B.1.2 NON-TECHNICAL DESCRIPTION

Reference drawings;
47067567-1018 Site Block Plan
47067567-1019 Overall Site Layout and Cable, Pipe Route and TP Layout
ENEM-URS-FS-00-DR-ME-00050 LNG Terminal & Regasification Process Flow Diagram
ENEM-URS-FS-00-DR-ME-00051 CCGT Process Flow Diagram
ENEM-URS-FS-00-DR-ME-00052 Typical Berthing Arrangement
ENEM-URS-FS-00-DR-ME-00066 Chemical & Service Tank Locations Sheet 1 of 2
ENEM-URS-FS-00-DR-ME-00067 Chemical & Service Tank Locations Sheet 2 of 2
ENEM-URS-E0-00-DR-ME-00106 IPPC External Tie In Points
21023-BAE-79430-MO-DW-0003 Anchor Pattern Drawing

The proposed new Delimara 4 CCGT Power Plant and LNG Terminal at the Delimara Site includes the following facilities:

1. LNG Storage Facility (Area E): This facility will receive LNG from an LNG carrier, via a ship to ship transfer, and store it within the floating storage unit (FSU). The LNG will then be transferred to the onshore regasification facility for processing. The LNG Storage Facility will included the following major systems:
    a. Floating storage unit (FSU), including accommodation facilities for Captain and crew.
    b. Ship-to-ship LNG transfer system.
    c. LNG ship to shore unloading system, jetty and jetty access arm.
    d. Boil off gas (BOG) management and ship to shore unloading hoses.
    e. Mooring and berthing dolphins and equipment.
    f. Storm mooring system (to be installed up to twelve months after arrival of FSU).
    g. Fire-fighting system and emergency equipment.
    h. Ship to shore power feed.
    i. Back up auxiliary service and emergency diesel generators.
    j. Nitrogen generating plant
    k. Inert gas generating (IGG) plant
    l. Gas fired auxiliary steam boilers and associated BOG compressors
    m. Once through cooling water for boilers, utilising a Impressed Current Anti Fouling (ICAF) system for the marine/biological growth prevention system
    n. Sewage treatment plant; the FSU incorporates a domestic waste water treatment plant (WTP) to treat domestic sewage water from the accommodation facilities on the FSU. The WTP is a package plant consisting of an activated sludge process followed by a chlorination stage. (refer to section B3.3.1 for further details)

2. Regasification Compound (Area B): This facility will regasify the LNG to provide a safe and reliable supply of Natural Gas (NG) to Enemalta's existing Delimara 3 power station and to

the new combined cycle gas turbine (CCGT) power plant, Delimara 4. The regasification facility will consist of the following main systems:

a. LNG regasification skids and associated LNG pumps (Intermediate Fluid Vaporiser Technology).
b. NG pipeline distribution system to Delimara 3 and the proposed CCGT.
c. Water/glycol loop heating and cooling system.
d. Electricity supply and distribution system.
e. Firefighting system.
f. Nitrogen generation package.
g. Boil off gas (BOG) compressors.
h. Frequency converting substation for ship to shore power.
i. Non visible combustion chamber (NVCC) for emergency use only.
j. Admin and Control Building
k. Emergency Diesel Generator.

3. Delimara 4 CCGT power plant (Area A): The power plant, capacity circa 205MW, will consist of a new Siemens gas-fired combined cycle facility (type SCC-800 3x1 multi-shaft type for condensing applications). The power plant will include the following main systems:

a. Three gas turbines and generators (GTGs) SGT-800 and associated gas systems.
b. Three two-pressure drum type heat recovery steam generators (HRSGs) and main stacks.
c. One steam turbine and generator (STG) SST-900, generator and associated steam systems.
d. Main and auxiliary once-through seawater cooling system.
e. Demi water polishing plant.
f. Firefighting system
g. Three by-pass stacks
h. Continuous emissions monitoring system (CEMS)
i. Gas turbine air inlet system
j. Admin and control buildings
k. Workshop and store
l. High voltage, medium voltage equipment and auxiliary power supply and distribution equipment.
m. Instrumentation and Control system.
n. Emergency Diesel Generator
o. Neutralisation system

· Delimara 3 gas reduction station (Area C): The Natural Gas from the regasification compound will be routed to Delimara 3 gas receiving station where the NG will be filtered, heated and conditioned to meet the requirements of the Delimara 3 the power plant. The gas will be heated via 2x100% boilers rated at 420 kWth each, they will burn NG and will only be operational when the regas plant is supplying D3 with gas.

- Cooling Water Pumps Switchgear Building (Area D): This power distribution system will supply the new main and auxiliary seawater cooling pumps. These pumps are required to meet the new seawater cooling demands of the CCGT condenser, regasification heating and other associated systems.

