

## Environment Impact Assessment (EIA) Report

### **PA 04929/09: Storm water tunnels and other infrastructural works as part of the National Flood Relief Project (NFRP), with proposals for the areas of Ħaż-Zabbar and Marsaskala; with a discharge point at Xgħajra, as outlined in the Cost-Benefit and EIA studies and Technical Assistance reports and other documents prepared by Politecnica**

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#### **1. INTRODUCTION**

The Malta Environmental and Planning Authority (MEPA) requested an Environmental Impact Statement (EIS) to support PA 04929/09: *Storm water tunnels and other infrastructural works as part of the National Flood Relief Project (NFRP), with proposals for the areas of Ħaż-Żabbar and Marsaskala; with a discharge point at Xgħajra, as outlined in the Cost-Benefit and EIA studies and Technical Assistance reports and other documents prepared by Politecnica*, as per Schedule IA, Categories 2.5.1.2 and 2.6.1.2 of the EIA Regulations, 2007 (L.N. 114 of 2007). The application is for a full development permission.

The EIS included a description of the project and its surroundings, relevant legislation and policies, an assessment of impacts and a description of mitigation measures, as required by the Terms of Reference. The EIS was co-ordinated by Dr Paul Gauci (Politecnica) and Aldo Coltellacci [Studi e Pianificazione del Territorio (SPT)].

#### **2. THE PROPOSED DEVELOPMENT**

The National Flood Relief Project (NFRP) is intended to attain the following objectives:

1. The prevention or minimisation of the adverse impacts of flash floods caused by heavy storms (5-years recurrent storms) in specific flood-prone areas; and
2. The promotion of options for storm-water harvesting.

The NFRP is intended to put into practice the general principles established in the Storm Water Master Plan for the Maltese Islands (SWMP), which was completed in 2008 by the Israeli consultants TAHAL.

This EIS considers the section of the NFRP, which covers the Marsaskala catchment. The proposed project consists of a tunnel which follows an L-shaped route (as per Figure 1-0 in the EIS Coordinated Assessment Report) to divert run-off from Ħaż-Żabbar and parts of Triq Wied il-Għajn to the northeast-facing coast, specifically at Ta' Barkat (limits of Xgħajra) near the sewage treatment plant. The tunnel shall be fed by a system of interceptors which will provide for the first-flush treatment of the flood waters. The separators used in such installations shall also be capable of grit separation. The tunnels shall be bored in Lower Globigerina Limestone and Lower Coralline Limestone and shall be lined with fibre-reinforced spritz-beton (*i.e.* shotcrete). The shotcrete lining is mainly intended to improve the efficiency of the tunnels, while protecting underground water deposits from the contaminated runoff that passes through the tunnel.

The dimensions of the proposed system will be catering for a project flow of 1-in-5 years recurrent storm, ensuring that the depth of the run-off in the effected streets will not surpass the 10cm mark. The principal tunnel has been designed to divert to Ta' Barkat, 12.55m<sup>3</sup>/s of the 21.50m<sup>3</sup>/s that would presently pass through Marsaskala on its way to the sea (Il-Port ta' Marsaskala). The remaining 8.95m<sup>3</sup>/s will be intercepted along the way by means of existing, upgraded and/or new culverts and discharged into Il-Port ta' Marsaskala. The route of the tunnel shall where possible, pass beneath existing roads and will have a minimum cover of 4m in order to bypass underground infrastructural works. This approach would also exclude the possibility of surface properties being damaged by the excavation works.

#### **2.1 LOCATIONS OF SHAFTS AND DISCHARGE OUTLET**

The construction of the tunnels shall require two access shafts (as per Figure 1-6 in the EIS Coordinated Assessment Report). These shall be used for the extraction of excavated material, and the storage of raw materials and waste. During operations, both shafts shall be used as access points for maintenance work. Shaft A will be located adjacent to the Ta' Barkat STP and Shaft B *circa* 60m from the southern periphery of Ħaż-Żabbar.

The Xgħajra discharge outlet shall take a conventional geometrical form and shall consist of reinforced concrete to ensure that it will withstand the rough waters characterizing the Xgħajra coast.

## 2.2 ALTERNATIVE LAYOUTS

The first draft of the EIS studied four alternative layout technical options illustrated in Figure 1-23 to Figure 1-27 of the EIS Coordinated Assessment Report. These options were assessed by means of a Multiple Criteria Analysis and it was concluded that Technical Option 3 was the best way forward for the layout of this project.

Technical Option 3 (Figure 1-26) involves the construction of two shafts:

- Shaft A will only act as an access point to the tunnel during both the construction works and operations. The location of Shaft A takes advantage of the presence by the coast of the access facility to the Ta' Barkat STP. This shaft is to form part of the same structure of the said access facility.
- Shaft B would be located in the same site as the Shaft Bs of the technical options 1 and 2. The tunnel passing beneath Triq Wied il-Għajn from Ħaż-Żabbar (south) would take a left turn underneath the said country road to the discharge outlet located near Il-Ġorf tal-Blata l-Bajda, a short distance away from the point on the shoreline where the Ta' Barkat STP outfall is expected to be sited. The TO3 system was designed to divert to the eastern coast  $12.55\text{m}^3/\text{s}$  of the  $21.5\text{m}^3/\text{s}$  which normally ends up in Marsaskala. This system shows an efficiency of 58.36%.

The discharge outlets pertaining to all the technical options studied, are located within the coastal strip which is designated an Area of Ecological Importance (AEI) and a Site of Scientific Importance (SSI). For this reason, the EIA Coordinator deemed it logical for the location of the discharge outlet to be as close as possible to the STP and its outfall in order for the disturbance to the area in question to be localised and contained within an already-compromised spot.

Following the review of the first draft of the EIS, MEPA concluded that this study was not exhaustive and did not assess all the possible options. In this regard, MEPA requested that other alternative layouts are to be determined and addressed in the multi-criteria analysis (MCA). This also addressed a request made by the Xgħajra Local Council during the Review Consultation Process. In this regard, the MCA was updated to include and assess two other technical layouts:

- Technical Option 5, illustrated in Figure 1-3 of Appendix 10b of the EIS Coordinated Report; and
- Technical Option 2' (or 6), illustrated in Figure 1-4 of Appendix 10b of the EIS Coordinated Report.

The conclusions of the updated MCA matched the initial conclusions, which identified Technical Option 3 as the best layout for this project against all assessment criteria. In effect, Technical Option 3 scored a total of 8.3 points, while the other options scored as follows:

TO1 - 7.9 points; TO2 - 7.1 points; TO4 - 6.2 points; TO5 - 4.8 points and TO2' (or 6) - 2.7 points.

As part of the review comments, MEPA had pointed out that another alternative that should be considered as a plausible solution to the flooding problem is the upgrading of the existing culverts, together with the upgrading and/or expansion of the existing dam system at Wied il-Għajn valley and catchment management. MEPA had requested a sound justification as to why this alternative was omitted from the MCA study.

The EIS Coordinator stated that the existing  $5000\text{m}^3$  reservoir did not have the capacity to contain the  $200,000\text{m}^3$  of runoff generated by one 1-in-5-years storm within the catchment area, since it could only reach a maximum capacity of  $10,000\text{m}^3$ . In effect, Politecnica engineers produced a drawing which is presented in Figure 1-1 of Appendix 10b of the EIS Coordinated Report to show how the maximum capacity can be attained.

The EIA Coordinator pointed out that if one allowed for the discharge in Marsaskala of 41.64% of the runoff, the reservoir would still need to have a capacity of 83,280 m<sup>3</sup>. Hence, this option would not meet the objectives of this project.

Furthermore, the design engineers have also stated that, in order for a dam to be acceptable for such a project, it would need to be constructed to specific safety standards such as the following:

- the spillway must be calculated for the 1-in-5-years discharge;
- a canal suitable for the transfer of the above-mentioned discharge to the recipient in safe conditions should form part of the system. Such canal should have a minimum freeboard of 2.5m above maximum water depth in the reservoir; and
- verification of dam break; i.e. if the dam breaks, the volume will be transferred as a wave to the final recipient.

The designer engineers have concluded that the space required for the introduction of such features is not available in Maltese valleys.

In view of the above, this option was not included in the MCA. Consequently, Technical Option 3 was identified as the best option and assessed in this EIS.

### 3. EIA CONSULTATION

As part of the EIA process, consultation with various consultees was carried out during the scoping and the reviewing stages. Public consultation was undertaken during the scoping and following the certification of the EIS, which also included a public hearing.

#### 3.1 CONSULTATION DURING SCOPING

One Project Description Statement (PDS) was requested by MEPA to incorporate the 5 different components making up the National Flood Relief Project. The project was later separated into 4 different applications at a much later stage. Consequently, during the scoping stage, the PDS was circulated to the following list of consultees, (some of which are not directly relevant to the application in question) and made available for public consultation on 29<sup>th</sup> August 2008:

- Ғ'Attard Local Council;
- Ғal Balzan Local Council;
- Birkirkara Local Council;
- Gżira Local Council;
- L-Iklin Local Council;
- Marsa Local Council;
- Marsaskala Local Council;
- Mosta Local Council;
- Msida Local Council;
- Naxxar Local Council;
- Ғal Qormi Local Council;
- San Ґwann Local Council;
- Siġġiewi Local Council;
- Ta' Xbiex Local Council;
- Ғaž-Żabbar Local Council;
- Ғaž-Żebbuġ Local Council;
- Malta Resources Authority (MRA);
- Department of Agriculture;
- Malta Maritime Authority;
- Civil Protection Department;
- Department of Public Health;
- Occupational Health and Safety;
- Malta Tourism Authority;

- Superintendent of Cultural Heritage;
- Nature Group (NG); and
- Din l-Art Ħelwa (DLĦ);

Within the stipulated timeframes, comments were received from Ħal Lija, Ta' Xbiex and Gżira Local Councils. These are inserted in Appendix 1 to this Report.

Six scoping meetings, chaired by MEPA, were held on 13<sup>th</sup>, 15<sup>th</sup> and 17<sup>th</sup> October, 2008 at MEPA. The aim of scoping meetings is to assist MEPA in the drafting of the EIA terms of reference. All the local councils mentioned above and NGOs were invited to attend. Ħal Qormi, Ħal Balzan, Ħ'Attard, L-Iklin, Birkirkara and Gżira Local Councils attended whereas the NGO Żminijietna also attended the said meetings during which various issues and questions were made. Minutes of the meeting have been posted on MEPA website.

Final terms of reference were issued on 6th November 2008.

### 3.2 CONSULTATION DURING REVIEW

The first draft EIS was submitted to MEPA on 26 February 2010 and circulated for review to the following consultees:

- Marsaskala Local Council;
- Xgħajra Local Council;
- Ħaż-Żabbar Local Council;
- Malta Resources Authority (MRA);
- Department of Agriculture;
- Malta Maritime Authority;
- Civil Protection Department;
- Department of Public Health;
- Occupational Health and Safety;
- Malta Tourism Authority;
- Superintendent of Cultural Heritage;
- Nature Group (NG); and
- Din l-Art Ħelwa (DLĦ);

The EIS was also circulated for internal review within MEPA.

Within the stipulated consultation period, comments were received from Department of Public Health and the Xgħajra Local Council. Comments made by MEPA and its consultees during the review stage were forwarded to the EIA Coordinator, the developer and the architect on 28 April 2010. These comments were addressed by the EIA Coordinator and responses were submitted to MEPA, all of which can be found in an Addendum to the EIS Coordinated Assessment Report.

Comments received during the public consultation period are inserted in Appendix 2 to this Report.

### 3.3 CONSULTATION FOLLOWING CERTIFICATION

The certified EIS was published for a four-week public consultation period on 14 June 2010. A public hearing was held in the locality of Ħaż-Żabbar on 28<sup>th</sup> July 2010. The deadline for submissions was 4<sup>th</sup> August, 2010. Written submissions were received from Nature Trust, the Xgħajra Local Council and the Water Services Corporation. Minutes of the public meeting are inserted as Appendix 3 to this document. Responses to written comments received are also included.

## 4. THE SITE AND SURROUNDINGS, ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

The following characteristics of the site, assessment of impacts and mitigation measures were identified in the EIS. The summary of impacts is found in Tables 4-5 to 4-16 (pgs 264 - 275) of the EIS Coordinated Assessment Report).

