Port of Gladstone
Gatcombe and Golding Cutting Channel Duplication Project

Environmental Impact Statement

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Transport

Contents

15 Transport

15.1 Chapter purpose

The purpose of this chapter is to describe the existing transport infrastructure that may be impacted by Project activities. This includes road, rail, marine and air transport infrastructure in the Gladstone region. The chapter addresses the following:

- The methodology adopted to assess the potential transport impacts from Project activities (refer Section 15.2)
- Project activities and their relevance to existing transport infrastructure (refer Section 15.3)
- Extent, function and/or capacity of the existing transport infrastructure (refer Sections 15.4 (road), 15.5 (rail), 15.6 (marine vessels) and 15.7 (air))
- Traffic generation from the construction of the WBE reclamation area bund walls, the BUF and other Project activities (refer Section 15.4.4)
- Potential transport impacts from the Project activities (refer Section 15.4.6 (road), Section 15.5 (rail), Section 15.6.4 (marine), Section 15.7 (air))
- Mitigation measures to minimise potential transport impacts from the Project activities (refer Section 15.4.7 (road), Section 15.5 (rail), 15.6.5 (marine), Section 15.7 (air)).

The chapter is structured to present a transport impact assessment for each transport mode namely road, rail, marine and air transport.

15.2 Methodology

The methodology adopted to assess the potential transport impacts from Project activities includes:

- Identify the existing transport infrastructure associated with road, rail, sea and air travel relevant to the Project activities
- Establish the dredging equipment transport requirements (i.e. area to be dredged, the number and type of dredgers, barges, pushbusters, tug and work boats to be used during the dredging activity)
- Establish timeframes for the dredging of the barge across channel and duplicate channels, and the associated workforce required to undertake these works
- Establish the transport requirements associated with the BUF and reclamation area bund wall material (i.e. quarry location, haul route(s), the number of vehicle movements and the type of vehicles to be used)
- Establish timeframes for the construction of the bund walls and dredged material placement process, and the associated workforce required to undertake these works
- Establish the timeframe for the navigational aids works, and the associated workforce required to undertake these works
- Assess the potential road impacts from Project activities by:
  - Determining the daily vehicle movements generated via the Project haulage requirements, personnel transport requirements and capacity of haulage vehicles
  - Assessing the potential impacts of the haulage routes on route users
- Assess potential rail impacts and the feasibility of rail utilisation from Project activities

- Assess the potential marine transport issues associated with vessels utilising the Port during the project implementation and following the completion of Project activities
- Assess any implications for aviation transport infrastructure
- Identify transport mitigation measures to address the potential impacts.

15.3 Project activities and relevance to transport infrastructure

15.3.1 Summary of Project activities

Table 15.1 provides a summary of the Project activities and their relevance to road, rail, sea and air transport modes.

The dredging activities, changes to navigational aids and the traffic generated from the Project workforce at all locations will generate low levels of additional shipping and traffic movements in the region. The main Project activity with the potential to generate additional transport movements is the WBE reclamation area bund wall and BUF construction, and accordingly this activity is addressed in detail in the transport impact assessment.

Table 15.1 Summary of Project activities and their relevance to transport infrastructure modes

Project activity	Activity description	Relevance to transport infrastructure and related workforce
Reclamation bund wall and BUF construction	The transport of rock material for the construction of the reclamation bund walls and part of the BUF wall. The most likely quarry location is in the Targinnie/Yarwun area. Rock material is assumed to be transported to the reclamation areas via the public road network, for the purposes of the EIS The assumed public road haul route to the WBE reclamation area is Guerassimoff Road and Landing Road Transport of structural components for use in BUF construction via the public road network Transport of fill material for BUF from existing dredged material in the WB reclamation area	■ Increased heavy vehicle traffic along the preferred haul route during the 36 month construction period ■ Workforce of up to 20 people at WBE reclamation area and BUF
Initial dredging	Initial dredging to establish barge access channel (0.25Mm^3)	■ A TSHD and CSD undertaking the initial dredging works to dredge the barge access channel. The dredged material will be pumped from the dredgers and placed in the WB reclamation area.
Dredging	Dredging to permanently duplicate the existing Gatcombe and Golding Cutting Channels over two dredging campaigns Stage 1 dredging involves 7.25Mm^3 and Stage 2 dredging involves 5.35Mm^3	■ A large sized TSHD dredging the channel areas and placement of dredged material into a fleet of four barges ■ Interaction of dredger, barges, pushbusters, tug and work boats with shipping traffic ■ Dredging workforce of 160 over two shifts

Project activity	Activity description	Relevance to transport infrastructure and related workforce
Barge unloading and dredged material placement	Barges will transport the dredged material from the Gatcombe and Golding Cutting Channels to the BUF to be unloaded using large excavators into trucks to place the material within the WB and WBE reclamation areas	■ Four barges to transport dredged material from the Gatcombe and Golding Cutting Channels to the BUF ■ Six excavators and 32 trucks involved in unloading operations with increased traffic and parking at reclamation areas and site office ■ Workforce of 164 (over two shifts) involved in barge unloading and trucking of dredged material ■ Traffic movements within WB and WBE reclamation areas
Managing dredged material within the reclamation areas	Placement of the dredged material within the WB and WBE reclamation areas and management of fine material, tailwater and stormwater	■ Increased traffic and parking at reclamation areas and site office ■ Workforce of up to 32 people (over two shifts) at the WB and WBE reclamation areas involved in reclamation area works
Changes to navigational aids	Removal of two existing navigational aids, relocation of five existing navigation aids, and installation of five new navigational aids involving a barge and vibratory hammer (pile extractor)	■ Negligible increase in shipping movements ■ Workforce of up to 10 people
Maintenance and stabilisation of the WB and WBE reclamation areas	Surface stabilisation works (capping and/or landscaping) for the portion of the reclamation areas that has achieved the final design surface level	■ Traffic and parking at reclamation area and site office for a small part time GPC workforce, peaking at 8 people during stabilisation works ■ Increased traffic (road and marine) in long term from potential Port development areas on the WB and WBE reclamation areas as potential future land uses become operational (subject to separate approvals)
Maintenance dredging	Overall net annualised siltation rate within the shipping channels of the Port is likely to increase by approximately 7% following completion of the Project	■ Minor increase in traffic and parking during shift changes.

15.3.2 Additional shipping and vessel movements

The Project will generate additional vessel movements associated with dredging and the changes to navigational aids. The initial dredging of the barge access channel by a TSHD and CSD with dredger shuttle and survey vessels will be undertaken over a 6.5 week period. Dredging for the duplication of the Gatcombe and Golding Cutting Channels will involve a TSHD working 110 dredging hours per week supported by dredger shuttle and survey vessels. A fleet of four barges will each make 10 trips per week between the Gatcombe and Golding Cutting Channels and the BUF. Stage 1 dredging will be undertaken over a 33 week period with Stage 2 dredging undertaken over a 25 week period. The changes to navigation aids will involve one barge and one work boat over an 8 to 12 week period.

The Port of Gladstone has well established procedures and guidelines for vessel movements and associated activities. The Regional Harbour Master will be consulted in relation to Project generated vessel movements and activities within the Port. Dredging equipment and associated vessels will obtain the Regional Harbour Master approval prior to commencing work (where required).

It is important to note that while the Project will facilitate an improvement in the existing and future vessel movement efficiency, and a reduction in the likelihood of vessel incident risk, the duplication of the Gatcombe and Golding Cutting Channels will not have any direct influence on increasing vessel movement numbers within the Port.

