PA 02342/06 (GF 00121/06)
Master Plan for the Maghtab Environmental Complex
Naxxar

ENVIRONMENTAL IMPACT STATEMENT UPDATE
TECHNICAL APPENDICES

Version 1: September 2011

adi
ASSOCIATES
ENVIRONMENTAL
CONSULTANTS

CONTENTS

PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 1

TERMS OF REFERENCE AND METHOD STATEMENTS

Supporting Documents for
Environmental Impact Statement Update

PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

GEOLOGY, GEOMORPHOLOGY, HYDROLOGY AND HYDROGEOLOGY METHOD STATEMENT

INTRODUCTION

1. This method statement provides information on the geo-environmental input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[1]:

- Extension of Zwejra cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;

[1] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and
- The establishment of a Biological Treatment Plant (AD).

2. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

3. As this is an update to an existing EIA, MEPA has not issued Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

4. The Areas of Influence (A of I) for the geomorphology, hydrology, and hydrogeology baseline studies are shown in **Figure 2**.

ASSESSMENT METHODOLOGY

Competence of surveyors

5. Dr Aaron Micallef will undertake the baseline surveys. Adi Associates and Dr Micallef will prepare the impact assessment.

Geology

6. As the EIS for the Ghallis landfill (PA 04834/04) includes an extensive geology survey (see Maps GH 7/2 and 7/3) and geology does not change over time, it is proposed to use the same baseline as that contained in the EIS. An update is not considered necessary and will therefore not be covered in the EIS Update. However, impacts on geology will be assessed.

Geomorphology

7. The purpose of this survey is to gather baseline data in respect of the geomorphology pertaining to the Application Site, and will involve:

- Identification and description of the geomorphology of the area shown in **Figure 2**;
- Identification, mapping and description of geomorphologic features; and
- Identification of features that are protected by legislation or warrant such protection, and in the latter case, the appropriate level of protection.

8. The baseline survey will result in the drawing up of the following maps:

- Geomorphological Map; and
- Digital Elevation Model.

Hydrology and Hydrogeology

9. The purpose of the hydrology / hydrogeology baseline survey is to:

- Identify and describe the following features: aquifers and their characteristics, water courses and their characteristics, drainage patterns, surface run-off, springs and wells, if any;
- Carry out a surface water flow study to map surface water channels across the site and downstream of it as shown in **Figure 2**, to assess the direction and volume of surface water within the proposed site, and to calculate the water balance of the catchment area relevant to the site;

- Determine the importance of the proposed site in recharging the mean sea level aquifer. The drainage potential of the site in accordance with the soil type and the underlying rock strata will be ascertained. Groundwater protection zones will be identified; and
- Identify the current users of the surface water.

10. The outputs of the hydrology / hydrogeology baseline surveys will be in the form of:

- Hydrological Map;
- Hydrogeological Map;
- Surface water flow Map; and
- Water balance estimations and hydrological models.

Mineral Resource Assessment

11. Although MEPA's Terms of Reference do not specifically require a geo-technical survey of the material to be excavated and noting that the EIS for PA04943/04 carried out a number of investigations, it is proposed to take 1 core sample that will extend to 10m below ground level, as shown in **Figure 2**. Sampling and testing will be in accordance with BS standards BS 5309/99, BS 812 and BS 1377.

Groundwater quality

12. The same borehole (as shown in **Figure 2**) will be used to collect groundwater and test it. It is proposed to test for the same parameters as those tested in the EIS for PA4834/04 namely: Arsenic, calcium, cadmium, chromium, copper, mercury, iron, manganese, nickel, lead, selenium, zinc, magnesium, chloride, COD, Kjeldahl nitrogen, nitrate, phosphate, sulphide, sulphate, ammoniacial nitrogen, potassium, sodium, Total Suspended Solids, total phenols, conductivity, dissolved oxygen, pH, total dissolced solids, alkalinity total as CaCO3, phenol, 2-methyl phenol, 4-methyl phenol, 2,4-dimethyl phenol, 1,4-dichlrorbenzene, 2-methyl naphthalene, diethyl phthalate, naphthalene, ci-1,2-dichloroethene, chloroform, trichloroethane,m total coliforms, E.Coli, Candiuda albicans, bacillus stearothermophilis (detection), listeria monocytogenes (detection), BOD, TAT, DBT.

Land Contamination

13. The core sample will be tested for leachate testing in accordance with Waste Acceptance Criteria testing under the Landfill Directive. This decision is in line with the aim of identifying the potential for leaching that could impact on groundwater quality at the Site (and the suitability for deposit elsewhere) in accordance with **Table 1** below.

Table 1: WAC testing and leachability

Parameter	u.o.m.	Inert Landfill	Non-hazardous Landfill	Hazardous Landfill

Parameter	u.o.m.	Inert Landfill	Non-hazardous Landfill	Hazardous Landfill
		LIMIT VALUES		
Total Organic Carbon (w/w%)	%	3		
Loss on ignition	%	10		
BTEX (mg/kg)	mg/kg	6		
PCBs (7 congeners) (mg/kg)	mg/kg	1		
Mineral Oil C_{10}-C_{40} (mg/kg)	mg/kg	500		
pH		>6		
Acid neutralisation capacity	mol H+/kg			
PAHs – total 17 including coronene	mg/kg	/		
Leachate		**Inert Landfill**	**Non-hazardous Landfill**	**Hazardous Landfill**
As	mg/kg	0.5	2	25
Ba	mg/kg	20	100	300
Cd	mg/kg	0.04	1	5
Cr	mg/kg	0.5	10	70
Cu	mg/kg	2	50	100
Hg	mg/kg	0.01	0.2	2
Mo	mg/kg	0.5	10	30
Ni	mg/kg	0.4	10	40
Pb	mg/kg	0.5	10	50
Sb	mg/kg	0.06	0.7	5
Se	mg/kg	0.1	0.5	7
Zn	mg/kg	4	50	200
Cl	mg/kg	800	15,000	25,000
F	mg/kg	10	150	500
SO_4	mg/kg	1,000	20,000	50,000
Total Dissolved Solids (TDS)	mg/kg	4,000	60,000	100,000
Phenol Index	mg/kg	1	/	/
Dissolved organic Carbon at own pH or pH 7.5-8.0	mg/kg	500	800	1,000

Guidance

11. The conservation importance of hydrologic / hydrogeologic and geologic, geomorphologic, and palaeontologic features will be identified by reference to the Structure Plan of the Maltese Islands, The North Harbours Local Plan, The Mineral Subject Plan and The Earth Conservation Strategy of The British Nature Conservancy Council, 1991.

IDENTIFICATION OF POTENTIAL IMPACTS

12. The sources of potential geo-environmental impacts arising from the construction and operation of the Scheme on the sensitive receptors are likely to include:

- Excavation impacts;
- Alteration of the surface water drainage pattern; and
- Changes to the runoff quantity and quality discharged from the Site.

Prediction of potential impacts

13. The results of the baseline geo-environmental surveys (maps and analytical data) together with data from other baseline surveys will be overlaid on the layout of the site to enable prediction of potential impacts on:

- Geology / palaeontology / geomorphology;
- Surface water flows;
- The mean sea level aquifer; and
- Protected areas or areas that warrant protection.

Geology / palaeontology / geomorphology

14. The impact of changes resulting from the construction and operation of the Scheme on geology / geomorphology will make reference to the nature of the beds and the degree of protection afforded to them through MEPA policy and / or legislation.

Surface water flows and quality

15. The impact of changes in water flows and quality on users downstream of the site will be assessed. The impact of the construction and operation of the Scheme on surface water flows will be determined by ascertaining the magnitude of changes in water flow through the use of water balance techniques.

Mean sea level aquifer

16. The sensitivity of the mean sea level aquifer to changes in surface water contamination and volumes brought about by the construction and operation of the Scheme will be evaluated by reference to the aforementioned surveys and water quality data.

IMPACT SIGNIFICANCE

17. The analysis of the significance of each potential impact identified (positive or negative) will include:

- Description of impact;
- Policy importance of the impact (local, national, international);
- Extent of impact;
- Duration of impact (temporary or permanent);

- Adverse or beneficial effect of impact;
- Reversible and irreversible effects of impact;
- Sensitivity of geo-environmental resources to impacts;
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement (very good, good, fair, none).

18. The above criteria will enable the determination of the significance of each impact in respect of the studies described above. The impacts will be described as not significant, of minor or major significance:

- Not significant
    - Little or no change to the hydrologic regime or geological regime, and no significant change to the quality of the aquifer;
- Minor significance
    - Geology: changes to the geological regime that may affect neighbouring properties but which may be offset by mitigation measures;
    - Hydrology: changes to the hydrologic regime but no impact on the aquifer; modifications to the surface water drainage pattern that will not negatively affect downstream users, or with potential for substantial changes to be offset by mitigation.
- Major significance
    - Geology: changes to the geological regime that may affect neighbouring properties and which may not be offset by mitigation measures (if negative) or may be enhanced by mitigation measures (if positive);
    - Hydrology: changes to the hydrologic regime that impact the aquifer with little opportunity for changes to be offset by mitigation (if negative) or may be enhanced by mitigation measures (if positive).

MITIGATION AND MANAGEMENT PLANS

19. Where mitigation measures exist, these will be explained in the impact assessment section. A monitoring framework will also be provided.

Adi Associates Environmental Consultants Ltd

August 2010

Figure 1: Master Plan for the Area

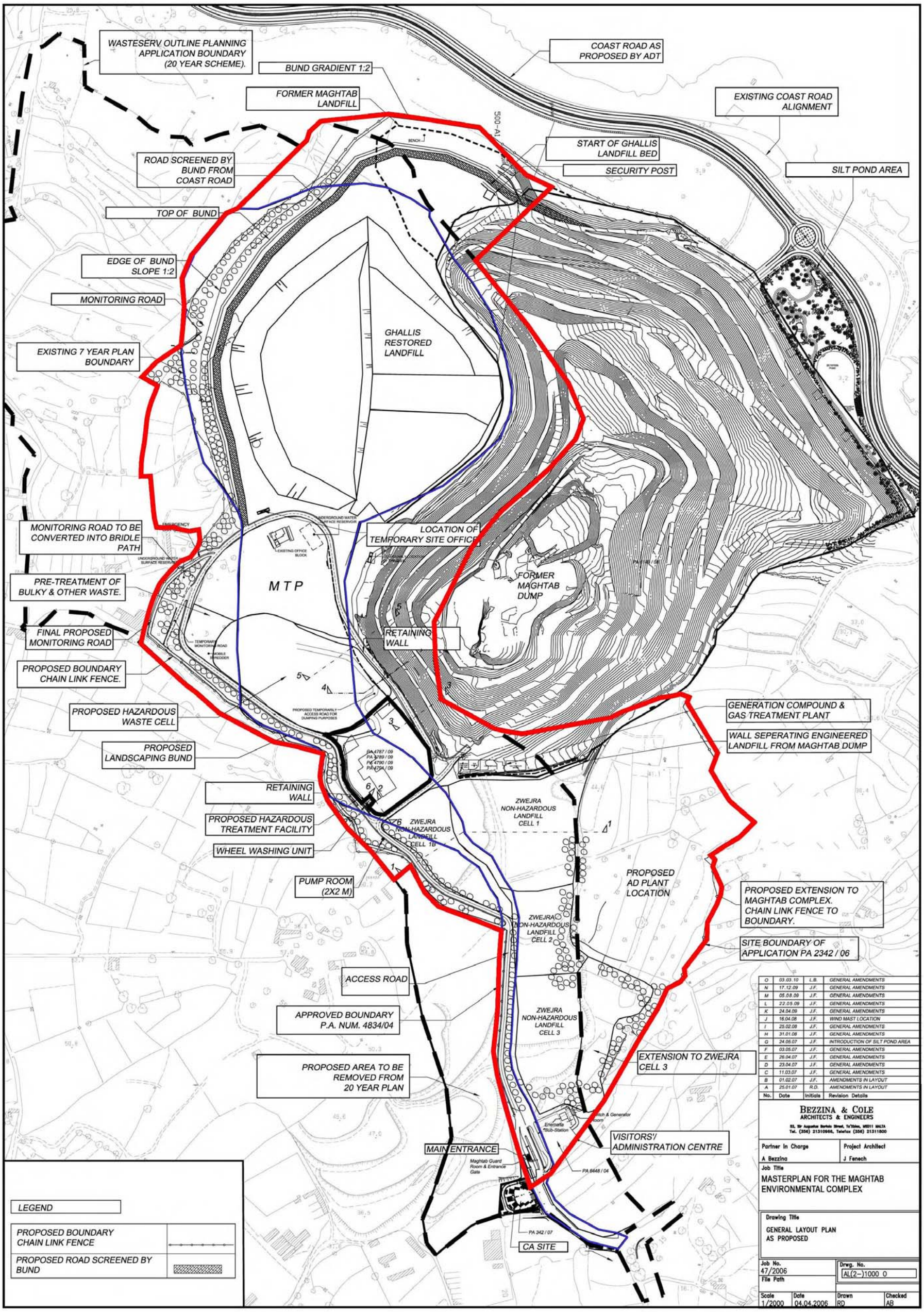
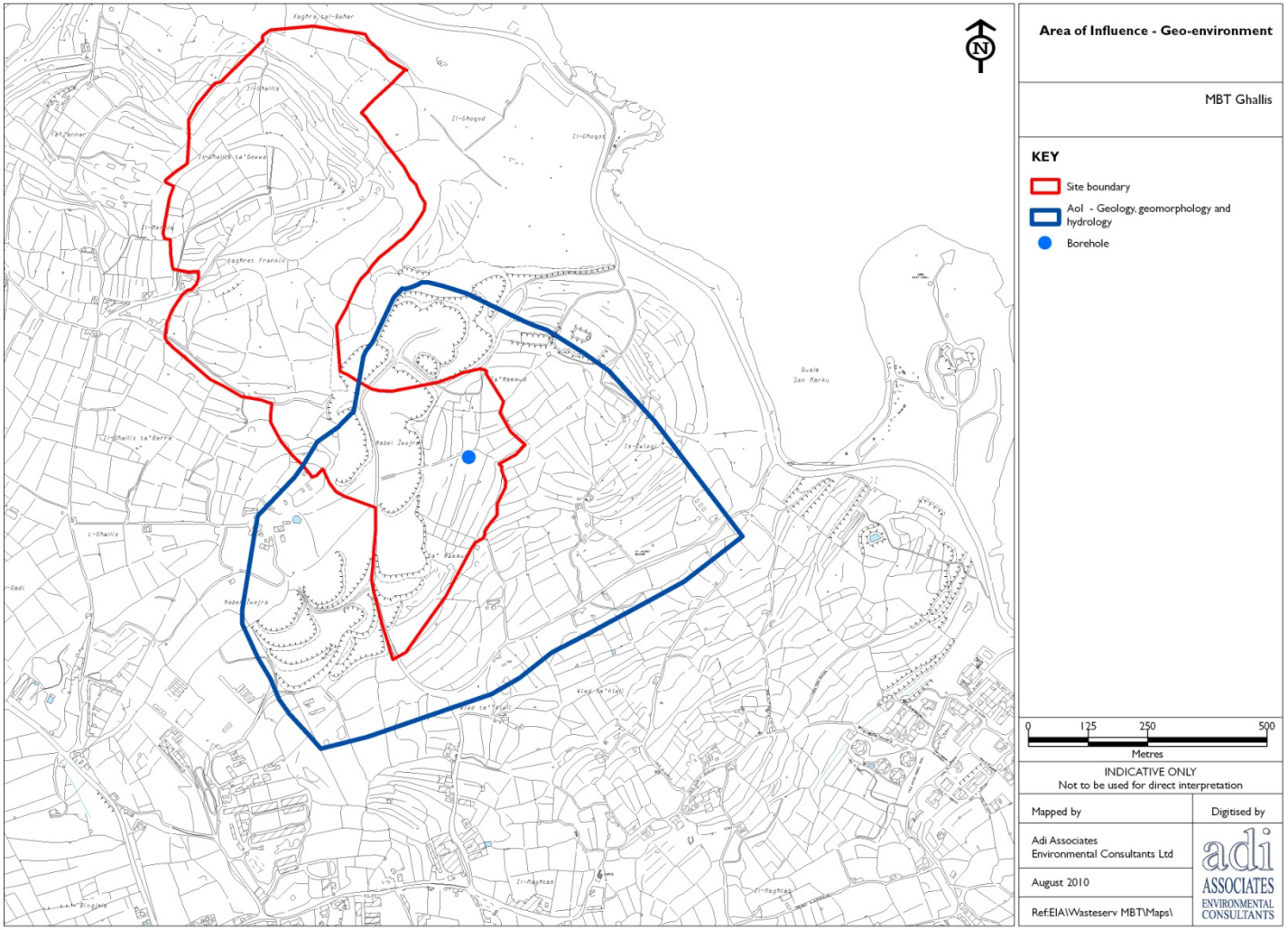


Figure 2: Area of Influence



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

LANDSCAPE AND VISUAL AMENITY METHOD STATEMENT

INTRODUCTION

14. This method statement provides information on the landscape and visual amenity input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar.

EIS Update Guidelines

15. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*

3. *Archaeology and cultural heritage;*

4. *Social impact;*

5. *Land contamination;*

6. *Risk assessment; and,*

7. *Cumulative impacts.*

Landscape and Visual Impact Assessment

16. Assessment of landscape and visual amenity is a complex task, involving examination of a wide range of factors that contribute to the qualities and attributes of the existing landscape and that may contribute to the qualities and attributes of the existing landscape and that may contribute to the landscape of the Scheme. This involves consideration of the evolution of the landscape and the factors that have led to its current condition from the underlying geology through to anthropogenic activities.

17. Landscape and visual impacts are distinct, albeit strongly related. Landscape impacts result from the interaction between the proposed development and the existing landscape resource, experienced through changes to any element or combination of landscape elements. Visual impacts relate to the effect that the Scheme would have on the amenity of sensitive receptors, relating to the actual or perceived visible changes to the character and quality of the landscape.

18. The landscape and visual amenity study will comprise the following:

- Baseline survey and characterisation of the landscape and visual amenity at and around the Scheme using desk top and field survey techniques;
- Evaluation of the landscape character of the Scheme area and its setting;
- Establishment of the key factors that have led to the formation of the current landscape;
- Establishment of the Zone of Visual Influence (ZVI) for the Scheme and identification of key viewpoints and receptors;
- Input of potentially beneficial design measures to the Scheme;
- Prediction of the impacts of the Scheme on the visual amenity of the Area of Influence;
- Assessment of the significance of the impacts on the landscape and visual amenity of the Area of Influence; and
- Description of mitigation measures designed into the Scheme to minimise adverse impacts and enhance any beneficial impacts on the landscape and visual amenity of the Scheme.

ASSESSMENT METHODOLOGY

Competence of Surveyor

19. Ms Krista Farrugia of Adi Associates Environmental Consultants Ltd will undertake the landscape and visual amenity study. Base photographs and photomontages will be prepared by Perit Joseph A Pace of Virtual Reality Studios Limited.

Standards and Guidance

20. The landscape and visual assessment will be carried out in line with the UK best practice methodologies as appropriate, notably:

- Preparation of Environmental Statements for Planning Projects that require Environmental Assessment, A Good Practice Guide produced by the Department of the Environment (now DETR) (1995);
- Guidelines for Landscape and Visual Impact Assessment (2002) – Institute of Environmental Management & Assessment and the Landscape Institute; and
- MEPA's draft Landscape Assessment Study.

Area of Influence

21. The Area of Influence has been defined using a combination of desk and field-based techniques. Most notably, the ZVI of the Scheme is identified. This encompasses the roads and public places from where the Scheme is visible. The ZVI and viewpoints are described in **Figure 1**.

Baseline Data

22. The visual amenity baseline will be formulated by reference to a series of viewpoints within the ZVI that will be agreed with MEPA (see **Figure 1**).

23. The landscape baseline will be established through reference to mapped land use information including cultural heritage features, trees, etc., an analysis of aerial photographs, and a review of the Structure Plan for the Maltese Islands, the North Harbours Local Plan, and the draft Landscape Assessment for the Maltese Islands, to identify policy background and any potentially important landscape areas within or adjacent to the Scheme.

Landscape Assessment

Description and character of site

24. This will comprise the description of the landform and land cover of the Scheme and its surroundings and confirmation of the location of landscape features. The landscape character of the Scheme site will also be identified, including the character of the cultural landscape. The information will be recorded through the use of checklists, map annotations, and photographic records.

Characterisation of local area

25. The characterisation of the local area will provide inputs into the design of the Scheme so that it might fit in with the local landscape and built character.

Evaluation

26. The importance of the landscape will be assessed in relation to appropriate legislation, standards, and guidelines, and in particular to any designations that apply to the Scheme Site and / or to the surrounding area.

Visual Assessment

27. The mapped material will be used to identify potentially significant views and viewpoints for analysis during the field survey. A three-dimensional computer-based viewshed analysis was established for the Scheme. The extent of the viewshed (ZVI) has been verified in the field and key viewpoints identified. They include:

- Short distance views;
- Medium distance views from publicly accessible locations; and
- Long distance views from high points or tourist attractions.

28. The viewpoints for which we propose to prepare photomontages from are:

Viewpoint	Location
1	Wardija
2	Triq il-Qawra promenade
3	Triq il-Luzzu, Qawra
4	Coastline Hotel
5	Triq il-Kosta (Ghallis Tower)
6	Triq il-Kosta, Il-Ghoqot
7	Triq il-Kosta, Qalet Marku
8	Sqaq tax-Xaqquf, l/o Gharghur
9	Triq ir-Ramla, Maghtab
10	Triq il-Kosta, Bahar ic-Caghaq
11	Triq il-Madliena, l/o Gharghur
12	Triq Ghaxqet l-Ghajn, l/o Gharghur
13	Triq John Adye, T'Alla w'Ommu
14	Triq l-Imsaqfin, Mosta

29. The existing views from these locations have been photographed. These views will form the basis for the preparation of photomontages that will be used to assess the impact of the Scheme. These initial photographs from the 14 viewpoints are set out in the **Appendix 1**. When taking the final baseline photographs Perit Pace will identify the best location to take the photograph; this may vary slightly from those shown in **Figure 1** and **Appendix 1**.

IDENTIFICATION OF POTENTIAL IMPACTS

30. Receptors sensitive to the change in the visual amenity will be identified. This will include residents and views from locations where people may congregate.

31. Potential changes in the landscape will be identified for each of the landscape character areas.

Prediction of potential impacts

32. The visual impacts of the development will be predicted by creating photomontages for each of the identified viewpoints. This will include overlaying a computer-generated perspective of the project over photographs of the existing situation, and assessing how the visual amenity will change.

33. Changes to the landscape will be assessed using the photomontages and the information available in the baselines studies: geo-environmental, cultural heritage and land cover.

IMPACT SIGNIFICANCE

34. This section will include the following information for each potential impact:

- Description of impact;
- Policy importance of the impact (Local, National, International);
- Extent of effect on landscape / visual amenity;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor;
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote);
- Scope for mitigation/enhancement (very good, good, none); and
- Residual impacts.

35. The significance of visual impacts will be assessed in relation to:

- The number and sensitivity of receptors affected;
- The duration of the changes;
- The changes to the view from the identified view points as shown by the photomontages; and
- Scope for further mitigation / enhancement measures.

36. Based on the above criteria, an assessment of: (i) the significance of impacts on the landscape and (ii) the visual impact at each of the viewpoints will be made in terms of whether it is considered:

- Not significant – little or no perceptible changes to the view or landscape;
- Of Minor significance – noticeable changes to the view or landscape with potential for substantial changes to be offset by mitigation; and
- Of Major significance – substantial changes to the view or landscape with little opportunity for changes to be offset by mitigation.

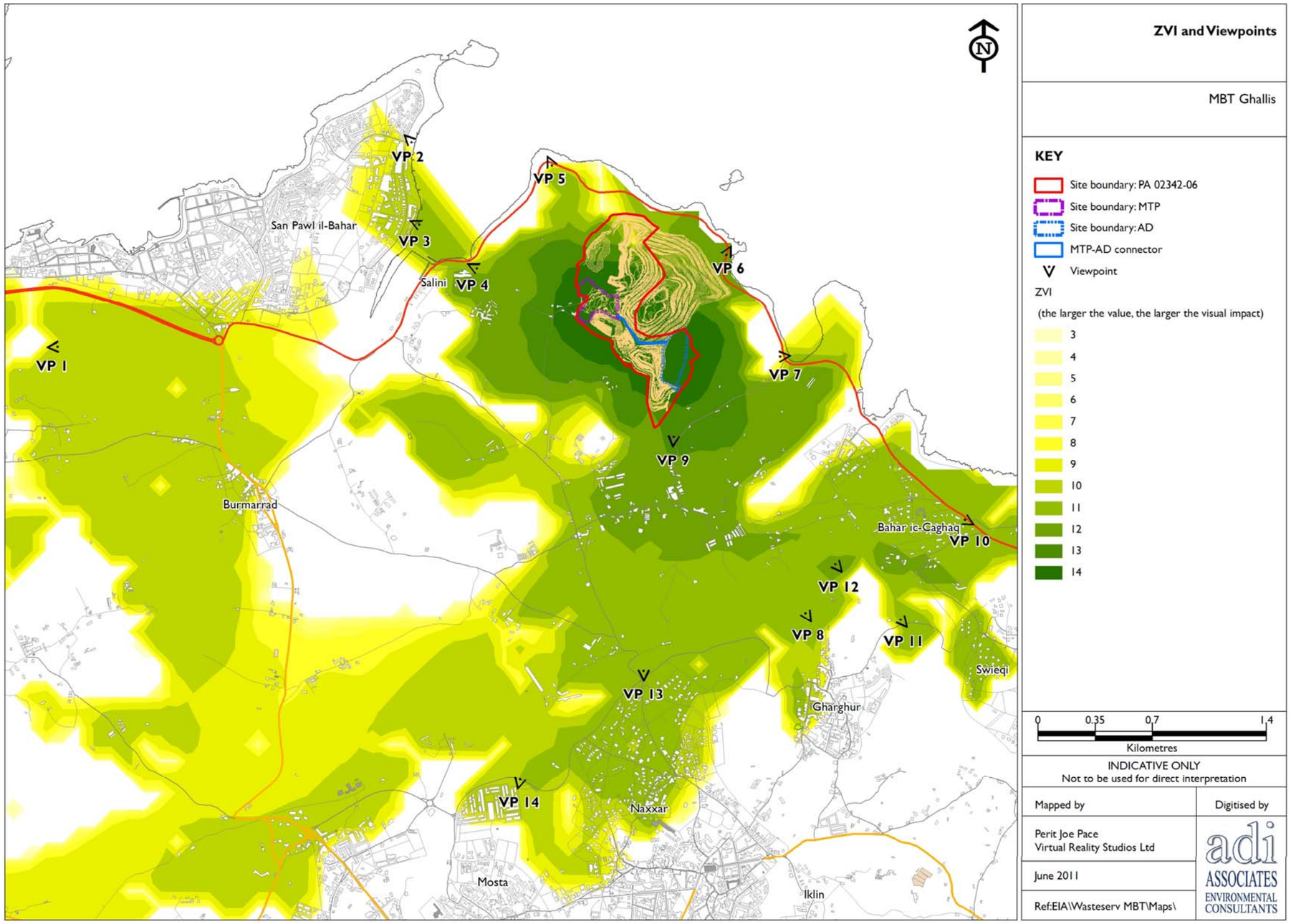
IMPACT MITIGATION & MONITORING

37. It is envisaged that the majority of the mitigation measures will be incorporated in the design of the Scheme so that it fits as closely as possible with the landscape and built character of the area. Landscape proposals will take account of the provisions in the *'Guidelines on Trees, Shrubs and Plants for Planting and Landscaping in the Maltese Islands'* published by MEPA.

Adi Associates Environmental Consultants Ltd

May 2011

Figure 1: Zone of Visual Influence



Appendix 1

Viewpoint 1: Wardija

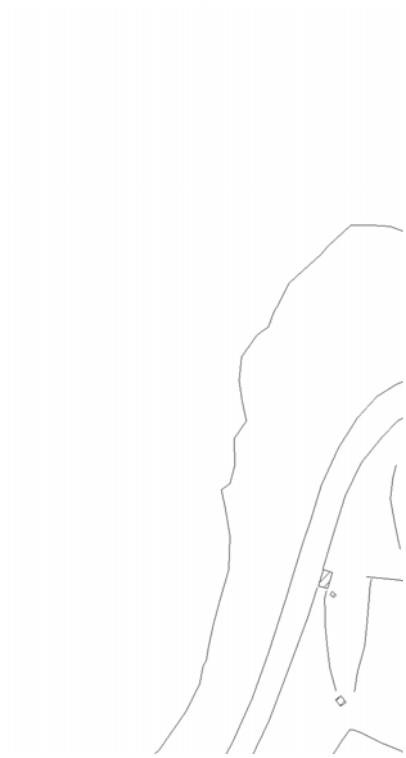
Viewpoint 2: Triq il-Qawra promenade

Viewpoint 3: Triq il-Luzzu, Qawra

Viewpoint 4: Coastline Hotel

Viewpoint 5: Triq il-Kosta (Ghallis Tower)

Viewpoint 6: Triq il-Kosta, Il-Ghoqot



Viewpoint 7: Triq il-Kosta, Qalet Marku

Viewpoint 8: Sqaq tax-Xaqquf, l/o Gharghur

Viewpoint 9: Triq ir-Ramla, Maghtab

Viewpoint 10: Triq il-Kosta, Bahar ic-Caghaq

Viewpoint 11: Triq il-Madliena, l/o Gharghur

Viewpoint 12: Triq Ghaxqet l-Ghajn, l/o Gharghur

Viewpoint 13: Triq John Adye, T'Alla w'Ommu

Viewpoint 14: Triq l-Imsaqfin, Mosta

PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

AGRICULTURE METHOD STATEMENT

INTRODUCTION

38. This method statement provides information on the agriculture input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[2]:

- Extension of Zwejra cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[2] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

39. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

40. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site inlcuding the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

41. The Area of Influence (A of I) for the agriculture baseline study has been defined by examining the potential impact of the Scheme on agriculture as shown in **Figure 2**. It is noted that the entire complex comprises disturbed / developed land, however the area to the east is the only area that is still undeveloped. It mainly comprises agricultural land. The A of I is therefore set as shown in **Figure 2** and comprises a buffer area of 25 metres around the relevant boundary of the survey area.

42. It is noted that the EIS (for PA 04834/04) does include an agriculture survey of most the area. Map GH 11/2 shows that the land comprises "shallow and very shallow terraces on globigerina". The fields are predominantly dry agriculture or abandoned and include cereals, some potatoes and fallow land. Drawing GH 11/6 classifies the fields as low to moderate in terms of agricultural land value. Since the EIS does not cover all the area proposed in PA 02342/06, it was decided to resurvey the entire area.

ASSESSMENT METHODOLOGY

Competence of surveyors

4. The survey will be undertaken by Dr Joseph Buhagiar. The impact assessment will be carried out by Adi Associates in consultation with Dr Buhagiar.

Study Methodology

5. In updating the EIA, the Agriculture Study will comprise:

- A field-by-field survey of the area of influence to provide information regarding seasonal and standing crops;
- A survey of existing trees within the Scheme boundary. This will focus mainly on protected tree species, the uprooting of which would require special permission; and
- The current agricultural value of the land in terms of productivity, and an assessment of the quality of the land for use by agriculture.

Literature Search

6. Based on literature searches and the consultants' knowledge of the area, a summary of previous survey work undertaken within the study area will be provided as context to the results of the current survey work.

Mapping of Field Crops

14. The fields comprising the A of I will be surveyed for a number of parameters / criteria that are needed for the baseline survey. The data will be entered into a GIS system for ease of reference and analysis.

15. A single agricultural survey will be undertaken to ascertain the following:

- Standing and seasonal crops by type and variety, and, where possible, quantity and stage of maturity;
- Current cropping pattern for seasonal crops; and
- Growth condition of the crops.
- Trees that are deemed of conservation importance due to their horticultural value or rarity in the Maltese Islands will be noted.

IDENTIFICATION OF POTENTIAL IMPACTS

20. The main impact on agriculture is the loss of agricultural land. The most sensitive agricultural areas will be identified in the baseline survey. The potential impacts of the Scheme on these agricultural areas could include:

- Permanent loss of good quality agricultural land through permanent land take, leading to loss of agricultural production; and
- Displacement of farming activities in the area as well as potential loss of employment for farmers, if relevant.

PREDICTION OF IMPACTS

7. Each of the potential impacts listed above will be examined. The agriculture baseline survey information will be entered into a GIS, which will assist in the identification of:

- Agricultural areas that are considered sensitive and of agricultural conservation value;
- Areas of good quality agricultural land lost during construction and / or operation; and
- Agricultural areas liable to fall into decline due to land fragmentation and possible access difficulties.

IMPACT SIGNIFICANCE

8. This section will include for each potential impact the following information:

- Description of impact;
- Policy importance of impact (Local, National, International);
- Extent of effect;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;

- Sensitivity of receptor;
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation / enhancement (very good, good, none).

9. Based on the above criteria, a summary of the significance of the impact will be judged in terms of whether the impact is considered not significant, of minor significance, or of major significance:

- Not significant - no material change in agricultural quality and / or extent;
- Minor significance - small-scale loss / disturbance of agricultural land that is unlikely to affect the agricultural integrity of the area; and
- Major significance – large / small scale loss / disturbance to agricultural land that is likely to affect the agricultural integrity of the area.

MITIGATION AND MONITORING

10. The scope for mitigation will be identified, and the need for monitoring of agricultural aspects of the A of I will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd & Dr Joseph Buhagiar

June 2010

Figure 1: Master Plan for the Area

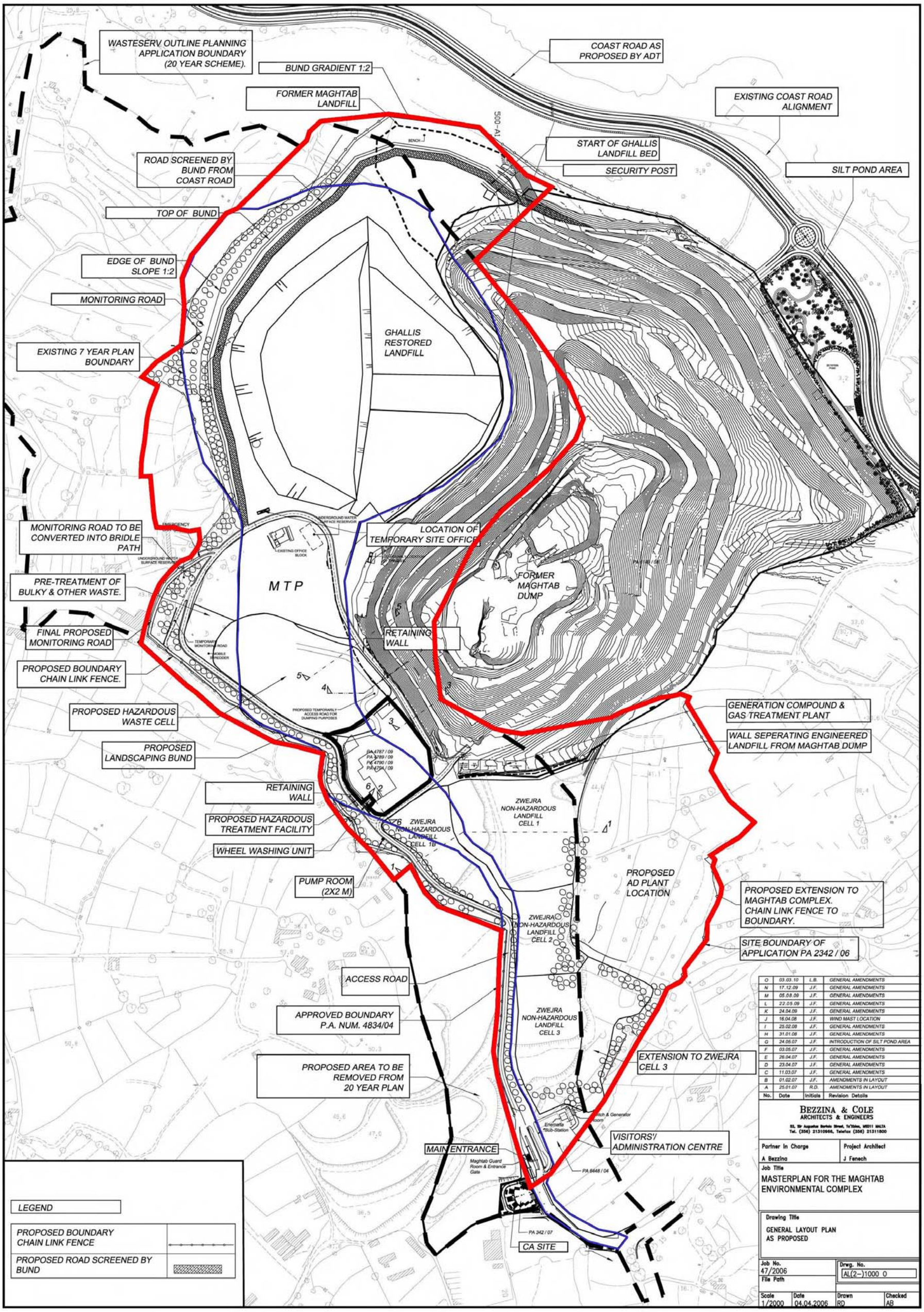
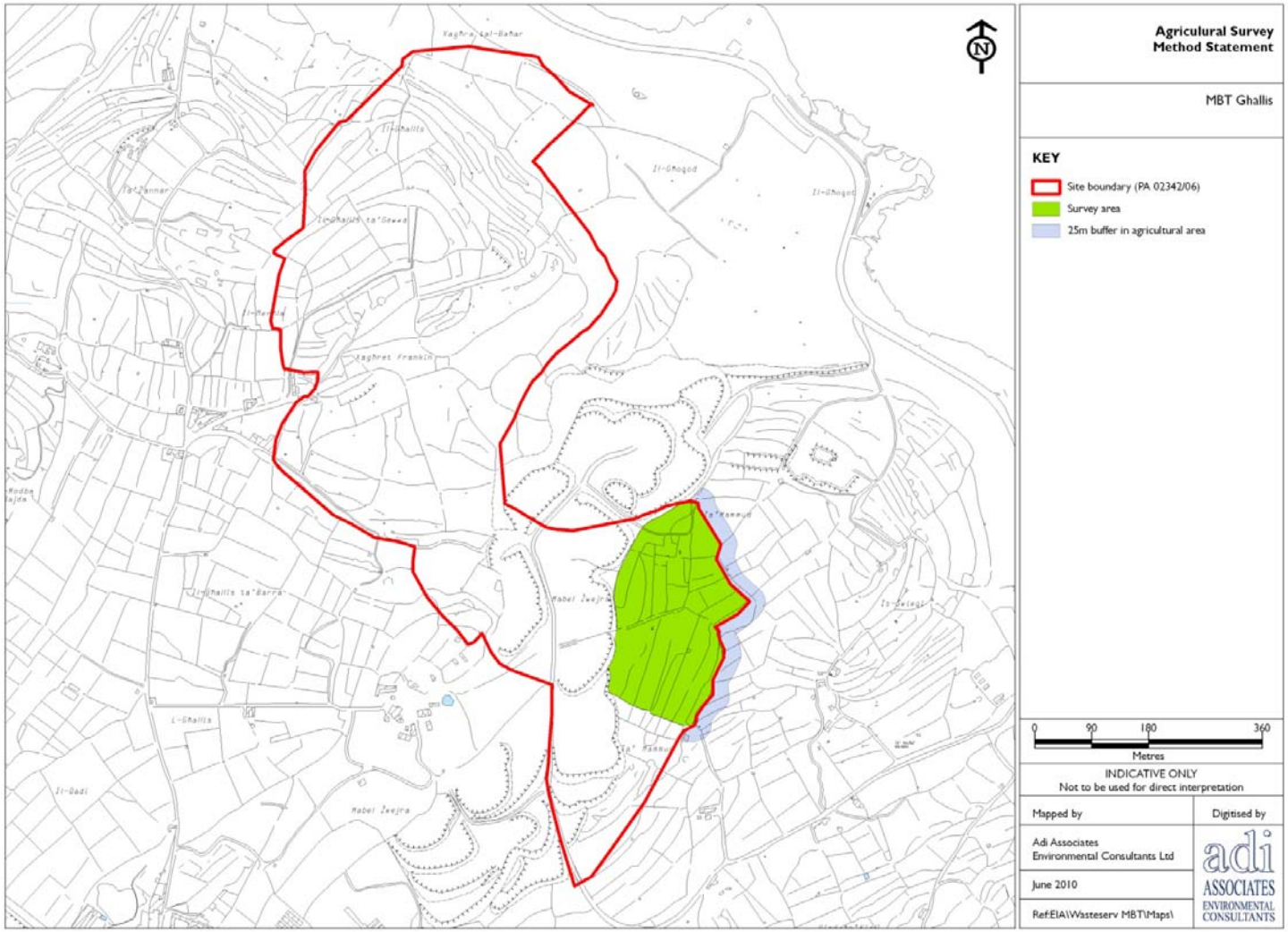


Figure 2: Area of Influence



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

CULTURAL HERITAGE METHOD STATEMENT

INTRODUCTION

43. This method statement provides information on the cultural heritage input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)3:

- Extension of Zwejra Cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[3] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

44. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

45. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

46. The EIS (for PA 04834/04) does not contain a plan showing cultural heritage features; however, the section on archaeology and cultural heritage does describe these features. The report mentions rubble walls as vernacular features. The site survey did not reveal pottery shards. The farmhouses and rubble walls "*are typical of the Maltese landscape*" but are "*not considered to have a high cultural heritage value*". The report mentions re-using rubble walls in landscaping.

47. The Area of Influence (A of I) for the cultural heritage baseline study has been defined by examining the potential impact of the Scheme on cultural heritage as shown in **Figure 2**. Although the area was surveyed for the original EIS, the area shown in Figure 2 is being resurveyed mostly to establish the state of the rubble walls on site and to map them, since no other features were found. However, the consultants will report on any findings.

ASSESSMENT METHODOLOGY

Competence of surveyors

4. The surveys will be undertaken by the following personnel of Archaeological Services Co-operative Ltd:

- Marlene Borg;
- Ernest Vella; and
- Luisana D'Amato (who will work under the supervision of Ms Borg and Mr Vella).

5. It is understood that MEPA holds the CVs of all of these personnel.

Study Methodology

6. In updating the EIS, the Cultural Heritage Study will comprise:

- A baseline survey of the cultural heritage assets and an evaluation of their importance;
- Input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage within the A of I;
- An assessment of the impact of the construction and operation of the scheme on the cultural heritage assets of the site and A of I and an evaluation of the significance of these effects; and
- A description of mitigation measures designed to minimise adverse impacts on cultural heritage.

Literature Search

8. Based on literature searches and the consultants' knowledge of the area, a summary of previous survey work undertaken within the study area will be provided as

context to the results of the current survey work. This phase would also include research on the toponomy (place names), analysis of cartographic material, and conservation legislation.

Cultural Mapping

9. A physical survey will be undertaken, to identify, inspect, record, and map all existing visible man-made features. No excavation or activities other than those described herein will be undertaken.

10. The results of the survey will be mapped and catalogued following MEPA's standardised system. Each feature will be individually identified with a consecutive numbered reference.

Evaluation

11. Based on literature searches, the consultants' previous knowledge of the survey area, and on the findings of the physical survey, the conservation importance of each of the identified features will be established by reference to appropriate legislation, standards, and guidance. These will include the Structure Plan for the Maltese Islands, the Development Planning Act, and the Cultural Heritage Act.

IDENTIFICATION OF POTENTIAL IMPACTS

12. The sensitive cultural heritage receptors will be identified as part of the baseline survey. An assessment of the potential impact will be made in accordance with the ToR. The potential impacts of the Scheme during construction include loss of features through land take to build the development, alteration or degradation of the quality of the setting of features and damage to features. During operation the features may be further degraded.

PREDICTION OF IMPACTS

13. Each of the potential impacts listed above will be examined. The cultural heritage baseline survey information will be entered into a Geographical Information System (GIS). This system will enable the following analysis to be undertaken:

- Map areas of cultural heritage importance that will be lost or affected during construction of the Scheme; and
- Map areas of cultural heritage importance that will be affected during the operation of the complex.

IMPACT SIGNIFICANCE

14. For each potential impact, this section will include the following information:

- Description of impact;
- Policy importance of impact (Local, National, International);

- Extent of effect ;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor;
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement.

15. The significance of impacts of the Scheme on the cultural heritage of the A of I is dependent upon the archaeological / cultural importance assigned to each of the features either through legislation or by the Consultant Archaeologists, and the degree of disturbance or damage likely to arise from the construction or operation of the project.

16. The assessment of the significance of potential negative impacts of the development on the cultural heritage aspects of the development site uses three levels: not significant, minor significance, and major significance. The assessment criteria applicable to each of these levels is described in **Table 1**.

Table 1: Impact Significance Criteria

Potential damage or destruction to features / Class or grade of feature	**Cultural significance**			
	Major Class / Grade A / 1	Medium Class / Grade B / 2	Minor Class / Grade C / 3	None / not graded
No material change to the cultural heritage feature	Not significant	Not significant	Not significant	Not significant
Small scale changes, such as alterations, to the cultural heritage feature that are unlikely to affect the integrity of the site	Major	Minor	Minor	Not significant
Loss of or disturbance to the cultural heritage feature that is likely to affect the integrity of the site	Major	Major	Minor	Not significant

MITIGATION

17. The scope for mitigation will be identified, and the need for monitoring of cultural heritage features will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd & Archaeology Services Cooperative Ltd

June 2010

Figure 1: Master Plan for the Area

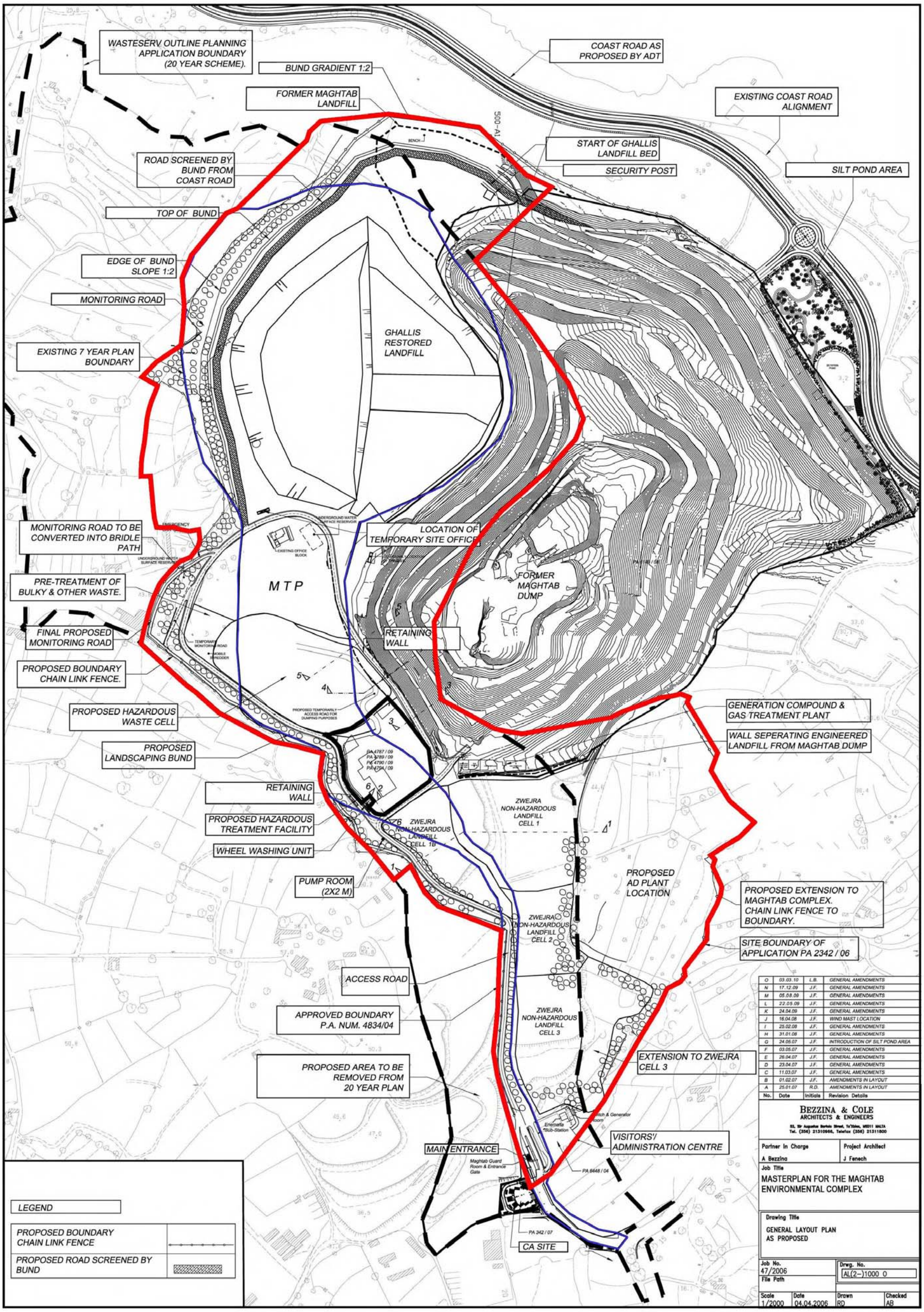
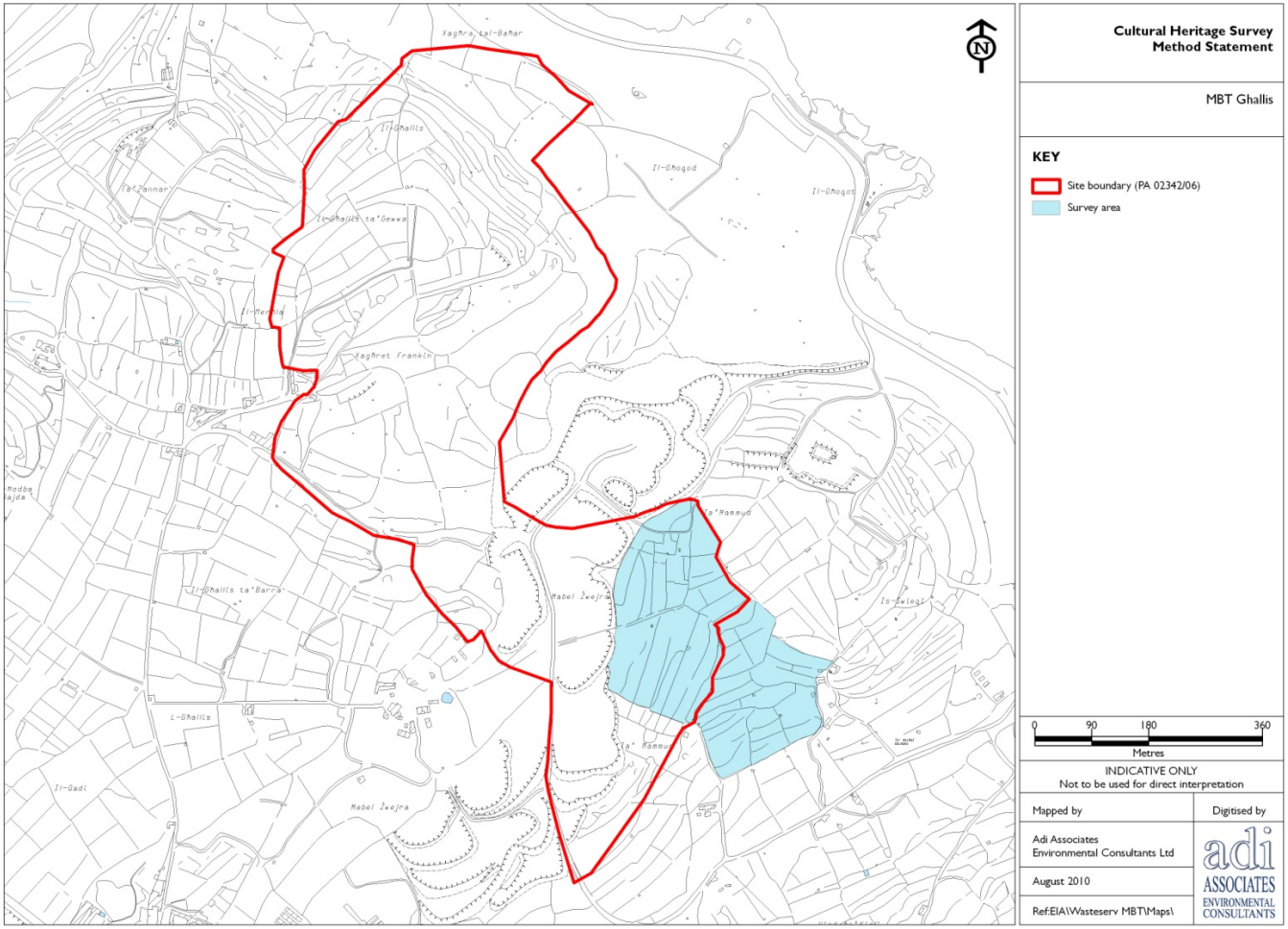


Figure 2: Area of Influence



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

NOISE AND VIBRATION METHOD STATEMENT

INTRODUCTION

48. This method statement provides information on the noise and vibration input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[4]:

- Extension of Zwejra cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[4] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

49. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

50. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

Noise

3. The Area of Influence will be determined following the noise monitoring survey by taking into account the maximum noise levels likely to arise from the construction and operation of the Scheme and the distance required for the levels to fade to 63dB(A) or 3dB(A) above the background levels, whichever is the greater.

Vibration

4. Vibration levels resulting from construction activities are very dependent on ground conditions, underlying geology, and upon foundations and the techniques used to recontour, excavate or to construct a building. BS 5228: Part 4 states that the threshold for vibration perception for humans is "…*typically in the peak particle velocity range of 0.15mm/s to 0.3mm/s at frequencies between 8 Hz and 80 Hz. Vibration levels above this value can disturb, startle, cause annoyance, or interfere with work activities. At higher levels they can be described as unpleasant or even painful*".

5. **Table 1** details distances at which certain construction activities give rise to a level of vibration that is just perceptible; it is based on BS 5228 and other studies.

Table 1: Construction vibration levels

Construction Activity	Distance from activity when vibration may just be perceptible (metres)
Excavation	10-15
Hydraulic breaker	15-20

6. Such distances assume no mitigation measures that would interrupt the vibration path.

7. The A of I for impacts on humans is therefore taken to be the maximum distance where vibration is just perceptible, that is 20m from the boundary of the Site.

8. Vibration assessment will only be carried out if excavations are undertaken at the Site.

ASSESSMENT METHODOLOGY

Noise

9. The long-term noise implications of the operations on-site will be determined by the changes in ambient noise levels resulting from the Scheme.

10. The environmental impact of a development can be expressed as the change in conditions relative to the baseline conditions directly attributable to that development. The assessment is to consider the effects of changes in ambient noise levels on the occupants of sensitive properties / uses in the Area of Influence.

11. The subjective significance of a change in noise levels is generally related to the magnitude of that change. The significance of the change is also related to the

number of people affected. Studies have shown that changes in broadband continuous noise, such as traffic noise, are not generally distinguishable until the change is of at least 3dB, while a change of 10dB represents a doubling of loudness. Changes of less than 3dB are not, therefore, generally considered to be significant, although it should be recognised that such imperceptible changes can lead to a gradual deterioration in the quality of the environment, if further development occurs in the area.

Vibration

12. Vibration at the site will be assumed to be that of typical urban areas. The impact of vibrations on human beings and on the stability on buildings will be assessed. As described above, levels of vibration above a Peak Particle Velocity (PPV) of 0.3mm/s are considered to disturb people, although at that level they will certainly not damage buildings.

Competence of Surveyor

13. The noise survey will be carried out by Mr John Demanuele, Grad. I.A.P., Building Services Consultant, Mediterranean Technical Services Limited as approved by MEPA. The noise and vibration assessment will be carried out by Adi Associates in consultation with Mr John Demanuele.

Standards and guidance

Noise

14. Guidance on environmental noise in the context of planning is not available specific to the situation in Malta. However, in situations where standards are not available, the Planning Appeals Board generally makes reference to equivalent guidance from the UK. In respect of noise, therefore, it is appropriate to refer to the British Standards and UK Government Planning Policy Guidance Notes clarifying their applicability to land use planning issues. In this regard, BS 4142, BS 5228 and The UK Department for Communities and Local Government (formerly Office of the Deputy Prime Minister) Planning Policy Guidance Note, PPG24, Planning and Noise are relevant.

Vibration

15. Since guidance on vibrations in the context of planning specific to Malta is not available, British Standards are used. British Standard 7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings – Guide to damage levels from ground borne vibration' and British Standard 7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings – Guide to damage levels from ground borne vibration' and BS 5228: Part 4: 1992 Noise and vibration control on construction and open sites. Code of practice for noise and vibration control applicable to piling operations will be used.

Equipment and measurements

16. The background noise level will be established by undertaking daytime and night time surveys at each of the 4 noise monitoring locations. These locations are shown on **Figure 2**.

17. A "Quest" integrating, logging, sound level meter will be used to take the measurements. L_{Aeq}, L_{max}, L_{A10} and L_{A90} will be reported.

- L_{Aeq} is the 'A' weighted average or residual noise;
- L_{max} and L_{A10} are used to assess traffic related noise; and
- L_{A90} indicates the background noise (ambient).

18. Measurements and procedures will be in accordance with BS 4142:1997.

19. Paragraphs 5.1 to 5.5 of BS 4142 give guidelines on measurement practice. These require calibration of the instrument and give guidelines in choosing measurement locations as well as on taking precautions against interference with the measurements, particularly from inclement weather.

Equipment Data

20. The following equipment will be used to undertake the survey:

- 'QUEST' sound level meter Model: 2900
- 'QUEST' Calibrator Model: QC-20

21. The sound level meter will be calibrated before each set of measurements in accordance with BS 4142: 1997 Para 5.1, and placed on a tripod stand 1.2m – 1.5m off the ground with no reflecting surfaces, or obstructing objects in the vicinity.

Monitoring Locations

22. Key to assessing the impacts of noise arising from the construction and operation of the Scheme is the proximity of the noise-sensitive land uses and activities. The noise monitoring locations are, therefore, set as described in **Figure 2**. A number of potentially sensitive receptors are located to the west, south and east of the site. Noise monitoring points 1 and 3 are similar to those used in the EIS for PA 4834/04. However we will not be using the same readings as the readings were taken 7 years ago and things may have changed in the area. Receptors include the Coastline Hotel and a group of residences. Location 2 represents the background noise in the vicinity of the Maghtab hamlet, while receptor 4 is the closest sensitive receptor to the east of the Site.

Methods for assessing noise levels arising from the construction and operation of the scheme

24. BS 4142 provides a method for rating external noise levels from factories, industrial premises or fixed installations of an industrial nature, to determine the likelihood of complaints from occupants of nearby residential properties. The methods are also applicable to assessing the impacts of noise on nearby residential properties arising from uses such as those proposed in the Scheme.

25. The method is based on the difference between the background noise level without the source (expressed as the LA90, the noise level exceeded for 90% of the time period of interest) and the noise level of the source at the receiver location (expressed as the LAeq, the equivalent continuous noise level, or energy average, over the period of interest). The noise level from the source (known as the specific noise level) can be weighted by 5dB if it displays an identifiable character (such as, tonality, impulsiveness, or intermittency). The background noise level is then subtracted from the rating level (the specific noise level plus any weighting for character) and the difference used to assess the likelihood of complaints, as shown in **Table 2** below.

Table 2: BS 4142 Assessment criteria

Difference	Assessment
10 dB or higher	Complaints likely
5 dB	Of marginal significance
Less than 5 dB	The lower the value the less likelihood of complaints
- 10 dB below background	Positive indication that complaints are unlikely

Traffic noise

26. While the Consultants recognise that the Scheme will generate traffic, it cannot be ascertained, at this stage, whether any increase is likely to give rise to a significant change in noise levels. Guidance Notes No 1 'Guidelines for the Environmental Assessment of Road Traffic' authored by the Institute of Environmental Assessment (UK), (now IEMA) indicates that in view of the logarithmic relationship between noise levels and traffic volume, the higher the level of existing traffic, the greater the increase that is required to effect a given change in noise levels. Typically, the guidelines state, a halving or doubling of flows will result in a 3dB(A) change in noise level.

27. The potential traffic generated by the Scheme will be estimated. These findings will feed into the noise study to determine whether the Scheme would result in traffic generation that would significantly affect noise sensitive uses in the A of I.

Methods for assessing vibrations arising from the construction and operation of the Scheme

28. Vibration can be expressed in terms of displacement, velocity, or acceleration, each of which varies with frequency and time. Peak Particle Velocity (PPV) is often used to

assess damage risk in buildings as it correlates best with case history data and is usually measured in mm/s.

29. BS 5228: 1992 Part 4 states that the threshold for vibration perception for humans is in the PPV range of 0.15 mm/s to 0.3mm/s at frequencies between 8Hz and 80Hz. **Table 1** details distances at which certain construction activities give rise to a level of vibration that is just perceptible.

30. British Standard 7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings – Guide to damage levels from ground borne vibration' gives the limit values for transient vibration, above which cosmetic damage would occur; these are presented in **Table 3**. Minor damage is possible at vibration magnitudes more than twice those given in **Table 3** and major damage to a building structure may occur at values greater than four times the tabulated values.

Table 3: Transient vibration guide values for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
Unreinforced or light-framed structures such as residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20 mm/s at 15Hz increasing to 50mm/s at 40Hz

31. For continuous vibration, the guide values given in **Table 3** should be reduced by 50%; cosmetic building damage could occur in residential or light commercial type buildings where levels of vibration above 7.5mm/s from 4Hz upwards are measured.

32. MEPA makes reference to BS 6472:1984 when monitoring vibrations from excavations from neighbouring properties. This Standard assigns a threshold value of 0.3mm/s for vibrations that are perceived by humans and peak particle values of between 12 to 19 mm/s as the threshold for cosmetic damage to buildings. These values are similar to those used in this assessment and those contained in BS 7385: Part 2: 1993.

IDENTIFICATION OF POTENTIAL IMPACTS

33. The sensitive noise receptors have been identified in order to site the noise monitoring location points. The potential impacts arising from the construction and operation of the Scheme on these sensitive receptors are likely to include potential noise disturbance to local users in the vicinity of the Scheme.

34. Impacts of vibrations on the stability of buildings and on humans will be assessed as described above, in accordance with the relevant BS Standards. The vibration sensitive receptors are similar to the noise sensitive receptors; in addition, buildings themselves are sensitive to vibrations. Potential impacts of vibrations include effects on stability of neighbouring buildings and disturbance to residents and local users in the vicinity of the Scheme.

PREDICTION OF IMPACTS

35. The potential impacts listed above will be examined and noise references established for the noise sensitive areas. These will provide a basis for comparison between the existing conditions and the conditions established when the Scheme is being built or is operating.

IMPACT SIGNIFICANCE

36. This section will include for each potential impact the following information:

- Description of impact;
- Policy importance of impact (Local, National, International);
- Extent of effect ;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor (residential dwelling, office, etc.);
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement (very good, good, none).

37. Based on the above criteria, a summary of the significance of the impact will be judged in terms of whether the impact is considered not significant, of minor significance, or of major significance.

MITIGATION AND MANAGEMENT PLANS

38. The scope for mitigation will be identified, and the need for on-going monitoring of noise emissions will be addressed in the EIS update.

Adi Associates Environmental Consultants Ltd & Mediterranean Technical Services Ltd

July 2010.

Figure 1: Master Plan for the Area

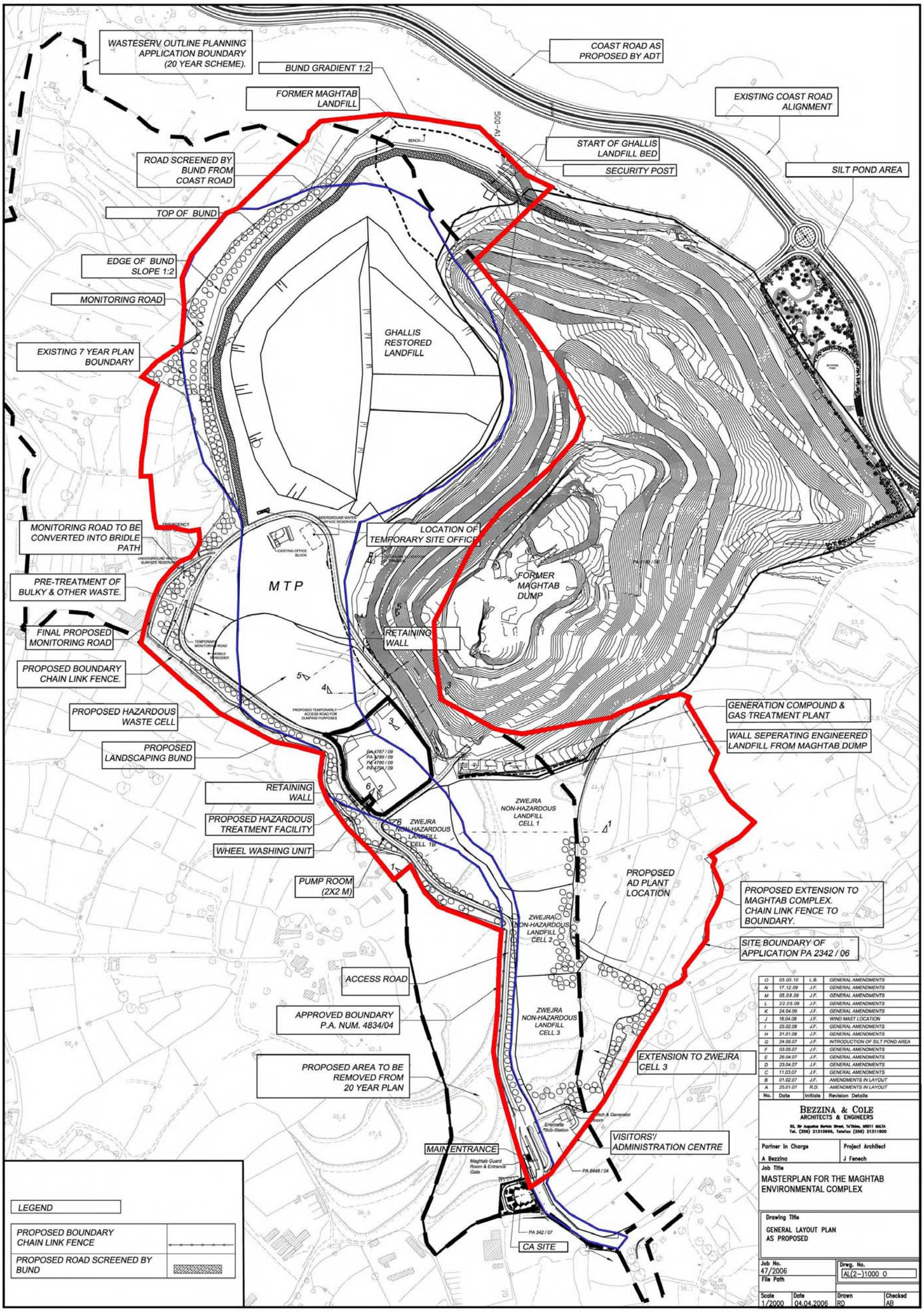
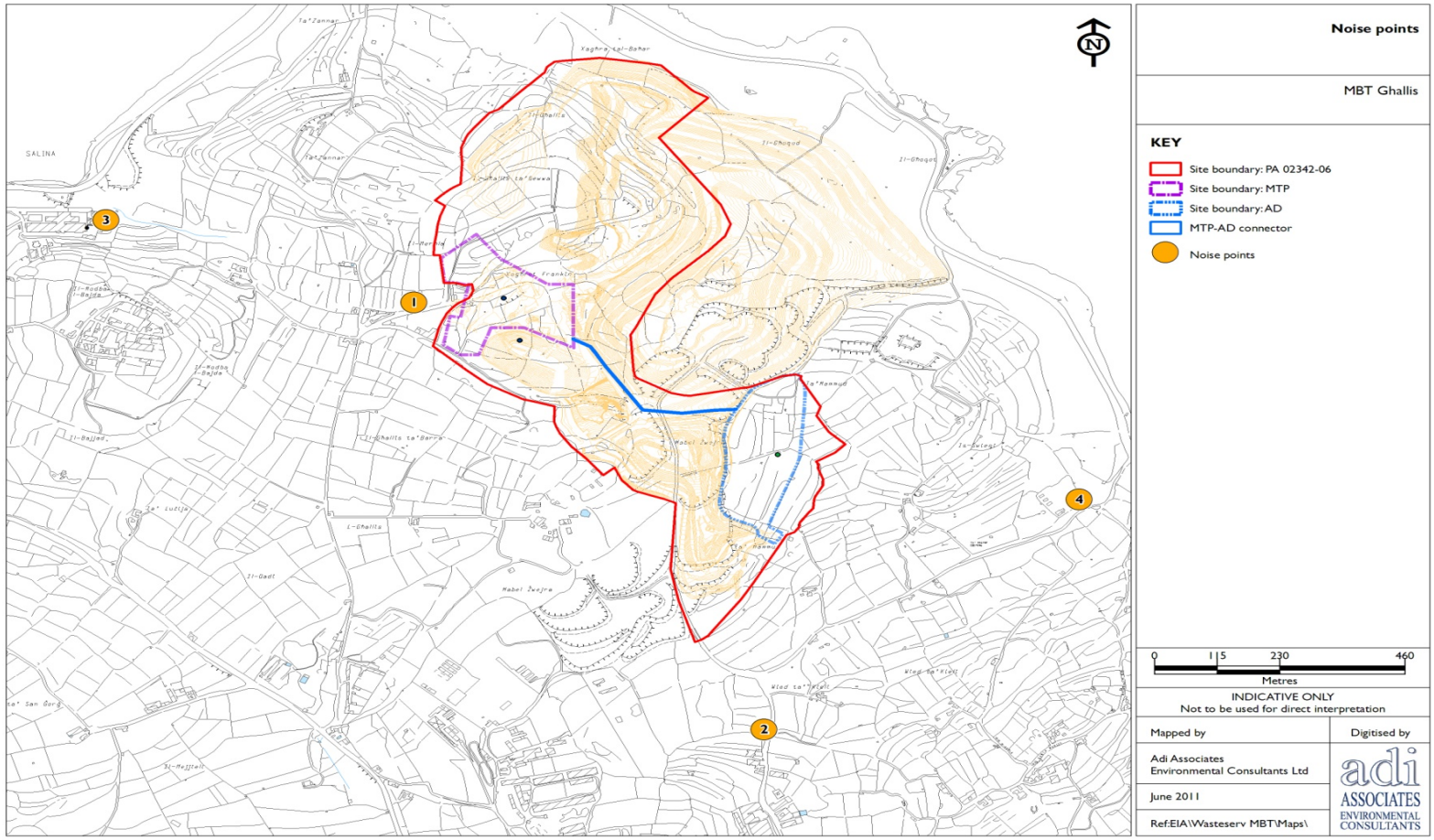


Figure 2: Noise Monitoring Locations



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

AIR QUALITY METHOD STATEMENT

INTRODUCTION

51. This method statement provides information on the air quality input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[5]:

- Extension of Zwejra Cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[5] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

52. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

53. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

Potential impacts on air quality

54. Air quality impacts could result from:

- Operational emissions - activities;
- Operational emissions – traffic;
- Construction emissions – primarily dust.

55. This note has been prepared to describe to MEPA the methodology that will be used to assess impacts.

OPERATIONAL TRAFFIC

56. The Project Description Statement prepared for the development (PA 2342/06) states that currently 340 vehicles per day arrive to the facilities at Ghallis. Once the Sant' Antnin Facility will be fully operational 30% of the waste will be diverted there, resulting in a decrease in 102 vehicles per day arriving at Ghallis.

57. The development of the MBT is expected to generate an additional 140 vehicles per day (100 vehicles carrying manure MBT input and output material and 40 vehicles carrying the output product from the municipal waste MBT). Considering the situation (when Sant' Antnin is operational) the net increase in traffic to Ghallis is 38 vehicles per day (140 - 102). However, the additional 140 vehicles will be reduced by 50 vehicles if the output (water) from the manure treatment facility is used to irrigate Maghtab and the surrounding area. This would effectively reduce to daily trips to less than 340, less than the current baseline.

58. **Figure 2** below also shows that new entry and exit point into the Ghallis Complex. The aim is for all vehicles to use the Trans-European Network and access the Ghallis Complex from the Coast Road. This means that the current entrance into Maghtab, located near the Maghtab village, will no longer be used as the main entrance, effectively removing the entrance away from sensitive receptors.

59. On the basis that the net increase in traffic is zero to minimal (and AADT is less than 200), and considering that there are no sensitive receptors at the new proposed entrance to the Ghallis Complex, it is proposed to scope out air quality emissions from operational traffic from the EIS Update.

OPERATIONAL EMISSIONS – ODOUR

60. A methodology for odour assessment will be presented when operational details of the project are known.

PROPOSED METHODOLOGY – CONSTRUCTION OPERATIONS

61. Only dust emissions resulting from construction are pertinent to the construction stage of the Scheme.

Dust Emissions

62. It is appreciated that dust emissions during the excavation phase might arise. Data collection and estimation of dust entrainment, however, present considerable difficulties, as acknowledged by MEPA in respect of a number of EIAs and other studies prepared by the consultants in the past.[6]

Area of Influence

63. Taking into consideration current MEPA thinking to secure a 100m buffer around quarries (for example see the *Central Malta Local Plan*), and on the basis that previous studies[7] have shown that the majority of softstone particulate emissions from a softstone crusher were deposited within 100m of the emission source, an A of I of 100m radius around the Application Site would be appropriate. Such an Area of Influence would account for most of the dust emissions escaping from the site. The remaining emissions, i.e., those carried by high winds, would be indistinguishable from those lifted from quarries, fields, and industrial uses in the vicinity, and should not be accorded significance in determining the A of I. Since there are no sensitive receptors 100m downwind from the proposed development, no baseline for PM10 will be undertaken.

IMPACT SIGNIFICANCE

64. This section will include, for each potential impact, the following information:

- Description of impact;
- Policy importance of impact (Local, National, International);
- Extent of effect ;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor (residential dwelling, office, etc.);
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement (very good, good, none).

[6] EIAs / studies prepared by Adi Associates Environmental Consultants Ltd for PA 1191/05, PA 03794/04, PA 00451/00, PA 00997/01, PA 01517/02, PA 04591/00, PA 2662/00 etc

[7] *Environmental Planning Statement: PA5616/01 To sanction a softstone crusher and a concrete block making machine at Triq il-Belt Valletta, Mqabba*, Planning Services Consultancy 2003

MITIGATION AND MONITORING

65. The scope for mitigation of air quality impacts and/ or future monitoring of air emissions will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd

October 2010

Figure 1: Master Plan for the Area

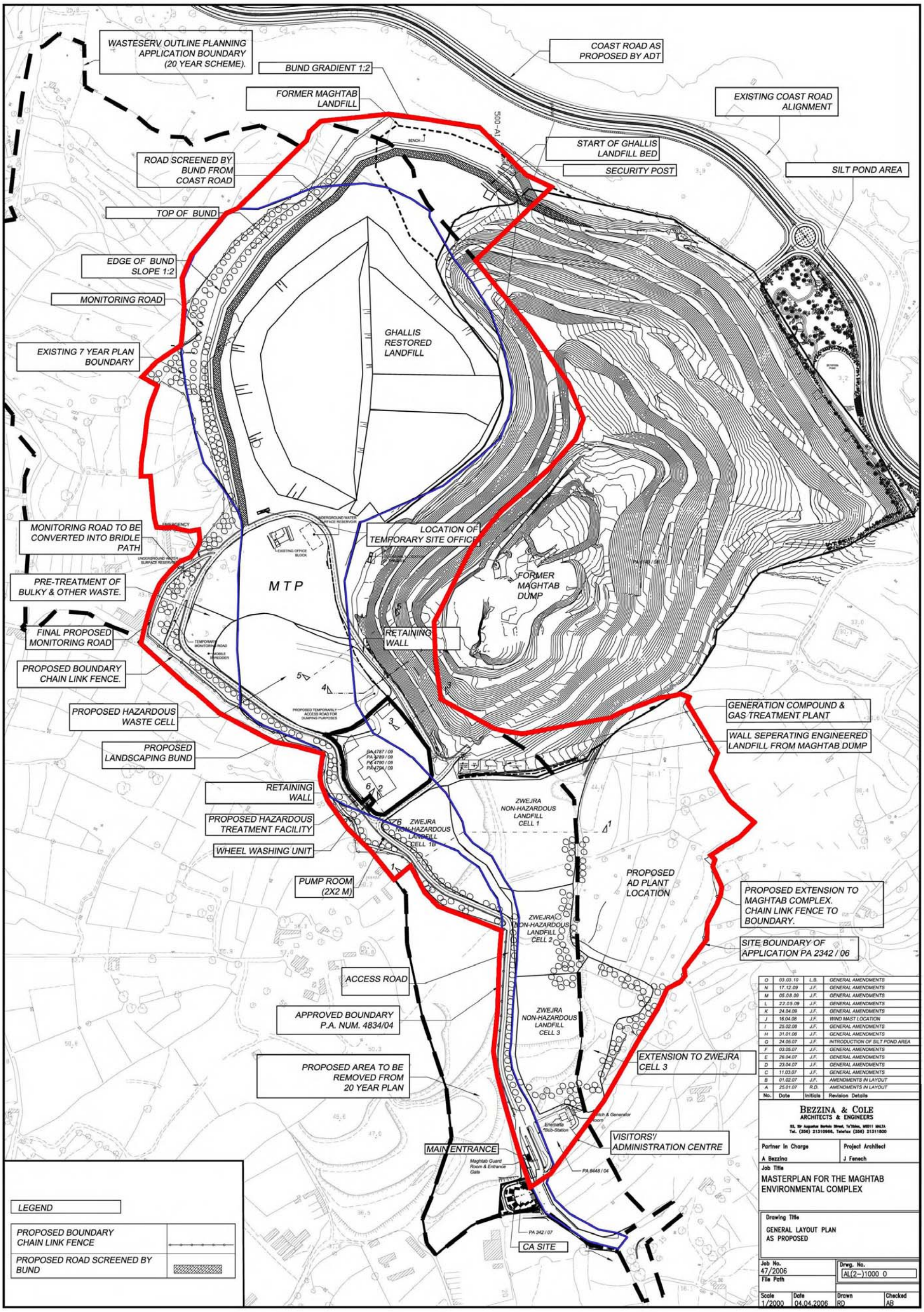
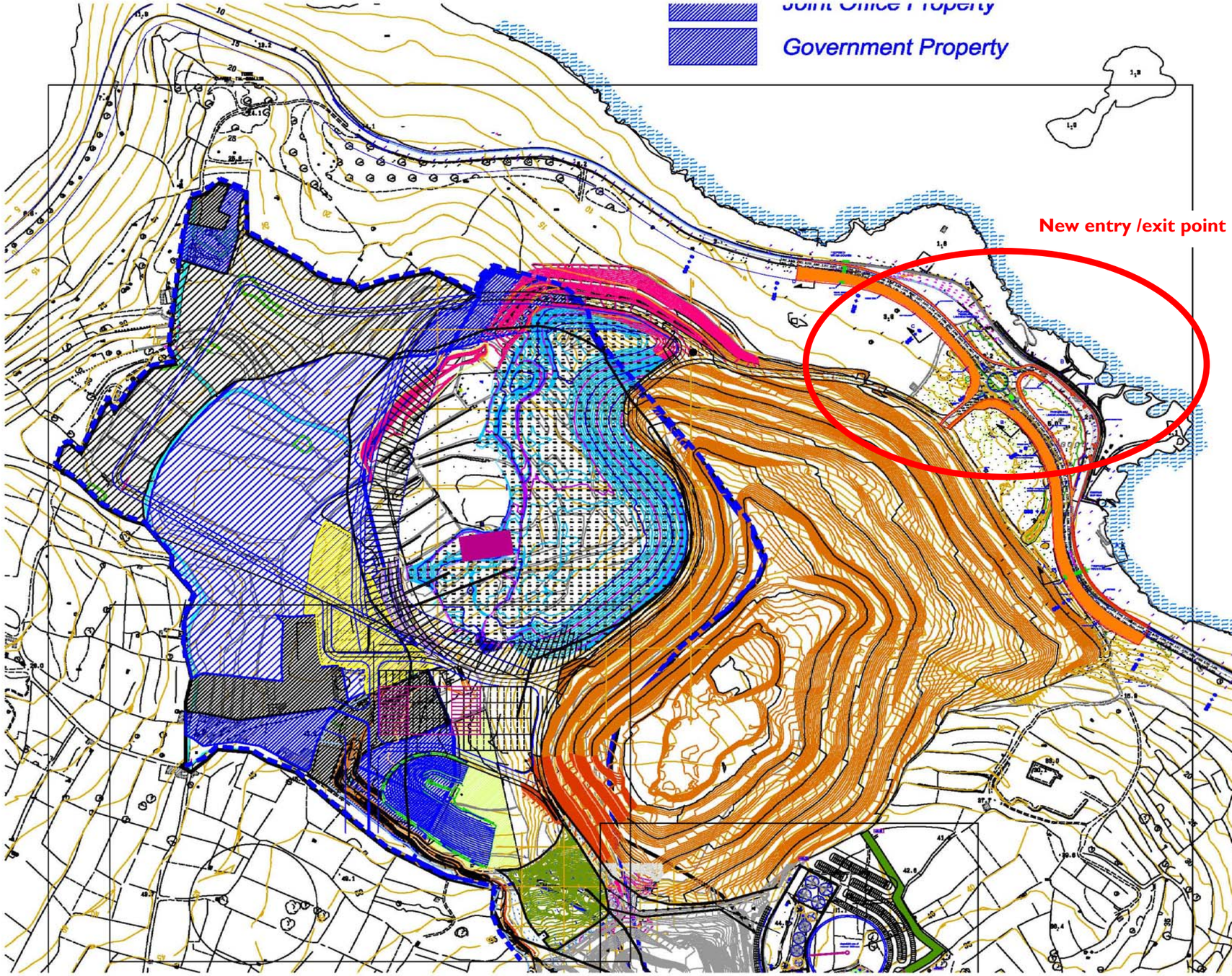


Figure 2: Plan showing entrance and exit to the Scheme



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

ODOUR METHOD STATEMENT – APPENDED TO AIR QUALITY METHOD STATEMENT

INTRODUCTION

66. This method statement provides information on the odour input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar as shown on **Figure 1**. The odour method statement should be read in conjunction with the air quality method statement that was accepted by MEPA on 18th October 2010.

EIS Update Guidelines

67. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*

1. *Geology, hydrology and palaeontology;*
2. *Agriculture;*
3. *Archaeology and cultural heritage;*
4. *Social impact;*
5. *Land contamination;*
6. *Risk assessment; and,*
7. *Cumulative impacts.*

PROPOSED METHODOLOGY - ODOUR

68. The odour assessment will involve the following:

- A review and presentation of information on baseline odours and records of odour complaints;
- Identification of the sensitive receptors for odours. This will initially be limited to 500m from the site boundary, however, this area may be extended following odour modelling;
- A review and presentation of sources of odour and proposed measures to be employed to minimise emissions of odours;
- Identification and quantification of the sources of odour. This will include determination of the odour emissions rate (OUe/s);
- Dispersion modelling using BREEZE AERMOD to predict the 98th percentile of hourly average odour contours and concentrations at specific receptors. Predictions will be made using three years of hourly meteorological data and will include the effect of building downwash and terrain where appropriate; and
- The assessment of the potential for emissions of odours from Scheme to give rise to annoyance will be made by reference to established odour thresholds as specified in the UK Environment Agency H48. The proposed threshold for odour annoyance is 3 OUe/m3 as 98th percentile of hourly average concentrations.

69. The assessment will be undertaken by Mr David Harvey.

IMPACT SIGNIFICANCE

70. This section will include, for each potential impact, the following information:

- Description of impact;

[8] Environment Agency. 2011. Additional guidance for H4 Odour Management.

- Policy importance of impact (Local, National, International);
- Extent of effect ;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor (residential dwelling, office, etc.);
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement (very good, good, none).

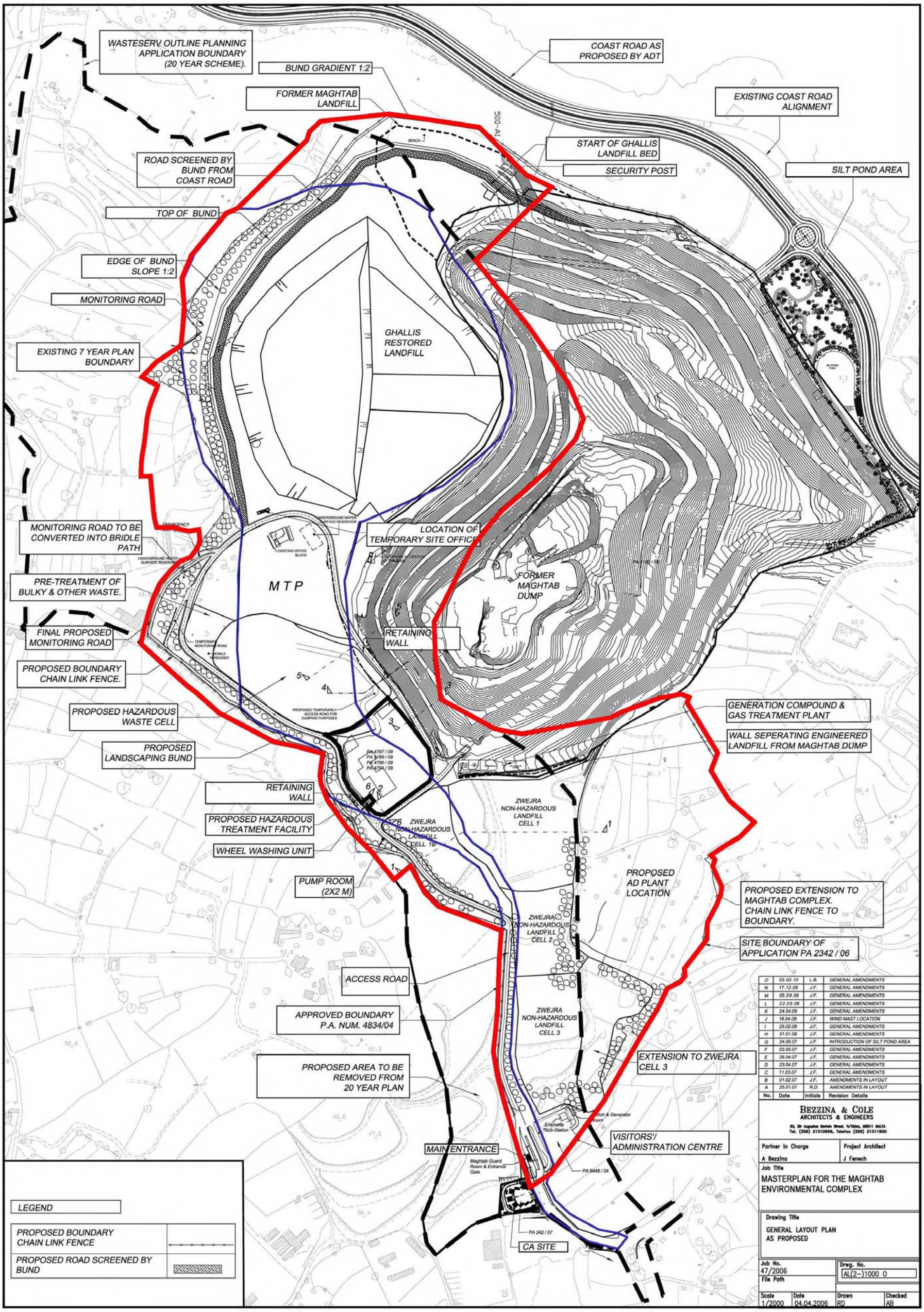
MITIGATION AND MONITORING

71. The scope for mitigation of odour impacts and/ or future monitoring of odorous emissions will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd

May 2011

Figure 1: Master Plan for the Area



PA 02342/06

MASTER PLAN FOR THE MAGHTAB ENVIRONMENTAL COMPLEX, NAXXAR

SOCIAL STUDY METHOD STATEMENT

INTRODUCTION

72. This method statement provides information on the social input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[9]:

- Extension of Zwejra Cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photovoltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[9] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

73. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

74. As this is an update to an existing EIA, MEPA has issued the following Guidelines:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site including the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

75. The Area of Influence (A of I) for the social study has been defined by examining the potential impact of the Scheme on sensitive receptors as shown in **Figure 2**.

