17 WASTE MANAGEMENT

17.1 RESPONSE TO SUBMISSIONS ON DRAFT EIS

Submissions relating to Queensland Curtis LNG (QCLNG) Project's LNG Component waste management, and in particular draft environmental impact statement *Volume 5, Chapter 17: Waste Management* are summarised in *Table 5.17.1* below.

Table 5.17.1 Response to Submissions on draft EIS

Issue Raised	QCLNG Response	Relevant Submission(s)
A number of issues were raised relating to management of sewage on the LNG Facility site for construction and operations, including: • the draft EIS indicates there will be discharge of sewage effluent into Gladstone Harbour. It is considered that tertiary treatment of sewage instead of secondary treatment should be utilised due to the site's proximity to the Great Barrier Reef Marine Park. Nutrient issues are already being highlighted by the Port Curtis Integrated Monitoring Program annual water monitoring program (including in The Narrows area) • use of the waste management hierarchy for treated effluent or benchmarking against world's best practice technology is not demonstrated, and greater emphasis should be placed on effluent reduction and reuse on site • tertiary treatment for sewage effluent prior to an discharge from the site • additional assessment of potential impacts arising from site effluent discharges, including near and far-field modelling and cumulative impacts associated with discharges from other potential projects on Curtis Island. Water quality objectives and environmental values will need to be determined for Port Curtis waters.	As the Project proceeds through detailed design, further consideration will be given to options for management of sewage effluent other than discharge, including reuse on site. A range of potential options are under consideration including: • moisture conditioning of backfill, truck wash, dust control around the site; and/or • irrigation within the boundary of the LNG Facility site. For discharged waters, QGC is investigating treatment of sewage effluent to a standard meeting the definition of tertiary treated sewage specified by sub regulation 135(3) of *The Great Barrier Reef Marine Park Regulations 1983 (Statutory Rules 1983 No. 262 as amended)* prior to discharge from the LNG Facility site. However, this is subject to ongoing assessment of treatment technologies. Near-field and far-field modelling results for the secondary-treated effluent described in the draft EIS are described in *Volume 5 Chapter 8*. Assessment of potential impacts on marine biota arising from discharge of treated sewage and reverse osmosis (RO) brines is provided in *Volume 5, Chapter 8* of this Supplementary EIS. The assessment is based on a worst case scenario which assumes discharge of all treated effluent (i.e., no reuse or irrigation, in order to provide a conservative assessment), with a peak discharge rate of approximately 7.5 litres/sec (based on peak construction camp population from approximately month 27 to month 30 of construction, with effluent discharge as a constant stream 24 hours per day during this period). Refer *Section 17.2* below for further detail on volumes. Estimated volumes of sewage effluent provided in the draft EIS for operations remain valid. Estimated volumes anticipated to be generated during construction have been updated based on the revised construction workforce (as described in *Volume 2, Chapters 6* and *13*), and are provided in *Section 17.2* below.	29, 32
More detail should be provided on the irrigation system for disposal of plant effluent and the associated environmental	Details of the irrigation system for sewage effluent reuse and disposal during operations are being developed through the detailed design phase of the Project.	32

