



**PA 02767/16**

**REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA' KALANKA,  
DELIMARA**

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**ENVIRONMENTAL PLANNING STATEMENT  
TECHNICAL APPENDICES**

**Version 1: January 2017**





**Report Reference:**

**Adi Associates Environmental Consultants Ltd, 2017. Redevelopment of Existing Derelict Hotel, at Ta' Kalanka, Delimara (PA 02767/16). San Gwann, January 2017**

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**PA 02767/16**

**Redevelopment of Existing Derelict Hotel at Ta' Kalanka, Delimara**

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## **Technical Appendix I**

### **TERMS OF REFERENCE AND METHOD STATEMENTS**

Supporting Documents for  
Environmental Planning Statement



## ***TERMS OF REFERENCE<sup>1</sup>***

FOR THE PREPARATION OF AN

## ***ENVIRONMENTAL PLANNING STATEMENT***

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July 2016

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### **DISCLAIMER:**

1. The assessment shall in no way be constrained or conditioned by the content, structure, or limitations of this document, and ERA reserves the right to amend the TORs, even significantly, as necessary. Such amendments may include: additional studies or extension of studies; omission or downscaling of any studies deemed irrelevant or unimportant; changes to methodology, format or level of detail; and any other modifications as ERA deems appropriate once a clearer picture of the proposal is available. The content of this document shall in no way constitute an exemption from the ensuing requirements, nor shall ERA be responsible or liable for any issues, difficulties or claims arising from variations from this document.
2. EIA Terms of Reference are primarily intended to guide the EIA process, rather than as a basis for tendering, subcontracting, calls for expression of interest, or other purposes even if ancillary to the project. Any use for such purposes is at the sole risk of the user.

- Note 1:** The Environment and Resources Authority (ERA) reserves the right to modify these Terms of Reference according to any relevant environmental and planning considerations that may emerge at any relevant stage of the EIA or the permit application process, as well as in the event of any changes or updates to the proposed development. ERA also reserves the right to request additional or amended studies should the findings of the EIA be insufficient to adequately inform the decision-making process or if the EIA identifies matters which should be subject to further investigation.
- Note 2:** Unless otherwise agreed with ERA, all requirements set out in these Terms of Reference are to be complied with. If there are any aspects that the consultants deem irrelevant to this study, or if at any stage the consultants discover any environmentally-relevant aspect (not included in these Terms of Reference) that needs to be studied, the consultants shall inform ERA immediately, justifying their reasoning.
- Note 3:** Difficulties, including technical difficulties and lack of information, encountered by the consultants in compiling the required information shall be made clear in the EIA. All references to published works and sources of information shall be duly acknowledged in a manner that enables tracing of the information source and verification. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the consultation period and thereafter, and for record-keeping and unhindered perusal by ERA. Any material which is based on unavailable proprietary data shall not be incorporated by reference.
- Note 4:** Any requirement for confidentiality of any section or detail of the EIA must be strongly justified and a formal request in this regard must be submitted to ERA. Should ERA grant confidentiality, alternative material that is still adequate for proper assessment, public consultation and decision-making must be provided.
- Note 5:** Agreement on method statements, and ancillary liaison with ERA, is not mandatory but is recommended. Nevertheless, ERA reserves the right to disagree with the methodology proposed, including proposed areas of influence, and with the EIA submissions in general, and to factor such disagreement in its critique of the EIA.
- Note 6:** During review of the EIA, ERA will submit comments for the consultants' consideration, as relevant. Following the consultants' response to ERA satisfaction, a revised second draft of the EIA, addressing the comments, will normally be required. This may take the form of a complete resubmission or of an Addendum detailing the revisions to the previous submissions, as deemed most expedient by ERA, taking into account continuity and traceability of the information, and overall user-friendliness vis-à-vis subsequent review, presentation, public consultation, record-keeping and decision-making. A complete resubmission will generally be required if changes are numerous or complex, whereas an Addendum may be preferred if changes are more limited.
- Note 7:** The consultants are not exonerated from obtaining any formal authorisation from ERA, and from other relevant entities, vis-à-vis any activity ancillary to the EIA (e.g. collection, sampling, capture, or waiver of access restrictions) wherever such authorisation is legally required.
- Note 8:** These Terms of Reference, and all ancillary correspondence, are issued without prejudice to the ERA position on the project and to ERA's final decision. Accordingly, their issuing (even when customised to address specific project details) should not be construed as evidence in favour or against the project or any component thereof, unless the contrary is clearly stated.

An Environmental Planning Statement (EPS) is to be prepared for *TRK 163702: Redevelopment of an existing derelict hotel including environmentally-friendly measures and provisions of public ancillary facilities, at Ta' Kalanka, Delimara, Marsaxlokk* - as required by the Environmental Impact Assessment Regulations, 2007 (S.L. 549.46). The required components of the EPS are:

- i. A **Coordinated Assessment Report**, in conformity with the following Sections of these Terms of Reference. This report should assess the project in its totality;

*[Note: The coordinated assessment should seek to analyse and integrate the main considerations emerging from the technical reports, rather than just reproducing excerpts from the reports.]*

- ii. A separate **Appendix (or Appendices)** containing all original survey reports as prepared by the individual specialist consultants for specific topics;  
*[Note: Experts contributing to the EPS should be specifically asked to consider impact interactions and cross-cutting issues, and to communicate information between each other accordingly].*
- iii. A separate **Non-Technical Summary** of the EPS, in both the Maltese and English languages. This should have enough details for the public to understand the project and the related environmental considerations, and should be written in reader-friendly language (e.g. avoiding unnecessary technical jargon);
- iv. A **declaration of conformity** with sub-regulations 28 and 29 of the EIA Regulations (refer to Appendix 1 to these Terms of Reference); and
- v. An addendum detailing the **feedback received from stakeholders, from the public, and from ERA** during the relevant consultation stages of the EPS, and how they were addressed.

Wherever relevant and appropriate, all components of the EPS should include tables and figures (e.g. maps, plans, photographs, photomontages, charts, graphs, diagrams, cross-sections) and quantifications.

The complete EPS (including all the above components) should be submitted as a printable digital copy (in .pdf format, with copying fully enabled throughout) and as a printed copy. Likewise, once the EPS has been certified, both a printable digital copy (in .pdf format, with copying enabled throughout) and a printed copy of the certified document is to be submitted to ERA.

Wherever any other study not forming part of the EPS is also envisaged, this is to be submitted separately from the EPS. Cross-referencing between the EPS and any such study should be clear and reasonably limited, such that both of the following considerations are duly satisfied:

1. Alerting the reader to the fact that the aspect in question is also being addressed in another parallel study; and
2. Enabling the reader to easily follow both the EPS and the other studies as stand-alone documents.

More detailed specifications are identified in the following pages.

## **1.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT AND ITS CONTEXT**

The description of the proposal is to include the aspects outlined below, and should take into account the entire proposal and any ancillary facilities and infrastructure connected with, or arising due to, the project.

### **1.1 Justification for the Proposal**

#### **1.1.1 Objectives**

The purpose and objectives of the proposal and whether these are related to current legal obligations, policies or plans.

#### **1.1.2 Demand**

The current and expected requirement or demand for the proposed land uses, also explaining how the proposal will address the requirement/demand.

### **1.2 Description of the Physical Characteristics of the Whole Project and the Land Use Requirements during the Construction, Operational and Decommissioning Phases**

The following aspects should be addressed for all phases of the project, clearly distinguishing between aspects relating to construction phase, operational phase, decommissioning phase, or more than one phase. References to construction phase and decommissioning phase also include ancillary site preparation, clearing, excavation, demolition/dismantling, and site reinstatement works, as relevant.

#### **1.2.1 General characteristics**

Description of the proposed development including size, area, height, volume, configuration/layout, general design, location and proposed elevations of buildings, hard and soft landscaping, access arrangements, boundary demarcation arrangements, land use requirements, and land take of ancillary facilities (including infrastructure, storage, servicing, security etc.). The description is to be consistent with the details submitted in the relevant permit application, throughout both the EIA process and the development permission application process.

#### **1.2.2 Construction, Operational and Production processes**

The relevant construction, operational and production processes and their main characteristics, including:

- The nature and quantity of materials used or generated;
- The source, type, quantity, composition and concentration of residues and emissions including water, air, soil pollution, noise, vibration, light, heat, radiation etc. resulting from the proposed project; and
- The expected annual and total emissions, including Greenhouse Gases (GHG), and the contribution to total national GHG emission on an annual basis.

#### **1.2.3 Project management**

An indicative framework outlining the key parameters and site management arrangements during construction, operation and decommissioning phases, including:

- Works methodology;
- Expected duration of all phases, as well as season, frequency and duration of interventions;
- Depths and volumes of excavation, and type of material to be excavated; and
- Types and quantities of raw materials and primary resources to be consumed, including water, energy, stone and other resources, and measures to reduce such consumption.

#### **1.2.4 Access, transportation and related infrastructure**

1. A forecast of the type, quantity and size of vehicles envisaged during each phase and their respective frequency of use, as well as an identification of the routes that vehicles will use to/from and within the site. The required arrangements should also be compared with the relevant existing situation (in terms of structural considerations, stability and state of roads, road width and gradient, turning circles and junctions, type of surfacing, and other physical or environmental constraints, etc). Interventions that would need to be carried out to accommodate the required vehicles (e.g. new or altered access roads), and sites/buildings/structures/features likely to be affected as a result, should be identified accordingly.
2. Facilities for the storage, parking, on-site servicing, loading/unloading of equipment, vehicles and other machinery.

#### **1.2.5 Water, sewerage, runoff management, energy, telecommunications, and ancillary infrastructure**

1. Estimates of water management specifications of the development and the identification of the sources of water to be used, including the following:
  - The features and processes of the proposed development and its ancillary facilities which consume water, including estimates of water consumption and runoff/effluent generation during operation;
  - The sources of water (e.g. second-class water, public potable water mains, on-site production) envisaged to meet the projected demand;
  - The water-saving measures, if any, that are envisaged (e.g. use of low-flow fittings, reuse of harvested storm water runoff and rainwater, treatment and reuse of grey water/sewage), and details as to how such water will be used/managed; and
  - The facilities and structures to be installed in connection with the above (e.g. water production, purification, collection, storage, distribution and saving) including estimates of the sizing of pipelines, reservoirs and equipment.
2. Estimates of the energy-related specifications, including:
  - The features and processes of the proposed development and its ancillary facilities which consume energy, including estimates of consumption during operation. The analysis should consider, as relevant, the connected load (in MW or MVA), the overall power factor, the annual MWh split in terms of end-use (lighting, climate cooling/heating/ventilation, plant etc.) which reflects the expected use of the facilities;
  - The energy sources envisaged to meet the projected demand;
  - The facilities and structures to be installed in connection with the above (e.g. energy production, storage, distribution and saving) including estimates of the sizing of cables, buildings and equipment; and
  - The expected energy performance of the proposal, including building orientation, natural ventilation, construction materials, integration of low/zero-carbon technologies to meet energy needs; avoidance of features which increase energy consumption; and energy efficiency measures in the finishing and operation of the development.
3. Infrastructural services and utilities related to water and power supplies, sewerage, telecommunications and runoff management, and ancillary works (e.g. trenches, tunnels, culverts, switching/transformer stations, pumphouses, inspection chambers).
4. The extent to which the project can realistically be self-sufficient with regard to its energy and water needs, through appropriate measures such as the efficient use of energy and water, collection of rain and storm water for reuse, reuse of treated wastewater/sewage, technologies that reduce energy consumption, and the integration of alternative energy sources. Alternatives in terms of design, fabric and orientation of the buildings should also be explored and assessed.

#### **1.2.6 Waste management**

1. A sufficiently detailed indication of the waste management implications likely to arise from the project, including wastes generated by ancillary facilities and wastes which may arise from accidental spillages and leakages and from repair works. Wastes should be subdivided according to the relevant project phases.
2. The following information is to be provided for each waste stream, as relevant to each phase:
  - Identification of processes or activities that would result in waste generation;
  - European Waste Catalogue Codes for each waste stream, as per relevant legislation;



- The projected quantities and rate of generation for each type of waste;
- Information on waste handling and storage, on site as well as off site; and
- The method of transportation and frequency.

This information should be presented in table format as follows, and should also include cross-references to the relevant regulations, particularly The Waste Regulations (Legal Notice 184 of 2011, as amended):

Phase	Type of waste	EW Code	H-Code	Activity (e.g. sanding, scraping, power washing etc.)	Estimated quantities	Final permitted disposal location

3. The envisaged waste management arrangements using the Best Practicable Environmental Options (BPEO) available, and the envisaged efforts to minimise waste generation and to divert waste to reuse or recycling rather than disposal.
4. Layout plans (to scale) clearly showing all relevant waste management infrastructure and related facilities (e.g. bunded areas for storage of waste fuels, wheel-wash facilities, etc.), clearly distinguishing between temporary and permanent structures for each phase.

### 1.2.7 Longer-term developments

Additional future developments, land uses and other commitments that are ancillary or consequent to the project or are likely to arise in relation to the same project or its expansion, as well as longer-term needs of the proposal, including: ancillary infrastructure not accounted for in the previous sections; any consequent interventions/arrangements required to accommodate the development; any foreseeable extensions or updates to the proposal; any displacement of existing uses; and decommissioning.

## 2.0 ASSESSMENT OF ALTERNATIVES

An outline of the main alternatives studied and an indication of the main reasons for this choice, taking into account the relevant environmental effects and their prevention (or optimisation) at source. The following alternatives need to be duly considered, as relevant to the development itself (or to one or more phases thereof) and its requirements and constraints:

- 2.1 Alternative sites
- 2.2 Alternative technologies
- 2.3 Alternative layouts (including building heights, where relevant)
- 2.4 Downscaling of the project, or elimination of project components
- 2.5 Zero option (do-nothing scenario) - *i.e.* an assessment of the way the site would develop in the absence of the proposed project.

**[Note:** The zero option should be considered in sufficient detail as a plausible scenario in the EPS, wherever relevant, and not discarded upfront without proper discussion of its implications.]

- 2.6 Hybrids/combinations of the above

The findings of the assessment of alternatives should be summarised in a table format for ease of comparison.

### 3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

**Note:** It is recommended that these details are discussed in advance with the ERA prior to commencement of the relevant parts of the studies, in order to pre-empt (as much as possible) later-stage issues.

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by **Section 4** below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).

**Note:** In addition to already in-force legislation, policies and plans, the discussion should also cover any foreseeable future updates (or new legislation, policies and plans) likely to be fulfilled, affected or compromised by the proposed project. Furthermore, it should be noted that some cross-cutting legal/policy instruments (e.g. Water Framework Directive) may need to be factored into more than one aspect of the discussion.

#### 3.1 Land cover and Land Uses

A description of the land cover and land uses, including agriculture and ecology, within the area of influence of the project, including roads, footpaths, public access routes and any agricultural tracts of land. Details including nature, magnitude, proximity to site, etc. should be included. Any trees, including protected trees, are to be mapped and identified accordingly.

#### 3.2 Landscape Character and Visual Amenity

##### 3.2.1 Landscape Character

The study should describe the landscape-related area of influence and landscape setting of the proposed site, identifying the component character areas and local landscape tracts, and the landscape elements, characteristics and degree of sensitivity thereof, so as to enable the prediction and assessment of:

- The changes to the landscape attributable (in full or in part) to the proposed development;
- The implications of such changes on the quality and perception of the landscape and its elements, in each of the identified landscape character areas and local landscape tracts; and
- The effects of such changes on relevant receptors. (The receptors should also be duly identified and their degree of sensitivity should also be indicated and justified).

Reference should also be made to the Planning Authority's 'Draft Landscape Assessment Study, 2004,' and to the *Guidelines for Landscape and Visual Impact Assessment, 2015 (The Landscape Institute & IEMA)*, as relevant.

### 3.2.2 Visual Amenity

The following need to be identified and submitted for prior ERA approval:

- The zone of theoretical visibility (ZTV) of the site and the development under consideration; and,
- Assessment viewpoints representative of short-, medium- and long-distance views towards the site. A baseline photograph taken from each proposed viewpoint is also required. The submission should cover all the important views of the site, whilst avoiding the inclusion of superfluous or inappropriate viewpoints (e.g. positions from which the site is not visible, or where the view is obstructed or dominated by physical obstacles in the foreground).

Thereafter, for each approved viewpoint, the projected situation and appearance of the site (*i.e.* as it would look with the proposed development in place) should be compared to the current baseline situation (*i.e.* without the proposed development). The following should be predicted and assessed accordingly:

- The expected changes to visual amenity as a result of the proposed development;
- The effects of such changes on the quality of the visual amenity of the site; and
- The effects of such changes on relevant receptors. (The receptors should also be duly identified and their degree of sensitivity should also be indicated and justified).

**Note:** The baseline photographs and the photomontages should, unless otherwise directed by ERA, satisfy the following:

(a) The location of each viewpoint should be shown on a map that also depicts the viewshed for the proposed site as described above. The visual angle of the photograph should also be indicated and should not be greater than 50°. Stitched photos that illustrate the field of vision towards the site from each viewpoint are acceptable as long as they are additional to the 50-degree photograph.

(b) The photographs and photomontages submitted should:

- Be at least A3 in size. Strips which are A3 in width but not in length are not appropriate except as supplementary illustrative material;
- Include the date and time at which the photo was taken;
- Be of good quality, with faithful reproduction approximating as much as reasonably possible what would normally be visible to the naked eye. The photos should be taken in good weather, and should be taken at least 2 hours after sunrise and 2 hours before sunset. Colours should not be digitally or otherwise manipulated. As a guideline, the image should have a printing density of 200 dots per inch or better. In some instances, digital images having a resolution of 1024 x 728 or better may be required for multimedia presentation purposes;
- Be taken in such a manner that near-field objects do not overpower or dominate features near the image plane passing through the project area;
- Be taken from a height above ground level that is representative of the eye level of the viewer, and such height should be duly documented; and
- Ensure that all additional/replacement structures and features depicted in the photomontages have a scale which proportionately tallies with the existing nearby features.

(c) Wherever relevant, the photomontage(s) should cover the following scenarios:

- The development without the proposed landscaping scheme, representing the worst-case scenario;
- The development complete with the proposed landscaping scheme as it is expected to look when the trees reach maturity, also providing an indicative timeframe as to when such maturity is expected to be attained; and
- (where relevant in relation to impact of nocturnal lighting) the development and its ancillary lighting as it would appear during night-time.

### Exterior lighting

In the case of light pollution, the study needs to consider, among others, glare (e.g. the blinding light which is a danger to motorists/pedestrians and to fauna), light trespass (light straying into an area where it is not desired or required) and sky glow ('wasted' light directed upwards), together with any other relevant variables which are relevant to the determination of impact on any surrounding receptors.

### 3.3 Geology, Geomorphology, Hydrogeology, and Soils

A comprehensive investigation of:

1. The geology and geomorphology of the site and its surroundings, including: existing lithological, stratigraphical, palaeontological, hydrogeological and physiographic features and soil types;
2. The geo-technical properties and considerations relevant to the site and its area of influence, including: land stability; mechanical, erosional and structural properties of the terrain and land mass; any relevant fissures, faults, hollows, or weak points; the vulnerability of the site to natural forces such as wave action, erosive elements, landslides and mass movements; and any other considerations affecting the

implications and risks posed by the proposed development or by any of its ancillary interventions such as site clearance, earth-moving, and excavations; and

3. The quality of the material that will be excavated (including soil, rock/mineral resource, and any existing fill material) and its potential for reuse.

Sampling and testing should comply with the relevant standards (unless otherwise agreed, BS standards or other recognised equivalents should be used), and should extend to a sufficient depth below the deepest level of the proposed development (taking into consideration all proposed excavations and underground structures). Wherever the study involves the drilling of core samples, the number, depth and location thereof should also be submitted for ERA approval prior to carrying out of any *in situ* tests.

### **3.4 Terrestrial Ecology**

The assessment should include:

1. An investigation of the ecology of the site and its surroundings (including flora, fauna (including any aquatic organisms), benthic, burrowing and pelagic organisms, and their habitats and ecosystems),
2. A reporting of the conservation status and ecological condition of the area and the state of health of its habitats, species and ecological features;
3. A reporting of all protected, endangered, rare, unique, endemic, high-quality, keystone, invasive/deleterious, or otherwise important species, habitats, ecological assemblages, and ecological conditions found in the area under study; and
4. A prediction of the potential impacts of the proposed project on the ecology of the site and its surroundings, including loss, damage or alteration of habitats and species populations (including potential increases in ambient noise levels in the marine environment) including alteration in the habitats and species' condition/state of health as measured through indicators used/specified for assessment of status in relevant EU policy.

In particular, the study should identify all relevant species and assemblages (e.g. protected species or habitats, key species relevant to habitat characterisation, and monitoring indicators), and assess their abundance and distribution patterns as well as the species' ecological niches. The findings should be supported by adequate maps and photographs. Classification of habitat types and species should be conducted in accordance with recognised classification systems (e.g. EUNIS and Palaearctic), to ERA's satisfaction.

### **3.5 Architectural, Archaeological, Historical and Cultural Heritage and related Material Assets**

Refer to Appendix 2.

### **3.6 Noise and Vibrations**

This study should provide sufficiently detailed information on representative background levels of noise and vibrations, as a baseline for assessing the levels and effects expected to result from the development, including any short- and long-term changes, peaks and fluctuations as well as their acute or chronic impacts. The study should also take into account other relevant factors such as:

- Cumulation with other existing sources including traffic and with other predicted sources such as new developments;
- Additional effects of road traffic associated with operations on the site;
- Sensitive receptors (e.g. residents, schools, hospitals, recreational areas, fauna and avifauna, natural ecosystems); and
- The potential for attenuation or exacerbation by 'environmental' factors (e.g. topography, vegetation, physical barriers etc.), and for mitigation (e.g. shielding, muffling/soundproofing, reduced lighting, etc.).

The study results should include measurable parameters as relevant, and should be evaluated against appropriate reference values<sup>2</sup>. The reference points and measurement locations used should be approved by ERA prior to commencement of studies and, unless otherwise indicated, should be at ground level.

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<sup>2</sup> Unless otherwise specifically indicated, it is recommended that: ISO 1996 and ISO 9613 (all series) standards are used for the noise assessment; BS6472 (relating to human exposure to vibration) and BS7385 (covering the effects on buildings) are used when studying vibration; BS 5228 is used for the assessment of construction noise; and BS 4142 is used vis-à-vis noise complaints.

### **3.7 Infrastructure and Utilities**

The assessment should investigate the currently available infrastructural services (including water supply, energy supply, sewerage, telecommunications infrastructure, access roads, parking, *etc.*), including details about their carrying capacity, physical condition and other relevant practical considerations. It should also compare this information to the infrastructural demands of the project as identified in **Section 1** above, so as to clearly indicate:

1. whether the current utilities are adequate to meet the demand arising from the proposed development;
2. whether any significant loading, congestion or damaging of the infrastructural or transport network is envisaged; and
3. whether any new or upgraded services/arrangements will be rendered necessary, both in the short-term and in the longer-term. If any requirement for new infrastructure (or upgrading, alteration or extension of the existing infrastructure) is envisaged, the relevant details including associated works and their environmental implications should also be indicated.

The assessment should also identify any existing or projected infrastructural services located within the area of influence of the development (even if not related to the demands of the development) that might be affected by the development or which may need to be displaced or diverted as a consequence of the development or its ancillary operations and interventions.

### **3.8 Public Access**

The assessment should identify the current public access arrangements, including existing footpaths and other public access routes, and should clearly indicate whether these would be affected and how.

Wherever any new or altered arrangements are proposed, these should be clearly identified and their environmental implications should also be indicated.

### **3.9 Other relevant environmental aspects and features**

Other relevant environmental features or considerations not identified in the preceding sections should also be identified and described, as relevant.

## **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (*i.e.* if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (*i.e.* impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:
  - interactions (*e.g.* summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;
  - interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable developments, activities and land uses and with other relevant baseline situations; and

- wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
  8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
  9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
  10. The probability of the impacts occurring; and
  11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

#### **4.2 Impacts related to Climate Change and Climate Change Adaptation**

The assessment should address the following aspects, as relevant:

1. The contribution of the project to greenhouse gas (GHG) emissions and climate change, including:
  - (i) The direct, indirect and off-site GHG emissions and related impacts during all relevant phases of the project, including those arising as a result of the electrical power demand of the project;
  - (ii) Any massive GHG emissions that may occur as a consequence of accidents or malfunctions;
  - (iii) The impacts of the proposal on carbon sinks (e.g. wooded/afforested areas, agricultural soils, landfills, wetlands, and marine environments);
  - (iv) The components of the project that are expected to contribute to renewable energy generation on site, including a quantification and critique of their reliability and actual net contribution to climate change mitigation as well as an identification of the impacts of such components on other aspects of the environment (e.g. landscape, land take, avifauna); and
  - (v) The implications of the project and its operations and ancillary demands on National GHG emission targets.
2. The implications of climate change on the proposal, including:
  - (i) The aspects/elements of the project that are likely to be affected by changes or variability in climate-related parameters (e.g. temperature, humidity, weather patterns, sea level, etc.);
  - (ii) The potential impacts that such changes may have on the proposal, including any possible impacts resulting from changes to multiple parameters; and
  - (iii) The adaptability of the project and its components and operations vis-à-vis the relevant climate change parameters and trends.

#### **4.3 Environmental Risk**

The assessment should also address, in sufficient detail, any relevant environmental risk (including major-accident scenarios such as contamination, emissions, explosions, blast, flooding, major spillages, etc.) likely to result in environmental damage or deterioration. The range of accident scenarios considered should exhaustively cover, as relevant:

1. one-time risks (e.g. during construction or decommissioning works);
2. recurrent risks during project operation; and
3. risks associated with extreme events (e.g. effect of earthquakes or natural disasters on the project).

The assessment should include, as relevant: a quantification of the risk magnitude and probability; and risk analysis vis-à-vis any hazardous materials stored, handled, or generated on site or transported to/from the site.

#### **4.4 Effects on Human Populations resulting from impacts on the environment**

This assessment should also identify any impacts of the development on the surrounding and visiting population (e.g. effects on public health or on socio-economic considerations), that may result from impacts on the environment. In the case of health-related effects, reference should be made to published epidemiological and other studies, as relevant, and the views of the Environmental Health Directorate should be sought.

#### 4.5 Other Environmental Effects

Any other environmental effects deemed relevant to the project but not fitting within any of the above sections should also be identified and assessed.

### 5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME

#### 5.1 Mitigation Measures

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see **Section 1.2.3** above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see **Section 5.4** below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites, conditionalities and side-effects.

#### 5.2 Residual Impacts

Any residual impacts [*i.e.* impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

#### 5.3 Additional Measures

Compensatory measures (*i.e.* measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

#### 5.4 Decommissioning Plan

A decommissioning plan (DP) should also be proposed to address the following circumstances, as relevant:

1. Removal of any temporary or defined-lifetime development (or of any structures, infrastructure or land use required temporarily in connection with it) upon the expiry of their permitted duration; and
2. Removal of the development (or of any secondary developments, infrastructure or land use ancillary to it) in the event of redundancy, cessation of operations, serious default from critical mitigation measures, or other overriding situations that may emerge in future.

The DP should also include, as relevant, a phasing-out plan, proposals for site remediation or decontamination, and methodological guidance on site reinstatement or appropriate after-use.

#### 5.5 Monitoring Programme

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);  
*[Note: Official written consent from the competent authorities may also be required for such interventions.]*
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## **5.6 Identification of required authorisations**

The assessment should also identify all environmentally-relevant permits, licences, clearances and authorisations (other than the development permit to which this EPS is ancillary) which must be obtained by the applicant in order to effectively implement the project if development permission is granted. Any uncertainty, as to whether any of these pre-requisites is applicable to the project, should be clearly stated.

### **Note on Sections 5.1 to 5.6 above:**

The expected effects, the proposed measures, the residual impacts, the proposed monitoring etc. should also be summarised in a user-friendly itemised table that enables the reader to easily relate the various aspects to each other. An indicative specimen table is attached in **Appendix 3**.



**Regulation 28: Identification of consultants and contributors**

**Extract:**

28. (1) *The environmental impact statement shall list the registration number and the names of the consultants and contributors responsible for the preparation of the environmental impact statement, environmental survey reports, appendices, non-technical summary and other components of the statement.*
- (2) *The consultants who are responsible for a particular analysis, including analysis in the environmental survey reports, shall be identified.*
- (3) *All consultants and contributors employed in the environmental impact assessment shall sign a declaration stating that the particular study (or part thereof) was solely carried out by them and that they take responsibility for any statement and conclusion contained therein. This signed declaration shall be included with each environmental survey report included with the environmental impact statement.*

**Signed declaration in accordance with sub-regulation 28(3):**

*This declaration is to be submitted with each environmental survey report forming part of the EIA.*

Attn: Director of Environment (ERA).

I \_\_\_\_\_, who carried out the study (or part thereof) on  
\_\_\_\_\_ for the EIA for the proposed  
\_\_\_\_\_, hereby declare that such study was solely  
carried out by me and take responsibility for any statement and conclusion contained therein.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**Regulation 29: Conflict of interest**

**Extract:**

29. (1) *In the interest of fairness, objectivity and the avoidance of bias, all consultants shall required to sign and abide by a declaration that they have no personal or financial interest in the proposed development.*
- (2) *The Director of Environment Protection shall not approve consultants, groups of consultants or consultancy firms that are in any way associated with any company, association or grouping that has any direct or indirect personal, association or grouping that has any direct or indirect personal, professional or financial interest in the proposed development.*
- (3) *The Director of Environment Protection shall not approve any environmental impact statement or environmental planning statement produced by a consultant or group of consultants, one or more of whom does not comply with the provisions of sub-regulations (1) or (2) of this regulation.*

**Signed declaration in accordance with Sub-regulation 29(1):**

*This declaration is to be submitted when proposing the list of EIA Consultants for approval.*

Attn: Director of Environment (ERA)

I \_\_\_\_\_, hereby declare that I have no personal or financial interest in the proposed  
development, namely \_\_\_\_\_. Moreover, I declare that I am  
not in any way associated with any individual, company, association or grouping that has any direct or indirect, personal,  
professional or financial interest in the abovementioned proposed development.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

### **1.0 Preamble**

The proposed project would involve development over an extensive area and may lead to intensification of activity over a larger area. Potential impacts may occur within the footprint of the project, in the immediate environs, and along access routes to the site. Potential impacts may include direct and immediate material impacts, as well as subsequent impacts that might arise from the modification of the existing situation.

### **2.0 Scope and Definitions of the EIA**

For the purposes of this document, cultural heritage is defined by Article 2 of the Cultural Heritage Act (2002). This includes movable or immovable objects of artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological importance.

2.1 The study area shall include the total footprint of the proposed development.

2.2 In the context of this particular application, cultural heritage considerations may include:

- Features of archaeological value and potential;
- Military or civil architecture from the Knights period to British period;
- Vernacular structures; and
- Field systems and agricultural features such as irrigation systems.

The above cultural heritage definitions and considerations are not to be considered as exhaustive. The EIA must consider all other forms of cultural heritage, both known and unknown.

2.3 The Environmental Impact assessment will:

- Describe the Cultural Heritage assets within the study area;
- Analyse the cultural heritage features within the context of the cultural landscape;
- Assess the physical, spatial and visual impacts of the proposed development on the cultural heritage assets; and
- Propose corrective measures for the protection of the cultural resources.

### **3.0 Methodology**

In quantifying the cultural heritage assets within the study area, and assessing the impacts of the proposed development, the EIA will undertake:

- Description and assessment of the property;
- Desktop and archival research limited to the study area;
- Fieldwork and research, including "field walking", topographic survey and remote sensing as may be necessary within the site. All fieldwork has to be authorised by the Superintendence of Cultural Heritage as defined below under point 4;
- Consultations with any relevant bodies, including the Superintendence of Cultural Heritage, Heritage Malta, the University of Malta, NGOs and Local Councils;
- Compilation of an inventory of the cultural heritage assets identified within the study area. The features of cultural heritage are to be described and plotted with grid references, on Data Capture Sheets, the design of which should be approved in advance by the Superintendence of Cultural Heritage. The Data Capture Sheets will be presented as an appendix to the EPS. The analysis of the features will be included in the main report; and
- A cultural heritage Risk Assessment Map examining the various impacts of the proposed project is to be included in the EIA.

### **4.0 Authorisation by the Superintendence of Cultural Heritage**

As per Cultural Heritage Act 2002, any form of investigation or prospection required for the identification of cultural heritage (including excavation, field walking, topographic survey and remote sensing) may only be undertaken by the Superintendence of Cultural Heritage or with its written approval.

<b>ERA</b> PROTECTIVE INVENTORY OF THE MALTESE CULTURAL HERITAGE HERITAGE DATA CAPTURE SHEET						Ref. No.
Location	Category	Type	Site Location ( Address )			
Eastings	Northings	Feature	Period - Year			
S.S. No. 1	S.S. No. 2	Description				
S.S. No. 3	S.S. No. 4					
Date						
Negative No.	Film No.					
Present Utilization						
Existing Legal Protection		GN. Number			GN. Date	
Comments						
Buffer Zone	A	B	C	D	E	Others
Eastings						
Northings						
Site Map						
Scale 1 : 2500						

Archaeological Characteristics – Sketch/Scaled drawings:	
Condition:	Degree of Protection (Structure Plan policies UCO7 or ARC 2):
State of Security:	Proposed Utilization:
Basic Bibliography:	
Compiled by:	Revised by:
Checked by:	Checked by:
Date:	Date:

APPENDIX 3: SPECIMEN IMPACT TABLE

Impact type and source			Impact receptor		Effect & scale							Probability of impact occurring (Inevitable, Likely, Unlikely, Remote, Uncertain)	Overall impact significance	Proposed mitigation measures	Residual impact significance	Other requirements (monitoring, authorisations, etc)
Impact type	Specific intervention leading to impact	Project phase (construction/ operation/ decommissioning)	Receptor type	Sensitivity & resilience toward impact	Direct/ Indirect/ Cumulative	Beneficial/ Adverse	Severity	Physical / geographic extent of impact	Short-/medium- / long-term	Temporary (indicate duration)/ Permanent	Reversible (indicate ease of reversibility) / Irreversible					

[Insert definition of relevant criteria used to describe the impacts]



**PA 02767/16**

## **REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA' KALANKA, DELIMARA**

### **GEO-ENVIRONMENT METHOD STATEMENT**

---

#### **INTRODUCTION**

1. This method statement outlines the methodology for the geo-environment input to the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara. The development is hereinafter referred to as 'the Scheme'.

#### **TERMS OF REFERENCE**

2. The Terms of Reference provided by the Environment and Resources Authority (ERA) are:

#### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).

### **3.5 Geology, Geomorphology, Hydrology and Soils**

A comprehensive investigation of:

1. The geology and geomorphology of the site and its surroundings, including: existing lithological, stratigraphical, palaeontological, hydrogeological and physiographic features and soil types;
2. The geo-technical properties and considerations relevant to the site and its area of influence, including: land stability; mechanical, erosional and structural properties of the terrain and land mass; any relevant fissures, faults, hollows, or weak points; the vulnerability of the site to natural forces such as wave action, erosive elements, landslides and mass movements; and any other considerations affecting the implications and risks posed by the proposed development or by any of its ancillary interventions such as site clearance, earth-moving, and excavations; and
3. The quality of the material that will be excavated (including soil, rock/mineral resource, and any existing fill material) and its potential for reuse.

Sampling and testing should comply with the relevant standards (unless otherwise agreed, BS standards or other recognised equivalents should be used), and should extend to a sufficient depth below the deepest level of the proposed development (taking into consideration all proposed excavations and underground structures).

Wherever the study involves the drilling of core samples, the number, depth and location thereof should also be submitted for ERA approval prior to carrying out of any in situ tests.

### **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (i.e. if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (i.e. impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:
  - interactions (e.g. summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;
  - interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable

- developments, activities and land uses and with other relevant baseline situations; and
- wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
  8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
  9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
  10. The probability of the impacts occurring; and
  11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

### **5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME**

#### **5.1 Mitigation Measures**

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see Section 1.2.3 above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see Section 5.4 below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites, conditionalities and side-effects.



## 5.2 Residual Impacts

Any residual impacts [i.e. impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

## 5.3 Additional Measures

Compensatory measures (i.e. measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

## 5.5 Monitoring Programme

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## AREA OF INFLUENCE

3. Having regard to the nature of the Scheme, and the extent of the excavation works in particular, the Area of Influence (A of I) for the geo-environment study comprises the area illustrated in **Figure 1**. The Aol for the hydrology / hydrogeology study is illustrated in **Figure 2**.

## **ASSESSMENT METHODOLOGY**

### **Literature Search**

4. A literature search in relation to previous geo-environment survey work relevant to the A of I will be undertaken. This, together with the Consultant's own knowledge of the area, will provide a context for the baseline surveys.

### **Methodology**

5. The study will establish the existing geology, geomorphology and hydrogeological baseline. This will involve:
  - Identification and description of the geology, geomorphology and hydrogeology of the site and the Aol (see **Figure 1** and **Figure 2**);
  - Identification, mapping and description of any structural features (such as faults) that may be present, outcrop formations, members, or bed sub-divisions, including their palaeontologic content;
  - Identification and description of aquifers, water courses, drainage patterns; surface run-off; and springs and wells (if any); and
  - Identification of features that are protected by legislation, or which warrant such protection and their appropriate level of protection, as necessary.
6. The following will be produced as part of the geo-environment baseline survey:
  - Geological Map;
  - Hydrology Map; and
  - Report of the quality of the stone material to be excavated and its potential reuse. This will be determined by visual inspection and by laboratory testing for water absorption, unconfined compressive strength, and wet and dry density.
7. The stability of the walls of the excavation will also be determined by the field survey and by the sub-surface geological investigation.
8. It is proposed to drill two boreholes as part of the baseline survey; **Figure 2** and **Figure 3** show the location of the proposed boreholes.

### **Standards and guidance**

9. The conservation importance of geologic, geomorphologic and hydrogeologic features will be determined by reference to the *Marsaxlokk Bay Local Plan, Minerals Subject Plan* and the *Earth Conservation Strategy* (The British Nature Conservancy Council, 1991).

## **IDENTIFICATION OF IMPACTS**

10. In terms of geology geomorphology, hydrogeology, and soils, the geo-environmental impacts of the Scheme are likely to arise from the excavation and construction of the Scheme.
11. The impact of changes resulting from the Scheme on geology and geomorphology will make reference to the nature of the beds and the degree of protection afforded to them through policy and / or legislation.

## **IMPACT SIGNIFICANCE**

12. The significance of the impact(s) will include:
  - 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 geo-environmental resources to impacts;
  - Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
  - Scope for mitigation / enhancement (very good, good, none).
13. Based on the above, a summary of the significance of the impact will be judged in terms of whether the impact is considered to be:
  - **Not significant:**
    - Little or no change to the geological, geomorphological and hydrogeological regime.
  - **Minor significance:**
    - Changes to the geological, geomorphological and hydrogeological regime that may affect neighbouring properties but which may be offset by mitigation measures.
  - **Major significance:**
    - Changes to the geological, geomorphological and hydrogeological 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).

## **IMPACT MITIGATION AND MONITORING**

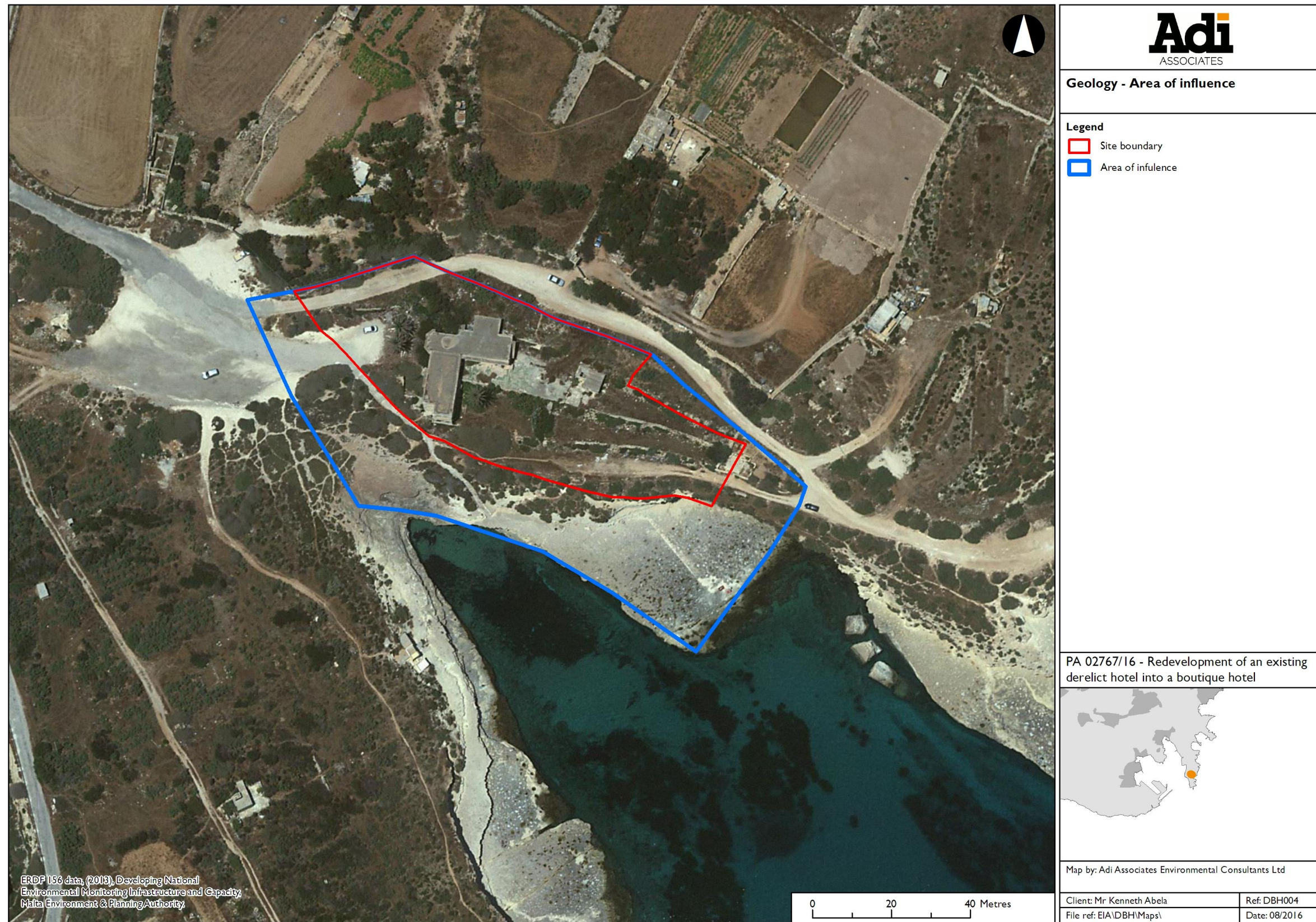
- I4. The scope for mitigation will be identified, and the need for monitoring of geological, geomorphological and hydrogeological aspects within the AoI will be addressed in the Environmental Planning Statement (EPS).

