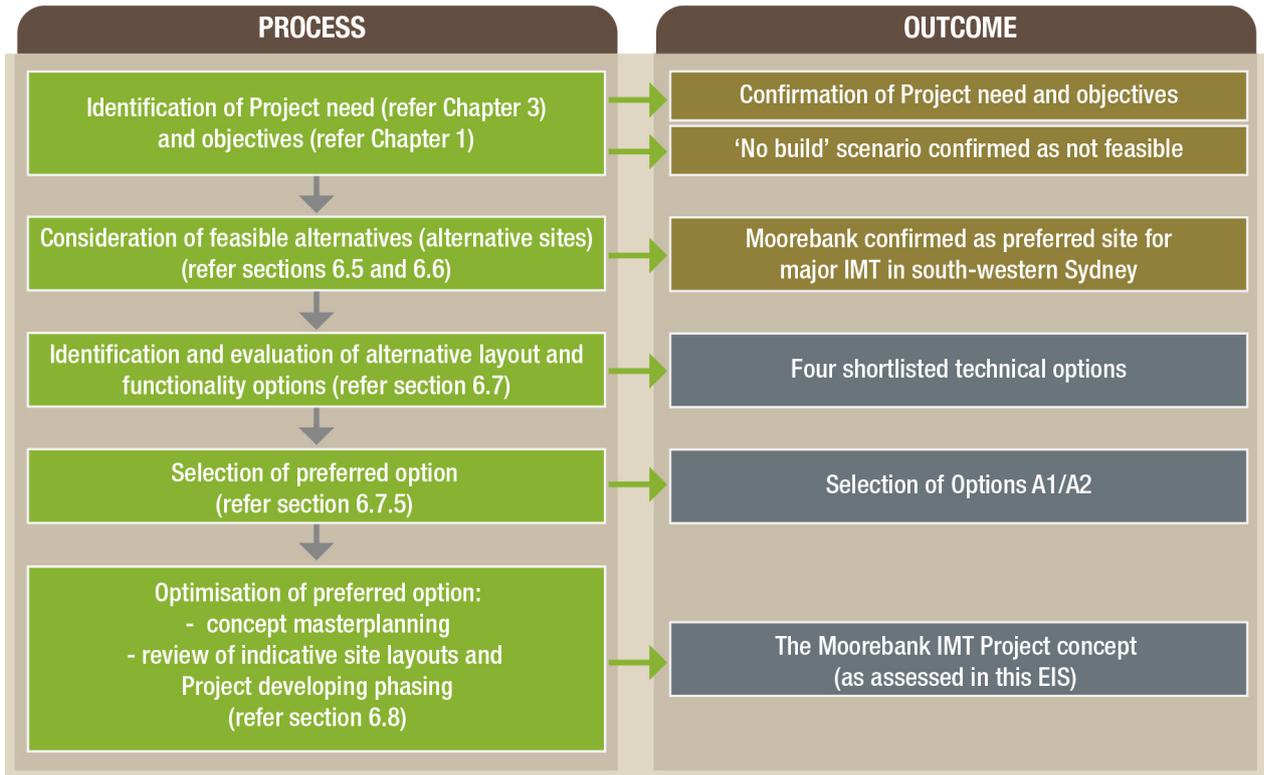


Figure 6.1 Overview of Project options identification and assessment process

6.2 The 'no build' alternative

The need to address Sydney's insufficient intermodal rail freight capacity has been under consideration for some years, and is recognised as a major barrier to the future development of Sydney and improvements in national productivity. As explained in Chapter 3 – *Strategic context and the need for the Project*, various government strategies and studies have identified development of a major IMT facility in south-western Sydney (and specifically Moorebank) as a priority.

The 'no build' alternative (i.e. not developing an IMT in south-western Sydney) is not considered feasible based on extensive studies conducted into rail and road freight capacity and the operations of Port Botany. A business case prepared for the Project has identified that not proceeding with the Project would have significant economic and social consequences for NSW and the Sydney region, including:

- loss of \$1 billion of benefits to the NSW economy and the national economies (largely associated with the bottleneck in container freight movements that would result if the Project did not proceed, which would add substantial costs to the supply chain and wider economic impacts associated with road congestion);
- 1,247 jobs (typical workforce) not realised during the construction of the IMEX terminal and warehousing, and 275 jobs (typical workforce) not realised during the construction for the interstate terminal;
- increased congestion of the Sydney arterial road network particularly in the Port Botany/airport precinct and the M5 and M4 Motorway corridors;
- increased environmental and social impacts on the local community (associated with road transport relative to rail) as well as increased accidents on the arterial road network; and
- loss of significant productivity improvements in the road and rail transport sectors which would have a knock-on effect to other economic sectors.

These consequences would mean that the Commonwealth Project objectives listed in section 1.3 of Chapter 1 – *Introduction* would not be achieved, and the identified benefits of the Project (refer to section 3.2 of Chapter 3 – *Strategic context and need for the Project*) would also not be realised.

The majority of the negative consequences of not proceeding with the Project would be felt at a national, state and/or regional level.

At a more local level, if the Project did not proceed, the Project site would most likely be left vacant until some alternative use is developed, following completion of the Department of Defence (Defence)'s Moorebank Unit Relocation Project (the MUR Project), which involves relocation of the existing School of Military Engineering (SME) to Holsworthy (due for completion in 2015). Relative to the Project site's development as an intermodal terminal, this vacant use would potentially result in a slightly improved local amenity and conservation values, and potentially reduced traffic volumes at some intersections in the immediate vicinity of the site. Not proceeding with the Project would, however, result in the loss of local employment and business opportunities associated with the construction and operational phases of the Project.

6.3 Why is an expansion/upgrade of Port Botany not a feasible alternative?

As also explained in section 3.1.1, an expansion of Port Botany is already underway with the commencement of a third new operator (Hutchison Port Holdings) in the market and continued growth in container volumes. The key reasons why a further expansion/upgrade of Port Botany is not a feasible alternative to the Moorebank IMT Project are as follows:

- There are significant constraints at Port Botany that limit the ability to further expand the port area to accommodate an IMT or other related facilities like warehousing. These constraints include road congestion around Port Botany and a lack of available land.
- The removal of the Port Botany planning cap (of 3.2 million twenty-foot equivalent units (TEU) a year) in 2012 means increased throughput capacity can now occur at Port Botany. As discussed in section 3.1.1 of Chapter 3 – *Strategic context and need for the Project*, throughput is projected to increase to a total of approximately 7 million TEU by 2031.
- Expanding Port Botany further to provide for a large IMT would cause significant road congestion around Port Botany and along key transport routes like the M5 Motorway.
- Expanding Port Botany to provide IMT facilities would not meet the identified need for IMT services in west and south-western Sydney (as discussed in Chapter 3 – *Strategic context and need for the Project* and section 6.4 of this chapter).

6.4 Why has the search for a feasible IMT site focused on western and south-western Sydney?

The key reasons why the search of a feasible IMT site has focused on the areas of western and south-western Sydney are as follows:

- Major freight related industries (i.e. the generators and consumers of cargo) are primarily located in employment and industrial centres in this region. Almost two-thirds of Port container freight is transported to or from markets in western Sydney where industrial areas and a number of distribution centres are concentrated.
- This region offers proximity to major rail and road transport corridors, particularly the M4, M5 and M7 Motorways and dedicated rail freight lines such as the Southern Sydney Freight Line (SSFL).
- The region is a sufficient distance from Port Botany to make rail economically viable (relative to road for movements to/from the Port Botany).
- Population and employment growth in the region are expected to result in increased freight activity.

IMTs serve a local catchment that is proportionate to the scale of the facility, and a large capacity terminal is needed for the west and south-western Sydney region. For this reason, the major IMT currently under construction at Enfield (which will serve the central west) would not replace the need for a major IMT servicing further west and south-western Sydney. Similarly, the existing (Minto) and planned (Ingleburn/Leumeah) IMTs in south-western Sydney would only serve immediately local catchments within south-western Sydney due to their limited size, and do not meet the need for a major south-western Sydney IMT. The potential IMT development at Eastern Creek (which would serve the west and north-west) is only in the early planning phases and is unlikely to be developed quickly enough to meet the identified demand. These other IMT sites are discussed further in section 6.5. Further detail on the likely freight catchment area and freight split for the Moorebank IMT Project is detailed in section 3.4 in Chapter 3 – *Strategic context and need for the Project*.

The above reasons are generally consistent with the recommended planning and operating principles for IMTs as detailed in the following documents:

- *Railing Port Botany's Containers* (Freight Infrastructure Advisory Board 2005);
- *NSW Freight and Ports Strategy 2013* (Transport for NSW (TfNSW) 2013);
- *NSW Long Term Transport Master Plan* (TfNSW 2012);
- *Metropolitan Plan for Sydney 2036* (NSW DP&E 2010); and
- *Draft Sub Regional Strategy – South West Subregion* (NSW DP&E).

6.5 Alternative sites for an IMT

6.5.1 Do other planned or existing IMT sites meet the Project objectives?

As discussed in Chapter 3 – *Strategic context and need for the Project*, the existing IMTs in Sydney are too small and too constrained to move a major proportion of the container demand throughput forecast for Port Botany. They are generally constrained in terms of access to available developable land on site, and access to a high quality road and rail network.

