Chapter 19
Greenhouse gas assessment

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19. Greenhouse gas assessment

This chapter provides a description of the potential greenhouse gas (GHG) emissions and impacts associated with the construction and operation of the Moorebank Intermodal Terminal (IMT) Project (the Project). In addition, this chapter addresses the Commonwealth Department of the Environment (DoE)'s Environmental Impact Statement (EIS) Guidelines and the Secretary for the NSW Department of Planning and Environment (NSW DP&E)'s Environmental Assessment Requirements (NSW SEARs) for the Project as they relate to GHG (refer Table 19.1). Full details of the GHG assessment are contained in Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6 of this Environmental Impact Statement (EIS).

Table 19.1 Relevant Commonwealth EIS Guidelines and NSW SEARs

Requirement	Where addressed
Commonwealth EIS Guidelines under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	
Not specifically mentioned	N/A
NSW SEARs under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act)	
Air quality – including but not limited to:	
• A Scope 1 greenhouse gas assessment, as defined by the Greenhouse Gas Protocol; and	Section 19.2
• Taking into account the *Australian Greenhouse Office Factors and Methods Workbook* (AGO 2006)	Section 19.1 and 19.2

19.1 Assessment approach

The aim of the GHG assessment (refer to Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6) was to estimate the GHG emissions resulting from the construction and operation of the Project. The assessment also considered the potential emission reductions as a result of the Project, including reductions in transport energy (through fewer truck journeys).

The GHG assessment considered the impacts of each of the Project construction phases (Phases A, B and C) separately. The exception is the Early Works development phase; because the extent of works is relatively minor and short term, and because the GHG emissions are likely to be negligible, the Early Works phase has not been considered further in this chapter.

The GHG assessment also considers the operational impacts of the Project during Phases B, C and Full Build. The calculated GHG emissions during operation of the Project are largely based on an estimate of energy and fuel demand, which are conservatively based on demand calculations.

Construction and operational emissions were estimated using information from the indicative site layouts and the construction approach as described in Chapter 7 – *Project built form and operations* and Chapter 8 – *Project development phasing and construction,* as well as the other technical studies that have provided input into this EIS. This included information relating to vegetation clearing, projected traffic volumes, terminal plant and equipment estimates, utilities' design and projected electricity consumption. While each of the three rail access options results in a different IMT layout, these differences in layout are not likely to result in any significant variances in the total energy and fuel demands required for the Project. However, there is likely to be a difference in total vegetation clearing between the three option layouts. Preliminary estimates indicate approximately:

- 44 hectares (ha) of remnant vegetation would be cleared as a result of the northern rail access option and associated IMT layout;
- 48 ha of remnant vegetation would be cleared as a result of the central rail access option and the associated IMT layout; and
- 53 ha of remnant vegetation would be cleared for the southern rail access options and associated IMT layout.

For the purposes of this assessment the worst case scenario – involving clearing 53 ha – has been used for the GHG calculations.

The Project details are indicative only; further assessments will be undertaken during the Stage 2 State significant development (SSD) approval process to provide more detailed information on the GHG impacts of the Project.

19.1.1 Relevant policy

The GHG assessment considered relevant international, national and state policy and guidelines for GHG emissions and assessment, as detailed in section 3 of the Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6. This includes the Kyoto Protocol produced by the United Nations Framework Convention of Climate Change (UNFCCC) as well as the Australian Government Renewable Energy Target (RET) scheme, the *National Greenhouse and Energy Reporting Scheme,* the *National Greenhouse Energy Report Act 2007* and the NSW *Greenhouse Gas Reduction Scheme.*

In addition, the GHG assessment followed the accounting standards of the GHG Protocol (World Resources Institute/World Business Council for Sustainable Development 2004) in conjunction with:

- the National Greenhouse Account (NGA) Factors 2013 Guideline, which supersedes the factors identified in the Australian Greenhouse Office Factors and Methods Workbook (AGO 2006);
- other published information, including online manufacturer provided data;
- data supplied by the indicative IMT site layouts; and
- data from research or prior experience, where information has not been available from the above sources.

Using estimates of the energy consumption for the construction and operation stages of the Project, GHG emissions were calculated based on the GHG accounting factors supplied in the NGA Factors 2013 Guideline.

