



# Visual Study

*for the Proposed Photovoltaic Project on Robben Island, Western  
Cape*

February 2016

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for the Proposed Photovoltaic Project on  
Robben Island, Western Cape

FINAL

February 2016

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## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


### DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

File Reference Number:	(For official use only)
NEAS Reference Number:	
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

### PROJECT TITLE

Environmental Authorisation Process for the proposed Photovoltaic Plant on Robben Island, Western Cape.
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## 4.2 The specialist appointed in terms of the Regulations\_

I, BELINDA GEBHARDT , declare that --

## General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



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Signature of the specialist:

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Name of company (if applicable):

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02 - 02 - 2016

Date:

# 1 Introduction

## 1.1 Background

The Robben Island World Heritage Site (RIWHS) is proposing to install a photovoltaic (PV) system to improve its sustainability efforts and reduce power generation costs on the Island. Currently the Island's power is supplied by diesel generators, with more than half of the energy being used by the desalination plant (WSP, *pers. comm.* 18 Jan 2016).

Four alternative sites on Robben Island have been investigated for the proposed PV project. The two preferred sites will be considered within the scope of this report<sup>1</sup>. The first site is located within the Village Precinct and is referred to as the cricket pitch (Site 1). The second site is located inland in close proximity to the landing strip and is located adjacent to the old agricultural buildings historically used for hydroponics and a piggery (Site 2). See Figure 1 below.

The NEMA and EIA Regulations require that a Basic Assessment (BA) be undertaken for the proposed project, since it includes scheduled activities in terms of these regulations. The BA is being conducted by WSP/ Parsons Brinckerhoff. This visual specialist study forms a component of the BA and should be read in conjunction with the Basic Assessment Report (BAR), the Cultural Heritage Assessment and other specialist studies.

## 1.2 Project Description

The following section provides a brief overview of the proposed PV project; please refer to the BAR for a more detailed description.

Detailed design for the proposed PV system will be designed by the appointed contracting engineers. Preliminary designs are for a small PV system intended to generate 300 to 500kW. These will be fixed-tilt, polycrystalline PV modules of 1,9m high (please see Figure 4). It is anticipated that the mounting system will be aluminium or steel galvanised frames with pile driven, screw pile or concrete foundations (WSP, *pers. comm.* 18 Jan 2016).

The site will extend over an area of approximately 1ha and will be enclosed with a 0,8m high perimeter fence. The PV modules will be connected to the closest point on the existing 11kv power line. All cables will be below ground. An exact route for the cables cannot be determined yet, but various options are presented in Figure 2a and 2b. A route corridor of 100m wide will therefore be included in the assessment to ensure all route options are included. A glass reinforced plastic (GRP) switchgear housing will be installed on site, approximately 5m x 3m, but not exceeding 3m in height (WSP, *pers. comm.* 5 Feb 2016). Although not yet specified, it is likely that some low-level security lighting will be required.

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<sup>1</sup> Please refer to the Basic Assessment Report for further detail regarding the site selection process.

## 1.3 Scope of Work

The primary aims of the study are to identify and assess visual concerns in order to inform the BA and, where possible, provide practical mitigation measures to reduce negative visual impacts. The scope of the visual study includes:

- Description of the existing visual character and sense of place (baseline) of the area, with an emphasis on the character and sensitivity of the visual landscape, significant views and any other key visual resources;
- Identification of potential visual impacts resulting from the proposed PV project;
- Discussion of visual concerns based on:
  - Visual quality;
  - Visual absorption capacity;
  - Visual exposure (viewshed determination);
  - Visibility;
  - Visual intrusion or integrity with the existing landscape/townscape; and
  - Sensitivity of the viewers.
- Review of the project alternatives from a visual perspective; and
- Development of mitigation measures to reduce visual impacts and enhance any positive visual benefits.

## 1.4 Approach and Methodology

Given the nature of visual issues, describing and assessing visual impacts in absolute and objective terms is not achievable. Thus, both qualitative and quantitative techniques are required. In this study emphasis has therefore been placed on ensuring that the methodology and criteria are clearly stated and transparent. The focus of the study was on determining the character and quality of the visual environment, determining the visual catchment area, identifying and assessing potential visual impacts and recommending mitigation measure to reduce negative impacts and enhance any benefits.

In order to meet the terms of reference, the following methodology was applied:

1. All the required data were collected, which included data on topography, existing visual character and quality, plans for the proposed project and other background information;
2. Fieldwork (a site visit) was conducted on 8 December 2015, with some additional fieldwork conducted on 4 February 2016. The objectives of the fieldwork were to:
  - a) familiarise the author with the sites and their surroundings;
  - b) to identify viewpoints from which the sites may be visible; and

- c) ground-truth the sensitivity of the landscape and visibility of the sites.

**Visual sampling was undertaken using photography from a number of viewpoints radius of approximately 15km from the site. The location of the viewpoints a GPS. Twenty of these were selected for inclusion in the report to (these are indicated in**

Figure 7 and Table 5: Site 1: Visibility from Specific ViewpointsTable 5

3. Table 6).
4. The zone of influence was determined. The visual zone of influence (viewshed) is defined as *the area, including all the major observation sites, from which the proposed activities will be visible*. This area varies for each visual intrusion or impact. For the purposes of this study the calculations were done on a SRTM Digital Elevation Model (DEM) using 25m contours in Google Earth Pro.
5. Potential visual impacts and concerns were analysed and discussed, using VIA evaluation criteria. All techniques and criteria used for evaluative review purposes are clearly explained within the text. Briefly the following aspects were considered:
  - Quality of landscape – the aesthetic excellence and significance of the visual resources and scenery;
  - Visual absorption capacity – the potential of the landscape to conceal the proposed development;
  - Viewshed analysis (visibility) – the geographic area from which the project may be visible (view catchment);
  - Visual intrusion (or integrity) – the level of congruence or integration with existing landscape/townscape; and
  - Viewer numbers and sensitivity – the level of acceptable visual impact is influenced by the type of visual receptors.

## 1.5 Assumptions and Limitations

The following assumptions and limitations are pertinent:

- Visual impact assessment is not, by its nature, a purely objective, quantitative process, and depends to some extent on subjective judgments. Where subjective judgments are required, appropriate criteria and motivations have been clearly stated.
- The assessment has been based on background information supplied by WSP/ Parsons Brinckerhoff, and is assumed to be accurate.
- The viewshed calculations have been taken at a height of 2m. Should larger/higher panels be specified in the detailed design phase, this would significantly influence the proposed project's visibility.
- The evaluation is based on available information regarding the layout plan. Should final detailed plans differ markedly from the information provided, the assumptions and conclusions contained in this report may be inaccurate.
- Planning and policy related impacts have not been assessed within the scope of this study and are assumed to be addressed elsewhere in the BAR, if required.



Figure 1: Location Plan (Google Earth Pro, 2016)

