PROJECT DESCRIPTION STATEMENT

INSTALLATION AND COMMISSIONING OF A BATTERY ENERGY STORAGE SYSTEM (BESS) AT THE A-STATION TUNNEL IN MARSA

1	First Revision	RS	JV	ID	June 2023
0	First Issue	RS	JV	ID	May 2023
Rev.	**Description**	**Prepared**	**Checked**	**Approved**	**Date**

INTERCONNECT MALTA

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1.0 General Introduction

This document is being compiled by Interconnect Malta Co. Ltd. (the Applicant) being the organisation tasked with implementing the Battery Energy Storage System within the underground tunnels of the former Marsa A Power Station (the A Station) in collaboration with Enemalta plc and International Energy Services Centre (IESC).

This Project Description Statement (PDS) is a detailed document requested by the Environmental Resources Authority (ERA) to provide the necessary information for screening in the Environmental Impact Assessment (EIA) process and is aimed at describing the scheme, the site of the development and its surroundings and planned activities during the construction and operational phases of the development. It also indicates the main expected environmental impacts.

1.1 Definitions and Abbreviations**

a.c.	Alternating Current
d.c.	Direct Current
DC	Distribution Centre
HVAC	High voltage alternating current
EU	European Union
IC1	Malta – Sicily Electrical Interconnector No.1 (Also known as 'MASI')
IC2	Malta – Sicily Electrical Interconnector No.2
ICM	Interconnect Malta Co. Ltd.
IESC	International Energy Services Centre
IEC	International Electro-Technical Commission
MW	MegaWatt
MWh	MegaWatt Hour
OCGT	Open Cycle Gas Turbine
S.L.	Subsidiary Legislation
TM	Transport Malta

1.2 Contents of the Project Description Statement

This Project Description Statement is being compiled in line with Regulation 12 and Schedule II of the Environmental Impact Assessment Regulations 2007 (S.L.549.46). The document describes the proposed scheme, the objectives of the scheme, the site characteristics and its surroundings, potential impacts and mitigation measures, indicative duration for the implementation of the scheme, alternatives considered in terms of technology and locations, indication of the existing services on site, number of employees in the scheme's different phases.

1.3 Details of the Applicant Proposing Scheme

The proposed scheme is being presented by InterConnect Malta Ltd (ICM), a 100% government owned company that falls under the responsibility of the Ministry for the Environment, Energy and Enterprise.

The company was originally established as Melita TransGas Co Ltd in 2018 and changed its name to Interconnect Malta Ltd on the 4th of August 2021.

ICM has been entrusted by the Maltese Government to develop and implement energy infrastructure projects for increasing the island's electricity interconnectivity, increasing the island's renewable energy potential and ending Malta's isolation from the European gas network:

- 2nd Electricity HVAC Cable link from Malta to Sicily
- Melita TransGas hydrogen-ready Pipeline – Project of Common Interest
- Concession for an Offshore Renewable Energy Supply

Additionally, ICM is being tasked with the responsibility of implementing other projects and schemes including, but not limited to, Battery Energy Storage Systems (BESSs) connected to the Maltese National electric grid network (the Project).

1.4 Funding

In order to implement this specific Battery Energy Storage System, the Project shall be assisted with EU funding from the Recovery and Resiliency Fund ("RRF"). The Project needs to be commissioned by 2026 in order to be eligible for these funds.

2.0 Description of the Project and its General Objectives

Malta, an EU member since 2004, is an island state in the Mediterranean Sea and lies 93km south of Sicily, 288km east of Tunisia and 300km north of Libya. Malta derives its supply of electricity from local generating plant, from local renewable energy sources and from a 200MW electrical submarine interconnection (IC1) with the Terna grid in Sicily, Italy, operated by Enemalta plc, the Maltese Distribution System Operator (DSO).

Local conventional generating plant in Malta is almost entirely based in Delimara Power Station. The base generating plant with an output of approximately 363MW is fuelled by natural gas. The emergency units have an output of approximately 180 MW and operate with diesel fuel.

The renewable sector is based almost entirely on PV systems where the current peak output has reached 224 MW. Currently, there is only one electrical interconnection (IC1) with another country (Italy) and the nominal capacity is 200MW. In 2017, Malta has also introduced natural gas as the main fuel for electricity generation through an LNG Floating Storage Unit and an onshore regasification unit. The introduction of natural gas in Malta in 2017 and the interconnection in 2015 have contributed to a significant lowering in emissions, and the interconnector has facilitated the integration of high proportions of RES generation and provided continuous supply in case of local generating plant failure.

Following the European Parliament elections in 2019, the European Union strengthened its policy towards limiting climate change caused by anthropogenic activities as detailed in the European Green Deal. Priority has now been shifted in achieving carbon emission neutrality by 2050.

Malta is experiencing a high increase in electricity demand, meaning that a new source of power is needed. The decision was taken by the Government of Malta to lay a second electrical interconnector (IC2) between Malta and Sicily to cater for this increased electrical demand particularly due to economic progress as well as the electrification of road transport.

Additionally, this second interconnection is also aimed at providing a means for Malta to attract more renewable energy by improving the connection to a large stable grid thus offsetting the instability caused by the intermittencies of large amounts of renewable electricity generated from solar or wind farms.

To ensure that offshore renewable energy can help the EU reach the ambitious energy and climate targets for 2030 and 2050, the European Commission published a dedicated EU strategy on offshore renewable energy (COM(2020)741) on 19 November 2020 which proposes concrete ways forward to support the long-term sustainable development of this sector. The Offshore Renewable Energy Strategy highlights the need to reach at least 300 GW of offshore wind and 40 GW of ocean energy by 2050 in the EU as a key means to reach climate neutrality, providing a major opportunity to ramp up renewables, develop a resilient industrial base in the whole EU and creating quality jobs, benefiting both coastal and landlocked Member States.

As part of Malta's forward outlook and ambition in increasing the share of renewable energy, the Maltese Government is also focusing on the development of its offshore (floating) renewable potential. This is being done with a view of establishing the necessary administrative and regulatory frameworks, which will enable the future deployment of larger-scale projects.

In parallel, pursuant to article 14(1) of the TEN-E Regulation (EU) 2022/869, in January 2021, Malta has entered into a non-binding agreement on goals for offshore renewable generation in 2050 for 400MW capacity, with intermediate steps in 2040 and 2030 of 400MW and 50MW respectively, within the priority offshore grid corridor South and West offshore grids. The Low Carbon Development Strategy also highlights offshore renewable energy as one of the strategies to enable Malta to reach its environmental targets towards achieving carbon neutrality by 2050 and has since been studying offshore areas that can be dedicated to offshore renewables.

In tandem with the interconnection project and in order to strengthen and widen the electricity distribution network, enhance the resilience of the grid, reduce grid bottlenecks and handle wider intermittence from RES, Malta is looking at Battery Energy Storage Systems ('BESS') to complement the Interconnector 2 Project in order to accelerate the penetration of more RES.

BESS presents an important potential contribution for Malta to achieve its EU decarbonisation commitments. The Project will help manage the intermittency associated with renewable energy generation, thereby facilitating further development of renewable energy production capacity, helping the country to meet international commitments in this regard and reducing its dependence on imported fossil fuels for electricity generation as it will provide a way how to capture energy from RES during low demand and use it during peaks, displacing the utilisation of CO2 emitting gas engines during peak hours. BESS will also contribute to more efficient grid balancing and black-start capability, which is an essential process that ensures a stable and reliable electricity supply to meet consumer demand. In fact, grid-scale Energy Storage Systems feature in the Malta Low Carbon Development Strategy (June 2021)[1] and Malta's 2030 National Energy and Climate Plan (December 2019)[2].

2.1 General Objectives and Justification for the Development

The overall objectives and purpose of the Battery Energy Storage Systems at the underground tunnels of the A-Station are to:

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[1] Malta Low Carbon Development Strategy, June 2021, available at: https://meae.gov.mt/en/Public_Consultations/MECP/PublishingImages/Pages/Consultations/MaltasLowCarbonDevelopmentStrategy/Malta%20Low%20Carbon%20Development%20Strategy.pdf

[2] Malta's 2030 National Energy and Climate Plan, December 2019, available at: https://energy.ec.europa.eu/system/files/2020-01/mt_final_necp_main_en_0.pdf

a) Provide a source of secure supply in cases of plant outages in order to enhance the grid's resilience and balancing the distribution grid.

b) Store energy generated by renewables during hours of maximum delivery and use that during peaks, thus flattening the variance between day and evening on conventional generation plant output. This in turn is expected to increase the efficiency of the conventional plant in operation and thus reduce its emissions as excess RES generated will be stored and then used to displace the starting up/ramping up of CO_2 emitting plants.

c) Reduce the effect of the variability and intermittency caused by renewables, in periods of variable cloud cover or variable winds, and thus permit the operation of conventional plant in a more stable manner, with inherent gains in plant reliability, plant emissions, and CO_2 emission savings, thus enabling the ingress of further RES power generation thereby reducing the use of fossil fuel for electricity generation. Limited interconnectivity, lack of battery storage and restrictions in the local distribution system, are all currently considered major bottlenecks for the country to accelerate the penetration of RES (both onshore and offshore) due to its inherent intermittency.

d) Provide black start facility and support for the emergency open cycle gas turbine at the former Marsa power station during re-energisation of the 33kV network connected to Marsa North distribution centre.

e) Address grid bottlenecks to accelerate the penetration of RES and offer solutions to alleviate congestion in the distribution network.

f) Provide fast frequency and voltage stabilisation to the Maltese grid in case Malta is isolated from the Entso-e grid because of maintenance or faults.

One of the targets of REPowerEU aims on strengthening and widening the electricity distribution network, through investments in the grid, distribution services and battery storage.

3.0 The Site of the Project Scheme and Surroundings

3.1 Scheme Location and Characteristics of the site

The site proposed for development is located within the limits of the former Power Station site at Marsa (MPS) with the geographical co-ordinates being 35°52'57.5"N 14°29'51.4"E. The Marsa Power Station (MPS) site covers an approximate area of 32,000 sqm and is located at the inner end of the Grand Harbour on two levels; the lower level has an elevation of approximately 2m above sea level, and the upper level, also known, as Jesuits Hill has an elevation of between 26 and 37m above sea level. It is surrounded by a public road, flour mill and haulage to the North, by the Grand Harbour, customs bonded stores and derelict buildings to the Southeast and mixed use of small business units, offices, residential and a petrol station to the West of the site.

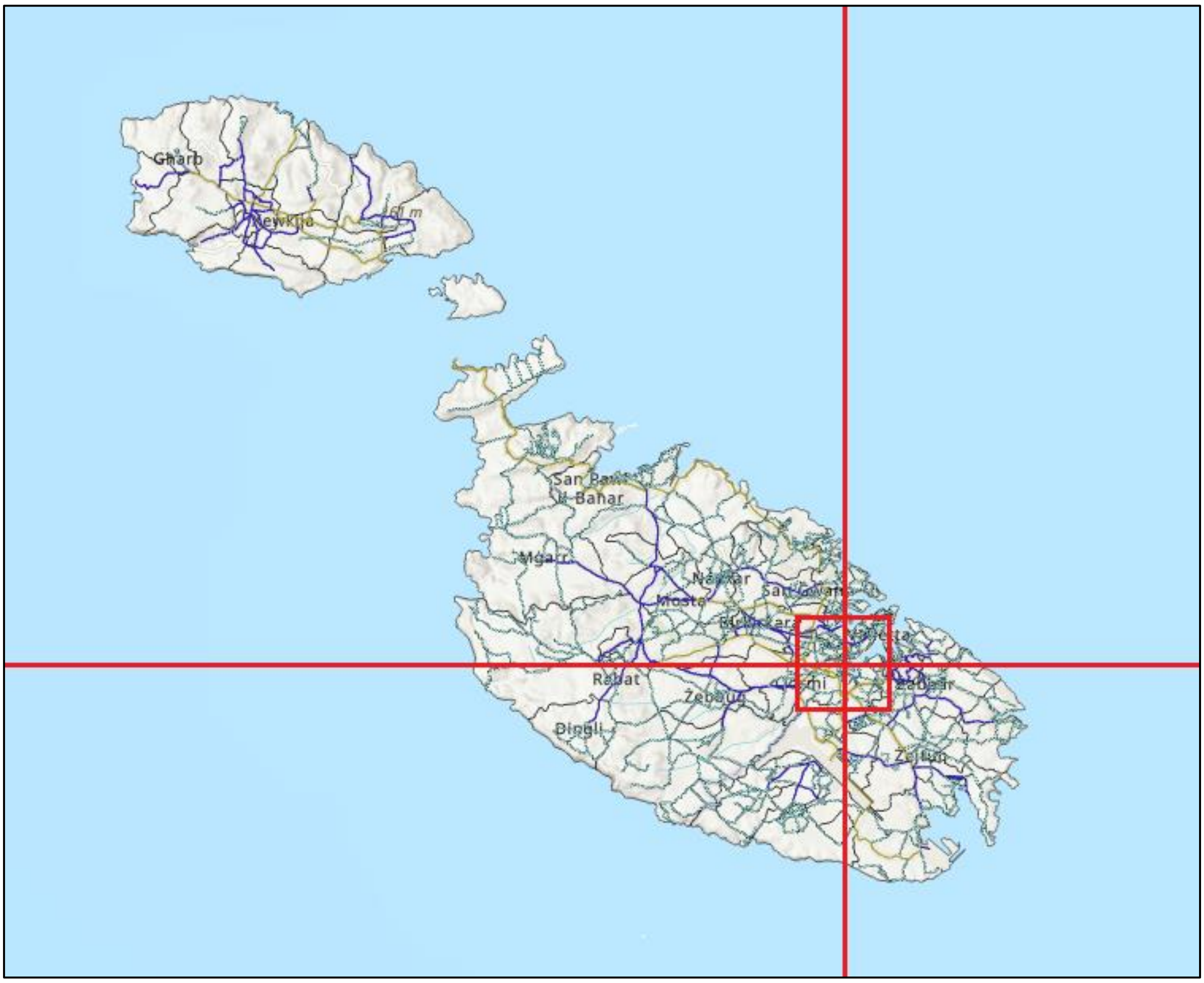

***Figure 1**: Map of the Maltese Islands showing the Jesuit Hill peninsula.*

The development is being proposed within parts of the underground tunnel complex of the decommissioned A-Station excavated underneath Jesuit Hill in Marsa, in close proximity of the decommissioned Marsa power station, adjacent to the existing Marsa North electricity distribution centre and to Enemalta plc administration building. The A-Station tunnel complex hosted a power station used for electricity generation until it was decommissioned in 1994.