## 4.1 LAND COVER AND LAND USE

### 4.1.1 TUNNELS

The land uses of the principal flood-prone areas and their surroundings, as covered by this proposed development are noted in Figure 2-1 of the EIS Coordinated Report. The following is a summary of the major land uses characterizing these areas:

- commercial of different types, small businesses in Ғaḏ-Ḑabbar, serving local clientele and restaurants in Marsaskala;
- cultural/community, which include churches and community facilities and schools; and
- residential of different types.

### 4.1.2 SHAFTS

The Shafts described in section 2.1 of this report, shall be located in areas with the predominant land uses being agriculture. Nevertheless, in the case of Shaft A, the Ta' Barkat STP will be the major land use in the near future. The following is a summary of the major land uses characterising these site areas:

Shaft A - located on a stretch of coast consisting of a rocky foreshore, characterized by inlets called Il-Ġorf tal-Blata l-Bajda and Il-Ġorf l-Abjad. This area is not popular with bathers, but very popular with anglers, bird hunters and trappers.

Land uses include:

- residential (cluster of buildings circa 140m away from the site earmarked for Shaft A and another cluster located to the south of Id-Dar tal-Barunissa);
- a convent (also known as Id-Dar tal-Barunissa);
- warehousing; and
- farms (such as Il-Forti San Anard currently being used as a cattle farm).

Shaft B - located in a field at the junction between Triq Wied il-Għajn and the unnamed road leading to the Ta' Barkat/San Anard areas.

Land uses include:

- residential; and
- building used for vehicle repair.

The site is presently being used for access to a tunnel being excavated by Enemalta Corporation. The EIA Coordinator states that this tunnel is not expected to affect the works on the NFRP tunnel. This was established in encounters between Enemalta and Politecnica engineers.

### 4.1.3 SEA USES

The current sea-uses se include:

- boating activities and marina activities (at the inner parts of Marsaskala bay); and
- swimming (at the outer parts of Marsaskala bay, and the natural rocky coast from Żonqor to Xgħajra).

## 4.2 CULTURAL HERITAGE

The cultural heritage study was based on a desktop research complemented by field work. The latter consists of site-surface survey or field-walking to locate and record the whereabouts of sites and features of archaeological and cultural heritage importance. No aerial reconnaissance or sub-surface surveys, including excavations, were carried out.

The cultural heritage features recorded in the area of study varied in category to include:

- Vernacular Features – most common. Recorded in the agricultural land located in the area of study;
- Engineering Features – representing the urbanization phase during Early Modern times;

- Residential Features – residencies of important historical and notable personalities; and
- Military Features – features dating back to the British Period, and erected in the preparation of WWII.

Table 1 summarises the cultural features recorded in the area of study, as illustrated by Figure 2-4 in the EIS Coordinated Assessment Report.

Reference no.	Site Description	Category
BKR06/001	Two-storey field room	Vernacular
BKR06/006	San Anard chapel and adjacent building known as Id-Dar tal-Barunissa or 'id-Dar tas-Soru'	Residential
BKR06/008	Small field room	Vernacular
BKR06/009	Country track leading from San Anard to Il-Ġorf I-Abjad	Vernacular
ŻBR09/001	Circular base of a fountain	Engineering
ŻBR09/002	House	Residential
ŻBR09/003	Milestone	Military
ŻBR09/004	Farmhouse	Vernacular
ŻBR09/005	Farmhouse	Vernacular
ŻBR09/006	Farmhouse	Vernacular

TABLE 1: CULTURAL FEATURES

In the Area of Study (AoS), rubble walls are found along the unnamed road linking Triq Wied il-Għajn with San Anard, as shown in Figure 2-10 in the EIS Coordinated Assessment Report. The condition of the rubble walls recorded in the survey is summarised in Table 2-5 of the same report and varies from Grade A rubble walls (good condition), typical of the San Anard stretch to completely destroyed ones.

The study did not exclude the fact that there might be undiscovered archaeological features, such as rock-cut tombs, other air-raid shelters or paleontological deposits that might be affected by the proposed development.

## IMPACTS

### LAND USES

#### During construction:

- Land uses surrounding the proposed shaft A, will not be significantly affected by this project since the area is already committed for the major works on the Ta' Barkat STP and its outfall.
- Land uses surrounding Shaft B, being agricultural and residential in nature, may be effected by impacts of high significance, should the construction sites not be managed competently, particularly with respect to particulates emissions. However, given the air quality requirements by the occupational health and safety policies, impacts due to air quality are expected to be of *low* significance.
- The excavation of the tunnel in the proposed location is not expected to have any impacts at all on land uses since the depth at which they will be bored will not affect third party properties or infrastructural networks. Furthermore, most of the tunnel would be excavated beneath existing roads and roadheaders do not generate vibrations.

#### During operations:

The improvements brought about by the proposed project on the flood prone areas, will probably contribute towards more investment in the area and an increase in property values. Such impacts are beneficial and can be *highly* significant.

The elimination of flooding in Marsaskala would make it easier for the Yacht Marina policy in the SMLP which is discussed in Section 2.1.1/B of the EIS Coordinated Assessment Report to be realised; in other words an indirect impact. The successful implementation of this project should be expected to stimulate substantial investments in the seafront, which could be of *high* significance with respect to the appearance of the front, property values, and traffic generation/parking demand.

#### **CULTURAL HERITAGE**

The proposed development may result in *moderate to high* significant impacts on presently undiscovered features such as rock-cut tombs, air-raid shelters and paleontological deposits. The location of these cannot be determined from a site-surface survey carried out for the scope of this report and therefore it is difficult to point out areas where such discoveries would be made. Feature ŻBR09/003, a milestone, is located on the spot where the shaft is to be located. The milestone may be destroyed or damaged during works, in which case the adverse impact would be of *high* significance and evidently permanent. Vibrations from tunnel boring are not likely to affect any cultural features, especially since the road header will be used to bore into the Globigerina Limestone.

#### **MITIGATION MEASURES**

##### **LAND USES**

Should the marina be constructed at Marsaskala, a well-designed Environment Management Plan (EMP) would be required. *[EPD comment: This measure has been proposed in the EIS, however it is considered to be only indirectly relevant to the proposed project.]*

#### **CULTURAL HERITAGE**

The following measures were recommended:

- Geotechnical investigations (since the survey carried out by the EIA consultants was of the surface type, and it does not survey buried artefacts or underground resources);
- Monitoring of works at all times;
- Minimization of vibration impacts (by the use of road headers as the excavation technology, the location of the proposed tunnels underneath existing roads and excavation at depths not less than 4m); and
- The removal of the milestone (ŻBR09/003) from site during construction (for safe keeping) and the reinstatement of this military feature in the same location once works are complete.

#### **RESIDUAL IMPACTS**

##### **CULTURAL HERITAGE**

Despite monitoring and other mitigation measures, undiscovered features may remain partially destroyed and/or completely lost during works. The milestone (ŻBR09/003) may still be lost. Nevertheless, it was pointed out that the EIA specialist consultant visited the Shaft B area on Saturday 12 June 2010, following works carried out by Enemalta on the same site. It was noted that excavation works were being carried out at about 40m distance from the milestone, and the latter was not being affected. In effect the milestone was in the same condition as at the time of the Cultural Heritage Survey carried out in December 2009.

#### **4.3 QUALITY OF THE MARINE ENVIRONMENT**

This study focused on the water dynamics, sediment and water quality, and anthropogenic activities at the inshore zone extending from Ricasoli to Il-Ponta taż-Żonqor (as illustrated by Figure 0-1 and Figure 2-11 in the EIS Coordinated Assessment Report). These waters could be affected by the discharge of the predicted runoff.

These waters are presently subject to anthropogenic activities leading to contamination. These include:

- Oil contamination - Release of petroleum oil and its products from a number of sources in the area

including the Ricasoli Tank Cleaning Installation (Malta ShipYards), bunkering operations and operational/accidental spills from ship traffic leading to and away from Grand Harbour, and illegal dumping of bilge oil;

- Contamination by runoff from agricultural land and animal husbandry farms; and
- Sewage contamination - Discharge of sewage from the Wied Għammieq sewage outfall. This sewerage system is presently being upgraded (and its outfall shifted), since the Ta' Barkat STP will soon be commissioned and operational and should significantly eliminate all sewage discharges to the sea and restore the water quality of the area.

According to the EIS report, the waters at the area under study are generally characterised by:

- shallow depths in the immediate vicinity of the discharge point with a depth of 6m being reached approximately 100m away from the shorelines;
- an average probability of 39% of onshore currents. These are more persistent and stable in the velocities attained than away-from-shore currents, reaching a 90% maximum onshore vector of  $4.1\text{cms}^{-1}$  during the October-December period;
- stratified waters (mostly in the form of a thermocline) in late spring;
- very poor microbial water quality (with 65% of water samples collected close to the site earmarked for the location of the discharge outfall, exceeding the 100 CFU/100mL level of FC);
- high nutrient loads mostly due to sewage discharge;
- high degree of water diffusivity (due to the open sea conditions);
- high water turbidity (even in the offshore region);
- good dissolved oxygen levels (no anoxic or hypoxic conditions were ever recorded); and
- no eutrophic conditions [*EPD comment: This statement seems to contradict the reference to high nutrient loads, and the greenish tinge of the coastline as observed on site also seems to indicate otherwise. However, the importance of this point is considered minimal since the EIS proceeds to assume a worst case scenario.*].

The study also concluded that marine sediment of the study area is highly contaminated with petroleum hydrocarbons and highly polluted by a range of heavy metals (including Pb, Zn, Cu and Cd).

The study also explains the correlations between the drop in salinity and levels of nitrates and phosphates in the waters at the Ta' Barkat area. It is predicted that a 5% drop in salinity (due to both runoff and the freshwater sewage discharge) would result in an increase in nitrate levels by a factor of 24, while the phosphate levels would increase by a factor of 88.

#### **IMPACTS ON MARINE WATER QUALITY**

Most of the likely impacts on marine water quality associated with the construction phase of the project are considered to be of *none to low* significance. Any impacts can be fully mitigated by good practices of coastal engineering works. The transient salinity changes during rain events brought about by the proposed project are considered to be of *low* significance. However, when combined with the impact of the STP outfall, this would result in a cumulative negative impact of *medium* significance. The re-suspension due to disturbance of seabed silt leading to remobilization of pollutants is considered to be insignificant in the case of this project, whilst the cumulative impact with the STP outfall would result in an overall impact of *low to medium* significance.

Nutrient release from runoff, are considered to be of *medium* significance and *medium to high* significance when combined with the impact resulting from the STP outfall. The increased incidence of pollution by sewage via runoff and release of oil residues are considered to be of *medium* significance. The release of suspended solids from runoff during operation is expected to result in an impact of *medium* significance.

However, when combined with the impact from the STP outfall, the overall effect would be of *medium to high* significance.

#### MITIGATION MEASURES

- Good practices of coastal engineering works;
- Proper supervision of barge operations;
- Prevention of sewage overflows from reaching runoff streams;
- Implementation of an action plan to reduce levels of phosphorous releases in sewage;
- Best possible level of treatment at STP;
- Installation of TSS filters;
- Assurance of compliance with sewer discharge regulations preventing discharge of residential runoffs in public sewers; and
- Encourage reduction of in release of oils and fuels from small industries, and good housekeeping practices in small garages, petrol stations etc.

#### RESIDUAL IMPACTS

The transient salinity changes during rain events will result in *medium* residual impact, and the scope for mitigation is low. The nutrient releases and the releases of total suspended solids from runoffs will result in a *medium* residual impact. The increased incidence of pollution by sewage via runoff, and the release of oil residues and other chemicals, will result in an overall *low* residual impact.

When considering the cumulative impact of the proposed project with the STP outfall, residual impact significance was considered as uncertain for the following effects:

- resuspension of nutrients and pollutants from sediments;
- spills of fuel/ oils and other contaminants from land-based activities at the construction site;
- re-suspension due to disturbance of seabed silt leading to remobilization of pollutants; and
- nutrient release from runoffs.

