Final Draft

PROPOSED ABERDEEN PHOTOVOLTAIC PLANT

Remainder of Portion 1 of the Farm Wildebeest Poortje No. 153, Aberdeen District, Eastern Cape Province

VISUAL IMPACT ASSESSMENT

Prepared as part of a Basic Assessment Process

9 MAY2012

PROJECT NO: VIA_160412.SA

Produced for:

BioTherm Energy (Pty) Ltd.

On behalf of:

Savannah Environmental (Pty) Ltd.

Produced by:

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ANNEXURES

1 INTRODUCTION

1.1 Background and Purpose of Report

BioTherm Energy (Pty) Ltd. proposes to develop a concentrated photovoltaic (CPV) plant on the Remainder of Portion 1 of the Farm Wildebeest Poortje No. 153, in the Aberdeen District of the Eastern Cape Province.

This Visual Impact Assessment (VIA) is undertaken as part of the Basic Assessment process being facilitated by Savannah Environmental (Pty) Ltd. in terms of the National Environmental Management Act 107 of 1998 (NEMA). As such, the purpose of this report is to assess the proposed development alternative for the site in terms of the *Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process* and the *NEMA EIA Regulations of 2010*.

1.2 Components of the Report

The aspects addressed in this report are as follows:

a) Description of the methodology adopted in preparing the report.
b) Description of the receiving environment.
c) Description of the view catchment area, view corridors, viewpoints and receptors.
d) Identification and evaluation of potential visual impacts associated with the proposed activity and the alternatives identified, by using the established criteria, including potential lighting impacts at night.
e) Description of the alternatives identified.
f) Identification in terms of best practical environmental option in terms of visual impact.
g) Addressing of additional issues such as:
    - Impact on skyline.
    - Negative visual impact.
    - Impact on aesthetic quality and character of place.
h) Assumptions made and uncertainties or gaps in knowledge.
i) Recommendations in respect of mitigation measures that should be considered by the applicant and competent authority.

1.3 Study Methodology

As stated previously, this VIA was undertaken in accordance with the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes*, as issued by the Western Cape Government's Department of Environmental Affairs and Development Planning during 2005.

The VIA was undertaken in distinct steps, each of which informed the subsequent steps. The figure below summarises the methodology adopted for undertaking the assessment.

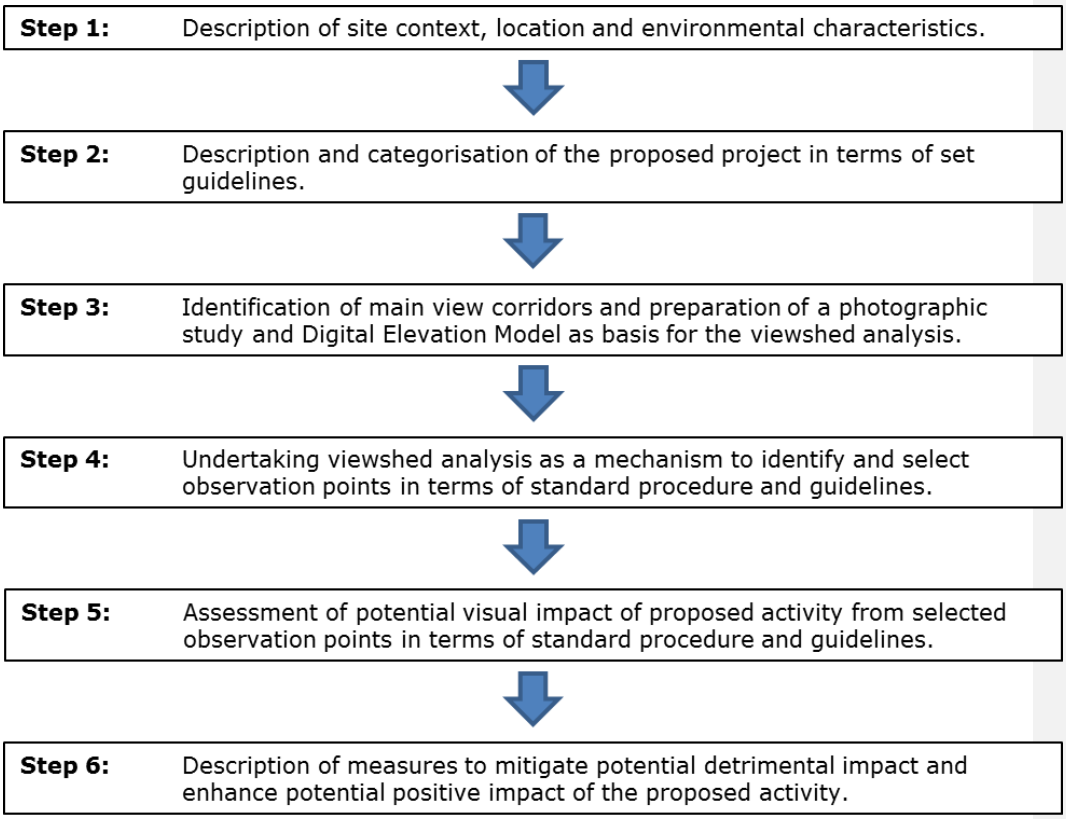

Figure 1: Methodology adopted for the VIA.

1.4 Supplementary Documentation

This report is to be read together with Annexure 1 (Observation point viewsheds and assessments), which provides an identification of the respective observation points and visual assessment of the proposed activity from each of these points.

1.5 Gaps in Knowledge, Assumptions and Limitations

This assessment was undertaken during the planning stage of the project and is based on the Background Information Document of April 2012 provided by Savannah Environmental (Pty) Ltd., for the mentioned project.

2 SITE DESCRIPTION

2.1 Locality

The project site is located in the Camdeboo Local Municipality (EC101) in the Eastern Cape Province and is some 266km from Port Elizabeth. Being located in close proximity

to the provincial boundary, the site is situated approximately 120km from the district town of Beaufort West in the Western Cape. The site does not fall within any designated urban edge, nor is it within 50 kilometres of the nearest national park or nature reserve or similar protected area (i.e. Camdeboo National Park near Graaf Reinet).

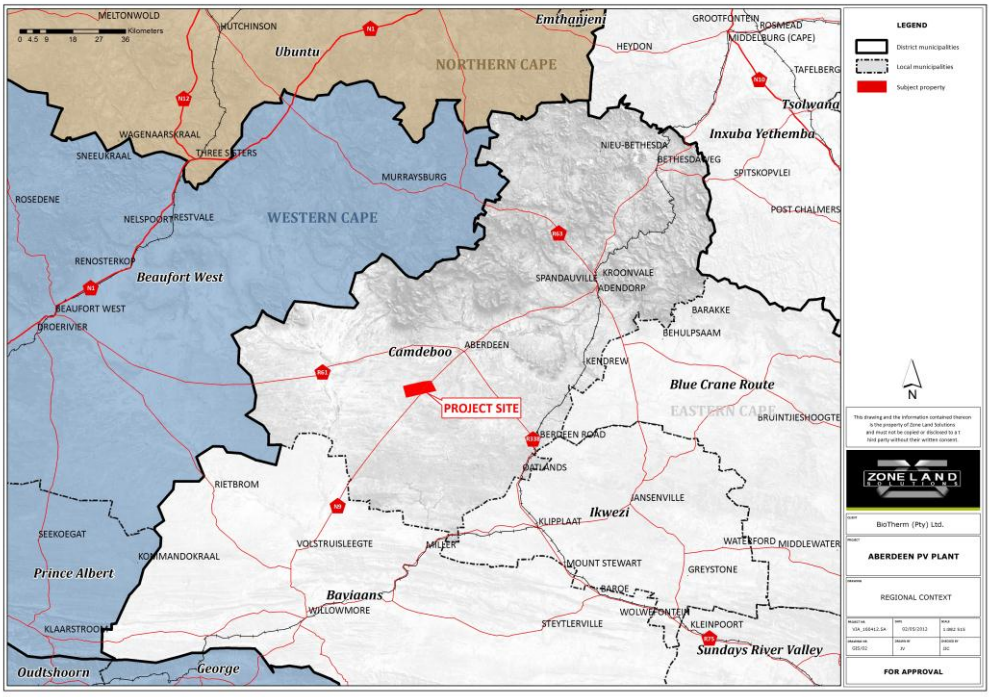

Figure 2: Regional context of the project site.

As illustrated by Figure 3 on the following page, the subject property is located some 16km from the town of Aberdeen. The site and its neighbouring properties are currently being utilised for agrarian purposes.

The subject property is bisected by the N9 which crosses the site in a southwest to north-eastern direction. The 20ha project site is located on the eastern side of the N9. Even though the project site has a generally flat terrain, this portion gently slopes downwards in a north-eastern direction. The height variations of this site are between 830m above mean sea level and 848m. The PV/CPV plant is to be erected on this site.

The Provincial Growth and Development Strategy describes the western region of the province as the principle potential area for solar and wind generation. The Camdeboo Spatial Development Framework states that *areas to the north and the west of the province, such as Camdeboo Municipality, have higher radiation levels than that of the best areas of Germany and Spain* (at 7567-7942MJ/m2/yr).

2.2 Project Site Description

The subject property consists of the Remainder of Portion 1 (Kaapsche Poortje) of the Farm Wildebeest Poortje No. 153. In total the subject property covers 4151.3779ha. Being located next to the N9, the project site is readily accessible.

During 1994, a servitude area of 1.0114ha had been registered over the property for the purposes of establishing an electrical substation to feed the town of Aberdeen. In addition, an electrical power line servitude of 22.0m in width has been registered over the property. The power line connects to the substation from a south-easterly direction.