The area measures circa 1,000 meters squared.

Access to the site is mainly through tunnels excavated in solid rock and accessed from the following points:

1. Triq Fra Diegu: 35°53'00.5"N 14°29'47.9"E
2. Il-Moll tal-Braken: 35°52'58.3"N 14°29'57.0"E
3. the decommissioned Marsa Power Station: 35°52'54.1"N 14°29'49.2"E

***Figure 2**: Jesuit Hill peninsula, location of underground A-Station tunnels as marked in blue.*

The A-Station tunnels are mainly unused; however, part of the site is connected to the new High Voltage cable tunnel network and to the Marsa North Distribution Centre. Additionally, parts of these underground galleries are temporarily used to store emergency equipment for the Ministry of Health and for material used by Enemalta plc.

Since the proposed development is situated within a decommissioned power station, an area that has served as part of the power generation of the Maltese islands, the land use of the area is not expected to change.

To note that the majority of the equipment within the boiler hall and the main turbine hall has already been dismantled and removed. Measurement for air borne asbestos fibres in line with LN 323 of 2006 and WHO standard method for air-borne asbestos fibres have been taken in 2016 and it has excluded the possibility of fibres in the air within the A-Station tunnel complex.

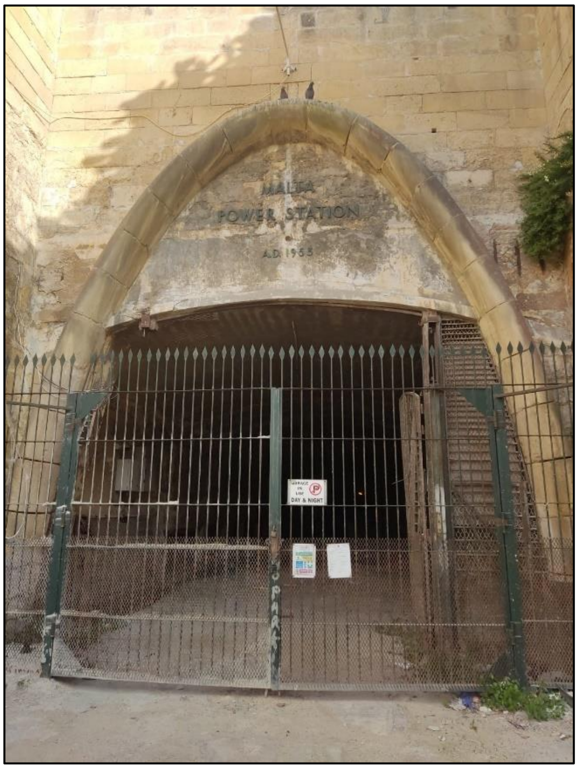

Figure 3: *Main tunnel access to the A-Station from Triq Fra Diegu, Marsa*

Figure 4: *Gallery within the A-Station which used to be operated as a Turbine Hall. Material and equipment relating to the power stations has been decommissioned and removed from site (photo dated 2018).*

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***Figure 5**: The only remaining turbine located at the far end of the Turbine Hall. This is outside of the area being proposed for the BESS facility (photo dated 2018).*

***Figure 6**: Part of the A-Station tunnel located at the end of the Boiler Hall which is expected to be used for the transportation of the BESS components at the project site. Image also shows the tunnel excavated by PA 3908/08 and PA/05631/16 (photo dated 2023).*

Figure 7*: Access tunnel to the A-Station from Triq Fra Diegu in Marsa (photo dated 2023).*

Most of the impact on land use is expected to be generated from activities related to construction only.

Further impacts on land use related to the development of the site will not significantly affect neighbouring land uses, though there is also expected to be a minor traffic increase in the area, especially on the arterial and nearby roads, due to the vehicles associated with the construction phase of the proposed development. This is expected to be very minimal, for a limited time only, and hence, deemed to be as negligible.

Figure 8: *Scheme location A-Station vis-à-vis IP 0003/21 site boundary and other immediate land uses*

3.2 Site and Planning History

The table below shows the site history pertaining to the land within or in close proximity to the proposed development. The referred planning applications mentioned in this table were extracted from the Planning Authority's mapserver and do not specifically refer to any development as having been implemented within the proposed site.

No	Application No	Description	Decision
1	DN/01340/20	Filming activities in the empty underground tunnels / halls which used to house the generators of the old power station	Accepted
2	PA/03317/18	To sanction amendments to PA3908/08 and PA3594/16 for the Tunnel Excavation from Marsa Power Station to Qormi tunnel	Approved
3	PA/00427/18	Change of Use of the underground A-Station to a Data Centre (storage of data Class 6A) including the installation of data servers	Approved
4	PA/05631/16	Renewal of PA 3908/08 for the tunnel excavation from marsa power station to qormi tunnel	Approved
5	PA/03594/16	Amendments to PA 3908/08 for the tunnel excavation from Marsa Power Station to Qormi Tunnel	Approved
6	PA/03349/14	To decommission, dismantle and demolish Marsa power station	Approved
7	DN/01655/14	Demolition of chimneys and tanks at Marsa Power Station	Accepted
8	PA/02968/13	Amended application for the excavation of an underground tunnel from Marsa power station to Qormi, and the temporary use of working area at Marsa and Qormi	
9	PA/05543/09	Proposed district office at Marsa Power Station	Approved
10	PA/04968/08	Construction of a 132KV distribution centre	Approved
11	PA/03908/08	Tunnel Excavation & cable laying	Approved
12	PA/02936/04	Extension of existing offices	Approved
13	PA/03910/02	Proposed garages at Jesuits Hill	Approved
14	PA/01032/01	Installation of telecommunication equipment and antennae over roof	Approved
15	PA/04906/97	To construct a two-storey building	Approved
16	PA/04965/96	Renewal application for additional office at third floor over generation building	Approved
17	PA/02353/95	Renewal application for additional offices at third floor over generation building.	Approved
18	PA/04887/93	Additional offices at third floor over Generation Building	Approved

Table 1*: Planning applications history on site [extracted from PA mapserver, 24 April 2023]*

Apart from the planning perspective, the site is also covered by an Integrated Pollution Prevention and Control (IPPC) permit, as per below:

Application Number	Name	Activity	Location	Status
IP 0003/21	Marsa Power Station	Large Combustion Plant	Marsa	Granted

The latest version of permit IP 0003/21 can be accessed from the following link: https://era.org.mt/era_ippc_installations/marsa-power-station/. The permit holders of this IPPC permit are Enemalta plc. This permit was issued under Regulation 7 of the Industrial Emissions (Framework) Regulations, (S.L. 549.76) ("the Industrial Emissions (Framework) Regulations") to operate an installation carrying out activities covered by the description in Section 1.1 in Schedule 1 of the Industrial Emissions (IPPC) Regulations (S.L. 549.77), to the extent authorised by the Permit, i.e. Combustion installations with a rated thermal input exceeding 50 MW.

This permit is valid until its expiry which is 4 year/s from the 'permit granted' date (19/10/2021).

3.3 Land Uses

A land use desktop analysis of the Scheme site surrounding area was carried. The land uses within approximately 300 m around the Scheme site are illustrated in the figure below.

The predominant land uses in the vicinity of the Scheme site are industrial, utility related uses and/or mixed use, including port-related activities, particularly due to the close proximity of the Scheme site to the Grand Harbour.

Mixed land uses are dominant on the western side of the Scheme site. This type of land use is characterised by commercial uses at ground floor level accompanied with residential uses on the overlying floors.

The Area of Study also include some pockets of unused land or vacant/derelict structures.

Within the analysed area, there is the Church of the Madonna of Graces located at approximately 150m away from the Scheme site and the Marsa Parish Church located at a distance of 280m.

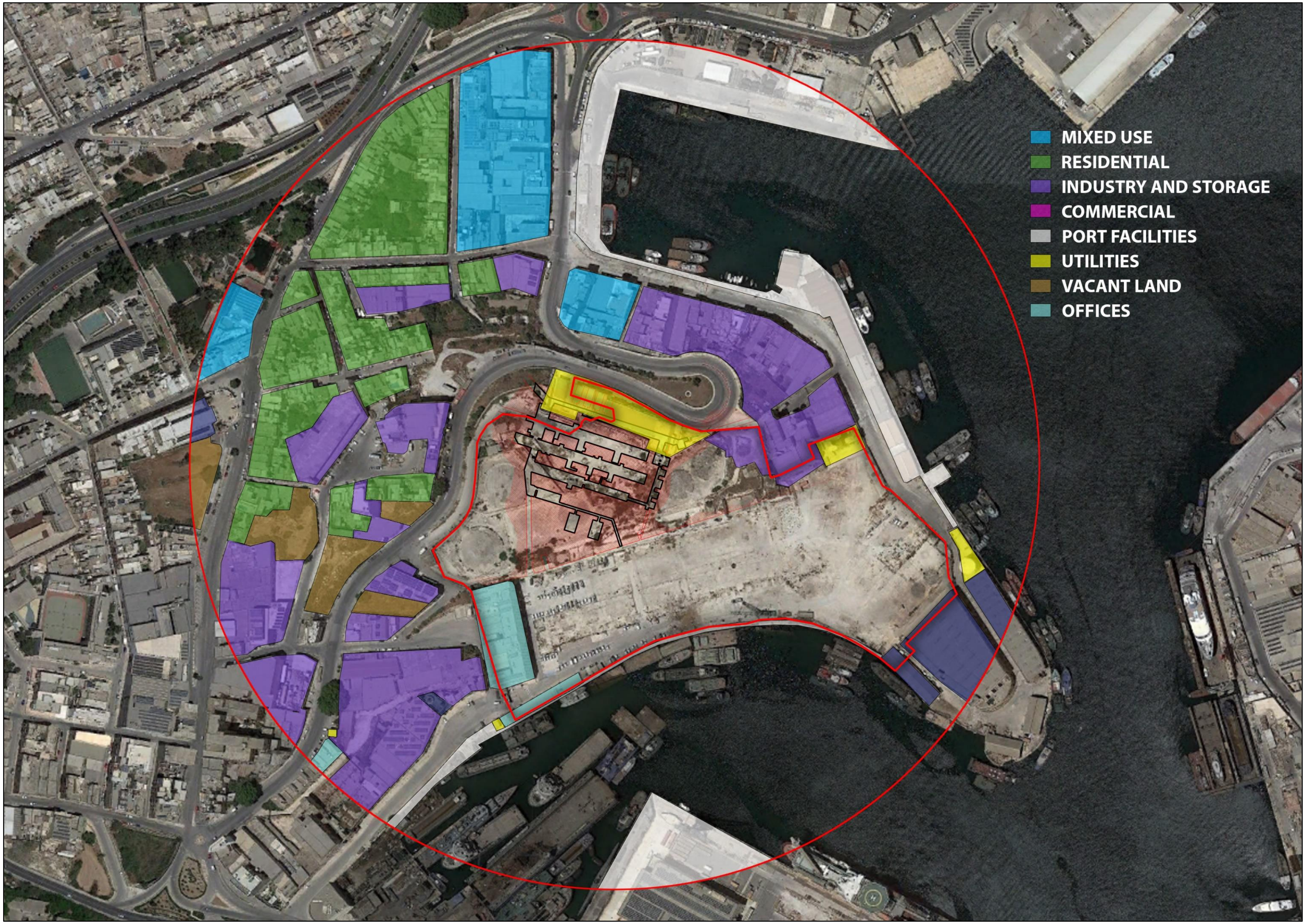


Figure 9*: Indicative Land Use desktop analysis*

3.4 Environmental Protected Areas

Existing data on environmental protection areas was obtained from the GIS mapserver interface available on the Planning Authority's website[3]. For the purpose of this report, the areas considered are restricted to areas that are within the proposed scheme or in close proximity within a radius of 500m.

3.4.1 Areas of High Landscape Value

The proposed scheme lies in close proximity to the protected landscape of the Grand Harbour Fortifications, designated as the Harbour Fortifications AHLV and published under G.N. 133 of 2001.

Nonetheless, given that the proposed scheme is located within the underground A-Station tunnels, the impact on such AHLV is deemed to be negligible to non-existent.

3.4.2 Tree Protection Area

The ERA, as part of its commitment to set up inventories of important trees and woodlands in Malta, has a number of areas as Tree Protection Areas ("TPA"). Trees within a TPA are protected from activities and operations that may have an adverse impact on them, such as development.

