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6. Infrastructure and Transport

6.1 Infrastructure Ownership and Management

Several submissions raised concern about the lack of infrastructure currently available for the HHI Development and the impact this might have on Gladstone Regional Council and the State agencies infrastructure programs.

It is recognised that significant infrastructure is required to support the proposed HHI Development including roads, bridges, water, wastewater and community infrastructure. The Proponent proposes that the HHI Development would provide the necessary infrastructure as well as contributions for external infrastructure so that local and State infrastructure providers are not affected. The Proponent proposes to enter into an operation and maintenance agreement with the Gladstone Regional Council to maintain and operate the service infrastructure for a period of years to be agreed and until such operation and maintenance costs can be covered by income from rates applied to the developed land.

Estimates provided by the Proponent suggest that the transfer in operation and management responsibility will likely occur 12 years after commencement of development of Hummock Hill Island (Net Benefit Assessment **Appendix B2**).

For infrastructure that the local government would ultimately own and maintain, Council will receive rate revenue from the HHI Development which would offset costs borne by the Council.

6.1.1 Swimming Enclosure

One submission questioned who would be responsible for the operation and maintenance of the proposed swimming enclosure.

As discussed in Section 16.2.7.5 of the EIS, the need for a swimming enclosure will be investigated together with other beach safety measures to protect residents and tourist from potential marine stingers. Should the swimming enclosure be identified as a viable option for beach safety, operation and maintenance costs, similar to other infrastructure would be covered by the Proponent for a period of approximately 12 years when costs can be covered by income from rates applied to the developed land.

6.2 Linear Infrastructure

One submission requested the provision of mapping of the proposed placement of linear infrastructures including power, water, and gas supply lines.

Information regarding the placement of these infrastructures will not become available until finalisation of the detailed design phase, as such it is not possible to supply mapping at this stage of the Project. The alignment of linear infrastructure will follow designated easements and infrastructure routes.



6.3 Power Supply

One submission raised concerns that there was a lack of investigation of alternative power sources, in particular solar power generation through photovoltaic cells. Solar/photovoltaic power generation was investigated along with a number of other alternative power sources including:

- mains grid connection from Ergon Energy's 22 KV network on the mainland;
- on-island generation using a gas fired cogeneration plant or diesel engine generators; and
- large scale wind turbines.

An investigation all of these energy systems concluded:

- a baseload supply of electricity will be required from the mainland grid to ensure security of supply to the HHI Development;
- extension of the grid to service Hummock Hill Island is the most cost effective option when compared to other sources of electrical power identified; and
- the baseload supply could be supplemented by the other sources including those listed above.

A combination of solar hot water, gas and mains electricity was found to be the most cost effective and reliable option for supplying energy to the HHI Development.

6.4 Boating Infrastructure

6.4.1 *Management of Boating Infrastructure*

One submission raised the issue that the management, ownership and funding arrangements for the boat ramps were not stated in the EIS.

The boat ramps, associated infrastructure and ongoing maintenance will be funded by the Proponent (discussed in Section 6.1), as part of the overall HHI Development and made available to the public. Public boating ramps will provide improved access to waters for small tourist and private vessels. Tourist and resident populations will be the main demographic utilising the facilities however, benefits are also expected to flow onto external day trippers with improved access to local estuaries (Section 6.1.6 of EIS).

The ownership of the boat ramps will be transferred to the Gladstone Regional Council at the end of the agreed operation and maintenance period.

6.4.2 *Boat Queuing Facilities*

Several submissions requested further information about the provision of boat queuing facilities.

The need for boat queuing pontoons will be decided during detailed design and will be based upon:

- the amount of boat traffic;
- the area available for boats; and
- the overall impact to the environment.

An estimated 20 - 30 boats will be in use on any given day (see Table 9.10 in the EIS). Based on daily usage rates the over-utilisation of boating facilities is expected to be minimal. Allowance will



be made for parking large towed vehicles, including the provision for drive through parking bays designed to accommodate a vehicle and trailer. These parking bays will be three metres wide and 15 m long. There will be 40 trailer parking bays at both the Boyne Creek and Colosseum Inlet boat ramps.