The planned PV/CPV plant will connect to the grid via the latter substation and distribution network.

An area of approximately 20ha around the substation has provisionally been allocated to establish the planned PV/CPV plant. The location of the latter site is indicated by the figure below.

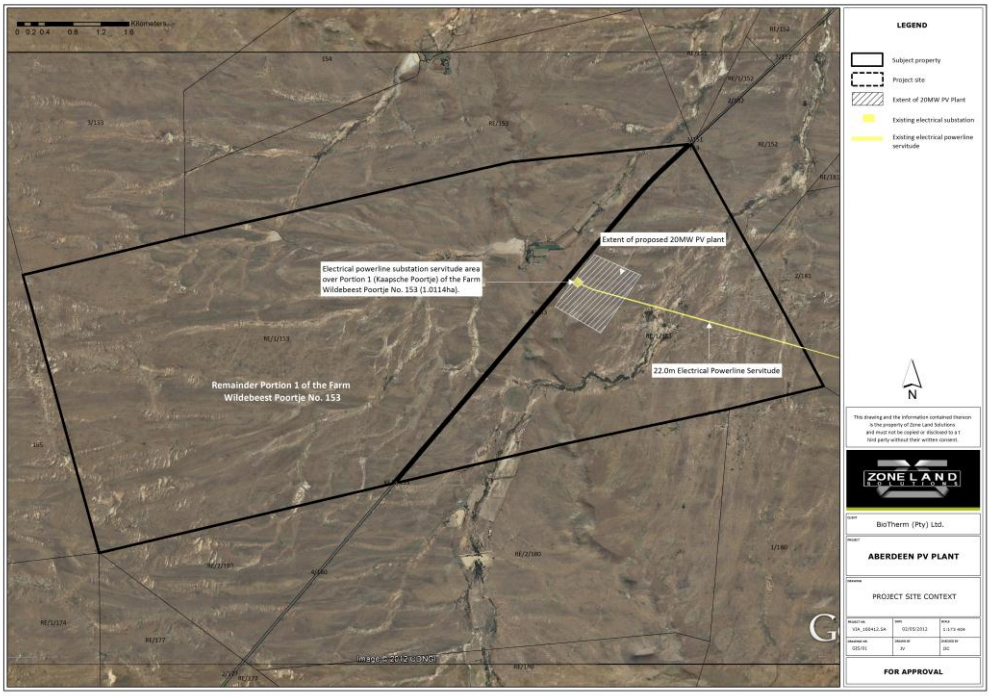

Figure 3: Extent of subject property and improvements.

The landscape character of the region typifies a Karoo landscape of great open spaces surrounded by mountain chains that from the escarpment. Being a low rainfall area (less than 300mm per annum), the area is dominated by four vegetation types, namely

dwarf shrub veld, grass veld, tree and shrub veld and ephemeral veld. According to Mucina and Rutherford (2006), the vegetation of the farm can be described as follows:

a) Eastern Lower Karoo, and
b) Southern Karoo Riviere (Riverine Thicket).

The project site is to be established on a portion of Eastern Lower Karoo, which is also referred to as eastern Mixed Nama Karoo. This vegetation type is relatively sensitive to grazing pressure and, depending on rainfall conditions and stocking density, may resemble either grassland or typical Karoo. As is evident by the photographs under Annexure 1, the project site is totally devoid of any large trees.

Sheep farming dominates the region and is the economic backbone of the Karoo. Other forms of agriculture, such as game farming, are also widely practiced.

Historic farmsteads and associated farm buildings are scattered throughout the landscape. Any new activity should take these structures into account.

3 PROJECT DESCRIPTION AND INSTALLATIONS

Photovoltaic systems use solar panels to convert sunlight into electricity. The system is made up of one or more solar panels, usually a controller or power converter, and the interconnections and mounting for the other components.

It is intended that a PV plant of approximately 20MW be established on the project site. Individual ground-mounted PV panels (also referred to as free-field or stand-alone arrays) will be connected into a 'string' of panels of up to 20m in height. The 'string' can either be fixed tilt or tracking, either single axis or dual axis. Tracking increases the output, but also the installation and maintenance cost.

The 'string', which will cover approximately 20ha of the project site, will feed the electricity generated directly into the electrical grid by means of the electrical substation on site.

The PV/CPV solar energy facility, as proposed for the project site, would typically comprise the following infrastructure:

a) Photovoltaic (PV) or Concentrated Photovoltaic (CPV) panels with an installed capacity of up to 20MW Aberdeen PV/CPV Plant.
b) A new on-site substation to evacuate the power from the facility into the Eskom grid via the Aberdeen Substation located adjacent to the project site.
c) Mounting structure to be either rammed steel pipes or piles with pre-manufactured concrete footings to support the PV/CPV panels.
d) Cabling between the project components, to be lain underground where practical.
e) Internal access roads and fencing.
f) Workshop area for maintenance, storage and offices.

3.1 Renewable Energy Technology Proposed

Various renewable energy technologies are available for electricity generation. Renewable energy technologies offer an alternative to fossil fuels, thereby reducing the amount of CO2 emissions into the atmosphere.

3.1.1 Photovoltaic Technology

Solar energy faculties, such as those using PV panels use the energy of the sun to generate electricity through a process known as Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity. The Solar PV facility will comprise a Photovoltaic Cell, an Inverter and Support structure, as illustrated by the figure below.

Figure 4: Illustration of a photovoltaic solar facility.

3.1.2 Concentrating Photovoltaic Technology

Concentrating photovoltaic (CPV) technology uses optics such as lenses to concentrate a large amount of sunlight onto a small area of solar photovoltaic materials to generate electricity. Unlike traditional, more conventional flat panel systems, CPV systems are often much less expensive to produce, because the concentration allows for the productions of a much smaller area of solar cells.

Each panel will be approximately 22m wide and 12.5m high. As such, when the tracking panel is vertical, the structure will be a maximum height of approximately 20m.

Figure 5: Illustration of a concentrating photovoltaic solar facility.

3.2 Potential 'triggers' or Key Issues

A 'trigger' is a characteristic of either the receiving environment or the proposed project which indicates that visibility and aesthetics are likely to be key issues and may require further specialist involvement (DEA&DP, 2005).

The 'triggers', as it relates to the proposed project refer to the following:

Table 1: Potential trigger.

KEY ISSUE	FOCAL POINTS	DESCRIPTION
a) Nature of the receiving environment:	*Areas with proclaimed heritage or scenic routes.*	The project site is not a proclaimed heritage site or part of a scenic route. However, it is located alongside the N9 which necessitates judicious planning and impact mitigation.
	Areas with intact or outstanding rural or townscape qualities.	The quality of the area has not been formally determined. The proposed activity will however be developed in a rural area with limited modification.
	Areas lying outside a defined urban edge line.	The proposed activity is situated outside the demarcated urban edge of Aberdeen and will be assessed accordingly.
	Areas of important tourism or recreation value.	The N9 is an important tourism spine route. Development alongside this route should enhance and build upon the comparative economic advantages of the region vested in tourism. As such, the proposed activity could contribute to an expanded electricity network which would help to ensure a constant and uninterrupted electricity supply to tourist-related operations in the region.
	Areas with important vistas or scenic corridors.	The project site does not fall within important public vistas or scenic corridors. The site also does not break any ridgelines.
b) Nature of the project:	*A change in land use from the prevailing use.*	The prevailing use will change on approximately 20ha. If some of the proposed mitigation measures could be implemented, the prevailing use could be retained to a degree.
	Possible visual intrusion in the landscape.	The proposed activity will form an integral part of the future landscape character. The extent and significance of a possible visual impact is to be determined through this VIA.

3.3 Development Category

Based upon the 'triggers' and key issues and the environmental context summarised above, the proposed activity is categorised as a **Category 4 Development**.

This categorisation is based upon the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes*, which lists the following categories of development:

Box 3: KEY TO CATEGORIES OF DEVELOPMENT

Category 1 Development: e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

Category 2 Development: e.g. low-key recreation/resort/residential type development, small-scale agriculture/nurseries/narrow roads and small-scale infrastructure.

Category 3 Development: e.g. low density residential/resort type development, golf or polo estates, low to medium-scale infrastructure.

Category 4 Development: e.g. medium density residential development, sport facilities, small-scale commercial faculties/office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5 Development: e.g. high density township/residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agriculture land and commercial tree plantations. Quarrying and mining activities with related processing plants.

Based upon the above categorization and the assessment criteria provided in the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes* it is expected that the visual impact of the proposed activity would be classified as **'high'** (refer to the table on the following page).

The objectives of the VIA described in this report is to:

g) determine whether such broad impact categorisation is appropriate and if not, to determine an appropriate category of impact;
h) formulate and implement measures or interventions that would mitigate any detrimental impacts to the extent that the activity will be acceptable.

Table 2: Categorization of expected visual impact (DEA&DP, 2005).

Type of environment	Type of development				
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
Protected/wild areas of international or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected

Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance/disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

4 VIEWSHED ANALYSIS

4.1 Dominant View Corridors

As a first step of this VIA, a survey was undertaken to determine the existence of significant view corridors associated with the project site. A view corridor is defined as *'a linear geographic area, usually along movement routes, that is visible to users of the route'* (DEA&DP, 2005). Accordingly, two dominant *view corridors* were identified, namely:

a) **N9-** The main distributor in the region that links, amongst others, the Western Cape towns of Oudtshoorn, De Rust and Uniondale with Willowmore, Aberdeen, Graaff Reinet and Middelburg in the Eastern Cape.

b) **R61-** The main links road between Aberdeen and Beaufort West. This road is approximately 13k m north of the project site.