The total number of TPAs over the Maltese Islands are 60, of which 48 are in Malta, 10 are in Gozo and 2 are in Comino. In Malta, there are approximately 60 native tree species, some of which are rare or endangered. Through the declaration of these TPAs, these trees and woodlands are being given the well-deserved protection for our and future generations.

TPA032MT, published under G.N. 316 of 2017, situated in Spencer Gardens (*limits of Marsa*), is the closest Tree Protection Area, is located at an approximate distance of 360m away from the proposed scheme and contains the tree species known as Osage orange *(maclura pomifera)*.

The proposed development is not envisaged to have any impact on TPA032MT.

3.4.3 Other protection areas

There are no areas directly within or in proximity of the proposed scheme that have any protection status designated as below:

- Special Areas of Conservation National Importance

[3] https://pamapserver.pa.org.mt/ accessed on 24 April 2023.

- Site of Scientific Importance
- Special Protection Areas
- List of Historical Trees having an Antiquarian Importance
- Bird Sanctuary
- Area of Ecological Importance and Site of Scientific Importance
- Area of Ecological Importance
- Special Areas of Conservation (Natura 2000 Sites) – terrestrial and marine
- SAC-SPA (Natura 2000 Sites)
- Special Protected Area (Natura 2000 Sites)

3.5 Geology and Geomorphology

The information provided in this section is extracted from the Digital Geological Map of the Maltese Islands published at a scale of 1:25,000 by the Oil Exploration Directorate (OPM) in 1993. This map depicts the bedrock geology of the Maltese Islands including lithological and structural information. This map was accessed from the Continental Shelf Department at the Ministry for Transport and Infrastructure.

The scheme site is located within an area having with geological layers predominantly pertaining to the Lower Globigerina Limestone Member (Miocene, Aquitanian, Mlg), having the following description:

> Pale cream to yellow planktonic foraminiferal packstones rapidly becoming wackestones above the base. Pectinid bivalves and Shizaster echinoids are frequent. The top of the member is marked by a ubiquitous hardground. This is phosphatized in western areas in Malta and carries a conglomerate of up to 1m of rounded, phosphatized clasts in Gozo (Lower Phosphorite Conglomerate Bed). Common fossils include fish teeth, molluscs, solitary corals and echinoids. In Malta, glauconite is common in western outcrops south of Fomm ir-Rih. Thickness 0-80m (Malta) and 5-40m (Gozo).

The area also features various horizontal bedding strata.

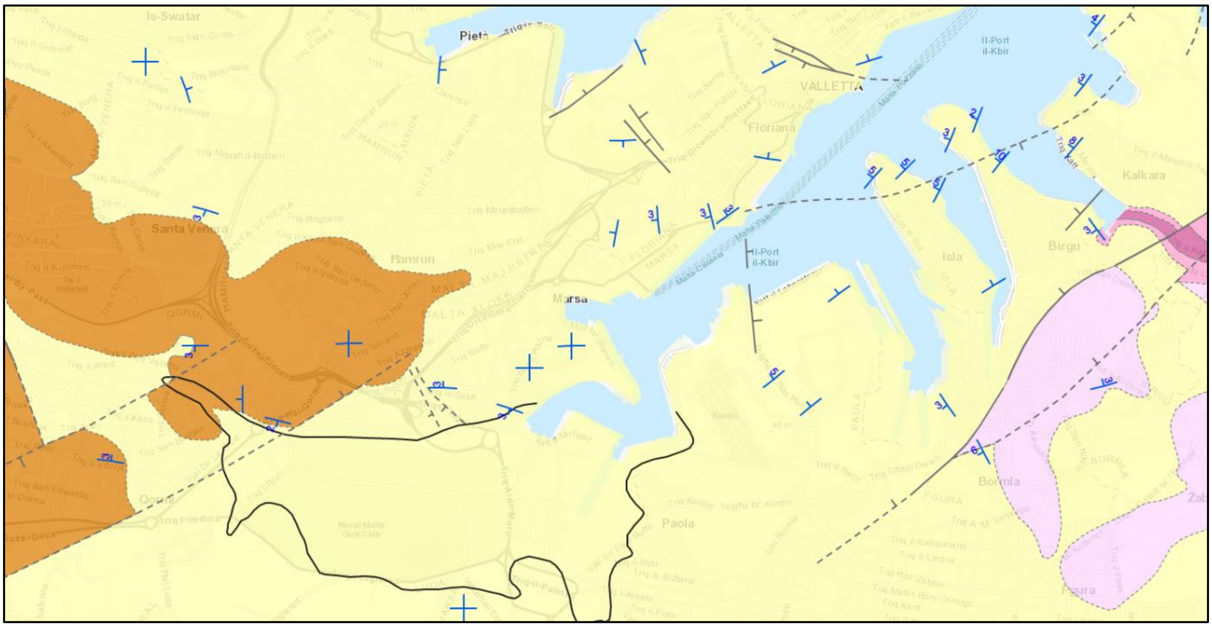


Figure 10*: extracted from the Geological Map of the Maltese Islands available at the Continental Shelf Department website (accessed on 04/05/2023).*

3.6 Hydrogeology and Hydrology

According to the Water Catchment Management Plan (WCMP) for the Maltese Islands[4], based on geological boundaries, the Scheme overlies the Malta Mean Sea Level aquifer (MSLA) (Ground Water Body GWB reference MT001) – refer to Figure 11. The aquifer is found within the Globigerina Limestone and is bound by the Great Fault Line of Malta and its escarpment. MT001 groundwater body is the largest aquifer of the Maltese Islands with an area of 216.6km^2. The presence of the aquifer is a direct result of the geology of the Maltese Islands. The top rock layers are highly porous which allows rainwater to percolate through to form the ghyben-herzberg system. Since freshwater is less dense than seawater the freshwater lens lies above the saline seawater. This was confirmed and adopted in the 2nd WCMP.

[4] Water Catchment Management Plan for the Maltese Islands, March 2011, available at: https://era.org.mt/wp-content/uploads/2019/05/1st-WCMP_final-1.pdf

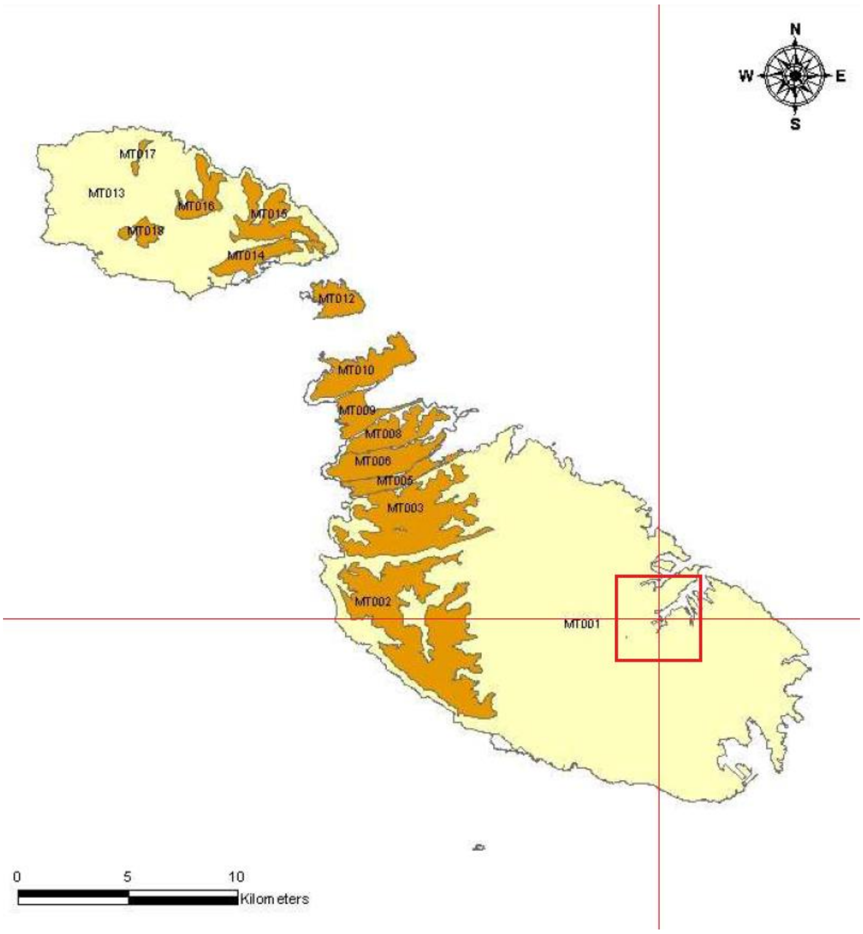


***Figure 11**: Designated Ground Water Bodies in the Maltese Water Catchment District with the Scheme site lying within the Lower Coralline Limestone Aquifer MT001 (Sourced from WCMP, 2011)*

3.7 Infrastructure and Utilities

The proposed Scheme site lies in very close proximity to existing supporting infrastructure needed to allow the BESS facility to operate. The A-Station is located underneath the Marsa North distribution centre allowing the batteries to be connected to the national electricity grid without the need to lay long HV cables between the two facilities. Additionally, the A-Station is connected directly with the high-voltage cable tunnel network used to connect important electricity nodes within the national electricity grid. This enables easier access to the Scheme site without the need for extensive open cut trenches to reach the Scheme.

Being used as an underground power station in the past, the tunnels are inherently equipped with vertical vents between the tunnels and the overlying areas that enable and provides relatively adequate access for ventilation purposes of any type of installation within the same tunnels. This passive ventilation system avoids humidity within the tunnels, although assisted/forced ventilation is still deemed a necessity.

The BESS is expected to consist in a number (depending on the required power and energy storage) of 20-foot or smaller containers (restrictions apply on the size of container because of transport logistics inside the underground tunnels) with batteries, power converters, transformers, HV switchgear, control and protection equipment, LV switchgear and ancillaries such as cooling equipment and fire-fighting systems. Cooling equipment will need to have external units installed, so part of the BESS equipment will be outside of the tunnels. The BESS is planned to be connected at high-voltage using cables to the switchgear at the Marsa North distribution centre.

The BESS is to be supplied with a low voltage (400V) supply for its ancillaries. This will be provided from the local substation in the Marsa North distribution centre.

The main connection will be at 33kV to the Marsa North Distribution Centre. Transformers and switchgear will be installed inside the A Station and cables will be laid to the distribution centre. The transformers will be encapsulated in cast resin (instead of mineral oil or ester fluids) to lower the risk of fire. All cables to be used will have XLPE insulation (no oil-impregnated insulation will be used) and will have fire retardant properties, low smoke and halogen-free outer sheaths to lower the risk of fire and its spread and generation of smoke. The use of flammable and smoke generating equipment will be reduced as much as possible.

All electrical installations, particularly for lighting and ventilation will be carried out according to the most stringent standards for tunnels and underground industrial installations.

3.8 Cultural Heritage Features

Data extracted from the mapserver available on the website of the Planning Authority shows two main features of high cultural value which have been scheduled and afforded some type of protection. This includes the underground bombproof power station between Triq Fra Diegu and Il-Moll tal-Pont, and the Area of High Landscape Value surrounding the Harbour Fortifications (refer to Table 2).

The Scheme lies within part of the A-station underground tunnels, a series of large, parallel galleries linked with several tunnels, all excavated at the base of Jesuits Hill in Marsa in the early 1950s to accommodate a new power station (Figure 12). These tunnels housed three Westinghouse 5MW steam turbines with a generating capacity of 15MW.[5] In the early 1960s, this underground power station was extended by two Metropolitan Vickers 5 MW steam turbines and by a Fiat 5.7 MW Gas Turbo Alternator. These plants were in operation until 1994, when the underground power station was decommissioned. This A-Station tunnel was scheduled with Grade 2 degree of protection as published in G.N. 22/12.

To date, the tunnels and halls of the A-Station has been cleared from all the equipment used for electricity generation.

At this stage, no structural interventions to the fabric of the Grade 2 scheduled structure is being envisaged.