15.3.3 Dredged material placement area

The preferred location for the placement of dredged material is the WBE reclamation area, however some of the dredged material will be placed in the existing WB reclamation area. The concept design for the reclamation and dredged material placement in the WBE reclamation area is described in Section 2.5. For the purposes of the EIS, the potential quarry location is within the Targinnie\Yarwun area and rock material is likely to be transported to the WBE reclamation area via the public road network (refer Section 2.5.4).

Figure 15.1 shows the location of the WBE reclamation area and the likely haul routes to be used for transporting rock to the WBE reclamation area for use in bund wall construction.

15.3.3.1 Reclamation bund material requirements

The reclamation bund walls, including part of the BUF wall, will comprise of two material types with the approximate volumes summarised in Table 15.2. Section 2.5.3 provides additional details on the reclamation area bund wall concept design.

Table 15.2 Western Basin Expansion reclamation area bund wall material types and volumes

Rock type	Weight range (kg)	Southern area approximate quantity (m^3)	Northern area approximate quantity (m^3)	Total approximate quantity (m^3)
Armour	200 to 300	60,000	113,000	**173,000**
Core	10 to 100	387,568	567,730	**955,298**
Total rock volumes (m^3)		**447,568**	**680,730**	**1,128,298**

Table notes:

Rock density is 2.6t/m^3
Quantity volumes are based on a 1.3 allowance for sinkage and contingency
Core material will contain fines (approximately 5%) to assist in the sealing of the outer bund wall
Armour and core material quantities includes allowances for BUF wall requirements

15.3.3.2 Reclamation area construction timeframe and workforce

The Project dredging is expected to commence in 2023, however the timing of the commencement could be after this time subject to actual and predicted Port throughput and associated vessel movements over the next 5 to 10 years. Pre-dredging reclamation works will be required prior to commencing dredged material placement, such as site establishment and construction of bund walls and the BUF.

A construction compound will be located within the general vicinity of the WBE reclamation area. A site office for up to 20 construction staff will be utilised during the establishment of the reclamation outer bund walls and BUF and up to 196 staff during the unloading and placement of the dredged material. A carpark for office and workshop staff will also be established within the construction compound area. For the purposes of the EIS the location of the construction compound is shown in Figure 15.1. The final location and layout of these facilities will be determined prior to the outer bund wall construction commencing, and will consider adjoining land use activities and access requirements.

The workforce post dredging for the reclaimed land will involve stabilisation, environmental management activities (e.g. dust control, erosion and sediment control) and landscaping works. The workforce is likely to be minimal and will involve up to eight GPC staff on a part time basis during maintenance and stabilisation activities.

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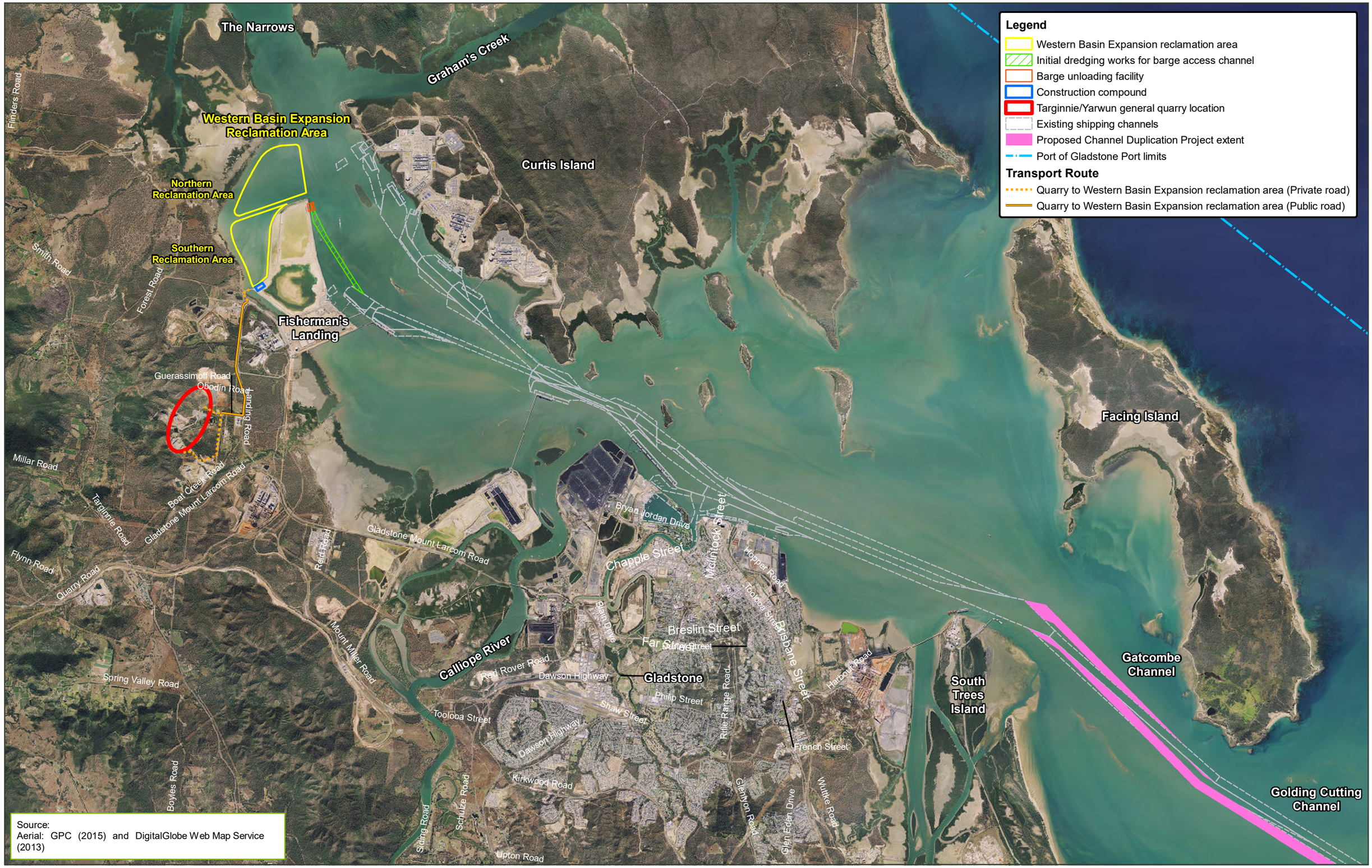

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Aerial: GPC (2015) and DigitalGlobe Web Map Service (2013)

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Date: 05/12/2018 Version: 15 Job No: 237374
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Gatcombe and Golding Cutting Channel Duplication Project

Figure 15.1: Western Basin Expansion reclamation area and potential quarry locations and likely haul routes

15.4 Road infrastructure assessment

15.4.1 General

The Gladstone region is serviced by an extensive approved heavy freight road network (approved for Truck and Dog and B-Double combinations) reflecting the high industrial and Port-related freight activities in the region. This approved freight network allows for improved freight transport efficiency, improved road safety and reduced adverse environmental impacts that are generally associated with heavy vehicles.

In the period from 2010 to 2014, Gladstone experienced significant traffic growth associated with the construction phase of major projects, including the WICT Project and the three LNG plants on Curtis Island. This growth in traffic placed elements of the road network under pressure particularly at key intersections during peak periods however this construction activity has now been finalised.

