PA 03862/16 - Refurbishment and repair of quayside structures, including slipways, installation of additional moorings, and dredging operations to facilitate such increased mooring. Mgarr Marina, Mgarr Harbour, Triq Martino Garces, Ghajnsielem, Gozo

PROJECT DESCRIPTION STATEMENT

Version 1 (August 2017)
Report Reference:
Quality Assurance

Refurbishment and repair of quayside structures, including slipways, installation of additional moorings, and dredging operations to facilitate such increased mooring. Mgarr Marina, Mgarr Harbour, Triq Martino Garces, Ghajnsielem Gozo.

Project Description Statement
August 2017

Report for: Transport Malta

Revision Schedule

<table>
<thead>
<tr>
<th>Rev</th>
<th>Date</th>
<th>Details</th>
<th>Prepared by</th>
<th>Checked by</th>
<th>Approved by</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Aug 2017</td>
<td>Submission to client</td>
<td>Adrian Mallia</td>
<td>Krista Farrugia</td>
<td>Rachel Xuereb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Director</td>
<td>Senior Consultant</td>
<td>Director</td>
</tr>
</tbody>
</table>

File ref: \Adi-fs\Adi\Active Projects\PDS\TM0019 - Mgarr Harbour\PDS\Mgarr Harbour Product_PDS_FINAL_250817.docx

Adi Associates accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided. Except as provided for by legislation, no person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Adi Associates. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document do not provide legal or tax advice or opinion.

It is pointed out that ISO14001 certification covers the management system only and not the contents of this report.
CONTENTS

Introduction .................................................................................................................................................. 1
Background to the Scheme ............................................................................................................................ 1
Objectives of the Scheme .............................................................................................................................. 1
Description of the Scheme ............................................................................................................................ 2
Location of the Scheme Site .......................................................................................................................... 2
Characteristics of the Scheme Site ................................................................................................................ 4
Description of the area surrounding the Scheme Site ............................................................................. 6
Scheme Description ..................................................................................................................................... 16
Preliminary Baseline Studies ....................................................................................................................... 23
Geotechnical Investigations ....................................................................................................................... 23
Benthic Survey .......................................................................................................................................... 28
Sediment Analysis ..................................................................................................................................... 33
Raw Materials and Resources .................................................................................................................... 41
Dredging method ....................................................................................................................................... 41
Construction works ................................................................................................................................... 42
Waste Management ................................................................................................................................... 43
Construction Phase ................................................................................................................................... 43
Operational Phase ....................................................................................................................................... 44
Employment ................................................................................................................................................ 45
Potential Environmental Impacts ............................................................................................................... 46
Mitigation Proposals ................................................................................................................................... 48

FIGURES

Figure 1: Mgarr Harbour and Fishing Port (red circle) ............................................................................. 2
Figure 2: Location of Scheme site .............................................................................................................. 3
Figure 3: Inter-island ferries ..................................................................................................................... 3
Figure 4: Mgarr Harbour breakwaters ...................................................................................................... 4
Figure 5: Seabed in inner reaches of harbour ............................................................................................ 4
Figure 6: Photos of shore and seabed ....................................................................................................... 5
Figure 7: Pontoons ...................................................................................................................................... 5
Figure 8: Land Uses ................................................................................................................................... 6
Figure 9: Marine Fuel Filling Station ........................................................................................................ 7
Figure 10: Land uses on main road .......................................................................................................... 7
Figure 11: Gnien Migiarro beneath Fort Chambray .................................................................................. 8
Figure 12: Terrestrial Habitats ................................................................................................................... 9
Figure 13: Gozo and Comino Local Plan Protected Areas map ............................................................... 11
Figure 14: Environmental and Cultural Designations ......................................................................... 13
Figure 15: Our Lady of Lourdes Chapel overlooking Mgarr Harbour ......................................... 15
Figure 16: Cluster of old buildings at Mgarr Harbour ..................................................................... 16
Figure 17: Extent of Scheme site .......................................................................................................... 19
Figure 18: Dredging extents .................................................................................................................. 21
Figure 19: Geological Map of the Scheme site ................................................................................... 24
Figure 20: Topography of the Scheme site and its surroundings .................................................. 25
Figure 21: Location of on-shore and off-shore boreholes ................................................................... 26
Figure 22: Area of Survey for Benthic Habitats Study ........................................................................ 28
Figure 23: Infaunal sampling stations .................................................................................................... 29
Figure 24: Benthic habitats map ............................................................................................................ 31
Figure 25: Assemblage of algae on low-energy infralittoral rock .................................................. 32
Figure 26: Assemblage of superficially muddy sands in sheltered waters ........................................ 33
Figure 27: Sediment sampling stations (November 2016) .............................................................. 34
Figure 28: Location of Stations 4 and 5 (March 2017) ..................................................................... 36
Figure 29: Location of Stations for leachability analysis ..................................................................... 38
Figure 30: Proposed Phasing of dredging works ............................................................................... 39
Figure 31: An example of an environmental clam shell dredge .............................................................. 41