ASSESSMENT METHODOLOGY

Competence of surveyors

76. The Social Impact baseline study will be carried out by Mr Steven Vella B.A. (Hons), M.A. (Manchester), an anthropologist. The impact assessment will be carried out by Adi Associates in consultation with Mr Vella. It is understood that MEPA holds his CV.

Methodology

5. The Social Assessment is aimed at understanding and evaluating the response of local residents, businesses, workers, visitors to the area, and other users, to the proposed development. It will be based on intensive qualitative analysis using the methods of social anthropology, namely in-depth interviews, questionnaires, and observation to probe people's uses of the land and seek to relate the proposed Scheme to various aspects of their everyday lives.

6. In respect of residents living near the Application Site, the Study will gauge how the proposed development might affect their work, recreational patterns, and lifestyle in general, and for tourists, it will aim to assess the impact of the development on their expectations, and its effect on their perception of the area.

7. The Study will generate data by means of in-depth interviews that will be combined with on-site visits and observation; the study will also make use of the very extensive literature on the social context / impact of gated communities, which in themselves present specific challenges to planners and assessors.

8. Purposive sampling techniques will be used to target specific populations, in particular residents, tourists, people involved in commercial activities, and visitors to the area.

9. The interviews will be semi-structured and non-standardized. They will gauge any significant impact of the proposed project by identifying their relationship with the land in question and assessment of how the proposed development would interact with their present use of the site, be it work, recreational patterns and life style in general.

Interview Key

10. The following key is an indication of the kind of questions that will be asked, varying on the different kind of relationship the interviewee will have with the site:

- Provenance and background of interview;
- Relationship of interviewee with the site;

- Type/s and seasonality of use/s relative to lifestyle and/or socio-economic circumstances;
- Briefing, using plans, of interviewee about proposed project;
- Discussion of envisaged impact/s of proposed project;
- Any recommendations.

11. The content of all interviews will be kept confidential at all stages of the research and analysis of the data.

Standards and guidance

13. The Study will be based on intensive qualitative analysis using the methods of social anthropology, namely in-depth interviews and observation.

IDENTIFICATION OF POTENTIAL IMPACTS

14. The potential impacts arising from the construction and operation of the Scheme on people's lifestyles, values, attitudes, etc., will be elicited through the interviews.

PREDICTION OF IMPACTS

15. The potential impacts described above will provide a basis for comparison between the existing conditions and the conditions established when the Scheme is being built or is operating.

IMPACT SIGNIFICANCE

16. This section will include the following information for each potential impact:

- Description of impact;
- Policy importance of impact (Local, National, International);
- Extent of effect ;
- Duration of impact (temporary / permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor (residential dwelling, office, etc.);
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
- Scope for mitigation/enhancement (very good, good, none).

17. Based on the above criteria, a summary of the significance of the impact will be judged in terms of whether the impact is considered not significant, of minor significance, or of major significance:

- Not significant: the proposed project is likely to have no effect on lifestyles;
- Minor significance: the project is envisaged to impact on the uses and values of the interviewees in such a way that it can be integrated with them without major lifestyle changes;
- Major significance: the proposed project will affect people's lifestyles in ways that would require major lifestyle changes.

MITIGATION

17. The scope for mitigation will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd & Mr Steven Vella

August 2010

Figure 1: Master Plan for the Area

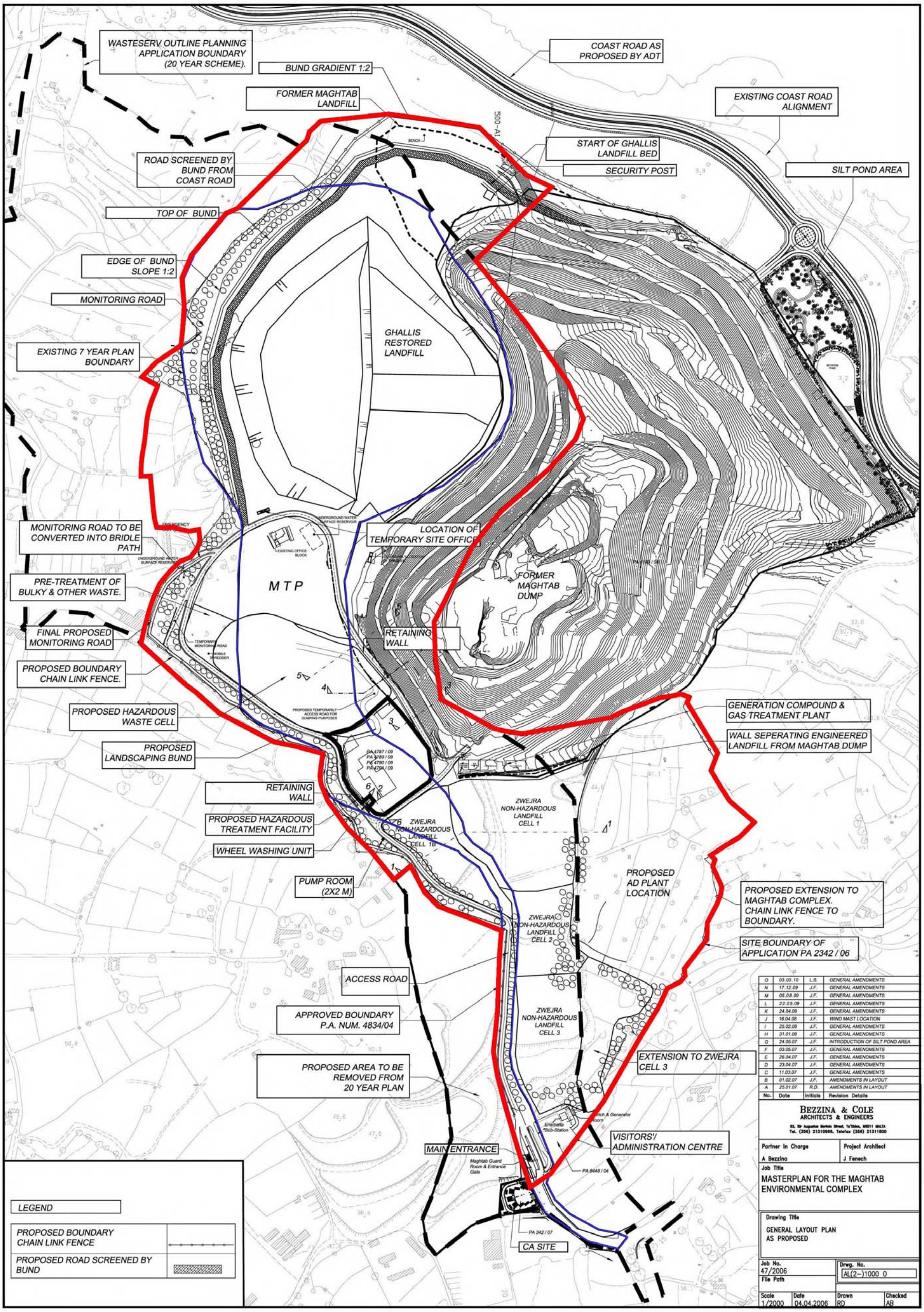
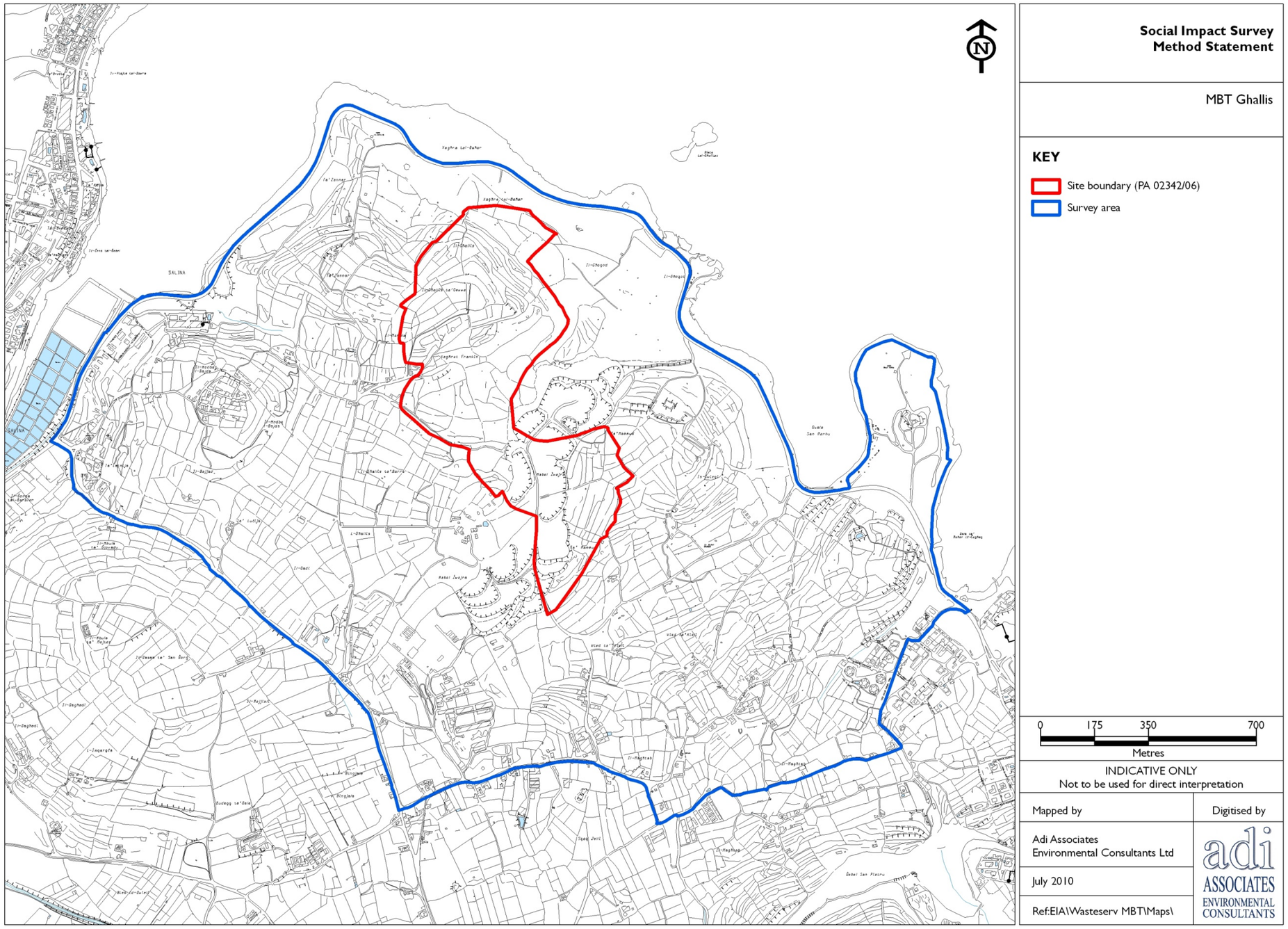


Figure 2: Area of Influence



PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 2

GEO-ENVIRONMENTAL BASELINE STUDY

Prepared by Dr Aaron Micallef

Supporting Documents for
Environmental Impact Statement Update

CONTENTS

FIGURES

TABLES

GEO-ENVIRONMENTAL BASELINE STUDY

INTRODUCTION

1. This report represents the baseline geo-environmental input to the Environmental Impact Statement related to the Maghtab Environmental Complex Master Plan.

Terms of Reference

2. As this is an update to an existing EIA, MEPA has not issued Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site inlcuding the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*

7. Cumulative impacts.

DATA AND METHODS

3. Field surveys were undertaken in August 2010 and focused on the geomorphology, hydrology and hydrogeology of the Application Site.

Geology and Geomorphology

4. A field survey of the area was carried out to gather baseline data on the geomorphology of the Application Site. This involved:

- Identification and description of the geomorphology of the area shown in **Figure 1**;
- Identification, mapping and description of geomorphologic features; and
- Identification of features that are protected by legislation or warrant such protection and, in the latter case, the appropriate level of protection.

5. As the EIS for the Ghallis landfill (PA 04834/04) includes an extensive geology survey (see Maps GH 7/2 and 7/3) and geology does not change over time, the same baseline as that contained in the EIS will be used. An update is not considered necessary and will therefore not be covered in the EIS Update.

Hydrology and Hydrogeology

6. A hydrology and hydrogeology survey was undertaken to:

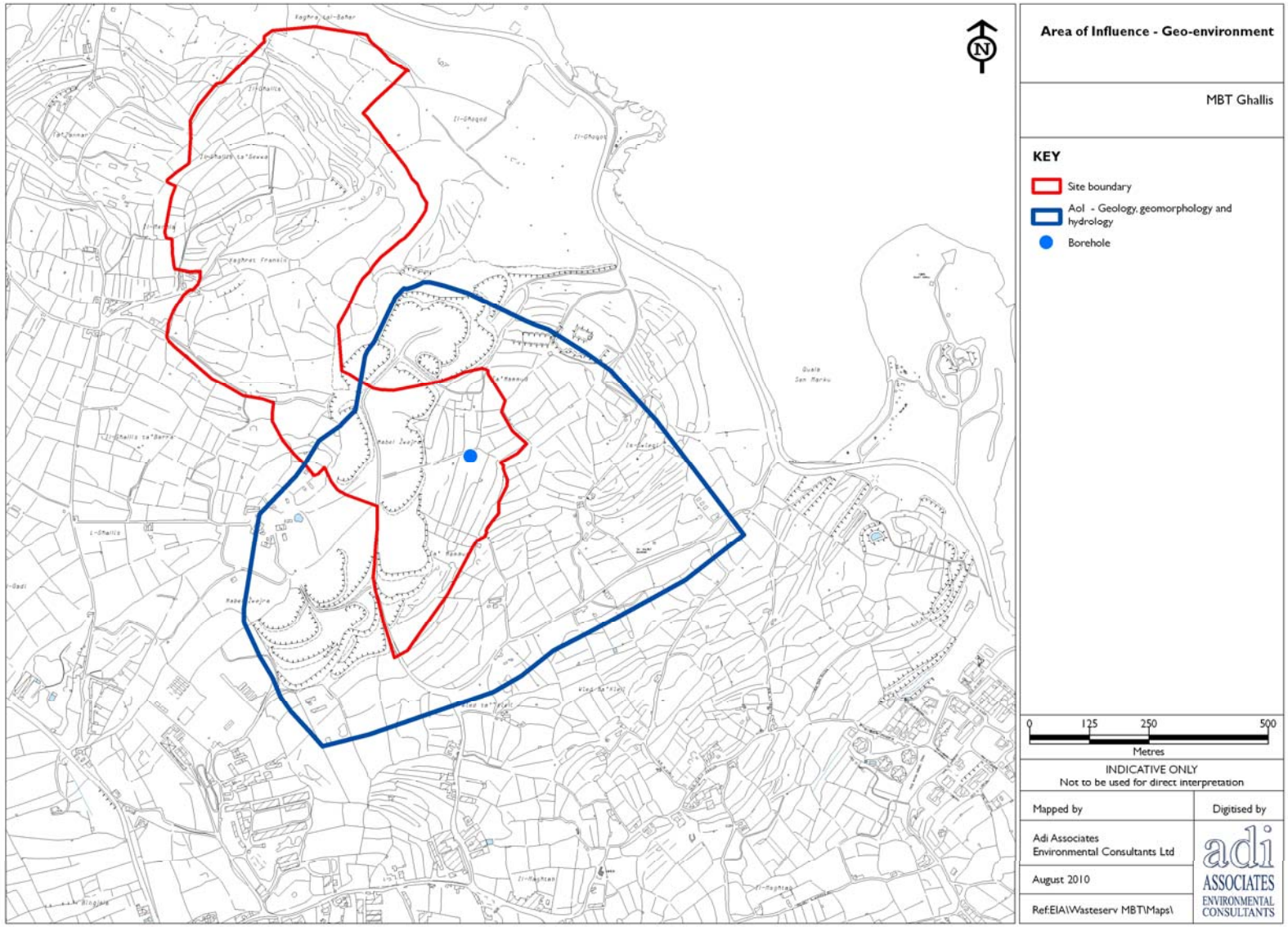
- Identify and describe the following features: aquifers and their characteristics, water courses and their characteristics, drainage patterns, surface run-off, springs and wells, if any;
- Carry out a surface water flow study to map surface water channels across the site and downstream of it as shown in **Figure 1**, to assess the direction and volume of surface water within the proposed site, and to calculate the water balance of the catchment area relevant to the site;
- Determine the importance of the proposed site in recharging the mean sea level aquifer. The drainage potential of the site in accordance with the soil type and the underlying rock strata was ascertained, and groundwater protection zones were identified; and
- Identify the current users of the surface water.

Area of Influence

7. The Area of Influence (A of I) for the geomorphology, hydrology, and hydrogeology baseline studies is shown in **Figure 1**.

.

Figure 1: A of I for Geomorphology, Hydrology and Hydrogeology



BASELINE: GEOLOGY

Lithostratigraphy

8. The five Late Tertiary formations exposed on the Maltese Islands are, from top to base:

- Upper Coralline Limestone (youngest);
- Greensand;
- Blue Clay;
- Globigerina Limestone; and
- Lower Coralline Limestone (oldest).

9. The formations outcropping at the A of I are Globigerina Limestone and Lower Coralline Limestone (**Figure 2**).

10. No appreciable Quaternary continental deposits have been identified within the Application Site and A of I.

Globigerina Limestone Formation

11. The Globigerina Limestone Formation is Aquitanian (23 – 20.4 million years ago) to Serravallian (13.6 – 11.6 million years ago) in age. Globigerina Limestone consists of a relatively uniform succession of biomicrite packstones, wackestones and marls that are up to 200 m thick. The Formation is generally characterised by massive, poor-to-moderately consolidated and intensely burrowed limestones that consist of planktonic foraminifera and pteropods, indicating deposition in outer shelf environments. The Formation can be sub-divided into three Members:

- Upper Globigerina Limestone Member (youngest);
- Middle Globigerina Limestone Member; and
- Lower Globigerina Limestone Member (oldest).

12. Only the Lower Globigerina Limestone Member is present within the A of I (**Figure 2**).

13. The Lower Globigerina Limestone Member consists of soft, near-horizontally-bedded, pale cream to yellow planktonic foraminiferal packstones and wackestones. The depositional environment of the Lower Globigerina Limestone Member is interpreted to be water depths in excess 200m with free access to the open sea.

14. The Lower Globigerina Limestone Member consists of 2 principal beds:

- Globigerinid bed (Franka): the dominant unit in the Lower Globigerina Limestone Member, this bed consists of a fine to medium grained, pale cream to yellow massive foraminiferal wackestone that exhibits a consistent thickness and

homogenous nature. Intense bioturbation has destroyed most of the original bedding.

- Soll layer: Soll is a thickly bedded biomicritic limestone that has a darker yellow and mottled hue than franka. Soll is also less porous and denser than franka; it has a higher compressive strength, and higher silicon, iron and aluminium content. Soll shows anomalously dense and large bioturbation.

15. The most abundant marine macrofossils found in the Lower Globigerina Limestone Member are benthonic and planktonic microforaminifera, Pectinid bivalves and Shizaster echinoids. Fish teeth, molluscs and solitary corals are also encountered.

16. The Lower Globigerina Limestone Member has a maximum thickness of 9.8 m within the A of I. The bedrock of the Application Site is composed of the Lower Globigerina Limestone Member, although this is entirely covered by cultivated soil.

Lower Coralline Limestone Formation

17. The lowermost and oldest rock formation exposed on the Maltese Islands, Lower Coralline Limestone is up to 1,000 m thick, although only the uppermost 140m are exposed. It consists of thickly bedded, massive white limestone beds of shallow marine origin, composed of wastes of shelly debris. The latter is derived from the skeletal remains of calcareous algae, benthonic foraminifera, corals and bryozoa, among others. The Formation is characterised by rapid variation of grading and sorting, which is characteristic of deposition in shallow, agitated water conditions. The contact of Lower Coralline Limestone with the overlying Globigerina Limestone is sharp and characterised by hard ground.

18. The Lower Coralline Limestone can be divided into four members:

- Maghlaq Member (oldest);
- Attard Member;
- Xlendi Member; and
- Il-Mara Member (youngest).

19. Of these four members, the Attard and Xlendi Members outcrop in the Area of Influence (**Figure 2**).

Attard Member

20. The Attard Member consists of a compact white to light yellow, very coarse grained limestone that is composed of white algal fragments and algal rhodoliths. Large *Archaeolithothamnion intermedium* (rhodolites) are ubiquitous and are locally associated with strombid gastropods and byrozoa. The Attard Member is up to 35.7 m thick and it outcrops as a strongly karstified, gently sloping platform along the coast.

Xlendi Member

21. The Xlendi Member outcrops as a light brown, porous, moderately strong limestone. It consists of massive to laminated fossiliferous, coarse to very coarse calcarenite. The member is predominantly composed of planar to cross-stratified wackestones

and contains numerous detrital coralline algal rhodolite fragments (up to 60%), as well as abundant echinoid and benthonic foraminiferal bioblasts, and less numerous fragments of bryozoa bivalves and algae. The most common fossil is the echinoid *Scutella subrotunda*. The Xlendi Member is up to 11.5 m thick and its basal contact with the Attard Member is very sharp.

Faults

22. The Maltese Islands are traversed by two major fault systems associated to two diverse rifting episodes in the proximity of the archipelago. The first and most widespread system is Early Miocene in age, and consists of faults that are orientated east-north-east to west-south-west. The most distinct of these faults is the Great Fault, which is 11km long and bisects the island of Malta into two blocks from Fomm ir-Rih on the western coast to Madliena tower on the east. The Great Fault has a downthrow of 90 m – 180 m in a north-west direction. The northern block is characterised by a series of normal faults that have resulted in horst and graben morphology. The faults in the southern block, in comparison, are less pronounced, and they have a less distinct control on topography. All of the faults of this system became dormant by the Early Pleistocene or Pliocene times. A younger system of faults (Late Miocene-Early Pliocene) is still active and consists of faults striking north-west to south-east that often cross-cut the first-generation of faults. The most extensive of these faults is the Maghlaq Fault, located along the southern coastline of the Maltese Islands.

23. A number of faults intersect the A of I (**Figure 2**). A SW-NE trending fault, which downthrows in a north-west direction, is located 360 m to the south-east of the Application Site. This fault is parallel to the Great Fault and belongs to the first and older system of faults. A series of minor faults are also common with the A of I; they comprise a conjugate set of faults with a general N-S orientation. One of these minor faults is located on the western boundary of the Application Site.

Mineral resource value

24. The quality of the mineral resource within the A of I has been described as 'mediocre' and not of use for the concrete construction or road construction industries (EIS for the Ghallis landfill (PA 04834/04)). The assessment is based on physical and mechanical tests carried out on core samples taken from site investigation boreholes. For example, whereas good quality Lower Coralline Limestone has a compressive strength of 30 – 40 Nmm^{-2}, the average compressive strength of samples of Lower Coralline Limestone from the A of I was in the range of 4.7 – 24 Nmm^{-2}. A further sample will be taken at the Application Site to determine the quality in the eastern sector.

Soils

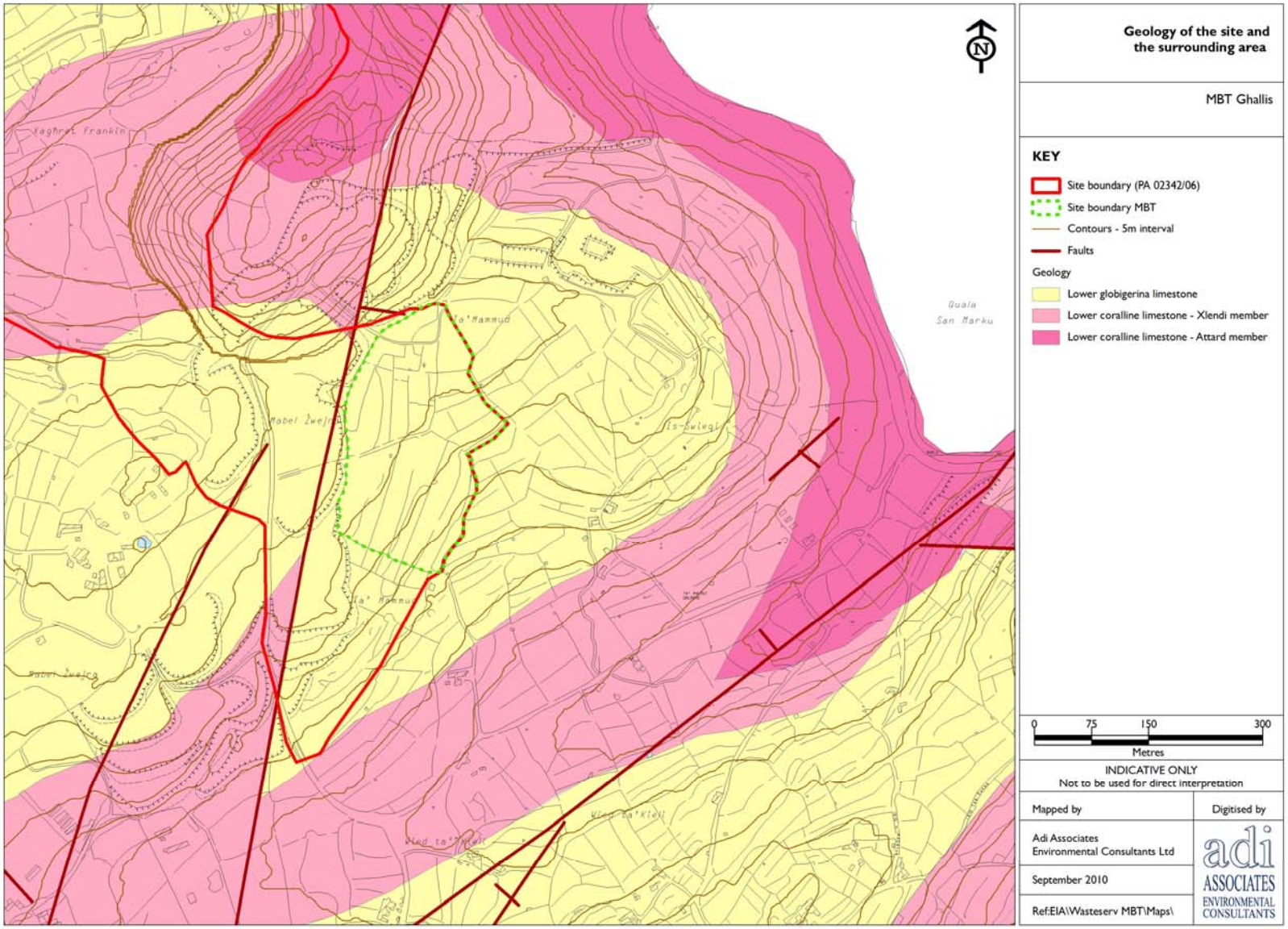
25. Two soil types can be identified within the A of I:

- The Xaghra Soil Series (associated with the Lower Coralline Limestone Formation): this consists of very shallow, red, heavy textured, decalcified soil with

a strong subangular to angular blocky structure. This type of soil occurs intermittently among the Lower Coralline Limestone outcrops.

- Tal-Inglin Complex (associated with the Lower Coralline Limestone Formation and Lower Globigerina Limestone Member): this is a pale brown to red, shallow to moderately deep, light to heavy textured man-made soil.

Figure 2: Geology of the site and the surrounding area



BASELINE: GEOMORPHOLOGY

26. The relief and landforms within the Application Site and the surrounding area are predominantly controlled by lithology, fluvial erosion processes and anthropogenic influences. The principal geomorphological features within the A of I include (**Figures 3** and **4**):

- Dry valley;
- Gently sloping landscape; and
- Former Maghtab dump.

Dry Valley

27. Streams flowing during a wetter climate in the Pleistocene period have formed the gentle and shallow Wied ta' Kieli valley. Nowadays, water flow within Wied ta' Kieli is ephemeral and only occurs after heavy rainfall episodes. The rise in sea level during the Quaternary has submerged the mouth of Wied ta' Kieli, resulting in the Qalet Marku Creek. The valley thalweg coincides with a SW-NE oriented normal fault. More information about the morphological and hydrological properties of this dry valley is provided in the **Hydrology and Hydrogeology** section below.

Gently Sloping Landscape

28. The soft Lower Globigerina Limestone Member comprising the valley sides of Wied ta' Kieli has weathered into smooth and gentle slopes covered by soil. On the north-western valley slopes of Wied ta' Kieli, the terrain falls gently towards the valley thalweg and the coastline. In the first case, the elevation decreases from 35 m to 5 m in a south-easterly direction; in the case of the latter, the terrain falls steadily from 40 m to sea level. Here, the Lower Coralline Limestone forms a low rocky coastline characterised by a gently sloping karstified platform.

Former Maghtab dump

29. The former Maghtab dump, which rises steeply from the natural ground level in benches to an upper plateau 0.06 km^2 in area, constitutes the highest topographic unit in the A of I with a maximum elevation of 100 m above sea level. The south-easterly facing slopes of the dump, which are located upslope of the Application Site, comprise the steepest areas of the A of I, with a maximum slope gradient of 17.4°. The dump has buried the Ghallis ta' Gewwa and Ta' Hammud ridges and the valley in between, which were originally covered by garigue and agricultural land.

Morphology of the Application Site

30. The Application Site is located on the gentle slopes of Habel Zwejra, on the north-western valley side of Wied ta' Kieli. The terrain within the Application Site is generally smooth and gentle, with a mean slope gradient of 5.7° and a south-east slope aspect. The elevation of the terrain with the Application Site varies between 27 m and 45 m above mean sea level. The area in the Application Site is divided into fields, some of which are fallow whereas the others have been abandoned and have naturally regenerated. There are no significant geomorphological features within the boundaries

of the Application Site, although the saline marshland at Qalet Marku, 600 m to the east of the Application Site, is designated as a level 2 site of scientific importance in terms of Structure Plan Policy RCO 12.

Figure 3: Digital Elevation Model

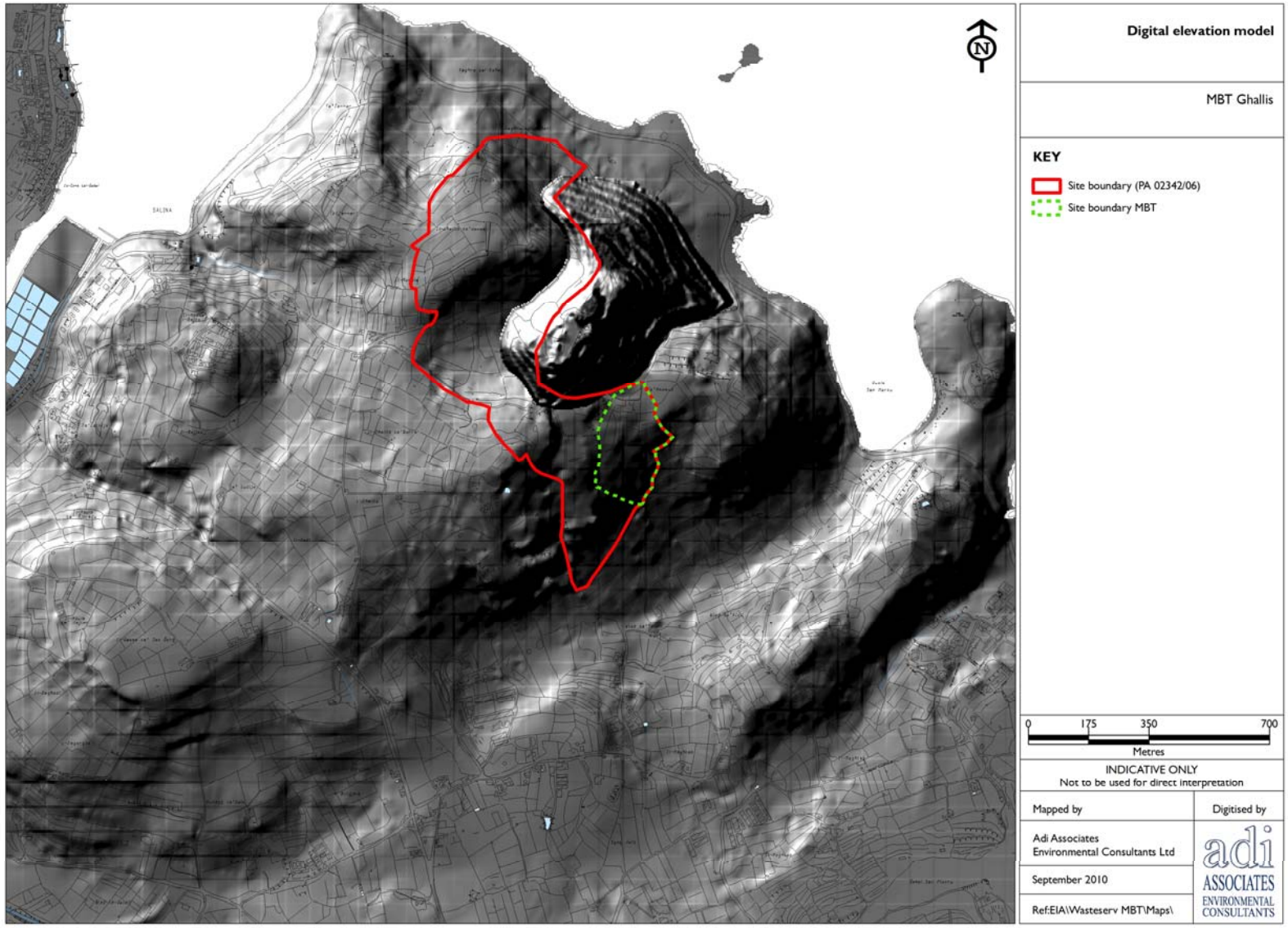
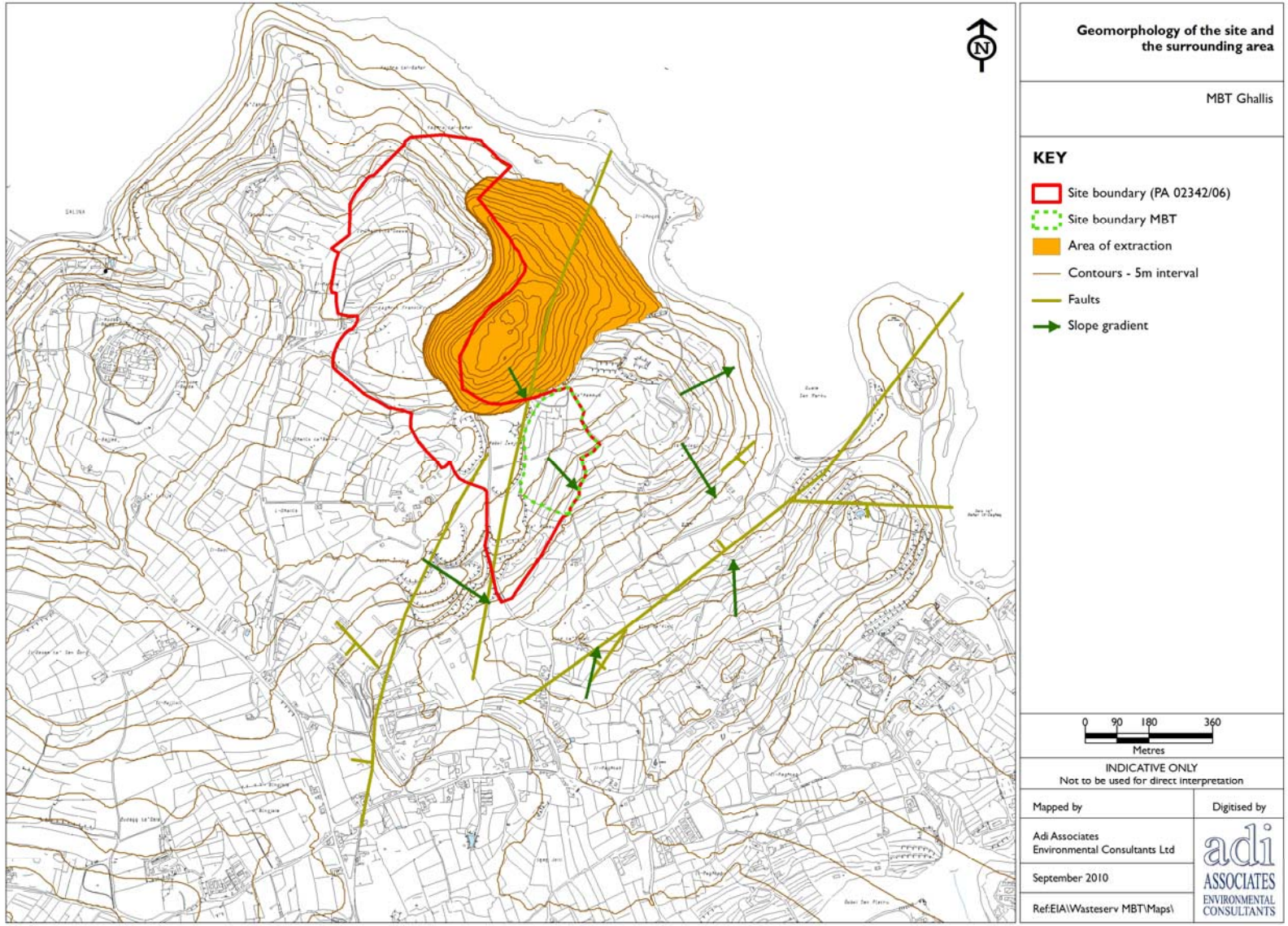


Figure 4: Geomorphology of the site and the surrounding area



BASELINE: HYDROLOGY AND HYDROGEOLOGY

31. The hydrologic and hydrogeologic features identified within the A of I comprise:

- Dry valley (Wied ta' Kieli) and associated catchment;
- Mean Sea Level Aquifer; and
- Agricultural boreholes.

Dry valley and associated catchment

32. The Application Site is located on the valley side of Wied ta' Kieli. Wied ta' Kieli is a first-order dry water course formed by stream erosion during a more humid climatic regime. Today runoff only flows along the valley during periods of prolonged rainfall or flush heavy rains.

33. The Wied ta' Kieli axial watercourse is oriented south-west to north-east; it separates Ta' Hammud ridge from Maghtab ridge, and it discharges into Qalet Marku creek. It has a general linear planform shape. The watercourse is 1.4 km long, up to 1 km wide and it is incised in the Lower Globigerina Limestone Member and Lower Coralline Limestone Formation. The valley floor has a mean slope gradient of 1.1°. The valley floor elevation drops from 30 m to sea-level. The cross-sectional profile is broadly U-shaped, with the valley depth reaching a maximum value of 50 m. The valley slopes are generally gently sloping; a maximum slope gradient of 8.5° was measured. The valley is mostly cultivated, whereas close to the valley head a few buildings are located. In proximity of the valley mouth, the north-western valley slope is characterised by kartsified limestone covered by garigue. Triq ir-Ramla runs along the thalweg of Wied ta' Kieli.

34. The A of I intersects the Wied ta' Kieli catchment, the boundary of which is shown in **Figure 5**. The catchment has a total area of 1.48 km^2 and its geology is comprised of the Lower Coralline Limestone Formation and Lower Globigerina Limestone Member. The boundaries of the catchment coincide with cultivated terrain.

Mean Sea Level Aquifer

35. An aquifer is a porous layer of rock capable of storing, filtering, and releasing water. The rock layer contains many pore spaces which, when connected, make the rock permeable and allow movement of water through it. Aquifers are the Maltese Islands' primary source of natural water as there are virtually no perennial surface water streams.

36. The Mean Sea Level Aquifer lies in the pores and fissures of Lower Coralline Limestone where this formation subcrops at sea-level. A body of fresh water in the form of a 'lens' floats on saline water by virtue of its lower density. The thicker part of this 'lens' is situated in the central part of Malta, with its height decreasing towards the coastline where it levels off to zero. The aquifer is recharged by the percolation of rainwater every winter, and is dissipated to sea at the coastline or by extraction. The Mean Sea Level Aquifer has a mean thickness of 67.5 m and covers an area of 216.6 km^2. It yields 66% of the water extracted in the Maltese Islands. The aquifer has a mean annual

recharge of 34.27 hm^3 and water is mainly abstracted for potable supply and agricultural use.

37. The Mean Sea Level Aquifer is the principal hydrogeological feature in the area (**Figure 6**) and it extends over the entire A of I. The aquifer is developed within the Lower Coralline Limestone Formation; it is in free contact with sea water and is overlain by the Lower Globigerina Limestone Member. The hydraulic characteristics of the aquifer are mainly controlled by the secondary hydraulic conductivity of the Lower Coralline Limestone Formation, which has a value of 2.0 x 10-4 - 1.5 x 10-3 ms-1 (Guttierez, 1994).

38. Precipitation is the only source of groundwater recharge. The geology of the A of I is conducive to the recharge of the Mean Sea Level Aquifer because the limestone bedrock is located at the surface or underneath a thin mantle of soil and/or overburden. These conditions promote a low soil moisture deficit and rapid infiltration of rainwater into the porous Lower Globigerina Limestone Member and the permeable Lower Coralline Limestone Formation, which percolates through the unsaturated zone until it reaches the Mean Sea Level Aquifer within the Lower Coralline Limestone Formation. In comparison, the effective recharge rates upslope of the Application Site, which is comprised by the Former Maghtab dump, are expected to be very low due to the substantial adsorptive capacity of the deposited waste and the evaporation of infiltrated rainwater associated to combustion (Scott Wilson, 2004).

39. Groundwater levels in the Ghallis area range between 0 and 1 m above sea level (Axiak and Sammut, 2002). Thus, the potentiometric surface of the Mean Sea Level Aquifer is estimated to lie at a depth of about 40 m below the surface of the Application Site. The hydraulic gradient of the Mean Sea Level Aquifer in the area is estimated to range between 0.0006 and 0.00083, and the direction of groundwater flow is north-east towards the coast (Axiak and Sammut, 2002; Scott Wilson, 2004). The direction of flow is affected by groundwater abstractions; however, since abstractions rates from nearby private wells are expected to be low due to low yields and saltwater intrusion, the effect of groundwater abstractions on groundwater flow direction is considered to be minimal. The estimated groundwater flow ranges between 41.5 and 1244 m^3 per day (EIS for the Ghallis landfill (PA 04834/04)).

40. Groundwater quality will be determined once the necessary tests are carried out. These will be presented in a separate report.

Agricultural boreholes

41. There are at least six abstraction boreholes within ~750 m of the Application Site (**Figure 6**). These boreholes extract water from the Mean Sea Level Aquifer, which is then used for agricultural irrigation. The A of I lies outside of the Groundwater Protection Zone, which has been established to protect the islands' groundwater resources. The Application Site is located 1.1 km to the north of the Groundwater Protection Zone associated with the Wied il-Ghasel pumping station.

Surface Water Flow and Water Balance Estimations

42. Malta experiences an average of 578 mm of rain per year. Precipitation occurs in sufficient quantities to produce run-off from October till February. The dry season

stretches from May to September. On reaching the ground, part of the water flows as run-off (6%), whereas another part percolates downwards until it reaches an aquifer as recharge (24%). The run-off is either harvested or directly lost to sea. A substantial part of the rainfall is returned to the atmosphere via evapo-transpiration, which during the dry season is very high (70%).

43. The contributing area of run-off that flows across the Application Site is shown in **Figure 7**. It has an area of 0.070493 km^2 and includes the area of the Former Maghtab dump upslope of the Application Site. To estimate the water balance for the Application Site, the area of the contributing area and Application Site are multiplied by the rainfall, giving the amount of water that is initially available. This is then further subdivided into run-off, evapo-transpiration, and percolation.

44. The contributing area and the Application Site are characterised by different surface compositions. The contributing area consists of waste and overburden from the Former Maghtab dump; this surface has a high infiltration capacity and is attributed a run-off co-efficient of 10% (**Table 1**). The Application Site, with an area of 0.051093 km^2, consists of disused agricultural land. The permeability associated with this terrain is considered to be low because the soil was cultivated and its structure was modified by repeated ploughing. The run-off co-efficient attributed to the Application Site is 75% (**Table 1**).

Table 1: Land uses and associated run-off co-efficients for the contributing area and the Application Site

Land use	Area (km^2)	Run-off co-efficient (%)
Agriculture (Application Site)	0.051093	75
Former Maghtab dump (Contributing area)	0.070493	10
Total area	**0.121586**	

45. The direction of surface water flow in the contributing area and the Application Site is predominantly south-east towards Wied il-Kieli (**Figure 7**).

46. The estimated annual water balance for the sub-catchment is shown in **Table 2**. The total annual volume of percolation within the contributing area and the Application Site is 13,217 m^3. The volume of run-off reaching the Application Site is 1,222 m^3 annually, whereas the volume of run-off being drained at the downstream boundary of the Application Site is 7,867 m^3 annually. The total annual volume of run-off and percolation for the Study Area at present is estimated at 6,654 m^3 and 2,216 m^3, respectively.

Table 2: Annual water balance for the sub-catchment associated with the Study Area

Catchment	Area m^2	Run-off m^3	Percolation m^3	Evapo-transpiration m^3	Total m^3 (assuming annual rainfall of 578 mm)
Contributing area	70,493	1,222	11,001	28,521	40,745
Application Site	51,093	6,645	2,216	20,672	30,626
Contributing area + Application Site (present)	121,586	7,867	13,217	49,193	71,371

Figure 5: Hydrological map

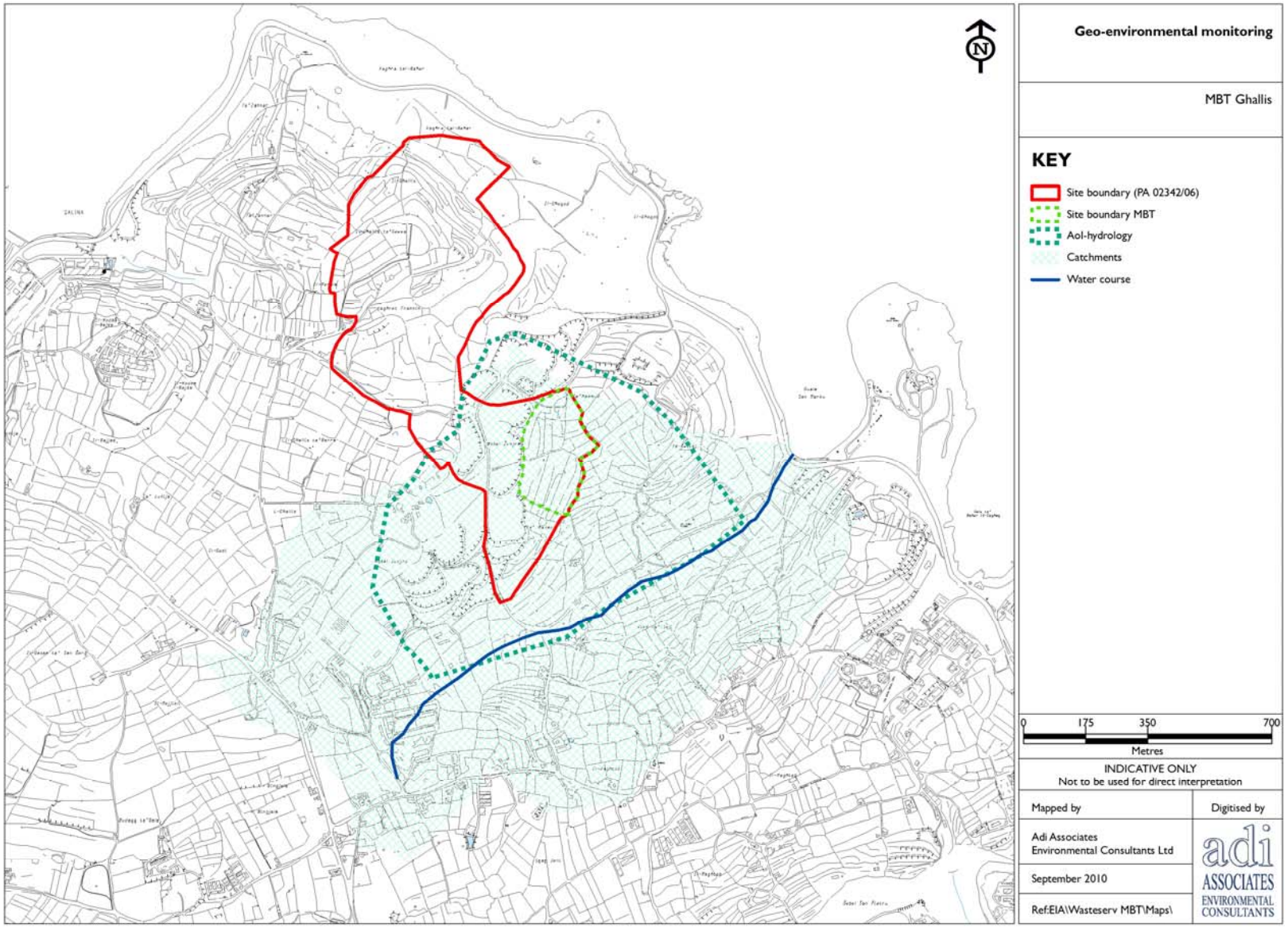


Figure 6: Hydrogeological map

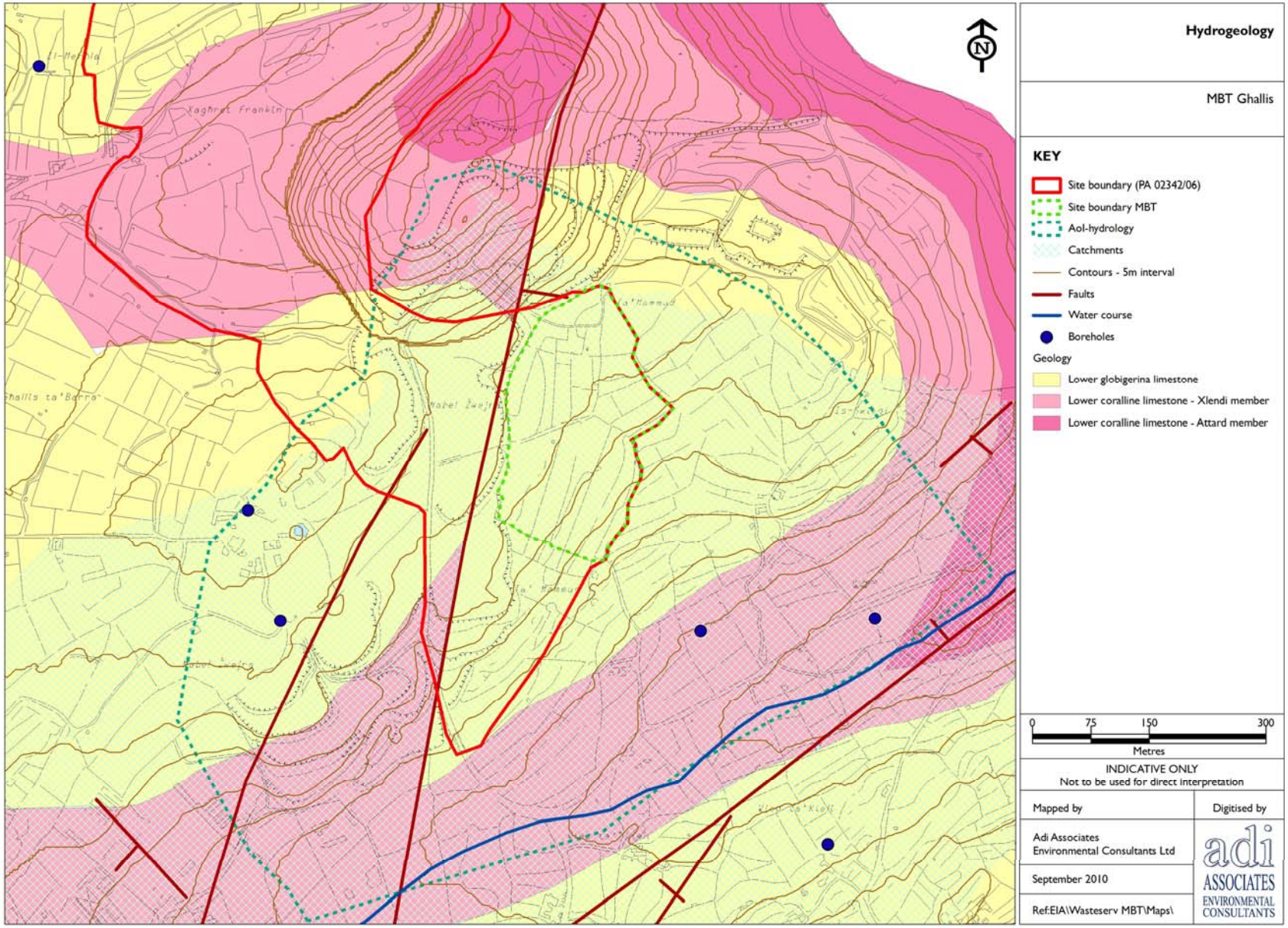
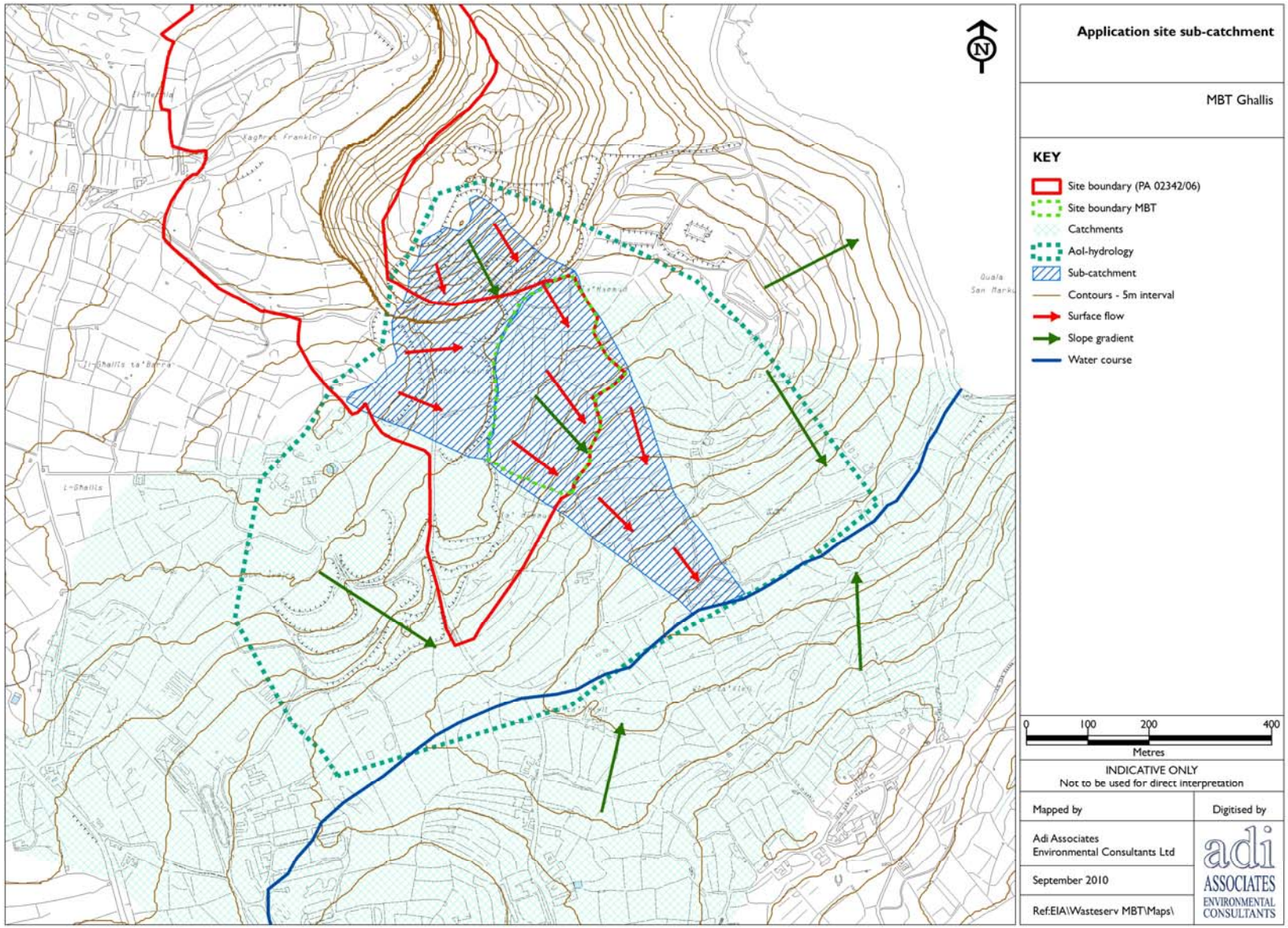


Figure 7: Sub-catchment of Application Site and associated surface water flow



BIBLIOGRAPHY

ATIGA Consortium, 1972. Waste Disposal and Water Supply Project in Malta (Vol. III).

Axiak, V. and Sammut, A. 2002. The Coast and Freshwater Resources. In: State of the Environment Report for Malta, 2002. Ministry for Home Affairs and the Environment, August 2002.

Government of Malta. 1993. Geological Map of the Maltese Islands. Oil Exploration Directorate, OPM, Malta.

Guttierez, A. 1994: Evaluation des Resources en Eau Souterraine de l'Ille de Malta. BRGM, Orleans, France.

Malta Resources Authority. 2005. Initial Characterisation of the Groundwater Bodies within the Maltese Water Catchment District under the Water Policy Framework Regulations, 2004. Marsa.

Scott Wilson. 2004. Development of Rehabilitation Strategies Maghtab, Qortin and Fulija Landfills. Stage II Final Report completed for Ministry of Resources & Infrastructure.

Zammit-Maempel, G. 1977. An Outline of Maltese Geology. Progress Press Co., Malta.

PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 3

AGRICULTURE BASELINE SURVEY

Prepared by Dr Joseph Buhagiar

Supporting Documents for
Environmental Impact Statement Update

Maghtab Environmental Complex
Survey of Ta' Hammud Site
l/o Ghallis, Malta

Baseline Study
Agriculture & Land Cover

Joseph A Buhagiar
Agricultural Consultant
September 2010

BACKGROUND

1. The Project Description Statement (PDS) (PA 02342/06), revised in July 2009 includes the installation of a pre-land filling Mechanical Treatment Plant (MTP) and a Biological Treatment Plant using wet or dry anaerobic digestion (BTP-AD). These treatment facilities are intended to treat the organic fraction of municipal solid waste (MSW) and possibly animal manure.
2. The PDS states that the space in the Western area, between the Ghallis Non-Hazardous Landfill and the Hazardous Landfill is being proposed to house the MTP and requires an area of circa 5,000 m^2 whilst the BTP-AD requires an area of circa 45,000 m^2.
3. MEPA has requested an update to the original EIA that was prepared for the Ghallis Non-Hazardous Landfill. This agricultural baseline survey comprises the baseline information on the agricultural area that is likely to be affected by the proposal as presented in the PDS for PA02342/06.
4. An extensive agricultural baseline survey of the site known as Ta' Hammud, Ghallis Malta which eventually will be the site for the BTP-AD was carried out.
5. The method statement on the agriculture input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar is given in **Appendix 1** and follows standard requirements for agricultural baseline studies.

SURVEY RESULTS

FIELD SURVEY DATES

The field surveys were carried out on four separate occasions namely on 9th, 11th, 14th and 17th August, 2010. The weather was typical of August with day temperature averages for these days in the 31.5 °C, the highest recorded 32.0 °C which is below the usual for this time of the year. The average high for the entire month August was 31.8 °C and daily average low was 23.6 °C.

August Temperatures	Mean (°C)	Max (°C)	Min (°C)
9th	25	31	19
11th	26	31	20
14th	28	32	24
17th	28	32	25

Throughout the survey period, field conditions were dry, with virtually no agricultural activity in the area except for a chance encounter with two farmers.

GENERAL COMMENTS ON AGRICULTURE IN THE SURVEY AREA:

It is noted that the EIS (for PA 04834/04) does include an agriculture survey of most the area. Map GH 11/2 shows that the land comprises "shallow and very shallow terraces on globigerina". The fields are predominantly dry agriculture or abandoned and include cereals, some potatoes and fallow land. Drawing GH 11/6 classifies the fields in the area that was surveyed as low to moderate in terms of agricultural land value.

The agricultural survey site contains a range of fields which are substantially large though not all of them are suitable for cultivation or were in cultivation at the time of the survey. Fields that were actively worked and had produced a crop (mostly wheat for fodder) in the previous season included several terraces in the north and south sections, with the rest either being abandoned fields, uncultivated areas given to carobs, olives and wild vegetation because of their shallow soils and exposed bedrock, or abandoned disturbed land that had been reclaimed or filled with soil but never put into agricultural production. North section terraces in active production included fields marked N1, N3, N8, N9b, N10b and N11a. The remaining north section fields

were either abandoned or degraded. South section terraces in active production were S3, S6, S7, S9ab and S10a of which S3, S7 and S10a are by far the largest.

During the present survey, no irrigated fields were noted on the survey site or in the vicinity, nor signs of any form of irrigated agriculture being practiced. It was therefore concluded that all agricultural activity is dry agriculture, completely dependent on rainfall, when it comes. Remains of produce confirmed that the main activity was fodder wheat production. There were signs of one field (S6) having had broad beans sown but the remains of the vegetative growth was so poor as to be doubtful of any yield of broad beans. This field was also overgrown in the farrows with White Mustard (*Sinapis alba*) confirming that growth was so poor that the farmer did not even bother to weed out the field.

On the 14th August a part-time farmer working fields S11 was encountered and interviewed re agricultural activity on the site. His comments were that the main activity for the area was fodder production mostly wheat but for the current year this was poor due to the low rainfall. Many farmers had abandoned their poor produce because of the poor growth as was observed in the course of the survey. This particular farmer had just collected a bagful of carob pods which he was taking away. On being asked about this he said that these were for personal use with his farm animals and none are sold nowadays since the produce did not fetch a good price.

Two other farmers were also encountered on site on the 17th carrying a load of prickly pear which they had just collected in the early morning for personal consumption. The fruit production in the area was described as currently poor though the site had seen better times. They referred to the presence of a prickly pear variety in the area immediately outside S10b which had originally been imported from Australia that was favoured since the fruit had fewer spines on them. This clump is outside the area marked for development.

They were again interviewed on the general produce of the area. The fields were mostly given to fodder production where the same comments on poor harvest were made. In addition they indicated that the area was not a particularly favourable because of the exposure of the terraced site to east and north east winds, which were liable to damage growth of produce. The site is

afforded some protection from these prevalent winds by being partly screened by a number of mature carob, olive and mastic trees and of more recent planting Eucalyptus and Acacia trees. They also mentioned that the northern part of the site was particularly suitable for capers and that they harvested this but were reluctant to give an estimate of the amount they harvested on a daily basis or seasonally.

SITE DESCRIPTION

The agricultural survey site indicated in **Figure 1 and 2** has the toponym of Ta' Hammud with corresponding aerial photo shown in **Figure 3**. It consist of a number of fields marked in green (figure 1) on the same figure with the A of I marked in grey and represents a 25m buffer area around the relevant boundary of the agricultural survey area proper. It is noted that the entire complex comprises a substantial percentage of disturbed land that has been covered over with building industry waste, the area to the east being an area that is still undeveloped. The remaining undeveloped area mainly comprises agricultural land with a substantial degree of disturbance.

For convenience the fields on the survey site have been divided into two sections – a north and south section divided almost equally by an old country path running almost east – west. The north section consists of some fifteen fields marked as N1-14 and the south section consisting of eight adjacent terraces with fields marked S1-11 on **Figure 4**.

The site measures approximately 350 m long on its north-south axis and is 160 m to 220m at its widest approximately at its mid section. The total area of the survey site is calculated at around 63,000 m^2 equivalent to 6.3 hectares or approximately 56 tumoli. Of this, about one third is in some form of low input and low income mainly fodder production, another third is land with shallow soil on which carobs had been planted and gave some financial returns in the past but currently abandoned, and the remaining third is disturbed land with sufficient soil but on which exotic trees have been planted or the soil left uncultivated for such a long time as to have become completely useless for the past several years. The accumulation of several forms of debris and rubbish has continued the deterioration of this abandoned land.

Figure 1: Area of Influence

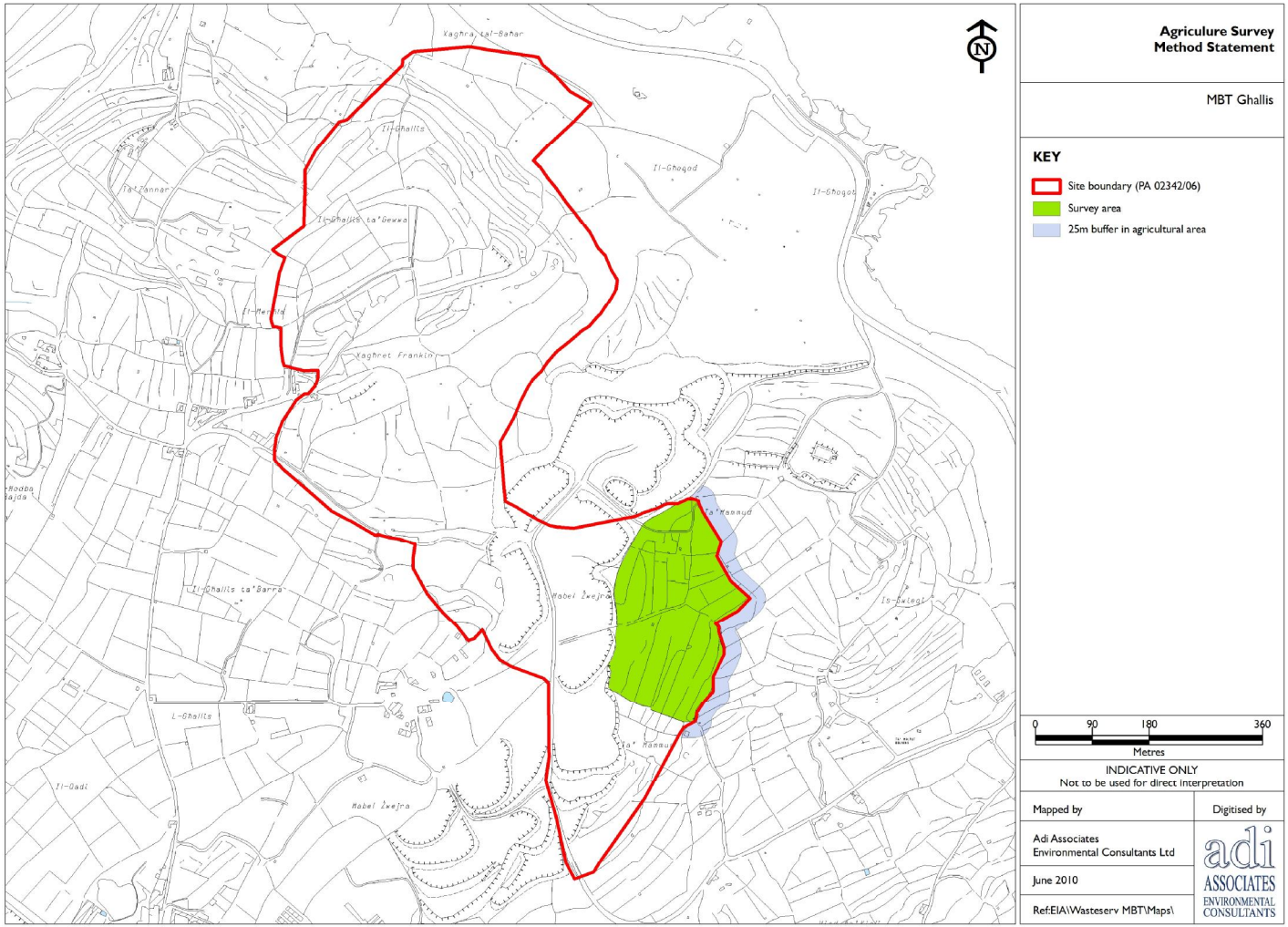


Figure 2 Survey site.

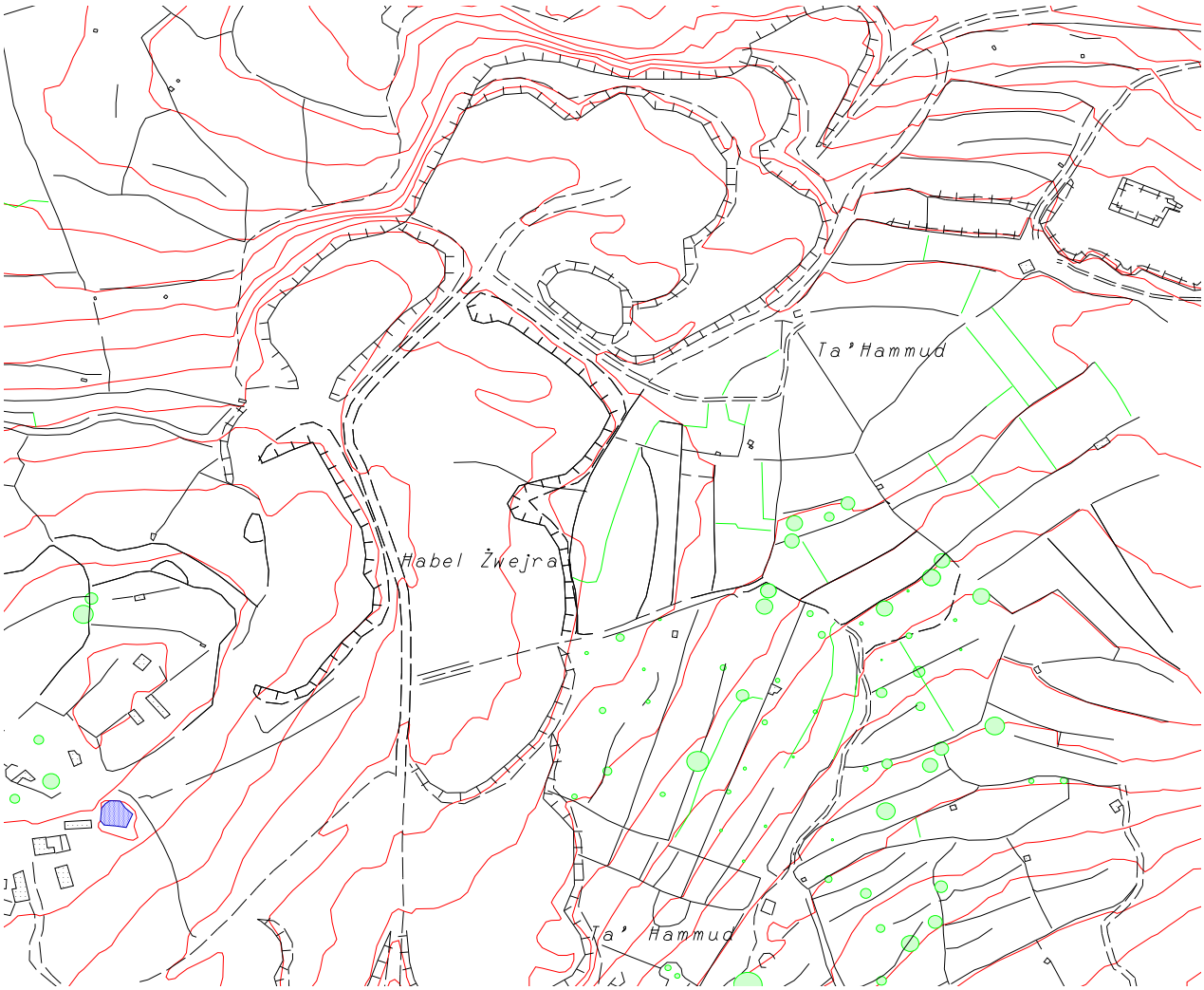
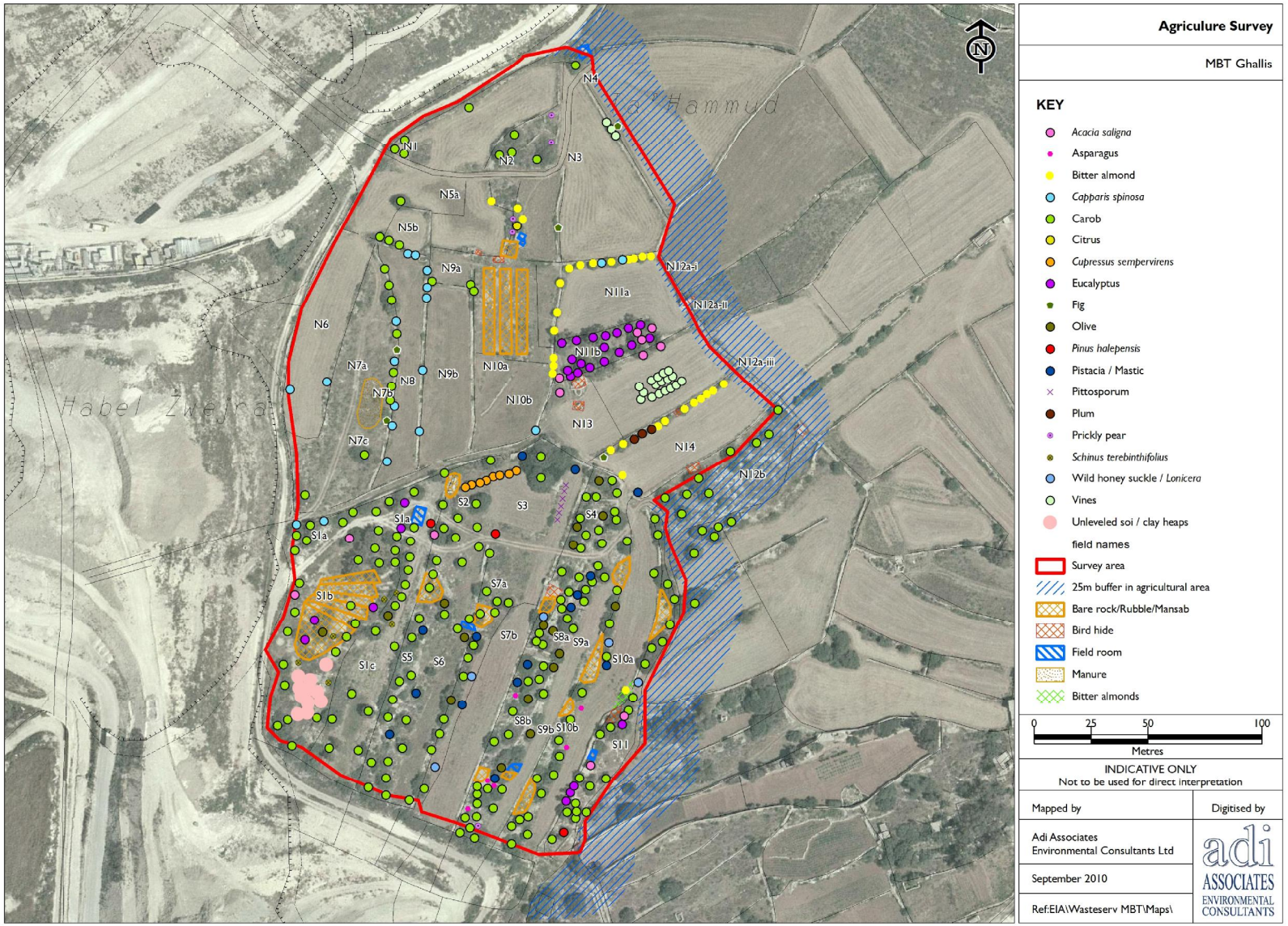


Figure 3: Aerial view of the site known as Ta'Hammud which was surveyed for the baseline agricultural study. The site has a mixture of worked fields, abandoned, potentially workable fields, recently reclaimed but disturbed land and areas of very shallow soil bordering on maquis.

Figure 4: Survey results



GENERAL LIE OF LAND, SLOPE, ASPECT:

The terrain of the site originally formed part of a low hill with a gently slope running in a northwest to southeast direction for the Ta' Hammud area, though for the entire site, it has a predominantly eastern slope towards the sea. The highest contour line of the natural ground level at the extreme west end of the site (field S1b) is situated at 45 m above mean sea level, whilst that at the extreme east limit of the site is at 27.5 m above mean sea level for field S11. This gives a decrease of 17.5 m over a distance of 180 m at its narrowest or a slope of 1 in 10 (5.7 ^{o}) in the south sector. In the north sector, the decrease is of 10 m over a distance of 220 m or a slope of 1 in 22 (2.6 ^{o}). This slope is not reflected in the present lie of the land since the fields are terraced but in general they are not steep terraces with difference between terraces rarely exceeding 1.5 m. The largest number of terraces is found in the south sector and are generally made up of narrow fields. Conversely fields in the north sector are wider and occupy fewer terraces since the land also has a lower slope.

The land immediately adjacent to the survey site on its western and north-western extremities now forms part of the Maghtab landfill and rises steeply over the site; due to the elevation it affords good protection from the west and northwest. The general aspect of the survey land is an east to south-east aspect for the south sector. This part of the survey area is also liable to adverse effects from exposure to strong north-east and east winds. The north sector being on flatter land does not have a predominant aspect but it is generally more exposed form the north and north east.

GEOLOGY, SOIL AND SOIL DEPTH:

The site predominantly overlies the Lower Globigerina Limestone Member but the northern extremity is at the interface with the Xlendi member of the Lower Coralline Limestone (LCL) stratum. The latter explains in part the origin of the shallow Terra Rossa soil in part of the area, probably scrapped off the LCL and carted to the site. The rest of the site has mixtures of soils as well as what looks like an artificial attempt at increasing soil depth by mixing the soil with extraneous substrates. Where the soil is still not mixed in this way, it is a predominantly reddish brown colour in the Terra Rossa series with variable degree of stoniness. The site is overall poor in soil cover with areas where the bare bedrock is quite visible especially the inner reaches of the terraces. As indicated earlier, there is evidence of recent addition of Coralline limestone grit and sand, presumable added to the previous soil to increase soil depth. Several areas on the south sector of the site show the remains of unmixed sand piles.

This mixing of the parent soil with unweathered sand, gives the resulting soil an unnaturally artificial colour and unweathered texture indicative of recent mixing.

RUBBLE WALLS:

Rubble walls are in various states of repair. Some are in a good to medium condition but in their majority the rubble walls have received very little maintenance in recent years with the result that a good number are either falling apart or have completely been lost. Walls are usually not in excess of 1.5m high and this applies mostly when terraces are present with about half this height given to the lower terrace and the remainder given as retaining wall for the upper terrace.

FIELD ROOMS:

There are a number of field rooms, some of which are distinctly associated with bird hunting. These are usually small and recently built (less than 20 years old). Others are much larger and are serving as a store room or a place for shelter. One field room on field S 9b is much older and built in the traditional corbelled system.

TREES AND OTHER VEGETATION:

A number of trees associated with agricultural land are growing on the namely carobs, olives, prickly pear, figs, vines, peaches, citrus and bitter almonds. Except for the bitter almonds, the carobs and the prickly pear, none were observed in fruit and their general shape can be considered poor with some showing signs of water stress. The fruit trees did not seem to be really cared for with a good number of trees overgrown, or having dead unpruned branches, signs of water stress and gum exudation (gummosis) typical of stone fruit trees which could be partly physiological or due to root infection by bacteria. Some dead trees showed signs of having been infected with honey dew fungus *Armillaria mellea*.

The site is very rich in carobs, some of which are very old mature trees and their orderly spacing and alignment indicates that these were intentionally planted for wind shelter from the north east and easterly winds but also served the additional function of providing pods for animal fodder. A considerable number of relatively young trees also occur haphazardly on most of the site and are the result of natural seeding and germination. These and the large quantity of male carob trees (obvious from their lack of pods which would be fully ripened at this time of the year as was seen for female carobs) suggest that the site has not been intensively cared for during the last several decades since male trees though acting as good

wind shelter are considered unproductive and would have been grafted, usually leaving one male to seven or eight female trees. Such male carobs are probably the result of spontaneous germination without subsequent grafting or loss of female scion graft without replacement. The productive carobs (females) did not show signs of pruning and pods from the previous year appear to have been left uncollected as evident from the large number of decayed pods under the tree. Despite this they did show a bountiful supply of ripe pods.

The olives were in their majority also untended some showing signs of considerable age, overgrown but without trace of any olives. Under some of the trees, a large quantity of olive pips was visible again attesting to the production of olives in previous seasons but which went uncollected. From the size of the pips it was concluded that the olive trees were of an oil producing variety but further inferences were not possible since the actual fruit were not present on any of the trees, presumably because the current year did not have sufficient rainfall for the trees to retain and develop the fruit. A number of small (but not necessarily young) olive trees were observed on the site in the vicinity of the mature olives, and are assumed to be spontaneous germinated saplings from olives dispersed by birds.

The few vines present were growing against rubble walls with no proper trellising systems but this was limited to a few vines with most of the rubble walls left unutilised for this fruit tree. One field (N13) had around 30 ungrafted root-stock vines (American vine root stock probably *Vitis berlandieri* x *rupestris*) arranged in the form of a grid probably planted for grafting with fruit bearing varieties. Other fruit trees were conspicuous by their small number except on one field (N14) with a fairly uniform planting of almonds and peaches. One field had a citrus tree growing on it surrounded by a 1.75 m high wall enclosure. Other fruit trees included figs where traces of fruit could be seen but these were few and must have been harvested or, more likely eaten by birds.

The site had a number of trees or shrubs growing on it, mostly associated with ornamental species but there was also at least two indigenous species one of which is a typical maquis species namely the Mastic tree (*Pistacia lentiscus*) growing fairly regularly on the site. Several Aleppo Pines (*Pinus halepensis*) were planted on site. A small clump of Giant Reed (*Arundo donax*) was also encountered on one of the fields (S10a). The ornamental tree species included the common Cypress (*Cupressus sempervirens*), Red Gum Eucalyptus (*Eucalyptus camaldulensis*), Blue-leafed Wattle (*Acacia saligna*), and Brazilian Pepper Tree

(*Schinus terebintifolius*). These were mainly planted to attract birds for hunting and trapping but also acted as wind shelter. Two other ornamentals encountered on S11 included *Yucca elephantipes*, *Euphorbia tirucalli* planted amongst other ornamentals such as the *Acacia saligna* and *Eucalyptus camaldulensis*.

Wild plants growing on the stretches of rocky ground amongst the carobs and olives included the wild honey Suckle (*Lonicera implexa*) and Wild Asparagus (*Asparagus aphyllus*) formed dense growths in association with the dominant shrubs. Other wild plants typical of rocky garrigue were encountered including the Giant Fennel (*Ferula communis*), the Wild Fennel (*Foeniculum vulgaris*) and Asphodel (*Asphodelus aestivus*). The north sector has a substantial number of caper (*Caparis spinosa* var *inermis*) bushes that can make an economic contribution if harvested.

WATER STORAGE FACILITIES, WELLS:

The site is characterised by its sheer absence of water storage facilities possibly due to the hard nature of the bedrock in the area and consequent difficulty in digging out wells. The lack of permanent water storage facilities were evident throughout the fields surveyed though temporary water storage was encountered in the form of plastic square type tanks used to import industrial chemicals. These were presumably used to store water hauled to the site by truck. This shortage of water storing facilities is further confirmed by the small number of fruit trees on the site and those present being mostly restricted to trees that can still produce under non irrigated conditions, namely: olives, prickly pear, figs, vines and bitter almonds. A couple of mature citrus and a few peach trees present showed signs of water stress and at the time of the survey were not bearing fruit.

EVIDENCE OF IRRIGATION:

During the survey, no evidence of an irrigation system was encountered on the site. It is usual for intensively cultivated sites to have evidence of irrigation in the form of old stone channels or the more recent metal or plastic pipes used for irrigation. None of these were encountered indicating that the site was always given to dry land farming relying on rain water for growing its produce.

INDIVIDUAL FIELD BY FIELD SURVEY

NORTH SECTOR

The north sector is made up of an aggregate of fourteen fields numbered N1- 14. The area is generally flatter made up of very shallow terraces which where present usually have less than 0.5 m difference between them. A path separates the north sector on the western margin from the landfill and another path separates N1 and N2 from the rest of the fields in the north sector. The north sector is separated from the south sector by a passage delimited by built rubble walls. Those walls in this passage associated with the north sector are in a very bad state of repair, mostly falling apart and exposing soil which is not very deep. The passage wall associated with the south sector is in better condition. It is good to note that the rubble walls surrounding fields on the north sector have a more than normal abundance of large Caper plants (*Capparis spinosa* var *inermis*), something which was almost completely missing in the south sector except for a few on the undisturbed parts of S1a, which is close to the north sector anyway. The fields in the north sector are marked by the conspicuous degradation in their boundary walls where a good many are falling apart and are of uneven height.

Figure 5: Fields in the north sector showing the dilapidated state of rubble walls and terrace walls with breaches evident leading to soil erosion. The photo was taken from N10a looking in a west direction towards N9b with the Maghtab landfill in the background.

Field N1 and N2

Field N1 represents one of the largest fields in the north sector, in cultivation to wheat for fodder, currently summer fallow. The field is level, with its perimeter touching the fence that surrounds the Maghtab landfill. There are few trees here, mostly carobs with a large tree being strategically placed at the northeast corner of the field N3/N4 and growing against a field room there. This large carob helps to deflect strong wind from this sector which is known to be destructive and could easily lead to lodging and loss of the crop. The field is also protected from destructive east winds by a group of large carobs and prickly pears located on N" which is overgrown with weedy herbaceous species including wild Fennel (*Foeniculum vulgaris*). The soil in N1 is again a Terra Rossa with depth in the range of 3 to 40 cm. An access path for tractors runs along the south margin of N1 and N2 so both fields are easily reached.

Fields N3 and N4

The situation here is very similar to that found in N1 and currently summer fallow after a crop of fodder wheat as confirmed from wheat stubble. These level fields are quite large, with good access for tractors. The fields are surrounded by rubble walls in good to medium state of repair. Field N3 has a few fruit trees planted, namely two figs on the east and west borders and some vines. Soil is again a Terra Rossa, not very stony that appears to be regularly tilled. The same applies for N4.

Fields N5a, b, c and N6

These level fields consist of three sections N5a, N5b and N5c of which the latter is made up of abandoned and disturbed land. N5c has two structures serving as a field room and bird hide respectively. There are several almond trees and prickly pears. A citrus tree (possibly lemon) is growing against the most sheltered western side of the field room structure, with additional sheltered afforded by the prickly pears. There is also an area of exposed bedrock, with stones and rubble, scattered all over this part. Walls are in a bad state of repair except for that dividing it from N3, against which a fig tree is growing. N5a and N5b are both worked fields with traces of wheat stubble present. There is a bird hide on the south margin of N5a. The boundary walls on the south margin of N5a and N5b are in a medium state of repair. Other features of interest include a few scattered carobs on N5b. As in other instances, the Terra Rossa soil present is not very deep.

The level field N6 is continuous with N5b but is showing signs of abandon encroaching on it from the adjacent totally abandoned and disturbed field N7. There are several large caper bushes on the site and a large carob tree at the extreme south end of N6, with this section appearing overgrown to weedy species especially wild fennel.

Fields and N7a, b and c

This stretch of land comprising N7a-c is an abandoned field traversed by several wide vehicle tracks with evidence of long term soil threading and disturbance. The dead remains of weedy, nitrophilous and opportunistic species including Common Mallow (*Malva sylvestris*) and Wild Chrysantemum (*Chrysantemum coronarium*) characterise this area. There is also a dense growth of wild fennel that indicated that this field had in the past been exposed to a lot of disturbance including that associated with excess nitrogen as for example that leaching out from manure clamps. Indeed the presence of a large dried out pile of farmyard manure that has been abandoned for several years is present on this site. For the rest of this field, a large fig and carob are present on the southern extremity.

Terraces N8, N9ab and N10a,b

N8 is an elongated field situated about 0.5m below N7, cultivated and given to wheat in the past season as confirmed from the wheat stubble. This field is particular in having a large concentration of mature caper bushes all around its perimeter. Several carobs are also present as well as a fig tree. The wall on the east margin is in a poor state of repair, uneven in construction with frequent breaches.

N9a and N10a are abandoned areas with a substantial part of N10a showing exposed bedrock or areas with very shallow soil. A large area is cleared for horizontal bird-trapping nets with associated bird hide. The site has typical features of land that has become very unsightly because of encroachment by bird trappers.

The fields N9b and N10b comprise two worked fields with a small difference in elevation between them at around 0.5m. The fields are level and both had a crop of wheat for fodder. There are a number of caper bushes scattered around the field margin. The outer reaches of these two fields border the passage dividing the north from the south sector, have walls in very poor state of repair and falling apart to the extent that soil is being lost. Soil depth is limited as can be confirmed from the exposed soil, this usually not exceeding 40 cm. The

space delimited by walls between 10a and 10b and the adjacent field N13 has a huge tangled overgrowth of wild Asparagus growing in the shallow soil and over exposed bedrock present here.

Figure 6: Field boundary between N10b and N11a where an overgrown clump of wild asparagus is growing from amongst the walls and poor soil cover on the upper terrace some 0.5m above. The stand of Eucalyptus and Acacia present on N11b are visible in the background.