Both boat ramps on Hummock Hill Island will have two lane access, toilets, bins and fish cleaning facilities. Colosseum Inlet boat ramp will provide access to BBQ's and a picnic area, and Boyne Creek boat ramp will provide showers, a marine centre and boat storage facilities (**Figure 6-1** and **Figure 6-2**).



6.4.3 Standard of Boat Launching Facilities

One submission requested a firm commitment to designing the boat ramps in accordance with Queensland Department of Transport and Main Roads (DTMR) standards.

In Section 6.1.6.2 of the EIS, the Proponent makes a commitment to design the boat launching facilities in accordance with *Australian Standard - Guidelines for Design of Marinas (AS3962-2001)*. The Proponent is also committed to working with DTMR on the provision and design standards of boat ramps and associated marine infrastructure.

6.4.4 Dredging of Estuaries

Two submissions raised the issue with regards to the dredging of waterways near and surrounding boat ramp, and the potential impacts that may occur to the Great Barrier Reef World Heritage Area (GBRWHA).

It is not the intention of the Proponent to have ongoing dredging of the channels or bars surrounding Hummock Hill Island or around the boat ramps in order to provide greater access for boats.

Localised excavation may be required during the construction of boat ramps. If required, appropriate environmental approvals will be obtained, this may include an approval for ERA 19 for extractive industries.

6.4.5 Accessibility

One submission raised concerns that the term 'all tide' had been used incorrectly in the EIS, due to the existence of shallow bars at the mouths of both Colosseum Inlet and Wild Cattle Creek.

Section 6.1.6 of the EIS states the sand bar located at Wild Cattle Island will limit accessibility to Colosseum Inlet. Although there is deep water within Colosseum Inlet, there are transient sand bars which present dangerous passage at low tides. Colosseum Inlet will be navigable by very small, shallow boats at all tides.

6.4.6 Vegetation Clearing

One submission raised the issue of associated vegetation clearing for the proposed boating facilities.

A response to this issue is provided in Section 12.7.4 of the Supplementary Report.

6.4.7 Public Wharf

One submission suggested that a public wharf and ferry to Boyne Island, Tannum Sands and Gladstone should be considered. This option was investigated during the preparation of the EIS and was not considered viable due to:

- a non navigable entrance to Colluseum Inlet;
- potential impacts upon the environment, (including clearing of vegetation, dredging of estuaries and water channels, and potential impacts upon marine species); and
- overall feasibility of the wharf as a transport option.



6.5 Air Infrastructure

Two submissions raised issues relating to the physical characteristics of the proposed airstrip, particularly as they relate to Civil Aviation Safety Authority (CASA) guidelines for aeroplane landing areas.

The airstrip on Hummock Hill Island is intended to be used by small/light aircraft, with less than six aircraft movements per day. The airstrip will be a private, unregistered airstrip and will not provide for night time usage. Development within the approach/take-off area will be limited in height to comply with CASA's advisory publication - Guidelines for aeroplanes landing areas.

As stated in Section 3.4.4.6 of the EIS, the airstrip development will also comply with the CASA Manual of Standards Part 139.

To comply with Part 139 of the CASA Manual of Standards and CASA's advisory publication - Guidelines for Aerodrome Landing Areas, the physical characteristics of the airstrip will be:

- runway width - 15 m;
- runway length - 1,000 m;
- longitudinal slope of the runway - less than 2%;
- traverse slope of the runway - 2.5%;
- clearance at end of runway - objects less than 2 m within 100 m of end of the runway; and
- clearance on side of runway - only low mass objects (frangible) within 80 m of the runway.

6.6 Road Infrastructure

6.6.1 Road Infrastructure and Fauna Movement

One submission raised the issue that road infrastructure will need to incorporate fauna passages when crossing watercourses to reduce impact upon fauna movement along riparian corridors.

As stated in Section 14.3.1.1 of the EIS, the master plan will include design elements that will minimise or mitigate impacts upon fauna communities by the incorporating the following:

- vegetated corridors within the master plan design which permit flora and fauna dispersal across the Island particularly the maintenance of riparian corridors adjacent ephemeral creeks. Three categories of wildlife corridor have been considered during master planning:
 - Major Linkage - several hundred metres in width and containing no buildings or major structures. These areas provide significant opportunity for dispersal;
 - Inter-urban Linkage - corridors of 100-200 m in width through a predominantly urban matrix, but containing large areas of green space such as a golf course;
 - Local Linkage - Corridors of less than 100 m in width through urban and non-urban matrices;
- formal fauna crossing points at potential road-strike points, particularly within the proposed corridors described above;



- fauna crossings in designed ephemeral watercourse crossings; and
- maximisation of tree retention across the HHI Development area to increase landscape permeability for flora and fauna particularly in and around the proposed golf course.