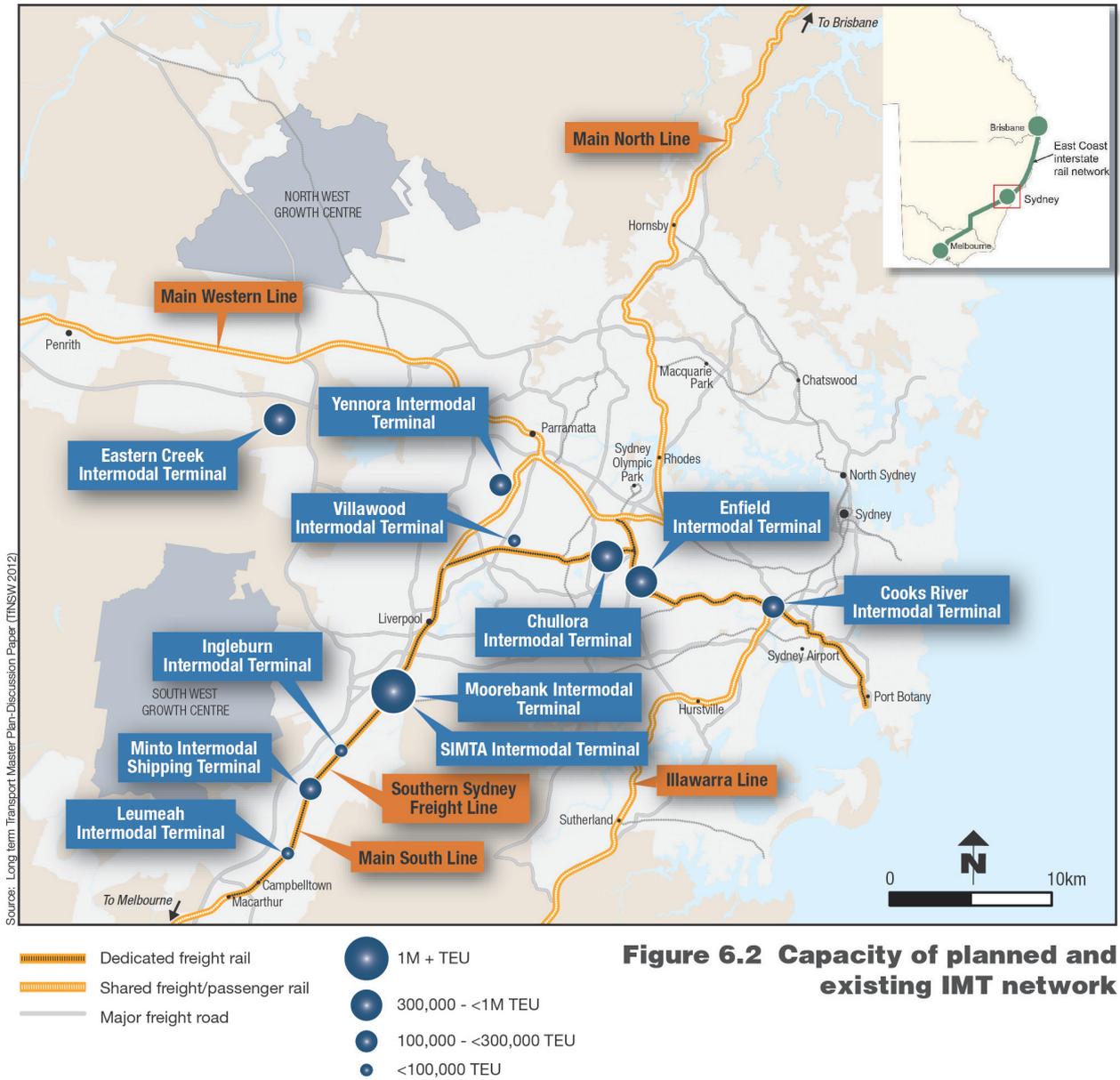
At the time alternative sites for an IMT were under consideration by the Commonwealth (i.e. prior to selection of Moorebank as the preferred site and prior to the establishment of the Moorebank Intermodal Company (MIC), the Commonwealth Project objectives were as listed below:

1. Boost national productivity over the long term through improved freight network capacity and rail utilisation.
2. Create a flexible and commercially viable facility and enable open access for rail operators and other terminal users.
3. Minimise impact on Defence's operational capability during the relocation of Defence facilities from the Moorebank site.
4. Attract employment and investment to west and south-western Sydney.
5. Achieve sound environmental and social outcomes that are considerate of community views.

- Optimise value for money for the Commonwealth having regard to the other stated Project objectives.

Figure 6.2 shows the existing and/or potential capacity of the various alternative IMT sites. As discussed further below, these alternative IMT sites would not meet all of these identified Commonwealth objectives for the Project.

Further assessment of these IMTs is included below and in Table 6.2, which includes a strategic assessment of the IMT sites relative to the Commonwealth Project objectives.



Enfield (existing IMT with expansion underway)

Other than the Moorebank IMT, a relatively large IMT is already under construction at Enfield in central western Sydney adjacent to the existing marshalling yards. Hutchison Port Holdings is due to commence operations at this facility by late 2014. The Enfield ILC will have a maximum throughput of 300,000 TEU a year. Original plans for the Enfield expansion comprised a substantially bigger facility, including development on adjacent land next to the existing marshalling yards. However, a NSW Government review in 2003 concluded the plans were too big for the site and Sydney Ports subsequently revised its plans to propose a smaller IMT (as is currently being built) (Australian Government, House of Representatives Standing Committee on Transport and Regional Services (HRSCRS) 2007). The Enfield site only allows for a maximum train length of 1,000 metres (m) which means that 1,500 m or 1,800 m interstate trains would need to be broken up somewhere else on the network before they could be handled at Enfield.

As the future capacity of the Enfield IMT is small compared to the expected growth in containers through Port Botany (refer Chapter 3 – *Strategic context and the need for the Project*), the need for another major IMT in western Sydney remains. Furthermore, due to its size and location, Enfield is expected to primarily serve a localised market and would not make a major contribution to freight movements in south-western Sydney.

For these reasons, a further expansion at Enfield does not meet the identified Commonwealth Project objectives (refer Table 6.2) and is not considered a feasible alternative to the Project site.

Chullora (existing IMT)

Chullora (located in central western Sydney near the Enfield site) is a key intermodal freight terminal in Sydney for interstate and regional freight. It is the only dedicated interstate rail freight terminal in Sydney. It is owned by Asciano and operated by Pacific National and has an estimated throughput of 200,000 TEU a year (NSW Government 2013). The draft Sydney–Melbourne Corridor Strategy suggests that redevelopment or expansion of Chullora will be necessary if the desired increase in rail's share of freight movements is to be achieved. Currently a single rail line connects Chullora to Port Botany. Improvements to the freight rail line between Port Botany and the Enfield and Chullora IMTs are included in AusLink planned works. The *NSW Freight and Ports Strategy* (NSW Government 2013) notes that Chullora is currently constrained by a lack of local road access for heavy vehicles with higher mass limits. The Australian and NSW Governments have agreed to fund pavement upgrades on two local roads to alleviate this constraint.

While media announcements by operators Asciano in July 2014 indicated that the company has plans for the expansion of Chullora (refer section 3.1.2), the capacity to significantly expand the site is constrained, and the site would not meet the identified Commonwealth Project objectives (refer Table 6.2). It is therefore not considered a feasible alternative to the Project site.

Yennora (existing IMT)

The Yennora IMT facilitates both IMEX and interstate freight movements, with an estimated throughput of 115,000 TEU a year. It is a Stockland owned and Qube operated facility, located 23 kilometres (km) west of the Sydney CBD. Like Chullora, this facility faces congestion problems and conflict with passenger train operations. That is, trains to and from Port Botany to Yennora must interact with passenger services on the shared network (NSW Government 2013). While some redevelopment work is required at Chullora, the North–South Rail Study found that facilities such as Yennora do not have sufficient expansion potential to accommodate longer trains and increased freight demands (Australian Government HRSCRS 2007). The site would not satisfy the identified demand for IMEX and interstate container freight handling. Therefore the site does not meet the identified Commonwealth Project objectives (refer Table 6.2) and hence is not considered a feasible alternative to the Project site.

Minto (existing IMT, planned for expansion)

The Macarthur Intermodal Shipping Terminal (MIST) at Minto is operated by Qube and located 35 km south-west of the Sydney CBD, adjacent to the main Sydney to Melbourne rail line. It currently has a rail throughput (IMEX) of approximately 100,000 TEU a year. A dedicated rail shuttle operates from the Minto terminal to Port Botany; however, the *NSW Freight and Ports Strategy* (NSW Government 2013) notes that trains to and from Port Botany to Minto must interact with passenger services at some points on the network.

While the Minto terminal does have shortcomings, such as restricted rail sidings, it differs from the more urban IMTs in its expansion potential. The MIST and Austrak have plans to extend the IMT onto adjacent land, which could result in a capacity increase of around 150,000 TEU a year. Even with the proposed expansion, the site is not sufficient to meet the identified demand for IMEX services in south-western Sydney (refer Chapter 3 – *Strategic context and the need for the Project*), nor is there sufficient space for an interstate IMT. Therefore the site does not meet the identified Commonwealth Project objectives (refer Table 6.2) and hence is not considered a feasible alternative to the Project site.

Villawood (existing IMT)

The IMT site at Villawood in central western Sydney is a small facility and site, with an estimated capacity of 15,000–20,000 TEU a year (IMEX only). The site is small in size and there is insufficient room for IMEX expansion or an interstate IMT to meet the identified demand. It is also located outside of south-western Sydney. Therefore the site does not meet the identified Commonwealth Project objectives (refer Table 6.2) and hence is not considered a feasible alternative to the Project site.

Ingleburn/Leumeah (possible new IMTs)

Sites in Ingleburn and Leumeah in south-western Sydney have been considered as possible IMT sites. As indicated in Table 6.2, however, the Ingleburn site is constrained by a lack of on and off ramps to the M5 Motorway, while the Leumeah site would potentially require a crossing of the Main South Railway Line to gain access to the SSFL. Both sites are also relatively small in size, with an indicative capacity of 40–70,000 TEU a year (IMEX only) at Ingleburn and less than 50,000 TEU a year (IMEX and regional) at Leumeah. There are currently no known plans for development of these IMTs. Therefore the sites do not meet the identified Commonwealth Project objectives (refer Table 6.2) and hence are not considered feasible alternatives to the Project site.

Eastern Creek (possible new IMT)

Other than Enfield and Moorebank, Eastern Creek in north-western Sydney has been identified as a possible location for a major new IMT in the long term. This site was identified by the NSW Freight Infrastructure Advisory Board (FIAB) as a site with potential for IMT development that warrants further consideration (Australian Government HRSCRS 2007). The privately owned site currently consists primarily of agricultural land. However, FIAB envisages a development with future capacity of 500,000 TEU a year. The Westlink M7 and M4 Western Motorway arterial roads intersect at Eastern Creek, providing access from the terminal to main economic and industrial areas in the region. An 18 km rail line construction would be required to connect Eastern Creek to the SSFL, but once completed the site could accommodate longer trains.

The *NSW Freight and Ports Strategy* (NSW Government 2013) notes the following regarding an IMT in Eastern Creek:

'To cater for forecast growth in the container market, further intermodal capacity will be needed in Sydney. In the longer term a key strategic location for an intermodal terminal could be in the Eastern Creek area. A future intermodal terminal in Western Sydney will need to be connected to the Metropolitan Freight Network. The necessary lands should be identified and protected in planning instruments to cater for future growth in the freight task.' (p101)

At present, an Eastern Creek IMT is largely undefined and only a 'possible project'. Considering the early planning phase of this possible project, it is unlikely to meet the identified short to medium term demand for an IMEX or interstate terminal in the time required, but could be expected to assist in meeting the long-term demand for these facilities. Furthermore, if an Eastern Creek IMT is developed, it would primarily service its localised market around the west and north-west of Sydney.

As the site is only a possible future project, and is a long-term option only, it is not considered a feasible alternative to the Project site.

Cooks River, St Peters (existing IMT)

The Cooks River IMT site is located in St Peters in inner-western Sydney (near the Sydney Airport). It is currently used only for empty container storage. The site is limited in size and located away from the identified demand for IMT services in western and south-western Sydney. Road and rail access constraints also exist at the site. Therefore the site does not meet the identified Commonwealth Project objectives (refer Table 6.2) and hence is not considered a feasible alternative to the Project site.