Terrace N11a and N11b

This terrace is made up of two almost level fields N11a and b which were originally continuous but at some point a rough row of stones was built to enclose an area delimited as field 11b where a dense stand of exotic trees namely Blue Wattle Acacia (*Acacia saligna*) and Red Gum Eucalyptus (*Eucalyptus camaldulensis*) are planted, with the undergrowth removed, leaving bare soil. The eucalyptus trees which predominate in this stand are quite tall and estimated to be between 25 to 30 years old. As in similar situations these have one function; to attract migratory birds for shooting which is supported by the numerous bird hides that are present on the adjacent fields N10, N12, N13, and N14. A bird hide was noted on N11b/N13 margin as well the eastern margin of N11a on the boundary between N11a and N12 (ii). The fields making up this terrace are delimited by a boundary wall rising approximately 0.75 - 1 m all the way round, in medium to bad state of repair. The fields making up terrace N11 are approximately on the same level as adjacent fields N3, N10a and N12a but there is a difference of around 0.75 m between N11b and N13, with the terrace wall being in a very bad state of repair and about 0.5 m difference between N10b and N11, again with the terrace wall being in a very bad state of repair. The area between these two fields is marked by an accumulation of dumped non-biodegradable rubbish. The soil of N11a is a

Terra Rossa soil unadulterated with the coralline aggregate seen in the south sector but again is not appreciably deep, gauged at less than 40 cm. At the time of the survey it had been worked for fodder production in the previous season as could be seen from the remaining wheat stubble and was summer fallow. The north and west margins of this terrace have numerous bitter almond trees planted against them of different size, ungrafted but in fruit. This does not appear to be harvested and were probably never intended to remain as bitter almond tree but sown as stock plants for later grafting into soft stone fruit, which never materialised. A number of large caper bushes were noted growing on the south aspect between these almonds.

Fields N12a and 12b

The areas marked N12a (i-iii) and N12b are actually parts of different fields in the 25m area of influence surveyed as per T of R. All four fields are level fields, quite large and most of them being worked. The fields marked N12a (i and iii) on the eastern margin of N11a, N13 and N14 had been worked in the previous season and were summer fallow at the time of the survey, whereas N12a (ii) has not been worked for a considerable period of time and appeared abandoned fallow.

The field marked N12b is an unworked area similar to the shallow soil areas and exposed bedrock of the south sector with which it is continuous. There are several large carob trees growing in the soil pockets present with undergrowth consisting of wild asparagus, several grasses and wild honey suckle. There are two makeshift rooms used as bird hides.

Field N13

This is a level field, currently fallow and not planted out in the previous season. The field is located some 0.75m below terrace N11b, some 0.5m below terrace N10b and some 1m above terrace N14. The field has been cultivated in the recent past since it was not particularly weedy. There are a number of wild vines planted out in rows presumably for grafting but this was never carried out. The field is surrounded by a wall some 1 m high in variable state of repair but generally not very good. Two improvised rooms serving as bird hides are present on the site together with a clump of three Eucalyptus and several Acacias may be partly the reason for being kept fallow.

Field N14

This is a large level field in cultivation to fodder wheat for the previous season, as evident from the wheat stubble present, currently summer fallow. This field is unique for the site in being the only one which has a few fruit trees apart from a row of bitter almonds. The fruit trees present include a fig, three peaches and several bitter almonds. There are also several caper buses and a small Mastic tree, presumably self sown. It is located about 1 m below N13 and 1m above N12b. The perimeter wall is about 0.75m and in medium state of repair. The Terra Rossa soil is not very deep and gauged on average in the range of 30 to 40 cm, slightly deeper in the outer reaches of the terrace.

SOUTH SECTOR

The south sector is made up of eight elongated but generally level terraces subdivided into various fields by walls or paths. The difference between terraces is usually relatively small and never exceeds 1.5m. The terraces contain areas where the soil is sufficiently deep to be tilled for wheat forage production but other areas have shallow soil and exposed bedrock and are not tilled. Instead they have a large number of planted and self seeded trees predominantly carobs and olives. It is estimated that less than a third of the south sector fields are suitable and actually cultivated for wheat for fodder production. The characteristics of each of these terraces will now be described.

Terrace S1a, S1b and S1c

Part of this terrace is one of the most disturbed areas on the entire site with what appears to have been attempts some years ago to increase the soil depth, perhaps over a number of years but without actually finishing the job. The result is that part of the site (S1b) appears especially overgrown with weedy opportunistic species as is typical of abandoned land rather than agricultural land. One can also observe that the soil present on most of S1b is not typical of the rest of the Ta' Hammud site where most areas are covered with Terra Rossa. For S1b the soil is closer to raw clay or carbonate raw soil which is very atypical of the area, which in some areas also appears more gritty possiblly through being mixed with sea sand. It must have been brought over from elsewhere (typically, valley clean-up operations from the north-west of the Island) and spread on the site as part of a land reclamation exercise or simply to increase soil depth. To support this observation, there are still several unlevelled piles (each representing truck-loads), of raw bluish-green clay soil. A possible reason for the overall bad condition of the site is that this soil was brought in and part of it levelled at the wrong time resulting in compaction so that it became impossible to work. This may be one reason why it was left untilled and now appears so disturbed. To add to the general dilapidated appearance, there are several makeshift bird shooting hides and perches partly hidden in the large Eucalyptus trees on this part of the site with the obvious purpose of attracting and shooting migratory birds.

This notwithstanding, the area still has a considerable number of Carobs (*Ceratonia siliqua*) which are typically quite old estimated at over 80 years. The older olives are probably in the 50 – 60 year range and could be of the same lots used in the reforestation of Bajda Ridge in the late 1950s when a large number of Aleppo Pines (*Pinus halepensis*) and Olives, both

cultivated varieties and the wild olive or Oleaster (*Olea sylvestris* ssp. *Sylvestris*), were imported from abroad and planted out.

There are also a number of other trees on this part of the site including the Brazilian Pepper Tree (*Schinus terebintifolius)* and Red Gum Eucalyptus (*Eucalyptus camaldulensis*). A number of Tree Tobacco plants (*Nicotania glauca*) were also noted. This species is not planted but typically follows disturbed land and is a sort lived opportunistic species that inhabits disturbed, rubble-filled land. Other plants occupying this disturbed area included Common Caper (*Capparis spinosa var inermis*)

S1a: Area is characterised by the presence of a number of mature carobs, Eucalyptus, Acacia and Aleppo Pine. The area is not cultivated and some parts are overgrown with weeds. It is typical of an area that is being used as a recreational ground, in this case bird trapping and shooting with some minor agricultural activity. Also, the large room present near the Pine, Eucalyptus and Acacia is not the typical field room associated with agricultural land and may serve for family picnics. A considerable amount of discarded material including rusty tanks is found in this area and adjacent area. A rough track leading from the perimeter of the Maghtab land fill traverses this part of the survey area. The wall on the north side of S1a which is in a good state of repair, has an opening at one end (west side) partly blocked by several carobs.

S1b: As described earlier, S1b is the most disturbed site in the survey area in that soil had been deposited but not properly levelled and the resulting field was never brought into proper agricultural use. This terrace is located some 2 m above the adjacent terrace S1c, therefore the amount of soil deposited on S1b is presumed to be considerable. There is no properly built wall between S1b and S1c.

S1c: This terrace represents an area which is more mature and more akin to the old undisturbed terraces found lower down (S5 to S11). There are several mature carobs and an olive tree here. This part of the terrace had ample soil gauged at over 40 cm and no part was noted with exposed bedrock. Soil in the northern half of area S1c had been worked in the previous seasons at least for half the length of the terrace. During the current cropping season it appears to have been sown to broad beans but these did not mature sufficiently to produce a crop. The field had been left to run to weed with wild mustard growing between the broad

beans. The southern half of S1c was untilled during the survey period and appears to have been left so for a considerable number of years.

Terraces S2 and S3

These two fields at the north extremity of the south section occupy the same level as terraces marked S5, S6 and S7. They are not perfectly level and have a slight slope to the east. The soil is mostly a lighter-coloured Terra Rossa, some of which was original and unmixed whereas other appeared to have been recently mixed with coralline limestone aggregate and sand as for other soil in this area. The depth is generally above 30 cm, except for south margin of S2 and S3 where there is visible bedrock and where stones and some rubble have also been dumped. This section is overgrown with natural low steppic vegetation (mostly grasses and other low herbaceous growth) indicating that the soil is really sparse here. The northern end is delimited by a rubble wall about 1.5m high which separates the south section from the access passage and the north sector. The wall is generally in good state of repair, with an opening where a metal gate once stood, now overgrown with weeds and cannot be opened properly. There were also a number of rusty metal tanks blocking the entrance. The south side of this wall has several large carobs and Mastic trees growing against the wall and must have been strategically planted out as a protection against destructive north wind to afford shelter to crops. A line of eight Cypress trees (*Cupressus sempervirens*) is planted some 15 m from the wall to fill the gap that is not protected by the carobs and mastic trees strengthening the hypothesis that these were planted out as a form of wind shelter. They are more recently planted, estimated at around 20 years and possibly of the same age as the other Eucalyptus, Acacia and Pine trees in the area. This may indicate that the cypresses may also have been planted as a screen to increase privacy especially because of the associated field room that as indicated earlier appears to have a recreational function. A line of Pittosporum (*Pittosporum tobira*, Japanese Cheesewood) about a metre high divides S3 in two sections but does not appear to have any useful function apart from some form of demarcation. There is no boundary wall on the south margin of S2 and S3 but a dirt track marks a separation between these fields and S6 and S7.

S2 and S3 represent fields where the soil is not sufficiently deep to support crop cultivation throughout, such that a substantial part of S2 appears to have been left uncultivated for a long time, possible reasons are that soil is not uniformly deep and since there are several grown trees including the cypresses, it is difficult to manoeuvre the tractor to plough the soil.

However, the remaining part of S2 that reaches up to the dirt track that divides S2 and S3 from S6 and S7 has also been left uncultivated, together with the corresponding part of S3, though easy to reach. The reason as to why it is not being cultivated is the presence of shallow soil and visible bedrock that has not received additional soil (the type of artificial mix made up of the original Terra and coralline aggregate) as for other areas and adjacent site. S3 is for its major part tilled and had been given to a fodder crop in the past season. The field is ploughed in two different directions and is not continuous. The remains of a fodder crop stubble shows that the field may not have been very productive in the past season.

Terrace S4

This field occupies the same terrace level as for S8a and S8b, as well as S9a and S9b. It is a level field almost entirely given over to Carob and Olives with Asparagus (*Asparagus aphyllus*), Asphodel (*Asphodelus aestivus*) and wild Honey Suckle (*Lonicera implexa*) growing amongst them. The field is delimited by a rubble wall on the west and north but the south is not protected but has a dirt track running through it so that S4 is physically continuous with S8a. The field does not appear to have been cultivated mainly because of its shallow soil; indeed there are several areas with exposed bedrock. An interesting elongated raised structure is present running in an east-west direction: possibly a raised turtle-dove (gammiem) trapping site.

Terrace S5 and S6

Terrace S5 is mostly bare rock with a shallow soil cover but this stretch is typically overgrown with mature carob and Mastic (*Pistacia lentiscus*) shrubs and weedy species in between. The terrace is separated from the one above it (S1c) by some 1 m difference. There are several stunted carobs growing on the east margin of S5 bordering into S6 where bedrock is clearly visible. Terrace S6 consists of stony Terra Rossa soil and is situated about 0.5m above field S7. The wall between S6 and S7 is discontinuous and in bad state of repair. There is also a considerable amount of scattered rubble on S5. The northern part of S6 had been planted to broad beans (*Vicia faba*) but these were probably not productive due to poor rainfall. The rows were overgrown with wild mustard indicating the farmer did not even bother to weed out the field.

Terrace S7 (parts a and b)

One of the largest and longest terraces in the south sector consisting of an overgrown uncultivated part (S7a) and a cultivated field (S7b) given to fodder production. The uncultivated part is typical of an area made up mostly of very shallow soil and visible bedrock with deeper soil pockets planted to carobs and olives. This part of the terrace also has naturalised mastic trees, wild Honey Suckle and associated vegetation which is typical of low maquis and steppic community including Asparagus and wild grasses. This part of the terrace is separated from terrace S6 by a discontinuous rubble wall in bad state of repair between 0.5 – 0.75m high. The eastern margin of S7a is continuous with S7b where the cultivated field is present and follows the same level. The soil here is distinctly Terra Rossa again recently mixed with Coralline Limestone grit. The field had been planted in the previous season to wheat as evidenced from the wheat stubble though the harvest was probably poor as for the other fields in the survey area. The east border of field S7b is delimited by a rubble wall rising 0.5m above soil level in good state of repair. The same wall drops about 0.75m to the next terrace on the east side (S8a). The only exception is an area on S8a where a raised platform has a bird hide /shooting hut built on it, with a clearing consisting of a heap of weathered field stones. The north border of S7ab is delimited by the rough track across which one can reach S3 and S3.

Terrace S8a and S8b

S8a: This part of the terrace is subdivided into two parts with a low wall circa 0.75m high in good to medium state of repair, running in a north-east to south west direction. Like field S4, this terrace is substantially overgrown with Carob, Mastic, Asparagus, wild olives, Asphodel and wild Honey Suckle. The result is that this part of the study area has taken the appearance of a low maquis, though growth was not vigorous possibly due to shortage of rain. There was also an abundance of the wild Rice Grass (*Oryzopsis miliacea*, Barrum). The soil depth in this area appears limited as could be seen for the adjacent terrace and also confirmed from areas where the bedrock was visible. The western part of terrace S8a has a clearing with a small bird hide built partly on the bedrock with a large pile of weathered field rocks around it. The bird hide appears to be of relatively recent construction (less than 20 years) with evidence of recent use from the number of spent cartridges on the ground. Growth on the eastern section of terrace S8a is more widespread with many shrubs indicated above present. The condition of the carobs is similar to that found on other parts with most showing no signs of recent pruning or maintenance. Some trees had pods present but others showed no sign of producing and are probably male (this can only be verified in early Autumn after a good

rainfall when female or male inflorescence will emerge). The north section has no wall and is traversed by a rough dirt track for tractors and other vehicles and continuous with terrace S4.

S8b: This terrace is also entirely grown with Carobs, Mastic and Olives (both cultivated, grafted olives and wild, self sown forms), as well as Asparagus, Asphodel and wild Honey Suckle. The outer terrace wall does not reach above the terrace soil level whilst the inner terrace wall was up to 1.5 m high (divided almost equally with around 0.5 - 0.75 m actually above terrace S7b) and in variable state of repair, sometimes a very bad state. The carobs, though mature (estimated at more than 80 years old), show they have been left neglected with dead wood on them for lack of pruning. They were in general unproductive either because of lack of maintenance or because the trees were males that had been left ungrafted. The olive trees present were also not in fruit, possibly because the fruit was aborted due to the drought that prevailed at the beginning of this year. However, a layer of olive pips (stones) was found under the larger olive tree adjacent to the Girna on S9b (see below), indicating the olive tree was productive at least in previous years. Two very large Pistacia lentiscus trees were also present in this section on the north section of S8a near the passage. Its considerable size is indicative of active growth either due to deep roots penetrating a fissure or an underground source of water, which is not excluded given the stand of Giant Reed (*Arundo donax*) on S10a, in line with these mastic trees and along the same slope.

Terrace S9a and S9b

Elongated field with outer (east) terrace wall not reaching above soil level and in bad state of repair. Terrace wall approximately 1 m to next terrace S10a. Inner reaches consisting of shallow soil pockets with exposed rock planted to carobs continuous with terrace S8 described earlier. Soil on terrace marked S9ab is a very stony Terra Rossa soil between 0.5 – 0.75m deep on the outer reaches, gradually tailing off in the inner reaches. This terrace has a small corbelled field room with a large mature olive tree planted against it estimated at over 50 years old. The inner terrace wall is between 0.5 - 0.75m to terrace S8 in variable state of repair. Several trees including carobs and olives are planted against the inner terrace wall as indicated in the adjoining field survey. Two olives are quite mature and the other is smaller and possibly a spontaneous seedling from the parent trees.

A walled passage separates the terraces between field S8a and S8b. The field had been planted to wheat and harvested though the harvest could not have been very good as

evidenced from the sparse stubble left on the field. The part of this field marked S9b is an area which is too shallow to be cultivated and given to carobs and olives. Bare rock outcrops are interspersed with shallow pockets of soil with carob trees but other vegetation such as Asparagus, Asphodel and wild Honey suckle were also present. Several mature carob trees are found here as well as a large olive tree shading a small square built Girna that presumably served as a field room in the past but not marked in the survey maps.

Terrace S10a and S10b

An almost level terrace,is made up of two parts: an outer part marked S10a which has soil and cultivated and an inner section marked S10b which has shallow soil pockets and mostly left to growth of shrubs including carobs, olives and mastic tree. Other dominant vegetation includes wild honey suckle (*Lonicera implexa*) and wild asparagus (*Asparagus aphyllus*). This terrace has an east aspect and is situated some 0.75 – 1 m above the S11 terrace. The average height of the retaining wall on the east side is an additional 0.75m giving a 1.5 - 1.75 m height from the top of retaining wall on terrace S10a to soil surface on terrace S11. Soil is a reddish brown colour in the Terra Rossa series with evidence of recent addition of Upper Coralline limestone grit and sand, presumable added to previous soil to increase soil depth.

Terrace S10a and S10b

S10a: currently summer fallow with traces of wheat fodder stubble. Field currently unploughed. The maximum soil depth measured to 0.75cm on the outer reaches of terrace but on average less than 40 cm at mid terrace. It tails off to exposed rock on the inner margins of S10a where the rocky platform of S10b starts off. The rubble wall on the outer (eastern) part of S10a is in rather rough shape and discontinuous in parts and shows no evidence of recent repairs but can still be classified as in medium state of repair.

S10b: this part of the terrace is the inner rocky area mostly dominated by old carobs presumably planted in the deepest soil pockets in this area or fissured rock. Rubble wall dividing this terrace from the terrace immediately above it (S9) is approximately 1 m high is also in bad state of repair with at least four parts showing extensive piles of rubble stones rather than a true wall. One particular area was shaped in the form of a rectangular platform slightly inclined to the east and may have served as a trapping site for turtle doves. The carobs present in this area are a mixture of male and female trees, all over 50 years old. The latter were seen to be producing pods.

Terrace S11

This terrace is mostly rocky ground with shallow pockets of soil interspersed with patches of bare rock. Several carobs are planted directly against the terrace wall of the terrace S10a situated some 0.75 – 1m above it. These carobs are productive but most of the carob pods are left on the tree uncollected. The farmer responsible was seen carrying one bag full for personal use but stated that its collection was hard work and not economically viable since it did not fetch a good price on the local market. This terrace had a large quantity of ornamental trees including the Blue Wattle (*Acacia saligna*), Red Gum Eucalyptus (*Eucalyptus camaldulensis*), Spineless Yucca (*Yucca guatamalensis* syn *Y. Elephantipes*) and Indian Tree Spurge (*Euphorbia* tirucalli) with the first two dominating after the carobs.

Table 1: List of tree species

Species	English Common Name	Maltese Common Name	L.N. 12 of 2001
Protected trees			
Ceratonia siliqua	Carob	Harruba	Schedule II
Pistacia lentiscus	Mastic Tree	Deru	Schedule I - Part A
Pinus halepensis	Aleppo Pine	Znuber	Schedule I - Part A
Unprotected trees			
Acacia saligna	Blue Wattle	Akacja	Schedule V
Eucalyptus camaldulensis	Red Gum Eucalyptus	Ewkaliptus	n/a
Prunus amygdalus	Bitter Almonds	Lewz Morr	n/a
Prunus persica	Peach	Hawh	n/a
Vitis vinifera	Grape Vine	Gheneb	n/a
Ficus carica	Common Fig	Tin	n/a
Opuntia ficus indica	Prickly Pear	Bajtar tax-Xewk	n/a
Citrus limon	Lemon Tree	Sigra tal-Lumi	n/a

LAND CLASSIFICATION

This land can be classified at the lower end of CLASS II with major disability classes namely:

1. Currently, there is general poor access to the fields, though this was not the situation in the past when access to field machinery was not an issue.ie before the Maghtab landfill commenced.
2. Shallow/poor soil cover over most of the land. Terraces, when formed did not receive adequate soil cover and the inner parts of the terraces were never excavated. The result is that the outer reaches did not get sufficient rubble fill and the terraces remained overall quite shallow. The net effect contributed to terraces where a substantial part could not be cultivated. An advantage was that sufficiently deep pockets of soil on the inner reaches had carobs and olives planted on them which contributed some fodder for farm animals and acted as wind shelter from destructive east and north-east winds prevailing on the site.
3. There are no water harvesting and storage facilities either above or below ground. Bore holes and shaft wells are not viable here because of the proximity of the site to the sea.
4. There has been limited utilisation of field boundary for growing fruit trees.
5. The use of unweathered substrate to increase soil depth has contributed to a general degradation of the physical and chemcial properties of existing soil and reducing its agricultural value.
6. General abandoned look of the site resulting from the import of low quality soil that was not properly levelled and the fields left to go to weed
7. Introduction of exotic species on the site for hunting purposes that has added to the general dilapidation of the site.
8. General lack of terrace maintenance has resulted in a considerable number of these falling apart leading to breaches from which soil is being lost.

AGRICULTURAL STATUS

The current agricultural status is one of low input with corresponding low output. The net financial contribution of that part of the worked land that is given to fodder production is estimated at between € 25 - € 30 per tumolo. This is after deducting the expense of ploughing, fertiliser input, seed, sowing and harvesting estimated at around € 30. However, this estimate is based for a year of normal rainfall and growth, usually giving around 25- 30 bales of fodder per tumolo. This year the rainfall was low so that the number of bales harvested per tumolo was less than 20 bales lowering the net returns still further. Given that the estimated area suitable for cultivation of fodder is around 18 tumoli out of a total of 56, the net annual income from this agricultural activity is not expected to exceed € 450 in a good year. It is good to note also that the economic contribution from the land given to carobs and abandoned fields is considered negligible, as is the contribution from fruit trees. However, the total contribution from capers may be substantial and could easily be in excess of that obtained from fodder. This is based on an estimate for the number of caper bushes on the north sector, given that this is harvested regularly. It is important to note that this activity is very labour intensive and ultimately if one factored in the hourly rate for harvesting, the net gain would again not be very substantial.

Extra Agricultural Survey: Area close to Ghallis and Ghallis Ta'Gewwa.

Two additional surveys were carried out in March and September 2011.

The survey was carried out on 12th of March 2011, weather conditions being overcast and windy. The fields were generally dry being on a high point and subject to direct wind exposure.

The study comprised two separate land parcels highlighted in yellow on the adjoining survey map Figure 1 and delimited in blue on adjoining survey map Figure 2. The field marked A which is the smaller parcel of the two surveyed, is located near the area formerly bearing the toponym Ghallis ta' Gewwa whereas the second parcel of land comprises fields located between the areas formerly bearing the toponyms Ghallis and Xaghra tal-Bahar. The contoured areas shown on the map marked in different colours refer to terraced mounds of landfill material or parts of the engineered landfill. Some other areas are serving as a temporary store for coralline limestone cut from the engineered landfill.

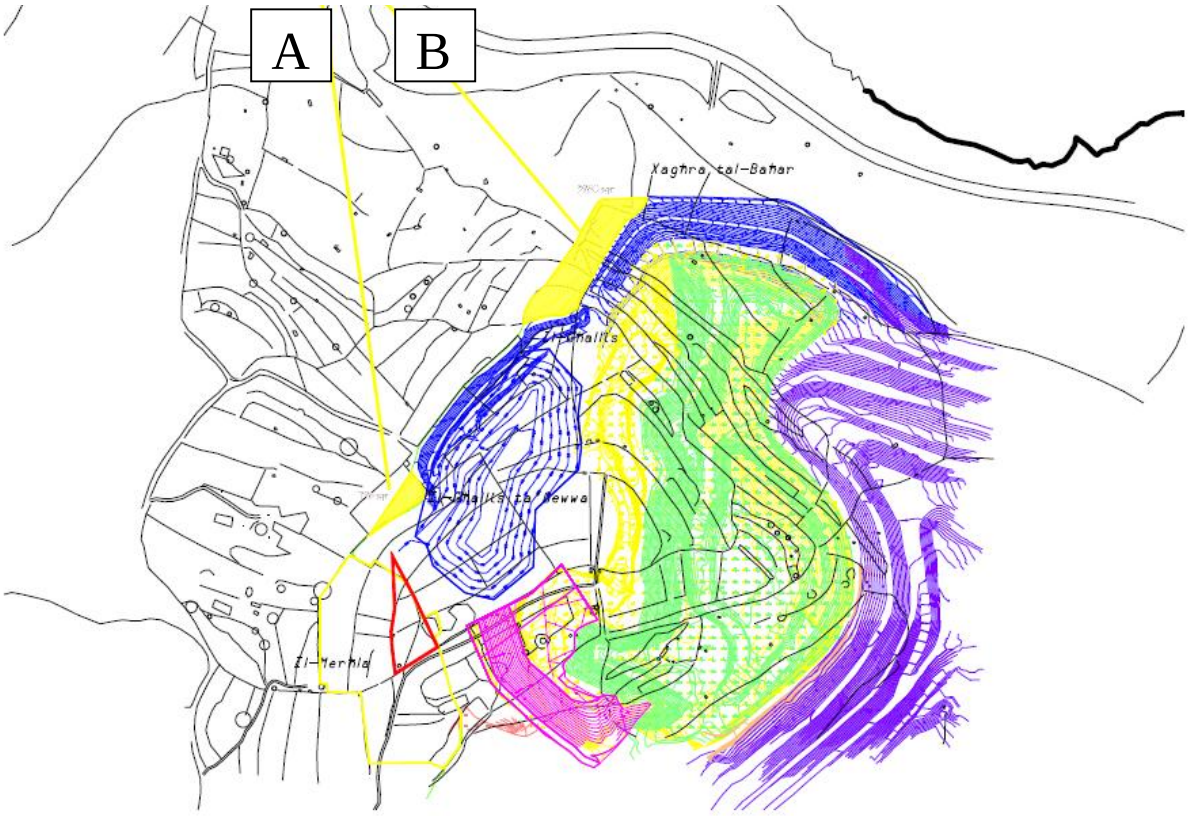


Figure 1: Sites surveyed shown as two parcels of land highlighted in yellow, one located near Ghallis ta' Gewwa and the other near Xaghra tal-Bahar.

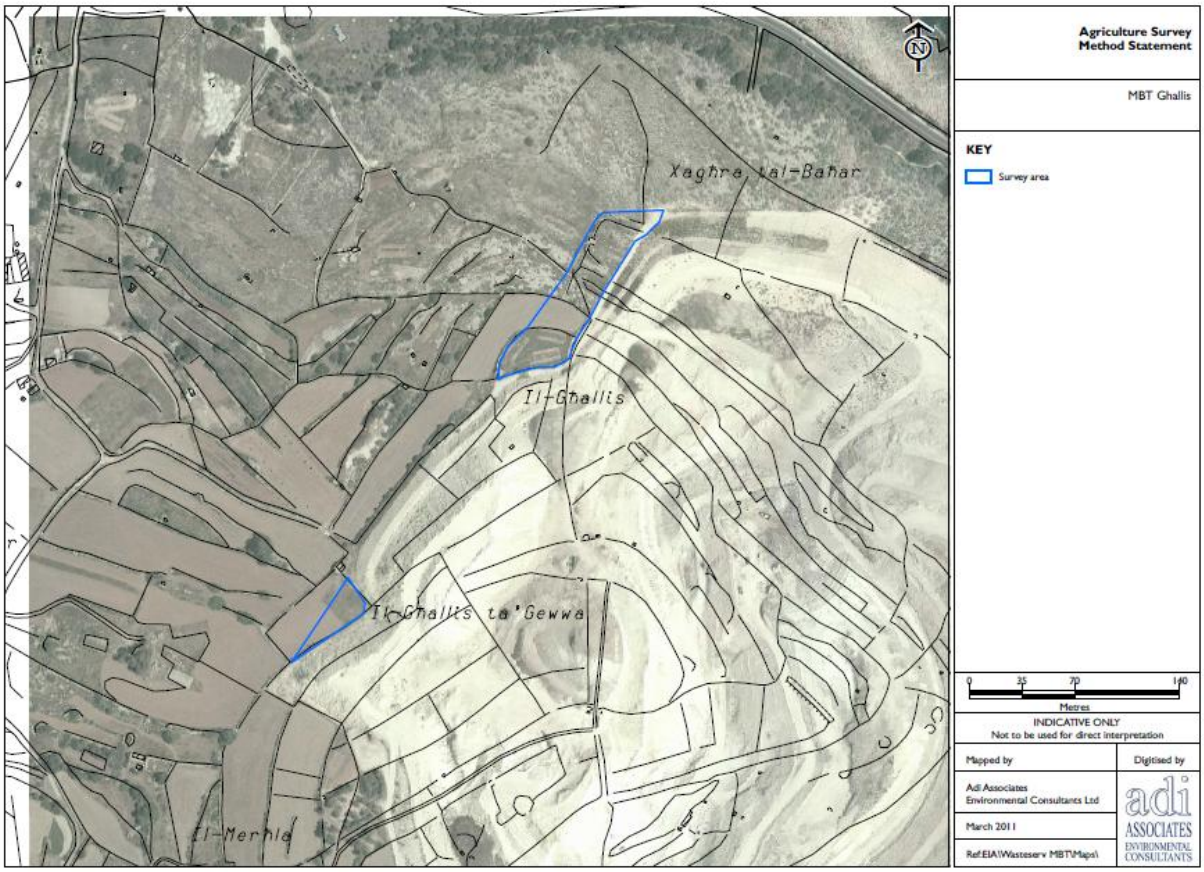


Figure 2: Sites surveyed shown as two parcels of land delimited, one located near Ghallis ta' Gewwa measuring circa 800 m^2 and the other near Xaghra tal-Bahar comprising of several terraced fields measuring circa 3960 m^2.

Site A.

Site A refers to a triangular parcel of land, formerly part of a larger rectangular field partly given to the cultivation of wheat and partly left uncultivated. Its south east margin which is the long side of the field, has a chain link fence delimiting it, though currently this is breached in several locations. Originally the fence served to separate the field from the Maghtab land fill across a dirt path that circumscribes the land fill, now partly obliterated with rubble that has cascaded from the coralline limestone spall heap and other inert material. This parcel of land measures 68m on the longer side by 23m on the shorter side, giving a total area of circa 800 (796.13) m^2.

The parcel of land is a level field, very well protected from winds by the high mound of landfill material on its south east side. It is located slightly below the surrounding terraced fields and therefore relatively open and unprotected on the north-west side. At the northern-most corner of this field, a large Prickly Pear (*Opuntia ficus–indica*) Bajtar tax-Xewk is growing against the wall of a field room located in the adjacent field. Some small Almond Trees (*Prunus amygdalus*) Lewz Morr are also planted. These would have afforded some shelter to the wheat growing in the field. Surrounding terraced fields situated slightly above

parcel of land A which make part of the field, have a number of large Carobs (*Ceratonia siliqua*) Harrub and Red Gum Eucalyptus (*Eucalyptus camaldulensis*) Ewkaliptus, which afford further protection from prevalent winds. The field is surrounded by a low rubble wall which is interrupted at intervals with gaps and has wooden pallets, rusty iron drums and other improvised material to block these gaps. The soil in this and surrounding fields is a prominent terra rossa soil, appears to be in the 30 to 45 cm depth range and lying directly on bedrock since there was no evidence of infill rubble which is often used to increase depth. This could be judged from a section where the field boundary wall had been ripped in the process of building the dirt track and chain link fence.

At the time of the survey, the field marked A was in a weedy fallow and overgrown state dominated by Wild Oats (*Avena sterilis*) Avena and Wild Fennel (*Foeniculum vulgare*) Busbiez. Weedy ruderal and opportunistic species including the Crown Daisy (*Glebionis coronaria*) Lellux and the Boar Thistle (*Galactites tomentosa*) Xewk Abjad were also present, the latter named species being especially visible on the untilled part of the field subjected to disturbance and improvised paths. These species are usually indicative of a tract of land showing frequent disturbance such as threading which encourages seed dispersal. Other species present included small pockets of Crimson pea (*Lathyrus clymenum*) Gilbiena tas-Serp, Common Vetch (*Vicia sativa*) Gilbiena Sewda and Sulla, French Honeysuckle (*Hedysarum coronarium*) Silla especially near the chain link fence. This type of vegetation shows that this part of the field had been cultivated in the recent past to these legumes though the Crimson Pea usually takes time to establish and dominate an area.

Conversely the adjacent land on what formerly was the rest of the field, had a crop of wheat growing on it some 75 cm to 1 m tall. At the time of the survey, the wheat was in the heading and flowering stage with some parts of the wheat in this field already developing a seed head and yellowing. Further details can be obtained form the photos of the vegetation shown in Figure 3.

No water storage facilities such as reservoirs or wells were noted for this area and the indications are that it was given to dry-land farming only. The absence of fruit trees except prickly pear also indicates that these were not unsustainable in the area, something which was also noted in other areas in the vicinity when these were surveyed.

Therefore for the land parcel under study in area A, the agricultural value of the produce present can be considered negligible though originally the land must have been productive and could easily sustain the production of wheat for fodder and other dry land farming fodder and non-fodder crops.

Figure 3: Photos of ruderal vegetation present on site A with adjacent cultivated wheat. The field room on adjacent field and Prickly Pears and Bitter Almond trees are shown on lower photos

Site B

Site B which is located between the site known as il-Ghallis and ix-Xaghra tal-Bahar, is made up of a series of terraced fields located on land sloping towards the north east. These fields are marked B1 – 4 on the map in Figure 2 with B1 being the highest to B4 being the lowest. Each terrace is separated by between 1-1.5 m difference in height. Of these fields only one (B2) showed signs of recent cultivation to wheat for fodder production. The rest were either abandoned fallow, completely disturbed with signs of bird trapping activity in the recent past or even uncultivated maritime garrigue. The total area of this parcel of land is circa 3960 (3960.50) m^2 with the individual areas of B1-B4 being as follows: The eastern margin of site B is demarcated by chain link fencing with the Coralline limestone stock pile rising immediately behind it to an estimated height of between one to three storeys. Another stockpile but much lower consisting of dark brown compost material (probably remains of the Sant Antin former composting facility) was also located further north of the rock stockpile as indicated in Figure 4. A detailed description of each field is given below.

Field B1

This is the largest of the four field parcel. The field showed signs of bird trapping activity with a very large bird hide located at the southwest end of the field close to the point of entry. In addition, at least three rectangular-shaped bare, treaded soil patches were located on this field, these being used for laying spring-activated nets and decoy birds for bird trapping.

The Terra Rossa soil was compacted in many areas, and all the evidence pointed to an area not recently worked. The type of vegetation present was typical of land that has not been recently worked for agriculture with most of the species present being typical of land that has been abandoned for more than three years as manifested from perennial species such as *Senecio bicolour*, *Pistacia lentiscus*, *Phagnalon rupestris*, *Urginea maritima* and *Foeniculum* vulgare to mention just a few. What is common to all these species is that they all take time to establish indicating that this field in particular would not have been worked for at least three years, perhaps more. Other species were typical of disturbed land, mostly ruderals such as Galactites tomentosa and Glebionis coronaria that are easily established and persist where the land is frequently disturbed. A list of the species encountered on B1 is given in table below.

List of Species encountered on Field B1			
Pistacia lentiscus	*Medicago orbicularis*	*Foeniculum vulgare*	*Anagallis arvensis*
Prasium majus	*Hippocrepis unisiliquosa*	*Anthyllis hermanniae*	*Euphorbia helioscopa*
Sedum caeruleum	*Lotus cytisoides*	*Asphodelus aestivus*	*Echium italicum*
Urginea maritima	*Asparagus aphyllus*	*Mercurialis annua*	*Papaver rhoeas*
Phagnalon rupestius	*Silene colorata*	*Carthamus lanatus*	*Euphorbia prostrata*
Plantago afra	*Carlina involucrata*	*Galactites tomentosa*	*Astragalus boeticus*
Bromus madridensis	*Melilotus sulcatus*	*Daucus carota*	*Convolvulus althaeoides*
Lotus edilis	*Gladiolus italicus*	*Hyparrhenia hirta*	*Ferula communis*

The field currently has a low boundary wall to about 1 m on the eastern side only, with other walls surrounding this field above soil level being overall low, in bad state of repair and often discontinuous. As for the eastern boundary wall, it should be pointed out that it is more the remains of the original boundary wall on the east margin, since this is now practically destroyed since it is frequently interrupted with breaches and the poles of the chain link fencing system that was used to create the landfill perimeter. The other walls present are the terrace walls on the west and north margins but these are almost equally divided with about half below and half above soil level to a height of between 0.75 to 1m from the surface of the adjacent terrace, situated below it. At the time of the survey, the parts of the wall below soil level were in a relatively good state of repair over the northwest margin but not so on the north margin. The boundary wall part above soil level was in a bad state of repair with parts missing both on the northwest and north margin for B1.

The soil which appears to be a deep red Terra Rossa type, has a shallow depth in the 30 cm for the outer reaches of the terrace, the rest being infill rubble. No fruit trees were noted on this field. There were no reservoirs or wells noted on site. Given the above, the best way to describe B1 is as fallow abandoned, recently used for bird trapping. All farming practised in the past must have been dry land farming very probably wheat for fodder and/or Sulla or other legumes such as the common vetch. Site photos are shown in Figure 4.

Figure 4: Photos of site B1. The bird hide is shown on top left photo and the stockpiles of compost and rock in the top right photo. Ruderal and established natural vegetation on B1 are shown in lower photos.

Field B2

This field terrace occurs at a 0.5 – 0.75 m lower level compared to B1 and circumscribes the latter on the north and northwest margin forming an inverted L-shaped terrace. The terrace wall between B1 and B2 is in a medium to bad state of repair between 0.75 to 1 m above the soil surface of B2 such that a low boundary walls is present around parts of B1 as described earlier. The wall surrounding B2 on its outer reaches is again partly a terrace to the next field B3 and partly a low boundary wall for B2 itself. This wall is in medium to good state of repair and has a height to around 1.5 m from the bare bedrock of B3 on which it is built. The soil is again a Terra Rossa soil but more dry and powdery. This is most probably due to the shallow nature of the soil in this field, gauged at less than 30 cm in the mid region of the terrace. The powdery nature of the soil also indicates a poor ped structure which often results from improper tillage, poor organic matter load and overall dry conditions.

At the time of the survey it was given to wheat for fodder but this was severely stunted and short compared to wheat growing in adjacent but more sheltered fields. The wheat though short was already beyond the heading and flowering stage, and already showing signs of a seed head but with premature yellowing indicating water stress. Indeed, the soil appeared also to be drier than that present in surrounding fields with a visible surface crust indicating poor water levels in the soil and/or rapid drying. This is most probably due to the drying effect of the northeast to northwest winds to which it is completely exposed.

It should also be pointed out that the field margins throughout were infested with weedy ruderal species which tend to accumulate even on cultivated fields especially since the field margin is difficult to rotovate and mechanically eliminate seeds and seedlings of weedy species. Apart from the usual ruderal and persistently weedy species such as *Galactites tomentosa* and *Glebionis coronaria* at the field margin, other species included the White Mustard *Sinapis alba*, the Cape Sorrel *Oxalis pes-caprea* and the Furrowed Melilot *Melilotus sulcatus.*

When the western reaches of field B2 were surveyed in September, the field was under summer fallow with mostly weedy species growing as is usual, namely an abundance of Wavy-leaved Saint John's Wort (*Hypericum triqutrifolium*) Fexfiex tar-Raba and Perennial Wall Rocket (*Diplotaxis tenuifolia*) Gargir Isfar. No fruit trees were noted on this field in the March or September survey.

Figure 5: Photos of site B2. The bird hide shown on top left photo shows location of field B1. The rest of the photos refer to the cultivated wheat for fodder terrace on B2. Some of the ruderal vegetation on B2 are shown in lower photos.

B3 and B4

These are fields that though demarked by a boundary wall and some have the semblance of a terrace, do not have sufficient soil cover to permit cultivation and are in a state that approaches more a maritime garrigue then a cultivated field. It is most probable that these fields, though having their layout planned, never received their rubble and soil infill. As a result they were never completed and rendered suitable for agricultural production.

The boundary walls on the north and northwest sides are in the range of 1 – 1.2 m high, of a flimsy appearance and not very thick. They are also rather roughly built and do not appear to have been intended to withstand infill material but more to resist and deflect wind off the site. Several parts of these walls are either missing or with rocks fallen off. The southeast margin of these fields is delimited by chain link fencing, this also delimiting the rough track that circumscribes the landfill. A number of large boulders are strewn on B3 and B4 fields; it is not clear if these are the remains of the original effort to clear up the land for farming, being left behind for later use or clearance. There are also the ubiquitous, improvised bird hides for bird trapping, roofed with corrugated iron as shown in Figure 6.

There are some "cultivated" pockets but these appear to be the result of some individual initiative in the recent past where cuttings of decorative plants such as *Yucca elephantipes* have been rooted on site. The other species growing on site are established maritime garrigue species that have been on site for many years and include the species listed below. There are also a considerable number of ruderal species that one associates with a disturbed site given that this area is exposed to frequent disturbances either from within or from the adjacent Maghtab landfill. This is confirmed by the presence of inert rubbish fragments that litter the site closest to the fence that rings of the Maghtab landfill on the south east margin of B3 and B4.

Partial List of Species encountered on Field B3 & B4 in March Survey		
Pistacia lentiscus	*Prasium majus*	*Agave americana*
Prasium majus	*Lonicera implexa*	*Yucca elephantipes*
Sedum caeruleum	*Urginea maritima*	*Hedysarum coronarium*
Periploca laevigata	*Asphodelus aestivus*	*Daucus carota*
Oxalis pes-caprea	*Anthyllis hermanniae*	*Silene colorata*
Sonchus oleraceus	*Capparis spinosa var inermis*	*Asparagus aphyllus*
Glebionis coronaria	*Galactites tomentosa*	*Senecio bicolor*
Foeniculum vulgare		

A survey of the area west of B3 and B4 were surveyed in September 2011. The area west of B3 and B4 does not differ in essence from what was noted for B3 and B4 in the March survey. This is an extension of the disturbed maritime garrigue with the species noted here being in their main identical to those in the adjacent B3 and B4 plots. The dominant species here were *Asparagus aphyllus*, *Daucus carota*, *Chiliadenus bocconei*, *Phagnalon rupestris*, *Foeniculum vulgare* and some mature though low shrubs of *Pistacia lentiscus*.

Figure 6: Photos of site B3 & B4. The fields are mostly unformed with natural maritime garrigue vegetation dominating the site, but other vegetation typical of a disturbed site is also present.

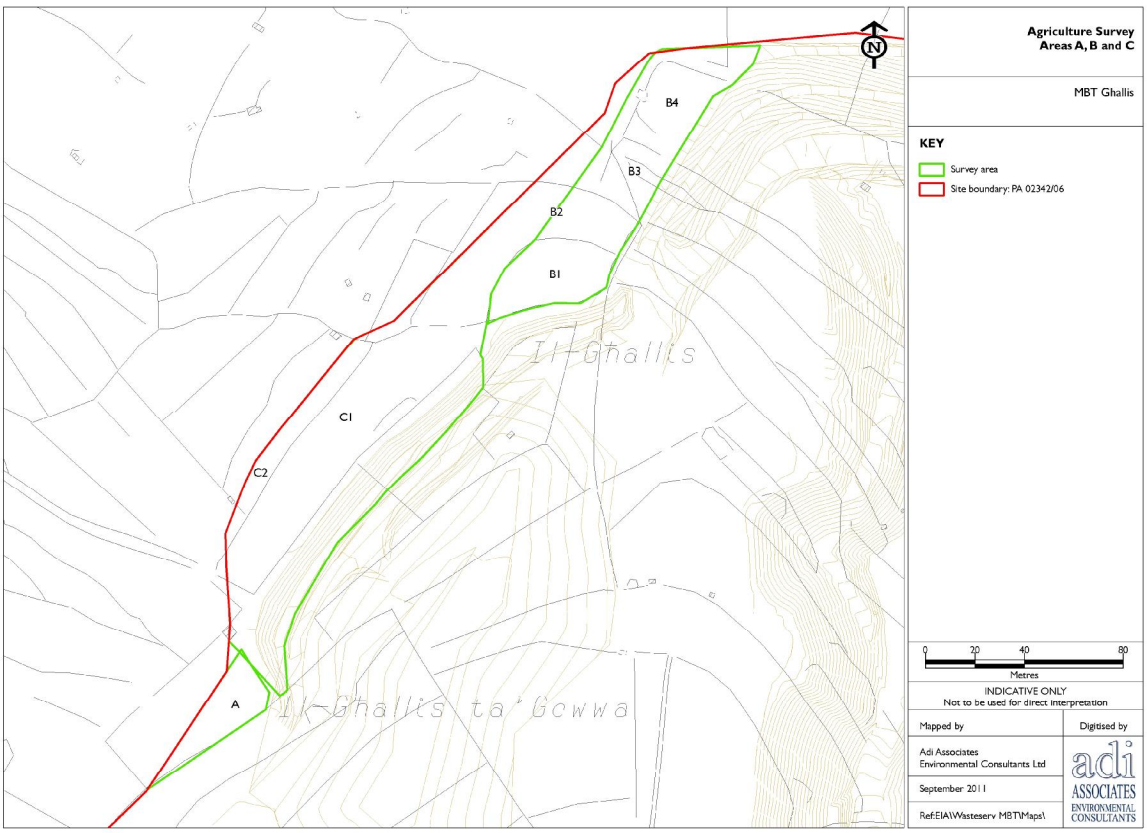
Survey of Extra Parts C and D for Ghallis

The survey was carried out on 3rd September 2011 following a walkthrough of the area, noting the facts important for the agricultural survey as well as points of ecological relevance. Full photographic records were also taken. The survey outcomes complement the previous surveys made on adjacent areas. The following were the major findings for the two areas.

Area C

This new survey area, marked in orange and red, consists mainly of two long fields lying between a triangular plot marked A and a series of terraced fields marked B1 to B4 in the previous survey. Essentially the field marked C1 and the field continuous with B2 are the main missing elements from the previous survey. C2 is a lower terrace adjacent to C1 which is highly disturbed and mostly planted to Eucalyptus where the tall trees help to lure bird for shooting. There are also some adjacent areas to terraced plots B3 and B4 which are mainly taken up with maritime garrigue though this is highly disturbed and has also a number of exotic species growing there.

Figure 7: Survey areas A, B and C



Fields C1 and C2

Field C1 is an elongated field of roughly uniform width that on the southeast side borders the peripheral road to the existing Maghtab landfill where the hard rock stockpile is deposited, and from which it is separated by a chain link fence. This parcel of land is a level field, and like fields B1 and B2, it is very well protected from winds by the high mound of landfill material on its south east side. Field C1 measures 22m at its widest and is 130m long. The southeast border does not have a continuous rubble wall but there is a chain link fence associated with this side. Where the rubble wall is present it is in a bad state of repair. Conversely the boundary wall present on the southwest side of the field is at least continuous, some 0.75 m above the soil surface. This wall is in variable state of repair but overall average to poor, though there are no major gaps. The height of this wall is some 1.5 to 1.75m from the surface of the adjacent lower terrace giving an average drop of some 0.75m between terraces.

The soil is a Terra Rossa soil, friable with a good ped structure. The soil appears to be quite fertile possibly because it has been in tillage for a considerable number of years and also the fact that leguminous crops have been planted as recently as this year (March survey indicated Sulla and Broad Beans). The soil also appears to be deeper on this terraced field than anywhere else in this area and has been gauged at more than 45 cm in the mid region of the terrace. Though the soil surface at the time of survey was dry, the size of some of the weeds and the fact that the Sulla was already sprouting new shoots indicates that there is a good water reserve deep in the soil and that growth conditions are probably quite good during the rainy season. The presence of the rock stockpile on the adjacent land may have something to do with it as well since the steep slope will probably allow more water to be shed off its slope that will end up on terrace C1.

At the time of the survey, field C1 was summer fallow with no traces of a summer crop. Indeed the fields in this area appear to be dry land farmed and therefore will only crop during the rainy season. The field showed traces of the previous crop of French Honeysuckle or wild Sulla (*Hedysarum coronarium*) Silla that at the time of the survey was sprouting new shoots indicating that its root stock did not die off. There were also traces of a Broad bean crop (Vicia faba) Ful which had also been noted from the previous survey carried out in March. As expected at this time of the year, the fields had the usual mix of weedy species associated with summer fallow crop land, mostly Wavy-leaved Saint John's Wort (*Hypericum triqutrifolium*) Fexfiex tar-Raba and Perennial Wall Rocket (*Diplotaxis tenuifolia*) Gargir Isfar.

A number of non-weedy species of wild plants were growing in this field, some quite unusually found on cultivated land. These included Silver Ragwort (*Senecio bicolor*) Kromb il-Bahar and Winged Larkspur (*Delphinium halteratum*) Sieq il-Hamiema. The first was growing against the field margin wall but had been noted in the adjacent field B1 that though disturbed had been abandoned for a long time. Being a coastal area the present of the Silver Ragwort is not entirely unusual. Most interestingly at least one wild plant which is not usually associated with cultivated ground, namely Maltese Fleabane (*Chiliadenus bocconei*) Tulliera ta' Malta, was found growing here and was much taller than what is usually found in

the wild. It may be something useful to investigate further, since an overall size of over 50 cm in height is quite unusual for this plant. Other wild plants or shrubs present on this field included Wild Asparagus (*Asparagus aphyllus*) Spragg Xewwieki, Italian Buckthorn (*Rhamnus alaternus*) Alaternu, Mastic (*Pistacia lentiscus*) Deru and Capers (*Capparis spinosa var inermis*) Kappar.

Two alien tree species were encountered on this field. These included three relatively small specimens of the Blue-Leaved Wattle (*Acacia salignia*) Akacja which were found on the chain link fence side of the southeast margin and several specimens of Tree Tobacco (*Nicotiana glauca*) Tabakk tas-Sur. The adjacent terrace C2, situated some 0.75m immediately below field C1, has a collection of some 15 Red Gum Eucalyptus (*Eucalyptus camaldulensis*) Ewkaliptus, which are mature and certainly over 20 years old. These were planted as bird lure for shooting as confirmed from the bird hides in the vicinity. The field C2 is so disturbed and/or has chemical inhibition from the Eucalyptus leaf fall, that very little apart from the Eucalyptus itself, grows in it.

Apart from these plants, the field margin on the southeast side is almost entirely lined with different fruit trees, though unproductive and in poor state of health. This is mostly due to the very hostile environment in which they are found (coarse and fine dust particles as well as various gaseous pollutants being the main culprits). In addition there is considerable negative impact from the huge number of rats present in the area. Indeed, the entire surface of the field was pock marked with shallow burrows dug by rats in search of roots.

The tree survey carried out shows the distribution of the trees mostly along the southeast boundary but also a few against the southwest boundary wall. Trees encountered were the following. Vines (*Vitis vinifera*) Dwieli, Gages or Plum (*Prunus domestica italic*) Ghajn Baqar, Bitter Almond (*Prunus amygldalus*) Lewz Morr, Prickly Pear (*Opuntia ficus–indica*) Bajtar tax-Xewk and Peach (*Prunus persica*) Hawh. The southwest wall of field C1 had a smaller section dedicated to fruit trees mainly Almonds and Prickly Pear.

Survey of Area D

Area D, marked in orane, represents the outer boundary of the original Ta' Hammud survey and marks the boundary between it and Habel Zwejra, where a rough dirt track divides the two. The chain link fence that surrounds Habel Zwejra marks the extreme western side of the new survey area. The area can be described as highly disturbed with a huge load of particulate dust since the dirt track used by farmers in the area to access their fields is not paved nor properly formed. The margin of this same dirt track then slopes off steeply on to the Ta' Hammud side which in most areas drops some 3-4 m down from the dirt track. The slope sides had been partially planted to Aleppo Pine and Atriplex in the recent past (possible some 5 years ago) as was evident from the plastic drip irrigation lines (albeit gnawed in various places by the huge rat infestation present on site) and wooden stakes present.

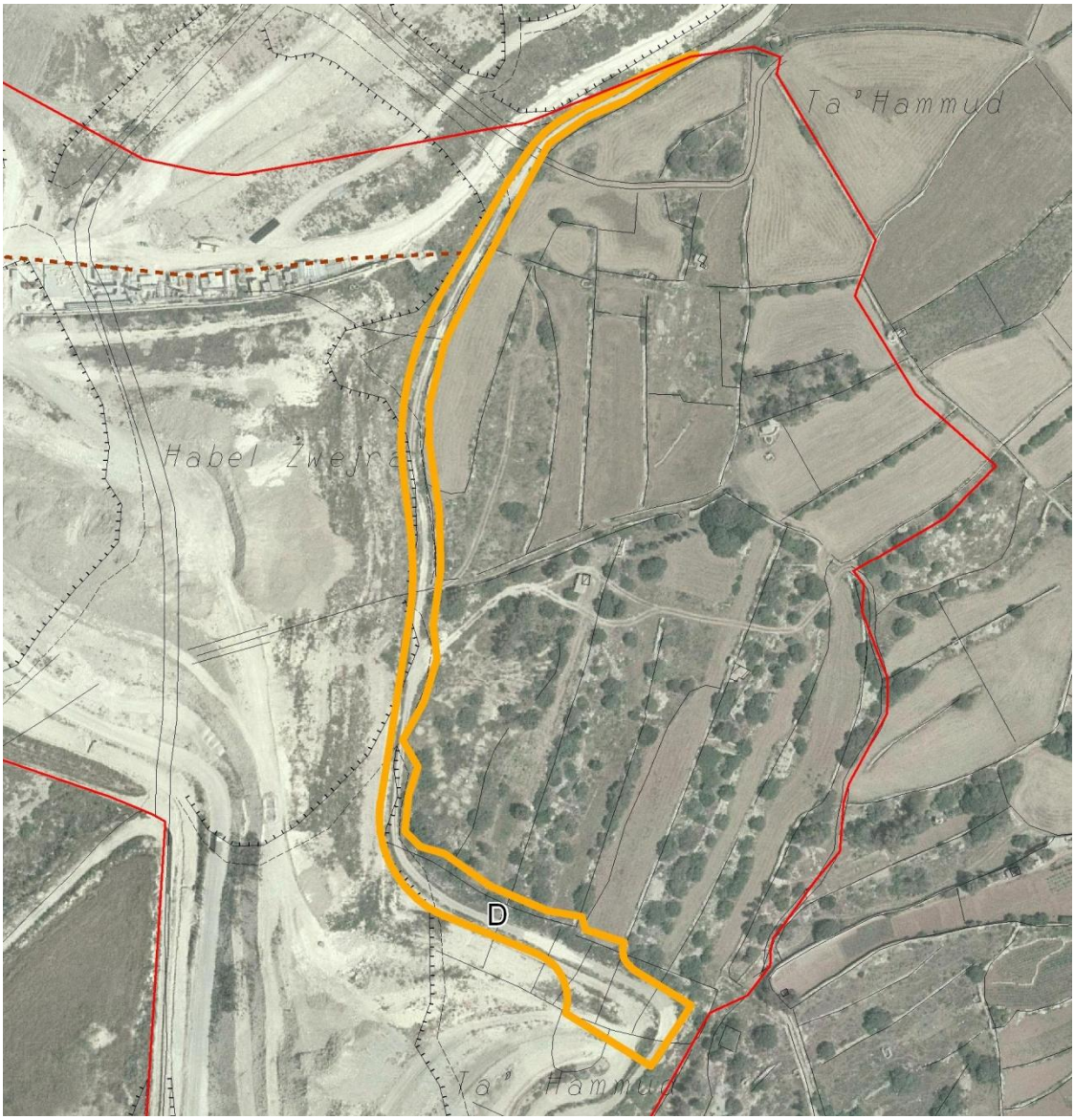


Figure 8: Survey area D

A walk-through survey of the area starting from the south section of Ta' Hammud was carried out on 2nd September 2011 noting tree or shrub species that had not been included in the original survey. Most of these trees were growing on the Ta' Hammud side, with practically none on the Ta' Zwejra side except for some Tree Tobacco (*Nicotiana glauca*) Tabakk tas-Sur. The tree position is given in the tree survey but a summary of species encountered is included here.

Species of cultivated trees encountered on the Ta' Hammud side included the following:
Carob (Ceratonia siliqua) Harrub
Olive (Olea europaea) Zebbug
Fig (*Ficus carica*) Tin
Prickly Pear (*Opuntia ficus-indica*) Bajtar tax-Xewk

Indigenous tree or shrub species whether natural or planted, included:
Giant Reed (*Arundo donax*) Qasab Kbir
Atriplex (*Atriplex halimus*) Bjaka
Mastic (*Pistacia lentiscus*) Deru
Aleppo Pine (*Pinus halepensis*) Znuber

Species of ornamental or alien plants growing on the same side included:
Yucca (*Yucca elephantipes*) Jukka
Red Gum Eucalyptus (*Eucalyptus camaldulensis*) Ewkaliptus
Blue-Leaved Wattle (*Acacia salignia*) Akacja
Castor Oil Plant (*Ricinus communis*) Rignu
Tree Tobacco (*Nicotiana glauca*) Tabakk tas-Sur

Conclusions:

The site appears to have been used of dry land agriculture in the past though not necessarily very productive given the location, soil depth and absence of water storing capabilities. Over the past few years, the land use has deteriorated, possibly because of its proximity to the Maghtab land fill where the perception has always been that the land and produce from this area are contaminated form the persistent toxic fumes that used to emanate from the land fill site. This process of land abandonment has been ongoing for at least the best part of a decade since the natural vegetation is very well established in some parts. As to the agricultural potential this must always have been limited by the fact that it is on exposed grounds and subject to strong salt-laden winds which would ruin any crop. The stunted growth of wheat on one of the fields (B2) confirms this hypothesis. The other evidence comes from the near absence of fruit trees around the field margins, indicating that past farmers would not have bothered in such a harsh environment. The overall agricultural potential is therefore deemed to be quite low, at least under the present conditions, unless very considerable investment is made to overcome the current negative impacts.

Figure 9: Survey results for areas A, B and C

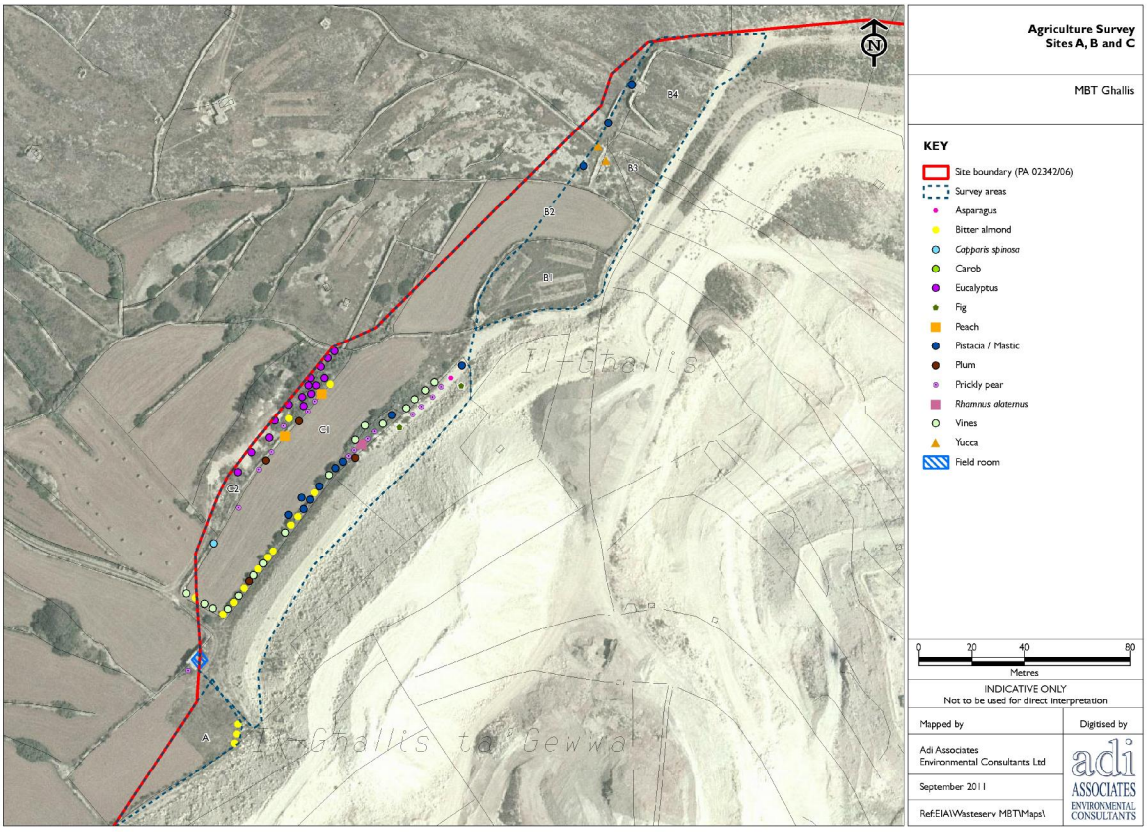
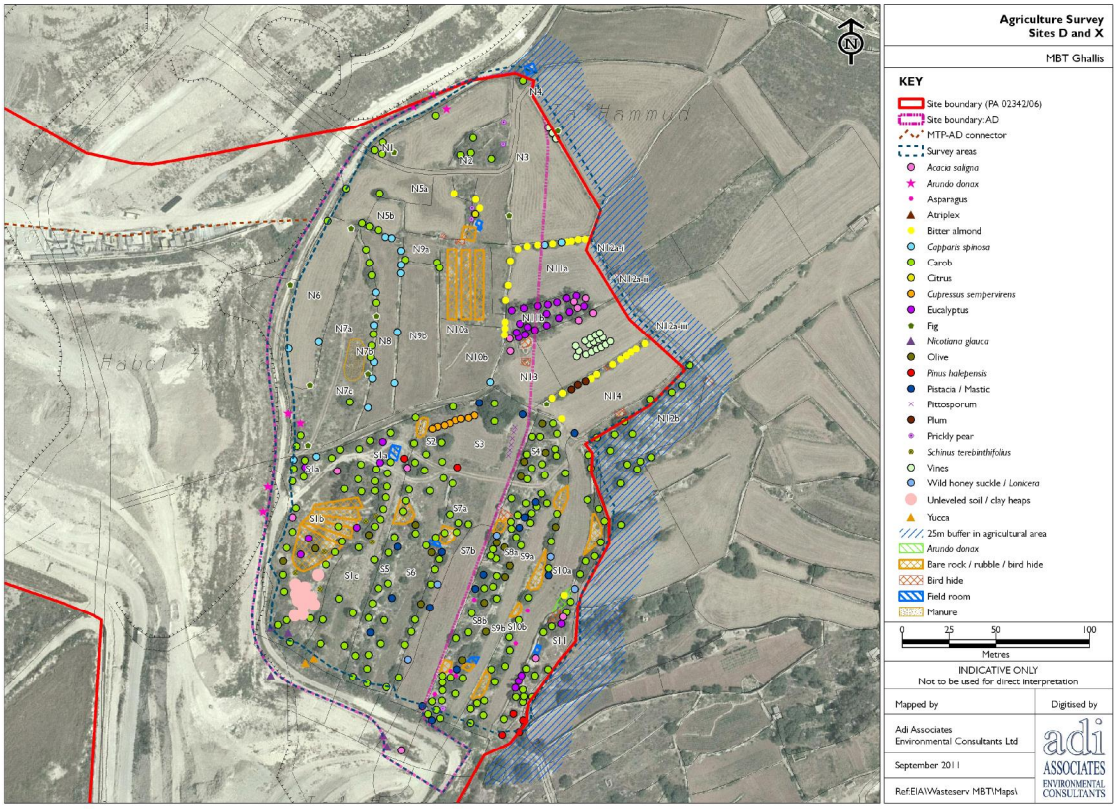


Figure 10: Survey results for Areas D and X



Appendix 1: Agriculture Method Statement

GFE 00121/06 (PA02342/06)

MAGĦTAB ENVIRONMENTAL COMPLEX MASTER PLAN

AGRICULTURE METHOD STATEMENT

INTRODUCTION

1. This method statement provides information on the agriculture input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar. The proposed development comprises the following elements as described in the Project Description Statement (PDS)[1]:

- Extension of Zwejra cell 1;
- Extension of Zwejra Cell 3;
- Closure plan for Ta' Zwejra;
- Construction of a service road along western perimeter;
- Sanctioning of the extension of the temporary Ghallis Site office;
- Extension of the northern bund and the Ghallis engineered landfill;
- Setting up of a fence;
- Re-orientation of hazardous cell;
- Introduction of photo voltaics and micro wind turbines;
- Introduction of a bulky storage refuse area (non-hazardous waste storage);
- Introduction of an engineered separator between Maghtab and Ghallis;
- Re-location of wheel wash;
- Embellishment scheme;
- Introduction of a bridle path for equestrian activities;
- The establishment of a pre-landfilling Mechanical Treatment Plant (MTP); and

[1] WasteServ Malta Ltd, 2010, Project Description Statement PA02342/06 May 2009 (Revised March 2010)

- The establishment of a Biological Treatment Plant (AD).

2. The proposed works will be undertaken within the site boundary as shown in **Figure 1** below.

EIS Update Guidelines

3. As this is an update to an existing EIA, MEPA has not issued formal Terms of Reference. The following guidelines have been issued by MEPA:

> *The EIS Update shall focus on the following:*
>
> *1. Project description i.e. the EIS update shall include a description of the additional proposed facilities that will be included within the development site inlcuding the MBT, MTP, AD and any other additional facilities that were not addressed in the original EIS;*
>
> *2. Alternatives (sites, layouts and technologies) as relevant;*
>
> *3. Landscape and visual amenity assessment;*
>
> *4. Transport;*
>
> *5. Noise and vibration;*
>
> *6. Air quality;*
>
> *7. Waste management issues; and*
>
> *8. Any other environmental considerations that in the consultants' opinion may be of relevance to the said Update.*
>
> *In addition to the above, the consultant/s is to verify whether as a result of the proposal, the impact significance for the following environmental characteristics outlined below (as presented in the EIS Sections for PA 04834/04), would require an update:*
>
> *1. Geology, hydrology and palaeontology;*
>
> *2. Agriculture;*
>
> *3. Archaeology and cultural heritage;*
>
> *4. Social impact;*
>
> *5. Land contamination;*
>
> *6. Risk assessment; and,*
>
> *7. Cumulative impacts.*

AREA OF INFLUENCE

4. The Area of Influence (A of I) for the agriculture baseline study has been defined by examining the potential impact of the Scheme on agriculture as shown in **Figure 2**. It is noted that the entire complex comprises disturbed / developed land, however the area to the east is the only area that is still undeveloped. It mainly comprises agricultural land. The A of I is therefore set as shown in **Figure 2** and comprises a buffer area of 25 metres around the relevant boundary of the survey area.

5. It is noted that the EIS (for PA 04834/04) does include an agriculture survey of most the area. Map GH 11/2 shows that the land comprises "shallow and very shallow terraces on globigerina". The fields are predominantly dry agriculture or abandoned and include cereals, some potatoes and fallow land. Drawing GH 11/6 classifies the fields as low to moderate in terms of agricultural land value. Since the EIS does not cover all the area proposed in PA 02342/06, it was decided to resurvey the entire area.

ASSESSMENT METHODOLOGY

Competence of surveyors

4. The survey will be undertaken by Dr Joseph Buhagiar. The impact assessment will be carried out by Adi Associates in consultation with Dr Buhagiar.

Study Methodology

5. In updating the EIA, the Agriculture Study will comprise:

- A field-by-field survey of the area of influence to provide information regarding seasonal and standing crops;
- A survey of existing trees within the Scheme boundary. This will focus mainly on protected tree species, the uprooting of which would require special permission; and
- The current agricultural value of the land in terms of productivity, and an assessment of the quality of the land for use by agriculture.

Literature Search

6. Based on literature searches and the consultants' knowledge of the area, a summary of previous survey work undertaken within the study area will be provided as context to the results of the current survey work.

Mapping of Field Crops

14. The fields comprising the A of I will be surveyed for a number of parameters / criteria that are needed for the baseline survey. The data will be entered into a GIS system for ease of reference and analysis.

15. A single agricultural survey will be undertaken to ascertain the following:

- Standing and seasonal crops by type and variety, and, where possible, quantity and stage of maturity;

- Current cropping pattern for seasonal crops; and
- Growth condition of the crops.
- Trees that are deemed of conservation importance due to their horticultural value or rarity in the Maltese Islands will be noted.

IDENTIFICATION OF POTENTIAL IMPACTS

20. The main impact on agriculture is the loss of agricultural land. The most sensitive agricultural areas will be identified in the baseline survey. The potential impacts of the Scheme on these agricultural areas could include:

- Permanent loss of good quality agricultural land through permanent land take, leading to loss of agricultural production; and
- Displacement of farming activities in the area as well as potential loss of employment for farmers, if relevant.

PREDICTION OF IMPACTS

7. Each of the potential impacts listed above will be examined. The agriculture baseline survey information will be entered into a GIS, which will assist in the identification of:

- Agricultural areas that are considered sensitive and of agricultural conservation value;
- Areas of good quality agricultural land lost during construction and / or operation; and
- Agricultural areas liable to fall into decline due to land fragmentation and possible access difficulties.

IMPACT SIGNIFICANCE

8. This section will include for each potential impact the following information:

- Description of impact;
- Policy importance of impact (Local, National, International);
- Extent of effect;
- Duration of impact (temporary/permanent);
- Adverse or beneficial impact;
- Reversible/irreversible impact;
- Sensitivity of receptor;
- Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and

- Scope for mitigation / enhancement (very good, good, none).

9. Based on the above criteria, a summary of the significance of the impact will be judged in terms of whether the impact is considered not significant, of minor significance, or of major significance:

- Not significant - no material change in agricultural quality and / or extent;
- Minor significance - small-scale loss / disturbance of agricultural land that is unlikely to affect the agricultural integrity of the area; and
- Major significance – large / small scale loss / disturbance to agricultural land that is likely to affect the agricultural integrity of the area.

MITIGATION AND MONITORING

10. The scope for mitigation will be identified, and the need for monitoring of agricultural aspects of the A of I will be addressed in the EIS Update.

Adi Associates Environmental Consultants Ltd & Dr Joseph Buhagiar

June 2010

Figure 1: Master Plan for the Area

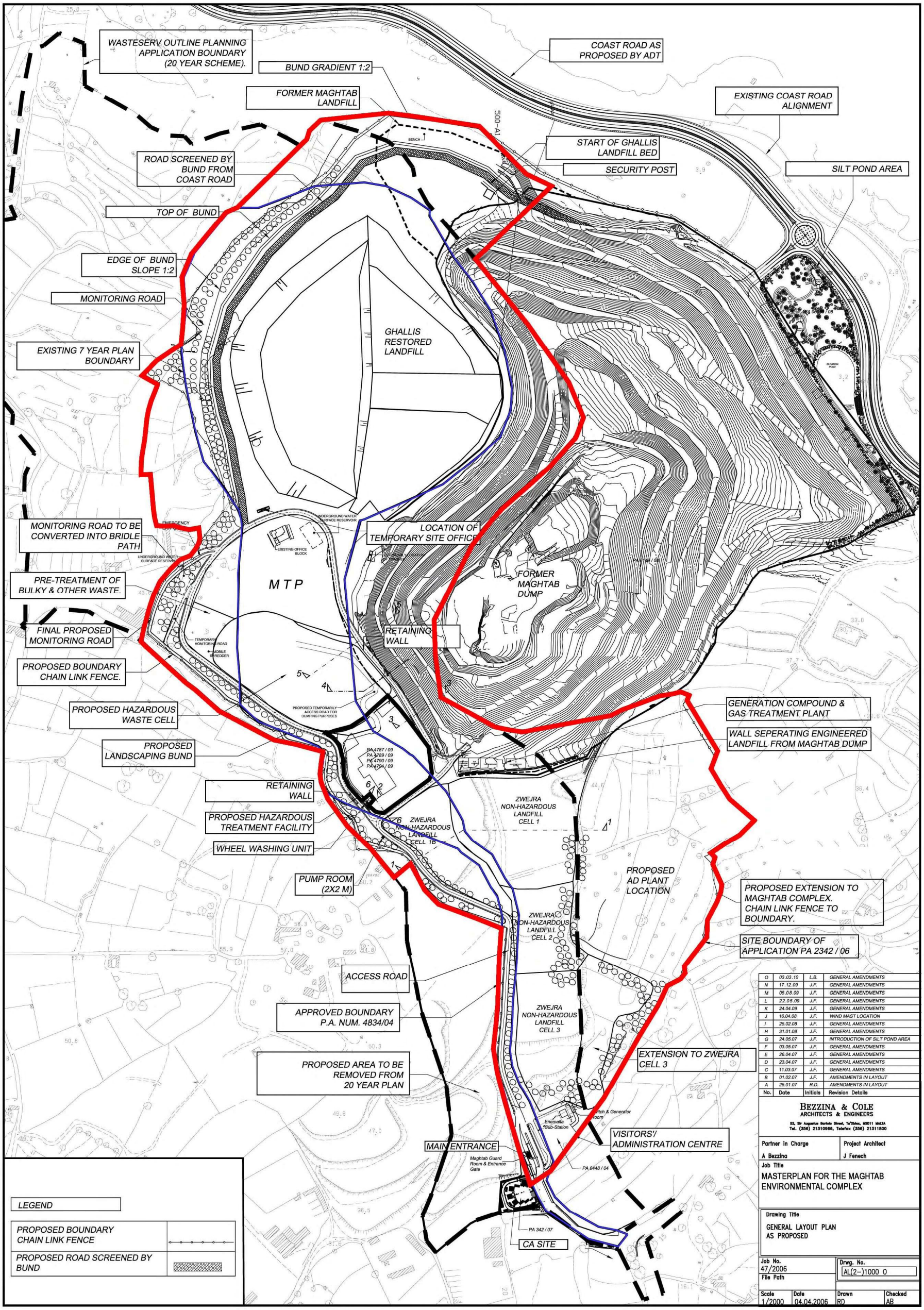
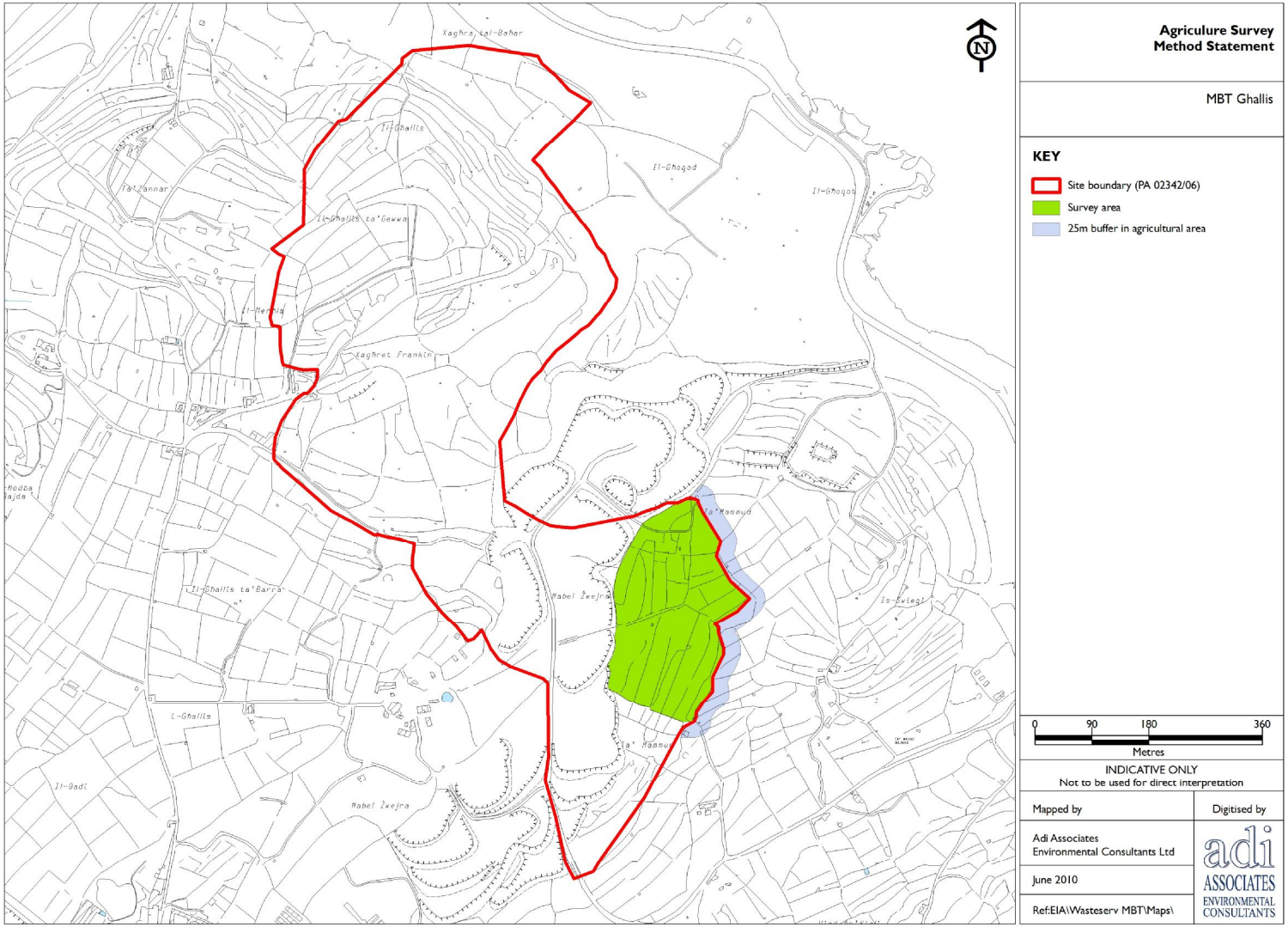


Figure 2: Area of Influence



PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 4

CULTURAL HERITAGE BASELINE SURVEY

Prepared by Archaeology Services Cooperative

Supporting Documents for
Environmental Impact Statement Update

1. CULTURAL HERITAGE STUDY

INTRODUCTION

1.1. This report is an update of a previous cultural heritage baseline study carried out by Mr Godwin Vella and follows the Method Statement submitted to MEPA in June 2010 by Adi Associates. The main aims of this study are to:

- carry out a baseline survey of the cultural heritage assets and an evaluation of their importance;
- input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage within the A of I;
- carry out an assessment of the impact of the construction and operation of the scheme on the cultural heritage assets of the site and A of I and an evaluation of the significance of these effects; and
- to describe mitigation measures designed to minimise adverse impacts on cultural heritage of the area.

STUDY METHODOLOGY

1.2. The study covers aspects of archaeological, rural, vernacular, historical, and cultural heritage within the Area of Influence as delineated on **Figure 1**.

Figure 1: Application Site and Area of Influence of present study

Competence of Surveyors

1.3. The surveys were undertaken by Marlene Borg (MA Archaeology) of Archaeology Services Co-operative Ltd.

Field Survey Methodology

Literature Search

1.4. A desktop study researched primary and secondary sources that included:

- Study of toponomy (place names);
- Analysis of cartographic and photographic material;
- Analysis of primary and secondary written sources; and
- Analysis of conservation legislation.

Mapping

1.5. The archaeological, rural, vernacular, historical, and cultural heritage features visible within the site boundary was mapped by a field survey based on what is technically referred to as Ground Reconnaissance. This method of investigation primarily involves actual fieldwork, and incorporates the consultation of documentary sources and place-name evidence (Renfrew & Bahn 1991: 63). The fieldwork carried out consisted of a site-surface survey, or field-walking, in order to locate and record the whereabouts of sites and features. No aerial reconnaissance or sub-surface surveys, including excavations, were carried out.

1.6. The fieldwork was carried out on 14th, 18th and 27th August 2010.

Cataloguing

1.7. Relevant information for each feature is presented on cards and digital media in the same format as currently used by MEPA. Each feature has been individually identified with a consecutive numbered reference. The information for each feature includes:

- A short written description of the feature;
- Co-ordinates recorded up to 5 digits for each Eastings and Northings based on the local UTM grid reference;
- Locality and address;
- Site indicated on a map to a scale of 1:2500;
- Colour photograph(s);
- Wherever possible a sketch of the feature showing the most significant details;
- The conservation importance of site or feature (proposed grading following Structure Plan UCO and ARC policies);

- Existing and / or proposed legislative and physical protection;
- Current and proposed use / enhancement;
- References; and
- Name of surveyors and date of compilation.

Evaluation

1.8. An archaeological assessment and significance of the archaeological, rural, vernacular, historical, and cultural heritage features has been derived from the desk-top and field studies. The importance of the conservation of the identified sites and features has been identified with reference to relevant legislation standards, guidance and practices. These include the Structure Plan for the Maltese Islands, Development Planning Act 1992, the Cultural Heritage Act of 2002, Government Notices, and the North West Local Plan.

Standards and Guidance

1.9. Guidance on the protection of cultural heritage in the context of planning was taken from the *Cultural Heritage Act*, *Government Notice 160 of 1997 (Rubble Walls Regulations)* the *Structure Plan for the Maltese Islands* and *the Central Malta Local Plan*.

Cultural Heritage Act

1.10. This Act provides overall protection to all *movable or immovable objects of artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological importance and includes information or data relative to cultural heritage pertaining to Malta or to any other country* (section 2). In section 3 it also specifies that *For the purposes of this Act, an object shall not be deemed to form part of the cultural heritage unless it has existed in Malta, including the territorial waters thereof, or in any other country, for fifty years, or unless it is an object of cultural, artistic, historical, ethnographic, scientific or industrial value, even if contemporary, that is worth preserving.*

No person shall make any interventions on such cultural property or classes thereof without first having obtained a permit therefore from the Superintendent (Section 44.3).

1.11. Applications are determined subject to the results of prior investigation: *Before determining an application under subarticle (3) hereof the Superintendent may require such information including the results of such tests, examinations or inspection by such persons accredited under this Act for the purpose as may be required by the Superintendent* (Section 44.4).

1.12. The restrictions on archaeological excavations is stated in Section 43(1) whereby *Archaeological or palaeontological excavations or explorations on land as well as in the territorial waters or in the contiguous zone of Malta can only be made by the Superintendent, or with written permission of the Superintendent.* Chance discoveries of archaeological remains are also regulated by Section 43(2), *Any person who, even accidentally, discovers any object, site or building to which this Act applies in accordance with article 3, shall immediately inform the Superintendent, keep the object found in situ, and shall not for a period of six working days after informing the Superintendent proceed with*

any work on the site where the object of cultural property is discovered. The details about rights and obligations by all parties in the eventuality of an archaeological discovery are described in Sections 43(3), 43(4), 43(5), 43(6), 43(7).

Government Notice 160 of 1997

1.13. *Rubble Walls and Rural Structures (Conservation and Maintenance) Regulations* as amended by **LN 169 of 2004** protects all rubble walls and non-habitable rural structures *in view of their historical and architectural importance, their exceptional beauty, their affording a habitat for flora and fauna, and their vital importance in the conservation of the soil and water*. Walls may be sensitively repaired without MEPA's prior authorisation. Certain areas may also be declared to be Rubble Wall Conservation areas in which no alterations to the location or construction of rubble walls and the traditional methods of their repair and maintenance will be permitted without the written approval of MEPA. In such Conservation areas, the Minister for the Environment may order the owner or occupier to repair and re-erect all the rubble walls within the area, and to continue to maintain them. The dismantling of the wall requires a permit from MEPA.

Structure Plan Policies

1.14. The Structure Plan contains policies that refer to the grading of archaeological sites and buildings.

1.15. Policy **ARC 1** states that in Local Plans for Rural Conservation Areas the Planning Authority may identify and designate Areas and Sites of Archaeological Importance.

1.16. Structure Plan Policy **ARC 2**, indicates that if the area is considered for top priority conservation **Class A** no development will be allowed which would adversely affect the natural setting of these monuments or sites. A minimum buffer zone around the periphery of the site will need to be established in which no development will be allowed.

1.17. Features identified as **Class B** are regarded *as very important and should be preserved at all costs. Adequate measures to be taken to preclude any damage from immediate development* and for features that are listed as **Class C**, *every effort must be made for preservation, but may be covered up after proper investigation, documentation and cataloguing. Provision for subsequent access shall be provided.* **Class E** has been introduced in the Northwest Local Plan). This deals with a site or area in which the Superintendence of Cultural Heritage or MEPA may have some archaeological interest. Should MEPA or the Superintendence have such an interest, the applicant proposing development in that location will be required to undertake an investigation including excavation, if necessary. If following investigation, the Superintendence of Cultural Heritage considers the site to be of archaeological value, MEPA will normally refuse development permission if the proposed development would lead to the destruction of the site, or require the development to be modified so that the archaeological value of the site is protected.

1.18. The permissible effects of the proposed development on archaeological remains are controlled by policy **ARC 3** … *development affecting ancient monuments and important archaeological areas and sites, including areas and sites having such potential, will normally*

be refused if there is an overriding case for preservation. Where there is no overriding case for preservation, development of such sites will not normally be permitted until adequate opportunities have been provided for the recording and, where desirable, the excavation of such sites.

1.19. All other archaeological features listed in the catalogue may be included in MEPA's National Protective Inventory according to policy **ARC 7** for which protection is granted by means of policy **ARC 6**.

1.20. Rural buildings and rubble walls are protected by the **Rural Conservation Areas** policies and policy **UCO 7**. Policy **UCO 7** establishes the grading of listed buildings in Urban Conservation Areas and regulates works that are acceptable in such buildings. The following are adaptations to that grading system to enable classification of cultural heritage features within a rural setting:

- **Grade 1:** Buildings to be retained in their entirety. *Demolition or alterations which impair the setting or change the external or internal appearances, including anything contained within the curtilage of the building, will not be allowed.*

- **Grade 2:** Buildings assigned a Grade 2 are considered to be of vernacular architectural interest and to contribute to the visual image of the rural area. Permission to demolish such buildings will not normally be allowed. *Alterations to the interior will be allowed if proposed to be carried out sensitively and causing the least detriment to the character and the architectural homogeneity of the building.*

- **Grade 3** Rural buildings are usually either modern (mid-20th century onwards) and therefore *have no historical importance and are relatively minor architectural interest*, or in a state of ruins which are impossible to restore. Permission may be granted for such modern buildings to be demolished provided the replacement building is in harmony with its surroundings. In the case of ruined buildings it is recommended that they be dismantled and the materials re-utilised for the construction, or restoration of other features.

Policy Importance of Archaeological Features

1.21. The classification of archaeological features according to their policy importance is guided by legislation, including the Cultural Heritage Act, the Development Planning Act 1992, Structure Plan Policies, and Government Notices regarding specific cultural features. **Table 1** indicates the grading of Archaeological features. It is noted that the same classification applies to Rural Features as discussed below. **Table 1** summarises the features and indicates their policy importance.

Features of International and National Importance

1.22. Archaeological features of international or national importance are protected by all of the above, and particularly Structure Plan Policy **ARC 2 Class A**. A feature graded as A in **Table 1** would qualify for protection under Structure Plan Policy **Arc 2 Class 2**. Such features are considered to be top priority for conservation *where no development will be allowed which would adversely affect the natural setting of these monuments or sites. A minimum buffer zone of at least 100m around the periphery of the site will be established in which no development will be allowed.*

Features of National Importance

1.23. Archaeological features of national importance are also protected by the above legislation. They are graded as B or medium in **Table 1**. They include those referred to in Structure Plan Policy **ARC 2 Class B**, and are *very important and should be preserved at all costs. Adequate measures to be taken to preclude any damage from immediate development.*

Features of Minor Importance

1.24. Archaeological features classified as of minor importance are protected by the Antiquities Protection Act, and other legislation mentioned above. Structure Plan Policy **ARC 3 Class C** provides for … *development affecting ancient monuments and important archaeological areas and sites, including areas and sites having such potential, will normally be refused if there is an overriding case for preservation. Where there is no overriding case for preservation, development of such sites will not normally be permitted until adequate opportunities have been provided for the recording and, where desirable, the excavation of such sites.* The features that have been listed as **Class C**, are protected in so far as *every effort must be made for preservation, but may be covered up after proper investigation, documentation and cataloguing. Provision for subsequent access shall be provided.*

Remaining Features

1.25. All other archaeological features listed in the catalogue may be included in the National Protective Inventory of the Planning Authority according to policy **ARC 7** for which protection is granted by means of policy **ARC 6** which indicates that all sites listed in the NPI *will be protected in accordance with the Development Planning Act powers and by reference to the ratings given in Policy* ***ARC 2***.