[5] Information extracted from Enemalta plc website: https://www.enemalta.com.mt/about-us/history-of-electricity/ (accessed on 24 April 2023)

Application Number	MRS003	
Application Type	H	H
Category	Architecture	Planning
Type	Industrial	Area of High Landscape Value
Feature	Tunnel	N/A
Name	Underground, bombproof Powerstation	Harbour Fortifications AHLV
Street Name	Triq Fra Diegu/Il-Moll tal-Pont	N/A
Locality	Marsa	Various Localities
Government Notice No.	22_12	133_01
Government Notice Date	10_01_2012	09_02_2001
Status	Approved	Approved
Status_Dat	10_11_2011	14_12_2000
Degree of Protection	Grade 2	N/A
Summary		Area of High Landscape Value of the Harbour Fortifications
Unit Responsible	HPU	HPU
Source	Captured on Paper by HPU	National Protective Inventory for the Maltese Islands
Date Plotted	05_10_2009	11_09_2000

***Table 2**: Scheduling of the underground A Station tunnels and the Harbour Fortifications as listed in the PA mapserver interface, accessed on 24 April 2023*

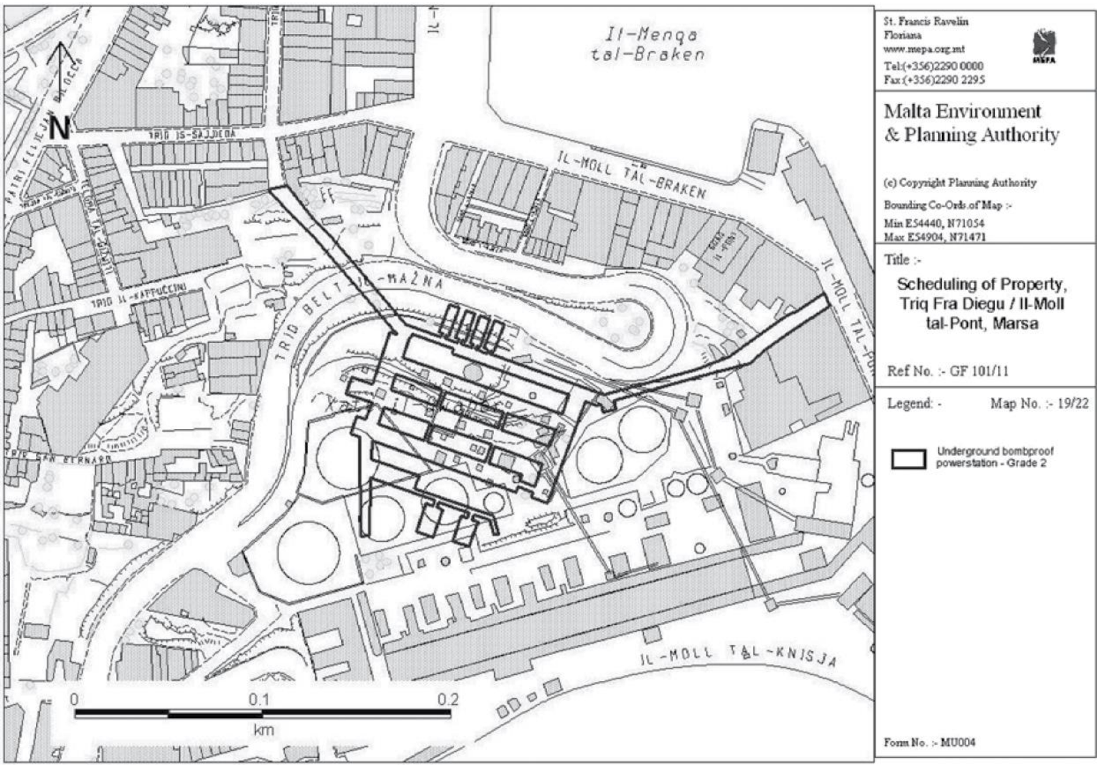


***Figure 12**: Plan 19/22 in Government Gazette dated 10 January 2012, scheduling the Underground bombproof power station between Triq Fra Diegu and Il-Moll tal-Pont, Marsa as a Grade 2 property in terms of Structure Plan Policy UCO 7.*

Within a wider context and in the immediate surrounding area from the scheme site, there are a number of known cultural heritage features particularly in view that the site, although located within a predominantly industrial area which was used for power generation and distribution, is located within the Grand Harbour.

The SCH GIS interface shows the presence of the following Cultural Heritage discoveries, as listed in Table 3 and Table 4 below:

<table>
<tr><th>Site Code</th><th>Locality</th><th>Type</th><th>Feature</th><th>Co-ordinates</th></tr>
<tr><td>MRS2015</td><td rowspan="7">Marsa</td><td>Unclassified</td><td>N/A</td><td>35°52’58.3”N 14°29’52.0”E</td></tr>
<tr><td>MRS1729</td><td>Civic/Administrative</td><td>Baths</td><td rowspan="2">35°52’56.9”N 14°29’54.8”E</td></tr>
<tr><td>MRS1768</td><td>Unclassified</td><td>Cultural Deposit</td></tr>
<tr><td>GWS2012</td><td>Unclassified</td><td>N/A</td><td>35°52’56.0”N 14°29’50.0”E</td></tr>
<tr><td>MRS1969</td><td rowspan="3">Burial</td><td rowspan="2">Tomb</td><td rowspan="3">35°52’56.0”N 14°29’55.9”E</td></tr>
<tr><td>MRS1983</td></tr>
<tr><td>MRS1968</td><td>Catacomb</td></tr>
<tr><td>MRS1913</td><td></td><td>Engineering/Industrial</td><td>Cistern</td><td>35°52’53.6”N 14°29’50.8”E</td></tr>
<tr><td>MRS1993</td><td></td><td>Cultic</td><td>Chapel remains</td><td>35°52’54.8”N 14°30’02.4”E</td></tr>
</table>

Table 3*: Cultural Heritage discoveries, as listed in the Superintendence of Cultural Heritage GIS interface, accessed on 24 April 2023*

NICPMI No.	**Locality**	**Type & Value**	**Property Name**	**Cultural Heritage Property Value Assessment**	**Co-ordinates**
00590	Marsa	Artistic Historical Social	Niche of the Madonna of Lourdes	Very High	35°53’0.02”N 14°29’52.43”E
00620	Marsa	Architectural Artistic Historical	Church of the Madonna of Graces	Very High	35°52’51.0”N 14°29’46.7”E

Table 4*: National Inventory of the Cultural Property of the Maltese Islands, as listed in the Superintendence of Cultural Heritage GIS interface, accessed on 24 April 2023*

4.0 Regulatory Framework: Legislative, Planning and Strategy Context

4.1 Policy and Planning Context

The development site lies within the extents of the A-Station which falls within the development zone of the Marsa Local Plan within the Grand Harbour Local Plan.

The Grand Harbour Local Plan (GHLP), which was approved in April 2002, designates the Scheme site for "Retention of Existing or more Environmentally Friendly uses", as depicted in Map 12 (Marsa Inset Map).

Historically, Marsa has been traditionally associated with the development of the Grand Harbour as a port and as a manufacturing area. Additionally, the proposed scheme area within Jesuit Hill area is located within an area which has a history of predominant use for electricity generation and transmission. This has resulted in the perception of the locality having poor environmental conditions occasioned by the power station and other industrial operations occurring nearby. The local plan earmarks the area for the retention of existing or more environmentally friendly uses.

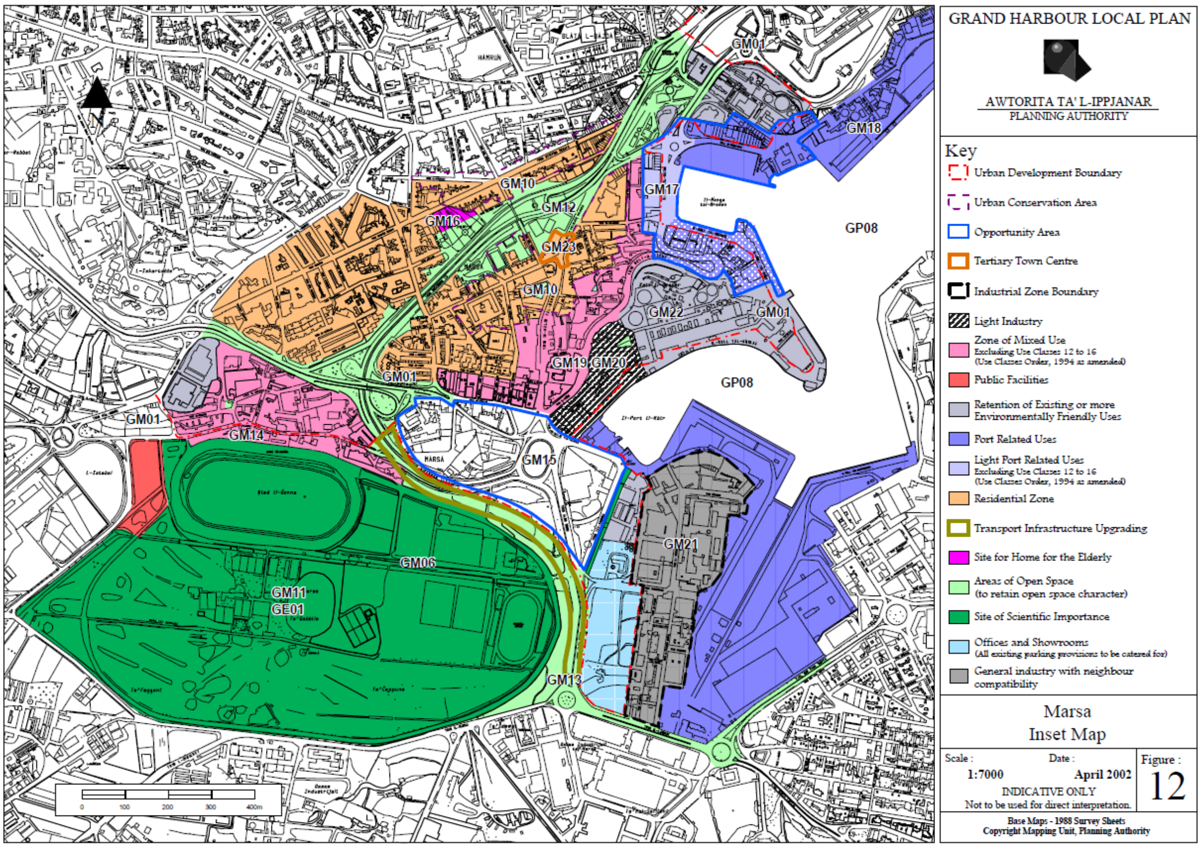


Figure 13: Marsa Local Plan

Policy GM 22 of the Grand Harbour Local Plan deals with the Marsa Power Station and that any approved uses do not jeopardise the future operation of the same power station, irrespective of the long-term strategy for power generation. Having said that, the Marsa Power Station has been decommissioned in 2015/2016 and its components completed demolished and removed by the end of 2017 except for a standalone diesel fuelled Gas Turbine which has been retained and is currently still available for emergency use.

4.2 Strategic Plan for Environment and Planning

All new developments must complement the goals and objectives outlined in the *Strategic Plan for Environment and Development* (SPED). The SPED, which replaced the Structure Plan of the Maltese Islands adopted in 1992, provides guidelines to decision takers and developers on planning applications, therefore safeguarding land and sea resources of the Maltese Islands, whilst ensuring that the environment is protected and enhanced. The SPED thematic objectives which are relevant to the proposed Scheme are listed below.

Socio-Economic Development Thematic Objective 4	To seek to ensure that existing strategic infrastructure is safeguarded and that provision is made for infrastructure (water, electricity, sewers, fuel storage, telecommunications) to sustain socio-economic development needs whilst encouraging the Best Available Technology and protecting the environment by: 1. Supporting the implementation of Malta Energy and Water Policies. 2. Facilitating the provision of strategic infrastructure and networks with particular emphasis on telecommunications technology infrastructure. 3. Facilitating the improvement of the quality and quantity of location and distribution of utilities infrastructure. 4. Facilitating the Interconnector cables, Natural Gas infrastructure and the extension of the Delimara Power Station including the supporting infrastructure. 11. Supporting the implementation of TEN-E Projects of Common Interest (PCI).
Environmental Thematic Objective 8	To safeguard and enhance biodiversity, cultural heritage, geology and geomorphology: 7. Controlling activities which might have an impact on areas, buildings, structures, sites, spaces, and species with a general presumption against the demolition of scheduled and vernacular buildings.
Climate Change Thematic Objective 9	To control greenhouse gas emissions and enhance Malta's capacity to adapts to Climate Change by:

	7. Ensuring that development plans and proposals contribute to national targets for GHG reductions and mainstream climate change adaptation measures

Table 5*: Objectives extracted from The SPED document (2015) deemed relevant to the proposed Scheme.*

Map 2B of the SPED document identifies the area of Jesuit Hill peninsula for Industry related activities.

4.3 Areas of High Landscape Value

The Maltese landscape has an attractive and distinctive character, and it is important to maintain it through positive protective measures. To this end, Areas of High Landscape Value (AHLV) have been designated under the provisions of the Development Planning Act in 1996, 2000 and 2006, and through the local planning process. The proportion of legally protected landscapes in the Maltese Islands stands at 33% of total land area.

The proposed scheme lies in close proximity to the Grand Harbour Fortifications area of High Landscape Value.

4.4 EU Legislative Context

Council Regulation (EU) 2022/2577 issued on 22 December 2022 lays down a framework to accelerate the permitting procedure in view of the urgent and exceptional energy situation. Hence, this regulation lays down exemptions from certain assessment obligations set in Union environmental legislation for renewable energy projects, for energy storage projects and electricity grid projects that are deemed as necessary for the integration of renewable energy into the electricity system.

4.5 Development Planning (Procedure for Applications and their Determination) Regulations (Subsidiary Legislation 552.13)

The scope of these regulations is to include clarity in legal provisions to ensure that the results of consultations and information gathered during the Environment Impact Assessment Process shall be duly taken into account in the development consent procedure. Additionally, these regulations describe the procedure adopted by the Planning Authority to the various development application types submitted for evaluation by developers to the Authority.

Schedule 1 of these regulations list the instances where a project is classified as a "Major Application" and hence, would or may require and Environmental Impact Assessment, and Appropriate Assessment or a Traffic Impact Assessment.

4.6 Construction Site Management Regulations (Subsidiary Legislation 623.08)

The scope of these regulations is to limit environmental degradation through appropriate construction management practices that cause the least nuisance to neighbours, to minimise the risk of injury to the public, to protect the property belonging to the Government and the local councils, and as much as possible to reduce the harm to the environment. These regulations shall have no bearing on the responsibilities related to construction sites emanating from other legislative instruments.

4.7 Assessment and Management of Environment Noise Regulations (Subsidiary Legislation 549.37)

These regulations provide the framework for the avoidance, prevention, or reduction of the adverse effects and annoyance resulting from exposure to environmental noise. These regulations transpose into Maltese Law the Environmental Noise Directive (END) (Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise).