Comment [U1]: Uri

4.2 Relevant Topographic and Physical Characteristics

A further key aspect affecting the potential visual impact of any proposed activity is the topography of the project site and the surrounding environment and the existence of prominent biophysical features from where the project site is visible. The topography and the major ridgelines of the area were subsequently determined and mapped by using a *Digital Elevation Model*[1].

[1] A Digital Elevation Model (DEM) is a geographic information system-based outcome generated from contours for a specific area. In this instance, 20m contour intervals for reference sheet nos. 3223bc, 3223bd, 3223da, 3223db, 3224ac and 3224ca were used to calculate the DEM for the region.

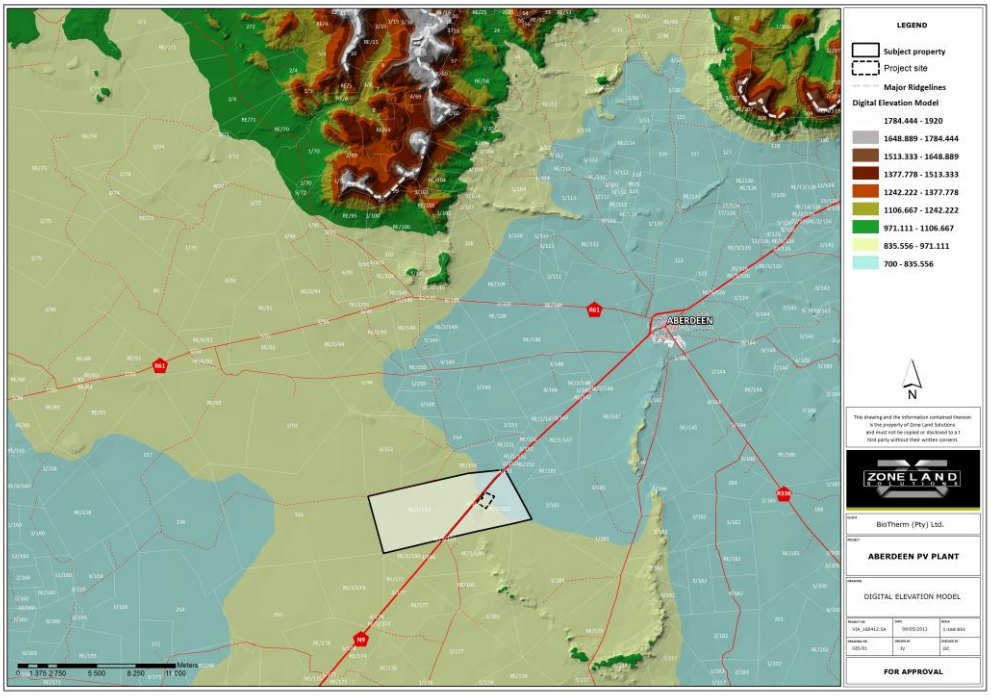

Figure 6: Digital Elevation Model illustrating major ridgelines and movement routes in the sub-region.

As illustrated by the DEM above, the project site is located at a mean elevation of approximately 840m above sea level on a slight easterly slope. The DEM shows that there are no prominent topographical manifestations in close proximity to the project site from which the proposed activity is particularly visually exposed.

Furthermore, as stated previously, the project site is located below any ridgeline. The proposed activity will therefore not impact on the skyline. Several farmsteads do however occur in the region. These farmsteads are sensitive to potentially visual impacts, which will be assessed in the chapters below.

4.3 Photographic Study as Supplementary Component

In order to quantify and assess the visibility and potential impact of the proposed activity and to provide a basis for selecting appropriate observation points outside of the project site, a photographic study and analysis was undertaken in the vicinity of the project site. The analysis and ground-truthing identified several observation points with similar characteristics and assessments outcomes. A selection of Key Observation Points is therefore included under Annexure 1. The figure and photograph below illustrate the nature of the landscape in the vicinity of the project site.

Figure 7: Photograph illustrating the substation on the project site. The planned PV/CPV 'strings' are to be established around the substation.

5 DIGITAL VIEWSHED ANALYSIS

The photographic study summarised above was supplemented with a digital viewshed analysis based upon the Digital Elevation Model (refer to Figure 5). As stated previously, the purpose of these two steps was to provide a basis for the identification and selection of appropriate observation points outside the project site for the VIA.

The viewshed[2] analysis was undertaken in accordance with the *Guideline Document for involving Visual Specialists in EIA Processes*. Geographic Information Systems (GIS) technology was used to analyse and map information in order to understand the relationships that exist between the observer and the observed view. Key aspects of the viewshed are as follows:

- It is based on a *single viewpoint* from the highest point of the proposed 20ha PV/CPV site.
- It is calculated from 20m above the natural ground level.
- It represents a '*broad-brush' designation*, which implies that the zone of visual influence may include portions that are located in a view of shadow and it is therefore not visible from the project site and vice versa. This may be as a result of landscape features such as vegetation, buildings and infrastructure not taken into consideration by the DEM.

[2] A viewshed is defined as *'the outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed'*. A Viewshed Analysis is therefore the study into the extent to which a defined area is visible to its surroundings.

As illustrated by the viewshed (refer to Figure 8 below), the primary *zone of visual influence*[3] is located in a north-easterly direction up to 35km from the project site. This is primarily due to the higher lying Camdeboo Mountains in the northeast. The GIS-generated viewshed illustrates a theoretical *zone of visual influence*. This does not mean that the proposed activity would be visible from all observation points in this area. The *zone of visual influence* is closely associated with the most prominent topographical features to the northeast.

Comment [U2]: uri

5.1 Key Aspects of the Viewshed

The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of a activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely:

a) Foreground: The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation.

b) Middle ground: The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape.

c) Background: the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are often not visible (SRK Consulting, 2007).

The distance radii indicating the various viewing distances from the subject property's boundary are illustrated by Figure 8 on the following page.

As is illustrated by the figure below, the main town of Aberdeen, where most of the visual receptors would be located, is located outside the generated viewshed and is situated in the background. However, the main view corridor, namely the N9 falls within the *foreground*, *middle ground* and *background*, while the R61 only falls within the *background*.

[3] Zone of visual influence is defined as *'An area subject to the direct visual influence of a particular project'.*

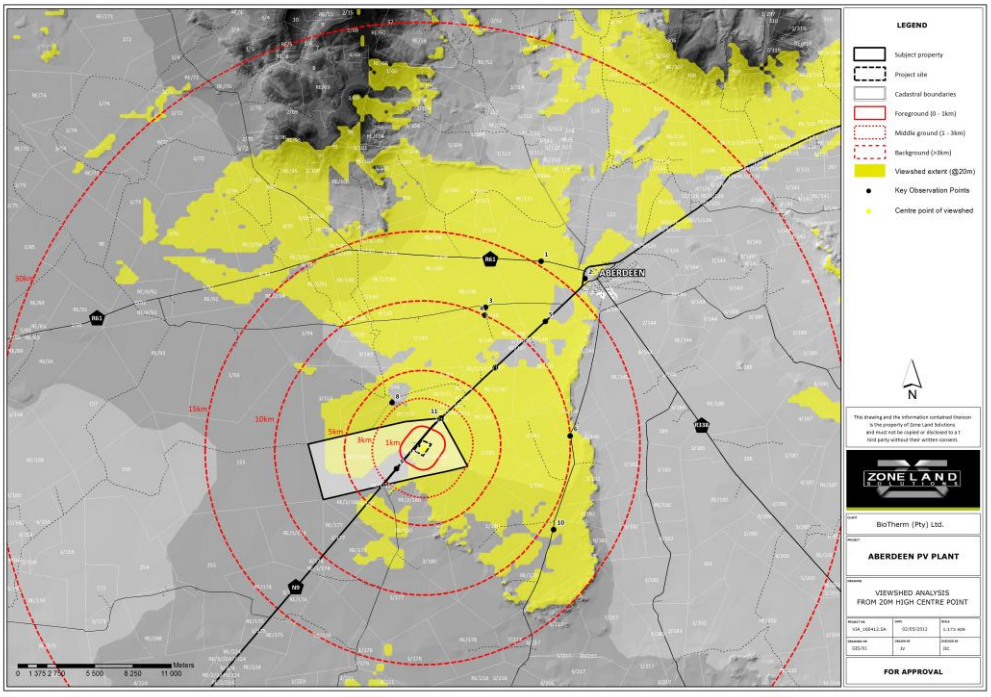

Figure 8: Viewshed generated from the project site.

6 VISUAL IMPACT ASSESSMENT

6.1 Selection of Observation Points

A total of 10 Key Observation Points (KOPs) were provisionally identified and selected within the defined viewshed for the visual assessment in accordance with the selection criteria stipulated in the Visual Guidelines. As a result of the similarity in the assessment results of the KOPs, the description and assessment of only five KOPs are included in Annexure 1.

KOPs selected for the assessment are generally located at the intersection between the zone of visual influence and the defined view corridor (refer to Sections 4.1 and 5 above). The view corridors are those areas that are accessible to the general observer.

6.2 Assessment Process

The identified *observation points* were categorised and assessed as summarised in the table on the following page.

Table 3: VIA methodology and process.