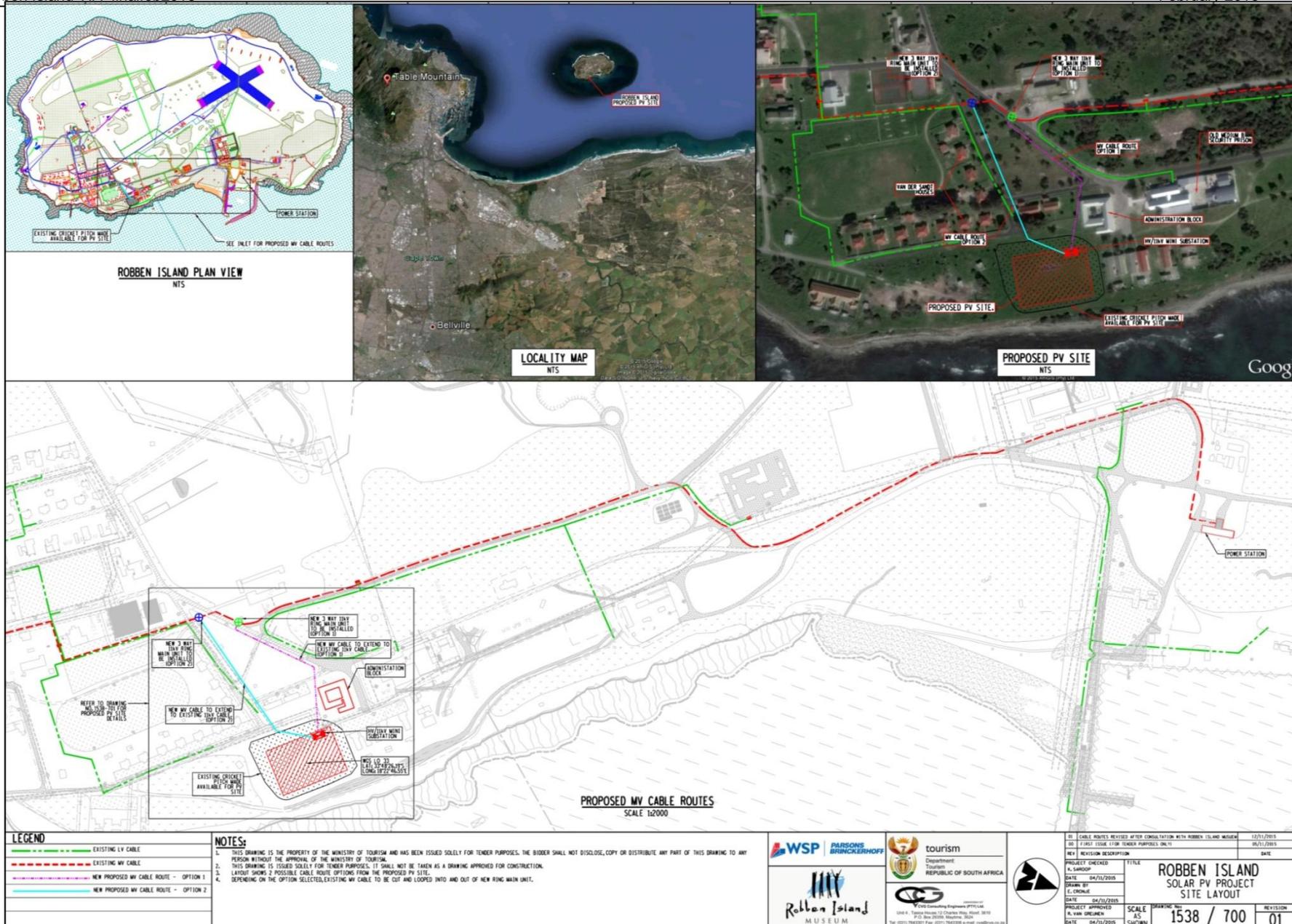


Figure 2a: Proposed Site 1 Layout (WSP, 2016)



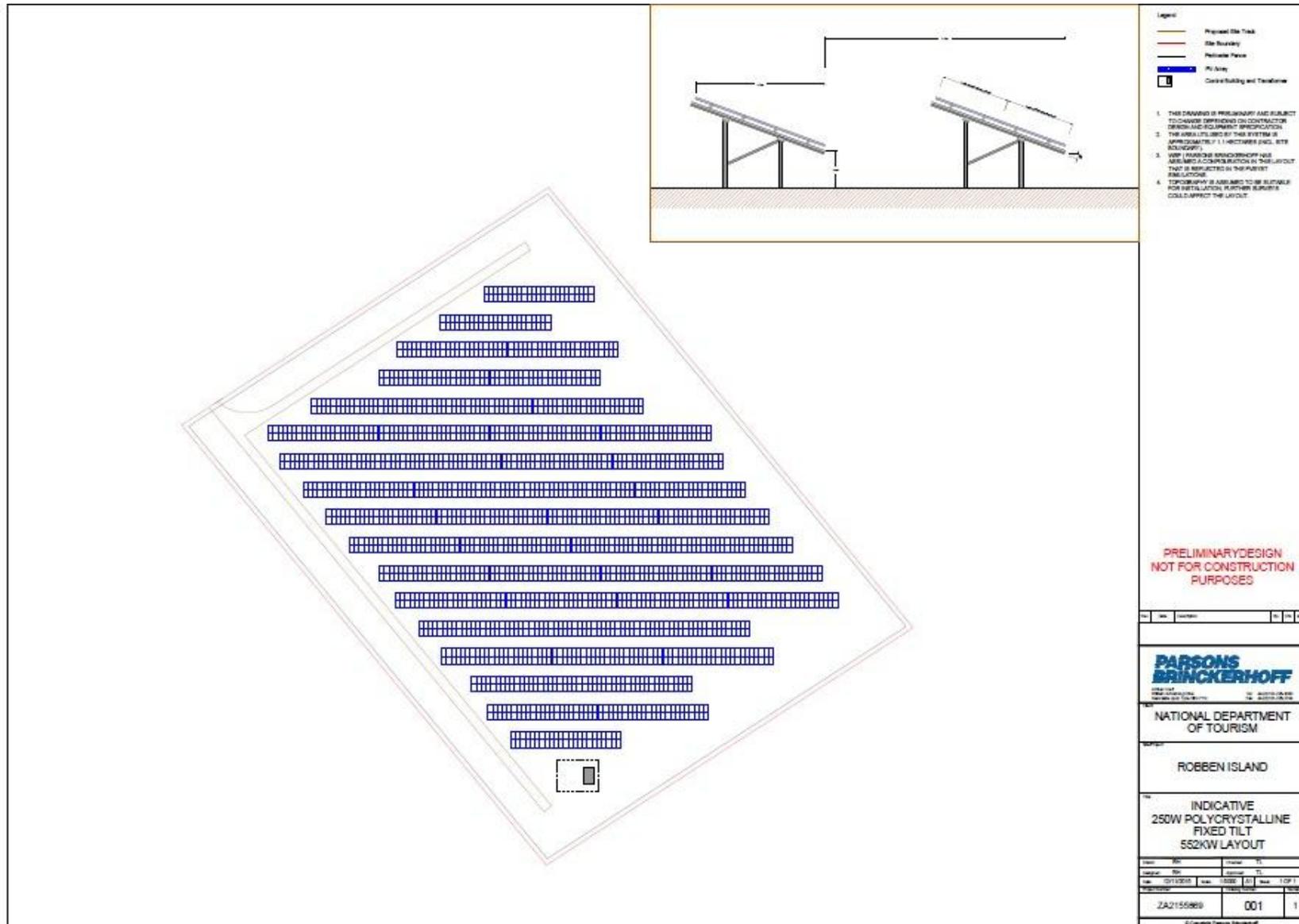


Figure 4: Proposed draft design of PV panels (WSP, 2016)

## 2 Understanding the Visual Context and Character

Landscape character is the description of the pattern of the landscape, resulting from particular combinations of natural (physical and biological) and cultural (land use) factors. It is the inherent nature of the land rather than the response of a viewer (Young, 2000). In order to establish the visual character or context of an area, the layers that make up the landscape need to be understood. These layers include geology, topography, vegetation and land use (man-made elements).

### 2.1 Geology and Topography

Robben Island is underlain by the Tygerberg Formation, part of the Neoproterozoic to early Cambrian Malmesbury Group of the Saldana Belt. The ancient Malmesbury shales are overlain by a thick layer of fossilised dune sands cemented together with calcium carbonates from the Langebaan formation, made up of limestone or calcrete (Rowe, 2010 and Riley, 1993 *in* ICMP, 2013). These are covered by windblown sand and shell fragments.

Topographically the Island is low-lying, about 3m in elevation around the perimeter of the island, rising gently inland. Inland, the island is interspersed with some undulating sand dunes, reaching its highest point on the south of the island at Minto's Hill (approximately 29m elevation). The coastline is predominantly rocky, with a sandy beach south of Murray's Bay.

Site 1, situated along the coastline on the eastern side of the Island, is low-lying and flat, with an elevation of about 7m. Site 2, situated further inland close to the middle of the Island, is also relatively low-lying at an elevation of about 15m. It is surrounded by stabilised dunes, particularly along the eastern side.

### 2.2 Vegetation

According to the SANBI the natural vegetation type on the Island is likely to have been Cape Flats Dune Strandveld (SANBI 2011, *in* ICMP, 2013). However, this has been significantly transformed over the past 350 years due to vegetation clearing, grazing and introduction of invasive alien species. Currently the Island is predominantly covered with grass and clusters of larger alien shrubs and trees. Generally, the eastern and southern sections of the Island are more heavily wooded and the northern and western areas have a more grassland-like character. In some areas, particularly in the north some indigenous vegetation remains intact or has re-established. The grassy expanses and low lying plants on the island provide little visual cover for structures, but the clusters and avenues of alien Rooikrans (*Acacia cyclops*), Manatoka (*Myoporum serratum*) and Eucalyptus, while not ecologically desirable, provide highly effective visual screening.

More specifically, Site 1 has been maintained as a grass turf, with some larger shrubs (predominantly Rooikrans) on the border of the site along the coast. A number of large trees are also planted close to the road and houses on the western boarder of the site.

Site 2 is predominantly covered with low-growing ground covers, grasses and small shrubs growing in the sandy soils. To the north is a relatively dense group of invasive alien trees, which have been earmarked for clearing. Along the road a number of well established, large, trees provide good visual cover.