Sydney Intermodal Terminal Alliance (SIMTA) IMT Project, Defence National Storage and Distribution Centre site (proposed IMT)

The SIMTA Project includes development of an IMEX terminal on the eastern side of Moorebank Avenue on land currently occupied by the Defence National Storage and Distribution Centre (DNSDC), with a connection to the SSFL via a rail alignment across the Glenfield Landfill site (similar to the proposed southern rail access described in Section 7.5.3). The SIMTA site would provide an alternative for IMEX services (up to 500,000 TEU a year by 2021 and up to 1 million TEU a year by 2031). However the site is of insufficient size to also provide an interstate IMT to meet the identified demand, and hence would not meet the Commonwealth Project objectives (refer Table 6.2). For this reason it is not considered a feasible alternative to the Project. As explained in section 3.1.1, there is insufficient IMEX demand for both the SIMTA IMEX and Moorebank IMEX terminals to occur simultaneously.

The SIMTA Project received Commonwealth approval under the EPBC Act as a 'controlled action' on 6 March 2014. In addition, in January 2012, SIMTA lodged an EIS with the NSW DP&E, and in June 2014 NSW DP&E provided a number of recommendations to the NSW Planning Assessment Commission (PAC). On 29 September 2014, the PAC determined to approve the SIMTA concept plan, with modifications and subject to further assessment requirements, including further traffic assessment. The PAC approval also placed a limit of 250,000 TEU a year throughput on the SIMTA Stage 1 project application. If monitoring and modelling of the operation of Stage 1 can demonstrate an increase in the volume of freight will not exceed the capacity of the transport network with or without further mitigation measures, then subsequent development applications can increase to a total upper limit throughput cap of 500,000 TEU a year. SIMTA also sought approval to access the SSFL via a route to the south of the Moorebank IMT Project site, which includes Commonwealth-owned land. The Australian Government has not provided landowner approval for this access.

At the time of publication of this EIS, MIC has commenced negotiations with SIMTA to determine whether suitable terms for the development and operation can be agreed for a combined IMT precinct. If negotiations are successful, and MIC and SIMTA agree to develop a combined IMT precinct, then:

- only one IMEX terminal would be built;
- an interstate facility would be ultimately provided in accordance with the Commonwealth IMT project;
- warehousing across both sites would be developed (including warehousing to support both IMEX and interstate operations); and
- a single rail access to the SSFL would be constructed at the south of the site across the Glenfield Landfill.

If a detailed agreement with SIMTA cannot be reached by the end of 2014, MIC will seek an alternative operator, and proceed with development in accordance with this EIS.

Other possible locations in west and south-western Sydney

There are no other known sites available in west or south-western Sydney that meet the Commonwealth Project objectives, and/or that meet the identified short and medium term demand for IMEX and interstate intermodal facilities. Other intermodal terminals are likely to be required in the long-term, and a review of long-term options would likely be undertaken at that time.

Badgerys Creek has been suggested by some members of the community and Liverpool City Council (LCC) as a possible alternative site. However, the site is too far west of Sydney to be economically feasible as an intermodal facility and does not currently have adequate road or rail supporting infrastructure. The site was also confirmed by the Australian Government in April 2014 as the location of the proposed second Sydney airport.

Table 6.2 Strategic assessment of existing and planned IMT sites relative to Commonwealth Project objectives

Facility	Owner/operator	Market	Estimated current/planned capacity (TEU a year)	Rail infrastructure	Rail access	Road access	Consistency with Commonwealth objectives for the Project
Enfield (existing IMT with expansion underway)	Hutchison Port Holdings	IMEX	300,000 (once expanded)	Rail sidings: 1,000 m X 1 Max train length: 1,000 m	Direct access using Port Botany to Enfield Freight Line	Wentworth Street, Cosgrove Road	<p>The size of the site would not allow for 1,500 m or 1,800 m interstate trains onsite (without the breaking up of these trains elsewhere on the network). The site also has insufficient room for expansion to meet the identified IMEX demand. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is located in Sydney's central west; therefore it would not make a significant contribution to the need for an IMT in west or south-western Sydney. It also would not attract employment or investment to west or south-west Sydney. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term) 4 (Attract employment and investment to west and south-western Sydney).</p>
Chullora (existing IMT)	Asciano/Pacific National	Interstate Regional	200,000 Asciano has recently identified plans to expand the terminal to handle 600,000 TEU. The potential split between IMEX and interstate is not known (refer section 3.1.2).	Rail sidings: 450 m X 4 Max train length: 1,800 m	Direct access using Port Botany to Enfield/Chullora Freight Line/SSFL	Local roads currently being upgraded to connect facility to Hume Highway	<p>The site does not have sufficient expansion potential to accommodate the identified IMEX or interstate freight demands. The site faces congestion problems and conflicts with passenger rail, even with the recent and ongoing Port Botany Rail Line upgrades (see Table 3.4 for further details). For these reasons, the site is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is located in central-west Sydney; therefore it would not make a significant contribution to the need for an IMT in west or south-western Sydney. Furthermore, it would not attract employment or investment to west or south-west Sydney. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term) or 4 (Attract employment and investment to west and south-western Sydney).</p>

Facility	Owner/ operator	Market	Estimated current/ planned capacity (TEU a year)	Rail infrastructure	Rail access	Road access	Consistency with Commonwealth objectives for the Project
Yennora (existing IMT)	Stockland (owner) Qube (operator)	Interstate IMEX	115,000	Rail sidings: 530 m X 2 and 250–480 m X 3 Max train length: 800–900 m	Main South Line	Loftus Road	<p>The site does not have expansion potential to accommodate identified IMEX or interstate freight demands. In particular, the size of the site would not allow for 1,500 m or 1,800 m interstate trains on site without the breaking up of these trains elsewhere on the network.</p> <p>The site faces congestion problems and conflicts with passenger rail. Therefore, the site is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is located in central-west Sydney; therefore it would not make a substantial contribution to the need for an IMT in west or south-western Sydney. Nor would it attract substantial employment or investment to west or south-west Sydney. Therefore, the site is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term) or 4 (Attract employment and investment to west and south-western Sydney).</p>
Minto (existing IMT, planned for expansion)	QUBE Logistics	IMEX	45,000 (plans to expand to approx. 150,000)	Rail sidings: 390 m X 1, 650 m X 1 and 900 m X 1 Max train length: 900 m	Main South Line	Stonny Batter Road	<p>Even with the proposed expansion, the site is insufficient in size to accommodate the identified demand for IMEX services in south-western Sydney. There is also insufficient room to accommodate 1,500–1,800 m interstate trains (without breaking these trains up elsewhere on the network). Therefore, the site is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p>

Facility	Owner/ operator	Market	Estimated current/ planned capacity (TEU a year)	Rail infrastructure	Rail access	Road access	Consistency with Commonwealth objectives for the Project
Villawood (existing IMT)	Toll	IMEX	15,000– 20,000	Rail sidings: 285 m X 2 and 350 m X 1 Max train length: 900 m	Main South Line	Miller Road, Monier Square	<p>The site is insufficient in size to accommodate the identified demand for IMEX services or 1,500–1,800 m interstate trains (without breaking these trains up elsewhere on the network).</p> <p>The site is also located in central-west Sydney, so it would not make a major contribution to the need for IMT in west or south-western Sydney, nor would it attract substantial employment or investment to west or south-western Sydney. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term) or 4 (Attract employment and investment to west and south-western Sydney).</p>
Ingleburn (possible new IMT)	Unknown	IMEX	40–70,000	Unknown	Direct access on to the SSFL through the provision of a rail spur to the south of Ingleburn Train Station.	The nearest M5 Motorway ramps are located approximately 4 km via local roads. The site is constrained by the lack on and off ramps close by.	<p>The Ingleburn site is insufficient in size to accommodate the identified demand for IMEX or interstate trains. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is also constrained in terms of road access, which would limit the ability to comply with Commonwealth Project objective 2 (Create a flexible and commercially viable facility) or 5 (Achieve sound environmental and social outcomes).</p>

Facility	Owner/ operator	Market	Estimated current/ planned capacity (TEU a year)	Rail infrastructure	Rail access	Road access	Consistency with Commonwealth objectives for the Project
Leumeah (possible new IMT)	Unknown	IMEX Regional	Less than 50,000	Unknown	The site has the disadvantage of being located on the wrong (eastern) side of the of the Sydney Trains (formerly RailCorp) passenger line to gain access to the SSFL.	The site has good road access through a network of local industrial estate distributor roads to the M5 Motorway.	<p>The Leumeah site is insufficient in size to accommodate the identified demand for IMEX or interstate trains. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is also constrained in terms of rail access, which would limit the ability to comply with Commonwealth Project objective 2 (Create a flexible and commercially viable facility) or 5 (Achieve sound environmental and social outcomes).</p>
Eastern Creek (possible new IMT)	Unknown (currently private land)	Potentially IMEX and interstate	500,000	Currently potential site not serviced by rail – would require new 18 km rail line connection to Metropolitan Freight Network (MFN)	Access onto MFN if new connection built	M7 and M4 Motorway arterial roads intersect at the site; could potentially have access to WestConnex (now a committed project)	<p>Considering the early stage of planning and no specific commitment to this possible project, it is unlikely to meet the identified short to medium term demand for an IMEX or interstate terminal in western Sydney; although it may assist in meeting the long-term demand.</p> <p>The site is currently constrained in regard to existing rail access and would require significant investment to construct a rail connection to the MFN. The site is not therefore consistent with Commonwealth Project objectives 6 (Optimise value for money for the Commonwealth).</p>

Facility	Owner/ operator	Market	Estimated current/ planned capacity (TEU a year)	Rail infrastructure	Rail access	Road access	Consistency with Commonwealth objectives for the Project
Cooks River (St Peters) (existing IMT)	MCS Transport	Empty container storage	150,000	Rail sidings: 500 m X 6 Max train length: 600 m	Direct access using Port Botany to Enfield Freight Line	Canal Road	<p>The site is of insufficient size to accommodate the identified demand for IMEX services or 1,500–1,800 m interstate trains (without breaking these trains up elsewhere on the network). Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term).</p> <p>The site is located in inner-western Sydney (not south-west), so it would not make a major contribution to need for IMT in south-western Sydney, or attract employment or investment to south-west Sydney. Therefore, it is not consistent with Commonwealth Project objective 1 (Boost national productivity over the long-term) or 4 (Attract employment and investment to west and south-western Sydney).</p>
SIMTA DNSDC Site, (proposed IMT)	SIMTA	IMEX only	500,000 TEU (capacity cap on the IMT)	Proposed rail sidings of up to 1,200 m	2 km from SSFL; requires link across Commonwealth land	Moorebank Avenue, then M5 Motorway	<p>The site would provide alternative for IMEX services but is of insufficient size (83 hectares (ha) as compared to 220 ha for the Project) to also cater for the identified demand for interstate services. Therefore, the site would not fully achieve Commonwealth Project objective 1 (Boost national productivity over the long-term).</p>
Moorebank site (proposed Project site)	MIC (future operators/ owners yet to be determined)	IMEX and interstate	1,200,000 TEU (IMEX) 500,000 TEU (interstate)	Rail sidings up to 1,800 m for interstate and 650 m for IMEX (refer Chapter 7 – <i>Project built form and operations</i>)	Direct access onto SSFL through provision of a rail link across Georges River	Moorebank Avenue, then M5 Motorway and other regional road corridors	<p>The site would meet identified demand for IMEX IMT services in west and south-western Sydney, plus demand estimates for interstate IMT services. It is of sufficient size (220 ha) to provide the maximum length interstate trains. Therefore, the site is consistent with all identified Project objectives.</p>

Note 1: Details in this table for IMT sites (other than Moorebank IMT) have not been verified with the owners/operators of these IMTs due to competition conflicts

6.6 Selection of the Project site as preferred

As detailed in Chapter 3 – *Project development and alternatives* and section 6.5, the selected Project site best meets all of the Project objectives and the identified planning principles/criteria for a feasible IMT site.