Current traffic volumes are typically at 2008 year levels with future growth highly dependent on further large project construction phase activities. Notwithstanding the 2010 to 2014 period, background traffic growth for the Project life is likely to be approximately 2% per annum, utilising historic DTMR annual average daily traffic (AADT) data. It is therefore difficult to predict the actual traffic volumes in the region for the period of main traffic generation activity associated with the Project (i.e. transport of reclamation outer bund wall material), which potentially could commence in 2020 or later.

Recent major road improvements within the network of potential roads to be utilised by vehicles associated with Project activities include the signalisation of the Philip Street and Dawson Highway intersection, upgrades to the Gladstone Mount Larcom Road and Landing Road intersection, and upgrades to the Gladstone Mount Larcom Road and Reids Road intersection.

The road infrastructure assessment is structured in accordance with the DTMR's Guide to Traffic Impact Assessment (DTMR 2017b).

As described in Guide to Traffic Impact Assessment, the fundamental basis of the DTMR approach is to serve the needs of industry and the broader community in a way that does not compromise the safety, transport efficiency or future planning of the State Controlled Road (SCR) network. To ensure the safety and efficiency outcomes from development impacts, the appropriate scope and level of a road impact assessment, and the need to consider a range of issues, including:

- Impact on the local community
- Road safety considerations
- Extent of potential impacts
- Whole-of-government objectives
- DTMR's strategic documents and investment strategies
- Local government planning schemes and instruments, as well as the land use implications flowing from these schemes and instruments.

15.4.2 Proposed development details

The sites associated with the Project are located within the industrial and port precincts of Gladstone and are highly compatible with the surrounding land use.

15.4.2.1 Current and intended use of the sites

Table 15.3 summarises the current and intended use of the sites.

Table 15.3 Current and intended use of the sites

Site	Current use	Intended use
Gatcombe and Golding Cutting Channels	Navigation channel	Navigation channel
WB and WBE reclamation areas	Harbour	Port – Reclamation area
Targinnie/Yarwun area	Special Purpose - Quarry	Special Purpose – Quarry

15.4.2.2 Proposed access location to road network

Due to the nature of the Project there is no specific access location to the network. During construction the main points of access are summarised in Table 15.4.

Table 15.4 Proposed access location(s) to road network

Site	Access location to road network
WB and WBE reclamation areas	Landing Road and Targinnie Landing Road
Targinnie/Yarwun area	Guerassimoff Road

15.4.2.3 Numbers of employees and visitors

During construction it is estimated that the Project will employ a maximum total of 386 people, including civil contractors, operators of dredgers, pushbusters, barges and a tug, dredger tender staff, truck and excavator drivers, office support and supervisors.

Due to the nature of the Project it is expected that the existing GPC workforce will undertake the maintenance and stabilisation of the WB and WBE reclamation areas after the completion of the dredging. It is not expected that there will be traffic associated with visitation after the completion of the construction phase.

15.4.2.4 Proposed hours of operation, peak times

During construction the dredging and dredged material placement activities will operate for 24 hours per day, 7 days per week in two shifts. A small peak in associated road traffic can be expected around the time of the shift change. Heavy vehicle movements carrying rock material for bund wall construction will operate for 12 hours per day (06:30 to 18:30) on a 6 day working week (Monday to Saturday).

15.4.2.5 Origins of major Project inputs and destinations of outputs

Due to the nature of the Project, inputs and outputs are limited to those during the construction phase.

15.4.3 Surrounding road network details.

This section analyses the sections of the State-controlled road network surrounding the Project that are likely to be most affected by the Project. It also includes the sections that are controlled by GRC. The Project will have an impact to the road network only during the construction phase. The roads affected by the bund wall construction are shown in Figure 15.1 and described in Table 15.5 and Table 15.6.

Table 15.5 Route for haulage of rock material for Western Basin Expansion bund wall and part of the barge unloading facility construction

Quarry	Haulage route	Route length	Number of intersections[1]
Targinnie/Yarwun	Guerassimoff Road and Landing Road	3.5 km	2

Table note:

1 Turning at intersections, level rail crossings, traffic lights and roundabouts. No other through movements.

The characteristics of each road section for the proposed haulage route is presented in Table 15.6. Traffic counts for Landing Road and Guerassimoff Road are shown in Table 15.7.

Landing Road has Average Weekday Traffic (AWT) of 1,591 vehicles with 46% being heavy vehicles and Guerassimoff Road has an AWT of 552 with 62% being heavy vehicles. The percentage of heavy vehicles on both roads is reflective of the industrial nature of the locality which includes heavy manufacturing industry and hard rock quarries (refer Table 15.7).

The WB and WBE reclamation areas are accessible from Landing Road, a GRC local road which operates as an industrial access road servicing existing industries, quarries and the Fisherman's Landing Port Precinct. Site access to the reclamation areas is available from a gravel road off Landing Road along the foreshore and across an existing causeway onto the existing WB reclamation area (the preferred access for the Project construction activities). Alternatively, there is access via entry to the Port Precinct on Noel Bowley Way.

Table 15.6 Road characteristics for roads on the proposed haulage route from the quarry to the Western Basin Expansion reclamation area and barge unloading facility

Section	Ownership	Road condition	Width	Length	Cross section	Traffic volumes AWT	% of heavy vehicle traffic	Heavy vehicle access	Adjacent land use
Guerassimoff Road	GRC	Sealed	10m	500m	Two lane undivided with appropriate shoulders	1,591	46%	PBS2A[1]	Industrial
Landing Road	GRC	Sealed	10m	3,000m	Two lane undivided with appropriate shoulders	552	62%	PBS2A[1]	Industrial

Table note:

1 PBS (Performance Based Standards) 2A equates to a 30m B-Double

Table 15.7 Traffic counts for Landing Road and Guerassimoff Road (2018)

			Landing Road						Guerassimoff Road					
			North			South			East			West		
			Total vehicles	Heavy vehicle	% Heavy	Total vehicles	Heavy vehicle	% Heavy	Total vehicles	Heavy vehicle	% Heavy	Total vehicles	Heavy vehicle	% Heavy
14 hour summary	Wed	21/03/2018	752	381	51%	803	380	47%	316	212	67%	290	193	67%
	Thurs	22/03/2018	749	381	51%	824	382	46%	307	193	63%	281	174	62%
	Fri	23/03/2018	507	202	40%	569	207	36%	213	133	62%	191	116	61%
	Mon	26/03/2018	720	361	50%	800	363	45%	239	149	62%	201	122	61%
	Tues	27/03/2018	701	347	50%	808	357	44%	249	145	58%	220	120	55%
Average			686	334	49%	761	338	44%	265	166	63%	237	145	61%
Expansion factor			1.1			1.1			1.1			1.1		
24 hour			754	368	49%	837	372	44%	291	183	63%	260	160	61%

Source: Austraffic March (2018)

15.4.4 Traffic generation from construction of reclamation bund walls

15.4.4.1 General

The supply of reclamation and BUF bund wall material has been identified as the major Project traffic generation activity with the potential to impact on current transport networks. Traffic generation from other Project activities is addressed separately in Section 15.4.5.

15.4.4.2 Sources, transport scenarios quantities and trip generation

As part of the EIS a Bund Wall Material Sourcing Strategy has been undertaken (refer Appendix E7) which identified and assessed six different quarry operations that may be suitable for producing the armour, core and earth material. The Strategy concluded that the preferred material sourcing location for the purposes of the EIS would be the Targinnie/Yarwun quarry area (refer Figure 15.1). This quarry location was chosen due to:

- Availability of suitable armour and core material
- Economic viability of different transport scenarios and distances.