## 2.3 Land Use

The long and diverse history of land use on Robben Island is what defines the Island and makes it the international landmark it is. Although probably best known as the place that former President Nelson Mandela was imprisoned before the fall of Apartheid, the Island has had many uses, summed up in the ICMP thus; *“Robben Island has a chequered history of maritime contacts, confinement and banishment, oppression and hard labour, torture, segregation and discrimination. It has also been a military post, World War Two garrison, leprosarium and mental health facility, a prison for common law criminals and for political prisoners. Very few places in the world have such a long and layered history of human suffering, the fight for freedom of the mind and the body, and of subsequent triumph.”*(ICMP, 2013)

Today the Island is used for tourism, with approximately 1 200 tourists visiting the Island daily. About 134 staff, who maintain and supply services to the Island, are also housed within the Village Precinct of the Island (WSP, *pers.comm.*, 8 Feb 2016).

Site 1, referred to as the cricket ground site, is believed to be on the edge of what was the convict station. Underground there may be remnants of foundations for the male leper ward, if these have not been removed (Titlestad, *pers. comm.* 18 Feb 2016.). It is thought to have been used as a military parade ground and for military activities during WWII (WSP, *pers.comm.*, 8 Feb 2016). It is viewed as structuring open space within the Island’s townscape and has unused cricket pitch in the centre.

Site 2 abuts what was part of the leper’s agricultural area. The site is associated with multiple atrocities committed by guards during the prison period (Titlestad, *pers.comm.* 31 Jan 2016). To the east of the site is the hydroponics building, which started as a dairy in the 1960s and was later transformed into a greenhouse. Smaller buildings in the area housed engines that were used to pump water to supply the agricultural activities. In the 1960s prisoners worked at the site, initially as a form of punishment but later this was regarded as ‘social rehabilitation’. To the west of the site is Boundary Road and to the south-west are the remains of the piggery buildings (WSP, *pers. comm.* 13 Jan 2016).

## 2.4 Visual Character and Sense of Place

### 2.4.1 Visual Character

The visual character of the Island is defined by the features on the Island which depict its long history of isolation, struggle and hardship. These include a visually diverse variety of elements including (but not limited to) the harbour, housing, prisons, places of worship, graveyards, pathways and quarries.

The natural vegetation, although severely degraded over large portions of the Island, together with the low lying, gently undulating topography also contribute to the visual character of the Island. The rich bird life, rugged beauty of the coastline and more pristine areas towards the north add to the Island's overall scenic quality. Robben Island was declared a National Heritage Site in May 2006 and is also a World Heritage Site, with international recognition as a significant landmark.

The images in plate i, while not representative of the entire Island, give some indication of the mixed visual character of the Island.

The visual character of Site 1 is best described as an open square which is defined by the coastline and buildings on the northern and north-western boundaries. The visual character of Site 2 is one of grassy dunes with scattered clusters of trees, which is afforded meaning by the old agricultural buildings and the history of the site.

### 2.4.2 Sense of Place

An area will have a stronger sense of place if it can easily be identified, that is to say if it is unique and distinct from other places. Lynch defines 'sense of place' as "*the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid or unique, or at least a particular, character of its own*" (Lynch, 1992:131).

Robben Island is symbolically rich, with a number of significant visual resources. It is a unique and powerfully evocative cultural landscape with a very strong sense of place.

Within this context, both sites can be said to have a strong sense of place. Site 1 is easily definable as an open grassy field along the coast between the houses and buildings in the Village Precinct.

Site 2 can be recognised by the remaining disused agricultural buildings. It has strong cultural significance linked to its historical use as a site where much suffering occurred. It is being proposed for inclusion in the greater core prison area alongside the Lime Quarry by the cultural heritage specialist (Titlestad, *pers. comm.* 31 Jan 2016).



Natural environment near Bluestone Quarry



Fallow deer resting in shade



Example of existing fencing



Bird colony near harbour



Prison



Staff housing near Site 1



Limestone Quarry



Harbour



Open area close to Site 2



Open area close to Site 1

Plate i: Mixed visual character

### 3 Potential Visual Issues

Potential visual issues and impacts identified by the visual specialist and other interested and affected parties are summarised in the Table 1 below. Not all of these can be classified as visual impacts, but are concerns and issues that should be considered.

**Table 1: Potential Visual Issues**

VISSUAL ISSUE	COMMENT
Visual impact on valuable heritage resources and sense of place, and the associated, potential impact on the World Heritage status of the Island.	Robben Island is a heritage site of national and international importance with World Heritage status. High visibility of the project may negatively affect this heritage resource.
Visual impact on staff living in houses on south-western border of Site 1.	Staff living in houses adjacent or close to Site 1 may be negatively impacted during and after construction.
Visibility from the mainland.	The proposed project may be visible from the mainland, and from the boat to the Island, if project is located on Site 1.
Potential visual impact on visitors to the Island and tourism.	Robben Island is a prominent tourist destination with a high number of visitors received by the Island daily. If/where visible by tourists, the proposed project may have a negative impact on visitors to the Island.
Visual impact during construction.	Disturbances during construction of the site and the laying of underground cables may have a negative visual impact on visitors to the Island and resident staff. If badly managed, construction activities could destroy heritage resources.
Glint and Glare	Glint and glare from the proposed solar panels could negatively affect aircraft.
Potential visual impact of additional lighting at night.	If required, security lighting at the facility may contribute to visual pollution and may have a visual impact at night.

## 4 Evaluation of the Magnitude of Visual Impact

The following section outlines the evaluation that was done to inform the **magnitude** (severity) of the visual impacts resulting from the proposed PV project. Various factors were considered in the assessment including; visual quality, visual absorption capacity, visibility, integrity with the existing landscape and sensitivity of viewers.

### 4.1 Visual Quality

Aesthetic value is an emotional response derived from our experience and perceptions. As such, it is subjective and difficult to quantify in absolute terms. Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity (Crawford, 1994). Landscape quality can be said to increase when:

- Natural landscape increases and man-made landscape decreases;
- Well-preserved, compatible man-made structures are present;
- Diverse or vivid patterns of grasslands and trees occur;
- Water forms are present;
- Topographic ruggedness and relative relief increases; and
- Where land use compatibility increases (Crawford, 1994, Arriaza, 2004).

Greater aesthetic value is also attached to places where:

- Rare, distinguished or uncommon features are present;
- The landscape/townscape evokes particularly strong responses in community members or visitors;
- The landscape/townscape has existing, long-standing meaning or significance to a particular group; and
- Landmark quality features are present. (Ramsay, 1993).

Visual quality therefore is an estimation of the composition of landscape and man-made elements and their resulting visual or scenic excellence.

**Table 2: Visual Quality Criteria**

Criteria
<p><b>Visual quality is high when:</b></p> <ul style="list-style-type: none"> <li>• The landscape offers dramatic, rugged topography and /or visually appealing water forms are present;</li> <li>• Pleasing, dramatic or vivid patterns and combinations of landscape features and vegetation are found;</li> <li>• The landscape is without visually intrusive or polluting urban, agriculture or industrial development (i.e.it reveals a high degree of integrity); and/or</li> <li>• Outstanding or evocative features and landmarks are present; and</li> <li>• The landscape/townscape is able to convey meaning.</li> </ul>

Robben Island's architecture is mixed and reflects its layered past and its history of re-use of buildings and facilities (ICMP, 2013). The topography and vegetation of the Island are not dramatic or pristine and over its long history much of the natural environment has been damaged. Although not scenic, this predominantly disturbed natural environment is significant in that it forms a part of the Island's cultural landscape. Areas of unspoilt vegetation, the Island's rocky coastlines, diversity of bird life and sea vistas also contribute to the rugged, windswept visual appeal of the Island.

The topography, vegetation and historic land uses of the Island convey strong meaning and are highly evocative. The Island as a whole is a powerful landmark, with national and international significance.

Within this context the visual quality of the two sites was considered:

**SITE 1:** The site itself is flat with little diversity of plants, alien vegetation and no structures. The rugged, rocky coastline with its associated colonies of birds on the south-eastern boarder of Site 1 increases the site's visual appeal. The site has spatial value as a structuring open space and aesthetic value due to its historical significance<sup>2</sup>. Primarily due to its cultural significance and its situation along the coastline, this site was rated as having a *moderate* visual quality.



Plate ii: From Site 1 looking north-west



Plate iii: From Site 1 looking south-east along coastline

**Site 2:** Site 2 is situated on stabilised dunes which provide some topographical interest. Vegetation is low-lying, with a small forest of alien invasive trees situated to the north of the site and some clusters of large trees are established along the road running on the south-western boundary. The site is situated inland with no views of the coastline or sea. Various old agricultural buildings are found close to the site including the hydroponics building, remains of the piggery buildings and smaller buildings which housed engines. To the south, beyond a stabilised dune field is the Limestone Quarry. The site is understood to have very high cultural heritage significance due to its proximity to the Limestone Quarry, the agricultural buildings and its history as a site where much

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<sup>2</sup> Please refer to Cultural Heritage Assessment Report for further detail.

suffering occurred<sup>3</sup>. Primarily due to its potential cultural heritage significance this site was rated as having a ***moderate-high*** visual quality.



