Shell Australia

Prelude FLNG Terminal Information Book - LNG

Document Number	OPS_GEN_004647
PML (SAP) Number	N/A
Revision Number	17
Document Status	Approved for Use
Revision Date	14-May-24
Cyclical Review Cycle	1 Year (BCRP's)
Safety Critical Content	[Safety Critical]
Technical Reviewer (TA2 or SME)	John Kaighin
Process Area/Discipline	Marine Process Model

Rev	Revision Update Description	Date Changed	Authors, Reviewers, Approvers	
16.01	Issued for Review. Removed duplications from Terminal Regulations.	05-Jan-2024	Madeline Deppeler John Campbell Divya Bharati Darcy McGowan Mark Scholma Rajeev Punnen (AP-MS) John Kaighin (SME-MS/TA-2)	Author Reviewer Reviewer Reviewer Reviewer Reviewer Reviewer
16.02	Issued for Approval. Actioned comments made in previous revision. Included Roles & Responsibility table. Updated diagrams & chartlets.	09-Feb-2024	Rajeev Punnen (AP-MS) John Kaighin (SME-MS/TA-2)	Author Approver
17	Approved for Use	14-May-2024		

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Abbreviation List

Abbreviation/Acronym	Definition
AIS	Automatic Identification System
ATEX	The name commonly given to the two European Directives for controlling explosive atmospheres
AQIS	Australian Quarantine and Inspection Service
AWST	Australia Western Standard Time
BAS	Berthing Aid system
BOG	Boil Off Gas
CA	Compatibility Assessor
CCR	Cargo Control Room
COLREGs	The International Regulations for Preventing Collisions at Sea 1972
COSWP	Code of Safe Working Practice for Merchant Seafarers
COU	Conditions Of Use
ERP	Emergency Response Plan
ESD	Emergency Shutdown
FLNG	Floating Liquefied Natural Gas
FOSSL	Fibre Optic Ship Shore Link
FLNG	Floating Liquefied Natural Gas
GCU	Gas Combustion Unit
IG	Inert Gas
IMO	International Maritime Organization
IMPA	International Maritime Pilot's Association
ISM	International Safety Management Code
ISPS	International Ship and Port Facility Security code
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISV	Infield Support Vessel (Tug)
LNG	Liquefied Natural Gas
LNGC	Liquefied Natural Gas Carrier
LPG	Liquefied Petroleum Gas
LTT	Lead Terminal Technician (Loading Master)
MARPOL	Marine Pollution convention issued by the International Maritime Organization
MLA	Marine Loading Arm
NOR	Notice Of Readiness
OCIMF	Oil Companies International Marine Forum

ODME	Oil Discharge Monitoring Equipment
OFSO	Offshore Facility Security Officer
OIM	Offshore Installation Manager
OLC	Office of Lifting Coordinator
OWS	Oily Water Separator
PFD	Personal Floatation Device
PLB	Personal Locator Beacon
PPE	Personal Protective Equipment
QC/DC	Quick Connect / Disconnect
SA	Shell Australia
SBT	Segregated Ballast Tanks
SIGTTO	Society of International Gas Tanker & Terminal Operators
SOPEP	Ship Oil Pollution Emergency Plan
S&L ATL	Storage and Loading Area Team Lead
SWL	Safe Working Load
TIB	Terminal Information Booklet
TTL	Terminal Team Lead
UHF	Ultra-High Frequency
VHF	Very High Frequency
WMS	Integrated Weather Monitoring System

Roles & Responsibilities

Role Title	Responsibilities
OIM	The OIM is a Company position representing the asset holder and has overall responsibility for the FLNG facility and activities in the Safety Zones, including the health and safety of all persons on board Prelude FLNG and for environmental compliance. The OIM: • Has overall field authority, including SIMOPS approval within the safety zones. Ensures that the MOPOs are adhered to in the issuance of Permit to Work or Safety Zone entry. • As ultimate permit to work authority, approves permitted activities in the Safety Zone. • Ensuring work is performed in accordance with the accepted Safety Case and Environmental Plan. • Conducts regulatory reporting per Prelude' regulatory obligations as facility operator and block titleholder. During emergencies, acts as incident commander of FLNG and maintains overall control and command the field.
Terminal Team Lead (TTL)	Accountable to the Terminal Coordinator for pilotage operations and oversees the cargo loading and unloading operations for all offtake tankers within the Prelude field and safety zone.
Lead Terminal Technician (LTT)	Responsible to support the TTL with offtake tanker pre-arrival preparations, supervises cargo loading and unloading operations. Responsible to the TTL for offtake tanker interface operations at the Prelude terminal.
Head of Marine	Accountable to the business as the appointed Shell Australia Subject Matter Expert Maritime Safety (SME-MS) to ensure compliance with HSSE & SP CF, Transportation Manual Maritime Safety, Maritime Process Model, Spill Preparedness and Response are implemented and applied across Shell Australia. As SME-MS and Technical Authority 2, responsible for implementation of Shell Group best practices.
Marine Terminal Coordinator	Accountable to the Head of Marine for management of the Prelude Marine Terminal which covers all LNG / LPG / Condensate offtake operations, Terminal Team, Infield Service Vessels. Acts as the interface between commercial interests and the Prelude operator for all marine terminal related operations is responsible for implementation of all terminal processes and procedures and conduct of all operations in line with the same and in accordance with industry guidance, for example ISGOTT/SIGTTO.

1. Objective – Prelude Terminal Information Book - LNG

This Terminal Information Book (TIB) has been produced to meet the information needs of users (LNG Carriers) of the Prelude Floating Liquefied Natural Gas (FLNG) Marine Terminal (hereafter referred to as ***Prelude*** in the Terminal Information book and ***FLNG Facility*** in the conditions of use).

The Booklet contains general port information, applicable regulations, safe working procedures and emergency response details, together with specific information governing the operations of ships at the Prelude Berths.

The information in this Booklet should be used in conjunction with the industry recommended practices contained in the latest edition of the "Liquid Gas Handling Principles on Ships and in Terminals published by the Society of International Gas Tanker & Terminal Operators (SIGTTO) and the International Safety Guide for Oil Tankers and Terminals (ISGOTT) published by Oil Companies International Marine Forum (OCIMF) as applicable and in particular the respective Ship/Shore (FLNG) Safety Check List.

While the information herein is believed to be correct at the time of publishing this Booklet, the Terminal Operator makes no guarantee and assumes no responsibilities regarding it or any information which may appear in supplemental publications.

1.1 Conditions of Use

Masters of all LNGCs using the Prelude Marine Terminal will be required to sign a copy of the Conditions of Use (COU) in acknowledgement of the ship's responsibilities and liabilities whilst calling at the terminal. A copy of the COU can be found in the Prelude FLNG Terminal Regulations this must be sent to the Prelude Terminal no later than 5 days prior to vessel arrival.

1.2 Safety Declaration

Prior to commencing cargo operations, the Master shall read, agree and sign a copy of the Prelude safety letter.

2. Prelude Description

Prelude is a floating hydrocarbon (LNG, LPG and Condensate) production, storage and offtake facility currently located at:

Latitude 13° 47.2´ S

Longitude 123° 19.0´ E.

Time Zone: UTC + 08:00

The radius of the Safety Zone around the Prelude FLNG facility is 1500m, all round 360 degrees measured from outwards of the turret mooring. It additionally maintains a flowline and umbilical corridor, which can be seen at Appendix I .

For the approach to the Prelude facility, see ENC AU220120, ENC 314123 or paper charts Aus. 319, Aus. 320, and Sailing Directions publication NP-13.

The Prelude FLNG weathervane's 360 degrees around a turret mooring. Three stern thrusters enable Prelude to maintain an optimum heading that will facilitate offtake operations within the design limits of the facility and associated cargo transfer equipment.

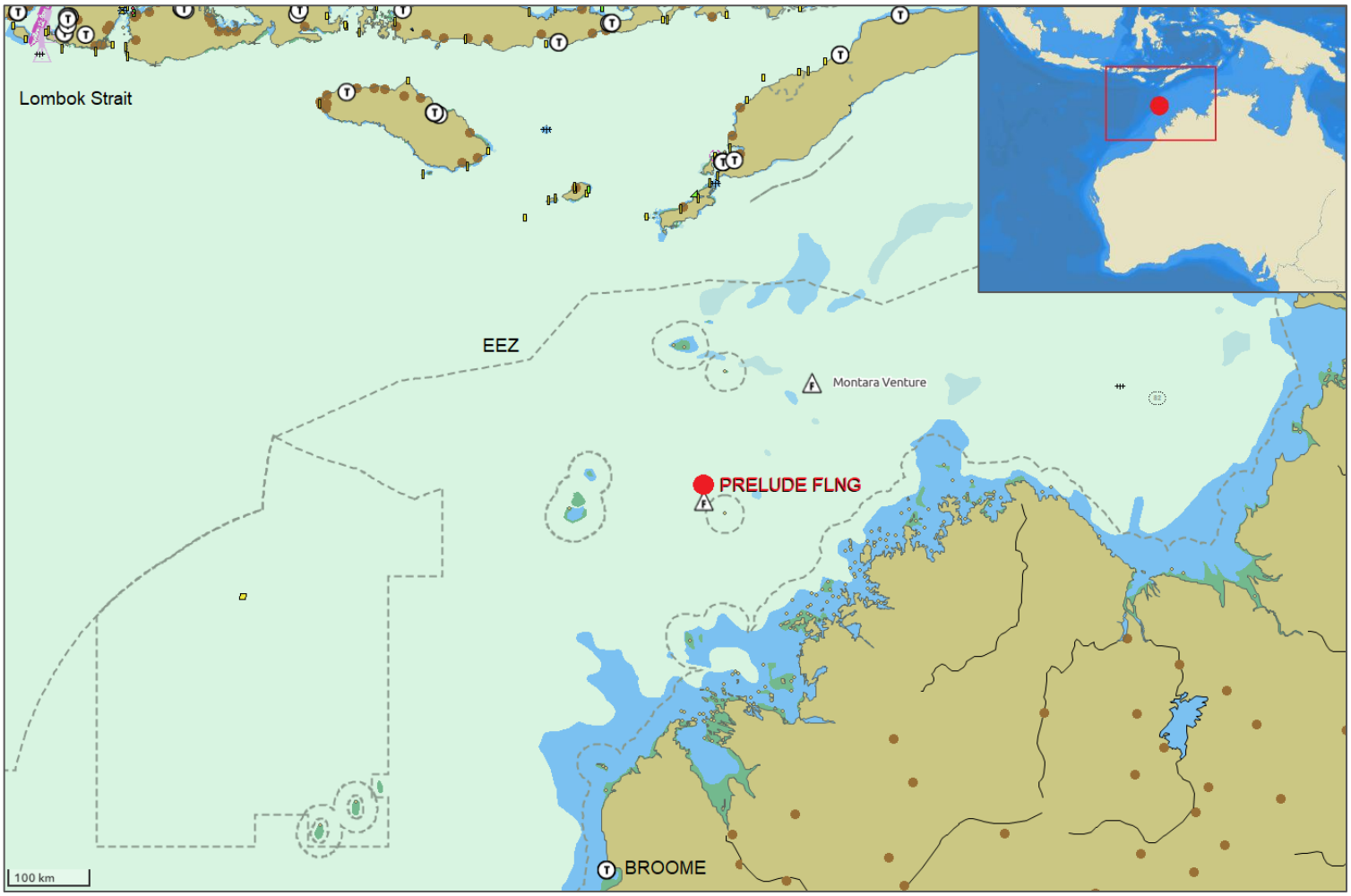

Figure 1: Approximate Prelude FLNG Location

The facility is moored to the seabed via 16 anchor piles and chains whilst being directly connected to wells that access the gas reservoir via flexible risers routed through the turret.

3. Fire and Emergency Response

3.1 Emergency Alarms

Alarm signals at this terminal are as follows:

Table 3.1-1: Alarm Signals

Alarm	Visual	Audible	Initiation
General alarm (GA)	Flashing amber beacons in high noise areas	Sinusoidal tone over the public-address system	ESD activation (either manual or automatic or “confirmed” fire and gas. Manual alarm point activation or manual GA initiation
Prepare to Abandon Facility Alarm (PAPA)	Flashing amber beacons in high noise areas	Continuous single tone + public address announcement	Responsibility of the OIM or his deputy as per the chain of command
Abandon Facility Alarm	Flashing amber beacons in high noise areas	Continuous single tone + OIM final instruction	Responsibility of the OIM or his deputy as per the chain of command

- **By Ship**: One or more long blasts on the ship’s whistle, each blast not less than ten seconds’ duration, supplemented by a continuous sound of the general alarm system.

3.2 Emergency Communications

The Terminal Team communications channel:

- Primary: UHF Ch 06
- Secondary: VHF Ch 68
- Alternative: Hotline/PABX (Via Fossil/Electric Link)

3.3 Emergency Actions

LNGCs must remain in a state of readiness for vacating the berth at short notice. Any maintenance activity that could impact the vessels operation or readiness to depart the berth requires Prelude Marine Terminal approval. Requests for any planned maintenance activities should be sent to Prelude Marine Terminal prior to arrival.

When the General Alarm is sounded, ships should stand by for possible stoppage of operations, including a Marine ESD1.

Other than Marine ESD1 (i.e., pumps are stopped and the valves close, see Section 9.7.1), ship staff must not initiate any action of their own concerning shutting down of valves (etc.) unless their ship is in immediate danger. Ships must await instruction from the TTL or “Prelude Terminal” before taking action regarding cargo operations.

Ships staff should consider the use of a Marine ESD1 in the following circumstances: Major leak, Fire, Loss of all communications with Prelude, failure of mooring integrity or any other situation when an immediate shut down of cargo transfer is deemed necessary. Terminal Team Leader (TTL) approval is required prior to commencing any preparations for unmooring / departure.

Table 3.3-1: Emergency Actions

Action by LNGC	Action by Prelude
Emergency on your LNGC	Emergency on an LNGC
Raise the alarm	Raise the alarm
Consider activating Marine ESD1. Stop de-ballast operation if safe to do so.	Cease all cargo operations and close all valves. Contact LNGC and establish nature of incident
Inform TTL and / or “Prelude Terminal”	Activate Prelude’s emergency response procedures.
Activate LNGCs emergency response procedures.	If necessary, stand by to assist fire fighting
Standby to purge & disconnect MLAs	Prepare to purge & disconnect MLAs
Bring engines to immediate standby	Inform ISV and / or other vessels in vicinity
Prepare for departure from prelude	Prepare for LNGC departure
Emergency on Prelude	Emergency on Prelude
Stand by, and when instructed:	Raise the alarm and activate Prelude’s emergency response procedures.
Consider activating Marine ESD1. Stop de-ballast operation if safe to do so	Cease all cargo operations and close all valves. Contact LNGC and explain nature of incident and LNGC requirements
Standby to purge & disconnect MLAs	Standby to purge & disconnect MLAs
Bring engines to immediate standby	Prepare for LNGC departure
Prepare to depart from prelude	
In the event of a fire: Activate deluge if deemed necessary. Consider unberthing tanker to mitigate the potential for escalation. Utilize ISVs as required, consider use of ETOPs. Transfer of SA personnel back to Prelude if safe to do so. Initiate tanker ERP	

3.4 Emergency Precautions

All fire-fighting equipment shall be in good working order with portable equipment correctly stowed and ready for immediate use. The LNGC fire main shall be pressurized whilst alongside Prelude.

To manage potential emergencies, the LNGC shall arrange:

a) A minimum of two fire hoses, fitted with jet/spray nozzles, uncoiled, and connected to the fire main on the flying passage or trunk deck.

b) A minimum of two fire hoses, fitted with jet/spray nozzles, uncoiled, and connected to the fire main in the vicinity of the port manifold.

c) The ships water deluge and dry chemical powder firefighting system should be prepared and ready for immediate use.

d) The ships outboard lifeboat shall be rigged at embarkation level for use as an emergency escape, except for those vessels on which embarkation level is the normal stowed position or free fall lifeboats.

e) A Pilot ladder or accommodation ladder shall be rigged or positioned on the outboard side of the vessel ready for immediate lowering as a means of escape in the event of emergency.

The above preparations on deck will be jointly checked by the responsible officer and a member of the Terminal Team during the safety inspection. In the event of an emergency, the Master shall proceed as agreed in the pre-operations meeting.

4. Safety and Security

4.1 General

During cargo operations, the seawaters around the LNGC and Prelude shall be constantly monitored by Prelude and LNGC staff for any sign of oil / oily sheen or any abnormalities. If oil / oily sheen or any abnormality is observed, report to the on duty TTL or LTT.

Firefighting or lifesaving appliances on the LNGC shall not be immobilised whilst within the 1500m safety zone; such equipment shall be prepared and in a state of readiness for immediate use.

Confined space entry activities are not permitted whilst alongside Prelude other than those specifically required for a safe cargo operation i.e., Pumprooms, Compressor Rooms and Electrical Motor Rooms.

Prelude maintains a “Safe Deck Policy” for all carriers. Hard restrictions are required on mooring areas (forward and aft for side-by-side berthing's and aft for tandem moorings). Should ships crews need access to mooring areas, this is to be discussed with the on-watch terminal team member. The terminal team member should make an assessment of the current conditions (including vessel motions, loads on lines etc.), and then provide his/her consent. On completion of mooring adjustment, the terminal team member on watch is to be notified. The mooring area should be barricaded, and placards placed accordingly to inform all vessel personnel. This does not relieve the vessel Master and her crew from their responsibility to exercise due diligence and safe practices when working or moving within mooring decks.

In the event that the vessel experiences an incident while moored at Prelude that affects the manoeuvrability of the vessel or safety of cargo transfer operations, the Terminal Team Leader shall be immediately notified. The Terminal Team Leader and vessel Master shall agree on appropriate actions to mitigate any dangers to both parties and the safety of cargo operations.

Consumption of alcohol and drugs is strictly prohibited while the LNGC is within the Prelude Field.

4.1.1 Anchors

The vessels anchors are to be secured in the seagoing condition (lashing wire on and guillotine down) prior to entry into the Prelude field. Under no circumstances is the seagoing security of the anchors to be altered whilst the vessel is under pilotage.

Un-trenched pipelines carrying hydrocarbons lie from the FLNG Prelude Turret in a SSE'ly direction. Refer to 0for diagram of the Prelude subsea layout.

4.1.2 Cathodic Protection

A vessels cathodic protection if fitted and functioning correctly maybe left on and running. However, if the vessel is without cathodic protection, or its impressed system has broken down, consideration will be given switching off the Prelude impressed well before the ship berths.

4.2 Port and Terminal Security

4.2.1 ISPS Requirements

The Prelude Offshore Security Plan has been prepared in accordance with the provisions of the International Ship and Port Facility Security (ISPS) Code. It is a mandatory requirement to comply with the above code.

As a precaution against unauthorised access, the TTL / accommodation ladder must be kept at deck level unless requested by the Terminal Team Leader to prevent unpermitted access.

Any suspicious activity in the vicinity of your vessel must be immediately reported to the Terminal Team Leader or Lead Terminal Technician.

Vessels are requested to ensure that all anti-piracy devices are removed from the following areas prior to arrival – Pilot access area, foc'sle, manifold area, and stern railings either side of the static tow point.

Fishing or swimming within the Prelude 1500m safety zone is always prohibited.

The LNGC shall not be permitted to take bunkers or stores from other vessels whilst moored at Prelude or within the 1500m zone or allow any unauthorised vessel alongside.

Prelude ordinarily operates under Security Level 1. You will be informed by the Offshore Facility Security Officer (OFSO) of any change to this level and subsequent requirement. Prelude will not accept an LNGC with a security level of 3.

A Declaration of Security requirements are to be in accordance with the provisions of the ISPS code.

The Terminal Team Leader will act as security liaison, onboard the LNGC, with respect to any ISPS matters including completing the DoS if required.