KEY	DESCRIPTION
NUMBER	Each observation point was allocated a reference number.
CO-ORDINATES	The co-ordinates of each of the observation points are provided.
ALTITUDE	The altitude of the observation point was provided in meters above sea level.
DESCRIPTION	A brief description where the observation point is located is provided.
TYPE	Each observation point is categorised according to its location and significance rating. These criteria include the following: • Tourist-related corridors, including linear geographical areas visible to users of a route or vantage points. • Residential areas (including farmsteads).
PHOTOGRAPH	A photograph was taken from each observation point in the direction of the project site to verify the digitally-generated viewshed.
PROPERTY LOCATION	The location of the property was described a *foreground*, *middle ground* or *background*.
PROXIMITY	The distance between the observation point and the project site was provided in kilometres.
VISUAL SENSITIVITY OF RECEPTORS	The visual impact considered acceptable is dependent on the type of receptors. A *high* (i.e. residential areas, nature reserves and scenic routes or trails), *moderate* (e.g. sporting or recreational areas, or places or work), or *low* sensitivity (e.g. industrial, mining or degraded areas) was awarded to each observation point.
VISUAL EXPOSURE	Exposure or visual impact tends to diminish exponentially with distance. A *high* (dominant or clearly visible), *moderate* (recognisable to the viewer) or *low* exposure (not particularly visible to the viewer) rating was allocated to each observation point.
VISUAL ABSORPTION CAPACITY (VAC)	The potential of the landscape to conceal the proposed activity was assessed. A rating of *high* (effective screening by topography and vegetation), *moderate* (partial screening) and *low* (little screening) was allocated to each observation point.
VISUAL INTRUSION	The potential of the activity to fit into the surrounding environment was determined. The visual intrusion relates to the context of the proposed activity while maintaining the integrity of the landscape. A rating of *high* (noticeable change), *moderate* (partially fits into the surroundings) or *low* (blends in well with the surroundings) was allocated.

DURATION	With regard to roads, the distance (in kilometres) and duration (in seconds) for which the property will be visible to the road user, were calculated for each observation point.

6.3 Summary of Assessment

Based on the viewshed analysis and the preceding sections, the envisaged visual impact of the proposed activity was assessed in accordance with the criteria for visual impact assessments (DEA&DP, 2005). The findings of the assessment from selected observation points are included under Annexure 1.

6.3.1 Assessment Criteria

It is stated in the DEA&DP's Visual Guidelines that to aid decision-making, the assessment and reporting of possible impacts requires consistency in the interpretation of impact assessment criteria. The criteria that specifically relate to VIAs were therefore described in Table 3 and Annexure 1.

The potential visual impact of the proposed activity was assessed against these criteria, with reference to the summary of criteria in Box 12 of the Visual Guidelines. Table 4 provides a description of the summary criteria used to determine the impact significance.

Table 4: Summary of criteria used to assess the potential impacts of the proposed activity.

CRITERIA	DESCRIPTION
NATURE OF THE IMPACT	The nature of the impact refers to the visual effect the proposed activity would have on the receiving environment. The nature of the development proposals are described in the preceding sections.
EXTENT	This category deals with the spatial or geographic area of influence and refers to the following levels: • *Site-related* (extending only as far as the activity), • *Local* (limited to the immediate surroundings), • *Regional* (affecting a larger metropolitan or regional area), • *National* (affecting large parts of the country), • *International* (affecting areas across international boundaries). A value between 1 and 5 is assigned as appropriate (with 1 being low and 5 being high).
DURATION	Duration refers to the expected life-span of the visual impact. A rating of short term (during the construction phase) (assigned score of 1 or 2), *medium term* (duration for screening vegetation to mature) (assigned score of 3), *long term* (the lifespan of the project) (assigned score of 4), or *permanent* (where time will not mitigate the visual impact) (assigned score of 5) were applied.

MAGNITUDE	Magnitude refers to the magnitude of the impact on views, scenic or cultural resources. The following ratings were allocated to determine the intensity of the impact: • *No effect* (assigned score of 0), • *Low* (visual and scenic resources not affected) (score of 2), • *Minor* (will not result in impact on processes) (score of 4), • *Medium* (affected to a limited scale) (assigned score of 6), • *High* (scenic and cultural resources are significantly affected) (assigned score of 8), • *Very high* (result in complete destruction of patterns) (score of 10).
PROBABILITY	This category refers to the degree of possibility of the visual impact occurring. A rating of *very improbable* (probably will not happen) (assigned score of 1), *improbable* (very low possibility of the impact occurring) (assigned score of 2), *probable* (distinct possibility that the impact will occur) (assigned score of 3), *highly probable* (most likely) (assigned score of 4), or *definite* (impact will occur regardless of any preventative measures) (assigned score of 5) were applied.
STATUS	Status will be described as positive, *negative* or *neutral*.
REVERSIBILITY	Degree to which the activity can be reversed. The following rating were allocated: • Reversible (assigned score of 1), • Recoverable (assigned score of 3), or • Irreversible (assigned score of 5).
SIGNIFICANCE	The significance is calculated by combining the criteria in the following formula: S = (E+D+M)P S = Significance E = Extent D = Duration M = Magnitude P = Probability The significance ratings for each potential impact are as follows: • *Low* (where it will not have an influence on the decision) (<30 points), • *Medium* (where it should have an influence on the decision unless it is mitigated) (30-60 points), or • *High* (where it would influence the decision regardless of any possible mitigation) (>60 points).

6.3.2 Assessment of Impact on Sensitive Receptors in Fore- and Middle Ground

The sensitive receptors in the foreground and middle ground of the generated viewshed represent only one identified farmstead on the Remainder of Farm No. 153 as well as the N9 en route to Aberdeen. The N9 is considered to be the major and most sensitive receptor in the area as observers using this road will come into direct view of the proposed activity.

The proposed activity will represent a change in land use and land form to what is currently the status quo. The introduction of foreign structures and forms in the agrarian landscape will have a significant impact on these sensitive receptors as described in the table below.

A photograph illustrating the site of the proposed activity in context of the N9 is appended under Annexure 1.

Table 5: Impact table summarising the significance of visual impact on sensitive receptors in the fore- and middle ground.

NATURE:	Potential visual impact on the sensitive receptors in the foreground and the middle ground.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Local	**2**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	High	**10**	High	**8**
PROBABILITY	Highly probable	**4**	Highly probable	**4**
SIGNIFICANCE	High	**64**	High	**56**
STATUS	Negative		Negative	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• Keep disturbed areas to a minimum. • No large-scale clearing of land to take place outside the demarcated 20ha footprint. • Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be introduced and planted in such a manner and location which would not cast shadows on the PV/CPV 'strings'. • Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.			
CUMULATIVE IMPACTS:	As described above, the Aberdeen substation and associated industrial-type infrastructure such as electrical powerlines and pylons already exists on site. Therefore, the cumulative impact will be			

	increased with the establishment of the PV/CPV plant.
RESIDUAL IMPACTS:	It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

6.3.3 Assessment of Impact on Sensitive Receptors in the Background

Visual receptors in the background represent a mix of farmsteads, intensive agricultural areas and mobility routes. The western-most part of Aberdeen is also theoretically impacted by the proposed plant from a visual perspective.

The envisaged development components are constant and similar to the aspects described above, the likelihood of these structures being visible from a greater distance is however the only variable.

Various photographs taken from key observation points in the background illustrate the extent to which the site is visible from a greater distance (refer to Annexure 1).

Table 6: Impact table summarising the significance of visual impact on sensitive receptors in the background.

NATURE:	Potential visual impact on the sensitive receptors in the background.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Local	**2**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Minor	**4**	Low	**2**
PROBABILITY	Probable	**3**	Improbable	**2**
SIGNIFICANCE	Medium	**30**	Low	**16**
STATUS	Neutral		Neutral	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• Keep disturbed areas to a minimum. • No large-scale clearing of land to take place outside the demarcated 20ha footprint. • Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be introduced and planted in such a manner and location which would not cast shadows on the PV/CPV 'strings'. • Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.			
CUMULATIVE IMPACTS:	It is near impossible to distinguish built forms and structures at distances greater than 5km. An example is that of the existing			

	electrical substation on site which is unrecognisable from this distance. However, the introduction of a 20ha PV/CPV plant might have a cumulative effect on the observer.
RESIDUAL IMPACTS:	It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

6.3.4 Assessment of Impact on Sense of Place

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically visual character of an area (informed by a combination of aspects, such as topography, level of development, vegetation, noteworthy features, cultural/historical features, etc.) play a significant role (MetroGIS, 2012).

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light (MetroGIS, 2012).

The sense of place of Aberdeen is very much one of an agrarian landscape, dotted by agricultural farmsteads against a backdrop of mountains and hills. The project site has to a large degree lost many of its sense of place attributes with the introduction of the electrical substation and associated infrastructure. In addition, the substation, and planned PV/CPV plant, is in relative close proximity to the town of Aberdeen, which therefore does not district too much of the rural character of the area.

Table 7: Impact table summarising the significance of visual impact on the sense of place.

NATURE:	Potential visual impact on the sense of place of the Aberdeen region.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Local	**2**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Medium	**6**	Medium	**6**
PROBABILITY	Highly probable	**4**	Probable	**3**
SIGNIFICANCE	Medium	**48**	Medium	**36**
STATUS	Negative		Negative	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• Keep disturbed areas to a minimum. • No large-scale clearing of land to take place outside the demarcated 20ha footprint. • Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be			

	introduced. • Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits. • Consider raising the PV platforms so that sheep can roam underneath the PV 'string'.
CUMULATIVE IMPACTS:	It is near impossible to distinguish built forms and structures at distances greater than 5km. However, the introduction of a 20ha PV/CPV plant might have a cumulative effect on the observer.
RESIDUAL IMPACTS:	It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

6.3.5 Assessment of Impact during the Construction Period

Construction periods are often characterised by an increase in construction vehicles and personnel and their associated impacts such as dust clouds, noise, potential pollution, safety considerations, etc.