**Plate iv: From Site 2 looking north**



**Plate v: Old piggery buildings**

## 4.2 Visual Absorption Capacity

Visual absorption capacity (VAC) is the potential for an area to conceal additional human intervention (activities and structures) without significant loss of character or visual quality. Landscapes or townscape that have a high VAC (i.e. are able to conceal activities and structures) are visually less sensitive than environments that have a low VAC (i.e. are unable to conceal activities and structures).

Factors contributing to the VAC include:

- Topography and vegetation that is able to provide screening in a landscape. A topographically diverse landscape is better able to absorb visual impacts and is less sensitive;
- The degree of urbanisation compared to open space / undeveloped land. A highly urbanised landscape is better able to absorb the visual impacts of similar developments; and
- The scale and density of surrounding development. A developed urban fabric that is dense or where buildings and structures are large is better able to offer visual screening.

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<sup>3</sup> Please refer to the Cultural Heritage Assessment Report for further detail

**Table 3: Visual Absorption Capacity Criteria**

High	Moderate	Low
<p>The area is effectively able to screen visual impacts:</p> <ul style="list-style-type: none"> <li>• Undulating or mountainous topography and relief;</li> <li>• Good screening vegetation (high and dense);</li> <li>• Is highly urbanised in character; and</li> <li>• Existing development is of a scale and density able to absorb the visual impact.</li> </ul>	<p>The area is partially able to screen visual impacts:</p> <ul style="list-style-type: none"> <li>• Moderately undulating topography and relief;</li> <li>• Some or partial screening vegetation;</li> <li>• A relatively urbanised character; and</li> <li>• Existing development is of a scale and density able to absorb the visual impact to some extent.</li> </ul>	<p>The area is not able to screen the visual impacts:</p> <ul style="list-style-type: none"> <li>• A flat topography;</li> <li>• Low growing or sparse vegetation;</li> <li>• Is not urbanised; and</li> <li>• Existing development is not of a scale and density able to absorb the visual impact to some extent.</li> </ul>

**Site 1:** Site 1 is very flat with no undulations to provided screening. However, it is at a very low elevation with buildings and high vegetation providing good screening from the north-west, west and south-western sides. These factors significantly increase the visual absorption capacity of the site. The site is most visible from the sea (south-east) with some vegetation along the coastline providing intermittent screening. From the road, the site is relatively well screened by the alien vegetation and buildings and is generally only visible from buildings immediately adjacent to the site. Overall the VAC for this site is rated as **moderate-high**.

**Site 2:** The elevation of Site 2 is slightly higher than Site 1, but the undulating nature of the site provides good screening. Tall, relatively dense alien vegetation along the road provides effective screening along sections of the road and the dense vegetation to the north of the site also provides excellent screening from the north (although this may be removed as part of the ongoing alien eradication programme). Visually the area is screened from the Limestone Quarry by a stabilised dune. Overall the VAC for this site is rated as **high**.

### 4.3 Visibility and Visual Exposure

Visibility is partially determined by the zone of visual influence or viewshed. The viewshed is the topographically defined area, including all the major observation sites, from which proposed structures/activities may be visible. The boundary of the viewshed connects high points in the landscape and demarcates the zone of visual influence. The viewshed calculations are based on worst-case scenario using 360° line-of-sight calculations on a Digital Elevation Model (at 25m contour intervals). The height of existing buildings, trees and small undulations in the surrounding area are not included in the calculation of the viewshed. *It is therefore important to remember that the proposed project will not be visible from all points within the viewshed, as some views will be obstructed by visual elements such as built structures, minor local variations in topography and vegetation. For this reason it is often referred to as the 'zone of theoretical visibility'.*

Viewsheds were determined for each site at a height of 2m above ground level (solar panels will be 1,9m). The viewsheds are included below in Figure 4-5 below.

Due to the low height of the proposed structure, the low elevation of the sites and the high visual absorption capacity, the viewshed areas for both sites are well contained, close to the site.

**Site 1:** The viewshed area for Site 1 lies predominantly to the eastern side of the site, stretching across the sea to the mainland and also includes the area immediately surrounding the site. The harbour falls within the viewshed area, but from most viewpoints visibility is partially or completely obscured by the harbour walls and buildings.

**Site 2:** The viewshed area for Site 2 is very limited and is restricted to a short section of Boundary Road and the highest points of elevation in a band to the west of the site (middle of the Island). The viewshed does not extend across the sea to the east or the mainland.