The roads will be fenced in retained vegetation areas.

6.7 Transportation

6.7.1 Link Road to Agnes Water

One submission stated that they would not support the construction of a road linking the HHI Development with Agnes Water as it would impact upon Eurimbula National Park.

The Proponent will not develop a road linking Hummock Hill Island with Agnes Water.

6.7.2 Turkey Beach Road and Foreshores Road

6.7.2.1 Intersection Upgrade

One submission questioned what amount of traffic would be required on the road before the intersection at Turkey Beach/Foreshores Road is upgraded and the timing of an upgrade.

Section 6.2.2.6 on pages 6-11 and 6-12 of the EIS states the intersection is to be upgraded to a Main Roads Standard type "CH" intersection which provides turning lanes to protect turning traffic.

A computer simulation of the Turkey Beach and Foreshores Road intersection indicates this will operate within capacity beyond 2033.

The Proponent will enter into an infrastructure agreement with Gladstone Regional Council in regard to the timing and sharing of cost to upgrade this intersection.

6.7.2.2 Road Upgrade

One submission questioned when, in the course of the development, will the highway end of Turkey Beach Road and Foreshores Road be reconstructed to accommodate extra and heavier traffic.

As identified on page 6-12 in Section 6.2.2.6 of the EIS, the access route between the Bruce Highway and Hummock Hill Island will have to be upgraded to a suitable rural road standard with a minimum 7.0 m of traffic lanes (2 x 3.5 m lanes) and 1.0 m of sealed shoulders and an additional 1.0 m of unsealed shoulders on each side. This would be an upgrade as Turkey Beach Road currently has a 5.5 to 6.2 m wide sealed surface with 1m shoulders in some sections. A 1.4 km section of seal is noted to be in poor condition (Refer to Appendix A7.4 - Road and Traffic Impact, Table 2.6.2.1 of Section 2.6.2 of the EIS).

The Proponent will enter into an infrastructure agreement with Gladstone Regional Council in regard to the timing and sharing of costs to upgrade and repair the subject road segments.

6.7.2.3 Traffic Volumes

One submission was concerned that traffic on volumes Turkey Beach Road and Foreshores Road would be significant at one vehicle per 14.1 seconds and this would cause traffic to bank up.



For any daily traffic volumes quoted in the EIS, it refers to a day consisting of 24 hours. For any peak hour volumes quoted in the EIS, it refers to a one hour period when the traffic volumes are expected to be the highest and generally a morning and afternoon/evening peak periods are analysed.

The anticipated daily volumes on Turkey Beach Road and Foreshores Road will be well within acceptable levels for a two lane undivided road. As noted in the EIS and in this response, the Proponent will enter into an infrastructure agreement with Gladstone Regional Council to upgrade the affected sections of Turkey Beach Road and Foreshores Road. The provision of a wider road carriageway and sealed road shoulders will improve conditions for vehicles entering and departing property accesses.

School buses would be able to continue to operate on these roads. Provision of shoulders will assist with the pick-up and set-down of children.

6.7.3 Bruce Highway and Turkey Beach Road

6.7.3.1 Railway Crossing

One submission raised the issue of adequacy of the proposed queuing distance between the Bruce Highway and rail crossing at Turkey Beach Road, particularly when viewed against projected traffic demand to 2033. The submitter suggested that for the safety of both rail and road users the Proponent should discuss this issue with Main Roads Central District Office and the Proponent is to clarify their intersection analysis with department officers. The Proponent should provide any revised traffic assessment findings and mitigation strategies in the Supplementary Report.