These uncertainties are mainly to baseline situation (and particularly due to the lack of data or uncertainty in a separate EPS that was conducted for the STP outfall), rather than to the stormwater project per se. Nevertheless, where possible, the worst case scenario was the one included in this assessment.

## 4.4 ECOLOGY

### 4.4.1 MARINE ECOLOGY

This report was based on the work carried out on both the sewage outfall EPS and the sewage treatment plant EIS. This study focused on the ecological sources and elements in the AoS (illustrated in Figure 2-22 in the EIS Coordinated Assessment Report) that are of conservation value and potentially sensitive to impacts resulting from the proposed development.

The type and distribution of marine benthic biocoenoses in the area of study are shown in Figure 2-23 of the EIS Coordinated Assessment Report. Seven main sublittoral biocoenoses were recorded:

- Infralittoral algae
- Stones and pebbles in shallow waters
- Infralittoral algae and *Posidonia oceanica* meadows;
- Infralittoral algae intermixed with biocoenoses of coarse sands and muddy heterogenous sediment;
- Coarse sands and muddy heterogenous sediment;
- *Posidonia oceanica* meadows; and
- Coarse sediment and heterogenous muddy sediment with association of *Cymodocea nodosa*.

Of these biocoenoses, those with the seagrass *Posidonia oceanica* are of conservation importance since *Posidonia* beds are listed in Schedule I of the *Flora, Fauna and Natural Habitats Protection Regulations, 2006*. Furthermore, *Posidonia oceanica* is listed in Schedule III of the *Flora, Fauna and Natural Habitats Protection Regulations, 2006*, in Appendix I of the Bern Convention, and in Annex II of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean of the Barcelona Convention.

Beds of seagrass *Cymodocea nodosa* are not protected habitats, but the seagrass itself is protected and is listed in Schedule III(b) and in Schedule VIII of the *Flora, Fauna and Natural Habitats Protection Regulations, 2006*, and in Appendix I of the Bern Convention. Therefore biocoenoses with this species are *ipso facto* protected.

Two protected marine invertebrate species were recorded from the AoS:

- Algae belonging to the *Cystoseira* genus - all species of this genus occurring in Malta are listed in Schedule III of the *Flora, Fauna and Natural Habitats Protection Regulations, 2006*; and
- The Rock-urchin *Paracentrotus lividus* - is listed in Schedule VIII of the *Flora, Fauna and Natural Habitats Protection Regulations, 2006*, in Appendix III of the Bern Convention and in Annex III of the Protocol for Specially Protected Areas and Biodiversity in the Mediterranean.

#### 4.4.2 COASTAL ZONE ECOLOGY

This report was based on the data presented in the EIS that was conducted for the Sewage Treatment Plant (STP). This EIS identifies the coastal area in the region of Il-Ġorġ tal-Blata l-Bajda, Il-Ġorġ l-Abjad and Ta' Barkat as consisting of bare rocky outcrops with very shallow pockets of saline soils colonised by mostly halophytic species. The STP EIS states that the area is characterised by rock pools during the wet season, but does not directly indicate whether these pools are freshwater (i.e. rainwater rockpools), or brackish, or marine (or a mixture of all three types). Whilst noting that rainwater rockpools are equivalent to the 'Mediterranean temporary ponds' listed in Schedule I of the *Flora, Fauna and Natural Habitats Protection Regulations*, the specific site context (very exposed coastal location, with conspicuously halophytic vegetation extending considerably inland), makes it reasonable to assume that the coastal pools are predominantly saline or brackish.

Within this coastal strip, species of conservation importance identified include:

- The African Tamrisk tree *Tamarix Africana* - listed in the *Red Data Book for the Maltese Islands* as rare, with a restricted distribution in the Maltese Islands and the Mediterranean', and listed in Schedule I of the *Trees and Woodlands (Protection) Regulations, 2001* (Legal Notice 12 of 2001);
- The Crystal Plant *Mesembryanthemum crystallinum* - listed in the *Red Data Book for the Maltese Islands* as very rare, with a restricted distribution in the Maltese Islands; and
- The Sea Daffodil *Pancreatium maritimum* - listed in the *Red Data Book for the Maltese Islands* as vulnerable, with a restricted distribution in the Maltese Islands.

No fauna of conservation importance was recorded. Supralittoral and mediolittoral assemblages in the AoS are not included in this report.

#### IMPACTS ON MARINE AND COASTAL ZONE ECOLOGY

The impact of *high* significance on marine ecology, which cannot be mitigated, is the obliteration of species due to construction and operation of the tunnel terminal itself. Species falling within the footprint will be eradicated. Damage and disturbance of species due to construction operations, and reduction in salinity of the water column due to discharge of stormwater are considered to be of *high* significance. Suspension and deposition of particulate matter on the seabed will result in a *low* significant impact during construction and a *high* significant impact during operations (discharge of water). The disturbance of the benthic habitats by the massive pulse discharges of stormwater will result in a *medium* significant impact on the infralittoral

habitats and biota of the AoS. Scope for mitigation is high but some disturbance will always occur. Airborne particulate matter results in an impact of *low* significance on the supralittoral and mediolittoral habitats and biota, since wave action will rapidly wash this particulate matter to the sea.

#### MITIGATION MEASURES

- Good operating practices to ensure that as little debris from the tunnel breaching operations as possible enters the sea;
- Immediate removal (once the tunnel breaching is over) of any large material that does not enter the sea;
- Breaching of tunnel 'out to in' rather than the reverse;
- The design of the tunnel terminal to include energy dissipating structures to cut down the mechanical force and the scouring effects of the discharge greatly. It should be noted that construction of these structures will itself generate impacts; and
- The design of the tunnel terminal to include devices for intercepting suspended particles so as to cut down the amount of suspended particulate matter introduced into the marine environment. It should be noted that construction of these devices will itself generate impacts.

#### RESIDUAL IMPACTS

Impacts due to obliteration of species during construction and operations of the project cannot be mitigated and therefore the issue of residual impacts is not applicable in this case. However, the overall impact would still be of *high* significance. Despite the implementation of mitigation measures, some damage and disturbance of species during both construction and operational phases of the discharge point will always occur. However shore biota is adapted to resist such disturbances. Similarly, despite the implementation of mitigation measures, there will still be an increase in the amount of suspended particles during both construction and operation. However during construction within the proposed location, the total amount of rock that will be 'pushed out' onto the shore in the breaching operation is small (circa 10m<sup>3</sup>), so no major impacts are envisaged even in the worst-case scenario. Furthermore, with regards to the reduction in salinity of the water column due to discharge of stormwater, given that the objective of the proposed project is to direct runoff to the sea, this impact will be a permanent feature of this project.

#### 4.4.3 TERRESTRIAL ECOLOGY AT SHAFT A AREA

This study was based on the data presented in the STP EIS. Shaft A shall be located partly (*circa* 40%) on agricultural land with the other 60% being situated in an area classified as 'Thistle fields/dry improved grasslands'. The STP EIS describes the Ta' Barkat area as follows:

- Characterized by abandoned fields or else fields with non-extensive agricultural practices;
- Cultivated fields host species typical of steppic grasslands, such as the thistles *Galactites tomentosa* and *Carlina involucreta*;
- The rubble walls bordering the fields host a number of mostly native or naturalised tree species namely *Opuntia ficus indica*, *Ceratonia siliqua*, *Prunus dulcis* and *Punica granatum* in order of decreasing abundance. These walls also host a number of fauna species such as various molluscs, insects and reptiles, some of which are endemic, vulnerable and/or protected;
- Hosts a number of woodlots of *Eucalyptus* sp. and *Acacia saligna*, a dense aggregation of vegetation including *Euphorbia pinea*, *Capparis orientalis*, *Asparagus aphyllus*, *Daucus* spp., various thistles and grasses. Such small patches of land may be classified as verging between steppic grassland communities and disturbed ground communities; and
- A very small area to the east of the STP site shows remnants of a garigue community, with a handful of specimens of *Thymbra capitata* and *Urginea pancration*.

The following are the Palearctic habitats prevalent in the inland areas of Ta' Barkat and San Anard, as identified in the STP EIS:

- Thistle fields

- Provence cane beds
- Dry improved grasslands
- Field crops
- Field margin cropland
- Vineyards
- Eucalyptus plantations
- Broad-leaved evergreen tree plantations (*Acacia saligna*)
- Small woodlots
- Suburban areas

#### IMPACTS ON TERRESTRIAL ECOLOGY

Significance of the following impacts on the Shaft A site (which has already been degraded by the works on the STP), *varies* depending on the quantities involved:

- Redistribution of sediments from stockpiles;
- Leakage of contaminants;
- Spillages of fuel and fall-outs from exhaust streams;
- General disturbance during excavation phase; and
- Periodic spraying of stockpiles of sediments.

Site illumination is of *moderate* significance due to the proximity of the sites to urban areas.

#### MITIGATION MEASURES

- Stockpiles of excavated materials to be covered with a tarpaulin so as to minimize the redistribution by wind and water;
- Duration of on-site storage of excavated material should be as brief as possible to reduce opportunities for winnowing of sediment;
- The material required for the formulation of Spritz-Beton is to be stored in secure containers;
- Secure storage of potential pollutants (including oil, cement and alkali-free additive);
- Frequent collection and removal of municipal waste from the site;
- Storage of industrial chemicals on bunded pallets to a maximum volume that will not exceed the required supply for three days;
- Presence of spill-kits on-site, and immediate reporting of spillages;
- Containment of spillages through secure storage and confinement of loads in vehicles;
- Use of downward facing lights (although such lights may still have a negative effect on wildlife);
- Periodic inspection of the surroundings of the proposed site of construction for evidence of off-site disturbance; and
- Volume of water used to sprinkle excavated material should not be excessive in relation to its function;

#### RESIDUAL IMPACTS

The following residual impacts were identified for Shaft A area:

- Residual impact of *moderate* significance resulting from the general disturbance during the excavation phase including the leakage of chemical contaminants;
- Residual impact of *low to moderate* significance resulting from site illumination;
- Residual impact of *minimal to moderate* significance resulting from spillages of fuel and fallout from exhaust streams (significance varies with the nature and volume of spills);
- Residual impact of *low* significance resulting from periodic spraying of stockpiles of sediment with water; and
- Residual impact of *minimal to low* significance resulting from the redistribution of sediments from stockpiles (significance varies with the volume of fugitive sediments from onsite storage).

#### 4.5 AGRICULTURE IN SHAFT A AND SHAFT B

A survey of the agricultural properties surrounding the areas surrounding the sites allocated for the shafts was carried out. The types of agriculture surrounding these two sites are illustrated in the ortho-maps Figure 2-26 (with respect to Shaft A) and Figure 2-27 (with respect to Shaft B) in the EIS Coordinated Assessment Report.

The following are characteristics of **Shaft A Site**:

- Agricultural land used both for irrigated agricultural produce as well as for hunting and trapping purposes;
- Apart from the fields abutting on Triq San Anard, most fields are lined with a variety of trees, both exotic and hardy fruit trees. The exotic trees include *Acacia saligna*, *Eucalyptus* species, and Tamarix species, while hardy fruits include carobs and olives;
- Two vineyards were recorded;
- The escarpment surrounding Il-Forti San Anard on its three flanks overlooking the coast has been afforested by Government in the early-1970s. The tree species still surviving include *the Acacia saligna*, *A. cyclops*, *Tamarix africana*, *T. gallica*, *Quercus ilex* and *Pinus halepensis*;
- Only one unit of protected cropping was recorded in the area under review, and it was located to the west of the Ta' Barkat STP site;
- Only three areas are sown with cereals;
- A few stables for equines are situated close to the unnamed road linking Triq Wied il-Għajn with San Anard; and
- The fields identified as being allocated for market garden cropping carried the following vegetables in the ratio of 2:1:1:
  - Potatoes [winter and spring]
  - Lettuce and brassicas
  - Broad beans, beetroot and vegetable marrows.