Adi Associates Environmental Consultants Ltd

August 2016



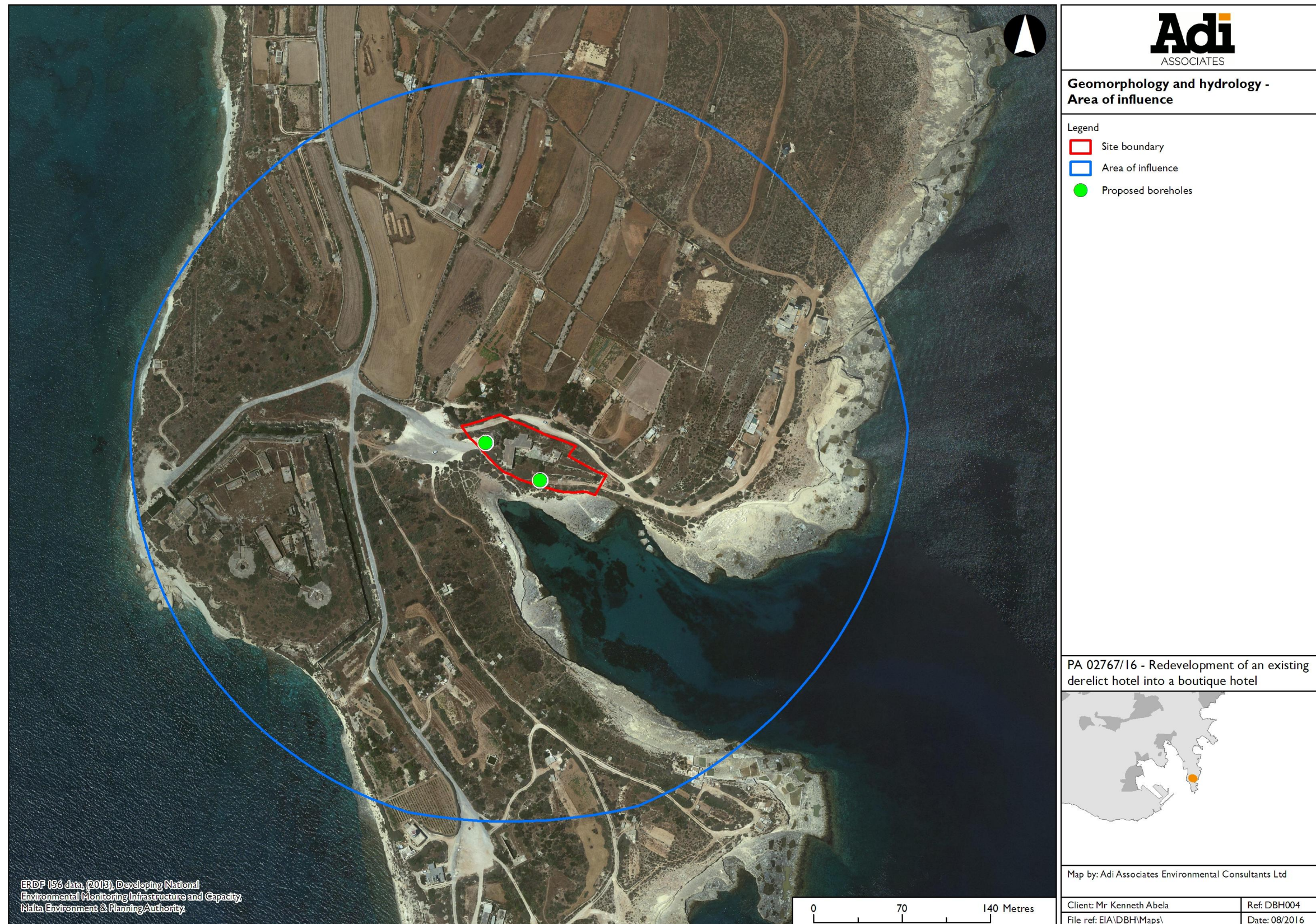
**Figure 1: Area of Influence for Geology Study**



INDICATIVE ONLY - Not to be used for direct interpretation



**Figure 2: Area of Influence for Geomorphology / Hydrology Study and Location of Boreholes**





**Figure 3: Location of Boreholes**





**PA 02767/16**

## **REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA' KALANKA, DELIMARA**

### **CULTURAL HERITAGE METHOD STATEMENT**

#### **INTRODUCTION**

15. This method statement outlines the methodology for the cultural heritage input to the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara. The development is hereinafter referred to as 'the Scheme'.

#### **TERMS OF REFERENCE**

16. The Terms of Reference provided by the Environment and Resources Authority (ERA) are:

#### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).



### **3.5 Architectural, Archaeological, Historical and Cultural Heritage and related Material Assets**

Refer to Appendix 2.

## **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (i.e. if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (i.e. impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:
  - interactions (e.g. summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;
  - interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable developments, activities and land uses and with other relevant baseline situations; and
  - wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
10. The probability of the impacts occurring; and
11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

### **5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME**

#### **5.1 Mitigation Measures**

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see Section 1.2.3 above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see Section 5.4 below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites, conditionalities and side-effects.

#### **5.2 Residual Impacts**

Any residual impacts [i.e. impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

#### **5.3 Additional Measures**

Compensatory measures (i.e. measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

#### **5.5 Monitoring Programme**

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## **APPENDIX 2: TERMS OF REFERENCE FOR A CULTURAL HERITAGE ASSESSMENT (AS PROVIDED BY THE SUPERINTENDENCE OF CULTURAL HERITAGE, AS REVISED IN OCTOBER 2013)**

### **1.0 Preamble**

The proposed project would involve development over an extensive area and may lead to intensification of activity over a larger area. Potential impacts may occur within the footprint of the project, in the immediate environs, and along access routes to the site. Potential impacts may include direct and immediate material impacts, as well as subsequent impacts that might arise from the modification of the existing situation.

### **2.0 Scope and Definitions of the EIA**

For the purposes of this document, cultural heritage is defined by Article 2 of the Cultural Heritage Act (2002). This includes movable or immovable objects of artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological importance.

- 2.1 The study area shall include the total footprint of the proposed development.
- 2.2 In the context of this particular application, cultural heritage considerations may include:
  - Features of archaeological value and potential;
  - Military or civil architecture from the Knights period to British period;
  - Vernacular structures; and
  - Field systems and agricultural features such as irrigation systems.

The above cultural heritage definitions and considerations are not to be considered as exhaustive. The EIA must consider all other forms of cultural heritage, both known and unknown.

2.3 The Environmental Impact assessment will:

- Describe the Cultural Heritage assets within the study area;
- Analyse the cultural heritage features within the context of the cultural landscape;
- Assess the physical, spatial and visual impacts of the proposed development on the cultural heritage assets; and
- Propose corrective measures for the protection of the cultural resources.

**3.0 Methodology**

In quantifying the cultural heritage assets within the study area, and assessing the impacts of the proposed development, the EIA will undertake:

- Description and assessment of the property;
- Desktop and archival research limited to the study area;
- Fieldwork and research, including “field walking”, topographic survey and remote sensing as may be necessary within the site. All fieldwork has to be authorised by the Superintendence of Cultural Heritage as defined below under point 4;
- Consultations with any relevant bodies, including the Superintendence of Cultural Heritage, Heritage Malta, the University of Malta, NGOs and Local Councils;
- Compilation of an inventory of the cultural heritage assets identified within the study area. The features of cultural heritage are to be described and plotted with grid references, on Data Capture Sheets, the design of which should be approved in advance by the Superintendence of Cultural Heritage. The Data Capture Sheets will be presented as an appendix to the EPS. The analysis of the features will be included in the main report; and
- A cultural heritage Risk Assessment Map examining the various impacts of the proposed project is to be included in the EIA.

**4.0 Authorisation by the Superintendence of Cultural Heritage**

As per Cultural Heritage Act 2002, any form of investigation or prospection required for the identification of cultural heritage (including excavation, field walking, topographic survey and remote sensing) may only be undertaken by the Superintendence of Cultural Heritage or with its written approval.

**AREA OF INFLUENCE**

17. The Area of Influence (Aol) for the Cultural Heritage study is illustrated in **Figure I**.

**ASSESSMENT METHODOLOGY**

**Methodology**

18. The Cultural Heritage Study will comprise:
- A baseline survey of the cultural heritage assets (artistic, architectural, historical, archaeological, ethnographic assets) and an evaluation of their importance;
  - An assessment of the impact of the construction and operation of the Scheme on the cultural heritage assets and an evaluation of the significance of these effects;

- Input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage assets; and
- A description of mitigation measures designed to minimise adverse impacts on cultural heritage.

### **Literature search**

19. A literature search in relation to previous survey work relevant to the Aol will be undertaken; this will include review of existing literature, old manuscripts, and reports of earlier discoveries, a study of toponomy, and other material, as relevant. This information, together with the Consultants' knowledge of the area, will provide a context for the baseline surveys.

### **Mapping**

20. 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. The results of the survey will be provided in the form of data cards, as prescribed by the ToR. Each feature will be individually identified with a consecutive numbered reference.

### **Evaluation**

21. Based on literature searches, on 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 1992*<sup>1</sup>, the relevant environmental and planning legislation, and the *Cultural Heritage Act 2002*.

## **IDENTIFICATION OF POTENTIAL IMPACTS**

22. 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.
23. The potential impacts of the Scheme during construction include loss of features through land take up, damage to features, and alteration or degradation of the quality of the setting of the features. The features may be further degraded during the operation of the Scheme.

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<sup>1</sup> The *Structure Plan for the Maltese Islands 1992* has been superseded by the *Strategic Plan for the Environment and Development 2015* (SPED); however, the SPED does not outline policy guidance for cultural heritage in the level of detail that it was outlined in the SPED. In the absence of specific policy guidance, and specifically in respect of the classification of cultural heritage features, reference was made to the Structure Plan.

## **PREDICTION OF IMPACTS**

24. Each of the identified potential impacts will be examined. The survey information will be entered into a Geographical Information System (GIS); this system will enable the mapping of features / areas of cultural heritage importance that will be lost or affected during the construction and operation of the Scheme.

## **IMPACT SIGNIFICANCE**

25. The significance of the impact(s) will include:
- 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 cultural heritage receptor to impact;
  - Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
  - Scope for mitigation / enhancement (very good, good, none).
26. The significance of impacts on cultural heritage is dependent upon the importance assigned to each of the cultural heritage features, either through legislation or by the Consultants, and the degree of disturbance or damage likely to arise from the construction and / or operation of the Scheme.
27. A summary of the significance of the impact will be judged in terms of whether the impact is considered to be **not significant**, of **minor significance**, or of **major significance**. The assessment criteria applicable in relation to determining the significance levels are described in **Table I**.

**Table 1: Impact Significance Criteria**

Potential damage or destruction to features / Class or grade of cultural heritage 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 to the cultural heritage feature (i.e. alterations), which are unlikely to affect the integrity of the feature	Major	Minor	Minor	Not significant
Loss of, or disturbance to, the cultural heritage feature which is likely to affect the integrity of the feature	Major	Major	Minor	Not significant

## IMPACT MITIGATION AND MONITORING

28. The scope for mitigation will be identified, and the need for monitoring of cultural heritage features will be addressed in the Environmental Planning Statement (EPS).



**Figure 1: Area of Influence for Cultural Heritage Study**



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**PA 02767/16**

## **REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA' KALANKA, DELIMARA**

### **TERRESTRIAL ECOLOGY METHOD STATEMENT**

#### **INTRODUCTION**

29. This method statement outlines the methodology for the ecology input to the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara. The development is hereinafter referred to as 'the Scheme'.

#### **TERMS OF REFERENCE**

30. The draft Terms of Reference provided by ERA are:

#### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).

### **3.4 Terrestrial Ecology**

The assessment should include:

1. An investigation of the ecology of the site and its surroundings (including flora, fauna (including any aquatic organisms), benthic, burrowing and pelagic organisms, and their habitats and ecosystems),
2. A reporting of the conservation status and ecological condition of the area and the state of health of its habitats, species and ecological features;
3. A reporting of all protected, endangered, rare, unique, endemic, high-quality, keystone, invasive/deleterious, or otherwise important species, habitats, ecological assemblages, and ecological conditions found in the area under study; and
4. A prediction of the potential impacts of the proposed project on the ecology of the site and its surroundings, including loss, damage or alteration of habitats and species populations (including potential increases in ambient noise levels in the marine environment) including alteration in the habitats and species' condition/state of health as measured through indicators used/specified for assessment of status in relevant EU policy.

In particular, the study should identify all relevant species and assemblages (e.g. protected species or habitats, key species relevant to habitat characterisation, and monitoring indicators), and assess their abundance and distribution patterns as well as the species' ecological niches. The findings should be supported by adequate maps and photographs. Classification of habitat types and species should be conducted in accordance with recognised classification systems (e.g. EUNIS and Palaeartic), to ERA's satisfaction.

## **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (i.e. if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (i.e. impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:

- interactions (e.g. summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;
  - interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable developments, activities and land uses and with other relevant baseline situations; and
  - wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
  8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
  9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
  10. The probability of the impacts occurring; and
  11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

### **5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME**

#### **5.1 Mitigation Measures**

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see Section 1.2.3 above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see Section 5.4 below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites,

conditionalities and side-effects.

## 5.2 Residual Impacts

Any residual impacts [i.e. impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

## 5.3 Additional Measures

Compensatory measures (i.e. measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

## 5.5 Monitoring Programme

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## ASSESSMENT METHODOLOGY

31. The site lies within an Area of Ecological Importance (AEI) and Site of Scientific Importance (SSI), as identified in the Marsaxlokk Bay Local Plan through **POLICY ME01**. The site also lies within the area designated as Delimara National Park (**POLICY MD01**), which recognises the importance of the natural heritage of the

Delimara Peninsula.

### **Baseline methodology**

32. The ecology baseline study will comprise:
- A habitats survey covering the area indicated in **Figure I**. The survey will include a description of the biotic assemblages and communities, which will be characterised based on indicator species, mainly vegetation. Classification of terrestrial community types will follow the scheme outlined in Schembri, 1991 and modified by Schembri *et al.*, 1999. Nomenclature of plant communities will follow the Palaearctic Habitat Classification system (Devillers & Devillers-Terschuren, 1996) and will also be cross-referred with Annex I of the Habitats Directive. Species lists of fauna and flora recorded from the area will be produced. A desk study of previous ecological surveys and other baseline data known from the area shall also be included;
  - The identification, description and analysis of the relevant international / Maltese legislation and protocols, agreements, etc., and Government / PA / ERA policies, and a summary of the threats and opportunities posed by the scheme in respect of the findings will be identified; and
  - A description of the ecological importance of the habitats and species / biotic assemblages and communities.

### **IDENTIFICATION OF POTENTIAL IMPACTS**

33. Potential impacts relate mainly to damage and disturbance to habitats and species in the A of I from contaminated run-off, noise, light, and dust.

### **IMPACT SIGNIFICANCE**

34. The significance of the impact(s) will include:
- 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 receptors to impacts;
  - Probability of impact occurring (certain, likely, uncertain, unlikely, remote); and
  - Scope for mitigation / enhancement (very good, good, none).

35. Based on the above, a summary of the significance of the impact will be judged in terms of whether the impact is considered to be:

- **Not significant:**

- No material change in habitat and/or species of conservation interest;

- **Minor significance:**

- Small-scale loss / disturbance to habitat and/or species of conservation interest;

- **Major significance:**

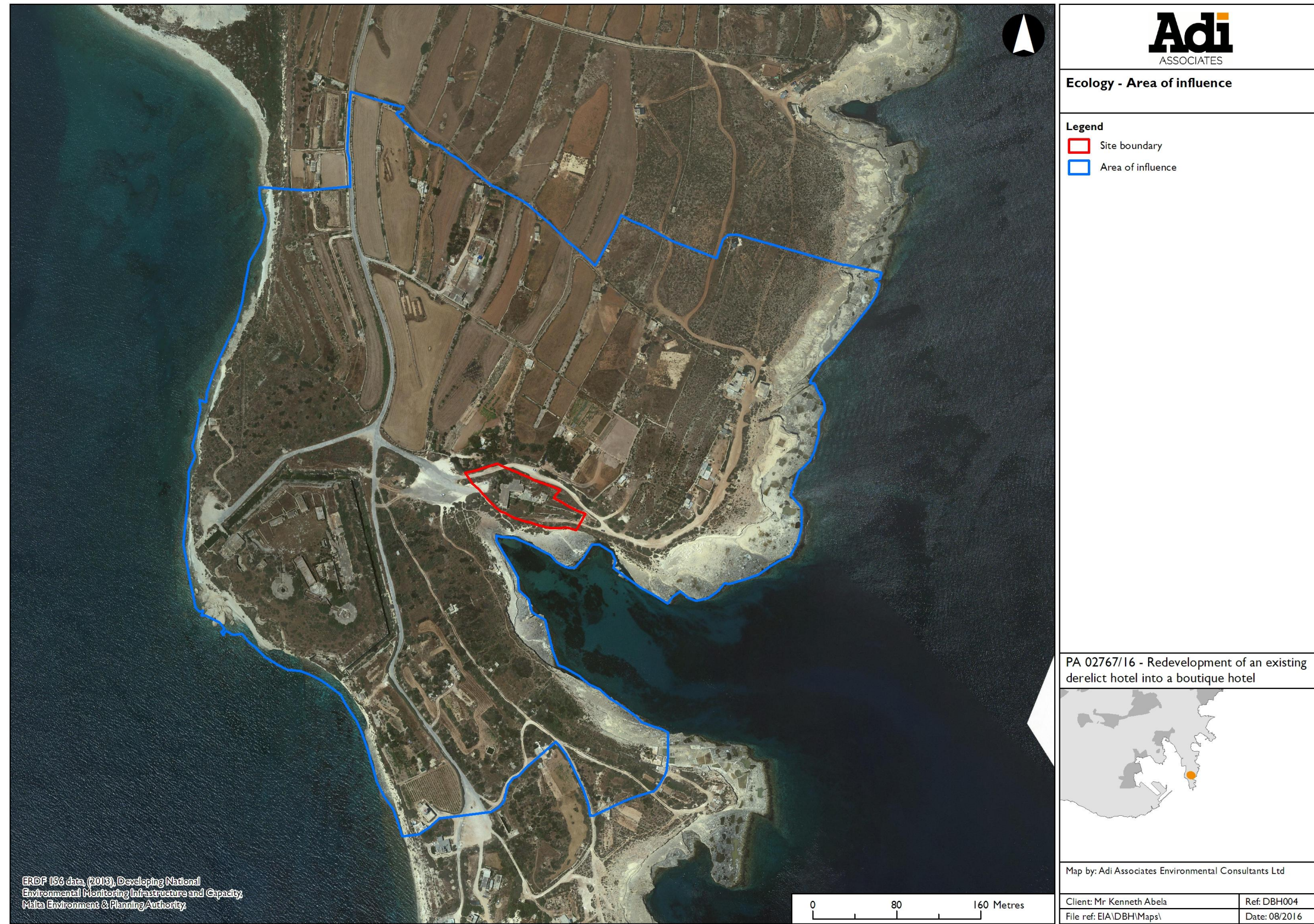
- Large-scale loss / disturbance to habitat and/or in species of conservation interest.

## **IMPACT MITIGATION AND MONITORING**

36. The ecology assessment will describe measures that can be put in place to prevent, minimise and, where possible, offset any significant adverse effects resulting from the Scheme. A monitoring programme will also be prepared, should this be required.



Figure I: Ecology Area of Study



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**PA 02767/16**

## **REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA' KALANKA, DELIMARA**

# **LANDSCAPE AND VISUAL AMENITY METHOD STATEMENT**

### **INTRODUCTION**

37. This method statement outlines the methodology for the visual amenity and landscape impact assessment as part of the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara. The development is hereinafter referred to as 'the Scheme'.

### **TERMS OF REFERENCE**

38. The Terms of Reference provided by the Environment and Resources Authority (ERA) are:

#### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action



plans, management plans, and protective designations such as scheduling or Natura 2000).

### **3.2 Landscape Character and Visual Amenity**

#### **3.2.1 Landscape Character**

The study should describe the landscape-related area of influence and landscape setting of the proposed site, identifying the component character areas and local landscape tracts, and the landscape elements, characteristics and degree of sensitivity thereof, so as to enable the prediction and assessment of:

- The changes to the landscape attributable (in full or in part) to the proposed development;
- The implications of such changes on the quality and perception of the landscape and its elements, in each of the identified landscape character areas and local landscape tracts; and
- The effects of such changes on relevant receptors. (The receptors should also be duly identified and their degree of sensitivity should also be indicated and justified).

Reference should also be made to the Planning Authority's 'Draft Landscape Assessment Study, 2004,' and to the Guidelines for Landscape and Visual Impact Assessment, 2015 (The Landscape Institute & IEMA), as relevant. Sampling and testing should comply with the relevant standards (unless otherwise agreed, BS standards or other recognised equivalents should be used), and should extend to a sufficient depth below the deepest level of the proposed development (taking into consideration all proposed excavations and underground structures). Wherever the study involves the drilling of core samples, the number, depth and location thereof should also be submitted for ERA approval prior to carrying out of any in situ tests.

#### **3.2.2 Visual Amenity**

The following need to be identified and submitted for prior ERA approval:

- The zone of theoretical visibility (ZTV) of the site and the development under consideration; and,
- Assessment viewpoints representative of short-, medium- and long-distance views towards the site. A baseline photograph taken from each proposed viewpoint is also required. The submission should cover all the important views of the site, whilst avoiding the inclusion of superfluous or inappropriate viewpoints (e.g. positions from which the site is not visible, or where the view is obstructed or dominated by physical obstacles in the foreground).

Thereafter, for each approved viewpoint, the projected situation and appearance of the site (i.e. as it would look with the proposed development in place) should be compared to the current baseline situation (i.e. without the proposed development). The following should be predicted and assessed accordingly:

- The expected changes to visual amenity as a result of the proposed development;
- The effects of such changes on the quality of the visual amenity of the site; and
- The effects of such changes on relevant receptors. (The receptors should also be duly identified and their degree of sensitivity should also be indicated and justified).

*Note: The baseline photographs and the photomontages should, unless otherwise directed by ERA, satisfy the following:*

- (a) *The location of each viewpoint should be shown on a map that also depicts the viewshed for the proposed site as described above. The visual angle of the photograph should also be indicated*

*and should not be greater than 50°.*

*Stitched photos that illustrate the field of vision towards the site from each viewpoint are acceptable as long as they are additional to the 50-degree photograph.*

*(b) The photographs and photomontages submitted should:*

- *Be at least A3 in size. Strips which are A3 in width but not in length are not appropriate except as supplementary illustrative material;*
- *Include the date and time at which the photo was taken;*
- *Be of good quality, with faithful reproduction approximating as much as reasonably possible what would normally be visible to the naked eye. The photos should be taken in good weather, and should be taken at least 2 hours after sunrise and 2 hours before sunset. Colours should not be digitally or otherwise manipulated. As a guideline, the image should have a printing density of 200 dots per inch or better. In some instances, digital images having a resolution of 1024 x 728 or better may be required for multimedia presentation purposes;*
- *Be taken in such a manner that near-field objects do not overpower or dominate features near the image plane passing through the project area;*
- *Be taken from a height above ground level that is representative of the eye level of the viewer, and such height should be duly documented; and*
- *Ensure that all additional/replacement structures and features depicted in the photomontages have a scale which proportionately tallies with the existing nearby features.*

*(c) Wherever relevant, the photomontage(s) should cover the following scenarios:*

- *The development without the proposed landscaping scheme, representing the worst-case scenario;*
- *The development complete with the proposed landscaping scheme as it is expected to look when the trees reach maturity, also providing an indicative timeframe as to when such maturity is expected to be attained; and*
- *(where relevant in relation to impact of nocturnal lighting) the development and its ancillary lighting as it would appear during night-time.*

## **Exterior lighting**

In the case of light pollution, the study needs to consider, among others, glare (e.g. the blinding light which is a danger to motorists/pedestrians and to fauna), light trespass (light straying into an area where it is not desired or required) and sky glow ('wasted' light directed upwards), together with any other relevant variables which are relevant to the determination of impact on any surrounding receptors.

## **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (i.e. if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other

relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (i.e. impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:
  - interactions (e.g. summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;
  - interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable developments, activities and land uses and with other relevant baseline situations; and
  - wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
10. The probability of the impacts occurring; and
11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

### **5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME**

#### **5.1 Mitigation Measures**

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or

offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see Section 1.2.3 above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see Section 5.4 below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites, conditionalities and side-effects.

## **5.2 Residual Impacts**

Any residual impacts [i.e. impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

## **5.3 Additional Measures**

Compensatory measures (i.e. measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

## **5.5 Monitoring Programme**

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## **LANDSCAPE AND VISUAL IMPACT ASSESSMENT**

- 39. 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 attributes 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.
- 40. 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.
- 41. 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 site using desktop and field survey techniques;
  - Evaluation of the landscape character of the Scheme site and its setting;
  - Establishment of the key factors that have led to the formation of the current landscape;
  - Establishment of the Zone of Theoretical Visibility (ZTV) 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**

### **Standards and Guidance**

42. The landscape and visual assessment will be carried out in line with the national and international 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 (2013)* – Institute of Environmental Management & Assessment and the Landscape Institute (UK)
  - MEPA's draft Landscape Assessment Study; and
  - *Best Practice Guide – Visual Simulations (2015)* – MEPA.

### **Area of Influence**

43. The Area of Influence has been defined using a combination of desk and field-based techniques. Most notably, the ZTV of the Scheme is identified. This encompasses the roads and public places from where the Scheme Site is visible. The ZTV, viewpoints and baseline photographs are illustrated in **Figure 1**, **Figure 2** and **Figure 3**, respectively.

### **Baseline Data**

44. The visual amenity baseline will be formulated by reference to a series of viewpoints within the ZTV that will be agreed with ERA (see **Figure 2**).
45. 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 *Strategic Plan for the Environment and Development (SPED)*, the *Marsaxlokk Bay 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**

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

#### **Characterisation of the Local Area**

47. 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**

48. 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**

49. 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 (ZTV) has been verified in the field and key viewpoints identified. They include:
- Short distance views; and
  - Medium distance views from publicly accessible locations.

50. The viewpoints locations are illustrated in **Figure I** and listed below:

Viewpoint	Location
1	Delimara Point (looking north-eastwards)
2	Delimara Point (looking south-eastwards)
3	Delimara Point (looking westwards)

51. 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 three viewpoints are set out in **Appendix I**.

### **IDENTIFICATION OF POTENTIAL IMPACTS**

52. Receptors sensitive to the change in the visual amenity will be identified.
53. Potential changes in the landscape will be identified for each of the landscape character areas.

### **Prediction of Potential Impacts**

54. 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.
55. Changes to the landscape will be assessed using the photomontages and the information available in the baselines studies: geo-environment, cultural heritage, and land cover.



## IMPACT SIGNIFICANCE

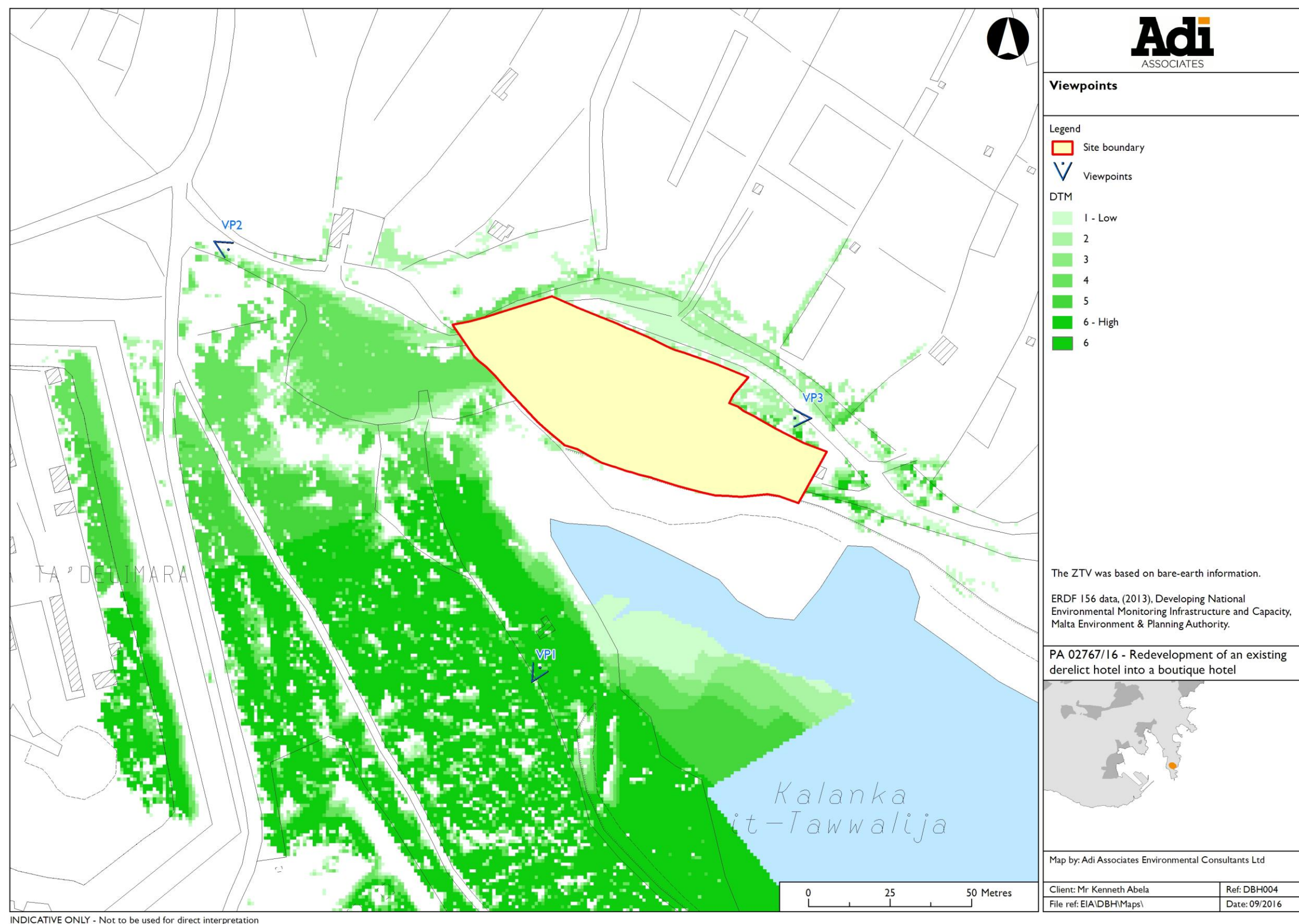
56. This section will include the following information for each potential impact:
- Description of impact;
  - Policy importance of the impact (Local, National, International);
  - Extent of effect on landscape / visual amenity;
  - Duration of impact (temporary/permanent);
  - Adverse or beneficial 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.
57. 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.
58. 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 moderate significance** - discernible changes to the view or landscape that are out of character with the landscape. Where the extent of the negative impact on the landscape character is medium in scale and landscape sensitive receptor is of medium sensitivity to change and/or of medium intrinsic value;
  - **Of major significance** – substantial changes to the view or landscape with little opportunity for changes to be offset by mitigation.



## **IMPACT MITIGATION & MONITORING**

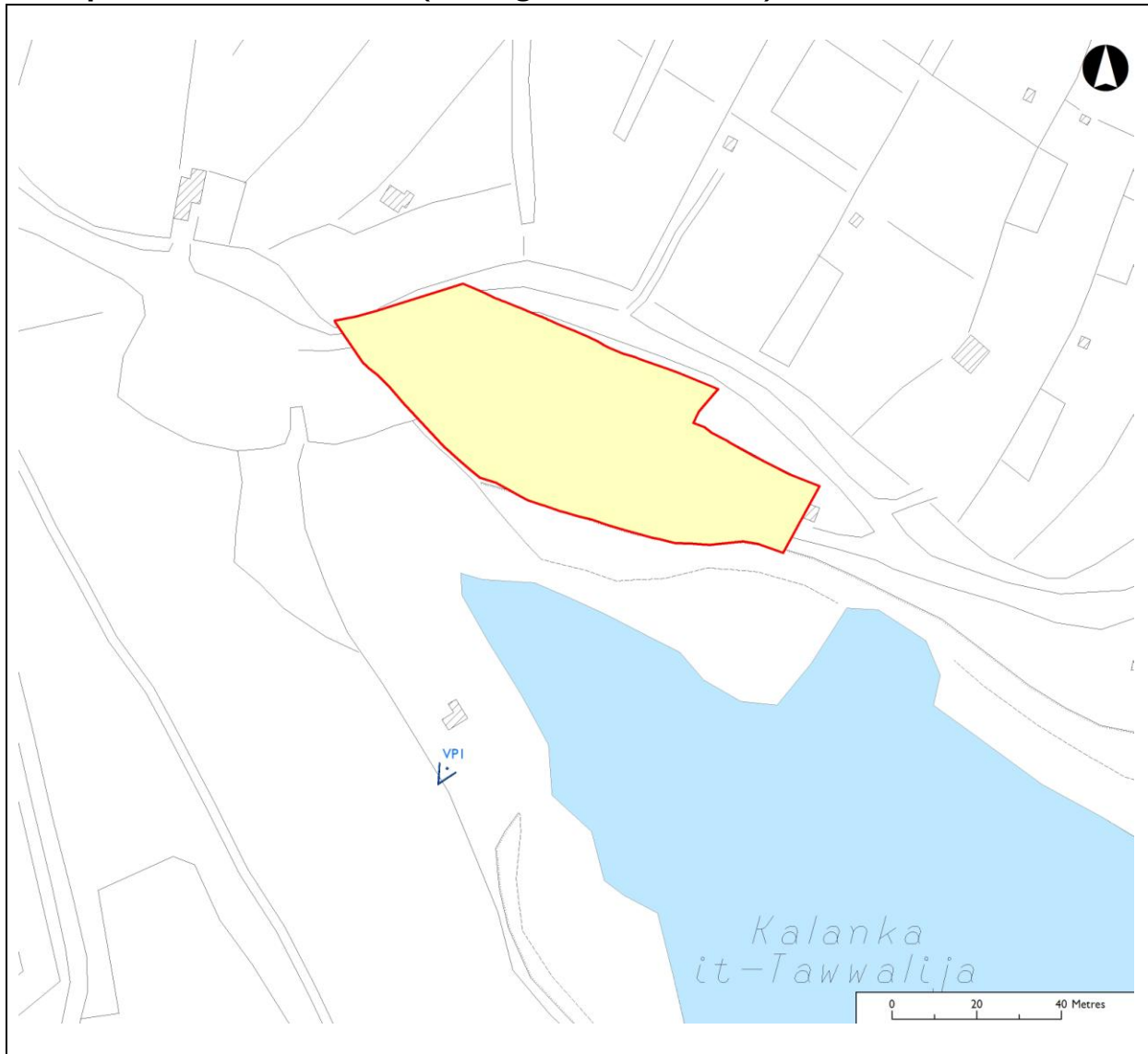
59. It is envisaged that the majority of the mitigation measures will be incorporated in the design of the Scheme so that it fits as closely as possible with the landscape and built character of the area. Landscape proposals will take account of the provisions in the '*Guidelines on Trees, Shrubs and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

**Figure 1: Zone of Theoretical Visibility**

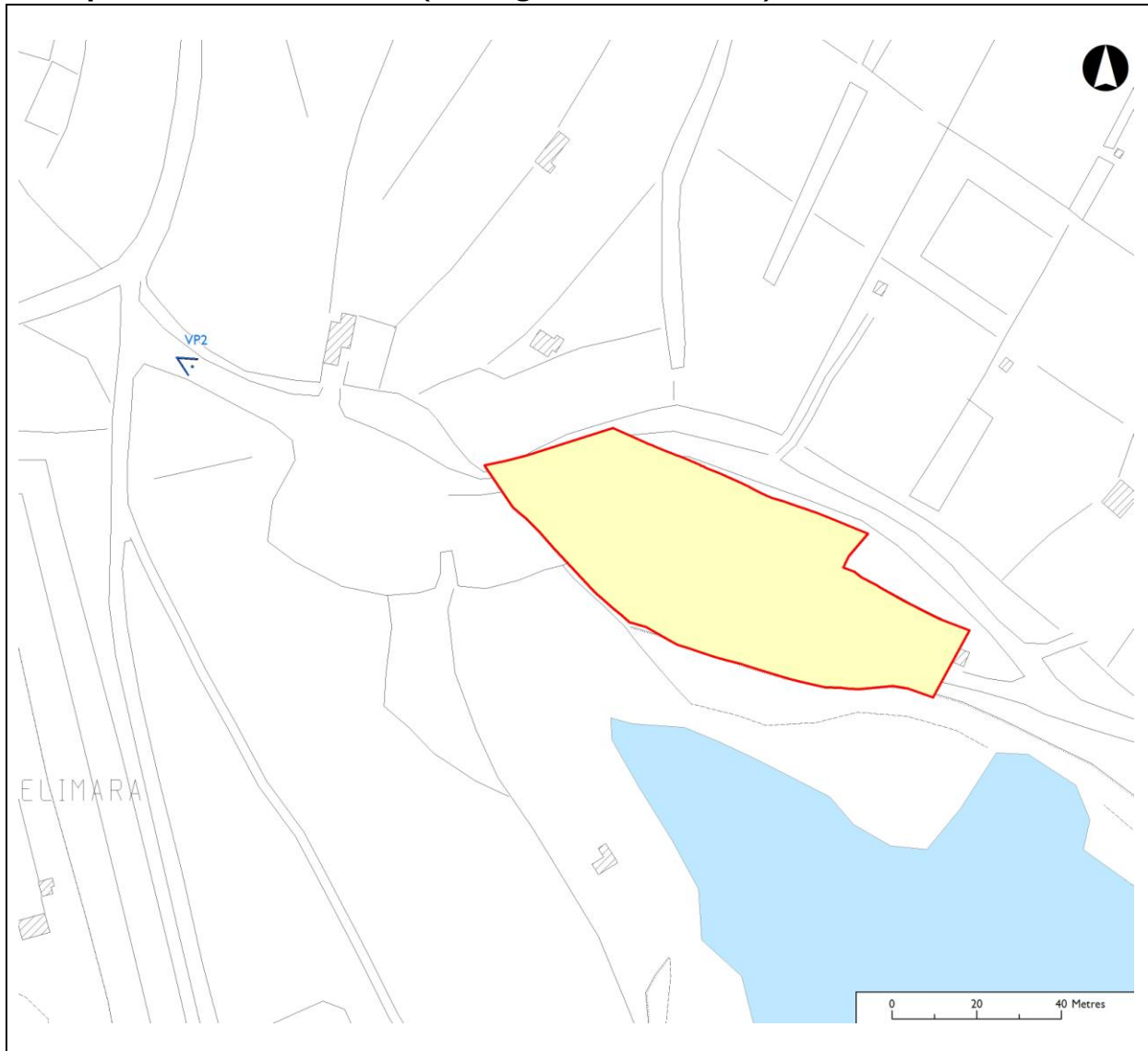


**Figure 2: Viewpoints**

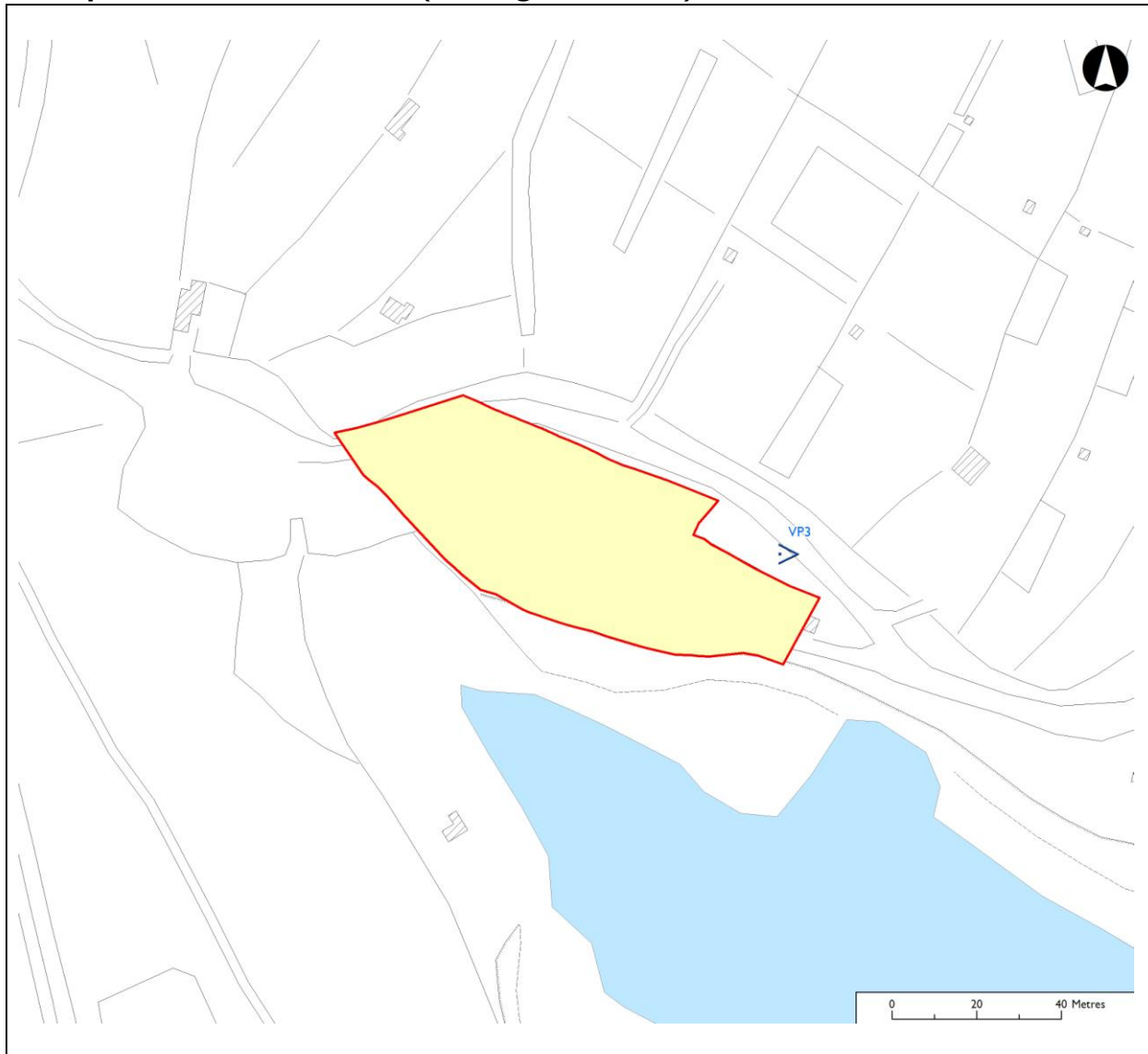
**Viewpoint I: Delimara Point (looking north-eastwards)**



**Viewpoint 2: Delimara Point (looking south-eastwards)**



**Viewpoint 3: Delimara Point (looking westwards)**



**Figure 3: Baseline Photographs**



**Viewpoint 1: Delimara Point (looking north-eastwards)**



**Viewpoint 2: Delimara Point (looking south-eastwards)**





**Viewpoint 3: Delimara Point (looking westwards)**



**PA 02767/16**

## **REDEVELOPMENT OF AN EXISTING DERELICT HOTEL TA' KALANKA, DELIMARA**

### **NOISE AND VIBRATION METHOD STATEMENT**

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#### **INTRODUCTION**

60. This method statement outlines the methodology for the noise and vibration input to the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara. The development is hereinafter referred to as 'the Scheme'.