TABLES

Table 1: Summary of main drilling works ........................................................................................... 26
Table 2: Estimated amounts of raw materials required ........................................................................ 42
Table 3: Equipment .................................................................................................................................. 43
Table 4: Waste Management ................................................................................................................. 44
Table 5: Employment ............................................................................................................................... 45

APPENDIX

Appendix 1: Schedule of existing pontoon berths and the re-organised berthing system
Appendix 2: Ground Investigations Report
Appendix 3: Benthic Survey Report
Appendix 5: Sediment Analysis Report – March 2017
Appendix 6: Leachability Analysis Report – August 2017
INTRODUCTION

1. This Project Description Statement (PDS) describes a proposal by Transport Malta to dredge the inner parts of Mgarr Fishing Port in order to increase berthing facilities for small boats in this inner north-western part of the Mgarr Harbour (see Figure 1). In addition, the proposal involves the reorganisation of this part of the harbour through the replacement of four existing pontoons and the addition of new berthing / mooring spaces and the upgrading of existing facilities at the fishing port.

2. The project’s overall aim is to produce an integrated, functional, and modern fishing port and its continued use for berthing of fishing and locally-owned boats. The project is hereinafter referred to as ‘the Scheme’.

BACKGROUND TO THE SCHEME

3. The island of Gozo faces a number of realities and challenges mainly originating from its double insularity which may necessitate a more tailor-made approach to address them (Transport Malta, 2017).

4. Mgarr Harbour in Gozo (together with the corresponding Cirkewwa harbour in the north of Malta) is vital for the economic development of the second largest island in the Maltese archipelago. Competition for coastal and berthing space is significant and includes requirements for various coastal uses, including port-related activities (such as fuel storage), aquaculture and recreation, which reflect the need for modernisation of the operations at the harbour.

5. It is envisaged that the reorganisation of the Mgarr Fishing Port will continue to promote and increase the use of Mgarr Harbour to its fullest possible potential.

OBJECTIVES OF THE SCHEME

6. As explained by the applicant, the primary objective of the Scheme is to upgrade the facilities and berthing opportunities in the Fishing Port at Mgarr Harbour. To achieve this, the Scheme will:
   - Reorganise the existing 197 berths in Mgarr Harbour, which are partly operated by the local fishing community and partly by commercial tourist operators;
   - Add pontoons and berthing spaces for a further 57 berths;
   - Improve the quay infrastructure;
   - Improve the quayside facilities (water, electricity, telecommunications);

---

- Upgrade the two existing slipways for use by the fishermen; and
- Encourage the proper environmental use of the facilities (including waste management, emergency response, fire and security).

**Figure 1: Mgarr Harbour and Fishing Port (red circle)**

**DESCRIPTION OF THE SCHEME**

**Location of the Scheme Site**

7. The Scheme site is located in the western / north-western section of Mgarr Harbour on the south coast of Gozo (see Figures 1 and 2). Mgarr Harbour is the main maritime entry point to the island of Gozo, home of the Gozo Channel Company Ltd and its inter-island ferries that make the daily crossings between Malta and Gozo (Figure 3).
Figure 2: Location of Scheme site

Figure 3: Inter-island ferries
8. Mgarr Harbour is a relatively small inlet on Gozo’s southern coast in the locality of Ghajnsielem. The harbour conditions were largely created through the construction of a rubble mound breakwater along the southern side and extending NE-ward from the shore. A secondary breakwater extending SSW provides further protection to the harbour which has an east-facing entrance (see Figure 4).