4.8 Environmental Impact Assessment Regulations (Subsidiary Legislation 549.37)

These regulations transpose into Maltese Law:

(i) the EIA Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification), as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014;

(ii) the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) of the United Nations Economic Commission for Europe, and its First and Second Amendments; and

(iii) provisions of Regulation (EU) No. 347/2013 of the European Parliament and the Council on guidelines for trans-European energy infrastructure, with regard to the co-ordination of environmental assessment procedures arising from the requirements of Council Directives 2014/52/EU, 92/43/EEC and other related Union legislation.

Section 3 of Schedule I of these regulations describes projects related to Energy Infrastructure which are deemed as requiring an Environmental Impact Assessment. A review of this Schedule does not show that Battery Energy Storage System facilities fall within the remit of either Category I or II of this Schedule. Nonetheless, it is clarified that projects shall not be exempt from the provisions of these regulations on the premise that they are not explicitly or precisely specified, or that their title or description is different from that contained in this Schedule. Thus, in this instance and to avoid any doubt as to whether a project is covered by this Schedule, the precautionary principle shall be adopted and consultation with the competent Authority will be sought as clarification.

Further to the above, this section should be read in conjunction with Council Regulation (EU) 2022/2577 in section 4.4 above.

4.9 Ambient Air Quality Regulations (Subsidiary Legislation 549.59)

These regulations provide the framework, among other things, for the assessment of air quality, the ensuring of the accuracy of measurements, and the analysis of assessment methods. They transpose into Maltese Law Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air and the Air Quality Directive (Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe).

4.10 Industrial Emissions (Integrated Pollution Prevention and Control) Regulations (Subsidiary Legislation 549.77)

These regulations provide for the implementation in part of Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control). They also provide for the implementation of the Industrial Emissions (Framework) Regulations (S.L.549.76).

The proposed scheme site is covered by an Integrated Pollution Prevention and Control (IPPC) permit. Refer to section 3.2 above.

4.11 Standards commonly applied to battery energy storage systems

The following is a non-exhaustive list of technical standards, codes, and guidelines, which are concerned with the design, installation, and operation of BESS facilities:

Code	Description
IEC 63056:2020	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems
IEC 62932-2-2:2020	Flow battery energy systems for stationary applications - Part 2-2: Safety requirements
IEC TS 62933-5-1:2017	Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid integrated EES systems - General specification
IEC 62933-5-2:2020	Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems
IEC 62984-2:2020	High-temperature secondary batteries – Part 2: Safety requirements and tests

Code	Description
IEC 62281	Safety of primary and secondary lithium cells and batteries during transport
IEEE 519	Recommended practice and requirements for harmonic control in electric power systems
IEEE 1547	Interconnection and interoperability of distributed energy resources with associated electric power systems interfaces
IEEE P2686	Recommended Practice for Battery Management Systems in Energy Storage Applications
IEEE 2030.2	Guide for the Interoperability of Energy Storage Systems Integrated with the Electric Power Infrastructure
IEC	International Electrotechnical Commission
UL 1642	Standard for Lithium Batteries
UL 9540	Energy Storage Systems and Equipment
UL 9540A	Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
UL 1741	Standard for Static Inverters and Charge, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
UL 62109-1	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements
UN 38.3	Certification for Lithium Batteries" (Transportation)
NFPA 855	"Standard for the Installation of Stationary Energy Storage Systems"

4.12 Malta's Low Carbon Development Strategy

Malta's Low Carbon Development Strategy[6] also acknowledges that as renewables are intermittent in nature, some backup supply is required. It highlights that backup possibilities are that the existing interconnector (or an additional one) could be used, the existing CCGT plants could have their operating lifetimes extended if their capacity factors are reduced, and/or battery storage technology could be used. Regarding the latter, the storage period is still not particularly long and so currently would be better suited for daily / weekly fluctuations in solar resource, rather than monthly or seasonal fluctuations in wind resource. However, battery technologies are improving consistently and at a fast pace, and so longer storage times that may suit the specific renewable energy systems could be implemented in future. The LCDS also highlights that the existing support for battery storage technology is unlikely to be of an adequate level for large-scale roll-out of battery storage systems, and Malta shall be seeking EU funds to bridge the gap.

[6] https://meae.gov.mt/en/Public_Consultations/MECP/PublishingImages/Pages/Consultations/MaltasLowCarbonDevelopmentStrategy/Malta%20Low%20Carbon%20Development%20Strategy.pdf

4.13 Malta's 2030 National Energy and Climate Plan

This NECP document[7] states that, currently, Malta has no utility scale battery storage facilities, and keeping large spinning capacity is highly inefficient and may not be technically viable at all times.

Additional electricity generation from RES shall also be aligned with the exigencies of a stable grid. Hence, this plan promotes the options which facilitate the integration of battery storage in view that these promise to provide several benefits, including better voltage regulation on the distribution network, peak shaving, increased self-consumption and demand management.

[7] https://energy.ec.europa.eu/system/files/2020-01/mt_final_necp_main_en_0.pdf

5.0 Technical Description of the Project

A Battery Energy Storage System (BESS) is an "electric storage resource capable of receiving electric energy from the grid or other electric resources and storing it for later injection of electric energy back to the grid." When referring to a BESS facility in relation to renewable energy, the system would be capable of storing excess power generated from renewable energy sources (such as solar or wind-generated power considered to be as variable generation sources which increases uncertainty and variability on the grid) for this stored power to be utilized later.

The role of BESS will continue to play an integral role in today's realities in view that EU member states are shifting away from the reliance on fossil fuels.

Lithium-ion batteries remain the dominant resource used in BESS facilities. Developments for larger-scale applications have already seen this technology becoming an integral feature in powering electric cars. BESSs are now also being connected with electricity grids to provide power for residential and industrial uses.

The primary purposes of BESS facilities are the reduction in use of fossil fuel plants and the replacement of their backup power supplies using energy generated from renewable technologies stored in batteries. The advantages of integrating BESS systems include:

(i) Store energy generated by renewables during hours of maximum delivery and use that during peaks, thus flattening the variance between day and evening on conventional generation plant output. This in turn is expected to increase the efficiency of the conventional plant in operation and thus reduce its emissions as excess RES generated will be stored and then used to displace the starting up/ramping up of CO_2 emitting plants.

(ii) Protect the environment and relieve the stresses caused by growing demands for energy.

(iii) Address grid bottlenecks to accelerate the penetration of RES and offer solutions to alleviate congestion in the distribution network.

(iv) Reduce the effect of the variability and intermittency caused by renewables, in periods of variable cloud cover, and thus permit the operation of conventional plant in a more stable manner, with inherent gains in plant reliability, plant emissions and CO_2 emission savings, thus enabling the ingress of further RES power generation thereby reducing the use of fossil fuel for electricity generation. Limited interconnectivity, lack of battery storage and restrictions in the local distribution system, are all currently considered major bottlenecks for the country to accelerate the penetration of RES (both onshore and offshore) due to its inherent intermittency.

(v) Promote a continuous flow of renewable energy by utilizing power reserves when the natural energy sources experience a dip – flattening the daily variations on the energy demand curve.

(vi) Energy Demand Management – balance loads between on-peak and off-peak times.

(vii) Provide a source of secure supply in cases of plant outages to enhance the grid's resilience and balancing the distribution grid for the BESS/s situated outside DPS precincts.

(viii) Provide a reliable backup source of energy in case of an electricity grid failure until complete power restoration that does not rely on local power generating plants. In this instance, BESS is operated as an uninterruptable power supply (UPS).

(ix) Black-Start capability with fast response time of such a system reduces the recovery period for power generation plants.

(x) preventing congestion in transmission systems by temporarily storing excess energy.

(xi) Provide fast frequency and voltage stabilisation to the Maltese grid in case Malta is isolated from the Entso-e grid because of maintenance or faults.

5.1 How BESS work

A Battery Energy Storage Systems is a compound system made up of various hardware modules along with control software low-level and high-level software. The main BESS components include:

a. Batteries which are used to convert chemical energy into electrical energy and vice-versa.
b. battery management systems (BMS) which are used to monitor the condition of battery cells and ensure that they are operated safely and avoid the possibility of failure developing into fires and other hazards.
c. power conversion systems (PCS) that convert and control energy flow to and from the batteries.
d. energy management system (EMS) that monitors and controls the energy flow within a BESS.
e. auxiliary systems such as temperature control systems, fire detection and suppression systems.

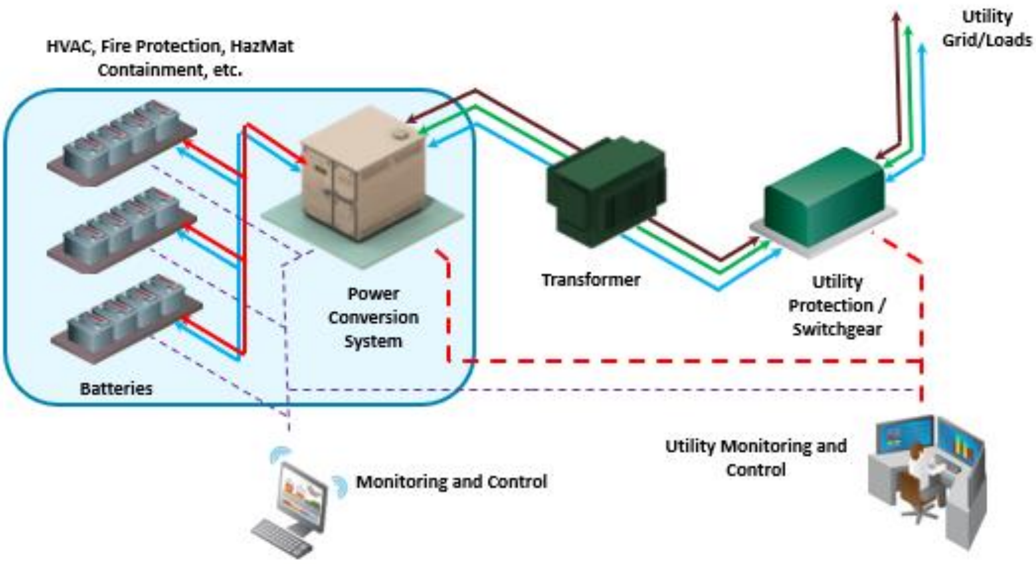


***Figure 14**: The components of energy storage systems connected with the electricity grid (Source: EPRI)*

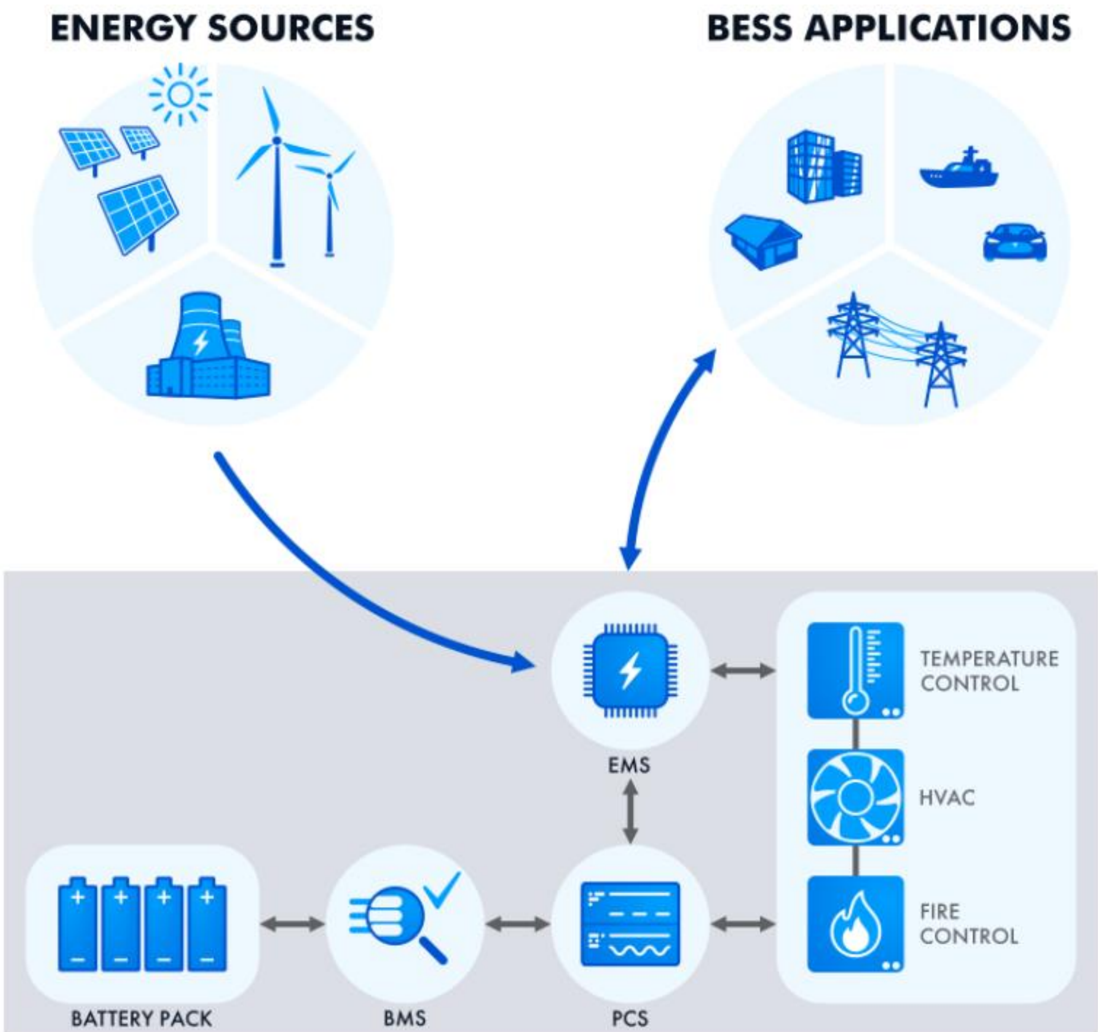


***Figure 15**: Infographic showing how BESS systems work*

For the purposes of this BESS facility at the A-Station, off-the-shelf battery energy storage system solutions are being considered – these offer a cost-effective and modular way to store energy, are readily available, less time-consuming and can also be easily transported and deployed in different locations. Modular construction considered in this report includes batteries inside 10ft, 20ft or 40ft containers, provided by various economic operators in the industry. It may be unlikely that 40ft containers will be used in this case because of transportation and handling difficulties inside the tunnels at the A-Station.