Table 15.8 to Table 15.11 provides the indicative trip movements for transporting the bund wall material quantities (including material required for part of the BUF wall) shown in Table 15.2, and adopting the following assumptions:

- Conversion rate of $1m^3$ to 2.6t for rock material (including core and armour) and $1m^3$ to 1.8t for earth material
- Haulage payload of 40t per B-Double vehicle
- Truck movements to occur over a 6 day working week (Monday to Saturday) assumes 300 work days/year which on average equals 25 work days/month
- Daily truck movements for the WBE reclamation area (southern and northern reclamation areas) and BUF assumes a three year construction period (18 months for each reclamation area) and a 6 day working week for each area.

The construction of the southern and northern reclamation bund walls for the WBE reclamation area are to be undertaken separately in two consecutive stages. The BUF bund walls will be constructed in the last 12 months in parallel with the northern reclamation bund walls.

Table 15.8 Transport options from the preferred borrow source with estimated daily and total haulage movements

Transport option	Quarry	Haulage route	Route length	Approximate one way truck travel time (minutes: seconds)	Estimated maximum daily haulage movements for Project construction	Estimated total haulage movements for Project construction (truck movements)
B-Double (40t payload)	Yarwun/ Targinnie	Guerassimoff Road and Landing Road	3.5km	4:10	198 movements a day (maximum)	73,340

Table 15.9 Preferred borrow source and transport scenarios

Reclamation option	Borrow source	Estimated total haulage movements for Project construction	Estimated max daily haulage movements for Project construction
B-Double (40t payload)			
WBE (southern area)	Targinnie/Yarwun area	29,092 truck movements	65 daily truck movements
WBE (northern area) and BUF	Targinnie/Yarwun area	44,248 truck movements	99 daily truck movements

Table note:

1 Daily haulage assumes a constant volume is transported each day

Table 15.10 Volumes and truck movements for core and armour material for Western Basin Expansion reclamation (southern area)

Month	Volume (m^3)	Estimated monthly truck movements (one way)	Estimated daily truck trips (laden and unladen)	Number of trucks needed (based on a 12 hour day)
1	24,900	1,619	130	4
2	24,900	1,619	130	4
3	24,900	1,619	130	4
4	24,900	1,619	130	4
5	24,900	1,619	130	4
6	24,900	1,619	130	4
7	24,900	1,619	130	4
8	24,900	1,619	130	4
9	24,900	1,619	130	4
10	24,900	1,619	130	4
11	24,900	1,619	130	4
12	24,900	1,619	130	4
13	24,900	1,619	130	4
14	24,900	1,619	130	4
15	24,900	1,619	130	4
16	24,900	1,619	130	4
17	24,900	1,619	130	4
18	24,268	1,578	128	4
Total	**447,568**	**29,101**	**NA**	**NA**

Table 15.11 Volumes and truck movements for core and armour material for Western Basin Expansion reclamation (northern area) and barge unloading facility

Month	Volume (m^3)	Estimated monthly truck movements (one way)	Estimated daily truck trips (laden and unladen)	Number of trucks needed (based on a 12 hour day)
1	37,850	2,461	198	6
2	37,850	2,461	198	6
3	37,850	2,461	198	6
4	37,850	2,461	198	6
5	37,850	2,461	198	6
6	37,850	2,461	198	6
7	37,850	2,461	198	6
8	37,850	2,461	198	6
9	37,850	2,461	198	6
10	37,850	2,461	198	6
11	37,850	2,461	198	6
12	37,850	2,461	198	6
13	37,850	2,461	198	6
14	37,850	2,461	198	6
15	37,850	2,461	198	6
16	37,850	2,461	198	6
17	37,850	2,461	198	6
18	37,280	2,424	194	6
Total	**680,730**	**44,261**	**NA**	**NA**

15.4.4.3 Western Basin Expansion reclamation area haulage route

The likely haulage route from the Targinnie/Yarwun quarry area to the WBE reclamation area and BUF will follow the B-Double approved routes of Guerassimoff Road and Landing Road to the Fisherman's Landing Precinct and to the WBE reclamation area and BUF (adjacent to the WB reclamation area) via the gravel road off Landing Road and the existing WB reclamation area (refer Figure 15.1).

The potential road traffic impacts from the vehicle movements associated with the construction of the reclamation bund walls is provided in Section 15.4.6.

15.4.5 Traffic generation from other Project activities

15.4.5.1 Reclamation bund wall site establishment

A construction compound will be located within the vicinity of the WBE reclamation area. A site office for up to 20 construction staff will be utilised during the establishment of the reclamation area. Assuming staff travel to the site by private vehicle, there may be up to 20 light vehicle movements during this phase.

As a result of the low number of additional vehicle movements, no adverse road impacts will occur from this Project activity.

15.4.5.2 Dredging activities

Dredging equipment will be based primarily within Port Curtis during the dredging campaign. There may be heavy vehicles associated with the initial transportation of associated dredging equipment (e.g. maintenance equipment/supplies), however the movements associated with such activity is not anticipated to trigger potential adverse road impacts as this is considered to be a once off transport task.

The workforce required for the dredgers, including pushbusters, a tug, work boats and dredger shuttle services required for the transport of dredger staff to and from the main land (expected to be from the Port Central precinct) is approximately 160 staff which will operate over two shifts.

Vehicle movements will be minimal for the dredger staff and will generally occur during shift change-over times for the dredger.

As a result of the low number of additional vehicle movements, no adverse road impacts will occur from this Project activity.

15.4.5.3 Placement of dredged material

The unloading and placement of dredged material will involve six excavators at the BUF and a fleet of 32 trucks operating between the BUF and the placement areas within the WB and WBE reclamation areas. All movements will occur within the reclamation areas and the public road network would only be used for trips associated with vehicle delivery and scheduled maintenance.

A workforce of up to 196 staff (over two shifts) is likely during the unloading and placement of dredged material within the reclamation areas. Assuming staff travel to the site by private vehicle, there may be up to 196 vehicle movements per day during this Project activity.

As a result of the low number of additional vehicle movements, no adverse road impacts will occur from this Project activity, which will occur after the completion of the rock haulage activity.

15.4.5.4 Maintenance and stabilisation

The existing GPC workforce will be utilised during post dredging works to undertake maintenance and stabilisation activities in the WB and WBE reclamation areas. Some vehicle movements will be associated with environmental management (e.g. dust control, erosion and sediment control and landscaping activities).

As a result of the low number of additional vehicle movements, no adverse road impacts will occur from this Project activity.

15.4.5.5 Waste management

Section 14.4 provides detail on the waste materials that are likely to be generated from Project activities. A summary of potential wastes produced during Project activities is provided in Table 14.1.

Traffic movements associated with the estimated quantities for each Project waste type is considered minimal. Green waste and fuels, oils and lubricants are likely to be reused and recycled onsite, therefore the local road network is unlikely to be used.

The traffic movements associated with the estimated quantities for sewage transportation, municipal and office waste, and general building material disposal is likely to be minimal.

As a result of the low number of additional vehicle movements, no adverse road impacts will occur from this Project activity.

15.4.6 Potential road transport impacts

Due to the relatively low traffic volumes associated with Project activities and the higher traffic volumes associated with reclamation bund wall and BUF construction occurring during an early phase of the construction activity, a formal Traffic Impact Assessment as per the DTMR guidelines has not been undertaken for the purposes of the EIS. If a DTMR Traffic Impact Assessment is required for this Project, the assessment will be undertaken during the detailed design phase of the Project following completion of the bund wall and BUF design.

Due to the Project having a negligible impact on the State Controlled network, cumulative impacts on the road network associated with known proposed or current major projects (as identified in Table 1.13) would be insignificant.