The areas occupied by the different facilities are outlined in drawing 47067567-1018, Block Site Plan.

LNG STORAGE FACILITY PROCESS DESCRIPTION

Introduction

The FSU is a converted LNG Carrier Class certified such that she can sail under her own engines from Singapore to Malta and then be moored at the jetty for 18 years without dry docking. After it arrives in Malta the FSU will be demobilised, such that the steam driven propulsion system and associated main boilers with be taken out of service. Should the vessel have to move from the jetty after she is demobilised, she will either winch off onto the storm moorings or, if necessary, disconnect from the storm mooring system and be taken by tug to an alternative anchoring location. Before the FSU is demobilised it must arrive in Malta, be safely moored to the jetty and connected to the storm mooring system, and complete a number of stringent commissioning tests.

While the above tests are ongoing and until all commissioning is complete and certification in place the FSU will remain mobilised. This is allowed for under the FSU's Bureau Veritas (BV) classification.

The propulsion system consists of a steam turbine connected to the vessels propellers. The steam to drive the turbine is generated in the existing main boilers. Thus during this mobilised period it will be necessary for the existing main boilers to be kept operational. Once the FSU is demobilised, the operations will change to use the two new custom fitted auxiliary boilers which have improved performance but are sized only to cater for the needs of the demobilised vessel (i.e. just cargo operations).

During normal operations, whilst moored at the jetty, the boilers will be kept cold except

- during an STS operation when steam is required to drive the BOG compressors; one of the new auxiliary boilers will be fired and the second boiler will be used as standby.
- When inclement weather is forecast the FSU will prepare to move away from the jetty on to the Storm Mooring System .This planned disconnection event will require the auxiliary boilers to be fired to provide BOG management while the FSU is disconnected from shore. The FSU needs four to six hours to pressurise the boilers, which coincides with the amount of time needed to stop cargo, inert, warm up and disconnect the fixed arm / send out BOG hoses & utility lines.
- If the storm mooring system is not available or there is another safety reason requiring the FSU to leave the harbour, the boilers shall be fired up The FSU will then be disconnected from the jetty, tugged out of the harbour and on to its anchoring location.
- During this disconnection event (estimated three times a year for four days each occurrence) both of the two auxiliary boilers will be fired.

Process Description

LNG is transferred from the LNG cargo carriers to the new FSU through the ship-to-ship transfer system, which will consist of a series of flexible hoses. The FSU is a permanently moored converted LNG carrier, originally named Wakabu Maru IMO No. 8125868 with dimensions 283m x 44.8 m. During the conversion process from an LNGC to an FSU the vessel is being renamed Armada LNG Mediterrana, with the same IMO number The FSU will be re-certified by Class through Bureau Veritas (BV) and have Malta Flag State

The FSU has a gross storage capacity of 125,877 m^3. The LNG containment system consists of five independent insulated Moss type tanks made of aluminium alloy and designed for operating at cryogenic temperatures. There is a secondary barrier designed for holding maximum envisaged potential leakage from the tanks. The design of the spherical tanks presents a high degree of protection against failure or fracture during the operational lifetime of the FSU.

It is foreseen that the FSU will be re-filled every circa six to eight weeks over two 24hour periods by an LNG Carrier resulting in an estimated 13 to 18 ship-to-ship LNG transfer operation per year. The reason for the two STS transfer activities per load is that the FSU and majority of compactible LNGCs will be of a similar size, and since the FSU is the sole source of LNG storage it will not be allowed to 'run dry'. Thus LNGC will initially off-load the majority of the cargo over a 20 to 24 hour period, she will then de-moor, leave the harbour and wait out to sea whilst sufficient LNG is converted to NG, burnt in the respective power plants and there is sufficient available storage capacity available in the FSU to take the rest of the LNGC cargo. The turn-around time for the double loading of LNGC is expected to be in the region of five days.

Since LNG is stored at cryogenic temperatures (circa-165 °C), it is unavoidable that some of the LNG will evaporate during normal operations. This boil-off gas (BOG) during normal operations is transferred in freeflow to shore via two BOG flexible hoses which connect to the jetty manifold. During ship to ship (STS) operations some of this BOG is used as displacement vapour and returned to the LNGC. To do this the pressure of the BOG is elevated using steam driven BOG compressors. The steam to drive the BOG compressors is produced from one of the two newly installed ancillary boilers (, each rated at 16.25 MWth and providing 2 x 100% coverage. The auxiliary boilers will only be operational during STS transfer events or an inclement weather disconnection event, refer to operational mode scenarios at the end of this section.