Emissions were reported in terms of standardised carbon dioxide equivalent (CO_2-e) values, which account for a number of GHGs, including carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O) and other synthetic gases (HFCs, SF_6, CF_4 etc.).

The major sources of direct emissions were categorised into Scope 1 and Scope 2 as defined in the NGA Factors 2013, both of which have been considered in this assessment, as follows:

- *Scope 1 emissions*: direct emissions from sources within the boundaries of Project operations such as fuel combustion within locomotives, vehicles, plant and equipment, heating and cooling; and
- *Scope 2 emissions*: indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation. Scope 2 emissions result from the combustion of fuel to generate the electricity, steam or heat and do not include emissions associated with the production of fuel.

Scope 3 emissions (indirect emissions) were not calculated as they do not require mandatory reporting.

19.1.2 Emissions by the Project

The study area relevant to the GHG assessment is defined by the Project site boundary, shown in Figure 1.1 in Chapter 1 – *Introduction*. Types of emissions (emission scopes) associated with the construction and operational phases of the Project are provided in Table 19.2 and Table 19.3 below.

Table 19.2 Project construction emission scopes

Scope	Emission sources
Scope 1	• Transportation of materials (via heavy vehicles); • Light vehicles for staff use; • Stationary energy including fuel use for construction equipment and diesel onsite generator; and • Woody vegetation clearing.
Scope 2	• Consumption of purchased electricity from the grid.

Table 19.3 Project operational emission scopes

Scope	Emission sources
Scope 1	• Operational fuel usage in locomotives; Vehicles and equipment; • Liquefied natural gas; • Municipal wastewater; and • Synthetic gases used in refrigeration (SF6).
Scope 2	• Consumption of purchased electricity from the grid.

Details of the calculation methodology and key assumptions used for the construction and operation emissions, including impacts of vegetation clearing, are described in section 4 of the Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6.

19.1.3 Heavy vehicle and background traffic emissions

Changes in GHG emissions were assessed in terms of:

- vehicle kilometres travelled (VKT) for Project-related heavy and freight vehicles (i.e. transport energy consumed); and

- the redistribution of background traffic, i.e. light vehicles and non-heavy vehicles driven by the general public).

As described in Chapter 11 – *Traffic, transport and access*, traffic modelling for the Project has predicted reductions in the amount of heavy vehicle traffic in metropolitan areas between Port Botany and Moorebank as a result of the import/export (IMEX) movement of freight by rail, as well as the interstate train freight associated with the Project. However, some increases in the VKT were experienced in the background traffic volumes in areas closer to the Project site. This is discussed further in section 19.2.2.

19.1.4 Cumulative assessment

In accordance with the NSW SEARs, this EIS includes a cumulative assessment of the GHG emissions of the Project in combination with development of the Sydney Intermodal Terminal Alliance (SIMTA) site and other planned developments within the surrounding region. The findings of the cumulative assessment are provided in Chapter 27 – *Cumulative impacts*.

19.2 Impact assessment

19.2.1 Early Works

As discussed in section 19.1, due to the nature and extent of activities associated with the Early Works, this development phase is likely to have negligible impacts in terms of GHG emissions.

19.2.2 Construction

A breakdown of Scope 1 and 2 GHG emissions during Phase A, Phase B and Phase C are shown in Tables 19.4, Table 19.5 and Table 19.6, respectively.

Table 19.4 Scope 1 and 2 emissions for Phase A construction works

Scope	Emission source	Source total	Emissions t CO_2-e
Scope 1	**Transport**		
	Light vehicle use for staff and onsite activities	797 kL	1,896
	Diesel heavy vehicle use for transport of materials	1,671 kL	4,503
	Stationary energy		
	Fuel use for equipment fleet and diesel power generation	10,661 kL	28,600
	Land use, land use change and forestry		
	Net loss of carbon sequestration potential due to clearing of woodlands, shrublands and forest	53 ha	14,442
Scope 2	**Stationary energy**		
	Purchased electricity use	157,498 kWh	139
Total Phase A construction			**49,580**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: kL = kilo-litres; ha = hectares; kWh = kilowatt hours

