



APPENDIX J

Landscape and Visual Impact Assessment Study for a Proposed 100MW Wind Energy Project, Kajiado District, Kenya

Report Prepared for

Kipeto Energy Limited

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Landscape and Visual Impact Assessment Study for a Proposed 100MW Wind Energy Project, Kajiado District, Kenya

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1 Executive Summary

1.1 Introduction

This report describes the scope of the landscape and visual impact assessment of the proposed wind farm at Kipeto and describes the methodology to be used. The landscape and visual impacts of the scheme will be assessed using a semi-quantitative analysis. This analysis is based on scale of magnitude judgements for a set of criteria including landscape sensitivity, the visual presence of the scheme and also its aesthetic impact.

- *Local community views taking consideration of those people that live or work in close proximity to the proposed wind farm*
- *Centres of population eg Kajiado, Ngong*
- *Major routes*

The key objectives of this chapter are to assess the landscape and visual impacts of wind farm development at Kipeto from a variety of receptor types, viewing angles and viewing distances.

1.2 Statement of Authority

Galetech Energy Developments Ltd (GED) has prepared this assessment report. GED has extensive experience at both project level and strategic planning for wind farms in Ireland and Europe.

GED is an Irish based internationally focused multi-disciplinary renewable energy consultancy also involved with the development of renewable energy projects in Ireland and worldwide. Over 50MW has already been developed with a further 350MW in various stages of development in Ireland and over 500MW in the development pipeline in Europe and Africa.

The company's principals, have a long record of accomplishment in the Irish, European and African wind and renewable energy industry both in Ireland and internationally, with multinational energy companies including General Electric.

GED is supported by a strong core team of wind energy professionals with extensive experience in Environmental Impact analysis including the impact of wind farms on the landscape and visual environment.

2 Assessment Methodology

Production of this Landscape and Visual Impact Assessment involves desk studies and fieldwork comprising professional evaluation by landscape consultants. This entailed the following, reflecting the format of this report:

- Establishing a Study Area to reflect the potential visibility of the proposed development;
- Preparation of a Zone of Theoretical Visibility (ZTV) map to indicate areas from which the development is potentially visible in relation to terrain within the Study Area;
- Selection of potential Viewshed Reference Points (VRP) to be investigated during fieldwork for actual visibility and sensitivity (VRP's are the representative locations used as the basis for the landscape and visual assessment);
- Description of proposed development and ancillary / associated structures;
- Description of the geographic location and landscape context of the proposed wind farm site;
- General landscape description concerning essential landscape character and salient features of the Study Area, discussed with respect to landform, vegetation, land use and structures;
- Consideration of design guidance, the planning context and relevant landscape designations.
- Semi-quantitative assessment of landscape sensitivity;
- Detailed assessment of photomontages produced by GED Ltd;
- Estimation of the likely degree of impact on landscape; and
- Recommendation of mitigation measures where appropriate and possible.

3 Description of Proposed Development

The developer proposes to build a wind farm approximately 18km north-west of the town Kajiado in the Rift Valley Province, Kenya. The wind farm will comprise the following main elements:

- Up to 75 wind turbines at 100m hub height; 50m blade length; 150m overall height;
- Substation compound and associated areas of hard standing;
- Internal access tracks – 5m wide; and
- Underground cabling.

4 Existing Environment

4.1 Definition of Study Area

An area radius of 30km from a proposed wind turbine has been defined as the Study Area. Please see attached a Zone of Theoretical Visibility Map indicating the area from which a turbine will be visible.

4.2 Description of Landscape Context

A description of the landscape encompassing the context of the proposed wind farm site is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities. The selection of Viewshed Reference Points (VRP's) for assessment purposes (see section 7.2) is largely determined by their relevance and association with the factors described below. Additional descriptions of the landscape are also provided later under the detailed assessments.

4.2.1 Landform and Drainage

Three distinct physiographic regions can be recognised in the study area (Fig. 1). They were formed by processes associated with the development and evolution of the East Africa Rift System (EARS). The uplands of the OI Doinyo Narok plateau represent the uplifted eastern shoulder of the rift and are underlain by igneous rocks associated with the rift-initiating uplift event (Chorowicz 2005). The uplands are bound on the west by an escarp where the land drops down almost 500m to the rift valley floor. The rift valley consists of north-south trending crustal blocks bound by further, smaller scarps (steep fault planes) running more-or-less parallel with the eastern escarp. The valley floor is underlain by rocks of volcanic origin (lava flows), and several dormant or extinct volcanoes are found in the valley (e.g. Olorgesailie) (NEMA 2007). The uplands east of the escarp have been eroded away by large river systems which drain into the Indian Ocean. The Athi-Kapiti plains are formed by the Athi River system and consist of low hills and shallow river valleys. The Kajiado River has formed a similar low relief landscape to the south-east of OI Doinyo Narok, by eroding the pre-rift highlands of the plateau (Matheson 1966).

The south-north topographic profile (Fig. 2a) is a cross-section along the escarp and shows some of the deep incisions into the uplands made by rivers draining east into small basins in the Rift Valley. The other topographic profiles clearly illustrate the three different physiographic regions in the study area: Rift Valley, OI Doinyo Narok plateau and the Athi-Kapiti plains.

