

Attachment 7: Construction Sewage Production Estimate

Barcaldine Regional Council's letter of 31 August 2020 requests further information related to demand for the use of the Barcaldine sewage treatment plant during the construction and operational phases. Barcaldine Regional Council's letter states:

"Council notes sewerage from construction workforce is proposed to be trucked off-site to a licenced facility. Council is not aware of a licenced facility in the region that would be able to receive the expected volumes based on peak construction workforce numbers. The nearest licenced facility to the site is the Barcaldine sewage treatment plant. The plant is currently undergoing upgrades to meet existing demand, there is no capacity at the plant to receive sewage from the project during the peak construction phases. Further details are required of the expected demand generated by the peak construction workforce, A monetary contribution will be required for any upgrades to Council's licenced facility to accommodate the demand generated by the proposed development. Council has undertaken initial cost estimates based on workforce projections at approximately \$2 million for the necessary upgrades to handle the increased load on the facility".

The purpose of this appendix is to estimate the quantity of sewage that will be produced during the construction phase of the project.

Queensland planning guidelines state that "Generally ADWF [average dry weather flow] will range between 150-275 L/EP/d" where an equivalent person (EP) is defined as "water supply demand or the quantity and/or quality of sewage discharge for a person resident in a detached house".¹

Queensland Urban Utilities use a rate of 0.2 EP/employee for factories². Factory workers would be similar to construction workers due to similar time spent on the work site and a similar mix of tasks. Therefore, it is anticipated that sewage production (requiring offsite disposal) will be in the range of 30 to 55 litres per worker per day.

Figure 1 shows sewage production in thousands of litres per day against project quarter calculated on the above basis. Sewage production estimates peak at 22 kl/day in Quarter 12 and Quarter 28 of the project, corresponding with peak construction workforce estimates for each phase of the project.

¹ Queensland Government, Department of Energy and Water Supply, "Planning Guidelines for Water Supply and Sewerage", April 2010 (March 2014 amendments).

² Queensland Urban Utilities, "Sewerage Code – Part 1 (Planning and Design)", November 2011, Edition V.3.