During a STS transfer event the visiting LNG carrier will typically keep its engines at low loads just sufficient to produce enough power generation to fulfil the electric loads required for the ship-to-ship transfer and other "hotel" loads. The technology of the propulsion and power generation system within the visiting cargo vessel will vary from vessel to vessel.

In addition to storage of LNG, for operational purposes the following will also be stored on the FSU: Diesel; Lube oil; Treated effluent from the WTP and grey water from the accommodation block;

Nitrogen; Solid Waste; Oily Waste, small quantities of boiler feedwater chemicals (Sodium Phosphate), oxygen scavengers and chlorine tablets for the WTP.

The jetty provides safe berthing for the FSU and also for the LNG supply carriers in a ship to ship mooring configuration with the FSU. The mooring system comprises of eight mooring dolphins, four fore and four aft and three berthing dolphins. The jetty and access arm comprised of a concrete platform supported on steel piles. The jetty will support the LNG unloading arm, the manifold for the BOG hose connections, the FSU access gangway, the FSU supply crane, fire protection system, associated ancillary equipment and LNG and BOG supply pipework feeding the onshore regasification plant. For a typical FSU berthing arrangement refer to the drawing ENEM-URS-FS-00-DR-ME-00052.

The FSU will have a ship to shore power feed which will be utilised during normal operations. It will also include an emergence diesel generator, a backup service diesel generator, 2400m^3 diesel storage tank, a 140 Nm^3/day nitrogen production plant, auxiliary steam boilers to supply stream to the cargo handling plant during ship to ship transfers, production and treatment of sewage and production of grey water at a rate of 14m^3/week and consequent storage of treated effluent and grey water (maximum storage capacity of 2100m^3), lube oil storage drums (circa 50 x 100 litres), small amounts of sodium phosphate powder chemicals for the feed water auxiliary boiler, oily waste and solid domestic on board waste generated at 126 m^3/week. The WTP excess sludge generated shall be disposed every three months via the discharge pump. During this activity, around 1.5m^3 of sludge/water from the aeriation compartment will be discharge into the holding tank and discharge into a certified barge.

The existing emergency diesel generator is to be retained and is rated at 150kW, this will power emergence systems only in the event of simultaneous failure of both shore and ship power. This EDG will not be in use during normal operation of the FSU

A new auxiliary backup service diesel generator will be installed, rated at 1.9MWe, which will be used as back up to the shore power, or during a disconnection event. This auxiliary diesel generator (ADG) will not operate during normal operation of the FSU. The ADG is only planned to operate during a storm mooring scenarios, which is anticipated to occur three times a year. Each event is expected to be two or three days. Once moored away from the jetty the stable power requirement is about 850kW resulting in a low utilisation of this ADG. There will also be the existing diesel genset rated at 1.2MWe which will be kept as a spare.

The FSU will have its means of propulsion disabled and will be for the most part be permanently moored to the jetty. However in the event that the weather conditions are such that the sea state is forecasted to produce mooring loads in excess of those that the FSU and jetty can accommodate there is an off-jetty storm mooring system onto which the FSU can winch itself and thus ride out the inclement weather without leaving the harbour. Refer to 21023-BAE-79430-MO-DW-0003 anchor pattern diagram attached.

Class certification of the FSU will be for no dry docking within the 18 years of operation; for this 18 years no dry docking the hull will be periodically inspected and cleaned as required by Class. The Class requirement is for a hull inspection every 30 months, however this will be reduced such that initially the hull will be inspected every six months in order to assess the rate of marine growth to set the future inspection regime. The marine growth will be removed as required using soft nylon brushes in order so as not to damage the paint coating. Detailed MSDS and TBT-free certification for the paint coating is included in section B020201. After the voyage from Singapore the FSU will arrive clean and the hull cleaning process will be developed further during the initial operating period such that the 'In Water Survey Manual' will be developed and agreed with Class and ERA prior to the first six monthly inspection, and with the relevant EPA permits in place.

FSU OPERATIONAL MODES

Mode	Operating scenario	Airbone emission source (Gross heat input MWth)	Max. annual operating hr.
1	FSU arrival in harbour	2 x FSU Main Boilers (58.5MWth each)	N/A
2	Normal operation only ship-to-shore LNG transfer	Delimara 4 (3x144MWth) 3xNVCC pilot flares (18kWth each)	8059
3	Ship-to-ship LNG transfer	Delimara 4 (3x144MWth) 1xFSU aux Boilers (16.25MWth) 3xNVCC pilot flares (18kWth each)	530
4	Storm FSU disconnection	2xFSU Aux. boilers (16.25MWth each) FSU Service Diesel gen-set (5MWth) 3xNVCC pilot flares (18kWth each)	120
5	Emergency shut down	Delimara 4 CCGT (2.6MWth) Regas plant EDG (0.54MWth) FSU existing EDG(0.48MWth)	12*
		NVCC main flare at full load (226MWth)*	0*
		FSU Spare existing emergency diesel genset (3.2MWth) To be used if all other FSU gensets and ship to shore power connection fails	4*

* These hours are for testing purposes only.
** The use of the NVCC is discussed later in this section

FSU SERVICE TANKS

- Potable and firefighting water storage tanks
- 2100 m^3 treated effluent and grey water holding tank.