15.4.6.1 Distribution of Project- heavy vehicle traffic

Project traffic increases are summarised in Table 15.12, showing the additional heavy vehicle traffic, which could be expected on the preferred route via Guerassimoff and Landing Roads, based on the assumed volumes provided in Table 15.7.

Table 15.12 Projected Project-related heavy vehicle increases on the preferred haul route

Mid-block section	Cross section	Heavy vehicle traffic volumes AWT	% of total traffic stream	Additional heavy vehicle traffic (per day)	Additional %
Guerassimoff Road	Two lane undivided with appropriate shoulders	Approximately 400	Estimated 70%	524	+131%
Landing Road	Two lane undivided with appropriate shoulders	Approximately 600	Estimated 45%	524	+66%

The Project will not have a long term impact on traffic after its completion. The only significant heavy vehicle traffic that will use the Gladstone network is construction traffic for a duration of up to 36 months, on Guerassimoff and Landing Roads (GRC roads).

It is worth noting that traffic trends for SCRs in Gladstone show a general reduction in AADT between 2012 and 2017 both for light and heavy vehicles, associated with the slowing of the most recent resources boom. Table 15.13 and Table 15.14 show this trend.

The largest reduction was 54% on Gladstone Mount Larcom Road, approximately 1km north of Calliope River. Decreases in AADT were also recorded in Gladstone-Benaraby Road, 1km south of Trees Inlet Drive (36.7% decrease); Gladstone Mount Larcom Road, 500m south of Red Rover Road (45.0% decrease); and Gladstone Mount Larcom Road 200m north of Lord Street (39.4% decrease).

Table 15.13 Traffic volume changes in State controlled roads in Gladstone (2012 to 2017)

Description	AADT (all vehicles)						Change 2012 to 2017	Change 2012 to 2017 %
	2017	2016	2015	2014	2013	2012		
Dawson Highway 450m west of Chapman Drive	6,540	7,434	7,748	7,658	8,082	7,807	-1,267	-16.2%
Gladstone Mount Larcom Road 200m north of Lord Street	6,716	7,584	9,233	10,115	11208	11,080	-4,364	-39.4%
Gladstone Mount Larcom Road 50m south of Auckland Creek	5,017	5,912	7,143	8,996	8517	8,015	-2,998	-37.4%
Gladstone Mount Larcom Road 1km north of Calliope River	4,834	5,346	6,751	7,399	8437	10,483	-5,649	-53.9%

Description	AADT (all vehicles)						Change 2012 to 2017	Change 2012 to 2017 %
	2017	2016	2015	2014	2013	2012		
Gladstone-Benaraby Road 450m southeast of Dawson Highway	14,483	15,020	17,528	18,719	19705	20,654	-6,171	-29.9%
Gladstone-Benaraby 1km south of South Trees Inlet Drive	7,305	7,481	8,329	9,096	8517	11,536	-4,231	-36.7%
Gladstone-Benaraby Road 150m east of Reef Street	8,926	10,367	11,098	11,900	12277	12,743	-3,817	-30.0%
Dawson Highway 250m north of Paterson Street	22,695	23,593	26,188	26,357	28,203	28,926	-6,231	-21.5%
Gladstone Mount Larcom Road 500m south of Red Rover Road	7,451	8,559	10,500	11,303	12,990	13,544	-6,093	-45.0%
Dawson Highway 250m west of Breslin Street	15,650	18,467	20,485	22,159	23,199	23,233	-7,583	-32.6%

This reduction was also recorded in heavy vehicle numbers with one exception. The largest percentage reductions in heavy vehicle traffic were recorded in:

- Gladstone Mount Larcom Road, 1km north of Calliope River (58.7%)
- Gladstone Mount Larcom Road, 200m north of Lord Street (53.1%)
- Dawson Highway, 250m west of Breslin Street (52.3%)
- Gladstone Mount Larcom Road, 500m south of Red Rover Road (42.9%)
- Gladstone Mount Larcom Road, 50m south of Auckland Creek (41.7%).

Only one DTMR road experienced increased numbers of heavy vehicle movements over the 2012 to 2017 period which was the Dawson Highway 250m north of Paterson Street (increase of 475 trucks per day or 32.3%) although the 2017 volumes were similar to the heavy vehicle movements experienced in 2013 to 2015. Heavy vehicle traffic movements on the Dawson Highway 250m west of Breslin Street significantly reduced between 2016 and 2017, but had been higher over the 2013-2016 period since the 2012 counts.

Table 15.14 **Changes in heavy vehicle traffic on State controlled roads in Gladstone (2012 to 2017)**

Description	AADT heavy vehicles						Change 2012 to 2017	Change 2012 to 2017 %
	2017	2016	2015	2014	2013	2012		
Dawson Highway 450m west of Chapman Drive	628	565	782	662	660	660	-32	-4.8%
Gladstone Mount Larcom Road 200m north of Lord Street	892	1,454	1,627	1,786	2,161	1,902	-1010	-53.1%
Gladstone Mount Larcom Road 50m south of Auckland Creek	999	1,107	1,541	2,031	2,028	1,714	-715	-41.7%
Gladstone Mount Larcom Road 1km north of Calliope River	1,100	1,435	1,333	1,719	2,049	2,664	-1,564	-58.7%
Gladstone-Benaraby Road 450m southeast of Dawson Highway	850	892	1,039	1,091	1,192	936	-43	-9.2%
Gladstone-Benaraby 1km south of South Trees Inlet Drive	901	919	464	1,030	2,028	1,057	-156	-14.8%

Description	AADT heavy vehicles						Change 2012 to 2017	Change 2012 to 2017 %
	2017	2016	2015	2014	2013	2012		
Gladstone-Benaraby Road 150m east of Reef Street	622	1,051	724	684	717	717	-95	-13.2%
Dawson Highway 250m north of Paterson Street	1,947	1,316	1,930	1,919	2,048	1,472	475	32.3%
Gladstone Mount Larcom Road 500m south of Red Rover Road	1,600	1,356	1,657	,2015	2,873	2,804	-1,204	-42.9%
Dawson Highway 250m west of Breslin Street	498	1,077	1,194	1,334	1,359	1,043	-545	-52.3%

15.4.6.2 Assessing construction traffic impacts

The vehicle traffic generated by the Project during the construction phase will have minimal impact on existing traffic operations of the Gladstone road network.

The most significant impacts will occur for the construction stages involving bund wall construction for the WBE reclamation area and BUF which are of short term duration with impacts confined to Guerassimoff Road and Landing Road. The intersections on the route have adequate capacity to accommodate the heavy vehicle traffic associated with the Project.

The key intersections that are expected to be utilised during Project activities are discussed in more detail below.

Guerassimoff Road and Landing Road T-Intersection

This intersection provides access to the likely source of rock material for the bund wall construction and will be used by construction traffic. It comprises a Basic Right Turn treatment (BAR) and an Auxiliary Left Turn treatment (AUL) on the major road (Landing Road). On the return trip from the reclamation areas, trucks will need to turn right into Guerassimoff Road. The existing intersection treatments (BAR and AUL) contribute to road safety at the intersection.

For EIS purposes, 14 hour weekday counts have been undertaken to understand baseline traffic levels at the intersection (refer Table 15.7). The data indicates that the intersection may already require a channelised right turn based on existing traffic levels. However, because of the short-lived nature of the construction phase, and the fact that users of Landing Road are already accustomed to trucks turning and queuing at the intersection (that is little or no tourist or external traffic), non-infrastructure measures are likely to be adequate to improve safety as follows:

- Temporary reduction in the speed limit to improve gap acceptance for trucks entering and exiting the traffic stream to and from Landing Road
- Variable message signage placed in advance of the intersection on the northern and southern approaches to provide further warning of the temporary speed limit reduction and trucks turning.