#### **TERMS OF REFERENCE**

61. The Terms of Reference provided by ERA are:

#### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).

### **3.6 Noise and Vibrations**

This study should provide sufficiently detailed information on representative background levels of noise and vibrations, as a baseline for assessing the levels and effects expected to result from the development, including any short- and long-term changes, peaks and fluctuations as well as their acute or chronic impacts.

The study should also take into account other relevant factors such as:

- Cumulation with other existing sources including traffic and with other predicted sources such as new developments;
- Additional effects of road traffic associated with operations on the site;
- Sensitive receptors (e.g. residents, schools, hospitals, recreational areas, fauna and avifauna, natural ecosystems); and
- The potential for attenuation or exacerbation by 'environmental' factors (e.g. topography, vegetation, physical barriers etc.), and for mitigation (e.g. shielding, muffling/soundproofing, reduced lighting, etc).

The study results should include measurable parameters as relevant, and should be evaluated against appropriate reference values. The reference points and measurement locations used should be approved by ERA prior to commencement of studies and, unless otherwise indicated, should be at ground level.

## **4.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL RISKS**

All likely significant effects and risks posed by the proposed project on the environment during all relevant phases (including construction/excavation/demolition, operation and decommissioning) should be assessed in detail, taking into account the information emerging from Sections 1, 2 and 3 above. Apart from considering the project on its own merits (i.e. if taken in isolation), the assessment should also take into account the wider surrounding context and should consider the limitations and effects that the surrounding environmental constraints, features and dynamics may exert on the proposed development, thereby identifying any incompatibilities, conflicts, interferences or other relevant implications that may arise if the project is implemented.

In this regard, the assessment should address the following aspects, as applicable for any category of effects or for the overall evaluation of environmental impact, addressing the worst-case scenario wherever relevant:

1. An exhaustive identification and description of the envisaged impacts;
2. The magnitude, severity and significance of the impacts;
3. The geographical extent/range and physical distribution of the impacts, in relation to: site coverage; the features located in the site surroundings; whether the impacts are short-, medium- or long-range; and any transboundary impacts (i.e. impacts affecting other countries);
4. The timing and duration of the impacts (whether the impact is temporary or permanent; short-, medium- or long-term; and reasonable quantification of timeframes);
5. Whether the impacts are reversible or irreversible (including the degree of reversibility in practice and a clear identification of any conditions, assumptions and pre-requisites for reversibility);
6. A comprehensive coverage of direct, indirect, secondary and cumulative impacts, including:
  - interactions (e.g. summative, synergistic, antagonistic, and vicious-cycle effects) between impacts;

- interactions or interference with natural or anthropogenic processes and dynamics;
  - cumulation of the project and its effects with other past, present or reasonably foreseeable developments, activities and land uses and with other relevant baseline situations; and
  - wider impacts and environmental implications arising from consequent demands, implications and commitments associated with the project (including: displacement of existing uses; new or increased development pressures in the surroundings of the project; and impacts of any additional interventions likely to be triggered or necessitated by situations created, induced or exacerbated by the project);
7. Whether the impacts are adverse, neutral or beneficial;
  8. The sensitivity and resilience of resources, environmental features and receptors vis-à-vis the impacts;
  9. Implications and conflicts vis-à-vis environmentally-relevant plans, policies and regulations;
  10. The probability of the impacts occurring; and
  11. The techniques, methods, calculations and assumptions used in the analyses and predictions, and the confidence level/limits and uncertainties vis-à-vis impact prediction.

The impacts that need to be addressed are detailed further in the sub-sections below.

#### **4.1 Effects on the environmental aspects identified in Section 3**

The assessment should thoroughly identify and evaluate the impacts and implications of the project on all the relevant environmental aspects identified in Section 3 above, also taking into account the various considerations outlined in the respective sections.

### **5.0 REQUIRED MEASURES, IDENTIFICATION OF RESIDUAL IMPACTS, AND MONITORING PROGRAMME**

#### **5.1 Mitigation Measures**

A clear identification and explanation of the measures envisaged to prevent, eliminate, reduce or offset (as relevant) the identified significant adverse effects of the project during all relevant phases including construction, operation and decommissioning [see Section 1.2.3 above].

As a general rule, mitigation measures for construction-phase impacts should be packaged as a holistic Construction Management Plan (CMP). Whilst the detailed workings of the CMP may need to be devised at a later stage (e.g. after the final design of the project has been approved and/or after a contractor has been appointed), the key parameters that the CMP must adhere to for proper mitigation need to be identified in the EPS. Broadly similar considerations also apply vis-à-vis operational-phase impacts [which may need to be mitigated through an operational permit] and decommissioning-phase impacts [see Section 5.4 below], where relevant.

Mitigation measures for accident/risk scenarios should be packaged as a holistic plan that includes the integration of failsafe systems into the project design as well as well-defined contingency measures.

The recommended measures should be feasible, realistically implementable to the required standards and in a timely manner, effective and reliable, and reasonably exhaustive. They should not be dependent on factors that are beyond the developer's and ERA's control or which would be difficult to monitor, implement or enforce. The actual scope for, and feasibility of, effective prevention or mitigation should also be clearly indicated, also identifying all potentially important pre-requisites, conditionalities and side-effects.

## **5.2 Residual Impacts**

Any residual impacts [i.e. impacts that cannot be effectively mitigated, or can only be partly mitigated, or which are expected to remain or recur again following exhaustive implementation of mitigation measures] should also be clearly identified.

## **5.3 Additional Measures**

Compensatory measures (i.e. measures intended to offset, in whole or in part, the residual impacts) should also be identified, as reasonably relevant. Such measures should be not considered as an acceptable substitute to impact avoidance or mitigation.

If the assessment also identifies beneficial impacts on the environment, measures to maximise the environmental benefit should also be identified.

In both instances, the same practical considerations as indicated vis-à-vis mitigation measures should also apply.

## **5.5 Monitoring Programme**

A realistic and enforceable programme for effective monitoring of those works envisaged to have an adverse or uncertain impact. The monitoring programme should include:

1. Details regarding type and frequency of monitoring and reporting, including spot checks;
2. The parameters that will be monitored, and the monitoring indicators to be used;
3. An effective indication of the required action to address any exceedances, risks, mitigation failures or non-compliances for each monitoring parameter;
4. An evaluation of forecasts, predictions and measures identified in the EPS; and
5. An indication of the nature and extent of any additional investigations (including EIAs or ad hoc detailed investigations, if relevant) that may be required in the event of any contingencies, unanticipated impacts, or impacts of larger magnitude or extent than predicted.

The programme should address all relevant stages, as follows:

- (a) Where relevant, monitoring of preliminary on-site investigations that may entail significant disturbance or damage to site features (e.g. geological sampling or any works that require prior site clearance);
- (b) Monitoring of the construction phase, including the situation before initiation of works (including site clearance), during appropriate stages of progress, and after completion of works;
- (c) Monitoring of the operational phase, except where otherwise directed by ERA (e.g. where monitoring would be more appropriately integrated into an operating permit); and
- (d) Where relevant, monitoring of the decommissioning phase, including the situation before initiation of works, during appropriate stages of progress, and after completion of works.

## **VIBRATION ASSESSMENT**

62. It is considered unlikely that there will be significant vibration impacts on sensitive receptors arising from the construction or the operation of the Scheme; it is therefore proposed to scope out vibration impacts from the assessment, for the reasons explained below. Notwithstanding this, the Scheme involves the excavation of a tunnel through the rock down towards the Bay, and the creation of a swimming

pool on the cliff edge overlooking the Bay, as well as other excavations works. These interventions are likely to result in potential stability issues given that the rock is Globigerina Limestone. These issues, including the impacts arising from vibrations from the excavations, will be assessed in the geo-environment study.

63. The construction period for the Scheme is expected to be relatively short - envisaged to last approximately eight months, with the demolition and excavation phase being approximately 18 days. BS 5228 (Part 4) outlines that the threshold for vibration perception for humans is "...typically in the peak particle velocity range of 0.15 mm/s to 0.3 mm/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". **Table I** outlines the distances at which certain construction activities give rise to a level of vibration that is just perceptible to humans; the information is based on BS 5228 and other studies<sup>2</sup>. The area of influence for impacts on humans can therefore be taken to be the maximum distance where vibration is just perceptible, that is, 20 m from the Scheme Site<sup>3</sup>.

**Table I: Construction Vibration Levels**

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

64. The nearest residential property to the Scheme Site is located approximately 95 m (plan distance) to the east, at its closest point. Having regard to the guidance, it is unlikely that vibrations from the Scheme Site during construction will have any impact on the residents of this property, and it is therefore proposed to scope out from the assessment vibration impacts resulting from the construction of the Scheme on these sensitive receptors.
65. Recreational users visiting the Bay to bathe will be closer to the Scheme Site. Bathers access the Bay from the steps running alongside the southwestern perimeter of the site, but tend to congregate further southeast on the point where there is ladder access to the sea, and where the configuration and terrain of the Bay are more conducive to sitting / lying. This area of congregation extends to directly beneath the cliff on the southeastern edge of the Scheme Site. Therefore, there is the potential for recreational users of the Bay to experience vibration impacts. However, these recreational users generally visit the Bay to bathe, and hence during the summer season. The carrying out of the excavation and initial construction works outside of

<sup>2</sup> Lammas Road Environmental Statement, [www.ashfield-dc.gov.uk/nalc/docs/Chapter%208%20-%20Noise.pdf](http://www.ashfield-dc.gov.uk/nalc/docs/Chapter%208%20-%20Noise.pdf), accessed on 3<sup>rd</sup> April 2006.

<sup>3</sup> The distances outlined in Table 2 assume no mitigation measures in place to interrupt the vibration path.



the summer months would mitigate the vibration impacts on the recreational users, and this would be possible given the relatively short excavation / construction period envisaged. It is therefore proposed to scope out from the assessment vibration impacts resulting from the construction of the Scheme on the recreational sensitive receptors.

66. Regarding operational impacts, given the nature of the development, it is in the interests of the operators to mitigate any vibration arising from plant equipment (extractors, ACs, etc.) which could impact on the amenity and enjoyment of the hotel's future guests. It is therefore considered unlikely that there will be vibration impacts arising from operational plant on either the residential sensitive receptors or the recreational sensitive receptors. It is therefore proposed to scope out from the assessment vibration impacts resulting from the operation of the Scheme.

## **NOISE ASSESSMENT**

### **Construction Noise**

67. As mentioned, the construction period is envisaged to last approximately eight months, with the demolition and excavation phase being only approximately 18 days. Notwithstanding this, there are a number of noise considerations related to any construction works on this site, arising from its sensitive rural location, where the ambient noise levels are currently relatively low. It is therefore considered important to quantitatively assess the potential construction noise impacts on nearby rural dwellers and those recreational visitors attracted to the area because of its quiet, peaceful ambience. The methodology for the construction noise assessment is described below.

### **Operational Noise**

#### ***Noise from the Proposed Restaurant***

68. Again, by reason of the sensitivities of the area, it is considered important to also assess the potential noise impacts arising from the operation of the restaurant to be included as part of the Scheme, which is envisaged to have seating outdoors, and where there is also the potential for outdoor music. The night-time impacts in particular are important to consider. The methodology for this aspect of the operational noise assessment is described below.

#### ***Noise from the Operational Plant Equipment***

69. Regarding operational plant equipment, it is envisaged that the Scheme will incorporate air conditioning units, extractors and water pumps, all of which will generate some noise. However, as mentioned, it is in the interests of the operators to mitigate any noise arising from this plant equipment which could impact on the guests staying at the hotel, both by installing the latest models available and by locating the plant where noise emissions can be controlled and mitigated.

70. Furthermore, as is now the requirement for all new hotels, the operators will be required to apply for eco-accreditation under the Malta Tourism Authority's (MTA) Eco-certification Scheme, and will therefore need to implement a long-term operational sustainability management system. The Eco-certification criteria specifically address noise emissions from a hotel's operations, in the interests of both hotel guests and those living / working in the area around the hotel.
71. Regarding those living in the area around the Scheme Site, it is highlighted that the nearest residential property to the site is located approximately 95 m (plan distance) at its closest point. For all these reasons, it is considered unlikely that there will be any significant noise impact from operational plant equipment on these sensitive receptors. It is therefore proposed to scope out from the assessment noise impacts resulting from this aspect of the operation of the Scheme.

#### ***Noise from Operational Traffic***

72. It is also proposed to scope out from the assessment noise impacts resulting from the traffic generated by the Scheme when it comes into operation, since it is considered unlikely that there will be a significant increase in traffic noise. This consideration is informed by a scoping survey that was undertaken to ascertain the potential for the additional traffic to influence the noise climate at the sensitive receptors likely to be most affected by the increase in traffic, as described below.
73. The Scheme in operation will generate additional vehicular traffic in the area, both during the day and at night. The Simplified Traffic Survey undertaken for the Scheme identifies a maximum of 20 vehicle trips likely to be generated during the weekday peak hour, between 16:00 – 17:00 (taking account of staff changing shifts), and a maximum of 16 vehicle trips likely to be generated during the weekend peak hour, between 20:00 and 21:00 (taking account of patrons arriving at the restaurant).
74. All of the traffic generated by the Scheme will access (approach and leave) the site via Triq Delimara. There are relatively very few residential sensitive receptors located along Triq Delimara. The residential property most likely to be affected by the increase in traffic as a result of the Scheme is located approximately 900 m (driving distance) from the Scheme Site (see **Figure 1**). Notably, this property is currently unoccupied, being under construction; however, it is a legally permitted residential property which is nearing completion and it has the potential to be occupied by the time the Scheme comes into operation. The property directly overlooks Triq Delimara, with the nearest facade (and apertures) being approximately 3 m from the carriageway.
75. The scoping survey involved undertaking day time and night time traffic counts at this residential property (sensitive receptor) in order to ascertain the current traffic flows. To enable comparison with the predicted trip generation figures in the STS, the traffic counts were specifically conducted as follows:
- Day time (Thursday 8<sup>th</sup> October 2016), between 16:00 and 17:00; and



- Night time (Saturday 10<sup>th</sup> October 2016), between 20:00 and 21:00.

76. The day time and night time ambient noise levels at the sensitive receptor were recorded simultaneously, in order to facilitate the prediction of change in the day time and night time noise levels. The noise measurements were carried out in accordance with the noise measurement methodology outlined in British Standard BS 4142: 2014<sup>4</sup>. **Figure 1** also shows the noise measurement location for both the day time and night time noise measurements.
77. **Table 2** shows the recorded traffic counts and the measured noise levels at the sensitive receptor.

**Table 2: Traffic Counts and Measured Noise Levels**

Day Time (Week day 16:00 – 17:00)		Night Time (Week end 20:00 – 21:00)	
Number of Motorised Vehicles	Ambient Noise Level – dB ( $L_{Aeq}$ )	Number of Motorised Vehicles	Ambient Noise Level – dB ( $L_{Aeq}$ )
41	58	12	54

78. The traffic counts reveal that the current traffic flows along Triq Delimara during the day and at night are relatively high given the remoteness of the area and the fact that it is relatively under populated. However, and despite it being October, it was observed that the day time traffic included a significant proportion of traffic to / from St Peter's Pool and Kalanka Bay, and even the night time traffic included traffic travelling to / from Kalanka Bay (even though it was dark). The assessors observed parked cars at Kalanka Bay and at the entrance to St Peter's Pool (on Triq Delimara) during the day time survey and a number of cars parked at Kalanka Bay during the night time survey.
79. The measured noise levels reveal that the ambient noise levels at the sensitive receptor are also relatively high. As observed, the reason for this is because of the proximity of the sensitive receptor to the Power Station (located immediately opposite the property). Noise from the Power Station (continuous whirring / hissing and underlying and continuous hum) was observed to be the most predominant noise source during both surveys; the assessors observed the ambient noise level in the absence of all noise except the Power Station to be in the range of 50 dB to 53 dB, both during the day time survey and during the night time survey. In both cases, the measured ambient noise levels ( $L_{Aeq}$ ) taking account of all noise sources, including traffic, were only marginally higher.

<sup>4</sup> BS 4142:2014, Methods for rating and assessing industrial and commercial sound, British Standards Institution

80. The Institute of Environmental Assessment UK (now IEMA) Guidance Notes No 1 *Guidelines for the Environmental Assessment of Road Traffic* advocates as a general rule that a doubling of traffic flow will increase traffic-related noise by 3 dB(A); the dB(A) increase of more substantial changes to traffic flows are calculated with the formula: *Change in noise in dBA = 10 \* LOG (peak traffic forecast / peak traffic actual)*. This is accepted practice for gauging changes in noise climate associated with changes in traffic flows where the traffic is free flowing at speeds of at least 50 kph and more than 1,000 vehicles per hour (vph). This is not the case here, where the current and predicted traffic flows during the day time and night time peak hours are substantially less than 1,000 vph and vehicles are generally moving slower than 50 kph along the poorly surfaced and narrow Triq Delimara. However, the Guidelines provide a useful gauge of what could be the likely change in traffic noise levels as a result of the Scheme.
81. Furthermore, in terms of human perception of changes in sound pressure levels, it is generally accepted that a 3 dB change in sound level is just perceptible in terms of an increase (or decrease) in perceived loudness, that a 5 dB change is perceived as a noticeable difference, and that a 10 dB change is perceived to be twice or half as loud.
82. In the case of the day time, where the current traffic flow at peak hour is in the range of 41 vehicles and the predicted maximum trip generation from the Scheme in this peak hour is 20 vehicles, the potential is that there will be an approximate 50% increase in the traffic flow along Triq Delimara at the location of the sensitive receptor likely to be most affected (61 vehicles). Hence, there is likely to be a change of less than 3 dB to the ambient noise level at the sensitive receptor, and the receptor is unlikely to perceive a noticeable difference in the noise level.
83. In the case of the night time, where the current traffic flow at peak hour is in the range of 12 vehicles and the predicted maximum trip generation from the Scheme in this peak hour is 16 vehicles, the potential is that there will be an approximate 130% increase in the traffic flow along Triq Delimara at the location of the sensitive receptor likely to be most affected (28 vehicles). Using the above mentioned formula, there is likely to be a change of approximately 4 dB (rounded from 3.68 dB) to the ambient noise level at the sensitive receptor, and the sensitive receptor is likely to perceive a difference in the noise level. Having regard to the magnitude of the change however, it is considered unlikely that this change will be perceived as being significant, or that traffic noise will be perceived to have become a noise nuisance.
84. In conclusion, the scoping survey points to it being unlikely that traffic generated by the Scheme when it comes into operation will have a significant impact on the sensitive receptors. There is the likelihood that current traffic flows during the peak summer months (June to August) are higher than were recorded during the October scoping survey, and therefore that changes to noise levels are likely to be less perceptible to the sensitive receptors than identified through the survey. The

October traffic counts are likely to be representative for the months of May and September.

85. Current traffic flows in November through to April are likely to be lower than were recorded in October, and therefore the change in the noise levels during the day and at night during these months could potentially be higher than identified through the scoping survey. However, it is important to bear in mind that the overall number of vehicles passing in front of the sensitive receptors during these months is unlikely to be higher than the overall number of vehicles passing during the months of May through to September (and may even be lower). Therefore, the ambient noise levels during the day and at night at the sensitive receptors could potentially be lower in the months of November through to April.

## **NOISE ASSESSMENT METHODOLOGY**

### **Standards and Guidance**

86. There is to date no specific guidance in Malta on noise in the context of land use planning<sup>5</sup>. In situations where standards are not available, ERA generally makes reference to equivalent guidance from the UK and ISO standards. In respect of measuring the baseline (background) noise levels, it is considered appropriate to refer to the noise measurement methodology outlined in British Standard BS 4142: 2014. In respect of the construction noise assessment, reference will be made to the British Standard BS 5228: 2009<sup>6</sup> and to the UK Government's Planning Policy Guidance Notes which clarify the applicability of these Standards to land use planning issues (PPG 24: Planning and Noise<sup>7</sup>). Reference will also be made to ISO 1996<sup>8</sup>, in accordance with Annex II of the Environmental Noise Directive (2002/49/EC). In respect of the operational noise assessment, it is considered appropriate to refer to the rating levels outlined in BS 4142.

## **BASELINE NOISE MEASUREMENT**

### **Noise Sensitive Receptors and Noise Measurement Locations**

87. The location of the noise sensitive receptors and the indicative location for the noise (sound level) measurements are shown on **Figure 2**. The baseline noise levels will be established at two locations:

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<sup>5</sup> Malta transposed the Environmental Noise Directive (Directive 2002/49/EC) into national legislation through Legal Notice 426 of 2007. The Regulations designate MEPA as the competent authority for the generation of strategic noise maps, the publication of information on environmental noise, and the drawing up of action plans.

<sup>6</sup> BS 5228: 2009, *Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1 Noise*, British Standards Institution.

<sup>7</sup> Department of Communities and Local Government (UK), Planning Policy Guidance PPG 24, *Planning and Noise*, September 1994.

<sup>8</sup> ISO 1996, *Acoustics - Description, measurement and assessment of environmental noise*, International Organisation for Standardization.

- *Measurement Location 1*: nearest residential sensitive receptor to the Scheme Site - located approximately 95 m (plan distance) from the eastern boundary of the site at its closest point. This baseline measurement will be used in respect of the construction and operational noise assessments; and
- *Measurement Location 2*: recreational sensitive receptors (bathers) - located on the coast of the Bay, approximately 16 m (plan distance) from the southern boundary of the site at its closest point. This location has been chosen having regard to where there is the greatest congregation of bathers and where the sensitive receptors are most likely to be affected by noise arising from the Scheme Site in view of the topography of the area. As mentioned, the bathers generally congregate towards the point, including the area directly beneath the cliff on the southeastern edge of the Scheme Site. However, and because of the change in elevation, it is most likely that those sensitive receptors located towards the edge of the Bay will experience the greater change in noise level because of noise arising from the Scheme Site. The baseline measurement from Measurement Location 2 will be used in respect of the construction and operational noise assessments.

### **Sound Level Measurements**

88. The baseline noise levels will be established by undertaking a total of three sound level measurements, as follows:
- One day-time measurement at both Measurement Locations 1 and 2, having regard to the hours during which construction works will take place (7:00 – 18:00). Both measurements will be undertaken on a week day. Construction works are expected to also occur on Saturday mornings. However, having considered the noise context, the noise climate at these sensitive receptors on a week day is considered to be representative of the noise climate at the same receptors on Saturday between 7:00 and 13:00. These measurements will also be used in relation to the operational noise assessment; and
  - One evening-time measurement at Measurement Location 1, having regard to the peak operational time of the restaurant (20:00 – 23:00). This measurement will be undertaken on the weekend (Friday or Saturday evening).
89. In accordance with BS 4142, the measurement time interval will be determined following observation of the range and fluctuation in baseline (background) noise levels, and based on what is sufficient to obtain a representative value of the baseline (background) sound level during the day and in the evening (as relevant) at the sensitive receptors. In accordance with BS 4142, the measurement time interval for the baseline (background) sound level surveys will not be less than 15 minutes.

### **Measurement Protocols**

90. A Type I Norsonic 140 NNR (Noise Nuisance Recorder), calibrated according to the guidance, will be used to take the baseline noise measurements. The sound level meter will be field calibrated before each set of measurements, in accordance with the guidance. The sound level meter will be placed on a tripod stand 1.5m off the ground and, to minimise the influence of reflections, the measurements will be taken at least 3.5m from any reflecting surface other than the ground. The measurement position, height and the distance from any reflecting structure other than the ground will be recorded.
91. As a precaution against wind interference, a Norsonic 1434 windshield will be used to minimise the effects of turbulence at the microphone. Weather conditions prevailing during all sound level measurements will be recorded. All measurements will be undertaken when wind speeds are 0.1 m/s or lower, in accordance with the Standard.
92. During the measurements, observations of all predominant noise sources will be recorded, and efforts will be made to identify / describe acoustic events and the phenomena attributable to these noises.
93. The following parameters will be measured and recorded:
  - $L_{Aeq(T)}$  (equivalent continuous A-weighted sound pressure level recorded over the relevant time interval of interest;
  - $L_{AFmax}$  (maximum A-weighted sound pressure level recorded over the time interval of interest, with fast time weighting);
  - $L_{AF10}$  (A-weighted sound pressure level exceeded for 10% of the time interval of interest, with fast time weighting); and
  - $L_{AF90}$  (A-weighted sound pressure level exceeded for 90% of the time interval of interest, with fast time weighting).

### **CONSTRUCTION NOISE ASSESSMENT**

94. The methodology for assessing the impact of construction noise involves predicting the noise level at the sensitive receptors at each phase of the construction stage. Noise from construction sites is produced by a range of different activities and types of plant and machinery, the noise from which varies by location and over time, as well as in intensity and character. BS 5228 (Part 1, Annex F) outlines a method for determining the noise level of construction noise sources allowing for a reasonably accurate prediction of the noise levels at the sensitive receptors. Annex C of BS 5228 provides sound level data in relation to typical construction site activities, plant and machinery; the data in Annex C is considered to be generally applicable for the purpose of predicting the sound levels of the activities, plant and machinery envisaged to be used in the construction of the Scheme.



95. BS 5228 (Part 1, Annex E) outlines criteria for assessing the significance of construction noise impacts; these include threshold values for day time noise levels at residential sensitive receptors and triggers for eligibility for noise insulation in relation to day time noise levels at the sensitive receptors. The guidance cites a week day (excluding evenings) threshold value of 65 dB in cases where the ambient noise level (the measured baseline noise level) is less than 65 dB (when rounded to the nearest 5dB), a threshold value of 70 dB in cases where the ambient noise level is 65 dB (when rounded to the nearest 5dB), and a maximum threshold value of 75 dB in cases where the ambient noise level is higher than 65 dB; the guidance also cites a noise insulation trigger value of 75 dB. In the case of weekends, the guidance cites a threshold value of 55 dB in cases where the ambient noise level is less than 55 dB (when rounded to the nearest 5dB), a threshold value of 60 dB in cases where the ambient noise level is 55 dB (when rounded to the nearest 5dB), and a maximum threshold value of 65 dB in cases where the ambient noise level is higher than 55 dB.
96. Based on this guidance, the following criteria will be used to assess the significance of impacts of the construction of the Scheme on the noise climate at the sensitive receptors:
- **Not significant** – if the noise level at the sensitive receptor does not exceed the threshold value of 55 dB;
  - **Minor significance** – if the noise level at the sensitive receptor is greater than 55 dB but does not exceed 65 dB;
  - **Moderate significance** – if the noise level at the sensitive receptor is greater than 65 dB but does not exceed the maximum threshold value and noise insulation trigger for day time of 75 dB; and
  - **Major significance** – if the noise level at the sensitive receptor exceeds the maximum threshold value and noise insulation trigger for daytime of 75 dB.

## OPERATIONAL NOISE ASSESSMENT

97. The noise arising from amplified outdoor music will be determined by calculation, using the noise source sound power levels to determine the noise likely to be generated during operation of the Scheme. The predicted noise level at the sensitive receptors will be determined by applying a distance adjustment, taking account of the distance to the receptors. As mentioned, the additional noise arising from outdoor patrons chattering, and from the general activity on the terrace of the restaurant, will be qualitatively assessed.
98. BS 4142 provides a methodology for rating and assessing noise of a commercial (and / or industrial) nature. The significance of the noise depends upon both the margin by which the 'specific sound level' (operational noise arising from the Scheme) at the sensitive receptors exceeds the 'background sound level' (measured baseline noise level), and the context in which the noise occurs.

99. The assessment methodology outlined in BS 4142 is based on obtaining an initial estimate of the impact of the Scheme by subtracting the measured 'background sound level' (baseline) from the rating level (the specific sound level which has been corrected for character, such as tonality, impulsiveness, or intermittency) and using the difference to assess the magnitude of the impact. Typically, the greater the difference, the greater the magnitude of the impact (as shown in **Table 3**).

**Table 3: BS 4142:2014 Assessment Criteria**

Difference	Assessment
Around +10 dB or higher	Likely to be an indication of a significant adverse impact, depending on the context
Around +5 dB	Likely to be an indication of an adverse impact, depending on the context
The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound, this is an indication that the specific sound source will have a low impact, depending on the context.	

100. Based on the above, the following significance criteria will be used to assess the significance of impacts of the noise arising from the operation of the Scheme on the sensitive receptors:
- **Not significant** - no material change in the noise climate (a change of less than 3 dB to the measured baseline noise level at the sensitive receptor);
  - **Minor significance** - a change of between 3 dB and 5 dB to the measured baseline noise level at the sensitive receptor;
  - **Moderate significance** - a change of between 6 dB and 9 dB to the measured baseline noise level at the sensitive receptor; and
  - **Major significance** - a change of 10 dB or higher to the measured baseline noise level at the sensitive receptor level.
101. In accordance with BS 4142 (Section 11), the initial estimate of the magnitude of the impact may need to be modified to take account of the context in which the noise will occur – in this case the context at the sensitive receptors - for example, the acoustic environment, and having regard to the absolute level of noise, the character and level of the background (baseline) noise compared to the character of the specific sound level (operational noise arising from the Scheme), and the sensitivity of the receptor. The influence of the context will only become clear once the baseline survey has been undertaken and the nature and character of the existing source noises have been investigated.
102. Based on the initial estimate of the impact, and any modification to take account of the context, a final assessment will be made of the significance of impacts of noise arising from the operation of the Scheme, in terms of whether the impact is

considered to be **not significant**, of **minor significance**, of **moderate significance** or of **major significance**.

## **IMPACT SIGNIFICANCE**

I03. For each potential noise 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 (very good / good / none).

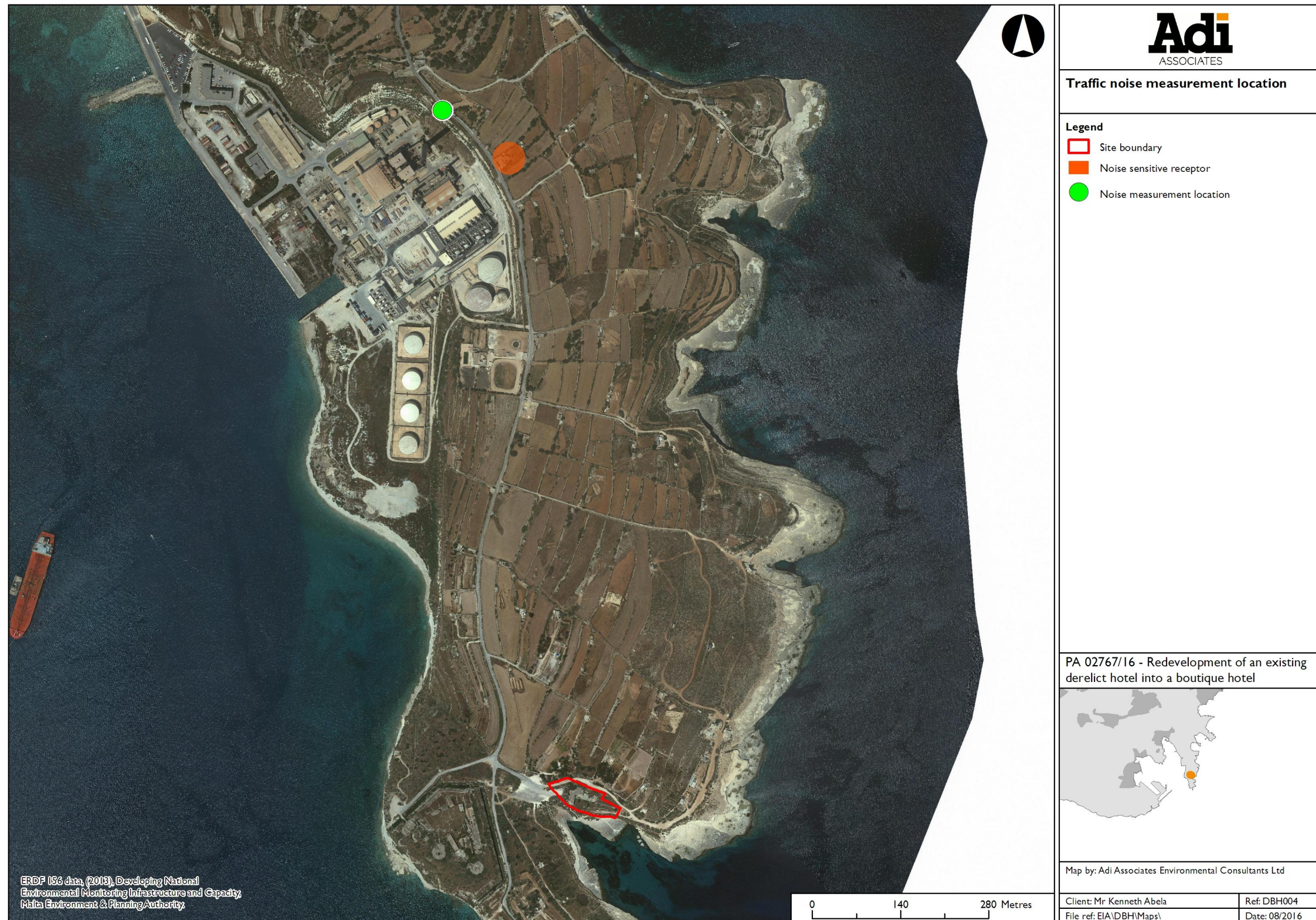
I04. Based on the above criteria, a summary of the significance of the impact will be judged in terms of whether the impact is considered not significant, of minor significance, or of major significance.

## **MITIGATION AND MONITORING**

I05. The scope for mitigation will be identified, and the noise assessment will describe measures that can be put in place to prevent, minimise and, where possible, offset any significant adverse effects resulting from the Scheme. A monitoring programme will also be prepared, should this be required.



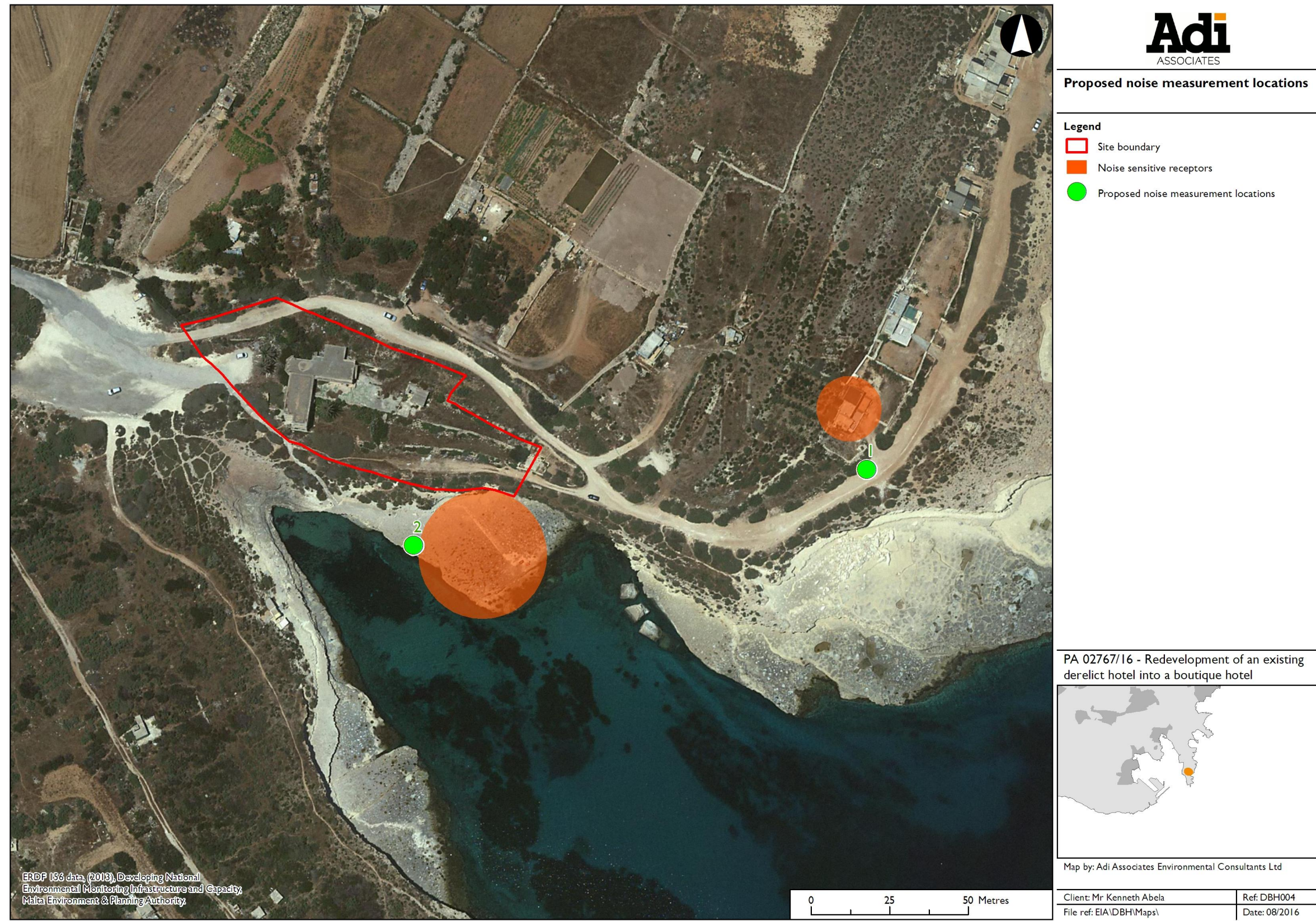
**Figure 1: Traffic Noise Sensitive Receptor and Noise Measurement Location**



INDICATIVE ONLY - Not to be used for direct interpretation



**Figure 2: Construction and Operational Noise Sensitive Receptors and Noise Measurement Locations**





**PA 02767/16**

**Redevelopment of Existing Derelict Hotel at Ta' Kalanka, Delimara**

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**Technical Appendix 2**

## **GEO-ENVIRONMENT BASELINE REPORT**

Prepared by Terracore Ltd

Supporting Documents for  
Environmental Planning Statement

## **PROPOSED CONSTRUCTION OF A HOTEL AT IL-KALANKA, DELIMARA**

Environmental Planning Statement

Geo-Environmental Baseline Study



**Signed declaration in accordance with Regulation 28 (3)**

Director of Environment Protection  
ERA

I, Dr Saviour Scerri, who carried out the Geo-environment Baseline study (or part thereof) for the EPS of the proposed redevelopment of existing derelict hotel at Ta' Kalanka, Delimara (PA 02767/16, hereby declare that such study was solely carried out by me and I take responsibility for any statement or conclusion contained therein.