Issue Raised	QCLNG Response	Relevant Submission(s)
impacts and mitigation of these impacts.		
The only suitable site for waste disposal within the area of Gladstone Regional Council is the Benaraby Landfill. General waste generated by the Project should be transported at the Project's cost to Benaraby Landfill, and not to local transfer stations.	The Project anticipates use of Benaraby Landfill for general domestic wastes (including food wastes) generated during construction and operations, as well as potentially for other waste streams (e.g. sewage sludge, quarantine wastes, etc). Transfer stations may be utilised for some waste streams with potential for recycling (i.e. paper. plastics, and glass), although the Project will work with the Gladstone Regional Council to ensure that transport arrangements for these are acceptable to council where use of council facilities is made.	29
Liquid waste will not be accepted at Benaraby Landfill.	A range of existing, appropriately licensed waste disposal/recycling facilities (other than Benaraby Landfill) have been identified for management of liquid waste from the LNG Facility site during construction and operations, and commercial arrangements with the operators of these facilities are ongoing. These include options for sewage treatment plant slurry, waste oils and oily sludges, solvents (including paint and thinners), quarantine wastes, and other liquid wastes.	29
The proponent should undertake discussion with the Gladstone Regional Council regarding the capacity at Benaraby Landfill to accept sewage sludge from the LNG Facility.	QGC and/or the LNG Facility construction EPC contractor or selected subcontractors will work with Gladstone Regional Council with regard to arrangements for acceptance of sewage sludge from the LNG Facility site, if Benaraby Landfill is the selected disposal option for this material.	29
Controlled burning for vegetation management should be limited where practicable. Excess timber could be mulched for use in erosion management around the site.	Cleared timber and vegetation from the LNG Facility site will be mulched on the site with mulch used on site as sediment and erosion control during construction and excess mulch blended with excess site cut (soil/rock) for disposal within the site boundary. Further detail is provided in *Volume 2, Chapter 13* of this supplementary EIS.	29
Volume 5, Chapter 8 of the draft EIS discusses flows of waste water. More description of the flows should be provided including more detail as to source of flows.	Additional discussion of the operational waste water system is provided in *Section 17.3* below.	32
An illustrated description of the LNG process is required, including all inputs and outputs and description of where wastes are produced, their characterisation, location, and method of disposal.	An LNG Facility process flow diagram and description was provided in *Volume 2, Chapter 9* of the draft EIS (refer in particular to *Figure 2.9.2 and Section 9.1* and *9.2*). A schematic of the LNG process flow diagram showing key operational wastes was provided in *Volume 5, Chapter 17* of the draft EIS (*Figure 5.17.4*), and indicative operational waste stream volumes for 1, 2 and 3 LNG trains were provided in *Table 5.17.2*. A summary of construction waste streams and indicative volumes was provided in *Volume 5, Chapter 17, Section 17.2.2* of the draft EIS. A schematic of the LNG process flow diagram showing atmospheric emissions was provided in *Volume 5, Chapter 12* (*Figure 5.12.1*). An overall summary of waste streams, and indicative methods of management and disposal was provided in *Volume 5, Chapter 17* of the draft EIS (refer *Table 5.17.5*).	32

Issue Raised	QCLNG Response	Relevant Submission(s)
Further detail is required as to the disposal methods for waste from the LNG Facility in general (including the water treatment plant) and opportunities for waste avoidance and reuse.	A range of potential disposal options for waste from the LNG Facility, during both construction and operations, remain under consideration. In general, wastes will be disposed of at an appropriately licensed facility, with handling and transport undertaken by a licensed contractor. A number of municipal and/or commercial facilities have been identified where different waste streams may be disposed of or recycled. Commercial arrangements with these facilities are under discussion. A number of potential facilities have been identified where construction and/or operations wastes may be recycled. These include facilities for recycling and/or reclaiming materials from: • paper • plastics • glass • metals • batteries. In addition, use will be made of some of the mulched timber from the LNG Facility site for erosion and sediment control on the site. In general, waste avoidance and reuse options will continue to be assessed throughout the construction and operations phases of the Project, in accordance with the QGC waste management philosophy and waste hierarchy as described in the *Volume 5, Chapter 17, Section 17.1.3* of the draft EIS.	32
Is the Gladstone Regional Council Curtis Island landfill proposed to be used as part of the waste management system?	The Gladstone Regional Council Curtis Island landfill is not under consideration for use by the Project as part of the waste management system for the LNG Facility.	32