The following are characteristics of **Shaft B Site**:

- The area around this shaft is of high agricultural value since very fertile and well utilised for intensive horticultural activity;
- The bulk of the area consisted of terraced fields carrying a wide range of good quality crops, including the following vegetables in the ratio of 2:1:1:
  - Potatoes [winter and spring]
  - Lettuce and brassicas
  - Broad beans, beetroot and vegetable marrows;
- Only two fields bordering Triq Wied il-Għajn carried cereals;
- Agricultural land characterized by good level of soil depth in the area;
- There are 6 active greenhouse units, the largest one of which is very close to the shaft site. The majority of these units were carrying tomatoes;
- A small number of fallow fields;
- No livestock units were noticed except for an equine stable unit; and
- The following trees and plants were observed:
  - Hardy fruit trees of olives, figs, prickly pears and pomegranates within the perimeter of many fields;
  - Caper plants in the Ħas-Sajd area
  - Eucalyptus and carob trees present in small numbers.

#### IMPACTS ON AGRICULTURE

In the case of Shaft A, *circa* 40% of the site is agricultural and this will be taken up. The STP-EIS indicates that this field was fallow when the area was surveyed. The significance of the impact would still be *high* since the potential of the land with respect to agriculture is not diminished. In the case of Shaft B, the site is

currently a fallow field, and therefore the significance of the impact would also be *high*. It should however be noted that the site is already being excavated, since Enemalta Corporation is currently constructing a tunnel for part of its network. In other words, by the time that Shaft B is constructed, the value of the field for agricultural production would already have been nullified.

Impacts of dust on the nearby agricultural land and produce, *vary* in significance depending on the distance of a particular field from the construction site, wind direction and strength, humidity and quantities involved. Furthermore, these impacts are temporary in nature.

Another adverse effect of any dust emissions is the reduction of sun light intensity required by the greenhouse units. This would result in loss of revenue to growers unless regular and frequent washing of the outside of green houses is carried out.

#### MITIGATION MEASURES

- Good working practices; and
- Proper cleaning, maintenance and management of sites by farmers.

#### RESIDUAL IMPACTS

The above mitigation measures should result in a *moderate to low* residual impact of dust on the produce.

#### 4.6 GEOLOGY, GEOMORPHOLOGY, HYDRO-GEOLOGY AND HYDROLOGY

The study was based on a desktop survey and on the data provided in the STP EIS and sewage outfall EPS, which reported the results of the geotechnical investigations, which Politecnica engineers consulted in order to carry out their engineering calculations.

#### GEOLOGY

The proposed project is located in a zone where the exposed formation is Globigerina Limestone. This formation is made up of the following three members:

- Upper Globigerina Limestone Member (Mug)
- Middle Globigerina Limestone Member (Mmg)
- Lower Globigerina Limestone Member (Mlg)

The Lower Globigerina Limestone Member features extensively in all the project areas. The major concern with this project is the location of the discharge outlet, since the coast is considered a Site of Scientific Interest (SSI) and part of an Area of High Landscape Value (AHLV).

Marsaskala catchment - mainly characterised by the Mlg formation, which does not outcrop in the area because of the extensive presence of regolith/colluvial deposits covering bedrock. Anthropogenic terraces delimited by stone walls are also present on slopes in order to allow agriculture and to prevent soil erosion. In the north-eastern part close to San Anard, the Middle Globigerina Limestone (Mmg) and Upper Coralline Limestone (Mgi) are also present. Mgi overlies Mmg in stratigraphic unconformity. Approaching Marsaskala from Ħaż-Żabbar, the Lower Coralline Limestone formation in the valley bottom is present and it is also covered by alluvial deposits.

The Coast - the rocks section exposed along the coastline at the site location consist of:

- Lower Coralline Limestone formation - represented by the Attard member and Il-Mara member. The former is not exposed on shore; and
- Globigerina Limestone formation (Lower and Middle Globigerina Limestone members) from the base to top.

The Lower Globigerina rock unit is composed of:

- Wackestone/Packestone at the base
- Foraminifera facies Bed and
- Sub-Facies A (soll ikħal).

This clayey limestone is about half the thickness of the entire Lower Globigerina Member, and is

characterised by heavily iron-mineralised rust-coloured burrows, which in recent cuttings often reveal frequent lenses and beds of bluish-grey clayey or marly limestone. This sub-facies is succeeded upwards by a scour surface and a phosphate pebble bed. The Middle Globigerina Limestone member overlies the Lower Globigerina Limestone rock. The contact is marked by a phosphate conglomerate bed mainly composed of mud-supported phosphatised pebbles and remaining hard ground material which may reach boulder size and often assume a highly irregular amoeboidal shape. The lime mud is foraminiferal-coccolith wackestone that is rich in matrix-supported planktonic and benthonic foraminifera, echinoids, pteropods and gastropods. The remaining hard-ground material, is extensively bored by polychaetes and sponges. The Middle Globigerina Limestone is best preserved in areas where it has been protected by Upper Globigerina and the overlying formations. Its Upper limit in the area is an erosional surface at the base of the Upper Coralline Limestone.

## **GEOMORPHOLOGY**

Marsaskala catchment - characterised by the typical geomorphologic setting of the southeastern part of Malta, since even if less urbanized than other villages, anthropic features (terraces, roads, agriculture) are still dominant. The main geomorphological features in the Marsaskala area are the narrow northwest – southeast oriented valley (Wied il-Għajjn) between Ħaż-Żabbar and Marsaskala, which is adherent to the minor fault trend, and coastal erosion features between Marsaskala and Xgħajra. There is no evidence of active features in the project area.

The Coast - as is shown in the AIS map in Figure 2-32 of the EIS Coordinated Assessment Report, the northeast boundary of the AoS is located at the coast and extends to the hinterland as far as the north-east margin of the ridge formed by the San Anard plateau. The geomorphologic units in this area are:

### 1. Shore platform and low cliffs at the coastline:

Due to the relative rate of erosion of the contact between the Lower Globigerina and the underlying Lower Coralline Limestone, the shore platform consists of an almost flat limestone platform. Frequently the shore platform is represented by the resistant and competent phosphate pebble/conglomerate bed at the top of the Il-Mara member of the Lower Coralline Limestone. Faulting parallel to the coastline has produced a raised shoreline terminating in the form of a low cliff. The cliff represents the fault plane now remodelled by wave action. Away from the faults the cliffs pass into a typical low coastline which is heavily indented and broken up due to the presence of a fracture set oriented northeast – southwest that is at 90° to the coastline.

### 2. Globigerina slope and shore platform:

Besides the northwest – southeast striking fault at the coastline there is also a corresponding northeast – southwest fracture system. The cross-cutting of the two fracture systems has given rise to weak zone now modelled by wave action to form the small steep-sided inlet or cove of Il-Ġorf I-Abjad.

## **SOIL**

The soil in both areas of Shaft A and B is a well drained loam with good water holding capacities and with an average depth ranging from circa 10cm to 60cm. The soil pattern includes Carbonate Raw soils and a mixture of Xerorendzina soils. This mixture is expected where terracing on the Globigerina limestone occurs. As expected, the soil round Shaft A, which is more exposed to sea spray originating from the rocky coast, has a higher level of salinity and exposure to wind, which curtail the full potential of the soil. Through the provision of windbreaks and with careful irrigation and fertilizer programmes, the soil would yield fodder crops of better quality. The soil around Shaft B shows its potential through a variety of crops grown at the time of inspection.

## **HYDROGEOLOGY**

The project area is located in the parts of Malta where the Mean Sea Level Aquifers occur (typical hydrogeology of the southern and central regions of Malta). These aquifers form as a result of the differences in density of seawater and fresh water, and are characterized by brackish or salty water. Rainwater percolates the ground (in this case belonging to the Globigerina Limestone formation), and depresses the salty water found beneath. The transition zone between the salty sea water and fresh

groundwater is not a distinct boundary but a zone of brackish water since the salty sea water and fresh water intermix. Such a zone on the Maltese Islands is greatly influenced by seasonal fluctuations in rainfall. Yet the amount of water abstracted for human use also greatly influences this zone. Boreholes that penetrate deeply within this transition zone results in sea water intrusion.

#### HYDROLOGY

The following section deals with data on rainfall harvesting at the sea outlet close to Xgħajra (specifically at Ras il-Ġebel), so as to assess the positive impact of the proposed design. On the average, in one year, only 30 days show rainfall events with a rainfall depth higher than 5mm in one day (effective rainfall). This implies that the average yearly rainfall depth equals to 450mm. The volume discharged in one year to the sea outlet is 873,540m<sup>3</sup>. In each of the 30 days per year of effective rainfall, a volume of 27,918m<sup>3</sup> of water will be discharged into the sea. Assuming the duration of the average rainfall event in one of these 30 days equal to four hours, the average flow would be 1.94m<sup>3</sup>/s.

#### IMPACTS ON THE GEO-ENVIRONMENT

The proposed development will involve substantial excavation in the Lower Globigerina Formation and the Il-Mara Member of the Lower Coralline Limestone Formation. Nevertheless the impact is considered to be of *low* significance.

With regards to impacts on the geomorphology, the report concluded that the impacts of the tunnel as proposed are *insignificant*. The EIA Coordinator however argues that in the coastal zone, the impact of the discharge outlet is adverse and of *moderate to high* significance. In addition to the fact that the integrity of the cliff face and the platform shall be undermined, the coast is identified as part of an SSI in the Environmental Constraints maps of the South Malta Local Plan.

With respect to hydrology, the EIS identified water-table interception as one possible impact. However, given that the impact is restricted to extremely limited portions of the tunnel layout and that the realization of tunnels will neither involve variations in the aquifer physical and chemical characteristics, nor introduce further potential pollution sources, the impact significance on the hydrology of the area is considered to be *low*.

#### MITIGATION MEASURES

- Re-use of mucking material as backfill, thereby reducing quarrying demands in other areas; and
- Water-proofing of the tunnel.

#### RESIDUAL IMPACTS

Impacts of the tunnel on the geology and the geomorphology of the area cannot be mitigated since infrastructure works and modification in the coastal morphologic structure are of a permanent and irreversible nature. *[EPD comment: The careful choice of location of the outlet to coincide with an already compromised spot is a particularly important consideration in this regard. This adverse and irreversible impact would have been considerably more important further away from the site, where the coastal environment is more pristine and the coastal geomorphology more physically constrained.]*

#### 4.7 NOISE EMISSIONS AND VIBRATION

Background noise levels were made at Ta' Barkat (Shaft A) and in Haż-Żabbar south (Shaft B) at the locations shown in Figure 2-45 and Figure 2-46 in the EIS Coordinated Assessment Report. Since the construction of the tunnel would only be carried out during the day, no night-time readings were taken for the purpose of this assessment. L<sub>AEQ</sub> readings for Shafts A and B were 53 and 71dB(A) respectively. In Shaft A site the main source of noise was the construction of the sewage treatment plant, while in Shaft B site the main source of noise was traffic. Noise-sensitive receptors during construction and operation include mainly nearby residents.

With respect to vibrations, measurements were not undertaken for this assessment and ambient vibration levels were estimated.

#### **IMPACTS ON NOISE AND VIBRATIONS**

In respect to both shafts/construction sites there are two phases to the noise scenario:

- the surface excavation to get the road header to the tunnel depth, and
- the daily to and fro of heavy vehicles taking out excavated material and bringing in concrete.

The second phase will be lengthier and would involve additional equipment such as ventilation fans and generators.

At the noise assessment points,  $L_{Aeq}$  sound levels during the excavation and construction phase are likely to reach 66 and 76db(A) for Shafts A and B respectively. The noise of equipment that will be underground has not been taken into consideration, as this will be sufficiently attenuated as to be of no consequence as long as attenuation measures are taken at the tunnel mouth.

The results show that it is likely that construction noise objectives would be exceeded at times at most affected residential boundaries during the construction period and on this basis reasonable and feasible noise control measures must be implemented for this period. Excessive noise, i.e. the impacts of which will be of high significance, is likely to occur as surface construction works are performed. With the implementation of reasonable and feasible noise control measures, however, it is likely that most construction noise objectives can be complied with except in the locations of Shafts B (Ħaż-Żabbar) where the level of significance of the impact is evidently *high*. Since this location is relatively close to residential developments, it would not be practical to attenuate the construction noise sufficiently. Special measures will have to be taken with respect to this site.

With respect to vibrations, the boring of tunnels in Globigerina Limestone by means of roadheaders is not expected to generate vibrations with the potential to damage properties. Furthermore, the tunnels are going to be excavated at depths of not less than four metres and underneath existing roads. Therefore impact significance of vibrations is considered to be *low*.