20 January 2017

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Date



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Signature

## DOCUMENT CONTROL

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PROJECT NAME : Proposed reconstruction of a hotel at il-Kalanka, Delimara

DOCUMENT TITLE : Environmental Planning Statement

DOCUMENT No. : TERR16/KEN001/J2752

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## DOCUMENT ISSUE

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## FOREWARD

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example away from the location of the borehole drilled, these are only for guidance and no liability can be accepted for their accuracy.

The rocks and soils encountered and the samples retained represent a limited amount of the material present in the subsurface at the site. Although the investigation recovered representative samples of the rocks present, some material present on the site may not have been examined. Should significantly different rocks or soils be determined during site works, then further investigation may prove necessary.

Unless otherwise stated in this report, drilling is undertaken using rotary techniques. This method is regarded as being one of the most reliable.

Boring and sampling procedures are undertaken in accordance with:

- BS 5930: 1999; Code of practice for geological site investigations;
- BS-EN 1997:2004 Geotechnical design- PART 1 General rules;
- BS EN 1997 - 2: 2007 Geotechnical Design – Part 2 : Ground investigation and testing ;

Likewise laboratory testing complies with ISRM Suggested Method 1999.

# 1 INTRODUCTION

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## 1.1 GENERAL

This report represents the geo-environment input to the Environmental Planning Statement (EPS) for the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara.

The proposed redevelopment consists in the dismantling of the old structure and construction of a 17-bed Hotel on a site on the edge of Il-Kalanka t-Tawwalija, Delimara (see **Figure 1**).

The primary objective of the project is to provide a Hotel to supplement the existing hospitality industry on the Island of Malta.



Figure 1: Map showing the location of the site at Il-Kalanka, Delimara

This report represents the Geo-Environmental section of the Project Description statement with respect to Geology, Geomorphology, Hydrology and Hydrogeology of the site.



### 1.1.1 TERMS OF REFERENCE

The terms of reference issued were as follows:

***Geology, Geomorphology, Hydrogeology, and Soils***

*A comprehensive investigation of:*

- 1. The geology and geomorphology of the site and its surroundings, including: existing lithological, stratigraphical, palaeontological, hydrogeological and physiographic features and soil types;*
- 2. The geo-technical properties and considerations relevant to the site and its area of influence, including: land stability; mechanical, erosional and structural properties of the terrain and land mass; any relevant fissures, faults, hollows, or weak points; the vulnerability of the site to natural forces such as erosive elements, landslides and mass movements; and any other considerations affecting the implications and risks posed by the proposed development or by any of its ancillary interventions such as site clearance, earth-moving, and excavations; and*
- 3. The quality of the material that will be excavated (including soil, rock/mineral resource, and any existing fill material) and its potential for reuse.*

*Sampling and testing should comply with the relevant standards (unless otherwise agreed, BS standards or other recognised equivalents should be used), and should extend to a sufficient depth below the deepest level of the proposed development (taking into consideration all proposed excavations and underground structures). Wherever the study involves the drilling of core samples, the number, depth and location thereof should also be submitted for EPD approval prior to carrying out of any in situ tests.*

## 1.2 DESCRIPTION OF THE SITE

The site is a large rectangular trapezium-shaped plot of land occupied by a derelict building which apparently once was a Hotel measuring about 4000sqm, lying at an altitude of about 15m above sea level at the edge of a gently tilted shelf at the coast of IL-Kalanka t-Tawwalija, Delimara. The existing derelict hotel is an I-shaped building which together with the surrounding land measures about and measures about 130m long by 40m wide. The site is surrounded by terraced fields

which appear to be semi-abandoned. Considering that these lie at the coastline with no freshwater source at hand. They make poor agricultural land.

The proposed site is located on a tilted block dipping northeast in an area exposing Upper Globigerina Limestone; West of the site is dominated by IL-Fortizza ta' Delimara and the prominent light house manned by the AFM.

To the north the site overlooks the picturesque inlet of il-Kalanka t-Tawwalija.



Figure 2: Google image showing the present conditions of the site and its environs. Note the contrasting land use mainly abandoned agriculture

## 1.3 STANDARDS AND GUIDANCE

### 1.3.1 STRATEGIC PLAN FOR THE ENVIRONMENT AND DEVELOPMENT (SPED)

The SPED replaces the previous Structure Plan (which was published in 1990 and adopted in 1992).

The new Strategic Plan for the Environment and Development (SPED) provides a strategic spatial policy framework for environment and development up to 2020 complementing Government's economic, social and environmental objectives for the same period. The SPED covers the marine

waters up to the extent of 25 nautical mile limit of the Fisheries Conservation Zone (adopted by Council Regulation EC No. 1967/2006).

The SPED provides the following guidance in the form of Specific objectives and arising issues listed in (Table 1).:

<b><u>Theme</u></b>	<b><u>Issues</u></b>
<b><u>Biodiversity</u></b>	Despite the legal protection biodiversity continues to be threatened by land development, invasive alien species, overexploitation and climate change
<b><u>Land</u></b>	The small size of the Islands and high population density result in competing demands for land. There is a tendency towards inefficient use of land through over provision of development
<b><u>Soil</u></b>	arising mainly from increased urbanisation, intensification of agricultural
<b><u>Mineral resources</u></b>	resources Extraction practices lead to wastage of resource
<b><u>Water resources including marine waters</u></b>	Pollution and development that alters the hydromorphology of these waters.
<b><u>Built heritage and archaeological remains</u></b>	Demolition, inappropriate design and use of new and restored buildings which undermines street character as well as pilferage of underwater heritage remain a threat especially if these are not afforded legal protection.
<b><u>Cultural landscape and coastal development,</u></b>	Malta's cultural landscape is threatened by the extent of built up area, industrial taller buildings on urban fringes that obstruct views of historic centres, modern agricultural practices, increased vehicular access, litter, poor standards of design and work, and lack of maintenance.
<b><u>Air quality</u></b>	Malta's significant air pollutants are particulates and nitrogen dioxide mainly arising from traffic, industry and energy generation and ozone mainly from transboundary sources.
<b><u>Noise</u></b>	Heavy traffic is the main source of ambient noise in the Maltese Islands.
<b><u>Use of Chemicals</u></b>	Misuse, poor collection, storage and treatment of chemicals may lead to air, water, and sediment and soil pollution. Pesticides and biocidal products are

	considered to be of particular concern.
<b><u>Solid waste management</u></b>	Malta's solid waste management practice is heavily dependent on landfills with low levels of material recovery. Construction and demolition waste makes up a significant proportion of total solid waste generated and the associated impacts are land take up, pollution and nuisance related to transport and depletion of mineral resources.
<b><u>Climate change</u></b>	The Maltese Islands are vulnerable to the predicted impacts of climate change. A decrease in annual precipitation that may lead to episodes of drought, more intensive storm events leading to flooding and predicted changes in global sea levels are likely to affect ecological processes and consequently the socioeconomic activities and infrastructure which depend on them. Energy including transport is the main source of Greenhouse Gas Emissions. Targets for non ETS sector are challenging.

Table 1: SEA Objectives and respective Issues (Strategic Plan for Environment and Development, Statement of adoption September 2015)

### 1.3.2 STRATEGIC ENVIRONMENTAL ASSESSMENT REGULATIONS, 2010 (L.N. 497 OF 2010)

These Regulations specify the cases in which a strategic environmental assessment must be carried out of certain plans and programmes which are likely to have significant effects on the environment. The aim is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.

#### HYDROLOGY AND HYDROGEOLOGY

**The sources of guidance for the hydrological /hydrogeological study were. The water framework directive** (Directive 2000/60/EC of the European Parliament and of the Council of the 23 October 2000 which establishes a framework for Community action in the field of water policy) is a key piece of legislation that sets a standard in the field of water policy. The Government of Malta has transposed the requirements of this directive into national legislation.

Transposition of this directive is allowed through the Environment Protection Act and the Malta Resources Authority Act. The latter Act delegates the power to issue regulations to the Minister, following consultation with the Authority.

The extent of the vulnerability of the water resources was evaluated in the light of conservation policies and in accordance with:

- EU Directive 80/68/EEC and 98/83/EC: Directive 91/676/EEC on nitrates from agricultural sources *On the protection of groundwater against pollution and*
- *the* Water Framework Directive, 2000/60/EC of the European Parliament, referred to above, which aims to get polluted waters, clean again, and ensure clean waters, are kept clean. A complete list of the EU directives concerning water quality is listed in **Table 1**.

Considering that the hotel lies on a narrow peninsula about 500m wide exposing Middle Globigerina Limestone and Upper Globigerina Limestone, no freshwater bodies can develop.

Other sources of guidance were the Malta Resources Authority annual reports and the draft “Water Policy” and the South Malta Local Plan and Marsaxlokk local Plans.

## 1.4 RELEVANT “STUCTURE PLAN” POLICIES – CONSERVATION OF SITES OF SCIENTIFIC IMPORTANCE

### (i) RURAL CONSERVATION POLICIES

- **RCO1:** Rural conservation Areas is designated as illustrated in the key diagram. Within such areas the following sub-areas will be designated, using World Conservation Union definitions and criteria where relevant:

Item 3: Sites of Scientific importance: sites containing individual species, groups of species and geological features

Item 7: Areas of high landscape value.

- **RCO 4:** Provides that particularly within rural conservation area, areas of scenic value will be protected and enhanced.
- **Legal Notice 160 of 1997** – Rubble Walls and Rural Structures (Conservation and Maintenance) Regulations, which declares rubble walls and non-habitable structures as



protected in view of their historical and architectural importance, their contribution to the character of rural areas, their affording a habitat for flora and fauna, and their vital importance on the conservation of soil and of water.

#### **RCO 11**

In identifying and designation Sites of Scientific Importance in Local Plans, one or more of the following features must be present:

- Level 1: site/area including unique features occupying relatively small area;
- Level 2: site /areas including rare features, occupying relatively larger area than in level 1 above;
- Level 3: sites /areas where control is necessary to preserve the features of nearby sites /areas from internal or external pressures which may threaten their existence or stability;
- Level 4: sites /areas of general geological interest not falling into any of the above levels.

#### **QUALIFICATION CRITERIA**

Sites of scientific importance must possess one or more of the following features:

- A locality of special palaeontological interest;
- A lithostratigraphical type section;
- A locality of geomorphological interest;
- Some other specific feature of scientific importance not listed above.

- **RCO 12 CLASSIFICATION CRITERIA**

Rating of site of scientific importance laid out in policy RCO12 of the structure plan specifies classification according to the 4 levels shown in RCO11.

As outlined under policy RCO12 applicable conservation measures include:

1. Human intervention kept to the barest minimum;
2. No physical development;

3. All efforts made to protect the identified features of scientific interest;

4. Management by the competent Government Agency in an appropriate manner.

- **RCO 21** There is a general presumption against development in areas prone to erosion.
- **RCO 22** The Planning Authority will take positive action to prevent further erosion of sandy beaches, sand dunes, coastal clay slopes, soil and cliff edges.
- **RCO 27** Development, which involves the excavation of significant quantities of Blue Clay, will not be permitted.
- **RCO 28** Valleys will continue to be protected as important catchment areas.
- **RCO 29** seeks to prevent soil erosion and encourage the conservation and management of water resources. No new physical development will normally be allowed on sides of valleys and especially on valley watercourses except for the constructions aimed at preventing soil erosion and the conservation and management of water sources.

## **(ii) SOIL CONSERVATION POLICIES**

- **AHF 4** Soil conservation and soil saving measures will continue to be mandatory on all occasions. Soil replenishment measures will be adopted where there are suitable opportunities;
- **Min 5:** There will be a presumption against surface mineral working in or near areas of acknowledged interest for ecology, archaeology, and in areas of high quality agricultural land. The extraction of significant amounts of Blue Clay will not be permitted;
- **MIN 6** The extension of existing workings ... will be given preference to the development of new mineral works.

## **1.5 OTHER RELEVANT CONSERVATION POLICIES**

Conservation profiles are intended to prevent future potential damages to sites. The conservation model is that adopted by the Earth Conservation Strategy of the English Nature Conservancy Council. In this model sites of geological importance are classified in two groups: Exposure sites and Integrity sites. The conservation of the two groups is treated differently.

- Exposure sites are those whose scientific or educational importance lies in providing exposures of a deposit which is extensive or plentiful underground but which is otherwise accessible only by remote sampling. Sites include outcrops, stream and foreshore sections, and exposures in quarries, pits, cuttings, ditches, mines and tunnels.
- Integrity sites are those whose scientific or educational values lies in the fact that they contain finite and limited deposits or landforms that are irreplaceable if destroyed. These deposits or landforms are usually of limited lateral extent. Examples include caves, karst, glacial and fluvial deposits, and unique mineral, fossil, stratigraphic, structural or other geological deposit and features Site investigation.

A field survey was undertaken to examine the exposed rock and its suitability for recycling or reuse in case of an eventual excavation at the site to BS 5930: 1999; Code of practice for geological site investigations;

Uniaxial compressive strength relative density and water absorption tests were assessed by visual observation of samples collected from the environs of the site.

## 1.6 AREA OF INFLUENCE

### 1.6.1 GEOLOGY, GEOMORPHOLOGY AND HYDROLOGY

The area of influence for geology shall be taken as the proposed site while the area of influence for Geomorphology and Hydrology shall be represented by an Area extending to a radius of about 500m from the site (**Figure 3**).



Figure 3: Google Map showing area of influence for Geomorphology and Hydrology – a circle 500m radius from the site.

## 1.6.2 QUALITY OF THIS STONE MATERIAL

The area of influence for the quality of the material to be excavated shall be marked by the boundary of the site, while the area of influence for the stability of the excavation shall be taken as a line extending for about 10m from the excavation to include any steeply inclined discontinuity that may impact on the stability of the site.

## 1.6.3 BASELINE SURVEY METHODOLOGY

### LITERATURE SEARCH

Based on literature searches and the specialist sub-contracted 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 included:

- To the field survey, a desk study on the geo-environmental characteristics of the A of I was performed reviewing existing literature sources. The geology of the environs of the site is

represented on the Geological Map of the Maltese Islands (OED, 1993) while the lithostratigraphy is described in various papers like Felix 1973 and Pedley, 1978.

- Previous work undertaken in relation to the subsurface geology of the site
- Surface Geology

Previous work on the subject undertaken by the writer comprised impact Assessment of the construction of the Delimara Heavy oil powered Power Station and the new Gas Fired mineral resource assessment of the franka stone quarries at Ix-Xwieki.

#### 1.6.4 FIELD GEOLOGICAL AND HYDROLOGICAL SURVEY

The rock units present at the site under study belong to the Lower Globigerina Limestone Member. A field walk over geological survey has been undertaken to examine the rocks present in the environs of the sites and extending to about 300m from the site. Geomorphological and hydrological field work was undertaken during the same survey. Rock sampling was undertaken for a mineral resource assessment of the site and its environs.

#### 1.6.5 STABILITY OF THE EXCAVATION AND QUALITY OF THE STONE MATERIAL

This shall be determined by visual inspection aided by experience gained by the writer in assessing the quality of the stone material of similar sites.

### 1.7 THE REPORT

The Report comprises the following:

- A baseline geological survey to identify and describe geologic, palaeontological, geomorphologic features including soils on or close to the site and an assessment of their scientific importance. The geo-environmental survey area extended out of the site to cover the catchment basin of the watercourse crossing the site.
- A baseline hydrological/hydrogeological survey to identify and describe the following features: aquifers, water courses, springs, wells, water channels, cisterns, catchment



areas, surface run-off, and any other features apparent on or close to the site to cover the catchment basin of the watercourse crossing the site.

- A baseline survey of the drainage potential of the site. This comprised the delineation of the full catchment upstream of the site and the estimation of its run-off characteristics. The drainage potential study covered the site as well as the entire watershed upstream
- A FIELD survey investigation report including field rock sampling and visual examination applying past experience of the writer on the local stone material will determine possible use of the waste stone material.

The survey will assist the EPS coordinator to assess the impact of the proposed project on the geo-environment.

## 1.8 SIGNIFICANT FEATURES

The most significant features of the site are:

- The location of the hotel on a shelf at the edge of the coastline
- Geomorphology- the pristine inlet of il-Kalanka t-Tawwalija
- Minor Quaternary deposits

## 2 GEOLOGY

### 2.1 STRATIGRAPHY

The five Late Tertiary rock formations that are exposed on the Maltese Islands are, from top to base **(Figure 4)**:

Upper Coralline Limestone (youngest);

Greensand;

Blue Clay;

Globigerina Limestone; and

Lower Coralline Limestone (oldest).

The rock formations exposed in the environs of the Site are:

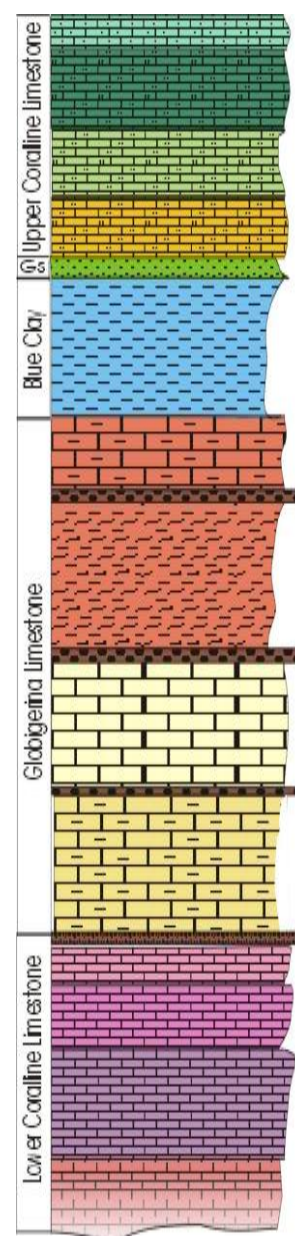
Globigerina Limestone Formation;

Lower Globigerina Limestone Mb

Lower Coralline Limestone Formation

Xlendi Mb.

**Figure 4: Lithological column showing the rock sequence exposed on the Maltese Islands**



The rocks exposed in the environs of the site are the Upper and Middle Globigerina Limestone Members of the Globigerina Limestone Formation **(Figure 5)**.

#### 2.1.1 LOWER CORALLINE LIMESTONE FORMATION

This rock unit does not outcrop in the environs of the site. The nearest exposure is that of il-Mara Mb at Wied Dalam, some 2.5km to the West.

### 2.1.2 GLOBIGERINA LIMESTONE FORMATION

This rock formation is subdivided into three Members:

- Lower Globigerina Limestone Mb
- The Middle Globigerina Limestone Mb and
- The Upper Globigerina Limestone Mb .

The upper units are extensively exposed on the Delimara Peninsula (Figure 5).



Figure 5: Geological map of Site and its environs. Mmg: Middle Globigerina Limestone Mb (yellow colour); Mug: Upper Globigerina Limestone. For scale grid squares measure 1000m by 1000m

The rock unit exposed at the site and within the area of influence is the Upper Globigerina Limestone while Middle Globigerina Limestone is exposed along the cliff line west of the site and in the bays further north (Figure 5).

### 2.1.3 UPPER GLOBIGERINA LIMESTONE MEMBER

**Distribution:** Outcrops of this member are extensively developed on the Delimara Peninsula

Petrographically it can be described as a foraminiferal biomicrite and biomicrosparticle (Giannelli and Salvatorini, 1972) the grey bed which often resembles the middle globigerina bears coccoliths (Bennet, 1980).

**Upper limit:** At the top there is a rapid transition by a rapid increase in the clay content of the bed. The upper limit often gradually it passes into bluish grey or greenish marl and clay in about 1m.

Its thickness is generally quite uniform and is of the order of 14 to 18m, but may go down to 8m.

This member represents the uppermost subdivision of the Globigerina Limestone Formation and is subdivided into a basal phosphate conglomerate bed two yellow limestone units with a bluish grey to greyish green marly interlayer. Rizzo, 1932 recognised four subdivisions and like earlier authors include the top phosphate pebble bed of the pair that usually found above the Middle Globigerina and place the base of the unit on top of the lower of the two a truly phosphor conglomerate bed. Felix like the more recent authors placed both beds within this unit which is subdivided into the following beds:

- **phosphate conglomerate bed** (at the base, C2 or Upper main phosphate conglomerate bed of Pedley
- **-Yellow/orange mottled Limestone,, foraminiferal wackestone facies**
- (white/grey middle bed)- **Foram-Coccolith grey marly facies**
- (top)-**Yellow/orange mottled foraminiferal wackestone facies**

This basal bed is overlain by two layers of fine grained yellow orange mottled due to oxidation of limonite and goethite nodules, intensely bioturbated limestones containing pectinid bivalves with an inter layer of white to greenish grey foraminiferal calcarenite or marl.

The limonite (Goethite) concretions impart a red coloured mottling to this member, which distinguish it from the lower globigerina.

#### **Upper Main Conglomerate Bed**

The phosphate (phosphoglaucinitic) bed constitutes the lower most bed of this member and consists of second widely developed brown phosphate conglomerate up to 60 cm thick overlying a hard ground and erosional surface. Clasts are often well rounded and similar in composition, though of smaller dimensions to those of the TLG Ph conglomerate bed and are immersed in yellow foram wackestone

matrix. Generally accompanied immediately by a massive yellow limestone bed 1 to 2m thick with a second developed phosphate bed above it in which the pebbles are often of smaller dimensions and are widely spaced in the upper globigerina. Moreover this bed is missing in several localities such as over a long stretch along Rdum Dun Nazju. Contrary to the lower conglomerate bed which usually is highly resistant to erosion and stand out as a ledge above the lower globigerina, this bed after forms a niche as it is much less resistant to erosion. Moreover it is much less developed in eastern Malta although it is still consistent east of Rabat at Girdgħi where it consists of a coarsening upward sequence 23cm thick overlain by a second well developed conglomerate bed about 2m above, but can hardly be recognised at Dellimara where it is represented by a few dispersed pebbles less than 1 cm in diameter and which also represents the only outcrops in eastern Malta.

**Macrofauna:** The bed contains a very rich assemblage of macrofauna.

**Molluscs** are represented by pectinids *Spondylus* and *Ostrea* and phosphatised cast of gastropods like *Conus* and *Xenophoria*. Bossio, 1972 reports the presence of casts or moulds of *Aturia cubaensis* and *Aturia formae* from Ras ta'Pinu in Gozo.

Menesini, 1971 recovered phosphatised teeth of *Odontaspis Isurus*, *Procharcarodon*, *Alopias*, *Galeocerdo*, *Hemipristis*, *Sphyrna*, and *Carcharhinus* among the 15 shark species recovered from this bed. The most common teeth are those of *Odontaspis*, *Isurus*, *Procharcarodon* and *Hemipristis*.

A rich unphosphatised Echinoid fauna is represented by *Echinocyamus*, *Pericosmus*, *Schizaster*, *Spatangus*, and *Lovenia*. Less common forms include *Echinolampas*, *Brissopsis* and *Ditremaster*

### **ENVIRONMENT OF DEPOSITION**

The ittiofauna recovered from this bed contains a predominantly pelagic nektonic assemblage and is indicative of water depths in excess of 200m in a sub-tropical climatic regime (Menesini, 1971). Echinoid biofacies indicates water depths ranging from 200 to 250m with the exception of East Gozo where water depths were shallower (Challis, 1985).

The tripartite subdivision of the Upper Globigerina Limestone member comprises:

- **Yellow/orange mottled foraminiferal wackestone facies at the base** (about 8m thick)
- **Coccolith grey marly facies – middle bed** ( about 5m thick)
- **Yellow/orange foraminiferal wackestone facies** (8m thick)



These three beds comprise the topmost member of the Globigerina Limestone and usually are more or less equal in thickness. The basal and upper beds are composed of yellow foraminiferal wackestones. Goethite concretions are common and impart an orange mottling to the Limestone due to oxidation. As with the Lower Globigerina bedding is absent due to intense Thalassinoidean bioturbation. Macrofauna is mainly represented by disarticulated and often fragmented pectinid shells. They exhibit honeycomb weathering due to intense bioturbation by Thalassinoides. The Middle grey marly bed consists of a usually grey coccolith bearing marly limestones petrographically described as mudstones together with Studyktonic and benthonic foraminifera. This bed contains bored lignite.

Macrofossils are sparse although the pteropod Vaginella is quite common and the gastropod Epithonium and the echinoid Schizaster eurynotus. Goethite nodules are absent. Trace fossils are represented by chondrites.

Microforaminifera are however very common especially in the yellow beds and often compose most of the limestones. Planktonic globigerinid microfauna are predominant and include a number of species of Praeorbulina, Globorotalia, Globigerinoides, Globigerinatella and Globigerina. The Studykton/Benthos ratio is of the order of 2:1 (Felix, 1973 fig.6). A rich assemblage of ostracofauna is also present and includes: Buntonia, Ruggieria, Cytherella, Oblitacythereis, Bythoceratina Parakrithe and Krithe, among many others, some of which are restricted to this unit (Russo and Bossio, 1976).

At Delimara the conglomerated bed is replaced by a number (2 or 3) Phosphatised limestone beds. No pebbles or conglomerate was seen during the field survey.

### **PALAEO-ENVIRONMENT OF DEPOSITION**

Felix believes that these beds were deposited in water depths ranging from 40 - 150m in a mid-Tethyan submarine rise. Challis 1979 compares Echinolampas lucae to the modern Conolampas of Malaysia which is most commonly found at around 200m water depth.

### **ECONOMIC IMPORTANCE**

In Gozo the lower limestone layer is known as *gebla tal-kwiener*. It is very resistant to heat and is quarried from Tal-Imghajjen near Xewkija and from Ta' Hamet and other localities for building ovens and small stoves.

#### 2.1.4 QUATERNARY DEPOSITS

The Quaternary deposit (**Figure 6**) consists of a lens shaped body about 6m long by 3m wide composed of a pebble to cobble sized upper Globigerina lithoclasts cemented by a fine red soil matrix (**Figure 7 and Figure 8**)



Figure 6: Google map showing the location of the Quaternary deposit





Figure 7: Photograph showing the relation of the deposit to the Hotel site



Figure 8: Photograph showing detail of the Quaternary Deposit

## 2.2 STRUCTURAL GEOLOGY

The geological map of the Maltese Islands shows that the site passes some 40m from a minor fault which is of no consequence. A small deposit of Quaternary deposits occurs on the fault scarp.

Strata dip some 4 to 6 degrees to the northeast. The Delimara peninsula can be regarded as a tilted block exposing Upper Globigerina Limestone on the east and Middle Globigerina Limestone on the west.



Figure 9: Coastline of il-Kalanka showing stepped strata and dipping Upper Globigerina Limestone beds

## 2.3 CLIFF STABILITY

The existing derelict structure lies close to the edge of a cliff about 12m high exposing Upper Globigerina Limestone (Figure 10), a pale yellow clayey limestone which is always exposed as a vertical low cliff wherever it occurs. Dellimara is the site where it is most developed and reported to be over 25m thick. Considering that the cliff has been standing there for ages and has withstood the

test of time there is no doubt that the cliff is stable. Clayey beds may show some flaking (**Figure 11**) but this does not in any way decrease the cliff stability.

Rock core samples recovered are very good to excellent and have a very low fracture frequency, generally less than 1 per meter. The rock is not fractured and forms stable cliffs. Generally it's a weak limestone with UCS of the order of 2MPa to 5Mpa. Due to its clay content it may shrink on exposure producing irregular joints but with no serious consequences.

Minor block detachment may take place owing to undermining by wave erosion acting on bedding planes or thin marly beds. Proof of this are the boulders presently seen on the shore platform. Of course, this is a slow process and block detachment is considered to be a rare occasion.

A higher but stable cliff can be seen at the southern tip of the Delimara peninsula, out of the area of influence. The shore platform is here occupied by one of the few still active salt pans (**Figure 12**).

Considering the weak nature of the rock it may be easily excavated. However it is recommended that excavations close to the cliff edge are done with a drum excavator or a quarry chain saw so as to disturb the rock as little as possible. Moreover, again due to its weak nature, it is recommended that a 2 to 3m corridor be left between the cliff edge and any excavation (see Figure 14). This will also ensure the stability of the cliff.

The proposed excavation will be very shallow of the order of 2m to 2.5m this will ensure that the cliff edge stability is maintained.





Figure 10: Northern coast at il-Kalanka - Shore platform and retreating cliff and small boulder field exposing Upper Globigerina Limestone



Figure 11: Photograph showing typical weathering of Upper Globigerina Limestone at il-Kalanka T0Tawwalija by flaking



Figure 12: Salt pans cut on the shore platform at the southern tip of the Delimara peninsula

### 2.3.1 ROCK MASS RATING (RMR)

A rock mass rating calculation was done to determine the rock mass classification. This is based on various parameters which include:

1. Intact rock strength
2. RQD
3. Discontinuity Spacing/Orientation/roughness/infill/separation
4. Groundwater condition
5. Length
6. Weathering

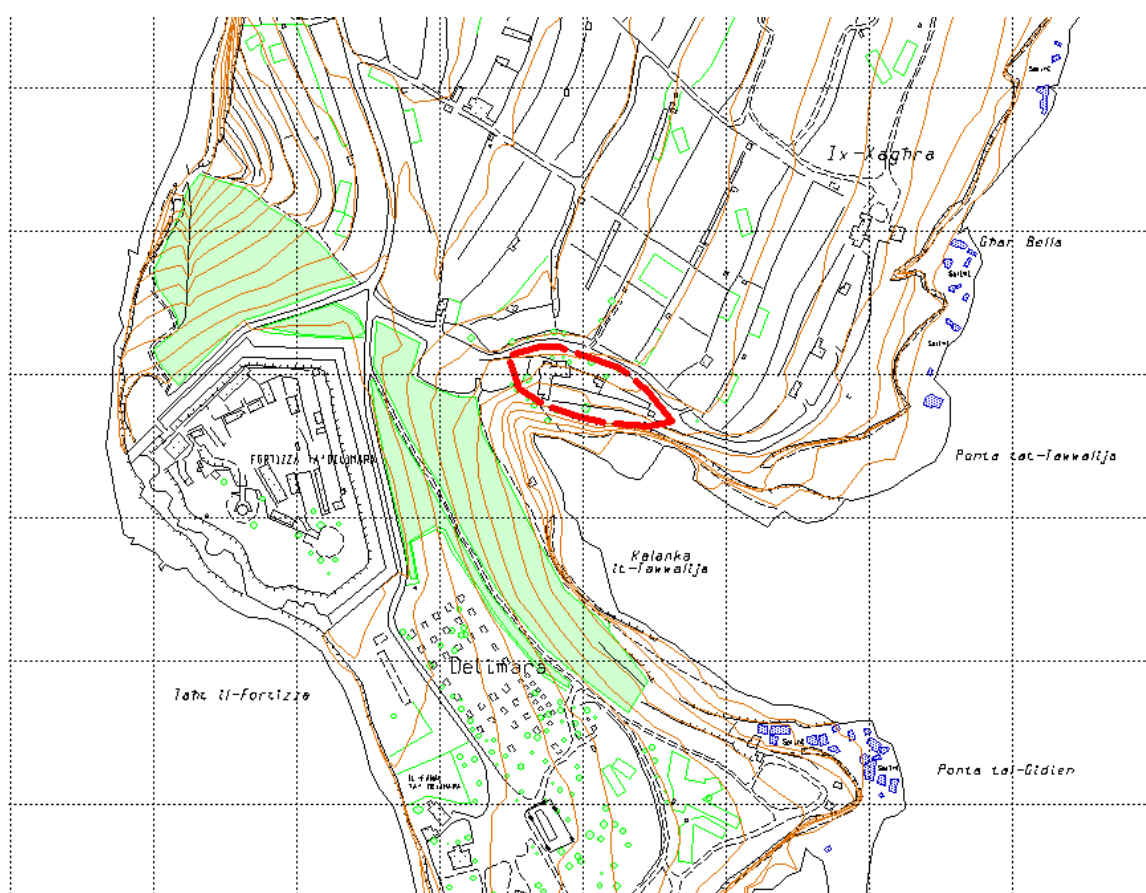
Out of a score of 99, the upper globigerina limestone scored an 86, meaning it has a Class 1: very good rock mass classification



## 3 GEOMORPHOLOGY

### 3.1 GEOMORPHIC FEATURES

The site under study is located on a block dipping to the northeast at about 5 degrees forming the Delimara peninsula (see **Figure 13**), characterized by a deep inlet and two promontories known as Ponta t-Tawwalija and Ponta tal-Gidien (**Figure 10**).



**Figure 13:** Map showing the southern segment of the Delimara Peninsula characterized by a deep inlet and two promontories known as Ponta t0Tawwalija and Ponta tal-Gidien

This peninsula is characterized by:

- A high coastline on the west 25m high. This particular morphology is the result of relatively fast wave erosion on Middle Globigerina Limestone strata dipping to the NE combined with overlying Upper Globigerina Limestone which acts as a protective competent cap
- A low stepped coastline or shore platform, on the east is indented with a number of inlets the

closest of which are: Il-Kalanka (or il-Qala) t-Tawwalija. The steps mark the differential erosion of the thick beds that make up the Upper Globigerina Limestone Mb.

- Undermining of Upper Globigerina Limestone strata has produced a retreating low cliff giving way to the formation of a shore platform occupied by derelict salt pans (See **Figure 10**).
- Quaternary deposits. These have been generated by a fault the traverses the inlet.
- There are no watercourses.



Figure 14: Google image showing the relationship between the hotel site, the cliffline and the shore platform developed on Upper Globigerina Limestone

## 3.2 SOILS

The site where the development is located lies on Upper Globigerina Limestone Mb of the Globigerina Limestone Formation. The region is mainly characterised by dry agricultural land.

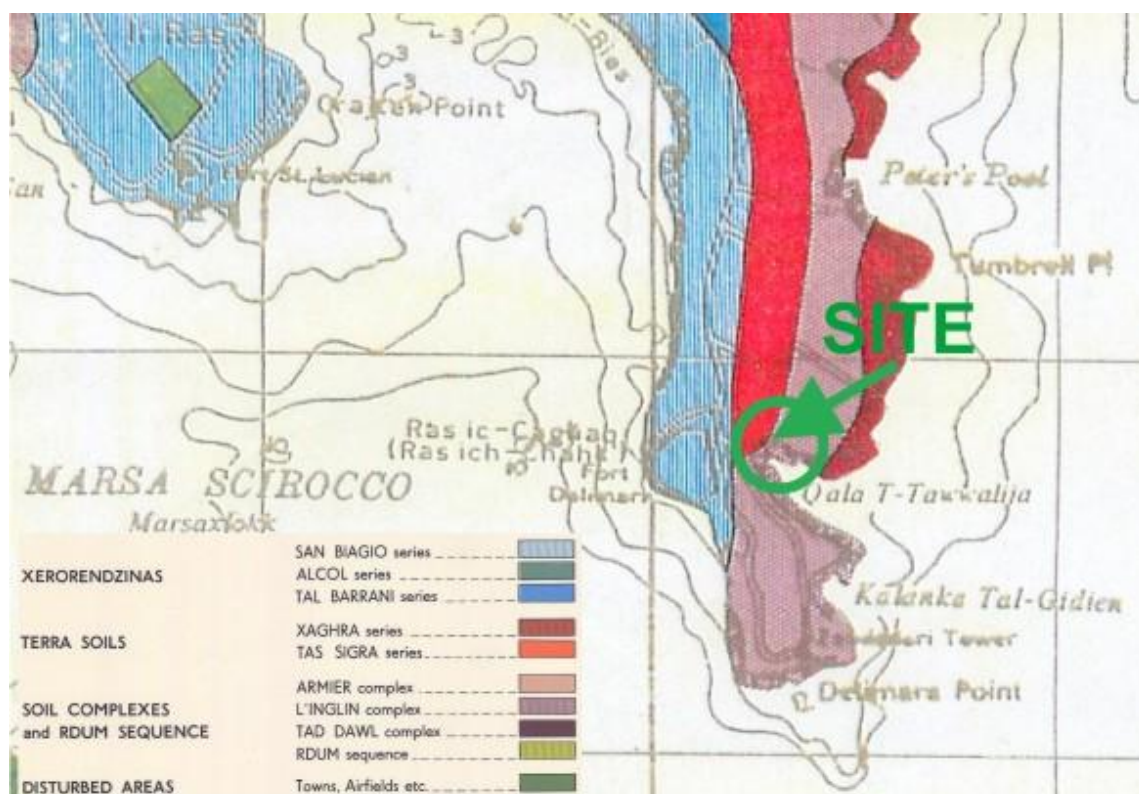


Figure 15: Lang's Soil Map (part) of the site and its environs (Lang, 1962)

The site has already been disturbed by past construction activities.

The soils found in the environs of the site are (Figure 15):

- Xaghra soil Series
- Inglin Complex
- Tal Barrani soil series

### **XAGHRA SOIL SERIES**

The Xaghra Soul Series usually represents the thin scattered soil patches developed on rocky morph such as the Upper Coralline Limestone Lower Globigerina Limestone and Lower Coralline Limestone. Here it is represented by bare rock outcrops of the Upper Globigerina Limestone Mb.

### **INGLIN COMPLEX**

**L'INGLIN COMPLEX** is a man-made soil complex is characterized by intense terracing in the valleys surrounding the site. It is a pale brown to red shallow to moderately deep, and light to heavy textured soil resembling Xaghra Soil from which it was largely derived to form terraced fields.



They occur on the broad, low gentle globigerina hills mainly in southern Malta. These soils have developed on the massive fine-textured lower globigerina limestone. Slow weathering of these rocks in the past climates gave rise to a partially decalcified residue of sesquioxide of iron which accounts for the brown colour.

The total calcium carbonate content varies from 70 to 80%.

### **TAL-BARRANI SOIL SERIES**

**TAL-BARRANI SOIL SERIES** - This soil series covers a broad range of shallow to moderately deep, reddish brown to brown, medium to heavy textured soils with a fine granular layer under a thin surface crust. They are moderately decalcified, with a humus-enriched surface layer and possess an A C D profile on a calcareous parent material.

### **HUMAN TERRACING AND INTERFERENCE**

Under the local climatic regime of a long dry summer and a short wet season with frequent heavy showers soils are usually easily eroded. However this has been prevented by terracing. In fact over the years, in order to preserve his scanty soil resource the local farmer has actually remodelled the land surface especially the hill slopes by terracing and building of rubble walls to protect the soil from the agents of erosion. The only areas which have escaped profound human intervention are the nearly level areas of deep soil in the erosional and structural valleys as well as the hard limestone plateau where the principal human intervention was the construction of rubble walls. However, even here man has re-sculptured the land surface. In these areas the soil was carefully removed the irregular and usually sloping rock outcrop was hewn and levelled and the soil.

Material was carefully and regularly spread over the entire surface. The excess material was usually disposed off by building rubble walls which act as wind breakers as well as prevented run-off water from eroding the soil.

Such terracing has been even more drastic in the globigerina areas as the limestone is very soft and hence man could cut even deeper thus giving rise to terraces separated by a depth interval which could be a metre or two. In these circumstances the scarce soil material has been supplemented by fine rock fragments and rock flour produced during terracing of the hill slopes as well as during the excavation of water reservoirs and building stone quarrying.

Soil material has always been recognised as a scarce resource and the literature refers to the transport of ship- loads of red soil from Sicily for the construction of the Maltese fields during the early days. However this is very unlikely, the only material that could have been imported was ballast for the ships.

## 4 HYDROLOGY AND HYDROGEOLOGY

---

### 4.1 SCOPE

A hydrological / hydrogeological survey of the Area of Interest was undertaken to identify and describe the following features: aquifers, water courses and their corresponding water catchment areas, drainage patterns of the site, springs, wells, water channels, cisterns, surface run-off, recharge, and any other hydrogeological features.

### 4.2 HYDROGEOLOGICAL AND HYDROLOGICAL FEATURES

The Delimara peninsula is only about 600m wide in the environs of the site and no watercourse are developed.

The only hydrological features close to the site is the catchment of il-Kalanka t-Tawwalija which has a very small area of about 900 sq m (**Figure 16**). The site falls within this catchment.

#### 4.2.1 THE MEAN SEA LEVEL AQUIFER

The rock is mostly impermeable and is not regarded as an aquifer. Moreover the peninsula is too narrow and even if an aquifer existed this would be seawater.

#### 4.2.2 THE CATCHMENT OF THE SITE

The site is surrounded by terraced fields so that any water coming from the roads upstream will be diverted downstream towards Il-Kalanka.