Table 1: Protection ratings & cultural significance

Cultural Significance	Class	Grade	Protection
Major *National Importance*	A	1	Conserve plus 100m buffer zone
Medium *Local Importance*	B	2	Conserve
Minor	C	3	Record May be covered
None	-	-	May be covered, destroyed, or recycled
Uncertain	E	-	Further investigation is required

The Central Malta Local Plan

1.26. The Central Malta Local Plan published by MEPA in August 2006, has designated particular policies to the Maghtab area, which is affected by this proposed development.

Policy CG03, Category 2 Rural settlements, has described Maghtab as "*affected by a fall in rural quality and amenity. The aim of this policy is to counteract these problems by preventing the further development of incompatible uses in the area and by directing further growth only to infill, corner and end of terrace sites as defined in the policy*". This policy is

also concerned with the natural vegetation of these areas which forms an essential part of the cultural landscape of the area of proposed development. The area is full of mature carob trees, which the policy calls for their protection. This is because "*Trees associated with rural settlements are generally indigenous or archaeophytic species that are exploited for agricultural purposes such as carob trees, olive trees, almond trees and pomegranates. Although some of these trees, such as carob trees, were much more commonly exploited in the past, they are generally associated with the agricultural landscape that constitutes a predominant feature within the Maltese rural environment. In this regard, such trees complement the character and heritage value of rural settlements. Therefore apart from being of intrinsic, ecological and scientific value, trees within rural settlements are also deemed to be of high aesthetic value. The majority of indigenous or archaeophytic trees are protected by Legal Notice 12 of 2001. This Legal Notice also protects trees that are more than 50 years of age provided that they are not considered to be invasive (invasive species are listed in Schedule V of this Legal Notice), and provided that they are not causing any damage to the biological identity of trees listed in Schedules I and II of this Legal Notice*".

SITE DESCRIPTION

1.27. The site of the proposed development and its area of influence are mostly made up of a number of terraced fields bounded by rubble walls (refer to **Plates 1 and 2**). Most of the fields are still worked and given the number of trapping huts, also used for hunting and trapping. The northern boundaries of the fields in the proposed area of development are dotted by carob trees (as shown in **Plate 3**) which are mostly mature trees and typical of the Maltese agricultural landscape.

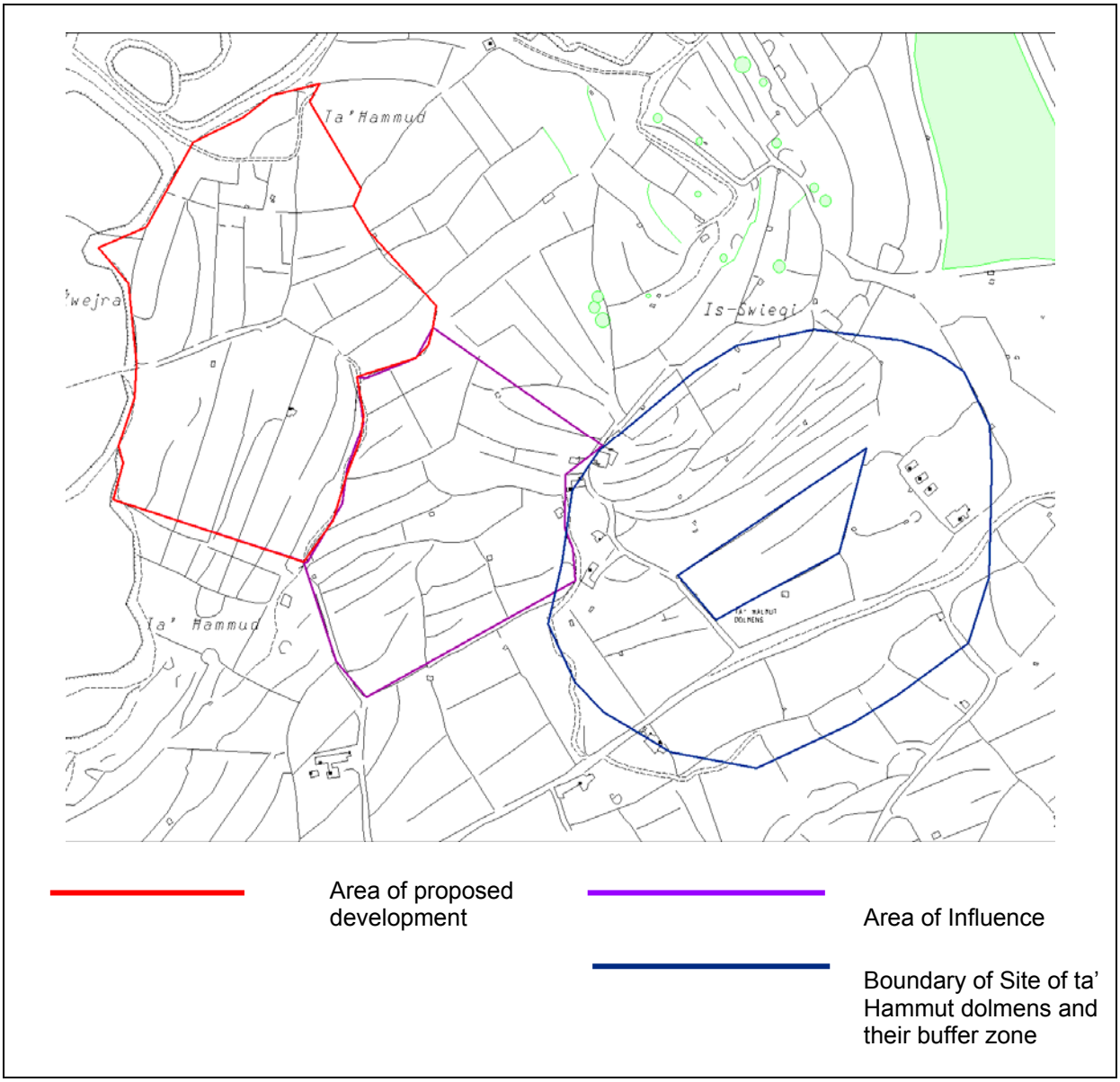
1.28. Within the area of influence lie the Taz-Zebbugija megaliths, while to the Southeast lie the Ta' Hammut Dolmens whose buffer zone intersects the A of I for this study.

THE SURVEY RESULTS

Scheduling

1.29. As mentioned above, the A of I is intersected by the buffer zone of the Ta' Hammut Dolmens as shown in **Figure 4.** This site has been scheduled by GN574 of 1994 as a Class A site.

Figure 4: Ta' Hammut Dolmens scheduled area and buffer zone in relation to the A of I



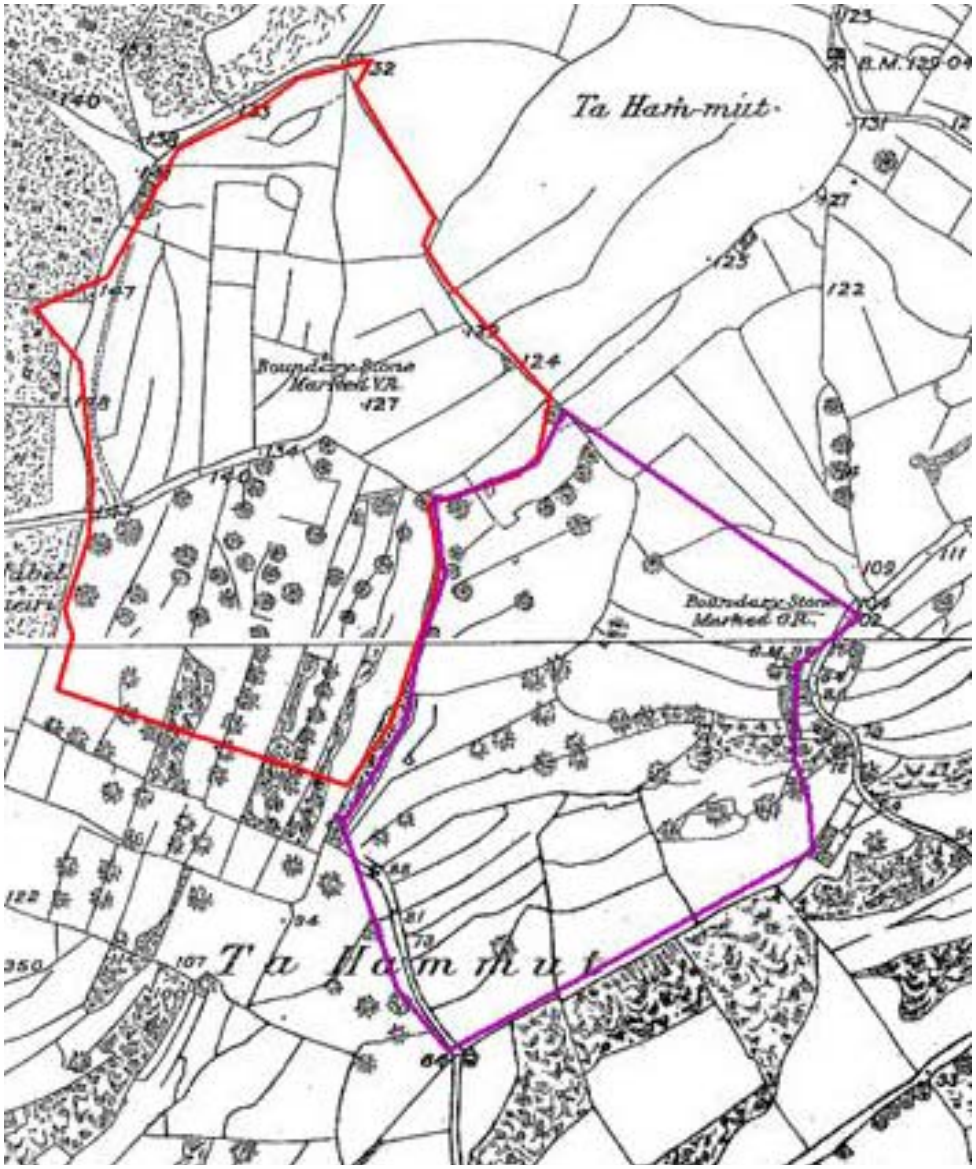
Historical Background

1.30. A research about the general surroundings of the area has been included in the report which is being updated by this study. This update will be restricted to the area of proposed development, it's A of I and its immediate surroundings.

Difficulties

1.31. The area of proposed development is an agricultural one. As such it was hardly documented given there were no major settlements in the vicinity. The only retrieved documentation was the 1899 survey sheet (refer to **Figure 5**), which shows that most of the area remained the same in the past hundred years, and provided a terminus ante quem for some of the features encountered.

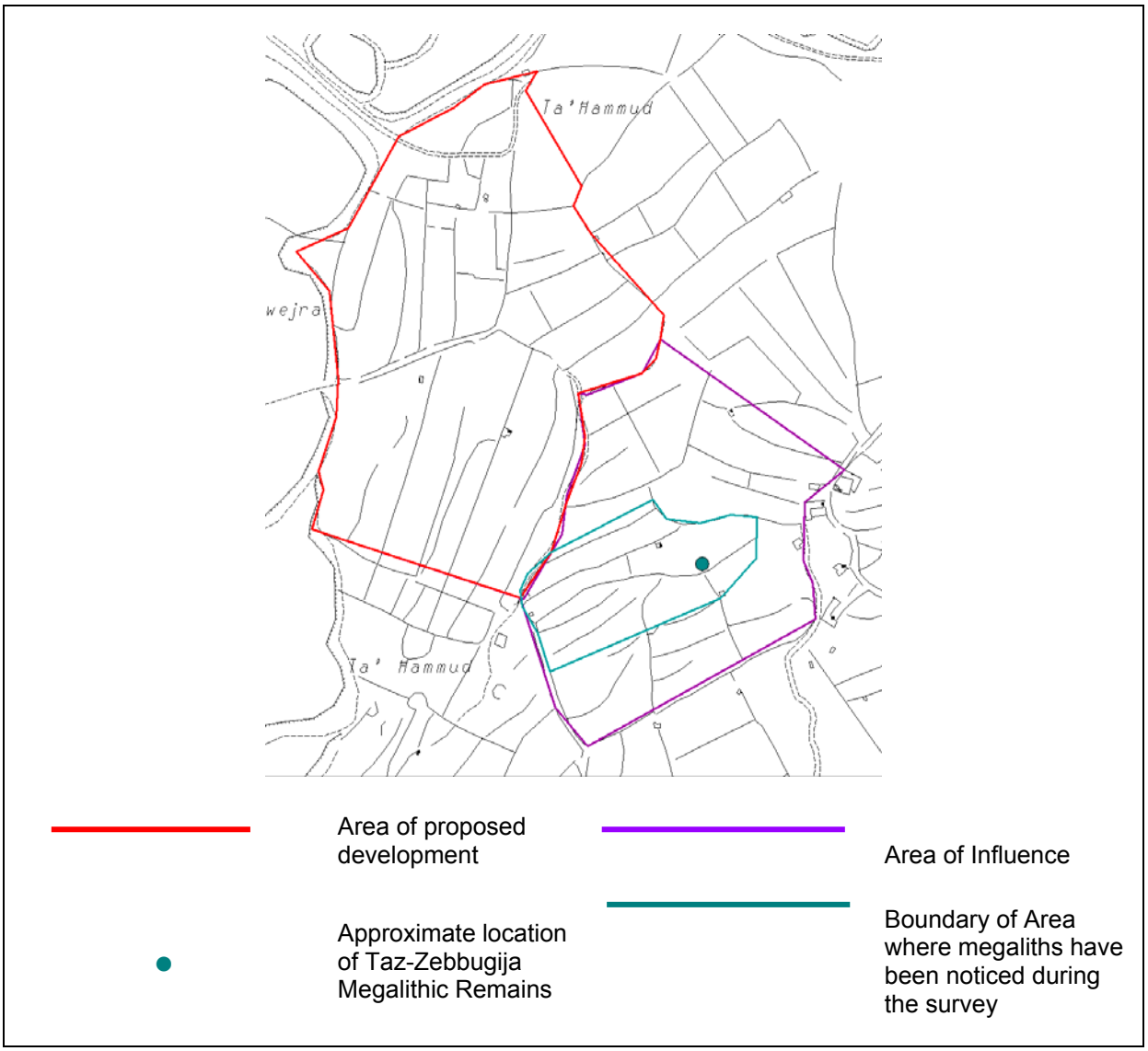
Figure 5: Sheets 22 and 31 dating to 1899 showing the area of study



1.32. The landscape surrounding the area of proposed development has been considerably altered by the Maghtab landfill, however the area itself has almost remained untouched at least for the past 100 years. The only changes relate to the creation of new field rooms or trappers' huts, and a field whose rubble wall has been enclosed by a higher new wall (marked in **Figure 8** as a modern wall).

1.33. As mentioned above, the area of influence includes the remains of a megalithic temple recorded by the MARs (MAR 1927-8:3- 4; MAR 1935-6: 18).. Since the area has been exploited for agriculture, much of the original landscape has been transformed and much of the temple megaliths covered, lost or displaced. This explains why large stone blocks have been noticed across as wide area as shown in **Figure 6**. These megaliths have been mostly noticed in the area of influence, but some of them are visible in the southern corner of the area of proposed development as well.

Figure 6: Location of Megaliths and the Taz-Zebbugija Megalithic Remains



Toponomy

1.34. A number of place-names have been identified from the survey sheet. Toponomy may indicate historical aspects of the area and as such, meanings and dates can be derived. Below is a list of these place-names as found on survey sheets and related information. The lack of documentation for the area is also reflected in the toponyms as can be seen below.

Maghtab

1.35. A district near Baħar iċ-Ċagħaq; mentioned in notarial archives of 15.x.1467, 13.iv.1486, and later. Meaning: a place of perdition or destruction; or dangerous place; a place where one becomes fatigued (Wettinger 2000: 356)

Wied ta' Kieli

1.36. No reference found.

Habel Zwejra

1.37. No reference found.

Ta' Hamut

1.38. No reference found.

Taz-Zebbugija

1.39. No reference found.

Historical Importance of the Area

1.40. The area was an agricultural area which must have been exploited only once the area was deemed safe from any corsair attacks. In fact one can say that there is a lack of documentation of the area from between the prehistoric period to Early Modern times.

Prehistoric Period

1.41. In the area being studied a number of prehistoric remains have been recorded. Within the area of influence, the MAR of 1927-28 (pg4) recorded the presence of a number of megaliths standing in the fields of *Taz-Zebbugia*. The MAR records the presence of megaliths "*as walls, passages etc., of once existing buildings*". Trump (2000:147) describes the remains as "*not of standard plan [and that they] can be seen among the carobs*". The temple was excavated in 1935. During these excavations two circular rooms and a semi-circular apse could be discerned (Evans 1971: 44). The entrance, made up of two stone slabs facing west-north-west, is still visible today. Evans dates the pottery, originally reported as belonging to the Copper Age, to the Zebbug (c. 4100 BC – c. 3700 BC) and Mgarr Phases (c. 3800 BC – c. 3600 BC) (1971: 44). An oval pendant was also found.

1.42. The MAR of 1927-1928 (pp3-4) records the presence of two dolmens. Evans (1971: 194) recorded a third one and noticed a number of oval small troughs cut in the rock

which he suggests are the remains of others. These depressions correspond to the oval depressions under the dolmens. He suggests that there were seven of these dolmens in the Ta' Hammut group. Evans carried out an archaeological excavation in the deposits beneath the dolmens. The pottery emerging from these excavations dated the dolmens to the Tarxien Cemetery period (c. 2400 BC – to c. 1500 BC). No such depressions were found in the areas where surface rock was exposed in the surveyed area.

1.43. Outside the area of influence, in an undetermined location, also lies a long narrow megalithic passage way running along an E/W axis, 33' long that is roofed with slabs and has two entrances at its eastern and western extremities (MAR 1935-36: 18-19). When this site was recorded the middle part of the passage was in ruins.

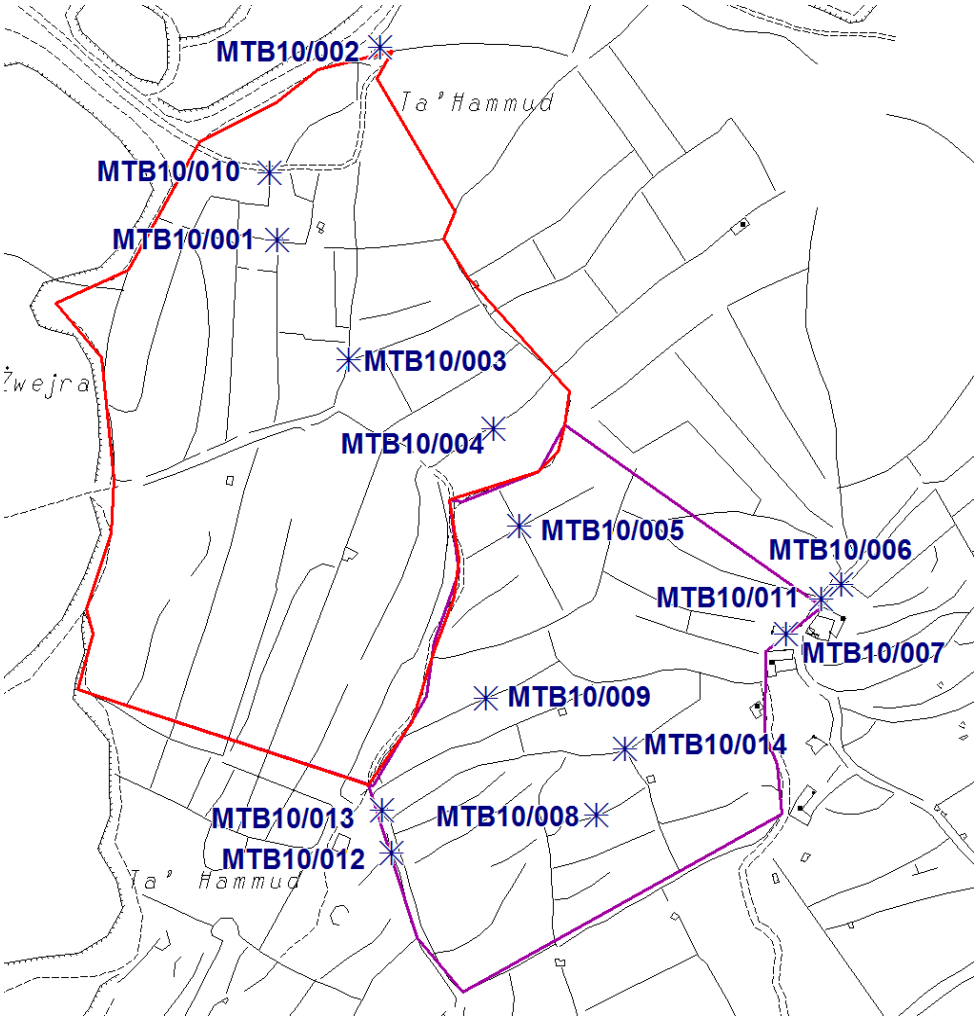
CULTURAL FEATURES

1.44. **Figure 7** shows the location of the cultural features within the A of I. These are described in detail in the Catalogue Sheets in **Appendix I**. **Table 2** lists these features and briefly describes their proposed level of protection.

Table 2: Cultural Features that Merit Conservation; Summary of Policy Importance

Feature Ref. Number	Feature	Class / Grade / Level	Merits
MTB10/001	Field room	Grade 3	Vernacular
MTB10/002	Field room	Grade 3	Vernacular
MTB10/003	Field room	Grade 3	Vernacular
MTB10/004	Field room	Grade 3	Vernacular
MTB10/005	Field room	Grade 3	Vernacular
MTB10/006	Boundary Marker	Class B	Engineering
MTB10/007	Farmhouse complex	Grade 2	Vernacular
MTB10/008	Megaliths	Class A	Archaeological
MTB10/009	Megaliths and quarrying	Class A	Archaeological
MTB10/010	Country road	Grade 2	Vernacular
MTB10/011	Country road	Grade 2	Vernacular
MTB10/012	Country road	Grade 2	Vernacular
MTB10/013	Field room	Grade 3	Vernacular
MTB10/014	Megalithic temple	Grade A	Archaeological

Figure 7: Recorded Cultural features in the A of I



Rural Features

1.45. Most of the cultural features in the area are vernacular features. Some of these features are in their original state while others have been altered in recent times.

1.46. **MTB10/001** is an abandoned field room which is was not marked in the 1899 survey sheet. It is built of rubble in the dry stone technique. Its roof is made up of wooden planks covered with rubble. Its doorway faces east in front of which there is an enclosed space. Its southern wall abuts a rubble wall. Given its vernacular nature it merits a Grade 3 level of protection. Another field room, which is abandoned and in a very bad state of preservation, **MTB10/002**, is built of dressed stones in the dry stone technique. Given that no particular features survive it warrants a Grade 3 level of protection. This room is visible in the 1899 survey sheet. A similar field room is **MRB10/013**. It is a small room built in rubble and in the dry stone technique. Its entrance, built of unusually large stones, probably taken from the nearby temple (see **MTB10/014**, **MTB10/008** and **MTB10/009)** faces south, while its western wall is included in the rubble wall. Its roof is made up of stone slabs covered by small stones. Given its lack of particular features the room deserves a Grade 3 level of protection. **MTB10/013** is a similar room where stone slabs from the temple were also used for the entrance. The roofing is made up of stone slabs. It warrants the same level of protection, that is Grade 3.

1.47. **MTB10/003** are two field rooms adjacent to each other. They are both not visible on the 1899 survey sheet. The smaller room is not currently used and retains its original characteristics with rubble and stone slabs. The larger one is locked and its outer walls have been plastered. These rooms also deserve a Grade 3 level of protection. Another small field room built in rubble in the dry stone technique, **MTB10/004**, also deserves the same level of protection.

1.48. **MTB10/005** is a field room visible in the 1899 survey sheet. It may be classified as a square-based corbelled hut since it has a corbelled ceiling which is narrower than its base. It is in a very good state of preservation and should be protected with a Grade 2 level.

1.49. **MTB10/007** also deserves the same level of protection since it is a farmhouse complex which is in a very good state of preservation even though it is currently not in use. The farmhouse has areas designated to hold animals, as well as residential units.

1.50. Three other vernacular features are country roads which were used to connect different fields. The first one, **MTB10/010**, lies to the north of the area of proposed development. This part was altered after 1899 since the survey sheet does not show this country road flanked by rubble walls and the other fields are also currently different. The other country road, **MTB10/011**, divided farmhouse complex **MTB10/007**, in two parts. It connects the fields of Ta' Hammut to Triq ir-Ramla and to a path leading to a number of fields to the south of the A of I. The upper part of the road is derelict and unusable but south of the farmhouse complex it is still being used. **MTB10/012** has the same function as the latter. However it is in a better state of preservation and in fact can still be used by a motor vehicle. Given

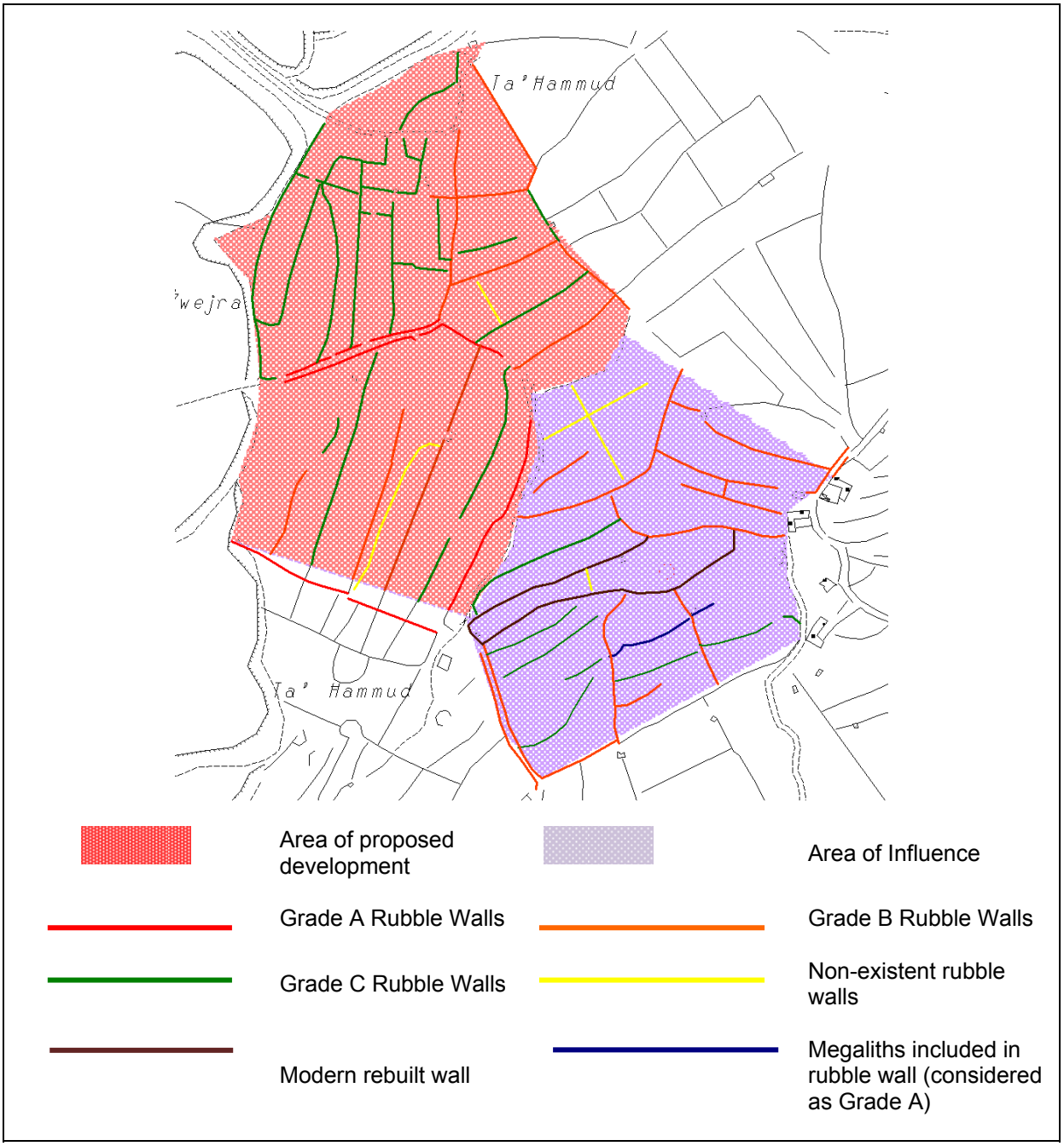
that the roads are part of the cultural landscape and flanked by rubble walls, they deserve a Class 2 level of protection.

Rubble Walls

1.51. Rubble walls have stood in the area for centuries, delineating boundaries, offering protection from winds to man, animals, crops and trees, and even used to build field terracing. The dating of rubble walls is usually difficult. Most of the rubble walls in the area can at least be dated to before 1899.

1.52. The condition of these rubble walls varies considerably as can be noted in **Figure 8**.

Figure 8: Conditions of Rubble Walls round the area for proposed development



1.53. The present state and length of the rubble walls in the area are divided into three categories (as agreed with MEPA) as shown in **Table 3**.

Table 3: Rubble Walls

	Grade	Length (m / %of total)	Colour Code on Figure 7
Good to Fair Condition	A	560.46m/12.5%	Red
Fair to Poor Condition	B	1815.72m/40.3%	Orange
Bad Condition/ Slight Traces only	C	1808.44m/40.2%	Green
Modern Rebuilt walls		315.46m/7%	Brown

Grade A walls

1.54. The state of preservation of the rubble walls indicated as Grade A, ranges from good to fair condition. These walls still retain a large percentage of the original stonework, which may vary from 85% to 65% of the whole **(Plate 4)**. In this case this category also includes walls which have megaliths which are of an archaeological nature.

Grade B walls

1.55. Grade B walls range from fair to poor condition. These walls still contain part of the original stonework but have parts either restored with new blocks of stone or are still partly in a demolished state. The amount of original stonework varies from 64% to 35% of the whole **(Plate 5)**.

Grade C walls

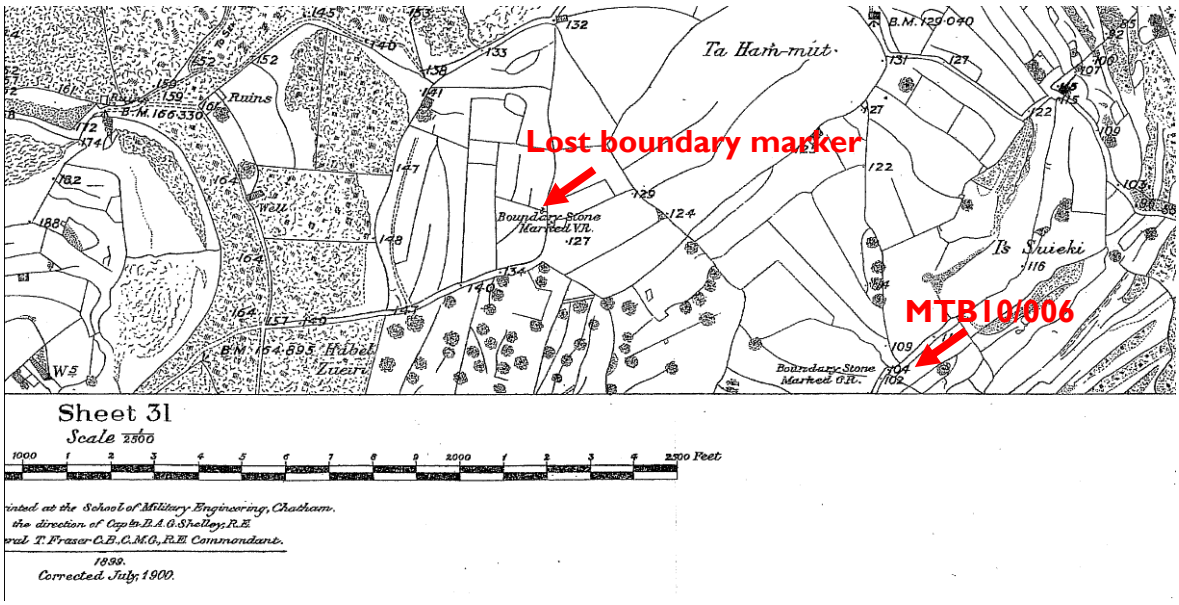
These walls are in a bad state of repair and in some cases they consist of slight traces only. The amount of original stonework varies from 34% to 10% of the whole **(Plate 6)**.

Boundary Marker

1.56. A boundary marker lies just outside the boundary of the A of I. Given that this marker is also marked in the 1899 survey sheet (corrected in 1900) and is almost within less than 15m from the A ofl it has been included in this report. These boundary markers, which are mostly undocumented, were used to mark government property. **MTB10/006** has GR inscribed on it, suggesting it was erected either during the reign of King George III between 1800 and 1820 (he was crowned in 1761) or King George IV some time between 1820 and 1830. As such the boundary marker deserves to be classified as a Class B feature.

1.57. Another boundary marker was listed on the 1899 survey sheet (refer to **Figure 9**). This was not visible during the site survey. However it should be classified as a Class E cultural asset.

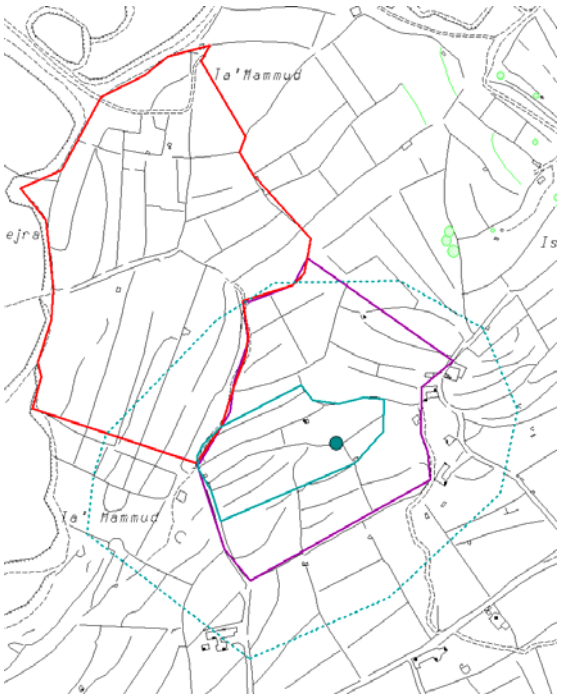
Figure 9: Part of the 1899 survey sheet showing the location of boundary marker MTB10/006 and another boundary marker not located during the survey



Megaliths

1.58. **MTB10/008** and **MTB10/009** are a number of megaliths or quarrying marks that are related to the prehistoric temple remains**, MTB10/014**. The megaliths in the former features do not follow any pattern and are included in rubble walls and field rooms or trapping huts (refer to **Plate 7**). While the area has been greatly changed from the original prehistoric landscape, the megalithic remains are both visible and its layout can be still made out. As such these remains all deserve a Class A level of protection, just like similar remains of the same period and in the state of preservation. A similar example to the Taz-Zebbugia is the Tal-Qadi temple in St Paul's Bay, which have been scheduled as a Class A cultural asset by GN829/98. Should a buffer zone of 100m be designated for such a site (like the Ta' Hammut Dolmens nearby), the affected area would be approximately that shown in **Figure 10**.

Figure 10: Taz-Zebbugija temples and a proposed buffer zone for the area where megaliths were noticed during the survey



Area of proposed development

Area of Influence

Approximate location of Taz-Zebbugija Megalithic Remains

Boundary of Area where megaliths have been noticed during the survey

Approximate buffer zone for the area including all the megaliths should tttheeese

Cultural Landscape

1.59. All archaeological and historical sites and features form part of the landscape which surrounds them, and any survey of the cultural heritage has to study a site's context as well as the site itself. From fieldwork in the neighbourhood, a picture of the cultural landscape of which the site is part can be formed. This is important since no site is isolated from the fields and geographical features which surround it, and on which it depends, to varying degrees. Every site is a piece of local history, embedded in its immediate cultural landscape and relating to the area around it (Barker 1993: 254). The phrase "cultural landscape" does not mean a special type of landscape, but rather a way of seeing landscapes that emphasizes the interaction between human beings and nature over time. The main value of the cultural heritage in the area lies in the information it can yield regarding past settlement patterns, as well as the indications regarding land-use patterns.

1.60. Schembri (1997: 115) describes the current Maltese landscape as "*a result of the interaction of geology and climate, coupled with the intense human exploitation of the environment over many thousands of years, which has altered the original condition of the vegetation cover, principally through the diversion of vast tracts of land to cultivation, the construction of terraces, water catchment devices, irrigation channels and drainage ditches, the grazing of animals on uncultivated land, and the development of land for buildings and industry*".

1.61. The cultural landscape at Habel Zwejra and Ta' Hammud is a reflection of these changes which affected the landscape across the centuries. The first traces of changes were made in prehistoric times with the extraction of stone for the building of the Taz-Zebbugija temple, and the actual construction and use of the temple and the dolmens to the southeast. It is not certain when the carob trees were introduced to the area, but some of the examples are considerably large and look as if they have been standing there for a very long time. While there are no traces of other use for hundreds of years, at a certain point in time, the agricultural potential of the area led to its transformation into terraced fields. Soil was most probably brought from another location, covering the temple and other structures and using its stones to build rubble walls and field rooms. Later on, a farmhouse complex and more solid field rooms were built, while access to the area was made easier with the building of country roads. The British Government felt it was necessary to assert its right of property over land in the area with the erection of the boundary marker. While until the present day, the area is used for agriculture, hunting and trapping, it is now being encroached by Maghtab landfill. The latter has considerably changed the landscape of the area of study, while acting as a showcase of what the whole area looked like before the landfill was located there.

PROPOSED MITIGATION MEASURES

1.62. The presence of the Taz-Zebbugija temple and the concentration of megaliths in the area surrounding it calls for further archaeological investigations before the proposed development takes places. Trial trenches may be excavated under the direction of the Superintendence of Cultural Heritage to ensure the presence or otherwise of buried cultural features. Moreover, the removal of soil from the area should be monitored by a qualified archaeologist approved and directed by the Superintendence of Cultural Heritage. An assessment of the state of conservation of the temple should also be carried out.

BIBLIOGRAPHY

Abela, G.F. 1647 Della Descrittione di Malta Isola nel Mare Siciliano con le sue Antichità , ed alter notizie. Libr Quattro., 1984 Facsimilie Edition. Midsea Books, Malta.

Aston, M. 1985 Interpreting the Landscape: Landscape Archaeology and Local History. Routledge, London.

Barker, P. 1993 Techniques of Archaeological Excavation. Third Edition. B.T. Batsford Ltd., London.

Cassar, L., F. 1997 Settlement Patterns in the Maltese Islands: from early colonisation to pre-Independence, GeoJournal 41.2: 137-144.

Catania, P. 1999 In-Naxxar: titwiliet fl-Istorja. Paul Catania and Joe Zammit Ciantar, Malta.

Evans, J.D. 1971 The Prehistoric Antiquities of the Maltese Islands: A Survey, The Athlone Press, London.

Goacinto, C., 1811 Saggio di Agricoltura per le isole di Malta e Gozo, Messina.

Gullaimier, A., 1972 Bliet u Rhula Maltin, Malta.

Jaccarini, C.J. 1998 Ir-Razzett – The Maltese Farmhouse. C.J. Jaccarini, Malta.

Pedley, M., Hughes Clarke, M. and Galea, P. 2002 Limestone Isles in a Crystal Sea: the geology of the Maltese Islands, P.E.G., Ltd, Malta.

Renfrew, C. & Bahn, P. 1991 Archaeology. Theories, Methods, and Practice. Thames and Hudson, London.

Sagona, C. 2002 The Archaeology of Punic Malta, Louvain, Peeters.

Schembri, P.J., 1997 The Maltese Islands: climate, vegetation and landscape, GeoJournal 41.2: 1115-125.

Trump, D. 1997 Malta: An Archaeological Guide. Reprint of the 1990 Second Edition. Progress Press, Malta.

Trump, D. 2002 Malta Prehistory and Temples, Midsea Books, Malta.

Vogiatzakis, I.N., Pungetti, G., Mannion, A.M. (eds),
2008 Mediterranean Island Landscapes: natural and cultural approaches, *Springer*.

Wettinger, G. 2000 Place-Names of the Maltese Islands ca. 1300-1800, P.E.G. Ltd, Malta.

Annual Reports of the Workings of the Museums Department (MARs). 1904–1998.
Malta Archaeological Review Issues 1 to 6 (1996-2002/2003).
Superintendence of Cultural Heritage Annual Reports 2004-2006.
The Structure Plan of the Maltese Islands (Revised). 1997.
Cultural Heritage Act, 2002.
The Central Malta Local Plan, July 2006.
The Development Planning Act, Environmental Impact Assessment Regulations, 2001.
The Environment Protection Act, 1991.

Appendix 1

Catalogue cards of features within Cultural Heritage Area of Influence

Data Capture Sheet

ref no
MTB10/001

Location	**Category**	**Site Description (Address)**
Habel Zwejra, Maghtab	Vernacular	field room

Eastings	**Northings**	**Period**
4977	7808	Modern

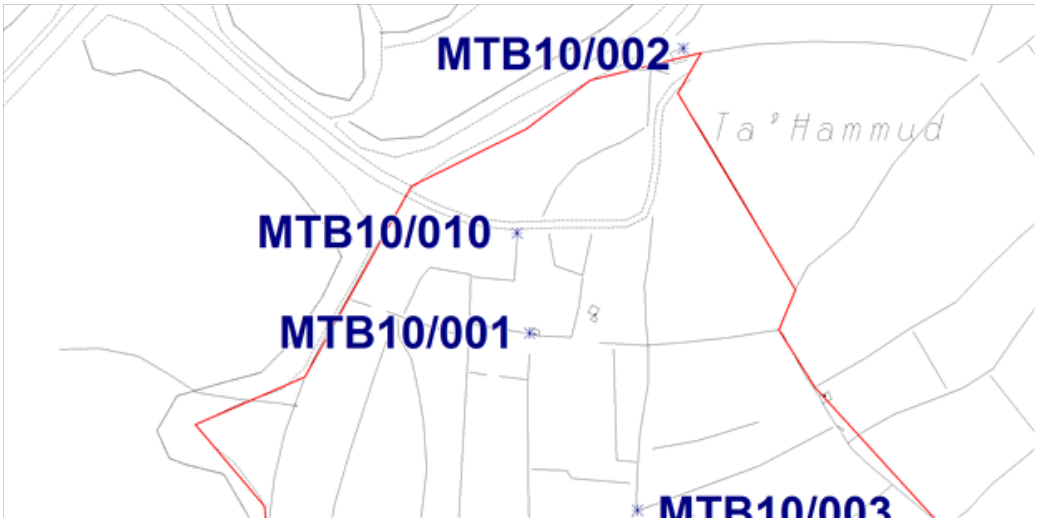
SS No1	**SS No2**	**Description**
4877		Field room with an enclosure in front of its west-facing doorway. The room is shallow and built of rubble in the dry-stone technique. Its roof is made up of wooden planks covered in rubble.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
Hunter/trapper hut

Comments

Site



MTB10/001 (1)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/001 (3)

Data Capture Sheet

ref no
MTB10/002

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	field room

Eastings	**Northings**	**Period**
4982	7817	Pre-19th century

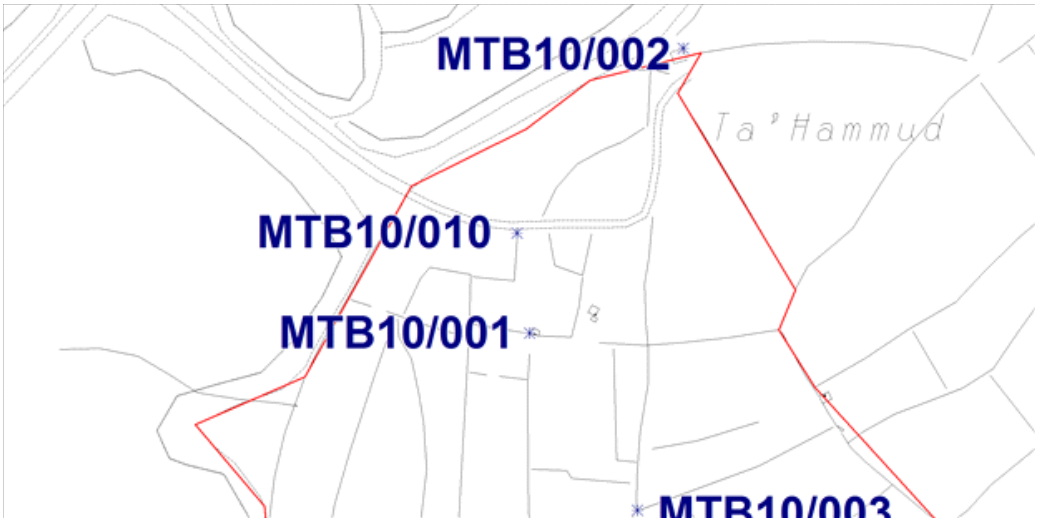
SS No1	**SS No2**	**Description**
4878		Partially destroyed field room, visible in the 1899 Survey Sheet. It was constructed of dressed stones in the dry-stone technique. Its roof has completely collapsed and is overgrown. No distinct features could be recorded.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/002 (2)

Condition
Bad

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/002 (3)

Data Capture Sheet

ref no
MTB10/003

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	field room

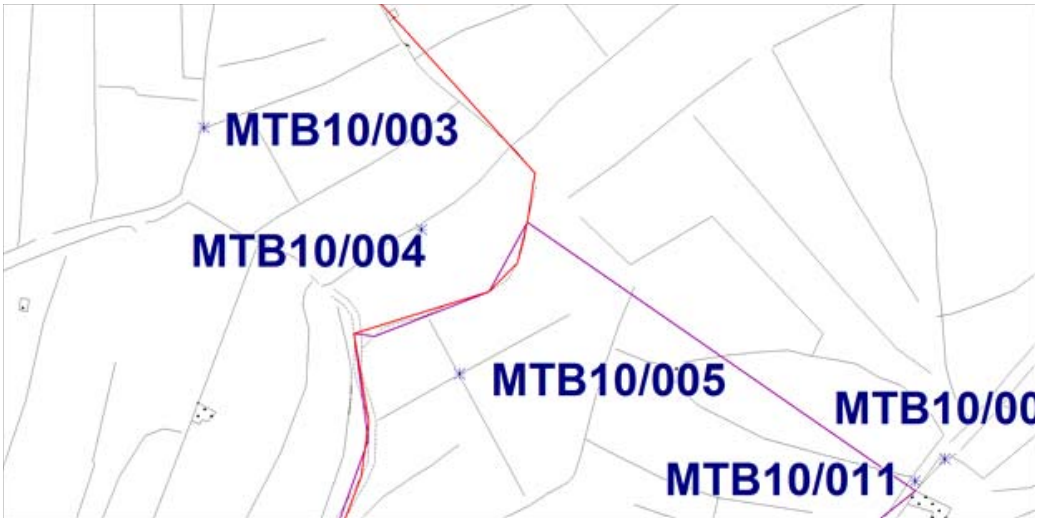
Eastings	**Northings**	**Period**
4981	7803	Modern

SS No1	**SS No2**	**Description**
4877		Two adjacent field rooms with an east-facing facade. The smaller one lying to the north seems older than the larger one. The former was built in rubble in the dry-stone technique and its rood was built of stone slabs. It must have been used to house animals. Given that the larger room was locked and its exterior walls plastered, no other outstanding features could be recorded.
SS No4	**SS No3**	
Date of survey sheet:	1992	

Present Utilisation
Field room

Comments

Site



MTB10/003 (2)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/003 (3)

Data Capture Sheet

ref no
MTB10/004

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	field room

Eastings	**Northings**	**Period**
4987	7792	Modern

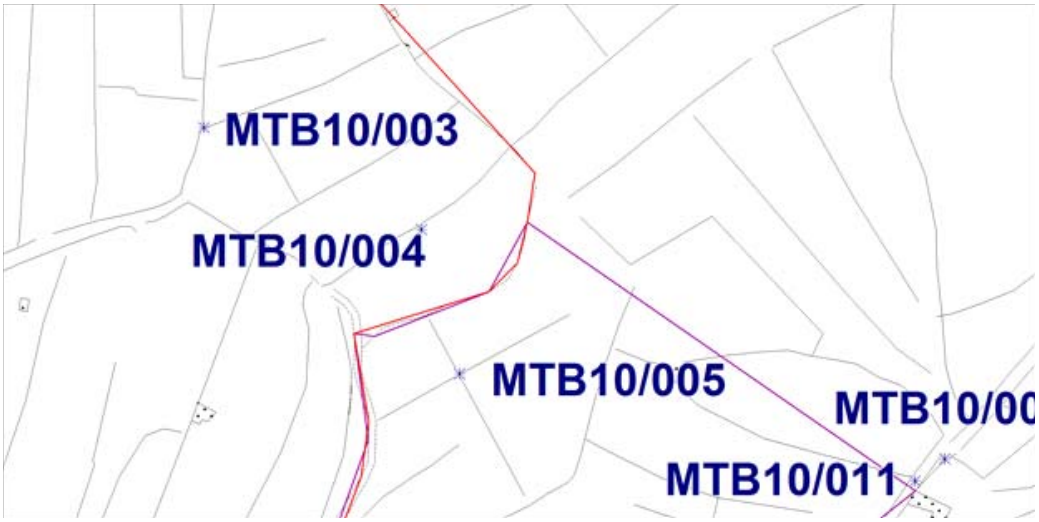
SS No1	**SS No2**	**Description**
4877		A small low-lying field room built in rubble in the dry-stone technique. Its doorway faces east, while its northern wall is actually a rubble wall. Its roof is built of metal sheets covered in rubble.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/004 (2)

Condition
Bad

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

Data Capture Sheet

ref no
MTB10/005

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	field room

Eastings	**Northings**	**Period**
4989	7795	Pre-19th century

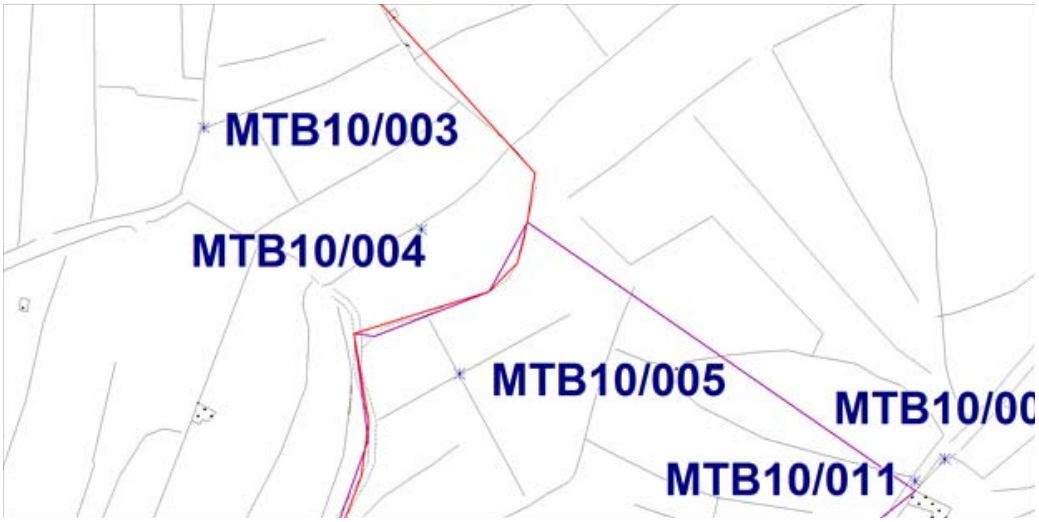
SS No1	**SS No2**	**Description**
4877		A square field room or corbelled hut. The base of the room is wider than the ceiling, though it is lower than the common corbelled hut. Its entrance faces east and has a small window on the southern wall. It has a flat lintel on the doorway and stone slabs for the ceiling. This room is visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/005 (2)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/005 (3)

MTB10/005 (4)

Data Capture Sheet

ref no
MTB10/006

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Engineering	boundary marker

Eastings	**Northings**	**Period**
5004	7792	Pre-19th century

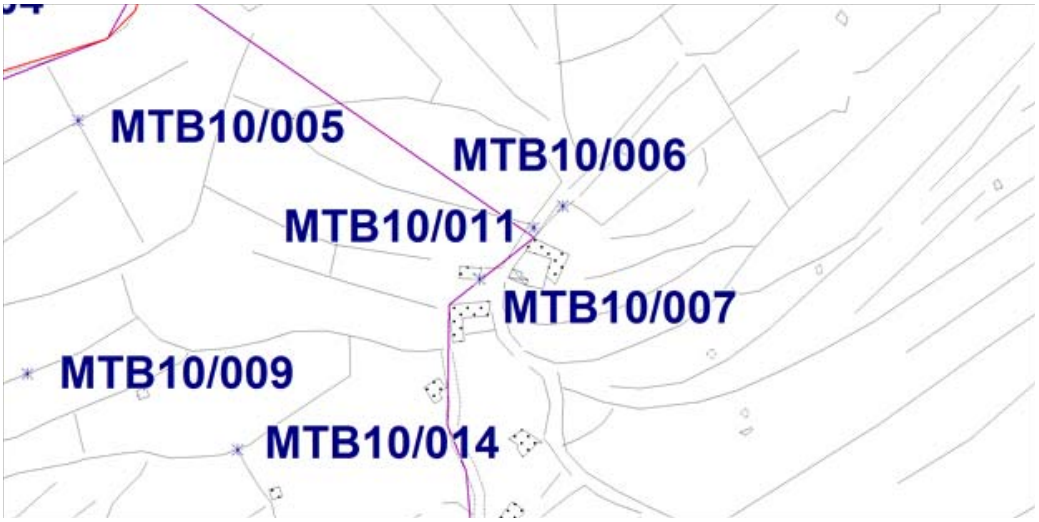
SS No1	**SS No2**	**Description**
5077		Boundary marker marked "GR" which is visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/006 (1)

Condition
Good

Degree of Protection
None

Proposed Protection
Class B

Basic Bibliography

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/006 (3)

Data Capture Sheet

ref no
MTB10/007

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	farmhouse complex

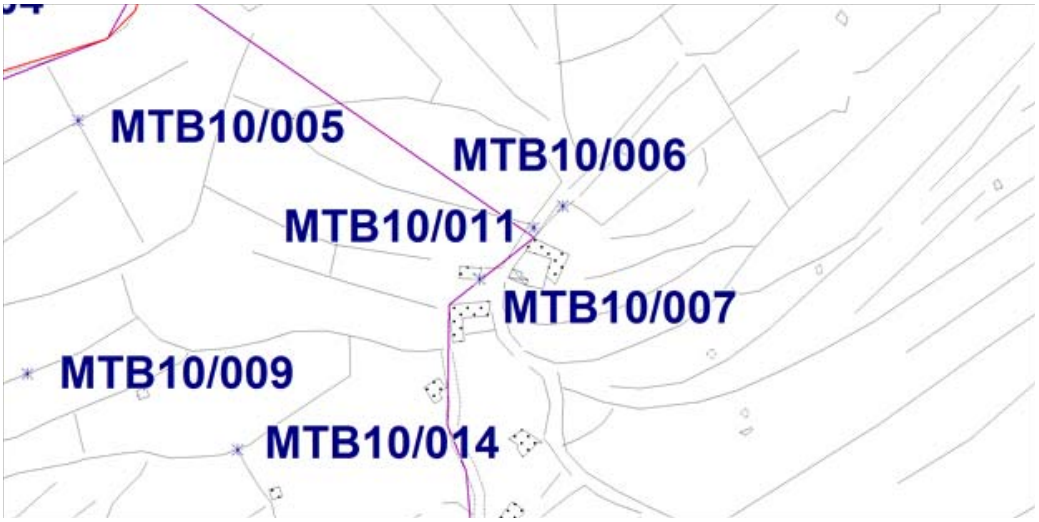
Eastings	**Northings**	**Period**
5002	7790	Pre-19th century

SS No1	**SS No2**	**Description**
5077		Farmhouse complex consisting of a number of rooms separated by country road MTB10/011. It is not clear whether the farmhouses formed part of the same cluster or not, since the larger rooms are locked. The larger farmhouse is located to the northwest of country road MTB10/011 while the smaller structures housing the animals were located to the southeast of the same road.
SS No4	**SS No3**	
Date of survey sheet:	1992	

Present Utilisation
None

Comments

Site



MTB10/007 (5)

Condition
Good

Degree of Protection
None

Proposed Protection
Grade 2

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/007 (7)

MTB10/007 (8)

MTB10/007 (10)

Data Capture Sheet

ref no
MTB10/008

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Archaeological	megaliths

Eastings	**Northings**	**Period**
4993	7781	Prehistoric

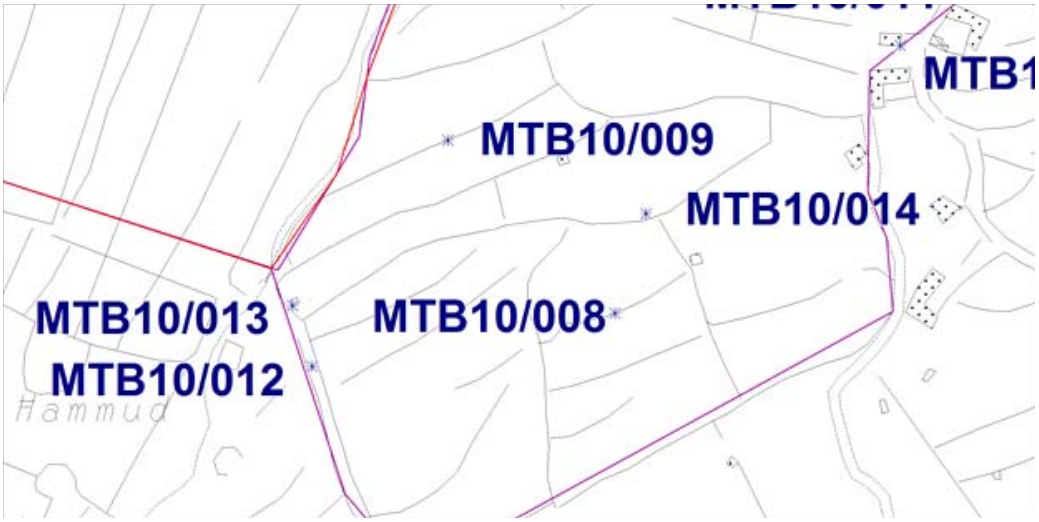
SS No1	**SS No2**	**Description**
4877		Large LCL blocks partly stacked haphazardly on top of each other and others incorporated into a rubble wall. No traces of pottery were noticed.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments
These lie to the south of the Taz-Zebbugija megalithic structures (which were not visible during this survey)

Site



MTB10/008 (1)

Condition
Fair

Degree of Protection
None

Proposed Protection
Class A

Basic Bibliography
MAR 1927-8:3- 4; MAR 1935-6: 18; Evans 1971: 44, 231

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/008 (2)

MTB10/008 (3)

Data Capture Sheet

ref no
MTB10/009

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Archaeological	megaliths and quarrying

Eastings	**Northings**	**Period**
4987	7787	Prehistoric

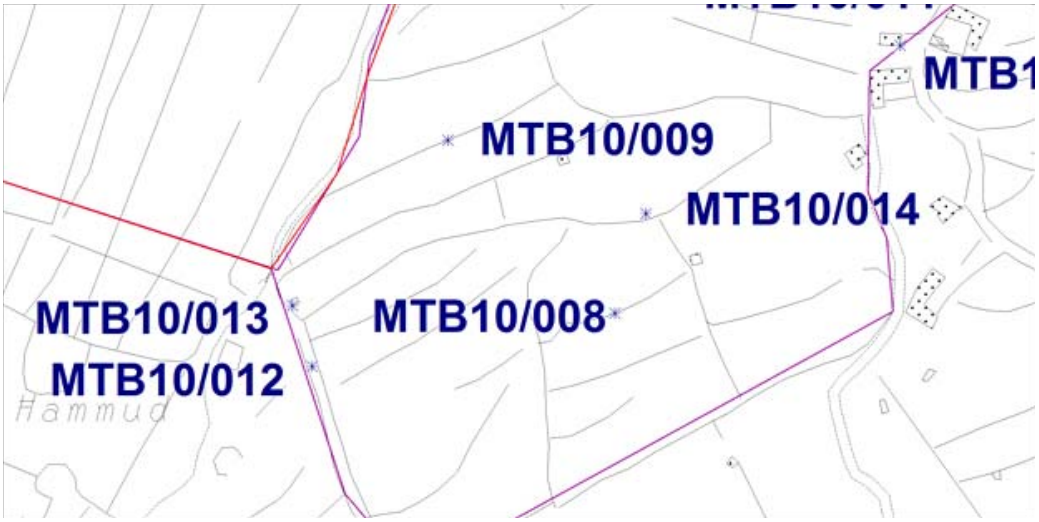
SS No1	**SS No2**	**Description**
4877		Surface quarrying and large UCL blocks possibly megaliths strewn haphazardly on the rock surface. No traces of pottery were found.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments
These lie to the north of the Taz-Zebbugija megalithic structures (which were not visible during this survey)

Site



MTB10/009 (4)

Condition
Fair

Degree of Protection
None

Proposed Protection
Class A

Basic Bibliography
MAR 1927-8:3- 4; MAR 1935-6: 18; Evans 1971: 44, 231

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/009 (6)

MTB10/009 (2)

MTB10/009 (8)

Data Capture Sheet

ref no
MTB10/010

Location	**Category**	**Site Description (Address)**
Habel Zwejra, Maghtab	Vernacular	country road

Eastings	**Northings**	**Period**
4977	7811	Modern

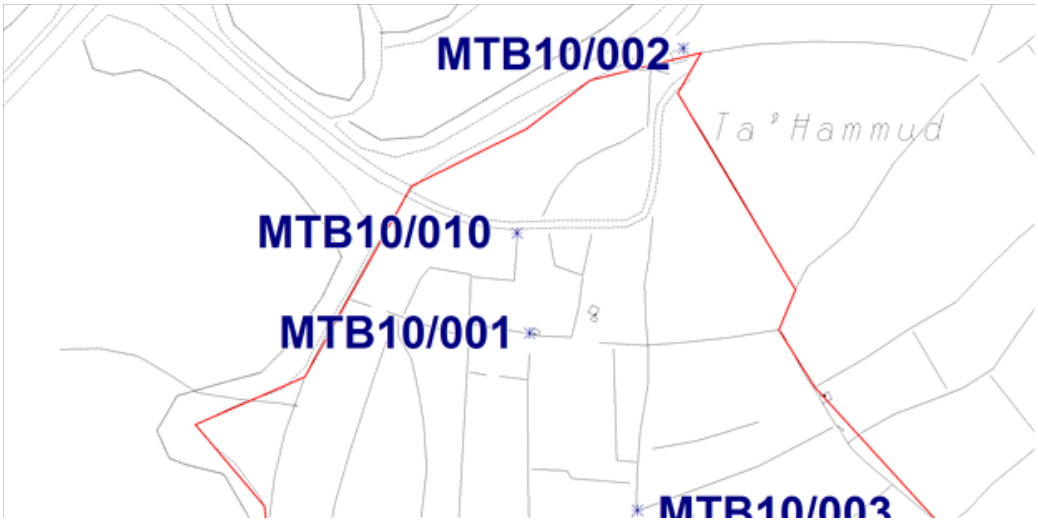
SS No1	**SS No2**	**Description**
4877		Country road, flanked by rubble walls that connects fields at Habel Zwejra. This road was not visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/010 (2)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 2

Basic Bibliography

Compiled by
MB

Date of Survey
18.viii.2010

Data Capture Sheet

ref no
MTB10/011

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	country road

Eastings	**Northings**	**Period**
5003	7791	Pre-19th century

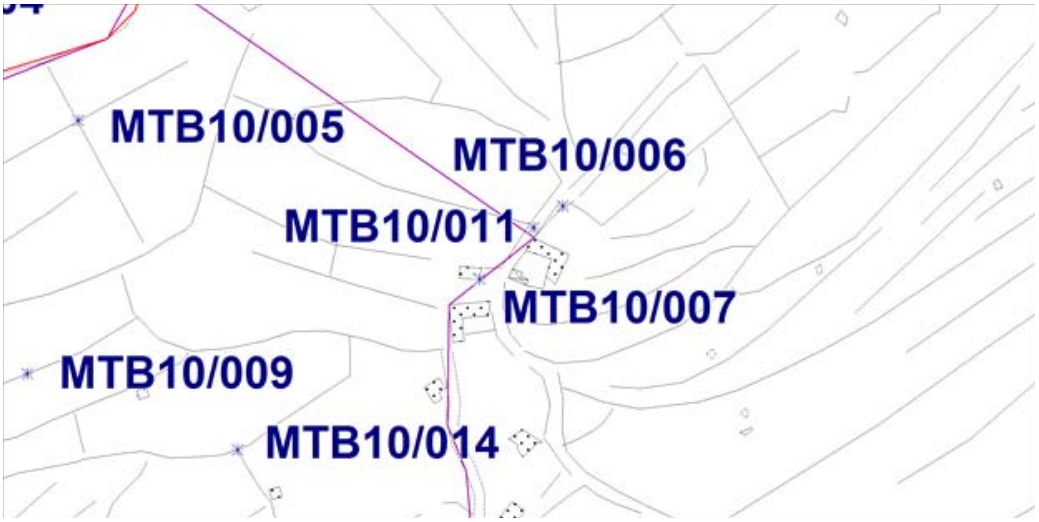
SS No1	**SS No2**	**Description**
5077		Country road, flanked by rubble walls and separating farmhouse complex MTB10/007 that connects fields at Ta' Hammud. This road was visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/011 (1)

Condition
Fair

Degree of Protection
None

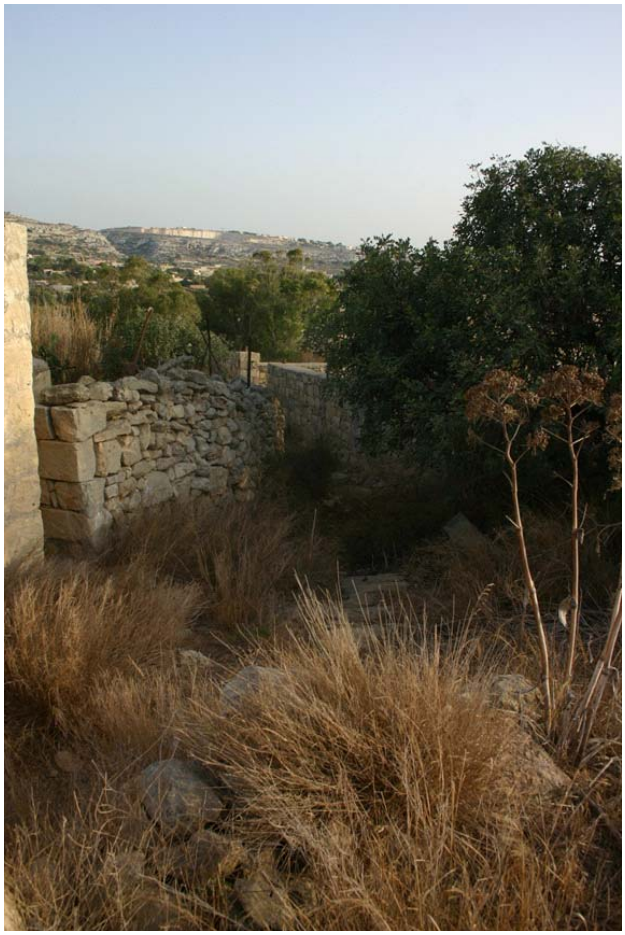
Proposed Protection
Grade 2

Basic Bibliography

Compiled by
MB

Date of Survey
18.viii.2010

MTB10/011 (2)



Data Capture Sheet

ref no
MTB10/012

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	country road

Eastings	**Northings**	**Period**
4983	7779	Pre-19th century

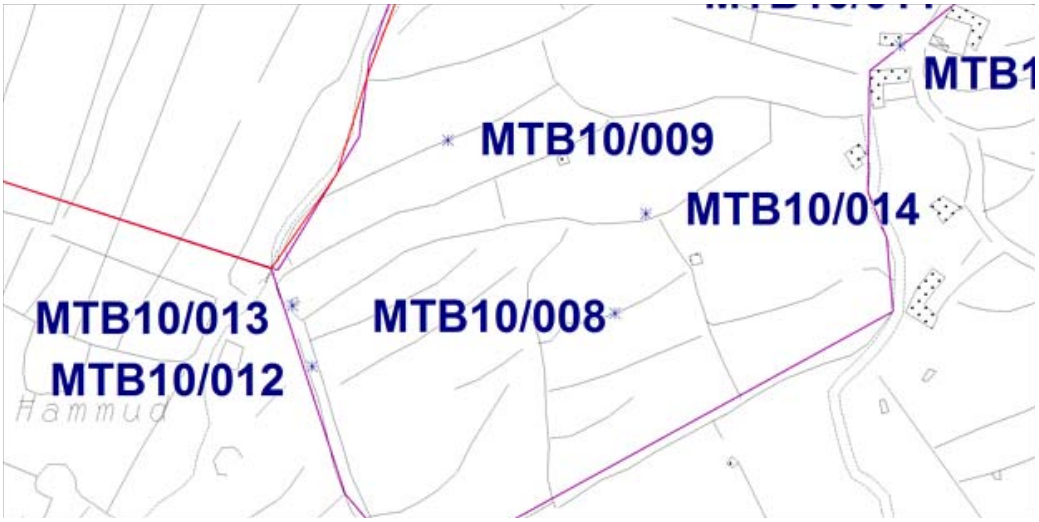
SS No1	**SS No2**	**Description**
4877		Country road, flanked by rubble walls connecting the fields at Ta' Hammud to Triq ir-Ramla. This road was visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
Road

Comments

Site



MTB10/012 (3)

Condition
Good

Degree of Protection
None

Proposed Protection
Grade 2

Basic Bibliography

Compiled by
MB

Date of Survey
27.viii.2010

MTB10/012 (1)

Data Capture Sheet

ref no
MTB10/013

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Vernacular	field room

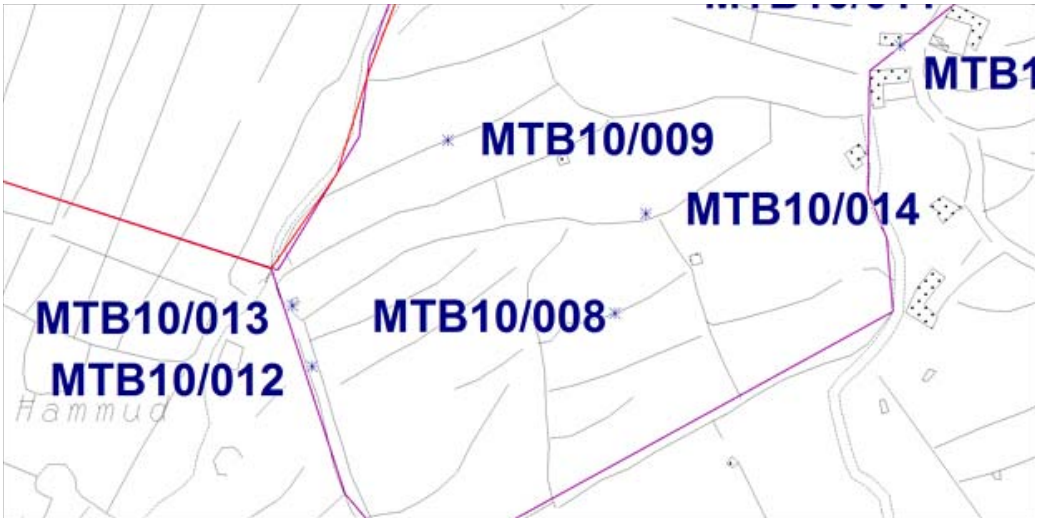
Eastings	**Northings**	**Period**
4982	7781	Modern

SS No1	**SS No2**	**Description**
4877		Small field room built of rubble in the dry stone technique. Its doorway, which faces south, is built of large stone blocks and it is roofed with stone slabs covered in small stones. Its western wall is the rubble wall, while on the eastern wall, which is partially collapsed there are traces of a small window. This room, though very small, is not visible in the 1899 survey sheet.
SS No4	**SS No3**	
Date of survey sheet:	1992	

Present Utilisation
None

Comments

Site



MTB10/013 (1)

Condition
Bad

Degree of Protection
None

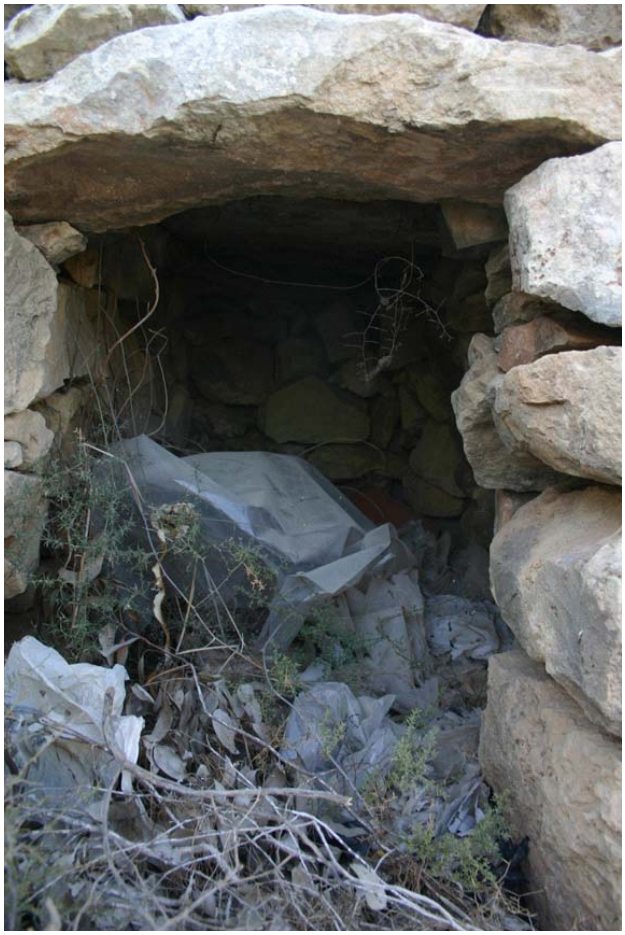
Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
27.viii.2010

MTB10/013 (3)



MTB10/013 (4)

Data Capture Sheet

ref no
MTB10/014

Location	**Category**	**Site Description (Address)**
Ta' Hammud, Maghtab	Archaeological	remains of a megalithic temple

Eastings	**Northings**	**Period**
4993	7784	Prehistoric

SS No1	**SS No2**	**Description**
4877		Remaisn of Taz-Zebbugija temple.

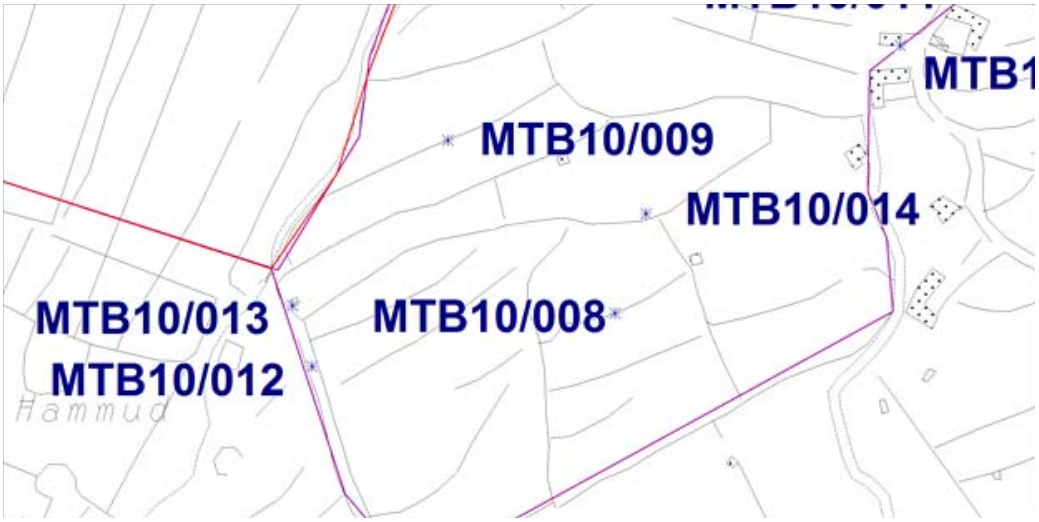
SS No4	**SS No3**

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB10/014 (7)

Condition
Fair

Degree of Protection
None

Proposed Protection
Class A

Basic Bibliography
MAR 1927-8:3- 4; MAR 1935-6: 18; Evans 1971: 44, 231

Compiled by
MB

Date of Survey
27.viii.2010

MTB10/014 (9)

MTB10/014 (12)

MTB014a (5)

MTB10/14a (4)

Appendix 2

Plates

Plate 1: Worked fields bounded by rubble walls in the area of proposed development

Plate 2: Worked fields bounded by rubble walls in the Aofl

Plate 3: Mature carob trees in the area of proposed development

Plate 4: Grade a rubble wall within the Aofl

Plate 5: Grade B Rubble wall within the Aofl

Plate 6: Grade C Rubble Wall within the Aofl

Plate 7: Megaliths imported in a trapper's hut

1. CULTURAL HERITAGE STUDY

INTRODUCTION

This report is an update of a previous cultural heritage baseline study carried out by Mr Godwin Vella and follows the Method Statement submitted to MEPA in June 2010 by adi Associates. ASC has already carried out an update to this report regarding an area south of the main Maghtab complex in August 2010. The main aims of this study are to:

- carry out a baseline survey of the cultural heritage assets and an evaluation of their importance;
- input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage within the A of I;
- carry out an assessment of the impact of the construction and operation of the scheme on the cultural heritage assets of the site and A of I and an evaluation of the significance of these effects; and
- to describe mitigation measures designed to minimise adverse impacts on cultural heritage of the area.

STUDY METHODOLOGY

The study covers aspects of archaeological, rural, vernacular, historical, and cultural heritage within the area of proposed developments as delineated on **Figure 1** and its immediate surroundings.

Figure 1: Application Site

Competence of Surveyors

The surveys were undertaken by Marlene Borg (MA Archaeology) of Archaeology Services Co-operative Ltd.

Field Survey Methodology

Literature Search

A desktop study researched primary and secondary sources, that included:

- Study of toponomy (place names); and
- Analysis of cartographic and photographic material;
- Analysis of primary and secondary written sources; and
- Analysis of conservation legislation.

Mapping

The archaeological, rural, vernacular, historical, and cultural heritage features visible within the site boundary was mapped by a field survey based on what is technically referred to as Ground Reconnaissance. This method of investigation primarily involves actual fieldwork, and incorporates the consultation of documentary sources and place-name evidence (Renfrew & Bahn 1991: 63). The fieldwork carried out consisted of a site-surface survey, or field-walking, in order to locate and record the whereabouts of sites and features. No aerial reconnaissance or sub-surface surveys, including excavations, were carried out.

The fieldwork was carried out on 14th March 2011.

Cataloguing

Relevant information for each feature is presented on cards and digital media in the same format as currently used by MEPA. Each feature has been individually identified with a consecutive numbered reference. The information for each feature includes:

- A short written description of the feature;
- Co-ordinates recorded up to 5 digits for each Eastings and Northings based on the local UTM grid reference;
- Locality and address;
- Site indicated on a map to a scale of 1:2500;
- Colour photograph(s);
- Wherever possible a sketch of the feature showing the most significant details;
- The conservation importance of site or feature (proposed grading following Structure Plan UCO and ARC policies);

- Existing and / or proposed legislative and physical protection;
- Current and proposed use / enhancement;
- References; and
- Name of surveyors and date of compilation.

The condition of each feature has also been recorded. A 'good' state of preservation means that the feature is well-maintained and is in no immediate need of restoration. A feature is in a 'fair' state of preservation when it requires immediate intervention since parts of it need conservation. When the feature is in dire need of preservation and risks to be lost if no conservation is carried out immediately, it is marked as being in a 'bad' state. Occasionally it is not possible to access some cultural features. In this case, these are marked as having an 'unknown' state of preservation. Features that are recorded but have been destroyed are marked as such (i.e. destroyed).

Evaluation

An archaeological assessment and significance of the archaeological, rural, vernacular, historical, and cultural heritage features has been derived from the desk-top and field studies. The importance of the conservation of the identified sites and features has been identified with reference to relevant legislation standards, guidance and practices. These include the Structure Plan for the Maltese Islands, Development Planning Act 2010, the Cultural Heritage Act of 2002, Government Notices, and the Central Malta Local Plan.

Standards and Guidance

Guidance on the protection of cultural heritage in the context of planning was taken from the *Cultural Heritage Act*, *Government Notice 160 of 1997 (Rubble Walls Regulations)* the *Structure Plan for the Maltese Islands* and *the Central Malta Local Plan*.

Cultural Heritage Act

This Act provides overall protection to all *movable or immovable objects of artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological importance and includes information or data relative to cultural heritage pertaining to Malta or to any other country* (section 2). In section 3 it also specifies that *For the purposes of this Act, an object shall not be deemed to form part of the cultural heritage unless it has existed in Malta, including the territorial waters thereof, or in any other country, for fifty years, or unless it is an object of cultural, artistic, historical, ethnographic, scientific or industrial value, even if contemporary, that is worth preserving.*

No person shall make any interventions on such cultural property or classes thereof without first having obtained a permit therefore from the Superintendent (Section 44.3). Applications are determined subject to the results of prior investigation: *Before determining an application under subarticle (3) hereof the Superintendent may require such information including the results of such tests, examinations or inspection by such persons*

accredited under this Act for the purpose as may be required by the Superintendent (Section 44.4).

The restrictions on archaeological excavations is stated in Section 43(1) whereby *Archaeological or palaeontological excavations or explorations on land as well as in the territorial waters or in the contiguous zone of Malta can only be made by the Superintendent, or with written permission of the Superintendent.* Chance discoveries of archaeological remains are also regulated by Section 43(2), *Any person who, even accidentally, discovers any object, site or building to which this Act applies in accordance with article 3, shall immediately inform the Superintendent, keep the object found in situ, and shall not for a period of six working days after informing the Superintendent proceed with any work on the site where the object of cultural property is discovered.* The details about rights and obligations by all parties in the eventuality of an archaeological discovery are described in Sections 43(3), 43(4), 43(5), 43(6), 43(7).

Government Notice 160 of 1997

Rubble Walls and Rural Structures (Conservation and Maintenance) Regulations as amended by **LN 169 of 2004** protects all rubble walls and non-habitable rural structures *in view of their historical and architectural importance, their exceptional beauty, their affording a habitat for flora and fauna, and their vital importance in the conservation of the soil and water*. Walls may be sensitively repaired without MEPA's prior authorisation. Certain areas may also be declared to be Rubble Wall Conservation areas in which no alterations to the location or construction of rubble walls and the traditional methods of their repair and maintenance will be permitted without the written approval of MEPA. In such Conservation areas, the Minister for the Environment may order the owner or occupier to repair and re-erect all the rubble walls within the area, and to continue to maintain them. The dismantling of the wall requires a permit from MEPA.

Structure Plan Policies

The Structure Plan contains policies that refer to the grading of archaeological sites and buildings.

Policy **ARC 1** states that in Local Plans for Rural Conservation Areas the Planning Authority may identify and designate Areas and Sites of Archaeological Importance.

Structure Plan Policy **ARC 2**, indicates that if the area is considered for top priority conservation **Class A** no development will be allowed which would adversely affect the natural setting of these monuments or sites. A minimum buffer zone around the periphery of the site will need to be established in which no development will be allowed.

Features identified as **Class B** are regarded *as very important and should be preserved at all costs. Adequate measures to be taken to preclude any damage from immediate development* and for features that are listed as **Class C**, *every effort must be made for preservation, but may be covered up after proper investigation, documentation and cataloguing. Provision for subsequent access shall be provided.* **Class E** has been introduced in the Northwest Local Plan). This deals with a site or area in which the Superintendence of Cultural Heritage or MEPA may have some archaeological

interest. Should MEPA or the Superintendence have such an interest, the applicant proposing development in that location will be required to undertake an investigation including excavation, if necessary. If following investigation, the Superintendence of Cultural Heritage considers the site to be of archaeological value, MEPA will normally refuse development permission if the proposed development would lead to the destruction of the site, or require the development to be modified so that the archaeological value of the site is protected.

The permissible effects of the proposed development on archaeological remains are controlled by policy **ARC 3** … *development affecting ancient monuments and important archaeological areas and sites, including areas and sites having such potential, will normally be refused if there is an overriding case for preservation. Where there is no overriding case for preservation, development of such sites will not normally be permitted until adequate opportunities have been provided for the recording and, where desirable, the excavation of such sites.*

All other archaeological features listed in the catalogue may be included in MEPA's National Protective Inventory according to policy **ARC 7** for which protection is granted by means of policy **ARC 6**.

Rural buildings and rubble walls are protected by the **Rural Conservation Areas** policies and policy **UCO 7**. Policy **UCO 7** establishes the grading of listed buildings in Urban Conservation Areas and regulates works that are acceptable in such buildings. The following are adaptations to that grading system to enable classification of cultural heritage features within a rural setting:

- **Grade 1:** Buildings to be retained in their entirety. *Demolition or alterations which impair the setting or change the external or internal appearances, including anything contained within the curtilage of the building, will not be allowed.*

- **Grade 2:** Buildings assigned a Grade 2 are considered to be of vernacular architectural interest and to contribute to the visual image of the rural area. Permission to demolish such buildings will not normally be allowed. *Alterations to the interior will be allowed if proposed to be carried out sensitively and causing the least detriment to the character and the architectural homogeneity of the building.*

- **Grade 3** Rural buildings are usually either modern (mid-20th century onwards) and therefore *have no historical importance and are relatively minor architectural interest*, or in a state of ruins which are impossible to restore. Permission may be granted for such modern buildings to be demolished provided the replacement building is in harmony with its surroundings. In the case of ruined buildings it is recommended that they be dismantled and the materials re-utilised for the construction, or restoration of other features.

Policy Importance of Archaeological Features

The classification of archaeological features according to their policy importance is guided by legislation, including the Cultural Heritage Act, the Development Planning Act 1992, Structure Plan Policies, and Government Notices regarding specific cultural features. **Table 1** indicates the grading of Archaeological features. It is noted that the same classification applies to Rural Features as discussed below. **Table 1** summarises the features and indicates their policy importance.

Features of International and National Importance

Archaeological features of international or national importance are protected by all of the above, and particularly Structure Plan Policy **ARC 2 Class A**. A feature graded as A in **Table 1** would qualify for protection under Structure Plan Policy **Arc 2 Class 2**. Such features are considered to be top priority for conservation *where no development will be allowed which would adversely affect the natural setting of these monuments or sites. A minimum buffer zone of at least 100m around the periphery of the site will be established in which no development will be allowed.*

Features of National Importance

Archaeological features of national importance are also protected by the above legislation. They are graded as B or medium in **Table 1**. They include those referred to in Structure Plan Policy **ARC 2 Class B**, and are *very important and should be preserved at all costs. Adequate measures to be taken to preclude any damage from immediate development.*

Features of Minor Importance

Archaeological features classified as of minor importance are protected by the Antiquities Protection Act, and other legislation mentioned above. Structure Plan Policy **ARC 3 Class C** provides for … *development affecting ancient monuments and important archaeological areas and sites, including areas and sites having such potential, will normally be refused if there is an overriding case for preservation. Where there is no overriding case for preservation, development of such sites will not normally be permitted until adequate opportunities have been provided for the recording and, where desirable, the excavation of such sites.* The features that have been listed as **Class C**, are protected in so far as *every effort must be made for preservation, but may be covered up after proper investigation, documentation and cataloguing. Provision for subsequent access shall be provided.*

Remaining Features

All other archaeological features listed in the catalogue may be included in the National Protective Inventory of the Planning Authority according to policy **ARC 7** for which protection is granted by means of policy **ARC 6** which indicates that all sites listed in the NPI *will be protected in accordance with the Development Planning Act powers and by reference to the ratings given in Policy* ***ARC 2***.

Table 1: Protection ratings & cultural significance

Cultural Significance	Class	Grade	Protection
Major *National Importance*	A	1	Conserve plus 100m buffer zone
Medium *Local Importance*	B	2	Conserve
Minor	C	3	Record May be covered
None	-	-	May be covered, destroyed, or recycled
Uncertain	E	-	Further investigation is required

The Central Malta Local Plan

The Central Malta Local Plan published by MEPA in August 2006, has designated particular policies to the Maghtab area, which is affected by this proposed development.