#### **MITIGATION MEASURES**

- Noise barriers should be erected especially in Shaft B;
- Majority of the noise equipment to be located underground to minimize noise impacts;
- The use of road headers as the excavation technology, to minimize vibration impacts;
- Locating the proposed tunnels underneath existing roads and excavate at depths not less than 4m (not to affect stability and integrity of nearby structures); and
- Replacing pneumatic hammers by rippers when works are taking place near building of cultural heritage importance.

#### **RESIDUAL IMPACTS**

The above mitigation measures should fully mitigate the noise and vibration impacts identified in this assessment. Hence no residual impacts are envisaged.

#### **4.8 IL-BLATA L-BAJDA LANDSCAPE AND VISUAL ASSESSMENT**

Both the visual amenity and the landscape assessments were conducted by means of a desk-top study complemented with the data available in the sewage outfall EPS.

##### **Landscape Assessment**

The 'Landscape Assessment Study of the Maltese Islands' (2004) designates the area within which Shaft A is to be located as a combination of Area of Very High Landscape value (AVHLS) and Area of High Landscape Value (AHLV). This designation was later confirmed in the SMLP which designates Wied Glavan, Ta' Barkat, and San Anard as AHLA.

The character of this area is typically rural which is rendered more interesting than the typical Maltese countryside scene by the geomorphologic features which define the coast. The visual contrast between the agricultural zones and the coastal cliffs projects a measure of uniqueness, which in Malta typifies the south-eastern coastline between Xgħajra and Il-Ponta taż-Żonqor (see the STMP Marsaskala, Xgħajra, and Haż-Żabbar Environmental Constraints Maps presented in Figure 1-28, Figure 1-35 and Figure 1-36 of the EIS Coordinated Assessment Report).

The following is a summary of the evaluation of this landscape as presented in the outfall-EPS:

- The coastline is characterized by low-lying cliffs and inlets (known as *ġorfijiet*);
- The site presents some cultural or historical associations;
- The surrounding landscape is characterised by pockets of agricultural land at different ground levels, tree plantations, hides, cage posts, abandoned rural structures and trapping sites;
- The landscape is already heavily conditioned by man-made structures prior to the SSTP interventions;
- Road verges of the coastal access path are heavily characterised by illegal dumping activity which have also degraded the visual setting of the coastal area;
- The landscape presents a number of sensitive receptors. Such sensitive locations include farms in the vicinity of the site, commuters of the Xgħajra coastline, sea traffic along the south-east coast of Malta and a number of residences within the area of visual influence in the vicinity; and
- With regards to landscape dynamics, apart from the recent addition of the SSTP, the landscape has probably not varied much over the years owing to the long-term agricultural activity within the area.

### Visual Amenity

Reference is made to Figure 2-48 of the EIS Coordinated Assessment Report, showing the viewpoint used in this assessment. This image was taken by AIS for use as a baseline for the landscape and visual impact assessments within both the sewage treatment plant EIS and the sewage outfall-EPS. The viewpoint is located within the zone of visual influence of the area where the proposed flood-relief discharge outlet is expected to be located.

The superimposition of the Ta' Barkat STP on the baseline photo (as per Figure 2-48 of the EIS Coordinated Assessment Report) indicates that the construction works introduced an amalgam of structures, the forms and scale which would normally be associated with urban fringes, rather than rural contexts.

### IMPACTS ON LANDSCAPE AND VISUAL AMENITY

The proposed NFRP discharge point would be located in the vicinity of the Ta' Barkat outfall but as shown in Figure 1-9 of the EIS Coordinated Assessment Report, it shall be positioned on the cliff face, resulting in the introduction of an additional element to the landscape. The presence of the STP will not decrease the significance of the impact since the integrity of the cliff face and platform survived the impacts on the landscape of the STP. In this regard, the impacts of the proposed project on the character and visual amenity of the landscape are expected to be of *high* significance.

With regards to the visual assessment, the proposed Shaft A would be adsorbed within the 'superstructure' of the STP while the discharge outlet should be expected to have a significant impact on the coastal landscape by virtue of its scale (particularly its height), form (conventional geometrical shape), and materials (reinforced concrete).

Summarizing, the proposed project is expected to significantly modify the cliff face. Such impacts would be considered as *high* when observed from a short distance and *low* when observed from a distance. Good architectural design and detailing may minimize this impact, but would still result in a *high* residual impact due to the permanent nature of the interventions.

### 4.9 EFFECTS ON EXISTING UTILITIES

The depth of the tunnels has been established in order for existing underground infrastructural networks not to be relocated. In effect, the proposed locations of the shafts were originally characterised by the absence of services within their confines. However, at the time of writing, the design engineers were informed of the

intentions of Enemalta Corporation to make use of the site earmarked for Shaft B to be used in connection with the construction of a tunnel to be used as part of the Corporation's distribution network. At a meeting held between Politecnica and Enemalta engineers on 04 February 2010, it emerged that the Enemalta tunnel was going to be at a lower elevation than the proposed NFRP one. Enemalta offered to leave their access ramp open for the construction of the latter. Enemalta agreed that upon completing the work that had to be done through the access shaft in question the responsibility for the site would be transferred to the Services Division together with the duty of the restoration of the field. Work on the Enemalta tunnel is expected to be completed by early 2011. For this reason, there should not be any conflicts between the work programs of the two projects. Therefore, in this regard, the impact on utilities was determined as varying from *low to moderate* significance, due to the lack of detailed information provided to the design engineers.

Such impacts would be fully mitigated by the amendment of the design to minimize the need of relocation of networks as much as possible.

#### 4.10 EFFECTS OF LIQUID DISCHARGES

During the works three types of discharges are anticipated:

1. During construction works, waterborne particulates may escape from the construction sites and end up in the Xgħajra aquatic environments (in case of Shaft A) and in the countryside.
2. During construction works, hazardous fluids may escape from the construction sites and end up in the Xgħajra aquatic environments (in case of Shaft A), and in the countryside.
3. The operations of the proposed project involve the discharge of runoff into the sea, which will have to pass through lined underground tunnels.

The effects of these liquid discharges on the marine quality include nutrient release from runoff, increased incidence of pollution by sewage via runoff, and release of oil residues. These impacts are considered to be of *moderate* significance. However, when combined with the impact from the STP outfall, the overall effects would be of *medium to high* significance.

Impact significance of liquid discharges such as toxic substances or other pollutants on marine ecology varies from *low to moderate* (depending on the nature and dosage of contaminant). However it is temporary in terms of duration, since it is only associated with the construction phase of the proposed development.

Release of these liquid discharges can be mitigated by:

- Containment of spillages through secure storage and confinement of loads in vehicles (this should be particularly stringent for loads of cement, oils, alkali-free additive and other hazardous material);
- Presence of spill-kits on-site; and
- Immediate reporting of spillages.

#### 4.11 EFFECTS ON AIR QUALITY

Before the commencement of this EIA, it was established that the impact on air quality of the construction works was not expected to be of significance because the work which was to be carried out in the construction sites (*i.e.* the access shafts) were not expected to be larger in scale than that executed in 'normal' construction sites.

In effect, with regards to **dust** generation:

1. most of the construction works shall be taking place underground;
2. the tunnel excavation works shall be equipped with air filtering systems of highest standards, principally for occupational health & safety reasons; and

3. the workers involved in the excavation and lining works will be spending 60 hours per week for over 30 weeks underground. Consequently all the equipment to be used in the excavation works including the roadheaders, and the ventilation and de-dusting systems must be fully in line with all the current requirements of the following two important EC Directives:
  - a. Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC, and
  - b. Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products.

This implies that the precautions that will be taken to protect the health of the workers with respect to air quality would result in the minimisation of emissions of pollutants such as particulates into the external environment.

This being said, it is envisaged that following implementation of the above-mentioned dust mitigation measures, residual impact of dust generation on the air quality would vary between *moderate to low* significance, depending on the quantities involved.

With regards to **emissions** generated by HGVs and on-site machinery, the heavy vehicle trips generated by the excavation works shall be on the low side. Such assumption was based on the conclusions of the air-quality section of the STP-EIS. Residual impacts of these emissions on air quality will be of *low* significance.

#### 4.12 EFFECTS ON PUBLIC HEALTH

##### NOISE IMPACTS

These will be mainly generated during construction. Assessments indicate that noise will be an issue in the case of the residential development in the vicinity of Shaft B. Although the effects of noise in the area in question are considered of high significance, one should expect the resultant effects on public health to be *moderate* significance because of the relatively short duration of the works, particularly the ones focusing on the formation of the shafts *per se*.

##### AIR QUALITY IMPACTS

Air quality is not expected to be a significant problem, if the mitigation measures identified this EIS are put into practice. Under such conditions, the significance of the impacts on public health resulting from the deterioration of air quality during construction works is expected to be *low to moderate*.

##### CONTAMINATED RUNOFF

During operations, the proposed tunnels will remove storm water runoff from the flood prone areas at substantially faster rates than at present. This runoff will be contaminated by a variety of substances, including sewage from overflows caused by the illegal connection of storm water drain-pipes of an as-yet unquantified number of buildings within the sewerage network.

The proposed system will divert at relatively fast rates 58.36% of the runoff, currently ending up at Marsascala, to Il-Ġorf tal-Blata l-Bajda. The level of significance of the impacts of this diversion is expected to range from *insignificant to high* depending on the contaminant under consideration. It was also pointed out in the EIS that the cumulative discharges of the NFRP tunnel and the STP outflow will disperse into open sea conditions.

The fast removal of contaminated runoff from the streets of Ғaḏ-Ḑabbar and Marsaskala will reduce/eliminate the risks associated with the presence in these streets of substantial amounts of waters contaminated with sewage and other potentially harmful pollutants, which may overflow into properties abutting on these same streets. It is difficult to establish the level of significance of the evidently beneficial impact of the proposed system with respect to public health, but *prima facie*, in the case of a 5-year storm, this EIA Consultant would expect it to range from *moderate to high*. The highest level of significance will be experienced in Ғaḏ-Ḑabbar since all the runoff in this town will be diverted via the tunnel. The level of

significance of the impact in Marsaskala could be lower than that, since 41.64% of the runoff would still end up in Marsaskala. Hence in the case of Marsaskala, the level of significance of the beneficial impact would be *moderate*.

#### **VERMIN**

The tunnel system is expected to attract vermin. The level of significance of the adverse impact of the occurrence of vermin on public health will depend on the quantities involved. Regular maintenance of tunnels should fully mitigate this adverse impact.

#### **4.13 WASTE**

The waste generated by the proposed development during construction can be described as follows:

- Inert waste from the excavation of the proposed sites and construction phase. The total volume of material to be excavated from the sites is estimated at 31,625m<sup>3</sup>, of which 7,908m<sup>3</sup> consisting of the Il-Mara member of the Lower Coralline Limestone formation and the remainder consisting of Lower Globigerina Limestone. This material is to be used as backfill wherever possible or disposed of at the Ta' Żuta inert waste landfill. Should construction works in the vicinity of Shaft A or Shaft B require backfill material on specific days, the trips to Ta' Żuta will be diverted to this site upon agreement with the owner, until the required amount of material is supplied;
- Limestone dust (quantity of which is difficult to predict), consisting mainly of extracted material and cement (especially when bags are emptied). This material will be disposed of at Ta' Żuta inert waste landfill;
- Water runoff (during construction) that is likely to contain sediments from the development site. This will be controlled by means of settling tanks located in the lower parts of the construction sites involved;
- Hazardous waste generated during construction, including waste oils, oil filters and contaminated absorbents, dried shotcrete from spraying operations and machinery spare parts. Such wastes will be separated and stored and disposed of as directed by the competent authorities; and
- Municipal waste generated by on-site workers.

Waste generated during operations would consist of contaminated residues resulting from the cleaning of oil/grit separators and the tunnels themselves. These waste streams (ECW: 13 05 08) shall be collected and transported away from the site by a Registered Waste Carrier appointed through a Registered Waste Broker. Such waste would be disposed at the Għallis hazardous waste facility, assuming that it would be operational by the time the tunnels are commissioned.