4.2.2 Security Contact Details

The following security-related positions can be contacted as follows:

Table 4.2-1: Security Contact Details

Position	Contact
Offshore Facility Security Officer (OFSO)	Name: Utilities Storage and Loading Area Specialist Phone: +61 (0) 8 6383-1771 (24hr) or +61 (0) 8 6383 1757 Email: Prelude-Utilities-Area-Specialist@shell.com
Head Security Officer (HSO)	Name: Anthony Ferguson Phone: +61 (0) 8 9338-6347 or +61 (0) 414 070 694 Email: anthony.a.ferguson@shell.com
Security and Emergency Response Advisor	Name: Paul Boquest Phone: +61 (0) 8 9223-0916 or +61 (0) 418 68 2025 Email: paul.boquest@shell.com
Deputy OFSO	Name: Storage and Loading Area Team Lead Phone: +61 (0) 8 6383 1771 (24hr) or +61 (0) 8 6383 1711 Email: Prelude-S-L-Area-Lead@shell.com
Shell Australia Security (24 Hour)	Phone: +61 (0) 419 766 309 (24hr) or +61 (0) 8 9338 6600 Email: shellhouse.security@shell.com

4.2.3 Personnel Access

There is no direct personnel access (e.g., gangway) between Prelude and the LNGC. LNGC personnel shall not be able to transfer to Prelude other than in exceptional circumstances, as approved by the OIM (e.g., medical emergency).

Prelude terminal personnel will transfer to the LNGC from the Infield Support Vessel (ISV) via the LNGCs combination pilot ladder.

Refer to **Appendix A** for Pilot ladder boarding requirements.

4.3 Engine Testing

At no time, shall the LNGCs Main Engine`s be tested whilst the Marine Loading Arms are connected. Testing of Engines shall only be carried out with the permission of the TTL.

4.4 Diving Operations

Diving operations are not permitted whilst the LNGC is alongside the Prelude or within the 1500m safety zone.

5. Pre-Arrival Procedures

5.1 ETA Notices

LNGC’s shall provide ETA notices strictly in accordance with Prelude FLNG Terminal Regulations

5.2 VHF Communication

Radio contact should be established with **“Prelude Terminal”** (VHF Channel 68) as follows:

a) As soon as the LNGC is within VHF range. The LNGC will be advised of the time and position for the TTL, LTT and Cargo Surveyor boarding, and

b) One (1) hour before the designated Pilot boarding time.

As a matter of course, all LNGCs shall maintain a listening radio watch as required by international, statutory and flag regulations, as well as VHF channel 68 once initial contact with **"Prelude Terminal"** has been made.

5.3 Immigration, Customs, Quarantine and Health

As detailed in Prelude FLNG Terminal Regulations

5.4 Pollution and the Environment

As detailed in Prelude FLNG Terminal Regulations

5.5 Exhaust Gas Scrubbers

Vessels operating within the Prelude field are required to ensure that the Sulphur content of fuel oil should not exceed 0.5% m/m. Recognising that there are vessels that continue to operate with fuels having Sulphur content up to 3.5% m/m, the following are accepted to meet compliance requirements of MARPOL 73/78 Annex VI when operating within the Prelude field.

a) Use only compliant fuels meeting the sulphur content of 0.5% m/m or

b) Use alternate means to ensure that the emission ratio generated are within the stipulated requirements as laid down in IMO Res. MEPC.340(77)

c) Use of Open loop Exhaust Gas Cleaning Systems is prohibited.

d) Wash Water discharged whilst in field must meet the discharge criteria within MEPC.340(77)

e) Vessels must carry sufficient stocks of compliant fuels to meet emission ratios in case the vessel's EGCS malfunctions during the port call.

f) If there is any failure of the EGCS, vessels must change over to using compliant fuels.

g) Each vessel that intends to use an EGCS must have an SO_x Emissions Compliance Plan (approved by the administration) and an up-to-date EGCS Record Book which shall be available for inspection upon request.

h) Vessels must also have a certificate of approval for its EGCS.

i) Any defects to vessel systems must be brought to the attention of the vessels flag state as well as the Australian Maritime Safety Authority by submission of the AMSA Form 18 and subsequently AMSA Form 19. SDA-preludemarineterminal@shell.com must be copied in on any notifications to AMSA.

j) It is the responsibility of the vessels agents to ensure that all vessel masters are fully abreast of the requirements.

Closed loop Exhaust Gas Cleaning systems or Hybrid Systems (operating in closed loop mode) are acceptable as meeting the requirements of above.

5.6 Ballast Water Management

Prior to arrival, LNGCs intending to discharge clean ballast water at Prelude do so in accordance with their approved Ballast Water Management Plan, using type approved Ballast Water Treatment System (BWTS) or, if appropriate, shall carry out a complete exchange of ballast water in line with requirements.

Ballast Water Management must be conducted in accordance with the Australian government's mandatory "Australian Ballast Water Management Requirements" (AQIS).

There are no ballast reception facilities at Prelude. Therefore, all ships must arrive with clean ballast in segregated ballast tanks (SBT).

Only clean ballast water from SBT tanks shall be discharged overboard. All ballast water contained in tanks not designated as SBT must be retained on board.

Any queries related to Ballast Water Management in Australian Waters are to be addressed to the vessels agent rather than the Prelude Terminal.

Safety of vessels and crews are of paramount importance. Vessels undertaking ballast water management to comply with Australian requirements should do so in accordance with the IMO Guidelines.

6. Metocean Conditions

6.1 General

The climate of the region is monsoonal, and displays two distinct seasons, “winter” from April to September and “summer” from October to March, with very short transition seasons, generally in April and September/October between the two main seasons. The winter is generally dry due to Southeast Trade Winds coming from the Australian mainland. The summer is wet as a result of the Northwest Monsoon.

Occasional tropical cyclones occur during these months and result in short-lived, severe storm events, often with strong but variable winds. The summer (October – March) monsoonal surges and associated convective squalls, are also prevalent (although less severe than cyclones).

Tropical cyclones originate from south of the equator in the eastern Indian Ocean and in the Timor and Arafura Seas. They occur during the predominantly summer months November to April, being most active in the months of December to March. The most severe cyclones will most often occur in the months of December and March-April when sea-surface temperatures are warmest.

Ambient wave conditions are dominated by swell propagating from the Indian Ocean, together with local wind-sea generated by the monsoonal winds. This can lead to significant angular differences between wind-sea and swell.

Currents result from a number of forcing mechanisms:

1. Tidal currents are high due to the strong tidal forcing, which extends much further offshore than in other regions.
2. Regional circulation related to the Pacific-Indian Ocean through-flow.
3. Currents generated by solitons, propagating onto the shelf slope in association with the internal tide.
4. Currents due to local wind stress, particularly during tropical cyclones; inertial currents following tropical cyclones.

Table 6.1-1: Prelude Mean Wind Statistics

Typical Monthly Statistics of 10-min Mean Wind Speed (Kts)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All-year
Min	0.3	0.4	0.1	0.3	0.4	0.7	0.5	0.7	0.2	0.4	0.5	0.4	0.1
Max	25.6	20.8	33.4	43.8	15.3	14.4	14.6	13.0	13.0	11.6	14.5	28.6	43.8
Mean	6.8	6.8	5.3	4.8	5.8	6.5	6.2	5.0	4.3	4.5	4.8	5.8	5.6

Table 6.1-2: Prelude Mean Rainfall Statistics

Typical Monthly Statistics of Mean Rainfall (mm)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All-year
322	191	465	119	416	15	15	0	23	48	74	82	1770

Table 6.1-3: Prelude Mean Air Temperature Statistics

Typical Monthly Statistics of Air Temperature (°C)													
Dry bulb air temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All-year
Mean	29.6	29.3	29.6	30.4	29.4	27.3	26.8	26.7	27.4	28.7	29.7	30.0	28.8
Maximum	33.2	33.0	33.3	33.2	33.3	30.9	30.1	30.1	31.5	32.2	33.8	34.2	34.2
Minimum	23.0	23.4	24.0	25.5	23.5	21.7	23.0	23.8	21.6	24.6	25.0	24.8	21.6

Table 6.1-4: Prelude Mean Sea Water Temperature Statistics

Typical Monthly Statistics of Mean Sea Water Temperature (°C)												
Depth (m MSL)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	29.8	29.3	29.7	29.6	29.0	27.7	26.8	26.1	27.0	28.2	28.8	29.5
10	29.8	29.1	29.6	29.5	28.9	27.7	26.8	26.1	26.9	28.1	28.6	29.2

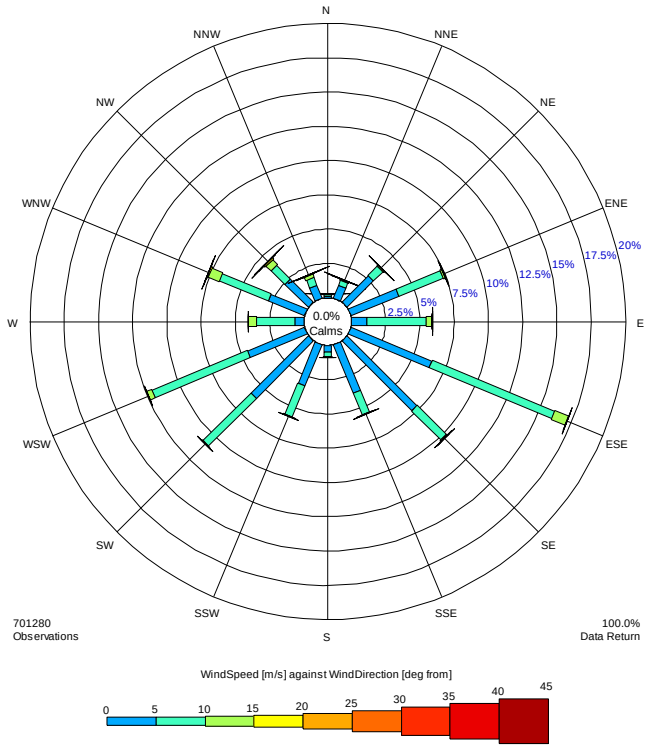

Figure 2: All-Year wind speed vs direction distribution for 10-min mean wind speed at 10m above sea level.

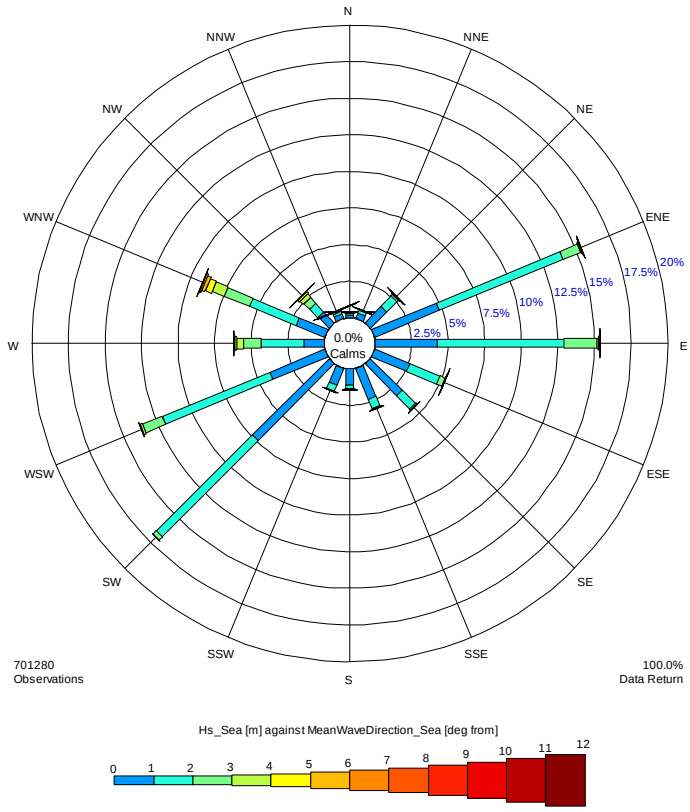

Figure 3: All-year significant wave height vs direction distribution for wind-sea

6.2 Visibility

Ships' observations indicate that typically visibility is greater than 5 nautical miles 95% of the time and less than 2 nautical miles 5% of the time on average with no obvious seasonal variation.

6.3 Tsunami

The tsunami potential for the Northwest Shelf region is considered moderate. Historically, only four tsunamis' have been known to affect this region in recorded history (1883, 1977, 1994, and 2004), although this observation should be qualified by the fact that the region has always been sparsely populated, and tsunami may well have gone unobserved, particularly if masked by the huge tides of the region. Tsunami emanating from these events would have been significantly smaller than the daily rise and fall of tide in this region (perhaps of the order of 2m).

Tsunamis in the deep ocean have length scales of several hundred kilometres and are likely to pass round the 'relatively' small (much less than one wavelength) diameter shoal, without significant response to the local topography.

Therefore, the potential effect of a deep-water tsunami (in 250 meters of water) on the relative motion of two vessels connected by a mooring line is considered to be low. However, there have been incidences of collision between two vessels moored side by side during the passage of a tsunami in relatively deep water.

6.4 Solitons

Solitary non-linear internal waves, which are waves propagating within the water column due to the interaction of strong tidal forcing, bathymetry, and density differences between the surface and subsurface layers of the water column, are common at Prelude location. Current speeds in excess of 2m/s (4 knots) near-surface may be sustained for 10-15 minutes during these events. Solitons are associated with the internal tide and as such may occur at tidal periods of ~12-hour intervals.

Solitons have been observed at Prelude location throughout the year, but are more prevalent during the late summer, when stratification is most intense. There is a high degree of variability, however, depending on the state of the tide (spring-neap cycle) and the intensity of density stratification.

7. Arrival off Port

7.1 Limiting Environmental Criteria – General

Prelude is fitted with an Integrated Weather Monitoring System (WMS) which includes:

- Two wind speed and direction sensors fitted to the top of the living quarters telecom mast,
- A wind speed and direction sensor fitted at the turret,
- An air pressure sensor,
- A visibility sensor,
- An air temperature and humidity screen (Met shelter),
- A cloud level sensor,
- A wave and surface current radar fitted at the turret with display in CCR and OCR,
- Two motion reference units, and
- A sea current sensor / profiler

The parameters affecting personnel transfer, mooring, unmooring and transfer of equipment include:

- Wind / current strength & direction,
- Sea / swell height & direction, and
- Visibility / light conditions (Daylight berthing only). The limiting factors for safe sustained offtake operations are generally:
- The interaction between the LNGC and Prelude and, and
- The ability of the ISV to operate safely in certain weather conditions.

During the pre-loading ship / FLNG information exchange, the LNGC shall be supplied with a copy of the current weather forecast for the Prelude location.

Prelude utilises a Decision Support Tool to assess the effect of actual and forecast environmental conditions at the terminal, with respect to offtake operations. This tool assists in determining if the forecast environmental conditions are suitable for safe and sustained operations throughout the offtake period, along with guidance on heading and thruster selection.

Prelude's stern thrusters may be utilised as required to enable optimum heading control throughout the alongside operations.

Prelude will determine whether its status is OPEN, RESTRICTED or CLOSED and will inform the LNGC of any changes in status:

OPEN: An LNGC is allowed to berth between sunrise and sunset.

RESTRICTED: An LNGC shall not be allowed to berth. An LNGC already at the berth may continue offtake operation subject to TTL advice.

CLOSED: An LNGC shall not be allowed to berth. An LNGC already berthed shall be required to depart if it is safe to do so.

If the weather forecast indicates the limiting environmental conditions will be exceeded, during berthing, mooring, cargo operations or other situation when an LNGC is at Prelude, that operation must cease prior to the stated limiting condition being reached. The limiting environmental conditions are described in the following tables in section 7.2 – 7.5.

Notwithstanding the statutory right of the Master, the decision for an LNGC to unberth from Prelude (due to adverse weather conditions) will be made by the TTL, in consultation with the Marine Terminal Coordinator and the LNGC Master.

The LNGC Master, however, remains solely responsible for the safety, condition, operation, and proper navigation of their vessel. As such, the TTL shall collaborate closely with the Marine Terminal Coordinator and LNGC Master when making adverse weather decisions which have an operational impact.

The Marine Terminal Coordinator shall ensure that the Shell Australia Head of Marine &, Prelude OIM is kept informed in any event and all actions taken are in line with Shell requirements.

7.2 Limiting Environmental Criteria – Personnel Transfer

The following limits exist for the transfer of personnel between the ISV and the LNGC.

Table 7.2-1: Environmental Limits for Personnel Transfer

Environmental limits for personnel transfer
30 Knots Mean Wind Speed, ≤ 3.0m Significant Wave Height, ≥600m Visibility

7.3 Limiting Environmental Criteria – Spool Piece Transfer

Transfer of spool pieces from ISV to LNGC will not be undertaken unless LNGC Master and ISV Master agree that conditions are suitable even if the prescribed limits below are **not** breached.

Table 7.3-1: Environmental Limits for Spool Piece Transfer

Environmental limits for spool piece transfer
≤ 25 Knots Mean Wind Speed ≤ 2.5m Significant Wave Height ≥600m Visibility

7.4 Limiting Environmental Criteria – Berthing

Berthing of LNGC will not occur unless observed 10-minute mean wind speed is less than or equal to 25 knots. Additionally, LNGCs will not be berthed if the weather forecast **over the planned time alongside** indicates sustained wind speeds greater than 25 knots.

The following berthing environmental limitations are in place, based on wind or waves coming from right ahead, +/- 20°. The TTL will advise the LNGC Master, prior to berthing, of the limitations in force at the time, given the prevailing wind and swell may be from different directions.

Table 7.4-1: Environmental Limits for Berthing

Environmental limits for berthing	
Criteria	**Actions when criteria not met**
≤ 25 Knots Mean Wind Speed* ≤ 2.0m Significant Wave Height ≤ 2 knots of current ≤ 2° Pitch or Rolling of LNGC ≥600m Visibility Daylight Conditions	Cease side-by-side berthing
Forecast >25 knots Mean Wind Speed	Cease side-by-side berthing prior to arrival of limiting wind.

** NB the 25 Knot limit is not applicable to all TTLs and caution should be made for Mean winds between 15-25 Knots. Please seek guidance from Pilotage Assurance Procedure or SME-MS*

7.5 Limiting Environmental Criteria – Offtake

Connection of Marine Loading Arms or cargo transfer will not commence unless observed 10-minute mean wind speed is less than or equal to 25 knots.

The following offtake environmental limitations are in place, based on wind or waves coming from right ahead, +/- 20°. The TTL will advise the LNGC Master, prior to commencing operations, of the limitations in force at the time, given the prevailing wind and swell may be from different directions.

Table 7.5-1: Environmental Limits for Offtake

Environmental limits for offtake	
Criteria	**Actions**
25 Knots Mean Wind Speed 2.0m Significant Wave Height	Consultation between LNGC Master and TTL
Forecast ≥ 25 knots Mean Wind Speed	Consider stopping LNG transfer and disconnecting from Prelude prior to arrival of limiting wind.
≥ 27 Knots Mean Wind Speed 2.5m Significant Wave Height 3° Pitch or Rolling of LNGC	1) Stop LNG transfer, gas free, disconnect and retract MLAs. 2) Consult Diodore operability window to manage heading (change orientation) and reduce environmental dynamic impact to vessel alongside. 3) Prepare to unberth in case required to.
≥ 30 Knots Mean Wind Speed 3.0m Significant Wave Height ≥ 2.0m Relative Surge ≥ 1.5m Relative Sway ≥ 1.5m Relative Heave 3° Pitch or Rolling of LNGC	Unberth and sail LNGC clear of Prelude.
Forecast >30 knots Mean Wind Speed	Unberth and sail LNGC clear of Prelude when ready, prior to arrival of limiting wind.
Moorings and Fenders	**Actions**
Unexpected loads on the mooring and fendering system of the below criteria: Mooring line monitor: More than five (5) peaks over 50% of MBL in three (3) hours across all lines; Mooring line monitor: Two (2) tension peaks above 50% of MBL in 2-minute period on same line;	Cease offtake, gas free, disconnect and retract MLAs. Unberth and sail LNGC clear of Prelude when ready.

Environmental limits for offtake	
>50% fender deflection.	

7.6 Approach to Prelude

LNGCs should not approach within 6 nautical miles of Prelude until such time it is requested to progress to the TTL boarding position.

When approaching Prelude, vessels should so far as possible avoid passing through the ICHTHYS field. See **0**.

Two buoys are deployed in the Prelude field. Details as safe passing distances are lister as below

	Directional Wave Rider (DWR)	Real Time Current Profiler (RTCP)
Position (WGS 84)	13º 48.64204' S 123º 17.05659' E	13º 45.78777'S 123º 17.04100'E
Shape	Ellipsoidal	Conical
Colour	Orange	Orange
Height	2m (above mean sea level)	2m (above mean sea level)
Flashing Pattern	Fl 5(Y) 20s 2M	Fl 5(Y) 20s 3M
Safe passing distance	>500m	>800m

Refer to Appendix I for Prelude FLNG Marine Terminal Layout

The TTL will contact the tanker on VHF channel 68 prior to departing Prelude. The TTL will advise the LNGC when to commence its approach to the boarding position.