The visual impact of the construction period and the associated impacts on visual receptors are provided in the table below.

Table 8: Impact table summarising the significance of visual impact during the construction period.

NATURE:	Potential visual impact of the construction period on visual receptors.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Regional	**3**	Local	**2**
DURATION	Very short term	**1**	Very short term	**1**
MAGNITUDE	Medium	**6**	Medium	**6**
PROBABILITY	Probable	**3**	Improbable	**2**
SIGNIFICANCE	Medium	**30**	Low	**18**
STATUS	Negative		Negative	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• A *Construction Phase* and *Operational Phase* Environmental Management Programme must be prepared which would guide and control all aspects of the activity, including visual aspects. • An Environmental Control Officer (ECO) must be appointed to oversee the construction process and ensure compliance with conditions of approval. • An Environmental Management Specifications document (Specs) must be prepared to form part of the Basic Assessment Report and be adhered to. The document is to describe specifications for			

	the pre-construction and construction phase of the project and include *inter alia* the following: o Details on aspects such as scope, interpretation, materials, the plant, tolerances, etc. o method statements for all identified aspects such as access routes, plant clearing, anchors, bunding, environmental awareness, fuel spills, rehabilitation, sensitive habitatis, traffic, etc. • Reduce and control dust through the use of approved dust suspension techniques as and when required. • Rehabilitate all disturbed areas (construction sites and roads) immediately after completion of construction works.
CUMULATIVE IMPACTS:	None
RESIDUAL IMPACTS:	None

6.3.6 Assessment of Impact of Lighting during the Operational Phase

The area in the vicinity of the proposed PV Plant has a relatively low incidence of light sources. A slight sky glow[4] effect is however visible at night in the vicinity of Aberdeen.

The proposed PV/CPV 'string' will not include lights of any kind, however, the associated ancillary buildings and infrastructure may include some degree of lighting.

It is not expected that the proposed activity will contribute to the effects of sky glow or artificial lighting of the area. In order to ensure this, the proposed mitigation measures will have to be complied with.

Table 9: Impact table summarising the significance of visual impact of lighting during the operational phase.

NATURE:	Potential visual impact of artificial lighting as a result of the activity during operational phase.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Local	**2**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Minor	**4**	Low	**2**
PROBABILITY	Probable	**3**	Probable	**3**
SIGNIFICANCE	Medium	**30**	Low	**34**
STATUS	Negative		Negative	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE	Yes			

[4]Sky glow refers to the illumination of the night sky or parts thereof. The most common cause of sky glow is artificial light that emits light pollution, which accumulates into a fast glow that can be seen from miles away.

MITIGATED?	
MITIGATION:	• Outdoor lighting must be strictly controlled so as to prevent light pollution. • All lighting must be installed at downward angles. • Sources of light must as far as possible be shielded by physical barriers. • Consider the application of motion detectors to allow the application of lighting only where and when it is required. • Only minimum wattage light fixtures must be used.
CUMULATIVE IMPACTS:	As mentioned above, the area within which the proposed activity is to be undertaken is relatively low lit. The occurrence of a farmstead on the western side of the N9 and the ancillary structures of the PV/CPV Plant will contribute to the cumulative lighting effect of the area but it is expected to be negligible in a local context.
RESIDUAL IMPACTS:	It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the potential lighting impact will also be removed.

6.3.7 Assessment of Impact of Reflection of PV Panels

Photovoltaic solar panels are designed to absorb sunlight in order to convert it into electricity. The more sunlight that is absorbed, the more energy that can be produced.

A monocrystalline silicon solar cell absorbs two-thirds of the sunlight reaching the panel's surface. This effectively means that only one-third of the sunlight reaching the surface of a solar panel has a chance to be reflected.

In addition, the PV panels have a reflectivity of around 30%, while surface materials such as dry sand has a reflectivity of around 45% and grass-type vegetation at 25%. Moreover, PV panels are installed at a fixed angle of around 30°.

With a height variation of approximately 80m over 15km, the majority of receptors in the region are located at more or less the similar height of the project site. The solar panels will therefore not noticeably alter the site's current amount of reflected, indirect sunlight.

Table 10: Impact table summarising the significance of visual impact of reflection of the PV panels.

NATURE:	Potential visual impact of reflection of the PV Panels on the sensitive receptors.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Local	**2**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Low	**2**	Low	**2**
PROBABILITY	Improbable	**2**	Improbable	**2**
SIGNIFICANCE	Low	**16**	Low	**16**
STATUS	Neutral		Neutral	

REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• Consider installing anti-reflective coating or glass to reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed.			
CUMULATIVE IMPACTS:	The introduction of the PV plant, coupled with the existing substation on site, contribute to a somewhat increased cumulative visual impact.			
RESIDUAL IMPACTS:	It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the potential impact of reflection will also be removed.			

6.3.8 Assessment of Impact of Erosion on the Landscape

The Karoo is prone to flash floods and severe thunderstorms. Coupled with the slight angle of the project site and the potential disturbance of the natural vegetation, severe downpours have the potential to erode large landscapes.

Great concern therefore needs to be taken in the construction and operation of the plant to prevent erosion and scouring of the landscape.

Table 11: Impact table summarising the significance of visual impact of erosion.

NATURE:	Potential visual impact on the sensitive receptors in the foreground and the middle ground.			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Site related	**1**	Site related	**1**
DURATION	Permanent	**5**	Long term	**4**
MAGNITUDE	High	**8**	Medium	**6**
PROBABILITY	Highly probable	**4**	Probable	**3**
SIGNIFICANCE	Medium	**56**	Medium	**33**
STATUS	Negative		Negative	
REVERSIBILITY	Recoverable	**3**	Recoverable	**3**
IRRIPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
MITIGATION:	• Keep disturbed areas to a minimum. • No large-scale clearing of land to take place outside the demarcated 20ha footprint. • Institute a rigorous planting regime once construction has ceased. • Reintroduce suitable plant species beneath the PV 'strings'. • Create stormwater channels alongside access roads and divert stormwater in the natural veld at regular intervals along the road. • Consider installing rainwater tanks to save all water from building			

	roofs. Alternatively, install spreaders at the bottom of downpipes to prevent scouring of the land. • All contractors to adhere to the Environmental management programme report.
CUMULATIVE IMPACTS:	The construction of the proposed plant will increase the cumulative visual impact of erosion in the area. The proposed cumulative impact is considered to be negligible in a regional context.
RESIDUAL IMPACTS:	Should the proposed mitigation measured be introduced, it is possible that the sourcing of the landscape will be prevented. Failing to implement these measures, the impact will remain.

7 IMPACT STATEMENT

The on-site verification from the selected Key Observation Points and the viewsheds generated from the latter points indicated that the project site is indistinguishable from most observation points. This is perhaps with the exception of the observation points in the *foreground*, and to a lesser effect, those in the *middle ground*.

To this end, the results of the viewshed analysis from defined Key Observation Points, together with a photograph indicating the actual view has been included under Annexure 1. The assessment findings of the KOPs were categorised as follows:

7.1 Impact on the Middle and Background

As described in the sections above, KOP 1-8, & 10-11 are located in the *middle* and *background* zone of visual influence. The visual analysis and assessment from all of these observation points is summarised as follows:

a)	**Visibility:**	Medium to low
b)	**Visual exposure:**	Low
c)	**Visual absorption capacity:**	High
d)	**Visual sensitivity of receptors:**	Medium
e)	**Visual intrusion:**	Medium to low
f)	**Significance of impact:**	Low

7.2 Impact on the Foreground

Key Observation Point 9 is located in the *foreground* zone of visual influence. These are the only observation points from which the proposed activity could have any significant detrimental impact. The visual impact analysis and assessment from the relevant observation points is summarised as follows:

a)	**Visibility:**	Medium to high
b)	**Visual exposure:**	High
c)	**Visual absorption capacity:**	Medium to low
d)	**Visual sensitivity of receptors:**	High

e) **Visual intrusion:** Medium to high
f) **Significance of impact:** Medium to high

The findings of the Visual Impact Assessment for the proposed Aberdeen PV Plant therefore found that the proposed activity will have a **low** impact from the *middle* and *background* and a **moderate** impact from the *foreground*(<1km).

In addition, it should be noted that users of KOP 11 (N9) would only see the activity for a short period of time as they drive by the project site. The activity will therefore not have a lasting visual impact.

The development of sustainable energy sources holds huge benefits for the country as a whole, and would have significant multipliers in the local economy. Not only do renewable energy projects contribute to clean development mechanism, but it would also establish an empowering environment in the region within which the facility is established. Sustainable energy projects should therefore be undertaken to provide the necessary infrastructure and associated amenities to accommodate the industry in an efficient manner. It is therefore crucial that Government would give preference to sustainable energy projects such as the proposed Aberdeen PV/CPV plan.

Based on the above and the documentation attached under Annexure 1, it is herewith recommended that the proposed activity be approved subject to the conditions described in section 6.3 above and the Environmental Management Programme described in section 8 below.

8 ENVIRONMENTAL MANAGEMENT PROGRAMME

The management plan tables aim to summarise the key findings of the visual impact report and to suggest possible management actions in order to mitigate the potential visual impacts.