Table 19.5 Scope 1 and 2 emissions for Phase B construction works

Scope	Emission source	Source total	Emissions t CO_2-e
Scope 1	**Transport**		
	Light vehicle use for staff and onsite activities	831 kL	1,978
	Diesel heavy vehicle use for transport of materials	1,528 kL	4,119
	Stationary energy		
	Fuel use for equipment fleet and diesel power generation	2,165 kL	5,808
	Land use, land use change and forestry		
	Net loss of carbon sequestration potential due to clearing of woodlands, shrublands and forest	53 ha	1,929
Scope 2	**Stationary energy**		
	Purchased electricity use	125,998 kWh	111
Total Phase B construction			**13,945**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: kL = kilo-litres; ha = hectares; kWh = kilowatt hours

Table 19.6 Scope 1 and 2 emissions for Phase C construction works

Scope	Emission source	Source total	Emissions t CO_2-e
Scope 1	**Transport**		
	Light vehicle use for staff and onsite activities	266 kL	632
	Diesel heavy vehicle use for transport of materials	258 kL	695
	Stationary energy		
	Fuel use for equipment fleet, locomotives and diesel power generation	3,252 kL	8,724
	Land use, land use change and forestry		
	Net loss of carbon sequestration potential due to clearing of woodlands, shrublands and forest	53 ha	1,286
Scope 2	**Stationary energy**		
	Purchased electricity use	86,480 kWh	76
Total Project Phase C construction			**11,414**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: kL = kilo-litres; ha = hectares; kWh = kilowatt hours

As evident in Table 19.4 to Table 19.6, the main emissions generated during the construction phases are associated with stationary energy, with the exception of Phase B where the main emissions are due to transport (light and heavy vehicles). Stationary energy accounts for 58% of emissions during Phase A, 42% during Phase B and 76% during Phase C. Transport energy contributes to approximately 13% of emissions during Phase A, 44% of emissions during Phase B, and 12% of emissions during Phase C.

The predicted loss of carbon sequestration as GHG emissions (as a result of vegetation loss) is approximately 14,442, 1,929 and 1,286 t CO_2-e for Phases A, B and C respectively. However, the extent of GHG emissions associated with land clearing is not expected to be as significant as calculated, as it is expected to be partly balanced by native vegetation restoration in the conservation area within the Project site and in other landscaping as appropriate. Therefore, emissions due to land clearing are presented as a worst case.

Emissions from purchased electricity use would be minimal compared to other emission sources, contributing between 0.2% and 0.7% of GHG emissions for each phase.

19.2.3 Operation

Emissions within Project site boundary

A breakdown of the annual Scope 1 and 2 GHG emissions for the Phase B, Phase C and Full Build of the Project is shown in Table 19.7 to Table 19.9.

Table 19.7 Annual Scope 1 and 2 emissions for Phase B

Scope	Emission source	Source total	Units	Emissions (t CO_2-e/year)
Scope 1	**Transport**			
	Light vehicle use for staff and onsite activities	101,069	L (petrol)	240
	Diesel heavy vehicle use	503,805	L (diesel)	1,358
	IMEX locomotive trains	538,200	L (diesel)	1,450
	Stationary			
	Fuel use for equipment fleet (forklifts, sidepicks, switch engines and stand-by power generation)[1]	2,544,684	L (LNG and diesel)	6,826
	Intermodal terminal vehicles (ITVs)	3,416,400	L (LNG)	5,259
	Natural gas			
	Natural gas distributed in a pipeline	2,192	GJ	112
	Waste			
	Wastewater treatment onsite	100	Personnel	23
	Industrial processes including use of synthetic gases			
	Sulfur hexafluoride (SF_6) losses	0.2	tonnes	23
	Refrigerant (HFC R134a) losses	6.1	tonnes	606
Subtotal – Scope 1				15,898
Scope 2	**Stationary energy**			
	Purchased electricity use (storage yard, rail terminal, reefer storage box, flooding lighting, onsite buildings, and warehousing)	53,653,264	kWh	47,215
Total annual operational emissions (t CO_2-e/year)				**63,113**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: [1] Equipment fleet is fuelled by LNG with the exception of switch engines which are diesel fuelled. L = litres; LPG = Liquefied petroleum gas; Gj = gigajoules and kWh = kilowatt hours

