GAS IMPORT JETTY AND PIPELINE PROJECT
ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE

TECHNICAL NOTE

TECHNICAL NOTE NUMBER:	TN 028
DATE:	19 October 2020
LOCATION:	Gas Import Jetty Works (FSRU)
EES/MAP BOOK REFERENCE:	Chapter 4: Project description, Chapter 6: Marine biodiversity, Technical Report A: Marine biodiversity and Attachment VIII, section 9.1.2
SUBJECT:	Response to RFIs 1 and 3: Section 2.1 Seawater Use
SUMMARY	This technical note provides further information on seawater intake velocity and provides a table that consolidates information describing the seawater uses, discharge volumes, inputs and outputs, duration of discharge, natural and altered temporal variability including volumes under the open and closed scenarios.
REQUEST:	This technical note has been prepared in response to the Request for Further Information 1 and 3 provided to the proponents by the Crib Point Inquiry and Advisory Committee dated 16 September 2020.

[RFI 001] Provide a table that consolidates information describing the seawater uses, discharge volumes, inputs and outputs, duration of discharge, natural and altered temporal variability under the range of open loop and closed loop scenarios, including total volumes.

1. See Attachment 1 of this technical note, which the provides the engineering capacity of the FSRU parameters. The actual operational parameters are influenced by a range of factors, see Technical Note 033.

[RFI 003] Provide information (with examples) that demonstrates the seawater intake velocity at 0.15 metres per second.

2. Section 7.5.1 of EES Technical Report A: Marine biodiversity impact assessment outlines the rationale for recommending 0.15 metres per second as the intake velocity.

3. Mr Scott Chidgey explains in his witness statement (document 71, page 24) that this recommendation is based on the US EPA, National Pollutant Discharge Elimination System: Final Regulations Addressing Cooling Water Intake Structure for New Facilities (USEPA 2004), which states:

   "To develop a threshold that could be applied nationally and is effective at preventing impingement of most species of fish at their different life stages, EPA applied a safety factor of two to the 1.0 ft/s threshold to derive a threshold of 0.5 ft/s. This safety factor, in part, is meant to ensure protection when screens become partly occluded by debris during operation and velocity increases through portions of the screen that remain open…

The data suggest that a 0.5 ft/s (0.15 m/s) velocity would protect 96 percent of the tested fish."

4. Mr Chidgey further explains (at 8.2.3) that:

> *The standard measures to minimize entrainment adopted for this project to mitigate entrainment were those used at desalination plants in Victoria, Western Australia and South Australia including;*
>
> - *maintaining water velocities below 0.15 m/s (9 metres per minute) at the intake which allows most free-swimming biota from around 2 cm long the ability to avoid entrainment threats (USEPA 2004),…*

5. The recommendation to limit intake velocities to 0.15 m/s was adopted at the Victorian Desalination Plant.

6. The recommended intake velocity is established in EPR-ME01 of the Day One Crib Point Jetty Works EPRs.

7. The mesh screen seawater intake boxes on the FSRU will be designed to ensure the intake velocity is no greater than 0.15 metres per second.

CORRESPONDENCE: N/A

ATTACHMENTS: 1 attachment:

1. GIJPP Seawater Stream Table

Attachment 1

GIJPP Seawater Stream Table

Open loop

1 regasification train, 250 mmscf/day

	Input streams							Output streams				
	Continuous flows				Intermittent flows*			Continuous flows		Intermittent flows*		
	Engine CW**	Auxiliary machinery CW**	Regasification process	FWG feedwater	Ballast water	Water curtain	Fire water	Regasification process	FWG discharge	Ballast water	Water curtain	Fire water
Flowrate (m³/day)	58,560	45,840	51,600	2,112	4,330	5,760	1,550	156,000	2,112	53,500	5,760	1,550
Temperature change (relative to background seawater) (ºC)	0	0	0	0	0	0	0	-7	+8	0	0	0
Chlorine concentration (µg/L)	0	0	0	0	0	0	0	100	100	21	100	100

2 regasification trains, 500 mmscf/day

	Input streams							Output streams				
	Continuous flows				Intermittent flows*			Continuous flows		Intermittent flows*		
	Engine CW**	Auxiliary machinery CW**	Regasification process	FWG feedwater	Ballast water	Water curtain	Fire water	Regasification process	FWG discharge	Ballast water	Water curtain	Fire water
Flowrate (m³/day)	58,560	45,840	207,600	2,112	8,670	5,760	1,550	312,000	2,112	53,500	5,760	1,550
Temperature change (relative to background sewater) (ºC)	0	0	0	0	0	0	0	-7	+8	0	0	0
Chlorine concentration (µg/L)	0	0	0	0	0	0	0	100	100	21	100	100

3 regasification trains, 750 mmscf/day

	Input streams							Output streams				
	Continuous flows				Intermittent flows*			Continuous flows		Intermittent flows*		
	Engine CW**	Auxiliary machinery CW**	Regasification process	FWG feedwater	Ballast water	Water curtain	Fire water	Regasification process	FWG discharge	Ballast water	Water curtain	Fire water
Flowrate (m³/day)	58,560	45,840	363,600	2,112	13,000	5,760	1,550	468,000	2,112	53,500	5,760	1,550
Temperature change (relative to background sewater) (ºC)	0	0	0	0	0	0	0	-7	+8	0	0	0
Chlorine concentration (µg/L)	0	0	0	0	0	0	0	100	100	21	100	100

Closed loop

	Input streams								Output streams							
	Continuous flows				Intermittent flows*				Continuous flows				Intermittent flows*			
	Engine CW	Auxiliary machinery CW	Atmospheric dump condenser CW	FWG feedwater	Regasification process	Ballast water	Water curtain	Fire water	Engine CW	Auxiliary machinery CW	Atmospheric dump condenser CW	FWG feedwater	Regasification process	Ballast water	Water curtain	Fire water
Flowrate (m³/day)	58,560	45,840	80,400	2,112	500	13,000	5,760	1,550	58,560	45,840	80,400	2,112	500	53,500	5,760	1,550
Temperature change (relative to background seawater) (ºC)	0	0	0	0	0	0	0	0	+12	+5	0	+8	+4	0	0	0
Chlorine concentration (µg/L)	0	0	0	0	0	0	0	0	100	100	100	100	0	21	100	100

NOTES

Abbreviations

CW - cooling water

FWG - freshwater generator

Frequency of intermittent flows

Ballast water - During gas production, the LNG tanks on the FSRU are progressively emptied and ballast water is taken into the FSRU to maintain the vessel's stability. The ballast water is discharged over the approximate 36-hour period when LNG is loaded into the FSRU from the visiting LNG carrier. Total capacity of ballast water tanks is 53,500 m³.

Frequency (up to 12 LNG carriers) - 18 days per year

Frequency (up to 40 LNG carriers) - 60 days per year

Water curtain - During unloading a seawater spray (water curtain) is discharged at a rate of 240 m³/hour = 5,760 m³/day.

Frequency (up to 12 LNG carriers) - 18 days per year

Frequency (up to 40 LNG carriers) - 60 days per year

Fire water - A firewater pump is tested for one hour every two weeks with a discharge rate of 1,550 m³/day.

Frequency - 1 and 1/12 days per year

Closed loop regasification process - Single seawater intake for closed loop process. Seawater is discharged when switching to open loop mode or when maintenance is required.

** Following use as CW for heat recovery CW for the engines and auxiliary machinery systems are redirected to the regasification loop in open loop mode for reuse