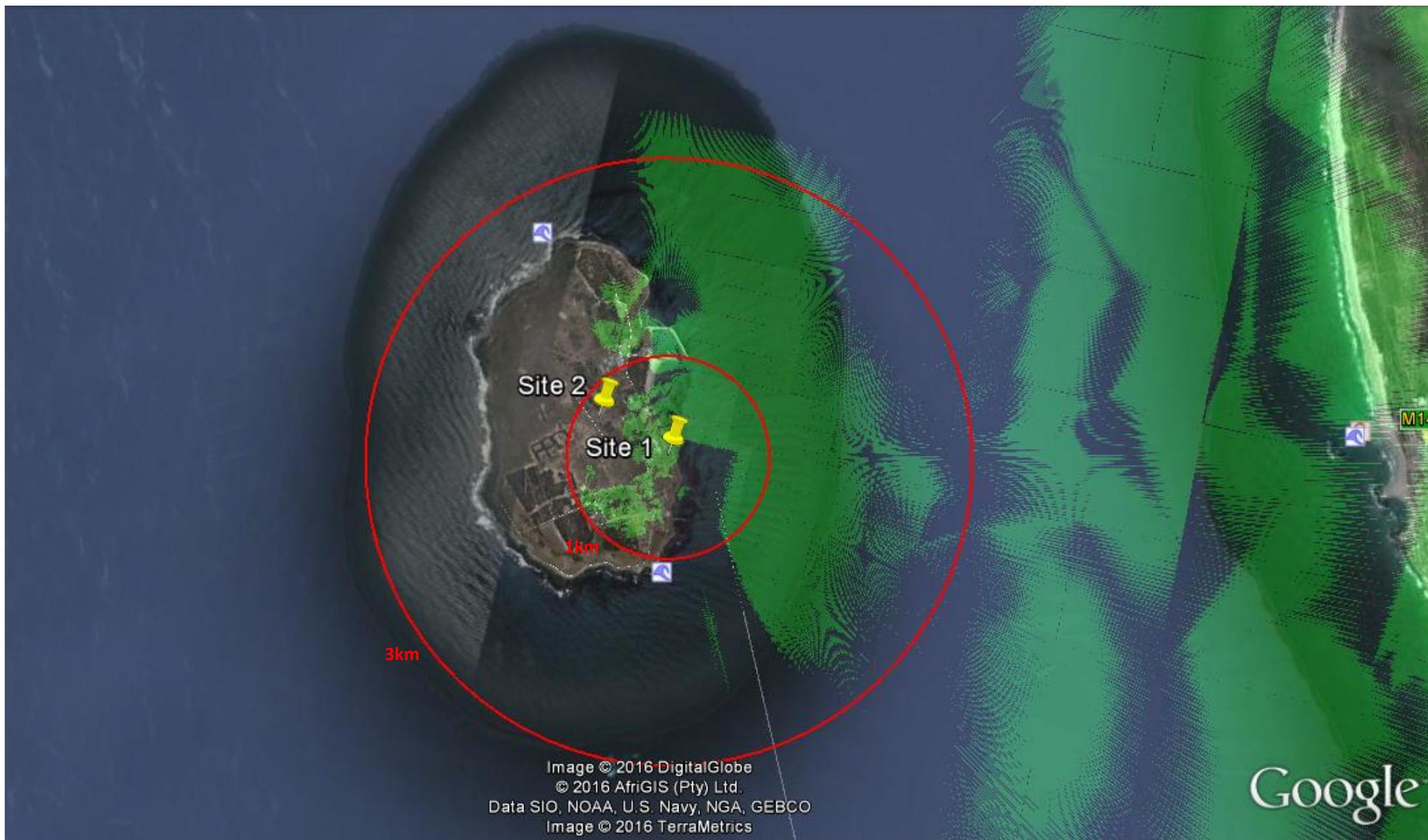


Figure 5: Viewshed for Site 1

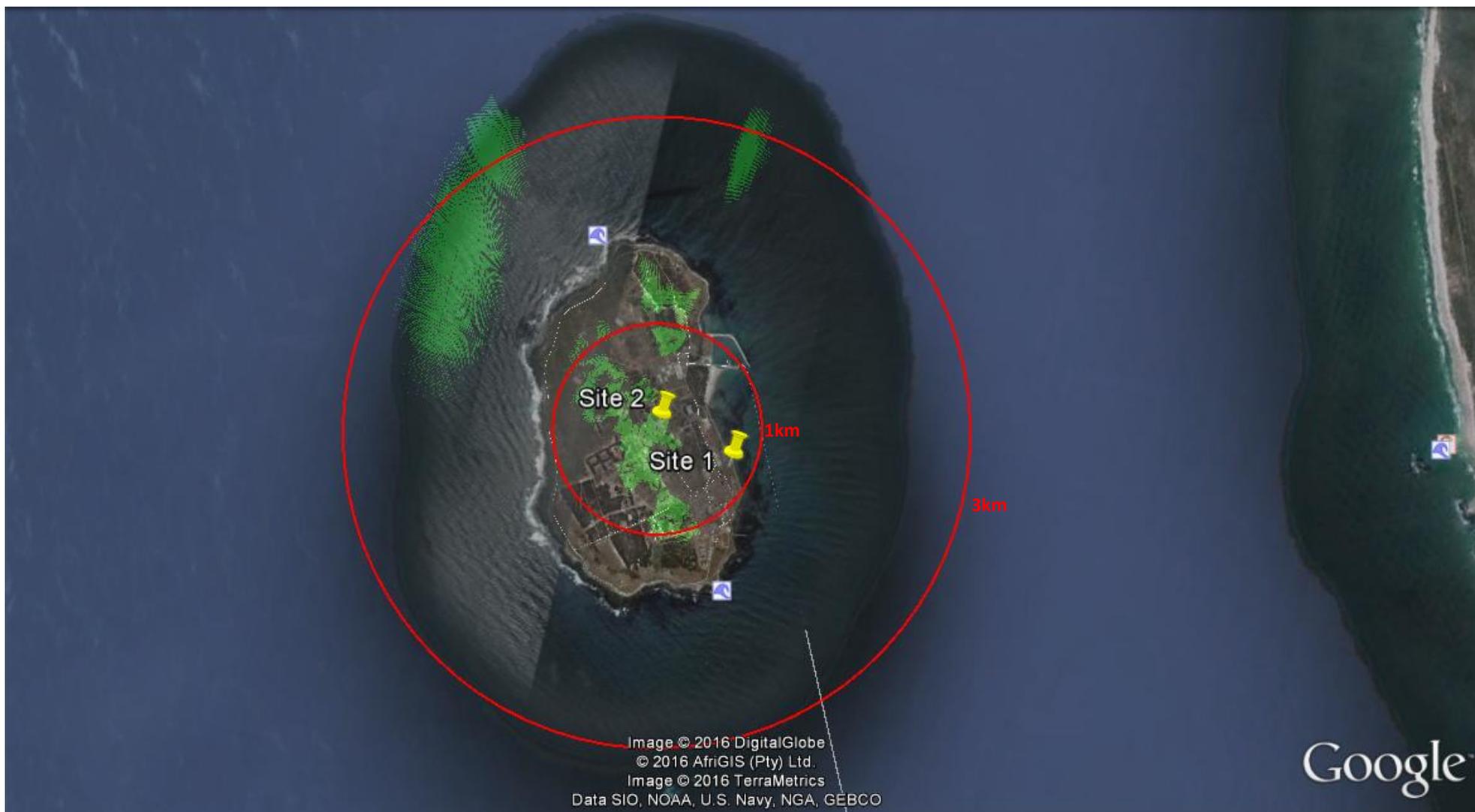


Figure 6: Viewshed for Site 2

When assessing the viewsheds as depicted in Figure 4 and 5 the distance of a viewer from an object is an important determinant of the visibility, often referred to as the visual exposure. This is due to the visual impact of an object diminishing/attenuating as the distance between the viewer and the object increases, at an exponential rate. Thus the visual impact at 1 000m would, nominally, be 25% of the impact as viewed from 500m. At 2 000m it would be 10% of the impact at 500m (Hull and Bishop 1988).

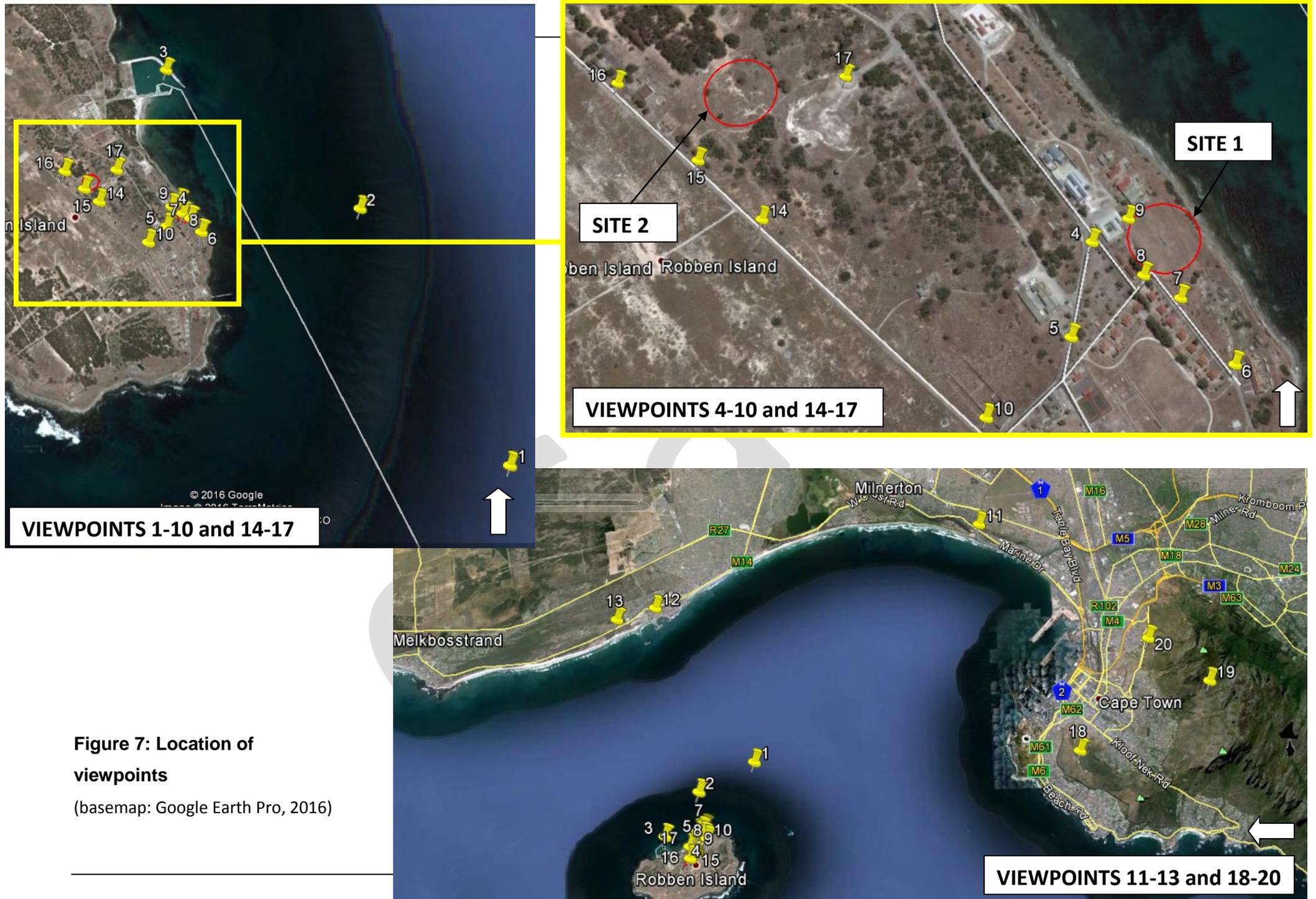
For the purposes of this study, three basic distance categories were defined:

- **Foreground:** The zone in which details such as colour, texture and form can be appreciated. The foreground is defined as the area extending approximately 1km from the viewer. Objects in this zone are clearly visible unless obscured by other landscape features, existing structures or vegetation.
- **Middleground:** The zone where detail is indistinct but colour, line and texture are discernable. This zone has been defined as between 1km and 3km. Objects in this zone can be classified as moderately visible unless obscured by other elements within the landscape.
- **Background:** This zone stretches from 3km to the point where the object can no longer be seen. Background views are discerned by means of line and colour. Texture and form are generally not seen. Objects in this zone can be classified as marginally visible to not visible.