Table 19.8 Annual Scope 1 and 2 emissions for Phase C

Scope	Emission source	Source total	Units	Emissions (t CO_2-e/year)
Scope 1	**Transport**			
	Light vehicle use for staff and onsite activities	243,418	L (petrol)	579
	Diesel heavy vehicle use	1,142,024	L (diesel)	3,077
	IMEX locomotive trains	1,068,600	L (diesel)	2,880
	Stationary			
	Fuel use for equipment fleet (forklifts, sidepicks, switch engines and stand-by power generation)[1]	2,544,684	L (LNG and diesel)	6,826
	Intermodal terminal vehicles (ITVs)	3,416,400	L (LNG)	5,259
	Natural gas			
	Natural gas distributed in a pipeline	4,712	GJ	242
	Waste			
	Wastewater treatment onsite	215	Personnel	50
	Industrial processes including use of synthetic gases			
	Sulfur hexafluoride (SF_6) losses	0.2	tonnes	23
	Refrigerant (HFC R134a) losses	12.8	tonnes	1,272
Subtotal – Scope 1				20,208
Scope 2	**Stationary energy**			
	Purchased electricity use (storage yard, rail terminal, reefer storage box, flooding lighting, onsite buildings, and warehousing)	105,958,132	kWh	93,243
Total annual operational emissions (t CO_2-e/year)				**113,452**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: [1] Equipment fleet is fuelled by LNG with the exception of switch engines which are diesel fuelled. L = litres; LPG = Liquefied petroleum gas; Gj = gigajoules and kWh = kilowatt hours

Table 19.9 Annual Scope 1 and 2 emissions for Full Build

Scope	Emission source	Source total	Units	Emissions (t CO_2-e/year)
Scope 1	**Transport**			
	Light vehicle use for staff and onsite activities	313,279	L (petrol)	745
	Diesel heavy vehicle use	1,983,827	L (diesel)	5,346
	IMEX locomotive trains	1,068,600	L (diesel)	2,880
	Interstate locomotive trains	93,600	L (diesel)	252
	Stationary			
	Fuel use for equipment fleet (forklifts, sidepicks, switch engines and stand-by power generation)[1]	3,075,568	L (LNG and diesel)	8,248
	Intermodal terminal vehicles (ITVs)	6,964,200	L (LNG)	10,720
	Natural gas			
	Natural gas distributed in a pipeline	6,903	GJ	354
	Waste			
	Wastewater treatment onsite	315	Personnel	73
	Industrial processes including use of synthetic gases			
	Sulfur hexafluoride (SF_6) losses	0.2	tonnes	23
	Refrigerant (HFC R134a) losses	19	tonnes	1,877
Subtotal – Scope 1				30,519
Scope 2	**Stationary energy**			
	Purchased electricity use (storage yard, rail terminal, reefer storage box, flooding lighting, onsite buildings, and warehousing)	136,617,564	kWh	120,223
Total annual operational emissions (t CO_2-e/year)				**150,743**

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

Notes: [1] Equipment fleet is fuelled by LNG with the exception of switch engines which are diesel fuelled. L = litres; LPG = Liquefied petroleum gas; Gj = gigajoules and kWh = kilowatt hours

The main sources of emissions during the operational phases of the Project are from stationary energy (Scope 2). This accounts for 74%, 82% and 80% of emissions Phases B, C and Full Build respectively.

The total annual emissions generated by the Project during Full Build operations are estimated to be 150,743t CO_2-e/year in 2030. The main sources of emissions associated with the Project during Full Build are related to stationary energy (Scope 2), being 79% of the total operational emissions during Full Build. Stationary (Scope 1) accounts for 13% of Full Build operational emissions and transport accounts for 6%. Wastewater treatment and use of onsite natural gas contributes to <0.5% of Full Build operational emissions.

Heavy vehicle emission reductions (associated with transport of freight to/from Project site)

The Project would result in an overall reduction in VKT, primarily as a result of the mode shift from trucks to trains for IMEX freight travelling between Port Botany and the Project site. Table 19.10 shows an estimation of heavy vehicle emission reductions as a result of the Project.

Table 19.10 Potential heavy vehicle emission reductions from Project

Year (phase of operation)	Reduction in VKT travelled/year	Fuel reduction (kL/year)	Emissions reduction (t CO_2-e/year)
2023 (operation of Phase B)	5,210,548	1,563	4,210
2028 (operation of Phase C)	11,792,216	3,538	9,530
2030 (Full Build operations)	20,499,230	6,150	16,570

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

While the Project will result in reduced VKT for trucks, there will be an increase in train movements, as a result of the mode shift from trucks to trains. When taking in consideration the increase in CO_2 emissions from trains, it has been found that overall there would be an overall reduction of approximately 7300 tonnes of CO_2-e a year from the Project (as a result of the use of trains rather than trucks).