The Project site is one of the last remaining parcels of suitable land for an IMT in south-western Sydney with close access to road and rail infrastructure. It is the only site within the south-western Sydney area with the capacity to provide both IMEX and interstate capacity. No other sites in south-western Sydney are considered to have the distinct advantages of the Project site, which include:

- the extensive size and length of the site, and its flat topography, which allow for development of both IMEX and interstate IMT capacity in accordance with the identified demand;
- its central location relative to the major employment lands of south-western Sydney, including Milperra, Minto, Leumeah, Smithfield, Fairfield, Smeaton Grange, Prestons, Chipping Norton and Warwick Farm, and the South West Growth Centre;
- its location within 1 km of a dedicated rail freight line (the SSFL);
- its location adjacent to the M5 Motorway and a major arterial road network, eliminating the need to use local roads;
- the potential for development of a freight precinct, with value-adding industries to be located on adjacent and nearby land; and
- the fact that the Project site is currently in Commonwealth Government ownership (which minimises potential acquisition costs and impacts private property).

Recognising the above benefits of the Project site and constraints of the other possible sites described in section 6.5, the Project site was selected by the Australian Government in 2004 as the preferred site for development of the Moorebank IMT Project.

6.7 Project site layout and functionality options

The Moorebank Intermodal Terminal Feasibility Study involved economic and financial analysis, a Scoping Study and concept masterplanning, which included a detailed analysis of layout and functionality options for the Moorebank IMT Project site. The following sections provide a summary of this process, with a focus on those matters requested in the EIS Guidelines and NSW SEARs for the Project in relation to analysis of feasible alternatives to the Project (refer Table 6.1).

6.7.1 Identification and selection process

The technical options were developed and evaluated to meet technical requirements for an IMT taking into account:

- the Commonwealth objectives for the Project (as listed in section 6.5.1);
- market demand projections, including the ability to achieve the maximum expected freight demand in 2050, in order to ‘future proof’ the Project and to test the feasibility of the options over time;

- rail track requirements, including suitability for interstate freight trains (with ability to handle 1,800 m long trains on site preferred as a long-term objective of ARTC is to have the majority of freight trains on the network 1,800 m in length); the ability to provide adequate trackage to allow effective and efficient terminal operations; and provision for all marshalling (arrival and departure) tracks onsite including interstate storage; and
- operational requirements (particularly efficient container flows).

The development of technical options for the Project (i.e. site layout and functionality options on the Project site) followed a six-step process, as detailed in Figure 6.3.

Ancillary services like internal roads, terminal administration, maintenance facilities and warehousing were also considered and environmental and sustainability considerations were integrated into each step.

The staging of the development was also considered in the detailed assessment of shortlisted options.

The six-step process included two detailed multi-criteria analyses (MCAs) to rank and shortlist options. MCA assessments are widely used for complex, multi-disciplinary feasibility studies to assist in the business case decision-making process. An MCA assessment establishes preferences between options through assessment against a range of criteria. These criteria are generally linked to the Project objectives and provide a measurable basis to assess the extent to which the objectives are likely to be achieved by each option. MCA was considered the most appropriate form of options analysis for this Project due to its complex and multi-disciplinary nature; and the need to compare a range of feasible alternatives, having regard to the Project objectives and economic, technical/operational and environmental matters.

The MCA criteria applied to this Project included environmental, community and technical and economic performance criteria that were developed based on the overall Project objectives. A list of the criteria applied to the assessment is provided in Table 6.4 and Volume 2, Appendix E.

Further details of the options considered and the evaluation process are provided in the following sections.

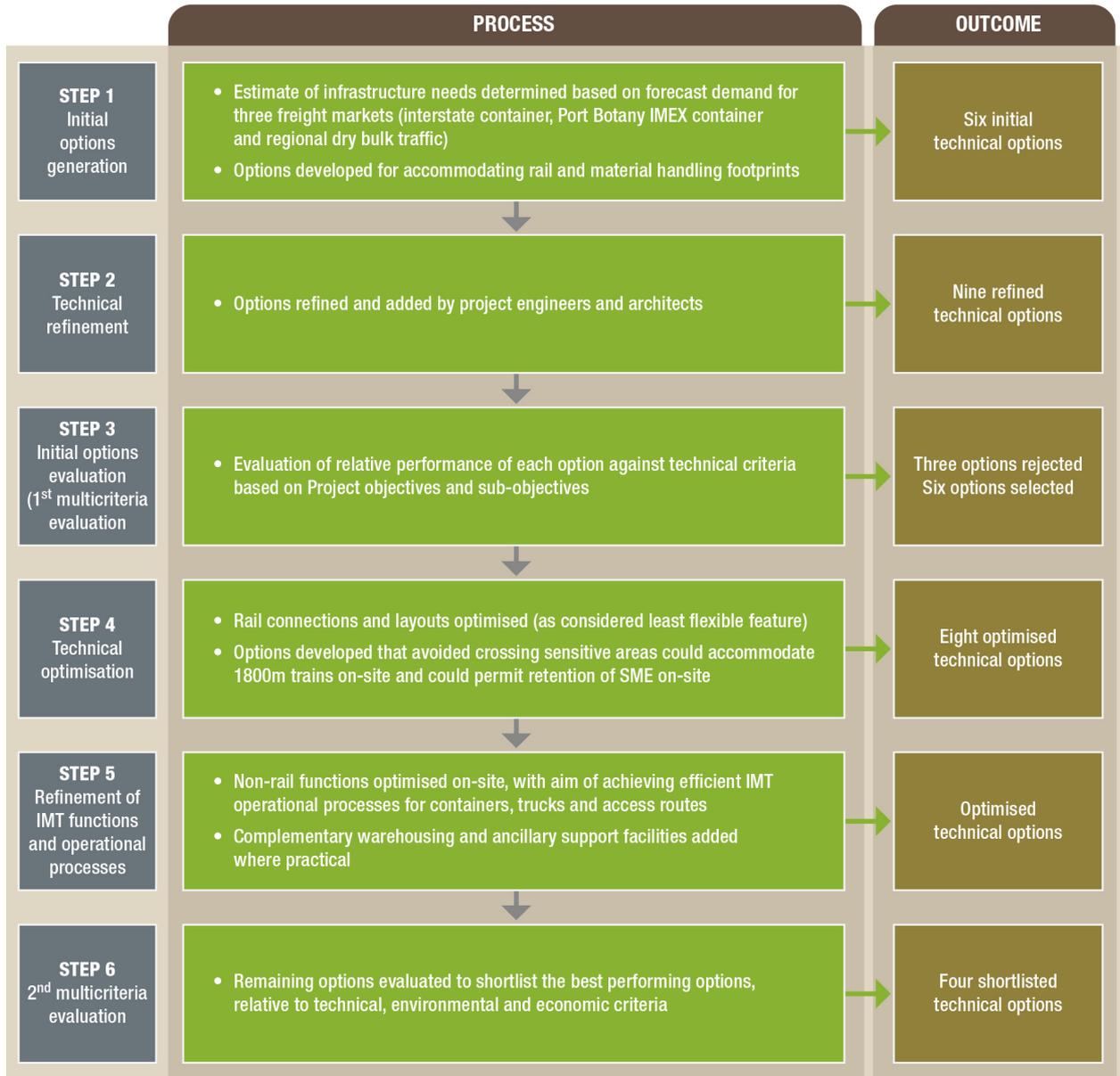


Figure 6.3 Technical options identification and selection

6.7.2 Initial technical options

Table 6.3 below provides a summary of the key initial technical options developed through Steps 1 to 5 of the process shown in Figure 6.3. The table includes key advantages and disadvantages of the options (including the inability to meet the Project objectives), and the outcome of the evaluation process.

The options developed focused on different markets (IMEX, interstate and bulk) or combinations of markets. Consequently, the different options would make different uses of the Project site. They also varied in regard to rail and road connections to the Project site, and the subsequent impacts of these connections.

The initial technical options considered rail access predominantly from either the north or south of the site (across Liverpool City Council (LCC) and Glenfield Waste Facility land respectively); however, some options had rail access from the centre of the site. In the end, the refining and assessment of the initial technical options identified a preference for a layout associated with a northern rail access (similar to the northern rail access option described in this EIS).

As presented in Table 6.3, key reasons for the dismissal of some initial technical options related to their inability to achieve the Project objectives:

- Some options were rejected as they represented infrastructure solutions that were significantly more complex and expensive, such that they would not achieve Project objective 5 (sound environmental and social outcomes) or 6 (value for money for the Commonwealth).
- Other options were rejected as they would have significant impacts on Defence and, therefore, would not achieve Project objective 3 (minimise impacts on Defence).
- Options involving bulk intermodal facilities (for non-containerised cargo) were rejected due to their inability to achieve Project objective 5 (sound environmental and social outcomes) or 3 (create a flexible and commercially viable facility). Specifically, these options were considered likely to result in potentially unacceptable environmental impacts (mainly dust and water quality), and to suffer from an identified lack of demand for this form of intermodal facility, considering that the majority of demand through Port Botany is for containerised freight transport.