Typical approximate dimensions of containers are the following:

- 10ft container: 3.05m by 2.45 by 2.90m (L x W x H)
- 20ft container: 6.10m by 2.45m by 2.90m (L x W x H)
- 40ft container: 12.20m by 2.45m by 3.00m (L x W x H)

Adopting a modular component approach ensures minimisation of the impacts of such an installation on the available land, also keeping in mind the eventual ease of decommissioning of such a facility. By installing standard containerised units, housing of the various components within new permanent structures is not envisaged. In this regard, such an installation is considered as easily reversible to its original condition.

Typical BESS facilities for energy storage connected with the national electricity grid include the following components: battery racks, power conversion systems (PCSs), converters, auxiliaries, step-up transformers, switchgear, control systems, cooling systems for thermal management, fire detection and suppression systems, intra system cabling and other ancillary equipment.

5.2 Size, Scale and Design of the Project

The overall size of the project site measures approximately 1,000 m^2.

For the purposes of the installation, commissioning and operation of this proposed BESS facility, no excavation of new tunnels or any civil works are being deemed as necessary, and hence, none are proposed. Additionally, no structural changes are intended to the fabric of the Grade 2 scheduled structure, with the new equipment being floor-mounted and that no impact on the existing rock-cut walls is anticipated.

The various components making up this BESS facility will be connected with each other within the site extents through cables supported by overhead cable trays, cable baskets and/or cable ladders – the methodology will depend on the type of proprietary equipment deemed suitable and feasible for this site.

Furthermore, the BESS facility will be connected with (i) the existing 132kV Marsa North distribution centre (PA/04968/08) located above the A-Station through existing cable shafts connecting the A-Station tunnels directly with Marsa North DC cable flat; and (ii) with the existing high-voltage cable tunnel network located opposite of the proposed BESS facility site. At this stage, all cable between the BESS facility and the electricity network is envisaged to be above ground, adopting adequate cable protection.

It is possible that an overhead travelling crane (OTC) may be required to handle the containers and equipment inside the tunnels. To note that the decommissioned power station used to have similar overhead travelling cranes installed on the upper parts of the halls to handle equipment within such confined spaces. In this regard, once the detailed design of the BESS facility is optimised and concluded, the use of an OTC within the Scheme site can be confirmed or otherwise. Using an OTC within these halls would be keeping with the same concept adopted during the operational period of the power station, and hence, optimise the potential provided by the site.

Stacking of modular battery components is also possible. This will allow an increase in capacity without increasing the footprint.

Based on the available space for this BESS facility, and on initial market research of such battery energy storage systems, the system is estimated to generate approximately 10MW, with a battery capacity of 20MWh.

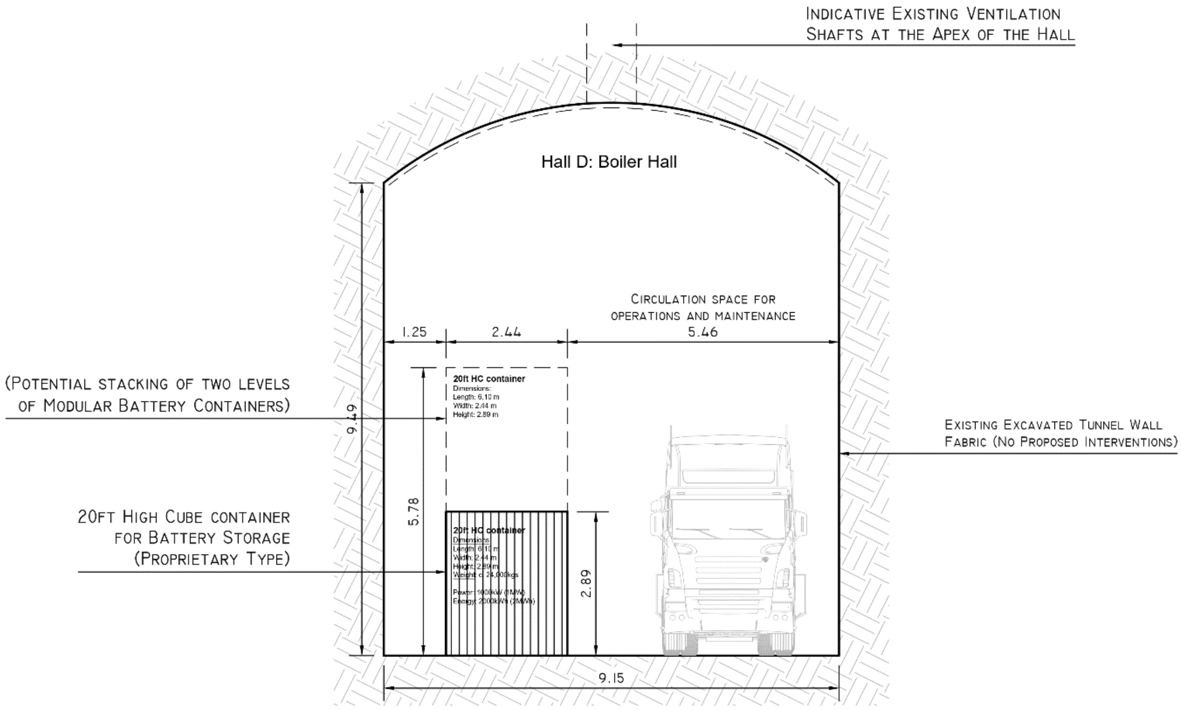


Figure 16*: Preliminary schematic layout of the scheme site*

The above data is subject to change upon detailed analysis and system design, based on the available market solutions that can be adapted to the A-Station site.

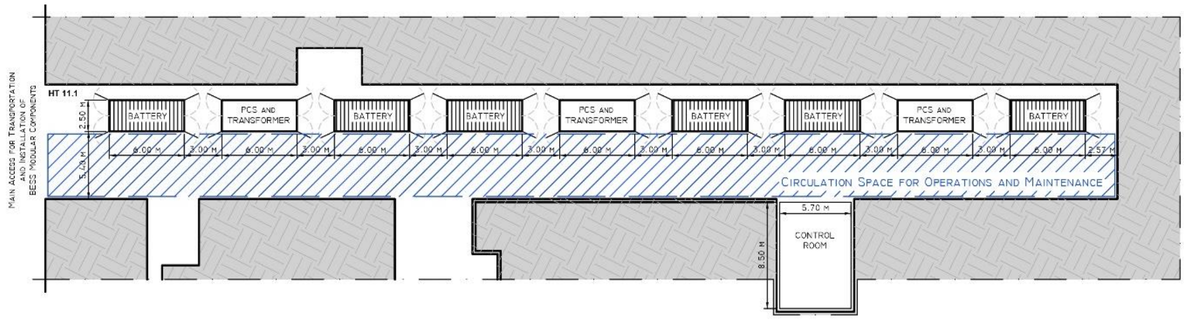
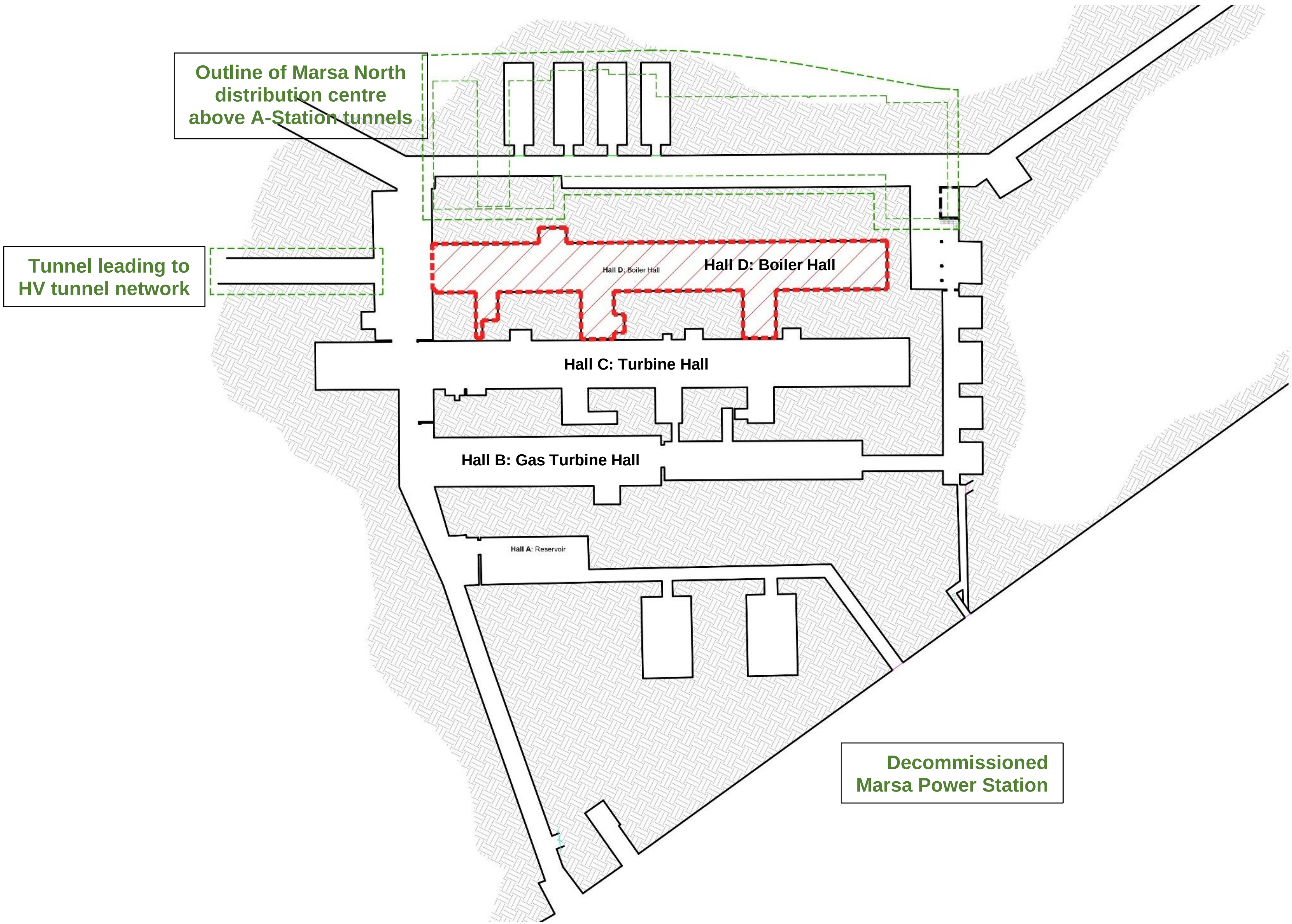


Figure 17*: Preliminary layout plan within the Boiler Hall of the A-Station*


Outline of Marsa North distribution centre above A-Station tunnels
Tunnel leading to HV tunnel network
Hall D: Boiler Hall
Hall D: Boiler Hall
Hall C: Turbine Hall
Hall B: Gas Turbine Hall
Hall A: Reservoir
Decommissioned Marsa Power Station

The final solution for the design and layout of the BESS will be determined in due course, once the detailed analysis and design of the BESS facility are concluded following the completion of the Cost Benefit Analysis and the feasibility study of such project. Additionally, more detailed surveys and field investigations are to be undertaken to provide necessary design data.

It is understood that any interventions that will affect the Scheduled A-Station tunnel complex will require the submission of a Restoration Method Statement (RMS) to standard Terms of References as issued by the relevant competent authority. Any changes to the proposal which would require physical intervention would necessitate the submission of the Restoration Method Statement.

5.3 Technology Adopted

The technology to be adopted shall be studied by the Consultant to be employed by ICM (a call for offers through an open tender procedure has been issued recently) who will consider the state of technology and future trends, costs and market availability. The evolving nature of the technology means that a definitive optimum battery type and converter technology will be decided at a later stage and before a competitive call for tenders of the EPC project is issued.

Currently the preferred battery technology available is Li-Ion. These batteries are used widely as an energy storage technology because of their high energy density and charge/discharge cycle fatigue resistance. Li-Ion cells consist of one positive electrode (e.g. Lithium Cobalt Oxide, Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt Oxide and other chemistries) another negative electrode (e.g. Carbon), a separator which keeps the electrodes apart while conducting ions, and an electrolyte to conduct the ions (usually Ether, an organic compound derived from hydrocarbons). Li-Ion batteries have a fast response time which makes them preferable for power application in grid-scale deployment, especially when RES penetration is high, and if the Maltese network is islanded.