Further traffic counts will be undertaken closer to the commencement year, and the measures above will be reassessed to confirm suitability at that time.

Landing Road and Hanson Road (Gladstone Mount Larcom Road)

The intersection has recently been upgraded by DTMR. The Project activities will only generate minimal use by light vehicles and therefore the Project-related traffic will have minimal impact on the performance of this intersection.

Breslin Street/Derby Street and Glenlyon Road

As the likely Project haul route will be via Guerassimoff and Landing Roads the use of Glenlyon Road will only involve minimal use by light traffic and therefore any Project-related traffic will have minimal impact on the performance of this intersection. This intersection is configured as a major signalised intersection with spare capacity on the north and southbound through routes.

15.4.6.3 Road safety – crash analysis

The crash history of the road network was reviewed to ensure that the Project would not exacerbate any existing crash risks. One head on fatal crash has occurred at a horizontal curve alignment on Hanson Road at Callemondah in 2016. The crash involved a car, a truck and a motorcycle. The crash occurred during daytime and the road condition was dry. Except for the fatal crash there were no intersections with significant numbers of crashes requiring hospitalisation in the last 10 years (2008 to 2017). Over the last three to four years with the reduction of overall levels of traffic throughout Gladstone and with the upgrade of several road sections within the city, road safety conditions have generally improved. The Project is therefore not expected to increase the existing crash risks in the region.

15.4.6.4 Other issues

Road use management

The Project will not result in operational changes within industry or significant industry changes that would significantly increase the volume of heavy vehicles on the SCR network and require additional road use management changes.

Road traffic noise

It is not expected that significant additional road traffic noise will be generated as a result of Project activities (refer Section 13.6).

Visual impacts

It is not expected that significant additional visual impacts, such as headlight glare, distractive lighting or impacts on the aesthetic appearance of SCRs will occur as a result of Project activities.

Geotechnical stability

The Project will not involve the construction of new roads of the establishment of additional quarries. Therefore, there are no impacts on geotechnical stability expected to occur as a result of Project activities.

Dust

With the exception of the immediate approach roads into the Targinnie/Yarwun quarry area and the access to the reclamation areas off Landing Road (remote from any sensitive receptors such as residential dwellings) the roads to be used by the Project are bitumen sealed, and of adequate width. Dust from traffic movements is therefore not considered to be an issue.

Hydraulic and hydrological impacts

The Project will not involve the construction of new roads or roadworks outside of the existing road formation and the existing access road and causeway to the reclamation areas. Hydraulic and hydrological impacts are therefore not expected to occur as a result of traffic-related Project activities.

Roadworks in the road reserve

No roadworks are proposed outside of the existing road formation that will require earthworks, vegetation removal or infrastructure extension (e.g. lane widening or bridgeworks).

Transport corridors

There are a number of bus lines that currently operate in Gladstone, however the existing bus network will remain unaffected by the construction and road transport activities associated with Project activities.

15.4.6.5 Access control

Due to the nature of this Project no access control is required.

15.4.6.6 Onsite parking requirements

Due to the nature of this Project no onsite parking is required, beyond the temporary requirements for the construction phase.

15.4.6.7 Ancillary works and encroachments

Due to the nature of this development no ancillary works and encroachments are required.

15.4.6.8 Over-dimension vehicles

No over-dimensional vehicles that will affect the road network will be used as part of Project activities.

15.4.6.9 Pavement impact assessment

A pavement impact assessment was completed for the Project using the spreadsheet published by DTMR (March 2018 - refer Appendix L)

The purpose of the pavement impact assessment is to determine the effect that the heavy traffic associated with Project activities has on the road network. The two roads significantly affected by the Project are Guerassimoff Road (0.5km) and Landing Road (3km). There is short section of private road connecting Landing Road to the site, however this road is unsealed and was therefore excluded from the investigation.

The current condition of the road was assessed using various parameters such as the current traffic, predicted growth rates and roughness. Secondly the loading due to Project traffic was calculated by determining the number of truck movements in each direction that are anticipated. The reduction in pavement life and the maintenance costs as a result of the additional traffic was then calculated.

The results of the pavement impact assessment are show in Table 15.15.

Table 15.15 Results of pavement impact assessment for Landing Road and Guerassimoff Road

Road name	Reduced pavement life		Estimated contribution (@ the PV base year)				
			Rehabilitation ($)		Maintenance ($)		Total
	To	From	To	From	To	From	($)
Guerassimoff Road	7.8%	0.6%	$9,685		$14,979	$904	$25,568
Landing Road	3.3%	0.3%			$41,677	$0	$41,677
Total			**$9,685**	**$0**	**$56,656**	**$904**	**$67,245**

15.4.7 Mitigation measures

No road-based infrastructure mitigation is proposed for Project activities. Non-infrastructure mitigation measures that are proposed to improve safety are:

- Temporary reduction in the speed limit to improve gap acceptance for trucks entering and exiting the traffic stream to and from Landing Road
- Variable message signage placed in advance of the intersection on the northern and southern approaches to the Landing Road/Guerassimoff Road to provide further warning of the temporary speed limit reduction and trucks turning.

Further traffic counts will be undertaken closer to the commencement year, and the measures above will be reassessed to confirm suitability at that time.

If the location of the Project bund wall material source/quarry changes during the detailed design phase (i.e. not all the bund wall material is sourced from the Targinnie/Yarwun quarry area), a reassessment of the Project potential impacts on the SCRs and local roads, including consultation with DTMR and GRC, will be undertaken.

15.4.8 Conclusions

The vehicle traffic generated by the Project during the construction phase will have minimal impact on existing traffic operations of the Gladstone road network.

The most significant impacts involving heavy vehicles will occur for the construction stages involving bund wall construction for the WBE reclamation area and part of the BUF, which are of short term duration with impacts confined to Guerassimoff Road and Landing Road. The intersections on the route have adequate capacity to accommodate the heavy vehicle traffic associated with the Project.

The reclamation bund wall construction program is assumed to be approximately 36 months at the rate of approximately 65,450t per month (first 18 months) and 94,500t per month (second 18 months) for the southern and northern reclamation areas, respectively including an allowance for BUF requirements.

Haul volumes on the Guerassimoff Road and Landing Road route will be in the order of 130 trucks per day in total (or 11 truck trips per hour) to and from the southern reclamation area and 198 trucks per day in total (or 17 truck trips per hour) to and from the northern reclamation area, including a small number of trucks to the BUF.

The key intersection affected by the Project is the Guerassimoff and Landing Road t-intersection, currently provided with a Basic Right Turn treatment (BAR) - for southbound movements on Landing Road and an Auxiliary Left Turn treatment (AUL) for northbound movements on Landing Road. During the detailed design phase of the Project once the timing of the project is confirmed, that further analysis will be undertaken to confirm the adequacy of the current layout for Project traffic.

Due to the relatively low traffic volumes associated with Project activities and the higher traffic volumes associated with reclamation bund wall construction occurring during an early phase of the construction activity, a formal Traffic Impact Assessment as per the DTMR guidelines has not been undertaken for the purposes of the EIS. If a DTMR Traffic Impact Assessment is required for this Project, the assessment will be undertaken during the detailed design phase of the Project following completion of the bund wall design.