Table 6.3 Key initial technical options considered

Option	Key advantages	Key disadvantages	Outcome of evaluation
IMEX, interstate (with 1,800 m trains), warehousing and acquisition of Asea Brown Boveri (ABB) and Glenfield Landfill sites. Northern rail access to the site.	<ul style="list-style-type: none"> Land acquisition and use of industrial zoned land for rail access to site avoids potential community impacts associated with use of Liverpool City Council (LCC) Northern Powerhouse Land (Lot 10 DP881265). Able to handle 1800 m interstate trains onsite, a key Project objective for the proposed terminal to effectively support the interstate freight task. Allows rail curves that reduce the potential for wheel squeal/flanging and maximise arrival/departure train speeds. Warehousing along western side of site could potentially attenuate some noise impacts associated with container handling by acting as a barrier between rail operations and the nearest residences to the west of the site. 	<ul style="list-style-type: none"> Rail arrival and departure roads are located offsite, potentially affecting Australian Rail Track Corporation (ARTC) operations on the SSFL. The rail connection to the SSFL is technically difficult due to grade restriction and topography, potentially resulting in more costly infrastructure development costs. Land acquisition costs for industrial zoned land and disruption to current operations expected to be high. Requires clearing of Commonwealth land (the toe of the 'bootland' – Lot 3001 DP 1125930) and Sydney Trains land (Lot 1 DP 825352) for the Moorebank Avenue off ramp (near East Hills Rail Line). Reduced potential value of warehousing because it does not front Moorebank Avenue. Potentially takes longer to develop due to land acquisition process. 	Option rejected during 1st multi-criteria analysis (MCA) (Step 3).
IMEX, interstate (with 1,800 m trains), warehousing and three rail access bridges over the Georges River. Combination of northern, central and southern rail access to the site.	<ul style="list-style-type: none"> Able to handle 1,800 m interstate trains onsite, a key Project objective for the proposed terminal to effectively support the interstate freight task. Noise-generating activities, such as onsite container handling, are located further away from residential properties in Casula. 	<ul style="list-style-type: none"> Rail arrival and departure roads are located off-site, potentially affecting ARTC operations on the SSFL. Potentially high costs of connecting rail infrastructure associated with three rail bridges over the river. Major impact on Georges River and riparian zone (due to three bridges for rail access link). Requires clearing of Commonwealth land (the toe of the bootland – Lot 3001 DP 1125930) for Moorebank Avenue off ramp (near East Hills Rail Line). 	Option rejected during 1st MCA (Step 3).

Option	Key advantages	Key disadvantages	Outcome of evaluation
		<ul style="list-style-type: none"> Potential major impact on the local road network due to proximity of the Moorebank IMT entry to M5 Motorway and Moorebank Avenue intersection (queuing of trucks). Potentially high land acquisition costs associated with all three rail access points. 	
IMEX, interstate (with 1,800 m trains), warehousing and ABB site acquisition Northern rail access to the site.	<ul style="list-style-type: none"> Able to handle 1,800 m interstate trains onsite, a key Project objective for the proposed terminal to effectively support the interstate freight task. Warehousing along western side of site could potentially attenuate some noise impacts associated with container handling by acting as a barrier between rail operations and the nearest residences to the west of the site. 	<ul style="list-style-type: none"> The rail connection to the SSFL is technically difficult due to grade restriction and topography, potentially resulting in more costly infrastructure development costs. Rail arrival and departure roads are located off-site, potentially affecting ARTC operations on the SSFL. Land acquisition costs for industrial zoned land and disruption to current operations expected to be high. Reduced efficiency in terminal operations due to internal terminal layout requiring an increase in terminal operating plant and equipment. 	Option shortlisted at 1st MCA (Step 3), but later rejected at 2nd MCA (Step 6).
IMEX, interstate (1,800 m trains), bulk freight (900 m trains) and warehousing. Northern rail access to the site.	<ul style="list-style-type: none"> Able to handle all forms of freight, including bulk. This has the potential to result in better utilisation of the terminal. Noise-generating activities, such as onsite container handling, are located further away from residential properties in Casula. 	<ul style="list-style-type: none"> Rail arrival and departure roads are located offsite, potentially affecting ARTC operations on the SSFL. Bulk freight (e.g. cement products) needs to meet specific handling requirement to avoid potential local impacts on local air quality and other values. Potential risks to water quality due to proximity of stockpiles for bulk freight and issues with groundwater runoff and treatment prior to discharge to Georges River. Major impact on the local road network due to proximity of IMT entry to M5 Motorway and Moorebank Avenue intersection (queuing of trucks). 	Option shortlisted at 1st MCA (Step 3), but later rejected at 2nd MCA (Step 6).

Option	Key advantages	Key disadvantages	Outcome of evaluation
<p>IMEX, interstate (1,500 m trains), bulk freight (900 m), warehousing.</p> <p>A rail link across Glenfield Landfill site to the south.</p>	<ul style="list-style-type: none"> • Able to handle all forms of freight, including bulk. This has the potential to result in better utilisation of the terminal. • Potentially more efficient IMT operations than above option due to some reduction in terminal operating plant and equipment for interstate operations. 	<ul style="list-style-type: none"> • Rail arrival and departure roads are located offsite, potentially affecting ARTC operations on the SSFL. • The rail connection to the SSFL is technically difficult due to grade restriction and topography, potentially resulting in more costly infrastructure development costs. • Bulk freight (e.g. cement products) needs to meet specific handling requirement to avoid potential local impacts on local air quality and other values. • Potential risks to water quality due to proximity of stockpiles for bulk freight and issues with groundwater runoff and treatment prior to discharge to Georges River. • Land acquisition costs for industrial zoned land and disruption to current operations expected to be high. • Interstate terminal separates IMEX from warehousing, reducing the efficiency of operations between the two. 	<p>Option rejected during 1st MCA (Step 3).</p>
<p>IMEX only, no warehousing and retention of School of Military Engineering (SME) onsite.</p> <p>Northern rail access to the site across LCC Northern Powerhouse Land (Lot 10 DP881265).</p>	<ul style="list-style-type: none"> • Reduces the overall footprint of the Project – both the area required and the potential associated impacts. • Retention of SME would save Commonwealth funds needed for SME relocation. 	<ul style="list-style-type: none"> • Does not accommodate key functions on site – the interstate terminal and warehousing. • IMT proximity could potentially affect Defence security and impact on SME occupants and operations. • Less attractive to users due to lack of warehousing (which is an important component of a functioning IMT). • Does not achieve Project objectives regarding minimising impacts on Defence and creating a flexible and commercially viable facility. 	<p>Option shortlisted at 1st MCA (Step 3). Initially referred to as Option C, it was then developed into Option C2 (which retained SME) and C1 (which did not retain SME).</p> <p>Option C2 was then rejected at 2nd MCA.</p>

Option	Key advantages	Key disadvantages	Outcome of evaluation
Interstate only (1,800 m trains). Rail link across Glenfield Landfill site to south.	<ul style="list-style-type: none"> Capital and operating costs are reduced due to only developing interstate terminal. 	<ul style="list-style-type: none"> Does not achieve the Project objective to create a flexible and commercially viable facility. Delays development of site as demand for interstate expected in the longer term only. The rail connection to the SSFL is technically difficult due to grade restriction and topography, potentially resulting in more costly infrastructure development costs. Rail arrival and departure roads are located offsite, potentially affecting ARTC operations on the SSFL. 	Option shortlisted at 1st MCA (Step 3), and then amended to relocate rail link to the north and across LCC land. Amended option referred to as Option B, which was then developed into Option B2 (which retained SME) and Option B1 (which did not retain SME). Option B2 was rejected at 2nd MCA.
IMEX, interstate (with 1,800 m trains), and truck entry at south-east corner of the Project site. Rail access over the LCC Northern Powerhouse Land (Lot 10 DP881265)	<ul style="list-style-type: none"> Rail arrival and departure roads can be located within the Project site; therefore there would be less impact on ARTC operations on the SSFL. Potentially avoids highest cost connecting rail infrastructure as link is shortest, minimises required structures and avoids industrial land. Meets all the Moorebank IMT Project objectives. 	<ul style="list-style-type: none"> Requires clearing of Commonwealth land (the toe of the bootland – Lot 3001 DP 1125930) and Sydney Trains land (Lot 1 DP 825352) for Moorebank Avenue off ramp (near East Hills Rail Line). Potential community impacts associated with use of LCC Northern Powerhouse Land (Lot 10 DP881265). 	Option shortlisted at 1st MCA (Step 3), and 2nd MCA (Step 6). Initially referred to as Option A, which was then developed into Option A1 (no deferral of interstate IMT) and A2 (with deferral of interstate IMT).

6.7.3 Shortlisted technical options

At the end of Step 6 (2nd MCA), the following technical options were shortlisted and ranked:

7. Option A2 – IMEX, interstate (with 1,800 m trains) and warehousing (with interstate deferred until suitable market conditions suitable);
8. Option A1 – IMEX, interstate (with 1,800 m trains) and warehousing (with no deferral of interstate);
9. Option C1 – IMEX only (with warehousing); and
10. Option B1 – Interstate only (with warehousing).

Options C2 (IMEX only, but with SME retained and no warehousing) and B2 (interstate only, but with SME retained and no warehousing) were initially on this shortlist, but were removed due to:

- their inability to achieve Project objective 3 (minimise impacts on Defence), due to likely impacts on Defence security, training capability and Defence residents (as well as the approval of the MUR Project to relocate the SME to Holsworthy); and
- their inability to achieve Project objective 2 (create a commercially viable facility), mainly due to the lack of warehousing, which would play an important role in an efficient logistics chain for locally destined goods, and would also provide efficient revenue streams for the Project. To not have the warehousing onsite would mean that revenue streams would not be available or able to be generated, meaning the cost competitiveness of rail against road between Port Botany and Moorebank would be at risk.

Although the concept layouts for these sub-options would have a smaller footprint and would retain the scattered trees and European heritage within the SME area, the SME area is not the most sensitive area of the Project site in regard to ecology/heritage (refer to section 2.4 for further details), and so the benefits would be marginal in terms of ecological and heritage impacts.

The four shortlisted options are described in more detail below, with indicative layouts in Figure 6.4 to Figure 6.6. Note: Larger A3 size versions of these figures are provided in Volume 2, Appendix F.

Options A1 and A2 – IMEX and interstate

Under both of these options, the Moorebank IMT would ultimately occupy the whole Project site and contain facilities to cater for IMEX and interstate freight (refer Figure 6.4). Warehousing would also be contained on the Project site along Moorebank Avenue.

The only difference between Options A1 and A2 is the timing of the IMT development. For Option A1, both IMEX and interstate would be developed concurrently on site. For Option A2, the interstate freight development and operations would be deferred until 2030 (if warranted). This layout is dependent on favourable interstate market conditions.