Figure 1: Topographic Map of the study area showing profile lines, viewpoints and latest turbine positions. other features discussed in the report are also shown

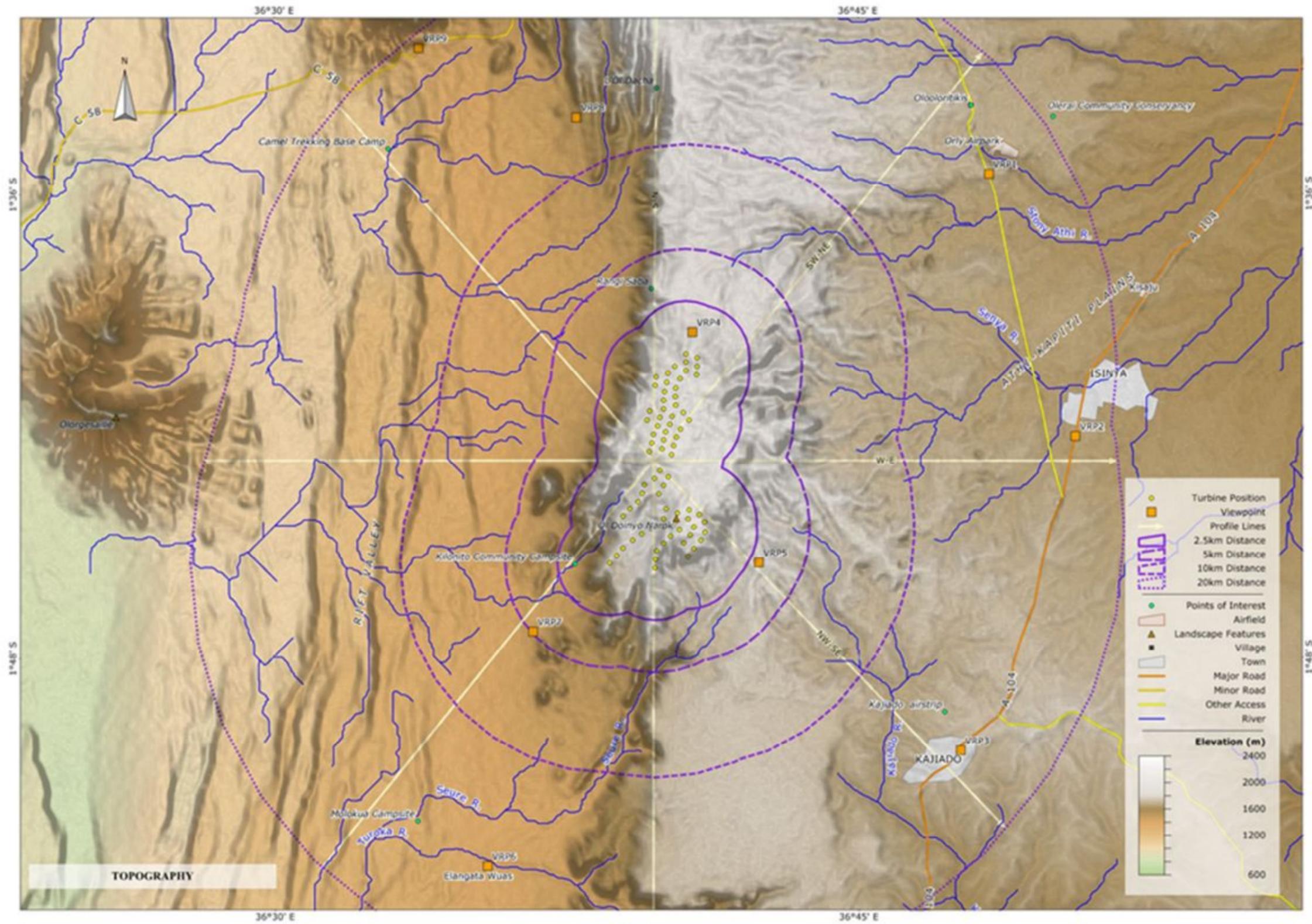
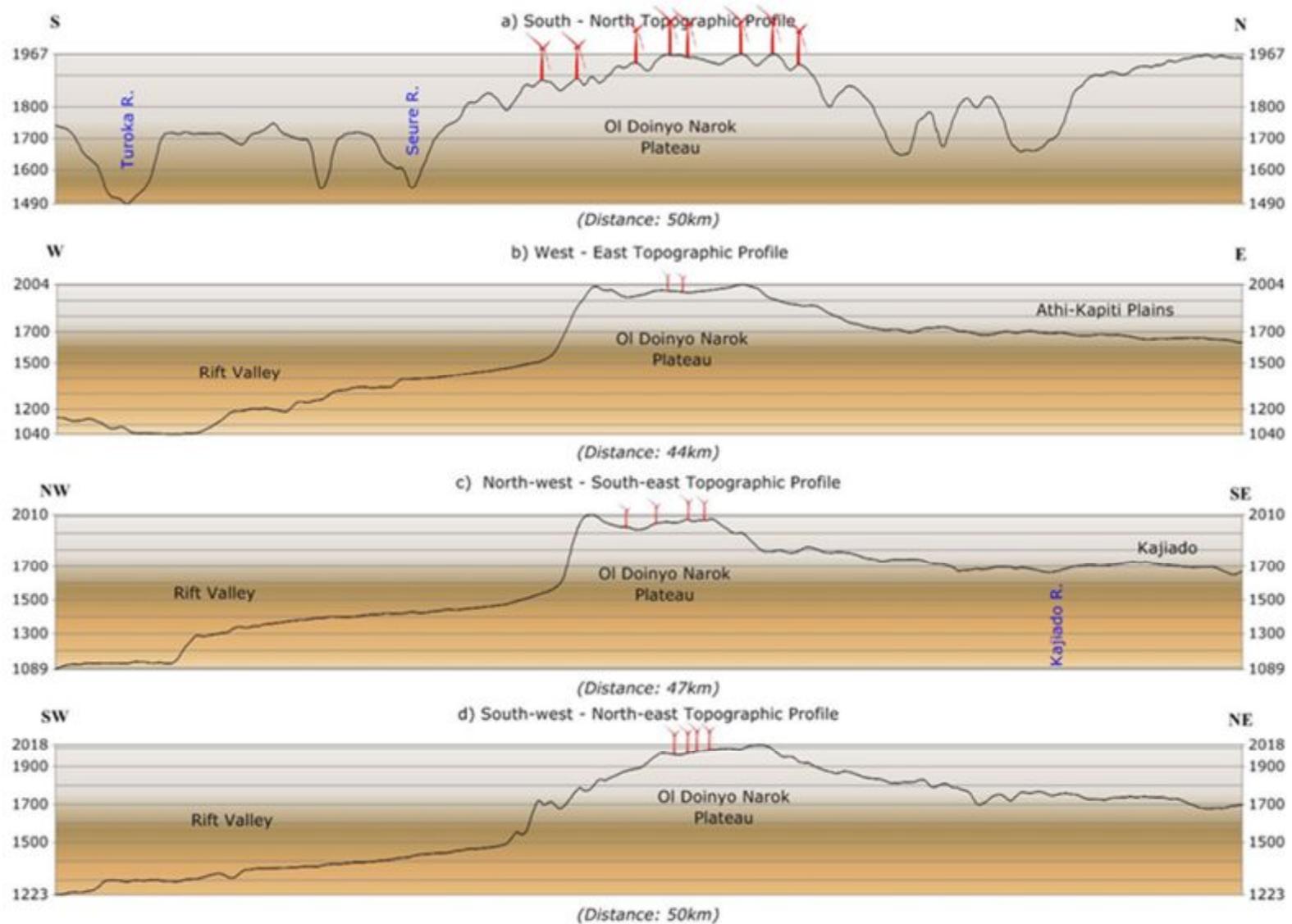