Notwithstanding this, there would be a relatively minor increase in background traffic emissions due to traffic diverting around the Project site and other road network improvements. Table 9.11 shows the potential background traffic emission increases relating to the Project.

Table 19.11 Potential background traffic emission increases relating to the Project

Year (phase of operation)	Increase in VKT travelled/year	Fuel (kL/year)	Emissions contribution (t CO_2-e/year)
2023 (operation of Phase B)	2,571,306	244	581
2028 (operation of Phase C)	4,090,715	389	925
2030 (Full Build operations)	3,908,094	371	884

Source: Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6

These predicted increases in emissions relate directly to increases in VKT (not a measure of traffic congestion, but only of distance). The traffic modelling behind the increases in VKT incorporates a number of complexities, including future road network improvements which may make background trips quicker, but at the same time increase the VKT.

19.2.4 Summary

As discussed above, total emissions generated during the Project's construction are predicted to be 49,580 t CO_2-e for Phase A, 13,945 t CO_2-e for Phase B; and 11,414 t CO_2-e for Phase C. Thus, the total emissions generated from the sum of these construction phases is approximately 74,939 t CO_2-e, which is made up of transport, stationary, land use and stationary energy emission sources, as shown in Figure 19.1 below.

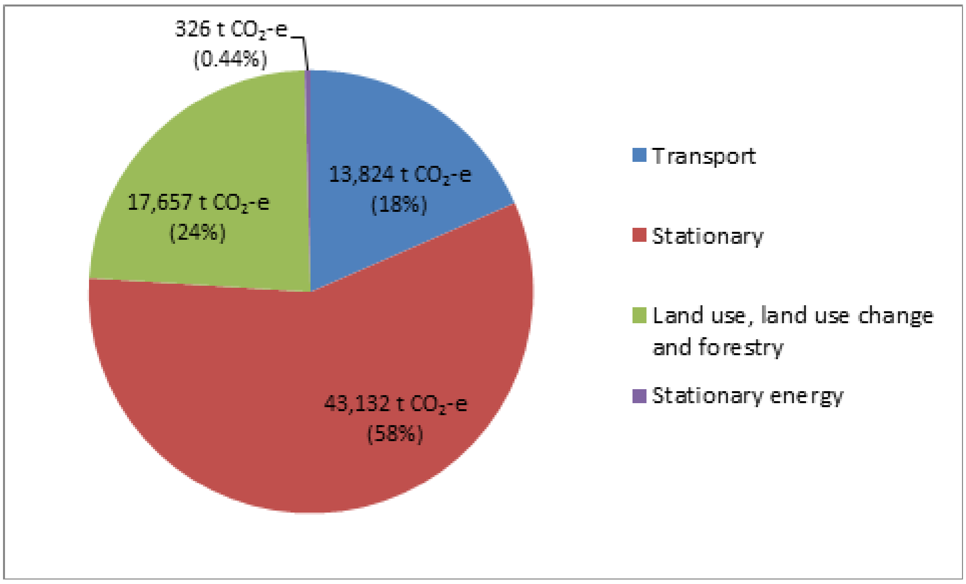

Figure 19.1 GHG emission sources for the total Project construction (all phases)

Once the Project is fully operational in 2030, processing and transportation activities would be conducted 7 days a week, 24 hours a day, which would result in approximately 30,520 t CO_2-e of Scope 1 emissions and 120,223 t CO_2-e of Scope 2 emissions year (refer to Table 19.9).

The annual operation of the Project at Full Build is projected to emit 150,743 t CO_2-e. However, this represents only a very small proportion of national (approximately 0.02%) and NSW (approximately 0.09%) GHG emissions.

As shown in Figure 19.2, the Project as a whole would result in reductions in freight transport emissions that outweigh the predicted increase in background traffic emissions (refer to Table 19.11).