SIDRA intersection analysis was undertaken of the future total traffic volumes, presented in **Appendix B3**. The volumes comprise the HHI Development volumes added to the background traffic volumes. The analysis was undertaken for the existing intersection layout as shown in Figure 4.1 of **Appendix B3** and a seagull layout shown in Figure 5.1 of **Appendix B3**. It is important to note that the modelling of a CHR (Channelised Right Turn) layout at the intersection yielded exactly the same results for the existing intersection layout, therefore only the results for the existing layout are reported.

Table 6-1 SIDRA Intersection Results for Hummock Hill Island Development for Existing Intersection Layout

Development Situation	Peak Period	Year	Peak	Degree of Saturation	95%ile Longest Queue (m)
Total with HHI Development (existing Layout)	Tourist	2013	AM	0.230	7m (S), 9m (E), 0m (N)
			PM	0.187	14m (S), 2m (E), 0m (N)
		2018	AM	0.557	10m (S), 28m (E), 0m (N)
			PM	0.252	21m (S), 5m (E), 0m (N)
		2023	AM	0.989	13m (S), 159m (E), 0m (N)
			PM	0.310	31m (S), 11m (E), 0m (N)
		2028	AM	1.388	17m (S), 814m (E), 0m (N)
			PM	0.339	42m (S), 15m (E), 0m (N)
2033	AM	2.077	23m (S), 1,535m (E), 0m (N)		



Development Situation	Peak Period	Year	Peak	Degree of Saturation	95%ile Longest Queue (m)
					(N)
			PM	0.571	59m (S), 22m (E), 0m (N)
	Commuter	2013	AM	0.210	4m (S), 8m (E), 0m (N)
			PM	0.108	7m (S), 2m (E), 0m (N)
		2018	AM	0.448	6m (S), 24m (E), 0m (N)
			PM	0.152	12m (S), 5m (E), 0m (N)
		2023	AM	0.713	7m (S), 55m (E), 0m (N)
			PM	0.258	15m (S), 10m (E), 0m (N)
		2028	AM	0.868	9m (S), 92m (E), 0m (N)
			PM	0.311	19m (S), 12m (E), 0m (N)
2033	AM	1.095	11m (S), 424m (E), 0m (N)		
	PM	0.400	25m (S), 16m (E), 0m (N)		

Table 6-1 shows that in the Tourist Peak by 2021 the total traffic volumes through the existing intersection would exceed its capacity (i.e. desirable maximum degree of saturation (DOS) of 0.80). It is also around this time that queues from the intersection would extend back into Turkey Beach Road and over the rail level crossing. However, the Commuter Peak exceeds capacity around 2027 and queues from the intersection would extend back into Turkey Beach Road to within proximity of the rail level crossing.

If the intersection was upgraded to a seagull form, with an acceleration lane provided for right turn movements from Turkey Beach Road, such an upgrade would extend the life of the intersection beyond 2033 for both the Tourist and Commuter Peaks as detailed in Table 6-2. However, the critical peak period is the Tourist Peak although the queues would not reach back to the level crossing.

Table 6-2 SIDRA Intersection Results for Hummock Hill Island Development for Seagull Intersection Layout

Development Situation	Peak Period	Year	Peak	Degree of Saturation	95%ile Longest Queue (m)
Total with HHI Development (existing Layout)	Tourist	2013	AM	0.206	0m (S), 5m (E), 0m (N)
			PM	0.245	2m (S), 1m (E), 0m (N)
		2018	AM	0.263	1m (S), 11m (E), 0m (N)
			PM	0.312	4m (S), 2m (E), 0m (N)
		2023	AM	0.411	1m (S), 21m (E), 0m (N)
			PM	0.362	6m (S), 3m (E), 0m (N)
		2028	AM	0.504	1m (S), 27m (E), 0m (N)
			PM	0.420	6m (S), 4m (E), 0m (N)
	2033	AM	0.634	2m (S), 36m (E), 0m (N)	
		PM	0.486	7m (S), 4m (E), 0m (N)	
Commuter	2013	AM	0.131	1m (S), 5m (E), 0m (N)	



Development Situation	Peak Period	Year	Peak	Degree of Saturation	95%ile Longest Queue (m)
			PM	0.137	1m (S), 1m (E), 0m (N)
		2018	AM	0.258	1m (S), 11 (E), 0m (N)
			PM	0.175	3m (S), 3m (E), 0m (N)
		2023	AM	0.338	1m (S), 21m (E), 0m (N)
			PM	0.203	4m (S), 5m (E), 0m (N)
		2028	AM	0.441	1m (S), 26m (E), 0m (N)
			PM	0.235	5m (S), 4m (E), 0m (N)
		2033	AM	0.551	2m (S), 32m (E), 0m (N)
			PM	0.272	5m (S), 6m (E), 0m (N)

In both cases for the two different intersection layouts, the AM peak hour in the Tourist Peak is critical, with the ability for right turning vehicles to depart Turkey Beach Road being the primary constraint for the capacity of the intersection.