Under no circumstances should the vessel enter the 1500m safety zone without the express permission from the TTL and only then when the Infield Support Vessels (ISVs) are in attendance.

7.7 Notice of Readiness

NOR is effective:

a) for an LNG Ship giving its NOR ***at*** its Required Arrival Time, NOR is effective at that Required Arrival Time.

b) for an LNG Ship giving its NOR after its Required Arrival Time, NOR is effective when the TTL boards, following the Prelude Operator's notice to the LNGC that Prelude is ready to receive the LNGC for loading; or

c) for an LNG Ship giving its NOR before its Required Arrival Time, the earlier of either:

   i. the Required Arrival Time, or

ii. when the TTL boards, following the Prelude Operator's notice to the LNGC that Prelude is ready to receive the LNGC for loading.

8. Berthing and Mooring

8.1 Berthing and Unberthing Criteria

Berthing of an LNGC is restricted to daylight hours only. Daylight is considered between morning and evening civil twilight (as noted on the Prelude's weather forecast issued daily). For further criteria, see sections 7.4 and 7.5 of this document.

Unberthing is permitted in daylight and night-time conditions.

8.2 Pilotage

Pilotage is compulsory for all vessels arriving and departing at Prelude.

All vessels shall stay at least 6 nautical miles from the Prelude until such time they are requested to proceed to the TTL Boarding Ground.

8.2.1 Pilot Boarding Area

The Pilot boarding ground is 2 nautical miles directly astern of Prelude or as advised by the TTL once radio contact is made.

8.2.2 Personnel Transfer

The LNGC shall adopt a course and speed as directed by ***"Prelude Terminal"*** or the ISV for the transfer of personnel from the ISV to the LNGC.

The following personnel will board the LNGC (unless pre-advised otherwise) at the TTL Boarding Ground:

a) 1 or 2 x Terminal Team Leader (TTL) who will conduct the pilotage and berthing of the LNGC. The TTL will additionally act as the Prelude representative on board the LNGC during the loading operation,

b) 1 or 2 x Lead Terminal Technician (LTT) who will assist the TTL, and focus on cargo operation

c) Other Terminal staff as directed

All personnel overnight bags and Berthing Aid System will be transferred with the toolbox described in section 8.6.1. As such, there will be no requirement to transfer equipment from ISV to LNGC via heaving line.

8.2.3 Personnel Embarked on LNGC

The TTL's and LTT (and if applicable additional person/s as advised) will remain on board the LNGC throughout its stay alongside Prelude to liaise and assist the vessel's Master and crew to:

- Manoeuvrer the LNGC to the berth,
- Berth at (and un-berth from) Prelude,
- Connect and disconnect the cargo transfer systems,
- Communicate between Prelude Terminal and the vessel cargo watch-keeper,
- Oversee and ensure the overall safety of the total operation whilst within the 1500m safety zone, and
- Witness and verify cargo measurements, including volume determination, temperature, pressure, list, trim and to prepare cargo documents.

LNGC Master's are requested to provide appropriate non-share officer's accommodation for the TTL and LTT. Prelude will provide advance notice should additional personnel (e.g., trainee TTL/auditors/assessors) be expected to also transfer and remain on the LNGC.

8.2.4 Personal Protective Equipment (PPE)

The TTL's and LTT will wear the appropriate PPE.

Additional COVID related PPE (Mask and Gloves) shall be donned by the Terminal team as required.

Additionally, terminal personnel will don an inflatable personal floatation device (PFD) with AIS enabled personnel locator beacon (PLB) during personnel transfer operations.

Should the LNGC Master require the TTL or LTT to wear any additional PPE whilst on-board the LNGC, this should be supplied by the LNGC.

8.3 Infield Support Vessels (ISV)

An LNGC calling at Prelude shall be assisted throughout their stay by at least two (2) multipurpose Infield Support Vessels (ISVs). These 42m long, 100ton bollard pull tugs manoeuvre via a Rotor tug propulsion configuration, comprising of 3 azimuth thrusters.

See **Appendix A** for ISV particulars and towing equipment drawing.

Maximum load on Tow line for use of ISV's during berthing / unberthing of LNGC's shall not exceed 100 Metric Tons at any time.

8.4 ISV arrangements for berthing / un-berthing

For berthing, three ISVs are utilised to assist; and these operate as directed by the TTL. The three ISVs are made fast in accordance with the vessel specific compatibility report which is issued to the Prelude Terminal Team prior to each offtake. The intentions for fairleads / bitts to be used will be confirmed by the TTL during the Master / TTL exchange prior to commencing operations.

For un-berthing, two ISVs are utilised, and directed by the TTL. Securing arrangements will be in accordance with the vessel compatibility report and will be confirmed by the TTL during the Master / TTL exchange prior to departure.

The LNGC shall ensure appropriate SWL securing arrangements are provided at required positions.

8.5 ISV arrangements during cargo transfer

Two ISVs will be always on standby and available whilst an LNGC is alongside. The ISVs will remain within the safety zone and under TTL's direction whilst loading arms are connected.

8.6 Manifold Spool Piece Targeting Cones

8.6.1 Spool Piece Transfer – General

To assist with connecting the liquid and vapour Marine Loading Arms, Prelude shall provide 3 x 16 inch, 150 ANSI spool pieces with integrated targeting cones. (Two liquid and one vapour manifold spool piece). See Appendix A for specifications of spool piece targeting cones.

Each spool piece is housed in its own integrated lifting basket, weighing a total of approximately 1.1 tonnes. These spool pieces shall be transferred to the LNGC from the ISV on each occasion that the vessel calls at Prelude and returned to the ISV once the LNGC has departed and is clear of Prelude.

The transfer will take place outside the 1500m safety zone and on a course and speed as agreed between the TTL, the ISV Master and the LNGC Master.

On completion of personnel embarkation to the LNGC, the ISV shall manoeuvre as required to enable the LNGC port side amidships / manifold crane to hoist the following items from the aft deck of the ISV:

a) Three (3) or Four (4) steel baskets containing the LNG loading arm targeting spools, weighing approximately 1.1 tonnes each.

b) A toolbox containing all necessary hand tools, nuts, bolts, and gaskets required to secure the targeting spools, weighing approximately 0.8 tonne.

c) An equipment basket, weighing approximately 0.8 tonne.

It is recommended these boxes be secured at the LNGCs port side manifold ready for the spool pieces to be fitted to the respective manifold presentation flanges.

8.6.2 Spool Piece Transfer – LNGC Midship / Manifold Crane

To prevent waiting time, all tanker permits, and risk assessments required to lift the spool pieces should be prepared and available prior to the TTL / LLT's arrival onboard.

The LTT will be present on deck to guide / support all lifting activities. A toolbox-talk will be conducted by the LTT at the manifold with the vessel team involved immediately prior to commencing any lifts.

During all equipment transfers from the ISV, the LNGC shall utilise a certified extension chain / strop (connected to the LNGC manifold crane hook) of sufficient length and SWL to provide protection to the ISV's crew from the LNGCs crane block.

In order to mitigate risk to the deck crew on the ISV; the LNGC crane block should never be lowered directly to the ISV.

If the vessel does not have a suitable / certified extension strop between the crane block and the hook, the vessels crane hook should be lowered with a soft strop / sling to the ISV deck prior to commencing any lifting operations, to pick up the certified extension wire / safety hook which is provided by the Prelude Terminal for the operation.

The crane block shall be marked in such a way that it is visible under all circumstances of operation. It is recommended that the LNGC Master and crew familiarise themselves with the appropriate sections of the Code of Safe Working Practices for Merchant Seafarers (COSWP).

8.6.3 Targeting Spool Piece Fitting and Removal

Vessels may be requested to arrive with or without her spools pieces / short distance pieces (SDPs) fitted. This may be necessary to prevent Prelude supplied targeting spool pieces clashing with the LNGC's manifold supports and/or other manifold fittings.

An LNGC shall arrive with ALL its manifold presentation flanges prepared in readiness as communicated by Prelude in the pre-arrival messages.

The Prelude MLA has a max permissible cantilever measurement of **1,200 mm** which will need to be strictly adhered to at all times. This 1,200 mm includes the length of the additional SDP that may be required to facilitate the fitting of the Prelude supplied targeting spool piece.

To be able to check the cantilever distance as part of the terminal compatibility acceptance criteria, the carrier must provide measurements of spool pieces to be used if required. The diagram 5a & 5b below will be used at the compatibility stage to assess the final cantilever distance.

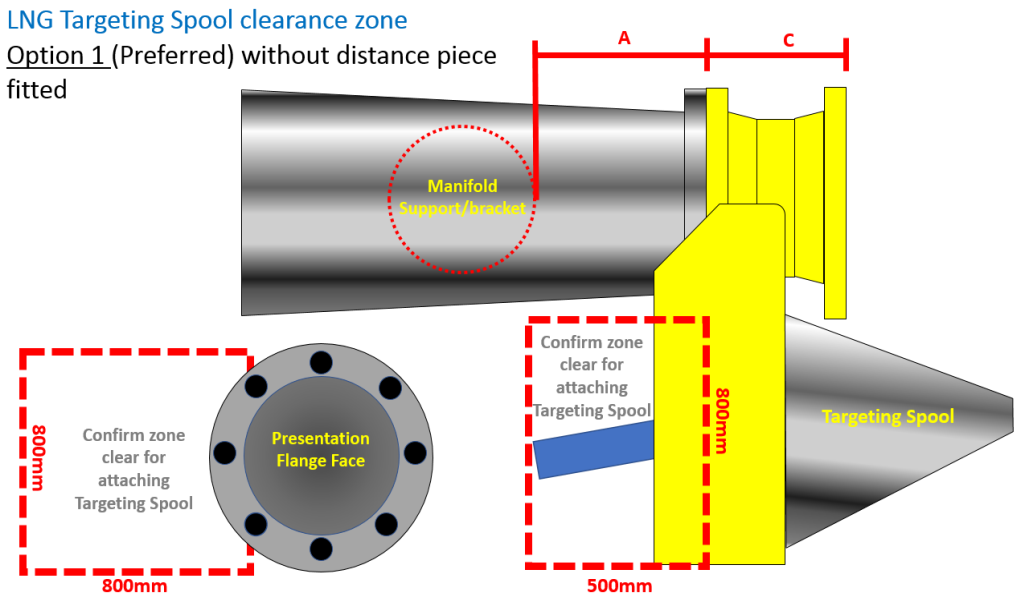

Figure 4: Cantilever Compatability Diagram (Option 1)

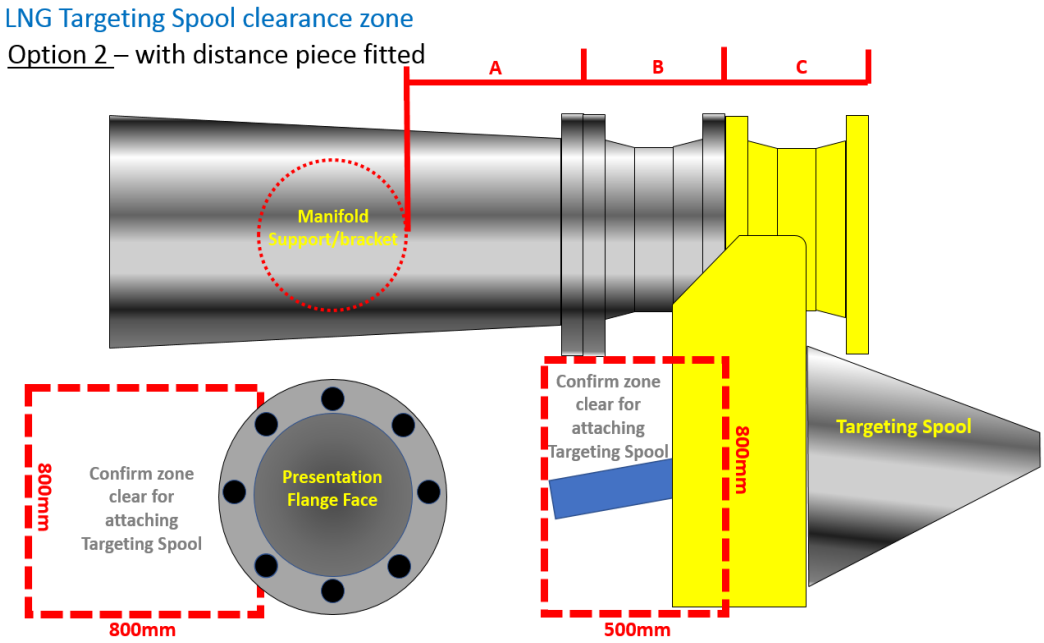

Figure 5: Cantilever Compatability Diagram (Option 2)

The **LNGC crew** will be required to connect / disconnect the targeting spool pieces, under the supervision of the LTT. All crane operations on board the LNGC shall be completed prior to the LNGC commencing an approach to Prelude berth. Final flanging of the spool pieces may be carried out during berthing (but completed by all fast), provided it does not require the use of the crane. See Appendix C for spool piece connection method and sequence of events.

8.7 Helicopters

Prelude will not carry out helicopter operations during the LNGCs approach or berthing / mooring operations. Helicopter operations may take place during the loading of a LNGC.

When Prelude helicopter operations are planned during the loading operation, the TTL will advise the LNGCs staff at the pre-cargo Ship / FLNG Safety Meeting.

8.8 LNGC Berthing – General

The TTL will discuss all aspects of the berthing operations with the LNGC Master prior to commencing the approach. When both parties have completed and signed the 'Master / TTL exchange' checklists, the approach may then commence.

8.8.1 Ballast, Trim and Stability

The LNGC must arrive with sufficient ballast, appropriate positive stability and should be even keel, with the propeller fully immersed on arrival and throughout berthing, residency, and departure.

Notwithstanding the above, the Master shall not allow the tanker to become trimmed by the head and endeavour to keep the vessel upright at all times. LNGC cargo and ballast operations shall be conducted simultaneously, with the conduct of ballast transfer during berthing / unberthing operations prohibited at Prelude. In accordance with Prelude's MLA flanging limits, LNGC draft amidships shall remain between 8.4m – 12.4m when loading arms are connected.

8.9 Berthing

8.9.1 Berthing Aid System

A real time Berthing Aid System (BAS) is supplied by Prelude for the berthing of the LNGC.

The antenna unit is magnetised and designed to attach to a flat steel surface on the LNGC bridge wing railing. The unit needs to be placed outside with an unobstructed view of the sky, clear of bulkheads and obstructions. The minimum distance from the unit's extended antennas to smaller obstructions (e.g., VHF antenna) is 1-2m; distance to larger obstructions (e.g., bulkheads) is 5-10m.

The TTL will set up the BAS.

8.9.2 Berthing Method

When the LNGC is between one and a half (1.5) and two (2) nautical miles astern of Prelude, and after all the relevant equipment has been taken off the ISV, the TTL will direct the three ISVs to make fast - one through the LNGC forward centre lead, one on the starboard shoulder and the other through the centre lead aft. The LNGC shall have heaving lines and messengers prepared as required to retrieve and secure the ISV line. The ISVs will then assist the LNGC to manoeuvre into position abeam of Prelude.

The method of berthing may vary depending upon environmental conditions.

The final approach by the LNGC shall be at a speed with which the vessel's heading can be controlled by a combination of ISV assist and main engines and rudder control.

In a predominantly ahead (relative) metocean environment, the carrier ground speed may be up to 2.5 knots when passing the stern of Prelude. The carrier shall arrive and stop at a position 200 – 300 m off and approximately parallel to Prelude. The carrier is then brought slowly alongside using tugs, propeller, and rudder.

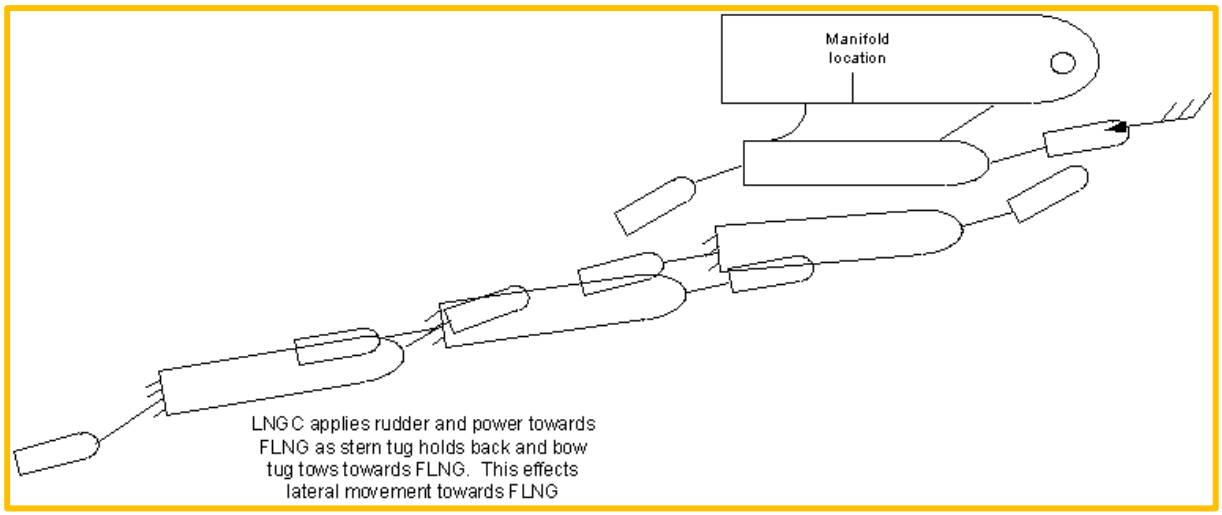

Figure 6:Typical berthing manoeuvre

The LNGC mooring lines will be passed to Prelude when the distance between the vessels has closed sufficiently.

To avoid damage to the fenders, the LNGC should normally be landed squarely onto the fenders with a **contact speed not exceeding 0.30 knots**.

8.10 Mooring

8.10.1 Mooring – General

LNGCs are required to have a full set of HMPE pennants for installation on their mooring line stretchers as defined in Terminal Regulations.

For vessels fitted with HMPE mooring lines, chafe protection made of HMPE material shall be used on every mooring line.

Where vessels have requested to loan the HMPE pennants from Prelude, the loading of these pennants will occur OPL Darwin or alternative port.

Required length of nylon stretchers for each mooring rope or wire will be dictated by Prelude Terminal; and any nylon stretchers shorter than 22 metres as notified by Prelude Operator must be provided by Vessel Operator.

Vessels mooring equipment and arrangements must be as per the current edition of the OCIMF Mooring Equipment Guidelines.

All vessels will be subject to a computer-based dynamic mooring analysis, carried out by Prelude, to prove the integrity of the mooring arrangements alongside.

A copy of the completed mooring analysis is forwarded to the ship for Master's review and concurrence. Thereafter, any deviations from the agreed mooring plan must be requested through Prelude compatibility team or the on board TTL. Please note the mooring plans are ship specific based on their fender contact area and hydrodynamic characteristics.

Small jockey ropes shall be fitted to all mooring line Dyneema Pennants (at the 2.0 metres eye) for ease of handling by Prelude Personnel as shown in Figure 7 below.

Figure 7: Mooring tail / pennant fitted with Jockey Rope

Jockey ropes **shall be of at least** 28mm 8 strand Polypropylene rope to facilitate hauling of the mooring line. The working end of the jockey rope on the Dyneema pennant / tail should be approximately one half (0.5) metre shorter than the length of the pennant / tails eye to facilitate landing of the Dyneema pennant / tail eye onto the quick release mooring hook.

The Masters shall ensure that sufficient mooring rope slack is provided when running moorings. However, mooring ropes should not impede the safety of the ISV's, foul the ship's propeller or Prelude's fenders, Particular attention must be given to the amount of slack deployed when running the mooring ropes to avoid the above-mentioned undesired situations.

Once moored, ship's winches must be secured out of gear with brakes set at the appropriate torque as per industry guidance. Winches must not be left on "Auto Tension."

Masters of vessels are responsible for ensuring that:

- Their vessels are safely secured in accordance with the preceding paragraphs.