Table 12: Environmental Management Programme – Construction Phase

OBJECTIVE: Mitigate the possible visual impact associated with the construction phase.		
Project component/s	Construction site	
Potential Impact	Visual impact of general construction activities and associated impacts.	
Activity/risk source	Potential impact on sensitive receptors within the *foreground*.	
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and general acceptance and compliance with Environmental management programme.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
An Environmental Control Officer (ECO) must be appointed to oversee the	BioTherm	Pre-construction

construction process and ensure compliance with conditions of approval.		
Contractor to sign and undertake to comply with Environmental management programme.	BioTherm	Pre-construction
Demarcate sensitive areas and no-go areas with danger tape to prevent disturbance during construction.	BioTherm / contractor	Pre-construction
Design buildings to reflect the local architecture and sense of place of the Karoo.	BioTherm / contractor	Pre-construction
Keep disturbed areas to a minimum.	BioTherm / contractor	Throughout construction
Identify suitable areas within the construction site for fuel storage, temporary workshops, eating areas, ablution facilities and washing areas.	BioTherm / contractor	Throughout construction
Institute a solid waste management programme to minimise waste generated on the construction site, and recycle where possible.	BioTherm / contractor	Throughout construction
Reduce and control dust through the use of approved dust suspension techniques as and when required.	BioTherm / contractor	Throughout construction
Construction to occur only during daytime. Should the ECO authorize night work, low flux and frequency lighting shall be used.	BioTherm / contractor	Throughout construction
Consider raising the PV platforms so that sheep can roam underneath the PV 'string'.	BioTherm / contractor	Construction
Rehabilitate all disturbed areas in accordance with the development plan.	BioTherm / contractor	Construction
Institute a rigorous planting regime in collaboration with the appointed botanical specialist.	BioTherm / contractor	Construction
Performance Indicator	Construction site is confined to the demarcated areas identified on the Development Plan. No transgression of the Environmental management programme visible and natural processes occurring freely outside boundaries of the construction site.	
Monitoring	Monitoring to be undertaken by an appointed Environmental Control Officer who will enforce compliance with the Environmental management programme.	

Table 13: Environmental Management Programme – Operational Phase

OBJECTIVE: Mitigate the possible visual impact associated with the operational phase.		
Project component/s	Photovoltaic 'string' of panels including ancillary infrastructure such as a security building, workshop and offices.	
Potential Impact	Potential visual intrusion in the area and damage to the natural environment.	
Activity/risk source	Potential impact on sensitive receptors within the *foreground*.	
Mitigation: Target/Objective	A facility that fits in with the landscape, that is well maintained and managed.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Maintain the general appearance of the facility as a whole (i.e. the PV panels, buildings and associated infrastructure, roads and natural environment).	BioTherm / operator	Throughout operational phase
Maintain access roads to prevent scouring and erosion, especially after rains.	BioTherm / operator	Throughout operational phase
Performance Indicator	Well maintained facility that has a small footprint on the environment. Natural processes continuing to occur unhindered. All actions to be measured against the Operational Phase Environmental Management Plan.	
Monitoring	ECO to undertake monitoring functions for a year after construction has been completed to ensure compliance with mitigation measures. Management thereafter to be undertaken by operator.	

9 REFERENCES

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ZONE LAND SOLUTIONS
9 MAY 2012

PROPOSED ABERDEEN PHOTOVOLTAIC PLANT

Remainder of Portion 1 of the Farm Wildebeest Poortje No. 153, Aberdeen District, Eastern Cape Province

ANNEXURE 1

SELECTED OBSERVATION POINT VIEWSHEDS AND ASSESSMENTS

9 May 2012

PROJECT NO: VIA_160412.SA

Produced for:

BioTherm Energy (Pty) Ltd.

Energy

On behalf of:

Savannah Environmental (Pty) Ltd.

ENVIRONMENTAL (PTY) LTD

Produced by:

PROPOSED ABERDEEN PHOTOVOLTAIC PLANT

Remainder of Portion 1 of the Farm Wildebeest Poortje No. 153, Aberdeen District, Eastern Cape Province

ANNEXURE 2

LIST OF PLANS

9 May 2012

PROJECT NO: VIA_160412.SA

Produced for:

BioTherm Energy (Pty) Ltd.

Produced by:

1 SELECTED OBSERVATION POINT ASSESSMENTS

The selected *observation points* were categorized and assessed in terms of the following assessment criteria.

KEY	DESCRIPTION
NUMBER	Each observation point was allocated a reference number.
CO-ORDINATES	The co-ordinates of each of the observation points are provided.
ALTITUDE	The altitude of the observation point was provided in meters above sea level.
DESCRIPTION	A brief description where the observation point is located is provided.
TYPE	Each observation point is categorized according to its location and significance rating. These criteria include the following: a) Tourist-related corridors, including linear geographical areas visible to users of a route or vantage points. b) Residential Areas.
PHOTOGRAPH	A photograph was taken from each observation point in the direction of the project site to verify the digitally generated view-shed.
PROPERTY LOCATION	The location of the property was described as *foreground*, *middle ground* or *background*.
PROXIMITY	The distance between the observation point and the project site was provided in kilometres.
VISUAL SENSITIVITY OF RECEPTORS	The visual impact considered acceptable is dependent on the type of receptors. A high (e.g. residential areas, nature reserves and scenic routes or trails), moderate (e.g. sporting or recreational areas, or places of work), or low sensitivity (e.g. industrial, mining or degraded areas) was awarded to each observation point.
VISUAL EXPOSURE	Exposure or visual impact tends to diminish exponentially with distance. A high (dominant or clearly visible), moderate (recognizable to the viewer) or low exposure (not particularly visible to the viewer) rating was allocated to each observation point.
VISUAL ABSORPTION CAPACITY (VAC)	The potential of the landscape to conceal the proposed development was assessed. A rating of high (effective screening by topography and vegetation), moderate (partial screening) and low (little screening) was allocated to each observation point.
VISUAL INTRUSION	The potential of the development to fit in with the surrounding environment was determined. The visual intrusion relates to the context of the proposed development while maintaining the integrity of the landscape. A rating of high (noticeable change), moderate (partially fits into the surroundings) or low (blends in well with the surroundings) was allocated.
DURATION	With regard to roads, the distance (in kilometres) and duration (in seconds) for which the property will be visible to the road user, were calculated for each observation point.

2 KEY OBSERVATION POINT 9

KOP9 is situated on the subject property and the N9 as it follows a north-easterly direction, approximately ±17 km from Aberdeen. The sparse natural veldt and pioneer plants from fallow agricultural land result in general good visibility from this particular point. This creates a high visual sensitivity and potential intrusion of the proposed activity in the landscape. The combination of the road elevation and the natural topographical features between the project site and observation point means that the proposed project will effectively be obscured from this point.

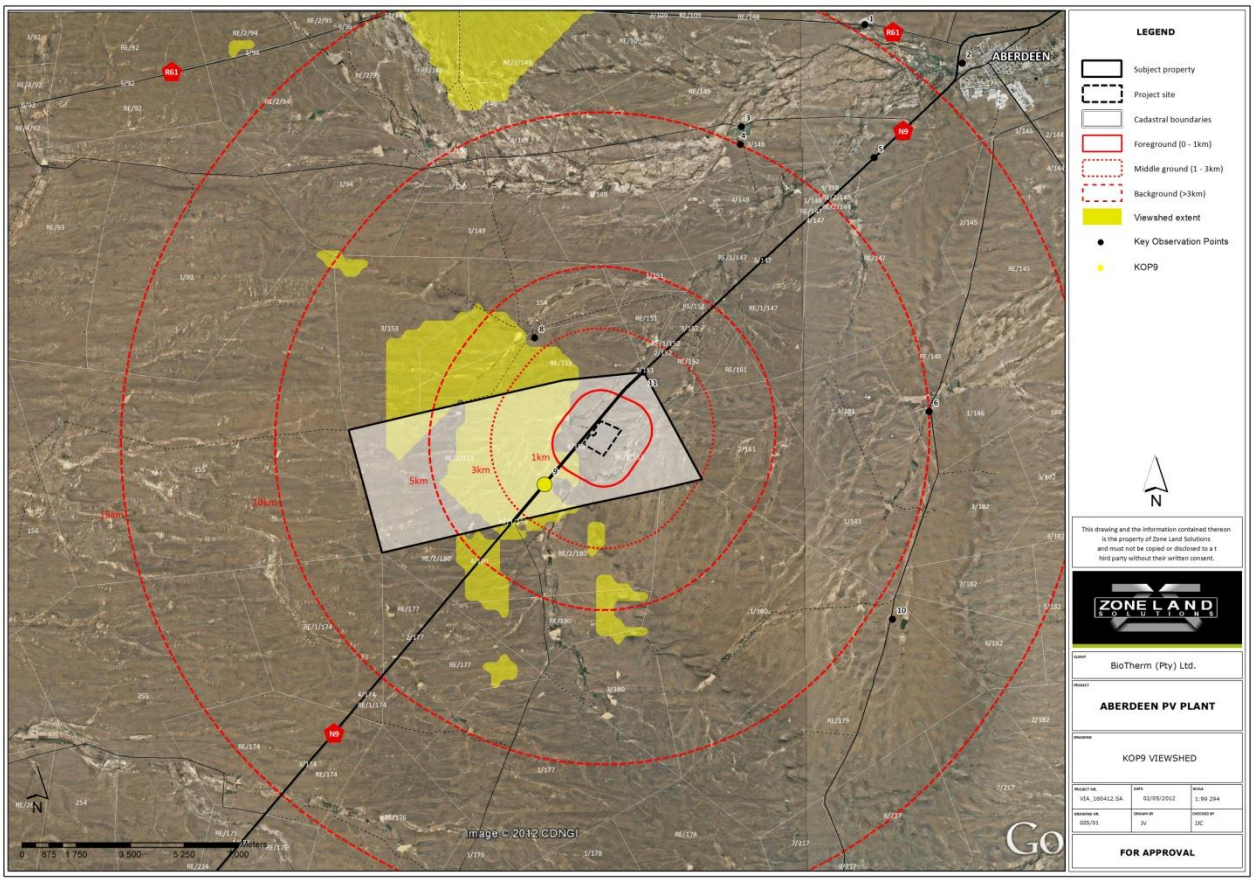

Figure 1: KOP9 Viewshed. Areas shaded yellow is theoretically visible from KOP9.