15.5 Rail infrastructure assessment

The main North Coast Line runs through Gladstone providing general passenger and freight movement along the Queensland coast. Coal is transported on the North Coast Line south from Rockhampton and the Moura Line from the west into coal export terminals and local industries (i.e. Rio Tinto Alcan Yarwun Refinery, Cement Australia, NRG Gladstone Power Station and QAL). Limestone is also transported from East End Mine to Cement Australia via the East End Branch Line and Fisherman's Landing Branch Line. The existing rail network is shown in Figure 15.2.

The closest rail to the WBE reclamation area is the Fisherman's Landing Branch Line, which terminates in a loop servicing Cement Australia for coal and limestone delivery, approximately 2.5km to the south of the WBE reclamation area.

Earth Commodities Gladstone quarry, located west of Yarwun, is currently serviced by a rail ballast siding. Earth Commodities Gladstone quarry is currently contracted to supply ballast to Aurizon and utilises the siding for loading of ballast into rail wagons. It is possible that this siding could be utilised for the transport of WBE reclamation bund wall material for delivery by rail to the Fisherman's Landing Rail Loop. However, given the relatively close distance between the quarry and the WBE reclamation area, together with the need to develop rail sidings, loading and unloading infrastructure, rail transport is not economical compared to the use of public roads.

Any potential use of the Fisherman's Landing Rail Loop would require additional rail unloading infrastructure or a new siding to the WBE reclamation area. In addition to potential conflicts with existing users of the rail network, rail transportation would still require the material to be unloaded from rail wagons and be reloaded into trucks for final delivery to the bund wall construction area. These issues and associated costs would make rail transportation of bund wall material impractical and uneconomic. Given the proximity of the site to the preferred source of bund wall material supply and the existing short road connection available, rail is not considered to be a viable economical transport option for the WBE reclamation area.

For the Project dredging activities and the changes to navigational aids, given the relatively low volumes of transportable materials and Project workforce associated with these activities, it is not feasible for these Project activities to utilise rail infrastructure.

In summary, the use of components of the North Coast Line and the Gladstone rail network for rail transport associated with the Project is not feasible due to the lack of appropriate existing infrastructure and the proximity of preferred sources of rock material close to the WBE reclamation area.

15.6 Marine vessel infrastructure assessment

15.6.1 General

The Port of Gladstone consists of eight existing wharf centres and associated facilities to cater for the import of raw materials and the export of finished products associated with major industries within the Gladstone and Central Queensland regions. The existing major Port wharf centres include:

- Auckland Point Terminal (four wharves owned by GPC and operated by others)
- Barney Point Terminal (one wharf owned and operated by GPC)
- RGTCT (four wharves operated by GPC)
- Boyne Wharf (one wharf operated by Boyne Smelters Limited)
- Fisherman's Landing (four wharves operated by multiple companies)
- Curtis Island (three wharves operated by LNG companies)

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The Narrows
Graham's Creek
Western Basin Expansion Reclamation Area
Curtis Island
Northern Reclamation Area
Southern Reclamation Area
Fisherman's Landing
Facing Island
Gatcombe Channel
South Trees Island
Golding Cutting Channel
Calliope River
Gladstone

Flinders Road
Smith Road
Forest Road
Guerassimoff Road
Obodin Road
Landing Road
Millar Road
Targinnie Road
Boat Creek Road
Gladstone Mount Larcom Road
Flynn Road
Quarry Road
Raglan Road
Mount Miller Road
Spring Valley Road
Boyles Road
Red Rover Road
Dawson Highway
Tooloora Street
Bryan Jordan Drive
Chapple Street
Blain Drive
Breslin Street
Far Quarter Street
Mollison Street
Hopper Road
Brisbane Street
Harbour Road
Philip Street
Shaw Street
Rifle Range Road
French Street
Kirkwood Road
Glenwyn Road
Glen Eden Drive
Wuttke Road
Schulze Road
Siding Road
Upton Road

Legend

- Western Basin Expansion reclamation area
- Initial dredging works for barge access channel
- Barge unloading facility
- Targinnie/Yarwun general quarry location
- Existing shipping channels
- Proposed Channel Duplication Project extent
- Port of Gladstone Port limits
- Road
- Rail

Source:
Aerial: GPC (2015) and DigitalGlobe Web Map Service (2013)

Map by: RB
P:\GIS\Projects\237374_GPC_Channel_Duplication_EIS\237374_EIS_112.mxd 05/12/2018 09:34

0 1,000 2,000 Metres

Date: 05/12/2018 Version: 6 Job No: 237374
Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 15.2: Rail infrastructure in relation to Project activities

- South Trees (two wharves operated by Queensland Alumina Limited)
- WICT (one operated by WICET).

Figure 2.1 shows the location of the major existing and potential future Port wharf centres and the Port is described in detail in Section 2.1.

The Port of Gladstone is open for ship movements and other Port-related activities 24 hours per day all year round. The existing commercial shipping channels and vessel numbers for the Port are provided in Section 2.1.3 and Table 2.4. The total number of commercial vessels accessing the Port in 2017/18 was 1,785.

15.6.2 Dredging and changes to navigational aids

The Project will generate additional vessel movements during the construction period associated with dredging and the changes to navigational aids. The initial dredging of the barge access channel by a TSHD and CSD with dredger shuttle and survey vessels will be undertaken over a 6.5 week period.

Dredging for the duplication of the Gatcombe and Golding Cutting Channels will involve a TSHD working 110 dredging hours per week supported by dredger shuttle and survey vessels. A fleet of four barges will each make 10 trips per week between the Gatcombe and Golding Cutting Channels and the BUF. Stage 1 dredging will be undertaken over a 33 week period with Stage 2 dredging undertaken over a 25 week period.

It is likely that between two and four dredge shuttle service boat movements per day will occur during the dredging operation.

The removal, relocation and installation of new navigational aids will utilise a barge moving between the Auckland Point wharf area (loading of navigational aids) and the locations where navigational aid changes are proposed. It is estimated that there will be one return barge trip per day for approximately 1 month for the removal and installation of the navigational aids. The equipment, electronics and commissioning of the new navigational aids will require two return work boat trips per day for approximately 2 months.

The annual commercial vessel numbers within the Port of Gladstone since 2010/2011 are provided in Table 2.4. The commercial vessels accessing the Port range in size from coastal traders to Capesize vessels. The movement of these vessels is restricted to existing navigational channels.

In addition to the commercial vessels that use the Port, there are also a number of recreational, tourist and fishing vessels that utilise the Port.

15.6.3 Western Basin Expansion reclamation area and barge unloading facility

Given the proximity of the WBE reclamation area and BUF to the preferred source of bund wall rock material (i.e. Targinnie/Yarwun quarry area) and the available existing road connections, sea transport is not a viable transport option for the WBE reclamation area and BUF bund wall rock material.

15.6.4 Potential marine transport impacts

The Port of Gladstone has well established procedures and guidelines for the vessel movement and associated activities. The Regional Harbour Master will be consulted in relation to Project generated vessel movements and activities within the Port. Project dredgers, barges and associated vessels will obtain the Regional Harbour Master approval prior to commencing work (where required).

The Queensland Government *Port Procedures and Information for Shipping – Gladstone* (DTMR 2018) defines the standard procedures to be followed in the Port of Gladstone. The Port Procedures and navigational charts clearly detail the transit routes to be utilised by ships moving from the existing harbour channels to the wharf berthing locations. The Procedure also provides relevant ship passing and weather restrictions.