- A strict watch is kept on their vessel's moorings and that they are tended as required to prevent slack or overly tight lines and undue movement of the vessel alongside.
- Their vessel's mooring ropes or wires are secured only to the proper fixtures provided for that purpose; additionally fixed moorings are correctly wound onto the winch drums.
- Sufficient persons are on duty to attend moorings whilst the vessel is alongside.
- Mooring tensions are monitored (recorded) and maintained within the prescribed operating limits.

In the event of any incident involving mooring integrity (line parting, ship movement on the berth, etc.), cargo operations will be stopped and will not be restarted until the cause, or causes, of the particular incident have been investigated, and defective mooring lines replaced, as applicable.

8.10.2 Mooring order of events

A 12 mm heaving line will be passed from Prelude to the LNGC by throwing one end of the 12mm heaving line. It is recommended to have two heaving lines on standby forward and aft mooring teams in the event that they are required. Once the heaving line is on board the LNGC, ships staff will have to recover the heaving line and heave in the 14mm Dyneema messenger line attached to the heaving line.

A maximum of 1 mooring line will be run at a time (forward and aft) via 14mm Dyneema rope messenger supplied by Prelude. The moorings forward will be run concurrently with the moorings aft.

The vessel shall have enough trained and competent crew standing by forward and aft to safely handle the mooring operation in a safe and timely manner. Unless otherwise agreed, the first lines to be run will be the inner spring lines forward and aft to assist with checking the fore and aft movement of the vessel while alongside FLNG. The remainder of the mooring lines will be sent in sequential order working from inside to out starting with the inside breast lines moving aft to the stern lines and forward to the headlines.

However, for the forward lines, individual lines going to the same hook set, the outer of the two (or three) lines must be sent first.

Prior to sending head or stern lines the ISV lines must be let go.

Once all the required mooring lines are secured (hooked) on the QRH, the carrier will be placed in the final position and a pretension of minimum 12 tonnes will be applied to all mooring lines. On completion of pre-tensioning, the LNGC is to be made fast to Prelude. Allow at least one hour for this operation after the completion of mooring. Afterward the carriers' engine readiness may be placed from "standby" to an "agreed short notice" with the TTL.

The LNGC deck watch crew on duty, as part of their responsibilities, must report hourly to the LNGC control room on vessel position. Any movements fore and aft or out (not touching the fenders) must be reported to the LNGC and FLNG control room.

In the following situations, the TTL may request that the carrier's engine be placed from "agreed short notice" back to "standby":

- Any situation where the LNGC is reported to be out of position with Prelude.
- Any situation where the safety of the LNGC, ISV or Prelude (asset or people) might be at risk.
- In the event that there is a substantial change in wind, swell or current.
- Any failure of or parting of one or more of the mooring lines

8.10.3 Fire Wires (ETOPs)

Two Vulcan soft rope fire wires/ETOPs (Emergency Towing off Pennant) constructed with a soft eye on one end and a thimble eye on the other will be supplied to the carrier by the ISV on completion of mooring. The ETOPs are to be rigged on the starboard bow and starboard quarter. They should be secured to bitts with a minimum of five turns and the soft eye placed over one of the bits. The line should lead directly to a ships side fairlead (min SWL 75 ton) with no slack on deck and the thimble eye on the outboard side. A heaving line is to be attached to the outboard end so the height of the thimble eye can be maintained between 1-2 meters above the water. Refer to Figure 8 below.

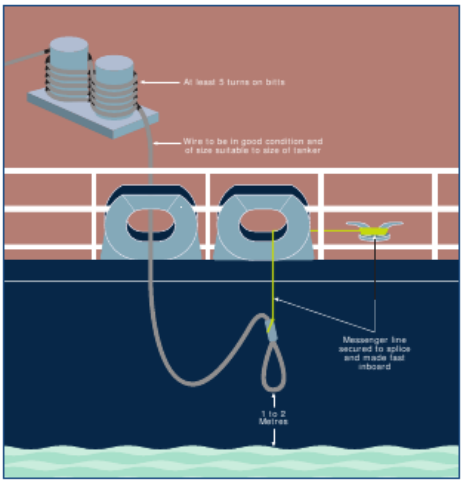

Figure 8: Rigging of Emergency Towing off Pennant

8.11 Provision of Mooring Crews on Prelude

Mooring crews will be provided on-board Prelude to make fast / let go the LNGC. The mooring crew will be in radio contact with the TTL. All instructions to the mooring crew shall be passed by the TTL.

Mooring crew on Prelude will be ready at short notice in event of an emergency.

8.12 Weighted Heaving Lines

Monkeys fist (or similar) should be used to weight the line for throwing.

The practice of weighting monkey fists (or heaving lines in general) with infills of metal and other heavy objects poses a significant risk of injury to ISV crew and terminal staff and is not acceptable at the Prelude.

8.13 Fendering Arrangement

Seven (7) primary Yokohama fenders (4500 x 9000 mm) are deployed along the starboard hull of Prelude, in location where LNGC parallel side hull will be in contact.

Figure 9: Prelude – Fenders

8.14 Provision of Ship / FLNG Access

There is no direct access between the Prelude and the LNGC.

9. Communications

9.1 Language

All communications, both verbal and written, shall be in the English language.

9.2 Communications

The following communication channels shall be used:

Table 9.2-1: Prelude Communication Channels

Prelude Communication Channels	
Prelude Terminal (Terminal operations related)	VHF 68 (Call up / Working)
ISV's	VHF 16 (Call up) & 68 (Working)
Prelude Panel (Cargo operations related)	VHF 16 (Call up / Emergency) & 68 (Working)

9.3 As specified in Prelude Terminal Regulations VHF Communication

Radio contact should be established with "Prelude Terminal" (VHF Channel 68) as follows:

a) As soon as the LNGC is within VHF range. The LNGC will be advised of the time and position for the TTL, LTT and Cargo Surveyor boarding, and

b) One (1) hour before the designated TTL on board (POB) time.

As a matter of course, all LNGCs shall maintain a listening radio watch as required by international, statutory and flag regulations, as well as VHF channel 68 once initial contact with "Prelude Terminal" has been made.

9.4 Operational Agreements

On arrival at Prelude, the TTL will present the Master with a folder containing amongst other documents, the following:

- Safety Letter to Master,
- Emergency Procedure Notice,
- Ship / FLNG Safety Check List.

The various forms, information and procedures laid out in these documents formalise the conduct and procedures governing LNGC & Prelude operations at FLNG which are to be mutually agreed before operations commence.

The agreements reached in these documents remain in force throughout the time a ship remains alongside Prelude. Any changes made to these agreements during the course of the cargo operation must be agreed in writing.

The contents of these documents are discussed by the TTL; and will require the Master / Chief Officers signature.

The original documents will need to be returned to, and retained by the TTL, and copies can be taken by the LNGC.

9.5 Communications Whilst Berthed

The primary method of communication between Prelude and the LNGC will be via a portable marine UHF radio supplied by the TTL to the LNGC on their arrival.

Supplementary means of communication will be via the Hotline or Public/PABX phone, this connection is provided via the Fibre Optic Ship Shore Link (FOSSL) or the electric ship-shore link, as appropriate. This link will be passed to the tanker for connection once the tanker is all fast and will be removed prior to the tanker's departure.

In the event that communication is lost between the tanker and Prelude, cargo operations shall be suspended until communications can be restored.

The fibre optic/electric cable shall be secured to the ship's side rails by means of a light and secure lashing, such that the cable hangs in a loose bight. The cable must not be bent over the handrails.

The TTL will liaise between the LNGC and Prelude. Insert comms table.

9.6 ESD System

The LNGC will be connected to Prelude by means of either the Fibre Optic Ship Shore Link (FOSSL) or the Pyle National Electric Ship-Shore Link. The primary method is the FOSSL.

9.6.1 ESD - Fibre Optic Ship Shore Link (FOSSL)

The fibre optic system is a six-core fibre optic connector that allows for phone, data and ESD communication between the LNG Ship and the Prelude Cargo Control Room. Only 4 of the 6 cores are used on the Prelude facilities system, with 2 as spare. Refer to Appendix E for connection configuration.

9.6.2 ESD - Pyle National Electric Ship-Shore Link

The electrical ESD system uses a Pyle National connector (37 pin) which allows for phone, data and ESD communication between the Prelude CCR and LNGC.

See Appendix F for Pin configurations.

9.7 ESD Activation

The Prelude emergency shutdown system (Marine ESD) has two stages of activity:

9.7.1 Stage 1 – Marine ESD 1

A Marine ESD 1 can be initiated manually or automatically from the LNGC or Prelude.

The Marine ESD 1 sequence is:

a) Tripping of the Prelude cargo transfer pumps,
b) Marine loading arm double ball valves (PERC) close
c) Prelude hydraulic loading valves (Prelude ESD valve) on the loading lines close.
d) The LNGC manifold valves close within 30 seconds after Marine ESD 1 signal is initiated. (The LNGC valves must close after the Prelude valves close)

9.7.2 Stage 2 – Marine ESD2

A Marine ESD2 can be initiated manually by Prelude or automatically from the Position Monitoring System (PMS).

The Marine ESD2 sequence is:

a) Initiates an ESD1, with all actions as described above,
b) PERC collar between the two closed ball valves uncouples within 2 seconds after the two ball valves have closed.
c) Prelude flow diversion valves on the loading lines open, diverting the flow to the surge drum.

10. Operations Alongside

10.1 Vessel's Arrival Condition

Unless otherwise agreed prior to arrival, all vessels are to arrive at Prelude gassed-up with Natural Gas and a temperature in its LNG tanks sufficiently cold to permit full rate continuous loading of LNG at the rate and back pressure stated prior to the LNGCs arrival. Liquid level in the LNG tanks must be more than the measurable limit. If this does not occur the tank will be considered with zero quantity on board prior loading and the tanks will be required to be zeroed at that level.

It is expected that Moss type LNGC will arrive, and be ready to load, with each LNG tank equator temperature colder than or equal to -110°C, or as agreed prior to arrival.

It is expected that Membrane type LNGC will arrive, and be ready to load, with each LNG tank mean temperature (except top sensor) colder than or equal to -130°C, or as agreed prior to arrival.

10.1.1 Heel and Arrival Temperature Requirements

The LNGC Master shall ensure that sufficient heel or fuel quantity of LNG is retained on-board the LNGC to maintain the required arrival temperatures (stated in 10.1) for at least forty-eight (48) hours of normal operations ***after*** the required arrival time. This requirement does not apply to an LNGC which has been scheduled for purging and / or long cooldown.

10.1.2 Arrival Pressure

The LNGC shall arrive with a tank pressure such that safe loading can be achieved with a back pressure at the liquid manifold of not more than 350 kilopascals (kPa) absolute whilst utilising one (1) vapour return arm.

All LNG carriers are requested to arrive with as low as possible tank pressures and less than 12kPa. This will enable Prelude to manage efficiently return gas volumes and prevent unnecessary flaring and maintain a steady return gas flow.

10.2 Loading Arm Connection

Prelude is fitted with four LNG Marine Loading Arms (MLAs). Each arm is 16" 150 ANSI standard LNG connection and numbered from forward to aft as follows:

- Arm 4 (Forward) – Liquid
- Arm 3 – Vapour
- Arm 2 – Liquid / Vapour hybrid
- Arm 1 (Aft) – Liquid

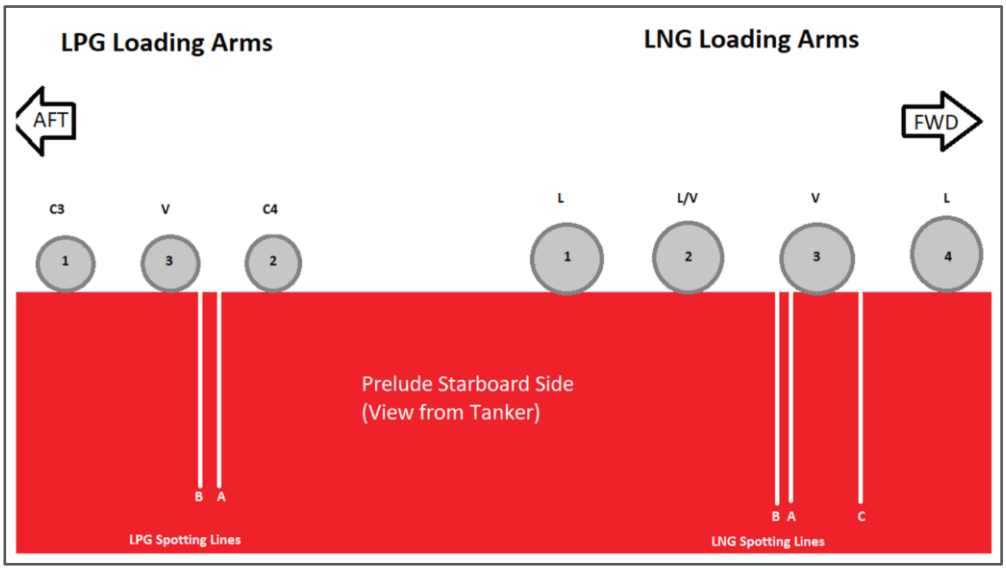

Figure 10: Prelude MLAs Side View

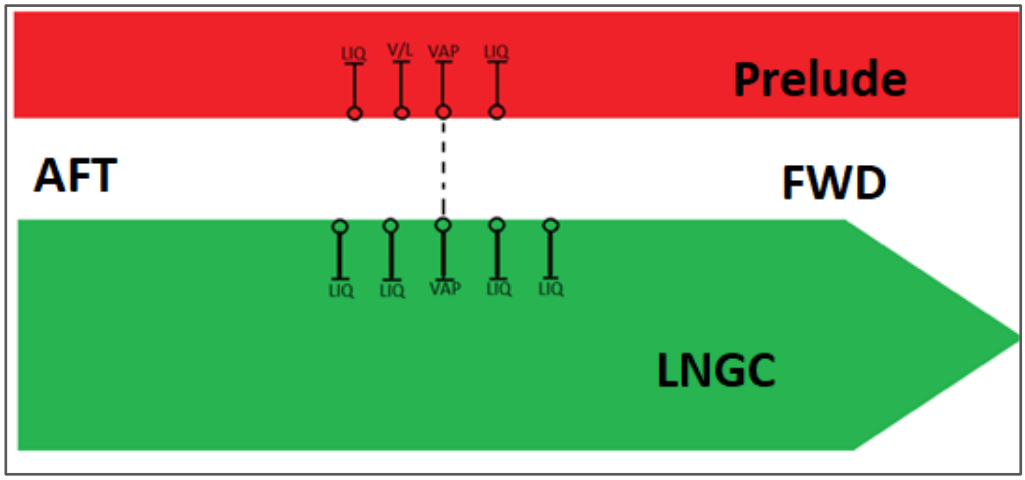

Figure 11: Prelude MLAs Top View

Loading of LNG will normally be carried out through two (2) liquid arms.

Boil-off vapour management for the LNGC cargo tanks will be returned to Prelude via a dedicated vapour arm. The vapour arm shall be connected prior to the liquid arms.

The LNGC port manifold should be prepared to receive 2 liquid and 1 vapour loading arm.

The Lead Terminal Technicians responsible for connecting the targeting line to the targeting spool piece as well as manoeuvring and connecting the MLAs. See Appendix G .

10.2.1 Strainers

Strainers will be fitted in Prelude's loading line. The LNGC should prepare its own strainers such that the strainers may be fitted between the LNGC presentation flange/ additional spool piece and the Prelude-supplied spool piece. Unless otherwise specified, strainers should be 60 mesh.

Strainers are not normally required on the Vapour line.

10.2.2 Pressure Test and Purge of Marine Loading Arms

Loading arms will be pressure tested with Prelude supplied nitrogen to a pressure of 500kpa (5 bar) for liquid arms and 200kpa (2 bar) for vapour arms. A leak test will be carried out on the manifold flange using a soap solution.

The arms will be depressurised by opening the drain or sample valve at the ship's manifold, until the O_2 content is less than or equal to 2% by Volume. The remaining of the pressure from the liquid arms will be drained back to FLNG; and the remaining pressure from the vapour arm will be depressurised at the manifold. O_2 readings will be taken at this valve outlet by ship staff using the LNGCs appropriately calibrated gas meter. The process of purging and sampling shall be repeated until the O_2 content is less than or equal to 2% by volume.

Throughout the period the LNGC is moored at Prelude, the crew shall be required to maintain deck watches; in particular, in the area around the port manifold. However, access to the manifold deck should be restricted to essential activities only from cooldown to liquid free to ensure ship's crew are not exposed to potential hazards during the loading operation.

10.3 Safety Inspection

Prior to commencing any ship shore operations, the TTL / LTT and a responsible Officer from the LNGC shall jointly conduct a safety inspection of the ship to ensure that the ship is effectively managing its obligations, as detailed in the Ship / FLNG Safety Check List. This will also require rounds of vessels engine room, cargo compressor room and cargo motor room.

In the event that safety or compatibility requirements have not been met, loading operations will not commence until corrective action is satisfactorily implemented. Prelude may revoke the LNGCs clearance to load and remove the vessel from the berth if the deficiencies are not (or cannot be) rectified.

10.4 Pre-Loading Meeting

A pre-loading meeting will be conducted covering all points as listed in the ship-shore safety checklist.

10.5 Emergency Shut Down (ESD) system tests

The FOSSL or Electric Cable (as appropriate) shall be passed between the LNGC and Prelude via a ship-supplied heaving line and connected to the LNGCs appropriate socket by ship staff. The cable shall be secured to the ship's side rail by means of a light lashing, ensuring that the cable hangs in a loose bight. The cable shall NOT be bent over the ship's handrails for risk of damaging the cable.

Emergency Shut Down (ESD) tests shall be conducted as follows:

a) A communication test of the ESD link will be initiated by the LNGC using the available means of communication, Hotline, PABX and Public Telephones
b) A "warm" ESD test before cool down, initiated by the LNGC from the CCR. The timing of closure shall be recorded. LNGC manifold valves shall close within 25 ~ 30 seconds. Prelude Loading Shut Down valves shall close in approximately 15 seconds.
c) On completion of cooldown a "cold" ESD valve stroke or test will be carried out to ensure all liquid ESD valves still close correctly in the fully refrigerated condition. The closing timings for the LNGC and Prelude valves are to be recorded.

During the ESD test, personnel should remain clear of the LNGC manifold.

10.6 Gauging

A Responsible Officer on the LNGC shall conduct initial / final gauging of the vessel's cargo tanks at the direction of, and in the presence of the TTL.

Initial gauging shall be carried out after the warm ESD test but prior to opening the vessel's double-shut valves.

Final gauging should be carried out immediately after vapour manifold valve is closed.

The vessel shall have available at hand, tank tables and certificates of calibration for cargo tanks, including gauging systems. These will be required to be sent in pre-arrival communications for use by the TTL and / or surveyor.

10.6.1 Gas Burning and Re-Liquification Plants

Unless dictated by vessels charterer, vessels are expected to maintain gas burning and operate all re-liquification plants throughout its entire port stay at Prelude. Vessels do not have to stop gas burning during opening and closing custody transfer.

10.6.2 Gas Combustion Units (GCU's)

If a vessel is fitted with a Gas Combustion Unit (GCU) it must be stopped for opening and closing gauging. The use of GCU's as secondary means of tank pressure control is permitted. However, it must be run on the lowest possible flow to maximize cargo efficiency during the offtake operation.

Counters will be taken and recorded pre and post opening and closing gauging.

LNGC's shall have the following items in place and working at all times before arrival and whilst moored alongside the Prelude FLNG Terminal.

1. GCU trip on exhaust temperature is set to 535 degree C and the trip is not bypassed.
2. All fixed Gas detection sensors and monitors applicable for GCU are fully operational.
3. Confirm that there will be no visible flame in the funnel space when the GCU is in operation as per IGC 7.4.1.1

LNGC's to minimize use of GCU's whilst alongside Prelude FLNG in particular while the Vapour MLA is connected, and LNGC's tank pressure control is via BOG return to Prelude Terminal. It is essential that the TTLs are advised when in use alongside.

10.7 Venting

Venting cargo vapour to the atmosphere is not permitted. The Master is required to take all action necessary to prevent venting.

Should venting from the vessel occur, or it becomes apparent that venting will occur, the LNGC Master shall advise the TTL immediately.

10.8 Sloshing Risks on Membrane LNGC

In managing sloshing risks on membrane LNG carriers moored alongside Prelude FLNG the following document OPS_PRE_013666 applies to membrane LNGCs between 138,000m^3 and 175,000m^3. This document provides guidance to ship operators on carrying out a risk assessment to ensure that the sloshing risks have been assessed by the operator and the risks are acceptable to them whilst operating alongside Prelude.