- 5x LNG FSU storage tanks, 125,000m^3
- 23 m3 liquid N_2 buffer tank.
- Instrument and service air buffer tanks.
- 2400 m^3 existing main diesel fuel tank.
- 3.8m^3 new service diesel gen-set tank.
- Service diesel gen-set lube oil tank 432litres.
- Clean lube oil storage drums, 50x200litres.
- Lube oil sump tank 24.8m^3
- Waste lube oil tank 1m^3
- Boiler feedwater chemistry tanks

The majority of these tanks have secondary bunding via the hull of the vessel, the grey water and diesel tanks have the vessel hull as their secure primary bund. None of them have a discharge to sea. Further information about the whole of the LNG Storage Facility is presented in section B020201 and specific further information regarding storage tanks and their bund capacities is presented in Section B0203.

REGASIFIACTION FACILITY PROCESS DESCRIPTION

A schematic process diagram for the LNG unloading and regasification systems is presented in drawing ENEM-URS-FS-00-DR-ME-00050. The LNG is stored in the FSU tanks and is transferred to the regasification compound to meet the fuel demand required by the two power plants through the unloading system where it is converted back to Natural Gas for use in the respective power plants, at a delivery pressure of 37barg for the CCGT and 7barg for Delimara 3. Since LNG is stored at cryogenic temperatures (circa-165 °C), it is unavoidable that some of the LNG will evaporate during normal operations. This boil-off gas (BOG) is recovered, transferred to shore, compressed and conditioned to operational pressures for use in the new CCGT and Delimara3. BOG is continually produced and as a result pressure could build up within the BOG system in the unlikely event that it cannot be consumed due to an emergency shut-down of both power plants. For safety reasons the BOG that cannot be used needs to be released from the lines so as to avoid over pressurization of the vapour lines and thus an emergency non visible combustion chamber (NVCC) ground flare system is installed for use in these emergency situations only.

The regasification process utilises Intermediate Fluid Vaporisation (IFV) technology and includes two trains (2x100%) rated at 75,840Nm^3/h each with a turndown capability of 5%. This turndown capability provides operational flexibility by adapting the natural gas production to the demand of the two power stations. The heat necessary for the evaporation of the LNG is transferred from the CCGT plant, with top-up from a seawater heat exchanger as required via a propane and water/glycol close cycle systems. The intermediate propane closed cycle avoids potential freezing of the water/glycol solution at all operating scenarios. The propane and water glycol loops are closed cycle systems, with only a minimum amount of losses expected throughout the operational lifetime.

The water/glycol loop transfers heat from the air intake of CCGT for use in the regasification process of the LNG and in return transfers the cooling from this regasification process to the CCGT air intake to improve the efficiency of the CCGT, it is a highly efficient way of using the heating and cooling from the two processes for the benefit of the other.

The first fill of the water glycol solution will be through a plastic water/glycol mixing tank of 10.0 m^3 volume, and is proposed to be a temporary installation, only to be used for first filling of the WG system as well as any subsequent re-filling expected on a five yearly basis. This will not be permanently bunded but will include a temporary bunded area capable of containing 10m^3 of leakage.

Propane leaks form the IFV are not expected with the proposed technology since the Propane is contained in a fully welded closed container. The natural gas resultant of the regasification is clean with a high content of methane and suitable for use in both Delimara3 and the new CCGT.

A Natural Gas odorization plant is not included in this installation as the Natural Gas is to be used for power generation only and will not be transferred to a natural gas distribution pipeline to final natural gas consumers.

All areas that have a potential for oil contamination risk, such as the transformer area and emergency diesel generator area, will have a complete sealed secondary containment from which any oil spillage will be removed via mobile equipment, thus there is no requirement for an oil interceptor within the regas compound. Refer to the table at the end of this section for details of oil stored and associated bunded volumes.

In additional to supplying NG to the two power plants, the regasification plant and the CCGT plant will also have connections to the existing facilities for the following services;

- Demin Water
- Cooling Water inlet
- Fire fighting (fresh water and sea water)
- Potable water
- HV, MV and LV electrical supplies

Refer to drawing ENEM-URS-E0-00-DR-ME-00106 for a list and location of these interface points.