The distance radii (at 1km and 3km intervals) are indicated on the viewsheds. Photographs were taken from a number of viewpoints within these zones to gauge the anticipated visibility of the project and ground-truth the viewshed. From these, 20 viewpoints were selected for analysis. The selected viewpoints are indicated on

Figure 7, represented in the accompanying photographs (Plates vi - xxvi) and discussed in the table below.

Additional photographs were taken by the Heritage Consultant, S. Titlestad, from the top of the Prison Guard Towers. The sites are not visible from the towers, which do not fall within the viewshed area. The photographs from the guard towers are included in Annexure A.



**Figure 7: Location of viewpoints**  
 (basemap: Google Earth Pro, 2016)

The criteria used to determine the visibility of the proposed development from each viewpoint are set out in the table below:

**Table 4: Visibility Criteria**

Not Visible	Marginally Visible	Visible	Highly visible
The site for the proposed activities cannot be seen.	The site for the proposed activities is only just visible / partially visible.	The site for the proposed activities is visible although parts may be partially obscured.	The site for the proposed activities is clearly visible (usually in foreground).

**Table 5: Site 1: Visibility from Specific Viewpoints**

Viewpoint	Waypoint Reference	Description	Direction	Approximate distance from Site 1	Visibility
VP 1	227	At sea (from boat)	NW	2700m	Marginally visible
VP 2	231	At sea (from boat)	W	1000m	highly visible
VP 3	235	From harbour	S	900m	Visible (from most locations in harbour site obscured by harbour walls)
VP 4	240	From road on south-western boarder (access road from harbour)	E	80m	Visible - marginally visible
VP 5	249	From the road linking the access road from harbour and road to Rifle Range	SE	185m	Not visible
VP 6	247	From Beach Road (house south-west of site)	NNW	160m	Marginally visible
VP 7	245	From Beach Road (house south-west of site)	N	45m	Highly visible
VP 8	243	From intersection of Beach Road and road going NW towards Rifle Range (houses south-west of site)	E	38m	Visible (highly visible from corner property)
VP 9	238	From Education and Research Center	E	0km	Highly visible (from side of building directly abutting site).
VP 10	262	From rifle range	NE	375m	Not visible
VP 11	266	From Lagoon Beach Road	NW	13 340m	Not visible
VP 12	268	From Big Bay	W	7 230m	May be marginally visible on clear day
VP 13	269	From Otto du Plessis Dr.	SWW	7 264m	Not visible
VP 18	278	Signal Hill	NNW	12 360m	not visible
VP 19	277	Tafelberg Road	NNW	16 820m	not visible
VP 20	275	De Waal Drive	NNW	15 650m	not visible

**Site 1:** Based on the above, the overall extent of Site 1's visibility is considered to be local (extends beyond the immediate surrounds but is primarily contained within a 3km radius). Visibility within this area is generally low, with the highest visibility from the sea/coastline on the south east alongside the site and staff housing and facilities which are directly adjacent to, or in close proximity to, the site.

**Table 6: Site 2: Visibility from Specific Viewpoints<sup>4</sup>**

Viewpoint	Waypoint Reference	Description	Direction	Approximate distance from Site 2	Visibility
VP 10	262	From Rifle range	NNW	687m	Not visible
VP 14	263	From Boundary Road	NW	218m	Not visible
VP 15	265	From Boundary Road	N	85m	Marginally visible
VP 16	255	From Boundary Road	SEE	97m	visible
VP 17	261	From limestone quarry	W	227m	Not visible
VP 18	278	Signal Hill	NNW	12 360m	Site not visible
VP 19	277	Tafelberg Road	NNW	16 820m	Site not visible
VP 20	275	De Waal Drive	NNW	15 650m	Site not visible

**Site 2:** Based on the above, the overall extent of Site 2’s visibility is considered to be local (extends beyond the immediate surrounds but is primarily contained within a 3km radius). Visibility within this area is generally very low, with the highest visibility from the road alongside the site (Boundary Road).



**Plate vi: VP1: From the boat about 2,7km from site (marginally visible)**

<sup>4</sup> Photographs were taken by the Heritage Consultant from the guard towers. These do not fall within the viewshed area and the sites are not visible from the towers. The photographs are included in Annexure A.



Plate vii: VP 2: From boat directly opposite site (highly visible)



Plate viii: VP 3: From Harbour (site visible – from most other locations in harbour, site is obscured by harbour wall)



Plate ix: VP 4: Just off access road from harbour looking east (visible/marginally visible, site partially obscured)



Plate x: VP5: From road linking the access road from harbour with the road to Rifle Range site looking south-east (not visible behind trees)



Plate xi: VP 6: From Beach Road looking north (marginally visible)



Plate xii: VP 7: From Beach Road looking north (highly visible)



**Plate xiii: VP 8: From road running NW towards Rifle Range site looking east (highly visible from intersection and corner property)**



**Plate xiv: VP 9: From front of Education and Research Centre (highly visible from front of building)**



Plate xv: VP 10: From Rifle Range looking north-east (not visible)



Plate xvi VP 11: from Lagoon Beach Road looking north-west (not visible)



Plate xvii: VP 12: From Big Bay looking west (not visible, may be marginally visible on very clear days)



Plate xviii VP 13: From Otto du Plessis looking west (not visible)



Plate xix: VP 10: From Rifle Rage looking north (not visible)



Plate xx: VP 14: From Boundary Road, looking north (not visible)



Plate xxi: VP 15: From Boundary Road looking north (may be marginally visible)

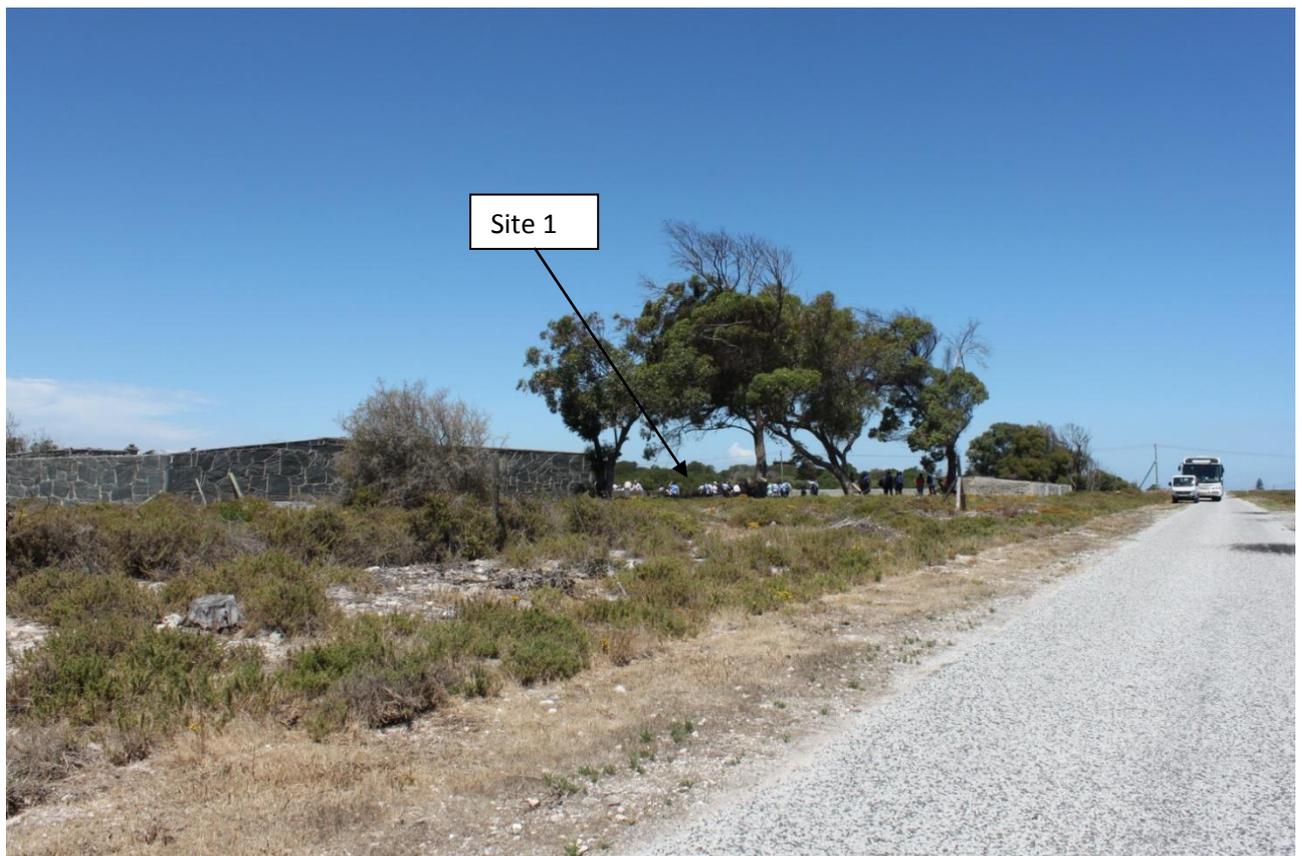


Plate xxii: VP 16: From Boundary Road looking south-east (visible)