10.9 Cargo Transfer Procedures

Prior to the opening of LNGC or Prelude manifolds, the water curtains on the LNGC and Prelude shall be started. Other protective systems for tank domes and carrier's superstructure shall be available for immediate use if so required. The fire main shall always remain pressurised.

10.9.1 LNGC Purge and Cooldown (Warm Arrival)

Cool down shall be performed based on consultation between the TTL and the LNGC Master (or delegate) with the aim of securing safety and minimising the berth occupancy. The LNGC shall provide Prelude with a copy of the cooldown tables and procedure with the seven (7) day notice, or as soon as it becomes apparent extended cooldown will be required.

10.9.2 Loading Arm and Line Cooldown

Once Prelude and the LNGC confirm their respective system line up, cool down of the two liquid loading arms followed by LNGC lines and tanks can commence. Initial cooldown flow rate will be 10m^3/hr per arm. The rate will be increased to 100m^3/hr on an MLA as the liquid passes the apex.

Cooldown is considered complete when the vessel's liquid header, and cargo tank temperatures have been confirmed to be ready to commence bulk rate loading by the vessel. To assist in the reduction of BOG generation, consideration should be given to achieving a bottom temperature of each LNGC tanks of at least -150°C prior to ramping up the transfer rate.

Tank vapour pressures of the LNGC cargo tanks are to be closely monitored at all times by ship staff. Close liaison is required between LNGC and ***"Prelude CCR"*** in order to effectively manage produced vapour.

10.10 Bulk Loading and Topping Off

10.10.1 Vapour Return to Prelude

Cargo operations by the LNGC shall be by closed loading operation only. Cargo vapour shall be returned to the Prelude. Venting of cargo tank vapour from the LNGC alongside Prelude is prohibited.

Boil-off vapour generated in the LNGCs cargo tanks shall be sent back to Prelude via the vapour return arm, which will be connected prior to the liquid loading arms.

Prelude Terminal is capable of receiving vapour return up to 35,000kg/hr through one vapour arm In order to prevent operational flaring during an offtake, High Duty (HD) Compressors are not normally used during loading at Prelude and loading operations at Prelude are typically carried out with 'free-flow' vapour return to FLNG. Tank pressure is maintained at around 14-15kPa throughout the loading. If tank pressure is tending to rise, HD compressors may be started after obtaining terminal team permission, but tank pressures should be maintained around 14-15kPa whilst HD compressors are in operation.

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10.10.2 Ramp Up, Full Rate and Ramp Down

On completion of cooldown, the initial transfer rate will be 500m^3/h. The LNGC shall request "***Prelude CCR***" to increase the transfer rate to the next step when they are comfortable with the current rate, but in any event not less than 5 minutes.

Once all pumps are online, the Prelude Terminal will stabilise the bulk loading rate.

Maximum LNG bulk loading rate is 10,000m^3/hr through two (2) liquid loading arms.

Average hourly loading rate, quantity loaded, quantity to go and estimated time of the commencement of rate ramp down are to be calculated and recorded by the LNGC. The LNGC shall exchange the above-named values with ***Prelude CCR*** hourly – on the hour.

A full exchange of figures shall be carried out hourly between the LNGC and the Prelude. This exchange shall include manifold pressures to give early indication in the strainers are becoming blocked.

The LNGC shall advise ***Prelude CCR*** one (1) hour prior to commencement of ramping down from full rate. When topping off, the loading rate will be decreased in 1000m^3/hr increments every five (5) minutes, or as directed by the LNGC, in order to meet the agreed load quantity.

The LNGC loading valves (not branch valves) are to be used during the topping off process and the ESD system must not be inhibited at any time during loading. Inhibiting of an individual tank's Hi-Hi alarm is not allowed. The independent tank alarm shall not be inhibited at any time except as part of tank alarm testing procedures, which occur after lifting the first cargo after refit and in agreement with the TTL during pre-loading meeting.

10.11 Draining and Inerting Loading Arms

All draining and inerting of the manifold arms shall be carried out in compliance with SIGTTO "*LNG Transfer Arms and Manifold Draining, Purging and Disconnection Procedure*".

The LNGC manifold shall remain clear of people whilst liquid remains in the loading arms. All activities associated with liquid purging shall be carried out from a position clear of the manifold. If this is not possible, the matter shall be addressed at the pre-cargo meeting, with appropriate barriers put in place to prevent injury to people.

On completion of loading the ESD system is to be inhibited, the Prelude liquid loading valves and the LNGC liquid loading double shut valves are to be closed. The LNGC double shut valves shall not be closed until the TTL has confirmed the Prelude valves are closed. Both parties shall confirm when this is completed.

The vapour manifold and line valves shall remain open throughout draining and purging of liquid arms and closed during gauging.

All nitrogen required for the following purging operation shall be supplied by Prelude unless informed otherwise by Prelude Terminal prior to arrival.

The liquid loading arms will be pressurised with nitrogen to 500 kpa (5 bar). The nitrogen and remaining liquid will then be drained back through the loading arms, initially to Prelude, and then to the vessel. This will be repeated until the lines are deemed to be liquid free.

ESD valves shall then be closed with a software block in place if provided by the IAS / DCS.

The loading arms will then be re-pressurised with nitrogen and lines drained back to the LNGC via the manifold loading cool-down line to the vessel's cargo tanks. Nitrogen purging back to the LNGC will continue until each cargo arm contains less than 2% hydrocarbon by volume (in nitrogen), is recorded at each loading arm, measured at the manifold sample vent by ship staff using the LNGCs appropriately calibrated gas meter. Liquid loading arms shall then be disconnected under the direction of the TTL/LTT.

The vapour manifold ESD valve shall then be closed with a software block in place if provided by the IAS / DCS. The arm shall be purged with 200 kpa (2 bar) nitrogen until a reading of less than 2% hydrocarbon by volume (in nitrogen), is recorded, measured at the manifold sample vent by ship staff using the LNGCs appropriately calibrated gas meter. A final nitrogen purge to the facility may be required. The vapour arm shall then be disconnected under the direction of the TTL/LTT.

The strainers of the loading arms are to be inspected by the TTL/LTT to confirm they are free of debris or damage. Any debris found should be collected for analysis. The inspection of the strainers shall be recorded in both events.

10.12 Cargo Documentation and Early Departure Procedure (EDP)

Early Departure Procedures (EDP) applies to all loadings

The Terminal Team lead (TTL) will only provide a Provisional Cargo Manifest, Letter of Protest (if any), and a Timesheet before the vessel departure.

The remaining documents, as outlined below, will be generated in Perth after the vessel departure and forwarded to the vessel Agent to sign on behalf of the Vessel Master.

Cargo documentation generated after departure will include documents such as the:

- Bill(s) of Lading,
- Certificate of Quality,
- Certificate of Quantity,
- Certificate of Origin,
- Cargo Manifest,

The provisional cargo manifest volume will be agreed by the TTL & Vessel Master, based on the Vessel CTMS output.

Letters of Protest, if any, should be handed to the TTL for onward delivery to the Prelude Marine Terminal Coordinator. The TTL will acknowledge receipt of the Letter of Protest only and is not authorised to approve such letters or otherwise.

Prior to the disembarkation of the TTL, the Vessel Master shall sight and verify the times and details contained in the documentation, sign the log in the space provided and affix the Vessel's official stamp thereto.

If the Master should so require, the TTL will sight, verify and sign, for receipt only, the Vessel's Record of Operations prior to his disembarkation.

If under exceptional circumstances, EDP is not enacted at the choice of the Vessel operator, then all documents will be issued Offshore, while the vessel waits at a safe distance away from the berth, so as not to interfere with subsequent Vessel loading operations.

11. Unmooring Parameters & Procedures

11.1 Unmooring

The LNGC shall, along with the TTL, monitor weather parameters, mooring line tension meter readings and loading arm proximity limits throughout the vessels stay at Prelude.

Once the loading arms have been fully recovered, the TTL will discuss all aspects of the unberthing operations with the LNGC Master prior to commencing the departure. Both parties shall complete and sign the ‘Master / TTL exchange’ checklists.

The first step is to return the Emergency Towing Off Pennants (ETOPs) to the ISVs. These are lowered to the crew on the bow of the ISV in a controlled manner, utilising the messenger attached to the line. To prevent injury, it is imperative that these lines are not released in an uncontrolled manner / dropped from the LNGC fairlead.

A minimum of two tugs are required for departure connected to appropriately rated bollards the locations at TTLs discretion.

Confirm ISVs are made fast in accordance with the MPX (the relevant forward head and aft stern lines will need to be let go prior to making fast the ISVs in case the same fairleads are being used)

Only upon agreement between the TTL and LNGC Master, the LNGC main engines may be tested ahead and astern prior to unberthing.

The ISV’s will assist with manoeuvring the LNGC clear of Prelude as directed by the TTL.

Once clear of Prelude, the ship’s crew, under guidance from the LTT, may disconnect the manifold spool pieces and make ready the loading arm targeting equipment for return to the deck of the nominated ISV. When the spool pieces and toolbox have been safely transferred to the ISV, then the TTL’s and LTT will disembark to the nominated ISV.

11.2 Removal of Spool Pieces

Manifold crane operations (or use of any other such inboard crane) whilst alongside Prelude are generally not permitted. As such, spool pieces may only be removed from the vessel's manifold (whilst alongside) with the aid of a manifold gantry or other such portable lifting appliance. If this is unavailable, and the manifold crane is required, spool pieces may only be removed utilising such a crane once the vessel is unmoored and clear of Prelude. In exceptional circumstances, use of the vessel's manifold crane may be permitted alongside following discussion, risk assessment and explicit approval from the TTL.

12. Services

The following services are not available at Prelude:

- Stores / spares / victuals
- Bunkers (of any type)
- Freshwater
- Crew change / Repatriation
- Shore leave
- General hospital or dental services other than emergency medical care as agreed
- Garbage, waste liquid, slops or ballast water reception

12.1 Medical Emergency

In case of a medical emergency requiring assistance, ***Prelude Terminal*** should be contacted on VHF 68 and assistance will be rendered as required. Prelude cannot offer medical treatment of a general nature and is only able to assist in event of an emergency.

12.2 Craft Alongside

During offloading, no vessels shall operate within the 200m exclusion zone on the starboard side of the Prelude, this is incorporated in the Field Entry, Safety Zone Entry and Departure Checklists.

Additionally, LNGCs moored at Prelude shall not have craft / service vessels alongside them whilst interacting in anyway with Prelude. Double banking shall not be undertaken at any given time.

12.3 Waterborne Testing of Lifeboats / Rescue Craft

It is not allowed to lower lifeboats or rescue boats in the Prelude field.

12.4 Main Engine Readiness

Whilst alongside the Prelude, the LNGCs main engines and related auxiliaries shall be kept in a state of readiness such that the LNG carrier can leave under her own power in an emergency.

Repairs and/or maintenance works to the main engines and related auxiliaries are prohibited.

In the case of a steamship this means that the turning gear be engaged, main steam stop valve closed with turbines sufficiently warm and condenser vacuum maintained commensurate with the engine manufacturer's operating instructions. For a diesel-powered LNG Carrier, this means that the fuel rail is under constant circulation and 'starting-air' bottles are fully charged.

12.5 Repairs

While alongside Prelude, any repair or maintenance work (either hot or cold) to machinery and equipment shall be limited to those items which do not impair or require the following:

- The fire detection, gas detection, lifesaving appliances or firefighting capability of the vessel.
- The safe and efficient handling of cargo.
- The manoeuvrability or propulsive power of the vessel.
- The safe operation of the mooring system.
- The safe operation of electrical equipment located in gas dangerous zones.

12.6 Smoking

Smoking is prohibited on vessels berthed alongside, except in the specifically designated ‘smoking areas’ on board within the accommodation.

A maximum of two (2) approved smoking areas will be permitted; these rooms shall be identified by Prelude Safety Notices, and in agreement with the vessel Master.

One of the recreation / TV lounges shall be designated as a non-smoking room. This is to prevent the negative health consequences of passive smoking to Prelude employees and contractors. Common work areas such as CCR, bridge or ship’s office are not deemed suitable “approved smoking areas” whilst berthed at Prelude.

The Master shall ensure that meetings held on board with Terminal staff are conducted in a smoke free atmosphere.

12.7 Hot Work and Use of Naked Lights

All ‘HOT WORK’ is STRICTLY PROHIBITED within the 1500m safety zone and whilst alongside the Prelude.

Naked Lights means open flames or fires, exposed incandescent material or any other unconfined source of ignition.

The use of naked flames is strictly prohibited except:

- Under conditions approved by the OIM / TTL for the particular reason and purpose.
- In the designated places at the times that smoking is permitted.

12.8 Ventilators and Air Conditioning Units

Intakes of central air conditioning or mechanical ventilations systems (fans) should be adjusted to prevent entry of dangerous gases or vapours. This should be accomplished, If possible, by the recirculation of air within the accommodation spaces. Window type air conditioning units must not be used.

If at any time, it is suspected that dangerous gas or vapour is being drawn into the accommodation the central air conditioning and / or mechanical ventilating systems should be stopped, and the intakes covered or closed.

All doors, portholes and openings to the accommodation or machinery spaces shall be kept closed, except for access purposes.

12.9 Transmitting Devices

All portable electronic equipment including radio transmitting equipment / mobile telephones etc. being used on Prelude and the decks of berthed LNGC shall be intrinsically safe. The use of non-intrinsically safe equipment outside of the accommodation / living quarters is strictly prohibited.

Fixed transmitting installations such as MF/HF radio installations shall be switched off and aerials grounded so far as possible. VHF and AIS equipment shall be switched to LOW power (1W) mode.

Radars on LNGCs shall be either switched off or placed in standby mode whilst berthed. Transmission whilst loading arms are connected is prohibited.

12.10 Incinerators

The running of or use of ships incinerators for disposal of garbage or sludge is STRICTLY PROHIBITED with within the 1500m safety zone and whilst alongside the Prelude.

12.11 Drug and Alcohol Policy

It is the policy of Prelude that the workplace is entirely free from the effects of drugs and alcohol.

No person on board either Prelude or the LNGC may work under the influence of alcohol or drugs.

Appendix A Required Boarding Arrangement

It is a requirement that “Pilot Boarding” Arrangements for TTL’s, LTT’s and other personnel who may board a vessel are to be in accordance with the international regulations. IMO Resolution A1045(27) and SOLAS Chapter V/23 regarding Pilot transfer arrangements.

The boarding arrangement shall be rigged on the lee side of the vessel as directed by the TTL.

The attention of Masters is also drawn to the applicable. The ladder should be clean, properly fitted with spreaders, well clear of all discharges and outlets, and all outboard fittings which might foul the ISV. Masters shall ensure that pilot ladder ladder certification is available to be sighted by the terminal team on request.

In addition, the following items should also be attended to.

- Mechanical Pilot Hoists are not acceptable to at any time banned by SOLAS Chapter V/23.
- When accommodation ladders are used in conjunction with a conventional pilot ladder the accommodation ladder should be secured to the hull.
- The pilot Ladder should be secured to the hull approximately 2 metres above the accommodation ladder platform.
- Pilot ladders should rest firmly against the ships side and should not be rigged in areas where the ladder will not rest against the ships side or areas of the hull with an overhang.
- Tripping lines are not to be used.
- **Man-Ropes are not currently permitted for use at Prelude.**
- An officer should be in attendance at the ladder, with life-saving appliances ready for immediate use. The officer must also have a Portable Radio for immediate communication with the bridge.
- When a combination ladder is to be used, and there are no appropriate lashing arrangements then Prelude FLNG requires that magnetic or suction devices be utilised to ensure the gangway and ladder can be properly secured to the hull.
- Any Hull door opening shall not open outwards.
- The pilot ladder should be secured to the vessels main deck using the correct securing method and not using the steps as a securing point.
- Handhold Stanchions Min. Diam. 32mm, Min. 120 cm above Bulwark.
- Handholds 70 to 80 cm apart.
- The vessel must have a six-metre unobstructed portion of ship side for the ISV to land.
- The accommodation ladder may only have a maximum slope of 45 degrees and should lead aft.
- The lower platform must be horizontal and must have a non-slip surface.
- The lower platform shall be a minimum of 5 metres above the sea.
- The responsible officer must be located on the lower platform with a hand-held VHF.
- The handhold stanchions must be rigidly secured to the deck.

If any vessel is unable to meet these requirements early advice must be given so as an appropriate risk assessment can be made to allow a TTL to board the vessel safely.

As a workplace health and safety issue, Prelude FLNG reserves the right to delay vessel embarkation of a Terminal Team until these procedures are fulfilled. Further, all instances of non-compliance will be reported to the Australian Maritime Safety Authority.

Some examples of what is not acceptable:

- Shackles and knots on ladder.
- Steps not equally spaced.
- Steps not horizontal and no chocks securing rungs.
- Spreaders must not be lashed between steps.
- Side ropes must not be unequally spaced.
- Steps must not be painted, be dirty or slippery.

No loops or tripping lines attached to ladder.

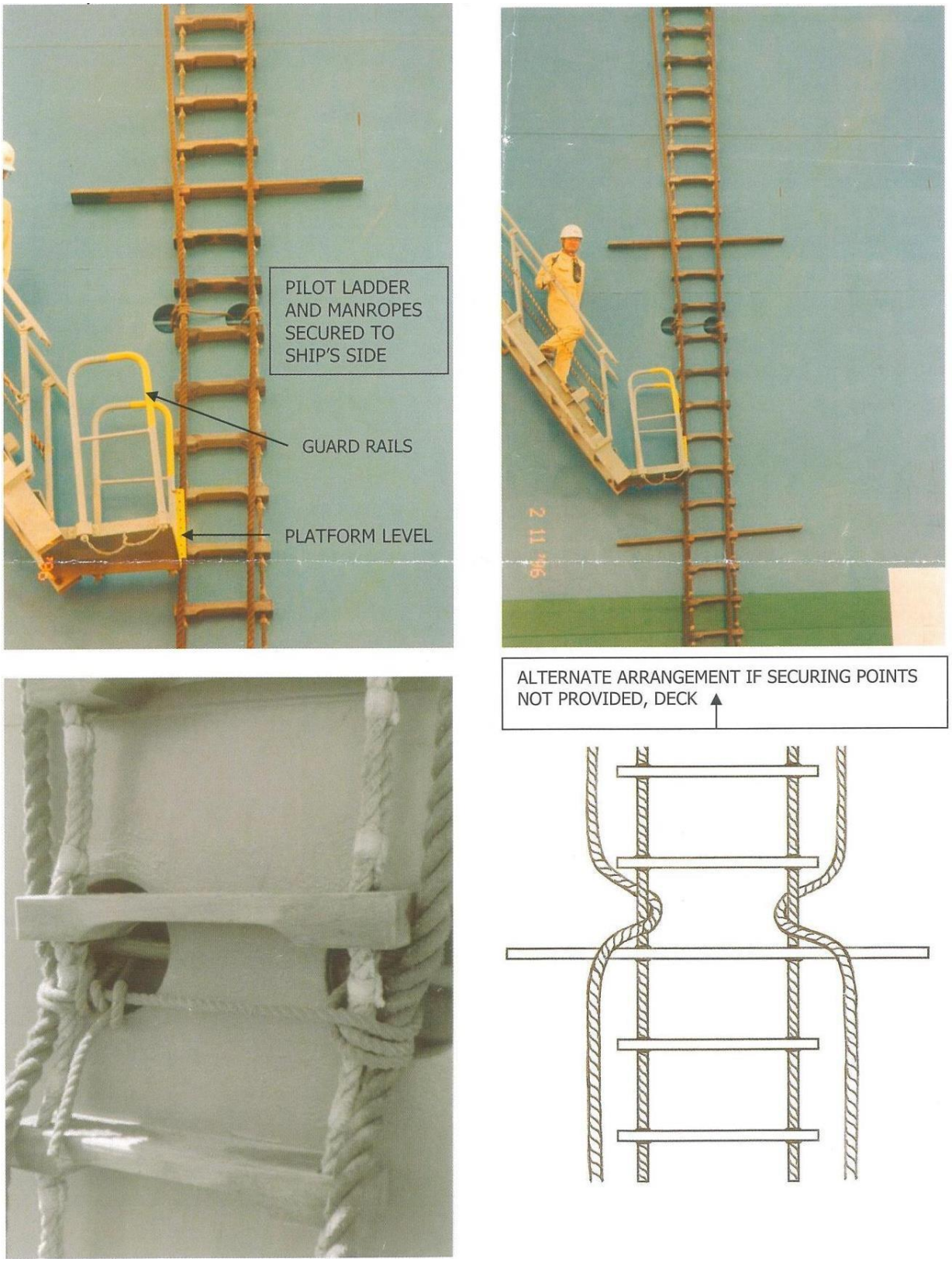


Figure 12: TTL Ladder Requirements for Freeboard Exceeding 9.0m (SOLAS Chapter V 23)