6.7.3.2 Traffic Volumes

One submission indicated that growth rate figures and base data used to forecast traffic estimates for the Bruce Highway (Appendix A7.4) and the intersection at Turkey Beach Road (Section 2.2), are less than those collected by DTMR Central District. The submission suggested that the Proponent should discuss with DTMR Central District Office the methodology and conclusions of the submitted Traffic Impact Assessment Report and provide any revised traffic assessment findings and mitigation strategies are to be provided in the Supplementary Report.

In response to this submission, a Supplementary Traffic Impact Assessment Report (**Appendix B3**) has been developed. As part of this process, the Proponent has consulted with Main Roads staff for advice on traffic count data, adopted growth rates and destination of trips.

To assist with determining an appropriate growth rate for the intersection, the Department of Main Roads provided traffic count data for 2005, 2006 and 2007 at permanent count site 60022 located on the Bruce Highway 100 m north of Rodds Creek (approximately 11 km northwest of Turkey Beach Road intersection) and permanent count site 60019 located at Colosseum Creek (approximately 39 km south of the Turkey Beach Road intersection) on the Bruce Highway. Irrespective of this data, in an email dated 29 August 2008, the Department recommended a 5% pa (compound) growth rate up to 2018 and a 3% pa (compound) growth rate beyond 2018 for the Bruce Highway be adopted for this area.

Further discussion and data is presented in **Appendix B3**.

Another submission claimed that the Traffic Report in Appendix A7.4 of the EIS appeared to be fairly conservative with respect to traffic assumptions. The submitter suggested that a sensitivity check to be undertaken to see what the impacts would be if the external trip generation for the development was greater than that assumed.



As discussed in **Appendix B3** of the Supplementary Report, in order to determine the external trips for the development and of those trips, how many are likely to travel to and from the highway, a number of analyses were undertaken. To determine the impact of the proposed development on the external road network, the land uses in Table 3.2 were considered in terms of whether it would be a trip attractor to/from the highway. The land uses were also considered in terms of whether the trips generated would be carried out predominately by tourists, local residents or both. The trips made by local residents were further split into residents who resided on the Island but commuted to work via the highway or local residents who resided on the Island but worked locally (not via highway).

As discussed in Section 3.2 of **Appendix B3** of the Supplementary Report, additional commuter trips generated in the Tourist Peak and additional tourist trips in the Commuter Peak were allowed and were added to the respective peak volumes.

As a result, Table 3.5 of **Appendix B3** identifies the assumed trip attractors, percentage of trips to/from highway and the resulting number of trips to/from highway for both 2013 and 2023. In summary, approximately 15% of generated trips are estimated to be external to/from the Bruce Highway in 2013 and 18% in 2023.

6.7.4 Foreshores Road and Clarks Road

6.7.4.1 Flood Immunity

Submissions raised concern around the flood immunity, proposed width and alignment of upgrades to the Foreshores and Clarks Road.

A response to this issue is provided in Section 7.6.1 of the Supplementary Report.

6.7.5 Hummock Hill Island Trunk Road

One submission questioned why is the island trunk road necessary to carry 10,000 to 12,000 vehicles per day. Is the Proponent hoping to develop other areas of the island, or is this the anticipated traffic flow with only the 4,500 population quoted?