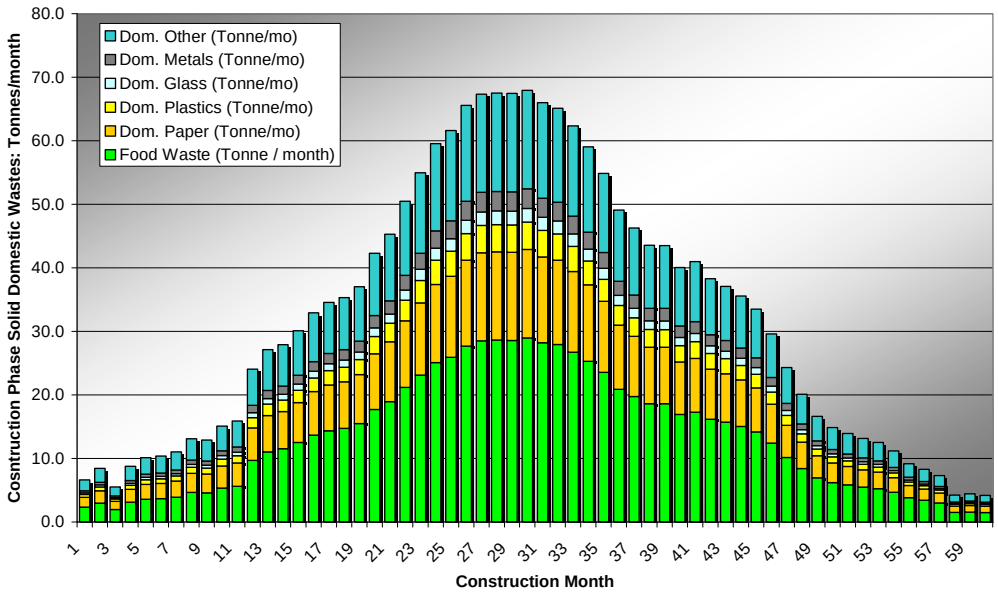
17.2 REVISED WASTE GENERATION ESTIMATES - CONSTRUCTION CAMP DOMESTIC WASTES

Given the amended workforce estimates for LNG Facility construction as described in *Volume 2, Chapter 13* of this sEIS, volumes of domestic wastes anticipated to be generated throughout the construction phase have been amended from those provided in the draft EIS (*Volume 5, Chapter 17, Section 17.2.2*). These amended estimates are provided in *Figure 5.17.1*, *Table 5.17.2*, and *Figure 5.17.2* below.

This revision of the estimated anticipated waste stream volumes has been undertaken based on construction of LNG Trains 1 and 2 and an assumed workforce breakdown as provided in *Volume 2, Chapter 13* of this sEIS.

Waste volumes provided are indicative, with detailed design and construction planning ongoing, and a potential for reduction in volumes as a result.

Figure 5.17.1 Indicative Construction Phase Solid Domestic Waste Volumes



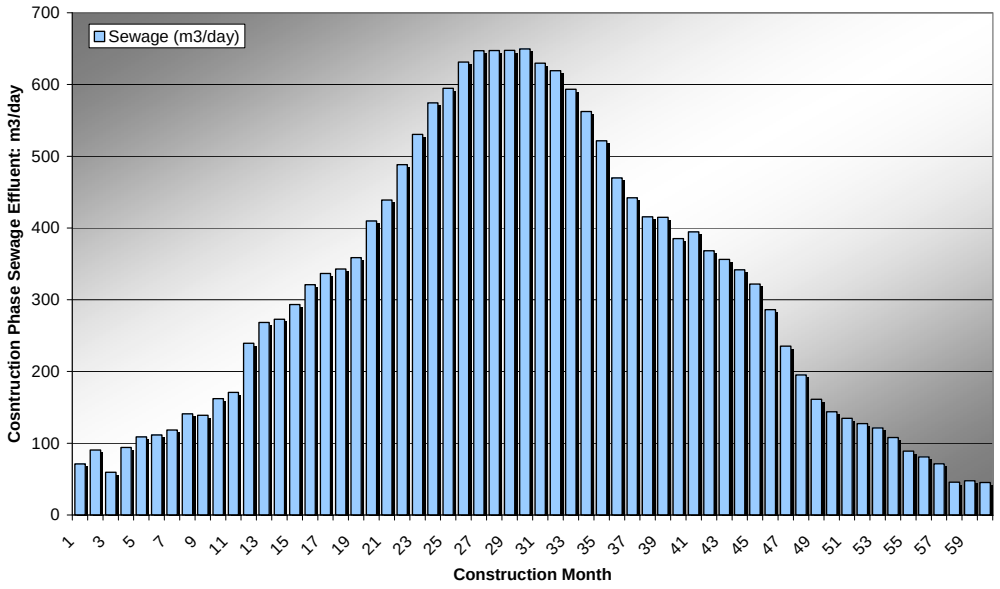
The total tonnages of construction phase solid domestic waste arising (generated predominantly from construction camp) identified above in *Figure 5.17.1* are outlined in *Table 5.17.2*, expressed as a forecast total over construction of Train 1 and 2.