#### **4.14 SECONDARY IMPACTS**

The project shall involve the disposal of substantial amounts of excavated material. This would take up a substantial amount of space in the inert waste landfill and would result in a high significant impact. Despite mitigation measures such as the use of muck in the construction industry mainly as backfill, the residual impact would still be high.

An additional secondary impact generated by the works will also be the noise and air pollution created by the vehicles carrying the extracted materials to the landfill. Significance of such impacts was not determined.

#### **4.15 INTERACTION BETWEEN IMPACTS**

The periodic spraying of works with water aimed at reducing airborne particulates, unless carefully controlled, would simply modify the mode of transport of particulates and result in a slurry that would flow downslope and pool in low-lying areas. The washing of vehicle wheels using sprinklers may produce a similar effect unless mitigated further.

The level of significance of such impact would vary, depending on the quantities involved. Given that each construction site shall be equipped with a settlement tank to which any run-off will be directed, the residual impacts are expected to range from *minimal to low* significance, depending on the volume of dust that was

not captured by mitigation measures.

#### 4.16 CUMULATIVE IMPACTS

##### Construction phase

The construction works of the proposed NFRP project may coincide with the final phases of the works on the STP and its outfall. However the STP excavation works and the outfall excavations would be over by the time that works on the NFRP project commence, and therefore, the cumulative impacts of the works on these three projects will only be experienced in the first few months of the NFRP works and the levels of significance of the of the adverse impacts, which would probably be connected with air quality, will be on the low side.

The STP EIS also refers to potential cumulative impacts when HGV trips generated by the STP and Smart City coincide. Such impacts should therefore be expected to take place with respect to trips generated by the proposed NFRP project.

##### Operations phase

As outlined in section 4.3 of this report, the operations of the NFRP will coincide with that of the STP outfall. In this regard, the following cumulative negative impacts on marine quality are expected:

- Transient salinity changes during rain (impact of *medium* significance);
- Re-suspension due to disturbance of seabed silt leading to remobilization of pollutants (impact of *low to medium* significance);
- Nutrient release from runoffs (impact of *medium to high* significance);
- Increase incidence of pollution by sewage via runoff and release of oil residues (impacts of *medium* significance); and
- Release of suspended solids from runoffs during operation (impacts of *medium to high* significance).

## 5 PLANNING, POLICIES AND LEGISLATION

The EIS considers the relevance of international and national legislation and Maltese planning policy to the proposed development. The following is list of main regulations to which the construction and operation of the proposal should conform:

### 5.1 INTERNATIONAL LEGISLATION

- **The European Cultural Convention**, 1954;
- **The European Convention on the Protection of the Archaeological Heritage**, 1992;
- **The Convention on Biological Diversity**, 1992; and
- **Åarhus Convention**, 2001.

### 5.2 NATIONAL LEGISLATIVE AND REGULATORY Development Planning Act, 1992

- Environmental Impact Assessment Regulations, 2007,

### Code of Police Law

#### Environment Protection Act, 2001

- Nature Protection:
  - **Legal Notice 311 of 2006**: Flora, Fauna and Natural Habitats Protection Regulations; and
- Air Quality
  - **Legal Notice 216 of 2001**: Ambient Air Quality Assessment and Management;
  - **Legal Notice 224 of 2001 (as amended by L.N. 231 of 2004)**: Limit values for Sulphur Dioxide, Nitrogen Dioxide and Oxides of Nitrogen, Particulate Matter and Lead in Ambient Air Regulations, 2001; and,

- **Legal Notice 229 of 2001:** Measure against the Emission of Gaseous and Particulate Pollutants from Internal Combustion engines (Non-road Mobile Machinery) Regulations.
- Waste Management:
  - **Legal Notice 337 of 2001:** Waste Management (Permit and Control) Regulations;
  - **Legal Notice 158 of 2002:** Waste Management (Batteries and Accumulators) Regulations;
  - **Legal Notice 168 of 2002:** Waste Management (Landfill) Regulations;
  - **Legal Notice 161 of 2002:** Waste Management (Waste Oils) Regulations;
  - **Legal Notice 227 of 2006:** Waste Management (Packaging and Packaging Waste) Regulations;
  - **Legal Notice 106 of 2007:** Waste Management (Activity Registration) Regulations.
- Noise:
  - **Legal Notice 193 of 2004:** Assessment and Management of Environment Noise Regulations;
- Other:
  - **Legal Notice 295 of 2007:** Environment Management Construction Site Regulations.

#### **Malta Resources Authority Act, 2001:**

- **Legal notice 213 of 2001:** Pollution Caused by Certain dangerous Substances Discharged into the Aquatic Environment;
- **Legal Notice 203 of 2002:** Protection of Groundwater against Pollution caused by certain Dangerous Substances Regulations;
- **Legal Notice 254 of 2008:** Borehole Drilling and Excavation Works within the Saturated Zone Regulations;
- **Legal Notice 194 of 2004:** Water Policy Framework Regulations;
- **Legal Notice 108 of 2009:** Protection of Groundwater against Pollution and Deterioration Regulations; and
- **Legal Notice 126 of 2008:** Prevention and remedying of Environmental Damage Regulations.

#### **Malta Standards Authority Act and Product Safety Act, 2000**

#### **Cultural Heritage Act, 2002**

#### **5.3 LOCAL PLANNING POLICY**

##### **Structure Plan Policies:**

- Settlement Pattern: SET1, SET11, SET12;
- Built Environment: BEN1, BEN2, BEN3, BEN5, BEN7, BEN 8, BEN9, BEN12, BEN 14, BEN15, BEN20, BEN21;
- Agriculture: AHF4;
- Minerals: MIN7;
- Transport: TRA2, TRA3, LEM6;
- Cultural Heritage: UCO6, UCO7;
- Rural Conservation Areas: RCO1, RCO2, RCO3, RCO4, RCO5, RCO12, RCO28, RCO29;
- Marine Conservation Areas: MCO1;
- Public Access to Coast: CZM3;
- Archaeology: ARC1, ARC2, ARC3;
- Water Conservation: PUT7; PUT8; and
- Waste Management: PUT13.

**South Malta Local Plan:** *Policies SMAG01, SMCO03, SMCO04. SMCO05, SMCO06, SMCO07, SMCO08, SMMS04, SMPU01;*

##### **Minerals Subject Plan;**

**Space for Waste: The Waste Management Subject Plan:** *Policies SWM1, SWM2, SWM3, SWM7;*

**Code of Practice for Quarrying Working and Restoration;** and  
**Access for All: Design Guidance (2005).**

#### **5.4 TOPIC PAPERS**

- **Urban conservation and Built Environmental Topic Paper;**

- **Rural Strategy Topic Paper;**
- **Coastal strategy Topic Paper;** and
- **Utilities Topic Paper.**

## 6. EPD Comments and Conclusions

The Environment Protection Directorate (EPD) agrees that beneficial impacts are envisaged in terms of alleviating flooding within the urbanised headwaters and valley mouth of Wied il-Għajn, but has reservations on:

1. the relatively drastic engineering intervention pursued, which essentially diverts, in a wholesale manner, half of the natural valley flow (Wied il-Għajn proper) into an artificial conduit that discharges into a completely extraneous location within a predominantly natural coast (Xgħajra-Żonqor coast) rather than promoting in-situ water catchment management measures;
2. the fact that the project seeks the rapid discharge of accumulated runoff directly to sea, with hardly any attempt at rainwater harvesting; and
3. the permanent defacement of undeveloped natural rocky coast to accommodate a new tunnel outlet.

In these regards, the EPD had initially insisted on the alternative management of the Wied il-Għajn runoff within the same catchment, such as by the enlargement of the existing dam and its retention basin. In response, the project engineers in liaison with the EIA Coordinator provided a technical argumentation as to the insufficiency of such option, based on its quantified retention volumes relative to the sheer quantity of 5-year-storm runoff flows and the limited potential for enlargement of the dam and its basin. Essentially, due to these limitations, the effectiveness of this lower-impact solution is only marginally better than the zero (do-nothing) option vis-à-vis the current baseline situation. As a result, this option was discarded and the EIA focused more closely at the technically preferred way forward (from an engineering perspective) of diverting the runoff to a different location, whilst seeking the least-impact solution for such purpose.

In the latter regard, a range of potentially feasible options were explored in detail to optimise site selection and avoid unacceptable environmental impacts. Whilst most of the EIA-relevant issues were more or less common to all options, the precise physical location of the tunnel exit was a major concern from both engineering and environmental points of view. Most of the coastal locations were considered as non-starters due to a combination of:

- constrained coastal topography (resulting in poor scope for a proper tunnel opening and/or the requirement for disproportionate scarring of the landscape to accommodate such opening);
- weak geological make-up and/or precarious geomorphology dominated by cliff recession, mass movements, and boulder scree formation (thus resulting in high-impact massive interventions such as the conversion of an entire natural cliff/cove into a concrete sea-wall);
- damage to highly localised geomorphological features/landforms worthy of conservation (especially the steep-sided coves known as '*għor f'ijiet*' and the cliff/caves at Is-Swali);
- impact on landscape (either due to prominent location along the open coast or due to irreversible mutilation of local scenic spots corresponding to the above-indicated geomorphological features); and
- engineering constraints.

Accordingly, the EIA Coordinator considers Ta' Barkat (immediately adjacent to the ongoing development of the sewage treatment plant and sewage outfall) as the preferred location for the tunnel outlet. The EPD agrees with this EIA conclusion. Furthermore, the EPD is of the opinion that Ta' Barkat is the only spot along the northeast-facing coast between Xgħajra and Żonqor where a new breach in the natural coast can be considered as being acceptable in principle. This site itself is a continuation of the above-mentioned natural coast, however its baseline situation needs to be seen in its fuller context as it is irreversibly dominated by the massive sewage treatment plant and its ancillary coastal developments such as the main pumping station, the sewage outfall and the extensive remodelling of the pre-existing topography. Other alternative locations would result in an unacceptable free-standing intrusion in the open coastal landscape further east, whilst not improving the environment at Ta' Barkat which would still remain severely compromised by the major STP development.

This is not to say that works at Ta' Barkat should be given carte blanche. Works would still require careful pre-emptive mitigation of construction-phase impacts, since the site is in very close proximity to the scenic cove of Il-Ġorf I-Abjad (also known as Il-Ġorf tat-Tafal) on its eastern side and to the smaller inlet of Il-Ġorf tal-Blata I-Bajda on its western (Xgħajra) side. Specific permit conditions had already been imposed on the WSC developments to pre-empt damage to these features worthy of conservation, and these safeguards are equally relevant to the proposed stormwater tunnel.

In conclusion, **the EPD is hereby accepting the proposed development strictly subject to the above terms.** *[In this regard, MEPA Board should be advised that any shifts from the above core issues (particularly any proposed shifting of the outlet location onto a more virgin site on the coast) would trigger an adverse EPD recommendation on the project, apart from necessitating the reopening of the concluded EIA process].* Additional detailed conditions are also attached herewith to address the various other impacts identified in the EIA or otherwise deemed relevant for effective mitigation of environmental impacts.