During construction the site will be a deep excavation having a catchment restricted to its boundary. A short dry watercourse about 100m long is associated with this catchment.

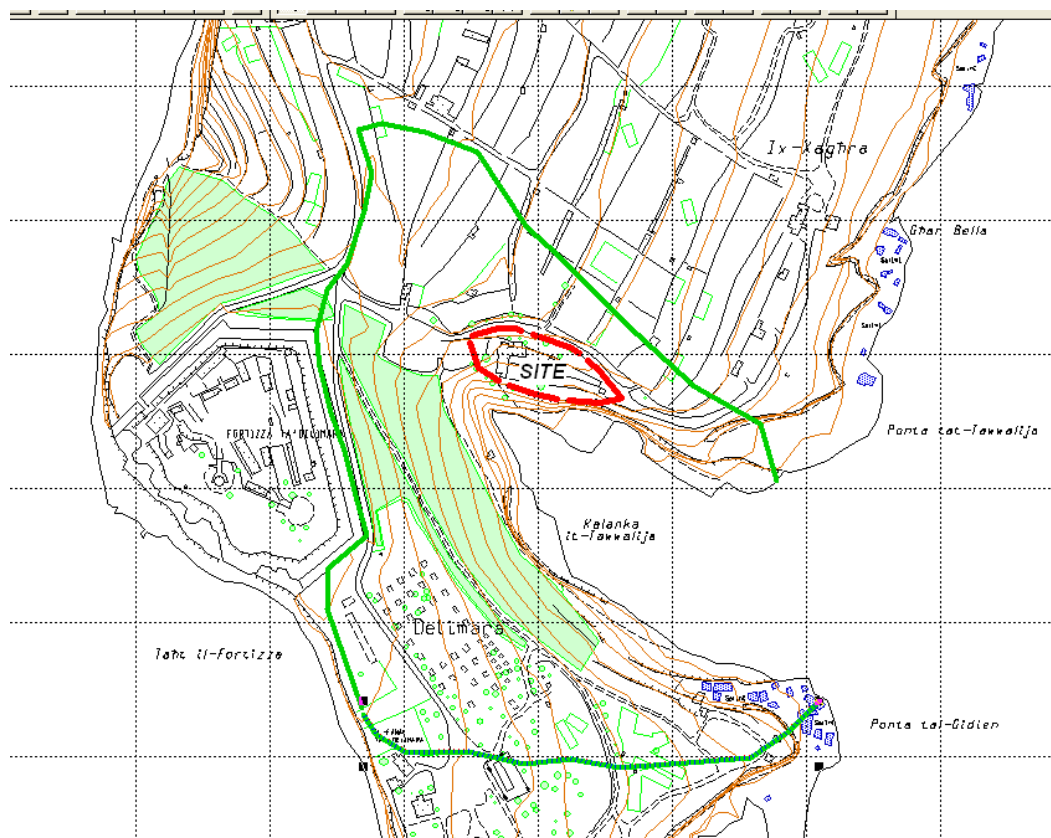


Figure 16: Map showing the cathment of il-Kalanka t-Rawwalija (Green line)

#### 4.2.3 OTHER

The Delimara Peninsula was traversed by an irrigation canal system fed from the Sant'Antnin Waste recycling plant. The system has now fallen into a derelict state and is no longer used.

## 5 ASSESSMENT OF THE STONE MATERIAL TO BE EXCAVATED ASSESSMENT

---

### 5.1 INTRODUCTION

In order to assess the quality of the stone materials a ground investigation was undertaken to examine the quality of the Upper Globigerina Limestone in exposures close to the site.

For this purpose two holes each 10m deep were drilled in the Hotel Grounds (**Figure 17**) using a T44 rotary drilling machine equipped with a T276 double tube core barrel and water circulation.

Drilling logs are found in **Appendix 1**, core logs in **Appendix 2** while laboratory test results are found in **Appendix 3**.



Figure 17: Google image showing location of the two investigation holes.



## 5.2 THE FINDINGS

### 5.2.1 ROCK SEQUENCE

Both holes recovered the same sequence of rock strata characterized by pale yellow limestone at the top grading into dark grey marly limestone (Figure 18).



Figure 18: Photographs of the core samples recovered from BH1 during ground investigation. Fractured rock is mainly due to mechanical damage

### 5.2.2 QUALITY OF THE RESOURCE

The rock core samples recovered consist of clayey and marly limestone beds of the Upper Globigerina Limestone Mb of the Globigerina Limestone Formation.

Owing to the clay content present this rock shrinks and cracks on drying.

Marly beds crumble after long exposure.

Owing to the clayey and marly nature of the rock it finds no use in the local building industry.

### 5.2.3 FUTURE EXCAVATIONS

The cliff section shows that excavations in Upper Globigerina Limestone are stable. Owing to the clayey nature of the rock shrinkage cracks might develop on exposure, but the stability is not jeopardised.

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## 7 PLATES – PHOTOGRAPHS OF CORE SAMPLES

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Plate 1: Photograph of core sample recovered from BH1 Run No.1 and No.2

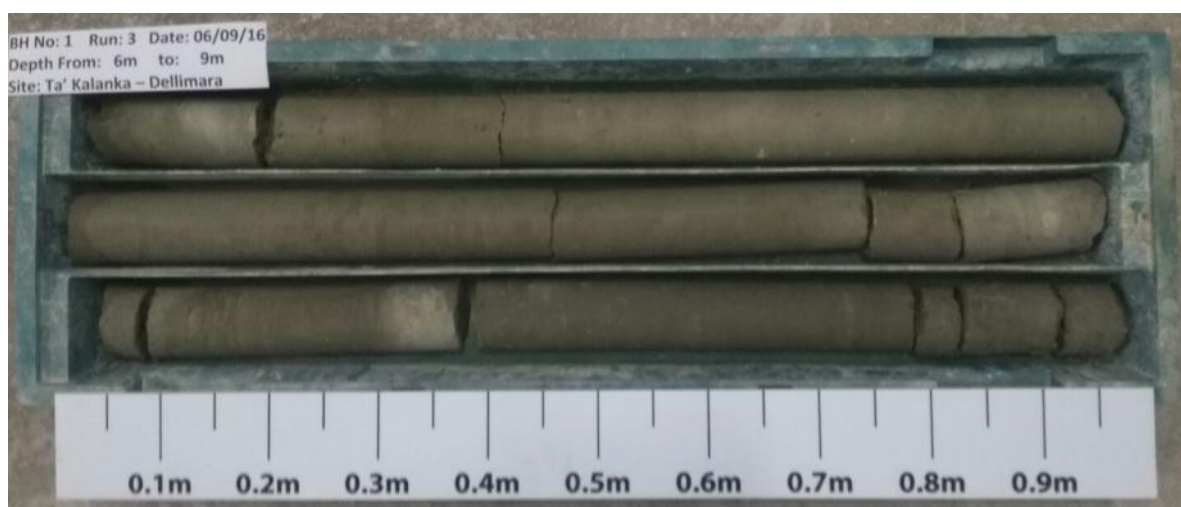


Plate 2: Photograph of core sample recovered from BH1 Run No.3



Plate 3: Photograph of core sample recovered from BH2 Run No.1 and No.2

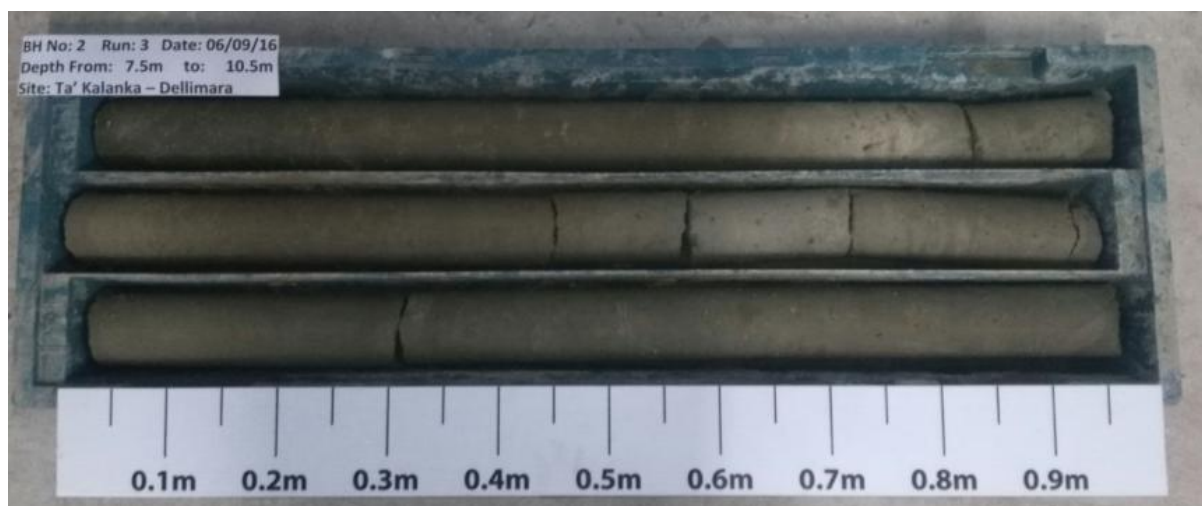


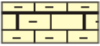

Plate 4: Photograph of core sample recovered from BH2 Run No.3

## APPENDIX 1 – DRILLING LOGS

<b>TERRACORE</b>		Terracore Ltd, New Street in Kappara Street, Industrial Estate, Mosta T: (+356) 2158 3241 F: (+356) 2141 8645 M: (+356) 9947 1618 E: info@terracoemalta.com W: www.terracoemalta.com				
<b>Client:</b> Kenneth Abela		<b>Drill Type:</b> T44		<b>B/H No:</b> 1		
<b>Location:</b> Delimara		<b>Drilling Fluid:</b> Water		<b>Job No:</b> J2752		
<b>Area:</b> Ta' Kalanka		<b>Drill:</b> Beretta		<b>Date:</b> 06/09/2016		
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Circulation	Core Recovery %
0.00	0.35	Started drilling open hoel to find bedrock. Bedrock starts at 0.35m in bedrock.	0.35			
0.35	3.00	Started coring run no.1 with cream returns.	2.65	3.00	F	113%
3.00	6.00	Started coring run no.2 with cream returns. Changed to grey returns at 4.35m	3.00	3.00	F	100%
6.00	9.00	Started coring run no.3 with grey returns.	3.00	3.00	F	100%
		Water level at m				
<b>Driller</b> Assistant Driller			<b>REMARKS</b>  Circulation: F = Full, P = Partial Loss, L = Total Loss. Test = SPT, Vane, Soil Sampling.			

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<b>Client:</b> Kenneth Abela		<b>Drill Type:</b> T44		<b>B/H No:</b> 2		
<b>Location:</b> Delimara		<b>Drilling Fluid:</b> Water		<b>Job No:</b> J2752		
<b>Area:</b> Ta' Kalanka		<b>Drill:</b> Beretta		<b>Date:</b> 06/09/2016		
From	TO	DESCRIPTION	Core Run Length	Core Run Recovery	Circulation	Core Recovery %
0.00	1.50	Started drilling open hoel to find bedrock. Bedrock starts at 0.70m. Drilled to 1.50m in bedrock. Advance casing	1.50			
1.50	4.50	Started coring run no.1 with cream returns.	3.00	3.00	F	100%
4.50	7.50	Started coring run no.2 with cream returns. At 5.05m changed to grey returns. At 7.40m lost returns.	3.00	3.00	L	100%
7.50	10.50	Started coring run no.3 with no returns.	3.00	3.00	L	100%
		Water level at m				
<b>Driller</b> Assistant Driller			<b>REMARKS</b>  Circulation: F = Full, P = Partial Loss, L = Total Loss. Test = SPT, Vane, Soil Sampling.			

*EPS il-Kalanka Delimara*

TERRACORE		Rotary Borehole Drilling Record						Page 1 of 1	BH No: 2	
Client: Mr Kenneth Abela		Location: Il-Kalanka t-Tawwalija Delimara				Weather: Fine		Date Started: 06/09/2016	Date Finished:	
Job No: J2752		Drill Type: T44	Bit type/diameter: T2 86 Double CB	Orientation: Vertical	Drilling Fluid: Water	Ground Level:		Eastings:		Water Level:
Description	Lithology	Depth m	Run	TCR %	SCR %	RQD %	f/m	Sampling/testing	Drilling progress	Returns
Ground Level		0.00						Open hole drilling		full
Overburden/Topsoil										
<b>Upper Globigerina Limestone:</b> Pale yellow-brown bioturbated, medium to fine moderately weak, bedded clayey limestone		1.00						Rock core sampling		full
		2.00								
		3.00								
		3.50	3	100	100	100	0			
<b>Upper Globigerina Limestone:</b> Dark grey bioturbated, medium to fine moderately weak, bedded marly		4.00								
		5.00								
		6.00	3	100	100	100	0			
		7.00								
		8.00								
		9.00	3	100	100	100	0			
		10.00								
Borehole terminated at 10.5m below ground level										
<b>Legend</b> GL: ground level AOD: above Ordinance Datum BGL: below ground level AMSL: above mean sea level RQD: Rock Quality Designation TCR: total core recovery SCR: solid core recovery f/m: fracture frequency O/H: open hole UCS: unconfined compressive strength										
 Upper Globigerina Limestone, clayey  Upper Globigerina Limestone, dark grey marly										
Depths are measured in metres from ground level										



## APPENDIX 3 – LAB TEST CERTIFICATES

---



Laboratory Test Certificate						
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method						
Client Name:	Kenneth Abela		Date of sampling:	06/09/2016	Certificate no:	1
Client address:			Date of test:	09/09/2016	Date of certificate:	12/09/2016
			Type of Corebarrel:	Standard	Job no:	J2752
Commissioned by:			Project:	Ta' Kalanka	Test reference no:	RCC001
Attn:					Tested by:	MH
Client Tel No:			Location/Town:	Delimara	Drill Type:	T44
<b>Details of prepared specimens</b>						
			<b>Borehole number:</b>		<b>1</b>	
Specimen No:	RC	1	RC	2	RC	3
Orientation of bedding planes with respect to the test specimen:	Perpendicular		Perpendicular		Perpendicular	
Storage condition of specimens:	Sealed		Sealed		Sealed	
Depth:	1.35m		5.5m		8.1m	
Run No:	1		2		3	
Sample Lithology:	Yellow Globigerina Limestone		Green Globigerina Limestone		Green Globigerina Limestone	
Specimen end flat to 0.02mm:	Yes		Yes		Yes	
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes		Yes		Yes	
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes		Yes		Yes	
Initial diameter:(Average)	mm	68.3	mm	66.4	mm	68.4
Initial length:(Average)	mm	186	mm	185	mm	188
Initial area:	mm <sup>2</sup>	3664.8	mm <sup>2</sup>	3466.2	mm <sup>2</sup>	3673.9
Initial volume:	mL	681.7	mL	644.8	mL	690.4
Length/diameter ratio:	L/D	<b>2.73</b>	L/D	<b>2.78</b>	L/D	<b>2.73</b>
Condition as tested:	As received		As received		As received	
Mass of specimen	g	1248.02	g	1235.02	g	1482.21
Water content (to 0.1%)	%	16.0	%	16.3	%	15.6
Pore Volume	m <sup>3</sup>		m <sup>3</sup>		m <sup>3</sup>	
Average	m <sup>3</sup>		m <sup>3</sup>		m <sup>3</sup>	
Porosity	%		%		%	
Average	%		%		%	
Bulk Density	kg/m <sup>3</sup>	1831	kg/m <sup>3</sup>	1915	kg/m <sup>3</sup>	2147
Average	kg/m <sup>3</sup>		kg/m <sup>3</sup>		kg/m <sup>3</sup>	
Dry Density	kg/m <sup>3</sup>	1538	kg/m <sup>3</sup>	1604	kg/m <sup>3</sup>	1813
Average	kg/m <sup>3</sup>		kg/m <sup>3</sup>		kg/m <sup>3</sup>	
<b>Test details</b>						
Machine type/ref:	EQ001 Rev.0 (Range 0 - 250kN)		EQ001 Rev.0 (Range 0 - 250kN)		EQ001 Rev.0 (Range 0 - 250kN)	
Rate of loading	N/min	8000	N/min	6000	N/min	6000
Stress rate:	Mpa/s	0.036	Mpa/s	0.029	Mpa/s	0.027
Maximum failure load:	kN	24.6	kN	24.2	kN	29.6
Test duration:	sec	253	sec	322	sec	328
Uniaxial compressive strength:	Mpa	6.7	Mpa	7.0	Mpa	8.1
Average UCS:			7.3			
Mode of failure:	Multiple shear		Multiple shear		Shear	
Degree of saturation:	100.0		100.0		100.0	
Comments/Deviations from suggested method:			Sample 1 - Out of time range			
Measurment of Uncertainty:			Nil			
Prepared by:		Approved by:				
Jessica Ciantar Quality Manager		Chris Magro Laboratory Manager				
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Registration No.: C32227  
Directors: Alfred Xerri  
Filename: J2752\_Rock\_Delimara\_Report001.xls



Laboratory Test Certificate						
Determination of Uniaxial Compressive Strength of Rock materials according to ISRM Suggested Method						
Client Name:	Kenneth Abela	Date of sampling:	06/09/2016	Certificate no:	2	
Client address:		Date of test:	09/09/2016	Date of certificate:	12/09/2016	
		Type of Corebarrel:	Standard	Job no:	J2752	
Commissioned by:		Project:	Ta' Kalanka	Test reference no:	RCC002	
Attn:				Tested by:	MH	
Client Tel No:		Location/Town:	Delimara	Drill Type:	T44	
<b>Details of prepared specimens</b>						
			<b>Borehole number:</b>		<b>2</b>	
Specimen No:	RC	4	RC	5	RC	6
Orientation of bedding planes with respect to the test specimen:	Perpendicular		Perpendicular		Perpendicular	
Storage condition of specimens:	Sealed		Sealed		Sealed	
Depth:	4.4m		5.7m		9.5m	
Run No:	1		2		3	
Sample Lithology:	Yellow Globigerina Limestone		Green Globigerina Limestone		Green Globigerina Limestone	
Specimen end flat to 0.02mm:	Yes		Yes		Yes	
Specimen perpendicular to 0.001 Radian, about 3.5' or 0.05mm/50mm:	Yes		Yes		Yes	
Specimen sides smooth and straight to 0.3mm over full length of specimen:	Yes		Yes		Yes	
Initial diameter:(Average)	mm	68.4	mm	67.1	mm	68.2
Initial length:(Average)	mm	187	mm	184	mm	188
Initial area:	mm <sup>2</sup>	3672.5	mm <sup>2</sup>	3531.9	mm <sup>2</sup>	3651.9
Initial volume:	mL	688.4	mL	662.0	mL	687.8
Length/diameter ratio:	L/D	<b>2.74</b>	L/D	<b>2.77</b>	L/D	<b>2.76</b>
Condition as tested:		As received		As received		As received
Mass of specimen	g	1429.57	g	1352.86	g	1323.46
Water content (to 0.1%)	%	14.5	%	17.7	%	14.1
Pore Volume	m <sup>3</sup>		m <sup>3</sup>		m <sup>3</sup>	
Average	m <sup>3</sup>		Average	m <sup>3</sup>	Average	m <sup>3</sup>
Porosity	%		Porosity	%	Porosity	%
Average	%		Average	%	Average	%
Bulk Density	kg/m <sup>3</sup>	2077	Bulk Density	kg/m <sup>3</sup>	1924	
Average	kg/m <sup>3</sup>		Average	kg/m <sup>3</sup>		
Dry Density	kg/m <sup>3</sup>	1776	Dry Density	kg/m <sup>3</sup>	1652	
Average	kg/m <sup>3</sup>		Average	kg/m <sup>3</sup>		
<b>Test details</b>						
Machine type/ref:		Equivalent No. 0 (range 0 - 250kN)		Equivalent No. 0 (range 0 - 250kN)		Equivalent No. 0 (range 0 - 250kN)
Rate of loading	N/min	6000	Rate of loading	5000	Rate of loading	5000
Stress rate:	Mpa/s	0.027	Stress rate:	0.024	Stress rate:	0.023
Maximum failure load:	kN	24.9	Maximum failure load:	23.7	Maximum failure load:	28.2
Test duration:	sec	318	Test duration:	381	Test duration:	387
Uniaxial compressive strength:	Mpa	6.8	Uniaxial compressive strength:	6.7	Uniaxial compressive strength:	7.7
Average UCS:			Average UCS:	7.1	Average UCS:	
Mode of failure:		Shear	Mode of failure:	Multiple shear	Mode of failure:	Multiple shear
Degree of saturation:		100.0	Degree of saturation:	100.0	Degree of saturation:	100.0
Comments/Deviations from suggested method:					Nil	
Measurement of Uncertainty:					Nil	
<div> <div>Prepared by:</div> <div>Approved by:</div> </div> <div> <div>Jessica Ciantar</div> <div>Chris Magro</div> </div> <div> <div>Quality Manager</div> <div>Laboratory Manager</div> </div> <div> <div>This document can only be reproduced in its entirety without revision and with written authorisation from Terracore Ltd</div> </div>						

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Filename: J2752\_Rock\_Delimara\_Report002.xls

**PA 02767/16**

**Redevelopment of Existing Derelict Hotel at Ta' Kalanka, Delimara**

---

**Technical Appendix 3**

## **ECOLOGY AND LAND USE REPORT**

Prepared by Dr Eman Calleja

Supporting Documents for  
Environmental Planning Statement

# **Ecology and Land Use Study for the Environmental Planning Statement (EPS) for TRK 163702: Redevelopment of an Existing Derelict Hotel at Ta' Kalanka, Delimara**

By

**Dr Eman Calleja** BSc, DSPU (Env. Rest.), MSc (Env. Mangt.), PhD (Warwick)

**September 2016**



**Signed declaration in accordance with Regulation 28 (3)**

Director of Environment Protection  
ERA

I, Dr Eman Calleja, who carried out the Terrestrial Ecology baseline study (or part thereof) for the EPS of the proposed redevelopment of existing derelict hotel at Ta' Kalanka, Delimara (PA 02767/16, hereby declare that such study was solely carried out by me and I take responsibility for any statement or conclusion contained therein.

20 January 2017

\_\_\_\_\_  
Date



\_\_\_\_\_  
Signature

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## **Introduction**

### **BACKGROUND**

The proposed project involves the redevelopment of the former Delimara Bay Hotel into a boutique hotel comprising 13 luxury suites, 3 superior deluxe suites and 1 presidential suite. Proposed amenities include a lounge area, bar and restaurant, a gym, a spa and an outdoor pool. The building area will be increased from 343 m<sup>2</sup> to 561 m<sup>2</sup>. The existing concrete terracing to the west of the building will be replaced with landscaping.

In addition to the redevelopment of the existing building, the Scheme includes the creation of a link to the Bay through the hotel. This will involve excavation of a tunnel through the rock down towards the Bay itself.

The Scheme includes construction of public facilities to service the Bay including a beach equipment store, first aid room and ablution facilities. Access to the Bay from the hotel via the tunnel will allow for wheel-chair access to the rocky beach.

### **ACCESS AND PARKING**

The area is accessed via Triq Delimara, a local access road that crosses the Delimara peninsula. Triq Delimara links to the main traffic network at Triq il-Patrijiet Terezjani, l/o Marsaxlokk. The area is not serviced by public transport; the Scheme site can be accessed by car, by bicycle, or on foot.

Currently, bathers that visit Il-Kalanka t-Tawwalija park in an area that, although was once surfaced, is now in poor condition due to lack of maintenance. This area is approximately 1,900 m<sup>2</sup> and can accommodate approximately 85 cars and is located in front of the Scheme site.

The Scheme will include a four car garage at level -1.

### **TERMS OF REFERENCE**

The scope of this report is to carry out an ecology and land use assessment of the Area of Influence (Aoi). This study is aimed at fulfilling the requirements of the EPS Terms of Reference part 3.1 and 3.3 as prepared by ERA, which are listed below:

#### **“3.1 Land cover and Land Uses**

*A description of the land cover and land uses, including agriculture and ecology, within the area of influence of the project, including roads, footpaths, public access routes and any agricultural tracts of land. Details including nature, magnitude, proximity to site, etc. should be included. Any trees, including protected trees, are to be mapped and identified accordingly.”*

#### **“3.4 Terrestrial Ecology**

*The assessment should include:*

1. *An investigation of the ecology of the site and its surroundings (including flora, fauna (including any aquatic organisms), benthic, burrowing and pelagic organisms, and their habitats and ecosystems),*
2. *A reporting of the conservation status and ecological condition of the area and the state of health of its habitats, species and ecological features;*
3. *A reporting of all protected, endangered, rare, unique, endemic, high-quality, keystone, invasive/deleterious, or otherwise important species, habitats, ecological assemblages, and ecological conditions found in the area under study; and*
4. *A prediction of the potential impacts of the proposed project on the ecology of the site and its surroundings, including loss, damage or alteration of habitats and species populations (including potential increases in ambient noise levels in the marine environment) including alteration in the habitats and species' condition/state of health as measured through indicators used/specified for assessment of status in relevant EU policy.*

*In particular, the study should identify all relevant species and assemblages (e.g. protected species or habitats, key species relevant to habitat characterisation, and monitoring indicators), and assess their abundance and distribution patterns as well as the species' ecological niches. The findings should be supported by adequate maps and photographs. Classification of habitat types and species should be conducted in accordance with recognised classification systems (e.g. EUNIS and Palaearctic), to ERA's satisfaction."*

To fulfil the above terms of reference, the following are included in the study:

- A description of the land cover and land uses, including agriculture and ecology, within the area of influence of the project, including roads, public access routes, and any agricultural tracts of land.
- Mapping of areas with trees, including protected trees.
- An investigation of the ecology of the site and its surroundings (including flora, fauna, and their habitats and ecosystems).
- An assessment of the habitat's quality and ecological condition of the area and the state of health of its habitats, species, and ecological features.
- A report on all protected, endangered, rare, unique, endemic, high-quality, keystone, invasive/deleterious, or otherwise important species,

habitats, ecological assemblages, and ecological conditions found in the area under study.

- GIS mapping of the agricultural and ecological resources in the AoI.

The assessment of impacts of the proposed Scheme on the ecology of the site and its surroundings are outside the scope of the baseline report and will be addressed in the Environmental Planning Statement (EPS).

## **Methodology**

### **LAND-USE SURVEY**

The Area of Study, from here on referred to as the AoS, was surveyed in August 2016 to provide a description of the land cover and land uses. The following parameters were recorded:

- Agricultural land,
- Unmanaged woodland,
- Recreation and leisure (Private garden),
- Derelict (Trapping sites),
- Natural habitat,
- Roads and public access routes,
- Protected trees.

Observations and records were taken from the access roads. In the inner areas, which were not visible from the access roads, observations were augmented by studying aerial photographs published by the Planning Authority or on Google Earth™. Some areas such as the Delimara Fortress and a holding enclosed by high walls in the northern end of the AoS were not mapped in view of the absence of good resolution aerial photos and lack of access to the sites.

The presence of large quantities of trees, including protected trees, found in the afforestation site, made it unfeasible to map them individually through the use of GPS coordinates; moreover, it was not always possible to reach them. Thus, they were instead mapped as areas of Unmanaged woodland and the relative dominance of the various species was recorded. The only individual trees that were mapped were those that would be directly affected by the project and would need to be removed or destroyed. This included those in the footprint of the proposed site for the boutique hotel.

The data was entered into a GIS system using ESRI® ArcMap™ 10.3 for ease of reference and analysis. Google satellite maps were used as a baselayer. Land use



was mapped using ArcInfo, to obtain an accurate representation of the prevalent land use. Areas used were then extracted from ArcInfo.

## **ECOLOGY SURVEY**

The site was surveyed in August 2016. The study includes an overview of the biotic assemblages and communities, which were characterised based on floral indicator species. Classification of terrestrial community types follows the scheme outlined in Schembri, 1991 and modified by Schembri *et al.*, 1999. Nomenclature of plant communities follows the EUNIS and Palaearctic Habitat Classification system (Devillers & Devillers-Terschuren, 1996). The species present were assessed in terms of their status, dominance, and cover and a qualitative assessment of the structure and conservation of the functions of the habitat was made. Plant assemblages were identified. Dominant species were noted and the majority of the accompanying species were recorded. Indicator species and species of ecological and/or conservation importance, especially those listed in the Red Data Book for the Maltese Islands (Schembri & Sultana, 1989), were actively searched for during the field surveys.

The ecology survey was preceded by a desk study, which included:

- Analysis of aerial photographs to determine land use trends;
- Review of land use survey findings;
- Review of existing baseline information from:
  - Literature searches;
  - The Red Data Book for the Maltese Islands;
  - Any previous environmental and planning studies undertaken in the area; and
  - Legislation and policy documents.

All data were entered into a GIS system using ESRI® ArcMap™ 10.3 for ease of reference and analysis. Habitat type according to the EUNIS habitat classification system and their habitat's quality was mapped using ArcInfo, to obtain an accurate representation of the quality of various habitats throughout the AoS. The extent of coverage of each habitat in m<sup>2</sup> was then extracted from ArcInfo.

### **Assessment of the state of health of habitats**

The assessment of the habitats' quality was carried out using qualitative tools that took into consideration the structure and functions of the habitat. The structure considers the species diversity and ranks higher habitats which are rich in habitat specialists, whilst habitats that have a high diversity of generalists and even some invasive species, are ranked poorly. The functions look at the temporal prospects of the habitat, and anthropogenic and natural factors

influencing the site. The assessment was entirely based on the ecologists' expert opinion. The overall status was divided into three categories; excellent, good, and poor. The criteria used were assessed as follows:

- **Excellent:** The habitat's structure is well preserved, with a good representation and dominance of habitat specialists that are typical of that phytosociological association. The ground cover and average vegetation is high relative to other reference ecosystems of the same habitat type found in Natura 2000 sites (a 'reference ecosystem' is taken to mean an ecosystem belonging to the same phytosociological association which has been classified as having an excellent conservation status in a Natura 2000 site in Malta).
- **Good:** The structure of the ecosystem is well preserved, with some of the habitat specialists typical of the habitat being dominant. Some generalist species may be present but they do not dominate the habitat. The ground cover and height is good but there is potential for growth. Anthropogenic disturbance may be having a negative effect on the habitat; however, the overall status is neither improving nor deteriorating.
- **Poor:** The structure of the ecosystem is poorly preserved with the habitat being over-represented by generalist species. Some alien and invasive species may be present but not dominant. Alternatively, the habitat may be dominated by habitat specialists; however, the ground cover is sparse or the average vegetation height is considerably lower than that typically found in a similar reference ecosystem.

## **Legislation**

International legislation relevant to the ecology of the AoS is mainly that protecting specific habitat types / biotopes or individual species. Of particular relevance are:

- The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention);
- The Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention);
- The European Union's Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (the 'Wild Birds Directive'); and

- The European Union's Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive').

Local legislation relevant to the ecology of the AoS is mainly that protecting individual features, habitats, or species. Of particular relevance are:

- Legal Notice 200 of 2011 (Trees and Woodland (Protection) Regulations, 2011); and
- Legal Notice 311 of 2006 (Flora, Fauna and Natural Habitats Protection Regulations, 2006) and its subsidiary Government Notice 112 of 2007.

The Application Site is also part of a Level 2 Area of Ecological Importance (AEI) protected by virtue of GN 400 of 1996.

## Land use



Figure 1 Map showing the Area of Study

The Scheme site lies at the east end of il-Kalanka it-Tawwalija on the site of an abandoned hotel. The Scheme site covers an area of 2,880 m<sup>2</sup>, while the AoS upon which this survey focuses, covers 264,000 m<sup>2</sup>. Six main land uses were encountered within the AoS, as follows (0):

- Agricultural land
- Unmanaged woodland
- Unused land (Natural habitats)
- Recreation and leisure (Private garden)
- Derelict (Trapping sites)
- Transport



Figure 2 Agricultural land within the AoS



Land use	Area covered/Ha	Proportion of the AoS
<b>Agricultural land</b>	104,250	39.5%
<b>Unmanaged woodland</b>	62,720	23.8%
<b>Unused land (Natural habitats)</b>	61,880	23.4%
<b>Recreation and leisure (Private garden)</b>	8,990	3.4%
<b>Derelict (Trapping sites)</b>	5,240	2.0%
<b>Transport</b>	25,650	9.7%

## **AGRICULTURAL LAND**

Agricultural land occupied the largest share of land use contributing to 40% of the AoS. Almost all of the agricultural land was found between the Tumbrell region and is-Serc. Only one plot was found elsewhere, along the Delimara peninsula, overlooked by the Delimara lighthouse (Figure 3).



Figure 3 *The vineyard below the Delimara lighthouse*



<b>Agricultural land use</b>	<b>Area covered/Ha</b>	<b>Proportion of the AoS</b>
<b>Cereals</b>	77,450	74.2%
<b>Fallow</b>	5,520	5.3%
<b>Other arable crops</b>	4,900	4.7%
<b>Recently converted</b>	14,130	13.6%
<b>Vineyard</b>	2,260	2.2%

Most of the agricultural land is being used for growing cereals through rain fed cropping practices, totalling around 77,450 m<sup>2</sup> or 74% of the agricultural land within the AoS (0, Figure 12). Other arable crops such as potatoes make up 4,900 m<sup>2</sup>. 2,260 m<sup>2</sup> of the land is being used to cultivate vines next to the lighthouse (Figure 3). Around 5,520 m<sup>2</sup> of land was left fallow, while another 14,130 m<sup>2</sup> has recently been converted to agriculture.



Figure 4 Part of the land recently converted to agriculture shown in Figure 13



*Figure 5 Another section of the recently converted agricultural land*

Evidence of land conversion to agriculture is widespread in the area of il-Ponta tat-Tawwalija. Recent satellite images from Google Earth dated 30<sup>th</sup> March 2016, indicate the plots of land behind the rocky shore at il-Ponta tat-Tawwalija as being occupied by a low scrub, most probably characteristic of habitat 1240 (Figure 13), being a continuation of the habitat found at ix-Xaghra. Thus, the land has been cleared either in the late spring or summer of 2016 despite this being part of a scheduled Area of Ecological Importance.

## **UNMANAGED WOODLAND AND UNUSED LAND (NATURAL HABITATS)**

Unmanaged woodland and Unused land (Natural habitats) between them occupied 47% of the AoS (Figure 11). According to survey sheets from 1968, the afforestation project had not yet started by the late 1960s. Nevertheless, both of these land uses will be discussed in more detail in section 0.



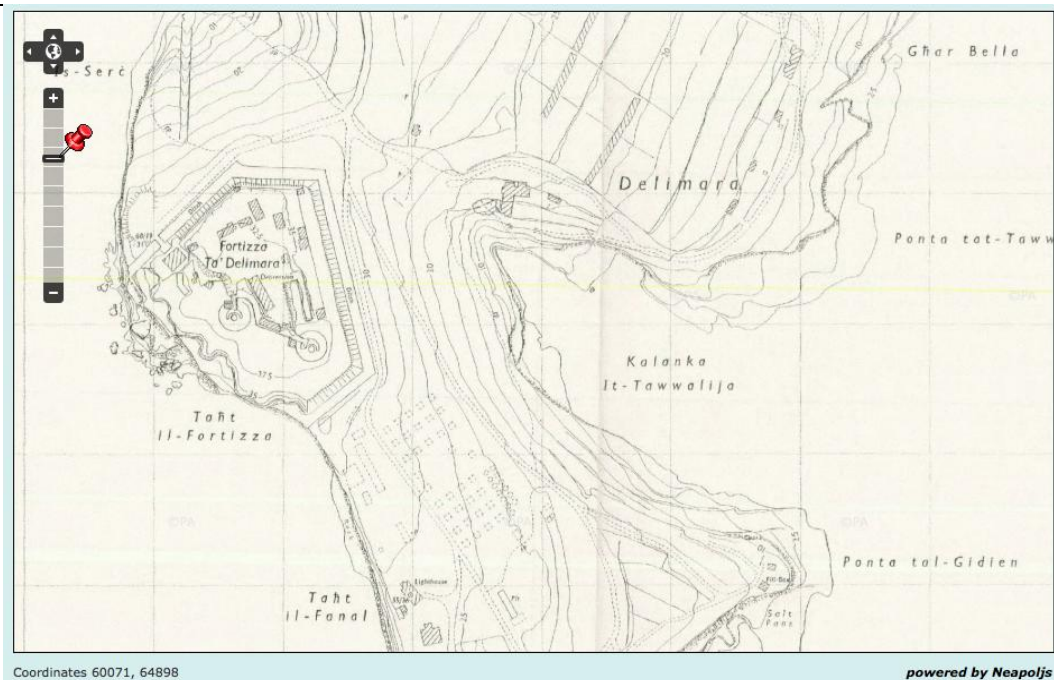


Figure 6 Survey map from 1968 indicating the area was not afforested at that time.

Source: PA Mapserver.

## RECREATION AND LEISURE (PRIVATE GARDEN)

The Private gardens occupied a total area of around 9,000 m<sup>2</sup>, which consisted of three separate plots. Two of these plots were found behind the Scheme site (Figure 7) and the other was located north of the vineyard (Figure 8). The private gardens were distinct from the afforestation areas through their being enclosed behind high walls. It is also apparent that the sites may be privately used in view of the different type of species found there. These included *Eucalyptus* spp., *Pinus halepensis* (Aleppo pines), and various fruit trees.



Figure 7 The boundaries of the private gardens behind the proposed site



Figure 8 *The private garden north of the Delimara lighthouse*

## **DERELICT (TRAPPING SITES)**

Three trapping sites were found within the AoS (Figure 11). One of these was located in the is- Serc fallow fields, while the other two were found amongst cleared habitat 1240 in the vicinity of il-Ponta tat-Tawwalija. The quantity of these trapping sites and their location varied over the years. Time series satellite images taken from Google Earth™ indicate that their quantity decreased at the end of the previous legislature when the trapping season was not opened for a few successive years, and increased in years when the trapping season was re-opened.



Figure 9 *Trapping sites at il-Ponta tat-Tawwalija*

## **TRANSPORT**

Around 10% of the AoS or 25,650 m<sup>2</sup>, were taken up by roads. These consisted of secondary asphalted roads, unsurfaced roads, and unsurfaced car parks. Just over half of these roads were unsurfaced. In view of this, the creation of air pollution from dust and airborne particulate matter is a problem in the area. This is particularly so next to the car parks, the largest of which is found along the Scheme site.