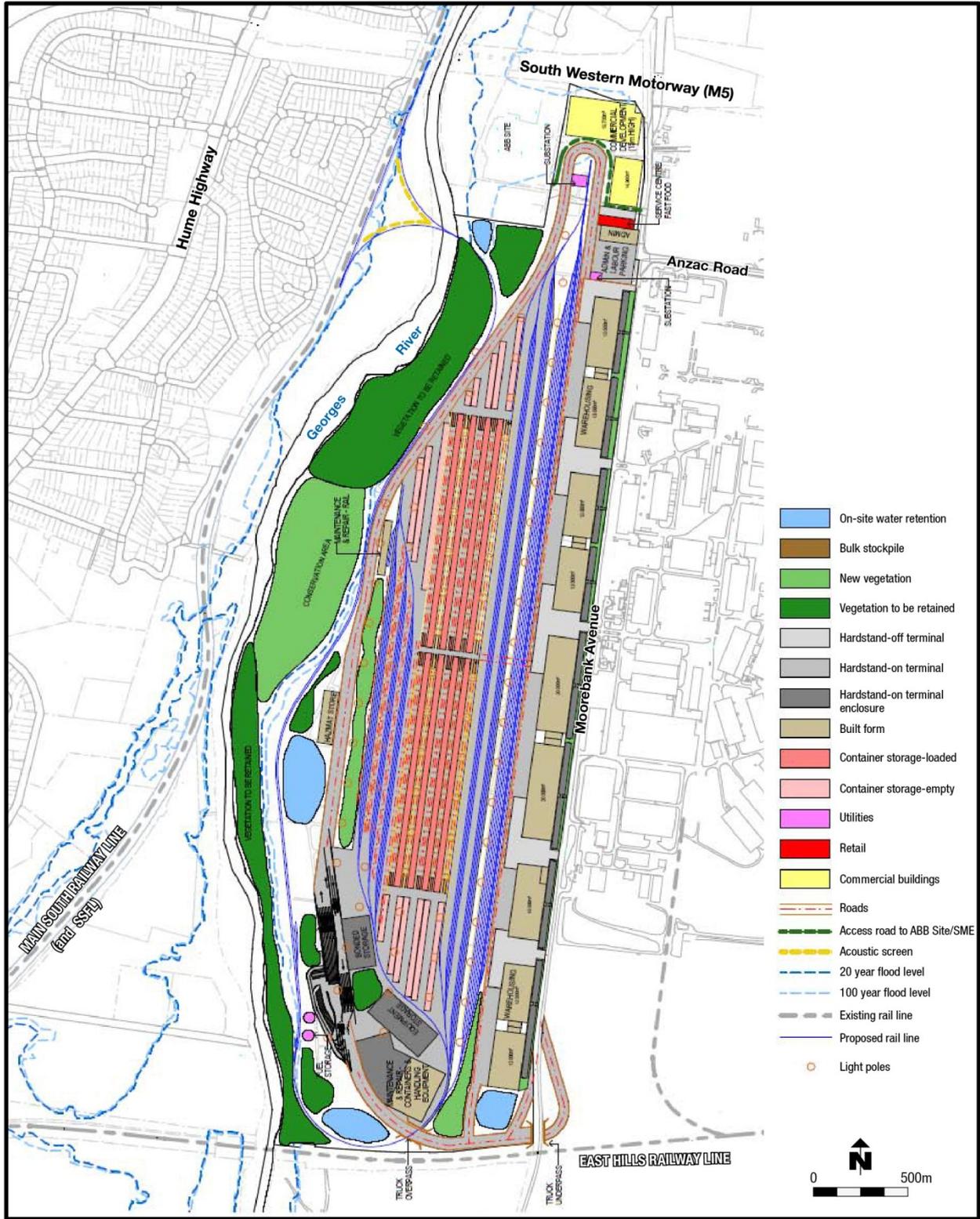


Figure 6.4 Options A1 and A2 – indicative only

The layouts of these two options are configured as follows:

- Rail access into the Project site would be via the SSFL and would involve crossing the Georges River at the northern end of the Project site. Rail access would ultimately be provided for both northbound and southbound rail connections to the SSFL.
- Heavy vehicle access would be provided off Moorebank Avenue at the southern end of the Project site.
- Warehousing would be located along Moorebank Avenue, with commercial development at the northern end of the Project site.
- Support functions for the terminal would be located close to container stacks.
- Rail tracks would occupy the available space between the warehousing and the environmental protection zone along the Georges River, which would contour the 100 year annual recurrence interval (ARI) flood level.

Options A1 and A2 would result in extensive clearing of the Project site, including several state-listed vegetation communities and Commonwealth-listed plant species along Moorebank Avenue and within the SME. However, the vegetation along the Georges River below the 100 year ARI floodline would be retained and revegetated to act as a conservation area. Furthermore, the Proponent would work with regulators to work through the environmental offset requirements for the preferred option.

Option B1 – Interstate only

Option B1 would provide an IMT that occupies the majority of the Project site and caters for 1,800 m interstate trains and warehousing (refer Figure 6.5). The layout assumes that the interstate terminal would commence operations in 2018–2019 (with warehousing included) and would occupy the entire SME site.

The layout of the option is configured as follows:

- Rail access into the Project site would be via the SSFL and would involve crossing the Georges River at the northern end of the Project site. Rail access would ultimately be provided for both northbound and southbound connections to the SSFL.
- Heavy vehicle access into the Project site would be provided off Moorebank Avenue at the northern section of the Project site.
- Warehousing would be located on Moorebank Avenue and internal to the Project site with a separate road entrance at the southern end of the site. A commercial development would be located at the northern end of the Project site.
- Support functions for the terminal would be located close to the container stacks.

Option B1 would result in extensive clearing of the Project site but would preserve the riparian corridor along the Georges River (western margin of the Project site). Furthermore, the Proponent would work with regulators to work through the environmental offset requirements for the preferred option.

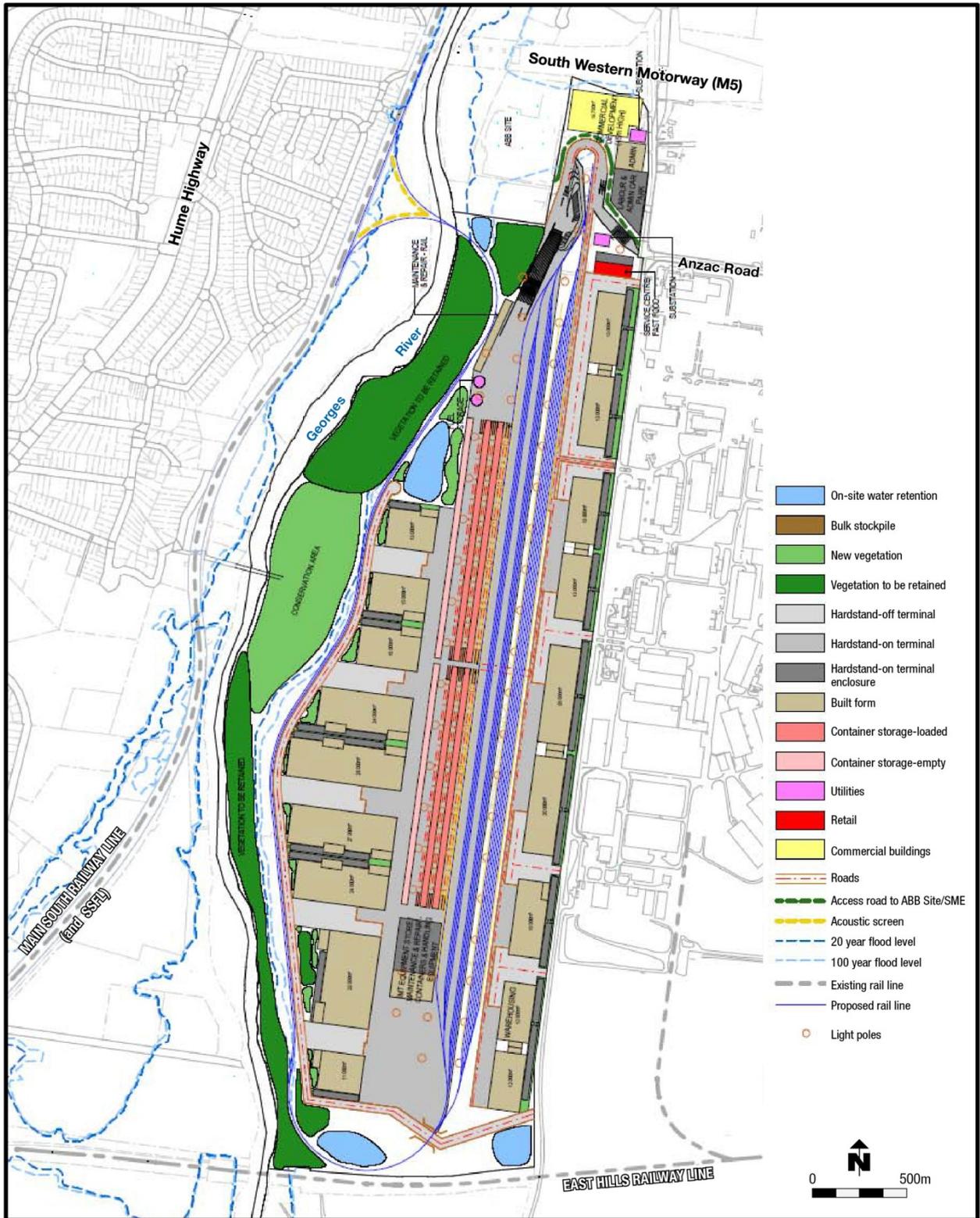


Figure 6.5 Option B1 - indicative only

Option C1 – IMEX only

Option C1 would provide an IMT that accommodates IMEX freight only. The layout assumes that the IMEX terminal would commence operation in 2018–2019 and (with warehousing) would occupy the entire SME site (refer Figure 6.6).

The layout is configured as follows:

- Rail access into the Project site would be via the SSFL and would involve crossing the Georges River at the northern end of the Project site. Rail access would ultimately be provided for both northbound and southbound connections to the SSFL.
- Heavy vehicle access into the Project site would be provided off Moorebank Avenue at the northern section of the Project site.
- Warehousing would be located on Moorebank Avenue and internal to the Project site with a separate road entrance at the southern end. A commercial development would be located at the northern end of the Project site.
- Support functions for the terminal would be located close to the container stacks.
- Rail tracks would occupy the area close to Moorebank Avenue.

Option C1 would result in extensive clearing of the Project site while preserving the riparian corridor along the Georges River (western margin of the Project site). Furthermore, the Proponent would work with regulators to work through the environmental offset requirements for the preferred option.

