Appendix 2.1 Environmental Performance of Biogas Utilisation Options

Appendix 2.1 Environmental Performance of Biogas Utilisation Options

A high-level assessment of potential environmental performance for the shortlisted biogas utilisation options has been undertaken, and is summarised in this sub-section. The following environmental topics have been considered in the assessment:

- Air Quality Impact,
- Noise Impact,
- Landscape Impact,
- Hazard to Life,
- Ecology Impact,
- Waste management,
- Cultural Heritage Impact,
- Traffic impact, and
- Preliminary Estimates of Net Greenhouse Gas Reduction (GHG) - CO_2 Equivalents

Table 2.1 shows the relative values for on-site emissions to air (NO_x and PM_{10}) associated with Options A and B. Option A is associated with the greatest emissions to air, as it involves combustion of all biogas produced at the facility at the OWTF 2. Option B(ii) also involves combustion of around 26% of the biogas produced on site in a single CHP unit and values for this option have been estimated proportionally to Option A. Emissions to air under Options B(i) is related to uncontrolled emissions from a biogas boiler consuming around 12% of the biogas produced at the facility. Values for the biogas boiler are derived from the factors presented in the Australian National Pollutant Inventory (Australian Government Department of Sustainability, Environment, Water, Population and Communities, 2011).

Table 2.1: Emissions to Air - Comparison of Options

Option	Unit	Option A[1]	Option B(i)[2]	Option B(ii)[3]
Equipment Type		CHP	Boiler	CHP
Gas used onsite	Nm_3/day	33,285	4,141	8,509
NO_x emissions	kg/day	3.33	1.66	0.85
PM_{10} emissions	kg/day	0.50	0.10	0.13

1. Based on mitigated emissions used in Section 3 AQIA (NO_x 100 mg/Nm^3, RSP 100 mg/Nm^3)

2. Based on Table 19: Emissions for landfill gas boilers (unmitigated). National Pollutant Inventory - Emission estimation technique manual for Combustion in boilers, Version 3.6, December 2011 (Australian Government Department of Sustainability, Environment, Water, Population and Communities)

3. Proportionally based on biogas used onsite for Option A (mitigated)

Overall the comparison of Options shows that emissions to air would be highest under Option A, with the production of an estimated 3.33 kg and 0.50 kg of NO_x and PM_{10} each day. Option B(ii) would emit the lowest amount of NO_x due to the relatively small quantities of biogas combusted on site, although PM_{10} emissions are roughly equivalent to those under Option B(ii).

Table 2.2 below provides a summary of potential environmental impacts associated with each option for the above topics.

Table 2.2: Matrix for Environmental Performance- Preliminary Qualitative Assessment

Impact	Option A – CHP generation and export	Option B – Biogas for onsite heat with surplus to Towngas	Option B (ii) – CHP for internal energy demand, and surplus to Towngas
Air Quality	• Air quality impacts are highest under Option A as a result of the exhaust gasses from the CHP plant. • SCR and thermal treatment (if necessary) is proposed for treatment of CHP plant exhaust gasses. • However, modelling carried out as part of the EIA indicates that impacts to ambient air quality will be minor.	• Minor air quality impacts at the OWTF 2 site associated with use of biogas for boiler. Off-site emissions are addressed under the relevant environmental permits of end-users. • Construction of the pipeline required under this option will be subject to separate environmental approvals regarding air quality.	• Minor air quality impacts a result of the exhaust gasses from the CHP plant. Impacts will be less than under option A due to smaller plant size. • SCR and thermal treatment (of necessary) is proposed for treatment of CHP plant exhaust gasses. • Construction of the pipeline required under this option will be subject to separate environmental approvals regarding air quality.
Noise	• This option is assessed within the EIA. No significant noise impacts have been identified in the preliminary assessment of noise impacts.	• Works associated with the development of the new connecting gas pipeline may lead to additional noise impacts during the construction stage. • No significant noise impacts, other than potentially for maintenance works, expected during operational stage. • Construction of the pipeline required under this option will be subject to separate environmental approvals regarding noise.	• Works associated with the development of the new connecting gas pipeline may lead to additional noise impacts during the construction stage. • Construction of the pipeline required under this option will be subject to separate environmental approvals regarding noise.
Landscape	• This option is considered as the worst case scenario in the EIA with regard to landscape impacts. The main impacts (real and perceived) associated with this option are related to a 30m flue stack for dispersion of emissions from the CHP plant.	• Flue stack not required under Option C, therefore landscape impacts are reduced, compared to Option A. • The pipeline will be subterranean and following an existing route. Therefore no landscape issues are anticipated. However, the pipeline will be subject separate environmental approvals.	• The main impacts (real and perceived) associated with this option are related to a stack for dispersion of emissions from the CHP plant. • The pipeline will be subterranean and following an existing route. Therefore no landscape issues are anticipated. However, the pipeline will be subject separate environmental approvals.

Impact	Option A – CHP generation and export	Option B – Biogas for onsite heat with surplus to Towngas	Option B (ii) – CHP for internal energy demand, and surplus to Towngas
Hazard to Life	• Potential hazards for the CHP Processes and the related storage of the biogas in OWTF2.	• Potential hazards for the storage of the biogas in OWTF2. • Hazard assessment identifies approximately 1.7km of proposed pipeline as falling within the Consultation Zone of a Potentially Hazardous Installation (Sheung Shui Water Treatment Works) and a LPG station is located less than 150m away from proposed pipeline in Fanling area. • The above issues to be addressed in separate approvals process for pipeline construction.	• Potential hazards for the CHP Processes and the related storage of the biogas in OWTF2. • Hazard assessment identifies approximately 1.7km of proposed pipeline as falling within the Consultation Zone of a Potentially Hazardous Installation (Sheung Shui Water Treatment Works) and a LPG station is located less than 150m away from proposed pipeline in Fanling area. • The above issues to be addressed in separate approvals process for pipeline construction.
Ecology	• Minor external works. No significant ecological impacts predicted.	• As the alignment pipeline follows an existing road, significant ecological impacts are not predicted. • Construction of the pipeline required under this option will be subject to the appropriate environmental approvals.	• As the alignment of the pipeline follows an existing road, significant ecological impacts are not predicted. • Construction of the pipeline required under this option will be subject to the appropriate environmental approvals.
Waste	• No additional waste arisings are expected.	• Construction of the pipeline will generate additional excavation waste (estimated 1,375m3 of spoil). • This will be assessed as part of the separate approvals process for pipeline construction.	• Construction of the pipeline will generate additional excavation waste (estimated 1,375m3 of spoil). • This will be assessed as part of the separate approvals process for pipeline construction.
Cultural Heritage	• No additional impacts on cultural heritage assets from external works or operation of the CHP have been identified.	• The preliminary pipeline alignment follows a previously developed alignment. No specific cultural assets have been identified along this alignment, and it is previously developed. Therefore impacts to cultural heritage are not anticipated. • Cultural impacts may need to be assessed as part of a separate environmental approvals process.	• The preliminary pipeline alignment follows a previously developed alignment. No specific cultural assets have been identified along this alignment, and it is previously developed. Therefore impacts to cultural heritage are not anticipated. • Cultural impacts may need to be assessed as part of a separate environmental approvals process.
Traffic	• No additional traffic impacts are expected	• No additional traffic impacts are expected	• No additional traffic impacts are expected