Table 5.17.2 Indicative Domestic Waste Volumes - Construction Train 1 and 2

Waste Stream	Indicative Amount (total for construction period)
Sewage	
Sewage	560,500 m³
Sewage treatment plant solids	1,495 m³
Domestic wastes	
Paper	400 tonnes
Food waste	800 tonnes
Plastics	125 tonnes
Glass	60 tonnes
Metals	90 tonnes
Other	450 tonnes

As shown in *Table 5.17.2* above, approximately 560,500 m^3 of sewage effluent is anticipated to be generated during construction of Trains 1 and 2. A breakdown of effluent volumes by month is provided in *Figure 5.17.2*.

Figure 5.17.2 Indicative Sewage Treatment Plant (STP) Effluent Volumes



From *Figure 5.17.2* it can be seen that peak generation of sewage effluent occurs in month 30 of construction, at approximately 650 m^3/day. Assuming constant discharge of sewage effluent, this corresponds to approximately 7.5 l/sec of peak sewage effluent discharge from the sewage treatment plant.

An assessment of potential impacts on marine biota arising from discharge of sewage effluent is provided in *Volume 5, Chapter 8* of the sEIS.

17.3 OPERATIONS EFFLUENT TREATMENT – FURTHER DESCRIPTION

In response to a submission requesting further detail on waste water flows, the following additional information is provided.

17.3.1 System Description

Process area waste water and sanitary sewage collection systems are segregated. Sanitary waste from various sources is routed to the sewage treatment plant.

The feed gas to the LNG Plant contains no ‘‘heavy’’ hydrocarbons. The process area drains (from vessels and pumps etc.) will contain mainly water with small amounts of entrained hydrocarbons. The process drains will be directed to the oily water treatment system.

Amine is a hazardous chemical used in the acid gas removal unit. A dedicated amine drains system is included at the QCLNG Facility site to collect all the drains around this processing area. Once collected the amine will be reused where possible. Some amine “sludge’’ will be produced by the process and

this will be collected in an amine sump drum. Any sludge will be pumped out and trucked to a specialist contractor for treatment.

Stormwater from the process and utility areas are routed to an oily water treatment system.

17.3.1.1 Process/Oily Water Collection/Treatment System

Liquid treated in the oily water treatment system will include:

- drips and drains from the compressor area - drained to above-ground collection tanks and then pumped to the oily water treatment system
- drips and drains from power generators - drained to a sump and then pumped to the oily water treatment system
- wastewater from the water degassing drum; this is flashed in flash pot and then sent to the wastewater tank or oily water treatment system
- wastewater from solvent regeneration drum is sent to the wastewater tank
- laboratory wastewater is gravity fed to a dedicated lift station and pumped to the oily water separator
- separated condensate from flare knockout drum is pumped to the wastewater tank or oily water treatment system
- potentially contaminated water from process area and maintenance buildings will be routed to lift stations and then pumped to the oily water treatment system. Potentially contaminated stormwater runoff from the process areas will be collected in and routed via concrete lined ditches to the Process Area Spill Containment Sump (PASCS), which will be sized to contain potential refrigerant leaks from the Process Area and to store contaminated “first flush” stormwater runoff from the process slab. The PASCS is equipped with an oil skimmer to skim and pump any oil to a corrugated plate interceptor. Water from the PASCS may be pumped to stormwater outfall on level control, and one pump can also be directed to the CPI separator if additional treatment is required, as determined by the operator.

Wastewater collected in the wastewater tank will be periodically collected and disposed of offsite by a licensed waste-handling contractor to an appropriately licensed disposal facility.

The oily water treatment system will include the CPI which separates free oil from the process wastewater and contaminated stormwater. Oil droplets rise to the surface of water and overflow into the oil chamber over a weir. Accumulated oil is pumped to a waste oil tank on level controls. Solids accumulate at the bottom of the separator as sludge and periodically pumped to a storage tank. Sludge will be periodically removed by a vacuum truck and disposed of offsite by a licensed waste-handling contractor to an appropriately licensed disposal facility.

Treated water then overflows into a surge tank and from there is pumped to a Dissolved Air Flotation unit (DAF) designed to remove dispersed and emulsified oil. Effluent from the DAF flows to an effluent clearwell and then discharged via the effluent discharge diffuser. The float is sent to waste oil tank on level controls. Solids accumulate at the bottom of the separator as sludge and will be periodically removed by a vacuum truck and disposed of offsite by a licensed waste-handling contractor to an appropriately licensed disposal facility.