**Figure 4: Mgarr Harbour breakwaters**

9. The Scheme site is located in the innermost reaches of the harbour. It is characterised by very shallow water ranging from 0 m in the innermost western region to approximately 5 m in the eastern boundary of the scheme site (see Figure 5).

**Figure 5: Seabed in inner reaches of harbour**

10. The shore is mostly made of concrete quays and jetties, with intermittent small areas supporting some sand or mixed coarse mobile sediments. The seabed is composed mostly of soft muddy sediments typical of port environments (Figure 6).
11. The Scheme site also includes four floating pontoons of different lengths, which support various boats of varying sizes (Figure 7).

Figure 7: Pontoons
Description of the area surrounding the Scheme Site

Land uses

12. The Scheme site forms part of the Zewwieqa waterfront that leads from the Gozo Ferry Terminal in the south and skirts round the coastline beneath Ghajnsielem and the Zewwieqa area towards the eastern breakwater.

13. The main land use in the area is also a maritime one and includes the ferry terminal (including the offices, cafeteria, shops, RO-RO ramps, breakwater, quays, marshalling area, parking, passenger terminal, bus stops and taxi stands, etc), boat hard standing and maintenance areas, slipways, quays and jetties, and access points to the marina and pontoons, and boathouses. Other uses include restaurants and pubs, mobile / semi-permanent food kiosks, Customs and Transport Malta offices, public conveniences, a public promenade, public utility infrastructure and public car park (see Figure 8).

Figure 8: Land Uses

<table>
<thead>
<tr>
<th>Ferry terminal</th>
<th>Boat hard standing area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat maintenance area &amp; boathouses</td>
<td>Transport Malta &amp; Customs offices</td>
</tr>
<tr>
<td>Restaurants</td>
<td>Promenade</td>
</tr>
</tbody>
</table>
14. A marine fuel station is located to the south of the fishing port (see Figure 9).

**Figure 9: Marine Fuel Filling Station**

15. Across the road from the port, on the main road leading to and from the ferry terminal, are also a police station, a fuel service station, a car hire outlet, supermarket, more restaurants, garages, and residential buildings (Figure 10).

**Figure 10: Land uses on main road**

17. The most striking natural feature in the area is undoubtedly the afforested hillside of Mgarr leading to Fort Chambray (known as Gnien Migiarro). Covering an area of approximately 45,000 m², this site, which in recent years has been planted with a further 2,300 trees and shrubs, is not only of aesthetic importance but also helps prevent soil erosion (see Figure 11).

**Natural and Cultural Heritage**

**Natural Heritage**

17. The most striking natural feature in the area is undoubtedly the afforested hillside of Mgarr leading to Fort Chambray (known as Gnien Migiarro). Covering an area of approximately 45,000 m², this site, which in recent years has been planted with a further 2,300 trees and shrubs, is not only of aesthetic importance but also helps prevent soil erosion (see Figure 11).
18. Though none of the natural areas are currently designated as protected sites, the areas surrounding the Scheme site support a number of natural habitats, including maquis, coastal and inland cliff (rupestral) communities, trees and woodlands, valleys, boulder screes, watercourses, steppe, and coastal communities (see Figure 12).

**Figure 11: Gnien Migiarro beneath Fort Chambray**

19. Stretches of the coast, especially the coastal cliff and associated screes and steppe are identified as prospective scheduled property in the Gozo and Comino Local Plan (MEPA, 2006) (see Figure 13). The Scheme site itself and the whole of Mgarr Harbour, like the entire coastal waters around Gozo forms part of the Special Protected Area of Il-Bahar ta’ Madwar Ghawdex (see Figure 14).

**Cultural Heritage**

20. The area also supports a number of historically important buildings. The most prominent of these are undoubtedly Fort Chambray (Figure 11) and the Chapel of Our Lady of Lourdes (see Figure 15).

21. Fort Chambray is a Knights’ period fortification built in the mid-eighteenth century (it was completed in 1758). Originally planned to replace the old Citadel, its construction was delayed substantially until it was taken up by Jacques de Chambray, a wealthy knight who offered to build the fortress following his retirement from active service. He did not live to see the fort completed. The plan to build a town inside the fortifications did not materialise; instead over time it was used variously as a barracks, as a mental institution, a hospital and for tourism purposes. In the 1980s, development permission was awarded for the fort to be converted into a residential village. Fort Chambray (and including its Glacis down to the water’s edge) is a Grade I scheduled building (GN 840/05).