REGASIFICATION FACILITY SERVICE TANKS:

- 5m^3 LNG suction tank – bunded and ‘drained’ into LNG impounding basin
- 10m^3 glycol water solution tank – temporary during first fill and subsequent fiver yearly changes. This will also include a temporary bund with bund volume greater than 11m^3 (110% of stored volume).
- Service N_2 tank, no bunding required
- 1.1 m^3 diesel storage tank for emergency generator
- 1.9 m^3 diesel storage tank for firefighting back up diesel pump.

- Potable water tank, no bunding required
- Fire-fighting system bladder and foam tank not bunded.
- Oil filled transformers, fully bunded.

Table of tank size and bunded volumes

Ref	Equipment	Volume (m^3)	Total bunded area volume constructed (m^3)
1	Transformer 12BBT10 oil tank	3.6	20.3
2	Transformer 12BFT10 oil tank	0.9	8.2
3	Transformer 12BFT20 oil tank	0.9	8.2
4	Transformer 12BFT30 oil tank	0.45	8
5	Transformer 12BFT40 oil tank	0.45	8
6	Diesel oil tank for fire pump	1.87	2.42
7	Emergency diesel generator	1.1	6.3
8	LNG suction drum + LNG pipeline	12.4	15
8	WG filling tank Temporary during first fill)	10	11

Further information about the regasification plant is presented in section B020201.

CCGT POWER PLANT PROCESS DESCRIPTION

A schematic process flow diagram for the CCGT power plant is included in ENEM-URS-FS-00-DR-ME-00051. The power plant includes three state-of-the-art Siemens SGT-800 gas turbine-generators optimized for combined cycle applications to have high efficiency and considerable high energy exhaust. The Gas Turbines (GTs) will be installed within an acoustic enclosure for noise and heat attenuation. The power plant net guaranteed power output will be 205MW with a net electrical efficiency of 54% at reference weather conditions. CCGT performance tests based on ISO 2314 shall be conducted after the commissioning of the power plant in order to verify these performance guarantees.

The working principle is common to any other state-of-the-art CCGT. Air is sucked, cooled and filtered in the combustion air intake system. This system incorporates a silencer for noise attenuation. The Natural Gas from the regasification plant is filtered from entrained pipework particles and liquid droplets and the pressure and temperature conditioned in the CCGT gas receiving station. The compressed air from the intake flows to the annular-type dry low emissions (DLE) burners where the Natural Gas is injected and mixed with the air, and the combustion process is developed. The DLE technology guarantees compliance with EU directive 2010/75/EU and the Maltese LN 11/2013 without the necessity of using any post-combustion emission abatement technology. The combustion gases are finally expanded in the GT expander generating mechanical shaft work which is in turn converted into electricity via the GT generator.

Three 30 meter high by-pass stacks are included. Flue gases will be released from the gas turbines directly to the atmosphere via the by-pass stacks during open cycle operation. This operating mode adds operational flexibility to the power plant and allows availability of around two-thirds of the total net rated power production in a short timeframe to support the commissioning activities and some partload dispatch requirements. The gas turbines will operate in open cycle mode while the steam cycle of the CCGT is being commissioned. However the plant is design for base load operations at close to maximum output of the full combined cycle operation, thus it is envisaged that the bypass stacks will rarely be utilised after commencement of full CCGT commercial operations. Emission concentrations from the bypass stacks when operating in open cycle mode will not vary from those expected in combined cycle mode, with the exception that the temperature will be higher and thus the emissions more buoyant. It should be noted that the Gas Turbines meet emission requirements between 70% to 100% of their maximum load and thus apart from start ups and shut downs each Gas Turbines will not be operated below 70% of its open cycle load and thus in order to be fully flexible and to meet all dispatch requirements (above the minimum of 70% of one GT in open cycle), various combinations of operating 1 to 3 GTs in open cycle and 1 to 3 GTs in combined cycle have been considered. For further details of these operating modes refer to section B020202.

Cooling water emissions during open cycle will also be reduced from a maximum of 17,260 m^3/h during combined cycle operations to 1,760 m^3/h during open cycle operations.

In combined cycle operation, once the flue gases are expanded in the GTs, they are diverted to the three HRSGs where a considerable share of this flue gas heat energy is recovered by producing superheated steam at two different pressure levels. This steam is routed to and expanded in the new SST-900 steam turbine (ST) and additional electricity is produced via the ST generator. The ST steam outlet is finally condensed by a once-through seawater cooling system, closing the Rankine steam cycle. The flue gases are then discharged through the main stacks at a high enough temperature to disperse in compliance with the Regulation 3 of LN 11 of 2013 (IED) and LN 478 of 2010. The flue gases will be discharged to the atmosphere at around 95°C with a velocity of 17.5m/s. The results from the air dispersion modelling are included in an Appendix of the Environmental

Impact Statement (EIS) and updated in the latest Environmental Coordinators statement to the updated Development permit. The three main stacks are 75m high and incorporate a silencer.