Policy CG03, Category 2 Rural settlements, has described Maghtab as "*affected by a fall in rural quality and amenity. The aim of this policy is to counteract these problems by preventing the further development of incompatible uses in the area and by directing further growth only to infill, corner and end of terrace sites as defined in the policy*". This policy is also concerned with the natural vegetation of these areas which forms an essential part of the cultural landscape of the area of proposed development. The area is full of mature carob trees, which the policy calls for their protection. This is because "*Trees associated with rural settlements are generally indigenous or archaeophytic species that are exploited for agricultural purposes such as carob trees, olive trees, almond trees and pomegranates. Although some of these trees, such as carob trees, were much more commonly exploited in the past, they are generally associated with the agricultural landscape that constitutes a predominant feature within the Maltese rural environment. In this regard, such trees complement the character and heritage value of rural settlements. Therefore apart from being of intrinsic, ecological and scientific value, trees within rural settlements are also deemed to be of high aesthetic value. The majority of indigenous or archaeophytic trees are protected by Legal Notice 12 of 2001. This Legal Notice also protects trees that are more than 50 years of age provided that they are not considered to be invasive (invasive species are listed in Schedule V of this Legal Notice), and provided that they are not causing any damage to the biological identity of trees listed in Schedules I and II of this Legal Notice*".

SITE DESCRIPTION

The site of the proposed development lies to the southwest of the Maghtab landfill. It partly consists of garigue and partly of terraced fields. Most of the fields are worked, while others are used by trappers. The southern area (marked A in **Figure** 2) is not worked but lies to a plot that was used for growing wheat at the time of survey as shown in **Plate** 1. The northern area (marked B in **Figure 2**) consists of a number of terraced fields. The southernmost field (marked as b1 in **Figure 2**) is used by trappers who have built a hut in the SW corner (**Plate** 2). The rest of the fields have been abandoned for quite some time as indicated by the shallow soil and transformation into garigue and the general bad state of preservation of the rubble walls. This area was also used by trappers as attested by a modern hut built in rubble which is found abutting two walls (**Plate 3**).

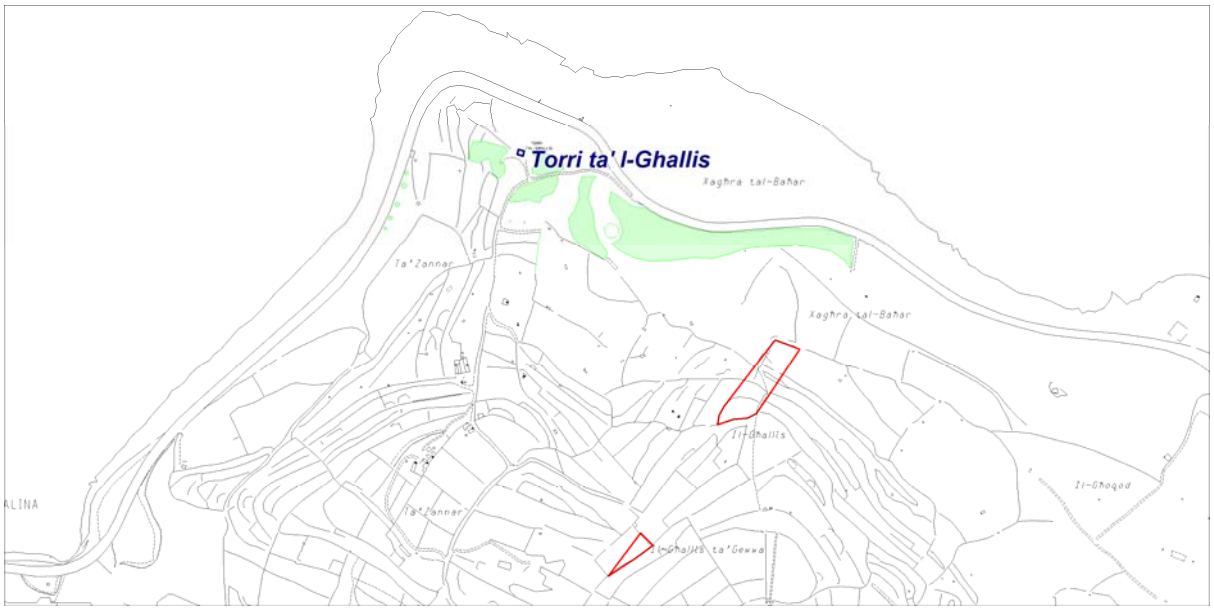
Figure 2: Land use of the Application Site

THE SURVEY RESULTS

Scheduling

There are no scheduled sites in the area of proposed development or immediate vicinity. The nearest scheduled feature is Ghallis Tower which lies about 400m of the NW corner of Area B as shown in **Figure 3**. The Tower has been scheduled as a Grade 1 asset by GN729 of 1995.

Figure 3: Ghallis Tower in relation to the area of proposed development



Area of proposed development

Boundary of Site Ghallis Tower

Historical Background

A research about the general surroundings of the area has been included in the report which is being updated by this study. This update will be restricted to the area of proposed development and its immediate surroundings.

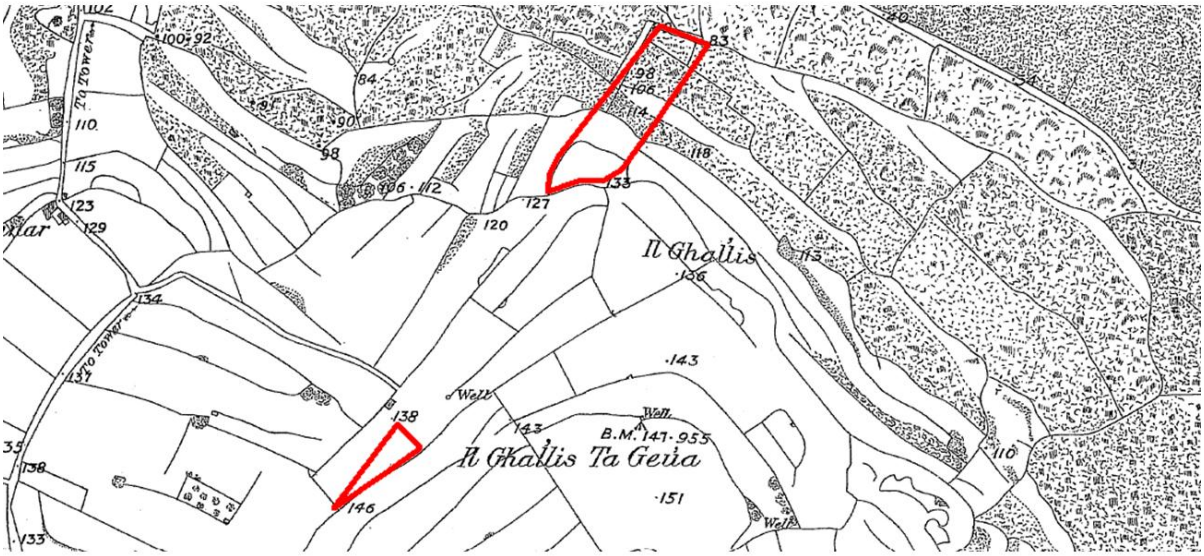
Difficulties

The area of proposed development is an agricultural one which is very close to the coast. There is limited documentation about the area. The 1899 survey sheet (reproduced in **Figure 4**) also shows that changes have been made to the area since it is clear that some rubble walls were either destroyed or added in later years. This was possibly the result of the land being used by the War Department as indicated by a number of signposts that were noticed and recorded in the area, as well as by modern agricultural and trapping activity.

During the time of survey the areas to be studied where overgrown with vegetation making it difficult to read the ground surface and identify any pottery scatters, if any.

The cultural landscape of the area has also been greatly disturbed by the presence of the Maghtab landfill which has completely erased any cultural features.

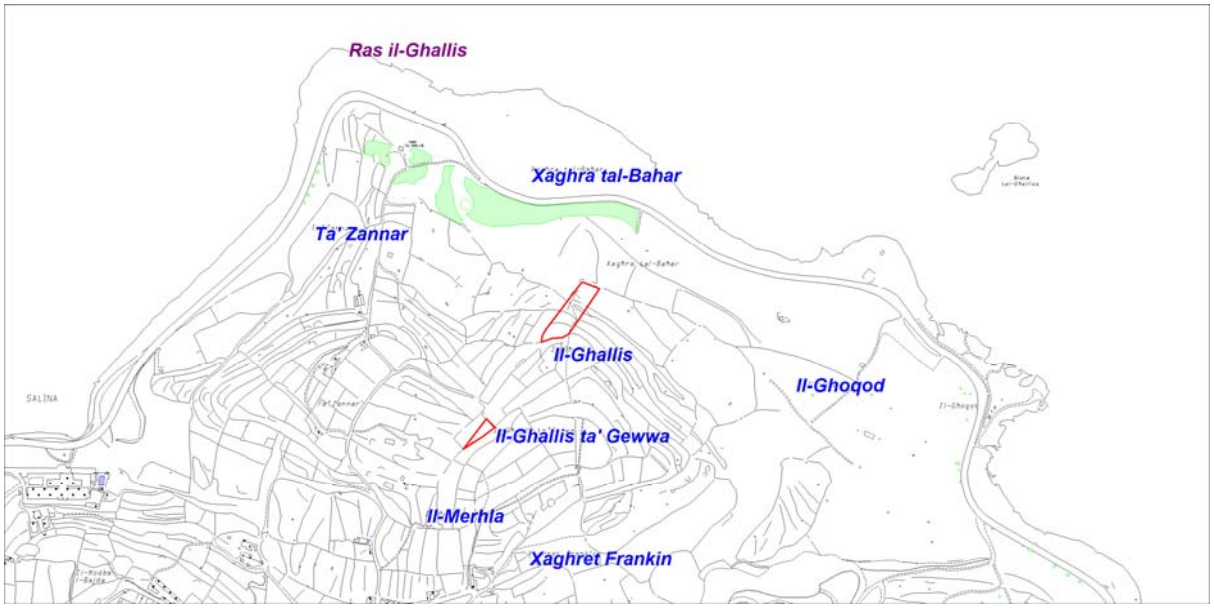
Figure 4: Sheet 22 dating to 1899 showing the area of study



Toponomy

A number of place-names have been identified from the survey sheets (**Figure 5**). Toponomy may indicate historical aspects of the area and as such, meanings and dates can be derived. Below is a list of these place-names as found on survey sheets and related information. Place names in the area shed important light on land tenure in the Medieval Period.

Figure 5: Place names in the area around the Application Site



Il-Merhla Place name from the 1992 survey sheet

Ras il-Ghallis Place name from the 1899 survey sheet

Maghtab

A district near Bahar ic-Caghaq; mentioned in notarial archives of 15.x.1467, 13.iv.1486, and later. Meaning: a place of perdition or destruction; or dangerous place; a place where one becomes fatigued (Wettinger 2000: 356)

Ras il-Ghallis

This place name refers to the eastern point of Salina Bay. It was mentioned as a fief in notarial deeds dating to 1548 (Wettinger 2000: 459).

Xaghra tal-Bahar

No reference found.

Ta' Zannar

No reference found.

Il-Ghallis

This place name refers to "extensive land at the southern side to the entrance of Salina Bay" (Wettinger 2000: 195). A reference to it was found in the Cathedral Museum Archives dating to 1490. The place name may either refer to an Arabic personal name, 'Allis, or a small plant (Wettinger 2000: 195).

Il-Ghallis ta' Gewwa

No direct reference is found, but it is linked to the 'Ghallis' place name mentioned above.

Il-Merhla

A field at Ghallis, which formed part of the Bishop's estates in Central Malta. These were 'galeki' belonging to the Bishop in 1517. A notarial deed of 1517 describes it as a piece of land at Ghallis which was surrounded with walls ('muraglie'). Wettinger (2000: 374) relates this place name to an animal yard, and to a farm ('razzett').

Xaghret Frankin

No direct reference found

Il-Ghoqod

Fields at Naxxar mentioned in notarial deeds that date to 1538. Wettinger (2000: 26) fails to give the place name a particular meaning.

Historical Importance of the Area

The area was essentially an agricultural area that assumed a defensive role due to its proximity to the coast. The area is not documented and as such there are no historical records apart from place names which indicate that the area consisted of fiefs which were used for agriculture already in the Late Middle Ages. The lack of information contrasts with the Salina Bay Area which was more sheltered, and therefore occupied from earlier periods. Although the area is quite poor in historical documentation, a number of vernacular features within the area of proposed development and the immediate surroundings were noted.

Medieval Period

Some of the place names in the area being studied date to the Medieval Period. Maghtab and Ghallis are both mentioned in documents of the late 15th century. Ras il-Ghallis was mentioned as a fief in 1548. A fiefdom was a common landholding in this period where blocks of royal land were granted out, mostly on terms of military service, to influential inhabitants of Mdina. In fact, in 1522, Naxxar landowners possessed land in Ghallis, among other areas (Wettinger 1981:8). The Bishop also possessed land in this area, as for example, Il-Merhla. This means that, although undefended, this area was already exploited for agriculture and animal husbandry.

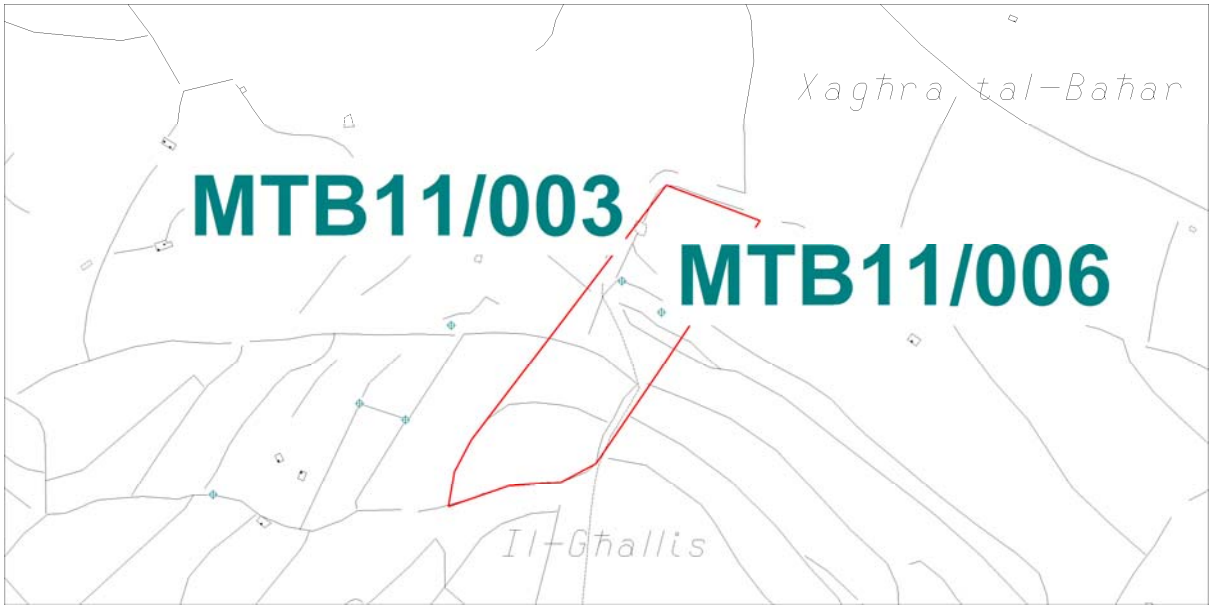
Knights Period

The Ghallis Tower, which lies outside the area of proposed development played an important role in the coastal defence of the Maltese Islands during the time of the Knights. Being on the headland, the area must have been practically deserted since it was too much exposed. This fort made the area safer since the tower acted both as an early-warning signalling post and a deterrent to enemy landing. This tower was erected in 1658/59 together with another 12 towers built at the expense of Grand Master De Redin (Spiteri 2008: 351). These towers were meant to be manned by the *Guardia Torre,* a permanent guard aimed at hoarding the coast and paid by the Università. This replaces the system of 60 look out posts manned each night by four peasants (Spiteri 2008: 351.)

British Period

The same defensive role was assumed during the British Period. This is indicated by a number of War Department markers (shown in **Figure 6**) recorded in the area of proposed development and its surroundings. Two of these markers, **MTB11/003** and **MTB11/006**, are within the area of proposed development. A number of structures in the general area of Ghallis belonging to the period of the Second World War are also still visible.

Figure 6: War Department Boundary Markers in the area of proposed development and surroundings



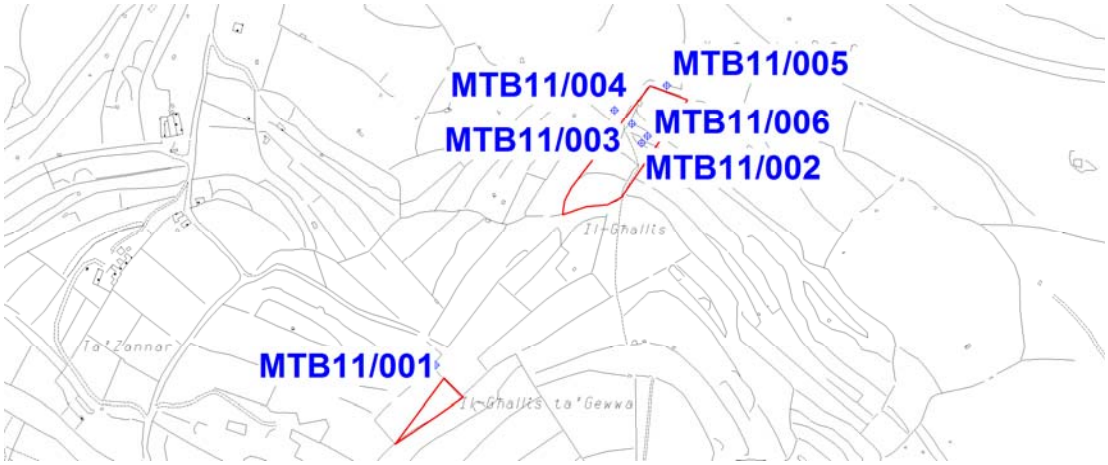
CULTURAL FEATURES

Figure 7 shows the location of the cultural features within the A of I. These are described in detail in the Catalogue Sheets in **Appendix I**. **Table 2** lists these features and briefly describes their proposed level of protection.

Table 2: Cultural Features that Merit Conservation; Summary of Policy Importance

Feature Ref. Number	Feature	Class / Grade / Level	Merits
MTB11/001	Field room	Grade 3	Vernacular
MTB11/002	Water channel	Grade 3	Vernacular
MTB11/003	Boundary Marker	Class B	Military
MTB11/004	Well	Grade 3	Vernacular
MTB11/005	Country Road	Grade 3	Vernacular
MTB11/006	Boundary Marker	Class B	Military

Figure 7: Recorded Cultural features in the A of I



Rural Features

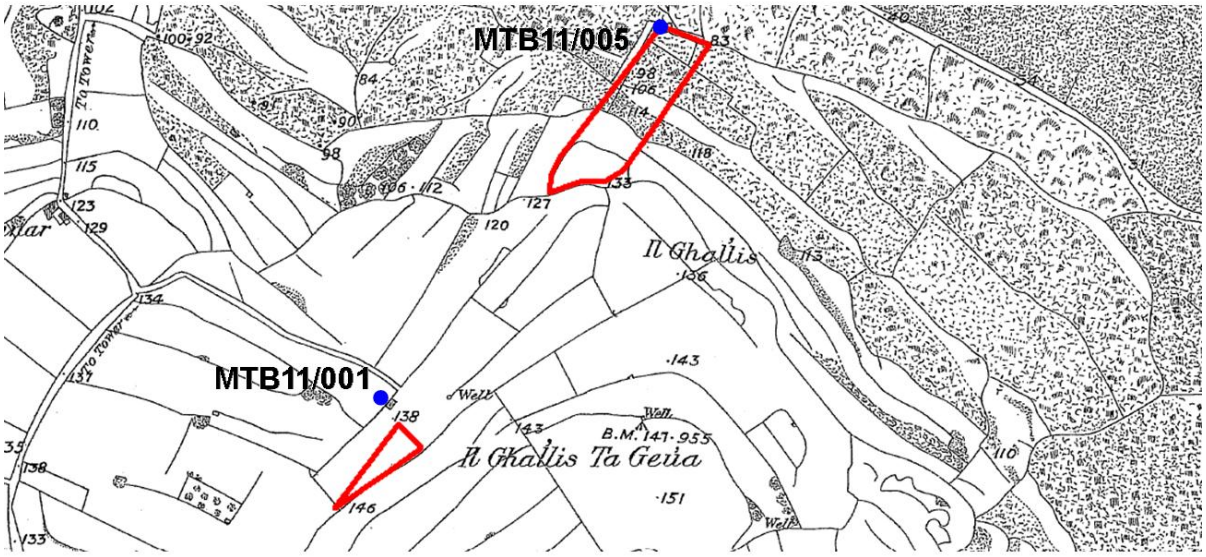
Given that the area is mostly an agricultural one, most of the cultural features in the area are vernacular features. It is being suggested that these features are given a Grade 3 Level of Protection following the description in the Structure Plan discussed above.

MTB11/001 is a one-storey field room which lies outside the area of proposed development. It is locked and still in use, since it is in a good state of preservation, and has been furnished with modern drain pipes for the collection of water from the roof. It was built in dressed ashlar blocks. Its door faces south-east and has a very small window on the north-eastern wall. This room predates 1899 since it is already visible in that survey sheet as shown in **Figure 8.**

MTB11/002 and **MTB11/004** are both linked to the collection of water. **MTB11/002** is a small rock-cut channel above which is a rubble wall. This must have been used to collect ground water from the field above. The area is overgrown and therefore it was not possible to determine the presence or otherwise of the continuation of this channel. However, a number of wells were already visible in the 1899 survey sheet. Therefore, the practice of collecting rain water was very common in the area. In fact, **MTB11/004** is a well that was hewn out of the rock. Its well head is clearly marked since it consists of a circular rubble structure, with a diameter of about 1.5m and a height of about 0.75m. This well was not marked on the 1899 survey sheet, and is now abandoned like the fields in this part of the survey area.

MTB11/005 is a short country road bounded by two rubble walls. It is particular, since it is visible in the 1899 survey sheet (refer to **Figure 8**) and presently seems to have no purpose. This is because many rubble walls have been abandoned or destroyed. However, it still needs to be recorded, and as such a Grade 3 level of protection is being proposed.

Figure 8: Recorded Cultural features in the A of I in relation to the 1899 survey sheet



Rubble Walls

Rubble walls have stood in the area for centuries, delineating boundaries, offering protection from winds to man, animals, crops and trees, and even used to build field terracing. The dating of rubble walls is usually difficult. Most of the rubble walls in the area, can at least be dated to before 1899.

The condition of these rubble walls varies considerably as can be noted in **Figure 9**.

Figure 9: Conditions of Rubble Walls round the area for proposed development

The present state and length of the rubble walls in the area are divided into three categories (as agreed with MEPA) as shown in **Table 3**.

Table 3: Rubble Walls

	Grade	Length (m / %of total)	Colour Code on Figure 7
Good to Fair Condition	A	32.26m/7%	Red
Fair to Poor Condition	B	220.71m/47%	Orange
Bad Condition/ Slight Traces only	C	216.07m/46%	Green

Grade A walls
The state of preservation of the rubble walls indicated as Grade A, ranges from good to fair condition. These walls still retain a large percentage of the original stonework, which may vary from 85% to 65% of the whole **(Plate 4)**. In this case this category also includes walls which have megaliths which are of an archaeological nature.

Grade B walls
Grade B walls range from fair to poor condition. These walls still contain part of the original stonework but have parts either restored with new blocks of stone or are still partly in a demolished state. The amount of original stonework varies from 64% to 35% of the whole **(Plate 5)**.

Grade C walls
These walls are in a bad state of repair and in some cases they consist of slight traces only. The amount of original stonework varies from 34% to 10% of the whole **(Plate 6)**.

Boundary Marker

Two boundary markers lies just within the area of proposed development. These markers showed that the area was under the jurisdiction of the War Department during the British Period. **MTB11/003** was erected on a rubble wall and supported by a triangular pillar. This marker was numbered 157. **MTB11/006** is not in its original location since it has been found lying horizontally on the garigue. It was marked as "WD 158". Although a number of these features are still found, they have been decreasing rapidly by modern development. As such, they deserve to be classified as Class B features.

Cultural Landscape

All archaeological and historical sites and features form part of the landscape which surrounds them, and any survey of the cultural heritage has to study a site's context as well as the site itself. From fieldwork in the neighbourhood, a picture of the cultural landscape of which the site is part can be formed. This is important since no site is isolated from the fields and geographical features which surround it, and on which it depends, to varying degrees. Every site is a piece of local history, embedded in its immediate cultural landscape and relating to the area around it (Barker 1993: 254). The phrase "cultural landscape" does not mean a special type of landscape, but rather a way of seeing landscapes that emphasizes the interaction between human beings and nature over time. The main value of the cultural heritage in the area lies in the information it can yield regarding past settlement patterns, as well as the indications regarding land-use patterns.

Schembri (1997: 115) describes the current Maltese landscape as "*a result of the interaction of geology and climate, coupled with the intense human exploitation of the environment over many thousands of years, which has altered the original condition of the vegetation cover, principally through the diversion of vast tracts of land to cultivation, the*

construction of terraces, water catchment devices, irrigation channels and drainage ditches, the grazing of animals on uncultivated land, and the development of land for buildings and industry".

Originally a garigue landscape, this area was transformed into an agricultural one. Rubble wells were built, wells excavated and field rooms erected. Its defensive importance led to its enclosure with War Department markers excluding civilians from the area. After the war, agriculture took over the land. At this stage rubble walls were reshuffled. Some fields were transformed by bird trappers, while others were abandoned. Today, it is being encroached by the Maghtab landfill, which has once again considerably changed the landscape of the area of study.

IMPACTS OF THE PROPOSED DEVELOPMENT

The area of proposed development, consisting of fields enclosed with rubble walls. **MTB11/002, MTB11/003**, **MTB11/005** and **MTB11/006** will be destroyed. **MTB11/001** and **MTB11/004** will be encroached upon by the landfill.

PROPOSED MITIGATION MEASURES

Soil removal from the area should be monitored by a qualified archaeologist approved and directed by the Superintendence of Cultural Heritage. This will ensure that no other features which were not visible or buried at the time of survey is destroyed or lost without previous documentation.

BIBLIOGRAPHY

Abela, G.F. 1647 Della Descrittione di Malta Isola nel Mare Siciliano con le sue Antichità , ed alter notizie. Libr Quattro., 1984 Facsimilie Edition. Midsea Books, Malta.

Aston, M. 1985 Interpreting the Landscape: Landscape Archaeology and Local History. Routledge, London.

Barker, P. 1993 Techniques of Archaeological Excavation. Third Edition. B.T. Batsford Ltd., London.

Cassar, L., F.
1997 Settlement Patterns in the Maltese Islands: from early colonisation to pre-Independence, GeoJournal 41.2: 137-144.

Catania, P. 1999 In-Naxxar: titwiliet fl-Istorja. Paul Catania and Joe Zammit Ciantar, Malta.

Evans, J.D. 1971 The Prehistoric Antiquities of the Maltese Islands: A Survey, The Athlone Press, London.

Goacinto, C., 1811 Saggio di Agricoltura per le isole di Malta e Gozo, Messina.

Gullaimier, A., 1972 Bliet u Rhula Maltin, Malta.

Jaccarini, C.J. 1998 Ir-Razzett – The Maltese Farmhouse. C.J. Jaccarini, Malta.

Pedley, M., Hughes Clarke, M. and Galea, P.
2002 Limestone Isles in a Crystal Sea: the geology of the Maltese Islands, P.E.G., Ltd, Malta.

Renfrew, C. & Bahn, P.
1991 Archaeology. Theories, Methods, and Practice. Thames and Hudson, London.

Sagona, C. 2002 The Archaeology of Punic Malta, Louvain, Peeters.

Schembri, P.J., 1997 The Maltese Islands: climate, vegetation and landscape, GeoJournal 41.2: 1115-125.

Spiteri, S. 2008 The Art of Fortress Building in Hospitaller Malta 1530-1798: A study in building methods, material and techniques, BDL Publishing Malta.

Trump, D. 1997 Malta: An Archaeological Guide. Reprint of the 1990 Second Edition. Progress Press, Malta.

Trump, D. 2002 Malta Prehistory and Temples, Midsea Books, Malta.

Vogiatzakis, I.N., Pungetti, G., Mannion, A.M. (eds),
2008 Mediterranean Island Landscapes: natural and cultural approaches, *Springer*.

Wettinger G. 1981 Agriculture in Malta in the Late Middle Ages, in Proceedings of History Week: 1-48.

Place-Names of the Maltese Islands ca. 1300-1800, P.E.G. Ltd, Malta.

Annual Reports of the Workings of the Museums Department (MARs). 1904–1998.
Malta Archaeological Review Issues 1 to 6 (1996-2002/2003).
Superintendence of Cultural Heritage Annual Reports 2004-2006.
The Structure Plan of the Maltese Islands (Revised). 1997.
Cultural Heritage Act, 2002.
The Central Malta Local Plan, July 2006.
The Development Planning Act, Environmental Impact Assessment Regulations, 2001.
The Environment Protection Act, 1991.

Appendix 1

Catalogue cards of features within the Area of Proposed Development

Data Capture Sheet

ref no
MTB11/001

Location	Category	Site Description (Address)
Il-Ghallis ta' Gewwa, Bahar ic-Caghaq	Vernacular	field room

Eastings	Northings	Period
4920	7864	19th century or previous

SS No1	SS No2	Description
4878		One-storey field room built in dressed ashlar blocks. Its door faces south-east and has a very small window on the north-eastern wall. This room predates 1899 since it is already visible in that survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation

Possibly storage. It is locked and still in use, since it is in a good state of preservation, and has been furnished with modern drain pipes for the collection of water from the roof.

Comments

Site

MTB11/001 (1)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography
Jaccarini, C.J., 1998, Ir-Razzett – The Maltese Farmhouse, P.E.G. Ltd, Malta.

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/001 (3)

MTB11/001 (4)

MTB11/001 (5)

Data Capture Sheet

ref no
MTB11/002

Location	**Category**	**Site Description (Address)**
Il-Ghallis, Bahar ic-Caghaq	Vernacular	water channel

Eastings	**Northings**	**Period**
4937	7883	Unknown

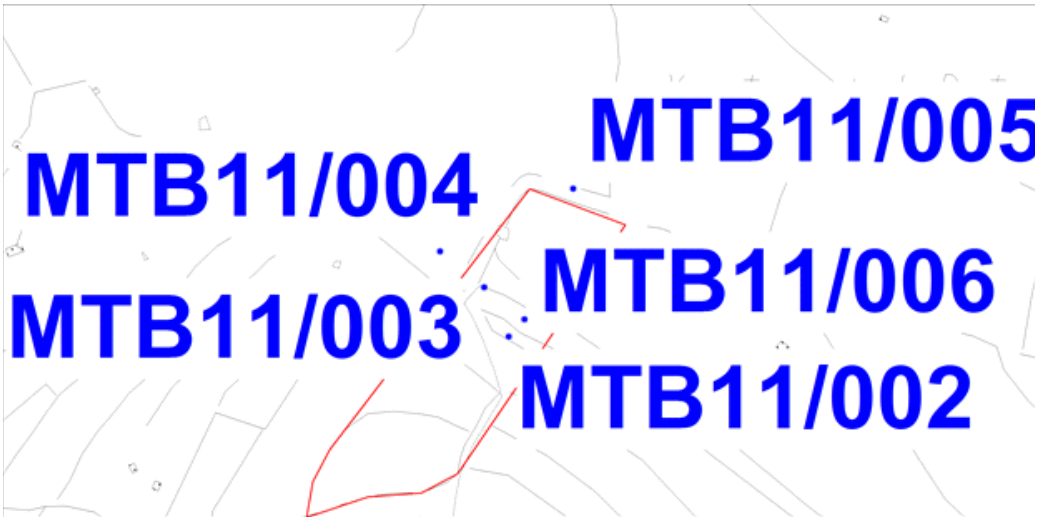
SS No1	**SS No2**	**Description**
4878		A small rock-cut channel below a rubble wall. This must have been used to collect ground water from the field above.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments
The area is overgrown and therefore it was not possible to determine the presence or otherwise of the continuation of this channel.

Site



MTB11/002 (6)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/002 (5)

MTB11/002 (8)

Data Capture Sheet

ref no
MTB11/003

Location	**Category**	**Site Description (Address)**
Il-Ghallis, Bahar ic-Caghaq	Military	boundary marker

Eastings	**Northings**	**Period**
4936	7884	20th century

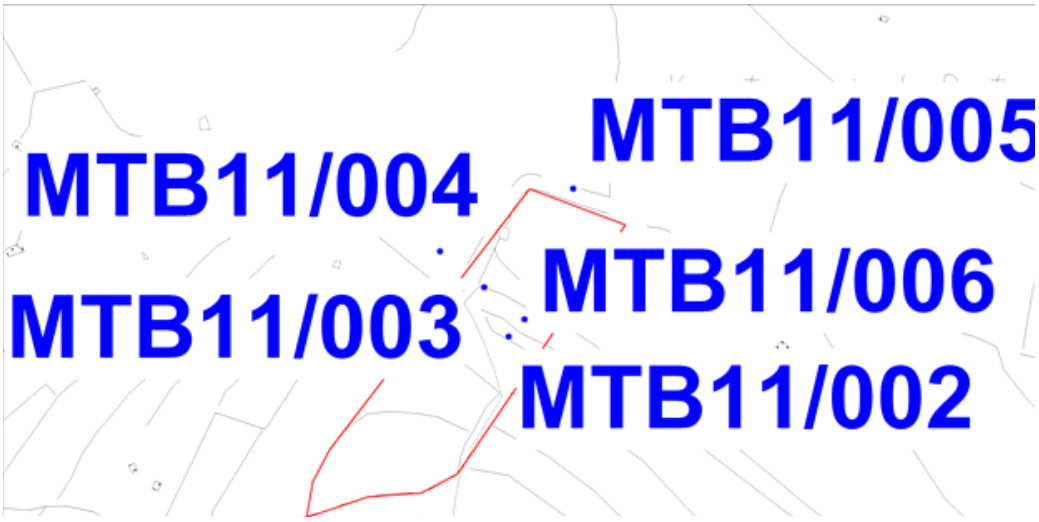
SS No1	**SS No2**	**Description**
4878		War Department boundary marker erected on a rubble wall and supported by a triangular pillar. This marker was numbered 157.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB11/003 (5)

Condition
Fair

Degree of Protection
None

Proposed Protection
Class B

Basic Bibliography

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/003 (3)

MTB11/003 (1)

Data Capture Sheet

ref no
MTB11/004

Location	**Category**	**Site Description (Address)**
Il-Ghallis, Bahar ic-Caghaq	Vernacular	well

Eastings	**Northings**	**Period**
4934	7885	Unknown

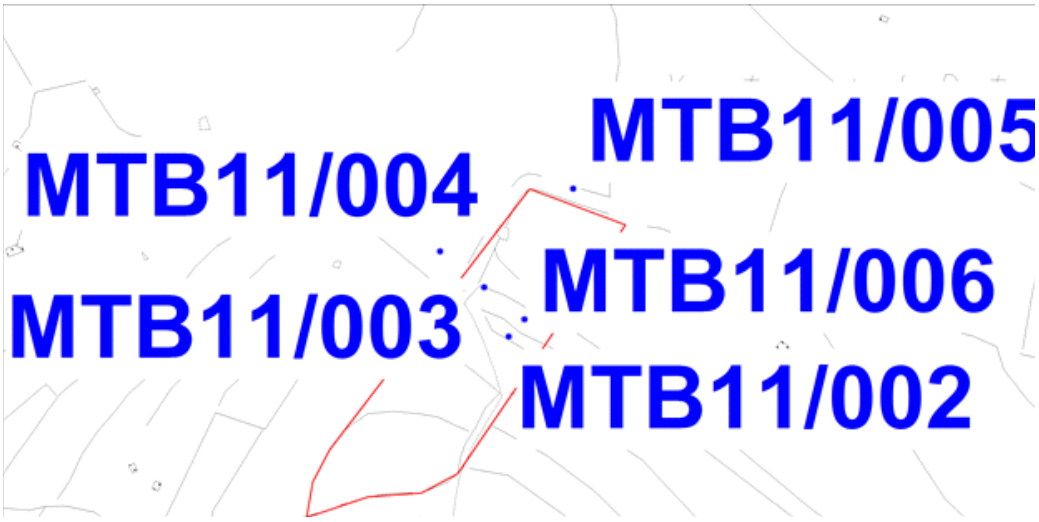
SS No1	**SS No2**	**Description**
4878		Bell-shaped well hewn out of the rock. Its well head consists of a circular rubble structure, with a diameter of about 1.5m and a height of about 0.75m.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB11/004 (8)

Condition
Fair

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/004 (1)

MTB11/004 (3)

MTB11/004 (7)

Data Capture Sheet

ref no
MTB11/005

Location	**Category**	**Site Description (Address)**
Il-Ghallis, Bahar ic-Caghaq	Vernacular	country road

Eastings	**Northings**	**Period**
4939	7887	19th century or previous

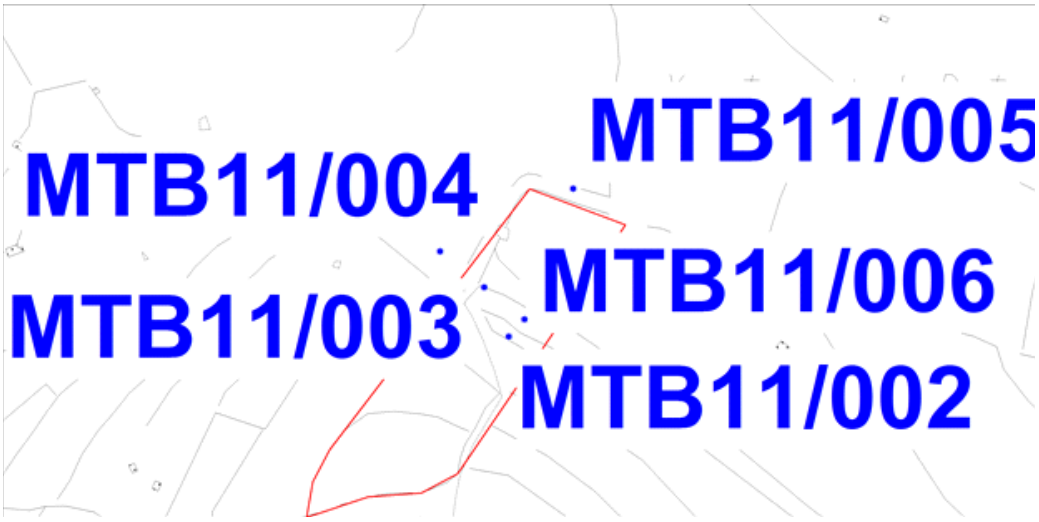
SS No1	**SS No2**	**Description**
4878		Short country road bounded by two rubble walls, visible in the 1899 survey sheet.
SS No4	**SS No3**	

Date of survey sheet: 1992

Present Utilisation
None

Comments

Site



MTB11/005 (2)

Condition
Bad

Degree of Protection
None

Proposed Protection
Grade 3

Basic Bibliography

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/005 (4)

Data Capture Sheet

ref no
MTB11/006

Location	**Category**	**Site Description (Address)**
Il-Ghallis, Bahar ic-Caghaq	Military	boundary marker

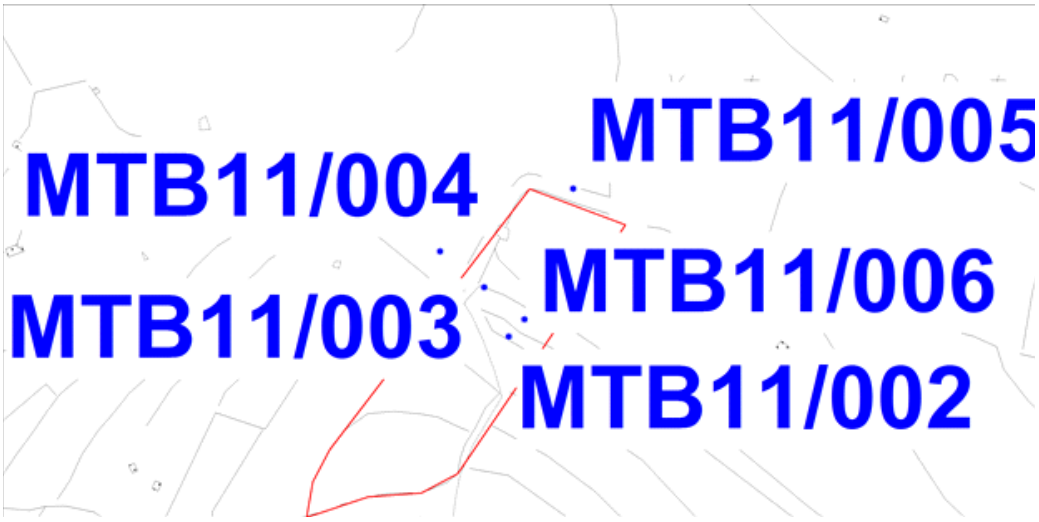
Eastings	**Northings**	**Period**
4937	7883	20th century

SS No1	**SS No2**	**Description**
4878		Two boundary markers lies just within the area of proposed development. These markers showed that the area was under the jurisdiction of the War Department during the British Period. MTB11/003 was erected on a rubble wall and supported by a triangular pillar. This marker was numbered 157. MTB11/006 is not in its original location since it has been found lying horizontally on the garigue. It was marked as “WD 158”. Although a number of these features are still found, they have been decreasing rapidly by modern development. As such, they deserve to be classified as Class B features.
SS No4	**SS No3**	
Date of survey sheet:	1992	

Present Utilisation
None

Comments

Site



MTB11/006 (2)

Condition
Fair

Degree of Protection
None

Proposed Protection
Class B

Basic Bibliography

Compiled by
MB

Date of Survey
14.iii.2011

MTB11/006 (4)

Appendix 2

Plates

Plate 1: Worked field in Area A

Plate 2: Trapping hut at the SW of Area B

Plate 3: Trapping hut at the NW of Area B

Plate 4: Grade A rubble wall within the area of proposed development

Plate 5: Grade B Rubble wall within the area of proposed development

Plate 6: Grade C Rubble Wall (foreground) within the area of proposed development

GFE 00121/06 (PA02342/06)

MAGHTAB ENVIRONMENTAL COMPLEX MASTER PLAN

Cultural Heritage input to the Environmental Impact Statement (EIS) Update related to the development at the Maghtab Environmental Complex, limits of Naxxar

Prepared by:

Marlene Borg

of

Archaeological Services Co-operative Ltd

On behalf of
Adi Associates

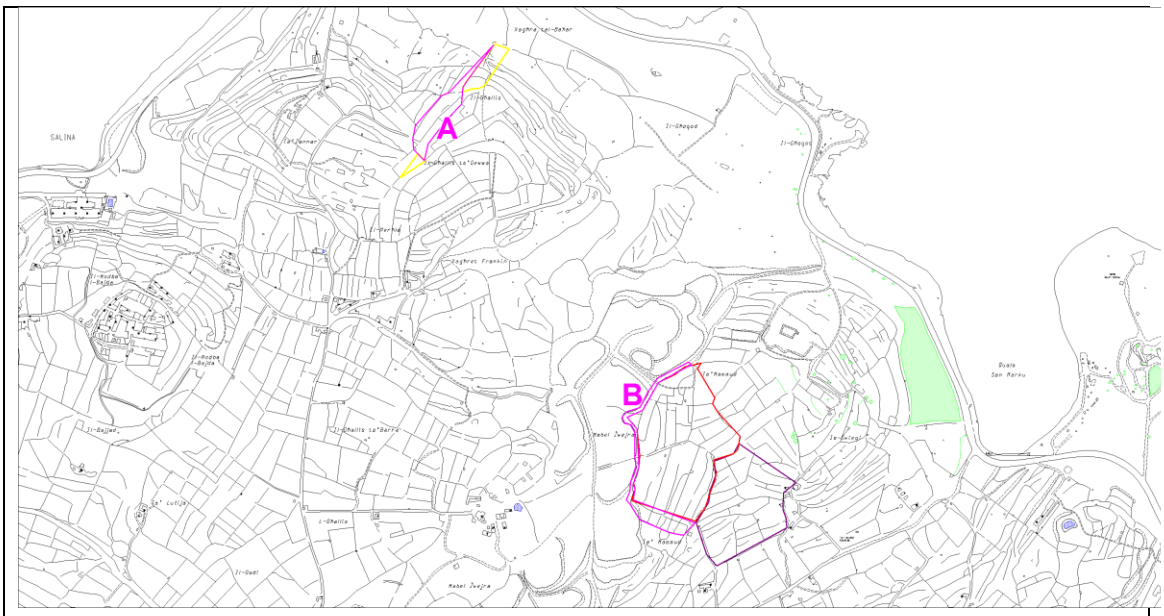
September 2011

1. CULTURAL HERITAGE STUDY

INTRODUCTION

This report is an update of a previous cultural heritage baseline study carried out by Mr Godwin Vella and follows the Method Statement submitted to MEPA in June 2010 by adi Associates. ASC has already carried out an update to this report regarding an area south of the main Maghtab complex in August 2010 and another one in March 2011 for an area north of the complex. The areas covered in these two previous report are shown in **Figure 1**. This report now concerns two extensions to the said areas, marked A and B in the figure below.

Figure 1: Areas covered in studies by ASC



	Area of study (August 2010)
	Area influence (August 2010) Figure 1: Application Site
	Area of study (March 2011)
	Areas of study for this report (A and B) (September 2011)

The main aims of this study are to:

- carry out a baseline survey of the cultural heritage assets and an evaluation of their importance;
- input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage within the A of I;
- carry out an assessment of the impact of the construction and operation of the scheme on the cultural heritage assets of the site and A of I and an evaluation of the significance of these effects; and
- to describe mitigation measures designed to minimise adverse impacts on cultural heritage of the area.

STUDY METHODOLOGY

The study covers aspects of archaeological, rural, vernacular, historical, and cultural heritage within the area of proposed developments as delineated on **Figure 1** and its immediate surroundings. The same methodology as to the other reports was followed.

SITE DESCRIPTION

The sites of the proposed development lie on the immediate outskirts of the Maghtab landfill. They consist of garigue and partly of terraced fields. Most of the fields in the area are worked, while others are used by trappers.

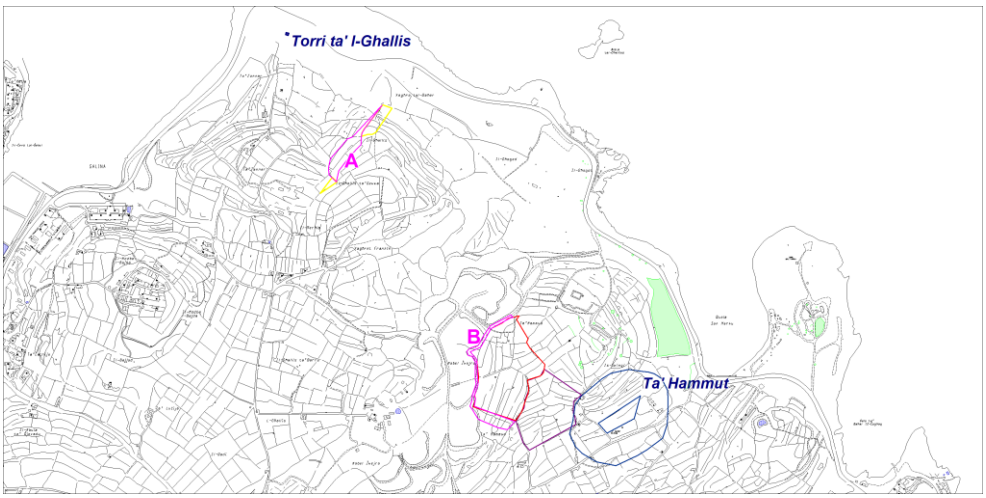
The northern area (marked A in **Figure 2**) is partially worked, while the rest is an enclosed garigue land which is used for trapping (**Plate 1**). The southern area (marked B in **Figure 2** and shown in **Plate 2**) is mainly the ring road surrounding the landfill and rubble which has been dumped from Maghtab to form this road.

THE SURVEY RESULTS

Scheduling

There are no scheduled sites in the area of proposed development or immediate vicinity. The nearest scheduled feature to Area A is Ghallis Tower which lies about 400m of the NW corner of Area B as shown in **Figure 2**. The Tower has been scheduled as a Grade 1 asset by GN729 of 1995. To the south-east of Area B is the buffer zone of the Ta' Hammut Dolmens as shown in **Figure 2.** This site has been scheduled by GN574 of 1994 as a Class A site.

Figure 2: Location of scheduled sites in in relation to the areas of study



Area of study

Scheduled sites

Historical Background

A research about the general surroundings of the area has been included in the report which is being updated by this study. There is no additional information found in relation to these two areas.

Difficulties

A further difficulty related to this particular study is that Area B is mostly either covered with debris from Maghtab and its ring road or covered in thick vegetation, mostly consisting of carob trees. This obviously hinders visibility.

Toponomy

A number of place-names have been identified from the survey sheets. No new place names were identified since the new areas are in the immediate vicinity of the previously surveyed areas.

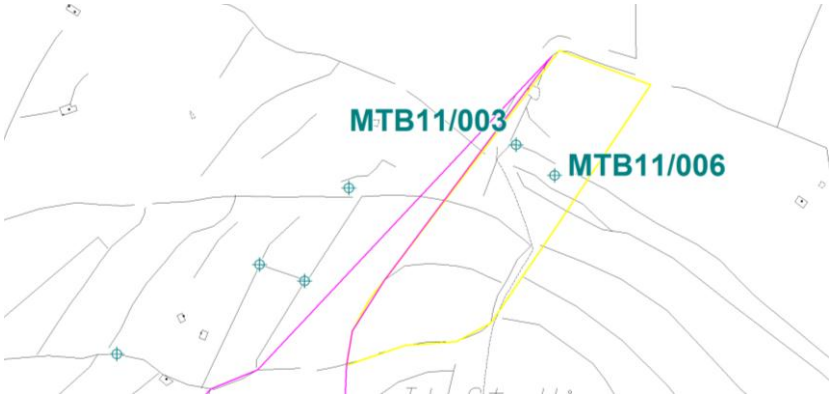
Historical Importance of the Area

The areas have the same historical context and there is no need for new additions to this section.

CULTURAL FEATURES

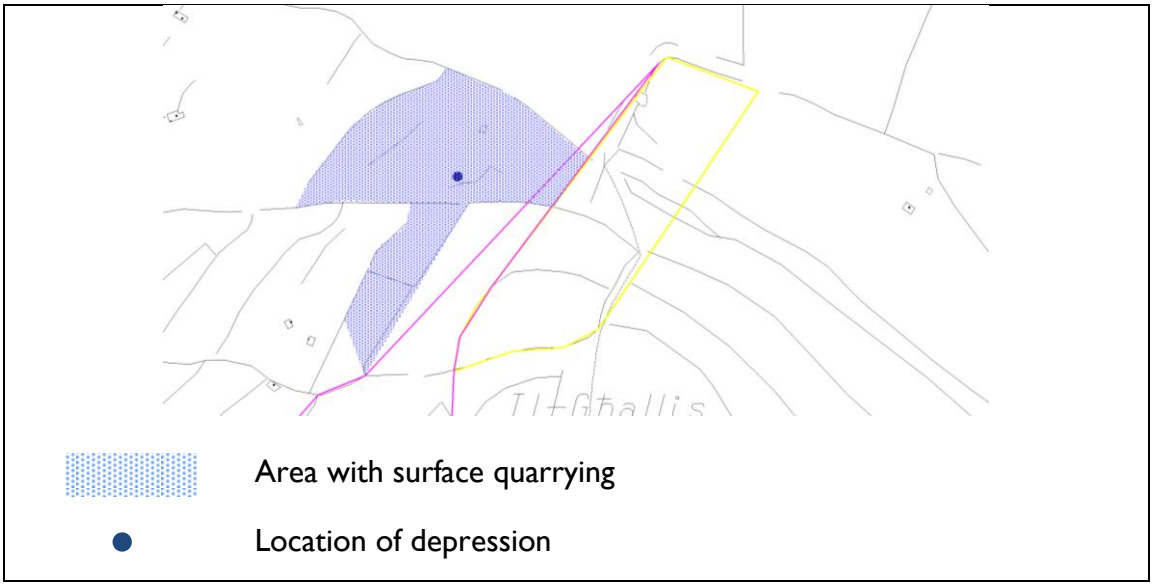
No further cultural features were documented in the area. However, outside the area, within 30m, a number of features were noted. These include War Department boundary markers, shown in **Figure 3**, already discussed in the March 2011 report.

Figure 3: Location of War Department Boundary Markers



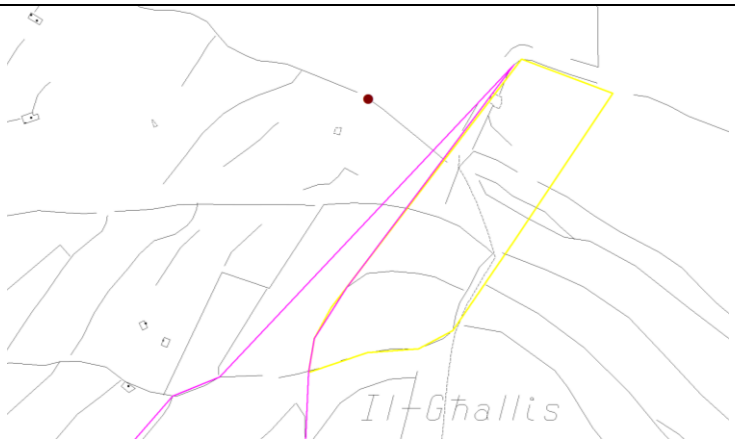
Part of Area A, as well as its immediate surroundings (**Figure 4**) showed signs of surface (**Plate 3**). This was practised in this area to make use of the natural fissures found in the Lower Coralline Limestone surface. One such natural fissure has led to the creation of a rock-cut depression, marked on **Figure 4** and **Plates 4** and **5**. This might have been enlarged later on to store water.

Figure 4: Area where surface quarrying is visible.



Another noteworthy feature, is the blocked entrance to a rubble wall which was formed by two large stones erected vertically to form a doorway. Its location is shown in **Figure 5**. It is not clear whether these stones (**Plates 6** and **7**) formed part of a previous megalithic structure or not. One should note that it is common for LCL to break up into large fragments.

Figure 5: Location of large stones in blocked rubble wall entrance



● Location of large stones in blocked rubble wall entrance

Rubble Walls

The condition of rubble walls has been noted in **Figures 6** and **7**. The rubble walls in Area A are relatively well maintained since the area is being used for bird trapping as well as for agriculture. The rubble walls in Area B are in a worse state, some of which have been covered by debris by the road mentioned above.

Figure 6: Conditions of Rubble Walls in Area A

Figure 7: Conditions of Rubble Walls in Area B

The present state and length of the rubble walls in the area are divided into three categories (as agreed with MEPA) as shown in **Table 1**.

Table 3: Rubble Walls

	Grade	Length (m / %of total)	Colour Code on Figures 6 and 7
Area A			
Good to Fair Condition	A	50.63m/12%	Red
Fair to Poor Condition	B	288.28m/66%	Orange
Bad Condition/ Slight Traces only	C	96.11m/22%	Green
Area B			
Good to Fair Condition	A	170.96m/48%	Red
Fair to Poor Condition	B	31.27m/9%	Orange
Bad Condition/ Slight Traces only	C	24.73m/7%	Green
Destroyed		129.42m/36%	Light Green

IMPACTS OF THE PROPOSED DEVELOPMENT

There are no other impacts for Area B which have not already been mentioned in the August 2011 report. The same accounts for Area A, except that since the development is encroaching further onto the area with boundary markers and quarrying, more attention should be given to rubble and debris which might cover and damage these features. The same goes for heavy machinery. Their manoeuvres in the area might lead to the destruction of rubble walls on which the boundary markers are found.

PROPOSED MITIGATION MEASURES

As mentioned in the previous reports, soil removal from the area should be monitored by a qualified archaeologist approved and directed by the Superintendence of Cultural Heritage (SCH). This will ensure that no other features which were not visible or buried at the time of survey is destroyed or lost without previous documentation.

SCH might also require further investigation into the quarrying and depression noted in the area. This may shed more light on the nature of the large rocks in the rubble wall and the depression's exact use.

BIBLIOGRAPHY

Abela, G.F. 1647 Della Descrittione di Malta Isola nel Mare Siciliano con le sue Antichità , ed alter notizie. Libr Quattro., 1984 Facsimilie Edition. Midsea Books, Malta.

Aston, M. 1985 Interpreting the Landscape: Landscape Archaeology and Local History. Routledge, London.

Barker, P. 1993 Techniques of Archaeological Excavation. Third Edition. B.T. Batsford Ltd., London.

Cassar, L., F.
1997 Settlement Patterns in the Maltese Islands: from early colonisation to pre-Independence, GeoJournal 41.2: 137-144.

Catania, P. 1999 In-Naxxar: titwiliet fl-Istorja. Paul Catania and Joe Zammit Ciantar, Malta.

Evans, J.D. 1971 The Prehistoric Antiquities of the Maltese Islands: A Survey, The Athlone Press, London.

Goacinto, C., 1811 Saggio di Agricoltura per le isole di Malta e Gozo, Messina.

Gullaimier, A., 1972 Bliet u Rhula Maltin, Malta.

Jaccarini, C.J. 1998 Ir-Razzett – The Maltese Farmhouse. C.J. Jaccarini, Malta.

Pedley, M., Hughes Clarke, M. and Galea, P.
2002 Limestone Isles in a Crystal Sea: the geology of the Maltese Islands, P.E.G., Ltd, Malta.

Renfrew, C. & Bahn, P.
1991 Archaeology. Theories, Methods, and Practice. Thames and Hudson, London.

Sagona, C. 2002 The Archaeology of Punic Malta, Louvain, Peeters.

Schembri, P.J., 1997 The Maltese Islands: climate, vegetation and landscape, GeoJournal 41.2: 1115-125.

Spiteri, S. 2008 The Art of Fortress Building in Hospitaller Malta 1530-1798: A study in building methods, material and techniques, BDL Publishing Malta.

Trump, D. 1997 Malta: An Archaeological Guide. Reprint of the 1990 Second Edition. Progress Press, Malta.

Trump, D. 2002 Malta Prehistory and Temples, Midsea Books, Malta.

Vogiatzakis, I.N., Pungetti, G., Mannion, A.M. (eds),
2008 Mediterranean Island Landscapes: natural and cultural approaches, *Springer*.

Wettinger G. 1981 Agriculture in Malta in the Late Middle Ages, in Proceedings of History Week: 1-48.

Place-Names of the Maltese Islands ca. 1300-1800, P.E.G. Ltd, Malta.

Annual Reports of the Workings of the Museums Department (MARs). 1904–1998.
Malta Archaeological Review Issues 1 to 6 (1996-2002/2003).
Superintendence of Cultural Heritage Annual Reports 2004-2006.
The Structure Plan of the Maltese Islands (Revised). 1997.
Cultural Heritage Act, 2002.
The Central Malta Local Plan, July 2006.
The Development Planning Act, Environmental Impact Assessment Regulations, 2001.
The Environment Protection Act, 1991.

Appendix I

Plates

Plate 1: Part of Area A

Plate 2: Debris from the landfill covering Area B

Plate 3: Surface Quarrying in Area A

Plate 5: Depression in rock in Area A

Plate 5: General view of depression in Area A

Plate 6: Blocked entrance of rubble wall (facing SW)

Plate 6: Blocked entrance of rubble wall (facing NE)

PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 5

NOISE STUDY

Prepared by Mediterranean Technical Services Limited

Supporting Documents for
Environmental Impact Statement Update

1. CLIENT

Adi Associates
2nd Floor
BSL Centre
Birkirkara Road
San Gwann

2. PURPOSE OF SURVEY

To determine the background noise levels at noise sensitive receptors near the WasteServ Maghtab site in accordance with the requirements of MEPA. Four locations were chosen and agreed to by MEPA.

3. DATE OF SURVEY

The daytime studies were carried out on Tuesday 10th and Wednesday 11th August 2010.

Four studies were undertaken, one study of one hour duration at each of the four locations. Weather for all four studies was clear with negligible wind.

Night time studies were carried out on the 18th August starting from 22:28. Again studies were undertaken in the same locations. These measurements were for duration of 5 minutes as recommended in BS4142.

The surveys were carried out by:

-	Mr John L. Demanuele **Building Services Consultant**	for	Mediterranean Technical Services Limited

4. EQUIPMENT DATA

'QUEST' sound level meter	Model: 2900
'QUEST' Calibrator	Model: QC-20

The sound level meter was calibrated before beginning the measurements and checked again at the end. In all locations the instrument was placed on a tripod stand 1.4 metres off the ground and away from reflecting surfaces in accordance with the recommendations of BS 4142 1997

5. OBSERVATIONS

The weather condition during all surveys was clear; wind was negligible. The Relative Humidity was reported as around 40% during the daytime studies and 65% for the nighttime studies.

Location 1

Location 'Just west of the WasteServ site',

Day 10:06 to 11:06 $L_{Aeq,60}$ - 58 L_{Amax} - 89 L_{A10} - 56 L_{A90} - 39
Noise was mostly due to farm animals and a couple of cars.

Night 23:32 to 23:37 $L_{Aeq,5}$ – 39 L_{Amax} - 53 L_{A10} - 40 L_{A90} – 35
Distant traffic noise and dog

Location 2

Location 'Entrance to Maghtab',

Day 08:26 to 09:26 $L_{Aeq,60}$ - 68 L_{Amax} - 96 L_{A10} - 70 L_{A90} - 44
Noise was due to traffic.

Night 22:56 to 23:01 $L_{Aeq,5}$ – 56 L_{Amax} - 77 L_{A10} - 56 L_{A90} – 38
Noise was due to traffic and distant generator or fan

Location 3

Location 'back of Coastline Hotel'

Day 08:54 to 09:54 $L_{Aeq,60}$ - 53 L_{Amax} - 81 L_{A10} - 50 L_{A90} - 41
Noise was mostly due to traffic.

Night 23:18 to 23:23 $L_{Aeq,5}$ – 48 L_{Amax} - 59 L_{A10} - 50 L_{A90} – 45
Traffic on the coast road and music from across the bay

Location 4

Location 'East of the WasteServ site',

Day 09:31 to 10:31 $L_{Aeq,60}$ - 70 L_{Amax} - 95 L_{A10} - 73 L_{A90} - 40
Noise was due to passing heavy vehicles.

Night 23:04 to 23:09 $L_{Aeq,5}$ – 58 L_{Amax} - 79 L_{A10} - 54 L_{A90} – 34
Noise was due to local traffic

6. COMMENTS/CONCLUSIONS

We do not expect any problems during the day in locations 2 and 4 as the present heavy vehicle traffic is already very high. More attention needs to be given to locations 1 and 3. The hotel in location 3 is quite distant but the greatest noise sensitive receptor in the area. The farmhouse at location 1 is certainly close and would be affected most but there is only one person living there.

Considering the great area and configuration of the site we feel that the usual practice of placing all noise sources in the middle of the site should be abandoned in favour of a more localized method.

FOR AND ON BEHALF OF
MEDITERRANEAN TECHNICAL SERVICES LIMITED

JOHN L. DEMANUELE
GRAD. I.A.P.
BUILDING SERVICES CONSULTANT

18th August 2010

PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 6

AIR QUALITY AND ODOUR ASSESSMENT

Prepared by Mr David Harvey of ADM Limited

Supporting Documents for
Environmental Impact Statement Update

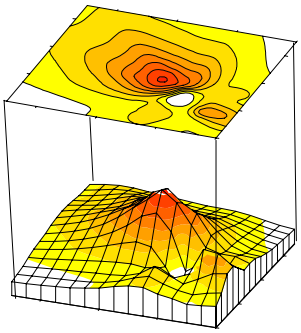
Air Quality and Odour Assessment of Emissions to Atmosphere from Proposed Mechanical and Biological Treatment Plant (MBT), Malta

P1117

A Report Prepared for
ADI Associates
by

ADM Ltd
Old Chambers
93-94 West Street
Farnham Surrey
GU9 7EB UK

Tel: +44 (0) 1252 720842
FAX: +44 (0) 1252 720843
Email: post@ADMLtd.com



Principal Author: David Harvey BSc MBA FIAQM
Client: ADI Associates

Version/File	Issue Date
File=P1117\text\Malta MBT AQ Odour v1.doc	6 July 2011

1 INTRODUCTION

ADI Associates has commissioned Atmospheric Dispersion Modelling Ltd (ADM Ltd) to undertake an air quality and odour assessment of emissions to atmosphere from the proposed Mechanical and Biological Treatment Plant (MBT) in Malta.

The process plant will process 147,000 tonnes per annum of feed stock derived from residual municipal waste arising in Malta, based on the following:

- 100,000 tonnes per annum of residual household wastes
- 47,000 tonnes per annum of bulky waste

Oversize rejected materials that can not be handled by the process plant will be removed after visual control by crane or wheel loader before they enter the MBT process. The project comprises mechanical and biological processes (MBT), including anaerobic digestion (AD). The plant has been designed to recover recyclables (eg metals), produce defuse derived fuel (RDF), recover energy from the combined heat and power (CHP) plant fuelled by the biogas and produce a refined digestate for end use.

A biogas fuelled CHP plant is included to maximise energy recovery. Electricity is exported to the grid while waste heat from the exhaust systems is used within the process.

Emissions to atmosphere will occur from the following:

- Construction of the facility.
- Three biogas fuelled CHP engines.
- Road traffic generated by the development.
- Biofilters.
- Waste handling hall.

Emissions from road traffic have been screened out as being insignificant.

The impacts of emissions odours to atmosphere from the biofilters are quantified and assessed, the potential for emissions of odours from the waste handling facility and other sources are discussed.

The impacts on air quality of emissions from the three gas engines are quantified and assessed. For emissions to atmosphere from the gas engines, it is the oxides of nitrogen (NO_x) which are most significant. Carbon monoxide (CO) and other pollutants will be released but at levels giving rise to an insignificant impact on air quality, compared to the effects of emissions of the oxides of nitrogen (NO_x). Carbon monoxide (CO) and other pollutants therefore have therefore not been considered further in this assessment.

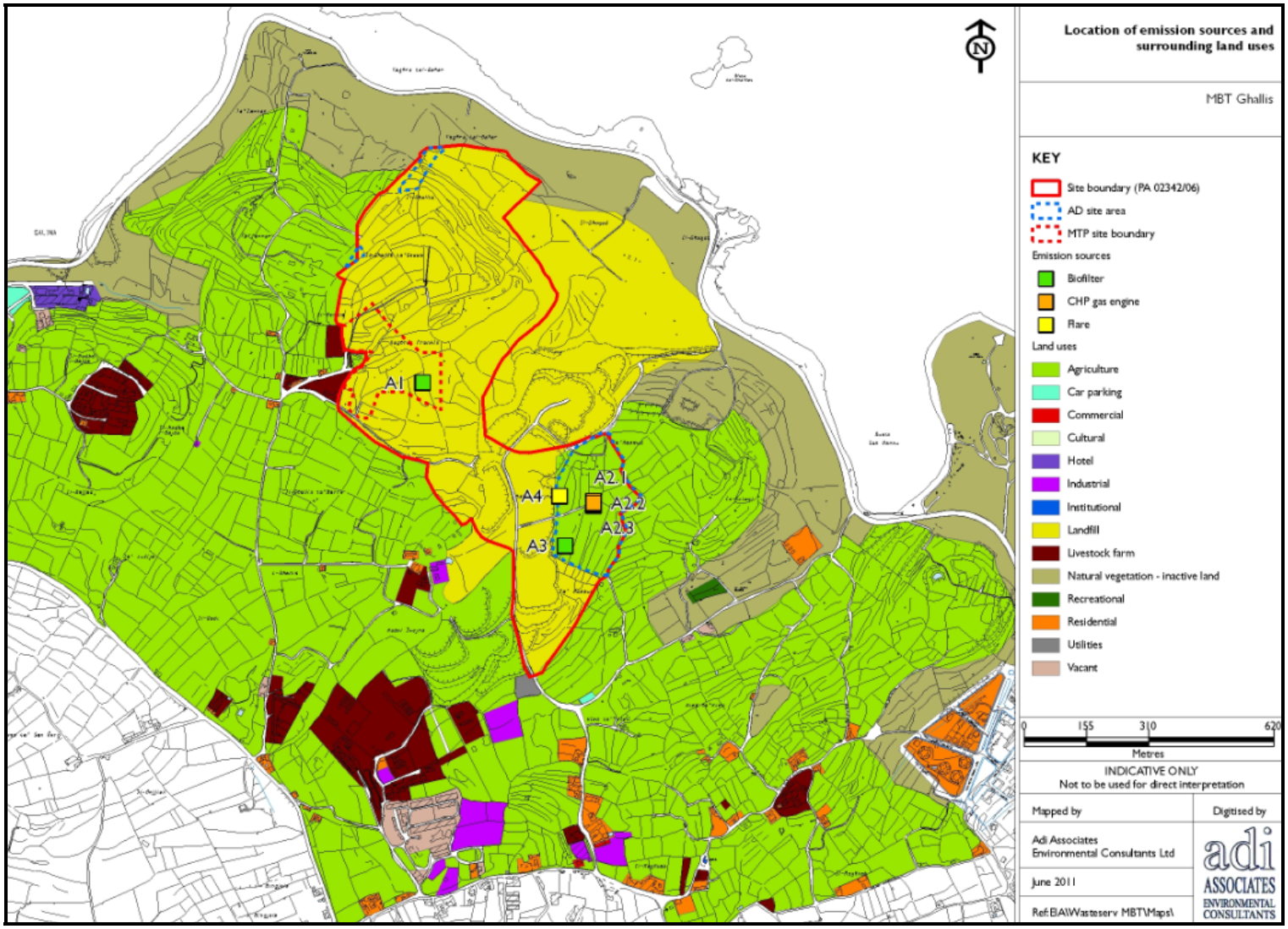
The sources of emissions to atmosphere considered in this assessment are:

- A1: Biofilter
- A2.1: CHP Gas Engine
- A2.1: CHP Gas Engine

- A2.1: CHP Gas Engine
- A3: Biofilter
- A4: Flare

Figure 1.1 shows the location of the sources and the land use around the facility.

Figure 1.1 Location of Sources of Emissions to Atmosphere and Land Use



The remainder of the report is structured as follows:

- Section 2: description of the assessment criteria.
- Section 3: presents and assesses the existing air quality
- Section 4: describes the modelling methodology
- Section 5: presents the predicted concentrations
- Section 6: mitigation and residual impacts.
- Section 7: provides a summary and conclusions.

2 ASSESSMENT CRITERIA

2.1 INTRODUCTION

The air quality standards for Malta are as set by the European Commission (EC) Directives.

The EU's Framework Directive 96/62/EC on ambient air quality assessment and management was formally adopted on 27 September 1996 and had to be implemented by Member States by 21 May 1998 [(1)]. The Directive aimed to protect human health and the environment by avoiding, reducing, or preventing harmful concentrations of air pollutants. As a Framework Directive it requires the Commission to propose "Daughter" Directives setting air quality objectives, limit values, alert thresholds and guidance on monitoring, siting and measurement for individual pollutants. To date there have been four "Daughter" Directives.

In April 2008 the European Union (EU) agreed and adopted a new European Air Quality Directive (2008/5O/EC). The Directive merges four Directives and one Council decision into a single directive on air quality. It sets standards and target dates for reducing concentrations of fine particulate matter ($PM_{2.5}$), which together with coarser particles known as PM_{10}, which is already subject to legislation.

Under the Directive, Member States are required to reduce exposure to $PM_{2.5}$ in urban areas by an average of 20% by 2020 based on 2010 levels. It obliges them to bring exposure levels below 20 µg m^{-3} by 2015 in these areas. Throughout their territory Member States will need to respect the $PM_{2.5}$ limit value set at 25 µg m^{-3}. This value must be achieved by 2015 or, where possible, by 2010.

The Directive introduces new objectives for fine particles $PM_{2.5}$ but does not change existing air quality standards. It does, however, give Member States greater flexibility in meeting some of these standards in areas where they have difficulty complying.

Although Directive 2008/50/EC has not as yet been transposed into Maltese legislation, Malta is still required to comply with its requirements.

The principal pollutant that will be released to atmosphere from the gas engines is the oxides of nitrogen (NO_x), the impacts on air quality of other pollutants released will be insignificant compared to the oxides of nitrogen (NO_x) and therefore have not been considered further in this assessment.

Oxides of nitrogen (NO_x) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, nitric oxide (NO) is oxidised to nitrogen dioxide

(1) "*Ambient air*" is defined as being "outdoor air in the troposphere, excluding work places".

(NO_2), which is of concern with respect to health and other impacts.

2.2 NITROGEN DIOXIDE (NO_2)

Nitrogen dioxide (NO_2) is a reddish brown gas (at sufficiently high concentrations) and occurs as a result of the oxidation of nitric oxide (NO), which in turn originates from the combination of atmospheric nitrogen and oxygen during combustion processes. Ground level concentrations of nitrogen dioxide (NO_2) in many parts of the world are dominated by emissions from road transport. This applies particularly in urban areas, where traffic densities are at their highest.

The effects of nitrogen dioxide (NO_2) with regard to human health are felt on the respiratory system. Pulmonary function in normal, bronchitic and asthmatic people is affected by exposure to concentrations of sufficient magnitude. The threshold concentration at which effects become observable is different from individual to individual.

The World Health Organization (WHO) report that animal and human studies indicate that at short term concentrations exceeding 200 µg m^{-3}, nitrogen dioxide (NO_2) is "a toxic gas with significant health effects" (1). It also reports that animal toxicological studies suggest that long term exposure to nitrogen dioxide (NO_2) above current ambient concentrations has adverse effects although "there is still no robust basis for setting an annual average guideline value for NO_2 through any direct toxic effect".

In spite of the relative uncertainty in the health effects attributable to nitrogen dioxide (NO_2), and at what concentrations such effects might arise, this pollutant is often the critical one in determining the overall impact of an industrial process. This is because it is associated strongly with combustion processes and is often present in concentrations which are close to the toughest air quality standards and guidelines.

Table 2.1 presents the air quality standards and guidelines for nitrogen dioxide (NO_2) used in this assessment.

Table 2.1 EU Directive Limit Value for Nitrogen Dioxide (NO_2, µg m^{-3})

Averaging Period	Annual Average	99.8th Percentile of Hourly Averages
Value	40	200 (allows for 18 exceedences per year)

(1) World Health Organization (2006) WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide; Global update 2005, Summary of risk assessment.

2.3 ODOUR

Human response to odour is very subjective; some people are particularly sensitive to odours and may object at odour concentrations that other people are not able to detect.

The detection of an odour may or may not cause annoyance. The concentrations of any particular substance or group of substances that can be detected by an individual depends on a number of factors which vary from individual to individual and can change for each individual depending on, for example, frequency of exposure. People with no sense of smell have a condition called anosmia and those with an abnormally acute sense of smell are hypersensitive, about 2% of the population fall into each of these categories.

The odour detection threshold of an odour is its concentration when 50% of an odour panel are able to detect the odour. At a higher concentration, the odour recognition threshold is where 50% of the panel are able to describe the characteristics of the odour.

The following sensory characteristics can be used to describe odours and are factors that together with frequency and duration of odour detection determine whether an odour may cause annoyance.

- **Hedonic Tone**: this is an individual's judgement of the relative pleasantness or unpleasantness of an odour.

- **Quality/Characteristics**: This is a qualitative attribute which is expressed in terms of 'descriptors' such as 'fruity' or 'fishy'.

- **Concentrations**: The odour concentrations can be expressed as a mass or volume fraction (mg m^{-3} or ppb) if it is a single odorous compound. More frequently the odour concentration is expressed as OU or OU_e m^{-3}. The 'e' subscript is reference to the European Odour Unit and reference method for its measurement. An OU is a ratio: it is the number of times an odour sample needs to be diluted such that 50% of an odour panel are unable to detect it. An OU_e m^{-3} is the equivalent odour strength of 1 OU of a reference odorant (123 µg of n-butanol) when evaporated into 1 m^3 of odourless gas at standard conditions.

- **Intensity**: This is a subjective measure of the strength or intensity of an odour. Intensity usually increases with increasing concentrations but often in a non-linear manner and the scale is usually from faint to strong.

An important characteristic of odour is odour fatigue or adaption which can take a number of different forms, as described in the UK's Environment Agency's Odour Guidance for landfills [1].

'At one extreme there is the action of gases such as hydrogen sulphide. In hazardous concentrations, the first action of hydrogen sulphide is to paralyse the olfactory nerves rendering the nose unable to detect its rotten egg odour, thus increasing the hazardous potential.

'At a different level, it is likely that if you wear perfume or aftershave you will quickly become unaware of the perfume given off by your own toiletry. However, you are still likely to be aware of the perfume given off by the toiletry being worn by someone passing close to you and vice versa.

'In the same way, people working in an odorous situation, such as a waste management facility, will quickly become unaware of their odorous surrounding possibly to the extent that they are unable to detect regular odours'.

Odour can be detected over a time period of a few seconds and may cause annoyance if the smell is offensive and/or reoccurring. Predictions of short-time periods present significant problems for dispersion models as they are not able readily or reliably to predict concentrations with an averaging period of less than about one hour. This is in part due to the fact that the meteorological data used are hourly average data and in part due to assumptions about dispersion made by most models, which are not appropriate for short averaging periods. To overcome these difficulties, a number of approaches to the modelling of odours and determination of odour annoyance have been developed.

There are no legal standards for odours, the most common standard for odour annoyance is in terms of the 98th percentile of hourly average odour concentrations which has been widely used with a threshold in the range of 1 to 10 OU_e m^{-3} set as the criterion.

The UK's Environment Agency's guidance on odour management advocates the prediction of the 98th percentile of hourly average odour concentrations (over a year) and suggests a range of benchmarks depending on the nature of the odour source [2]. The benchmarks are thresholds of unacceptable pollution.

The Pollution Prevention and Control (England & Wales) Regulations 2000 (the "PPC Regulations") define "pollution" as "emissions as a result of human activity which may be harmful to human health or the quality of the environment, cause offence to any human senses, result in damage to

(1) Environment Agency (2002) Odour Guidance; Internal Guidance for regulation of Odour at Waste Management Facilities.

(2) Environment Agency (March 2011) H4 – Odour Management.

material property, or impair or interfere with amenities and other legitimate uses of the environment".

The UK's Environment Agency suggests a range of benchmarks for unacceptable pollution as shown below.

- 1.5 OU_e m^{-3} 98th Percentile of Hourly Averages for 'most offensive' offensive odours.
- 3.0 OU_e m^{-3} 98th Percentile of Hourly Averages for 'moderately offensive' odours.
- 6.0 OU_e m^{-3} 98th Percentile of Hourly Averages for 'less offensive' odours.

Table 2.2 shows the UK's Environment Agency examples a range of odours

Table 2.2 UK Environment Agency - Odour Characterisation

Category	Examples
Most Offensive	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge Biological landfill odours
Moderately Offensive [(a)]	Intensive livestock rearing Fat frying (food processing) sugar beet processing Well aerated green waste composting
Less Offensive	Brewery Confectionery Coffee roasting Bakery
(a) Most odours from processes fall into this category ie any odours which do not obviously fall within the 'most offensive' or 'less offensive' categories.	

The odour emissions from the biofilters are different in character to the raw gas/pig odour and can be described as 'damp wood' which is considered to fall into the 'less offensive' category. However, for the purpose of this assessment a benchmark in the range of 3 OU_e m^{-3} 98th percentile of hourly averages is used for emissions from the biofilters. It is considered that this is a conservative assessment criteria to use.

3 AMBIENT AIR QUALITY DATA

3.1 INTRODUCTION

This section presents a description of the ambient air quality in the region of the proposed facility. Given the large degree of variation in pollutant concentrations, both with time and location, it is desirable to have measurements over a period of time that is long enough to ensure that a complete range of meteorological conditions and emissions have been experienced.

The assessment criteria used throughout this assessment are compared to the incremental increase and therefore an accurate determination of the prevailing concentration is not necessary.

3.2 NITROGEN DIOXIDE (NO_2)

Mepa operate a number of automatic and passive monitoring stations. Given that data from real-time measurment stations are more reliable than those from passive diffusion tubes, it is considered that the most representative data for the prevailing background concentration at the site of the proposed development is the rural background site in Gharb, Gozo. Data from this site provides an indication of the prevailing pollutant concentrations in the region of the proposed development in the absence of any local sources of pollination. **Table 3.1** shows the measured data from the Gharb, Gozo for 2009 which is the most recently available year.

Table 3.1 Measured Nitrogen Dioxide (NO_2) Concentrations at Gharb, Gozo Rural Background Site for 2009 (µg m^{-3})

Year	Annual Average	99.8 %ile of Hourly Averages
Measured Concentration	3.5	25.5
Assessment Criteria	**40**	**200**

Table 3.1 shows that the measured concentration at the rural background station was very low compared to the assessment criteria.

Although it is recognised that the actual concentration of nitrogen dioxide (NO_2) in the region of the development may be higher than that measured at Gharb, for the purpose of this assessment it is considered an adequate indication. It should also be noted that the focus of the assessment is the predicted increment to prevailing concentrations and how this compares to the assessment criteria and therefore an accurate determination of the prevailing background concentration is not necessary.

3.3 ODOURS

Given the proximity of the location of the proposed development to the Maghtab landfill, it is likely that there will be ongoing emissions of odours from

the landfill. Odour monitoring undertaken by WasteServ Malta Ltd for April and May 2011 show odours are present at both the Ghallis and Zwejra landfill site. The maximum odour intensity observed was 'strong', this was report on two occasions. Most of the observations were that the odour intensity was 'weak' or 'distinct'.

Given that the odour from the biofilters will be different in character to those from the landfill there will be no cumulative odour impacts and therefore a detailed assessment of the prevailing odours in the region is not warranted. Even if this were to be available, no modelling or assessment of cumulative impacts would be possible, given the complex nature of the interaction of different odours.

For the purpose of this assessment and following best practice, the assessment of odour presented here considers only the incremental impacts from the proposed facility.

4 METHODOLOGY

4.1 INTRODUCTION

This section describes the methodology and assumptions made for the air quality assessment. Also described are the emissions data used.

In additional to the sources described below the facility will include an emergency flare. Because the flair will only operate during planned maintenance or unforeseen incidents, its impact on air quality will be insignificant and it therefore has not been considered further.

4.2 EMISSIONS DATA

4.2.1 Biogas Engines

The proposal is to install three 1.0 MWe biogas engines at the site.

Table 4.1 shows the parameters which describe the physical properties of emissions from each of the three proposed biogas engines, as required for definition of the emissions in dispersion modelling terms. These data are the best estimate of the emissions rate with the units operating at their emissions limit.

Table 4.1 Biogas Engines Emissions and Physical Properties

Parameter	Value
Number of stacks	3
Number of units	3
UTM Grid Reference (m) – Stack 1	449725.0 3977805.1
UTM Grid Reference (m) – Stack 2	449725.0 3977795.1
UTM Grid Reference (m) – Stack 3	449725.0 3977800.1
Number of flues per stack	1
Release height above ground level (m)	15
Exhaust gas oxygen content (% v/v dry)	5
Exhaust gas water content (% v/v)	11.5
Exit diameter (m)	0.35
Exit velocity (m s^{-1})	19.9
Flue gas emission temperature (deg C)	150
Actual volumetric flow rate for each unit (Am^3 s^{-1})	1.79
Normalised volumetric flow for each unit (Nm^3 s^{-1}) [(a)]	1.22
Emission Concentration (mg Nm^{-3}) [(a)]	
Oxides of nitrogen (NO_x as NO_2)	500
Pollutant Emission Rate per Unit (g s^{-1})	
Oxides of nitrogen (NO_x as NO_2)	0.55
(a) Corrected for: temperature; 273 k; pressure; 101.3kPa (1 atmosphere); dry; 5% v/v O_2.	

4.2.2 Biofilters

The location of the two biofilters on the site of the proposed facility (A1 and A3) is shown in **Figure 1.1**.

It is important to note that the character of the odour changes as it passes through the biofilters. The odours released to atmosphere from the biofilters smell of damp wood and are therefore much more pleasant than the odours extracted from the waste handling facility.

With the exception of the service building and biofilters, there are no other potential sources of routine odour emissions to atmosphere as all aspects of the process are sealed from the atmosphere. Full details of the mitigation measures that will be employed to contain odours are presented in the application for a permit and are not reproduced here other than a brief summary presented in the mitigation section of this report.

Table 4.2 shows the emissions data for the two biofilters.

Table 4.2 Biofilters Emissions Data

Source Number	Dimensions (m)	Flow Rate (m^3 hr^{-1})	Emission Rate Odour [(a)]	
			(OU_e s^{-1})	(OU_e m^{-2} s^{-1})
A1	20 x 20	92 000	12 778	32
A3	11 x 12	13 000	1 806	14

(a) Odour concentration 500 OU_e m^{-3}.

It should be noted that the modelling conservatively assumes a constant flow rate whereas night time flow rate will be about 50% of the day time values shown in **Table 4.2**.

4.3 RECEPTORS

The focus of this assessment of the impacts of emissions from the proposed facility will be of the effects at the closest receptors which are selected to be representative of those that will be most affected by the proposed development, and are residential, recreational and the hotel.

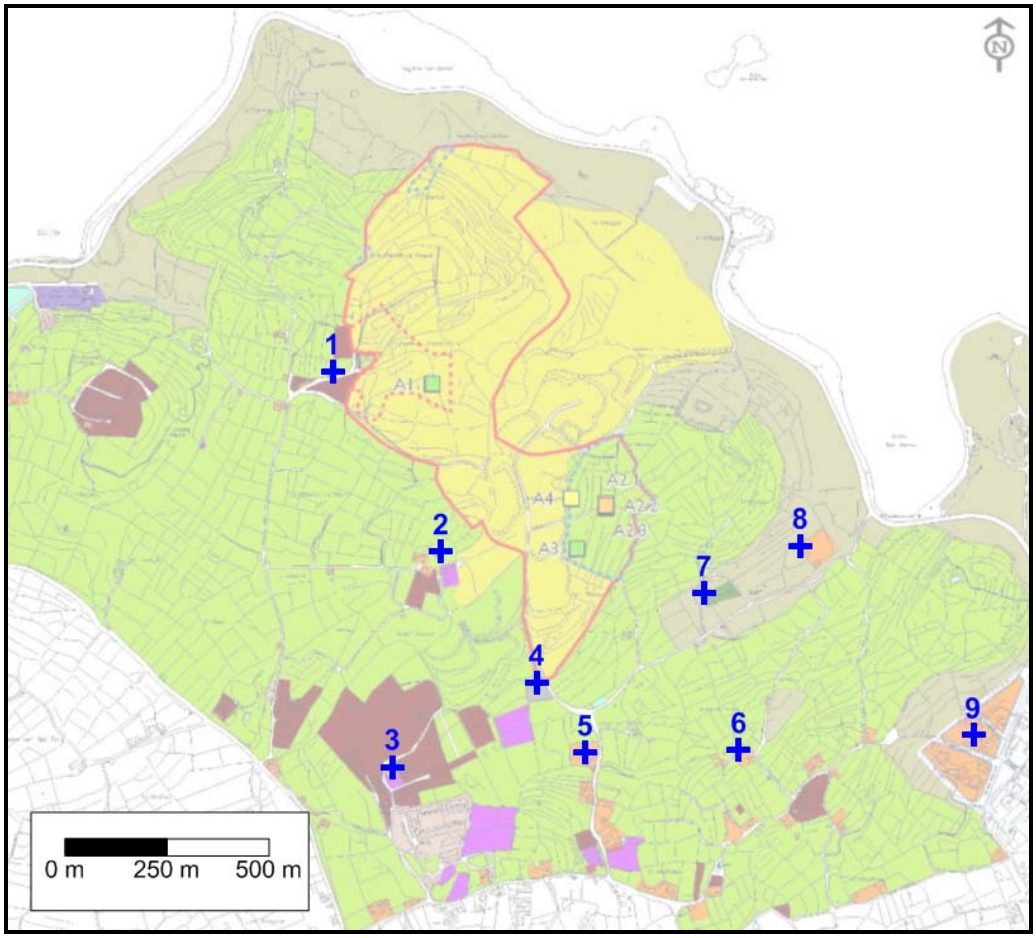
Table 4.3 presents details of the specific receptors included in the modelling.

Table 4.3 Receptor Locations

Number	Description	UTM Grid Reference (m)	
1	Residential	449055	3978128
2	Residential	449321	3977687
3	Residential	449202	3977158
4	Hotel	449556	3977365
5	Residential	449674	3977193
6	Residential	450051	3977199
7	Recreational	449966	3977584
8	Residential	450202	3977701
9	Residential	450626	3977236

Figure 4.1 shows the location of the specific receptors used in this assessment.

Figure 4.1 Location Specific Receptors



To determine the distribution of ground level concentrations occurring due to emissions to atmosphere from the proposed gas engines and the distribution of emissions from the biofilters, predictions are made for a grid of receptors. The receptor grid is 2,500 m by 2,300 m with grid spacing of 100 m.