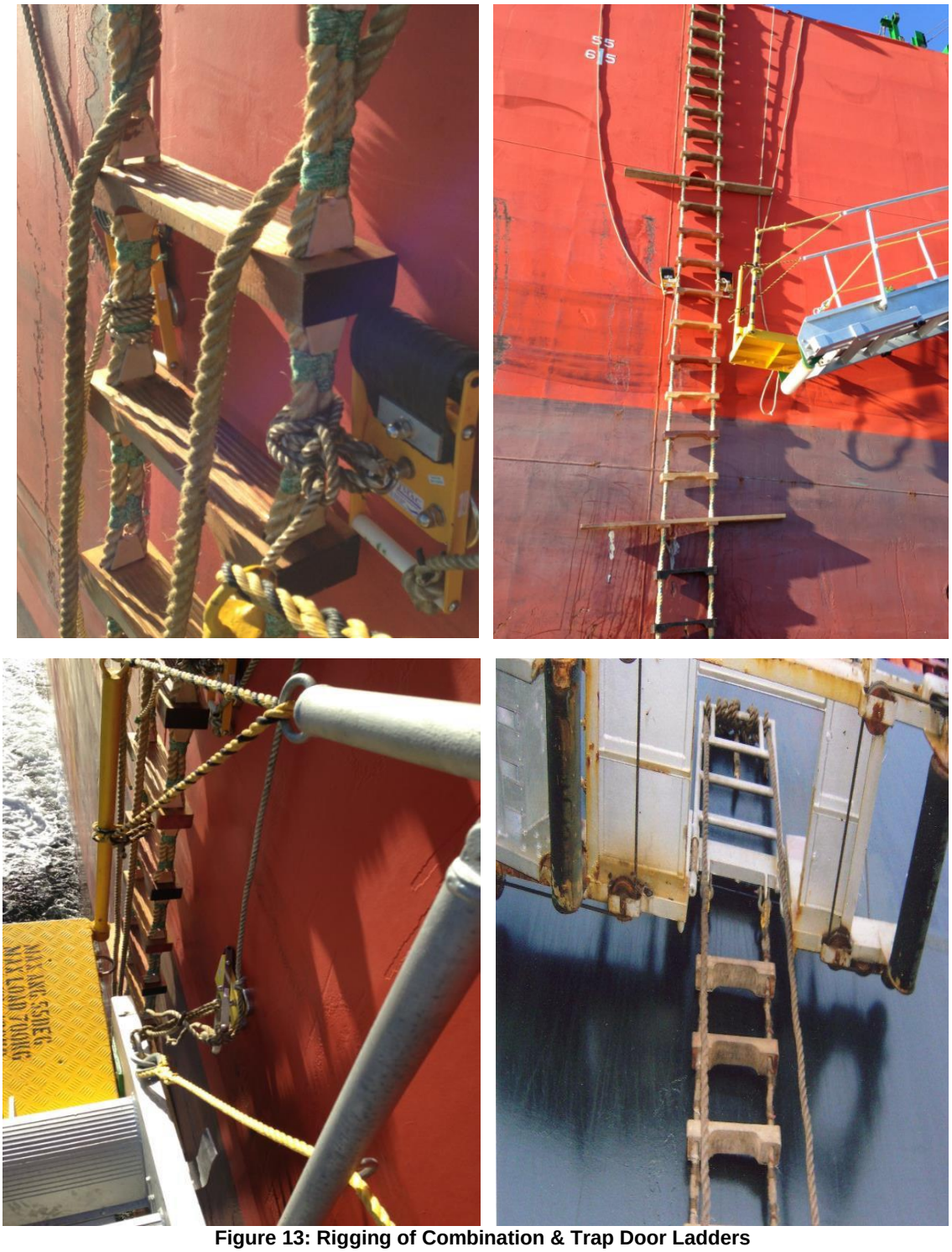
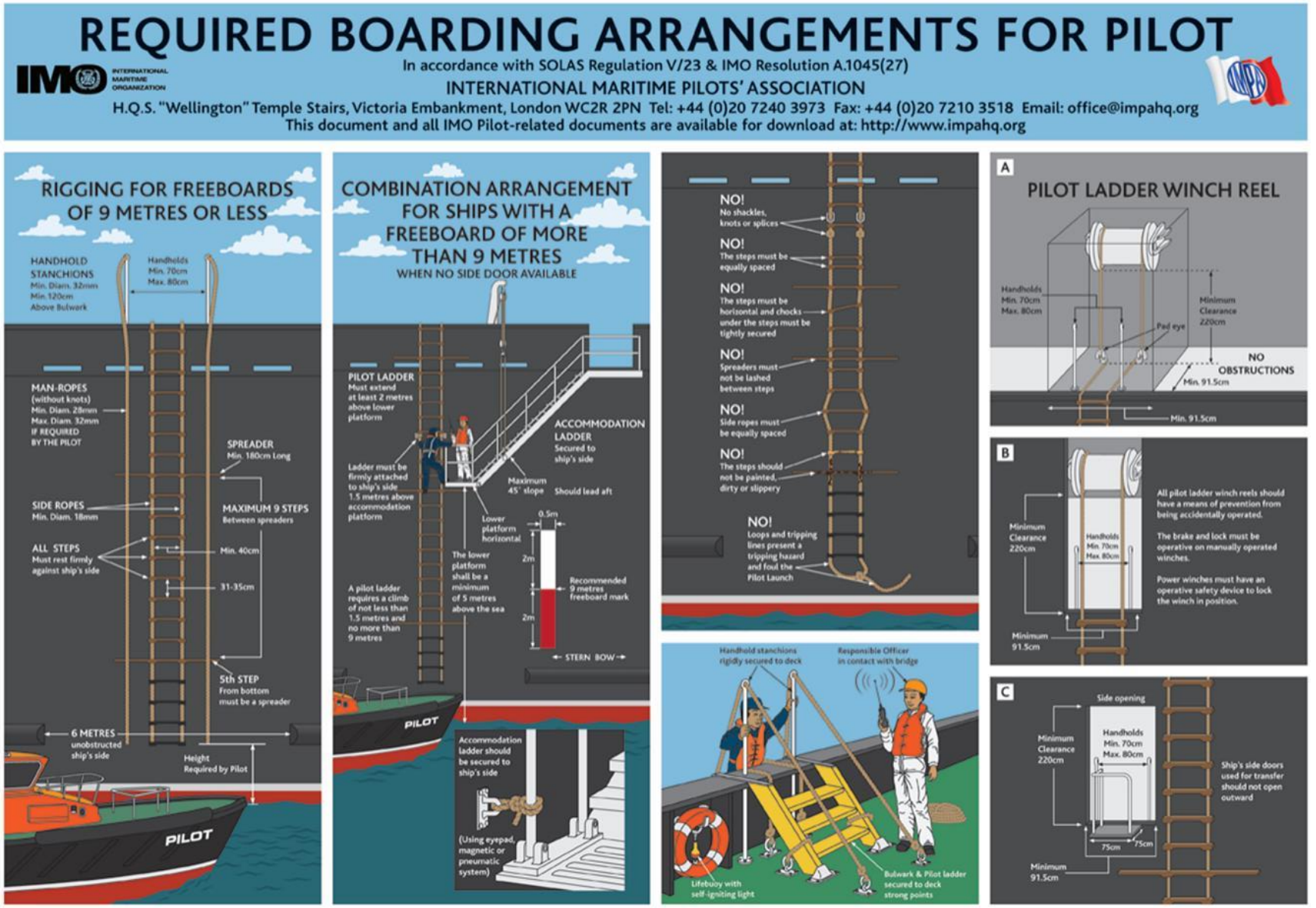


Figure 13: Rigging of Combination & Trap Door Ladders

Man-Ropes are not currently permitted for use at Prelude.

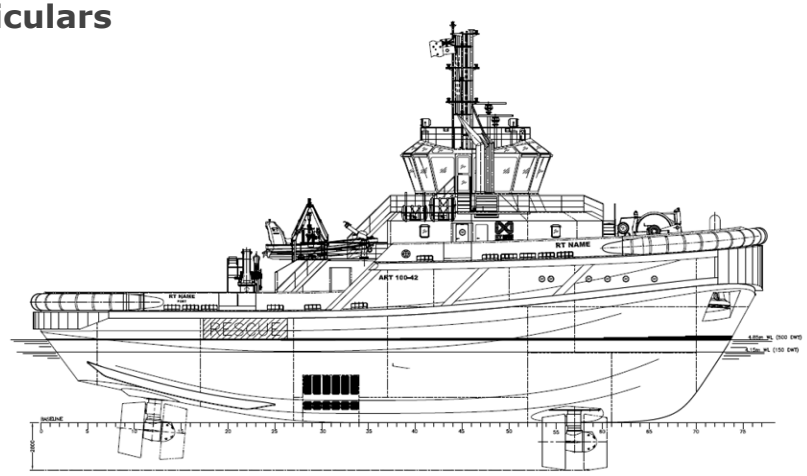
Never attach Pilot ladder to accommodation ladder.

Figure 14: IMPA Pilot Boarding Arrangements



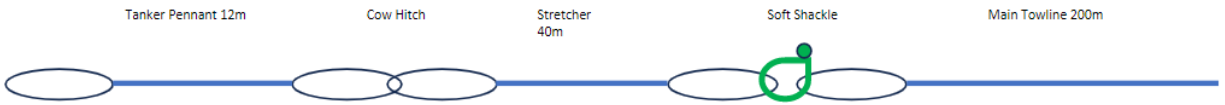
Appendix B Infield Support Vessels (ISV) Particulars

Length	41.95 m
Beam	14.50 m
Depth	6.27 m (Amidships)
Bollard Pull	100 Tonnes @ 100% MCR



OUTBOARD PROFILE

Port FWD Towline



Starboard FWD Towline

Aft Towline


Tanker Pennant 12m
Cow Hitch
Stretcher 30m
Soft Shackle
Main Towline 325m

Appendix C Targeting Spool Piece Transfer & (Dis) Connection

Purpose

The majority of LNG tankers which call to Prelude FLNG for offtake operations will not have their own targeting spools. Therefore, for each LNG tanker arrival the transfer by hose handling crane, connection and dis-connection of either 3 or 4 targeting spools will be required. The transfer and (dis) connection of the targeting spools will take place at sea within the extremity of the Prelude FLNG field but outside of the 1500m Safety Zone.

Scope

The scope of this procedure is to clearly define the work involved with transferring the targeting spools and tanker boxes from the Integrated Support Vessels (ISV) to the LNG tanker, connecting and dis-connecting the targeting spools and then landing all of the equipment back on to the ISV.

Personnel

The Lead Terminal Technician (LTT) will be present at the manifold throughout the operations to provide guidance, assistance and supervision for the lifting operations and the connection / disconnection of the spool pieces. The LTT will maintain radio contact with the team on the ISV; and will typically provide instruction / signals directly to the crane operator; but this will be clarified in the Tool Box Meeting prior to commencing the operation.

The LNGC team are requested to ensure there are sufficient vessel personnel available to assist with the operation. The minimum number of personnel will include a competent crane operator, and at least three persons able to control guide ropes / tag lines from the LNGC deck.

Transfer of equipment from ISV to LNG tanker

On arrival at the TTL Boarding Ground a minimum of two terminal team members will board the tanker via the ISV.

Once onboard, the LTT will conduct a Tool Box Meeting (TBM) with the LNGC team at the manifold in order to discuss the details of the task. Only after completion of the TMB the lifting operation can commence.

The following is a chronological sequence of events for transferring the equipment from the ISV to the tanker:

1. The TTL / ISV and tanker Master will decide the best heading to create a lee on the port side so that the ISV can hold a steady position during the lifting operations, whilst minimising rolling of the tanker.
2. The ISV will move into position under the port side mid-ship crane.
3. Once the ISV is in position, the LTT will advise when the lifting operations can commence.
   Note: These will be blind lifts, therefore, it's essential that robust communication procedures are followed at all times
4. A 'guide rope' / 'tag line' is to be attached to the crane hook or crane block.
5. The ships crane hook is lowered to the ISV with a soft strop / sling suspended from the hook in order to ensure sufficient clearance from the crane block for the ISV crew.
6. The ISV crew will hook a certified extension wire and safety hook to the soft sling on the crane hook.
7. The crane hook will be returned to the tanker deck to remove the soft sling from the arrangement.
8. Two 'guide ropes' / 'tag lines' will be placed using a bowline onto the terminal provided hook.
9. Offtake carrier to lower the crane hook with attached guide ropes to the ISV deck.
10. The ISV deck crew are to remove the guide ropes from the hook, and the hook immediately lifted / cleared from the area.
11. ISV deck crew to attach the guide ropes to the load which is to be transferred.
12. The hook is to be lowered again to the ISV deck. ISV deck crew to connect the hook to the load.

13. Lifting is to commence only when permission is granted & clearly communicated by the ISV crew member, visually or verbally (UHF). The ISV to be in a safe position, motion is to be monitored and the ISV deck crew must be clear of the back deck prior to lifting.
14. The load is to be safely landed on the offtake carrier's deck or manifold (as agreed during the TBM with offtake carrier crew).
    Note: The lifting baskets are unable to be moved by use of a pallet jack, therefore, they should be landed on pallets or placed in their final position
15. The guide ropes are to be re-attached to the hook with a bowline and repeat above steps for subsequent loads.

Connecting the targeting spools

Once all the equipment has been safely landed on the tanker, the targeting spools can now be connected to the tankers manifold under direction of the terminal team using the provided tools. The following is a chronological sequence of events for connecting the targeting spools to the manifold:

1. The securing arrangement removed and the targeting spool prepared to be lifted out of the basket using the port side midship crane.
2. A shackle will be installed on the lifting eye of the targeting spool, which is the center of gravity and is to be the only lifting point used.
3. A soft sling will be use to connect the shackle to the crane hook.
4. Two tag-lines will be attached to the spool to control movement during the lift from the basket to the manifold area.
5. Once the targeting spool has been lifted out of the basket and in position in front of the correct manifold, the crane will continue to undertake subsequent lifts.
6. Whilst subsequent lifts are carried out, any available personnel can remove the studs and nuts from the spool piece, and assist to clean the flange faces.
7. Once all spools are in position at the manifold, a chain block is placed between the crane hook and the targeting spool to allow for more controlled adjustments.
8. The pool is lifted into position at the manifold.
9. The chain block will be used to make the final adjustments prior to placing the bolts and spiral wound gaskets in position.
10. As soon as the bolts are in position and tight the rigging can be removed and proceed on to the next targeting spool.
11. Once all targeting spools are fixed on the manifold they can then be tightened to their respective torque value as guided by the LTT.

Dis-connecting the Targeting spools

On completion of the cargo transfer, and after the vessel has departed the 1500m safety zone the disconnection of the spool pieces can commence. This activity will be conducted under the guidance of the LTT who will be present throughout. A Tool Box Meeting (TBM) will be carried out by the LTT prior to commencing the activity.

The following is a chronological sequence of events which is similar to the connection process:

1. A shackle will be installed on the lifting eye of the targeting spool, which is the centre of gravity and is to be the only lifting point used.
2. A 1m sling will be connected to the hose crane hook and a 1-ton chain block hooked to the opposite end of the 1m sling. The running end of the chain block is to be attached to the targeting spool at the shackle.
3. Once the rigging is in place the remaining bolts and spiral wound gasket can be removed and the targeting spool lowered directly to the deck in front of the manifold.
4. The studs, nuts and flange covers are to be replaced on the spool once it is landed to deck.
5. The shackle, sling and crane are to be transferred to lift the remaining spools from the manfold.
6. Once the spool is prepared, two tag-lines should be affixed to the spool, and the crane utilised to transfer the spools one at a time to the baskets.
7. Next the targeting spool should be secured to the lifting basket as guided by the LTT.
8. The same process can now be followed for the remain targeting spools.

Transfer of equipment from LNG Tanker to ISV

Once all the targeting spools have been dis-connected, placed back into their lifting basket and secured they are now ready to be transferred back to the ISV.

The terminal team will also be responsible to ensure all Prelude supplied equipment has been placed into the tanker box / equipment cage and made ready for offloading.

Lifting operations will be conducted under the guidance of the LTT; who will conduct a tool-box meeting prior to undertaking this activity.

The following is a chronological sequence of events for transferring the targeting spools and tanker box back to the ISV:

1. If not already done, the TTL and tanker Master will decide the best heading to create a lee on the port side so that the ISV can hold a steady position during the lifting operations.
2. The ISV will move into position under the port side hose handling crane.
3. Once the ISV is in position the lifting operations can commence.
4. The targeting spools and tanker boxes will be lifted one at a time and landed on the back deck of the ISV.
   Note: These will be blind lifts, therefore, it's essential that robust communication procedures are followed at all times
5. Two 'Guide Ropes' / 'Tag Lines' are attached to each load being transferred, these are controlled at all times by LNGC crew on the upper deck.
6. Once the item has been landed onto the ISV, the ISV crew will untie the 'guide rope' and release, this is to be recovered promptly by hand by the LNGC crew ready for subsequent lifts.
7. Once all items have been landed on the back deck of the ISV this operation is now complete.

Approximate timing of events

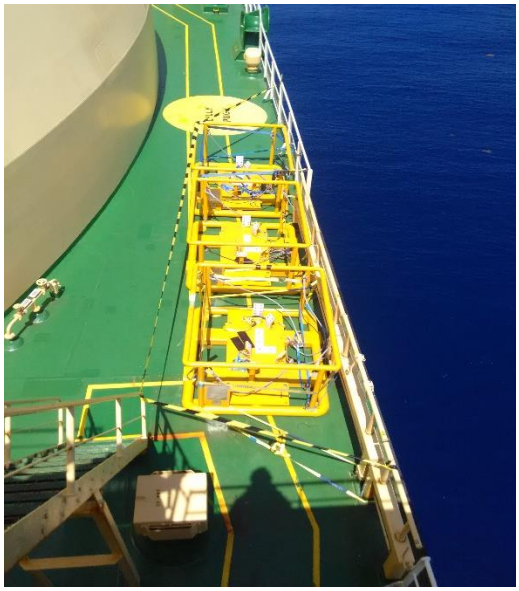
Transfer targeting spools and tanker boxes from FLNG to ISV	30 Minutes
Transfer targeting Spools from FLNG to ISV and proceed to tanker	1hr
Transfer targeting Spools and Tool Box from ISV to LNG tanker	30 Minutes
Fitting of 3 X Targeting Spools to the LNGC Manifold	2hr
Total Time	**4hr**

Reference Photographs

Targeting Spools and tanker boxes located on the back deck of the ISV.


ISV alongside transferring the targeting spools and tanker box.