The final selection of the appropriate battery chemistry and arrangement will consider:

a. Performance:
   - (i) Power rating
   - (ii) Optimum state of charge range – considering number of cycles per day and depth of discharge likely to be needed
   - (iii) Self-discharge rates
   - (iv) Cell losses – through heat generated which affects system efficiency and cooling considerations
   - (v) Rest periods required after the cycles, and
   - (vi) End-of-life condition

b. Safety:
   - (i) Mechanical integrity

(ii) Fire-risk assessment considering likelihood of thermal runaway and specific fire safety requirements
(iii) Emissions – no process emissions are envisaged (air or water leakage), however some noise is generated from the cooling systems and transformers.

A BMS suitable for the type of battery chosen will be provided to ensure battery longevity and safe operation.

There are various types of PCS technology that could be adopted for the BESS project. The call for competition will specify the requirements of the quality (magnitude and harmonic content) of the voltage generated by the converter at its point of connection with the Maltese grid, operational requirements and performance, and the bidders are expected to offer their most cost-effective topologies meeting the specification whilst taking into account various considerations including the number of components (semiconductors and wound components), overall conversion efficiency, switching frequencies, filtering, battery characteristics, and cooling requirements. BESS manufacturers offer various solutions that could be used for this Project and the final choice of converter type will only be made at a later stage.

5.4 Fire and safety considerations

In view that the BESS will be installed underground we should consider:

5.4.1 Mitigation measures and systems

- Install systems to monitor the performance of the individual battery cells and shut down the battery system in case of operating outside the limiting criteria including over-charging and over-discharging, exceeding temperature limits, short circuits, etc.
- Provision of suitable ventilation

5.4.2 Detection systems

- Installation of the below mentioned systems assist with the prevention of a potentially catastrophic failure by setting off local and remote alarms, alerting the operators and initiating specific mitigating measures including the shutting down of faulty operating battery cells:

  a) gas detection systems
  b) smoke detection alarms and systems
  c) heat detection systems

5.4.3 Containment response measures

- In view that the BESS will be installed underground, fire suppression using argonite or similar for each container should be considered.
- The fire and safety plan will be prepared by a specialist and discussed with the CPD so as to include their recommendations.
- Standard Operating Procedure shall be prepared and put in place in the eventuality of a fault in the BESS facility or 'thermal runaway'.

5.4.4 Design considerations

- Grouping of containers using fire or smoke barriers to limit the spread of fire should it occur and is not suppressed by primary systems.
- Preparation of pipework from outside into tunnels (through Fishermen Street or Church Wharf) to circumvent limitations of fire engine access. One should keep in mind the need to use water to cool the batteries if the batteries experience thermal runaway and temperatures rise out of limits.
- Materials to be used for cables, transformers, switchgear, paint etc. are to be selected so that they will lower the possibility of ignition, limit the spread of fire, reduce the amount of smoke and its toxicity.
- Fire escapes – there are exits to Fishermen Street, Flour Mills, Church Wharf, and Mosta-Qormi Tunnel

6.0 Work life of the project

6.1.1 Commissioning and Operation phase

Training for personnel working on BESS facility shall cover mechanical and electrical operation and maintenance training topics.

6.1.2 Inspection and Maintenance phase

The required maintenance works will be carried out according to the recommendations brought forward by the suppliers/manufacturers, ensuring good engineering practices. This will result in a cost-effective strategy that will ensure the BESS facility's optimal energy efficiency performance.

Use of maintenance records that integrate maintenance management programmes is a requirement at the facility. Common and fundamental replacement parts should be ordered and stored to ensure a reduced downtime of operations when any engineering system breaks down.

Regular service checks and upkeep of the facility components and associated equipment shall be carried out in accordance with good housekeeping practices for such energy storage systems.

Adopting a predictive maintenance approach which involves the monitoring of the various BESS components for changes in operating parameters that may be indicative of a pending fault. Such changes indicate the need for maintenance while the fault is still recoverable and prevent potentially catastrophic failures from occurring. Hence, predictive maintenance prompt intervention.

Predictive maintenance will be adopted along with routine maintenance.

Preventive and predictive maintenance are mature concepts for operational systems in the industry. Operators are to complete preventive maintenance on a routine basis (weekly, monthly, annually, etc.) based on average or expected lifetime statistics for BESS components.

6.1.3 Decommissioning and End-of-Life phase

The proposed BESS facility project has an estimated lifespan of 10 to 15 years. Although the proposed development does not envisage any permanent works on site except for the construction of the foundation and associated cable trenching. All other components are demountable or removable, a decommissioning plan will be prepared in the eventuality that the BESS facility is considered for complete termination. However, in view of the componentized nature of battery energy storage systems, it may be considered that only the parts of the system that reach their end of lifespan need to be replaced.

In the eventuality that the BESS facility operator decides to terminate the operations, a decommissioning plan will be prepared, describing how to dismantle the infrastructure and restore the site to a condition suitable for future land use. Normally, much of a plant is recyclable, minimising waste to landfill.

The decommissioning plan will include an outline for the following activities:

a) Shutting down and removing system from service.
b) Disassembling, removing, and transporting off-site system components.
c) Disposal, reuse, and/or recycling of BESS facility components.
d) Site restoration and remediation, if necessary.

7.0 Indicative Timing of the Project

The current indicative project timelines are shown below:

Description	Indicative Timeline
Geotechnical Sampling and Analyses:	Q2 2023
Preliminary BESS Design and Configuration Layout	Q2 2023
Submission of Development Permit Application	Q2 2023
BESS facility Detailed Design	Q1 2024
Publication of EPC Tender	Q2 2024
Award of EPC tender	Q3 2024
EPC Design of BESS facility	Q4 2024
Civil Works	Q2 2025
Manufacture of Equipment	Q4 2025
Delivery and Installation	Q1 2026
Testing and Commissioning	Q1 2026
Start of Operation of BESS facility	Q2 2026

The above is a high-level estimate of the duration and is based on a number of assumptions including the duration of regulatory planning process, the approval of the application and any other studies requested by the competent authorities.

8.0 Alternative uses, technologies and locations for the project.

8.1 Alternative Technologies Considered

The most important energy storage technologies are:

8.1.1 Pumped hydro

Pumped hydro storage constitutes c.96% of total energy storage and power capacity and is commercially mature technology but is site specific and not applicable to Malta.

8.1.2 Thermal

Thermal energy storage applications are, at present, dominated by CSP plant, with the storage enabling them to dispatch electricity into the evening or around the clock. Molten salt technologies are the dominant commercial solution deployed today and they account for three-quarters of the globally deployed thermal energy storage used for electricity applications. CSP plants require vast areas of land and thermal energy storage on a grid-scale is not currently practical in Malta.

8.1.3 Electromechanical

The most important technologies used are compressed air and flywheel storage. A small number of installations worldwide have been installed, some of which utilise underground (e.g. salt) caverns and possess large values of stored energy.

8.1.4 Electrochemical

This is the most rapidly growing market segment although its current penetration worldwide is still small. Lithium-ion (Li-Ion) batteries account for the largest share of operational capacity and there are small contributions from NaS and flow batteries. The cost of Li-Ion batteries has fallen substantially in the last 10 years and have made them attractive for use in stationary grid-scale applications. Their efficiency, modularity, improvements in battery management and electrical conversion equipment have made batteries the most applicable technology for this project. Although a final decision has not yet been taken on the choice of battery technology to be used at DPS, it is likely that Li-Ion batteries will be employed.

8.2 Alternative Locations Considered

ICM has explored and analysed alternative locations around the Maltese Islands that have the potential to allow for the installation of a BESS facility in the short term, with a view of enhancing the choice of sites in a bid to eliminate potential risks and delays in the timely implementation and commissioning of the same BESS facility.

Risks identified include:

- Sites not close to major electrical infrastructure where bottlenecks are to be addressed.
- Sites not already planned for electrical infrastructure thus compromising further land.
- Procurement and implementation delays.
- Delays in securing rights and/or titles over potential sites.
- Delays in obtaining permitting for the installation and operation of the installation.

In an attempt to expediate the choice of adequate sites and use areas already earmarked for energy infrastructure, ICM in consultation with Enemalta, explored already Enemalta owned sites and analysed their potential in allowing for a BESS installation within their site extents without jeopardizing any future development.

For the purposes of site analysis, the following criteria were deemed to be relevant:

- Addressing bottlenecks
- Accessibility to the electrical infrastructure and transmission facilities
- Site extents and size
- Zoning of the area – site should be away from residential and touristic areas, and free from archaeological deposits, agricultural activity and sensitive ecological areas
- Local Plan policies
- Location vis-à-vis other site installations
- Site Limitations
- Visual Impact
- Known structural capabilities and/or limitations
- Ease of accessibility
- Technical limitations and restrictions
- Adequate circulation space
- Interference with known existing infrastructure

A high-level analysis of a number of Enemalta owned sites was performed including (i) existing power generation sites, (ii) existing Distribution Centres, (iii) sites within decommissioned power stations.

The proposed Scheme site is deemed as being one of the most suitable sites and selected for this project in view that it fulfils the main criteria outlined above, and provides a number of advantages, mainly the following:

- **Size**: the size of the alternative sites did not have adequate space for the installation of the numerous components needed within a BESS facility
- **Ownership**: Enemalta, as the local DSO, already has a title over this site
- **Nature of Site**: being within a decommissioned power station, the site is already committed for industrial use and has a history associated with electricity and the energy industry.
- **Layout**: the layout of the site being considered is adequate for the installation of modular components
- **Ventilation**: ventilation necessary for such a BESS facility can make use of the inherent vents already cut in rock, which used to serve the same purpose in the past.
- **Site Security**: due to the inherent site characteristics, site security is an intrinsic characteristic of the A-Station tunnel. Additionally, site security is provided for and controlled by existing Enemalta plc security personnel.
- **Location**: A-Station is under the Marsa North distribution centre, an existing and a major electricity distribution node with which the BESS facility can connect with. Additionally, the A-Station is also connected with the tunnel network used for electricity distribution around parts of the Maltese Islands.
- **Ambient temperatures**: given that the tunnels are excavated within rock and provide stable ambient temperatures, it is anticipated that the cooling equipment and power required will be marginally less than in similar setups.

Considering the environmental, social, economic and technical issues, the proposed Scheme site within the A-Station tunnels is deemed to satisfy the abovementioned criteria and an adequate location for the development of the proposed project.

9.0 Number of employees in Each Phase of Development

9.1.1 Construction Phase

At this early stage, it is not possible to give details of the number of contractor employees who shall be engaged during the construction and testing phases of the project. This shall be determined at a later stage.

9.1.2 Operational Phase

There shall be no employees permanently manning the BESS facility within the A-Station during the operations phase. Operations shall be carried out remotely from the existing control rooms situated at the national Network Control Centre at Marsa or Delimara Power Station's control room. However, maintenance, repair and occasional switching operations shall be carried out on site.

10.0 Raw Material, Energy, Waste, Emissions and Machinery used during the Construction and Operation Phases

10.1 Waste Management

Excavation is expected to be minimal in order to reduce the excavation waste generated by this project. No excavation works are expected to take place during the construction and operational phase of this project.

Given that the various units will be manufactured off-site and only brought to the site in a finished or semi-finished manner, it is expected that on-site procedures will only involve assembly. Thus, it is expected that there will be very little waste generated on-site.
There will be no waste generation during the operational phase of the scheme.

Nonetheless, any waste generated during both the construction and operational phases, waste collection and segregation will take place on-site and stored into appropriate segregated containers and bundled in a waste dedicated place. Waste for disposal or recycling will be collected by a certified contractor to be disposed of at appropriate locations.

The management of waste must adhere to the Waste Management Regulations as published by L.N. 22 of 2009 and L.N. 184 of 2011. Adequate waste management strategies and environmental impact mitigation measures must be in accordance with S.L. 549.63 on Waste Regulations 2011 that regulates Waste Management Plans, Permits, and Controls in Malta, and L.N. 337 of 2001 and the Environment Protection Act 2011.

10.2 Odour emissions

No odour emissions are expected as a result of normal BESS operation. Nonetheless, in the event of a fire or an explosion, noxious fumes could be emitted. In this instance, and as a precaution, adequate separation and ventilation taking care of at design stage would become even more important for such an internal BESS facility.

10.3 Noise emissions

Temporary and short-term noise generated during construction phase. To mitigate these impacts, the construction phase will abide with the Environmental Management Construction Site Regulations.

During the operation stage, the BESS facility is not expected to generate any type of noise disturbance.

In the case that any part of the BESS equipment and components are causing unexpected high levels of noise, the owner/operator will be responsible to take the necessary actions to reduce the noise impact including fixing the machinery as soon as possible or provide necessary noise abatement equipment.

10.4 Equipment and Machinery

The construction/installation phase will require the use of heavy machinery, which are expected to include low-loaders, delivery trucks/vans, fork lifters, Heavy-Good Vehicles, mobile cranes (amongst others).

No machinery is deemed as necessary during the normal operation phase of the BESS facility. In cases of repair and/or replacement of failed components within the site, machinery expected to be used are cranes, trucks and fork lifters.

10.5 Raw Materials

The raw materials required during the construction phase of the proposed Scheme are not yet known at this stage. Nonetheless, the main materials that are required to commission this BESS facility will be chosen to have minimal on the environment.

Due to the limited space on site and due to the access restrictions within the Scheme site, the majority of the components will be manufactured and stored off site. Once they are brought onsite, they will be installed in their permanent place immediately.

11.0 Access and Parking Requirements

11.1 Access

The Scheme site within the 'A' Station can be accessed/exited from the following points:

Access points	Co-ordinates
Il-Moll tal-Braken	35°52'58.3"N 14°29'57.0"E
Triq Fra Diegu onto Triq is-Sajjieda	35°53'00.5"N 14°29'47.9"E
decommissioned Marsa Power Station	35°52'54.1"N 14°29'49.2"E

Additionally, the A-Station tunnel is also connected with Enemalta's existing tunnel network through the tunnel excavated by PA/02968/13 and PA/03594/16.