---

Figure 12: Terrestrial Habitats
Figure 13: Gozo and Comino Local Plan Protected Areas map

Source: MEPA, 2006
Figure 14: Environmental and Cultural Designations

Legend
- Site boundary
- Environmental designations
- Special Protection Areas
- Cultural designations
- Architecture

Map: Adi Associates Environmental Consultants Ltd

PA/03862/16 - Valid - Daniel Xuereb - on behalf of Environment and Resources Authority - 1/9/17 9:47:49 AM
22. The Chapel of Our Lady of Lourdes stands on a promontory overlooking Mgarr Harbour, from where one can enjoy spectacular views of the Gozo Channel and the Island of Malta. Designed by Emmanuel Luigi Galizia and built by stonemason Wigi Vella of Zebbug, Gozo, the chapel has a Gothic style with a steeply pitched roof, lance windows and a series of buttresses topped with pinnacles. A circular rose window adorns the gable over the main door while, at the other end, a square tower is topped by a tall, slender spire. The tower has a set of five bells and at its top, immediately under the spire, there are four clock faces (Visitgozo.com, 2017\(^3\)). Inside, the chapel has a ribbed Gothic vaulted roof and is dominated by a statue of the Virgin Mary of Lourdes. A statue of the Virgin Mary of Lourdes sculpted by Antonio Busuttil was placed in a natural cavity beneath the promontory in 1879.

23. Other buildings of cultural significance include the cluster of buildings at the port, most of which now house restaurants and pubs or Fisheries Department offices, old boathouses located beneath Triq ix-Xatt (see Figure 16). One of these buildings, a former warehouse (now converted into a restaurant) located in Triq Manoel de Vilhena, is scheduled as a Grade I historic building (GN 8/97). East of Mgarr Harbour are remains of the Knights' Period Zewwieqa entrenchment, a Grade I scheduled military historic structure (GN 729/95) (see Figure 14).

**Figure 15: Our Lady of Lourdes Chapel overlooking Mgarr Harbour**

---

24. No official archaeological records exist from Mgarr Harbour; however, the maritime use of the site for centuries is likely to have produced some deposits, as have been recorded in other ports and harbours on the islands. The shallow nature of the water in the Scheme site is such that side scan sonar and sub-bottom surveys are not possible and the presence of the large number of mooring chains precludes the use of magnetometry. Hence, remote sensing surveys of the Scheme site are not possible and the only approach available to determine the presence or otherwise of any cultural deposits is through monitoring of the dredging works.

**Scheme Description**

25. The Scheme site covers 20,175 m$^2$ in the inner reaches of the Harbour (see Figure 17), in the area occupied by the fishing port. The main works will entail the dredging of an area of almost 10,000 m$^2$ of seabed to increase the depth of the water to -3 m below chart datum (see Figure 18). Approximately 17,800 m$^3$ of sediment are expected to be dredged as part of this project.

26. In addition to the dredging, the four existing pontoons will be removed and new pontoons deployed in their stead to retain the same number of berths (although the boat numbers and location will be reassigned – see Appendix 1). A number of new moorings will also be laid to provide the additional berthing / mooring spaces. The two existing slipways will be renovated to improve the infrastructure, as will the existing quays and jetties. The roadside quays will also be extended outwards by approximately 3.5 m. Street furniture as well as bollards, landscaping, etc will also be installed.
27. The planned activities are as follows:

- **Site preparation and clearing of vessels:**
  - Before works commence, the area will be cleared of existing vessels to facilitate the dredging works. The four existing pontoons and all other paraphernalia will also be removed.

- **Removal of contaminated material:**
  - The areas identified as containing contaminated sediment (see later) will be dredged first by means of eco-grabs and the material transferred to shore for dewatering and landfilling. Approximately 820 m$^3$ of sediment are expected to be dredged in this phase.

- **Construction works of quays:**
  - Since the existing quays are not built on strong foundations (see geotechnical section), before any dredging works can take place close to the existing quays, they need to be protected by sheet piling and infilling / concreting works. Sheet piles will be hammered into the seabed parallel to the existing quays and the gap infilled with fill material and concrete as part of the quay upgrading works. These sheet piles will be retained as part of the final quay structure.