Figure 10      *Photo of one of the secondary unsurfaced roads in Delimara*

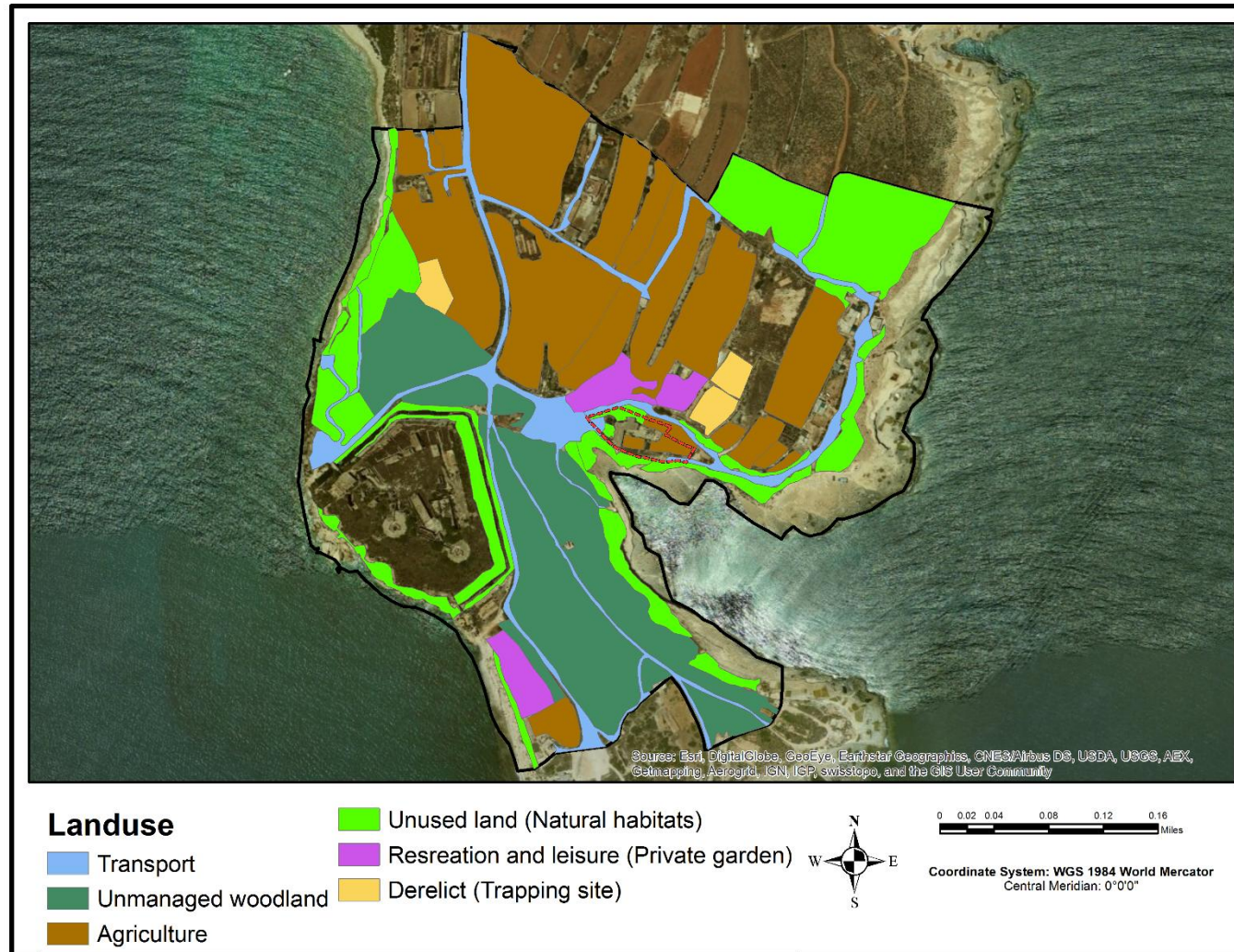


Figure 11 *Map showing the various land uses within the AoS*



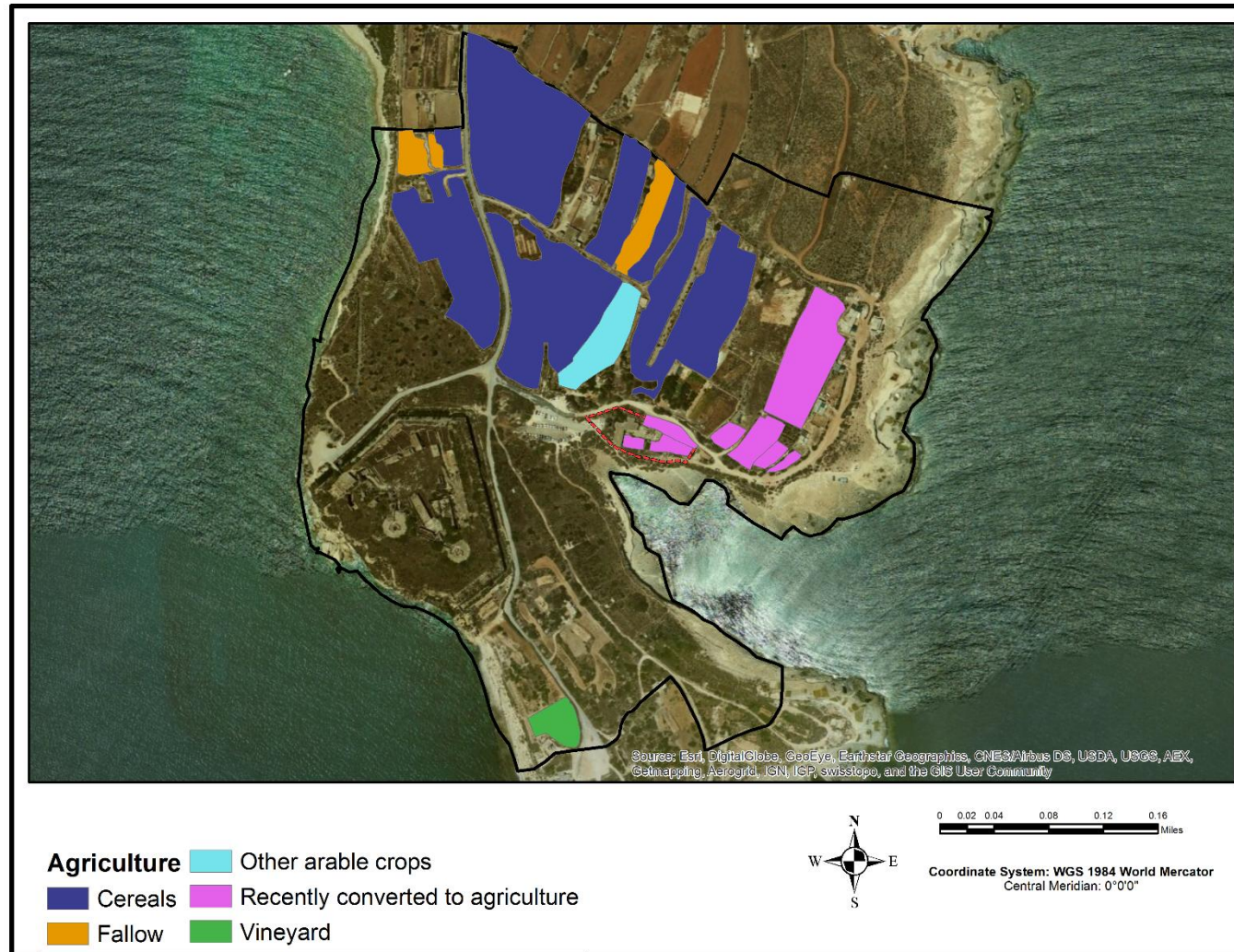


Figure 12      *Map showing the various agricultural uses within the AoS*





Figure 13      *Area within the red polygon has been converted to agriculture in 2016. The habitat was most likely a continuation of habitat 1240 from ix-Xaghra.*

## **Ecology survey**

The AoS was found to support 5 habitat types as follows:

- An unmanaged woodland dominated by a mixture of native and alien trees species;
- Hyblaeo-Maltese sea-cliff communities (Palearctic habitat classification code 18.22174) or Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp (Habitat 1240 in the EUNIS classification system);
- Maltese rdum communities (Palearctic habitat classification code 62.1155) or Calcareous rocky slopes with chasmophytic vegetation (Habitat 8210 in the EUNIS classification system);
- Sea-cliff and rocky shore aerohaline communities (Palearctic habitat classification code 18.2) or a combination of Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp and Mediterranean and thermo-Atlantic halophilous scrubs (Habitats 1240/1420 in the EUNIS classification system); and
- Ermes community.

Each habitat type will be discussed separately. The quality of each habitat has also been assessed and has been mapped in Figure 14. The proposed site is being considered separately at the end of this section.

### **UNMANAGED WOODLAND**

The unmanaged woodland covers an area of 62,700 m<sup>2</sup> and is located on the Delimara peninsula and on the slope north of the Delimara fortress. It consists of an afforestation site established in the 1970s to occupy land that was abandoned by the British military, post-independence. The resulting habitat consists of a 2 m high scrub dominated by a mixture of alien and native species.



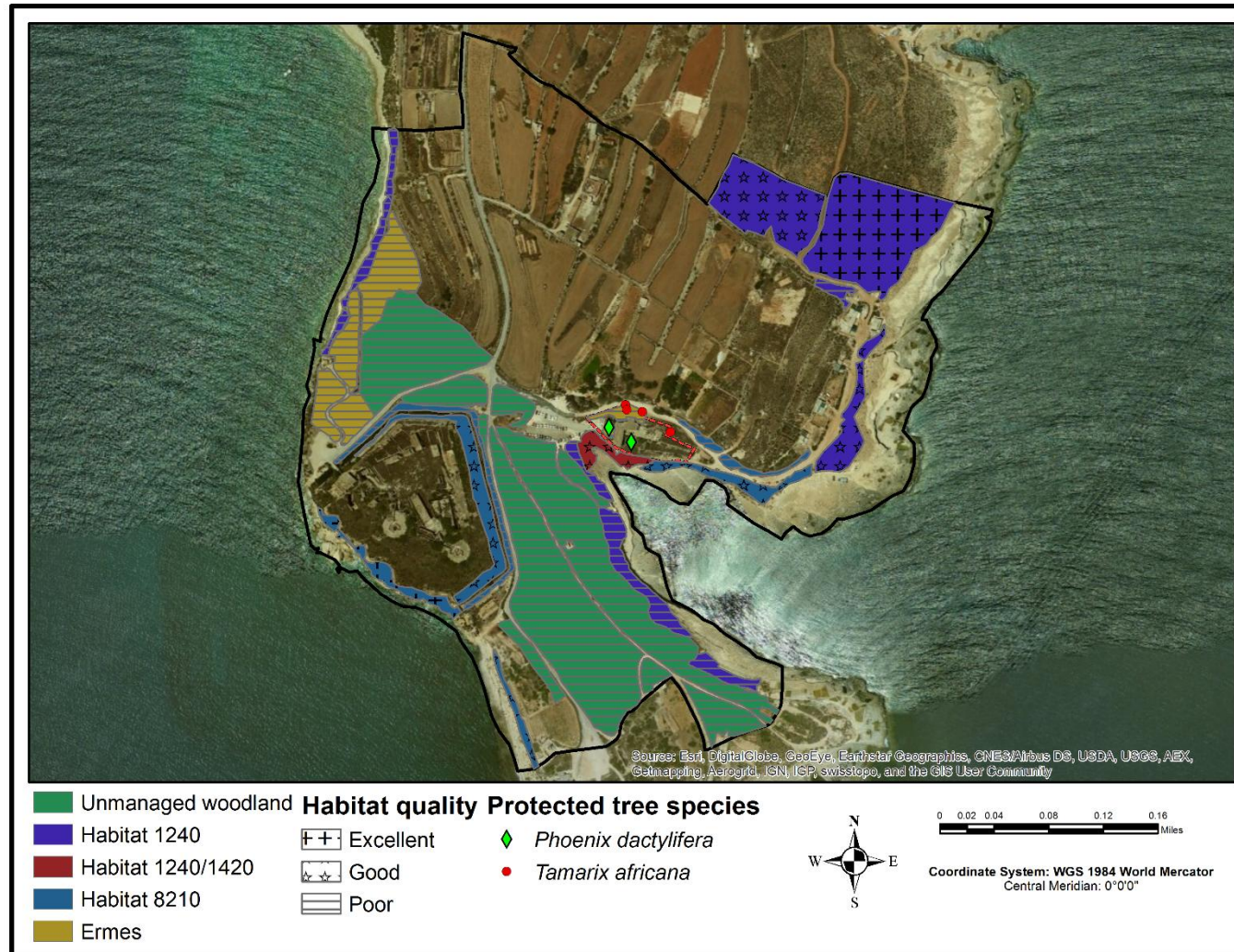


Figure 14 Map showing the prevalent habitats and their quality, and the presence of tree species within the proposed area for development.

The main species used along the border of the afforestation site consist of *Atriplex halimus* (Shrubby Orache), which acts as an inaccessible barrier throughout most of the scrub. The bulk of the tree cover is made up of *Acacia saligna* (Blue-leaved Acacia) and *Tamarix africana* (African Tamarisk). *Opuntia ficus-indica* (Prickly Pear) is also common in certain areas. Other subdominant species include *Salsola melitensis* (Maltese Salt-tree), *Asparagus aphyllus* (Mediterranean asparagus), *Capparis orientalis* (Caper bush), *Hyparrhenia hirta* (Hispid Beard-grass), *Limbarda crithmoides* (Golden Samphire) and *Agave americana* (American Agave).



Figure 15      *Part of the afforested area in the Delimara area*

The habitat structure was found to be poor in view of the abundance of alien species, and lack of a dominant phytosociological association that is typical of coastal areas. Moreover, there is strong evidence of littering and in some cases even dumping. In certain areas, the vegetation is sparse, particularly in the slope north of Fort Delimara where the vegetation cover is less than 50%. In view of the above, this habitat is considered to have limited ecological value and is recorded throughout its extent as having a poor habitat quality.



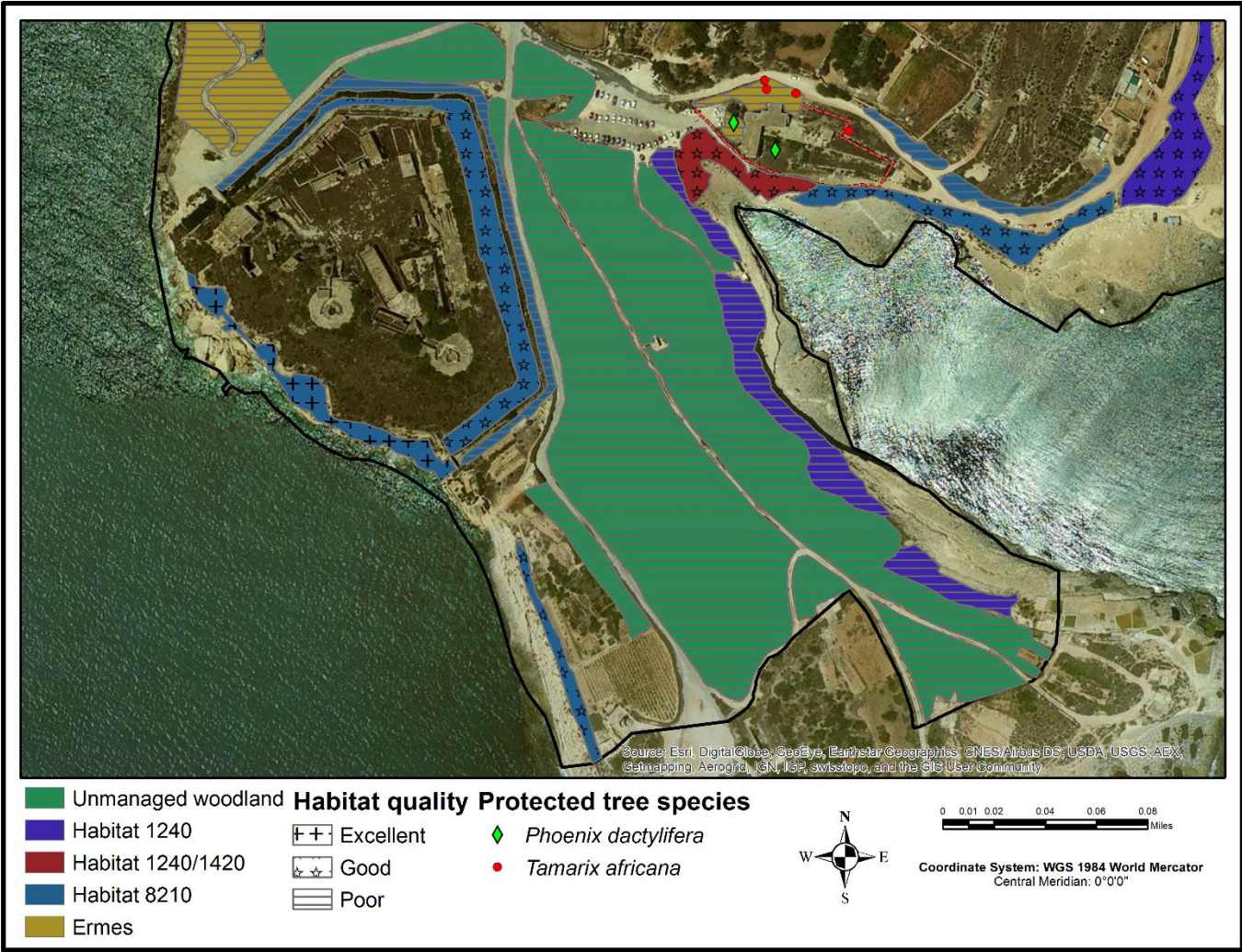


Figure 16 Map showing the prevalent habitats and their quality in the Delimara area.



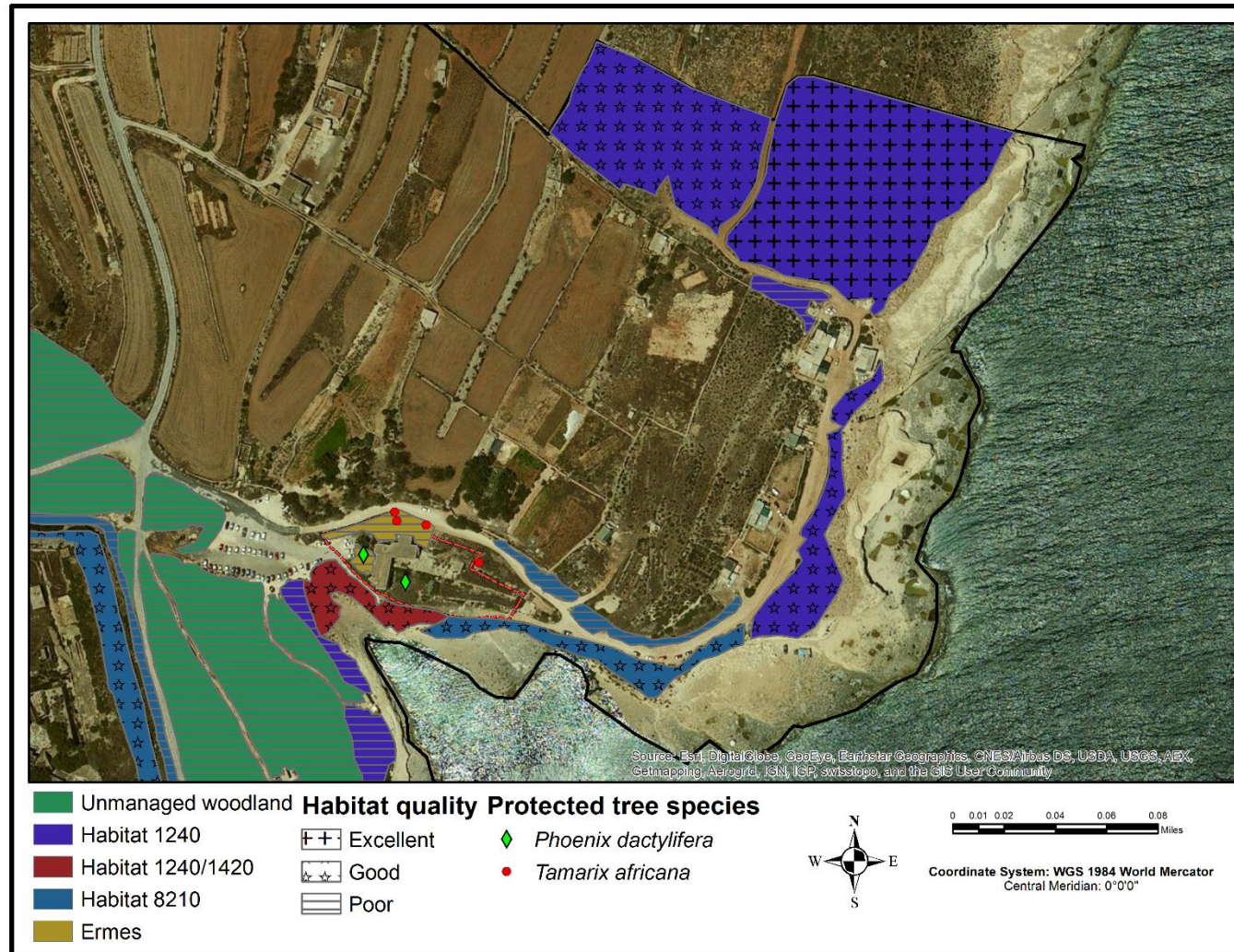


Figure 17 Map showing the prevalent habitats and their quality in the Xaghra to il-Ponta tat-Tawwalija area.



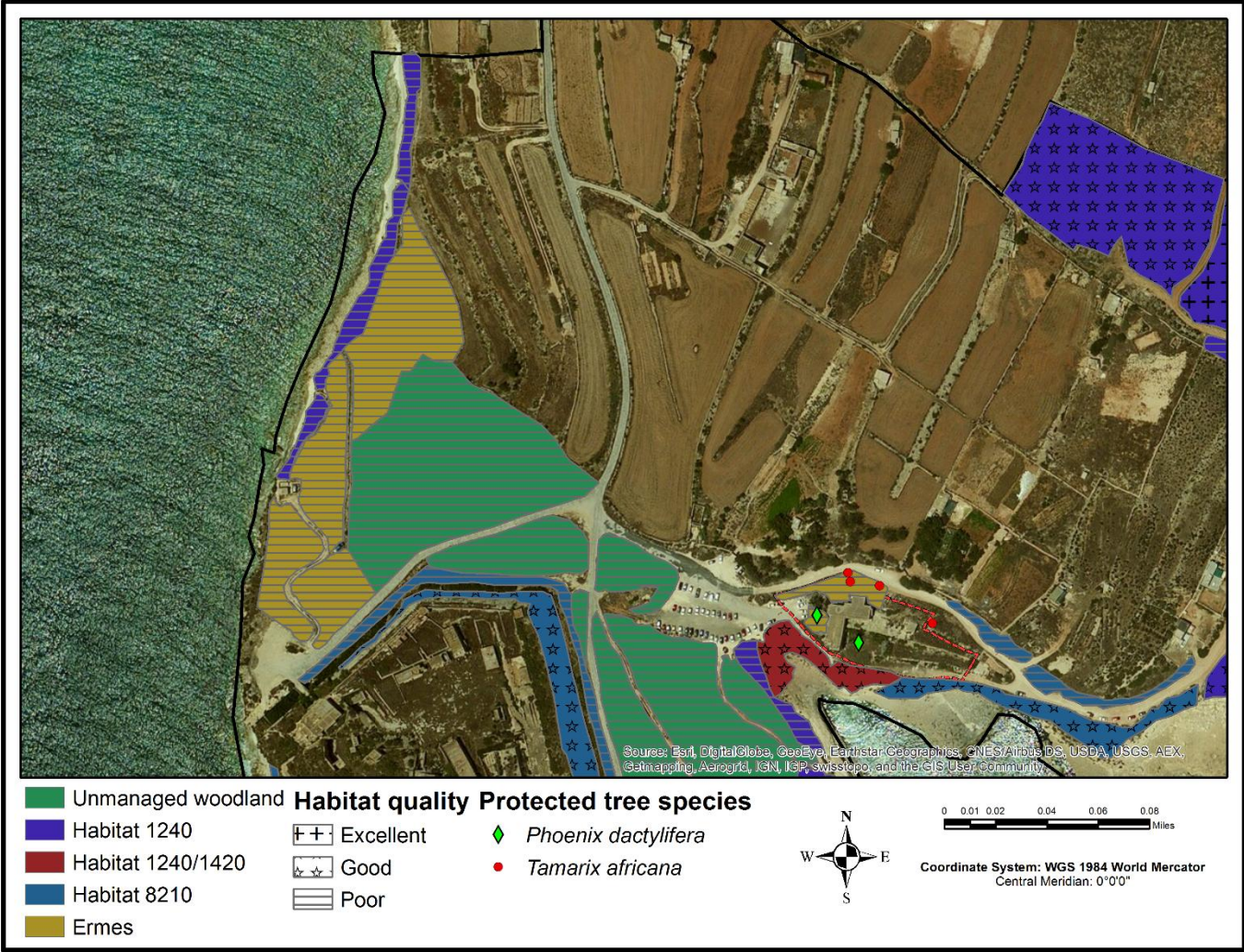


Figure 18 Map showing the prevalent habitats and their quality in the Serc area.



## **HYBLAEO-MALTESE SEA-CLIFF COMMUNITIES**

This habitat, also known as Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp or Habitat 1240 in the EUNIS classification system, was found to be widespread in the AoS along the coastal zone. The habitat was found along the coastal stretches of il-Kalanka t-Tawwalija, is-Serc, il-Ponta tat-Tawwalija and Ghar Bella. It also extended further inland at ix-Xaghra, northwest of Ghar Bella.

The habitat covered a total of around 35,600 m<sup>2</sup> throughout the AoS. The largest extent of habitat was found at ix-Xaghra, totalling around 19,200 m<sup>2</sup> or 54% of the total surface area of this habitat within the AoS. The smallest section was that at is-Serc which only extended a few metres along the coastline. In some coastal areas this habitat was replaced by Maltese rdum communities (EUNIS code habitat 8210).



Figure 19      *Habitat 1240 at ix-Xaghra*





Figure 20      *Habitat 1240 at il-Kalanka t-Tawwalija*

The habitat was characterised by the dominance of *Limbarda crithmoides* (Golden Samphire) which contributed to more than 50% of the vegetation cover. Other frequent species were *Crucianella rupestris* (Rock Crosswort), *Crithmum maritimum* (Rock Samphire), *Cuscuta epithymum* (Dodder), *Asparagus aphyllus* (Mediterranean Asparagus), *Euphorbia pinea* (Pine Spurge), *Daucus gingidium* (Sea Carrot), *Carthamus lanatus* (Woolly Safflower), *Urginea pancration* (Sea Squill), *Asphodelus aestivus* (Summer Asphodel), *Salsola melitensis* (Maltese Salt-tree), *Limonium melitense* (Maltese Sea Lavender), *Cichorium spinosum* (Spiny Chicory),

*Lygeum spartum* (Esparto Grass), *Hyparrhenia hirta* (Hispid beard-grass), *Plantago lagopus* (Mediterranean Plantain) and *Mesembryanthemum nodiflorum* (Lesser Crystal Ice Plant).

*Table showing the extent and location of different sections of habitat 1240, together with their habitat quality.*

Quality of habitat 8210	Area /m <sup>2</sup>	Location	Proportion
Poor	7,888	All of Delimara peninsula and is-Serc; a small part of ix-Xaghra	22%
Good	12,318	All of il-Ponta tat-Tawwalija, and part of ix-Xaghra	35%
Excellent	15,358	Just over half of ix-Xaghra	43%
Total	35,564		100%

The quality of the habitat ranged from poor, along the Delimara peninsula (Figure 16) to excellent at ix-Xaghra (Figure 17). The best conserved habitat was located in the ix-Xaghra area, partly due to the fact that it was the least disturbed and had the least footfall. There was also less disturbance in this area as it was furthest away from the popular bay of il-Kalanka t-Tawwalija. The habitat here consisted almost entirely of species typical of habitat 1240, whilst the ground cover was relatively high for this habitat type at over 60% and an average vegetation height of 40 cm. The causes of disturbance in the poorly conserved stretches of this habitat found elsewhere in the AoS, were partly due to the high footfall that the Delimara area is subjected to, but also due to past dumping practices here and at is-Serc, which have affected the abiotic conditions of the substrate. Littering is also a prominent problem in this area, particularly close to the boundary with the afforested areas at Delimara.

## MALTESE RDUM COMMUNITIES

This habitat, also known as Calcareous rocky slopes with chasmophytic vegetation or Habitat 8210 in the EUNIS classification system, is found around the Delimara fortress, and on the East side of the il-Kalanka t-Tawwalija Bay, covering an area of around 12,900 m<sup>2</sup>. The largest extent of habitat was found around and on Fort Delimara. Here the habitat developed into a scrub with many of the shrubs growing over two metres in height. The size of the vegetation was due to the inaccessibility of the habitat, having developed undisturbed inside the fortress for over thirty years. The site was also inaccessible during the survey, thus the proper extent of this habitat within the fortress could not be mapped.





Figure 21      *Maltese irdum communities forming along the fortress ditch*

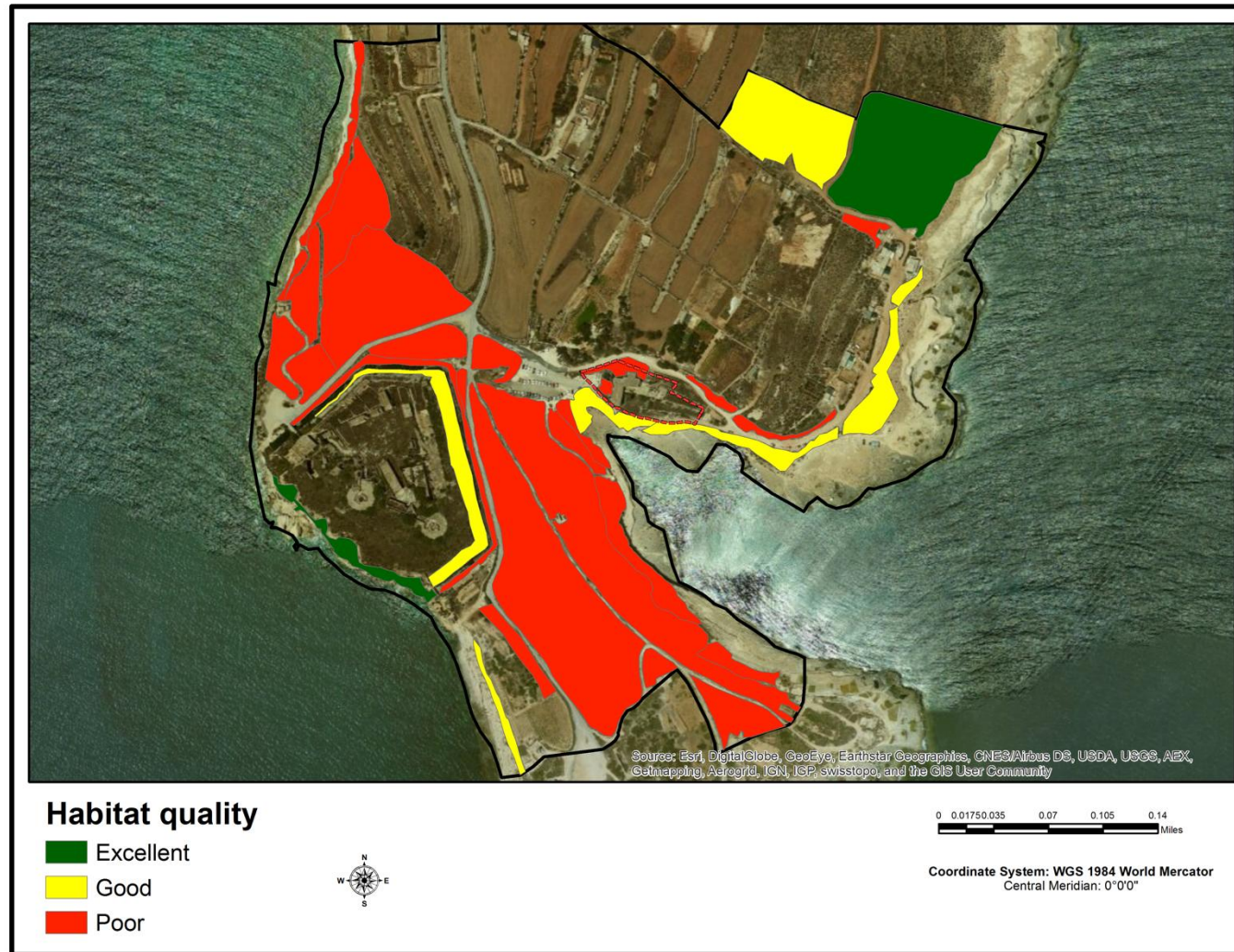


Figure 22 Map showing the habitats' quality within the AoS.



The habitat was characterised by the dominance of *Salsola melitensis* (Maltese Salt-tree), which contributed to over 75% of the vegetation cover. The habitat formed an open scrub averaging around 0.5 m in height with a ground cover of over 50%. Other species growing intermittently between the Maltese Salt-trees were *Asparagus aphyllus* (Mediterranean Asparagus), *Glebionis coronaria* (Crown Daisy) and occasionally *Lygeum spartum* (Esparto Grass). The habitat was prominent along the fortress ditch and along the cliffs overlooking Marsaxlokk Bay. Within the ditch itself, the habitat was replaced by a scrub dominated by large shrubs and trees that included *Salsola melitensis* (Maltese Salt-tree), *Punica granatum* (Pomegranate), *Atriplex halimus* (Shrubby Orache), *Arundo donax* (Giant Reed) and *Olea europaea* (Olive). Elsewhere, on the eastern side of il-Kalanka t-Tawwalija, the habitat occupied the coastal stretch of land between the beach and the dirt road going towards ix-Xaghra. It also grew along the field margins and in some cases took over a number of abandoned fields.



Figure 23      *Scrub growing in the ditch surrounding Fort Delimara*

The quality of this habitat ranged from poor to excellent. Almost a third of the habitat has a poor quality. This is characterised by the habitat consisting almost entirely of Maltese Salt-tree shrubs, with a ground cover of less than 50%. Other species typically associated with this habitat were mostly absent. The best conserved sections of this habitat were located along the cliffs on the seaward side of Fort Delimara, where they were allowed to develop undisturbed. The majority of the habitat, however, had a good habitat quality, that is driven by the successful recruitment of Maltese Salt-tree seedlings that was evident throughout the AoS.

Table showing the extent and location of different sections of habitat 8210, together with their habitat quality.

Quality of habitat 8210	Area /m <sup>2</sup>	Location	Proportion
Poor	3,642	Around ditch of Fort Delimara; along field boundaries east of il-Kalanka t-Tawwalija	28%
Good	7,198	Along eastern cliff of il-Kalanka t-Tawwalija, and along walls of Fort Delimara	56%
Excellent	2,021	Cliffs on seaward side of Fort Delimara	16%
Total	12,861		100%

## SEA-CLIFF AND ROCKY SHORE AEROHALINE COMMUNITIES

This habitat, being a combination of Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp and Mediterranean and thermo-Atlantic halophilous scrubs or Habitats 1240/1420 in the EUNIS classification system, was the least widespread habitat, occupying only 1,580 m<sup>2</sup>. It was found along the headland of il-Kalanka t-Tawwalija (Figure 17), where it grows over a substrate that has a high content of infill material. As a result, the substrate is highly friable and has a poor soil profile.

The habitat was characterised by the dominance of *Salsola melitensis* (Maltese Salt-tree) with *Atriplex halimus* (Shrubby Orache) being sub-dominant. Other species include *Limbarda crithmoides* (Golden Samphire). The ground cover was up to 80%, whilst the average vegetation height was of 30 cm.



Figure 24 Sea-cliff and rocky shore aerohaline communities



The quality of the habitat was good, in spite of a number of footpaths crisscrossing the site. Nevertheless, the habitat is highly vulnerable due to the nature of the substrate, the steep slope, and the high footfall. Access to and within the habitat should be restricted.

## **ERMES COMMUNITY (STEPPE)**



Figure 25 *Ermes community dominated by Asphodelus aestivus and Salsola melitensis.*

This habitat is located along the slope north of Fort Delimara, occupying a total surface area of 11,870 m<sup>2</sup>. It consists of an open scrub/steppe dominated by *Salsola melitensis* (Maltese Salt-tree) and *Asphodelus aestivus* (Summer Asphodel). Approximately 40% of the ground cover is made up of *Salsola melitensis*, which grows to 0.50 m throughout this section. Other species include *Glebionis coronaria* (Crown Daisy), *Acacia saligna* (Blue-leaved Acacia), *Carthamus lanatus* (Woolly Safflower), *Hyparrhenia hirta* (Hispid Beard-grass), *Daucus carota* (Wild Carrot) and *Tamarix africana* (African Tamarisk). The dominance of Summer Asphodel is a result of past grazing pressure. This most likely happened when the fortress was used to rear cattle in the 1980s and 1990s. The author recalls cattle and sheep grazing here up to 15 years ago. The cessation of grazing activity has led to the recruitment of the Maltese Salt-tree throughout the ermes community as is evidenced by the large quantity of young seedlings belonging to this species observed in this section.

The quality of this habitat is considered to be poor, in view of the presence of alien species throughout and the codominance of Summer Asphodel. Nevertheless, the extensive recruitment of the Maltese Salt-tree throughout this section is strong evidence that the habitat is recovering since grazing has stopped. Littering and dumping, however, remain a significant problem along this segment.

## **VEGETATION ON THE PROPOSED SITE**



Figure 26      *Photo of the south end of the proposed site*

The proposed site coincides with the premises previously occupied by the hotel. It includes parcels of land bounded by masonry walls. The vegetation is characterised by a number of alien species and others typical of disturbed habitats, including *Agave americana* (American Agave), *Acacia cyclops* (Western Coastal Wattle), *Acacia saligna* (Blue-leaved Acacia), *Glebionis coronaria* (Crown Daisy), *Asparagus aphyllus* (Mediterranean Asparagus) and *Diplotaxis* spp (Wall Rocket). Other species included *Capparis orientalis* (Caper bush) and *Salsola melitensis* (Maltese Salt-tree). Six trees belonging to two protected species were also present. These consisted of four specimens of *Tamarisk africana* (African Tamarisk) and two *Phoenix dactylifera* (Date Palms). Both species are listed in Schedule II of the Trees and Woodlands Protection Regulations of 2011 (L.N. 200 of 2011), and are protected in view of their existence Outside the Development Zone. Their removal requires permission from the environmental authorities





Figure 27      *Photo of the northern end of the proposed site showing the American agave and acacias*



## LIST OF SPECIES

<i>Species name</i>	Common name	Flora, Fauna and Natural Habitats Regulations	Trees and Woodlands Protection Regulations	RDB status
<i>Acacia cyclops</i>	Western Coastal Wattle		Schedule III	
<i>Acacia saligna</i>	Blue-leaved Acacia		Schedule III	
<i>Agave americana</i>	American Agave			
<i>Arundo donax</i>	Giant Reed			
<i>Asparagus aphyllus</i>	Mediterranean Asparagus			
<i>Asphodelus aestivus</i>	Summer Asphodel			
<i>Atriplex halimus</i>	Shrubby Orache			
<i>Capparis orientalis</i>	Caper bush	Schedule VIIIb		
<i>Carthamus lanatus</i>	Wooly Safflower			
<i>Cichorium spinosum</i>	Spiny chicory			
<i>Crithmum maritimum</i>	Rock Samphire			
<i>Crucianella rupestris</i>	Rock Crosswort			
<i>Cuscuta epithymum</i>	Dodder			
<i>Salsola melitensis</i>	Maltese Salt-tree			Endemic
<i>Daucus carota</i>	Wild Carrot			
<i>Daucus gingidium</i>	Sea Carrot			
<i>Diplotaxis spp</i>	Wall Rocket			
<i>Euphorbia pinea</i>	Pine Spurge			
<i>Glebionis coronaria</i>	Crown Daisy			
<i>Hyparrhenia hirta</i>	Hispid Beard grass			
<i>Limbarda crithmoides</i>	Golden Samphire			
<i>Limonium melitense</i>	Maltese Sea Lavender	Schedule III		Endemic
<i>Lygeum spartum</i>	Esparto Grass			
<i>Mesembryanthemum nodiflorum</i>	Lesser Crystal Ice Plant			
<i>Olea europaea</i>	Olive		Schedule IIb	Rest (MI) (?)
<i>Opuntia ficus-indica</i>	Prickly Pear			
<i>Phoenix dactylifera</i>	Date Palm		Schedule IIb	
<i>Plantago lagopus</i>	Mediterranean Plantain			
<i>Punica granatum</i>	Pomegranate			
<i>Tamarix africana</i>	African Tamarisk		Schedule IIb	R, Rest (MED + MI)
<i>Urginea pancration</i>	Sea Squill	Schedule VIIIb		

The list of species included all the species encountered in the AoS. It does not consist of an exhaustive list from a detailed survey. It is noted that the survey was carried out in August, following a relatively extensive dry season. Most evidence was noted either from the presence of living trees or shrubs, or from the remnants of dried up plants.

## **POLICY CONTEXT**

The ecological significance of the site under investigation has been determined in accordance with the policies of the Marsaxlokk Bay Local Plan (MBLP), approved by the Planning Authority in May 1995, and relevant legal and Government notices.

### **Area of ecological importance/site of scientific importance**

Most of the AoS is scheduled as a level 2 Area of Ecological Importance (AEI) and an Area of High Landscape Value according to GN 400 of 1996 (Figure 28). A small section is listed as a level 3 AEI. Marsaxlokk Bay Local Plan Policy ME01 regarding the Protection of Areas of Ecological Importance and Sites of Scientific Importance states:

*“In such areas, development of any description, which in the opinion of the Planning Authority could prejudice the unique natural characteristics of the areas or adversely affect individual sites, will not be permitted.”*

### **Policies concerning protected species according to the Tree Protection Regulations of 2011**

Three species of trees that are protected under Schedule II of Legal Notice 200 of 2011 were noted during the survey. All three species are protected in view of their location within a protected area (*Olea europaea*, *Phoenix dactylifera* and *Tamarix africana* according to Schedule IIb). These trees are protected in their entirety and cannot be cut down or pruned, except for horticultural reasons and then only if permitted by the Competent Authority.