## Appendix 1: Scoping comments submitted to MEPA during scoping consultation (29 August 2008).

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<b>Environment Health Dept</b>	An integrated water management approach to flood relief (IWMAFR)
30 Oct 2008	<p>With reference to application subject in caption, following review of the PDS provided to this Dept, we would like to have the following issues related to public health included in the terms of reference for this development.</p> <p>The health related impacts from the development on:</p> <ol style="list-style-type: none"> <li>1. Air pollution especially from fine dust during the excavation and construction stage, including its effects on the surrounding sensitive area;</li> <li>2. Waste disposal issues off site;</li> <li>3. Noise and vibration pollution;</li> <li>4. Traffic related problems;</li> <li>5. The overall cumulative impacts of the development on the general public are also to be assessed as the development is in such a sensitive area.</li> </ol> <p>The EIA should also include a detailed description of the measures envisaged to prevent, minimise and where possible offset any significant adverse health effects on the general public. This should include details regarding monitoring programmes that may be proposed. The EIA should also identify, describe and discuss in detail the possible health effects of any residential impacts that cannot be mitigated.</p>
<b>Gżira Local Council</b>	We would like to confirm that we are in agreement with the projected Component related to the Gzira area in the IWMAFR project.
28 Oct 2008	We would like to point out however that there seems to be no consideration of the storm water which originates from neighbouring villages, namely Sliema and San Gwann, which is running at street level passing through Gzira and ending up in the sea at the Strand. We believe that most of the flooding occurring in the Gzira area is caused by this phenomenon and thus would be grateful if due consideration is given to this problem.
<b>E. J. Zuijdgeest</b>	Reference is made to the relevant Chapters and pages of the PDS
Undated	<p><b>1. Introduction</b></p> <ol style="list-style-type: none"> <li>A. Water harvesting and conservation has become secondary in this project. It is noted that the decision was taken in 2006-2007 (chapter 1.1). Since then fuel prices and energy prices exploded. The recent new electricity rates have shown a further increase now better exposing the true costs involved in water production from reversed osmosis. Malta has further obligations to reduce dependency on and emissions from fossil fuel. In the light of these developments the project objectives should be revisited.</li> <li>B. Measures proposed for the various project components should make visible and quantify the improvements in water conservation as compared to the present situation where much, if not most, of the rainwater is discharged into the sea. The EIA should not only address the increase in retaining capacity, but show that increase in relation to the quantity in rainfall, the quantity to be stored and discharged into the sea. Further the EIA should provide detailed info into the change, hopefully an increase, into the replenishment of the aquifer.</li> <li>C. Reference is made I chapters 1.10 and 1.11 to the Sept 2003 flood in pictures only and not in precipitation figures. This event seems to be well above the chosen 5-year return period rainfall event.</li> </ol> <p>Doubt exists if the proposed scheme will bring the expected relief.</p>

**Figure 2.9, page 50/Chapter 7**

Flood prone areas are indicated as per local plan, here Zebbug South West. As a matter of fact the affected area and population will be much bigger as a number of roads leading to the flood prone areas are “acting” open culverts with the risk of flooding of properties, limited access, etc as per definition used in chapter 1.23. Examples in Zebbug are for instance (parts of) Triq Parocca and Triq Tad-Dawl and all of Triq Vassalli, which get the brunt of the water from as far as the village. Effectiveness and environmental impact of the project measures can only be judged if the EIA will provide detailed info on the lay out of the smaller culverts in conjunction with the routing of the gravity tunnel. This detailed info is also required to establish the impact on the UCA of Zebbug and its old and monumental buildings.

**Chapter 7**

The existence and role of Hal Dwien valley in Zebbug, a green area in the old village core, appears to be missing from the PDS and should still be incorporated. This area has an important role in rain water discharge of a much wider part of Zebbug. This valley has an important role for feeding water into the Wied tal-Baqqiegha valley system and its underground. Reference is made to MLP, page 178/179. SMLP paragraph 28.4.4 highlights the importance of this valley. The EIA should address the existence and function of this valley as any reduction in water flow will be counterproductive to water conservation and harvesting. The role of the valley in the water management system should be safe guarded. Strengthening its role should be investigated incl. the environmental consequences, flora and fauna included. The design of storm water collection and discharge with the village core should be addressed in conjunction with the valley system. A reduction of the role of the valley, if any, should be documented for its environmental impact.

**Żminijietna**

22 Oct 2008

Re Project Component 2 (Wied Ghollieqa), MEPA should consult the Nature Trust re the flooding problems of Wied Ghollieqa and the interventions being proposed. Though EPD has already consulted with them, with no reply, a discussion on the need of and the interventions proper being proposed should ensue;

Zminijietna urged that the EIA would examine the presence of illegal development within valley systems and the project should propose this removal. This is since they may further promote flooding, such as would happen should illegal dumping have occurred;

Whilst Zminijietna agree with the principle of flood relief and water retention, the project should bear in mind that valleys are ecologically sensitive and any interventions should respect the sensitivity. Alternatives to interventions in valleys should be examined first and foremost to alleviate any impacts which works in valleys may have. Further consultation with Nature Trust on Wied Ghollieqa, Wied Qirda and Wied is-Sewda should ensue. (EPD notes that the PDS has been sent to Nature Trust for comments though to date no reply has been received).

**Appendix 2: EIA Review Consultation comments submitted to EPD (starting 26 February 2010)**

Comments submitted by Consultee	Response by EIA Coordinator	MEPA
<b>Xgħajra Local Council</b>		
<p>Refer application PA 4929/09 Storm Water Tunnel proposal for areas of Zabbar and Marsascala with a discharge point at Xgħajra.</p> <p>Firstly at no time has the Xgħajra Local Council been included in the consultation process of any EIA or method statements in connection with this application. We strongly protest, disagree and OBJECT that the discharge point should be at Xgħajra along the SSTP outlet.</p> <p>Is it not enough that the the SSTP at Xgħajra will be catering for 85% of Malta's sewage with an expected discharge in the immediate site and sea of approx 30,000 m<sup>3</sup> DAILY of 2nd class treated water.</p> <p>The control, monitoring and coastal environmental effect of the SSTP and its functions at Xgħajra is already a controversial issue.</p> <p>Whoever thought out this brilliant idea to direct the storm water with an outlet at ta' Barkat along side the SSTP is purely tantamount to gross irresponsibility.</p> <p>The Xgħajra Local Council Objects and will protest with all its resources and wish to state categorically that the co-operation so far regarding the SSTP is being put in jeopardy by this irresponsible action or proposed action.</p> <p>Surely this outlet should be sited along the coast past the SSTP site in areas where there are no Strategic Plants like the SSTP.</p> <p>The Xgħajra Local Council has no intention to allow the increase of the disposal of storm water with all its impurities on to the coast of Xgħajra.</p>	<p>The public consultation stage of the EIA process has not commenced yet. This process will commence following the Certification of the EIS.</p> <p>This is the Review stage of the EIA process and the Xgħajra Local Council was invited to participate in the Review.</p> <p>This EIS Coordinator disagrees with view that the adoption of Technical Option 3 is "tantamount to gross irresponsibility". The data and reasoning which led to the selection of Technical Option 3 as the preferred Option to be analysed in detail from Chapter 2 of the Coordinated Assessment Report onward, are described in detail in Chapter 1 of the Coordinated Assessment.</p> <p>Irrespective of the weightings applied to each criterion, Technical Option 3 would still emerge as the best, given the following:</p> <ol style="list-style-type: none"> <li>1. it will disturb an already disturbed area, in a protected rural zone which is considered in the South Malta Local Plan as having substantial potential to be developed into a countryside recreational park, and</li> <li>2. the level of significance of the adverse impact on the landscape would be the lowest for all the options by a substantial degree.</li> </ol> <p>It should also be noted that, as is shown in Figure 2-30 (on page 153) in the Coordinated Assessment that at the discharge point the tunnel fits in very well in a Lower Coralline Limestone platform.</p>	Response Noted
The Xgħajra Local Council obo the residents of Xgħajra consider that the discussed outflow should be	Point taken.	Response Noted

<p>sited further south along the coast which extends some 3.5 Km with no adjoining residential buildings.</p> <p>I wish to make one small remark regarding the statement made that storm water only happens 2 or 3 times a year. I genuinely suggest that this is incorrect and with the invariable weather conditions being experienced all over Europe, the probabilities are that we may experience much more storms in the future.</p> <p>Further more on every occasion of moderate and heavy rainfall over Zabbar and M'scala this causes flooding along the M'scala road and invariably this catchment area will remain the source of diversion to any selected outflow. I can guarantee to you that with every constant rainfall the quantity of water gathered in this valley road is not of a one or two or three off occasions per year but throughout the winter season.</p> <p>I trust that you and your consultants realize our concerns and seek an alternative discharge site for the Zabbar and M'scala stormwater.</p> <p>As stated we are on record of co operating fully with the SmartCity and SSTP projects and do not wish anything that may jeopardize the co operation so far re these 2 strategic ongoing projects.</p>		
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**Department of Public Health**

<p><u>Air Quality</u></p> <p>During construction works air quality impacts (especially particulate matter) would be a potential issue due to the tunnel excavation works and the transportation of excavated material from Shaft A and B by heavy vehicles.</p> <p>In view of the fact that dust emissions from Shaft A and Shaft B can have a negative impact on residential and agricultural areas (agricultural produce) while Shaft A can also affect adversely the marine environment in the vicinity, all proposed monitoring and mitigation measures regarding these impacts are to be implemented by developer.</p> <p>Moreover the proposed measures regarding occupational health and safety management in the tunnels are highly recommended since besides protecting the health of the workers with respect to air quality they would minimize the emissions of pollutants, in particular particulate matter, into the external environment.</p> <p>Uncontrolled periodic spraying of excavated material with water to mitigate dust emissions may result in the production of run-off slurry that would flow down slope and pool in low-lying areas. Similar effect may result from washing vehicle wheels with sprinklers and hence further mitigation measures or else other de-dusting systems are to be considered. Such mitigation measures are deemed to be necessary to control dust</p>	<p>Comment much appreciated</p>	<p>Responses Noted</p>
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<p>emissions. However measures will be required to prevent possible impacts and nuisances from runoff.</p> <p>It is of utmost importance that all proposed mitigation measures with respect to air quality are implemented so as to significantly reduce the impacts on public health resulting from the deterioration of air quality.</p>		
<p><u>Noise and Vibration</u></p> <p>Noise will be generated from the surface excavation of the tunnels and the transportation of excavated material and concrete by heavy vehicles.</p> <p>During the construction phase noise pollution will have an adverse impact on nearby residential areas and hence the importance of the developer implementing reasonable and feasible noise monitoring and control measures so that most construction noise objectives can be complied with.</p> <p>However the assessment carried out indicates that following implementation of these proposed measures noise will still be an issue in the case of the residential development in the vicinity of Shaft B. Thus it is of utmost importance that special mitigation measures are taken at this site irrelevant of the fact that although effects of noise at this site (shaft B) are considered to be of high significance it is expected that because of the relatively short duration of the works, the effects on public health would be of moderate significance.</p> <p>Moreover appropriate noise control measures must also be taken by developer so as to sufficiently mitigate noise from equipment used underground.</p> <p>With regards to vibrations generated during excavation works, the proposed measures are to be taken by developer to mitigate the adverse impacts of vibrations on the Area of Influence.</p>	<p>Comment much appreciated</p>	
<p><u>Water Run-off</u></p> <p>During the construction phase of this development the main risks to water quality are likely to result from the release of both coarse and fine particulates and undissolved and suspended matter from the excavation of the tunnel leading to the outlet on the coastline at Il-Ġorf tal-Blata l-Bajda, the release of dissolved substances from coastal engineering works and other contamination risks during the construction phase by contaminants such as fuels, lubricating oils, etc and accidental spills of hazardous materials into the marine environment.</p> <p>Hence the importance of good site management enforcement and that spill contingency plans are properly in place so as to significantly reduce the impacts from these risks.</p> <p>During operation of the development, storm water run-off contaminated by a variety of substances including sewage from overflows or leakages (caused by the</p>	<p>Comment much appreciated</p>	

<p>illegal connection of storm water drain pipes with the sewerage system and/or from malfunctions, substandard construction, or infrastructural damage) which blends with the normal run-off during heavy storms is the major source of pollution having a residual impact on the marine environment. This residual impact will affect more Marsaskala than Il-Ġorf tal-Blata l-Bajda area where open sea conditions prevail.</p> <p>Adequate measures are also to be taken by the developer to prevent/minimise the release of suspended solids from run-offs.</p>		
<p><u>Waste</u></p> <p>With regards to waste generated during the construction works and during the operation and maintenance phase, the developer is to abide to the proposed waste management plan and waste handling procedures as per the current Waste Management Policy.</p>	<p>Comment much appreciated</p>	
<p>It is recommended that all proposed mitigation measures, including those proposed for the operation and maintenance phase, are to be strictly implemented by the applicant so as to mitigate to the maximum any possible adverse impacts on public health especially with regards to any negative impacts on the Area of Influence. Any other unpredicted impacts and nuisances which may arise and that may have a significant adverse effect on public health should be immediately addressed by the developer and the necessary mitigation measures taken. All relevant complaints lodged should be investigated and remedial action taken immediately.</p> <p>All complaints lodged and actions taken are to be recorded and such records are to be readily available to the Competent Authorities when requested.</p> <p>All the monitoring which is being proposed is also to be implemented.</p>	<p>Comment much appreciated</p>	
<p>Secondary impacts generated by the works of this project are also to be taken into consideration and the appropriate mitigation measures taken as necessary.</p> <p>Cumulative impacts which may occur both during the construction and operations phase and which may have an adverse effect on public health should be taken into consideration and addressed immediately.</p>	<p>Comment much appreciated</p>	
<p>Regular and proper pest control is also to be implemented, should vermin, especially rodents pose a nuisance.</p>	<p>Comment much appreciated</p>	