It should be noted that the Gas Turbines meet emission requirements between 70% to 100% of their maximum load and thus apart from start ups and shut downs each Gas Turbines will not be operated below 70% of its open cycle load and thus in order to be fully flexible and to meet all dispatch requirements (above the minimum of 70% of one GT in open cycle), various combinations of operating 1 to 3 GTs in open cycle and 1 to 3 GTs in combined cycle have been considered. For further details of these operating modes refer to section B020202.

An automatic Continuous Emissions Monitoring System (CEMS) complying with ISO 14956, EN 14181 and EN 15267 shall be installed to monitor and log stack emissions from the proposed plant. Sampling probes will be installed in both main and bypass stacks. The monitoring system will be switchover between the two depending on the actual operating scenarios. Both will be fully calibrated. The quality assurance level 1 (QAL1) CEMS equipment certification is included as part of this submission and the QAL2 validation certificate will be issued after commissioning of the works.

Blow down water from these HRSGs will be collected, treated and discharged with the seawater cooling water system via the existing DPS CW outfall.

In the future should additional abatement equipment need to be installed then space in the HRSG has been allow for the future retrofitting of a Selective Catalytic Reduction (SCR) system, as further detailed in section B20204/B.

The CCGT using demin water from the existing facility to supply the boiler feed water system. The quality of this demin water is not guaranteed to be sufficient for the CCGT plants use and as such a demin water polishing plant is to be installed. It will consist of activated carbon and mixed media filters to extract parts of copper, iron, silica, organic substances and free irons should it be required. Any effluent (backwash etc) will be routed to the neutralisation tank prior to discharge. It is expected that the activated carbon and mixed media filter media will need to be replaced every three to five years. Refer to section B3.1.1 for further details.

The waste management area for the CCGT will be located to the South of the plant on the southern side of the monument road as shown on drawing ENEM-URS-E0-00-DR-ME-00068. This will be a concrete slabbed area, fully bunded with a drainage connection to the CCGT oily drainage system which will be treated via the new oil separator within the CCGT site.

The CCGT plant will also have connections to the existing facilities for the following services;

- Demin Water
- Cooling Water inlet
- Fire fighting (fresh water and sea water)
- Potable water
- HV, MV and LV electrical supplies

Refer to drawing ENEM-URS-E0-00-DR-ME-00106 for a list and location of these interface points

CCGT SERVICE TANKS:

- Atmospheric blow-down water tank (feeds into the neutralisation tank)
- Atmospheric drain water tank (feeds into the neutralisation tanks).
- Integrated de-aerator feed-water tank
- Demineralized make-up water tank
- Potable water tank
- Service and instrument air tank
- 16 m^3 lube oil tank
- 2x80l compressor washing tank
- Compressor wash down tank
- 2m^3 blackout Diesel storage tank
- Oil cooled transformers.
- Neutralisation tank, 23m^3

There are two dosing package skids which serve the tanks included above; the dosing package for the HRSG make up water (refer to item 2 on drawing ENEM-URS-FS-00-DR-ME-00066) and the dosing skid for the neutralisation tank (refer to item 3 on drawing ENEM-URS-FS-00-DR-ME-00066)

CCGT bunded tanks inventory

Ref	Equipment	Volume (m^3)	Total bunded volume (m^3)
1	Phosphate tank	0.5	1.09
2	Ammonia Tank	0.5	0.55
3	EDG Diesel Tank	2	No bunded area as the tank is double walled
4	GT Lube Oil Tanks	12	3 x 16.2
5	ST Lube Oil Tank	5.7	25.1
6	Main Transformer 1	25.9	135
7	Main Transformer 2	40	165
8	Main transformer 3	23	160
9	Station Transformers 1	6	50

10	Station Transformer 2	6	50
11	HCl tank	1	1.1
12	NaOH	0.125	0.21
13	Corrosion inhibitor for closed cooling water	0.035	0.035

The following table B1.2 summarises the emissions from the above the installations described above with specific reference to the proposed facilities and their associated activities as listed in section B1.1