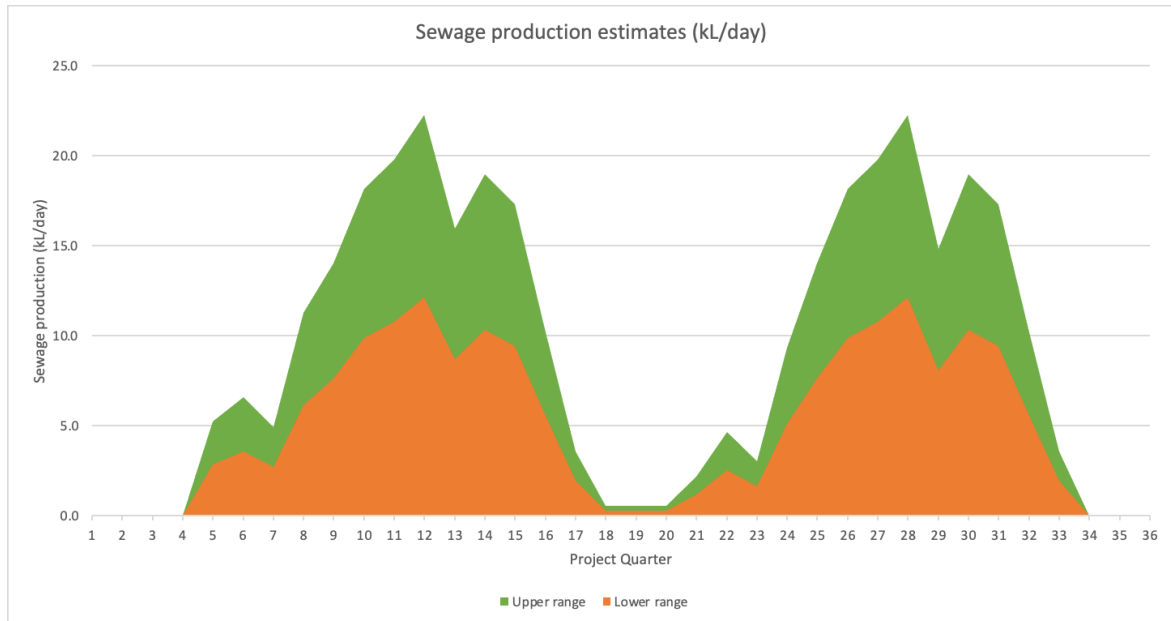


Figure 1: Construction sewage production estimates

20,000 litre sewage tankers are common, meaning that, at peak, just over one tanker load per day would be required to service peak construction demand. If this volume is too great for the Barcaldine Sewage Treatment Plant, it is not uneconomical to transport the waste (or the waste exceeding Barcaldine's capacity) the additional distance to Emerald or Clermont for disposal.

Attachment 8: Construction and Operational Landfill Demand Estimate

Barcaldine Regional Council's letter of 31 August 2020 requests further information related to demand for the use of the Alpha landfill during the construction and operational phases. Barcaldine Regional Council's letter states:

“Council notes a commercial contractor will remove construction and operational waste from site and transport to established Council waste facilities (i.e. landfill). Council will require further details such as an assessment of the waste streams and expected volumes produced throughout the lifespan of the project. A monetary contribution may be required for any upgrades to the Council waste facilities”.

This appendix intends to estimate the quantity and timing of disposal to landfill over the construction and operational phases of the project. Due to limited data in relation to waste production rates and other sources of uncertainty, the estimates should be considered to be order of magnitude only and subject to change as the project progresses.

Disposal to landfill will be minimised through the maximisation of opportunities to recycle waste. Recyclable waste will include:

- Refundable containers,
- Plastics, glass, paper and cardboard,
- Waste oil,
- Batteries,
- Technical waste (computers, telephones),
- Metals.

Waste to be disposed of by off-site landfill will consist of:

1. General office waste,
2. Workshop and construction waste, and
3. Food and meal related waste.

General office waste will consist of items such as:

- Packaging,
- Used consumable items,
- Incorrectly classified recyclable items,
- Sanitary waste.

Workshop and construction waste will consist of items such as:

- Used rags,
- Consumables such as ear plugs, dust masks, paper overalls and other PPE items,
- Worn and broken equipment such as gloves and safety glasses,
- Treated timber packaging and broken pallets,
- Styrofoam and other synthetic packaging material, and
- Incorrectly classified recyclable waste.

Food and meal related waste will consist of food scraps, disposable cups and food packaging not suitable for recycling.

National annual average per capita waste production rates and average recycling rates have been taken from Section 7 of the 2018 National Waste Report³. An estimated factor to allow for the difficulty and cost of recycling in a regional community has been applied to the national average recycling rates. These assumptions are set out in Table 1.

Table 1: Waste generation assumptions

Waste type	National annual waste per capita	National recycling rate	Regional recycling efficiency
	kg/capita	%	%
Paper and cardboard	229	60%	50%
Metals	226	90%	90%
Plastics	103	12%	50%
Glass	44	57%	90%
Food waste	203	0%	100%

An estimate of the waste generated by each worker on the project as a proportion of the per capita waste production rate has been made (for example the estimate assumes that each worker will dispose of 20% of the national per capita rate of food waste at work). In some cases (e.g. metal waste) the estimate exceeds 100% of the per capita rate, as a worker will produce more of a particular type of waste while at work than an average Australian will in the course of their daily lives (for example a metal worker will produce metal waste at a significantly higher rate at work than the per capita rate). These estimates are set out in Table 2.