4.4 FACTORS AFFECTING DISPERSION

There are a number of factors that will affect how emissions disperse once released to atmosphere. The four factors having the greatest effect on dispersion are:

- physical characteristics of the emissions;
- climate;
- terrain; and
- building downwash.

4.4.1 Physical Characteristics of the Emissions

Provided that the engine exhaust gases have sufficient velocity at stack exit to overcome the effects of stack tip downwash, which is almost certainly the case for velocities of 15 m s^{-1} or more, the physical characteristics of the flue gases will determine the amount of plume rise and hence the affect on ground level pollutant concentrations. The degree of plume rise usually depends on the greater of the thermal buoyancy or momentum effects. In the case of emissions from the gas engines, with an exhaust gas exit temperature greater than 150 ºC, it is likely to be the thermal buoyancy effects that determine how high the plume will eventually rise.

For emissions from the biofilters, the modelling assumes no thermal or momentum driven plume rise.

4.4.2 Climate

The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind speed, wind direction and atmospheric stability.

- **Wind direction** determines the broad transport of the plume and the sector of the compass into which the plume is dispersed.

- **Wind speed** can affect plume dispersion by increasing the initial dilution of pollutants and inhibiting plume rise.

- **Atmospheric stability** is a measure of the turbulence of the air, particularly of the vertical motions present. For dispersion modelling purposes, one method of classifying stability is by the use of Pasquill Stability categories, A to F. Another is by reference to the surface heat flux present at the ground.

Dispersion models, such as ADMS and AERMOD, do not allocate the degree of atmospheric turbulence into six discrete categories. These models use a parameter known as the Monin-Obukhov length which, together with the wind speed, describes the stability of the atmosphere.

4.4.3 Building Downwash

The presence of buildings can significantly affect the dispersion of the atmospheric emissions. Wind blowing around a building distorts the flow and creates zones of turbulence that are greater than if the building were absent. Increased turbulence causes greater plume mixing; the rise and trajectory of the plume may be depressed generally by the flow distortion. For elevated releases such as those from stacks, building downwash leads to higher ground level concentrations closer to the stack than those present if a building was not there. For ground level releases such as those from the biofilters the presence of a building will increase turbulence and the mixing and hence dilution of the emissions and will therefore reduce downwind concentrations.

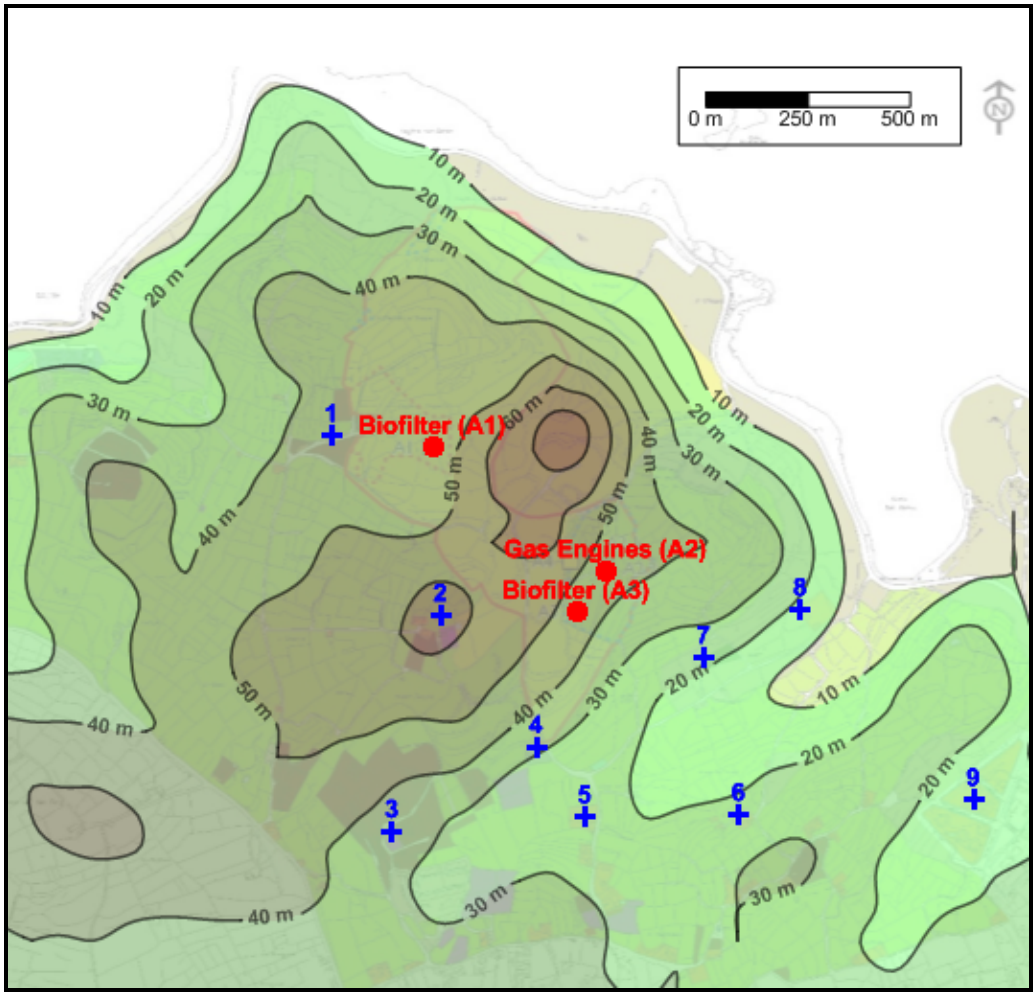
The building that will have the most significant effect on dispersion is the 45 m by 48 m maturation area building which is 11 m high. Even though this building is open-sided for the purpose of this modelling and assessment it is conservatively assumed to be a fully enclosed building.

4.4.4 Nature of the Surface

Terrain

The effects of terrain can effect dispersion and have been included in this assessment. **Figure 4.2** shows the terrain in the region of the facility that has been included in the modelling together with the location of the sources and receptor.

Figure 4.2 Terrain, Sources and Receptors



Roughness

The nature of the surface of the terrain can have a significant influence on dispersion by affecting the velocity profile with height and the amount of atmospheric turbulence. To account for the surrounding nature of the proposed site, a surface roughness length of 0.2 m has been assumed for the dispersion modelling.

4.5 SELECTION OF SUITABLE DISPERSION MODEL

The dispersion models which are widely used to predict ground level pollutant concentrations are based on the concept of the time averaged lateral and vertical concentration of pollutants in a plume being characterised by a Gaussian (1) distribution and the atmosphere is characterised by a number of discrete stability classes. So called 'new generation' dispersion models have been developed which replace the description of the atmospheric boundary layer as being composed of discrete stability classes with an infinitely variable

(1) A Gaussian distribution has the appearance of a bell shaped curve. The maximum concentration occurs on the centre line.

measure of the surface heat flux, which in turn influences the turbulent structure of the atmosphere and hence the dispersion of a plume.

There are two commercially available dispersion models that are able to predict ground level concentrations arising from emissions to atmosphere from elevated point sources (ie stacks), and are described by the UK Environment Agency as being 'new generation'.

- AERMOD: The US **A**merican Meteorological Society and **E**nvironmental Protection Agency **R**egulatory Model Improvement Committee developed a dispersion **MOD**del called AERMOD which incorporates the latest understanding of the atmospheric boundary layer.

- Atmospheric Dispersion Modelling System (ADMS): This dispersion model was developed by the UK consultancy CERC. The model allows for the skewed nature of turbulence within the atmospheric boundary layer.

In many respects the models are quite similar and in some situations generate similar predictions of ground level concentrations. Two intercomparison studies commissioned by the UK Environment Agency however found there to be significant differences in calculated concentrations between models [(1)]. These reports highlight modelling uncertainties and do not suggest that any one of the models is considered to be the most accurate.

AERMOD was selected as the model for use in this assessment because of its greater international recognition.

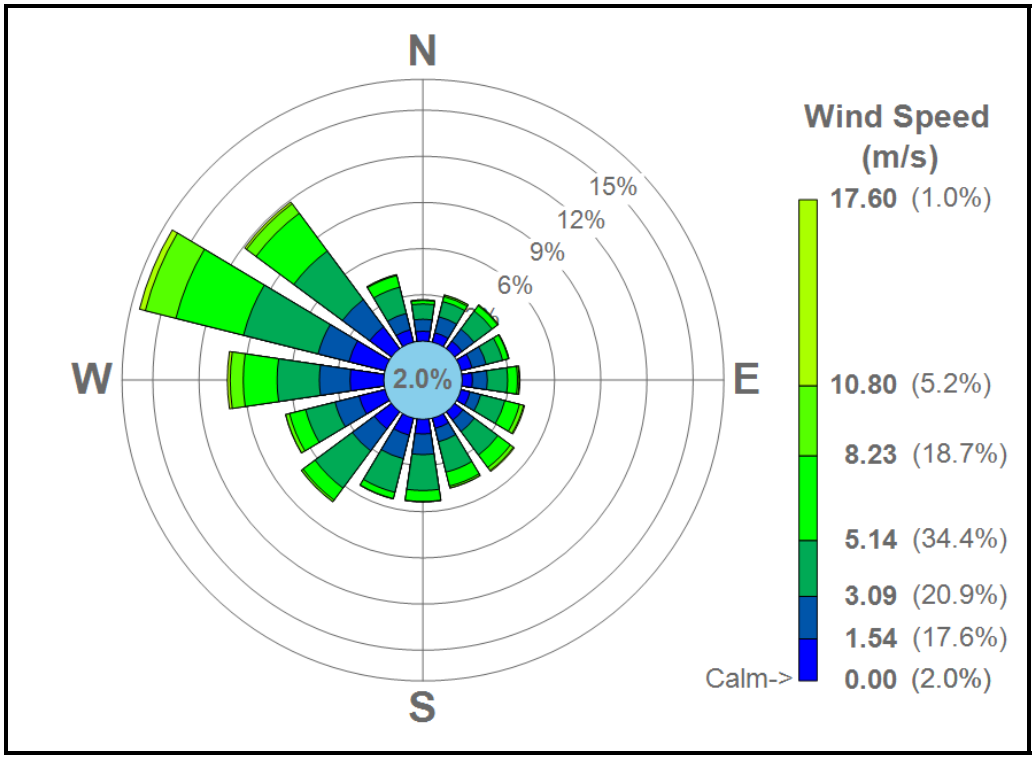
4.6 METEOROLOGICAL DATA

An important input to the dispersion model is the meteorological data. These data are important in determining the location of the maximum concentrations and their magnitude.

The closest observing station where data is available is Malta International Airport at Luqa. To allow for an understanding of the magnitude of any year-to-year variation in predicted ground level concentrations, three years of hourly meteorological data have been used in this assessment. **Figure 4.3** shows the windrose for Malta International airport for 2008-2010, used in this assessment, which shows that the prevailing wind is from the north-west west, which will transport emissions to the south east.

(1) R&D Technical Report P353: **A review of dispersion model intercomparison studies using ISC, R91, AERMOD and ADMS** (ISBN 1 85705 276 5) and R&D Technical Report P362: An intercomparison of the AERMOD, ADMS and ISC dispersion models for regulatory applications (ISBN 1 85705 340 0).

Figure 4.3 Wind Rose Malta International Airport (2008-2010)



4.7 PERCENTAGE OXIDATION OF NITRIC OXIDE (NO) TO NITROGEN DIOXIDE (NO_2)

Oxides of nitrogen (NO_x) emitted to atmosphere as a result of gas combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, nitric oxide is oxidised to nitrogen dioxide (NO_2), which is of concern with respect to health and other impacts. The proportion of nitric oxide oxidised to nitrogen dioxide depends on a number of factors and the oxidation is limited by the availability of oxidants, such as ozone (O_3).

An oxidation of 35% has been assumed for oxidation of nitric oxide (NO) to nitrogen dioxide (NO_2) for short-term concentrations. For predictions of annual averages, it is assumed that 70% of the oxides of nitrogen (NO_x) are in the form of nitrogen dioxide (NO_2). These assumptions are recommended by the UK Environment Agency, extensively used and considered to be appropriate for an assessment of this nature in Malta [(1)].

(1) Environment Agency (AQMAU): Conversion Ratios for NO_x and NO_2.

5 PREDICTIONS AND ASSESSMENT OF IMPACTS

5.1 INTRODUCTION

This section presents the incremental increase in ground level concentrations predicted to occur as a consequence of emissions to atmosphere from the construction and operation of the proposed facility.

Predictions are presented and assessment made of the routine emissions to atmosphere from the following sources;

- odours from the biofilters;
- oxides of nitrogen (NO_x) from the three gas engines.

5.2 CONSTRUCTION

5.2.1 Dust

During construction of the facility there is the potential for emissions of dust to cause a soiling nuisance. Also emissions to atmosphere from construction vehicles will effect air quality.

Emissions of dust have the potential to effect locations within about 200 m and give rise to a nuisance through soiling. Emissions of dust can be abated by mitigation measures should these be necessary.

The closest residential receptors to the AD site are located about 300 m to its west. Given the separation between these receptors and the construction site and the prevailing wind direction, which is from the north-west, it is considered that even without mitigation measures, dust is unlikely to cause annoyance during construction. Notwithstanding this, best practice mitigation measures will be part of a construction management plan and will be implemented during construction.

The closest properties to the MTP site are about 50 m to 300 m to the west of the site. Even though the prevailing wind direction is from the north-west it is likely that without mitigation measures dust would cause annoyance during construction. It is however considered that with appropriate mitigation measures included in the construction management plan the likelihood of emissions of dust during construction can be minimised. If however annoyance were to occur during construction additional mitigation measures would be implemented.

The measures included in the construction management plan will be agreed with MEPA prior to construction and if appropriate would include monitoring.

5.2.2 Emissions from Construction Vehicles and Machinery

The effect on air quality of emissions to atmosphere from construction vehicles and machinery will be negligible and has not been considered further.

5.3 OPERATION

5.3.1 Emissions from Vehicles

The Project Description Statement prepared for the development (PA2342/06) states that currently 340 vehicles per day arrive to the facilities at Ghallis. Once the Sant'Antnin Facility will be fully operational 30% of the waste will be diverted there, resulting in a decrease in 102 vehicles per day arriving at Ghallis.

The development of the MBT is expected to generate an additional 140 vehicles per day (100 vehicles carrying manure MBT input and output material and 40 vehicles carrying the output product from the municipal waste MBT). Considering the situation (when Sant'Antnin is operational) the net increase in traffic to Ghallis is 38 vehicles per day (140-102). However, the additional 140 vehicles will be reduced by 50 vehicles if the output (water) from the manure treatment facility is used to irrigate Maghtab and the surrounding area. This would effectively reduce daily trips to less than 340, less than the current baseline.

The current entrance into Maghtab, located near the Maghtab village, will no longer be used as the main entrance, effectively removing the entrance away from sensitive receptors.

Emissions to atmosphere from road traffic have been screened out as being insignificant on the basis that the net increase in traffic is less than 200 vehicles per day and there are no sensitive receptors at the new proposed entrance to the Ghallis Complex.

5.3.2 Odour

Predictions of the 98th percentile of hourly average odour concentrations have been made for both a grid of receptors and at the 9 specific receptors.

Table 5.1 shows the AERMOD predicted 98th percentile hourly average odour concentrations at each of the 9 specific receptors for each of the three years of meteorological data occurring as a consequence of emissions to atmosphere from the biofilters.

Table 5.1 AERMOD Predicted 98th Percentile of Hourly Average Odour Concentration ($OU_e\ m^{-3}$)

Receptor Number/ Source		Meteorological Data Year								
		2008			2009			2010		
		A1	A3	Both	A1	A3	Both	A1	A3	Both
1	Residential	2.0	0.0	2.0	1.4	0.0	1.5	1.2	0.0	1.3
2	Residential	0.2	0.1	0.3	0.1	0.0	0.2	0.1	0.0	0.2
3	Residential	0.1	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.1
4	Hotel	0.3	0.1	0.6	0.2	0.0	0.4	0.2	0.0	0.3
5	Residential	0.2	0.0	0.4	0.2	0.0	0.3	0.1	0.0	0.2
6	Residential	0.5	0.2	0.7	0.5	0.2	0.7	0.3	0.1	0.4
7	Recreational	1.3	1.3	2.2	1.4	1.2	2.2	0.8	1.0	1.8
8	Residential	1.6	0.5	1.8	1.6	0.6	1.7	1.1	0.5	1.3
9	Residential	0.5	0.2	0.7	0.6	0.2	0.7	0.3	0.1	0.4
Maximum		**2.0**	**1.3**	**2.2**	**1.6**	**1.2**	**2.2**	**1.2**	**1.0**	**1.8**
Assessment Criteria						**3**				

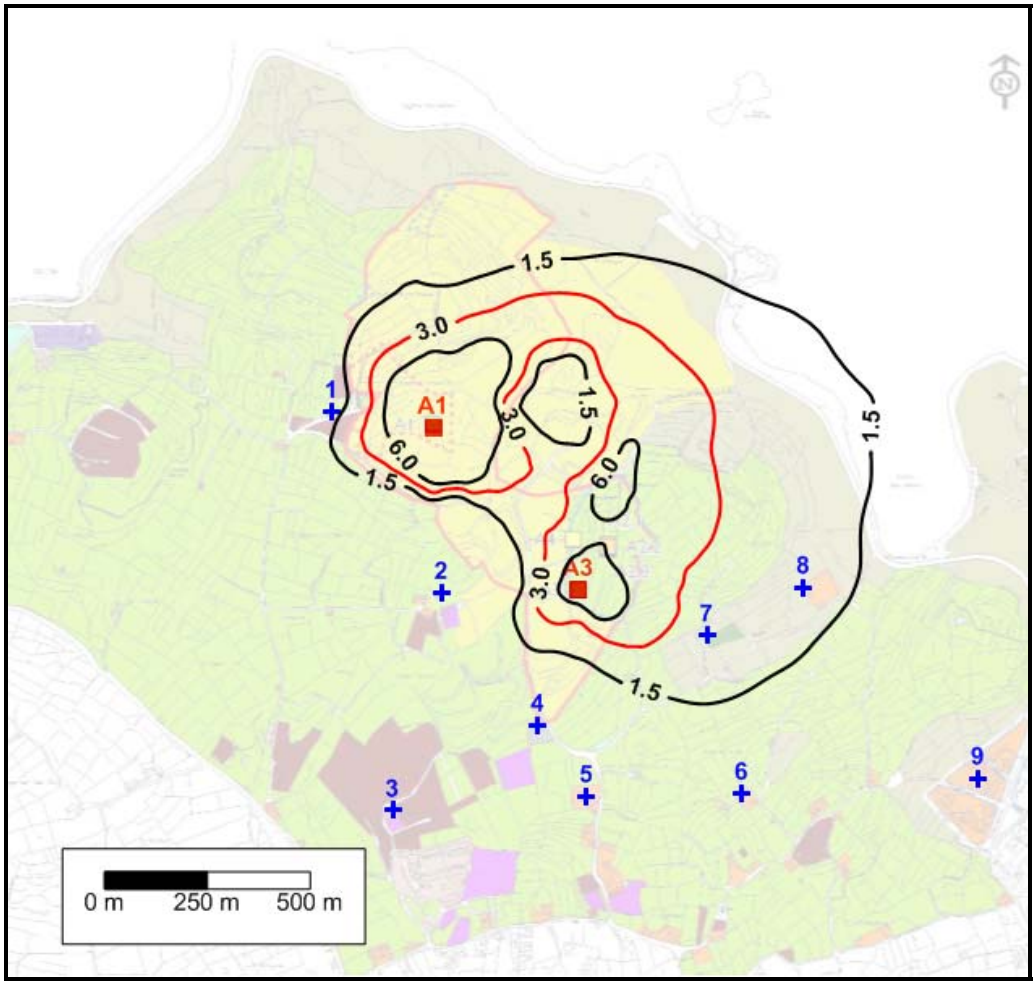
At each of the specific receptors the predicted 98th percentile of hourly average odour concentrations is less than the assessment criteria of 3 $OU_e\ m^{-3}$. The maximum predicted odour concentration at a residential receptor of 1.8 $OU_e\ m^{-3}$ is significantly less than the assessment criteria and therefore the concentrations are predicted to give rise to no odour annoyance.

Figure 5.1 shows the distribution of the 98th percentile of hourly average odour concentration for 2009 meteorological data. 2009 was selected as this was the year that gives rise to the highest concentrations.

The figure shows that the predicted odour concentrations reduce rapidly with distance away from the facility and the area in which the presence of odours may give rise to annoyance is very limited and does not include any relevant exposure.

It is therefore considered that the concentrations of odour as predicted are acceptable.

Figure 5.1 AERMOD Predicted 98th Percentile of Hourly Average Odour Concentration ($OU_e\ m^{-3}$), 2009 Meteorological Data



5.3.3 Gas Engines

The principal pollutant released to atmosphere from the three gas engines is the oxides of nitrogen (NO_x) which will progressively oxidise to nitrogen dioxide (NO_2) in the atmosphere.

Table 5.2 shows the predicted concentration of nitrogen dioxide (NO_2) at the specific receptors for each of the three years of meteorological data.

Table 5.2 AERMOD Predicted Concentrations of Nitrogen Dioxide (NO_2) at Specific Receptors; (µg m^{-3}) [(a)]

Receptor	Description	Annual Average			99.8th Percentile of Hourly Averages		
		2008	2009	2010	2008	2009	2010
1	Residential	0.5	0.5	0.6	11.7	14.1	19.0
2	Residential	0.9	0.6	0.6	17.6	15.7	16.3
3	Residential	0.3	0.2	0.3	8.4	8.0	8.4
4	Hotel	0.7	0.6	0.5	14.2	14.0	13.9
5	Residential	0.3	0.3	0.3	9.2	7.7	7.8
6	Residential	0.6	0.6	0.6	10.7	10.4	10.0
7	Recreational	-	-	-	36.5	35.4	33.0
8	Residential	1.7	2.1	1.9	14.8	13.6	13.8
9	Residential	0.7	0.8	0.7	7.1	7.5	7.0
Maximum		**1.7**	**2.1**	**1.9**	**36.5**	**35.4**	**33.0**
Background Concentration			3.5			25.5	
Maximum Increment + Background			5.6			32.5 [(b)]	
Assessment Criteria			**40**			**200**	

(a) Assumes 70% oxidation for annual average and 35% for 99.8th percentile.
(b) UK guidance states that it is appropriate to add the predicted 99.8th percentiles to twice the annual average concentration to estimate the total 99.8th percentile of hourly average NO_2 concentrations.

The maximum predicted increment to annual average concentrations of nitrogen dioxide (NO_2) occurs at receptor 7 which is a recreational area. Therefore, only short term exposure is of relevance at this receptor as there will be no exposure to annual average concentrations.

The maximum predicted increment to annual average concentration of nitrogen dioxide (NO_2) at any receptor where there is likely to be relevant exposure is 2.1 µg m^{-3} at receptor 8. This is less than the criteria usually adopted by MEPA of 4 µg m^{-3} and therefore considered to be acceptable.

The maximum predicted 99.8th percentile of 36.5 µg m^{-3} occurs at the recreation area, receptor 7 and can be compared to the assessment criteria of 200 µg m^{-3}.

It is considered that both the predicted increments and the total predicted concentrations are small compared to the assessment criteria and are not of concern to human health.

The following figures are presented to illustrate the distribution of concentrations of nitrogen dioxide (NO_2). Predictions are presented for 2009 meteorological data which was selected as it give rise to the highest impact.

- **Figure 5.3;** Annual Average
- **Figure 5.4**; 99.8th percentile of hourly averages

The figures show that peak predicted increments to ground level concentrations occur within about 250 m of the gas engines at locations where there is no relevant exposure.

Figure 5.3 AERMOD Predicted Annual Average Ground Level Concentrations of Nitrogen Dioxide (NO_2); 2009 Meteorological Data (µg m^{-3})

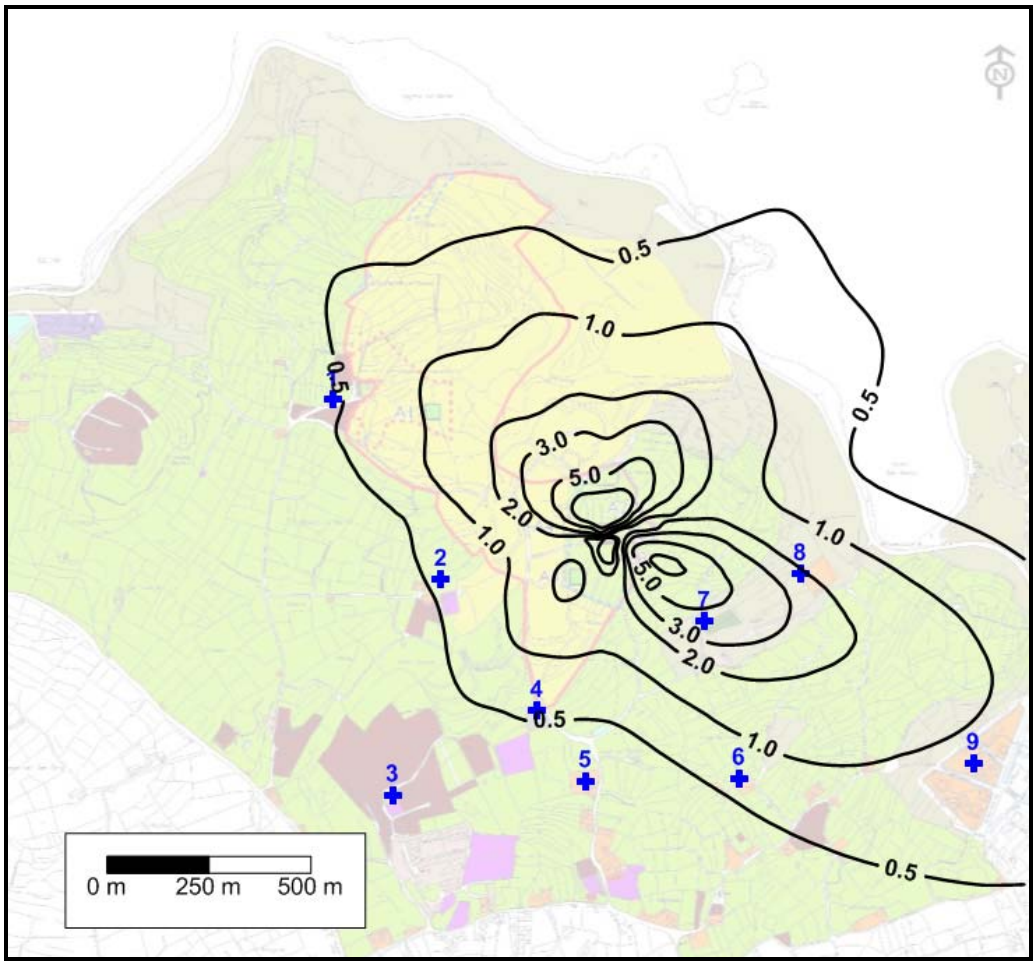
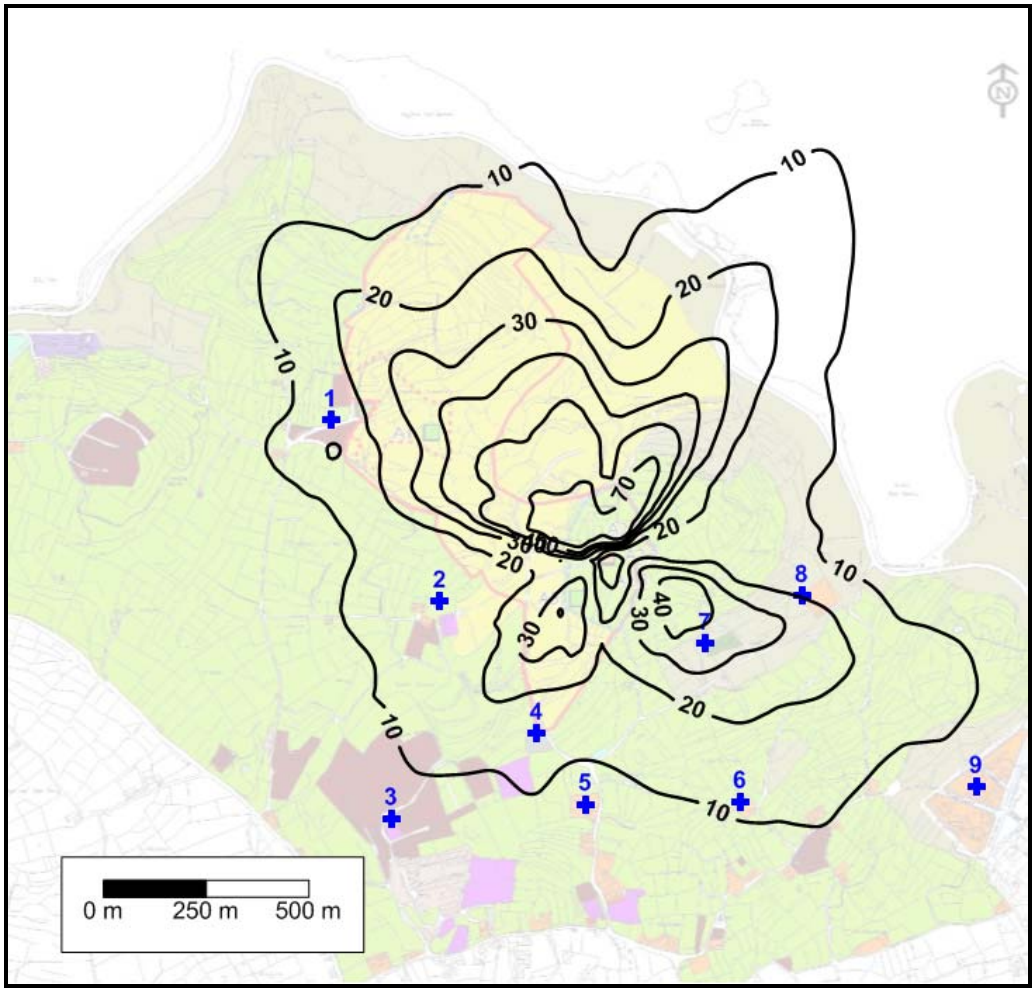


Figure 5.4 AERMOD Predicted 99.8th Percentile of Hourly Average Ground Level Concentrations of the Nitrogen Dioxide (NO_2); 2009 Meteorological (µg m^{-3})



6 MITIGATION AND RESIDUAL IMPACTS

6.1 INTRODUCTION

The assessment presented in this report assumes an appropriate level of mitigation and therefore the predicted impacts are following mitigation and therefore can be considered also to be the residual impacts.

It should be noted that there are aspects of the design that would allow additional mitigation if this proved to be necessary.

This section outlines the mitigation measures that are inherent in the design, construction and operation of the facility.

6.2 CONSTRUCTION

Emissions of dust generated during construction can be minimised by mitigation measures should these be necessary. The mitigation measures that will be employed during construction will be those considered adequate by the construction company. The measures will be discussed and agreed with MEPA prior to commencement of construction.

6.3 OPERATION

6.3.1 Odour

The design of the facility has been focused on minimising emissions of odour to atmosphere.

With the exception of the service building and biofilters, there are no other potential sources of routine odour emissions to atmosphere as all aspects of the process are sealed from the atmosphere. Full details of the mitigation measures that will be employed to contain odours are presented in the application for a permit and are not reproduced here, other than the flowing brief summary. **Text Box 6.1** provides an outline of the odour mitigation measures.

Text Box 6.1 Odour Mitigation Measures

All areas of the MBT-plant, in which there is malodorous process air, are designed to have an air collection system to remove such odours by means of forced extraction.

The most significant area where odour is released is the Reception Hall. The entrance to the Reception Hall will be by automatic doors protected by air curtains to minimise the release of odours and dust from the waste reception area.

Exhaust air collected from the Reception Hall and source segregated air from the mechanical pre-treatment items will pass a dust filter system. Afterwards the air is treated in an acid scrubber and a biofilter. Waste air from the machines within the wet pre-treatment hall is directly sucked off to the scrubber.

The exhaust air concept shall be optimised to reduce the air flow from the process to a minimum.

Emission monitoring shall be made by the analysis of a discrete sample from the measuring point at the biofilter. The measured odour will be less than 2,000 O/U. Specific samples will be measured and tested within the agreed protocols.

The exhaust air treatment for the AD process can be reduced to a chemical scrubber system. Most of the tanks are connected to the biogas system which has only defined emission points.

Source: Permit Application; Description of Process (April 2011)

With regard to emissions of odours to atmosphere from the biofilters, the modelling has shown that the concentrations at the specific receptors are less than the assessment level. The modelling assumed a specific flow rate and emission concentration for each biofilter. The input to the model is however the odour emission rate and therefore as long as the total odour emission rate for each biofilter is less than that assumed for this assessment the impacts will be less than those presented and therefore will be acceptable. This may give the providers of the biofilters some flexibility to increase the odour concentration providing that there is a corresponding reduction in odour emission rates. For clarity, **Table 6.1** shows the odour emission rates that should not be exceeded for the final design of the facility.

Table 6.1 Biofilters: Maximum Odour Emission Rates

Source Number	Emission Rate Odour ($OU_e\ s^{-1}$)
A1	12 778
A3	1 806

6.3.2 Gas Engines

The assessment presented here shows that the dispersion provided by the three 15 m high gas engine stacks is sufficient to render the emissions harmless at ground level and therefore no further mitigation measures are required. It should be noted that the gas engine stacks were increased from

the original design height of 10 m, this was to improve dispersion and reduce the impacts on air quality.

7 SUMMARY AND CONCLUSIONS

ADI Associates has commissioned Atmospheric Dispersion Modelling Ltd (ADM Ltd) to undertake an air quality and odour assessment of emissions to atmosphere from the proposed Mechanical and Biological Treatment Plant (MBT) in Malta.

The process plant will process 147,000 tonnes per annum of feed stock derived from residual municipal waste arising from Malta, based on the following:

- 100,000 tonnes per annum of residual household wastes
- 47,000 tonnes per annum of bulky waste

Oversize rejected materials that can not be handled by the process plant will be removed after visual control by crane or wheel loader before they enter the MBT process. The project comprises mechanical and biological processes (MBT), including anaerobic digestion (AD). The plant has been designed to recover recyclables (eg metals), produce refuse derived fuel (RDF), recover energy from the combined heat and power (CHP) plant fuelled by the biogas and produce a refined digestate for end use.

A biogas fuelled CHP plant is included to maximise energy recovery. Electricity is exported to the grid whie waste heat from the exhaust systems is used within the process.

Emissions to atmosphere will occur from the following:

- Construction of the facility.
- Three biogas fuelled CHP engines.
- Road traffic generated by the development.
- Biofilters.
- Waste handling hall.

The following are the principal conclusions that can be drawn from this assessment which has been undertaken using the emissions data provided and the assumptions specified:

- The impact on air quality of emissions to atmosphere from road traffic generated during the construction and operation of the proposed facility will be negligible.

- During construction there is the potential for emissions of dust to cause a soiling nuisance at locations within about 200 m of the construction site. However with appropriate mitigation measures the potential for soiling nuisance is minimal.

- Emissions to atmosphere from the three gas engines will not significantly effect air quality at ground level.

- Emissions of odours from the building will be contained by appropriate mitigation measures.

- Emissions of odours from the biofilters will not give rise to exceedence of the assessment criteria for odour annoyance at the specific receptors and therefore is considered to be acceptable.

PA 02342/06

Master Plan for the Maghtab Environmental Complex, Naxxar

Technical Appendix 7

SOCIAL BASELINE SURVEY

Prepared by Mr Stephen Vella

Supporting Documents for
Environmental Impact Statement Update

GHALLIES SOCIAL BASELINE STUDY

Table of Contents

INTRODUCTION

1. The aims of the social assessment are to:

- Document the lifestyles and social activities of those who own / live in / use buildings in the vicinity of the Application Site (Figure 1), or who use the surrounding urban and rural spaces;
- Through anthropological investigations to document the perceived impact of the Scheme on the existing social fabric of the surroundings;
- Identify communities, and document their present values, attitudes to living in / visiting Area of Influence (A of I) as defined in Figure 1; and
- Assess the impact of the Scheme on the lifestyles of the Users of the Area.

2. The key issues for the assessment are:

- The lengthy timeline and the risk of Maġħtab becoming a permanent Waste Management Solution;
- Lack of enforcement and monitoring during the construction and implementation phases, which would in turn increase the significance of other impacts;
- Health and Safety issues caused by the ancillary operation of the Waste Management Scheme (manure spillage; dust and air pollution etc.);
- Potential Health and Safety / risks of the hazardous waste cell;
- Lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion;
- Visual Impacts by the recycling plants;
- Loss of Agricultural land;
- An increase in Traffic during both construction and implementation phases;
- Impacts to tourism; and
- Social transformation of Maġħtab resulting in further loss in community values

DATA SOURCES AND DEFINITIONS

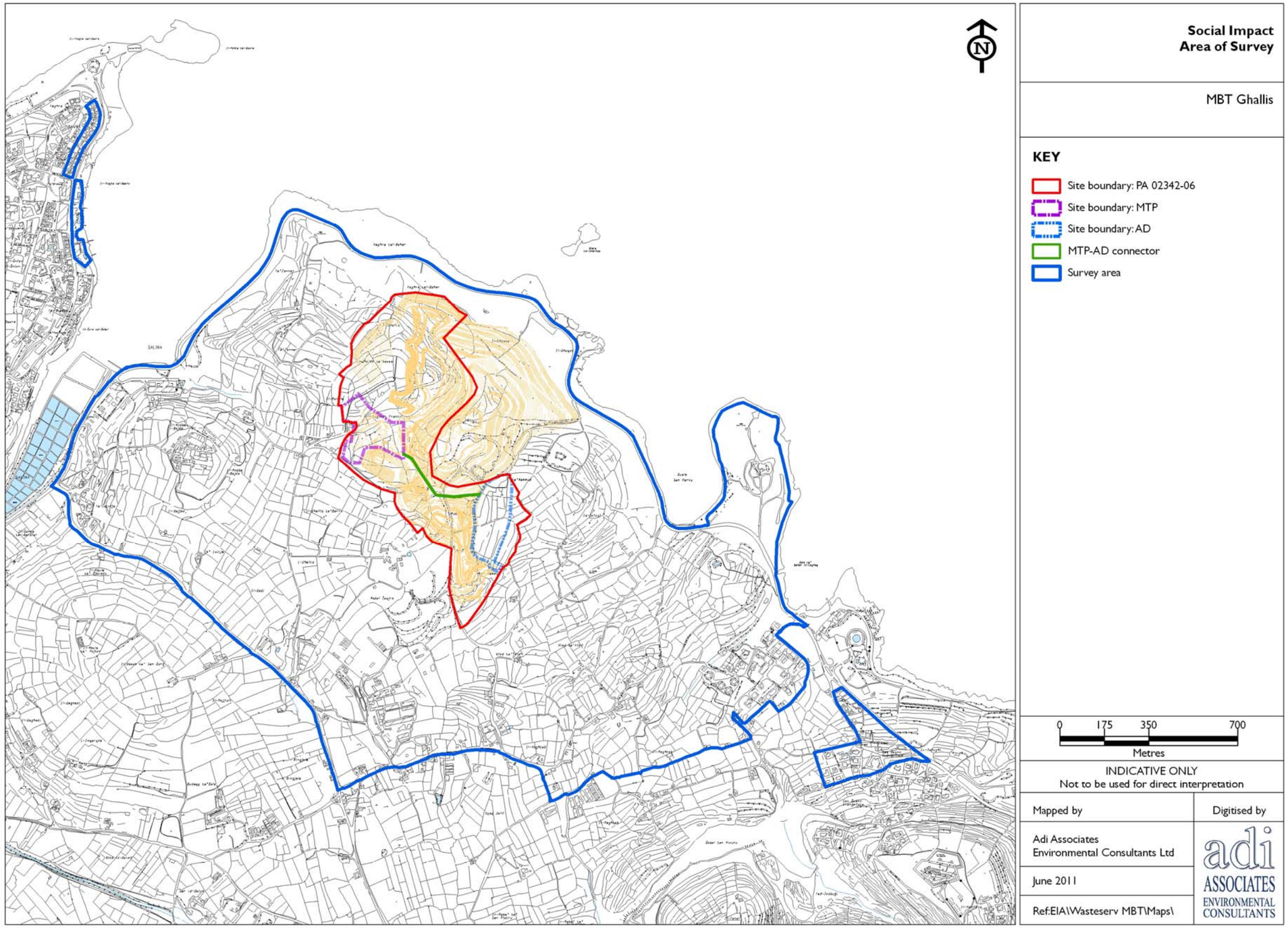
3. The social assessment draws upon intensive anthropological fieldwork carried out in 5 weeks during the months of May and June 2011 to assess local identities, life styles, community values, recreational practices, and economic stakes. The fieldwork was undertaken by social anthropologist Steven Vella B.A. (Hons.), M.A. (Econ.) (Manchester).

4. It is important to acknowledge that the social assessment is not a survey of people's opinions on the proposed development, but rather the presentation of anthropological data about people's relations within the A of I, their values and

aspirations, and lifestyles, followed by the assessment of the data in accordance with MEPA's Terms of Reference (ToR).

5. The geographical area within which the sensitive receptors were interviewed are as follow:
   1. The Hamlet of Magħtab
   2. Baħar iċ-Ċagħaq
   3. Salini
   4. The Waterfront area of Qawra overlooking the application site (on the other side of the bay)

Figure 1: Application Site and the areas where the interviews where held, including the waterfront of Qawra and the whole of Bahar ic-Caghaq.



Space and Place

6. The data indicates that the localities around the Site show a textbook case of contestation of space and identity. Theoretically, the field of proxemics (Hall, 1966, 1976) indicates how people use space and structure it culturally, using the space where they live or conduct their business, such as their property, fields or place of employment, to define boundaries between themselves and the rest of world. In this particular case, there is a dichotomy between a sense of belonging, which has become confused because of political movement, as a locality, together with other factors.

7. The Hamlet of Magħtab, Baħar iċ-Ċagħaq and Salini all make part of the Naxxar Local Council administratively. Magħtab is unfortunately immediately associated with the landfill found on the site and a lot of people not from the area barely know that there is a hamlet with over 200 people residing in the area. This has created a lot of mixed feelings towards the space within which the residents reside and towards the Authorities, who had called the landfill Magħtab Landfill. In many cases, especially in children or adult who grew up in the area, they felt shame stating that they lived at Magħtab, because Magħtab was immediately associated with the landfill.

8. Baħar iċ-Ċagħaq has a similar set of factors in relation to space and place. Apart from falling under the administration of Naxxar, religiously the locality falls under the parish of Madliena. The Church at the locality has only recently been given permission by the Madliena parish to perform rites that include weddings, baptism, Holy Communion and Confirmation. This created a displaced sense of local community to identify with, reminiscent to their roots. This is further complicated by the fact that for a long time Baħar ic-Cagħaq was associated with a summer residence locality where people had their summer residence there and lived permanently elsewhere. In actual fact, in access of 800 people reside permanently at the locality today.

9. Similarly, Salini has only recently grown as a locality with residents living there permanently, even though the area has always had people living in the area permanently, predominantly of a rural nature. More recently it became associated with summer residence area and people who go to the locality from other areas as a place of transition, renting for a period of time and moving on.

10. Furthermore, the three localities mentioned above can also be seen as the clash between the old and the new, two worlds that use the same geographical space, such that long standing residents take the space that there is between themselves and their neighbours into a different dimension or meaning.

11. 'Space' becomes 'place' when people attach meaning to it; when different individuals and / or groups attach different meanings to the same space, and the different versions of 'place' have to spatially co-exist. Hall (1966, 1973) proposed four general kinds of personal space ranging from intimate to public. Because these spatial aspects of behaviour are tacit, actors usually only become aware of the boundaries when they are violated. A set of complex contestations develops involving, to a greater or lesser extent, conflict. This is not due to the proposed Scheme *per se*, though the fact that there has been a landfill for over 33 years in their vicinity does play a role, especially when it comes to issues such as the construction of any major new

development in the area, including, but not limited to the two recycling plants proposed by the Scheme. Similar feelings have also been caused by apartment blocks that have been sprouting both at Baħar ic-Cagħaq and Salini. This result in the resurrection of contestations and grievances that were already present but largely subdued.

12. It is opportune to add that such contestations are threefold, in the sense that there can be said to be three distinct groups that hold very different relationships and claims of different forms (some of which are of a very emotional nature) to the socio-physical landscapes of the areas in question. There are those who have ties going back generations, who are those with rural ties to the land; those who have moved to the area in the last 15 to 30 years; and then those who have only recently moved to the localities. Such contestations have been rationalised by some of the respondents, yet, it needs to be said that such emotional ties and the underlying contestations can rarely be quantified.

13. Contestation of space involves the different perceptions of that same space by different groups of people, whether resident or transient, which hold a stake in that same physical space. The fieldwork showed that, in the A of I, a number of different perceptions and meanings of that space exist, sometimes within the same household or the same socio-physical environment. These processes have different derivations; from gender to age, from the use of the space in question, and from the stakes that different individuals or groups have within the area.

14. Though the report will have a final section with recommendations that the users had made during the interviews, it is beyond the scope of this report to seek to resolve or mitigate contestations. Rather, the assessment provides a detailed account of the issue, often with reference to long-term processes and the various individual and group interests at stake.

Social Landscape: Socioscapes and Sociospheres

15. The landscape of a particular area is made up of two distinct qualities: the physical landscape and the social landscape. When discussing the social landscape of a locality, it can be said that it forms part of a socioscape, which is then made up of various social groups that may or may not interact with one another, directly or indirectly through time and space. If one had to look at the study of sociospheres in general, socioscapes were first conceptualised because, with the advent of communication, easier means of transportation and so forth, people may live in the same locality but do not communicate or interact with the people physically living at the same geographical area or locality, but with people that are geographically far apart, through telecommunications, e-mails and so forth. A socioscape, then, is not limited by geographical proximity[1].

[1] This can be easily understood by using an example from data collected during fieldwork: that of people who have family abroad. A number of residents at the A of I have such an experience, where their siblings migrated to other countries in the sixties and never returned, with whom they still keep contact presently, more than they could in the past, when the only means of communication was through letter-writing. Thus their socioscape can include both Malta and Australia, in this case.

16. For the purpose of this study, the Socioscape comprises areas of association to which people or groups have their affiliations. As described above, residents keep alliances to kin relations, sometimes found at their previous place of residence and where their friends still reside. This is true for a number of respondents from Baħar ic-Cagħaq and Salini. Some respondents were very vocal about their alliance to Madliena or Għargħur as opposed to Naxxar, for example. Others held their alliances to uxorilocal (settlement close to mother's residence) or virilocal (settlement close to father's residence) associations (see below), especially those residents with long-standing relations to the land. Others still felt that even though they have not lived as long at the locality, they now consider themselves as pertaining to that particular locality, pointing out that their work to improve the locality is proof of such ties.

17. These differences in worldviews towards their locality, even though, for example, Magħtab is a hamlet, cannot be seen as a community, as such, hence the use of the terms sociospheres, even for a locality such as Magħtab.

18. To conclude, people who inhabit the same locality do not inhabit by default, the same socioscape. Even if they might not interact in an open manner as a united community in the traditional sense, their ideologies might still have similarities. Within a given locality, people may not interact with all members in an obvious manner, limiting their interactions, making different social networks, forming different social groups that would form part of their 'sociosphere'. At times, as explained above, their sociosphere extends the physical, or in this case, the political limits of a locality.

Area of Influence

19. The Area of Influence (A of I) for the local context social assessment is defined in terms of people potentially affected by the Scheme living in or visiting the area immediately around the Application Site as described below. The area considered, as shown in Figure 2, was an arbitrary line delineating the selection of the sample to be interviewed and is only indicative of the population closest to the Site that could potentially be affected by the Scheme[2]. The A of I and the Social Analysis described below should not be used for direct interpretation as a stand-alone analysis. The Scheme, being a Master Plan and dealing with the municipal waste of most of the country has larger social implications to what is described in this analysis. This report attempts to identify the social ramifications of the localities and areas closest to the application site, as described above and may be considered to help assess the micro or local social assessment as opposed to the meso- or macro-assessment of the project. It should be stressed that a project of such magnitude has a very broad social affect on the whole of Malta.

20. As shown in Figure 2, the A of I includes;

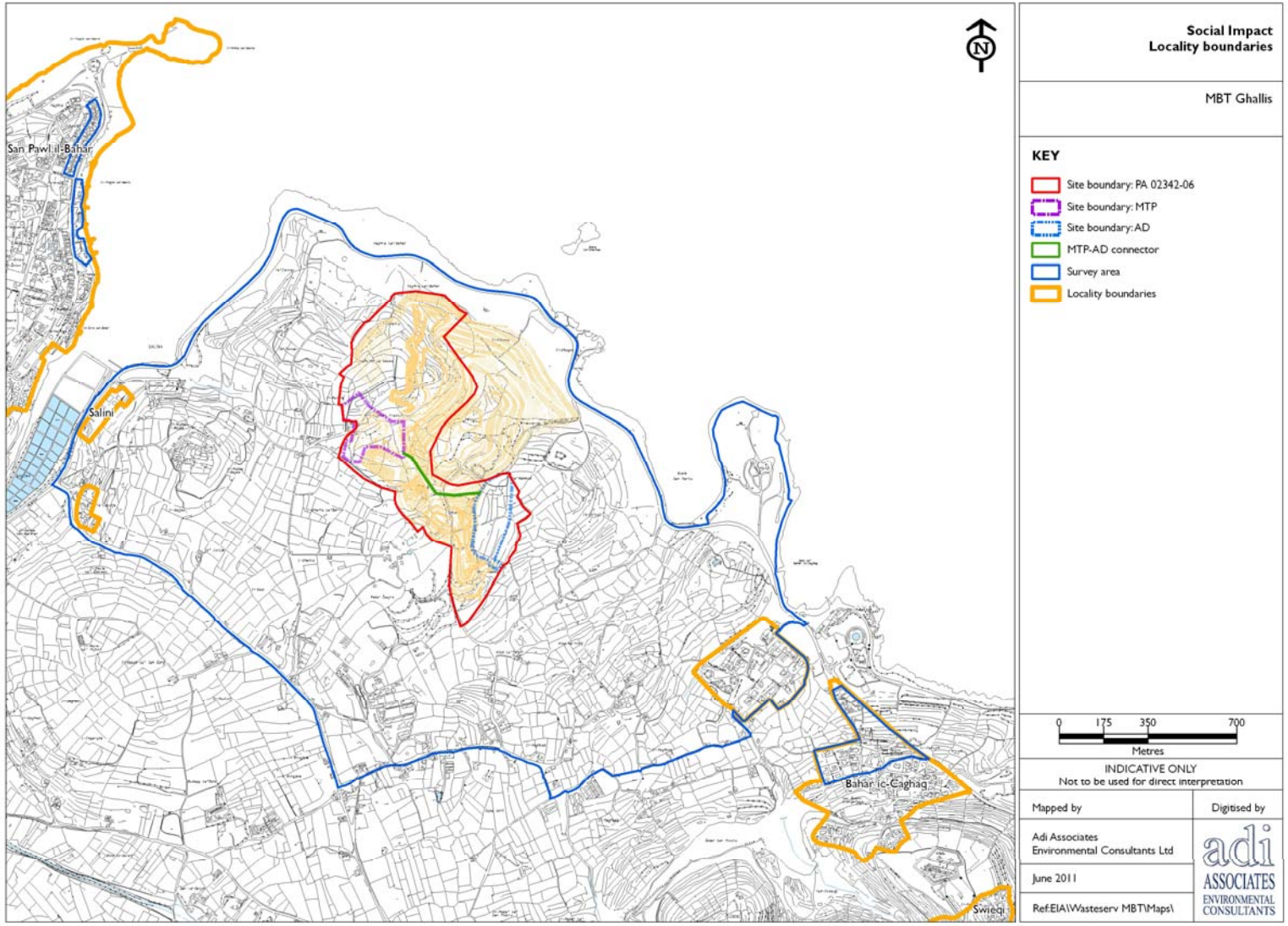
- The locality of Magħtab,
- The locality of Salini;
- The locality of Baħar ic-Cagħaq;

[2] See section describing the limitations encountered, below.

- A portion of Qawra that is overlooking the application site and the disused Magħtab landfill.

  Together with the above, it was important to include the tourism industry of the area, which includes a sample of the hotels found in the area, especially at Qawra, again overlooking the application site.

Figure 2: Area of Influence



21. The communities (or sociospheres – see below) within the A of I include:

- The residential population (permanent and transient) around the Application Site and people using the area for other purposes, including farming; and
- People going to the A of I for work and leisure. This includes tourists who visit the area, and those whose business or place of work is in the area.

Standards and Guidance

Legislation & Policies

22. There are no social-specific legislation or policies in the Structure Plan or the Local Plan; relevant policies are described in the subject chapters of the EIS.

Defining Tourism

23. Tourism is defined as "the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes" (WTO, 1993). A tourist is defined by the WTO as "a temporary leisured person who voluntarily visits a place away from home for the purposes of experiencing change" (ibid, 1993). Anthropology further classifies tourists into different groups (Boorstein, Cohen, Maccannell, Urry, Smith). For the purposes of this report, Cohen's classification of tourists (1974) is adopted. According to Cohen, tourists may be classified as follows: the "organized mass tourists" (thereafter, OMTs) or package tourists, relying on tour operators to visit an area; the "drifter" or independent traveller, and in-between, there are the "independent mass travellers" (thereafter, IMTs) who, whilst not relying completely on a tour operator, will make sure that they have an organisation backing them up but will go on tours for sightseeing purposes on their own initiative[3].

METHODOLOGY

24. The research was aimed at understanding and evaluating the response of the people using the area to the Scheme. This called for a qualitative research methodology in accordance with the methods of social anthropology and the ToR of this study, and with the generally-accepted idea that, in case of research that considers a large number of variables within a relatively small population, qualitative approaches are desirable; this is particularly so when the considering 'meanings' — in this case meanings of "space" and "local identity" and perceptions of their physical and social environment.

Techniques

25. Intensive on-site fieldwork was conducted over approximately 160 hours, including the weekends and evenings in order to encompass as broad a range of persons as possible, during the months of May and June 2011. In-depth, qualitative interviews

[3] It has to be noted that apart from Qawra, which is a hub for tourism and a few tourists on the coastline opposite Baħar ic-Cagħaq, within the A of I, no tourists were encountered, at least not anywhere close to the proposed site. The definitions above therefore have been inserted for completion and clarification purposes.

and observations were carried out in the three localities, in close proximity to the Application Site and the area around it to probe people's uses of the land and to seek to relate the proposed development to various aspects of their everyday lives.

26. Questions were asked in a non-standardised manner (in accordance with the methodological standards of anthropology), using an interview *aide-memoire* and interview key rather than a set questionnaire to generate questions in a feasible manner according to the situation. The March 2010 revision of the PA 02342/06 Project Description Statement (PDS) dated May 2009 was used to explain to interviewees its nature and extent. The MEPA website details for the more voluminous PDS of the 2006 Masterplan for the Magħtab Environmental Complex (GF/00121/06) was also offered as supplemental reading.

27. It is to be stressed that most of the people interviewed were largely ignorant of the proposed Master Plan and had no knowledge of the proposed Mechanical / Biological / Manure plants (thereafter MTP and BTP) and other details of the current project and confused it with plans for other projects connected to the Scheme that do not form part of the said Scheme, such as a park or golf course (and other hearsay projects) associated with the rehabilitation of the closed Magħtab Landfill.

Sampling

28. The non-random quota sample of around 170 people interviewed included residents - both seasonal and permanent, Maltese and foreign within the A of I; owners or managers of businesses operating in the area, and a number of their clients; formal and informal organisations / clubs with a stake in the area; farmers (mostly part-time) who work the fields in the area; and other groups that use the area, including people who use the area for leisure, including a number of tourists who visit the area on walks at the waterfront of Qawra, together with Maltese visitors around the coastline next to St. Mark's tower and Maltese residents and visitors walking along the surrounding countryside behind Baħar ic-Cagħaq and Salini. There also were a number of first time tourists (during the particular season when the interviews were held, the tourists encountered not within the premises of the various hotels of the area were mostly IMTs and at the hotels were mostly OMTs From evidence collected for another SIA performed in the same area of Qawra (Falzon & Vella, PA 04591/00, SIA baseline study for a Multi-storey Complex, Triq in-Nakkri / Triq it-Tamar, Qawra, 2005), the number of IMTs at hotels will increase during the summer.

29. In addition to interviews, the fieldwork included walks in the area in order to 'read' the social landscape and the activity that invariably marks it: much can be deduced from reading these signs.

Gendered space

30. Gendered space was also taken into account when looking at the contestation of space. Males and females have different perceptions of space and, where possible, all the members of a household were interviewed, especially when the members were males and females, parents and their children. Anthropologically, the construction of gender and space has been discussed in detail (see for instance Ingold, 2002) and,

based on such paradigms, it was noted that spatial understanding inside the household mirrors that outside. Women think in different ways about the space outside their houses and the area surrounding where they live.

31. Whilst general perceptions of possible impacts from the scheme converged and both males and females had similar views, the order of importance given to different (perceived) impacts was sometimes different. Males, for example, were immediately very concerned about access to the site, especially those who have farming activities there, and the possibility of increased traffic and property prices, for example; female perceptions immediately went to dust management, noise pollution, and safety for their children due to both the construction and implementation phases of the proposed project. It must be pointed out though that property prices was a general issue for both genders, sometimes being brought up by women first during the conversation. Health was another recurrent issue that both genders broached frequently. Since for example mothers usually went to pick up their children from school and many also had jobs to go to, traffic was also an issue touched upon by both genders. The absence of proper amenity facilities in the areas (excluding Qawra) was also an issue.

Past Experience

32. Past experience is a very important factor to take into consideration, because it enables consideration of possible reactions that residents and other stakeholders of the area might have during and after the construction of the project. Past experience, as a reference, is a more reliable basis than opinion polls on which to make forecasts on possible reactions and impacts. *Opinions* change frequently depending on rumour, information when present, and public opinion, while one speaks of present and past experiences with more certainty depending on personal impacts.

33. It should be also noted that many interviewees used past experience of the sewage treatment plant at Marsascala rather than two recycling plants operating there. It had to be explained to these respondents that those are two very different types of operations and that even the current plants at Marsascala have very few odour and sanitation problems, while the proposed plants will be using better technology than that used currently. A number of respondents had also had the opportunity of having a site visit at the Marsascala recycling facilities and most agreed that there was a marked improvement to the air quality of the area. A number of respondents though did have their doubts and argued that there still were foul odours within the facilities that could permeate to the surroundings if such plants were implemented at the proposed site. This argument was also compounded by the experience of the engineered landfill that still produces foul odours on days when the wind prevails towards their place of residence together with their experiences of the now decommissioned original Magħtab landfill.

34. Another important factor that this project has to its disadvantage is the respondents' past experience with the authorities and the project proponent regarding the closure of the Magħtab landfill and the opening and management of the engineered landfill at Għallies. Nearly all respondents of the study believed that they had been short-

changed by the system (Borg & Vella, 2010) and that many promises that the Authorities and / or the proponent had been made but never maintained. This will be discussed in further detail in this report.

Limitations

35. The first limitation of the research was sampling due to time constraints. Although every effort was made to sample as many different interested groups as possible, there were a number of constraints that kept the sample relatively small, in relation to the total population of users of the A of I. In this respect, the fieldworker opted to interview more sensitive receptors closer to the site and lesser interviews the further away from the proposed site one got. Therefore there are a high number of interviewees from the hamlet of Magħtab and the surrounding areas while less interviews were conducted at Baħar ic-Cagħaq and Salini. The fieldwork technique of in-depth interviews as opposed to the use of a survey counterbalanced this limitation in that data tended to 'add up', in the sense that information given by the various groups was to a very high degree congruent.[4] Therefore sufficient data was gathered in the process to compile a representative and comprehensive report. During fieldwork, visits were made to the area during different times of the day and week, including the weekend, to meet as many different interest groups as possible within the same space. The knowledge of who should be interviewed became more apparent as fieldwork progressed, since interviewees generally pointed in the right direction.

36. The second limitation was that being such a sensitive project also meant that it took time to win the trust of people encountered and on various occasions the interviewer was mistaken for a representative of the proponent or a MEPA / official, only interested in presenting a positive picture of the proposed project. Once this barrier was overcome, respondents were more willing to collaborate for the study and by word of mouth there was a snowball effect in that other receptors came forward to be interviewed.

37. Another misconception associated with the second limitation was that of the role of the fieldworker. Many thought that the fieldworker was on an information-giving rather than one of an information-gathering one or part of a consultation exercise by the proponent and was expected to answer questions of a technical nature on particular environmental impacts that only the EIS would be able to answer on its completion. Once the true intentions of the fieldworker was understood, while most of those contacted went on to be interviewed, there were still a number of respondents who remained hostile and declined to be interviewed. The reason most gave reflects paragraph 35, where they explained that the study would be useless and the powers to be would not heed their concerns and still go ahead with the project without altering it.

38. The third limitation was seasonality. With respect to land use, seasonality is of particular relevance, and since the bulk of the fieldwork was conducted in May and therefore early in the summer season, localities such as Qawra, Baħar ic-Cagħaq and

[4] When data converge on a set of conclusions is known as the 'saturation point'.

Salini were lacking in summer residents, while most of the part-time farmers of the area had already harvested their fields. Qawra was also limited in the different types of tourists usually present during the summer. The first limitation was overcome as far as possible by probing interviewees on use and seasonality and by collaborating with official / unofficial organizations that have all-year-round contact with the users of the A of I and the localities that were being investigated. The second limitation was overcome by probing the tourist operators for information on the other seasons while also comparing that information with data that had been gathered and analysed by the same researcher in 2005[5].

39. The fourth limitation was the magnitude of the project itself, the fact that it was a master plan with completion of its various phases taking a lengthy period of time, together with the landfill area being the site for other on-going or proposed projects, made it difficult for interviewees to understand the project in its entirety. Many felt by the time the whole area was rehabilitated, which was the most important concern for all the respondents even though not part of the current proposed Scheme; their lives would have already changed radically (aging and changes in their social circumstances). It was argued that local and national social change and transformation happens all the time, even if the project did not exist. It was not just senior citizens but also younger people in their forties who lamented that they would not live to see the complete rehabilitation of Magħtab and the landfills found there[6].

40. One final limitation was that the Scheme ties with various projects that are being proposed or are under way as part of the rehabilitation Scheme of Magħtab. Presently there is no policy that allows for a number of projects taking place within the same area to gauge the cumulative effects of such projects. In this particular case, it might be beneficial for the project proponent to take this under advisement since it is the same company in conjunction with other companies and the Government that are undertaking the other closely related projects.

THE SOCIOSCAPE

41. Local culture has been studied thoroughly by way of an anthropological analysis of the social use of place and space that introduce "socioscapes" and "sociospheres" (Albrow, 1997 in Eade (Ed.) instead of the traditional analysis of community.

42. The A of I can be seen as a socioscape with different sociospheres. The same people may belong to a number of sociospheres, depending on their lifestyle and aspirations, and values are not necessarily common to all members of a sociosphere.

43. The following sociospheres were identified predominant within the A of I; they are not necessarily exclusive such that one person may belong to more than one

[5] Falzon & Vella, PA 04591/00, SIA baseline study for a Multi-storey Complex, Triq in-Nakkri / Triq it-Tamar, Qawra, 2005)

[6] The Assessor believes that it is important that further analysis be undertaken during the length of this proposed Scheme and other projects being undertaken at Magħtab, together with more information transfer and stakeholder involvement. It is recommended that the social changes over time are monitored and gauge predicted impacts in the present SIA to the actual impacts sustained during the progress of the different projects by the same proponent, thus re-evaluating mitigation and monitoring strategies.

sociosphere. For example, members of the farming community may also belong to the local, full-time residents community; a respondent may have both his place of residence and his business at the locality, and so forth. The sociospheres are here placed in groups that have been called 'communities', where each community has several sociospheres:

a. The Local Community: The local community is made up of sociospheres whose constituents use the A of I regularly, and therefore can be labelled 'local'. These include:
   - Well- established Maltese residents;
   - More recent permanent Maltese residents;
   - Local foreign residents, a number of whom may be married to Maltese nationals;
   - The working community, including Business Owners and workers

b. The Transient Community: This group of sociospheres include;
   - Maltese Summer Residents (at the three other localities not including Maghtab)[7];
   - Maltese transient residents, usually renting from a number of months;
   - Foreign visiting residents (spending short or lengthy periods of time at the locality)[8], and
   - Regularly returning tourists, not at Maghtab but at the three other localities[9] (usually because they have friends at the locality).

c. The Visiting Community:
   - Tourists[10];
   - Visitors to local residents;
   - Visitors to the locality for leisure, including sports and recreation activities, including bars and clubs (in the case of Qawra); restaurant goers and social club goers; people going for morning walks in the countryside etc. These also include nightlife visitors: people using restaurants/ bars and other amenities[11].

[7] Due to the time of fieldwork, most summer residents had not yet moved to the localities for the summer. In fact a number of houses or apartments were found vacant and neighbours and other interviewees informed the researcher that the property belonged to summer residents that had not yet arrived for the summer.

[8] At Maghtab, interviewees informed the researcher that there were a number of foreigners living for part of the year in converted farmhouses but at the time of interviews these were not encountered.

[9] While the researcher was informed that this group exists in the three localities excluding Maghtab, very little data was collected directly from this group due to the time of year and is not considered representative.

[10] It is important to note, here, that during the period of fieldwork, only a very few number of tourists outside of hotels were noticed, and at only one locality (Qawra). A few were seen walking towards particular sites at the periphery of Salina and Baħar ic-Ċagħaq.

[11] This last group is constituted by a number of sociospheres who have associations with or pertain to other sociospheres, as has been explained above, such that visitors to residents (kin or friends) would form part of those sociospheres; bar goers are associated with businesses, and so forth. As described previously, pertinence to a particular sociosphere is by association in one way or another.

d. The farming community: These are either visitors since they do not live in the immediate vicinity (within the A of I established in figure 2), though a number of those interviewed lived in localities relatively close by, such as Naxxar and Mosta. Others were full-time residents of Magħtab from both categories, i.e. either part-time or full-time farmers. From the data collected from the interviews, most farmers of the area are part-time farmers and it was also explained that the reason why the fieldworker did not encounter many farmers on their fields during the fieldwork period was because the harvest period was practically over.

Overview of the Localities within the A of I

44. The following is a short overview of the localities found within the A of I. The Local Councils of the localities and other official organizations that operate in the area supplied some of the data. Most of the information found in this section is extrapolated from the interviews, reflecting the sample of users of the A of I.

45. It is important to note that official boundaries do not necessarily correspond to the social and personal (individual) constructs of the space where people live and conduct business. This has been witnessed during fieldwork. Indeed, apart from Qawra, the localities of Magħtab, Baħar ic-Ċagħaq and Salini fall under the Naxxar Local Council and only Baħar ic-Ċagħaq residents have their address listed as 'Baħar ic-Ċagħaq, Naxxar'. The two other localities are only listed under Naxxar.

46. Discussion of the different groups and sociospheres in later sections of the report will look at the above three localities collectively and distinction between localities will only be made when necessary. This is also due to a lot of convergent data between the various respondents.

Magħtab Hamlet

47. The Magħtab settlement is spread out over a large linear area (circa 1.6km) and thus lacking an identifiable core apart from the 16th century chapel with a population of circa 250 residents.

48. The hamlet of Magħtab is situated on the periphery of Naxxar, just under the Victoria Lines (1870-1899) and very visible from Heritage Trail that runs along the Victoria Lines, a very popular spot with tourists. Magħtab is also located on what has been termed as the "Golden Mile" that is the road linking Sliema, Paceville, St. Thomas Bay, and Dawret il-Gzejjer in Bugibba, where the highest concentration of all the tourist visiting Malta are located.

49. Spread around Magħtab there are a number of interesting features of historical note that include the Magħtab Land Radar ('*il-widna*') from Malta's British heritage. The structure is now dwarfed by the large satellite dishes of the Go Earth Station. Of archaeological interest there is the Neolitic Temple of Tal-Qadi, then towards Salina the 16th centuary St Michael's chapel and along the Coast Road there are a number of other historical sites: the Catacombs, Ximenes's redoubt, the Fougasse, Ghallis Tower, Qalet Marku Tower, the Dolmens at Maghtab and the world famous cart ruts which still baffle all tourists visiting them as to their intended purpose.

50. Magħtab, while having a predominantly rural visual landscape, it has a highly mixed and somewhat conflicting land use, that give a rather disorganized character to the settlement. MEPA states, in the Central Malta Local Plan (2006) that the "area and has a number of existing different uses apart from farmhouses. These existing uses include residential units of varying types and design, batching plants, plant yards, garage industries, animal husbandry farms as well as a substantial number of disused buildings. Due to these mixed and conflicting uses and the disorganised character of this settlement, Magħtab is affected by a fall in rural quality and amenity."

51. For the purposes of this report, interviewees were sought from out from these various land uses but were mostly concentrated around residential use, consisting of long-standing residents and more recently established residents; farmers, including full-time and part-time farmers; legitimate business operations, including those in construction, livestock farms, equestrian facilities and recreational facilities found in the area. While every effort was made to interview users such as workers of garage industries (panel beaters, mechanics and the such like), most declined to be interviewed.[12]

Baħar ic-Ċagħaq and Salini

52. Baħar ic-Ċagħaq is situated to the east of Magħtab and over the years the distance between the two has been reduced to a mere 100m. For a long period of time the locality was associated with summer residences, where people living in other localities for the rest of the year spent the summer months at Baħar ic-Ċagħaq. This is probably reminiscent from the British era when the British forces used to use the area as a camping site. The locality is also associated with the White Rocks tourist complex, which had fallen into disrepair and is now being turned into a sports complex. Opposite the residential area of the locality, across the Coast Road, there are a couple of bars and a marine entertainment center. There also is a Boy Scout camping site. There are two chapels that are not in use but the locality now has a large church and a Franciscan retreat house.

53. During these last 35 years, though, there has been an increase in development and an influx of full-time residents. During the summer months the population goes up to around 1,250 people but during the wintertime when only the full-time residents live in the locality permanently, the population is of around 800.

54. The locality can be divided into two areas, the lower part of the locality, at sea level, and the upper part, mainly housing large houses and villas. While there are a number of houses that are either still being built or recently inhabited, there are a number of houses that have been permanently lived in since the sixties.

55. Salini residential area is found to the west of Baħar ic-Ċagħaq and north of Magħtab. It is associated with the salt pens found by the sea. Salini used to be a predominantly rural area with just a few farms and later a number of summer houses. Slowly the locality started to grow with people moving to the area more permanently.

[12] It was reported by other users that many of those who declined being interviewed either had illegal operations or had operations that were not up to standard (such as a number of husbandry and livestock farms, who stonewalled the researcher's efforts to get access to such facilities.

According to a long-standing resident, the locality has been growing slowly for these past 25 years. While it was mostly catering for summer residents, with very few full-time residents, more recently there have been a new wave of development and blocks of flats have been erected, attracting many transient residents—renters who may stay from a few months to a few years. For many of the longstanding residents of the area this meant over-development and building in an 'ugly' fashion, changing the quality of the area, not jut physically, but also socially. This is because a lot of transient residents have moved to the area, many of whom are either single, separated or from broken families. Salini has some 250 registered voters but the number of full-time residents is closer to 350, according to those interviewed.

56. At Salini there also is a four-star hotel, which operates all year round, catering for British senior citizens during the winter period and students wanting to learn English during the summer months. During the fieldwork period, the hotel was hosting the British OMTs.

Qawra

57. For the purposes of this report, the area of Qawra overlooking the Magħtab landfill was also taken into consideration, since it is a major area for tourism and may also be potentially affected by the proposed Master Plan. The hotels (and their workers and clientele) along the promenade were the main focus here, though a number of local residents, visitors to local residents; a number of foreign residents, people power-walking along the front, a number of businesses and their clientele were also interviewed[13].

58. In the following sections, the various users of the area and the various sociospheres are listed below with a brief general description. A more detailed analysis of the social make up of the sociospheres will be given in later sections.

The local 'communities'

59. The term *local communities* is used here not in the traditional sense of the term (for community), but is referring to those users who habitually use the area. These users form part of different sociospheres, sometimes even when placed under the same heading such as permanent residents, since, as will be explained further down in the report, their interactions can be minimal with others falling under the same within the same nomenclature.

Permanent Residents

60. Permanent residents are people who generally live permanently in a particular area, all year round.

61. Long-standing permanent residents can be subdivided into two categories, those who have their roots at Magħtab (the indigenous population) and those who don't. As will be described later, these are considered outsiders, even if they lived at the locality all their lives.

[13] Supplemental data for Qawra was also taken from another SIA baseline study performed in the same area by the author (2005: EPS: PA 4591/00)

62. At Magħtab, long-standing residents can be described as follows:

- People with their roots at the locality, including their extended families, who usually live close by, sometimes on the same road. Historically these were mostly farmers with fields in the area;
- Young couples, one of whom was born and raised at Magħtab. These usually were given a plot of land by the extended family to be able to start their own family with less economic burden, though kin ties are also very influential;
- People who have fields in the area, sometimes for generations but their family was originally from another locality, usually not too far away from the locality (for example, Mosta, Naxxar, Gharghur) and have since come to live closer to their fields;
- People from other localities who have moved to the area when they got married, decades ago. These types of people were usually attracted by the rural lifestyle and decided to buy or build a house in the area and rent (*bil-qbiela) or buy* fields in the area.
- Married couples, one of whom was born at Magħtab, whose family has since moved elsewhere. These usually have fields and / or land belonging to the spouse and therefore opted to move back to the hamlet to build their house there.

63. More recently established permanent residents can be described as follows:

- Couples or families from other localities who decided to move to the area, usually attracted by the locale and the possibility of converting a farmhouse. These are usually of a higher socio-economic status and standard of education who can afford to convert the farm. A number of such residents bought the farm with the ancillary buildings and sometimes surrounding fields and could be considered a countryside villa with a particular architectural style.
- Foreigners who, like the above decided to convert or renovate a typical farmhouse.

64. From data gathered during interviews, it is known that there are also a number of foreigners who do not live permanently at Magħtab, but return every year for a number of months, usually in excess of 6 months of the year. These are therefore part-time (foreign) residents. These were not in Malta during the fieldwork period.

65. At Baħar ic-Ċagħaq Salini and Qawra (always, in the area where the interviews were conducted, along the promenade from the top of the street to the hotels to their left), permanent residents can be described as follows:

- Maltese people owning houses (and in some cases in Salini, farmhouses that belonged to their family and therefore can be considered long-standing residents) and have lived for a substantial number of years at the locality. In Qawra there are also apartment owners who fall in this category. Some of

these used to own the house as a summer residence and then moved permanently into the house in later years. The house could have also belonged to their parents, who used to use it as a summer residence when they were young. Some of these permanent residents moved back to the house when their socio-economic circumstance changed (for example, they got separated). They were attracted to the localities for their proximity to the sea, the quiet environment (at the time of buying the property). Those at Baħar ic-Ċagħaq and Salini also wanted to be close to a countryside area and away from the more populated centre of Qawra. This group is formed of mostly educated middle class workers or business entrepreneurs in middle management or higher. Some are also freelance workers in business or other industries. A number were government employees. Most of their children have a university background. As long-standing residents, some are in the fifties and over. The oldest interviewee was in his late eighties.

- Foreign permanent residents who might have been returning tourists for years and then decided to buy property in Qawra, where they used to rent. In Qawra and Baħar ic-Ċagħaq, there is a predominance of British people who fall in this category. In Salini, there may be the long-standing foreign residents owning property who fall under the above category, but these were not encountered during the fieldwork. On the other hand, foreigners married to Maltese spouses were encountered. Most of these foreigners again, were in their fifties or older.

- More recent residents, especially in Qawra and Baħar ic-Ċagħaq, but also in Salini, also fall within the above socio-economic grouping. These either own or rent their houses or apartments (especially in Salini). These belong to three different groups:

  - Young couples of childbearing age, with or without children, both working and with a mixture of tertiary or post-secondary level education. These include professionals and business owners (especially those who own villas at Baħar ic-Ċagħaq); Couples may also be of mixed nationalities, where one of the partners is Maltese;
  - Foreigners living in Malta (These range from students and other young tertiary educated workers at Salini to rich businessmen and dignitaries in Baħar ic-Ċagħaq);
  - Single parents, with or without their children;
  - Blue-collar working class, with jobs that vary from drivers, manual labourers, house-cleaners, chambermaids, and runners / dish-washers, and bar-tenders and waiters most of whom work in the restaurants and hotels of the area.

66. In Salini, though, the predominant group that make up the more recent permanent residents are young married couples, though interviewees have explained that there is an increasing number of separated couples or individuals who rent indefinitely. Most of the above chose to live in the three localities, especially Salini because the localities promote anonymity and everybody minds his own business.

The working community (Business owners, including recreational facilities and their employees, hotel workers, hoteliers)

67. At Magħtab there is a mixed variety of businesses, some legitimate and other less so. As described above, there are a number of livestock farms and an increasing number of equestrian facilities. Their employees are usually skilled labourers in most cases, both Maltese and foreign. Then there are the more industrial side of the area, including a construction company, a number of construction related small businesses, some working out of garages or other makeshift structures that may have been tool sheds of farms or fields. There also are a number of garage industries, using disused fields or farms to place trucks and busses, and car repair shops such as panel beaters, mechanics, sprayers and so forth. Magħtab has no amenities such as grocery stores or retail.

68. Baħar ic-Ċagħaq and has one grocery store and two restaurants (that were always closed during fieldwork). At the periphery of the residential area there are a couple of bars and the marine entertainment facility. Salini also has three restaurants. For most amenities, residents of all three localities have to go elsewhere. Salini also has a four star hotel, whose workers mostly live in neighbouring localities, especially Qawra and Bugibba.

69. Qawra is a predominantly touristic area and the workers supply the industry for the most part. Many workers, including hotel management live relatively close to the their work place. Others, who don't necessarily live in the area, such as management, use the area not only for work but also for leisure, using the hotel's amenities and leisure facilities such as the gym and pool; they also play squash, tennis, football and so forth. This contrasts with the non-management staff, many of whom do not like mixing pleasure with work and therefore go elsewhere during their leisure hours. It is not uncommon, however, that they go to the beach in Qawra.

The Transient 'community'

70. The group of sociospheres that are considered transient are those users that return regularly for a period of time but are not permanently established at the locality.

Maltese summer residents

71. During the interview period, no summer residents were encountered at Magħtab.

72. At Qawra, Salini and Baħar ic-Ċagħaq, summer residents have their principle dwelling elsewhere in Malta and opted to purchase property in the area because it was usually less expensive than other places, such as Sliema. This is mostly referring to those people who bought the house more than a decade ago since this is not the case any longer, as prices have generally gone up everywhere. Villa owners, on the other hand, (in Qawra and Baħar ic-Ċagħaq), have a higher income from educated jobs and businesses, and the villa was bought in the area mostly because it was a positive business move at the time when they bought the villa.

Foreign summer residents and other regularly returning tourists

73. While no foreign summer residents or other regularly returning tourists were encountered during the fieldwork period at Magħtab, Baħar ic-Ċagħaq and Salini, interviewees from other data gathered from other sociospheres show that these two groups exist in all three localities. At Magħtab there are a few foreigners who own farmhouses and return to Malta during the summer months. At Baħar ic-Ċagħaq and Salini, the two groups are more frequent.

74. In Qawra, returning tourists fall into two groups; those who always come back to Qawra, and those who come to Malta but do not always follow the same pattern; they choose different localities each time they return. From the data gathered and desk research, most returning tourists are from the British Isles and are OMTs and IMTs. During the summer months there are a number of returning tourists who are "explorers", actively engaging with the local population and sampling cultural norms and lifestyles. They return to Qawra because they enjoy the variation there is while appreciating the "quaint" surroundings that Qawra still offers, to a certain degree.

The Visiting Community

First time tourists and domestic tourism

75. While no tourists where encountered at Magħtab and Salini, a few IMTs were interviewed near Baħar ic-Ċagħaq. At Salini, those interviewed were in the confines of the hotels and these were British OMTs. If the fieldwork took place a few weeks later, there would have been a completely different type of tourists—teenagers and young adults from Italy and other parts of mainland Europe in Malta to "learn" English as a foreign language. This is because the hotel caters for these two very different OMTs during two different seasons.

76. At Qawra, first-time tourists staying at the hotels there were OMTs and IMTs, either going directly through tour operators or by checking out various destinations online or through a travel agent. In some cases, friends who had already been to the island, sometimes as regular returning tourists, recommended Malta. During the summer months there are also a number of domestic 'holiday makers' who go for weekend breaks or for longer periods of time, to remain on the island while getting away from it all and enjoy being pampered. The season for such domestic tourism had not yet started during the fieldwork period.

Visitors to local residents

77. All localities hosts visitors to local residents, family members, lovers and friends who visit both the Maltese residents and the foreign ones (as tourists).

Visitors to the locality for leisure

78. Visitors to the localities for leisure, including sports and recreation activities, including bars and clubs (in the case of Qawra); restaurant goers and social club goers; people going for morning walks in the countryside (especially around Baħar ic-Ċagħaq) or along the waterfront or the shoreline, regulars to sports facilities

(including Magħtab and Qawra) and so forth. These also include nightlife visitors: people using restaurants/ bars and other amenities, where available.

79. At Magħtab there is one particular sports facility that is frequented by many enthusiast of that particular sport. Some go to the facility practically every day, where one could easily categorise them under the 'local' group category. A few people were encountered in fields that were disused by couples on picnics, since the weather was still fresh at the time. These interviewees go regularly to the area during the autumn and spring but not during the summer and winter seasons. No visitors were encountered walking though the fields at Magħtab though a number of residents mentioned that they do have friends over for lunch and a walk in the fields on weekends. Other regular visitors to Magħtab are the horse owners who keep their horses at the various stables around Magħtab. It is reported that the stables at Magħtab keep more than 450 horses between them.

80. The countryside around Baħar ic-Ċagħaq offers particularly nice landscapes and a relatively quiet environment for many visitors (not just residents) who go walking every day or during the weekend. Residents who go walking in the morning report that they recognise many people not from the locality when they go walking. The marine entertainment facility has many visitors, both Maltese and foreign, especially during the summer months. The coastline between Baħar ic-Ċagħaq and Salini is used regularly by people who go walking along the coast road and fishing enthusiasts who go fishing to pass the time. During the fieldwork period there were a number of groups who were camping using caravans or tents near Qalet Marku Tower and these came from all over the island.

81. Qawra is a place of high recreational value; many people use the area during their leisure. The data show that Qawra is predominantly frequented as a recreational space by people from other parts of Malta, rather than by people who actually live in the locality. In the early morning, one finds power walkers, cyclists, and people walking their dogs. During the daytime in summer people go swimming and in the evening there is a whole plethora of activities. This used to be more seasonal, but during the last few years, there has been a steady increase in people going out for walks, eating out at restaurants and having social evenings at the many bars of the area. Sirens football club uses the area for jogging and stretching. During the evenings both Maltese and foreigners go to bars, restaurants and clubs. TEFL students go to particular clubs en masse.

The Farming Community (Magħtab and Salini areas within the A of I)

82. Farmers in the area are predominantly part-time farmers, according to the number of farmers interviewed. Since the harvesting period was at its end, most of these farmers had already vacated their fields. This group of people could be considered visitors because they visit their fields very irregularly during the year, mainly to till the fields, to plant and later to harvest their crops. These part-timers are mostly, though not exclusively residents of neighbouring localities, such as Naxxar, Mosta, Gharghur and Madliena. A number of part-timers were residents of Magħtab though, as explained above in the local residents section. There also were a number of full-time

farmers, but again, prominence varied from being residents of Maghtab but also from neighbouring villages. The amount of part-timers is larger than that of full-timers.

83. A number of farmers, both part-time and full-time owned their fields but more leased the fields from either other farmers or from the Government. Some have been working the same fields for a lifetime and has been in their family's hands for a number of generations, even if it was leased. Farmers living at Maghtab, even if they are part-timers, have a different relationship with the land than those who live elsewhere. They go to their fields much more regularly, some even daily and consider their fields as an integral part of who they are.

VALUES AND LIFESTYLES

84. One of the functions of a Social Assessment is to relate the present attributes found within the socioscape where the Scheme is located to attitudes towards the perceived effects that the proposed development would have on the everyday life of the members of the sociospheres. To understand how the Scheme would interact with their lifestyle, work, and recreational patterns, the following factors were taken into consideration:

- What does the physical space (the socioscape) offer to the various sociospheres that inhabit it; and
- What are the attitudes and values that the sociospheres have towards these elements through the way they interact with their physical and social environment through their lifestyles?

And from these attitudes about the present conditions found at the locality,

- What are the attitudes that people have towards the Scheme; and
- How do these attitudes relate to the perceived social effects of the Scheme (how it is perceived to interact with their work, recreational patterns and lifestyle in general) and what is their response to such a project?

These questions are posed in order to, by reference to the Method Statement and the findings of the baseline study, assist in the:

- Assessment of the perceived social impacts of the construction and operation of the Scheme on the people living in or visiting the A of I;
- Assessment of the social impact of the Scheme on the future residents within the A of I;
- Formulation of mitigation measures to ameliorate such impacts;
- Identification of residual impacts of the Scheme on the people living in the A of I, and / or visiting the area; and in the
- Formulation of Monitoring Plans.

85. The data collected shows that people using the area value various attributes of the localities that they use, even if in different ways. People have different perceptions of their social environment depending on many factors, including contestation of land (space) depending on their uses of the space (Ingold, 2000), in other words their lifestyle. These contestations become more intense in an area such as the socially diverse area as the socioscape in question, where so many cultural backgrounds converge. In other words, one also finds that people with similar or the same uses of the socioscape, constituents of the same groups mentioned above, such as farmers, full-time residents and even visitors, can have different and even divergent attitudes towards particular issues. These include, land rights and use (including prospective uses in the future); access; the transformation of the socio-physical landscape of the locality, especially caused by population growth; an increase in traffic and circulation throughout the area and so forth.

86. Values are also forged by the way people have seen the locality / area/ socio-physical landscape change over the years or decades. This is especially true in respect of the Magħtab landfill, where people who lived in the area prior to the landfill's commencement of operation, reminisced on the beauty of the landscape and the area in general. Similarly, their experience of the closure of the Magħtab landfill again creates other preconceived perceptions, expectations and attitudes towards what they might expect out of the proposed Scheme.

87. Their attitude and aspirations towards what the locality offers are constructed by these values and in turn respond to changes in the physical and social environment of the locality based on past experience to the aspirations they had towards the place when they moved to / visited the locality; whether it met their expectations then, and the changes that happened during their stay (whether temporary, for visitors and the transient communities, or permanent for residents).

88. For the transient communities and visitors, as well as, in very particular cases, permanent residents (in some cases recent permanent residents and in others, well-established residents), their values and perceptions towards the locality are formed by their idea of something different from that which they are used to in the spaces they usually inhabit.

89. For some other groups, their experience of local lifestyle is strongly influenced by kinship and friendship bonds as well as past experience and nostalgia (many of which are again closely tied to the present socioscape). Such groups therefore perceive a threat in the physical and economic development of the socioscape, which may then result in an alteration of their current networks, sociospheres and therefore lifestyle.

90. Uses of the area, reasons why they moved to the locality and attitudes towards the socio-physical environment, may also differ depending on factors such as gender and age. Within the same household the meanings and attachment they have towards the locality and the space they inhabit were sometimes different. Unlike other case studies, gender was not always a major factor for difference of attitude and data provided by the two sexes was generally congruent, depending on whether the factor being discussed influenced their lifestyle or not. In this particular case study, both the sexes of a household usually agreed on factors that might usually be pointed out by the females of the household, such as dust and cleanliness, health and so forth. Traffic was a factor that influenced both sexes when usually males complain more about the increase of traffic.

91. Age too played a lesser role to other case studies in relation to their values toward the present state of the socio-physical landscape. Age played a role when the generation gap between parents and their children was significant enough for each party to remember the landscape completely differently (i.e. without a landfill). Most did not have the experience of a hamlet of Magħtab without the landfill being an omnipresent landmark. Age also played a difference in some cases with the various social backgrounds that each had, including education and a disposition to interacting with different sociospheres for the younger generation.

92. Finally, perceptions (which influenced the values for the area) sometimes changed markedly depending on where the respondent physically had his place of residence or business (or field / farm). If their residence was effected less by the landfill or its ancillary operations (for example, residents living in more remote areas of the Maghtab hamlet where the visual or odour ill-effect of the landfill were less felt; or lived in on a street not used by the trucks coming and going to the landfill; then, the landfill becomes less of an issue and other factors take precedence for the construction of their values towards the locality and area.

93. The following Figure describes the relationship between community perceptions of an area, the expectations, aspirations, attitudes etc of the sociospheres, and the formulation of community values.