The traffic capacity of the HHI Development road network has been determined with reference to the Queensland Streets Design Guidelines for Subdivisional Streetworks. The volume of traffic to be generated by the HHI Development is based on the specific land uses included in the Project such as retail, commercial, tourist, recreation and residential uses. From the areas for each of these land uses and an allowance of the number of trips generated by these land uses, a level of traffic has been determined. The volume of traffic expected to be generated by the development requires that the road connecting the town centre to the bridge is a Distributor Road with a design capacity of 15,000 - 20,000 vehicles per day. It is recognised that the daily traffic volumes anticipated with full development are expected to be at the low end of the capacity range. For this reason a high standard two lane road would be sufficient, however other design objectives may result in a four lane form being implemented. This proposed size of road reserve can accommodate either a two or four lane form and is consistent with the land use and level of movement needed by the community visiting and living on Hummock Hill Island. Providing a Distributor Road does not indicate a future intention to expand the development.



The Proponent proposes to have the undeveloped parts of the island (84% - which includes the undeveloped parts of Special Lease area and Unallocated State Land) declared as Nature Refuge and protected under a formal agreement with the government agencies. The HHI Development boundary will be fenced and have a barrier to prevent vehicular access and uncontrolled pedestrian access to the Nature Refuge. The conserved areas will be maintained, protected and enhanced through a management contract between the Proponent and an appropriate environmental management company who will also be contracted to manage the offset areas. The Proponent propose the Gladstone Regional Council impose a special area environmental levy on land owners to cover the cost of these environmental services.

6.7.6 Movement Planning

One submission suggested that a movement network plan should be developed that encapsulates the following issues:

- promoting land uses and development patterns that reduce reliance on private vehicles and promote public transport and non-motorised transport options;
- provision of the public bus services along the main cross island boulevard and advises that the proposed bus route should be in compliance with the provisions of the Transport Planning and Coordination Regulation 2005 Schedule 1; and
- the proposed bus route should provide linkages to the mainland and appropriate regional centres.

Section 6.1.4 of the EIS stated that a network of pedestrian and cycle paths will be included to allow access between various sections of the proposed HHI Development. A movement plan has not been formulated but will be prepared at the detailed design stage.

Appendix A7.4 - Road and Traffic Impact of the EIS contains the full Traffic Impact Assessment Report dated August 2007. In Appendix G of the Report, Drawing No 7900/25-C001 details the indicative road hierarchy of Hummock Hill Island. Section 4 details the expected traffic volumes in accordance with Queensland Streets and this is indicated in Table 4.0.1. The allowance of road reserve width for distributor and collector roads will ensure Schedule 1 of the Transport Planning and Coordination Regulation 2005 would be met.

6.7.7 Land Use Patterns

Submissions questioned the level of connectivity provided through pedestrian and cycle networks as shown on the Master Plan.

The design of the street network for the HHI Development will provide a significant level of connectivity through:

- extensive pedestrian and cycling networks including access between major activity centres;
- minimal use of cul-de-sacs; and
- the provision of public transport.



6.7.8 Commitment to Public Transport

Several submissions requested clarification of the Proponent's commitment to provide public transport infrastructure.

As stated in Section 3.4.4 of the EIS the Proponent is committed to the provision of public bus services within the HHI Development and to the mainland. The Proponent recognises the need to construct streets to a width that accommodates buses and will undertake detailed design of the road network that is consistent with the requirements of the Disability Standard for Accessible Public Transport, 2002.

Section 3.4.4 of the EIS states that the a bus station will be provided in the Town Centre and bus lay-bys will also be incorporated into design of the main access road so that a bus service can be provided in the future. The design of the HHI Development to incorporate these features will enable ready access of tourist and shuttle buses.

The Proponent will provide bus services during the initial years of the development to Gladstone and to link with existing school bus services. It is expected that as the population grows commercial bus services will be established by existing local bus companies. Major hotels will also run shuttle services to the Gladstone airport to service tourists

6.8 Public Access

One submission raised the issue that access to Hummock Hill Island is not currently restricted by the causeway and that the community does not necessarily require greater access.

As stated in the EIS in section 6.1.3, access to Hummock Hill Island via the causeway is currently constrained and is only achievable during low spring tides and requires a four wheel drive vehicle. The Boyne Creek Bridge will utilise the existing causeway alignment and considerably improve accessibility to the island.

Improved access to Hummock Hill Island will be primarily provided to support the tourist and residential populations of the HHI Development, but will also provide access to day trippers and the broader community if they so desire it. The upgrading of road infrastructure will also ensure greater safety and general accessibility for all visitors and residents and not limited to those with 4WD vehicles or small boats.