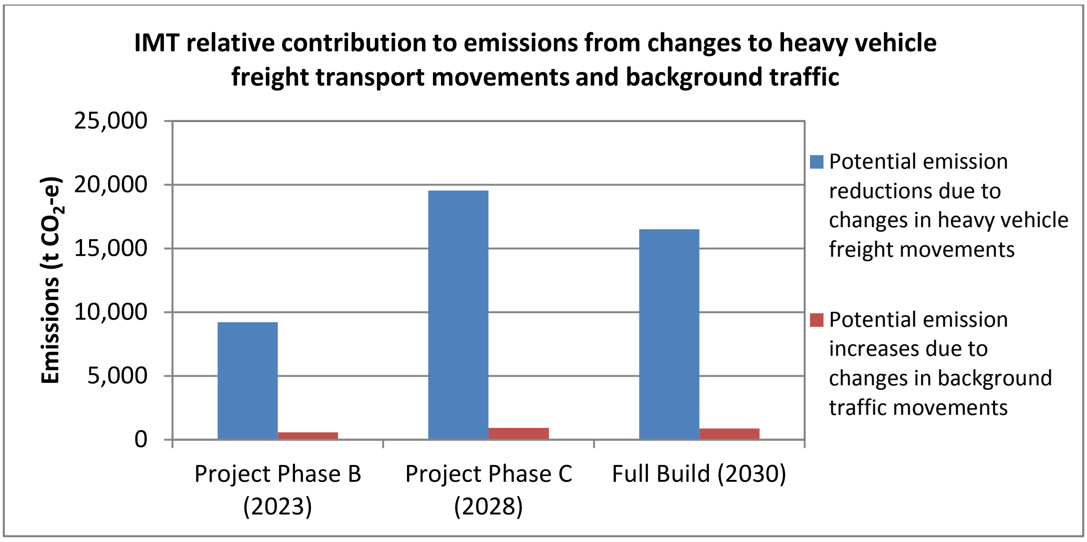

Figure 19.2 Comparison of GHG emissions using forecast VKT

19.2.5 Consideration of cumulative impacts

As GHG emissions are quantified and compared on a global scale, a cumulative assessment of GHG emissions resulting from the Project and other nearby developments is not considered relevant.
A general assessment of the cumulative impacts of the Project in relation to development of the SIMTA site to the east of the Project site is contained within Chapter 27 – *Cumulative impacts*.

19.3 Management and mitigation

Throughout the construction and operation of the Project, the primary focus would be to improve and maintain operational efficiencies, by implementing best practice technologies to reduce energy consumption and GHG emissions. The mitigation and management measures below describe the key actions and procedures that would be undertaken, where feasible, to minimise energy consumption and GHG emissions throughout the Project.

19.3.1 Construction

The following measures are proposed for the construction of the project (including Early Works):

- Where possible, establish and maintain areas of native flora and vegetation either within the Project site or at alternative suitable locations to generate significant carbon sequestration benefits.
- Where possible, implement the use of biofuels (e.g. biodiesel, ethanol, or blends such as E10 and B880) to reduce GHG emissions from plant and equipment.
- Consider the use of vehicles with GHG emissions ratings of a minimum of 7.5 for passenger vehicles and 6 for light commercial vehicles, as described in the Green Vehicle Guide (http://www.greenvehicleguide.gov.au/GVGPublicUI/home.aspx).

As well as the above general mitigation and management measures, Table 19.12 below describes a number of specific options available for mitigating major sources of GHG emissions through reducing energy consumption during the construction phases of the Project. These options would be further considered as part of the detailed design and construction planning for the Project.

Table 19.12 Mitigation options for reducing energy and GHG emissions

Emissions source	Project use	Suggested alternative	Potential reduction (% of GHG intensity)	Comments
Diesel	Plant and equipment	Biodiesel (B20)	14.8%	Switch engine manufacturers have different acceptance levels for Biodiesel blends (e.g. Isuzu accepts only B5, Caterpillar accepts B20 on compact and mid-range industrial engines).
	Transport	Biodiesel (B20)	14.8%	A key issue with biodiesel for trucks might be the reduction in power output; although with blends this reduction in power is not significant.
Truck movements and fuel usage	Materials haulage	Reduce truck idling	Various	Despite difficulty in measuring the reduced to CO_2-e, it is clear that by minimising prolonged idling, typical vehicles can avoid 2 to 2.5 L of fuel per hour of idling.
		Movement planning to reduce travel distances	Various	Despite difficulty in measuring reduced to CO_2-e, by planning delivery schedules so there are fewer and shorter trips, energy/GHG emissions can be saved.
Electricity usage	Electricity use for construction and operation	50–100% green power	50–100%	Green power is sourced from renewable energy sources and generally has a small price premium attached to it, dependent on the % of green power sourced.