## Appendix 3: Minutes of Public Hearing dated 28 July 2010

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### PA 4929/09

**Storm water tunnels and other infrastructural works as part of the National Flood Relief Project (NFRP), with proposals for the areas of Żabbar and Marsaskala with a discharge point at Xgħajra, as outlined in the Cost-Benefit and EIA studies and Technical Assistance reports and other documents prepared by Politecnica.**

#### Public Exhibition and Public Consultation

**Notre Dame Parish Hall, Mediatrix Place, Żabbar.  
28th July 2010**

#### Minutes of meetings held with Identified Stakeholders and the Public

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##### Legend to initials used in the minutes:

**MEPA:** Martin Seychell (MS; Chairman); Elaine Saliba (ES); Josianne Abela Vassallo (JAV);  
**EIA Consultants:** Paul Gauci (PG); Sandro Lanfranco (SL); Patrick Schembri (PS); Joseph Borg (JB);  
**Developers (MRRA):** Carmel Mifsud Borg (CMB); George Buhagiar (GB); Albert Caruana (AC);  
**Xgħajra Local Council (XLC):** Anthony Valvo (AV);  
**Nature Trust:** Graziella Cavlan (GC);  
**Haż-Żabbar Residents:** Charles Mizzi (CM); Resident (ZR).

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MS introduced the meeting, explaining its scope; to discuss the findings of the Environmental Impact Statement (EIS) for the said proposal. MS gave a brief overview of the EIA process and explained the way forward following public hearing; i.e. after the week of public consultation following the public hearing, the EIA Report and proposed conditions are forwarded to case officer for presentation to MEPA Board for a decision.

MS stated that MEPA would accept comments in writing till the 4<sup>th</sup> August, 2010. Comments may be sent by email on [eiamalta@mepa.org.mt](mailto:eiamalta@mepa.org.mt).

PG gave a brief presentation on the proposed development together with a brief overview of the findings of the Environmental Impact Statement (EIS).

AV stated that Xgħajra will not be benefiting from this project since it will only be serving as a recipient to sustain the system. He expressed his concern with regards to the location of the proposed outfall; 50 meters away from the Xgħajra residents.

PG explained that based on the studies carried out, the distance of the proposed outfall from the existing hamlet of ODZ properties is 135m.

AV stated that he is very disappointed that this site was chosen for the proposed outfall, especially due to the fact that Xgħajra is already carrying the burden of other national projects. AV referred to the Sewage Treatment Plant at Ta' Barkat. AV stated that problems with regards to monitoring of the effluent parameters of this treatment plant, are envisaged, and consequently Xgħajra does not need to carry the burden of additional effluents brought about by the proposed project.

AV also expressed his concern with regards to the design of the proposed outfall. AV compared this to the one STP outfall. The latter will be discharging effluent at one kilometre away from the shore, while the

storm water outfall will be discharging at shore. AV mentioned that the STP has an emergency outfall, located 50m away from the shore, but explained that as the name implies this will be used under emergency situations only.

AV stated that given that Marsascala is basically a valley, Marsascala Road will be flooded every time a heavy rainfall event occurs, and not necessarily during a 1/5 year storm only. This implies that effluent will be discharging at Xgħajra throughout the whole winter and not only as a result of extraordinary events.

AV questioned the findings of the alternative site assessment. AV pointed out that there is a site located 2.8km away from Ta' Barkat in the direction of Żonqor point, which is not residential and should have been an alternative site for the location of this discharge outfall. AV asked whether such site was thoroughly assessed.

PG referred AV to the findings of the alternative site assessment. PG explained that the site referred to by AV was considered in the study and amongst other findings it was noted that it was a site popular for swimming.

MS asked whether the EIS studied the possibility of cumulative impacts.

PG confirmed that the cumulative impacts on the water quality of the proposed site were addressed and assessed in the study. PG explained that due to limited national data on flooding and water quality, the worst case scenario was adopted for this study.

AV stated that if Ta' Barkat is to be considered as the best site for the location of the proposed outfall, how will the developers ensure effective traffic management so as to avoid an additional consequential impact on the Xgħajra residents.

PG stated that it is recommended that during excavation, there should not be more than 8 truck trips per day (4 trucks per day).

MS requested the developers to take an official position about the recommendation made by PG in the EIS.

GC asked the reason behind not considering the use of reservoirs as a possible solution to the flooding problem.

PG explained that the use of reservoirs was in effect studied as an alternative option. It was concluded that there are no existing reservoirs with the required capacity, there is no land available for the construction of new reservoirs and that the tunnels will be large enough to allow for water retention themselves.

CMB stated there is only one existing dam, and in order to cater for the volume of water envisaged for a 1/5yrs storm, it has to be 30 times its size. No land is available for such a significant expansion.

GC asked why spent quarries couldn't be used as reservoirs instead.

CMB stated that there are no quarries in the areas covered by this planning application. CMB explained that most quarries are privately owned and since the EU does not fund acquisition of land from private owners, this option was not economically feasible. Furthermore, CMB pointed out that the first obligation to spent quarries is that of rehabilitation.

PG also commented that should reservoirs be constructed instead of the proposed system, the large volumes of excavation material that will be produced would result in the infilling of the spent quarries being mentioned in previous comments.

GC remarked that this development would result in a significant wastage of water.

CMB explained that the water volumes to be discharged through this system are very small when compared to the 3000cm<sup>3</sup> of water that will be discharged from the STP on a daily basis.

MS explained that the treated effluent being discharged from the STP could only be used for agricultural purposes and not for human consumption without further treatment, the feasibility of which was not clear.

AC explained that there is a pilot study that will be carried out on existing reservoirs in Gżira, through which the water quality of the retained water will be determined. That could give an insight to the possible re-use of this water.

ZR pointed out that there are a large number of reservoirs in Ғaḡ-Ḓabbar that can be used to complement the proposed system. She asked whether the use of such reservoirs was considered.

AC confirmed that the existing reservoirs will not be excluded from the system.

ZR complained that Sanctuary Street is not connected to the proposed flood relief system. AC stated that the calculations with regards to flooding in Sanctuary Street are to be reviewed.

CM asked the developers how the archaeological remains located in close proximity to the sites earmarked for the underground tunnels will be safeguarded.

PG confirmed that excavation works will be monitored as per standard procedures.

Final comments by MS.

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#### Public Hearing Comments received by 4 August 2010.

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Comments submitted by Consultee	Response by EIA Coordinator	MEPA
<b>Mr. Vince Attard obo Nature Trust</b>		
<p>As Nature Trust (Malta) we wish to register our objection regarding the 'Storm water tunnels and other infrastructural works as part of the National Flood Relief Project (NFRP), with proposals for the areas of Zabbar and Marsascula with a discharge point at Xgħajra.</p> <p>Our main concern is that the project has not given much consideration to water wastage and that this rainwater should be harnessed. Our objection is also against spending funds on digging tunnels, when Malta has many degraded reservoirs and wells. The restoration of these reservoirs may be more expensive at the start but should prove environmentally more sound than dumping fresh water into the sea.</p> <p>Nature Trust (Malta) as was also suggested by MRRA, wish to see these reservoirs restored and used before one can say they are not viable for reducing flood water.</p>	<p>The issue of water wastage and harvesting was discussed long before the present EIS was commissioned. Indeed, it was studied in detail in the Storm Water Master Plan. The findings of the Master Plan were analysed by the designers of the present system who found that the financial and environmental cost of 'harvesting' would be high. It would be much cheaper to treat the constantly available effluent of the Sewage Treatment Plants for the production of second class water (and indeed, for drinking by human beings) than to store the run-off produced by storms which occur for few days a year. It should be noted that in this case financial costs reflect adverse environmental impacts, because the Nature Trust proposal involves the use of natural resources, such as, energy for treatment and substantial exvacation works (with all the implications) for storage. In other words, the environmental cost of treating sewage effluent is substantially lower to that of storing and treating storm water.</p> <p>The comment regarding the cleaning up of existing reservoirs/wells. This issue is studied in the Storm Water Master Plan and by the</p>	Response Noted.

	<p>current design engineers. The capacity of the existing systems does not cater for the requirements of 5-year storms, which is what the NFRP is about.</p> <p>The need for the upgrading of existing reservoirs/wells is agreed with.</p>	
<b>Mr. Anthony Valvo - Mayor of Xgħajra Local Council</b>		
<p>I refer to the EIA Public Meeting held at Zabbar last week in connection with PA 4929/09 and the proposed outlet at ta' Barkat alongside the site of the SSTP.</p> <p>I refer to my council's previous submissions on this issue which are well documented and acknowledged and in MEPA's files.</p> <p>I also refer to the comments I made at the Public Meeting on behalf of the Xgħajra Local Council representing the residents of Xgħajra and its peripherals whereby we object to the outlet site at ta' Barkat for various reasons which are well documented with you and which were also discussed at the Public Meeting.</p> <p>The vast majority of the residents of Xgħajra have signed a petition objecting to the choice of site at ta' Barkat.</p> <p>You are kindly requested to desist from concluding on the choice of site at ta' Barkat and move further southerly down the coast.</p>	<p>There is nothing to be added beyond what was stated by this EIA Coordinator in response to Mr Valvo's comments during the actual hearing, and which are recorded in these minutes.</p>	<p>Response Noted.</p>
<b>Mr. Marc Muscat - CEO Water Services Corporation</b>		
<p>Reference is made to the Flood Relief Tunnel Outlet PA 4929/09</p> <p>It has been brought to my attention that if the tunnel exit were to be adjacent to the Ta' Barkat STP, it is envisaged to use the STP's internal road to carry excavated material.</p> <p>Please bear in mind that this road will not be open to public traffic, it is only a service road for use by the Corporation for its daily operation of the plant.</p>	<p>The EIA Coordinator included the link between the access shaft and Triq San Leonardu, through the Ta' Barkat STP as one of many traffic-management options presented in pages 31 to 37 of Appendix Ten Volume Two of the EIS.</p> <p>These options were formulated to assist in the making of informed decisions regarding the routes through which contractors' heavy vehicles could be driven to/from the access shafts, without adversely affecting residential/commercial zones – especially the ones in Żabbar and Xgħajra.</p> <p>The option in question was meant to preclude the possibility of contractors' vehicles being driven through Xgħajra, in the event that the best financial/environmental tunnel layout, out of the seven layouts, which were tested in the EIS, is adopted.</p>	<p>Response Noted.</p>

	<p>According to this option, the contractors' vehicles loaded with excavated material would be driven through the ring road of the STP to Triq San Leonardu, which links Ta' Barkat with the roads by-passing Żabbar/Xgħajra, Kalkara, Birgu, Bormla, Żabbar, Fgura, Tarxien until they reach Triq tal-Barrani, on their way through non-urban roads to the inert-waste land fill (at Ta' Żuta). The reverse route would be used for unloaded vehicles and others supplying materials to the access shaft in question. This route was used by the STP contractor, at the time when the optional routes were explored.</p> <p>Pages 31 to 37 of Appendix Ten Volume Two of the EIS show that unless the Triq San Leonardu option is used, the probability would be that all the contractors' heavy vehicles would have to be driven through the following Żabbar roads or squares:</p> <ul style="list-style-type: none"> <li>• Triq is-Santwarju and the Żabbar Centre (outbound), and</li> <li>• Misraħ il-Madonna Medjatriċi, Triq Hompesch (onto which the Żabbar Primary School abuts), Triq il-Kunvent, Triq Felice, to Triq Wied il-Għajn (inbound).</li> </ul> <p>The viability of this option depends on the obtaining of a permission from WSC for the use of the internal ring road through Ta' Barkat STP.</p>	
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