NUMBER:	KOP9	**CO-ORDINATES:**	**S**	**E**
ALTITUDE:	845 m		32° 35'57.22"	23° 54'26.11"
DESCRIPTION:	KOP9 is located along theN9 highway approximately 1km southwest of the project site.			
TYPE:	National road	**PHOTO:**	Photograph 1	
PROP. LOCATION:	Right foreground	**PROXIMITY:**	1km	
VISUAL SENSITIVITY:	Low			
VISUAL EXPOSURE:	Low	**VAC:**	High	
VISUAL INTRUSION:	Low	**DURATION:**	0	

Photograph 1: View from KOP9 approximately 1km southwest of the project site along the N9**.**

3 KEY OBSERVATION POINT 7

KOP7 is situated ±12 km from the project site along the N9 north-east towards Aberdeen. Due to a 45 metre drop in elevation compared to KOP9, and the project site, the topography contributes to general low visibility from this particular observation point towards the proposed project site.

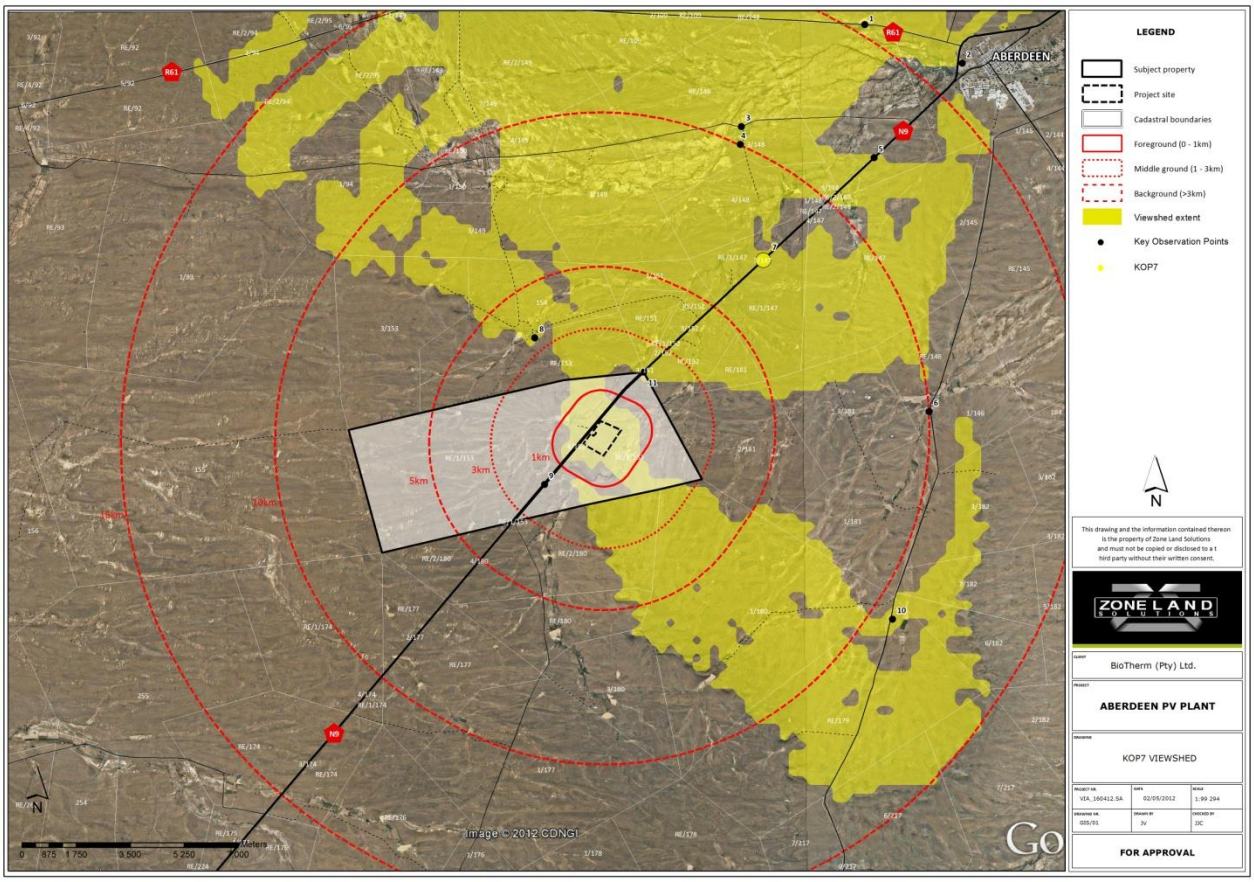

Figure 2: KOP7 Viewshed. Areas shaded yellow is theoretically visible from KOP7.

NUMBER:	KOP7	**CO-ORDINATES:**	**S**	**E**
ALTITUDE:	800 m		32°32'13.39"	23° 58'51.22"
DESCRIPTION:	KOP7 is located along the N9.The photograph is taken towards the Project Site westwards.			
TYPE:	National road	**PHOTO:**	Photograph 2	
PROP. LOCATION:	Right background	**PROXIMITY:**	±12 km	
VISUAL SENSITIVITY:	Low			
VISUAL EXPOSURE:	Medium	**VAC:**	Medium	
VISUAL INTRUSION:	Low	**DURATION:**	5.32km southwards 2.66min @ 120km/h	

Photograph 2: View from KOP7 towards the project site with theN9 adjacent.

4 KEY OBSERVATION POINT 2

KOP2 is situated ±17 km away from the project site in the town of Aberdeen, which, theoretically, would have the most receptors. The project site is not visible from this Key Observation Point.

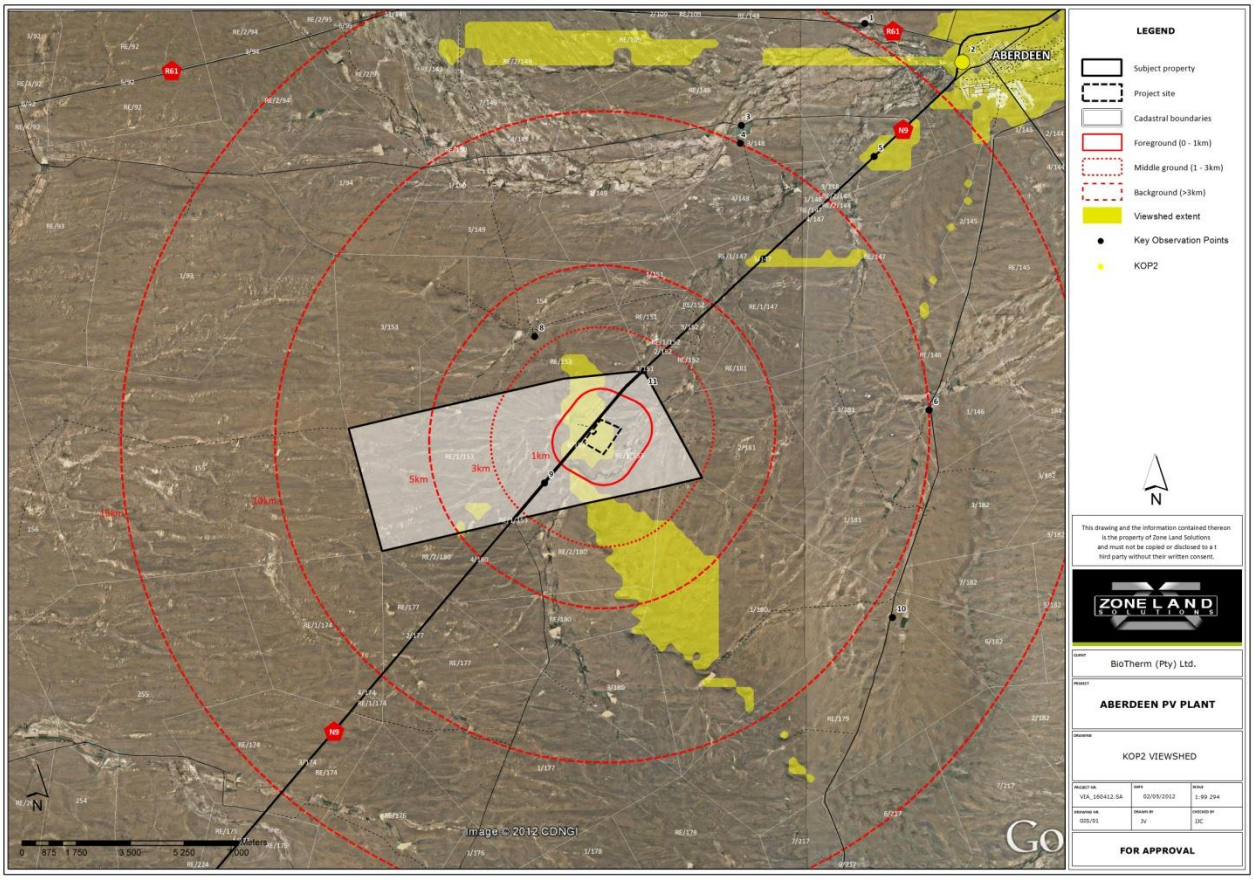

Figure 3: KOP2 Viewshed. Areas shaded yellow is theoretically visible from KOP2.