<table>
<tr><th colspan="3">TABLE B1.2 Summary of the emissions from the facility and associated activities as listing in section B1.1</th></tr>
<tr><th>· Item No.</th><th>· Installations</th><th>· Activities relating to IPPC permit</th></tr>
<tr><td>1</td><td>New LNG system comprising a new FSU, Jetty and other auxiliary systems</td><td>The FSU comprises five moss-type LNG tanks totalling an LNG net storage capacity of 125,000 m^3. Tank refilling shall be regularly programmed so as to meet the downstream regasification compound demands without compromising availability of the whole complex, predicted to be every four to six weeks. During the ship to ship unloading of LNG auxiliary gas boilers on the FSU will be utilised to provide steam to the cargo handling equipment.</td></tr>
<tr><td>2</td><td>New regasification compound comprising LNG evaporators, BOG compression system, emergency shutdown (ESD), purging nitrogen system and supporting auxiliary systems.</td><td>The new regasification compound shall be designed to cater for Delimara3 and the new CCGT Natural Gas (NG) maximum consumption plus an operational margin, 75,840Nm^3/h. At MCR conditions, the total estimated volumetric flow rate is around 61,000 Nm^3/h. The system has turndown capability of up to 5% of the MCR NG flow rate.</td></tr>
<tr><td>3</td><td>New CCGT power plant comprising 3xGTGs/HRSGs plus one ST in multi-shaft configuration</td><td>
<table>
<tr><th>Flue gas release point</th><th>Source</th><th>Gross NG (HHV) Heat Power intake at MCR</th><th>UTM coordinates of stacks</th></tr>
<tr><td>Main Stack 1</td><td>GT 1</td><td>144 MWth</td><td>E=459764.81; N= 3965808.50</td></tr>
<tr><td>Bypass stack 1</td><td>GT1</td><td>144 MWth</td><td>E=459753.82; N= 3965823.29</td></tr>
<tr><td>Main Stack 2</td><td>GT 2</td><td>144 MWth</td><td>E=459750.96; N=3965798.51</td></tr>
<tr><td>Bypass stack 2</td><td>GT2</td><td>144 MWth</td><td>E=459739.98; N=3965813.33</td></tr>
<tr><td>Main Stack 3</td><td>GT 3</td><td>144 MWth</td><td>E=459737.29; N=3965788.49</td></tr>
<tr><td>Bypass stack 3</td><td>GT 3</td><td>144 MWth</td><td>E=459726.41; N=3965803.37</td></tr>
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Item No.	Installations	Activities relating to IPPC permit
5	Associated activities of fuel handling and storage in the FSU	The FSU shall include a ship-to-ship LNG transfer system for offloading activities. The LNG shall be stored in the five moss-type tanks and transferred when demanded to the onshore suction tank through the ship-to-shore LNG transfer unit. BOG shall be transferred from the top of the spherical tanks and will be routed to the BOG compression system through a dedicated BOG line. There will be a back-up diesel storage tank feeding the diesel generator for emergency electricity generation when shore-to-ship power supply is interrupted.
6	Associated activities of fuel handling and storage in Regasification compound	A new suction drum will store the LNG coming from the FSU and will separate natural gas vapour phase (BOG) from liquid phase. The vapour will be recovered and sent to the BOG compression system. The volume of the new suction drum will be approximately 7.5m^3. Two knockout drums with an approximate volume of 20m^3 and 12 m^3 will be included. The smaller one shall be installed upstream of the BOG compression system. The other 20 m^3 drum will be installed upstream of the non-visible combustion chamber system which provides over-pressure protection to the LNG compound and associated piping. Any possible drain or droplet entrained from the different BOG transfer lines will be separated within these drums. The operating principle is based on the difference of gravitational force exerted on a gas and liquid which causes the liquid droplets of the incoming stream to settle to the bottom of the vessel. No emissions are expected in these drums. A 1.1m^3 diesel oil storage tank to feed the Emergency Diesel Generator will be included to supply power to the LNG regasification plant electric loads in case the main electric supply is interrupted. A diesel oil storage tank of approximately 1.9m^3 will be included as a back-up fire-fighting system to feed the back-up diesel oil fire-fighting pump in compliance with NFPA20 requirements. All diesel tanks shall be bunded for secondary containment.