The *Transport Operations (Marine Safety) Regulation 2016* refers to ships not being operated at a speed of more than six knots when within 30m of any jetty, wharf, boat ramp or pontoon, a vessel at anchor or moored or made fast to the shore.

With the exception of the above, no speed restriction is specified in the Port of Gladstone. However, a ship's master is made fully aware of the effects of interaction, particularly when passing ships moored at berths adjacent to the channels, and any directive given by Gladstone Harbour Control.

The Port contains navigational aids, leading lights, beacons and buoys to assist ships' masters, owners and agents of vessels arriving at and traversing the Port. The Port Procedures provide details of the services and regulations, and procedures to be observed by vessels utilising the Port.

The Project dredger activity and associated tender boat movements are typical of capital and maintenance dredging activities. Maintenance dredging operations are carried out on a regular basis and past capital dredging campaigns have involved similar marine operations to that proposed by Project dredging activities. The barges and piling activities associated with the changes to navigational aids are also typical activities associated with an active port.

Accordingly, the relatively small number of additional vessel movements associated with the Project will have an insignificant impact on existing and likely future vessel movements in the Port, including both commercial and recreational vessel movements. With all vessels operated in accordance with Port Procedures and under the direction of the Regional Harbour Master, and by appropriately licenced operators, maritime safety in the Port will not be compromised by the Project activities.

A slight reduction in the area of navigable waterway within the Port will occur during dredging operations and also following completion of the WBE reclamation area and BUF, however this reduction is not expected to be significant and will not compromise maritime safety, the safe navigation of vessels within the Port nor will it have a significant impact on recreational boating.

Shipping management is addressed under the Port Procedures (DTMR 2018) which provides details of the services and regulations, and procedures to be observed by all vessels utilising the Port of Gladstone. No changes to the Port Procedures are anticipated as a result of the Project.

It is important to note that while the Project will facilitate an improvement in the existing and future vessel movement efficiency, and a reduction in the likelihood of vessel incident risk, the duplication of the Gatcombe and Golding Cutting Channels will not have any direct influence on increasing vessel movement numbers within the Port. As such, the Project will not generate any additional requirement for pilots or directly generate other impacts associated with increased shipping in the Port such as the impact of tanker and tug activities.

15.6.5 Mitigation measures

The dredging contractor will comply with the relevant requirements within the following documents:

- *Standard for Commercial Marine Activities – Gladstone Region* (DTMR 2017a) and preparation and implementation of the approved Project Marine Execution Plan
- *Port Procedures and Information for Shipping – Gladstone* (DTMR 2018)
- *Transport Operations (Marine Safety) Regulation 2016*
- Dredging EMP (refer Appendix Q1).

Due to the potential impacts on marine transport being insignificant, no additional mitigation measures are proposed for the Project.

15.6.6 Conclusions

The Port of Gladstone has well established procedures and guidelines for the movement and associated activities undertaken by vessels and the Regional Harbour Master will be consulted in relation to Project generated vessel movements and activities within the Port.

The relatively small number of additional vessel movements associated with the Project will have an insignificant impact on existing and likely future vessel movements in the Port, including both commercial and recreational vessel movements. With all vessels operated in accordance with Port Procedures and under the direction of the Regional Harbour Master, and by appropriately licenced operators, maritime safety in the Port will not be compromised by the Project activities.

A slight reduction in navigable waterway within the Port will occur during dredging operations and also following completion of the BUF and WBE reclamation area, however this reduction is insignificant and will not compromise maritime safety or the safe navigation of vessels within the Port.

It is important to note that while the Project will facilitate an improvement in the existing and future vessel movement efficiency, and a reduction in the likelihood of vessel incident risk, the duplication of the Gatcombe and Golding Cutting Channels will not have any direct influence on increasing vessel movement numbers within the Port.

15.7 Air infrastructure assessment

Gladstone Airport is located in Clinton, in the southwest of Gladstone city, approximately 4km from the central business district. Gladstone Airport is owned and operated by GRC.

Table 15.16 details the inbound and outbound passengers through Gladstone airport from 2009 to 2018. The number of passengers peaked in 2013/14 during the height of the Curtis Island LNG plant and associated infrastructure construction, and WICT Project construction, with a total of 501,140 passengers travelling through the Gladstone airport. In 2017/18 the number of passengers had reduced by 47% to 265,613 which is equivalent to 2010/11 passenger numbers.

Table 15.16 Passengers through Gladstone airport (2009/10 to 2017/18)

Financial year	Inbound passengers	Outbound passengers	Total passengers
2009/10	88,016	89,528	177,544
2010/11	119,561	120,714	240,275
2011/12	177,247	178,639	355,886
2012/13	229,096	228,508	457,604
2013/14	249,527	251,613	501,140
2014/15	219,455	224,275	443,730
2015/16	180,069	187,970	368,039
2016/17	150,780	152,483	303,263
2017/18	131,765	133,848	265,613

Source: Department of Infrastructure and Regional Development (2018)

The workforce requirements for dredging and changes to navigational aids will be minimal, and will include approximately 160 for maritime operations. While the workforce will operate in two shifts, workers are expected to be based in Gladstone and are not likely to utilise airport infrastructure regularly between shifts.

The workforce requirements for dredged material unloading at the BUF and placement within the WB and WBE reclamation areas is up to 20 construction staff for the bund wall construction and up to 196 staff during the dredging operation. The workforce is anticipated to be predominantly already based in the Gladstone region and only minor use of the Gladstone airport is anticipated.

As noted in Section 2.3.1, the total maximum workforce for the Project during construction is expected to reach 386 people. The workforce is anticipated to be predominantly already based in the Gladstone region and only minor use of the Gladstone airport is anticipated. A small proportion of this workforce may not be local to Gladstone or surrounds and may need to access Gladstone by air via Gladstone airport on an occasional basis.

In a worst case scenario, assuming 50% of these workers were to fly-in fly-out every week for 33 weeks a year, this would equate to an additional 4% to 5% in annual passengers created by the Project, based on 2017/18 airport total passenger numbers. This is considered to be a minimal impact with a low likelihood of occurring, yet well within the capacity of the airport to accommodate based on previous passenger throughput.

No machinery or materials will be brought in by air. Such materials will arrive by land and sea transport routes only.

In conclusion, additional demand for air transportation as a result of Project activities would be negligible and no mitigation measures are required.

15.8 Summary

The dredging activities, changes to navigational aids and the traffic generated from the Project workforce at all locations will generate low levels of additional shipping and traffic movements in the region.

The relatively small number of additional vessel movements associated with the Project will have an insignificant impact on existing and likely future vessel movements in the Port, including on both commercial and recreational vessel movements. With all vessels operated in accordance with Port Procedures and under the direction of the Regional Harbour Master, and by appropriately licenced operators, maritime safety in the Port will not be compromised by Project activities.

A slight reduction in navigable waterway within the Port will occur during dredging operations and also following completion of the WBE reclamation area and BUF, however this reduction is insignificant and will not compromise maritime safety or the safe navigation of vessels within the Port.

The most significant transport impacts will occur during the construction of the bund walls for the WBE reclamation area and part of the BUF wall which will be of short term duration and would be confined to Guerassimoff Road and Landing Road. The main intersection on the route has adequate capacity to accommodate the heavy vehicle traffic associated with the Project with no road-based infrastructure mitigation required. Temporary speed reduction and variable message signage are proposed to improve road safety along the haulage route during the 36 month bund wall construction period.

The Project will not generate any additional demands for rail infrastructure due to rail transport of rock material and other Project materials by rail not being practical nor economically feasible. The Project will not generate any demand for new aviation infrastructure in the region.