19.3.2 Operation

- Energy-efficient guidelines for operational work, such as minimal idling time for machinery or complete shut off, would be considered and implemented where appropriate.
- The use of biofuels (e.g. biodiesel, ethanol, or blends such as E10 and B880) to reduce GHG emissions from plant and equipment would be considered and implemented where feasible.
- The use of vehicles with GHG emissions ratings of a minimum of 7.5 for passenger vehicles and 6 for light commercial vehicles, as described in the Green Vehicle Guide (http://www.greenvehicleguide.gov.au/GVGPublicUI/home.aspx), could be considered.
- Establish an Environmental Management System (EMS) that involves regular monitoring, auditing and reporting on energy, resource use and GHG emissions from all relevant activities.
- Include energy audits with a view to progressively improving energy efficiency and investigation of renewable energy sources (e.g. onsite solar generation) where feasible.
- Investigate methods to reduce losses from industrial processes (refrigerants and SF6).
- Investigate and, where possible, implement key performance indicators (KPIs) for plant efficiency and GHG intensity.

- Where possible, establish and maintain areas of native flora and vegetation either within the Project site or at alternative suitable locations to generate significant carbon sequestration benefits.
- Consider and implement, where appropriate, the measures identified in Table 19.12 (i.e. these measures may be appropriate to implement not only for construction but also for operation of the Project).

In addition, as outlined in Chapter 9 – *Project sustainability,* mitigation measures that would assist in minimising GHG emissions and would also contribute to the delivery of environmental sustainability include:

- greenhouse gas targets for the Project, set in accordance with the relevant sustainability policies and rating tools discussed above, could be considered during the detailed design phase;
- the use of energy efficient materials, fixtures and fittings would be considered for the Project site and installed where appropriate;
- the potential for use of onsite renewable energy generation to cover a proportion of the Project site's energy requirements would be explored during detailed design, based on operational requirements. Potential options would include installation of photovoltaic (PV) cell panels and wind turbines; and
- solar streetlights, lit with light emitting diodes (LED), would be considered and utilised for external lighting and for internal lighting where applicable.

19.4 Summary

The key aspects of the Greenhouse Gas Assessment for the Project are summarised below:

- The Project would result in the emission of GHG during both the construction and operational phases of the Project. The main emission sources during the construction phase would be associated with stationary energy (fuel use for equipment fleet and diesel power generation) and transport (light and heavy vehicles). During the operational phases of the Project the main emission sources would be stationary energy (purchased electricity use) as well as stationary energy (fuel use for equipment fleet).
- Due to the nature and extent of activities associated with the Early Works, this development phase is likely to have negligible impacts in terms of GHG emissions.
- Once the Project is fully operational in 2030, the annual GHG emissions would represent only a very small proportion of national (approximately 0.02%) and NSW (approximately 0.09%) emissions. Furthermore, the Project as a whole would result in reductions in freight transport emissions, as a result of the mode shift from trucks to trains for IMEX freight travelling between Port Botany and the Project site.

Table 19.13 provides a summary of the Project's potential GHG impacts at Full Build for each rail access option.

Table 19.13 Summary of GHG emissions at Full Build, without mitigation, for each rail access option

Impact	IMT layout and associated rail access connection option		
	Northern	Central	Southern
Emission of GHGs including carbon dioxide, methane nitrous oxides and other synthetic gases	•[1]	•[1]	•[1]
Reductions in freight transport emissions that outweigh the predicted increase in background traffic emissions	•	•	•

Key: • = impact, - = no impact

Notes: [1] The emissions would represent only a very small proportion of national and NSW emissions

Mitigation measures that improve and maintain operational efficiencies and reduce energy consumption and GHG emissions would be considered and implemented, where feasible, during the construction and operational phases. This includes measures such as use of biofuels, establishing and maintain areas of native flora and fauna; and regular monitoring, auditing and reporting on energy, resource use and GHG emissions.