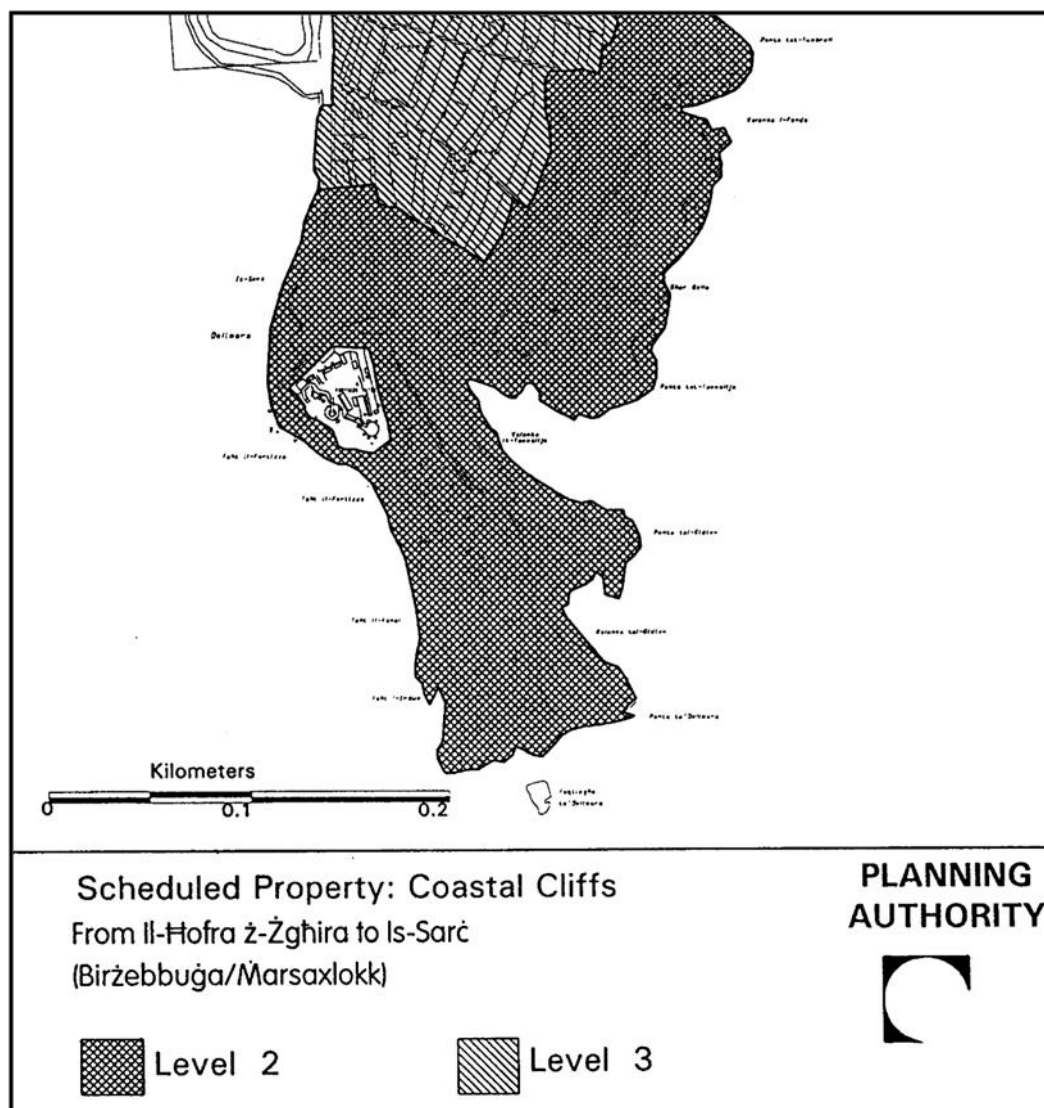


Figure 28 Map of scheduled land at Delimara including the Area of Ecological Importance

## **Policies concerning alien and invasive species according to the Tree Protection Regulations of 2011**

The AoS contains two species of trees that are considered to be invasive or environmentally incompatible according to Schedule III of Legal Notice 200 of 2011 (*Acacia cyclops* and *Acacia saligna*). Regulation 9 (1)(a) states that the Competent Authority may “order any person responsible for the land in which any tree listed in schedule III to these regulations is sited, to remove, uproot, kill or destroy any such tree, where such removal would, in the Competent Authority's opinion, constitute an environmental improvement”. In fact, both of these species are found in the site proposed for development. They are also found extensively in the afforested areas throughout the AoS.

The AoS and the proposed site contains another alien and invasive species that is not listed in LN 200 of 2011: *Agave americana* (American Agave).

## **Policies concerning species relevant to the Flora, Fauna and Natural Habitats Regulations of 2006**

The AoS contains three plant species that are listed in the Flora, Fauna and Natural Habitats regulations (Legal Notice 311 of 2006 as amended by Legal Notice 322 of 2013). The first two species are *Capparis orientalis* (Caper Bush) and *Urginea panchratium* (Sea Squill) which are listed under Schedule VIII(b) as “plant species of national interest whose taking in the wild and exploitation may be subject to management measures”. Regulation 27 (1) of Legal Notice 311 of 2006, gives the Competent Authority, the authority to “take any measures to ensure that the taking in the wild of specimen or species of wild fauna and flora listed in Schedules VII and VIII as well as their exploitation is compatible with their being maintained at a favourable conservation status”. To date no such measures have been taken for these two species anywhere in Malta, since neither species are under threat from exploitation.

The third species is *Salsola melitensis* (Maltese Salt-tree), which is listed under Schedule III as a plant species of national interest whose conservation requires the designation of Special Areas of Conservation. Nevertheless, this site has not been included in the Natura 2000 sites list as a potential Special Area of Conservation.

The AoS does not contain plant species from any of the other schedules of Legal Notice 322 of 2013 as follows:

- Schedule II: Animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation
- Schedule V: Animal and plant species of Community interest in need of strict protection
- Schedule VI: Animal and plant species of national interest in need of strict protection

### **Fauna potentially present in the AoS**

Though this study focused on flora, the possibility that faunal species that are listed in these schedules occur within the AoS is not excluded. It is not unlikely that any of the species in Table 2 do make use of the site. A specimen of *Chamaeleo chamaeleon* and various specimens of the Maltese Wall Lizard were observed within the AoS. No other species listed in 0 were observed by the author during the surveys.

*Faunal species listed in different schedules of LN322/2013 that are/may be present in the AoS*

<b>Schedule II</b>	<b>Schedule III</b>	<b>Schedule V</b>	<b>Schedule VI</b>
Animal and plant species of community interest whose conservation requires the designation of special areas of conservation	Animal and plant species of national interest whose conservation requires the designation of special areas of conservation	Animal and plant species of community interest in need of strict protection	Animal and plant species of national interest in need of strict protection
<i>Elaphe situla</i>		<i>Erinaceus algirus</i>	<i>Mustela nivalis</i>

Schedule II	Schedule III	Schedule V	Schedule VI
(Leopard snake - Infrequent)		(North African hedgehog – Common)	(Weasel - Rare, but widely distributed)
		<i>Podarcis filfolensis</i> (Maltese wall lizard – Widespread)	<i>Hemidactylus turcicus</i> (Turkish gecko - Widespread)
		<i>Chalcides ocellatus</i> (Ocellated skink – Common)	<i>Tarentola mauritanica</i> (Wall Gecko – Widespread)
		<i>Chamaeleo chamaeleon</i> (European chameleon – Observed on site)	
		<i>Coluber viridiflavus</i> (Black whip snake - Widespread)	
		<i>Elaphe situla</i> (Leopard snake - Infrequent)	

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**PA 02767/16**

**Redevelopment of Existing Derelict Hotel Ta' Kalanka, Delimara**

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## **Technical Appendix 4**

# **CULTURAL HERITAGE BASELINE REPORT**

Prepared by Adi Associates Environmental Associates Ltd

Supporting Documents for  
Environmental Planning Statement



**TN 163702**

**REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA'  
KALANKA, DELIMARA**

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**CULTURAL HERITAGE BASELINE REPORT**

**Version 1: November 2016**



**Report Reference:**

**Adi Associates Environmental Consultants Ltd, 2016. Redevelopment of an existing derelict hotel at Ta' Kalanka, Delimara. San Gwann, November 2016; iv + 20pp + 1 appendix.**

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RESPECT THE ENVIRONMENT – KEEP IT DIGITAL**





## Quality Assurance

### Redevelopment of an existing derelict hotel at Ta' Kalanka, Delimara Environmental Planning Statement November 2016

Report for: **Delimara Bay Hotel Ltd**

### Revision Schedule

Rev	Date	Details	Written by:	Checked by:	Approved by:
0.0	Nov2016	Submission to client	<b>Chantal Cassar</b> Lead Archaeologist	<b>Rachel Xuereb</b> Director	<b>Adrian Mallia</b> Managing Director

File ref: G:\\_Active Projects\EIA\DBH004 - Boutique hotel at Delimara\Baseline Studies\CULTURAL HERITAGE\ Cultural Heritage Baseline Report\_FINAL.docx



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## APPENDIX

Appendix 1: Cultural Heritage Data Capture Sheets
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## 1. INTRODUCTION

- I.1. This Cultural Heritage Baseline Survey was carried out as part of the Environmental Planning Statement (EPS) of the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara (hereinafter referred to as 'the Scheme').
- I.2. This Survey considers the cultural heritage baseline at the Scheme Site and its surroundings (the Area of Influence).
- I.3. The Terms of Reference (ToR) provided by ERA in respect of cultural heritage prescribed the following:

### **3.0 A DESCRIPTION OF THE SITE AND ITS SURROUNDINGS (I.E. ENVIRONMENTAL BASELINE)**

The existing environmental features, characteristics and conditions, in and around the proposed development site as well as in all locations likely to be affected by the development or by ancillary interventions and operations, are to be identified and described in sufficient detail, with particular attention to the aspects elaborated further in the next sections.

The consultants should also identify (and justify) wherever relevant:

1. The geographic area (e.g. viewshed or other area of influence) that needs to be covered by each study;
2. The relevant sensitive receptors vis-à-vis the environmental parameter under consideration (e.g. residential communities, other users, natural ecosystems, specific populations of particular species, or individual physical features);
3. The location of the reference points or stations (e.g. viewpoints, monitoring stations, or sampling points) to be used in the study; and
4. Other methodological parameters of relevance, also noting that the assessment will normally require both desk-top studies and on-site investigations (including visual observations and sampling, as relevant).

Wherever relevant to the environmental aspects under discussion, reference to legislation, policies, plans (including programmes and strategies) standards and targets, should also be made, such that the compatibility (or otherwise) of the proposal therewith is also factored into the assessment required by Section 4 below. The discussion should cover the following aspects, in the appropriate level of detail:

- Supra-national (e.g. European Union; United Nations; or other international or regional) legislation, directives, policies, conventions, protocols, treaties, charters, plans and obligations;
- National legislation, policies and plans (e.g. Structure Plan; National Environment Policy); and
- Sub-national legislation, policies and plans (e.g. local plans, site-specific regulations, action plans, management plans, and protective designations such as scheduling or Natura 2000).

### **3.5 Architectural, Archaeological, Historical and Cultural Heritage and related Material Assets**

Refer to Appendix 2.

## **APPENDIX 2: TERMS OF REFERENCE FOR A CULTURAL HERITAGE ASSESSMENT (AS PROVIDED BY THE SUPERINTENDENCE OF CULTURAL HERITAGE, AS REVISED IN OCTOBER 2013)**

### **1.0 Preamble**

The proposed project would involve development over an extensive area and may lead to intensification of activity over a larger area. Potential impacts may occur within the footprint of the project, in the immediate environs, and along access routes to the site. Potential impacts may include direct and immediate material impacts, as well as subsequent impacts that might arise from the modification of the existing situation.

### **2.0 Scope and Definitions of the EIA**

For the purposes of this document, cultural heritage is defined by Article 2 of the Cultural Heritage Act (2002). This includes movable or immovable objects of artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological importance.

2.1 The study area shall include the total footprint of the proposed development.

2.2 In the context of this particular application, cultural heritage considerations may include:

- Features of archaeological value and potential;
- Military or civil architecture from the Knights period to British period;
- Vernacular structures; and
- Field systems and agricultural features such as irrigation systems.

The above cultural heritage definitions and considerations are not to be considered as exhaustive. The EIA must consider all other forms of cultural heritage, both known and unknown.

2.3 The Environmental Impact assessment will:

- Describe the Cultural Heritage assets within the study area;
- Analyse the cultural heritage features within the context of the cultural landscape;
- Assess the physical, spatial and visual impacts of the proposed development on the cultural heritage assets; and
- Propose corrective measures for the protection of the cultural resources.

### **3.0 Methodology**

In quantifying the cultural heritage assets within the study area, and assessing the impacts of the proposed development, the EIA will undertake:

- Description and assessment of the property;
- Desktop and archival research limited to the study area;
- Fieldwork and research, including “field walking”, topographic survey and remote sensing as may be necessary within the site. All fieldwork has to be authorised by the Superintendence of Cultural Heritage as defined below under point 4;
- Consultations with any relevant bodies, including the Superintendence of Cultural Heritage, Heritage Malta, the University of Malta, NGOs and Local Councils;
- Compilation of an inventory of the cultural heritage assets identified within the study area. The features of cultural heritage are to be described and plotted with grid references, on Data Capture



Sheets, the design of which should be approved in advance by the Superintendence of Cultural Heritage. The Data Capture Sheets will be presented as an appendix to the EPS. The analysis of the features will be included in the main report; and

- A cultural heritage Risk Assessment Map examining the various impacts of the proposed project is to be included in the EIA.

#### 4.0 Authorisation by the Superintendence of Cultural Heritage

As per Cultural Heritage Act 2002, any form of investigation or prospection required for the identification of cultural heritage (including excavation, field walking, topographic survey and remote sensing) may only be undertaken by the Superintendence of Cultural Heritage or with its written approval.

<b>ERA</b> PROTECTIVE INVENTORY OF THE MALTESE CULTURAL HERITAGE HERITAGE DATA CAPTURE SHEET			Ref. No.			
Location	Category	Type	Site Location ( Address )			
Eastings	Northings	Feature	Period - Year			
S.S. No. 1	S.S. No. 2	Description				
S.S. No. 3	S.S. No. 4					
Date						
Negative No.	Film No.					
Present Utilization						
Existing Legal Protection		GN. Number	GN. Date			
Comments						
Buffer Zone	A	B	C	D	E	Others
Eastings						
Northings						
Site Map						
Scale 1 : 2500						

Archaeological Characteristics – Sketch/Scaled drawings:	
Condition:	Degree of Protection (Structure Plan policies UCO7 or ARC 2):
State of Security:	Proposed Utilization:
Basic Bibliography:	
Compiled by:	Revised by:
Checked by:	Checked by:
Date:	Date:





**Figure I: Scheme Site**









## **ASSESSMENT METHODOLOGY**

### **Objectives of the Assessment**

- I.4. The objectives of the cultural heritage baseline were to:
- Identify, document, and present information on the known archaeological and cultural heritage features within the Aol;
  - Identify the potential for additional archaeological remains within the Aol, from desk study research and through field survey; and
  - Assess the cultural heritage significance of the Aol.

### **Standards and Policy Guidance**

- I.5. Guidance on and planning policy relating to the protection of archaeology and cultural heritage is provided by the *Cultural Heritage Act 2002*, Legal Notice 160 of 1997 (the *Rubble Walls and Rural Structures Regulations*, S.L.552.01), the *Structure Plan for the Maltese Islands 1990*, and, in relation to the Scheme Site, the *South Malta Local Plan 2006*.

### **Cultural Heritage Act**

- I.6. 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). It also includes “*archaeological, palaeontological or geological sites and deposits, landscapes, groups of buildings...which have an historical value*”. In section 3, the Act 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,..., 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*”.
- I.7. Furthermore, “*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 sub-article (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).
- I.8. The restrictions on archaeological excavations are 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*". Details on the rights and obligations for all parties in the eventuality of an archaeological discovery are described in Sections 43(3), 43(4), 43(5), 43(6), and 43(7) of the Act.

### ***Rubble Walls and Rural Structures (Conservation and Maintenance) Regulations***

- I.9. Legal Notice 160 of 1997 (S.L.552.01) 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 the competent authority'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 the competent authority. 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 such walls requires a permit from the competent authority.

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

- I.10. The Structure Plan<sup>9</sup> contains policies relating to the classification of archaeological features. The classification system is outlined in **POLICY ARC 2** and **POLICY ARC 3**; **POLICY ARC 6** and **POLICY ARC 7** provide further guidance on the classification system.
- I.11. **POLICY ARC 2** provides for a four-tier classification system, with Class A representing the most important sites / features, where development that is considered would adversely affect the natural setting of the site / feature will not be allowed. The policy prescribes a development-free buffer zone of at least 100 m around the periphery of a Class A site / feature. Class B sites / features are regarded as very important, to be preserved at all costs, where adequate measures must be taken to preclude any damage from immediate development. In the case of Class C sites / features, every effort must be made for preservation, but these features may be covered up after proper investigation, documentation and cataloguing, with provision for subsequent access being provided. Class D features are those of which there are numerous examples; these features may be covered up or destroyed after recording.
- I.12. Permissible effects of development on archaeological remains are addressed in **POLICY ARC 3**: "... development affecting ancient monuments and important archaeological areas and sites, including areas and sites having such potential, will normally

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<sup>9</sup> Although the Structure Plan has been superseded by the Strategic Plan for Development and the Environment (SPED), the latter does not provide guidance on the classification of archaeological features. For this reason, reference will be made to the Structure Plan.

*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”.*

- I.13. As provided by **POLICY ARC 7**, any catalogued archaeological feature may be included in the National Protective Inventory (NPI), for which protection is provided by means of **POLICY ARC 6**.
- I.14. The Structure Plan is weak on the protection of individual archaeological artefacts; the principal thrust of the Structure Plan is to protect sites, buildings and monuments. Artefacts are afforded better protection under the *Cultural Heritage Act*.

### **Policy Importance of Archaeological Features**

- I.15. The classification of archaeological features according to their policy importance is guided by legislation, including the *Cultural Heritage Act 2002*, the *Environment Protection Act 2016*, the Structure Plan policies, and Government and / or Legal Notices regarding specific archaeological and cultural heritage features. Each of these assigns its own degree of importance and remedies. In applying these to the EIA process three categories are used:
- Features of International Importance (major importance);
  - Features of National Importance (major importance); and
  - Features of Local Importance (minor importance).
- I.16. **Error! Reference source not found.** I summarises the cultural significance of different features.

**Table I: Protection Ratings and Cultural Significance**

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

- I.17. The laws, policies, classification systems, etc., pertaining to the conservation of buildings or other structures have been assigned to these categories of policy importance as follows:

***Features of International Importance***

I.18. Cultural features of international importance are those:

- Protected specifically by legislation;
- Qualifying as Class A features under Structure Plan **POLICY ARC 2**; or
- Similarly identified by the Minister responsible for cultural heritage or the Superintendence of Cultural Heritage.

***Features of National Importance***

I.19. Features of international importance would also be of national importance. Additionally, cultural features of national importance are those:

- Qualifying as Class B features under Structure Plan **POLICY ARC 2**; or
- Similarly identified by the Minister responsible for cultural heritage or the Superintendence of Cultural Heritage.

***Features of Local Importance***

I.20. Cultural features of local importance are those:

- Qualifying as Class C or Class D features under Structure Plan **POLICY ARC 2**; or
- Similarly identified by the Minister responsible for cultural heritage or the Superintendence of Cultural Heritage.

***Remaining Features***

I.21. All catalogued cultural heritage features may be included in the NPI, and those not already protected are afforded protection under Structure Plan **POLICY ARC 6**, which provides that all sites / features listed in the NPI will be protected in accordance with the Environment and Development Planning Act (now the Environment Protection Act and the Development Act) powers and by reference to the classification ratings outlined in Structure Plan **POLICY ARC 2**.

***Area of Influence***

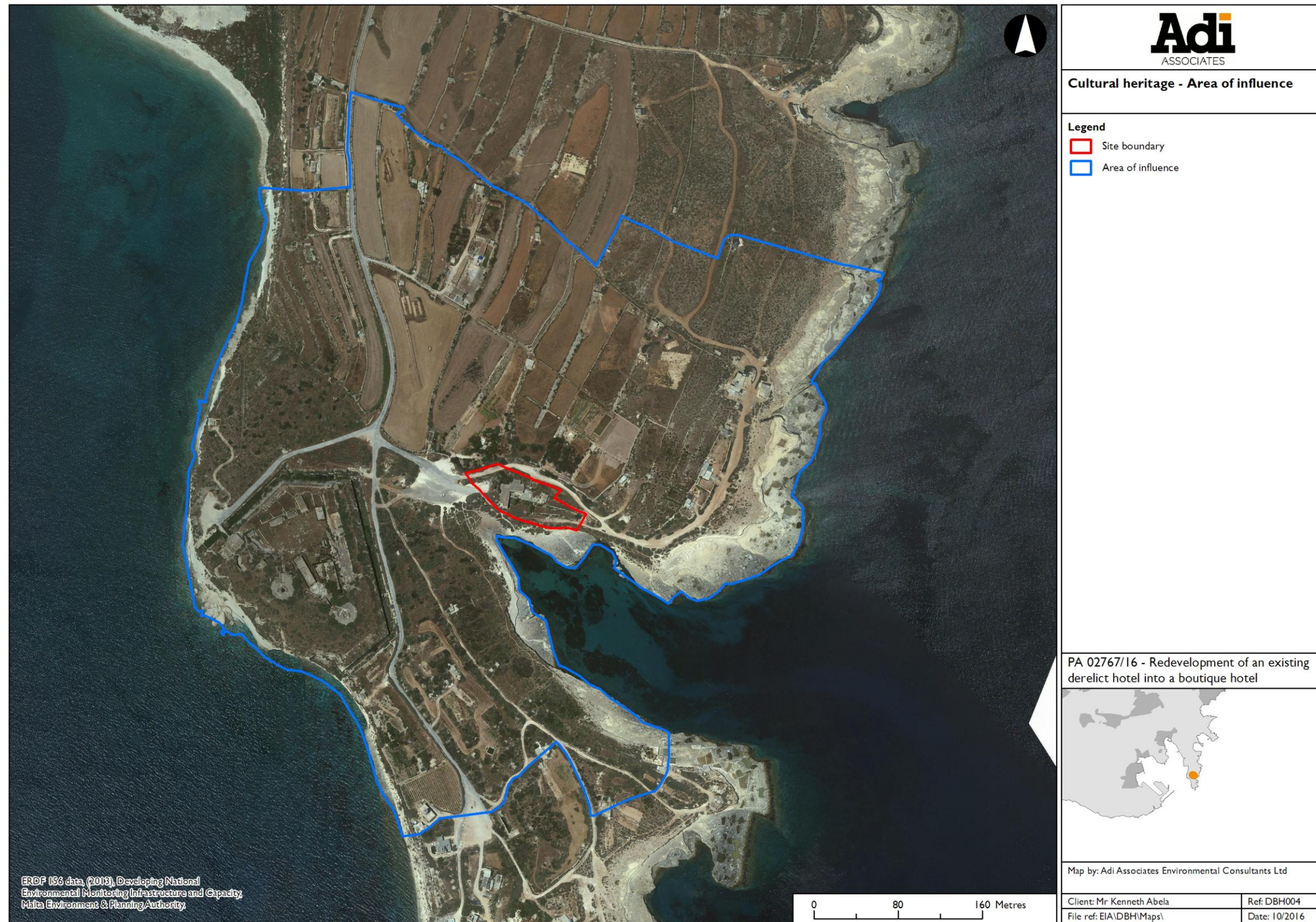
I.22. The Area of Influence (Aoi) for the cultural heritage study is illustrated in **Figure 2**.

***Competence of Surveyors***

I.23. The cultural heritage study was undertaken by archaeologist Chantal Cassar; the impact assessment was coordinated by Adi Associates, in consultation with the archaeologist.



**Figure 2: Area of Influence for Cultural Heritage Study**



INDICATIVE ONLY - Not to be used for direct interpretation



## **Methodology**

I.24. The methodology for the cultural heritage assessment involved:

- A baseline survey of the cultural heritage assets (artistic, architectural, historical, archaeological, ethnographic, palaeontological and geological assets) and an evaluation of their importance;
- An assessment of the impact of the construction and operation of the Scheme on the cultural heritage assets and an evaluation of the significance of these effects;
- Input to the design and operational plan for the Scheme to minimise potential adverse impacts on the cultural heritage assets; and
- A description of mitigation measures designed to minimise adverse impacts on cultural heritage.

## **Literature Search**

I.25. The literature search included primary and secondary sources: a study of toponomy, analysis of cartographic and photographic material; analysis of primary and secondary written sources; and analysis of conservation legislation.

## **Mapping**

I.26. The archaeological, rural, vernacular, historical, and cultural heritage features within the Aol were mapped primarily by means of a field survey but also through consultation of documentary sources and place-name evidence. The fieldwork took the form of a site-surface survey (field-walking); no aerial reconnaissance or sub-surface survey, including excavations, was carried out. The fieldwork was carried out on 18<sup>th</sup> June 2015.

## **Cataloguing**

I.27. The relevant information for each feature was recorded on cards and using digital media, in the format currently used by ERA. Each feature was individually identified using 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 map (scale 1:2500);
- Colour photograph(s);
- Sketch of the feature showing the most significant details (wherever possible);

- Conservation importance of the site / feature (proposed grading in accordance with Structure Plan policies);
- Existing and / or proposed legislative and physical protection;
- Current and proposed use / enhancement;
- References; and
- Name of surveyors and date of compilation.

### ***Evaluation***

- I.28. An archaeological assessment and significance of the archaeological, rural, vernacular, historical, and cultural heritage features was undertaken from the desk-top and field study. The conservation importance of the identified sites / features has been identified with reference to relevant legislation standards, guidance and practices and described above.

## **BASELINE SURVEY**

### **Historical Context**

#### ***Early Period***

- I.29. There is relatively very little information available on the early historic context of the Aol, and of Delimara as a whole, with the exception of the area around Tas-Silġ, at the northern end of the peninsula. There is evidence of continuous human activity dating from the Neolithic period at Tas-Silġ, through the Bronze Age, the Phoenician and Classical periods, and up to the medieval period. Generally however, up until the Knights period, the majority of the Delimara Peninsula was vulnerable to attack and would therefore have been sparsely populated (Abela 1647: 21).
- I.30. The Phoenicians arrived at Tas-Silġ around 7,000 BC, where they established a temple dedicated to Astarte (Bonanno 2005: 2884 - 285).
- I.31. By the 2<sup>nd</sup> Century, Tas-Silġ was being cited by Ptolemy as one of the five most important locations on the Maltese Islands (Bonanno 2005: 220), and Cicero wrote that the now Roman temple at Tas-Silġ possessed a number of riches and was universally respected (Verrines: II, 4, 103-1104).

#### ***Medieval Period***

- I.32. From excavations carried out at Tas-Silġ in the 1960s it is known that by the 5<sup>th</sup> Century there was a Paleo-Christian Basilica built on the site of the previous temple, and a medieval burial site was excavated nearby. The excavations revealed that the presbytery of the Basilica had been rebuilt several times, most probably due to repeated sacking by the Arabs between 825 and 870 AD when the area was under Arab occupation.

### ***Knights Period***

- I.33. Coastal fortifications in the area around Marsaxlokk Bay were a priority for the Knights of St John. The first set of large defence towers on Malta commissioned by the Knights included St Lucian Tower, constructed in 1610, on the opposite side of Marsaxlokk Bay to Delimara (Spiteri 2008: 344). Later coastal watch posts were constructed to support the defence towers, including at Xrobb L-Għaġin and Tumbrell on the Delimara Peninsula (Gian Franngisk Abela 1647: 660), both located outside of the Aol for the cultural heritage study.
- I.34. In 1658, Grand Master de Redin commissioned thirteen smaller defence towers, two of which were built at the extreme end of the Delimara Peninsula (Delimara Tower) and at Xrobb L-Għaġin in 1659 (Spiteri 1994: 499), again both located outside of the Aol. The fortifications were further strengthened throughout the 18<sup>th</sup> Century, with a number of batteries being constructed on the Peninsula - the Wilġa Battery and the Tumbrell Battery, again both outside of the Aol. A small mortar battery was erected in the vicinity of the Delimara Tower in 1793 (Spiteri 1994: 499).

### ***British Period***

- I.35. In the early 19<sup>th</sup> Century, Marsaxlokk Bay was still considered to be a strategic port and the British, on their arrival, retained most of the then existing Knights' defences. In 1872, a number of new forts / batteries were planned for all along the southeastern coast of Malta. These included three on the Delimara Peninsula - Fort Delimara, located within the Aol to the west of the Scheme Site, as well as Fort Tas-Silġ and Wolseley Battery, located to the north of the Aol.
- I.36. Works on Fort Delimara commenced in January 1876 and were completed by 1878. The Fort was constructed as the strategic defence for Marsaxlokk Bay (Spiteri 1996: 340, Hughes 1993: 115). By the end of the 19<sup>th</sup> Century, Fort Delimara was the only fort still capable of defending Marsaxlokk Bay. The Fort was abandoned by the British in the 1950s and in the mid-1970s the Fort was given by the Government to a private operator and was used as a pig farm until relatively recently. It is now in a very dilapidated state.
- I.37. In addition to the fortifications, the British also constructed the Delimara Lighthouse, located within the Aol to the southwest of the Scheme Site. Built in 1850 / 1851, the 24 m lighthouse had a Fresnel lantern with a reach of 15 miles (Vella 2011: 24). After being long-term abandoned, the lighthouse was recently restored by the non-governmental organisation (NGO) Din l-Art Helwa (including the lantern), which manages the property as tourist accommodation.
- I.38. More recent British military infrastructure on the Delimara Peninsula include pill boxes, beach posts and anti-aircraft batteries, constructed up to the period of the Second World War. These include a Second World War searchlight emplacement located within the Aol, to the northwest of the Scheme Site.

### **Cultural Heritage Features**

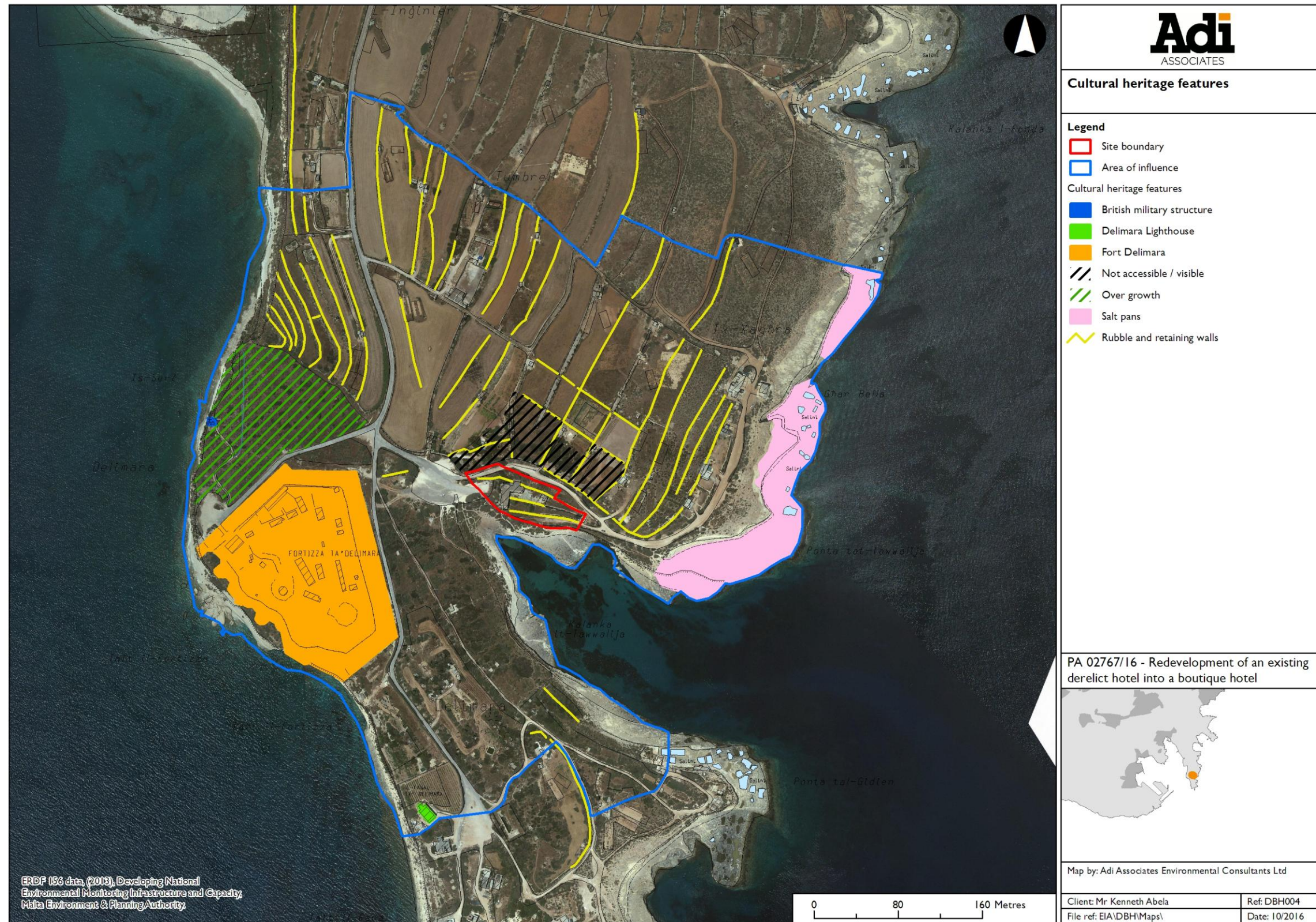
- I.39. **Figure 3** shows the location of the identified cultural heritage features within the Aol; **Figure 3** also shows those areas of the Aol that were inaccessible / not visible or covered by overgrowth. The majority of the Aol was accessible to the assessors during the site survey, with the exception of the area immediately north of the Scheme Site, which was not accessible and also not visible from the surroundings. An area on the coast, along the western perimeter of the Aol was covered by overgrowth which made inspection of the underlying terrain difficult.
- I.40. There are currently no scheduled cultural heritage features within the Aol. There are however a number of buildings / structures considered important because of their military and industrial historical and architectural significance. These include the 19<sup>th</sup> Century Fort Delimara (see **Figure 4**) located approximately 96 m to the west of the Scheme Site and the 19<sup>th</sup> Century Delimara Lighthouse (see **Figure 5**), located approximately 275 m to the southwest of the Scheme Site. Recent communication with the Planning Authority<sup>10</sup> reveals that Fort Delimara is proposed for scheduling as a Grade I building of historical, architectural and contextual value; it is one of the only two British-period forts in Malta that still has its original armament. Additionally, the Planning Authority considers that Delimara Lighthouse also merits protection as a Grade I scheduled building.
- I.41. There is also a Second World War searchlight emplacement, located on the coast, approximately 238 m northwest of the Scheme Site. This area wasn't accessible during the survey, and it wasn't possible from the survey or from research to ascertain the state or importance of this feature.
- I.42. The area of the coast east of the Scheme Site, between Ponta Tat-Tawwalija and Kalanka l-Fonda, features a complex of salt pans (see **Figure 6**). The complex is located approximately 100 m (plan distance) from the Scheme Site at its closest point. There is very little literature available about these salt pans; however, it is suggested that these may date from the Knight's period, and the Planning Authority considers that they merit protection as Grade 2 scheduled features.
- I.43. Rubble walls were noted within the Scheme Site and elsewhere within the Aol (see **Figure 4**). Some of the walls, including within the Scheme Site, are built with traditionally-sized rubble stones (see **Figure 7**), whilst others show frequent interventions with the introduction of larger sized blocks (see **Figure 8**). The walls within the Scheme Site aren't of any particular historical importance.
- I.44. A detailed description of all the identified cultural heritage features is given in **Appendix I**.

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<sup>10</sup> Emails from the Heritage Unit, dated 15<sup>th</sup> November and 16<sup>th</sup> November 2016.



**Figure 3: Cultural Heritage Features in the Area of Influence**



INDICATIVE ONLY - Not to be used for direct interpretation



**Figure 4: Fort Delimara**



**Figure 5: Delimara Lighthouse**



**Figure 6: Salt Pans**



**Figure 7: Rubble Walls within the Scheme Site**






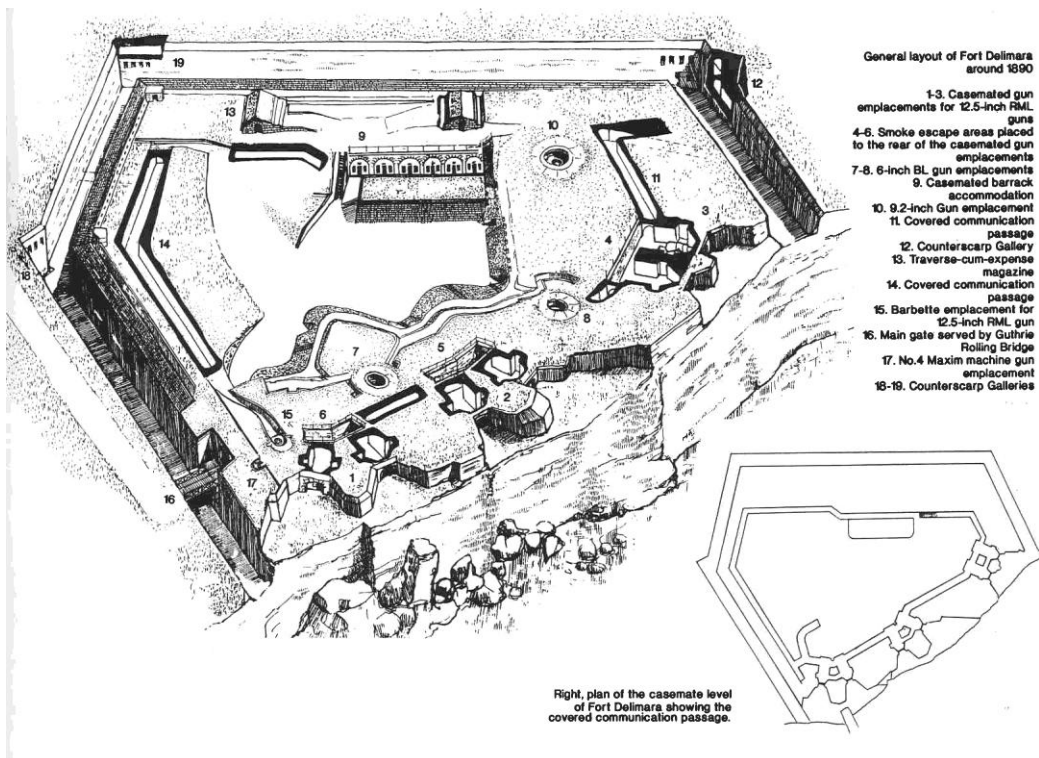
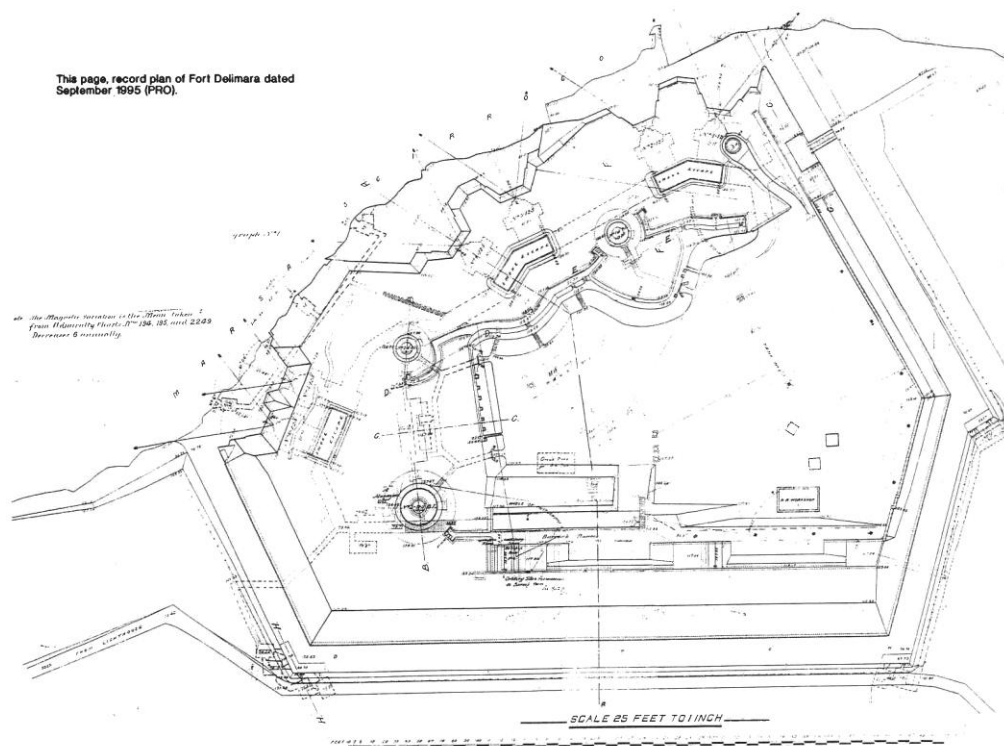
**Figure 8: Rubble Walls within the Area of Influence**



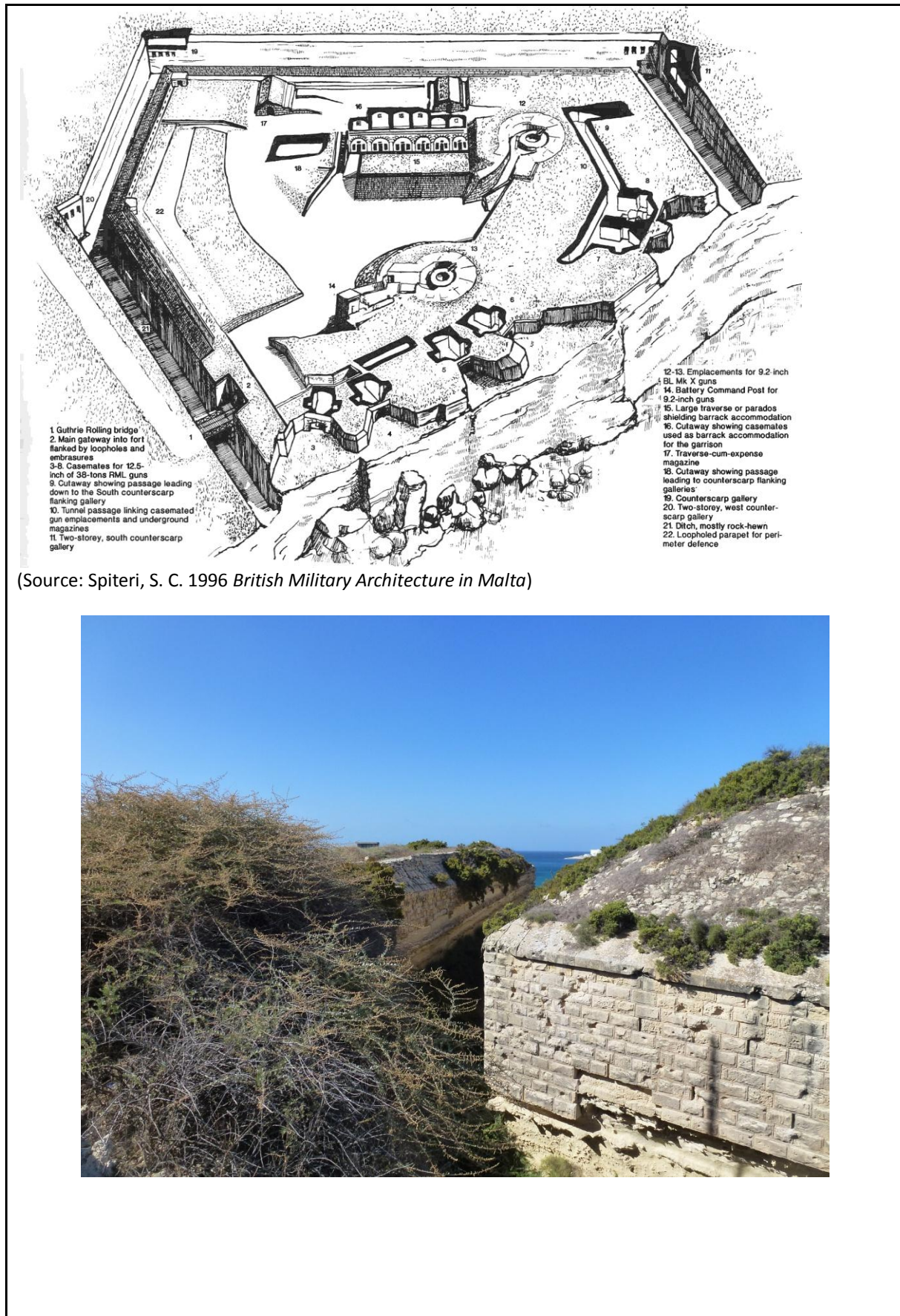
## **Appendix I: Cultural Heritage Data Capture Sheets**

			Ref. No. MXK001
<b>Location</b> Delimara, M'Xlokk	<b>Category</b> Architecture	<b>Type</b> Military	<b>Site Location (Address)</b> Delimara, Marsaxlokk
<b>Eastings</b> 60087.495635	<b>Northings</b> 64726.9757211	<b>Feature</b> Fortification	<b>Period - Year</b> British
<b>S.S. No. 1:</b> 5964	<b>S.S. No. 2:</b> 6064	<b>Description – <u>Fort Delimara</u></b>  During the Knight's period Marsaxlokk Bay was fortified with a network of towers, redoubts and batteries. The main defence structure in the area was Fort St Lucian, which is located in the central part of the Bay. By the mid-19 <sup>th</sup> century, the Knight's structures were no longer useful and plans were made to upgrade the military infrastructure in the area to support heavier armaments.  The construction of Fort Delimara started in January 1876 and was completed in December 1878. The Fort is located at the mouth of Marsaxlokk Bay and has an irregular hexagonal shape.  Between 1982 and 2005, the Fort was used as a pig farm. In 2005, the Fort was passed on to Heritage Malta. The Fort still houses four 12.5 inch, 38 ton guns mounted on dwarf carriages.  (Source: Spiteri, S. C. 1996 <i>British Military Architecture in Malta</i> )	
<b>S.S. No. 3:</b> N/A	<b>S.S. No. 4:</b> N/A		
<b>Date of S.S.:</b> N/A			
<b>Present Utilization:</b> N/A			
<b>Existing Legal Protection:</b> N/A	<b>GN. Number:</b> N/A	<b>GN. Date:</b> N/A	
<b>Comments:</b> N/A			
<b>Site Map:</b> 			

Archaeological Characteristics - Sketch/Scaled Drawings:














<p><b>Condition:</b></p> <p>The site is government property and is rented to Heritage Malta. The site has a number of problems, these include: the site's misuse over the years (e.g. accumulation of pig waste), vandalism and dumping in the ditch, vegetation over growth and structural problems due to chemical and sea erosion.</p>	<p><b>Degree of Protection:</b></p> <p>Recent communication with the Planning Authority<sup>1</sup> reveals that, though not yet scheduled, Fort Delimara is proposed for scheduling as a Grade 1 building of historical, architectural and contextual value; it is one of only two British-period forts in Malta that still has its original armament.</p>
<p><b>State of Security:</b></p> <p>In an initial site visit the site's main entrance was open. In a subsequent site visit the main entrance has been locked again.</p>	<p><b>Proposed Utilization:</b></p> <p>N/A</p>
<p><b>Basic Bibliography:</b></p> <p>Spiteri, S. C. 1996 <i>British Military Architecture in Malta</i></p>	
<p><b>Compiled by:</b></p> <p>Andrea Pace</p> <p><b>Date:</b> 29<sup>th</sup> November 2016</p>	<p><b>Checked by:</b></p> <p>Chantal Cassar</p> <p><b>Date:</b> 29<sup>th</sup> November 2016</p>

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<sup>1</sup> Email from the Heritage Unit, dated 15<sup>th</sup> November 2016.