NUMBER:	KOP2	**CO-ORDINATES:**	**S**	**E**
ALTITUDE:	769 m		32°29'08.46	24° 03'04.86"
DESCRIPTION:	KOP2 is located in Aberdeen Residential Area.			
TYPE:	Aberdeen Town	**PHOTO:**	Photograph 3	
PROP. LOCATION:	Distant background	**PROXIMITY:**	±17 km	
VISUAL SENSITIVITY:	Low			
VISUAL EXPOSURE:	Low	**VAC:**	High	
VISUAL INTRUSION:	Low	**DURATION:**	N/A	

Photograph 3: View ±17km south-westerly from KOP2 towards project site.

5 KEY OBSERVATION POINT 1

KOP1 is situated ±15km away from the project site along the R61 and 8km from Aberdeen. The project site is not visible from this Key Observation Point on the R61.

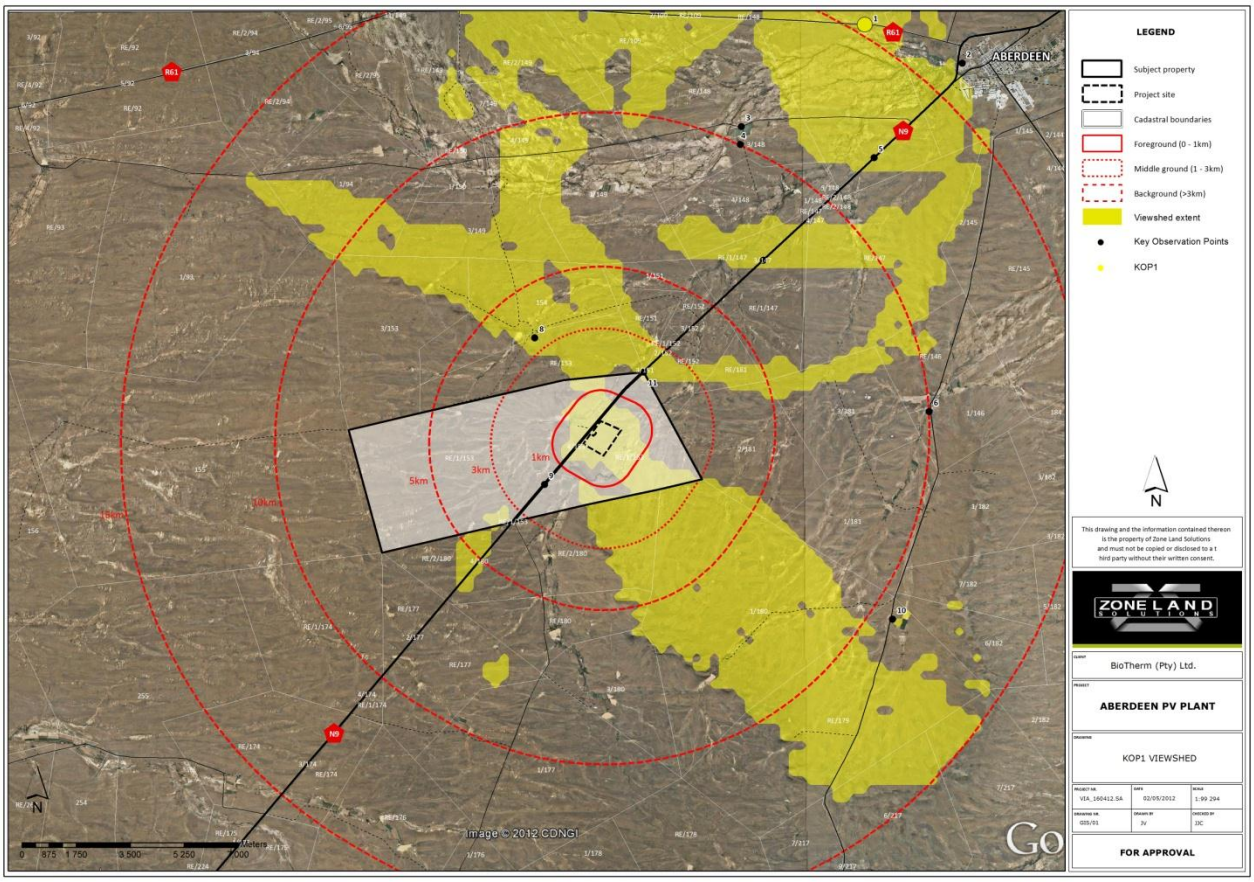

Figure 4: KOP1 Viewshed. Areas shaded yellow is theoretically visible from KOP1.

NUMBER:	KOP1	**CO-ORDINATES:**	**S**	**E**
ALTITUDE:	776 m		32°27'55.46"	23°53'59.89"
DESCRIPTION:	KOP1 is located along the R61			
TYPE:	Regional distributor	**PHOTO:**	Photograph 4	
PROP. LOCATION:	Distant background	**PROXIMITY:**	±15 km	
VISUAL SENSITIVITY:	Low			
VISUAL EXPOSURE:	Low	**VAC:**	High	
VISUAL INTRUSION:	Low	**DURATION:**	27.47km westwards 16.48min @ 100km/h	

Photograph4: View from KOP1 towards the project site.

6 KEY OBSERVATION POINT 6

KOP6 is situated ±8km away from the project site and 11km outside Aberdeen. The project site is not visible from this Key Observation Point on the minor road.

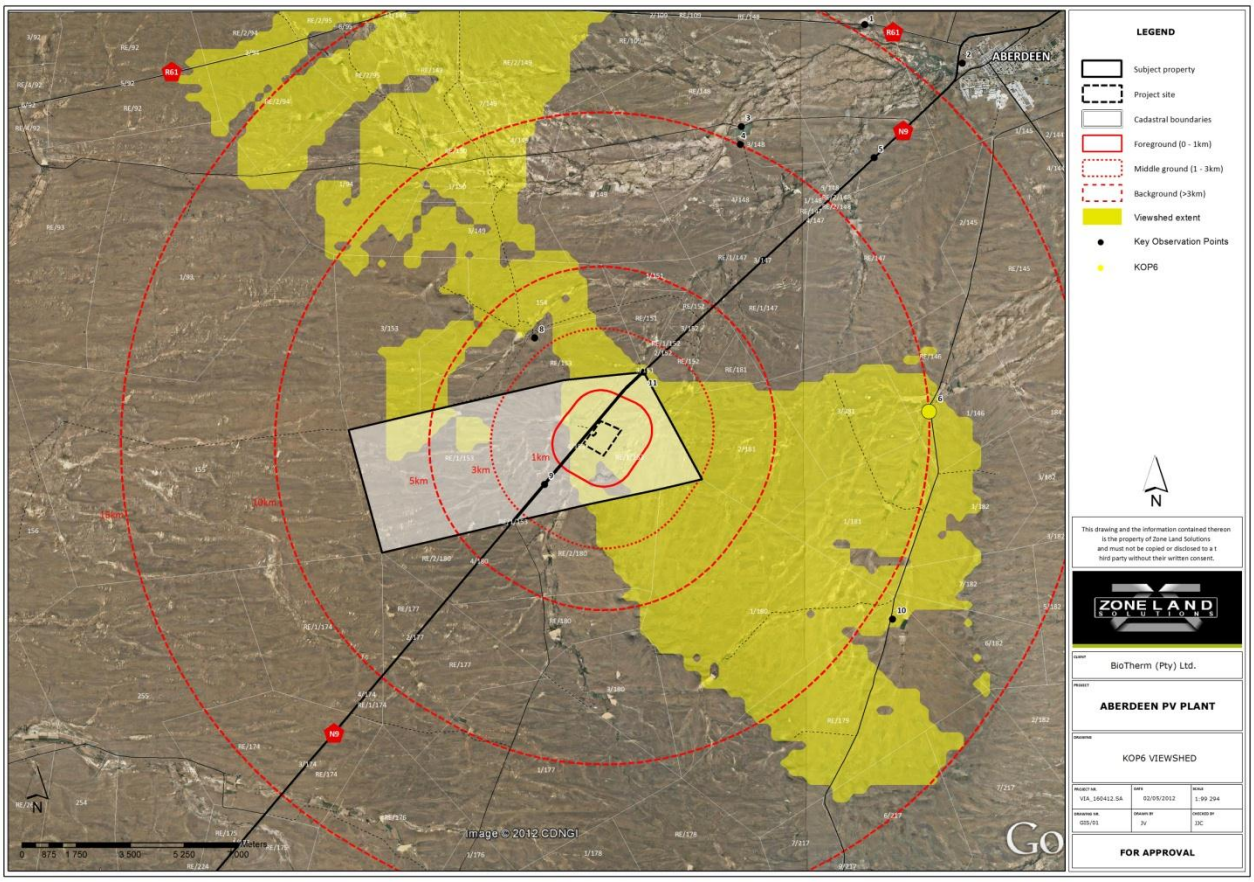

Figure 5: KOP6 Viewshed. Areas shaded yellow is theoretically visible from KOP6.

NUMBER:	KOP6	**CO-ORDINATES:**	**S**	**E**
ALTITUDE:	812 m		32°34'36.62"	24°02'20.68"
DESCRIPTION:	KOP6 is located along a minor road			
TYPE:	Minor Road	**PHOTO:**	Photograph 5	
PROP. LOCATION:	Distant background	**PROXIMITY:**	±8 km	
VISUAL SENSITIVITY:	Low			
VISUAL EXPOSURE:	Low	**VAC:**	High	
VISUAL INTRUSION:	Low	**DURATION:**	8.01km southwards 8.01min @ 60km/h	

Photograph 4: View from KOP6 towards the project site.