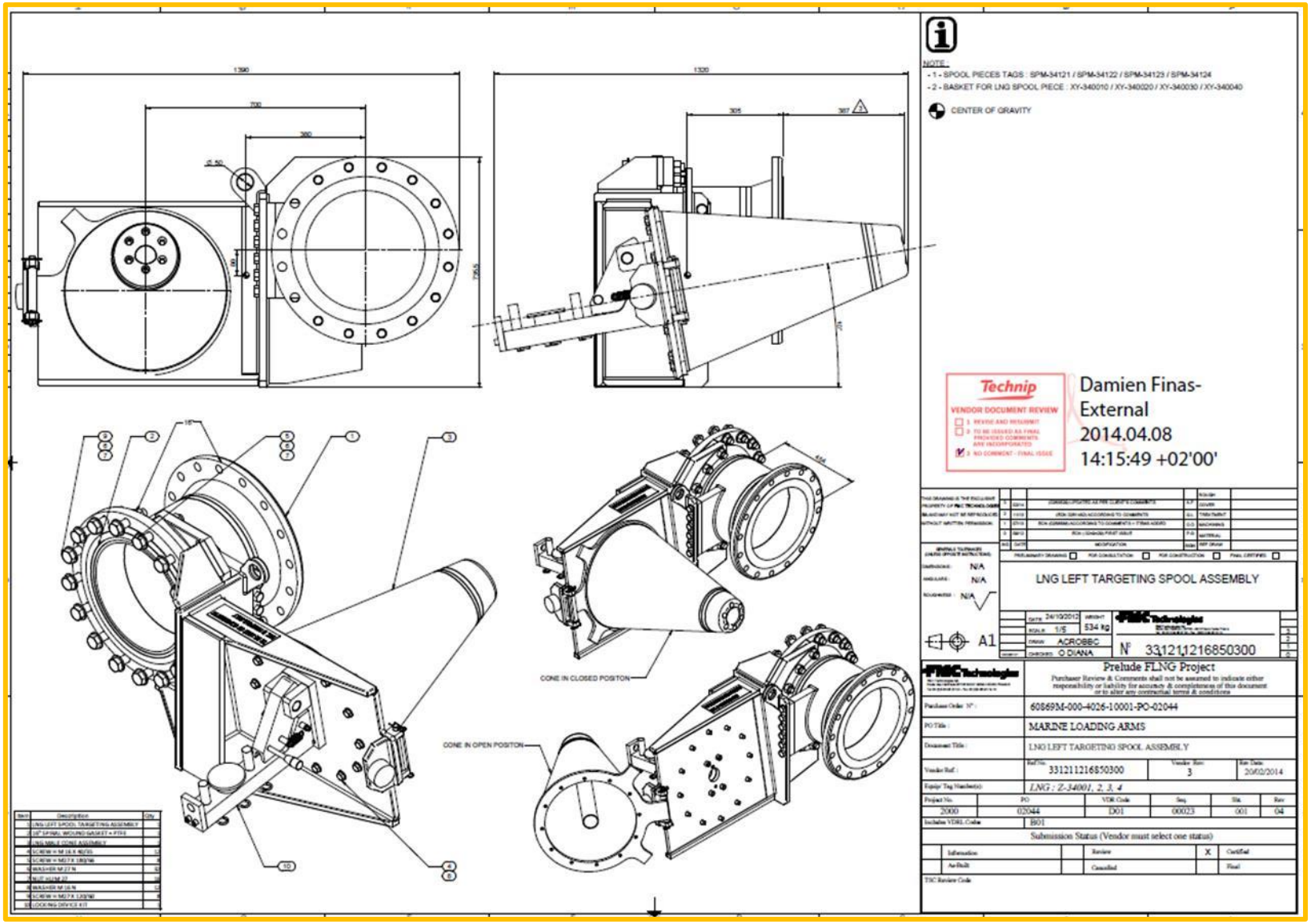
Proper securing the targeting spool baskets and tanker box to the ship.

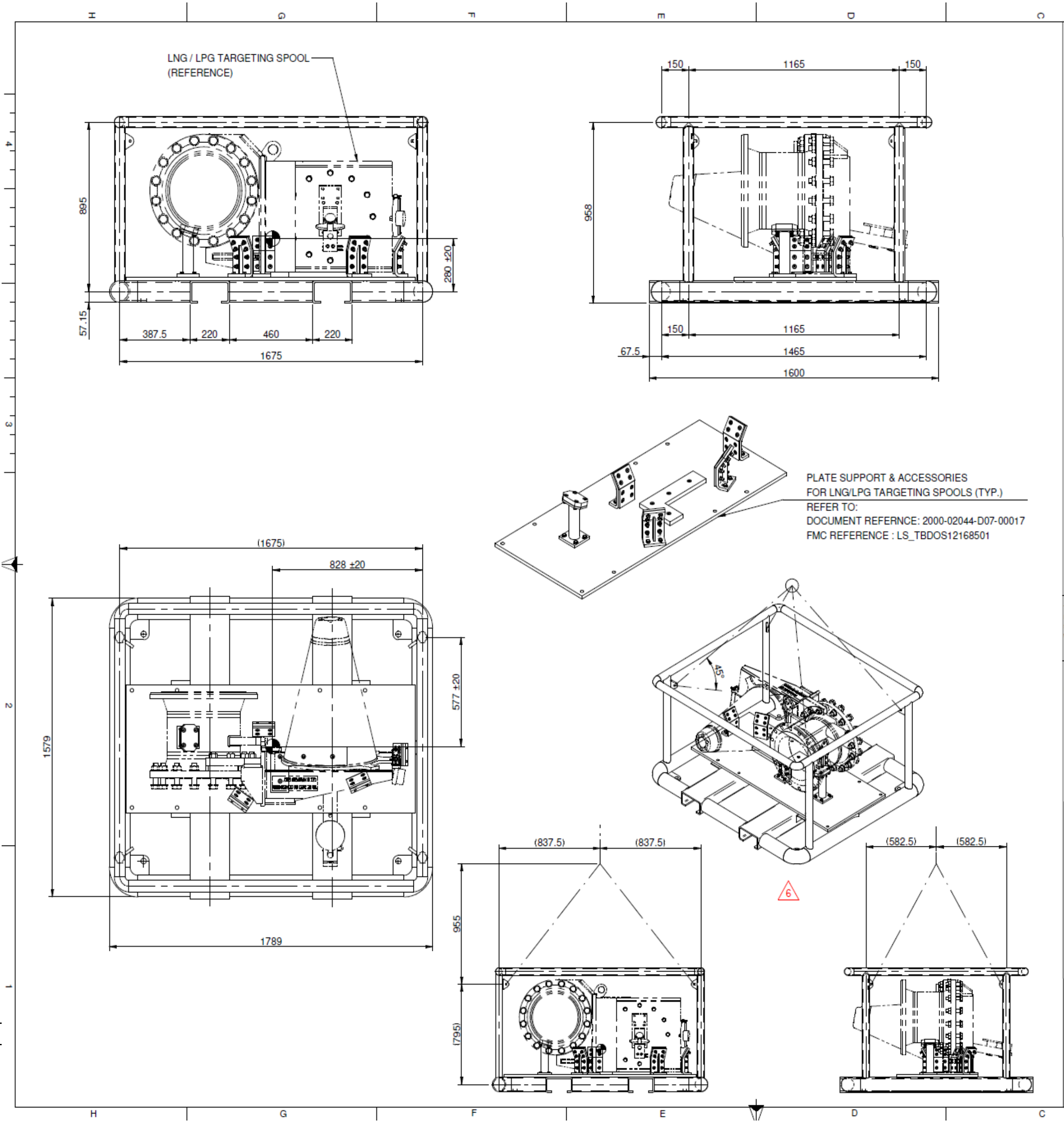



Chain block and lifting configuration for (dis) connection of the targeting spools.

Final position of targeting spools connected at the manifold.

Appendix D Targeting Spool Pieces & Basket Design





NOTE(S) :

1- MAXIMUM WEIGHT: BASKET + SPOOL + SUPPORT PLATE & ACCESSORIES: 1070 KG

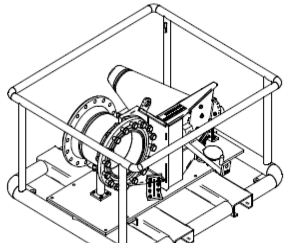
- CoG OF BASKET + SPOOL + SUPPORT PLATE & ACCESSORIES

2- DISTANCE BETWEEN SPREADER BEAM PADEYES (CENTER HOLE) TO BE 1675 ±50, TO ENSURE THAT THE SLING OUT-OF-PLANE (PADEYE) ANGLE IS NO MORE THAN 2.5 DEGREES.

3- STRUCTURAL STEEL MATERIAL SPECIFICATION (REF. PAGE 2)

01	2" & 4" ELBOW SHORT RADIUS SCHXS	NIL	ASTM A235 Gr. WPB
02	ALL OTHER STRUCTURAL MEMBERS	MP032_021	EN10225/EN10025 Gr. S355

4- PADEYE PLATE WELDED END TO BE BEVELED FROM 15mm TO 6mm FOR TOTAL THICKNESS OF 6mm FULL PENETRATION WELD.



3D VIEW

IND	DATE	MODIFICATION	SIGN		
				ROUGH	
				COVER	
				TREATMENT	
6	06/17	UPDATE PADEYE LOCATION	J.O.	MACHINING	
5	06/17	MODIF WITH ADDED TOL. & MATERIAL SPEC./GRADE	N.C.	MATERIAL	MP032_021
				REF DRAW	

PRELIMINARY DRAWING ☐ FOR CONSULTATION ☐ FOR CONSTRUCTION ☐ FINAL CERTIFIED ☒

GENERALS TOLERANCES (UNLESS OPPOSITE INSTRUCTIONS)
DIMENSIONS : ±2
ANGULARS : ±0.5
ROUGHNESS : 250

[CO] LNG/LPG TARGETING SPOOL BASKET

A1

DATE: 3/7/2017 | WEIGHT: N/A | SCALE: 1:10 | DRAW: J.OLIVA | CHECKED: E.CHAUVIN | ORDER Nº

FMC Technologies

N° 331211216851092 — 6 / 0

FMC Technologies SA
Route des Clérimois BP705 89107 SENS CEDEX FRANCE
Tel 33 (0)3.86.95.87.00 - Fax 33 (0)3.86.95.19.16

Prelude FLNG Project

Purchaser Review & Comments shall not be assumed to indicate either responsibility or liability for accuracy & completeness of this document or to alter any contractual terms & conditions

Purchase Order N° :	60869M-000-4026-10001-PO-02044				
PO Title :	MARINE LOADING ARMS				
Document Title :	[CO] LNG/LPG TARGETING SPOOL BASKET				
Vendor Ref. :	Ref No. 331211216851092	Vendor Rev: 3	Rev Date: 15/05/2017		
Equip/ Tag Number(s):	LNG : Z-34001, 2, 3, 4 ; LPG: Z-35001, 2, 3				
Project No.	PO	VDR Code	Seq.	Sht.	Rev
2000	02044	D07	00016	001	04
Includes VDRL Codes					

Submission Status (Vendor must select one status)

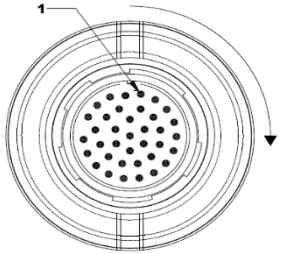
	Information		Review	X	Certified
	As-Built		Cancelled		Final

TSC Review Code

Appendix E SeaTechnik Fibre Optic Ship Shore Link Connection

Connector Type	Pin Number
Pin used for Ship-Shore communications	1
Pin used for Shore-Ship communications	2
Pin used for ESD 1 Ship-Shore	3
Pin used for ESD 1 Shore-Ship	4
Spare	5
Spare	6

Appendix F 37 Pin Pyle National Electrical Link



37 Way Electrical Plug
Pin numbering (Clockwise)
Front View
Scale 1:2

Connector Type	Pin Number	Remarks
Pin used for Sound Powered Phone	1 & 2	Phone located in Prelude CCR
Pin used for Hotline communications	5 & 6	Private line lift to ring
Pin used for Public Phone communications	7 & 8	Connected to the Prelude PABX exchange
Pin used for PABX	9 & 10	Voltage level 48v DC when ringing
Pin used for ESD1 Shore-Ship	13 & 14	Prelude to LNGC
Pin used for ESD1 Ship-Shore	15 & 16	LNGC to Prelude
Pin used for Umbilical Continuity Link	19 & 20	Essential for phones to work
Pin used for MLM communications	31, 32 & 33	Ship should have IS Barrier MTL 3058 or compatible for receiving MLM data

Appendix G Marine Arms Connecting / Disconnecting

The objective of the targeting system is to progressively apply the relative movements of the LNG Carrier on the loading arm during the approach to the manifold of the LNG carrier. A cable that is kept under tension is to guide the style 80 terminal swivel joints assembly toward the manifold. During this phase, the loading arm is in free wheel mode, and is only guided by the cable.

The cable is kept under tension between the manifold of the LNG carrier and the base riser of each loading arm. Its tension is kept constant using a constant tension winch located at the base riser of the loading arms. The constant tension winch uses a hydraulic motor that is maintained with a constant oil pressure. If the difference between the LNG Carrier and the platform increases, the winch will let the cable unroll while maintaining constant tension, if it decreases, it will roll the cable with the same tension. In all cases, the tension in the cable remains the same.

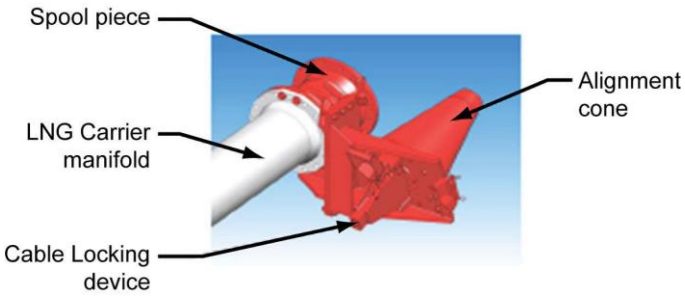
For the approach of the loading arm toward the manifold of the LNG Carrier, the loading arm is set in the free wheel mode. The style 80 is guided along the cable that passes on the side of the Chicksan hydraulic Quick Connect/Disconnect (QC/DC). A special hydraulic acquisition winch located near the QC/DC pulls the style 80 in one direction or the other, using friction on the cable. The cable passes through a female conical guide at the style 80 on the loading arm side, and it's connected to the top of the corresponding male conical guide at the LNG Carrier side.

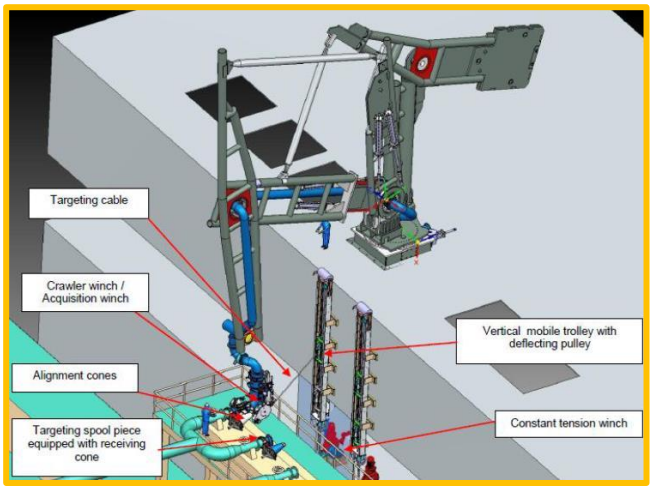
At the end of the approach phase, the cones engage into each other and ensure the alignment of the two elements. In addition to this, four guides are placed around the QC/DC to finalize its correct alignment before closure.

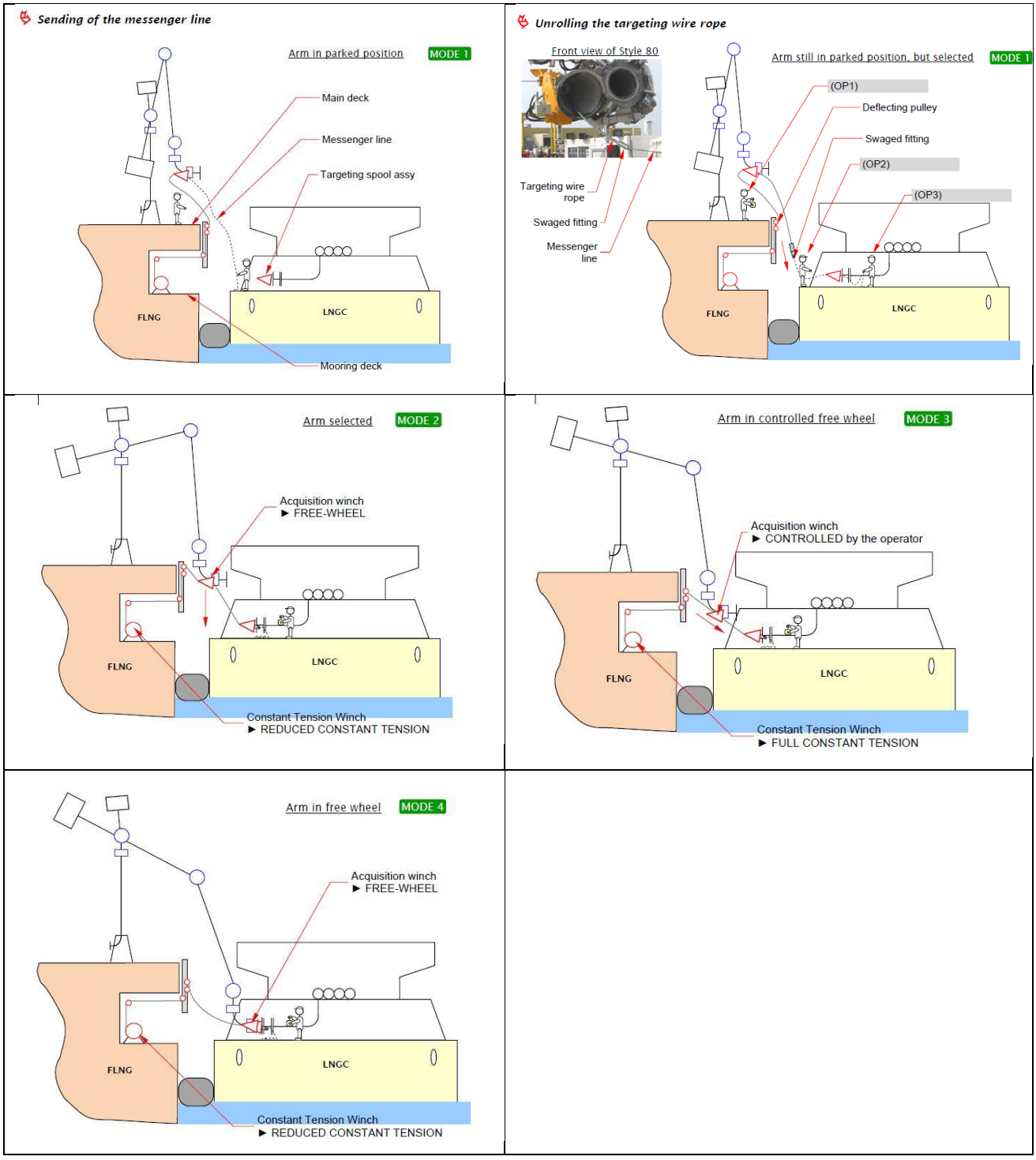
Once the loading arm is connected, the constant tension is released. Only a minimum tension is maintained to avoid any slack cable. The other loading arms are then connected using the same procedure.

For disconnection, the same principle is used. The only difference is that the acquisition winch is activated in the other direction. The major reason to use the same procedure is to avoid any risk of interference or shock with any part on the LNG Carrier.