- **Construction dredging from land:**
  - This part of the dredging will be carried out from land and will focus on the areas adjacent to the quays for a distance of approximately 10 m from shore. Since this material is not contaminated (see sediments section below), it will be collected for disposal in the offshore dumping site under ERA’s consignment permit procedures. This dredging will take place in parallel with the quay construction works, with each second dredged following the installation of the sheet piles to protect the quays. Approximately 11,500 m$^3$ of sediment will be dredged in this phase.

- **Marine dredging works:**
  - This will involve the dredging of the rest of the Scheme site down to design depth (-3 m CD). This dredging will take place from floating craft. A backhoe or suction dredger will be used for this purpose (depending on tendering / contractual agreements). The sediment so dredged will be transferred to hopper barges and disposed of at the offshore dumping site under ERA consignment permit procedures. Approximately 5,500 m$^3$ of sediment will be dredged in this phase.

- **Replacement of pontoons, addition of moorings and finishing works:**
  - In this final phase of the Scheme works, the pontoons and moorings /
berthing equipment will be laid and the planned services installed and other finishes completed for the Scheme to commence operations. The sinkers currently holding the four existing pontoons in place are expected to be re-utilised within the Scheme but chains, ropes and other equipment will likely be replaced.
Figure 18: Dredging extents
PRELIMINARY BASELINE STUDIES

28. In order to support this development permit application, Transport Malta has commissioned a number of studies to supplement the current PDS. A number of studies have already been undertaken to date, including geo-technical investigations, benthic study, and sediment analysis; a water quality study will be undertaken in the coming weeks following award of a tender. The following sections describe the surveys undertaken and summarize the findings of each study.

Geotechnical Investigations

29. The Ground Investigations were undertaken by Solidbase Laboratory Ltd. The main objective of the investigations was to determine the geological profile of the site and to characterise the ground materials. The investigations followed BS 5930:1999 “Code of practice for investigations”. In situ and laboratory testing followed BS 1377:1990 “Methods of tests for soils for civil engineering purposes” and the relevant ISRM suggested methods. The investigations included:

- Drilling of seven on-shore boreholes with core recovery to a maximum depth of 13 m;
- Drilling of eight off-shore boreholes with core recovery to a maximum depth of 7.5 m below sea level;
- Eighteen Standard Penetration Tests at various levels within some of the boreholes; and
- Various laboratory tests (including shear strength profile, particle density, pore pressure measurement, etc).

30. The Ground Investigation Report is included as Appendix 2 to this PDS.

Geological setting

31. As shown in Figure 19, the site is mostly underlain by the Blue Clay Formation, which also forms the surrounding terraced land, including the agricultural fields. On the higher coastal ground, the site is surrounded by outcrops of the Upper Coralline Limestone which sits atop the Blue Clay Formation and also forms the boulder screes in the region.

---

Figure 19: Geological Map of the Scheme site

Source: Oil Exploration Department, 1993

**Topography**

32. The Upper Coralline Limestone outcrop exists at varying heights around the Scheme site, indicating that the area is traversed by one or more fault lines. These are shown on **Figure 19** as a series of WSW-ENE trending fault lines that define the north-western boundary of the graben that created the Gozo-Comino Channel. These faults continue to the north of the site and are responsible for the considerable topographic relief present in this area. **Figure 20** illustrates the various valleys surrounding Mgarr harbour. The main valley is Wied Imgarr located immediately to the west of the Scheme site; a smaller tributary exists to the north. The large thickness of the Blue Clay Formation results in landslides as wave action at the foot of the clay slope undermines the overlying Upper Coralline Limestone crust forming...
a mass of remoulded clay and coralline limestone boulders that are transported as colluviums to the sea level. The Scheme site is the receiving basin of these various geological processes.

**Figure 20: Topography of the Scheme site and its surroundings**

![Topography of the Scheme site and its surroundings](Source: Solidbase Laboratory Ltd, 2017)

**Ground investigations**

33. A total of fifteen boreholes with core recovery were drilled (see Figure 21). **Table 1** provides a summary of the data for these boreholes. The description of the drilling works, the tests undertaken, as well as the borehole logs and photos are include in the report reproduced as **Appendix 2**.

34. A total of six main strata were retrieved from the Scheme site (not all strata were identified in every borehole). These were:

- Man-made concrete;
- Man-made fill;
- Valley deposits;
- Seabed deposits;
- Colluvium; and
- Blue clay.