Plate xxiii: VP 17: From Limestone quarry looking west (not visible)

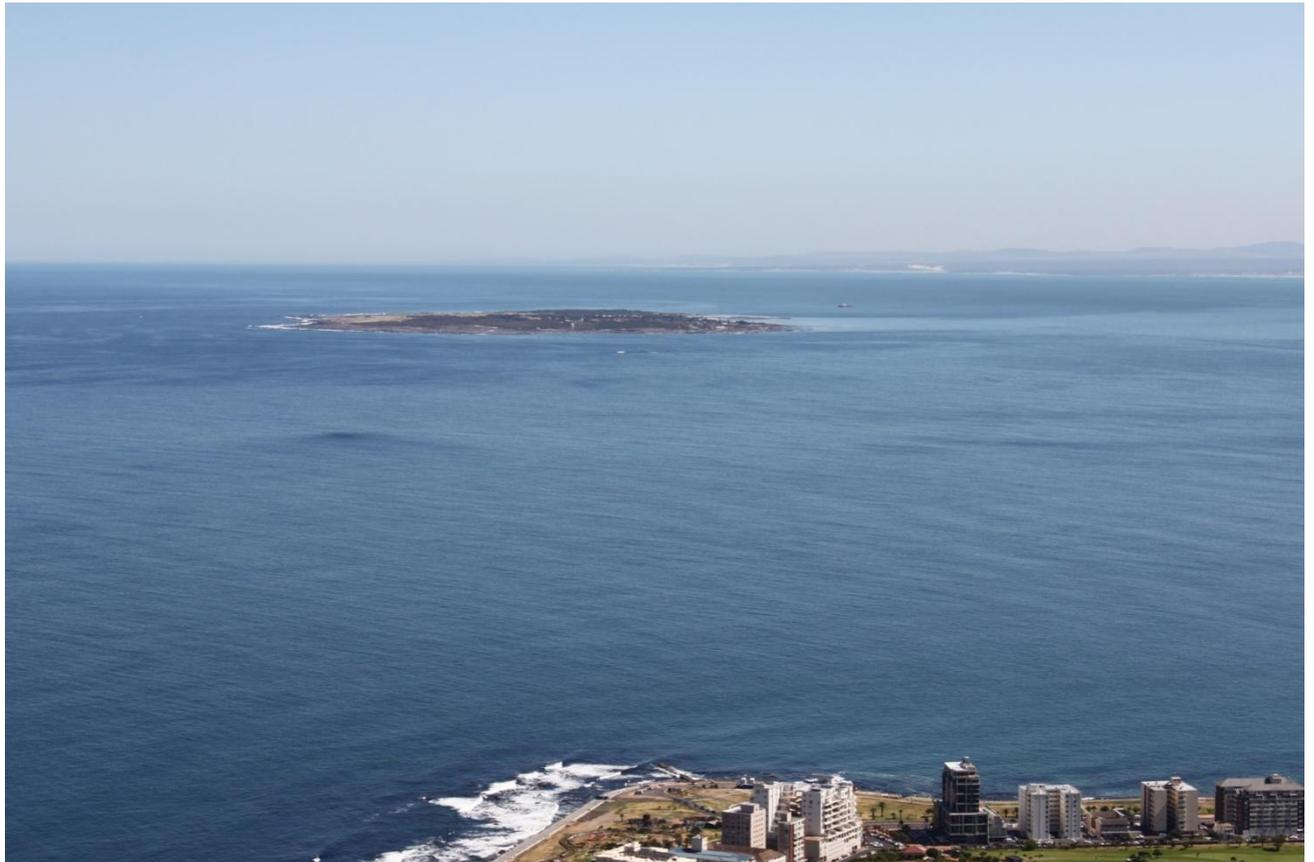
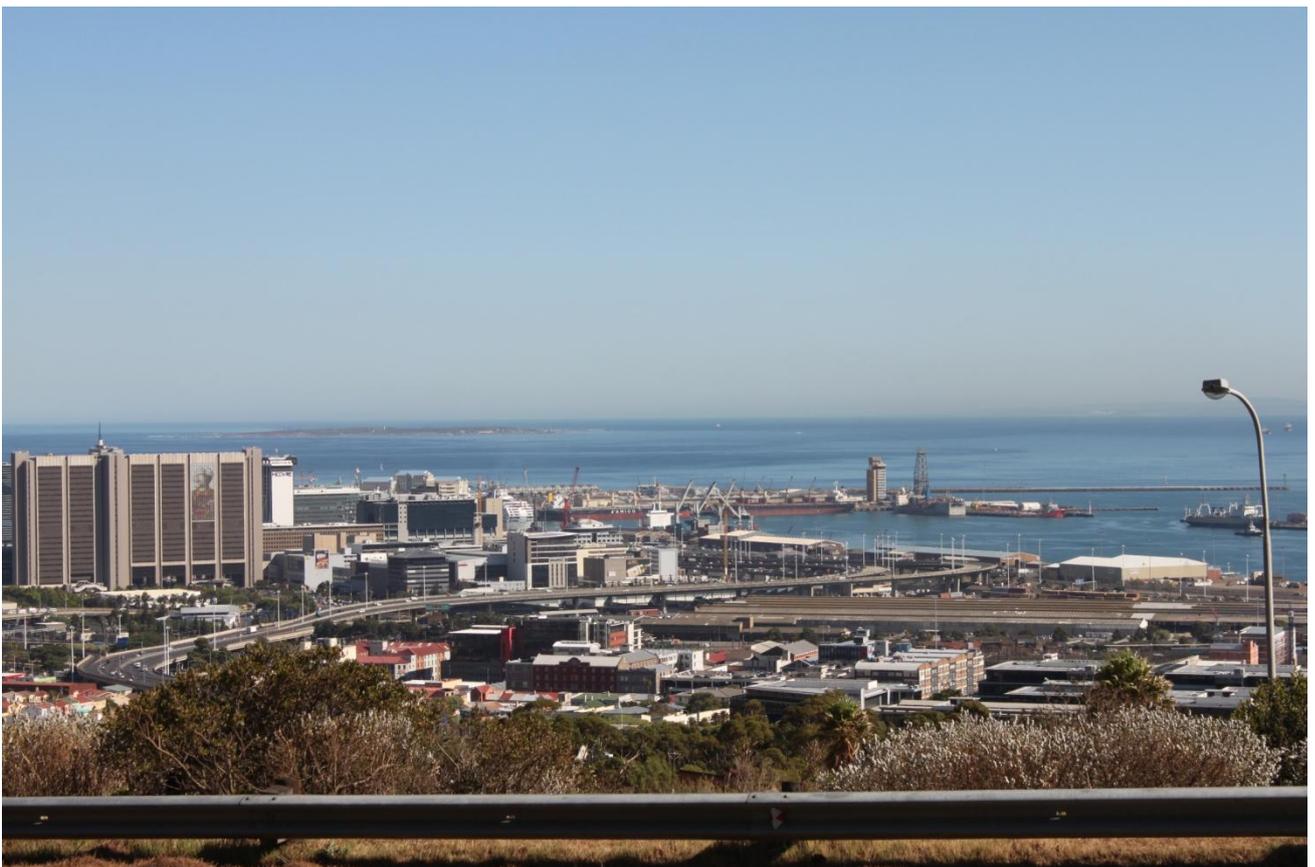


Plate xxiv: VP 18: From Signal Hill looking NNW (neither site visible)



**Plate xxv: VP 19 From Tafelberg looking NNW (neither site visible)**



**Plate xxvi: VP 20: From De Waal Drive looking NW (neither site visible)**

## 4.4 Visual Intrusion

The previous section considers how visible the proposed activities will be in the landscape. This should be considered together with what effect this visibility will have on the existing visual character/landscape. This is referred to as the level of visual intrusion. Thus landscape (or visual) intrusion refers to the compatibility of the proposed activities with the existing landscape and/or townscape.