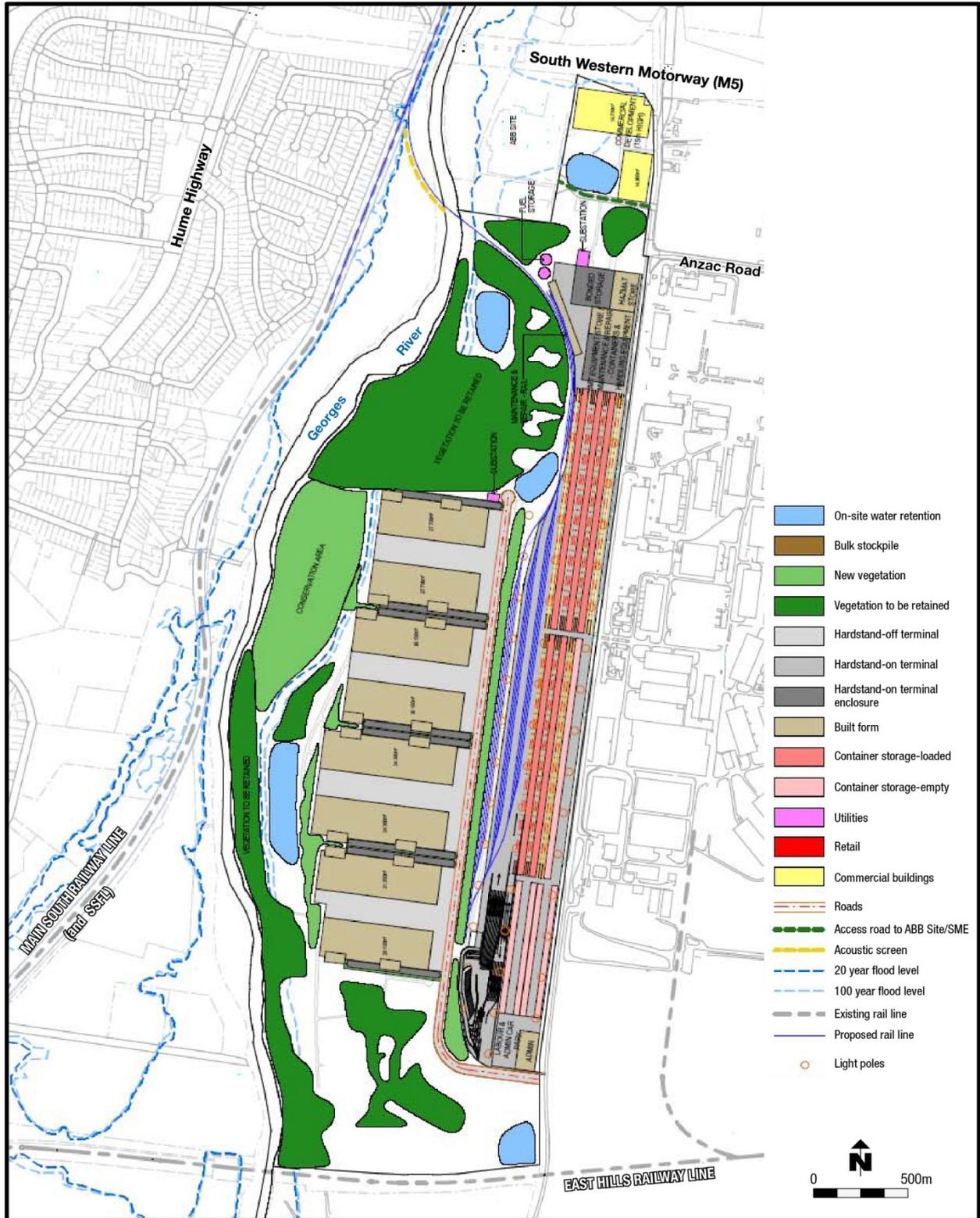


Figure 6.6 Option C1 - indicative only

6.7.4 Comparative assessment of shortlisted technical options

The MCA process included assessment of options relative to environmental, technical and economic criteria, which were developed considering the overall Project objectives.

Table 6.4 presents a summary of the comparative performance of the shortlisted technical options, relative to the identified criteria.

Note: The MCA assessment undertaken (as summarised in Table 6.4) was based on preliminary environmental assessment that was available at the time of the MCA, including assumptions about likely environmental issues. It also did not account for details of the Project such as detailed phasing of earthworks and vegetation clearing, as these were unknown at the time of the MCA.

Table 6.4 Comparative assessment of shortlisted technical options against the environmental, technical and economic criteria

Criteria	Comparative assessment of options (A1, A2, B1 and C1)
Environmental/community performance	
Flood risk: <ul style="list-style-type: none"> • avoids development in 20 year floodplain; • minimises development in 100 year floodplain and probably maximum flood extent; and • minimises stormwater runoff generation. 	<ul style="list-style-type: none"> • Option C1 most preferred as it substantially avoids development in floodplain, plus single rail link reduces works in floodplain. • Options A1/A2 slightly less preferred as they place double rail link along 100-year flood boundary and occasionally enter the 100 year floodplain. • Option B1 least preferred as it places significant extent of rail infrastructure close to or within flood-labile land, with limited flexibility to realign this further to the east.
Ecology: <ul style="list-style-type: none"> • minimises clearing of Commonwealth or NSW State listed vegetation communities; and • maintains riparian corridor. 	<ul style="list-style-type: none"> • All options retain riparian corridor, except for the area required for development of the rail links (which have bigger footprint for Options A1/A2 and B1 due to double link). • Option C1 most preferred as it preserves the riparian corridor and threat-listed species found on southern end of Moorebank Avenue would be retained. • Options A1/A2 have largest impact on threat-listed vegetation in north-west corner of Project site due to vegetation removal, plus removal of some threat-listed vegetation and populations of Commonwealth and State-listed plant species along Moorebank Avenue.
Heritage: <ul style="list-style-type: none"> • minimises impact on Aboriginal heritage; and • potential to preserve European heritage. 	<ul style="list-style-type: none"> • All options retain riparian corridor (which has most potential for Aboriginal heritage), except for the area required for development of the rail links (which have bigger footprint for Options A1/A2 and B1 due to double link). • Option C1 is most preferred as it has a single rail link across the riparian corridor (which has most potential for Aboriginal heritage). • No real difference between Options A1/A2 and B1.
Contamination: <ul style="list-style-type: none"> • minimises remediation effort; and • avoids off-site contamination areas. 	<ul style="list-style-type: none"> • All options avoid the ABB site, but include development immediately south of the ABB site (known to have a potential contamination plume). • No clear preference between options.

Criteria	Comparative assessment of options (A1, A2, B1 and C1)
<p>Regional air quality:</p> <ul style="list-style-type: none"> enhances regional air quality. 	<ul style="list-style-type: none"> Options A1/A2 are most preferred as they create significant opportunities to reduce vehicle kilometres travelled for freight transport due to diverse markets served (IMEX and Interstate). Option C1 is IMEX only so there is less opportunity to reduce vehicle kilometres travelled (but more opportunity than Option B1, because IMEX concentrates benefit in Sydney metropolitan area where air quality is subject to higher existing pollutant loads). Option B1 is least preferred as it only takes interstate trains, so limited opportunity to reduce vehicle kilometres travelled.
<p>Local air quality:</p> <ul style="list-style-type: none"> minimises internal vehicle movement; and minimises transport volume (fewer trains and trucks). 	<ul style="list-style-type: none"> None of the options have any significant positive or negative issues associated with local air quality. Option C1 is most preferred as it has the least potential for local air emissions. No clear preference between other options.
<p>Noise:</p> <ul style="list-style-type: none"> noisy activities away from noise sensitive receivers (Project site's north-western corner); site layout minimises potential truck/train noise; and site layout maximises provision of noise mitigation. 	<ul style="list-style-type: none"> All options provide substantial setback between Casula residents and noisy activities onsite. Option B1 is most preferred as it has relatively lower train numbers, meaning potentially less noise generation. Option C1 is the next most preferred option, as it only has rail freight access from north, so reduces noise impacts on Casula residents. Options A1/A2 are the least preferred. (Note: Comparative assessment was based on preliminary desktop assessment only, not noise modelling).
<p>Land use:</p> <ul style="list-style-type: none"> minimises impact on third party land uses; and minimises requirement for rezoning to achieve development. 	<ul style="list-style-type: none"> None of the options require offsite land to build arrival/departure tracks. No clear preference between options.
<p>Local employment opportunities:</p> <ul style="list-style-type: none"> maximises direct and indirect employment opportunities during construction and operation. 	<ul style="list-style-type: none"> Options A1/A2 are most preferred as they would generate more employment due to more development on site. Options B1 and C1 are least preferred (no real difference between these options).
Technical performance	
<p>Rail IMEX and interstate capacity:</p> <ul style="list-style-type: none"> maximises length of trains (1,800 m better than 1,500 m); and maximises both terminal functions onsite. 	<ul style="list-style-type: none"> Option C1 is least preferred as it does not provide for interstate trains, along with B1 which provides for interstate operations only and no IMEX. Options A1/A2 are preferred over other options as they allow for both functions.
<p>Efficiency of rail layout:</p> <ul style="list-style-type: none"> provides adequate tracks to allow effective and efficient terminal operations; all marshalling (arrival and departure) onsite, including interstate storage; and minimises off-site infrastructure requirements. 	<ul style="list-style-type: none"> All options provide onsite arrival and departure tracks, allowing efficient operations without causing delays to arriving/departing trains or operations on the SSFL. No clear preference between options.

Criteria	Comparative assessment of options (A1, A2, B1 and C1)
<p>Terminal operations:</p> <ul style="list-style-type: none"> • crane maintenance shed located close to working tracks but not impeding them; • grounded storage close to truck in/out gate but not impeding traffic; • ground storage close to warehousing/distribution/cross dock buildings; • minimises lift equipment required; • custom facilities location minimises impact to terminal operations; • provides required connectivity between terminal components with minimal travel distance; and • minimises open level crossings in terminal. 	<ul style="list-style-type: none"> • Options A1/A2 are most preferred as they provide for development of all terminal operations. • Options B1 and C1 are least preferred because they do not propose full functionality of the proposed terminal (IMEX, warehousing and interstate).
<p>Road capacity:</p> <ul style="list-style-type: none"> • minimises potential impact on regional road network (e.g. M5 Motorway). 	<ul style="list-style-type: none"> • Option C1 and A1/A2 performed well as they would be associated with the greatest shift in regional freight traffic from road to rail. • Option B1 also performed well because it would generate a limited amount of traffic on the road network.
<p>Road traffic impacts and safety:</p> <ul style="list-style-type: none"> • minimises need for alternate road access to other users. 	<ul style="list-style-type: none"> • Option C1 is most preferred as it avoids unnecessary intersections between vehicle and train movements within the Project site, enhancing site safety. • No real preference between other options.
<p>Economic performance</p>	
<p>Rail infrastructure:</p> <ul style="list-style-type: none"> • minimises river crossings; • minimises tracks on bridges over river; • minimises acquisition of off-site property; • minimises offsite environmental offsets; and • maximises economic benefits of rail freight transport. 	<ul style="list-style-type: none"> • Other than LCC land on the western side of the Georges River, no options require major offsite acquisition as arrival/departure tracks are provided onsite. • Options A1/A2 are most preferred as they would maximise economic benefits of rail freight transport. Option A2 slightly preferred over A1 as it would defer the cost of a second rail link to the SSFL until 2030.
<p>Road infrastructure:</p> <ul style="list-style-type: none"> • provides effective connection from external road network with minimum infrastructure investment; • minimises cost of alternative access to other users (SIMTA, ABB); • minimises off-site infrastructure requirements; and • minimises acquisition of third party property. 	<ul style="list-style-type: none"> • Option B1 is most preferred because the expected throughput of the interstate terminal would be significantly lower than for the IMEX or IMEX and Interstate options, resulting in fewer anticipated upgrades to the road network. • No clear preference between Options A1/A2 and C1.