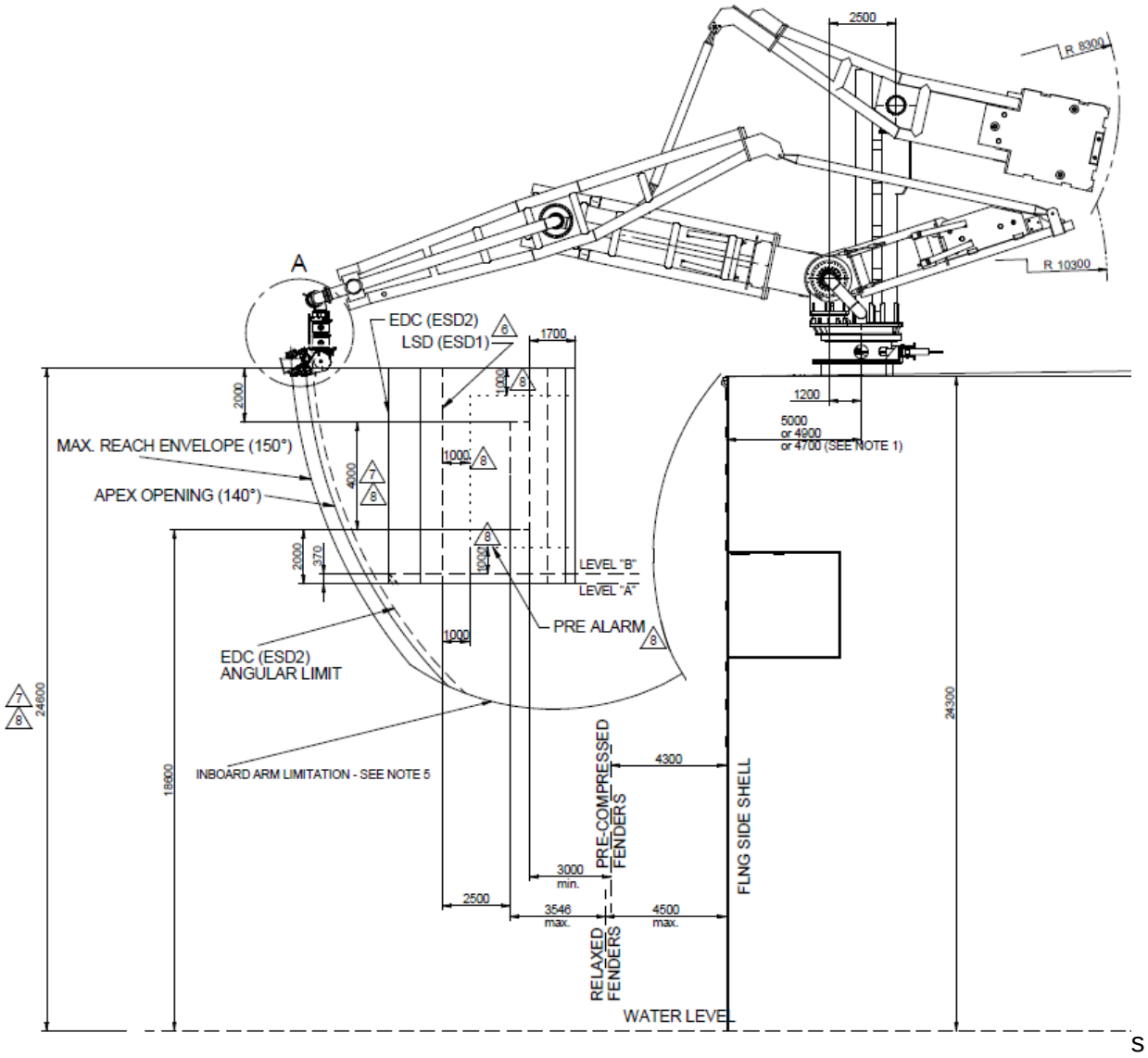
Fitted on the LNG Carrier manifold flange, the spool pieces allow the alignment of the hydraulic coupler.

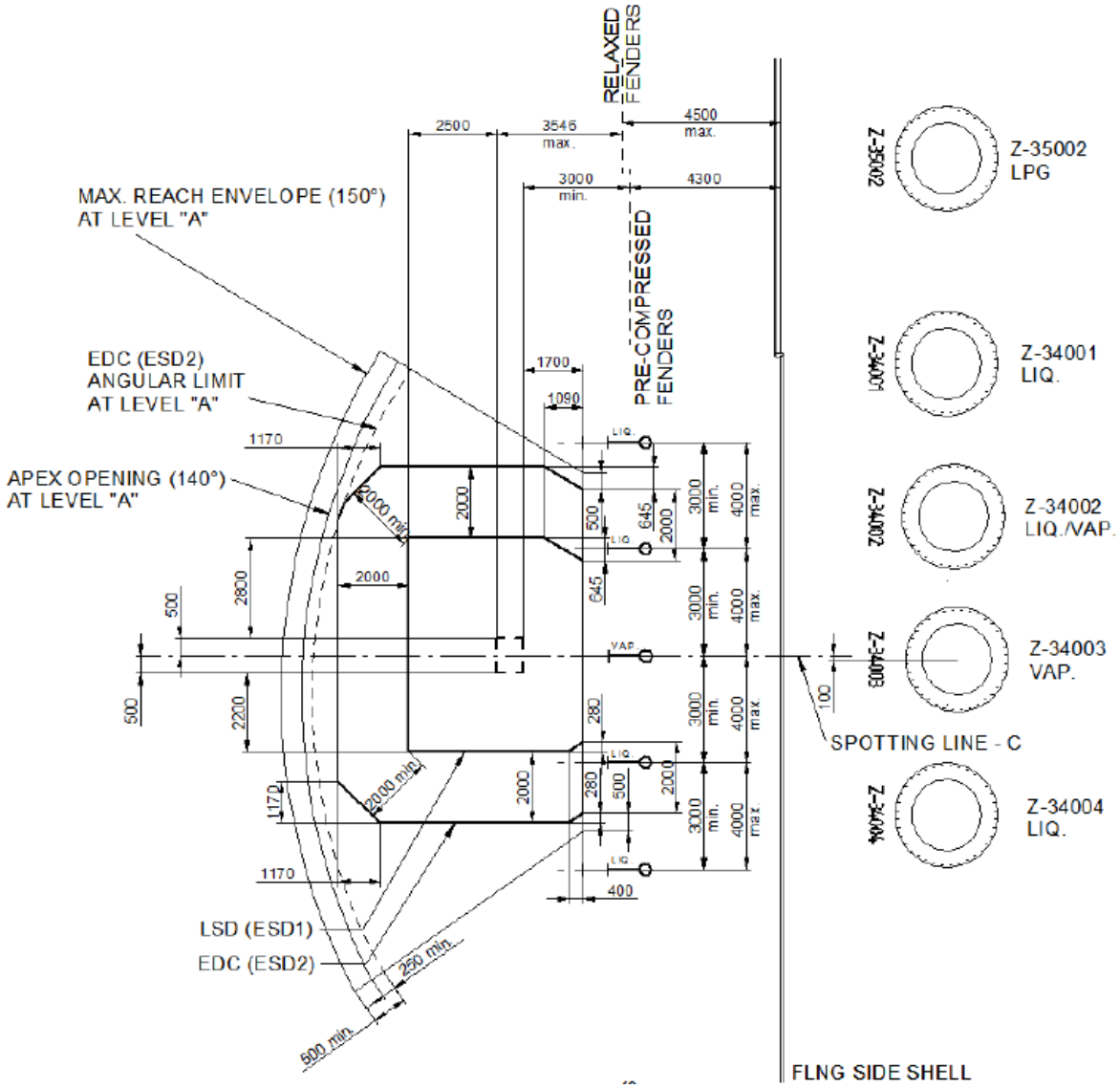





Sending of the messenger line
Arm in parked position
MODE 1
Main deck
Messenger line
Targeting spool assy
FLNG
LNGC
Mooring deck
Unrolling the targeting wire rope
Front view of Style 80
Arm still in parked position, but selected
MODE 1
(OP1)
Deflecting pulley
Swaged fitting
(OP2)
(OP3)
Targeting wire rope
Swaged fitting
Messenger line
FLNG
LNGC
Arm selected
MODE 2
Acquisition winch
► FREE-WHEEL
FLNG
LNGC
Constant Tension Winch
► REDUCED CONSTANT TENSION
Arm in controlled free wheel
MODE 3
Acquisition winch
► CONTROLLED by the operator
FLNG
LNGC
Constant Tension Winch
► FULL CONSTANT TENSION
Arm in free wheel
MODE 4
Acquisition winch
► FREE-WHEEL
FLNG
LNGC
Constant Tension Winch
► REDUCED CONSTANT TENSION

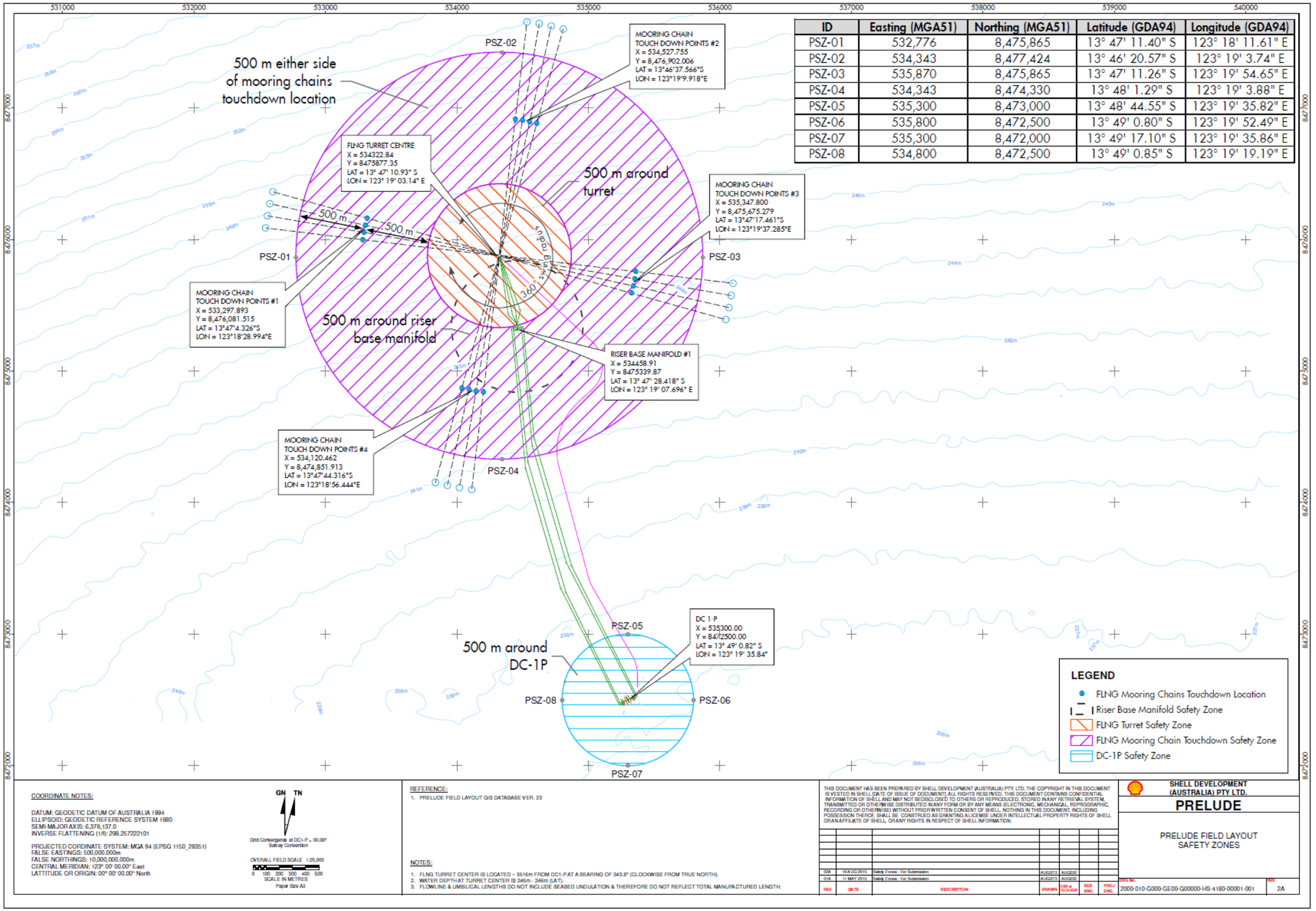
Appendix H ESD Envelopes





Equipment Name	Z-34001/04 LNG Offloading Arms	Z-34003 LNG Vapour Return Arm	Z-34002 LNG Offloading/Vapour Return (Hybrid) Arm
Service	Liquid	Vapour	Liquid / Vapour
Design flow rate	5000 m^3/h	41351 kg/h	5000 m^3/h / 41351 kg/h
Size	16”	16”	16”
Arm estimated pressure drop	1.4 bar	0.1 bar	

Appendix I Field Layout Diagram



ID	Easting (MGA51)	Northing (MGA51)	Latitude (GDA94)	Longitude (GDA94)
PSZ-01	532,776	8,475,865	13° 47' 11.40" S	123° 18' 11.61" E
PSZ-02	534,343	8,477,424	13° 46' 20.57" S	123° 19' 3.74" E
PSZ-03	535,870	8,475,865	13° 47' 11.26" S	123° 19' 54.65" E
PSZ-04	534,343	8,474,330	13° 48' 1.29" S	123° 19' 3.88" E
PSZ-05	535,300	8,473,000	13° 48' 44.55" S	123° 19' 35.82" E
PSZ-06	535,800	8,472,500	13° 49' 0.80" S	123° 19' 52.49" E
PSZ-07	535,300	8,472,000	13° 49' 17.10" S	123° 19' 35.86" E
PSZ-08	534,800	8,472,500	13° 49' 0.85" S	123° 19' 19.19" E

COORDINATE NOTES:

DATUM: GEODETIC DATUM OF AUSTRALIA 1994
ELLIPSOID: GEODETIC REFERENCE SYSTEM 1980
SEMI-MAJOR AXIS: 6,378,137.0
INVERSE FLATTENING (1/f): 298.257222101

PROJECTED CORDINATE SYSTEM: MGA 94 (EPSG 1150_28351)
FALSE EASTINGS: 500,000.000m
FALSE NORTHINGS: 10,000,000.000m
CENTRAL MERIDIAN: 123° 00' 00.00" East
LATTITUDE OR ORIGIN: 00° 00' 00.00" North

GN TN
Grid Convergence at DC1-P = 00.08°
Survey Convention

OVERALL FIELD SCALE 1:25,000
0 100 200 300 400 500
SCALE IN METRES
Paper Size A3

REFERENCE:
1. PRELUDE FIELD LAYOUT GIS DATABASE VER. 23

NOTES:
1. FLNG TURRET CENTER IS LOCATED ~ 3516m FROM DC1-P AT A BEARING OF 343.8° (CLOCKWISE FROM TRUE NORTH).
2. WATER DEPTH AT TURRET CENTER IS 245m - 246m (LAT).
3. FLOWLINE & UMBILICAL LENGTHS DO NOT INCLUDE SEABED UNDULATION & THEREFORE DO NOT REFLECT TOTAL MANUFACTURED LENGTH.

REV	DATE	DESCRIPTION	DRAWN	CHK or TECH REVD	DES ENG.	PROJ ENG.
02A	05 AUG 2015	Safety Zones - For Submission	AUGDSP	AUGDSP		
01A	11 MAY 2015	Safety Zones - For Submission	AUGDSP	AUGDSP		

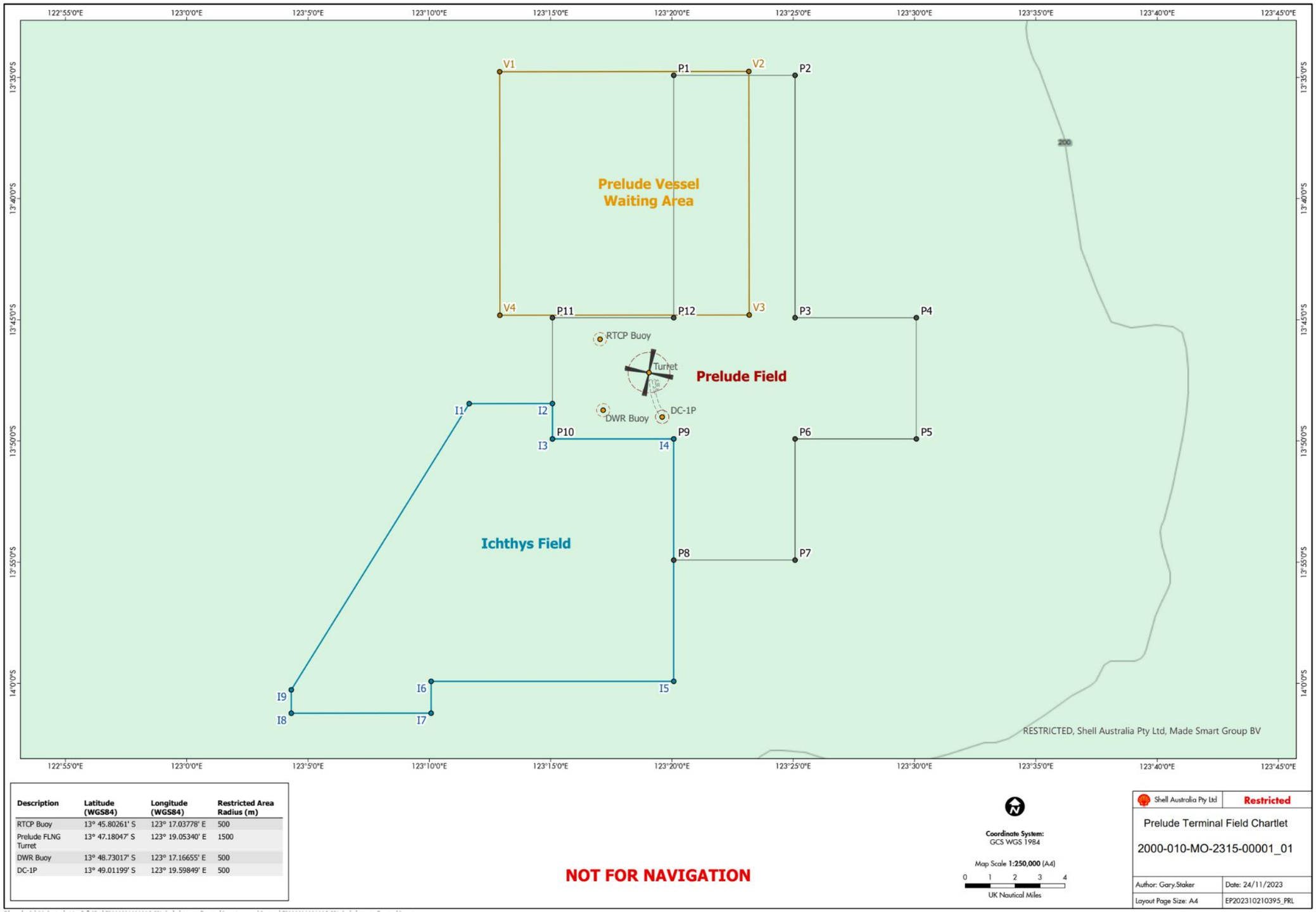
SHELL DEVELOPMENT (AUSTRALIA) PTY LTD.

PRELUDE

PRELUDE FIELD LAYOUT
SAFETY ZONES

DRG No. 2000-010-G000-GE00-G00000-HS-4180-00001-001
REV. 2A

Appendix J Prelude / Ichthys Field Diagram



Description	Latitude (WGS84)	Longitude (WGS84)	Restricted Area Radius (m)
RTCP Buoy	13° 45.80261' S	123° 17.03778' E	500
Prelude FLNG Turret	13° 47.18047' S	123° 19.05340' E	1500
DWR Buoy	13° 48.73017' S	123° 17.16655' E	500
DC-1P	13° 49.01199' S	123° 19.59849' E	500

NOT FOR NAVIGATION

Coordinate System: GCS WGS 1984

Map Scale 1:250,000 (A4)

0 1 2 3 4

UK Nautical Miles

Shell Australia Pty Ltd | Restricted

Prelude Terminal Field Chartlet

2000-010-MO-2315-00001_01

Author: Gary.Staker | Date: 24/11/2023

Layout Page Size: A4 | EP202310210395_PRL

Prelude Field

ID	Latitude (DDM) WGS84	Longitude (DDM) WGS84
P1	13° 34.91609' S	123° 20.07522' E
P2	13° 34.91603' S	123° 25.07492' E
P3	13° 44.91611' S	123° 25.07492' E
P4	13° 44.91605' S	123° 30.07507' E
P5	13° 49.91603' S	123° 30.07507' E
P6	13° 49.91609' S	123° 25.07492' E
P7	13° 54.91613' S	123° 25.07492' E
P8	13° 54.91613' S	123° 20.07522' E
P9	13° 49.91609' S	123° 20.07522' E
P10	13° 49.91615' S	123° 15.07507' E
P11	13° 44.91617' S	123° 15.07507' E
P12	13° 44.91611' S	123° 20.07522' E

Ichthys Field

ID	Latitude (DDM) WGS84	Longitude (DDM) WGS84
I1	13° 48.46062' S	123° 11.64413' E
I2	13° 48.45755' S	123° 15.07507' E
I3	13° 49.91615' S	123° 15.07507' E
I4	13° 49.91609' S	123° 20.07522' E
I5	13° 59.91617' S	123° 20.07522' E
I6	13° 59.91622' S	123° 10.07492' E
I7	14° 01.23003' S	123° 10.07492' E
I8	14° 01.23288' S	123° 04.31186' E
I9	14° 00.26719' S	123° 04.31156' E

Prelude Vessel Holding Area

ID	Latitude (DDM) WGS84	Longitude (DDM) WGS84
V1	13° 34.76844' S	123° 12.89909' E
V2	13° 34.75607' S	123° 23.17031' E
V3	13° 44.80358' S	123° 23.18667' E
V4	13° 44.81611' S	123° 12.90820' E

End of document