Table 2: Estimate of the proportion of the per capita rate of waste generation by each worker

Waste type	Construction rate	Operations rate
Paper and cardboard	200%	100%
Metals	500%	200%
Plastics	200%	100%
Glass	30%	30%
Food waste	20%	20%

A further estimate of general office waste and general construction waste has been applied as the National Waste Report does not contain granular information suitable to estimate production of waste from these activities (for example we were unable to find data to estimate the rate of disposal of worn gloves or used earplugs). An allowance of 300 g per worker per day has been applied.

³ Blue Environmental, "National Waste Report 2018", 19 November 2018.

The assumptions and data are then combined to form an estimate of waste to landfill per worker, per quarter for each of the waste types as set out in Table 3.

Table 3: Waste to land fill estimates per worker per quarter

Waste type	Construction waste kg/worker/quarter	Operations waste kg/worker/quarter
Paper and cardboard	80.2	40.1
Metals	53.7	21.5
Plastics	48.4	24.2
Glass	1.6	1.6
Food waste	10.2	10.2
Other general office waste	18.0	18.0
Other workshop and construction waste	18.0	18.0
Total	230.0	133.5

The waste production rates (net of recycling rates) are then applied to the labour force estimate to produce a quarter by quarter estimate of landfill demand by waste stream. These results are set out in Figure 2. The total estimated demand on landfill over the construction phase is 1,373 tonnes.

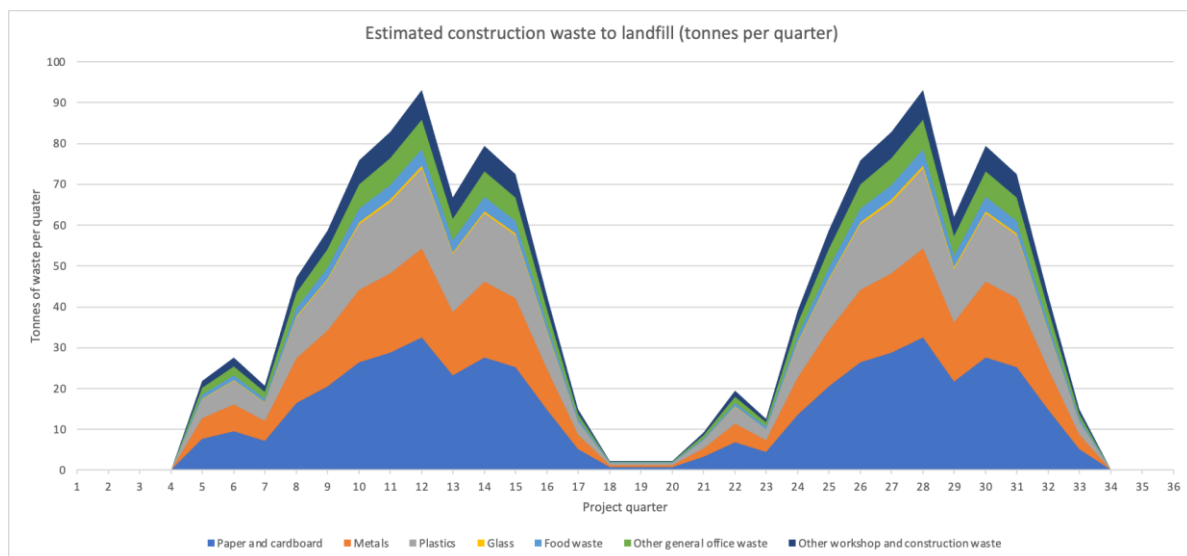


Figure 2: Estimated construction waste to landfill by waste type and by quarter

Operational landfill demand is estimated on the basis of ninety full time workers. The operational landfill demand estimate is set out in Table 4.

Table 4: Operations phase estimated annual landfill demand

Operational phase	Tonnes per annum
Paper and cardboard	14.4

Metals	7.7
Plastics	8.7
Glass	0.6
Food waste	3.7
Other general office waste	6.5
Other workshop and maintenance waste	6.5
Total	48.1