· Item No.	· Installations	· Activities relating to IPPC permit
7	Associated activities of fuel handling and storage in the CCGT	Natural Gas from the regasification compound is routed to the CCGT. The CCGT includes a gas receiving station where the Natural Gas stream is conditioned and preheated before being sent to the GTs. A 2m^3 diesel tank will be included within the CCGT area (Zone A). This shall feed a new standby diesel generator which shall supply power to the low voltage switchgear in case of an interruption of the regular supply line occurs. The diesel generator supplies power to safely shut down the plant and to prioritise loads for keeping the plant in a non-operational standby condition ready to start when the grid voltage returns.
8	Other associated activities of fuel handling and storage	A new gas reduction station (GRS) shall be included in the defined area C (See drawing 47067567-1018). The Natural Gas routed from the regasification compound shall be filtered, conditioned and preheated before supplying the Delimara 3 power station. The Natural Gas filters in the D3 gas receiving station will be multi-cyclone coalescing type filters. Minimal particle waste is expected from these filters due to the relatively clean form of NG that the LNG process produces
9	Associated activity of storage, treatment and disposal/ recycling of waste materials	Any waste generated in any of the facilities shall be collected, sorted and, where possible recycled, or treated and disposed. A waste management plan will be compiled as part of the site-wide HSE management system. Waste water and sewage water from the FSU will be collected in tanks and periodically pumped to barge for appropriate disposal on land. Domestic sewage water generated in the FSU will be treated in the on-board wastewater treatment plant. Once treated and disinfected the treated effluent will be collected in the FSU holding tank. Grey water generated in the FSU from sinks, showers and washing machines will be collected in the holding tank too. The WTP sludge will be recirculated within the treatment process, every five year a minimal amount of sludge, circa 6 litres, will be containerised and disposed of via barge. Oily water will be segregated from rain water runoff and treated via an oil separator before being discharged off site. Washing water used for servicing activities will be treated before disposal. Boiler Blow-down water and other clean water drains within the CCGT will be collected to a neutralisation pit and treated as required prior to discharge via the existing DPS CW outlet. Foul water from the CCGT will be discharged into the existing DPS foul water pumping station which currently discharges to the local public sewer.

Item No.	Installations	Activities relating to IPPC permit
10	Maintenance activities description	A detailed maintenance program shall be established for these LNG to power facilities. Some additional solid and liquid wastes may be generated during these maintenance activities. These shall be handled and treated in accordance with EU legislation and will be included in the site HSE management procedures.
11	Emissions to air – Particulate matter emissions (PM)	Negligible or no PM emission is expected from the new facilities.
12	Emissions to air – Sulphur oxides (SOx) emissions	Minimal SOx emissions are expected as Natural Gas from the regasification process has a low sulphur content Most of the sulphur contained in the NG prior to liquefaction is removed in a gas treatment plant via a gas purification processes. The Sulphur removal efficiency of these processes, although high, doesn't achieve 100%. That is why the LNG could contain traces of sulphur presented as H_2S and CO_2. These compounds are completely oxidized in the GT combustion chambers to SOx. The concentration of total sulphur in the Natural Gas shall always be lower than 30mg/Nm^3 and will on average not be greater than 5mg/Nm^3. This sulphur content is then highly diluted with air in the GTs combustion chambers so that so that the concentration of sulphur in flue gases at the stacks, based on the maximum value above, shall always be lower than 10 mg/Nm^3 at 15% O_2 (dry basis). This value is in line with European Best available technique (BAT) recommendations for gas fire power plants and no further technical measures for abatement of SOx are required. Refer to BAT comparison section B020204.
13	Emissions to air – Nitrogen oxides (NOx) emissions	The emission level for NOx will be ≤30 mg/Nm^3 at 15% vol. O_2 dg (BAT reference emission values are included in section B2.2.4 for information). This value will be only guaranteed for 70-100% GT load operating range. At lower loads than 70% the NOx emissions can reach values of 90 mg/Nm^3 at 15% vol O_2.
14	Emissions to Air – Release of CO_2	The emission level for CO will be <100mg/Nm^3 at 15% vol O_2 dg (BAT reference emission values are included in section B020204 of this submission). This value will only be guaranteed for 70 to 100% GT load operating range. No THC nor VOC emissions are expected at normal operating conditions. It is expected the this CO emission level will not in any case increase at loads lower than 70%

· Item No.	· Installations	· Activities relating to IPPC permit
15	Emissions to marine water	Chemical dosing of the main cooling water system to reduce biological grow within the condenser tube bundles shall be carried out by Enemalta, cooling water for the new CCGT will be extracted downstream of the existing dosing regime, no additional storage of chemicals for CW dosing will be required. Seawater Thermal Discharge: The CCGT condenser is designed so that the discharge water temperature difference with respect to the seawater inlet never exceeds 8 degC. The same design requirements are adopted in the auxiliary cooling seawater system. Periodic monitoring of the discharge will be carried out prior to mixing within the Enemalta seal weir. During operation of the FSU boilers cooling water will be used for once through cooling of these boilers. No chemicals will be used to treat this water and the subsequent discharge will never exceed inlet plus 8 degC. Minimal amount of boiler blowdown will also be discharged to marine water from the FSU main boilers on entering the harbour prior to the boilers being decommissioned. During operations the boiler blow down from the auxiliary boilers will discharge into the bilge water for disposal via barge.t