During the construction / installation phase, the access tunnel connected with Triq Fra Diegu is expected to be used due to the adequate widths and headroom of this tunnel for the size of equipment deemed necessary for the BESS facility. Closure of roads may be necessary during the delivery of large equipment that will need to make use of Triq Fra Diegu, Triq is-Sajjieda and il-Moll tal-Hatab.

During the construction phase, access shall be required for the construction, installation, testing and commissioning.

The proposal does not warrant alternative arrangements in terms of transport.

Furthermore, no visitors are expected to visit the site except for educational purposes. The existing access arrangements will remain unchanged.

Furthermore, the equipment intended to be installed on site shall be transported through the available access tunnels/passageways using adequate transportation equipment. The installations shall be assembled on-site unless a method is identified which allows the transportation of the same equipment within the site without affecting the A-Station tunnels/walls.

11.2 Parking

No additional parking requirements are considered necessary with the construction and commissioning of this installation. The existing parking facilities are deemed sufficient. This can be confirmed at a later stage.

11.3 Effect on Road Network

The existing infrastructure can adequately accommodate the construction vehicles and the delivery or equipment on site.

No significant additional traffic is being anticipated to and from the site. Thus, the scheme will not cause capacity issues or any noticeable impact on the existing road network leading to the site. In view of this, this development does not require a Traffic Impact Assessment (TIA).

12.0 Long Term Developments

It is being assumed that the proposed BESS facility would be operational for at least 10 to 15 years. During its lifetime, this BESS facility may be further enhanced and upgraded with additional components, subject to space availability or new technology.

After the operational period, the proposed installation will be either decommissioned or upgraded with up-to-date technology:

12.1 Scenario 1: Decommissioning of the project

The proposed development does not envisage any permanent works on site. All other components are demountable or removable.

12.2 Scenario 2: Upgrading of the Project

The battery energy storage system industry can provide a scenario were upgrading of the system may be possible and feasible. In this regard, the proposal foresees for this eventuality and the supporting structure is easily demountable and can be reconfigured as dictated by future technological requirements.

13.0 List of major environmental impacts and mitigation measures

Notwithstanding the fact that the proposal is deemed to be an acceptable use, the proposal would only be considered favourably if it does not give rise to overriding adverse impacts.

The potential for adverse environmental impacts associated with similar Battery Energy Storage Systems and that are likely to be associated with the Scheme are being identified in this report. Adequate mitigation measures to address such impacts are also be listed. These and may serve as an initial scoping assessment in the context of S.L. 549.46.

13.1 Impacts and Mitigation Measures

A preliminary list of the potential environmental impacts arising from the project is shown in table below.

Features Potentially Impacted	Description of Potential Impact	Mitigation Measures
Land use	Being located underground within tunnels previously used for energy related uses, the Scheme is not expected to change the land use of the site. Additionally, heavy construction practices are not envisaged in this Scheme. The type of installation allows ease of reversibility. Thus, long term effects on land use are minimal to none.	None required.
	The partial redevelopment of part of the A-Station tunnel to provide storage of electrical energy generate from 'green' renewable energy sources is deemed to have a moderate beneficial impact.	None required.
Sea use	No sea use impacts are expected to be generated with the proposed project	None required.
Marine Environment	No impacts to the marine environment are foreseen.	None required.
Terrestrial Ecology	No impacts to terrestrial ecology are expected since all works shall be carried out within an area predominantly used for industrial purposes for the last 70 years.	None expected.

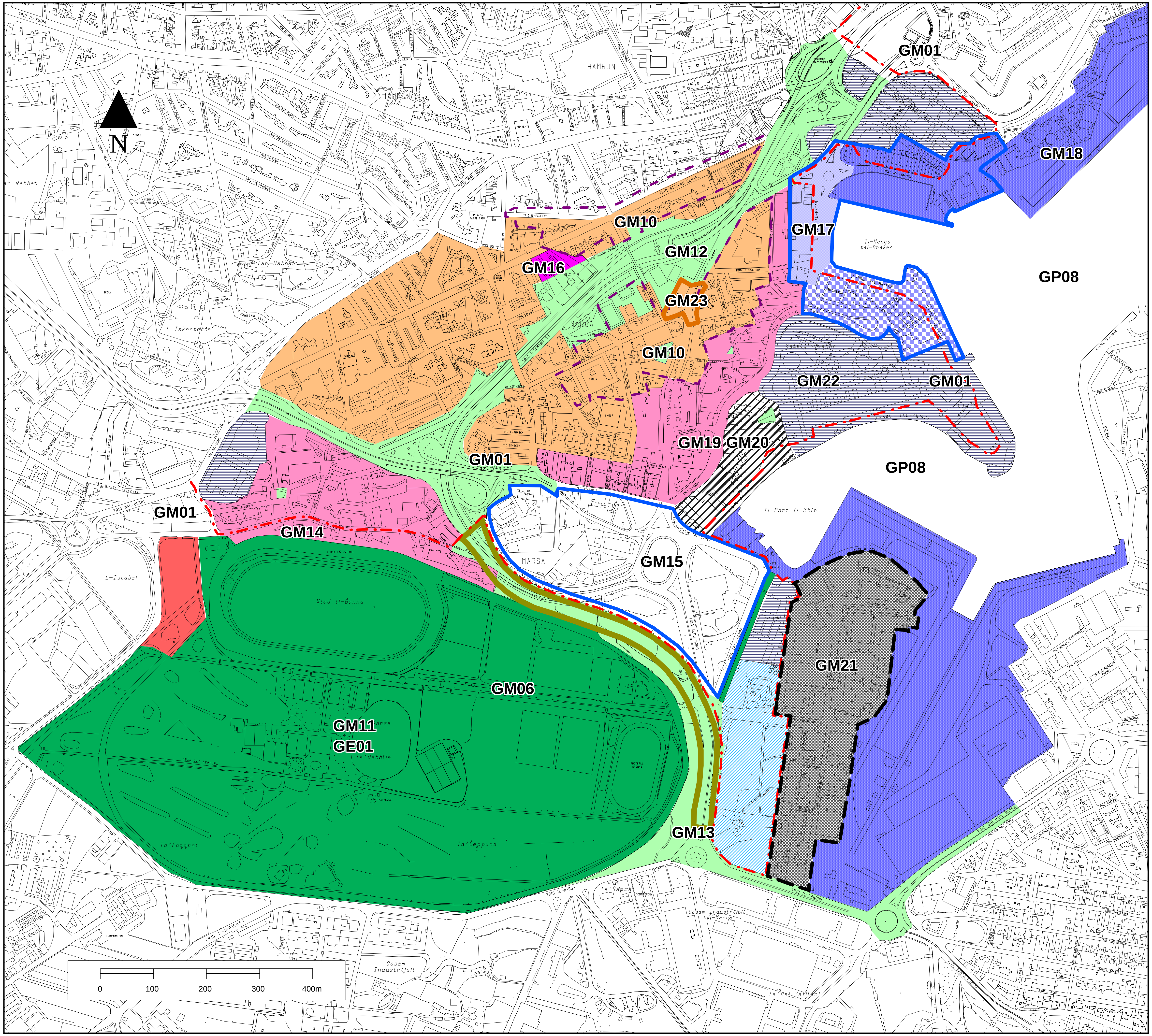
Features Potentially Impacted	Description of Potential Impact	Mitigation Measures
Agriculture	No impact on agriculture from the proposed development.	None required.
Cultural Heritage	BESS facility equipment envisaged is floor mounted and no effects on the tunnel fabric is envisaged. Impacts on the scheduled Grade 2 'A-Station' are likely to be negligible, localised to the hall being used and reversible once facility is removed.	Consultation with SCH throughout the planning application process and during the installation phase and ensure that SCH conditions are adhered to.
Geology, Geomorphology, Hydrology, Hydrogeology	The proposed development will not be having any significant impact on the geo-environment of the area, since no heavy construction and excavation works are required.	None required.
	No contamination of groundwater is expected as a result of the operation of the BESS installation.	None required.
Landscape character and visual amenity	All works will be carried out within an area with predominant use as an industrial and utility related uses dedicated to energy generation and distribution.	None required.
	No impacts on the landscape and visual amenity of the area are expected in view that the Scheme is being proposed within an underground enclosure. No added buildings are envisaged. Overall, the impact is negligible to non-existent.	None required.

Features Potentially Impacted	Description of Potential Impact	Mitigation Measures
Air quality	Minor negative impact on air quality and possibly dust emitted during the construction/ installation phase. These potential impacts are likely to be short term, temporary and localised. They can be reversible	Proper adherence with the current Environmental Management Construction Site Regulations, dust impacts during construction / installation phase can be limited.
	Fire or explosion within this contained BESS facility can have noxious emissions resulting in an adverse, localised and temporary impact within the enclosed space.	Include adequate measures at design stage to reduce the possibility of fires and explosions and to ensure that, should a fire or explosion occur, the amount of possibly noxious emissions that could escape to the surroundings will be minimised.
	Reduction in the effects of variability and intermittency caused by RES, thus permitting the operation of conventional plant in a more stable manner, reducing plant emissions, reducing the use of fossil fuel and saving CO_2 emission. This impact is deemed to be beneficial with widespread effects and on a permanent basis.	None required.
Noise	Temporary and short-term noise generated during construction phase.	Abiding with the Environmental Management Construction Site Regulations.
	During the operation stage, the BESS facility is not expected to generate any type of noise disturbance. Nonetheless, faulty equipment may propagate noise within such a confined space.	None required. Take the necessary actions to reduce the noise impact including fixing the machinery as soon as possible or provide necessary noise abatement equipment.
Waste Management	The severity of the impact will depend on the quantities waste generated, which are currently unknown. However, it is	Compliance with all relevant waste management regulations

Features Potentially Impacted	Description of Potential Impact	Mitigation Measures
	expected that there will be very little waste generated on-site in view that the various components will be manufactured off-site and only brought to the site in a finished or semi-finished manner. Thus, it is unlikely that there will be any impacts.	and the adoption of best practice in relation to both construction and operational waste management. Where possible any waste material should be re-used on site to limit the volumes of waste that needs to be disposed of to the landfill.
Health, Safety, Fire and Explosion Risks	Being in an underground and contain space, any fire and explosion occurrences can have devastating adverse impacts.	Ensure that all safety measures are in place. Adequate battery management systems, fire detections, alarms and suppressions systems are put in place.
	Hazards to operating personnel while carrying out routine maintenance or regular checks in case of fire or explosion. Impacts can be adverse, with high severity and permanent, with an uncertain probability of occurrence.	Standard Operating Procedure shall be prepared and put in place in the eventuality of a fault in the BESS facility or 'thermal runaway'
		Provision of fire escapes through existing tunnels to Fishermen Street, Flour Mills, Church Wharf, and Mosta-Qormi Tunnel.
Wastewater	No wastewater is expected to be generated during operations phase. Any water used during the operational phase as part of the potential fire suppression system can become contaminated. The impact expected to be moderately adverse, with a remote probability of occurring.	Potentially contaminated water used as part of the fire suppression system shall be collected, treated and disposed in approved methods.

Features Potentially Impacted	Description of Potential Impact	Mitigation Measures
Transport and traffic	Additional trips on the local transportation network during construction and commissioning phase.	Implementation of a construction traffic management plan as part of the Construction Management Plan (CMP).
	Delivery of large modular equipment through local roads and A-Station tunnel can have a minor, adverse and limited effect on contiguous land uses and local roads.	Careful consideration of the access arrangements for vehicular traffic during construction. Planning of delivery routes through adequate roads and provide traffic controlling officers if needed during the delivery of large equipment.

ANNEX 01: Marsa Local Plan Map



GRAND HARBOUR LOCAL PLAN

AWTORITA TA' L-IPPJANAR
PLANNING AUTHORITY

Key

- Urban Development Boundary
- Urban Conservation Area
- Opportunity Area
- Tertiary Town Centre
- Industrial Zone Boundary
- Light Industry
- Zone of Mixed Use
  Excluding Use Classes 12 to 16
  (Use Classes Order, 1994 as amended)
- Public Facilities
- Retention of Existing or more Environmentally Friendly Uses
- Port Related Uses
- Light Port Related Uses
  Excluding Use Classes 12 to 16
  (Use Classes Order, 1994 as amended)
- Residential Zone
- Transport Infrastructure Upgrading
- Site for Home for the Elderly
- Areas of Open Space
  (to retain open space character)
- Site of Scientific Importance
- Offices and Showrooms
  (All existing parking provisions to be catered for)
- General industry with neighbour compatibility

Marsa
Inset Map

Scale : 1:7000

Date : April 2002

Figure : 12

INDICATIVE ONLY
Not to be used for direct interpretation.

GRAND HARBOUR LOCAL PLAN

AWTORITA TA' L-IPPJANAR
PLANNING AUTHORITY

Key

- 2 Storeys
- 3 Storeys / Frontage
- 4 Storeys
- 5 Storey Frontage
- 6 Storey Frontage
- Planning Gain Considerations (Refer to Policy GM02)
- Planning Gain Considerations (Refer to Policy GM10)

Note : Indicated height limitations are subject to General Policy GS01

Marsa
Building Height Limitations

Scale :	Date :	Figure :
1:6000	April 2002	13

INDICATIVE ONLY
Not to be used for direct interpretation.

ANNEX 02: IPPC IP 0003/21 site limits