**Table 7: Visual Intrusion Rating Criteria**

High	Moderate	Low
<p>The development/activity results in a noticeable change or is discordant with the surroundings:</p> <ul style="list-style-type: none"> <li>• Is not consistent with the existing land use of the area;</li> <li>• Is not sensitive to the natural environment;</li> <li>• Is very different to the urban texture and layout;</li> <li>• The buildings and structures are not congruent / sensitive to the existing architecture / buildings; and</li> <li>• The scale and size of the activities are different to nearby existing activities.</li> </ul>	<p>The development/activity partially fits into the surroundings but is clearly noticeable :</p> <ul style="list-style-type: none"> <li>• Is moderately consistent with the existing land use of the area;</li> <li>• Is moderately sensitive to the natural environment;</li> <li>• Is moderately consistent with the urban texture and layout;</li> <li>• The buildings and structures are moderately congruent / sensitive to the existing architecture / buildings; and</li> <li>• The scale and size of the activities are moderately similar to nearby existing activities.</li> </ul>	<p>The development/activity results in a minimal change to the surroundings and blends in well:</p> <ul style="list-style-type: none"> <li>• Is consistent with the existing land use of the area;</li> <li>• Is highly sensitive to the natural environment;</li> <li>• Is consistent with the urban texture and layout;</li> <li>• The buildings and structures are congruent / sensitive to the existing architecture / buildings; and</li> <li>• The scale and size of the activities are similar to nearby existing activities.</li> </ul>

The Island is made up of many layers of historical use. Elements are linked together by themes of hardship and struggle rather than by visual characteristics or style. The diverse visual nature of the Island will help to facilitate visual integration. However, the proposed solar field would be a new and different visual element introduced into this historical landscape/townscape. Perimeter fencing is compatible with the existing visual character and wire mesh fencing is present elsewhere on the Island.

While the congruency of the project is improved by the modest scale and size of the proposed solar project, the solar field would contrast with the natural, rugged coastline landscape at Site 1 and the historic agricultural landscape of Site 2. Overall the visual intrusion for both sites is considered ***moderate***.

## 4.5 Viewer Sensitivity of Receptors

Viewers (or visual receptors) are important insofar as they inform visual sensitivity. The sensitivity of viewers is determined by the number of viewers and by how likely they are to be impacted upon. The level of visual impact considered acceptable is depended to some degree on the sensitivity of the visual receptors.

**Table 8: General categories of sensitivity for visual receptors (DEADP, 2005)**

High	Moderate	Low
<ul style="list-style-type: none"> <li>Residential areas</li> <li>Nature reserves</li> <li>Scenic routes / trails</li> </ul>	<ul style="list-style-type: none"> <li>Sporting and recreational areas</li> <li>Places of work</li> </ul>	<ul style="list-style-type: none"> <li>Industrial areas</li> <li>Active mining areas</li> <li>Visually severely degraded areas</li> </ul>

Potential viewers (visual receptors) included in this study are:

- Tourists visiting the Island;
- Viewers from the mainland; and
- Staff housed on the Island.

Tourist numbers to the Island are very high with approximately 1200 visitors coming to the Island a day. Neither site is on any of the tourist routes but Site 1 will be visible for a short stretch (approximately 2 km included in viewshed area) when approaching the Island by boat. Occasionally visitors are also accommodated in the Education and Research Centre situated on the north-western border of Site 1 (Titlestad, *pers.comm.* 31 Jan 2016). Overall, tourists are considered to have **high** sensitivity for Site 1.

Since visibility from the mainland is limited, viewer numbers and sensitivity of viewers on the mainland is considered **low**.

There are approximately 134 members of staff living in the Village Precinct. They could potentially be affected by the proposed project, especially for Site 1 (where housing is closer to site). Staff living in the houses on the south-western side of Site 1 have raised some concerns regarding disruption during and after construction. Although viewer numbers are low (11 houses, with 7 of these likely to be affected), many of these staff have historical ties to the Island and are considered to have **moderate-high** sensitivity.

Overall the sensitivity of the visual receptors can be said to be **moderate-high**, for Site 1 with tourists coming in on the boat and staff accommodated in close proximity to the site of primary concern.

Since Site 2 is not visible from the boat, the mainland, any current tourist routes and is not in close proximity to/visible from staff housing, viewer numbers are very low and sensitivity was rated as **low**.

## 4.6 Summary of Assessment

The table below briefly summarises the assessment for each site.

**Table 9: Summary of Assessment**

Criteria	Site 1	Site 2
Visual quality	Moderate	Moderate-high
Visual absorption	Moderate-high	High
Visual exposure and visibility	Local, with low visibility	Local, with very low visibility
Visual intrusion	Moderate	Moderate
Sensitivity of visual receptors	Moderate-high	Low

## 5 Findings and Recommendations

### 5.1 Findings

The following key findings are pertinent to the visual issues considered for the proposed project:

- The **visual quality** of the Island is a function of its richly symbolic cultural history and its significance as an evocative landmark, and is considered to be of high value. Within this context, Site 1 is considered to have a moderate visual quality primarily due to its spatial value and the scenic quality of the coastline. Site 2 is considered to have a moderate to high visual quality due to its cultural significance.
- Site 1 has a moderate-high **visual absorption capacity** afforded by its low elevation as well as the screening vegetation and buildings surrounding the site to the N, NW and SW. The undulating topography, high, dense clusters of trees and low elevation of Site 2 provide it with a high absorption capacity.
- The **visual exposure** or viewshed of the proposed project is largely contained within a 3km radius for both sites. The viewshed area for Site 1 extends primarily towards the east, including approximately 2km of the coastline and then fans out across the ocean to the east. It also includes portions of the Village Precinct in close proximity to the site. The viewshed area of Site 2 is very limited and is primarily contained on the Island in a band along the highest points in the middle of the Island.
- **Visibility** is limited due to the low elevation of the sites and the low height of the proposed panels. The proposed project is not likely to be highly visible beyond 3km. For Site 1 the project will be most visible from the coast and sea to the east of the site and from buildings

in close proximity to the site. For Site 2 visibility is very low and the proposed project is likely to be most visible from sections of Boundary Road.

- Overall the **visual integrity** of the proposed project is considered to be moderate. Although the diverse visual nature of the Island makes it easier to integrate new visual elements, the new and modern/technical visual character of the proposed solar field is different to existing visual elements on the Island. Perimeter fencing and lighting is relatively consistent with existing visual elements.
- The **sensitivity of viewers** varies. For Site 1 tourists on the boat trip and staff housed in close proximity to the site are considered to be of primary concern, with overall sensitivity rated as moderate-high. For Site 2 viewer numbers are very low and since the site is not visible from tourist routes, staff housing, mainland or the boat coming to the Island, sensitivity was rated as low.
- The visual impacts of the proposed **solar panel field** are generally well contained for both sites and particularly low for Site 2. The visual impacts of the solar panels could be mitigated from most of the surrounding houses and the boat, with vegetative screening. The visual impact on the **cultural resources** is therefore largely dependent on the cultural significance of the sites themselves, which is understood to be far higher for Site 2. This is addressed in the Cultural Heritage Report.
- Visual impacts during **construction** will be temporary. If properly managed and the ground restored to its former state, these impacts will not be permanent and can be acceptably mitigated from a visual perspective.
- Visual impacts from the **mainland** are limited and marginal.
- The impacts of **lighting** (if required) may add to the cumulative lighting impact at night but if recommended mitigation measures are enforced, the impact can be acceptably mitigated.
- The visual impact of the perimeter **fencing** will be mitigated by the low height (0,8m high) and by the existing wire mesh fencing on the Island. If it is well maintained, the visual impact of the fencing can be acceptably mitigated.
- Comment on **glint and glare** concerns for aircraft must be obtained from the aviation authorities.

## 5.2 Recommendations

The following key recommendations should be implemented in the event of the proposed project being approved:

- The construction footprint must be kept as small as possible, to avoid unnecessary disruption to the existing vegetation and topography;
- No blanket clearing or removal of vegetation outside of the building zone is allowed (unless part of the Island's management plan);
- Ground level at site boundary must remain natural ground level;
- Vegetative screens should be established along Boundary Road (Site 2) and Beach Road and the coastline (Site 1);
- An ecologist (preferably the ecological specialist appointed to undertake the assessment) must be appointed to assist with the final design and plant selection for vegetative screening;
- Natural vegetation or original path surfaces must be re-established on disturbed areas after construction;
- Any construction offices, temporary ablutions and related facilities must be sensitively placed on the site where they will be least visible from key viewpoints;
- No dumping in unauthorised and/or highly visible areas is permitted;
- Dust and litter control measures must be included in the Environmental Management Plan (EMP) and implemented during the construction phase;
- If required, install light fixtures that provide precisely directed illumination;
- If possible use lighting that is activated on movement of illegal entry to the site;
- Avoid high pole top security lighting;
- Wire mesh or Clear-Vu type fencing should be used for perimeter fencing;
- Signage related to the project must be discreet and confined to the entrances. No corporate or advertising signage is permitted; and
- The colour of the solar array structures, such as the supports and the rear of the panels, should be carefully selected, and be in the dark grey or green range, to minimise visibility and avoid reflectivity.

## 6 References

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# **Annexure A**

Photographs from Prison Guard Towers

taken by S. Titlestad