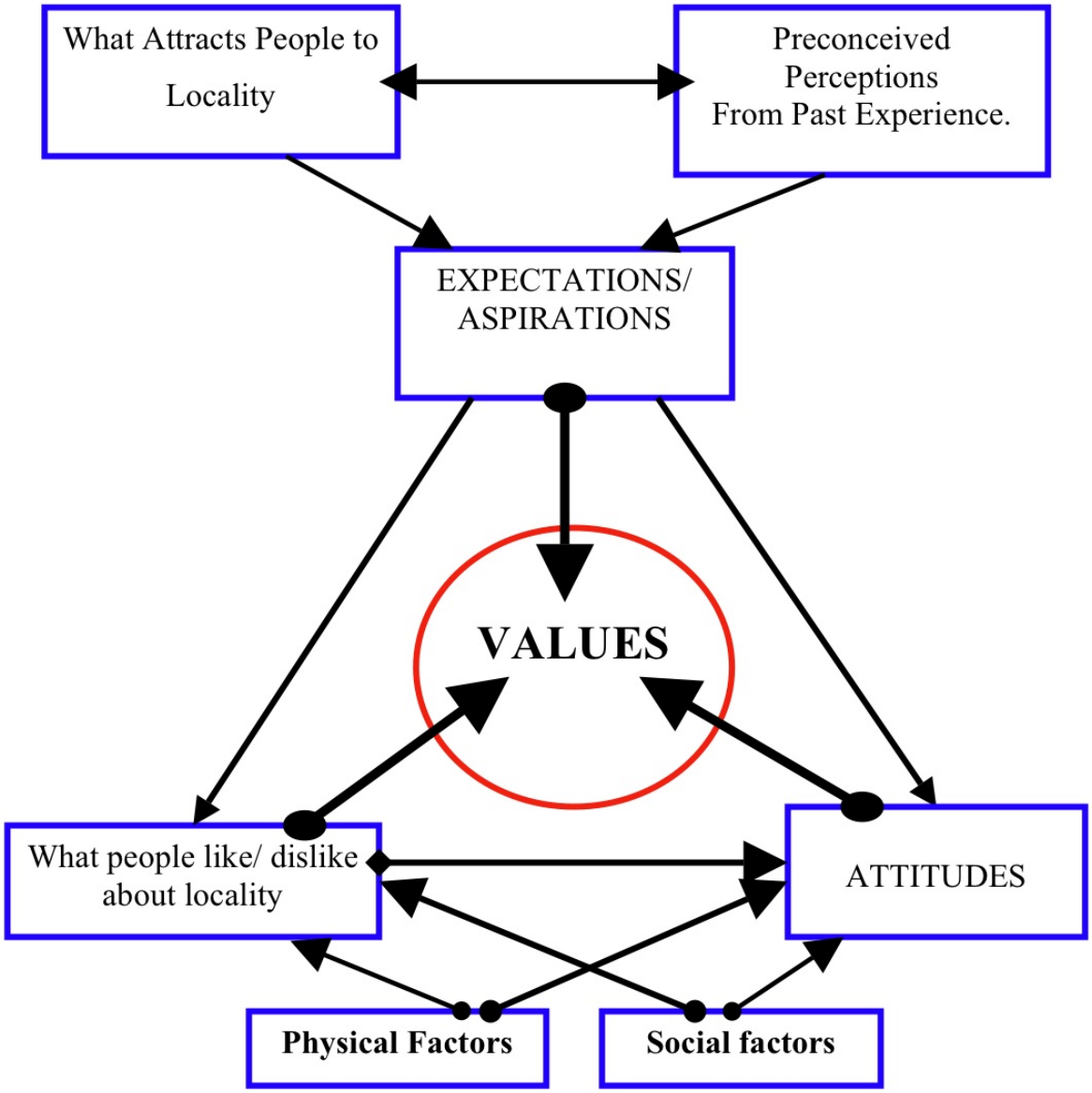


Figure 3: The Construction of Values (Adapted from Vella; 2005: EPS: PA 4591/00)

Pull and Push Factors within the A of I

94. From the lifestyles of the people that make up the different sociospheres within the locality, a relatively clear indication of what the socioscape has to offer and what attracted the people to move or visit / return to the locality. Changes in lifestyle over time can also be indicators of changes in the physical or social landscape that detract from prior enjoyment of the socio-physical landscape. The following sections should be read in conjunction with the sections on attitudes and values towards the present state of socio-physical environment as affected by the experience of change through time.

95. The factors that attract people towards settling in a particular locality or vice-versa can be divided into two broad but inter-related categories: physical and social factors. Both physical and social factors should not be interpreted as being stand-alone reasons to why people move to a particular area or locality but it is usually the cumulative effects of a combination of physical and social factors that attract people to a particular locality or area.

Physical Factors

96. Physical factors refer to characteristics of the socioscape that are considered as being attractive to migrants and include factors such as greenery, proximity to sea, good views, social isolation and so forth. Such physical factors provide natural attractiveness, as well as the possibility of recreation. In Qawra and Baħar ic-Cagħaq, for example, proximity to the sea allows for fishing and boating are primary pastimes for both summer and full time residents. On the other hand, changes in the physical environment, such as the pollution of the sea make the same physical attribute a detractor or negative factor in the present environmental conditions.

97. Some physical factors are considered to be important pull factors for the full-time residents who may include these factors into their lifestyle and value systems. Part-time residents who make long-term use of the area also consider such factors to be important motivators. Visitors may also be attracted by the physical characteristics of the location, but social factors may have a more determining influence.

98. Other physical factors may be push factors and detractors to the enjoyment of the physical environment found in the area. These may have changed over time

99. While there are significant overlaps of such factors for residents and other users of the A of I (from the four localities for physical factors in their respective locality), it must also be understood that most respondents of the localities of Baħar ic-Cagħaq, Salini and Qawra were not referring to the area closest to the application site, unlike users of the hamlet of Magħtab, but to physical attributes found within their respective localities. A number of respondents from Magħtab and to a lesser extent Baħar ic-Cagħaq and Salini though referred to physical attributes found in the other neighbouring localities as being attractors, in the sense that while not living in the hustle and bustle of Qawra for example, which for them overcrowding, nightlife activities and being surrounded by hotels were negative aspects of living in a locality such as Qawra, living at Magħtab (or the nearby localities) meant that while their place of residence was in a quieter, more rural socio-physical environment, they were

still close enough to the more lively (social) environment of Qawra together with the recreational amenities that it offered.

Physical Pull Factors

100. The main physical pull factors are:

- Proximity to Sea (especially for residents of Qawra, Baħar ic-Cagħaq and Salini);
- Sea breezes / Access to the shore (as above);
- Open Spaces and countryside paths related to recreation and leisure;
- The countryside both as visual amenity (open space / landscape) and fertile land;
- Quiet Environment;
- Rural Fields and landscape.

Proximity to Sea

101. Being close to the sea, can be a factor attracting individuals moving away from the dense conurbations of the harbour or for migrants from further inland. Views of the sea are considered to be attractive, especially during sunrise and sunset, and, like other physical factors, become extremely important when are disrupted. A number of residents of Magħtab for example mentioned that years earlier, they could see the sea from their house but don't any longer because of the landfill.

Sea Breezes / Coast

102. Cool evening breezes rarely are key factors in bringing people to the area; however, summer lifestyles may revolve around such geographical processes and may be sorely felt upon disruption by development and physical blocking of access to the sea on the one hand or due to other physical factors, such as bad odours. Residents of Baħar ic-Cagħaq in particular, for example mentioned the contrast between the bad odours coming from the landfill and the fresh breeze coming from the coast depending on the prevailing wind. On the other hand, the same sea breezes or the coast may attract an overwhelming number of visitors to the area that become undesirable for residents (in particular those living at Baħar ic-Cagħaq and Qawra, though for those living at Qawra there are many other factors that attract visitors, such as night life businesses and the tourism industry).

Open Space and countryside paths for recreation and leisure

103. The possibility of having open spaces for recreation may also be considered as much of a social factor as it is a physical factor. Open spaces, usually give the family an ability to allow children to meet and play while being kept under watchful supervision. Countryside paths, or other roads along the sea (such as the waterfront at Qawra) are important routes used by families and recreational visitors practicing power walking, strolls, cycling and so forth. It was noted that while residents of Magħtab appreciated the views and scenery away from the landfill and only very few of the residents interviewed went for walks (or other recreational uses) in the surrounding countryside, residents of Baħar ic-Cagħaq went for walks more readily in the

surrounding countryside. This is in part because the countryside surrounding the locality is considered further away from the landfill area and therefore cleaner. While a number of people walking through such landscapes were noticed and engaged during fieldwork, local residents who walk regularly in the morning reported that they encounter many visitors not from the vicinity who also walk in the morning along the same paths. It was estimated by a number of local residents from Baħar ic-Cagħaq that around 60 people from localities close by regularly go walking on these countryside paths in the morning[14].

104. Long standing residents of Magħtab on the other hand reminisced on how beautiful the countryside was in the past, before the landfill was established and described in detail how they used to play in the fields when they were young, taking care of the goats and / or sheep while their parents worked the fields. They also mentioned that they used to go and play / walk to the archaeological remains and caves that are now buried under tonnes of refuse.

105. The countryside around Magħtab hamlet all the way to Baħar ic-Caghaq is also regularly utilised by horse riders from the surrounding equestrian centres at Magħtab. The presence of horses and horse riders is the cause for mixed feelings among other users of the area, especially residents of Magħtab and Baħar ic-Cagħaq, a number of whom complain of the horse dung on the paths and the streets, especially within the confines of the locality core of Baħar ic-Cagħaq.

Field Landscapes

106. "Traditional" field and rubble wall landscapes can be an important pull factor that attracts individuals to an area. Some families who used to own larger fields or a number of fields along with small storage rooms (*ghorfa*), eventually decided to convert the smaller structure into permanent housing – the isolation offered by their fields being the main cause for such a move. This is also related to virilocal and uxorilocal arrangements described further below, which in turn reduced the field landscapes and increased urban development in particular areas.

107. Other more recent residents bought and converted farmhouses found in the quieter or more remote parts of Magħtab, surrounded by such landscapes. With the widening of a number of roads, mostly due to the landfill operation and further development along these roads (mentioned in the previous paragraph) reduced these landscapes over time, which also decreased the quiet environment mentioned above.

The countryside both as visual amenity (open space / landscape) and fertile land

108. On the same theme of fields and countryside / open space, longstanding residents who grew up at Magħtab reminisced about how beautiful the area was as prime countryside with fertile fields that used to yield the best crop on the island. Some long-term residents who did not own fields even declared that it was one of the reasons why they had chosen Magħtab as their place of residence.

[14] This number is only an estimate made by more than one local resident and was not corroborated during fieldwork by physically counting walkers over a period of time for an average.

109. The countryside as visual amenity was an important factor. Full-time residents who did not previously own land or fields in the Magħtab area considered the visual aspects of being surrounded by a predominantly open and rural countryside as a major factor for buying property in the area. Those who lived in converted farmhouses mentioned that living in a converted farmhouse in a rural environment was also an attractor. This has to be combined with other factors, including relatively inexpensive property prices at the time of purchase (compared to other localities that offered similar attractors) and the advantageous geographical position of the locality (below).

110. Residents of Baħar ic-Cagħaq and Salini also mentioned the countryside views and being surrounded with or close to countryside and fertile land as being desirable. It is also worth noting that many residents also mentioned that at the time of purchase or building their residence, the area was not over-developed when compared with other localities. This was an attribute that has since changed for the localities of Baħar ic-Cagħaq and Salini, especially where blocks of flats are concerned, while at Magħtab, the increase in the commercial operation of livestock farms (as opposed to smaller operations that used to exist in the past) and the exponential increase of equestrian stables has since become a negative aspect of living in the countryside.

Quiet Environment

111. Quiet environment usually refers to two distinct but related phenomena. A quiet environment, free from traffic and other noises related to dense urban centres is considered as beneficial to private domestic lifestyle and can attract people to the area. A quiet environment, from an anthropological point of view is usually interchangeable with quiet social surroundings, free of any problems (discussed below).

112. The first type of 'quiet environment' was mentioned by residents living further away from roads not utilised by the ancillary operations of the landfill, namely trucks going to and from the landfill and from the main roads used by other vehicles. This was true for parts of Magħtab where houses could only be reached by country tracks; the residential areas of Baħar ic-Cagħaq that were not close to the Coast Road and quieter areas of Salini. Such statements for Qawra, on the other hand depended on the seasonality. In winter, Qawra is a quieter locality, especially during the week.

Physical Push Factors

113. The main push physical factors are mainly attributed to the landfill operation as a manmade 'mountain' (in other words, a negative visual impact). While it is understood that the original Magħtab landfill was closed in 2004, since the engineered landfills of Żwejra and Għallies are still accessed from the same entrance on Ramla Road, for most users of the A of I, especially those at Magħtab hamlet and the areas surrounding the landfill site, the operation is still on-going and consider Għallies and Żwejra extensions of the original landfill, rather than completely new or different operations.

114. While there is general consensus that since the closure of the original Magħtab landfill there has been an improvement to the physical environment of the surrounding

areas, there still are a number of physical factors that are considered push or negative factors, especially when compared (by long standing Magħtab residents) to the original state of the physical environment of the Magħtab area. For those who came to the localities of Magħtab, Baħar ic-Cagħaq and Salini (and to a much lesser extent, Qawra[15]) during the operation of the landfill, the positive factors usually outweighed the negative ones caused by the landfill operation in their choice of buying property at the localities. On the other hand, most interviewees also made it clear that if they had known that the operation would have lasted as long or that the area used for waste management was going to increase (including the Żwejra and Għallies operations), they would have seriously thought of not moving to the area at the time when they were considering purchasing their houses. These include,

- Bad or foul odours (depending on prevailing winds);
- Dust and air pollution;
- A marked change in the physical landscape
- Vermin (large rats and stray dogs)
- Pollution to ground water affecting fields and crops
- Pollution of the sea, especially the shoreline close to the landfill along the coast road.

115. The above factors will be discussed in more detail in the relevant sections below, when discussing the experience of living at the locality.

Social Factors

116. Social factors refer to already existing human/social characteristics or aspects of the community that encourage settlement in the area.

<u>Permanent and Part-time / transient Residents (Maltese) and Farmers (Full-time and Part-time), where relevant</u>

117. Social factors that attract people to reside long term at the four localities within the A of I, include:

- Proximity or attachment to kin and land ownership (Mostly Magħtab);
- Inexpensive land / property;
- Residence as a result of domestic problems (Residents of Baħar iċ-Ċagħaq, Qawra and Salini);

[15] Using data collected during the SIA for EIA on a highrise scheme proposal (EPS: PA 4591/00), the landfill was rarely brought up during conversations, except for those in the tourism industry. Since this SIA is about a proposed Scheme at the landfill site, interviewees were more disposed to concentrate on issues that had to do with the landfill. It must also be noted that most of the interviewees were situated on the seafront area, which are more prone to negative effects caused by the landfill, unlike the majority of the interviewees in 2005, most of whom lived further inland.

- Anonymity (including privacy) and Independence (Residents of Baħar iċ-Ċagħaq, Qawra and Salini);
- Advantageous geographical position of the locality / Proximity to Urban Centres.
- Frequent public transportation (buses): comfortable for pensioners, offering good service that makes up for traffic congestion (Only for Qawra at time of interviews)
- A quiet (peaceful) environment in the anthropological sense.
- The alleged closure of the Magħtab landfill operation (Predominantly for residents of Magħtab, Baħar iċ-Ċagħaq and Salini).

Proximity or attachment to kin and family land ownership

118. In general, land is an important, essential and expensive resource for the establishment of a new family group the choice of habitation revolves around the availability of land. While it has been observed by several academics studying Maltese marriage and family systems that in many areas in Malta and Gozo there is a slight bias towards uxorilocal residence (settlement close to mother's residence)[16], the data gathered has shown that at Magħtab in particular, both uxorilocal and virilocal arrangements are found. This usually depends on who owned the land on which the newly wedded couple build their house. These arrangements seem to be a mixture of socio-economic circumstance & family obligations. It was observed that I at least one case, most of an entire street was dominated by one extended family where kinship is the major factor in local organization and unity (and identity) in the absence of a local religious feast and other administrative centres.

119. It has been noted that property is a very big 'attractor' for young married couples to live near the in-laws. The younger generation, now with families of their own were more concerned with the economic benefits of not having to buy property elsewhere, rather than the family ties. This was very much the case for young adults who had lived at Magħtab as children with the opportunity of building a house on family land, after having passed through the experiences related to living close to a landfill and the discomforts it had caused. This was more so for the spouse, who in many cases admitted that s/he would have preferred living elsewhere due to the landfill situation. Family ties were more important for older generations.

120. Those residents who were also farmers (both part-time and full-time) felt a much more deep-seated emotional tie to the fields that in many cases had been worked by their forefathers, sometimes going back several generations. A number of these individuals were very vociferous about these ties and admitted that these ties went beyond livelihood or spending some time in the open for recreational purposes.

121. It must also be noted that there were instances where the parents actually sought out and bought property at the locality (especially at Baħar ic-Cagħaq and on a number of cases, Qawra) where their children had bought their house. While reasons given were not solely to be close to their children, being closer also meant that they could help out more with their grandchildren whereas where it would have been

[16] Boissevain, 2006: pp. 44—49

more difficult or impossible to contribute to such responsibilities where they used to live previously.

Inexpensive land / property

122. Twenty to thirty years ago, land was cheaply available, especially around Magħtab. The fact that there was a landfill close by might have contributed to these advantageously priced properties. A number of interviewees had the opportunity to buy land for a relatively cheap price and then build on it. This was an especially favourable prospect for those who already had fields in the area. This ties with the above factor of family ties where the parents bought enough land over the years to be able to give a sizeable plot to each of their children. This has been recorded in other villages that had been predominantly rural in the past (for example at Xghajra, St. Peter's area, Zabbar and parts of Kalkara during the SMART CITY baseline local social study).

123. Those who did not previously own land at the locality also mentioned the price at the time of purchase, in that for the price they bought their property, they could buy a larger property when compared to other localities offering the same style of house, which was desirable. This factor is connected to others that were perceived as being desirable when buying property.

124. At Baħar ic-Cagħaq, Salini and Qawra inexpensive property prices in the past meant that people from other localities such as Mosta, Naxxar, B'Kara and San Gwann for example, could afford summerhouses in the localities being investigated. In time, a number of part-time residents had since became full-time residents at the various localities, either residing in the same house or had another one, depending on financial or social / personal circumstances (next factor). There still are a large number of part-time residents in the three localities mentioned here, who only use the locality during the summer and had bought the house or apartment because of inexpensive property. Those who rent, partly choose to rent at these localities partly because they are less expensive than other seaside localities in the northeast / east of Malta (such as Sliema, for example).

Residence as a result of domestic problems

125. Crisis within a married couple may lead to one of the partners to settle back along with children in either relatively low cost housing in the area or to move back to one's parental house. This was encountered predominantly at Baħar ic-Cagħaq, Qawra and Salini. In most cases (mostly at Baħar ic-Cagħaq and Qawra) the parental house was the family summerhouse.

126. Single parents and separated couples may also live at the above localities by renting and not buying the apartment, usually because their situation is thought of being temporary. These individuals choose to live in such areas because of the comparatively lower rent and may have 6-monthly or yearly contracts while their situation becomes more stable or they find a more permanent residence in another locality.

127. Such choices (for permanent and temporary residents with the above domestic problems) are not just dependent on economic considerations but also due to the fact that the localities offered anonymity.

Anonymity (including privacy) and Independence

128. Apart from Magħtab, a number of permanent and many part-time residents of the other three localities in this study mentioned anonymity as desirable and is largely present at these localities. Socio-economic independence has become highly desirable for young adults and actively breaking away from kinship ties and residing in areas where there are no kin may be sought. The relevance here is that an increasing number of people are making such decisions, breaking off from their own cultural traditions and residing in villages where they have no such ties.

129. Anonymity is also another desirable factor for young unmarried or more mature separated couples wishing not to be judged by people of a more conservative disposition, which are usually found in other closely knit localities or communities. While anonymity contributes to the lack of community values found in these localities, it is exactly this lack of community that allows for people who seek anonymity to be able to live undisturbed in these localities. It must be noted that even a number of other residents who are married and with families appreciate the value of anonymity. This may not always be unanimously agreed upon within the same family unit, with gender and age being the primary reasons for such differences in opinion, though there is not enough evidence to determine that males predominantly appreciate anonymity more than females.

130. A large number of long-standing permanent residents of the localities (mostly Qawra and Baħar ic-Cagħaq) on the other hand do not attribute anonymity as being a positive and desirable attribute of the localities and have pointed out, as mentioned above, that the increase of developments (predominantly apartment blocks) has contributed to this increase in anonymity, a decrease in privacy and community values at the locality.

Advantageous geographical position of the locality / Proximity to Urban Centres

131. Although counter-urbanization usually implies that the further one distances himself from dense urban centres, the more successful, data shows that proximity to an urban centre and therefore, a balance between closeness to amenities and places of work, and lesser populated settlements, closer to a rural or seaside landscape is desirable. Many interviewees from Magħtab, Baħar iċ-Ċagħaq and Salini mentioned that one of the reasons why they decided to have their place of residence there (permanently or otherwise) was because of its advantageous geographical position – not in the more chaotic central localities but still centrally located, unlike a number of other hamlets or sea-side locations. The localities were also close enough to a larger locality that offers other types of recreational facilities (Qawra) if they needed to reconnect. Most residents interviewed who did not work the fields (and even then, most were part-time farmers and had other jobs for subsistence) worked elsewhere. The reasoning that was offered was that when returning back home from a day of work, they wanted peace and quiet (peaceful environment, below).

132. At the same time, it was desirable that there should be more amenities at the localities of Magħtab, Baħar iċ-Ċagħaq and Salini. The lack of amenities was not considered to be a positive attribute.

133. Residents (permanent and part-time) of Qawra also mentioned the geographical position of Qawra as being advantageous, for other reasons. These residents weighed the disadvantages caused by living in a predominantly touristic part of the locality (traffic, lack of parking, overcrowding (etc), especially in summer), with living very close to the sea, the centrality of the locality, being in a touristic area which is not as chaotic as localities such as Sliema and St. Julians as example given by interviewees), and being surrounded by all the amenities that they needed, including recreational.

Frequent public transportation (buses) – Qawra

134. While residents of Magħtab, Baħar iċ-Ċagħaq and Salini complained about the lack of public transportation in the area, for residents of Qawra, it was quite the contrary. The bus system at the time, which catered for the tourism industry as well, offered a good and frequent service, which was especially comfortable for pensioners, making up for traffic congestion in the area, especially during the summer months.

135. It must be noted that as from the beginning of July 2011, the new Arriva bus service will be offering their service at Baħar iċ-Ċagħaq, Salini and Magħtab.

Peaceful Environment

136. This is an important factor for many residents, as mentioned above, especially for residents of Magħtab, Baħar ic-Cagħaq and Salini, in conjunction with other factors. This factor has to be put in perspective though because apart from those living in more remote parts of Magħtab, for example, the increase in development has decreased this factor considerably. Time of day becomes a decisive factor in that when traffic decreases in the evening, the locality becomes much more peaceful, apart from those living directly on the main road. Qawra residents on the other hand while mentioning a peaceful environment as desirable, attributed seasonality together with time of day during the winter, autumn and spring seasons as contributing factors to when a peaceful environment is found at the locality.

The alleged closure of the Magħtab landfill operation

137. Many residents, including some that have been living in the general vicinity of the landfill for even up to 30 years (not just for Magħtab but also for Baħar ic-Cagħaq) had decided to buy, build or renovate their property because they had heard rumours stemming from the Government administrations of the time that the landfill was only temporary and that it would have been decommissioned soon. It is interesting to note that even residents that bought their properties later, for example in the nineteen-eighties, for example, had heard similar rumours during that period.

Foreign Full-Time Residents

138. Foreign residents generally tended to list more physical than social factors that had attracted them to the area, especially Magħtab. At the same time a mixture of the

two are mostly intertwined. When one mentioned the rural environment of the area, it was also explained that the 'traditional' rural social environment was also being included. Foreign residents from both Magħtab and Baħar iċ-Ċagħaq mentioned these socio-physical qualities of the area.

139. Full-time foreign residents of Qawra and Baħar ic-Cagħaq mentioned other attractors though, to why they had moved to the locality. Besides the physical factors, safety, economic viability, social networks (other foreigners found in the area, especially for the British residents) that were present at the locality (predominantly Qawra) and mixed marriages (when one of the couple is Maltese). While there was a higher British presence in this respect, especially in Qawra, it has been observed that in Baħar iċ-Ċagħaq and Salini, a number of interviewees were originally from other European countries, some of whom had been residing in Malta for a long period of time.

140. The concept of 'quaintness' is key to understanding the attractiveness of Qawra in particular to British residents and regular visitors (foreign part-time residents). Quaintness conveys a perception of a physical and social landscape that has not been irrevocably changed by progress and industrialisation, as has happened in most towns in their own country. It is of considerable value to this group. Many retired to Malta, or brought their children to Malta because of this "quaint" environment. Many said that this mixture of physical (architecture) and social environment that is perceived as quaint is slowly disappearing because of the increase in development, even at the locality and because of this, many were thinking of selling their property or put it up for rent and finding another destination, not necessarily in Europe. Returning visitors also voiced their disappointment at these changes and mentioned that they might stop visiting as often or stop returning indefinitely, even though they have a lot of friends at the locality and the country.

141. While Maltese people would not use a term like "quaint" in their conversation, the same reasons why foreigners consider a place like Qawra quaint are also reasons why Qawra attracted long-standing residents in the instance. The same can be said for Baħar ic-Ċagħaq 25 years ago and for Salini when there only were a few houses in the area along with the farms that had already been present. Some of the attractors mentioned earlier for these areas and for Magħtab (wanting to be near the countryside, in a rural landscape where one could still see a farmer milking his or her goats) are what the Maltese residents who chose to go and live at Magħtab and the other three localities would consider as quaint.

<u>Livestock farmers, equestrian stable owners and other businesses</u>

142. This is similar to residents who bought their houses because it was relatively cheap at the time of purchase. Most of the owners of businesses in the Magħtab area admitted that it was the only place they could afford at the time. It must be said that a few of the owners though have since started living on the farms or at Magħtab, which meant that they appreciated the locality not just as a business opportunity. This was evident from high standard that the operation was run. This was also true for a number of other livestock farms of which owners did not live in the close vicinity. On the other

hand, it was not possible to interview the owners of a number of farms whose operation was not up to standard, from slurry seeping from under gates to manure not being covered. Other users of the area informed the researcher that these farm owners were not from the area and only had the operation there (see section on Experiences of present conditions for more detail).

143. Other business owners at Magħtab and Qawra interviewed explained that they had inherited the business from their family or had the opportunity to start the business because of land owned by the family. Here again, the importance of kin is observed.

144. Equestrian stables operators and owners were attracted to the area as being a predominantly rural area where clients could also take the horses out for rides. Those who were interviewed also admitted that being independent (not being employed by others but being their own boss) was a very desirable and sought after.

145. Most businesses at the part of Qawra covered by this study were mainly concerned with the tourist industry, directly or indirectly and this was the main attractor.

Tourists

146. Tourists choose the area (especially Qawra) for a number of reasons. One of the most important factors when choosing their destination, besides how cheap the holiday is going to be is to be in an area that is considered or perceived as being situated in an area that is not a mass tourism destination such as St. Julians or Paceville and is therefore considered more 'local' with a 'quaint' social environment, especially for British tourists. They want a relatively inexpensive holiday where they can still pamper themselves, have the sun and sea at walking distance (across the road from the hotels where they are staying) OMTs usually look for such packaged holidays which the hotels in the area offer. IMTs also look for localities or areas that are quiet enough and safe to be able to go for walks along the waterfront without feeling threatened in any way, especially in early summer (which was during the time of the year when the fieldwork was conducted). Returning tourists also come back to Malta to visit friends, usually living in the area.

Employees of businesses and the tourist industry

147. At Qawra, there is a multitude of workers who live close to their work place and therefore it is convenient for them to work in Qawra. Those who live elsewhere find it difficult to travel to work because, during peak hours, the area becomes congested by traffic and parking is difficult, and therefore public transportation that is relatively regular is sought though not preferred.

148. The employees interviewed at the hotel found at Salini also happened to live in Qawra or Buġibba or at localities relatively close by, such as Naxxar. Proximity to their workplace seems to be a priority. Those who live within walking distance mentioned that they like walking to and from work unless they have other commitments before or after, especially during the time of the year when the interviews were conducted.

Recreational Users

149. As mentioned above, the countryside around Baħar ic-Cagħaq is frequented by many people who go walking, especially in the morning. Interestingly, many perceive the area as being 'clean' especially the air quality, since country paths are preferred for their lack of traffic as opposed by larger roads. The landfill was only mentioned when the wind happened to be carrying the smell typically associated with the landfill towards that part of the countryside and those who have been walking in the area since before 2004 commented that the situation has become much better and they rarely smell the landfill presently. This is a clear case of 'out of site (and smell), out of mind. Recreational users (power walkers etc.) are virtually absent as one gets closer to the landfill area, though a number of people walking their dogs were observed on Ramla road from the side of the coast road.

150. At Magħtab, there also is shooting range and those interviewed, who were regulars of the establishment, explained that they like the relaxed and outdoor environment, the company of others with the same hobby and the seriousness of the establishment's management. Since many have been returning for years, most know each other well and they feel like they are one big family, which differs from other similar establishments.

151. Horse riders who keep horses at stables around Magħtab are attracted by the surrounding countryside, in the sense that they do not need to take their horses elsewhere to give the horses some exercise in the outdoors.

152. Qawra caters for tourism and, therefore, there are many establishments in the area that offer recreational activities for both tourists, residents and visitors (both foreign and Maltese), including restaurants, nightclubs, activities organised by hotels, and so forth. Since the area is close to the sea, during the summer many recreational users go to Buġibba to swim, whilst the promenade offers people the opportunity to go for walks by the sea and, in the morning and late afternoon / evenings, people can be observed jogging.

Perceptions of Community and Community Values

153. The sociospheres introduced above that constitute the socioscape, indicate that there are different meanings and values given to the word "community" and the idea of constructed community. It is in part one of the reasons why the anthropological term sociosphere has been used in this study. Even though individuals have disjointed kinds of interactions with the rest of the socioscape as a whole and many times within the same sociosphere, they tend to interact with different people in different ways without realising that they are still acting as a part of the collective, a community, even though not in the traditional Maltese sense of the word. The term sociosphere is also used because, as described above, different people within the same social group may seek different attributes that the locality has to offer, such as privacy and anonymity, that detract from the collective idea of what a community should be like.

154. To understand what individuals within a space consider a community, one has to first understand the definition of community. The closest concept of the symbolic

construction of community for the purposes of this study can be described using Cohen's arguments; the idea of the consciousness of individuals of boundaries, not as social-structural systems and institutions but as worlds of meaning in the minds of their members. Relations between members represent not a set of mechanical linkages between working parts so much as 'repositories of meaning' (1985:98), and it is these, which come to be expressed as a community's distinctive social discourse. Membership consists not so much of particular behavioural attributes as thinking about and deliberating upon behaviour in common; here is attachment to a common body of symbols, a shared vocabulary of values. Self-conceptualisation, the reflective way people describe the important factors and mechanics that create and sustain a community, as well as the identification of factors that can alter or destroy such local networks, were found to be usually the product of local interaction and discussion. This relationship between active, daily discussion and interaction (possible citing) and the formation of a body of commonly shared values and outlooks is crucial to analysis.

155. Perceptions of what a community is and whether an individual pertains to that community, are identified by understanding the values of the people of the locality, because community is, after all, a social construct (Cohen, 1985). These differing ideas and values on community reflect on the lifestyle people choose to have and their attitudes towards the socio-physical conditions found within the socioscape.

156. In certain parts, for example, the combination of family land available for construction, as well as the reduced influence of religious and administrative activity, places kinship ties at the main concept influencing interaction and activity.

157. This does not necessarily mean that kinship ties are the only social relationships influencing social ties and networks. Individuals of a younger age, in all the localities show that, through easier and faster transportation around the island, but more importantly in their participation in secondary or tertiary education which allows them to meet and form bonds with people from outside the locality where they reside, forming and eventually belonging to sociospheres covering, geographically a much larger area and socio-culturally consisting of a greater variety of individuals from different backgrounds and classes.

158. From an anthropological point of view, the concept of community is even less stable, with important changes in membership and self-description occurring across time. In simpler terms, therefore, the fact that locals may feel collectively threatened, that they are different from other inhabitants of the area, and that they need to interact and discuss present issues is a sign that present needs as well as past experience and backgrounds are important creators of "community and community values" – in bringing together people of different roles and backgrounds together. This was experienced for example at Maghtab when a meeting by the researcher was called for and around 46 people showed up, some of whom had already been interviewed.

159. The point here is considerably similar to the ideas presented by the Sociologist Emile Durkheim in his distinction between Mechanical and Organic Solidarity. Common and local conceptions of what a community is and should be, conforms closely to the

concept of Mechanical Solidarity, a group of people who feel attached and united because they share common characteristics, such as background, class, religious and political alignments and beliefs, values and attitudes. In some cases, however, events that are outside one's control may force people of different beliefs, occupations, and origins to conglomerate and feel united. Unity through the need to unite, in order to solve logistical problems (such as complex trade) or to effectively confront a commonly shared problem or issue is known as Organic solidarity in the Social Sciences.

Factors influencing the formation of and the decrease of community and community values

160. Taking the above as a starting point, the perceptions that different people have of what a community is and the construction of community in people's mind depends as much on the experiences one has within a culture, as much as the external socio-physical conditions found within the socioscape. In other words, whether it fits with their preconceptions as to whether the locality sustains, or can sustain, a community. Therefore, a group's perception of community and the values held by the group go hand in hand and depend on the interaction of one with the other. Finally, does their perception of community affect their lifestyle in any way; does it stop or limit them from forging new friendships or alliances with different people?

161. In many cases, events such as developments that are outside the control of the users of the locality occur, and may or may not conflict with their original expectations and preconceived ideas regarding the social and physical situation of the area. In other words, the factors that once attracted them to the area are no longer present and new factors are at play that changes, sometimes forcibly, the lifestyle of the residents.

162. Most interviewees from all the localities investigated mentioned to some degree the lack of community or community values present at their respective locality. Reasons varied depending on who was being interviewed. Long standing residents (or one might say, the indigenous population) of Maġħtab, usually consisting of large extended families with longstanding ties to the land stated that they felt that they were a community but then did not interact as much with other residents, especially those who established themselves in the area more recently.

163. These more recently established residents had different views of whether there was a community at Maġħtab or not, depending on their involvement within the community. Statements here were also incongruent because while stating their position on whether or not there was a community at the area, their uses of the area and interactions with other residents sometimes seemed to indicate otherwise, though this was not always the case.

164. The factors that are considered by the locals as important factors affecting their communities, are discussed in the following section, however, the responses to such socio-physical change, which may add to social cohesion or fragmentation are listed below:

- Tensions between the indigenous population and 'outsiders' (also found in a farming context);
- Formal Social Organization: Absence of and gaps in administration and amenities and the formation of Official Organizations including Action Groups against common threats;
- The Church perceived as being a major factor in the formation of a community; the lack of a physical space for community interaction – no 'pjazza' and no local feast
- Families with children/ teenagers with the same age-groups
- Privacy and anonymity

Tensions between the indigenous population and 'outsiders' (also found in a farming context)

165. Land ownership and access rights tend to forge relationships and shared values. This has been noticed in particular with farmers who feel solidarity with each other since it is envisaged that a number of fields will be reclaimed for the proposed Scheme. While a large number of fields in the area are leased from the Government, a number of owners of fields do not work their own land but lease it out to other farmers, while they themselves lease other fields[17]. This tendency is also present with fields that are leased by the Government to one farmer but is worked by another farmer.

166. These strategies together with the sharing of the same physical space usually contribute to the building of community values. At Magħtab though many residents with farming backgrounds worked land either belonging to their extended families or have been worked by their forefathers for a number of generations, even if the land belonged to the Government. At the same time, though, there were many fields that were tilled by part-time farmers who lived elsewhere and farmers of the area did not interact as much with these farmers, unlike other areas such as Manikata, for example. These discussions indicated that the farmers of the area did not feel that there was a distinct farming community in the area because of the predominance of such part-timers who resided elsewhere. Indeed, these farmers admitted that when they do go to their fields, they go there to maintain their fields and rarely interact with others, usually because they do not encounter other farmers when they do go to their fields. These dynamics where part-timers from other localities were considered as 'outsiders' contributed to the fragmentation of the type of farming communities usually found at other hamlets that are surrounded by farmland.

167. One of the indicators for this feeling of lack of community at Magħtab is migration of people from other localities to the hamlet promotes tension which lies beneath the surface, creating feelings of unease and discomfort. Essentially there are two distinct groups: the long standing residents that have their roots there who have extended

[17] This seems to be a common practice among Maltese farmers because data gathered for other SIAs where farmers where involved showed similar trends (ex. The baseline study for the local SIA of the SMART CITY development Scheme).

family living at the hamlet as well and those who came later, the outsiders. This group too can be further sub-divided two. One group is still made up of long-standing residents who have been living at the hamlet for thirty years or longer but these do not have extended families living in the area, thus, without the familial network, they too are perceived as having fewer ties to the hamlet and therefore not totally belonging. This group might have fields in the area or built on land belonging to their spouse's family (the spouse's family may not be originally from Magħtab or might have moved a long time ago, therefore there are no current ties to the locality apart from their family unit. The second sub-group belongs to residents who have no original ties to the locality, having bought their houses on land previously owned by others, usually converting a farm, which might have been in a dilapidated state into the modern concept of farmhouse. This group includes foreigners who might have been living at the locality for decades.

168. While it does not automatically mean that those considered as outsiders are automatically shunned or avoided within the locality, a migrant, even if Maltese but originally from a different locality, is very reluctantly looked upon as an integral part of a locality, even after having lived at the locality for years. This tension becomes more heightened when such migrants start involving themselves on particular aspects of the locality, such as mitigating on some particular problem that is affecting the entire locality. Such actions inadvertently touch upon the sensitivities of the indigenous group's very strong sense of belonging, and therefore local identity that distinguishes who is an outsider from those who they believe truly belong to the locality. Thus an 'outsider' is always an outsider! They feel that outsiders reduce the collective idea of local identity and (local) values[18]. These tensions are partly a fear of the process of gentrification, a fear that the social texture of the locality will be altered beyond recognition, creating a response from the original group, who actively start showing that they are economically as affluent as the newcomers. This is usually observed in how large the house is and the type of vehicles that are driven.

169. It is important to note though that it was observed that regardless of their history with the locality or their socio-economic grouping, there is a general sense of belonging to the place, even for those who have established themselves at the hamlet much later than others. While there are a number of such residents who are thinking of leaving because of the proposed master plan, for example, many prefer to fight it out rather than abandoning a whole life's worth of work that they have put into their houses and establishing themselves at the hamlet.

Formal Social Organization: Absence of and gaps in administration and amenities and the formation of Official Organizations including Action Groups against common threats

170. From an anthropological point of view[19], an absence or a gap in administration, services and retail amenities may in fact provide grounds that create communities or enhance community values. Magħtab, Baħar iċ-Ċagħaq and Salini all fall under the official administrative authority of the Naxxar Local Council. All those who were

[18] See Epilogue to Jeremy Boissevain's book Hal Kirkop: A Village in Malta (2007)

[19] … as opposed to a political or administrative point of view where a gap in administration may promote marginalization and therefore a lack of unity.

interviewed mentioned that the Local Council was too far away of course did not feel that the belonged to the Naxxar community at all. While the tensions described above are part of the social reality at Magħtab, there still is a sense of solidarity, however disjointed it may be, the geographic and administrative isolation may play an important part in creating a feeling of solidarity between the users of the area towards the resistance to certain issues of development or the presence of a threat to their physical environment or their way of life, in the case of Magħtab hamlet – the landfill operation as being the one big problem that got the various groups together. The Magħtab Residents' Association was created to try and bring together the various groups together in the face of such a threat to their physical environment in the absence of a more formal organisation that represented their needs. To some extent this did create a shared value towards their rapidly changing physical landscape, bringing about more participation within the hamlet. At the same time, as with many environmental grassroots groups, long term commitment is usually very difficult to sustain and individual and other motivations together with feelings of helplessness towards what they perceived as being a corrupt system fragmented this initial unity[20].

171. Neighbourhoods and local groupings, which in anthropological discourse do classify as informal communities, are classified, even in grass-roots conversation, as "*l-akwat*" (the neighbourhood). In an other particular case, a group of households, marginalised geographically and in terms of amenities, unified by a common perceived threat, who identify themselves as a community that will share the same eventual fate and who try to defend each other's rights, again, when interviewed claimed that "We are not a Community". While they do confirm that the residents are united against this common threat, what a community should be like is rather somewhat different -- proper amenities, administrative and political support, all factors that should be present in a community. In simple terms, a community here refers to the complex mixture of present conditions and future expectations. The point here is that notions of what community varies from sociosphere to sociosphere, and more importantly, from what they say to what they do.

Baħar iċ-Ċagħaq

172. Prior to the establishment of the administrative committee at Baħar iċ-Ċagħaq, most interviewees who had been residing there for a longer period of time commented that there was a complete lack of community values, especially because there was no official representation of the locality at administrative level (at the Local Council). While the establishment of the administrative committee did make a lot of progress in organizing activities and improving the general quality of the locality, there still seemed to be a gap between what the committee was achieving and continued lack of participation within the locality, since out of a population of around 800 full time residents, most of these improvements rested on the shoulders of a handful of people. In fact a number of interviewees mentioned that rather than being a united community there were action committees that came together in times of duress,

[20] This will be discussed further in the section on perceptions and values towards present socio-environmental conditions.

when there was an external factor that was disrupting the general state of the socio-physical environment of the locality, in the case of Magħtab, it was the landfill operation while for Baħar iċ-Ċagħaq it was the recreational facility by the sea, the Splash and Fun Park.

Qawra

173. One of the reasons given for this lack of participation was the high rate of turnover of short-term residence by young couples and separated individuals. This is similar to the Maltese residents of the area in Qawra that was investigated, who seek a sense of "quiet" that does not just mean a lack of auditory pollution but the idea of "peace and quiet" where they are not disturbed (previously explained). In many cases, Baħar iċ-Ċagħaq and Qawra are considered to be a refuge, offering anonymity and privacy; a kind of dislocation from the rest of civil society. At the same time, the Maltese residents describe the locality that they chose to live in for those qualities as having a lack of community. One of the reasons for this lack of community is the large amount of summer residents who do not feel that they are part of a Qawra community and the amount of foreigners at the locality, including visitors.

The Church perceived as being a major factor in the formation of a community; the lack of a physical space for community interaction – no 'pjazza' and no local feast; lack of 'social gathering'

174. It is interesting to note that both at Magħtab and Baħar ic-Cagħaq, the fact that there was a church that residents frequented was a clear indicator for most of the interviewees that there was a community present at the locality. When asked whether or not there was a community and the values usually attributed to a community at the locality, the first thing that came to their mind was the church and that people from the locality met for Mass on Saturdays or Sundays. The tensions mentioned above were only consequential to being a community, though many did specify that there was a lack of community values present at the locality. The Church has always been a very influential force in Malta and community activities revolved around the Church calendar. Indeed, the village was usually built around the parish church and community activities happened on and around the 'pjazza' in front of the Church.

175. Magħtab, Baħar iċ-Ċagħaq and Salini do not have a square or 'pjazza' where residents can meet and interact with each other and discuss matters related to village life. The residents of Baħar iċ-Ċagħaq were more vociferous about this since they did have a large space in front of the Church, which has been for decades an empty lot where people sometimes parked their cars. Through work done by the local administrative committee, a proper 'pjazza' was now going to be built using EU funds (works on this project started right at the end of the fieldwork period of this study) and residents were hoping that this project would instigate more community activities and a general feeling of having a community at Baħar iċ-Ċagħaq. A number of residents though had their doubts to whether the 'pjazza' would bring a marked change because when works were about to start a number of residents had passed suspicious comments to members of the administrative council. This is indicative that people are generally afraid of change.

176. Examined anthropologically, at its simplest, the village (religious) *festa* is an event that seeks to highlight and reproduce throughout time community values and identity. Many interviewees, especially at Baħar iċ-Ċagħaq commented that the village did not have its own local religious feast, since it made part of the Madliena parish and this does not help in creating or perpetuating community values. The Maltese religious feast consists of two parts, the more religious 'internal' feast, with a number of religious activities taking place inside the church and the 'outer' component of the feast, where in other villages in Malta, there would be a procession with the statue of the Saint whose feast is being celebrated. The outer feast is the component that tends to reproduce community cohesion, value and identity. After the inner feast, the priest organises a small gathering outside the church with food and drinks for the community. It is interesting to note that very few people from the village attend this event and is instead attended mostly by residents of Madliena.

177. On the other hand many residents, especially long-standing residents noted that the village now had a priest stationed permanently at the village (while in the past a priest would be sent to the village from the parish to give Mass). Also, very recently, the parish gave permission for weddings, baptism, Holy Communion and Confirmation to take place at the Baħar iċ-Ċagħaq church. These rituals have been attributed to help in the formation of a feeling of community within the village.

178. Another important factor is the idea of 'social gathering', which is a very important factor in many villages. Whole families gather near the entrance of their houses and while keeping a watchful eye on the children, the adults talk about socio-political interests and exchange local news with each other. This is mostly absent at Magħtab, Salini and Baħar iċ-Ċagħaq. While at Baħar iċ-Ċagħaq and Salini there are different dynamics for this (namely people are more private because they are either transient residents or because of their socio-economic circumstance), at Magħtab the situation is a little bit different. There is the geographical aspect where many houses are not closely placed next to each other, while those areas where there are houses in a row, one of the reasons for this lack of socialisation was given to the landfill operation. Dust, rubbish debris, foul smells and smoke (when the landfill catches fire) keep families indoors. Those with extended families visit each other's houses and therefore do not socialise much with other residents who are non-kin. When the old landfill closed in 2004 and the environmental conditions became a little bit better, residents had lost the tradition of staying outdoors and socialise with neighbours, especially if they were not kin.

Families with children/ teenagers with the same age-groups

179. Families with children of similar age groups are perceived to contribute to the formation of a feeling of community within a socioscape. Relatively new residents agree with the more established ones that children of similar age groups contribute towards more interaction between residents that make the community more conducive, especially between adult, married children of established residents who live permanently at the locality and parents who are summer residents.

180. This was more apparent at Magħtab where car-pooling seemed to be one of the practices taking place, since there was no public transportation at the locality, especially for teenage children who wanted to go out in the evenings. It was observed though that after school many minibuses passed through the hamlet.

Anonymity and privacy

181. For some members of the younger generation, the influx of new residents may create a sense of anonymity, which is beneficial, rather than damaging to the community and its values. The fact that everyone knows each other, that rumours, events and gossip spreads rapidly and easily, they claim, is the sign of a backward community, rather than a closely-knit one. It is possible that such feelings are common throughout the younger generation. Alternatively, the willingness and ability to travel and integrate with different people and encounter different ideas, socioscapes and attitudes, may result in a development and difference in the notions of privacy, space and place. Migrants (transient residents) and the younger generation are therefore of crucial importance in the alteration of community values.

Baħar iċ-Ċagħaq

182. On the other hand, many residents of an older generation, especially from Baħar iċ-Ċagħaq, commented to the opposite. The fact that there were a lot of transient residents who subscribed to anonymity because of their social position (being separated, single parents and so forth), was not conducive to the strengthening of a community but rather the opposite. People know each other by sight and say their hellos but even neighbours rarely know each other on a first name basis.

Attitudes and Values towards Present Social and Physical Conditions

183. People have different and sometimes mixed attitudes towards what is currently found at the localities that they use within the A of I. Many interviewees talked about reasons why they bought or rented, in the first instance (see previous section) and how things changed with time, an important factor since experience gauges their attitudes to future changes within their socioscape, such as the proposed Scheme. This section identifies locality values and attitudes towards socio-physical changes of the area over time, identified through personal experience and lifestyle.

184. Since this baseline study is aimed to help identify the potential impacts of further waste management operations at the current waste management site at Magħtab, the section will start with the experiences that the sociospheres have had over time regarding the landfill operation. It is important to understand that some experiences are not a direct effect of the landfill operation but may be indirectly caused by the operation.

185. This section should be read in reference to both the previous sections and the perceived effects of the proposed Scheme, which follows this section.

Magħtab (and where specified, other localities)

Full-time Residents with extended families (Long standing residents with roots at the hamlet); Long standing Families without extended families in the area but are part-time / Full-time farmers who have worked the fields for a long period of time; more recently established local residents (where indicated) and foreign full-time residents

186. The following experiences were largely homogeneous for the users above. Distinction will be made within the text for differences between one group and another, especially significance. The list is not in order of importance and many factors are interrelated, especially when one discusses changes in activities and lifestyle. In other words, activities and lifestyles may have changed because of a combination of different factors.

- The experience of the landfill operation:
    - Changes in the physical landscape, which in turn caused:
        - The experience of changes in activities (also bringing about a decrease in a feeling of community values)
        - The loss of trees and fields because of the landfill operation
        - The experience of losing tangible heritage
        - The experience of changes in the visual landscape
        - The Experience of dirt at Magħtab, where the surrounding area of the landfill was used as a rubbish dump, 'fly-tipping'; the stigma of living at Magħtab as being associated with a rubbish dump (the experience of being 'used' as the receptacle of most of the domestic waste of Malta and especially, more recently, Gozo);
        - The stigma of living at Magħtab caused by peer pressure
    - The experience of pollution attributed to the landfill operation:
        - Change in air quality, foul smells and air pollution from the disused landfill gas extraction operation
        - Dust
        - Rats and other vermin; stray dogs
        - The experience of sea and ground water pollution
        - The experience of Health issues (largely perceived as being a consequence of living close to the landfill)

- A general distrust in the authorities and company operating the Waste Management Site because of promises not being kept, including lack of Information and enforcement;
- Economic considerations because of the landfill operation

- The experience of the widening of the road with the effect of an exponential increase in traffic (for Magħtab, this is in part associated with the landfill operation)
- The experience of development with an influx of non-indigenous settlers, including more industrial use of the area: Increase in population and a dichotomy between community values and unity

The Experience of the Landfill Operation

The Experience of changes in the physical landscape

Changes in the Physical Landscape: The experience of changes in activities (also bringing about a decrease in a feeling of community values)

187. The older generations (over 70 years of age) remember a completely different kind of physical landscape with very different kinds of activities. Farming activities in the area (emphasising that it was one of the most fertile parts of the island) where the landfill is currently situated. It was also mentioned that they used to go herding the sheep and goats in various areas (Ta' Ħammut and Għallies together with the caves and the archaeological site that are now buried under the landfill were specifically mentioned), while their children and friends used to play there. Residents in their forties and fifties remember how they used to play in the area. Now that they are married with their own children at the hamlet, these are stories that are already being transmitted to their children and grand children, since some of those interviewed were in their thirties with very young children of their own. Both generations only know the landfill as being part of the landscape. What worries them is that in such a short time, in the last 18 to 20 years, the landfill has grown exponentially, changing the landscape dramatically and irreversibly.

188. The experience and perception of an increase in pollution in the area surrounding the landfill operation (below) produced a change in use of the landscape by users of the area, especially residents. They stopped going for walks in the countryside, they stopped going to swim or fish in areas that were declared polluted. The younger generation (their children) do not have the experience of enjoying the countryside in the area because for them it is dangerous—polluted and infested by vermin and stray dogs. They have no memories of the area being different.

189. Dust and other inconveniences caused by the landfill kept people indoors, reducing chances for socialisation and with it the feeling of community within the hamlet. Older generations remember when families used to go to each other's farms to

socialise or stay outside their homes on chairs and chat with their neighbours while their children played in traffic-free roads.

190. Farmers (full and part time) recounted stories as though they were war stories, of when the original landfill was in operation and it was windy, there would be flying debris, dust, paper and plastic bags all over their fields and getting trapped in their trees. The foul smells would be so acrid, especially when the landfill caught fire that they would have to abandon their fields and go back home.

Changes in the Physical Landscape: The loss of trees and fields because of the landfill operation

191. While long-term and even short-term residents had mentioned this, farmers were more sensitive to this issue, not just as a visual or landscape feature but also because of their attachment to the land and fields. When the landfill first started in a matter of weeks trees were uprooted and fields used for the landfill operation. This continued over the years as the landfill grew. This experience is of particular relevance because the proposed Scheme is envisaged to use a sizeable area of fields on which there are trees, which farmers claim to have been there for more than a century.

192. Many farmers were worried that one day the whole area would be scheduled for landfilling and they will lose the fields they love so much (referring to the proposed Scheme as being an indicator that waste management will continue to happening at Magħtab).

Changes in the Physical Landscape: The experience of losing tangible heritage

193. As mentioned above, the tangible heritage (archaeological sites and cart ruts) was mentioned several times during interviews. A lot of longstanding residents (even from Baħar iċ-Ċagħaq) and visitors of the area over the age of 40 mentioned that they used to go walking to the archaeological sites when they were young and these have since been lost, buried by the landfill.

Changes in the Physical Landscape: The experience of changes in the visual landscape

194. Older generations specifically talked about the picturesque landscapes that one could see, which included seascapes, which are now part of the past. This is very much associated with the previous point.

195. Since many farmers spend long day working in their fields, the visual amenity is considered to be very important. Some farmers could see Gozo, the sea and other landscapes for example from their fields. The increasing development in Qawra and the landfill changed their views along the years.

196. More recently established residents of Magħtab (in the eighties and nineties) were under the impression that the landfill operation was soon to be closed and the landfill was either not visible at all or barely visible from the farmhouses and properties they bought. In this respect and the fact that the surrounding area was still mostly rural meant that they could enjoy the visual landscape. For these residents it was shocking how quickly these changes took place. The fact that the landfill was now visible from

their premises, for them meant that their property was worth much less than before. It also meant that their enjoyment and appreciation of their physical and visual landscape were much less appreciated, even though after the closure of the old landfill and the establishment of the engineered landfill (and the fact that construction waste was not dumped at the landfill any longer) the situation improved in terms of dust, smells and other inconveniences.

Changes in the Physical Landscape: The Experience of dirt at Magħtab, where the surrounding area of the landfill was used as a rubbish dump, 'fly tipping' the stigma of living at Magħtab as being associated with a rubbish dump (the experience of being 'used' as the receptacle of most of the domestic waste of Malta and especially, more recently, Gozo)

197. Because of the landfill, when it rains, the road becomes a river of sludge, what residents referred to as 'tajn' (mud), where one can't even walk. The trucks pass by their residences at 40km an hour in this river of sludge, splashing the dirt onto their parked cars and houses. They literally could not go out of their house when it rained. Residents on these roads regularly used the expression "Magħtab became a living hell".

198. Along the years, rubbish was dumped in the open countryside, along roadsides, abandoned farms and other dilapidated structures. Indeed, Magħtab at large was considered as being one large dumping site with little regard that there was a hamlet called Magħtab (not just a landfill) where people actually lived[21].

199. Since the closure of the landfill operation in Gozo, its domestic waste is being transported to Magħtab. Users of the area have reported that this waste is being brought to the Magħtab landfill entrance and deposited there and then it is bulldozed up during the day, creating a lot of dust and pungent smells, bringing back pre-2004 memories, before the old landfill was closed. This has made many users, especially residents and business operators very angry because they feel that the authorities consider Magħtab, its physical environment and the users of the area as expendable, where most of the waste produced by the country can be dumped practically at their doorstep and they cannot do anything about it. They feel that such operations will never cease and will in fact increase and they will not live to see the area rehabilitated. This is of particular relevance to their perception of the proposed Scheme, discussed in the next section.

Changes in the Physical Landscape: <u>The stigma of living at Magħtab caused by peer pressure</u>

200. Peer pressure can be very unforgiving and can leave psychological scars that influence people's attitudes towards community cohesion and social bonding. Adults who had grown up at Magħtab used to tell their fellow peers, especially at school, that they lived anywhere but Magħtab. When they did specify where they lived, they used to be

[21] It is interesting to note that when the researcher talked to people not associated in any way with the general area of Magħtab about the SIA, most people in general did not know that there actually were people living at Magħtab, let alone a hamlet of more than 200 full-time residents. Many thought that besides the landfill, the only other activities that existed at the landfill were a number of farms and an industrial zone.

bullied and ridiculed, called names associated with rubbish and dirt and were told that they lived in a rubbish dump. Apparently young adults living at Magħtab today still do so, stating that they live in Naxxar and not specifying where exactly in Naxxar they do live, even though they did admit that since 2004 and the closure of the old Magħtab landfill, the situation has ameliorated.

201. Even residents of nearby localities did not realising that there actually is a whole hamlet there where people live in the vicinity of the landfill. From the data collected, interviewees admitted to stereotyping people of Magħtab as scavengers who go looking for dumped stuff or to fly tip in the area.

The experience of pollution attributed to the landfill operation

202. The following sub-sections are all related to the experience of pollution in the area, which by and large, are perceived to be the fault of the landfill operation. They should be interpreted as such and as being inter-related with one-another, which are put into perspective in the last sub-section, which explores their attitudes on health related issues, both at an individual level and the general health of the physical environment.

The experience of pollution: Change in air quality, foul smells and air pollution from the disused landfill gas extraction operation

203. The indigenous population talked about the healthy rural air that there used to be in the past. This is also connected to the lack of traffic that there was at the time. The air quality declined steadily both with the growth of the landfill and the increase in traffic, especially the trucks going to and from the rubbish dump.

204. It must also be pointed out that most interviewees also mentioned that since the closure of the original Magħtab landfill the quality of the air has improved. Many interviewees from the village of Baħar iċ-Ċagħaq for example mentioned that they rarely smell the landfill unless the wind prevails directly towards the village. Inhabitants of the upper part of Baħar iċ-Ċagħaq though explained that since they are on a hill and therefore higher up than the rest of the village, they are more affected and still smell the landfill more regularly.

205. Residents of Magħtab though while admitting that the situation has become better, during the summer months there still are foul smells even on still days when there is little or no breeze. The situation has become bad again since the Gozo landfill has been closed and the Gozo waste started to be brought to Għallies and Żwejra. They blame the Gozo rubbish, which is being deposited near the entrance of the site in the morning for these smells, because in previous years, since the closure of the original landfill site residents living close to the site could smell the landfill only when the wind was prevailing towards their houses, which was a big improvement from before.

206. As already mentioned above, farmers also complained about the air quality and foul smells, stating that on very bad days before the old landfill was closed, especially when it caught fire, the acrid smells were too much to bare and they had to return back home.

207. A number of residents and farmers living or working close to the landfill operation have reported that on occasion they can smell the gases that are being extracted from the disused landfill. The Magħtab Residents Association and the Naxxar Local Council have received similar reports from users of the area.

The experience of pollution: Dust

208. Dust is another problem that still afflicts the users of the area. While plastic bags (farmers with fields in the vicinity of the landfill used to spend days collecting plastic bags from their fields and trees) have become something of the past and 'rubbish dust' or 'landfill dust' has decreased considerably compared to pre-2004, they still complain a lot about dust. The older generations reminisced on how they could hang their clothes outside before the landfill while younger generations stated that during the summer they had to keep their windows closed all the time because of the dust. Farmers mentioned that there had been days when they could not resist remaining at the fields, both because of the stench and the dust when the wind prevailed in their direction.

209. Today there is a different type of dust, a fine white dust that originates from the 'white mountain', the material that is used to bury the top layer of the waste. The fieldworker observed that most households at Magħtab wash their front entrance of the house every evening. Those living on roads used by scammells explained that the trucks would leak waste onto the roads. Trucks coming out of the landfill were usually very dirty; a sign that the wheel-wash had not been used. Therefore they do not just wash the front of the house just because of the dust but also because of these other factors as well. In the past, for example, whole bags of waste would fall out of trucks and the drivers would not stop to pick them up. This is conducive to other accounts on fly tipping in the area[22].

The experience of pollution: Rats and other vermin; stray dogs

210. In previous sections it was explained that people living at Magħtab rarely use the surrounding physical landscape for leisure. The reason behind this is that they fear the vermin found in the area, mostly, very large rats. Many explained that the situation became worse a few months after the closure of the old landfill because lacking their primary food source, the rats started migrating to other areas. Farmers in the area lost whole crops to the vermin and people who lived in farmhouses found them inside their homes. People living at Baħar iċ-Ċagħaq and Salini recounted similar stories. The situation got better a number of months later.

211. People also mentioned that there were dozens of stray dogs that roam the area close to the landfill and a number of residents recounted stories of being attacked by dogs when walking close to the perimeter of the landfill in the evening.
Long-standing residents (pre-landfill) used to sleep on the roofs, especially in summer. Now they cannot even leave the windows open -- the flying vermin (mosquitoes and

[22] Indeed, the washing of the front of houses was one of the examples brought up by a number of residents to illustrate the social tensions explained in the previous section: that those who wash their houses daily do not just do it because of the dirt and dust but also to send a subliminal message to other residents considered of a higher socio-economic status that even they can afford to use all that water on a daily basis.

flies) intestate the house the moment one opens a window. This was an experience shared by Baħar iċ-Ċagħaq and Salini residents as well.

The experience of pollution: Sea and groundwater pollution

212. Related to farming activities, many part-time and full-time farmers attribute to the landfill operation the pollution of ground water in the area and the production of bad crops. A number of farmers remember being approached by the landfill operators who wanted to buy their crops because they were not healthy[23].

213. Many residents, predominantly from Magħtab and Baħar iċ-Ċagħaq, together with visitors camping near Torri San Marku blame the landfill operation as being one of the main reasons why the sea at the area is polluted.

The experience of pollution: Health Issues, both personal and to the physical environment, especially fields

214. Related to the above sub-section, many residents and especially farmers were concerned about the general health of Magħtab's physical environment, especially their fields, and how that could influence their own health by using the area. Farmers wondered about the health of the soil and their crops because of the flying debris and other pollutants carried by the wind from the landfill to their fields while livestock farmers were also concerned with the health of their animals and the meat and other products they produced. Interestingly, horse owners were less concerned with possible health issues brought about by the landfill and were more concerned with runoff slurry from a number of farms and other operations such as dark smoke originating from nearby farms.

215. While it is not the purpose of this study to make statements related to health issues that the landfill operation may or may not have caused to the population, it is the perceptions of the people interviewed (in all the locations discussed) that their health, especially those related to respiratory conditions, were adversely affected by the landfill operation. This is a very big concern for residents who have young children.

216. A doctor specialising in children who was interviewed at one of the localities investigated stated that it was his professional opinion that there was an increase in respiratory diseases such as asthma because of the increase in dust and other particulates from the construction phases of developments in the area and the landfill operation.

217. It was also mentioned that when the old landfill was still operating, all sort of waste would be dumped there, including dead animals[24]. Residents do not know what kind of pollution is found in the area and whether their health has been affected by such activities.

[23] Senior management of the waste management operator corroborated these statements during a meeting with the researcher.

[24] The foot and mouth disease incident was expressly mentioned by a number of interviewees, while others also mentioned that when the hospital incinerator was not working, even human parts had been dumped on the landfill.

The Experience of the Landfill operation: A general distrust in the authorities and company operating the Waste Management Site because of promises not being kept, including lack of Information and enforcement; no stakeholder involvement or participation and not being included or consulted about the plans for the future of their locality.[25]

218. Users of the area, especially residents, business operators (including tourist operators), farmers (including livestock farmers) and returning recreational visitors (for horse-riding and other sports) complained that they do not have any information on what is going on and what is happening at the landfill. They emphasised that people in the area should be informed whenever things that may affect their surroundings take place and the reasons why. Many users agreed that if they are informed they do not need to make up their own minds on what is happening and the effects of such operations, which is usually worse than what may really be happening.

219. For example, the residents have noticed that the Magħtab landfill is still being used on occasions -- they see that the old rubbish is being taken to the new landfill. They have also noticed that at times it actually still goes on fire. These are examples that were used to show that they did not know why such activities were taking place or whether the landfill should still be spontaneously catching fire even though it is now an engineered landfill.

220. Farmers who either lost fields during the enlargement of the landfill operation or were now going to lose fields because of the proposed Scheme felt that the lack of information was more of a threat and increased their distrust in the authorities. Interviewees explained that the only hint they had that something was about to happen was when they did not receive the notification to pay the government rent. Months later they received a notification that their fields were going to be taken away from them for a government project and were invited to go to a government office to inspect the plans.

221. The feeling of lack of information and collaboration from the part of the Authorities and the operating company was compounded when a particular report (the Scott Wilson Report) was denied to them. This is when the Magħtab Residents' Association became much more active and after a legal battle that even involved correspondence to EU officials, the report was finally made available to them.

222. Users, especially residents mentioned that a number of tests were supposed to have been carried out by the operators of the WMF, including air quality tests. It was reported that some kind of test was carried out on the rooftop of at least one house in the vicinity of the landfill. Residents were perturbed that the test was done in only one place (to their knowledge) and that they were not informed of what type of test was performed, the results of such tests and whether as users of the locality, they should be worried. The fact that they were not given any information already made them weary and suspicious that there were health hazards from air quality that they are not aware of because of lack of transparency and transfer of information.

[25] Ths section is of particular relevance to gauge their predisposition towards accepting (or not) the proposed Scheme.

223. One of the most important experiences of users of the area, especially residents have, which in turn has influenced their perception negatively towards the proposed scheme is the fact that the Authorities had made many promises to them that were never kept. The original landfill was supposed to be temporary, only operating for around three years. A number of residents mentioned an initiative of the time called "iżra u rabbi" (sow and rear), which residents now interpret as having been a smokescreen. In 2003, before the EU referendum, residents were told that once Malta entered the EU, the Magħtab landfill would be closed. While it must be mentioned that there were a number of residents who had heard rumours of an engineered landfill, most residents had interpreted the statement as the landfill would be permanently closed and rehabilitated over time and another place would be found to deposit Malta's waste.

224. Effectively, residents feel cheated because they interpreted the move by the Authorities as being yet another lie – that the Authorities had effectively enlarged the landfilling scheme because the landfill that had been used till then had reached carrying capacity, by using the original names of the area, another landfill was opened – with the names Għallies and Żwejra. For Magħtab residents, Magħtab geographically comprises of the whole area, including Għallies, Żwejra and ta' Ħammut not just the original landfill. They closed their argument by stating that the landfills of Għallies and Żwejra still used the same entrance of the old landfill and that Żwejra was in fact part of the older landfill. A number of the more vociferous residents and members of the action group showed the researcher aerial photographs of the landfill over time, together with topographical maps, which corroborated the above statement.

225. This feeling of betrayal was felt even more because residents had been invited to an open day where the Government had shown them plans for a park, a golf course, and flyers with hand-gliders jumping off the park and so forth.[26]

226. Residents had also been promised free electricity to make up for the many inconveniences that they had to endure over the years. They were told that the gases extracted from the landfill would provide them with electricity. During Christmas night of 2010 a large Christmas tree was erected with lights being lit using energy from the extracted gases. All the people that mentioned this (from various localities from where the Christmas tree was visible) also mentioned that the tree was lit for only a few hours. Those living close to the landfill retorted that if the gases could not produce enough energy to light the Christmas tree[27], how could the gases produce enough energy for the whole street or the hamlet?

227. Residents living close to the landfill even asked for compensation from the Government and Waste Management operators but whatever compensation they

[26] Indeed, when the researcher first contacted the residents they were under the impression that the SIA was being conducted for the abovementioned park.

[27] Those living close to the landfill swore that they could hear the generator that was operating the Christmas tree, though this could be hearsay that becomes fact and part of the collective memory of a particular community. It is anthropologically interesting though that a number of residents from other localities including Baħar ic-Ċagħaq and Qawra mentioned that the Christmas tree had been operated by a generator, though this too can be considered as hearsay.

received in the form of street cleaning was short lived and unsatisfactory. The only promise that according to the grieved residents was kept was that construction waste was not allowed into the landfill any longer once the original landfill was closed, which reduced the traffic considerably, some roughly estimating that traffic was reduced by more than 50%.

228. There is lack of enforcement on a number of levels. From the data gathered these include trucks that should not pass through certain roads to access the landfill still pass unchecked; fly tipping still occurs on occasion; wheel washing of trucks leaving the landfill premises is not enforced and does not always take place. Users, especially residents from Magħtab feel that there has not been a lot of help from the local council. When discussed with the Naxxar Local Council, it is interesting to note that even the Local Council feels a little bit helpless to help the users and residents of Magħtab, especially due to lack of funds to keep a constant vigil on those breaking the law, especially truck drivers who should not pass through particular roads.

The experience of the widening of the road with the effect of an exponential increase in traffic (for Magħtab, this is in part associated with the landfill operation)

229. Until around 35 years ago the roads at Magħtab were very narrow with very few vehicular traffic, save the occasional farmer. When the landfill was opened, the road was widened and the traffic has increased exponentially though not just trucks to the landfill but also in vehicular traffic of people by-passing the Coast road.

230. Though the streets were widened, the amount of traffic that passes through them quickly damaged the roads. These have rarely been patched up and the patchwork usually broke off with the first rain, revealing the large holes again.

231. There are predominantly two types of trucks that use the roads of Magħtab:

- Trucks (to service the construction industry): These are considered a nuisance, but the operators of the industry who also reside or have their business at Magħtab do recognise that they contribute to this increase in traffic of large trucks since their business is in the area.
- Trucks (servicing the Landfill Operation): Since the entrance gate to the engineered landfill is the same one, the traffic is still as bad as when the old landfill used to be in operation and when trucks pass by they leave a pungent smell behind them. When the road was still narrow, when the landfill first opened, residents remember truck drivers fighting over the right to pass first.

The experience of development with an influx of non-indigenous settlers, including more industrial use of the area: Increase in population and a dichotomy between community values and unity

232. The relationships and tensions between migrants and well-established residents are closely related with development and construction. Generalisations and simplifications here must be made with care. The usual approach to such a situation is to freely associate well-established residents with conservatism and migrants (as

being, in themselves a new development) with social and economic change. According to the data gathered, this is only partially correct and the actual situation on the ground is more complex than that.

233. Long-standing residents and farmers remember the area as being a predominantly a rural community with a few farms and houses surrounded by fields. In this respect the hamlet of Magħtab has remained largely unchanged. What has changed is who lives in those farms today. When a number of the original community stopped living in those farms, moving elsewhere, a different type of person bought these farms and transformed them into family homes with very different use of the same space. These people, not originally from Magħtab came from other areas of Malta and were usually of educated, middle working class or business entrepreneur backgrounds, with very few actually interested in farming land. A number of these farms were even bought by foreigners. This created an invisible chasm or divide between the long standing residents and the new arrivals.

234. As already mentioned in the previous section, the well-established residents perceive the more recent residents as part of the increase in population, which is, in turn, viewed as detrimental to the locality, because it reduces drastically their idea of peace and quiet (if one had to take the landfill operation out of the equation). This has resulted in a situation where the idea of community seems to have diminished for the long-term residents, and the short-term residents do not perceive it as being particularly present. It might be for this reason that many recent in-comers commented that unless they make the effort to show interest themselves, they are not invited to get involved in the community life of the locality. They talk to other members of the community by chance when meeting on the roads, keeping neighbours at arm's length, trying to keep that reserved attitude towards their social environment. Those who feel differently, mingle more freely, both those with a long association with the locality and many who have arrived more recently and are close to their age-group / friends.

235. This is an on-going, dynamic process and regardless of these tensions, there is an inherent attachment to the space these different groups occupy and it is generally accepted that the new arrivals are respectful of their surroundings and of the rural aspects and uses of the area. This is in part shown by the way they refurbished their farmhouses, keeping the architecture homogenous to the rural landscape, rather than building an apartment block, as has happened in other rural localities in Malta and Gozo.

236. These tensions have also contributed in rights over who should take the lead in the standing up for their rights when it came to the landfill operation, also contributing to some fragmentation. The problems caused by the landfill operation though affected all the users of Magħtab, both long-standing residents and migrants to the area and this in itself has also created a point of contact between the various users, creating more unity than each group cares to admit.

237. There has also been an increase in the industrial use of the area, both agriculturally, in the form of livestock farms that run a business operation rather than the family run

type of farms that used to be found in the area and other industries such as construction, though this business is mostly run by indigenous residents of the area and are felt to be a diversification of their original land owning operation. While the area did already offer a number of services by residents who had their business in the area, such as mechanics, there was an increase in these types of activities that replaced the original use of the physical space, from a farm to an industrial establishment. This was felt as being incongruent by a number of residents, both indigenous and migrants.

238. Differences in attitudes are not simply limited to the social place they occupy within the A of I. Individuals usually classified together may have divergent attitudes influenced by family backgrounds and future prospects. This dynamic has been observed in senior landowners from an agricultural background who viewed the land as a resource, a resource which can be passed on to one's children to bolster their economic standing. The point here is that attitudes towards development are not solely dependent on one's occupation, but on a wider set of factors, the family being the most prominent and influential. Notions and attitudes towards development also depend on how one views one's property and the function such property has in one's lifestyle.

239. Apart from the above experiences shared by the users as indicated, the following were experiences that were more specific for particular users.

More Recent Full-time residents (Maġħtab)

The Experience of change of uses, including the increase of livestock farms and other industrial uses

240. Besides the above experiences relating to the Maġħtab landfill operation (all more recent residents interviewed had already been living at Maġħtab prior to the closure of the old landfill), experienced the changes in uses of the area that happened over time. At the time when they moved to Maġħtab hamlet the area was still predominantly agricultural with small farms having livestock. Since then there was an increase in industrial livestock farming activities and other industries sprouting in the area, utilising old farms as their premises, such as mechanics, panel beaters and welders and construction companies, for example. In their eyes, these activities have increased the pollution in the area (apart from the landfill activities) and other inconveniences such as foul smells emanating from the farms; noise pollution from the garages and so forth. This has also created a perception of change in the overall socio-physical and economic environment of the area, making the area feel more 'run-down' or a feeling of decay. This goes back to the idea of "quaintness" that was discussed earlier and how that feeling has disappeared over the years. The shock for many recent full-time residents is that it happened over a short period of time, something that many of their young-adult children agreed on.

The Experience of change for young adults

241. While young adults of more recently established residents have always had the experience of the landfill, it was noted that a number of young adults had other experiences of change in the area. The change of use of surrounding farms from having sheep and goats to operations such as mechanics and panel beaters was

considered a big and shocking change for them, who were younger children at the time. Experiences such as buying eggs from one of the farms and seeing farmers milking their goats became part of the past.

The experience of not having public transportation

242. More recently established residents, especially those with teenage children, felt this gap in the infrastructure of the hamlet much more since they did not have a (kin) network to rely on. Those who wanted to catch the bus had to walk to Baħar ic-Ċagħaq, which could be dangerous during the evening (for reasons mentioned above). Once a network of friends was established and car-pooling could be organised, this became less of an issue.

An increase in equestrian facilities (stables) and related activities

243. It is interesting to note that nearly none of the long-standing residents of Magħtab listed the increase in stables in the area as one of the historical changes that occurred at Magħtab. Most recent residents on the other hand did mention this increase and apart from the inconvenience of the occasional horse faeces on the road, most welcomed this change and some enjoyed the occasional ride as well.

Full time and Part time farmers (Magħtab and Salini)

Increase in livestock farms

244. The increase in livestock farms of an industrial level (by Maltese standards) added to an increase in foul smells, especially from pig and cow farms that might have been close to or downwind from their fields. Some farmers complained that a number of farms did not operate up to standard and let slurry runoff contaminate the surrounding areas.[28]

Visitors to the area (Magħtab)

245. Older visitors used to visit the area when they were young, play in fields where Magħtab landfill is now situated, go swimming etc. They have memories of farmers taking care of the goats, the caves and archaeological sites.

246. Younger visitors do not know the area without the landfill, without the problems etc. Since 2004 they noticed a slight change for the better but the sea is still contaminated and they cannot swim there. They do not come to the area much since there is the landfill.

Baħar ic-Cagħaq, Salina and Qawra

247. Users of the three localities have similar experiences to change though attitudes and values may vary depending on the locality. Sometimes it is exactly because of those differing attitudes and values that attracted them to one locality and not another. A major example of this is the experience of urban growth happening in the three localities, which, when compared to one another, this growth started happening later in both Baħar ic-Ċagħaq and Salina, while at Qawra, due to the tourism industry present there, development happened earlier. Urban growth though is happening at

[28] This is not true for all the farms in the area and a number of these well-kept farms were interviewed. It is interesting to note that the farms that had been indicated as being sub-standard declined to be interviewed.

an increasingly faster rate in all three localities but is being felt more at Salina and Baħar ic-Ċagħaq since both localities were predominantly summer refuges for people living elsewhere for a lengthier period of time than Qawra.

248. Again, these sections need to be taken in context with the previous section on perceptions towards community and community values.

Residents: The local and transient communities

The experience of urban growth, privacy, wanted-anonymity and official representation

249. Baħar iċ-Ċagħaq was mostly a locality catering mostly for summer residents. Long-standing residents who have lived for more than a few decades remember the locality as only having a few houses, mostly summer homes with very few people, surrounded by a rural and seashore landscape. It has now grown to more than 800 full-time residents and a multitude of apartment blocks that have risen in this last decade or so. This has brought a lot of changes to the social texture of the locality, especially with the arrival of young couples living permanently or renting for a number of years before moving on to other localities. Before there were no businesses in the area, now there are three restaurants and a grocery store, though it only caters for the regular clientele, since most residents do their shopping elsewhere. Through the administrative committee of the Naxxar Local Council, now the locality has a mobile post-office that services the locality once a week, which seems to be quite popular.

250. This brings with it a number of factors, also mentioned earlier, such as privacy and wanted anonymity, which enables people to feel that they can blend into the social environment without attracting attention, 'disappearing' in the area without the fear of being annoyed by others. On the other hand, with the influx of people coming into the area and the continued construction of apartment blocks, for a number of interviewees, this feeling of seclusion and privacy is being perceived as decreasing rather than increasing.

251. Similarly, long-standing residents remember Qawra as an area with little housing and few or no hotels, something that had attracted them to the area then. As time passed and Qawra started becoming more saturated with apartment blocks, houses and hotels, this feeling of quiet seclusion faded into a memory to reminisce about. Many, though, still felt that the area was still relatively quiet and that the surrounding hotels only enlivened the area, even though those same hotels had changed the physical and social landscapes of the area.

252. While some interviewees do not think of tourists as a menace, others feel that tourists invade their privacy and personal space, some directly, and for others indirectly. Long-standing residents of Qawra claimed that because of the multitudes of tourists that come to the area during the peak season, more hotels, apartments and amenities had to be built, which encroached upon their own personal space, decreasing the feeling of seclusion and privacy that had attracted them to the area in the first place. On the other hand the experience of tourists was not the negative impact of most significance. It was the lack of parking and increase in traffic that most were perturbed about (next sub-section). The need for anonymity though is not pursued by all residents, especially those who moved to the area to start a new life,

such as separated individuals and single adults who moved to the area because of the nightlife and the more economically feasible rent.

253. The urban growth at Bahr ic-Ċagħaq though has spurred a number of resident to form the administrative committee of the Local Council of Naxxar, which started a number of initiatives with the aim of creating both the physical space and the traditions towards a sense of community and identity of an actual village at Baħar ic-Ċagħaq. The same thing happened with the church, so that as mentioned earlier, a number of rituals are now taking place at the locality.

254. These initiatives are very different from the feeling of hopelessness that some residents of Qawra have towards the rapid urban growth in Qawra. This is probably due to the fact that Baħar iċ-Ċagħaq is geographically and demographically smaller than Qawra and the residents at Baħar iċ-Ċagħaq that are spearheading these changes feel that they can make a contribution towards improving the socio-economic texture of Baħar iċ-Ċagħaq. The general attitude of residents of Qawra on the other hand is that the authorities should be responsible for improving the infrastructure. This may be brought upon by the collective anonymity found in Qawra, which brings with it a lack of community unity that is perceived by those seeking the anonymity as detrimental to the community in respect of official or administrative issues, especially since the heart of the residential area is St. Paul's Bay, which further increases distance between the residents of Qawra and the Local Council.

255. Residents of Salina have similar experiences to Baħar iċ-Ċagħaq – a lot of development and being surrounded by apartment blocks, which reduces privacy while increasing collective anonymity (as in Qawra). This has in turn increased the perception of a growing sense of urban decay in Salina that fulltime residents feel should be addressed. This feeling of urban decay may be stemming from the feeling of being completely cut off from the administration, since unlike Baħar iċ-Ċagħaq, they do not have an administrative committee that know what their needs are and can address them.

The experience of the increase in traffic and parking problems

256. As described above, this was one of the most significant negative experience for residents of Qawra, which is today much more frequented than before, especially by Maltese recreational visitors, especially during the summer. During the time of fieldwork, which was before the peak summer season started, during the day, there was a lot of traffic though not congested and all the parking places were usually taken. In the evenings though, especially during the week, the streets were mostly quiet, void of cars and the parking places that were not vacant were taken up by residents living on the street.

257. In summer the situation becomes congested and they perceive the situation as being worsened by the one-way road system found in the area, which creates bottlenecks. Many residents with houses have garages incorporated with the house. Parking is not a problem except on weekends when many times recreational visitors, not finding parking themselves, park their vehicles even in front of garages, blocking residents. Those who do not own garages or have families with more than one car find it very

frustrating during weekends and in summer because they have to park far away from their houses or apartment.

258. While the situation at Baħar ic-Ċagħaq might be less of a problem than in Qawra, during weekends, after religious feasts around Malta and football matches a lot of people go near the sea-side in front of Baħar ic-Ċagħaq to celebrate, parking in the village and like Qawra, even in front of driveways and garages. This situation is similar to some areas in Salina, when people who go to the restaurants situated there.

259. Residents living further inland in Baħar ic-Ċagħaq have less problems of this sort regarding parking but have a problem with traffic once they reach the coast road.

260. A number of residents of Qawra in the area interviewed complained of large trucks in their area but these were mostly directly related to the increase in development in the area and not the landfill operation. At Baħar ic-Ċagħaq and Salina, trucks associated to development were the main concern though they did mention the trucks that go to the landfill operation. Besides the mount of trucks going to the landfill, their concerns were more about the cleanliness of the trucks. The complained that trucks leak waste and considered such trucks as health hazards.

The experience of Noise pollution

261. Noise pollution due to traffic is only an issue in three instances:

- When the residents are outdoors;
- Noise arising from early morning deliveries to the hotels in the area,
- Noise from large busses and vans servicing the tourist industry near hotels,
- For residents of Baħar ic-Ċagħaq and Salina mostly, including users of Qawra: noise from construction in the area;
- For a number of residents of Baħar ic-Ċagħaq, noise pollution is also attributed to recreational facilities on the shoreline in front of the locality.

262. In Qawra, noise pollution from vehicular traffic was mostly an issue when people were outside. During the summer, residents have to keep their windows closed, especially in the afternoons and evenings because of the amount of traffic found in the area. Users also complained about the many developments taking place in the area (though not in the area where the interviews were held), complaining about the noise pollution they caused (besides the dust, though this has reduced a bit in these last few years since a few construction sites have started to 'wrap' the site up in material to decrease dust and conceal the site).

263. At Baħar ic-Ċagħaq, noise from vehicular traffic is less significant except during times mentioned above (after religious feasts around the island, football matches etc.). Residents living further inland, this is even less significant. On the other hand, those living close to construction sites due to development, noise can be a nuisance. This is a similar grievance for residents of Salina.

264. Residents living close to the coast road find noise from traffic disturbing, especially during peak hours and in the summer months.

265. For a number of residents of Baħar ic-Ċagħaq, music from the recreational facilities near the shore has been a nuisance. An action group from the Residents' Association have also taken the owner of the facility to court about this problem. Recently, though, a number of residents have reported that this has become less of an issue since volumes are being kept relatively low.

The Experience of dust pollution

266. For residents in the three localities who live close to construction sites, dust pollution is a problem, especially when the construction site does not conform to proper dust management.

267. Though dust from the landfill has also been a problem for residents from the three localities, it is less significant to those experienced by users of Magħtab. More recently residents have been experiencing fine white dust coming from what many interviewees describe as 'the white mountain', which is visible from Qawra.

268. For dust pollution from developments, see above point on noise pollution.

The experience of the landfill operation

269. Apart from grievances already mentioned above where specified, residents of the three localities who lived there prior to the closure of the old Magħtab landfill have experienced foul smells, debris and fumes when the landfill caught fire. This still occurs on occasion today and when the wind prevails towards their localities, they still experience these problems, though less accentuated than before.

270. Other negative experiences include rats, especially right after the closure of the old landfill, flies and very small flying insects that most interviewees called "midges" (though this may be the wrong term for this particular insect).

271. Most interviewees were worried about health issues, which were perceived to be caused by the landfill operation over the years, including allergies, watery eyes, asthma and rashes, including dust induced skin problems.

272. For residents of Qawra living on the waterfront and for other residents of the two other localities who can see the landfill from their houses, the experience of the change of the visual landscape was negative. Apart from the loss of what they considered to be a visually appeasing landscape before the landfill became visible, they were also worried of the effect this would have on the price of their property.

Visitors: Power walkers and sports people

273. As mentioned in earlier sections, there are a number of people, some residents and some from other localities, including neighbouring localities and for the most part, excluding Magħtab hamlet, that go walking in the early morning in the countryside near Baħar ic-Ċagħaq. A number of people were also observed walking, alone or with their dogs, along the shoreline opposite Salina Hotel. A lot of people, mostly residents from the area and other areas of Qawra and Bugibba also go walking on the waterfront of Qawra.

274. The above and other sports-people, have an increasing concern about pollution and safety. While people in the countryside have less concerns about pollution caused by traffic and as mentioned in earlier sections, problems concerned with the landfill (out of site out of mind) and perceive the air quality to be better than in other areas, those walking on the Qawra sea front and Salina shoreline are more concerned with the increase in traffic and the pollution that is caused by vehicular fumes. This is compounded by lack of safety because of the increase in traffic, especially in the early morning when vans and trucks are servicing hotels in the area, creating noise and fumes. Another concern for early morning Qawra users is the increase in development with the ancillary operations of trucks passing through, creating dust and more fumes. The attitude of 'out of site, out of mind' though, was also observed with people walking in the evenings, when construction work would have stopped for the day and no trucks would be passing by at the time. This issue is similar for the landfill operation on the other side of the bay. In the morning, those interviewed would mention the dust produced by the landfill, usually pointing to it if it were a particularly windy day. During the evenings, unless prompted by the researcher when asked why the study was being done, none of those interviewed mentioned the dust from the landfill unless they lived in Qawra and were aware of these problems.

275. People who use the area are aware of these changes and the effects that they have on them. With an increased awareness in environmental pollution and safety issues, even if they might not do anything about it themselves on a personal level, they do expect others, especially the authorities, to do something about environmental degradation.

Visitors to family and friends

276. In all the four localities, family members and friends visit residents. At Magħtab, visiting family, especially for long-standing residents with the extended families is something that happens on Sundays, when families meet for Sunday lunch though this is not often since family members from other households do this more frequently than for outside family members to go and visit. For recently established residents, there is more interaction with friends coming in to visit and to then go out at neighbouring urban centres for a pizza or to the movies, since there is less interaction with other members of the locale. In winter more recently established residents do go for walks in the countryside with friends, maybe not close to the landfill site since many do not consider the surrounding countryside in the immediate vicinity of the landfill site as being safe, but along heritage walks and to the Victoria lines. Long-standing residents do not appreciate the surrounding countryside as much, since they perceive all the surrounding area it as having become too polluted and infested by vermin and stray dogs to be safe. Many, having been affected by the 'Magħtab stigma' for so long decline inviting friends over or to take them to the surrounding countryside further away from the landfill, since many are afflicted by memories of how the Magħtab landscape once was and how it has changed for the worse. This perception has been transmitted to friends and non-resident kin.

277. Residents of Qawra on the other hand receive visitors much more often. They go out for drinks, to the beach, for movies, for walks and so for. Family members from other localities visit family members who have summer houses at Qawra, especially

extended family members and married children go for Sunday lunch or for the evening on Saturdays. This is also the case for residents of Baħar ic-Ċagħaq, though from data collected, those residents with pools have friends over regularly for a day at the poolside but never go to the beach at Baħar ic-Ċagħaq or other neighbouring places. Since there are shorelines that are polluted, it is assumed that other neighbouring areas are also affected by the pollution and prefer staying in the comfort of their villas. This is less so for those who do not own pools and these do go with friends to the beaches such in Qawra or Xemxija.

Visitors: Tourists

278. As described earlier, due to the timing of the fieldwork, most of the tourists interviewed were those encountered in hotels and a number of IMTs in Qawra. No tourists were encountered 'on the streets' in Baħar ic-Ċagħaq and Salina, though a few tourists were encountered outside Baħar ic-Ċagħaq, near the recreational facilities. For this reason, experiences described here come from IMTs and OMTs.