			Ref. No. MXK002
<b>Location</b> Delimara, M'Xlokk	<b>Category</b> Architecture	<b>Type</b> Maritime	<b>Site Location (Address)</b> Delimara, Marsaxlokk
<b>Eastings</b> 60198.8163948	<b>Northings</b> 64493.9530033	<b>Feature</b> Lighthouse	<b>Period - Year</b> British
<b>S.S. No. 1:</b> 6064  <b>S.S. No. 3:</b> N/A		<b>S.S. No. 2:</b> N/A  <b>S.S. No. 4:</b> N/A	
<b>Date of S.S.:</b> N/A		<b>Description – <u>Delimara Lighthouse</u></b>  The Delimara lighthouse was commissioned in 1850 by Governor Sir Richard More O'Ferrall. The lighthouse became operational in 1855. The lighthouse is 24 m high and consists of a rectangular block of two floors and a central octagonal tower painted in white and black stripes. The tower was painted in these colours to make it easier for mariners to identify during daytime.	
<b>Present Utilization:</b> Heritage site including holiday accommodation		The lighthouse was deactivated in 1990 and replaced by a newer lighthouse. In 2005 Din L-Art Ħelwa (Malta National Trust) requested the Malta Maritime Authority to manage and restore the 19 <sup>th</sup> century lighthouse. The lighthouse was devolved to Din L-Art Ħelwa.  Restoration works on the lighthouse were performed in three phases: firstly, securing the building and its outside; secondly arranging interior spaces and installing services and finally restoration of the canopy hood and the lantern.  (Source: Farrugia Randon, S. The Restoration of the Lighthouse at Delimara [accessed online on the 30 <sup>th</sup> November 2016 - <a href="http://www.academia.edu/9010595/The_Restoration_of_the_Lighthouse_at_Delimara">http://www.academia.edu/9010595/The_Restoration_of_the_Lighthouse_at_Delimara</a> ])	
<b>Existing Legal Protection:</b> N/A		<b>GN. Number:</b> N/A	<b>GN. Date:</b> N/A
<b>Comments:</b> N/A			
<b>Site Map:</b> 			

**Archaeological Characteristics - Sketch/Scaled Drawings:**



**Condition:**

The site has been restored and is in an excellent condition.

**Degree of Protection:**

Recent communication with the Planning Authority reveals that the Heritage Unit considers that Delimara Lighthouse merits protection as a Grade 1 scheduled building<sup>2</sup>.

**State of Security:**

The building has been restored recently.

**Proposed Utilization:**

The Delimara Lighthouse has been restored and is held in trust by Din I-Art Helwa. The lighthouse-keeper's quarters have been converted into two holiday accommodations. All proceeds generated from renting these accommodations are directed to the restoration and environmental funds of the National Trust.

**Basic Bibliography:**

Farrugia Randon, S. The Restoration of the Lighthouse at Delimara [accessed online on the 30<sup>th</sup> November 2016 - [http://www.academia.edu/9010595/The\\_Restoration\\_of\\_the\\_Lighthouse\\_at\\_Delimara](http://www.academia.edu/9010595/The_Restoration_of_the_Lighthouse_at_Delimara)]

**Compiled by:**

Andrea Pace


**Checked by:**

Chantal Cassar

**Date:** 30<sup>th</sup> November 2016

**Date:** 30<sup>th</sup> November 2016

<sup>2</sup> Email from the Heritage Unit, dated 16<sup>th</sup> November 2016.

			Ref. No. MXK003
<b>Location</b> Delimara, M'Xlokk	<b>Category</b> Architecture	<b>Type</b> Industrial	<b>Site Location (Address)</b> Delimara, Marsaxlokk
<b>Eastings</b> 60528.9362581	<b>Northings</b> 64814.4384825	<b>Feature</b> Salt pans	<b>Period - Year</b> Unknown, possibly Knight's period
<b>S.S. No. 1:</b> 6064	<b>S.S. No. 2:</b> 6065	<b>Description – <u>Salt pans</u></b>  There is very little literature available about these salt plans, however, it is suggested that these may date from the Knight's period <sup>3</sup> .	
<b>S.S. No. 3:</b> N/A	<b>S.S. No. 4:</b> N/A		
<b>Date of S.S.:</b> N/A			
<b>Present Utilization:</b> Salt harvesting			
<b>Existing Legal Protection:</b> N/A		<b>GN. Number:</b> N/A	<b>GN. Date:</b> N/A
<b>Comments:</b> N/A			
<b>Site Map:</b> 			

<sup>3</sup> Email from the Heritage Unit, dated 16<sup>th</sup> November 2016.



**Archaeological Characteristics - Sketch/Scaled Drawings:**




<b>Condition:</b>  N/A	<b>Degree of Protection:</b>  Recent communication with the Planning Authority reveals that the Heritage Unit considers that salt pans found around the Delimara peninsula merit protection as Grade 2 scheduled features <sup>4</sup> .
<b>State of Security:</b>  N/A	<b>Proposed Utilization:</b>  N/A
<b>Basic Bibliography:</b> N/A	
<b>Compiled by:</b> Andrea Pace  <b>Date:</b> 30 <sup>th</sup> November 2016	<b>Checked by:</b> Chantal Cassar  <b>Date:</b> 30 <sup>th</sup> November 2016

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<sup>4</sup> Email from the Heritage Unit, dated 15<sup>th</sup> November 2016.



			Ref. No. MXK004
<b>Location</b> Delimara, M'Xlokk	<b>Category</b> Architecture	<b>Type</b> Military	<b>Site Location (Address)</b> Delimara, Marsaxlokk
<b>Eastings</b> 59994.9290773	<b>Northings</b> 64866.0488989	<b>Feature</b> Second World War military structure	<b>Period - Year</b> British
<b>S.S. No. 1:</b> 5964	<b>S.S. No. 2:</b> N/A	<b>Description – <u>Second World War searchlight emplacement</u></b>  A Second World War searchlight emplacement is located to the north of Fort Delimara. Searchlight emplacements are linked to the invention of electricity.  The searchlights fulfilled four functions: <ul style="list-style-type: none"> <li>- To detect the approach of hostile vessels</li> <li>- To illuminate targets which were to be engaged by guns,</li> <li>- To illuminate the water area which was covered by the fire of the quick-firing torpedo boat guns, and</li> <li>- To dazzle and blind hostile crafts attempting to slip into a harbour.</li> </ul> (Source: Spiteri, S. C. 1996 <i>British Military Architecture in Malta</i> )	
<b>S.S. No. 3:</b> N/A	<b>S.S. No. 4:</b> N/A		
<b>Date of S.S.:</b> N/A			
<b>Present Utilization:</b> N/A			
<b>Existing Legal Protection:</b> N/A		<b>GN. Number:</b> N/A	<b>GN. Date:</b> N/A
<b>Comments:</b> N/A			
<b>Site Map:</b> 			

**Archaeological Characteristics - Sketch/Scaled Drawings:**



**Condition:**

N/A

**Degree of Protection:**

N/A

**State of Security:**

N/A

**Proposed Utilization:**

N/A

**Basic Bibliography:**

Source: Spiteri, S. C. 1996 *British Military Architecture in Malta*

**Compiled by:**


Andrea Pace

**Checked by:**

Chantal Cassar

**Date:** 30<sup>th</sup> November 2016

**Date:** 30<sup>th</sup> November 2016

			Ref. No. MXK005
<b>Location</b> Delimara, M'Xlokk	<b>Category</b> Architecture	<b>Type</b> Rural	<b>Site Location (Address)</b> Delimara, Marsaxlokk
<b>Eastings</b> N/A	<b>Northings</b> N/A	<b>Feature</b> Rubble walls and other retaining walls	<b>Period - Year</b> Unknown
<b>S.S. No. 1:</b> 6064	<b>S.S. No. 2:</b> 6065	<b>Description – <u>Rubble walls and other retaining walls</u></b>  Rubble walls and other retaining walls are vernacular field / property boundary walls that are constructed through the use of dry stones. They are a protected cultural feature.  Both the Scheme site and the Area of Influence had rubble walls. Some of the walls, including within the Scheme Site, are built with traditionally-sized rubble stones, whilst others show frequent interventions with the introduction of larger sized blocks.	
<b>S.S. No. 3:</b> N/A	<b>S.S. No. 4:</b> N/A		
<b>Date of S.S.:</b> N/A			
<b>Present Utilization:</b> N/A			
<b>Existing Legal Protection:</b> Legal Notice 160 of 1997		<b>GN. Number:</b> N/A	<b>GN. Date:</b> N/A
<b>Comments:</b> L.N. 160/97 prohibits the dismantling of such walls except by permission from the competent authority.			
<b>Site Map:</b> 			



**Archaeological Characteristics - Sketch/Scaled Drawings:**







<b>Condition:</b> N/A	<b>Degree of Protection:</b> N/A
<b>State of Security:</b> N/A	<b>Proposed Utilization:</b> N/A
<b>Basic Bibliography:</b> N/A	
<b>Compiled by:</b> Andrea Pace	<b>Checked by:</b> Chantal Cassar
<b>Date:</b> 30 <sup>th</sup> November 2016	<b>Date:</b> 30 <sup>th</sup> November 2016

**PA 02767/16**

**Redevelopment of Existing Derelict Hotel, including Environmentally Friendly Measures and Provision of Public Ancillary Facilities at Ta' Kalanka, Delimara**

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## **Technical Appendix 5**

### **NOISE BASELINE REPORT**

Prepared by Adi Associates Environmental Associates Ltd

Supporting Documents for  
Environmental Planning Statement



**TN 163702**

**REDEVELOPMENT OF AN EXISTING DERELICT HOTEL AT TA'  
KALANKA, DELIMARA**

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**BASELINE NOISE SURVEY**

**Version 1: October 2016**



**Report Reference:**

**Adi Associates Environmental Consultants Ltd, 2016. Redevelopment of an existing derelict hotel at Ta' Kalanka, Delimara. San Gwann, October 2016; v + 8pp + I Appendix.**

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## Quality Assurance

### Redevelopment of an existing derelict hotel at Ta' Kalanka, Delimara Baseline Noise Survey October 2016

Report for: **Delimara Bay Hotel Ltd**

### Revision Schedule

Rev	Date	Details	Written by:	Checked by:	Approved by:
00	Oct 2016	Submission for EIA	<b>Eilis McCullough</b> Senior Consultant	<b>Rachel Xuereb</b> Director	<b>Adrian Mallia</b> Director

File ref: G:\\_Active Projects\EIA\DBH004 - Boutique hotel at Delimara\Baseline Studies\NOISE\Baseline Noise Survey.docx



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

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## **BASELINE NOISE SURVEY**

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### **INTRODUCTION**

- I.45. This baseline noise survey was carried out to inform the Environmental Impact Assessment (EIA) of the proposed redevelopment of the former Delimara Hotel, at Ta' Kalanka, Delimara (hereinafter referred to as 'the Scheme').
- I.46. The Report describes the baseline noise climate at the identified noise sensitive receptors in the vicinity of the Scheme Site. The baseline noise climate was established in order to allow for assessment of the construction noise impacts and the noise impacts arising from the operation of the restaurant to be provided as part of the Scheme on these sensitive receptors.

### **STANDARDS AND GUIDANCE**

- I.47. There is to date no specific guidance in Malta on noise in the context of land use planning<sup>11</sup>. In situations where standards are not available, the Environment and Resources Authority (ERA) and the Planning Authority (PA) generally make reference to equivalent guidance from the United Kingdom (UK) and International Organisation for Standardisation (ISO) standards. Accordingly, the baseline noise survey was undertaken with reference to British Standard (BS) 4142: 2014<sup>12</sup>.

### **DESCRIPTION OF THE EXISTING NOISE CONTEXT**

- I.48. The Scheme Site is located towards the southern end of the Delimara peninsula, overlooking Kalanka Bay, in what is a relatively remote rural area accessible from only one road (Triq Delimara). A detailed land use survey of the area 250 m around the Scheme Site was conducted in July 2015 (see **Figure 1**).
- I.49. There are relatively few residential properties on the peninsula. The closest residential properties to the Scheme Site are located to the east / northeast of the site; these are summer residences. The nearest of these properties is located approximately 95 m (plan distance) to the Scheme Site at the closest point.
- I.50. Kalanka Bay is a designated swimming zone and is popular with bathers during the summer months in particular; the area is also used in the evening-time (for barbecues), although to a lesser extent than during the day-time. Access to the Bay is from the steps running alongside the southwestern perimeter of the Scheme Site, but bathers (and other users) tend to congregate further southeast on the point where there is ladder access to the sea, and where the configuration and terrain of the Bay are more conducive to sitting / lying; this includes the area directly beneath

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<sup>11</sup> Malta transposed the Environmental Noise Directive (Directive 2002/49/EC) into national legislation through Legal Notice 426 of 2007. The Regulations designate MEPA as the competent authority for the generation of strategic noise maps, the publication of information on environmental noise, and the drawing up of action plans.

<sup>12</sup> BS 4142:2014, *Methods for rating and assessing industrial and commercial sound*, British Standards Institution

the cliff on the southeastern edge of the Scheme Site.

I.51. In determining the current noise context in the area surrounding the Scheme Site, the assessors identified a number of noise sources / noise-generating activities having the potential to contribute to the noise climate, as follows (in no order of priority):

- Vehicular traffic, passing along Triq Delimara and parking in the vicinity of the Scheme Site (engines, suspensions, horns);
- Pedestrian activity, both bathers and other visitors to Kalanka Bay passing along the side of the Scheme site to the coast, and other visitors walking in the area (chatter and other associated noise);
- Activity on the coastline in connection with bathing and the congregation of visitors to the Bay (chatter, splashing, and other associated noise);
- Activity at the nearby residential properties (chatter and other associated noise);
- Agricultural activity, and other activity in the surrounding fields, including hunting (chatter, animal sounds, gunfire, and other associated noise);
- Boats / yachts visiting the Bay (engines, chatter, and other associated noises);
- Boats going to / from the off-shore fish farm (engines);
- Wave activity;
- Aircraft (at a distance); and
- Power Station (faint underlying hum).

## **NOISE SENSITIVE RECEPTORS AND NOISE MONITORING LOCATIONS**

I.52. The Method Statement for the baseline noise survey identified two noise measurement locations, identified as the most appropriate locations to establish the baseline noise climate at the residential and recreational sensitive receptors. Importantly however, when it came to undertaking the evening time survey at the residential receptors, it was necessary to relocate one of the originally intended locations. The reasons for this related to access to the originally intended measurement location and the safety of the assessors. Relocated to a distance of only approximately 12 m away, the assessors considered that the noise measurement taken would be representative of the noise climate at the location originally intended.

I.53. The baseline noise climate was established at the following locations:

- *Measurement Location 1 (ML 1)*: within the side curtilage of the nearest residential property, at a distance of approximately 90 m (plan distance) from the Scheme Site at its closest point; this baseline measurement was used in respect of the construction noise assessment and the day time operational

noise assessment;

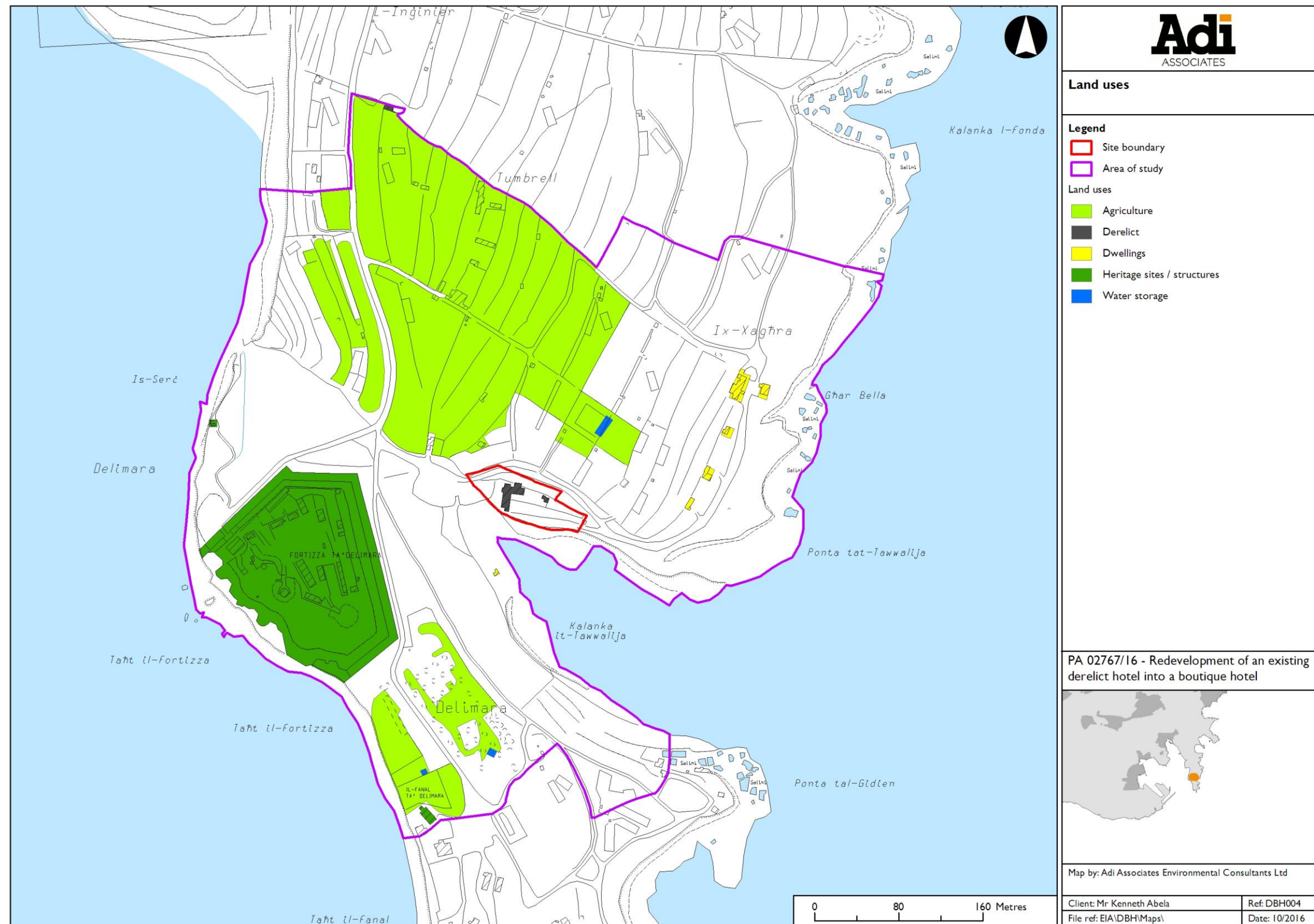
- *Measurement Location 2 (ML 2):* on the northern shore of the Bay, at a distance of approximately 20 m (plan distance) from the southern boundary of the Scheme Site at its closest point. This location was chosen having regard to where there is the greatest congregation of bathers and where the sensitive receptors are most likely to be affected by noise arising from the Scheme Site in view of the topography of the area. The bathers generally congregate towards the point, including the area directly beneath the cliff on the southeastern edge of the Scheme Site. However, and because of the change in elevation, it is most likely that those sensitive receptors located towards the edge of the Bay will experience the greater change in noise level because of noise arising from the Scheme Site. The baseline measurement from ML 2 was used in respect of the construction noise assessment; and
- *Measurement Location 3 (ML 3) – alternative location to ML 1:* on the approach road to the nearest residential property, at a distance of approximately 78 m (plan distance) from the Scheme Site at its closest point; this baseline measurement was used in respect of the evening time operational noise assessment.

1.54. The measurement locations (ML) are described in **Table 1** and identified in **Figure 2**; **Figure 2** also shows the location of the sensitive receptors.

**Table 1: Noise Measurement Locations**

Measurement Location		Eastings (ED50)	Northings (ED50)	Distance from Scheme Site (plan distance in metres)
<b>ML 1</b>	At the nearest residential sensitive receptors to the site (east of the Scheme Site)	460442.660	3964778.334	90
<b>ML 2</b>	On the northern shore of Kalanka Bay (south of the Scheme Site)	460309.718	3964747.129	20
<b>ML 3</b>	At the nearest residential sensitive receptors to the site (east of the Scheme Site)	460425.349	3964757.905	78

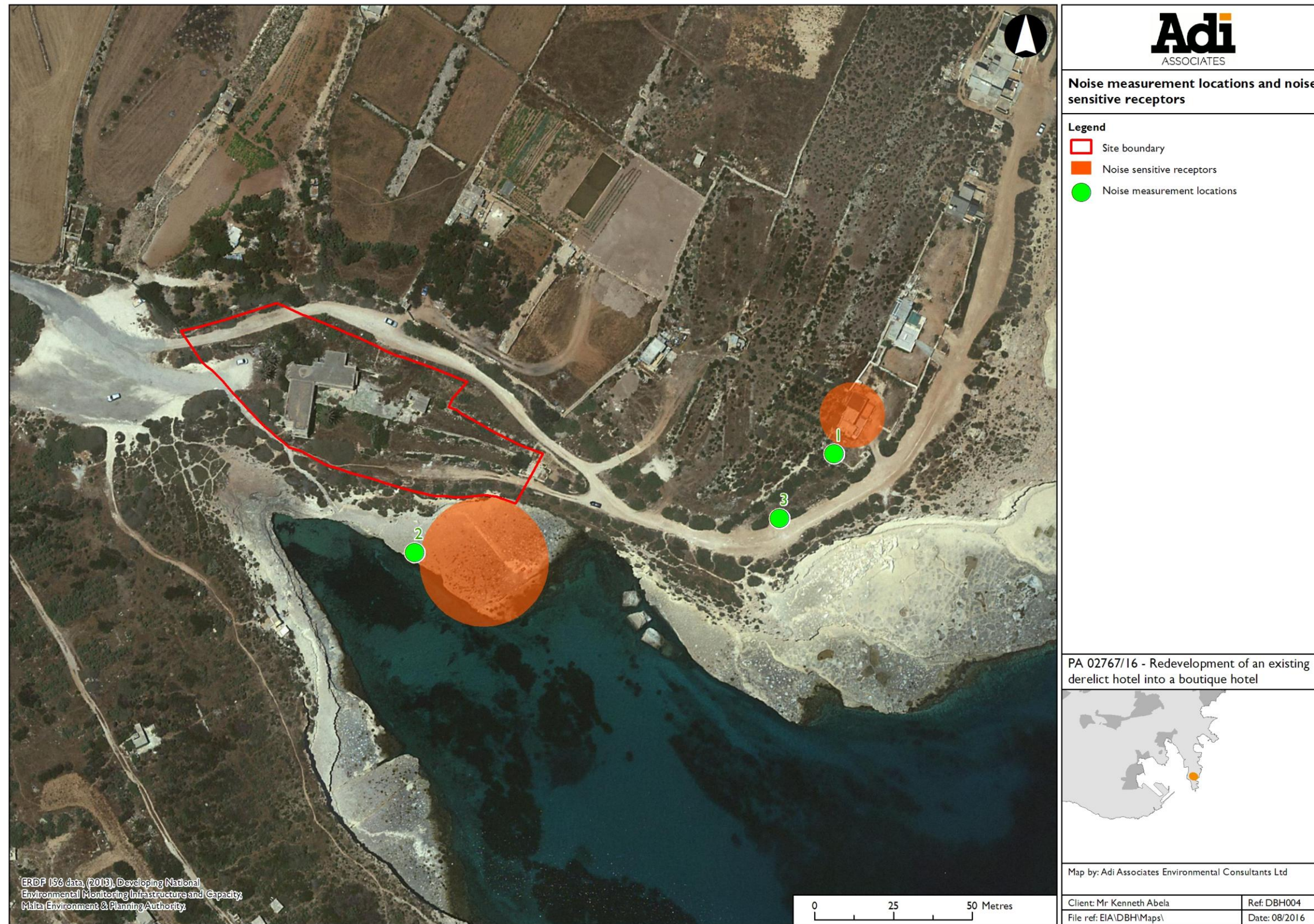
**Figure 1: Land Uses in the Vicinity of the Scheme Site**



INDICATIVE ONLY - Not to be used for direct interpretation



**Figure 2: Noise measurement locations and noise sensitive receptors**





## BASELINE SURVEY METHODOLOGY

### Sound Level Measurements

- I.55. Construction activities in relation to the Scheme are envisaged to take place Monday to Friday, during day time hours (7:00 to 19:00), and on Saturday mornings (7:00 – 13:00). Having observed and considered the noise context, the noise climate at the sensitive receptors on a week day morning was considered to be representative of the noise climate at the receptors on a Saturday morning between 7:00 and 13:00. Accordingly, two day time sound level measurements were taken, at ML 1 and ML 2, so as to establish the day time baseline noise climate (the background sound level) at the sensitive receptors (see **Table 2**).
- I.56. One sound level measurement was taken at ML 3, so as to establish the evening time baseline noise climate (the background sound level) at the residential sensitive receptors (also see **Table 2**). The timing of this measurement took account of the peak operational time of the proposed restaurant (between 20:00 – 23:00 on a weekend (Friday / Saturday) evening).
- I.57. Having observed and considered the noise context, and in accordance with BS 4142:2014, the measurements at ML 1 and ML 2 were based on a 15 minute recording. Having observed and considered the noise context, this time interval was considered sufficient to obtain a representative value of the day time background sound levels at the sensitive receptors.
- I.58. The intention had been to also measure for 15 minutes at ML 3. However, as mentioned, when it came to undertaking the evening time survey there were issues in respect of the safety of the assessors. Specifically, and following advice from a Police Patrol, it was decided to reduce the measurement period at ML 3 to five minutes. This decision was taken with regard to the need for the measurement time interval to allow for a representative evening time baseline noise level at the residential receptors. The assessors observed there to be relatively very little fluctuation in the noise level over the five minute time interval (as can be seen from **Table 3** below). Hence, noise level recorded over five minutes can be taken as being representative of the noise level that would likely have been recorded over a 15 minute time interval, and therefore representative of the evening time baseline noise level at the residential receptors.

**Table 2: Noise Measurements**

Monitoring Location	Date	Time
<b>ML 1</b>	8 <sup>th</sup> October 2016	15:00 – 15:15
<b>ML 2</b>	8 <sup>th</sup> October 2016	15:30 – 15:45
<b>ML 3</b>	10 <sup>th</sup> October 2016	21:15 – 21:20

### Measurement Protocols

- I.59. A Class I Norsonic 140 Precision Sound Analyser (serial no. 1406005) with a Norsonic Type 1225 Microphone (serial no. 208101) was used to take all the sound level measurements. A type 1251 Sound Calibrator (serial no. 34129) was used to calibrate the sound analyser in the field.
- I.60. The Sound Analyser and Sound Calibrator were both recalibrated on 24<sup>th</sup> June 2016; the calibration certificates are included in **Appendix I**. The Sound Analyser was field calibrated before and after each measurement (113.8 dBA) in order to eliminate the potential for drift; the drift during the measurements at ML 1, ML 2 and ML 3 was 0.1, 0.2 and 0.1, respectively. A Norsonic 1434 windshield was used to minimize the effects of turbulence at the microphone.
- I.61. In order to minimise the influence of noise reflection on the recordings, the sound level measurements were taken at a distance of at least 3.5 m from the nearest reflective surface (excluding the ground); specifically, the measurements at ML 1, ML 2 and ML 3 were taken at 6 m, 14 m and 40 m from the nearest reflective surface (excluding the ground). In all cases, the Sound Analyser was mounted on the tripod at a height of 1.4m above ground level.
- I.62. The weather conditions prevailing during each measurement were also recorded. In all cases, the conditions were dry and the wind speed was less than 18 km/hr throughout the measurement. It is unlikely that there was any significant effect by reason of temperature inversion during the measurements. There was also observed to be no potential for electrical interference to the measurements.
- I.63. During each measurement, observations of all predominant noise sources were recorded and efforts were made to identify / describe acoustic events and the phenomena attributable to these noises.

### Measurement Parameters

- I.64. The following parameters were measured and recorded:
- $L_{Aeq(T)}$  (equivalent continuous A-weighted sound pressure level recorded over the relevant time interval of interest);
  - $L_{AFmax}$  (maximum A-weighted sound pressure level recorded over the time interval of interest, with fast time weighting);
  - $L_{AF10}$  (A-weighted sound pressure level exceeded for 10% of the time interval of interest, with fast time weighting); and
  - $L_{AF90}$  (A-weighted sound pressure level exceeded for 90% of the time interval of interest, with fast time weighting).

## **BASELINE NOISE SURVEY RESULTS**

- I.65. The background sound level measurements and the predominant noise sources recorded during the baseline surveys are shown in **Table 3**. In accordance with BS 4142:2014, the recorded sound levels are quoted to the nearest whole number of decibels. The climatic conditions experienced during the surveys are also identified.
- I.66. The average day time baseline (background) noise level recorded at the residential sensitive receptors (ML 1) was 41 dBA( $L_{Aeq}$ ); the average day time baseline (background) noise level recorded at the recreational sensitive receptors (ML 2) was 55 dBA( $L_{Aeq}$ ). The maximum sound level recorded at the residential sensitive receptors during the day was 61 dBA( $L_{Amax}$ ); the maximum sound level recorded at the recreational sensitive receptors during the day was 69 dBA( $L_{Amax}$ ).
- I.67. The average baseline (background) noise level recorded at the residential sensitive receptors (ML 3) in the evening time was 43 dBA( $L_{Aeq}$ ); the maximum sound level recorded at the residential sensitive receptors in the evening time was 55 dBA( $L_{Amax}$ ).



**Table 3: Baseline Sound Level Measurements**

ML	$L_{Aeq}$	$L_{Amax}$	$L_{A90}$	$L_{A10}$	Predominant noise sources	Climatic Conditions
<b>Day time Measurements</b>						
<b>ML 1</b>	41	61	37	43	<ul style="list-style-type: none"> <li>Gentle waves (continuous throughout the measurement)</li> <li>Bird chirping (continuous throughout the measurement)</li> <li>Engine of small boats (in the far distance, from three boats and for the first 10 minutes of the measurement)</li> <li>Overhead aircraft (in the far distance, and only once)</li> </ul>	Wind direction: E Wind speed: av 4.6 km/hr (max gust 4.8 km/hr) Air temperature: 26 °C Rainfall: 0 mm Relative humidity: 58 %
<b>ML 2</b>	55	69	52	57	<ul style="list-style-type: none"> <li>Waves (in close proximity and continuous throughout the measurement)</li> <li>Chatter from bathers nearby (occasional but frequent)</li> <li>Splashing from bathers entering the water (occasional but frequent)</li> <li>Engine of small boat leaving the Bay (in close proximity, but only for the last 3 minutes of the measurement)</li> </ul>	Wind direction: E Wind speed: av 4.3 km/hr (max gust 6.4 km/hr) Air temperature: 25 °C Rainfall: 0 mm Relative humidity: 60 %
<b>Evening time Measurement</b>						
<b>ML 1</b>	43	55	46	51	<ul style="list-style-type: none"> <li>Gentle waves (continuous throughout the measurement)</li> </ul>	Wind direction: - Wind speed: 0 km/hr Air temperature: 22°C Rainfall: 0 mm Relative humidity: 69 %

**APPENDIX I:**  
**Sound Level Meter Calibration Certificates**

# Campbell Associates Ltd

5b Chelmsford Road Industrial Estate  
GREAT DUNMOW, Essex, GB-CM6 1HD  
[www.campbell-associates.co.uk](http://www.campbell-associates.co.uk)  
Phone 01371 871030 Facsimile 01371879106



CALIBRATION



0789

## Certificate of Calibration and Conformance

Certificate Number:- U21957

Test object: Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)  
Manufacturer: Norsonic  
Type: 140  
Serial no: 1406005

Customer: Adi Associates Environmental Consultants Ltd  
Address: Kappara Business Centre, 113 Birkirkara Road,  
San Gwann, Malta. SGN 4197.  
Contact Person: Adrian Mallia.

### Method :

Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	208101	21956
Calibrator*	Norsonic	1251	34129	U21955
Preamplifier	Norsonic	1209	20041	Included

Additional items that also have been submitted for verification

Wind shield None  
Attenuator None  
Extension cable None

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50.0 %RH
Measurement conditions:	101.03 ±0.01kPa	23.4 ±0.2°C	55.7 ±2%RH

Date received : 17/06/2016  
Date of calibration: 24/06/2016  
Date of issue: 24/06/2016

Engineer

  
Michael Tickner

Supervisor

  
Darren Batten Tech IOA

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



**Certificate number: U21403**

## Certificate of Calibration and Conformance

**Test object:** Sound Calibrator  
**Manufacturer:** Norsonic  
**Type:** 1251  
**Serial no:** 33407

**Customer:** En-Sure Ltd  
**Address:** Kappara Business Centre, 113 Triq Birkirkara,  
 San Gwann, Malta. SGN 4197.  
**Contact Person:** Natalie Falzon.

Measurement Results:	Level	Level Stability	Frequency	Frequency Stability	Distortion
1:	113.98 dB	0.06 dB	1000.37 Hz	0.00 %	<0.3 %
2:	113.97 dB	0.06 dB	1000.37 Hz	0.00 %	<0.3 %
3:	113.97 dB	0.06 dB	1000.38 Hz	0.00 %	<0.3 %
<b>Result (Average):</b>	<b>113.97 dB</b>	<b>0.06 dB</b>	<b>1000.37 Hz</b>	<b>0.00 %</b>	<b>&lt;0.3 %</b>
Expanded Uncertainty:	0.10 dB	0.02 dB	1.00 Hz	0.01 %	0.10 %
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated level is relative to 20µPa. The level is traceable to National Standards.

The stated level is valid at reference conditions. The following correction factors have been applied during the measurement: Pressure: 0.0005 dB/kPa Temperature: 0.003 dB/°C Relative humidity: 0.000 dB/%RH Load volume : 0.0003 dB/mm<sup>3</sup>

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2016\NOR1251\_33407\_M1.nmf

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	102.492 ± 0.041 kPa	24.6 ± 0.1 °C	40.1 ± 1.5 %RH

Date received for calibration: 13/04/2016  
 Date of calibration: 20/04/2016  
 Date of issue: 20/04/2016  
 Engineer

Supervisor

Michael Tickner  
  
 Darren Batten TechIOA

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full without the prior written approval of the issuing laboratory.



Certificate number: U21403

#### Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

#### Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

#### Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

#### Instruments and program

A complete list of equipment, hardware and software that has been used in this calibration is available from the calibration laboratory on request.

#### Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level: National Physical Laboratory, United Kingdom

Voltage: National Physical Laboratory, United Kingdom

Frequency: National Physical Laboratory, United Kingdom

Ambient Pressure: National Physical Laboratory, United Kingdom

Temperature & Relative Humidity: National Physical Laboratory, United Kingdom

#### Comment

Calibrated as received, no adjustments made.

#### Statement of conformance

**As public evidence was available<sup>1</sup>, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.**

<sup>1</sup> This evidence is held on file at the calibration laboratory.

#### Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and averaged by a WS2P working standard microphone for class 1 or 2 devices or a LS2P reference microphone for class 0 or LS devices as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in **BOLD** are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Measurements performed by



Sonitus House, 5b Chelmsford Road Industrial Estate, Great Dunmow, GB-CM6 1HD  
Tel ( +44) 01371 871030 Fax (+44) 01371 879106  
email calibration@campbell-associates.co.uk

# Certificate of Calibration and Conformance

UKAS Laboratory Number 0789

Certificate Number:- U21957

## Conformance

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN IEC 61672-1:2002 and similarly that the associated sound calibrator conforms to BS EN IEC 60942.

## Statement of conformance

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of BS EN IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available<sup>1</sup>, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with BS EN IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in BS EN IEC 61672-1:2002, and that the sound level meter submitted for testing conforms to the class 1 requirements of BS EN IEC 61672-1:2003.

<sup>1</sup> This evidence is held on file at the calibration laboratory

## Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.1 #9	Passed
Self-generated noise - IEC 61672-3 Ed.1 #10	Passed
Acoustical test of a frequency weighting - IEC 61672-3 Ed.1 #11	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.1 #13	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.1 #14	Passed
Toneburst response - IEC 61672-3 Ed.1 #16	Passed
Peak C sound level - IEC 61672-3 Ed.1 #17	Passed
Overload indication - IEC 61672-3 Ed.1 #18	Passed
Combined electrical and acoustical test - IEC 61672-3 Ed.1 #12	Passed

## Comment

Correct level with associated calibrator is 114.0dB(A).

## Observations

The details of the uncertainty for each measurement is available from the Calibration Laboratory on request and is based on the standard uncertainty multiplied by a coverage factor K=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. Details on the sources of corrections and their associated uncertainties that relate to this verification are contained the detailed test report accompanying this certificate.