Criteria	Comparative assessment of options (A1, A2, B1 and C1)
Commercial potential of terminal: <ul style="list-style-type: none"> • maximises potential for commercial yield. 	<ul style="list-style-type: none"> • Options A1/A2 have warehousing along Moorebank Avenue, which would maximise its value. Option A2 slightly preferred relative to A1, as it provides flexibility to respond to the market. • Option C1 is less preferred but still allows warehouses to be built on residual land and has potential for warehousing on Moorebank Avenue. • Option B1 is least preferred as it does not have as much residual area for warehousing as Option C1.

The technical evaluation of these options presented two key conclusions, as follows:

- Options A1 and A2 would make optimal use of the Project site with efficient terminal operations that accommodate 1,800 m interstate trains and expected demand for IMEX and interstate freight through to 2050, while avoiding off-site marshalling of interstate trains. However, there would be impacts on the local environment including noise, air quality, contamination, heritage and ecological issues.
- Relative to all combined options, the IMEX only and interstate only options (Options B1 and C1) have the potential to provide a range of operational, cost and environmental advantages driven primarily through the smaller scale and more specialised focus of these facilities. However, these options lack the flexibility to diversify to both the IMEX and interstate markets.

In regard to environmental impacts, the evaluation presented the following key conclusions:

- Clearing of high value Commonwealth or State-listed vegetation communities:
 - > Options A1, A2 and B1 have the highest potential for impacts to existing vegetation communities on the Project site. All three options would occupy the entire Project site and would involve extensive clearing of the area including most vegetation outside the flood-labile riparian land. This would include several State and Commonwealth-listed plant species located along Moorebank Avenue.
 - > Alternatively, Option C1 would retain large areas of natural vegetation particularly in the northern and southern sections of the Project site.
- Noise and vibration:
 - > Noise impacts of Options A1 and A2 were identified as potentially greater than other options due to the relative proximity of the IMEX working tracks to residents at the southern end of Casula. In addition, the location of warehousing along Moorebank Avenue would offer no opportunity to use these buildings as a noise buffer.
 - > Noise impacts of Option B1 were identified as an improvement on Options A1 and A2, partly due to the improved setback between the working tracks and Casula residents, but also due to the reduced number of train movements compared to Option A1 and A2.
- Air quality:
 - > Options A1 and A2 were identified as potentially resulting in greater operational local air quality impacts than other options. However, the two options would also offer the greatest opportunity to reduce regional air quality impacts through a reduction in the vehicle kilometres travelled by both IMEX and interstate road freight.

- > Options B1 and C1 would have less potential for operational local air impacts than Options A1 and A2 and would, therefore, potentially result in less local air quality impacts. Since Option B1 would provide for interstate rather than IMEX freight, the regional air quality benefits would be accrued largely outside the Sydney basin (where the majority of interstate transport would be located). Option C1 would provide some benefit from a regional perspective, given that it would avoid the road transport of freight between the port and south-western Sydney.
- Heritage:
 - > With the exception of Option C1, which retains some land north of the Project site, all technical options would have similar footprints in terms of Project site clearing. For all technical options, the conservation zone along the riverbank would remain largely undisturbed, which would limit potential impacts on Aboriginal heritage. The Project site is extensively cleared so all items of Aboriginal and European heritage significance on site are assumed to be affected by removal and/or relocation. Areas of higher potential Aboriginal sensitivity would remain undisturbed as the proposed conservation zone along the western bank of the Georges River (below the 100 year ARI) would remain undeveloped.
- Flood risk:
 - > All technical options would avoid development on the flood-labile land along the Georges River, with the exception of the rail link and access bridge across the Georges River. The latter would include appropriate flood and scour mitigation during detailed design.
- Contamination:
 - > The Project site was identified as being likely to contain localised areas of contamination associated with former and current land uses, which would be subject to appropriate remediation works. For each technical option, extensive areas of hardstand (hard surface or paved areas where vehicles are parked or containers stored) would be created, which would mitigate the contamination risk to future Project site users.

In regard to technical and economic performance, key conclusions of the assessment were:

- Options A1 and A2 performed the best against most technical criteria as they would provide both IMEX and interstate functions.
- Options A1 and A2 performed the best against the economic criteria as they would maximise benefits of rail freight transport and commercial potential associated with warehousing; however Option B1 performed best for road infrastructure costs.

In regard to short, medium and long-term differences between the options (in terms of their advantages and disadvantages), no real difference exists between the shortlisted options, with the exception of Options A1 and A2. As Option A2 would defer the interstate freight facility until 2030 (or when the market determines it is required), some of the long-term advantages and disadvantages of this option would also be deferred. This includes deferring some of the impacts on ecology, noise and road capacity (which is an advantage), but also deferring some of the benefits for regional air quality and local employment (which is a disadvantage).

6.7.5 Selection of the preferred technical options: Options A1/A2

This section explains which technical option(s) were selected and the reasons for this selection.

Following the technical evaluation of the options (as summarised in section 6.7.4), the shortlisted technical options described above were then evaluated further against the Commonwealth Project objectives to select a preferred technical option. On the basis of this analysis, and taking account of trade-offs and relative priorities between the objectives, Option A2 was selected as a preferred technical option, but was closely followed by Option A1 (as the only difference between the two was the timing of the interstate development). Options C1 and B1 were ranked third and fourth respectively.

Options A1 and A2 (IMEX plus interstate terminal) were selected as the preferred technical options and this layout was developed further because they would make the strongest contribution to improving national productivity and achieving a commercially viable outcome – by developing an IMEX IMT and an interstate IMT. Although the options were identified as having environmental impacts, they would also generate substantial environmental benefits for the wider community (mainly associated with removing trucks from roads). All options also include the establishment of a conservation area along the western boundary of the Project site. Furthermore, although the options would entail a high cost to government, this would be financially sustainable over the long term with revenues forecast to exceed operating costs (due to the commercial benefits the options are expected to achieve).

6.8 Optimising the preferred option

Following selection of Options A1/A2 as the preferred technical options, the layout for these options was subject to a detailed optimisation process. This process included concept masterplanning to develop the Project concept to a level that is sufficient for environmental assessment and approval; a further review of indicative site layouts based on feedback/responses from industry; and further consideration of the Project development phasing. These steps are explained further in the following sections.

6.8.1 Concept masterplanning and design development

A concept masterplanning process was undertaken by Parsons Brinckerhoff and Sutera in 2012. This included:

- detailed site analysis to confirm environmental and other constraints;
- reviewing existing planning requirements;
- establishing masterplanning, technical and urban design principles;
- reviewing national and international IMT facilities to identify potential ecologically sustainable development (ESD) initiatives, and encourage effective integration of ESD as the design progresses;
- considering the optimal staging of the development; and
- developing indicative layouts.

Other considerations in the process included:

- optimising the use of land (layout), warehousing, infrastructure and equipment to achieve the most cost-efficient and economically beneficial solution;

- ensuring feasible and efficient road access arrangements (i.e. upgrade to Moorebank Avenue);
- ensuring feasible and efficient rail access arrangements (i.e. connection to SSFL);
- responding to social and environmental needs; and
- providing a design that can accommodate the forecast IMEX and interstate freight demand out to 2050.

The concept masterplanning process led to the following improvements to the functionality and layout of the preferred Project:

- moving the entry into the IMT further north along Moorebank Avenue to avoid the need for major vegetation clearing to the south-east of the Project site, and to avoid the need for trucks to queue outside the Project site (therefore improving safety and minimising interruptions to local traffic);
- including an upgrade of Moorebank Avenue to accommodate the traffic capacity needed and enhance traffic flows;
- providing sufficient rail infrastructure to avoid potential disruptions to line capacity on the SSFL;
- separating over the road (OTR) vehicles and in-terminal vehicles (ITVs) onsite and improving the internal IMT layout to maximise the efficiency and safety of the terminal operations;
- removing the commercial development at the northern end of the Project site and replacing this with warehousing to avoid potentially greater traffic impacts and maximise the economic potential of the Project; and
- potentially allowing for inclusion of a perimeter road to improve access for security of the IMT.

Automation of the terminal was also considered, but was rejected as it would incur substantially higher initial development costs, as well as reduced local benefit in relation to employment opportunities.

A hold point was reached in the development and assessment of the Project following establishment of MIC as the Project Proponent in December 2012. The Project optimisation process beyond this point is described below.

6.8.2 Further review of site layouts

The indicative design of the terminal was developed by the Australian Government prior to the establishment of MIC. In 2013, shortly after it was established, MIC undertook an initial internal review of the Project to ensure alignment with its constitutional objectives (as listed in Table 1.1 in Chapter 1 – *Introduction*). Also during this period, MIC provided briefings to container freight logistics industry participants and issued a request for registration of interest calling for local and international companies and consortia to indicate their interest in operating and developing the terminal. As part of this review and market interaction process, MIC consulted with potentially interested private developers/operators of the IMT in regard to development of the Project. Based on feedback received from these potential industry partners, the Project concept was developed further to ensure that the Project would be commercially viable.

In late 2013 a request for expression of interest was issued seeking parties suitably experienced and qualified to design, build and operate an intermodal terminal at Moorebank. At the time of publication of this EIS, an evaluation of interest from potential operators and developers of the terminal has been completed. MIC has commenced direct negotiations with Sydney Intermodal Terminal Alliance (SIMTA) for a period of up to six months to determine whether suitable terms for the development and operations of the terminal can be agreed. If a detailed agreement with SIMTA cannot be reached within six months, MIC will consider other options. This process provided additional feedback on the Project concept, which was further developed to retain flexibility in the rail access connection arrangements, allowing for either a northern, central or southern rail access connection.

The northern, central and southern rail access options are detailed in Chapter 7 – *Project built form and operations* of this EIS. Each option is associated with a different indicative IMT layout. Only one of the options would be built; however approval is sought for all three options in order to:

- retain flexibility for the future terminal operator to define the most efficient and beneficial layout for the terminal; and
- manage uncertainties in relation to the securing of land for the rail access.

6.8.3 Further review of Project development phasing

Initial investigations into the Project assumed that the site, and in particular the IMEX function, would be developed rapidly to its full 1.05 million TEU capacity. Subsequently, the development phasing of the options was reviewed by MIC and Deloitte in 2013 and 2014, including further modelling of demand for the facility (Deloitte 2013).

The market feedback and further demand assessment provided a better indication of the likely rate of growth of demand for IMEX, warehousing and interstate business at the site. The outcome of this process was the selection of a revised ‘ramp up’ of the development through a series of development phases. Like Option A2, the preferred development phasing for the Project includes development of the IMT facility first, and a delay in the development of the interstate IMT facility until around 2025–2030, in timing with the expected demand. However, the preferred Project development phasing also includes a ramp up in the IMT and warehousing development over time. An Early Works component has also been added as the first phase of development. Further details of the revised development phasing are provided in Chapter 8 – *Project development phasing and construction*.

The layout and operational changes described above are incorporated into Chapter 7 – *Project built form and operations*. The indicative development phasing for the Project is detailed in Chapter 8 – *Project development phasing and construction*. Together these chapters describe the Project concept (and proposed Early Works) which are the subject of this EIS.