279. In Qawra, the idea of quaintness and the social environment, together with the amenities and services offered by the hotels was particularly positive. IMTs in particular, who ventured to explore other localities and areas beyond the packaged holiday offered by the hotel noticed the amount of development going on and commented that some areas, particularly in Qawra were 'dirty', referring mostly to dust[29].

280. IMTs were more responsive towards construction sites and the socio-economic implications that on-going construction has on the development of the area. Their idea of a pleasant holiday does not simply mean sun, sea and general relaxation, but interaction with the social environment of the area. If the social tapestry changes, it is bound to affect their attitude towards the outcome of their holiday and their disposition to returning to the area. In fact, while a number of IMTs do rent cars, many prefer using the public transportation and had what they defined as 'interesting experiences' on the 'quaint yellow buses', though their comments varied on the service given. Those who were knowledgeable of the change in the transport system that was about to take place in Malta expressed disappointment for the departure of the yellow bus, which to them was an attractive addition that added colour and identity to the visual urban landscape.

281. Most tourists were unaware that there was a landfill close by (in all three localities), but were surprised that the landfill was situated so close to a touristic area. Once they were told about the operation though, they quickly blamed the landfill for the amount of dust and in some cases 'dirt' found in the area, where previously, they had blamed the dust and dirt to bad management of the infrastructure or to the construction activities found in the area.

282. Return clients, some of whom have been returning to Malta for over two decades are aware of the landfill and the problems it poses and on several occasions have asked

[29] It must be noted that the period when the fieldwork was undertaken in Qawra, the days were very windy, producing a lot of dust clouds. This perception of dirtiness and 'too much dust' might have been less pronounced had the days been less windy.

hotel management whether the Government has taken any action since the last time they were there on holiday. Some interviewees had some knowledge of the plans to rehabilitate the disused landfill and asked when that project was going to start. On the other hand they had little knowledge of the extent of the Waste Management Plan or that part of the plan included an MBT and an AD / manure plant.

283. Most of the tourists interviewed could not understand why a landfill was situated so close to a touristic area and return tourists who knew that the old Magħtab landfill had been closed, went one step further by stating that after the closure of that landfill the authorities should not have introduced another landfill, even if it was an engineered landfill and created much less inconvenience to the tourist area of Qawra, but should have stabilised the old landfill and in time rehabilitated it into a park.

284. A particular group of British tourists who were interviewed had had similar experiences in Britain. They live close to a landfill that was supposed to be decommissioned and instead a part of it was closed off and extended it to get a few more years out of the operation. When that was filled to capacity, the same thing was done again. The users of the area were infuriated and made a big fuss with the local and central governments especially because the operators were 'sneaky' about it, especially the second time they did it. The residents had been told that it would be landscaped but it is still not landscaped to date, even after its closure because of malpractice and lack of public consultation. The group were amused that the same thing was happening in Malta though not surprised[30]. It was interesting to note that these people still had an environmental conscience and stated that they still separated all their household refuse. A number of tourists living in larger cities in the UK such as London though were less environmentally conscious and stated that since they pay a high council tax, which also covers waste disposal, they do not separate their waste and leave it to the companies that make money out of their refuse.

Hotel workers and business owners / operators

285. The attitude of workers revolves around working in a comfortable environment, including arriving to work on time and going back home without being delayed by traffic jams. For those who live close to their workplace, traffic congestion and parking difficulties did not really mean much for them as workers but more as residents (see above). A number of interviewees mentioned that when traffic was congested, they preferred walking to work, which also served as exercise.

286. At Qawra, the hotels of the area generated business and work for a lot of people, many of whom lived either at Qawra or neighbouring localities. However, these workers, especially those resident in Qawra, also noted that that the large number of hotels found in the area has overloaded the area's infrastructure. Some of the recent changes to the infrastructure have not improved the situation, whilst others, such as

[30] This paragraph was inserted because this conversation and others with various other tourists added up to the conclusion that Malta has a bad reputation with tourists, especially European and more often than not British ones, when it comes to environmental matters. This should be an important consideration for the authorities since tourism is considered one of the most important industries of the nation.

the embellishment of the waterfront making it more visually appealing, are perceived to have increased the areas' economic viability.

287. Tourist-dependent business owners and operators were worried about the apparent decline in business in the area, blaming it on the area's faulty infrastructure[31]. The increase in developments in Qawra, attracting more people and traffic is causing more stress to an already suffering infrastructure. The only hotel present at Salina had other worries, rather than infrastructure. They were more worried of their proximity to a livestock farm, which was causing complaints from their clients relating to smells caused by the farm's activities. The hotel workers interviewed also confirmed the experience of foul smells both personally and from complaints made by the clientele.

The experience of the landfill operation by the tourist industry

288. Relevant to this study, the hotel closest to the landfill operation have been worried for a long time about the health implications of the landfill, especially the dioxins and the burning of gases. Secondly, the ancillary activities of the landfill, namely the waste disposal trucks that come and go to and from the landfill, many of which are not clean and have not been properly wheel washed when coming out of the landfill.

289. Hotels in Qawra had other concerns besides the ones in the previous paragraph. All the hoteliers commented about the proximity of the landfill to a high value tourist locality. They have all been hopeful, along the years that the operation would be decommissioned and the area embellished, since it is a cause of a number of problems for their clients and the hotels. They feel that the authorities are not giving too much importance to the tourism industry of the area and have similar attitudes to residents of Maġħtab towards the authorities about their declining faith in the system and having been short-changed by the authorities.

290. In previous years, prior to the closure of the old landfill, there used to be a lot of complaints and clients had to be relocated to other hotels when the landfill caught fire and when the wind prevailed towards Qawra and the stench and the dust were unbearable. These problems have decreased significantly since 2004 though the problem of dust still persists. Clients complain because they cannot open their windows and have to keep their air-conditioning on throughout their stay on windy days.

291. Hoteliers are also aware of the effect of the landfill operation on the visual amenity that their hotels can provide, given that clients on the 8th floor of their hotels have an

[31] Due to the propensity with which many interviewees mentioned the word "infrastructure," it was necessary to understand what they meant by the term. Infrastructure here means the public systems of the town, those services that are provided and maintained by the Local Council and the State, including road systems, transportation services and feasibility in the area, water supply and drainage disposal, and telecommunications. Therefore, for most interviewees, grievances such as an increase in traffic, parking problems, proper drainage disposal and dust and noise pollution form part of the infrastructure and should be managed and / or policed by the Local Council and / or the State. On the other hand, hoteliers included waste disposal, which does not fall under the purview of the local authorities and therefore is not policed, creating a lot of problems for the operators.

eye-level view of the landfill operation and the trucks transporting the waste on top of the landfill. This is of particular interest in connection to the proposed Scheme.

292. Other tourism dependent businesses (including domestic clients) felt that after the closure of the Maghtab landfill and the opening of the engineered landfill, there was a change for the better in the area, with less dust and debris, except on windy days and the foul smells became a rare experience.

Summary of Factors that Contribute to Lifestyle

293. It results, from the above, that the A of I is attractive to the members of each sociosphere because it allows each to follow a particular lifestyle and undertake activities of their choosing in the A of I. Changes in the social and physical environment over time changes lifestyle and the perceptions people have towards the locality where they live, work or play.

294. These are summarised in **Table 1**. It is noted that the same people may belong to various sociospheres and, because each sociosphere represents a grouping of values etc, not all people in a sociosphere necessarily hold exactly the same values.

Table 1: Lifestyle values and activities by sociosphere

PERCEIVED EFFECTS OF THE SCHEME

295. The investigations also sought to document the perceived effects of the proposed Scheme on the lifestyles and activities of interviewees. Perceived effects are necessarily based on past experience and / or conjecture, most having not lived near a recycling plant. Some compared the proposed Scheme with the experience they had (or secondary information, in other words, hearsay) of the sewage treatment plant at Marsascala, as already discussed in the section on past experience. Others still used direct experience of visits to the recycling plants at Marsascala, on invitation by the proponent.

296. Therefore, expectations of how the Scheme would affect a person's lifestyle depend greatly on how that person has interacted with the physical and social environment over time leading to the present. Perceived effects also depend on where within the A of I the individual lives, works or plays (taken from description of lifestyle in the TOR).

The implications that the experience of users of the Magħtab landfill operation had in formulating their general attitude and perceived impacts of the proposed Master Plan.

297. The experience of the waste management operation at Magħtab (i.e. both the pre-2004 landfill and the engineered Għallies and Żwejra landfills) is a very important factor when gauging the perceived effects of the proposed Scheme. This is because the operation at Magħtab has been a great part of many of the users' lives for a very long time, especially users of the surrounding areas of Magħtab hamlet. As has been described in the earlier sections, the waste management operations at Magħtab have influenced the lifestyles of users and their perceptions of their socio-physical environment over time.

298. It must also be understood that these perceptions also contain many questions and worries by the users. These are listed in this section with the knowledge that many of these questions will be addressed within the EIS. It is the professional opinion of the assessor, an environmental anthropologist specialising in stakeholder involvement, participation and information transfer, that most of these questions and negative perceptions could have been prevented before this stage in the planning process. These questions and negative perceptions are mostly the result of the lack of a strategy for information and knowledge dissemination and transfer from the part of the competent Authorities during the planning stages of the Waste Management Plan, the Rehabilitation of Magħtab and the connections between the various projects. This strategy would have addressed what the proposed interconnected Schemes meant for the users of the area, and more importantly, how these projects are put in perspective at micro, meso and macro levels. In other words, the implications of the various projects both for those in the immediate vicinity of the projects and more widely, for the nation and in relation to the EU directives that these plans are addressing. If this exercise has been done, it has not managed to reach the most sensitive receptors of these projects, given the data that has been collected for this report.

299. If the above were addressed, including timelines of the projects and the potential difficulties which may be encountered during the implementation of these projects, many of the perceived impacts of the project would have already been addressed, partially or in full.

300. The importance of the above statement is related to the fact that many of the sensitive receptors of this (and other related) projects have spent years with little or no information about both the projects and what they meant for the area they use. Furthermore, when they tried to access the desired information, they have been stonewalled or dismissed and they had to turn to legal council and the European Union for help. This has effectively made these users of the area feel marginalised by the planning system which is envisaged to continue changing the socio-environmental landscape where they live, work and/ or play. This has made these users very suspicious towards the authorities and the proponents of the project. It will be very difficult to gain trust of these users and the proposed project will encounter a lot of opposition from the more sensitive receptors, regardless of whether or not the positive socio-environmental impacts of the proposed Scheme prove to outweigh the negative impacts and therefore be beneficial for those sensitive receptors[32].

301. The length of the various phases of the Scheme together with the implications that the Scheme has in respect of the possible effects that will directly and indirectly involve the A of I, made it very difficult for interviewees to understand the project in its entirety. Many users, especially residents of Magħtab, expressed their disillusion by drawing from their experience of the old landfill, stating that they had waited for the closure of the Magħtab landfill for nearly three decades (in a number of instances) and when it finally was decommissioned, they were repaid for the years of inconvenience with yet another landfill, irrespective of whether the new one was engineered or not. By the time the whole area will be rehabilitated, as was promised to them by the Authorities[33], their lives would have already changed radically due to their physical aging. Some even considered the possibility that they would have already died by then. They further stated that their grandchildren might be lucky enough to enjoy a regenerated Magħtab and the park that had been promised to them. Some of these interviewees were not even senior citizens but adults in their thirties and forties with young or teenage children. Many residents perceived the proposed Scheme as more proof that the status quo will be maintained and the plan for Magħtab is to make it a permanent waste management plan, catering for the domestic waste of the whole nation.

[32] There are many examples in the literature on environmental sustainable development in regards to similar projects where lack of stakeholder involvement in such intricately large projects (among others) have resulted in the very costly lengthy mitigation processes with a lot of opposition from the sensitive receptors. On the other hand, it has also been shown that involving stakeholders during the early stages of a project, understanding their needs and concerns and including them during the early stages of the planning process have proven to be more expeditious and cost effective, not to mention arguments of 'democracy', equity and human rights. For further information on these issues see for example, Eckley, 2001; Cooke and Kothari (Eds.), 2001; Webler,1999.

[33] Interviewees were referring to plans to rehabilitate the old landfill into a national park with a golf course, education centre and other amenities, including hand gliding, according to interviewees. This was widely publicised by the Government during a site visit in 2003 where residents and other stakeholders were invited to the event.

302. Because of the lack of enforcement and monitoring they have witnessed along the years (discussed in previous sections), most believe that even though the project is partly funded by the EU, the same things will happen again and that the outcome of the proposed plans will be markedly different from what there is on paper, irrespective how good the proposed plans seem to be at conceptual level.

303. These feelings and perceptions are not only shared by the users closest to the landfill but also by most other users within the A of I. Therefore it is not a simple case of NIMBY (not in my back yard) syndrome, where users are saying no to the project because it is close to them. After all, most users have experienced first hand the effects of the landfill operation and fear that the proposed plans will be more of the same.

304. As with many such large development projects, there can be large benefits on a national scale and also for the localities discussed in this report, especially in the long run, but very detrimental and negative effects for small groups and particular individuals, especially within the A of I in particular those users (residents, part-time farmers, land owners etc) closest to the Site.

305. Effectively, many users (including a number of Magħtab residents) do understand the need for such a waste management plan, especially as a small island state. After the initial emotional outburst of having experienced the anguish of the landfill operation, a number of interviewees (including users close to the proposal site) did state that logically, it does make sense that such a project would be envisaged to be sited there, given that there already are a disused landfill and a number of engineered landfills. There were different opinions, perceptions and attitudes to whether or not there should be one recycling plant or two, the siting of these pants and most could not understand the need for having a manure plant as part of the AD plant.

306. Most residents though did not want to endure more grievances because of lack of enforcement and monitoring, especially of the ancillary operations, in other words, the vehicles taking the waste to the recycling plants and the landfills. This is based on their experience of the ancillary operations of the engineered landfill, where the heavy vehicles continued to pass through residential roads, even though it was illegal to do so. Therefore, it is foreseen that as long as the entrance of the site remains where it is, the trucks will continue to pass from those roads, both during the construction phase and once the recycling plants are in operation, unless there is proper and continued enforcement and such irregularities are curbed.

307. What this means is that the significance of the perceived impacts depend largely on these perceptions and to whether or not enforcement and monitoring is performed. This is compounded by a general lack of faith that the authorities and the project proponents will not honour such mitigation and monitoring agreements, or if they do, it is perceived as being temporary, as with various initiatives that these users have experienced in the past.

308. *For these reasons, the author of this report believes that it is important that further analysis be undertaken during the length of the project and its different phases of implementation, to monitor social change and gauge predicted impacts in the present SIA to the actual impacts sustained during the progress of the different phases of the Scheme, together with 'parallel'*

transfer of information and stakeholder involvement, in order to re-evaluate mitigation and monitoring strategies.

The general attitude towards the proposed Master Plan and the most commonly perceived Impacts

309. For the reasons mentioned above the general attitude toward the Master Plan was not negative only if it meant a drastic improvement of the current waste management operation and more importantly, a sizeable step forward towards the rehabilitation of the landfill site (not just those delineated by the perimeter of the proposed Master Plan) and of the Magħtab region in particular.

310. As previously mentioned, positive effects of the Master Plan and the significance of negative effects largely depended on whether or not enforcement and monitoring were taken seriously by the authorities and the project proponents. Once that was made abundantly clear by the interviewee, many became rather ambivalent towards the Master Plan with individuals mentioning both positive and negative effects, effects not necessarily connected to their sociosphere. The magnitude of the Scheme also meant that factors such as transport and traffic, infrastructural aspects related to the Master Plan, different aspects of the two plants, especially the AD / manure treatment plant were seen as positive by some, and negative by others, even within the same sociosphere or group of users within the A of I.

311. Another important point is that perceived effects were mentioned more or less by various individuals from the same group of people (such as residents) of all four localities within the A of I. For this reason, the effects were grouped by sociospheres or users, rather than further sub-divided by locality, and where pertinent the locality that was most effected was highlighted. A number of perceived effects were shared by most users except for one or two particular groups. In such cases, these potential effects were also placed in this section and the groups that did not perceive themselves as being sensitive receptors were highlighted.

312. The main worries that were generally felt by the users of the A of I are listed below. It should be noted that points and the information therein can be inter-related and have only been separated for clarity. The first four have been discussed earlier in this section and are only mentioned below to have a comprehensive and full list:

- Accountability and trust in the Authorities;
    - Magħtab becoming a permanent waste management solution for the whole of Malta
    - Creating a precedent for further industrial development
    - Promises will not be kept & therefore No constant enforcement and monitoring (apart from first time tourists)
    - Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National)
    - The time Frames for the whole master plan is too lengthy, rehabilitation of Magħtab too long

- Fear of potential cumulative negative impacts which are currently unknown, of related projects at the Waste Management Site

- Perceived effects directly associated with the Construction and Implementation of various elements of the Master Plan
  - Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants
    - Fear of potential Health and Safety / risks of the hazardous waste cell
    - Fear of lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion
    - Preoccupation of other health and safety issues regarding AD / manure plant, effecting their peace of mind (apart from first time and a number of returning tourists, and employees of hotels)
    - Heath and safety issues caused by lack of enforcement of, or the improper use of the Wheel Wash, for the ancillary operation of the WS / AD/ Manure Plants.
    - Potential increase in vermin (notably rats and flies) because of the recycling plants and the landfill operation. This, of course affects quality of life. The most sensitive receptors were residents of Magħtab and Baħar ic-Ċagħaq, followed by those of Salini; the hotel employees at Salini, farmers, mostly those with fields in proximity of the site; livestock farmers at Magħtab; recreational businesses and their clientele at Magħtab. Tourists in general were not worried and so did the hotel industry and other users of Qawra.
  - Effects on Quality of Life:
    - An improvement in (positive impact) or an increase in stress (negative Impact) on the present infrastructure
    - Increase in and other Traffic related problems caused by the construction phase
    - Increase in Dust due to the construction phase
    - Noise pollution during the construction phase of the project
    - Further degradation of surrounding 'countryside' and pollution of Sea during construction phase
    - Negative Visual impact of the project, during both the construction and implementation phases
    - Potential loss of visual amenity if one or both of the recycling plants are visible
    - Loss of agricultural land as visual and landscape amenity
    - Loss of agricultural land implied as a decrease in quality of life and intangible heritage

- The potential damage to the remaining megalithic ruins (loss of tangible & intangible cultural heritage)
- Loss of peacefulness (quiet environment due to construction phase)-- Except for a number of Qawra users and First time tourists (who would not know how the area was before)

o Economic Implications on Tourism: Depending on various factors mentioned above, including visual impact (whether or not the bund will be successful in decreasing the visibility of the construction phase, the recycling plants and the landfill operation); smells; noise; safety and risk hazards; an improvement or more stress on the present infrastructure; and the potential further degradation, or conversely, an improvement of the physical environment; the WMS could potentially either increase or decrease tourism.

313. The impacts that were most widely perceived by most users of the A of I were as follow:

1. Magħtab becoming a permanent Waste management Solution for the whole of Malta (discussed above);

2. The time Frames for the whole master plan is too lengthy, rehabilitation of Magħtab too long (discussed above);

3. Promises will not be kept & therefore no constant enforcement and monitoring (apart from first time tourists, even though those who were familiar with Malta's socio-political realities or had had similar experiences in their own countries mentioned this, including returning tourists) – Also discussed above[34];

4. Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National):
Interviewees, especially residents of Magħtab and including those of Salini and Qawra, stated that they felt marginalized from the decision-making processes both at present and eventually during the construction and implementation of the Scheme. While residents of Baħar ic-Ċagħaq felt that the administrative committee has done a lot and have a lot of confidence in what they are doing, it was ironic that the Local Councils, which were not made participant during the planning stages of the Magħtab Environmental Complex Master Plan and related projects, also felt this feeling of marginalisation. Even though members of the Local Councils had been invited to go for a guided visit of the recycling plants operating at M'Scala, they still did not have a clear picture of what the Master Plan entailed and they did not have an updated version of the PDS. They were not given information on the current plans during the visit and were told to discuss their issues with the EIA team and later, they would have the chance to voice the issues that worried them during the consultation period. These

[34] It must be stressed though that residents and other users of residential areas of Magħtab are more likely to be affected if there is lack of enforcement and monitoring of the ancillary operations, such as trucks passing through residential areas to enter the application site from the old landfill entrance found on Triq ir-Ramla.

incidents made them feel left out on an official and organizational level as representatives of their localities, and in Naxxar's case, they represent the three closest residential areas to the proposed Master Plan.

Being well represented by the Local Council means that the locality is represented officially at the highest level of social organisation, the government. This means that they are being given official status and considered an active community by the governing bodies. When this is not so, there is a feeling of helplessness, that whatever they do will not make the difference. This is the case within parts of the A of I pertaining to the three localities falling under the Naxxar Local Council. This is felt even more when the localities in question are at the periphery of what is considered as being Naxxar, something that all the residents feel that they cannot identify with, as previously described.

A number of users of the A of I also felt that success of the project depends solely on their marginalisation, being kept out of the loop such that the planning machine can continue turning unimpeded and plans can forge ahead. In other words, many feel they have to change their lifestyle, attitudes, and expectations in order to satisfy the interests and demands of an outsider, who after all is perpetuating what 'he' has been doing for over thirty years, sucking the life out of their landscape, with socio-physical effects that some have come to consider beyond repair.

In the case of Magħtab residents there also is the fear that there will be a further decrease in community values caused by social tensions within the various groups discussed earlier, because of the proposed plans (see relevant section below).

5. <u>An Increase in various types of traffic, during both the construction and implementation phases of the Master Plan</u>:
Because of the perceived probability that there would be a lack of enforcement / monitoring during the construction and implementation phases, users' perceptions were that there will be an increase in traffic and traffic related problems first caused by the construction phase and then because of the ancillary operations of the landfill / recycling plants, the vehicles going to and from the waste management operation, i.e. to the landfills and the recycling plants. This would increase dust, air pollution from dust and vehicle exhaust fumes; health and safety issues because of no or improper wheel washing; leaking of domestic waste and manure from sub-standard trucks, causing smells and dirt; accidents that might cause spillages, even substantial ones on roads or near residential areas…

The wheel wash was a sore spot for many users of Magħtab, Baħar ic-Ċagħaq and Salini, using experience as an baseline indicator. If the wheel wash were a normal practice, a lot of the dust, safety issues and other inconveniences would be reduced significantly (also see section on recommendations). It was also noted that even returning tourists were intrigued by the wheel wash. Both those who knew what a wheel wash was and those who needed an explanation usually asked whether presently it is being used since they considered most of the

garbage trucks they saw around the island as being filthy. They felt that if it is not being used regularly now, there will be a big chance that it will not be used in the future as well, during the operation of the proposed Scheme.

6. Health hazards caused by the recycling plants:
While the possibility of smells and other inconveniences caused by the WSP was there for users in proximity of the site, it was more the possibility of vermin that worried most users, especially residents and agricultural users. The manure plant was on the mind of most users, especially its ancillary operation (the trucks carrying the manure to the plant). Many could not understand why there was the need for a manure plant at the site at all.
The AD plant and the production of combustible gas that can produce electrical energy was another worry for many users, including those further away from the site, Qawra. Many worried about the risk of such a plant near a residential area and opposite a tourist locality. Their asked about the safety precautions that were envisaged to be put in place, especially in the case of an emergency or accident, some of whom called a disaster, especially if the gas chamber exploded.

7. The hazardous waste cell:
The hazardous waste cell was another health and safety issue mentioned frequently. Many users were unaware of the existence of one at the site and were quite shocked to here about it for the first time. Some didn't even register its existence while the proposed elements of the Master Plan were being described and only noticed while scrutinising the map details. While some were worried in a more general sense, those with more technical knowledge asked more targeted questions on the same level as the anaerobic fermenters (such as, how thick are the walls, how high; what materials are used; what types of hazardous waste are envisaged to be placed there? etc.). This was particularly true for official organisations and administrations (Residents' associations and Local Councils), feeling responsible towards their members and constituents. These also had members who had the technical expertise to ask targeted questions on various aspects of the project elements being proposed, not just the hazardous cell. Tourists were surprised that such an element was included in the Master Plan, being so close to the tourist locality and a hotel at Salini.

8. The loss of peacefulness:
The loss of peace and quiet was a recurrent theme with most users. In other words, the loss of a quiet environment due to the construction phase. The point that was crucial when discussing this point was that first there had to be enforcement of such things as trucks not being allowed to use residential roads. If this weren't the case, then any vestiges of peace and quiet in the area would disappear completely. Alternatively, if there was enforcement, there would still be a lack of peace and quiet because of the 'hum' of the construction site, but the significance would be much less and it would be relatively temporary, especially if the recycling plants had a tight construction phase schedule. Residents, both full-time and part-time of the three localities closest to the site were the most sensitive receptors, especially those living at Maġħtab. Those in Qawra said that they had enough construction sites around them already and besides, the proposed site is across the bay. It was interesting that returning

tourists though otherwise, in the sense that they would mind yet another development in the general area, even if it was across the bay, if they were visiting during the construction phase. First time tourists did not care much and said that they were only in the area for a very short time to be too bothered, especially OMTs who would have a very full schedule organised by the hotels taking them around the rest of the island during the day, when the construction site was active. Hotel workers, on the other hand were only worried when they were also residents of the area.

9. Loss of agricultural land as a negative impact on the quality of life and loss of visual and landscape value:
On seeing the plans overlaid with the present uses of the A of I, one of the first comments that most users had was for the loss of agricultural land to make way for the AD / Manure plant. Virtually all users who saw the map mentioned this as an irreversible and significant long-term negative effect of the proposed Scheme and most asked whether other alternatives had been considered. Reasons for this concern varied according to the interviewee in question. This obviously particularly alarmed farmers, firstly because they could empathise with those who were losing the fields they work (knowing that the fields were government property). Secondly, since the Master Plan is a long term Scheme, they were worried that some time in the future, it might be their turn to lose 'their' land, to which they have a particular attachment, as explained in previous sections.

   Residents and most other users felt that another piece of the area's agricultural heritage was being sliced off, fearing (going back to the first point) that the Environmental Complex will spill over to the limits of Salini and Baħar ic-Ċagħaq and virtually obliterating the undeveloped parts of Magħtab hamlet. They also felt that the loss of agricultural land was also a negative impact on the visual and landscape amenity of the area, especially if the recycling plant will be visible. Most wondered whether the bund would make a difference or not. The significance of the visual amenity hinged greatly on how large the trees will be when planted around the site and asked whether they will be enough to reduce the eye-sour that currently exists, referring to the landfills (both old and new), or would they have to wait for ten years until the trees matured, unless they died prematurely, as has happened in recent years?

   The loss of agricultural land was also associated with further degradation of what is considered countryside, even if many do not particularly use the area closest to the landfill site, unless they were farmers. One of the recurrent comments was that Malta is losing all its greenery. This, in a way is a sentiment that also falls under the visual amenity that the area offers, which from a number of viewpoints still looks very 'green' and rural. This leads to the next perceived effect that was mentioned by all users.

10. The construction of the Recycling plants would create a precedent for further industrial development:
This perceived effect is also related to other perceived effects, some already mentioned and others depending on the sensitive receptor (next section). Presently, the whole area of Magħtab has a predominantly rural aesthetic,

including the main uses of the area. There are a number of livestock farms and a number of stables that are relatively sizeable, but these are mostly focused in particular geographical areas of the area and in some way, with a few exceptions still maintain the rural aesthetic. It is feared that once the recycling plants are built, which have a sizeable footprint, will change the general 'feel' of the area, even if they will be found within the confines of a large landfill site. This will be more so if they are not properly hidden by the bund. Most sociospheres and users within the A of I feel that this will affect the landscape and visual value of the area; increase pollution and other related socio-environmental impacts associated with industrial zones.

For residents of Magħtab especially (but also for residents of Baħar ic-Ċagħaq and Salini), the fear is that these elements of the proposed Master Plan will create a precedent that might encourage further industrial development in the area, such as an industrial estate. This is perceived to have the potential to significantly decrease both the quality of life and the social texture of the area. In other words the social-economic transformation would be so great, which includes economic repercussions on property value, for example that residents could be potentially encouraged to move away from the area.

The Effects (positive and negative) of the proposed plans on tourism

314. Most users of the area understand the economic importance of tourism for the area. Their understanding is that the landfill site (old and new) does not help improve the touristic amenity of the area, especially Qawra. Therefore their perception of the proposed Master Plan in relation to tourism hinges on whether the project will help improve tourism or not. If the project is successful in improving the physical environment by producing clean energy, recycling waste, especially biological municipal waste so that more inert material ends up on the engineered landfill, while improving the landscape and visual amenities, especially if the recycling plants are hidden behind a treeline that gives the impression that they are not there, then they consider the project to be beneficial to tourism.

315. If on the other hand, as explained above, there is lack of enforcement and the project does not do what it states in the PDS, then they consider the project to be potentially harmful for tourism. Furthermore, the fact that the recycling plants aim at prolonging the life span of the engineered landfill automatically means that it will take even longer to rehabilitate the area into the much awaited park, which would finally improve the visual amenity of the area for tourists.

316. Hoteliers in Qawra are especially sensitive to the visual aspects of the landfill operation and the possibility that the plants may be visible from the higher floors of their hotels.

317. Hoteliers also worry about the health and safety issues involving the manure plant and the ancillary operation. They are worried that if the trucks are not properly washed and are up to standard, they may have very significant health and safety impacts, such as the risk of E-Coli infection from manure spillage onto the roads in front of their hotels, especially the closer their hotel is to the project site.

318. Other concerns had to do with the gases generated by the AD plant and the risk of explosion of carbon monoxide being discharged into the atmosphere in quantities enough to affect the hotel closest to the site. Other safety issues had to do with the risks that the hazardous waste cell might present.

319. Finally, envisaged impacts for both the construction and implementation phases of the proposed recycling plants were construction noise pollution; dust control; an increase in traffic and continued enforcement and monitoring during both the construction and implementation phases.

320. The concerns of particular sociospheres are summarised in the following paragraphs.

Additional perceived socio-economic impacts that influence the quality of life

321. Various users of the A of I (mentioned below where pertinent, but mostly residents of Magħtab and in some cases the neighbouring localities closest to application site) voiced a number of perceived additional impacts besides the ones already described. These impacts are mostly related to affects to the quality of the social make up of their locality or in the case of returning tourists, of the locality they choose to visit. In some cases they have already been given a mention while explaining other perceived impacts.

- Further decrease in Community Values within locality because of social tensions caused by project:

  In the case of Magħtab residents, especially those from Magħtab, this feeling of marginalisation has brought together a number of residents, forming the Magħtab Residents Association. As has already been discussed in the previous section on community values, while having an association organised by local residents may seem healthy in creating community cohesion, the social stratification of the locality has also created various tensions when dealing with the landfill problem, also causing some fragmentation. While the proposed plans may indeed create a newly found unity between the residents, many, on the other hand, fear that there will be further loss in community values caused by tensions between the various groups of residents.

- Social transformation and Degradation in local social tapestry

- Maladaptation to the Scheme (Not being able to adapt to the presence of the Scheme)

- Decrease in Population - people moving out of locality because of proposed project

- Depreciation of property because of project

  Related to the first point above, but also affected by various other perceived impacts described above, the changes brought about by the proposed plans may give way to social transformation, bringing with it a degradation in the local social tapestry. It should be pointed out that social transformation is a dynamic process

and will happen regardless of the proposed Master Plan. The important point here is whether the proposed Master Plan and related ancillary operations and other related projects will positively affect the social make up of the locality or not and whether this transformation happens in a way that decreases the enjoyment and lifestyle of the people inhabiting the area, leading to people opting to move away. A number of residents from both Magħtab and Baħar ic-Ċagħaq have already voiced their resolution to move if the project is given development consent. Some were actually putting their property on the private market, in the hope to receive a better price at present, since their perception of how the proposed Master Plan will affect the property market is negative. If such a trend occurs, social transformation is bound to happen due to the people who move in to replace the ones who left. This may have further decrease community values.

Those residents with fields declared that they would remain at the locality unless their fields are taken away from them, in which case, there would be nothing keeping them at the locality any longer. Young couples with children from all three localities also voiced their concerns about the proposed Master Plan. If they found that the envisaged negative impacts start becoming a reality, especially because of lack of enforcement and monitoring, they would seriously think of leaving the locality because they do not want their children to grow up in an unhealthy environment.

Returning tourists who have been returning to the locality for years would notice a change in the social tapestry. If they find it unpleasing, they might choose not to return to the locality[35].

- Social marginalisation (The prolongation of the stigma associated with proximity to the landfill)

  As has been described earlier, Magħtab has, for a long time, had the stigma of being a 'dump' since it is associated with the old landfill. Most of its residents and other users fear that the increased lifespan of the engineered landfills because of the recycling operation and further delays in the rehabilitation of the whole landfill area will effectively prolong the stigma the area has, especially if, as some fear, the Master Plan is a precursor for a permanent waste management solution for Malta. This was also voiced by residents of Baħar ic-Ċagħaq and Salini, in some cases with reference to their own locality and in others, referring to the Magħtab area in general.

- Fear of potential cumulative negative impacts of other projects not directly related to the proposed Scheme, especially health and safety / risk issues. A recurrent example given was the Electricity pipeline connecting Malta to the European mainland.

[35] Due to the already mentioned limitations during fieldwork, returning tourists were only encountered in Qawra. Making an anthropologically educated deduction, it is foreseen that returning tourists to localities such as Baħar ic-Ċagħaq and Salini would have similar views towards the change in the social make up of the localities and would react similarly.

Recommendations made by Users of the A of I

322. While discussing the proposed Master Plan with the various users of the A of I, based on their experience of the A of I, the landfill operation found at Maġħtab and their areas of expertise, users made their own suggestions and recommendations. Interviews were also conducted with official organisations, including but not limited to the Local Councils. A number of these recommendations have already been embedded within the text of this report.

323. These are briefly listed below for consideration during mitigation strategies formulated within the EIS.

- The Authorities should appoint representatives from the sensitive receptors (the stakeholders) as the internal watchdog for the project and are involved in the decision-making process;
- Timely information transfer and sharing of issues pertaining to this Scheme and other projects related to the Environmental Management Complex (EMC) – the stakeholders should be informed and educated on the various projects being planned or going on at the site and the linkages between projects;
- An educational package or programme is set up by Wasteserv to educate the public on waste management and recycling in particular;
- The EMC operators should have corporate economic liability towards the ancillary operations of the Waste Management Scheme. Heavy vehicles that are not up to standard should not be allowed to enter the facility and are fined on the spot. If the EMC operators do not enforce such requirements, then the operators become liable and will be fined.
- With the above, the operator should employ a warden (or pay the Local Council to be able to employ a warden) to enforce the law, such as heavy vehicles not passing from residential roads and the compulsory use of the wheel wash;
- The wheel wash is built in such a way that the whole truck is washed not just the wheels when leaving the EMC;
- The entrance gate that is currently used (from Triq ir-Ramla) has to be closed even before the construction phase. In other words, the perimeter road from the Coast Road should be the first step in the construction phase, together with the bund, so that the construction machinery etc. are immediately made invisible;
- New refuse that arrives at the site is immediately buried and not left for a whole day or more before it is moved, as is happening at the moment with the Gozo refuse;
- The bund, which should be made up of trees that are high enough to camouflage the construction site and later the plants, should surrounds the whole landfill not just the project perimeter, to reduce the visual impact of the WHOLE landfill not just the project site;

- If the project goes through, MEPA should impose planning gain that goes directly towards the improvement of the locality and the residents of the area. This is not, for example, the resurfacing of the road, which is in the competence of Central Government, but other socio-environmental issues such as cleaning and refurbishing the area (such as planting trees along roads) and monitoring the environmental situation very closely;

- As part of the mitigation strategy and the planning gain mentioned above (including Wasteserv's corporate responsibility, it is suggested that Wasteserv, together with the Residents' Associations and the Local Councils team up and apply for EU funds for a project that would improve the image of the locale and involve the residents of the locality, to improve community values. The project should involve the community from planning to execution of the project, not just inform.

- On monitoring the environmental situation, it is suggested that the recycling plants should have an online monitoring system that can be scrutinised by the public. Air monitoring should be done frequently and from various distances, especially in the residential parts of the localities closest to the EMC and the results published quarterly online;

- SMEs should be involved and encouraged to get involved in small, targeted recycling operations, to reduce the burden on one recycling operator for the whole of Malta;

- To decrease the amount of traffic carrying waste to the EMC, waste could be brought in by barge;

324. The perceived impacts of the Scheme are summarised below (See **Table 2**). *It should be noted that the table does not indicate the significance of the impact and its effect together with the duration of the impacts (whether short term or long term). These can be found in the summary chapter of the EIA.*

Table 2: Impacts that are perceived to affect the enjoyment of lifestyles and activities

BIBLIOGRAPHY

Albrow, M. (1997) *Travelling Beyond Local Cultures: Socioscapes in a Global City* in "Living The Global City: Globalisation as Local Process" Ed. Eade, J., Routledge 1997

Boissevain, J. (2007) (latest edition) Hal Kirkop: A village in Malta. Midsea Books Ltd: Malta.

Cohen, A.P (1998) *The Symbolic Construction of Community,* Routledge

Cohen, N. (1999) *Urban Conservation*, Cambridge Massachusetts: The MIT Press.

(1974) *"Who is a tourist?"* in Social Review 22: 527- 555 Commission for Architecture and the Built environment (Cabe) and English

Goldman, L (Ed.) (2000) Social Impact Analysis, An Applied Anthropology Manual

Ingold, T. (2002) *The perception of the Environment: Essays in livelihood, dwelling and skill*, London and New York: Routledge

Lefebvre, H. (2001) *The production of Space*, Translated by Donald Nicholson-Smith, Blackwell

Low, S.M & Lawrence- Zuniga, D (Eds.) (2003) *The anthropology of space and place: locating culture*, Blackwell Publishing

Smith, V. (1989) *Hosts and Guests,* University of Pennsylvania Press

Vella, S. (2005); EPS: PA 4591/00, Malta Environmental and Planning Authority

Lifestyle Values and Activities	Type of User within the A of I [1]										
	Permanent Residents (Long-standing)				**Permanent Residents (More recently established)**				**Seasonal Residents**		
	Maghtab	Bahar ic-Caghaq	Salini	Qawra	Maghtab	Bahar ic-Caghaq	Salini	Qawra	Bahar ic-Caghaq	Salini	Qawra
Family ties / obligations (including proximity to kin)	✓✓	✓	✓	✓ NR	✓ [2] NR	✓ NR	NR	✓ NR	NR / A / ✓ ✗	NR / A / ✓ ✗	NR / A / ✓ ✗
Ties to the land	✓✓	✓	✓	✓ NR	✓	✓ NR	✓ NR	NR	NR	NR	NR
Economically viable property or rent or family land available for construction of family home / family house available	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reduction in economic viability of their property (in general)	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Different Environment to where they lived	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The locality considered "quaint"	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The locality not having a "quaint" feel to it any longer	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Privacy & Anonymity	✓ ✗	✓	✓	✓	✓ ✗	✓	✓	✓	✓✓	✓✓	✓✓
Quiet / personal time	✓✗	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓
A place to relax	✓✓	✓✓	✓	✓✓	✓	✓	✓	✓	✓✓	✓✓	✓✓
Locality considered a "refuge"	✓	✓	✓	✓✓	✓ NR	✓ A	✓	✓	✓✓	✓✓	✓✓
The locality stopped being considered a "refuge" over time	✗	✗✗	✗✗	✗✗	✗	✗	✗	✗	✗ A	✗	✗ A
Lack of Quiet personal time / relaxation due to increase in population / activities [3]	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
A socially safe environment	✓	✓	✓	✓	✓	✓	✗ ✓ A / NR [4]	✓	✓	✓	✓
The social environment became unsafe over time	NR	✗	✗✗	✗	NR	NR / ✗	✗ ✓ A / NR [5]	NR ✗	✗	✗✗	NR
A quieter social environment when compared to other similar localities	NR	✓	✓	✓✓	NR / ✓	✓	✓ A	✓	✓	✓	✓
A quieter social environment but still close to urban centres	✓	✓	✓	NR	✓✓	✓✓	✓	NR	✓	✓	NR
An increase in social activities compared to when they first moved	✗	✗ A	✗✗	✗✗	✗	✗	✗✗	✗✗	✗	✗✗	✗
A good public [6]	✗✗✓	✗✗✓	✗✓	✓✓✗	✗✗✓	✗✓	✗✓	✓✓✗	✓✓	✓✗A	✓
A change in type of public over time (for better (✓) or for worse (✗) ? If answer is (✓✗), the situation has improved but there still are grievances.	✓✗	✓✗	✓✗	✓✓✗	✓✗	✗	✗	✗ A	✗ A	✗	✓
Experience of development / Increase in population [7]	✗	✗	✗✗	✗	✗	✗✗	✗✗	✗	✗	✗✗	✗
Amenities such as ATMs, supermarkets, post office	✗✗	✗	✗✗	NR / A	✗✗	✗	✗✗	NR	✗✓	✗✗	NR
Increase in traffic and circulation	✗✗	✗✗	✗✗	✗ A	✗✗	✗	✗	✗✗	✗	✗	✗✗
Parking problems	✗	✓	✓	✓	✗ A	✗✗	✗✗	✗✗	✗ NR	✗	✗✗
Good public transport facilities	✗✗	✗✓	✗	✓✓	✗✗	✗✓	✗	✓✓	✓ A	✗	✓✓

Proximity (and access) to Heritage (archaeological sites)	✓✓	✓✓	✓	✗ A	✓✓	✓✓	✓✓	NR	✓ A	NR ✓	✓ A
Proximity to the seashore	✓	✓	✓	✓	✓ A	✓✓	✓✓	✓✓	✓	✓	✓
Proximity to the countryside	✓✓	✓✓	✓✓	A / ✓	✓	✓✓	✓	A	✓✓	✓	NR ✓
Access to countryside	✓✓	✓✓	✓✓	A / ✓	✓✓	✓✓	✓	A	✓✓	✓	NR ✓
Quiet physical environment (void of traffic, noise etc)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decrease in the quiet physical environment due to increase in traffic, noise pollution etc.	✗✗	✗	✗	✗✗	✗✗	✗	✗	✗	✗	✗	✗
Less pollution esp. air quality in comparison to other places	✓	✓✓	✓✓	✓	✓ A	✓	✓	✓	✓✓	✓	✓
An increase in air pollution over time	✗✗	✗	✗	✗	✗✗	✗	✗	✗	✗✗	✗✗	✗
An increase in sea pollution over time	✗	✗✗	✗✗	✗	✗	✗✗	✗✗	✗	✗✗	✗✗	✗
The place considered 'dirty'	✗✗	✗ A	✗	✗	✗✗	✗ A	✗	✗	✗ NR	✗	✗
Good views / visual space	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓	✓✓
Visual impact of development	✓	✓	✓	✓	✗	✗	✗	✗	✗✗	✗✗	✗
Loss of visual space	✗✗	✗✗	✗	✗	✗✗	✗✗	✗	✗ A	✗✗	✗✗	✗
The landfill operation: Loss in tangible / intangible Heritage	✗✗	✗✗	✗	✗ A	✗	✗	✗	✗ A	✗	✗	✗
The landfill operation: Bad or foul odours	✗✗	✗✗	✗	✗	✗✗	✗✗	✗	✗	✗✗	✗✗	✗
The landfill operation: a decrease in bad odours after closure of Maghtab landfill	✓	✓	✓	✓	✓	✓	✓	✓✓	✓	✓	✓
The landfill operation: A change in views (visual impact over time because of landfill growing)	✗✗	✗✗	✗	✗✗	✗✗	✗✗	✗	✗✗	✗✗	✗	✗✗
The landfill operation: A marked change in the physical landscape	✗✗	✗	✗	✗	✗✗	✗	✗	✗ A	✗	✗	✗
The landfill operation: large rats and stray dogs	✗✗	✗	✗	NR	✗✗	✗	✗	NR	✗✗	✗✗	NR
The landfill operation: a decrease in rats a number of months after the old Maghtab landfill closed down (first there was a an increase then after a number of months, a decrease in rats)	✓	✓	✓	NR	✓	✓	✓✗	NR	✓✓	✓✓	NR
The landfill operation: flies and midgees	✗✗	✗✗	✗✗	✗	✗✗	✗	✗	✗	✗✗	✗✗	✗ A
The landfill operation: an increase in pollution attributed primarily to the landfill (apart from other factors)	✗✗	✗	✗	✗	✗✗	✗✗	✗	✗	✗✗	✗✗	✗
The landfill operation: Dust pollution	✗✗	✗	✗	✗	✗✗	✗✗	✗	✗	✗✗	✗✗	✗
The landfill operation: The perception of a decline of physical health, including skin and respitory conditions	✗✗	✗	✗	✗	✗✗	✗	✗	✗	✗ ?	✗ ?	✗ ?
The landfill operation: Increase in traffic because of ancillary operations	✗✗	✗	A ✗	A ✗	✗✗	✗	✗	NR ✗	✗ A	✗ A ?	NR
The landfill operation: Decrease in the quiet physical environment specifically due to landfill ancillary operations (increase in traffic, noise pollution etc.)	✗✗	✗	A ✗	A / NR	✗✗	✗	✗	NR	✗A	✗A	A ✗

Lifestyle Values and Activities	Type of User within the A of I [1]									
	Agriculture within A of I		**Businesses including livestock farmers & equistrian facilities**				**Visitors (Recreation, Sports & Business Clientele, visitors to friends and family)**			
	Magħtab	Salini	Maghtab	Bahar ic-Caghaq	Salini	Qawra	Maghtab	Baħar ic-Cagħaq	Salini	Qawra
Family ties / obligations (including proximity to kin)	✓✓ ✗	✓✓ ✗	✓ NR	✓ NR	✓ NR	✓ NR	✓ NR	✓ NR	✓ NR	✓ NR
Ties to the land	✓✓ ✗	✓✓✗	✓ NR	✓ NR	✓ NR	✓ NR	NR	NR	NR	NR
Economically viable property or rent or family land available for construction of family home / family house available	✓✓✗	✓✓✗	✓ NR	NR	NR	NR	NR	NR	NR	NR
Reduction in economic viability of their property (in general)	NR	NR	✗	✗	✗	✗	NR	NR	NR	NR
Different Environment to where they lived	✓✓ NR	✓✓ NR	✓ NR	✓ NR	✓ NR	✓NR	✓	✓	✓	✓✓
The locality considered "quaint"	NR	NR	✓ NR	✓	✓ NR ?	✓	NR	NR	NR	✓✓
The locality not having a "quaint" feel to it any longer	NR	NR	✓ NR	✗ NR	✗ NR	✗	NR	NR	NR	NR / A
Privacy & Anonymity	✓ NR	✓ NR	NR	NR	NR	NR	✓ NR	✓ NR	✓ NE	✓ NR
Quiet / personal time	✓✓	✓✓	NR	NR	NR	NR	✓	✓	✓	✓
A place to relax	✓✓	✓✓	NR ✓	NR ✓	NR ✓	NR	✓	✓	✓	✓
Locality considered a "refuge"	✓✓	✓✓	NR	NR	NR	NR	✓	NR	NR ?	NR ✓
The locality stopped being considered a "refuge" over time	✗ A	✗ A	NR	NR	NR	NR	A	NR	NR ?	NR ✗
Lack of Quiet personal time / relaxation due to increase in population / activities [3]	✗	✗	NR	NR	NR	NR	NR	NR	NR ?	NR
A socially safe environment	✓	✓	✓	✓	✓	✓	✓	✓	✓✗	✓✓
The social environment became unsafe over time	A	A	NR	NR	✗ ?	NR	NR	NR	✗	NR
A quieter social environment when compared to other similar localities	✓	✓	✓ NR	✓ NR	✓ NR	NR [8]	✓	✓	✗✓A ?	✓
A quieter social environment but still close to urban centres	✓	✓	NR ✓	NR ✓	NR ✓	NR	✓	✓	✓	NR
An increase in social activities compared to when they first moved	✓	✓	NR	✓	✓	✓	A	✗✓	✗✗ ?	✓ ✗ A
A good public [6]	✗	✗	✗✓	✓✗	✓✗	✓✓	✗	✓	✗✓ ?	✓✓
A change in type of public over time (for better (✓) or for worse (✗) ? If answer is (✓ ✗), the situation has improved but there still are grievances.	✓✗	✓✗	✓✗	✓✗	✗	✓	✓✗	✓✗	✗	✓
Experience of development / Increase in population [7]	✗	✗	✗	✗	✗	✗	✗	✗✓	✗	✓✗✗
Amenities such as ATMs, supermarkets, post office	✗	✗	✗	✗	✗	✓	✗	✗	✗✗	✓✓
Increase in traffic and circulation	✗✗	✗✗	✗✗	✗	✗	✓	✗✗	✗	✗	✗✗
Parking problems	NR	NR	NR	✗	NR ?	✗	NR	✗	✗	✗✗
Good public transport facilities	NR	NR	✗ NR	✓	✗	✓	✗ NR	✓	✗	✓✓
Proximity (and access) to Heritage (archaeological sites)	NR	NR	NR	NR	NR	NR	✓✓ NR	✓✓ NR	✓ NR	✓ NR
Proximity to the seashore	NR	✓	NR ✓	✓	✓	✓✓	✓ NR	✓ NR	✓ NR ?	✓✓

Proximity to the countryside	✓	✓	✓	NR	NR	NR	✓ ✗ A	✓	✓	A
Access to countryside	✓	✓	✓	NR	NR	NR	✓ ✗ A	✓ ✓	✓	A
Quiet physical environment (void of traffic, noise etc)	✗ ✓	✗ ✓	✓	NR	NR	NR	✓	✓ ✓	✓	✓ [9]
Decrease in the quiet physical environment due to increase in traffic, noise pollution etc.	✗	✗	✗	NR	NR	NR	✗ ✗	✗ ✗	✗	✗ ✗
Less pollution esp. air quality in comparison to other places	✗ ✗	✗ ✓	✓	✓	✓	✓	NR	✓ ✓	✓	✓
An increase in air pollution over time	✗ ✗	✗ ✗	✗ ✗	✗	✗	✗	✗ ✗	✗	✗	✗
An increase in sea pollution over time	✗	✗	✗ NR	✗	✗	✗ ✗	✗ ✗	✗ ✗	✗ ✗	✗
The place considered 'dirty'	✗ ✗	✗ ✗	✗ ✗	✗	✗	✗ ✗	✗ ✗	NR	✗	NR / A
Good views / visual space	✓	✓	✓	✓	✓	✓ ✓	✓	✓ ✓	✓	✓ ✓
Visual impact of development	✗	✗	✗	✗	✗	✗ ✗	✗ ✗	✗	✗ ✗	✗ ✗
Loss of visual space	✗	✗	✗	NR	✗	NR	✗ ✗	✗	NR ✗ ?	NR
The landfill operation: Loss in tangible / intangible Heritage	✗	✗	✗ ✗	✗	✗	NR	✗	✗	NR ✗ ?	A NR
The landfill operation: Bad or foul odours	✗	✗	✗ ✗	✗ ✗	✗ ✗	✗	✗ ✗	✗	✗	✗
The landfill operation: a decrease in bad odours after closure of Maghtab landfill	✓ ✗	✓	✓	✓	✓ ✓	✓ ✓	✓	✓	✓	✓ ✓
The landfill operation: A change in views (visual impact over time because of landfill growing)	✗	✗ NR	✗	✗	✗	✗ ✗	✗ ✗	✗	✗	✗ ✗
The landfill operation: A marked change in the physical landscape	✗ ✗	✗ NR	✗ ✗	✗	✗	✗ ✗	✗ ✗	✗	✗	✗
The landfill operation: large rats and stray dogs	✗ ✗	✗	✗ ✗	✗	✗	NR	✗ ✗	✗	✗	NR
The landfill operation: a decrease in rats a number of months after the old Maghtab landfill closed down (first there was a an increase then after a number of months, a decrease in rats)	✓	✓	✓ ✗	✓ ✗	✓ ✗	NR	A NR	✓ NR	✓ NR	NR
The landfill operation: flies and midgees	✗ ✗	✗	✗ ✗	✗ ✗	✗ ✗	✗	✗ ✗	✗ A	✗ A ?	✗ NR
The landfill operation: an increase in pollution attributed primarily to the landfill (apart from other factors)	✗ ✗	✗	✗ ✗	✗ ✗	✗	✗	✗ ✗	✗ A	✗ ?	✗ ✗
The landfill operation: Dust pollution	✗ ✗	✗	✗ ✗	✗	✗	✗ ✗	✗ ✗	✗	✗	✗ ✗
The landfill operation: The perception of a decline of physical health, including skin and respitory conditions	✗ ✗	✗	✗ ✗	✗	A	A	NR ✗ ✗	NR / A	NR ?	NR / A
The landfill operation: Increase in traffic because of ancillary operations	✗ ✗	✗	✗ ✗	✗	✗	NR	✗ ✗	✗	✗	NR
The landfill operation: Decrease in the quiet physical environment specifically due to landfill ancillary operations (increase in traffic, noise pollution etc.)	✗	✗	✗ ✗	✗	✗	NR	✗	NR / A	NR ?	NR

Lifestyle Values and Activities	Type of User within the A of I [1]							
	The Tourism Industry (Both first time & returning OMTs also reflect worries by Hoteliers who have such							
	Tourists (OMTs & IMTs)			**Returning Tourists**			Hotel employees	
	Qawra	Salini	Bażar ic-Cagħaq	Qawra	Salini	Bażar ic-Cagħaq	Salini	Qawra
Family ties / obligations (including proximity to kin)	NR	NR	NR	NR	NR	NR	NR	NR
Ties to the land	NR	NR	NR	NR	NR	NR	NR	NR
Economically viable property or rent or family land available for construction of family home / family house available	NR	NR	NR	NR	NR	NR	NR / ✓	NR / ✓
Reduction in economic viability of their property (in general)	NR	NR	NR	NR	NR	NR	NR / ✗	NR / ✗
Different Environment to where they lived	✓	✓	✓	✓	✓	✓	NR	NR
The locality considered "quaint"	✓	✓	✓	✓	✓	✓	NR	NR
The locality not having a "quaint" feel to it any longer	✗	✗	✗	✗	✗ ?	✗ ?	NR	NR
Privacy & Anonymity	✓	✓	✓	✓	✓	✓	NR	NR
Quiet / personal time	✓	✓	✓	✓	✓	✓	NR	NR
A place to relax	✓	✓	✓	✓	✓	✓	NR	NR
Locality considered a "refuge"	NR	NR	NR	✓	✓	✓	NR	NR
The locality stopped being considered a "refuge" over time	NR	NR	NR	✗	✗ ✗	✗	NR	NR
Lack of Quiet personal time / relaxation due to increase in population / activities [3]	NR	NR	NR	✗	✗	✗	NR	NR
A socially safe environment	✓✓	✗	✓	✓✓	✗	✓	✓	✓
The social environment became unsafe over time	NR	NR	NR	NR	✗ ✗	✗	NR	NR
A quieter social environment when compared to other similar localities	NR	NR	NR	✓	✓	✓	✓	✓
A quieter social environment but still close to urban centres	NR	✓	✓	NR	✓ ?	✓	NR	NR
An increase in social activities compared to when they first moved	NR	NR	NR	✓ ✗	✗ ?	✓ ✗ ?	✓ ✗	✓ ✗
A good public [6]	✓✓	✓ / NR [11]	✓ / NR	✓	✓	✓	✓	✓✓
A change in type of public over time (for better (✓) or for worse (✗) ? If answer is (✓ ✗), the situation has improved but there still are grievances.	NR	NR	NR	✓	✗ ?	NR	NR	NR / A
Experience of development / Increase in population [7]	NR	NR	NR	✗ ✗	✗ ?	✗ ?	✗	✗ ✗
Amenities such as ATMs, supermarkets, post office	✓✓	✗	✗	✔✔	✗	✗	NR / A	✓✓
Increase in traffic and circulation	NR ✗ ✗	NR / A ✗	NR / A ?	✗ ✗	✗	✗	✗	✗ ✗
Parking problems	NR ✗	NR / ✗	NR	✗ ✗	✗	✗	NR / ✗	✗ ✗
Good public transport facilities	NR / ✓✓	NR / ✗	NR / ✓	✓✓	✗	✓	✗	✓✓
Proximity (and access) to Heritage (archaeological sites)	OMTs: NO / IMTs: ✓	OMTs: NO / IMTs: ✓	OMTs: NO / IMTs: ✓ ?	✓	✓	✓	NR	NR
Proximity to the seashore	✓✓	✓	✓	✓✓	✓	✓	✓ / NR	✓ / NR

Proximity to the countryside	OMTs: NO / IMTs: ✓	NR	✓ ?	✓	✓	✓	NR	NR
Access to countryside	✓	NR	NR	NR / A	✓	✓	NR	NR
Quiet physical environment (void of traffic, noise etc)	NR	NR	NR	✓	✓	✓	✓	✓
Decrease in the quiet physical environment due to increase in traffic, noise pollution etc.	NR	NR	NR	✗ ✗	✗ ?	✗ ?	✗	✗
Less pollution esp. air quality in comparison to other places	✓	✓	✓	✓	✓	✓	✓ NR	✓ NR
An increase in air pollution over time	✗	✗	✗	✗ ✗	✗ ?	✗ ?	✗	✗
An increase in sea pollution over time	✗	✗	✗	✗ ✗	✗	✗	✗	✗
The place considered 'dirty'	✗	✗	✗	✗ ✗	✗	✗	A	A
Good views / visual space	✓	✓	✓	✓	✓	✓	✓	✓✓
Visual impact of development	✗	NR / A	NR / A	✗ ✗	✗ ✗	✗	✗ ✗	✗ ✗
Loss of visual space	NR ✗	NR / ✗	NR / ✗	✗	✗ ?	✗	✗	✗ ✗
The landfill operation: Loss in tangible / intangible Heritage	NR	NR	NR	NR	NR	NR	NR	NR
The landfill operation: Bad or foul odours	NR	NR	NR	✗ ✗	✗	✗	NR / A	✗ ✗
The landfill operation: a decrease in bad odours after closure of Maghtab landfill	NR	NR	NR	✓	✓	✓	✓	✓
The landfill operation: A change in views (visual impact over time because of landfill growing)	NR	NR	NR	✗ ?	✗ ?	✗ ?	✗	✗ ✗
The landfill operation: A marked change in the physical landscape	NR	NR	NR	✗	✗ ?	✗ ?	✗	✗ ✗
The landfill operation: large rats and stray dogs	NR	NR	NR	NR	NR	NR	NR	NR
The landfill operation: a decrease in rats a number of months after the old Maghtab landfill closed down (first there was a an increase then after a number of months, a decrease in rats)	NR	NR	NR	NR	NR	NR	✓	NR
The landfill operation: flies and midgees	NR A	NR ✗ A	NR ✗	✗	✗ ?	✗ ?	✗ ✗	NR / A
The landfill operation: an increase in pollution attributed primarily to the landfill (apart from other factors)	NR ✗	NR ✗	NR ✗ ?	✗	✗ ?	✗ ?	✗ ✗	✗
The landfill operation: Dust pollution	✗ ✗	✗	✗	✗	✗ ?	✗ ?	✗	✗ ✗
The landfill operation: The perception of a decline of physical health, including skin and respitory conditions	NR [10]	NR [10]	NR [10]	NR / A [10]	NR / A ? [10]	NR / A ? [10]	A ✗	A / NR
The landfill operation: Increase in traffic because of ancillary operations	NR	NR	NR	NR	✗ ?	NR	A / NR	NR
The landfill operation: Decrease in the quiet physical environment specifically due to landfill ancillary operations (increase in traffic, noise pollution etc.)	NR	NR	NR	✗ A	✗ ?	✗ ?	A ✗	NR

1 Groupings do not necessarily reflect Sociospheres

2 This depended on whether the more recently established resident either had an extended family living at Maghtab or the individual was married to the son or daughter of an extended family. There were other factors for deciding to stay at Maghtab though, including economic reasons such as not having to buy land since it was inherited.

3 This depends on what type of activities is being referredd to -- at Maghtab, increase in activities because of the landfill operation; at Bahar ic-Caghaq, increase due to population increase & also activities caused by some recreational activities; Salini, the increase in tourists negaitvely affected some, while others embraced it.

4 While some Salini residents felt that the area was not particularly safe environment, others thought that it didn't matter as long as they minded their own business and other people's privacy and anonymity. Others still didn't really care when they moved to the locality (hence the NR)

5 The status quo as above didn't change much over time, though they all agreed that the locality became more unsafe

6 Public here means people who are not from the locality or the area, in other words visitors. In the case of Maghtab, the public would include people over the years going to Maghtab to fly-tip. Therefore in the case of Maghtab, there are welcome visitors and those who are not welcome. In the case of Bahar ic-Caghaq and Salini, and to a lesser extent Qawra, there are the restaurant or bar goers who create noise and park in front of their houses / garages.

7 In the case of Maghtab, this also includes the indsutrialisation of a number of areas of Maghtab, which include the increase of garages (panel beaters and the such like) and the industrialisation of livestock farms and the increase of equestrian facilities in the area of Maghtab. For Bahar ic-Caghaq and Salini, development means buildings for various uses, especially apartment blocks.

8 Qawra is not a socially quiet area but for businesses it is actually good that it is a thriving socially diverse area because it brings business

9 This depends on the time of day, day of the week and season.

10 Visitors to the area and returning tourists, unless they visit regularly, as for example those who own horses or use other recreational facitilies regularly; or in the case of returning tourists, visit for a number of months yearly, would not have enough knowledge to attribute declining health to the landfill operation.

11 For tourists at the Salini hotlel, a good public also includes the hotel employees, who, according to all those interviewed, provide a commendable service

KEY

✓	: Positively interacts with sociosphere / group and lifestyle
✓✓	: Positive interaction is more prominent with sociosphere / group compared to other localities
✗	: Negatively interacts with sociosphere and detracts from lifestyle
✗✗	: Negative interaction is more prominent with sociosphere / group compared to other localities
✓✗	: Predominantly positive interaction with sociosphere / group & lifestyle but not everybody agrees
✗✓	: Predominantly negative interaction with sociosphere / group & lifestyle but not everybody agrees
NR	: Not relevant for sociosphere, no effect on sociosphere and lifestyle of individuals
A	: Group predominantly ambivalent, i.e. they are not sure whether the factor positively or negatively interacts with them
?	: Either not enough data collected for a representative sample or sociosphere so a "?" is placed next to educated gues from converging data of other similar groups

Grouped Impacts	Perceived Impacts of the project	Type of User within the A of I[1]						
		Permanent Residents (Maltese & Foreign)				**Seasonal Residents**		
		Maghtab	Bahar ic-Caghaq	Salini	Qawra	Bahar ic-Caghaq	Salini	Qawra
Accountability & trust in authorities	Magħtab becoming a PERMANENT Waste management Solution for the whole of Malta	✓✓	✓✓	✓	✓	✓	✓	✓
	Creating a precedent for further industrial development	✓✓	✓✓	✓	✓	✓	✓	✓
	Promises will not be kept & therefore No constant enforcement and monitoring (apart from first time tourists)	✓✓	✓✓	✓	✓	✓	✓	✓
	Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National)	✓✓	✗✓	✓	✓	✓	✓	✓
	The time Frames for the whole master plan is too lengthy, rehabilitation of Magħtab too long	✓✓	✓✓	✓✓	✓	✓	✓	✓
	Fear of potential cumulative negative impacts which are currently unknown, of related projects at the Waste Management Site, including the various mixed uses envisaged for the whole area.	✓✓	✓✓	✓	✓	✓	✓	✓
	Fear of potential cumulative negative impacts of other projects not directly related to the proposed Scheme, especially health and safety / risk issues. A recurrent example given was the Electricity pipeline connecting Malta to the European mainland.	✓✓	✓✓	✓	✓	✗	✗	✗
	Inconveniences caused by the ancillary operation of the WMS if there is no enforcement for the trucks not to pass from residential roads by still using the old entrance to the WMS.	✓✓	✗	✗	✗	✗	✗	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants	Fear of potential Health and Safety / risks of the hazardous waste cell	✓✓	✓✓	✓	✓	✓	✓	✓
	Fear of lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion	✓	✓	✓	✓	✓✓	✓	✓
	Preoccupation of other health and safety issues regarding AD / manure plant, effecting their peace of mind (apart from first time and a number of returning tourists, and employees of hotels)	✓✓	✓✓	✓	✓✗	✓	✓	✓✗

	Heath and safety issues caused by lack of enforcement of, or the improper use of the Wheel Wash, for the ancillary operation of the WS / AD/ Manure Plants.	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓
	Health hazards & other inconveniences caused by the WS plant (such as foul smells, dust or debris escaping from the plant)	✓✓	✓	✓	✗	✓	✓	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants. This also effects Quality of Life.	Potential increase in vermin (notably rats and flies) because of the recycling plants and the landfill operation.	✓✓	✓	✓	✗	✓	✓	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Ancillary operations of the Recycling Plants	Health hazards and other inconveniences caused by the ancillary operation of the WS plant, i.e. the vehicles carrying the unsorted waste to the plan (possibility of foul smells, increase in dust and fumes raised by the trucks; spillage of waste onto the streets because the trucks are not kept up to standard)	✓✓	✓	✓	✗	✓	✓	✗
	Health and safety issues that may be caused by the manure plant's ancillary operations (ex. Leaking vehicles carrying manure, accidents causing spillages, trucks not being up to standard and therefore leaking manure on the roads)	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓
	Possible smells caused by the manure plant's ancillary operation (the vehicles carrying the manure to the plant) -- apart from full and part-time farmers, unless they also were residents)	✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓
Effects on Quality of Life: Impacts on present infrastructure	More stress on present infrastructure during construction and implementation phases	✓✓	✓	✓	✗	✓	✓	✗
	Improvement of present infrustructure if Master Plan is Implemented successfully	✓	✓	✓	✗	✓	✓	✗
Effects on Quality of Life: Traffic	Increase in and other Traffic related problems caused by the ancillary operations of the landfill / recycling plants (such as an increase in air pollution from vehicle exhaust fumes)	✓✓	✓✓	✓✓	✓	✓	✓	✓
	Increase in and other Traffic related problems caused by the construction phase	✓✓	✓✓	✓	✓✗	✓	✓	✓
Effects on Quality of Life: Dust	Increase in Dust due to the construction phase	✓✓	✓✓	✓✓	✓	✓	✓	✓
Effects on Quality of Life: Noise	Noise pollution during the construction phase of the project	✓✓	✓	✓	✗	✓✗	✓✗	✗

Effects on Quality of Life: Environmental degradation	Further degradation of surrounding 'countryside' and pollution of Sea during construction phase	✓✓	✓✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Visual Impact	Negative Visual impact of the project, both the construction and implementation phases	✓✓	✓✓	✓	✓✓	✓	✓	✓
	Potential loss of visual amenity if one or both of the recycling plants are visible	✓✓	✓	✓✗	✓✓	✓	✓	✓
	Loss of agricultural land as visual and landscape value	✓✓	✓✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Tangible & Intangible Heritage	Loss of agricultural land implied as a decrease in quality of life and intangible heritage	✓✓	✓✓	✓✓	✓	✓	✓	✓✗
	The potential damage to the remaining megalithic ruins (loss of tangible & intangible cultural heritage)	✓✓	✓✓	✓	✗	✓	✓	?✓
Effects on Quality of Life: Loss of Peace and quiet	Loss of peacefulness (quiet environment due to construction phase)-- Except for a number of Qawra users and First time tourists (who would not know how the area was before)	✓✓	✓	✓	✗	✓✓	✓	✓
Effects on Quality of Life: Socio-economic Effects	Further decrease in Community Values within locality because of social tensions caused by project	✓✓	✓	?✓✗	?✓✗	✗	?✓✗	✗
	Social transformation	✓✓	?✓✗	?✓✗	?	✓	?✓✗	✗
	Degradation in local social tapestry	✓✓	?✓✗	?✓✗	?	✓✓	?✓✗	✗
	Decrease in Population - people moving out of locality because of proposed project	✓✓	✓✓	✓	✗✓	✓✓	✓	✓
	Social marginalisation (The prolongation of the stigma associated with proximity to the landfill)	✓✓	✓	✓	✗	✗	✗	✗
	Maladaptation to the Scheme (Not being able to adapt to the presence of the Scheme)	✓✓	✓	✓	✗	✗✓	✗✓	✗
	Depreciation of property because of project	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓

Economic implications TOURISM	The Perception that the WMS could potentially decrease tourism and tourism related industry within the A of I	✓	✓	✓✓	✓✓	✓	✓	✓✓
	Possibe increase of tourism if landfill / Scheme are less visible because of bund (Even though farmers were not directly effected by tourism, they still mentioned this)	? ✓	✓	✓	✓✓	✓	✓	✓

Grouped Impacts	Perceived Impacts of the project	Type of User within the A of I[1]					
		Agriculture within A of I		**Businesses (These include livestock farmers & equistrian facilities at Maghtab)****			
		Magħtab	Salini	Maghtab	Bahar ic-Caghaq	Salini	Qawra
Accountability & trust in authorities	Magħtab becoming a PERMANENT Waste management Solution for the whole of Malta	✓	✓	✓	✓	✓	✓
	Creating a precedent for further industrial development	✓✓	✓	✓✓	✓	✓	✓
	Promises will not be kept & therefore No constant enforcement and monitoring (apart from first time tourists)	✓✓	✓	✓✓	✓✓	✓	✓
	Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National)	✓	✓	✓	✗✓	✓	✓
	The time Frames for the whole master plan is too lengthy, rehabilitation of Magħtab too long	✓	✓	✓✓	✓	✓	✓
	Fear of potential cumulative negative impacts which are currently unknown, of related projects at the Waste Management Site, including the various mixed uses envisaged for the whole area.	✓	✗	✓	✓	✓	✓
	Fear of potential cumulative negative impacts of other projects not directly related to the proposed Scheme, especially health and safety / risk issues. A recurrent example given was the Electricity pipeline connecting Malta to the European mainland.	✓	✗	✓	✓	✓	✓
	Inconveniences caused by the ancillary operation of the WMS if there is no enforcement for the trucks not to pass from residential roads by still using the old entrance to the WMS.	✓	✓	✓	✗	✗	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants	Fear of potential Health and Safety / risks of the hazardous waste cell	✓✓	✓	✓✓	✓✓	✓	✓
	Fear of lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion	✓	✓	✓	✓	✓	✓
	Preoccupation of other health and safety issues regarding AD / manure plant, effecting their peace of mind (apart from first time and a number of returning tourists, and employees of hotels)	✓	✓	✓	✓	?	✓

	Heath and safety issues caused by lack of enforcement of, or the improper use of the Wheel Wash, for the ancillary operation of the WS / AD/ Manure Plants.	✓	✓	✓✓	✓	✓	✓✗
	Health hazards & other inconveniences caused by the WS plant (such as foul smells, dust or debris escaping from the plant)	✓✓	✓	✓✓	✓	✓✓	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants. This also effects Quality of Life.	Potential increase in vermin (notably rats and flies) because of the recycling plants and the landfill operation.	✓✓	✓	✓✓	✓	✓✓	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Ancillary operations of the Recycling Plants	Health hazards and other inconveniences caused by the ancillary operation of the WS plant, i.e. the vehicles carrying the unsorted waste to the plan (possibility of foul smells, increase in dust and fumes raised by the trucks; spillage of waste onto the streets because the trucks are not kept up to standard)	✓✓	✓	✓✓	✓	✓✓	✗
	Health and safety issues that may be caused by the manure plant's ancillary operations (ex. Leaking vehicles carrying manure, accidents causing spillages, trucks not being up to standard and therefore leaking manure on the roads)	✓	✓	✓✓	✓	✓	✓✗
	Possible smells caused by the manure plant's ancillary operation (the vehicles carrying the manure to the plant) -- apart from full and part-time farmers, unless they also were residents)	✗	✗	✓✓	✓	✓✓	✓
Effects on Quality of Life: Impacts on present infrastructure	More stress on present infrastructure during construction and implementation phases	✓✗	✓✗	✓	✓	✓	✗
	Improvement of present infrustructure if Master Plan is Implemented successfully	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Traffic	Increase in and other Traffic related problems caused by the ancillary operations of the landfill / recycling plants (such as an increase in air pollution from vehicle exhaust fumes)	✓✓	✓	✓✓	✓	✓	✗
	Increase in and other Traffic related problems caused by the construction phase	✓✓	✓	✓✓	✓	✓	✗
Effects on Quality of Life: Dust	Increase in Dust due to the construction phase	✓✓	✓	✓✓	✓	✓	✗✓
Effects on Quality of Life: Noise	Noise pollution during the construction phase of the project	✓✓	✗	✓	✓	✓	✗

Effects on Quality of Life: Environmental degradation	Further degradation of surrounding 'countryside' and pollution of Sea during construction phase	✓	✓	✓✓	✓✓	✓	✓
Effects on Quality of Life: Visual Impact	Negative Visual impact of the project, both the construction and implementation phases	✓✓	✓	✓	✓	✓	✓
	Potential loss of visual amenity if one or both of the recycling plants are visible	✓✓	✓	✓	✓	✓	✓
	Loss of agricultural land as visual and landscape value	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Tangible & Intangible Heritage	Loss of agricultural land implied as a decrease in quality of life and intangible heritage	✓	✓	✓✓	✓	✓	✓
	The potential damage to the remaining megalithic ruins (loss of tangible & intangible cultural heritage)	✓	✓	✓	?	✓	?
Effects on Quality of Life: Loss of Peace and quiet	Loss of peacefulness (quiet environment due to construction phase)-- Except for a number of Qawra users and First time tourists (who would not know how the area was before)	✓✓	✓	✓	✓	✓	✗
Effects on Quality of Life: Socio-economic Effects	Further decrease in Community Values within locality because of social tensions caused by project	✓✗#	✓✗#	✓✗##	✓✗	✗	✗
	Social transformation	✓✓	✗	✓✗	✓✗	✗	✗
	Degradation in local social tapestry	✓✗	✓✗	✓✗	✓✗	✓✗	✗
	Decrease in Population - people moving out of locality because of proposed project	✓✗	✓✗	✓✗	✓✗	✓✗	✗
	Social marginalisation (The prolongation of the stigma associated with proximity to the landfill)	✓✓	✓	✓	✓✗	✗	✗
	Maladaptation to the Scheme (Not being able to adapt to the presence of the Scheme)	✓✗	✓✗	✓	✓	✗	✓
	Depreciation of property because of project	✓✓	✓	✓	✗	✗	✗

Economic implications TOURISM	The Perception that the WMS could potentially decrease tourism and tourism related industry within the A of I	✗ (✓)	✗ (✓)	✓	✓	✓	✓✓
	Possibe increase of tourism if landfill / Scheme are less visible because of bund (Even though farmers were not directly effected by tourism, they still mentioned this)	✗ (✓)	✗ (✓)	✓	✓	✓	✓✓

Perceived Impacts of the project	Type of User within the A of I[1]			
	Visitors (Recreation, Sports & Business Clientele and visitors to residents)			
	Maghtab	Baħar ic-Cagħaq	Salini	Qawra
Magħtab becoming a PERMANENT Waste management Solution for the whole of Malta	✓✓	✓✓	✓	✓
Creating a precedent for further industrial development	✓	✓	✓	✓
Promises will not be kept & therefore No constant enforcement and monitoring (apart from first time tourists)	✓	✓✓	✓	✓✓
Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National)	✓	✓	✓	✓
The time Frames for the whole master plan is too lengthy, rehabilitation of Magħtab too long	✓	✓	✓	✓
Fear of potential cumulative negative impacts which are currently unknown, of related projects at the Waste Management Site, including the various mixed uses envisaged for the whole area.	✓	✓	✓	✓
Fear of potential cumulative negative impacts of other projects not directly related to the proposed Scheme, especially health and safety / risk issues. A recurrent example given was the Electricity pipeline connecting Malta to the European mainland.	✓	✓	✓	✓
Inconveniences caused by the ancillary operation of the WMS if there is no enforcement for the trucks not to pass from residential roads by still using the old entrance to the WMS.	✓	✓	✓	✗
Fear of potential Health and Safety / risks of the hazardous waste cell	✓✓	✓	✓	✓
Fear of lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion	✓	✓	✓	✓
Preoccupation of other health and safety issues regarding AD / manure plant, effecting their peace of mind (apart from first time and a number of returning tourists, and employees of hotels)	✓	✓	?	✗✓

Heath and safety issues caused by lack of enforcement of, or the improper use of the Wheel Wash, for the ancillary operation of the WS / AD/ Manure Plants.	✓✓	✓	✓	✓
Health hazards & other inconveniences caused by the WS plant (such as foul smells, dust or debris escaping from the plant)	✓✓	✓	✓	✗
Potential increase in vermin (notably rats and flies) because of the recycling plants and the landfill operation.	✓✓	✓	✓	✗
Health hazards and other inconveniences caused by the ancillary operation of the WS plant, i.e. the vehicles carrying the unsorted waste to the plan (possibility of foul smells, increase in dust and fumes raised by the trucks; spillage of waste onto the streets because the trucks are not kept up to standard)	✓✓	✓	✓	✗
Health and safety issues that may be caused by the manure plant's ancillary operations (ex. Leaking vehicles carrying manure, accidents causing spillages, trucks not being up to standard and therefore leaking manure on the roads)	✓✓	✓	✓	✓
Possible smells caused by the manure plant's ancillary operation (the vehicles carrying the manure to the plant) -- apart from full and part-time farmers, unless they also were residents)	✓✓	✓✓	✓	✓
More stress on present infrastructure during construction and implementation phases	✓	✓	✓	✓
Improvement of present infrustructure if Master Plan is Implemented successfully	✓	✓	✓	✓
Increase in and other Traffic related problems caused by the ancillary operations of the landfill / recycling plants (such as an increase in air pollution from vehicle exhaust fumes)	✓✓	✓✓	✓✓	✓
Increase in and other Traffic related problems caused by the construction phase	✓	✓	✓	✓
Increase in Dust due to the construction phase	✓✓	✓✓	✓	✓
Noise pollution during the construction phase of the project	✓	✓	✗	✗

Further degradation of surrounding 'countryside' and pollution of Sea during construction phase	✓	✓	✓	✓
Negative Visual impact of the project, both the construction and implementation phases	✓✓	✓	✓	✓✓
Potential loss of visual amenity if one or both of the recycling plants are visible	✓	✓	✓	✓
Loss of agricultural land as visual and landscape value	✓✓	✓✓	✓	✓✓
Loss of agricultural land implied as a decrease in quality of life and intangible heritage	✓	✓	✓	✓
The potential damage to the remaining megalithic ruins (loss of tangible & intangible cultural heritage)	✓	✓	✓	?✓
Loss of peacefulness (quiet environment due to construction phase)-- Except for a number of Qawra users and First time tourists (who would not know how the area was before)	✓✓	✓✓	✓	✗
Further decrease in Community Values within locality because of social tensions caused by project	✗	✓✗	✓✗	✓✗
Social transformation	✗	✗	✗	✗
Degradation in local social tapestry	✗	✗	✗	✗
Decrease in Population - people moving out of locality because of proposed project	✗	✗	✗	✗
Social marginalisation (The prolongation of the stigma associated with proximity to the landfill)	NR	✓✗	✓✗	✗
Maladaptation to the Scheme (Not being able to adapt to the presence of the Scheme)	✗	✗	✗	✓
Depreciation of property because of project	NR	NR	NR	NR

The Perception that the WMS could potentially decrease tourism and tourism related industry within the A of I	✓	✓	✓	✓
Possibe increase of tourism if landfill / Scheme are less visible because of bund (Even though farmers were not directly effected by tourism, they still mentioned this)	✓	✓	✓	✓

Grouped Impacts	Perceived Impacts of the project	Type of User within the A of I[1]							
		The Tourism Industry (Both first time & returning OMTs also reflect worries by Hoteliers who have such clientelle)							
		Tourists (first time IMTs / OMTs)			Returning Tourists			Hotel Employees	
		Qawra	Salini	Baħar ic-Caġħaq	Qawra	Salini	Baħar ic-Caġħaq	Qawra	Salini
Accountability & trust in authorities	Maġħtab becoming a PERMANENT Waste management Solution for the whole of Malta	✗ ✓	✗ ✓	✗ ✓	✓ ✓	✓ ✓	✓	✓	✓
	Creating a precedent for further industrial development	✓	✓	✓	✓	✓	✓	✓ ✗	✓ ✗
	Promises will not be kept & therefore No constant enforcement and monitoring (apart from first time tourists)	✓ ✗	✓ ✗	✓ ✗	✓	✓	✓	✓	✓
	Feeling of marginalisation and isolation in the planning and decision-making processes related to the WMP and the rehabilitation of the landfill site (from official representation- Local and / or National)	✗	✗	✗	✗	✗	✗	✗ ✓	✗ ✓
	The time Frames for the whole master plan is too lengthy, rehabilitation of Maġħtab too long	✗	✗	✗	✓	✓	✓	✓ ✗	✓ ✗
	Fear of potential cumulative negative impacts which are currently unknown, of related projects at the Waste Management Site, including the various mixed uses envisaged for the whole area.	✗	✗	✗	✓	✓	✓	✗	✗
	Fear of potential cumulative negative impacts of other projects not directly related to the proposed Scheme, especially health and safety / risk issues. A recurrent example given was the Electricity pipeline connecting Malta to the European mainland.	✗	✗	✗	✓ ✗	✓ ✗ ?	✓ ✗ ?	✗	✗
	Inconveniences caused by the ancillary operation of the WMS if there is no enforcement for the trucks not to pass from residential roads by still using the old entrance to the WMS.	✗	✗	✗	✗	✗	✗	✗	✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants	Fear of potential Health and Safety / risks of the hazardous waste cell	✓	✓	✓	✓	✓	✓	✓	✓
	Fear of lack of safety due to potential Risks of accidents regarding gases produced by AD Plant, including gases not being burnt properly, air pollution from gas emissions and more worrying, the risk of an explosion	✓	✓	✓	✓	✓	✓	✓	✓ ✓
	Preoccupation of other health and safety issues regarding AD / manure plant, effecting their peace of mind (apart from first time and a number of returning tourists, and employees of hotels)	✗ ✓	✗ ✓	✗ ✓	✓ ✗	✓ ✗	✓ ✗	✓ ✗	✓ ✗

	Heath and safety issues caused by lack of enforcement of, or the improper use of the Wheel Wash, for the ancillary operation of the WS / AD/ Manure Plants.	✗	✗	✗	✗✓	✓✗	✓✗	✓	✓
	Health hazards & other inconveniences caused by the WS plant (such as foul smells, dust or debris escaping from the plant)	✓	✓	✗	✓✗	✓✗	✓✗	✓✗	✓✗
Health and Safety/ Risk Issues + Inconveniences caused by the Recycling Plants. This also effects Quality of Life.	Potential increase in vermin (notably rats and flies) because of the recycling plants and the landfill operation.	✗	✗	✗	✗	✗	✗	✗	✓✗
Health and Safety/ Risk Issues + Inconveniences caused by the Ancillary operations of the Recycling Plants	Health hazards and other inconveniences caused by the ancillary operation of the WS plant, i.e. the vehicles carrying the unsorted waste to the plan (possibility of foul smells, increase in dust and fumes raised by the trucks; spillage of waste onto the streets because the trucks are not kept up to standard)	✓	✓	✗	✓✗	✓✗	✓✗	✓✗	✓✗
	Health and safety issues that may be caused by the manure plant's ancillary operations (ex. Leaking vehicles carrying manure, accidents causing spillages, trucks not being up to standard and therefore leaking manure on the roads)	✓	✓	✓	✓	✓	✓	✓	✓
	Possible smells caused by the manure plant's ancillary operation (the vehicles carrying the manure to the plant) -- apart from full and part-time farmers, unless they also were residents)	✓	✓	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Impacts on present infrastructure	More stress on present infrastructure during construction and implementation phases	✓	✓✓	✓	✓	✓	?	✓	✓
	Improvement of present infrustructure if Master Plan is Implemented successfully	✓	✓	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Traffic	Increase in and other Traffic related problems caused by the ancillary operations of the landfill / recycling plants (such as an increase in air pollution from vehicle exhaust fumes)	✓	✓	✓	✓	✓	✓	✓	✓
	Increase in and other Traffic related problems caused by the construction phase	✓	✓	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Dust	Increase in Dust due to the construction phase	✓	✓	✓	✓	✓	✓	✗✓	✓
Effects on Quality of Life: Noise	Noise pollution during the construction phase of the project	✗	✓	✗	✗	✓	✓	✗	✓

Effects on Quality of Life: Environmental degradation	Further degradation of surrounding 'countryside' and pollution of Sea during construction phase	✓	✓	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Visual Impact	Negative Visual impact of the project, both the construction and implementation phases	✓	✓	✓	✓	✓	✓	✓	✓
	Potential loss of visual amenity if one or both of the recycling plants are visible	✓	✓	?	✓	✓	✓	✓	✓
	Loss of agricultural land as visual and landscape value	✓	✓	✓	✓	✓	✓	✓	✓
Effects on Quality of Life: Tangible & Intangible Heritage	Loss of agricultural land implied as a decrease in quality of life and intangible heritage	✓ ✗	✓ ✗	✓ ✗	✓	✓	✓	✓	✓
	The potential damage to the remaining megalithic ruins (loss of tangible & intangible cultural heritage)	✗ ✓	✗ ✓	✗ ✓	?✓	?✓	?✓	✗	✗
Effects on Quality of Life: Loss of Peace and quiet	Loss of peacefulness (quiet environment due to construction phase)-- Except for a number of Qawra users and First time tourists (who would not know how the area was before)	✗	✗ ✓	✗	✓	✓	✓	✗	✓ ✗
Effects on Quality of Life: Socio-economic Effects	Further decrease in Community Values within locality because of social tensions caused by project	✗ ✓ *	✗ ✓ *	✗ ✓ *	✗	✗ ?	✗ ?	✓ ✗	✗ ✓
	Social transformation	✗ ✓ *	✗ ✓ *	✗ ✓ *	✓	✓ ?	✓ ?	✓ ✗	✗ ✓
	Degradation in local social tapestry	✗ ✓	✗ ✓	✗ ✓	✓	✓ ?	✓ ?	✓ ✗	✗ ✓
	Decrease in Population - people moving out of locality because of proposed project	✗	✗	✗	✓ ✗	✓ ✗ ?	✓ ✗ ?	✓ ✗	✗ ✓
	Social marginalisation (The prolongation of the stigma associated with proximity to the landfill)	✗	✗	✗	✗	✗ ?	✗ ?	✗	✗
	Maladaptation to the Scheme (Not being able to adapt to the presence of the Scheme)	✗	✗	✗	✗	✗ ?	✗ ?	✗	✗
	Depreciation of property because of project	NR	NR	NR	NR	NR	NR	✓ ✗	✓ ✗

Economic implications TOURISM	The Perception that the WMS could potentially decrease tourism and tourism related industry within the A of I	✓	✓	✓	✓	✓	✓	✓	✓
	Possibe increase of tourism if landfill / Scheme are less visible because of bund (Even though farmers were not directly effected by tourism, they still mentioned this)	✓	✓	✓	✓	✓	✓	✓	✓

[1] Groupings do not necessarily reflect Sociospheres

This depended on whether the farmers were full-time or part-time, residents to the area or not.

whether or not the receptor was sensiteve to the impact depended on whether or not the receptor was invested emotionall or otherwise in the locality. This usually included being a resident of the locality.

*

OMTs staying at hotels at the localities and going for organised tours might not even notice a change in social tapestry at the locality. On the other hand, IMTs might venture out of the hotels on their own and may be negatively affected by the lack of community at the locality. This may have a spinn-off effect in that these tourists might not recommend the locality or the hotel to friends when they go back home. As with returning tourists, these may decide not to ever return to either Malta or at least to the locality.

**

Some of the businesses were more worried about their clientelle not being able to adapt to the Scheme or be negatively effected in some way or other that would decrease the number of clients and therefore affect their business. This is therefore also put into consideration.

KEY:

✓ Sensitive to the perceived impact

✗ not sensiteive to the precived impact

✓✓ More sensitive when compared to other localities

✗✓ Ambivalent towards impact but were more in agreement that they were not as sensitive to the perceived Impact

✓✗ Ambivalent towards impact but were more in agreement that they were more sensitive to the perceived Impact rather than not.

? Where not enough interviews were done to have a representative sample of the group, a "?" was placed next to an anthropologically educated guess using data from similar users. This refers mostly for tourists in Bahar ic-Caghaq and Salini, who where not present becuase of the fieldwork period. In some cases, there are similar educated guesses for seasonal residents, especially at Salini. In other cases, where there is a "?" on its own, it means that the interviewees were largely undecided to whether they could be positively or negatively affected by the impact described. In some cases, as in the case for social transformation, residents of Bahar ic-Caghaq and Salini were ambivalent to whether the Scheme would be responsible for social transformation at their locality but were more inclined towards a yes rather than a no answer.

NR Not relevant for sociosphere, no effect on sociosphere and lifestyle of individuals