Figure 2: Topographic profile of the study area



4.2.2 Vegetation and Land Use

Open grassland is the main land cover of the study area (Kurrent Technologies 2011). Some bush and woodland occur on the steeper slopes along the escarp and in river valleys. Forests are rare and tend to be limited to hill crests. Vegetation has mostly been transformed by human activities and overgrazing (NEMA 2009). Land use varies in relation to proximity to urban centres such as Kajiado and Nairobi, but most of the study area is still used by semi-nomadic pastoralist Maasai as grazing land for livestock (cattle, goats and sheep). Some horticultural farming (vegetables such as onions, tomatoes and Asian vegetable varieties) occur closer to urban areas, between Isinya and Nairobi.

4.2.3 Centres of Population and Houses

Nairobi is a major urban centre in Kenya and although it is more than 25km from the proposed wind farm site, increased signs of human population and urbanisation are apparent towards the north-eastern part of the study area. Nairobi skyscrapers are visible from some locations in the study area. The town of Kajiado, the district headquarters, is located approximately 15km south-east of the proposed wind farm site. The other large settlement in the study area is Isinya which is about 20km east of the proposed site. There are a few other, smaller settlements in the area, but most of these occur north-east of the site towards Nairobi. Elangata Wuas is a small settlement south-west of the site in the rift valley (about 15km away).

Maasai villages and huts are scattered throughout the region and normally consist of a few huts enclosing an area for goats and cattle. Other small crop farms, small-holdings and homesteads are associated with the highlands above the Rift Valley and with proximity to urban centres and major roads.

4.2.4 Transport Routes

The A104 is a major, tarred road connecting Nairobi with Kajiado, and which extends to Arusha in Tanzania. Approximately 40km of this road is located within the Study Area. The C58 tar road connects Nairobi with the town of Magadi (and the Magadi soda mine) and is one of the few major roads which provide access to the Rift Valley in the region. The only other tarred road in the Study Area connects the Magadi road (C58) with the A104 (near Isinya). All other roads are untarred and in poor condition (NEMA 2009).

A railway line runs from Magadi town through the southern part of the Study Area connecting Magadi and Kajiado with the Nairobi-Mombasa line further east at Konza.

4.2.5 Public Amenities and Facilities

According to the District Environmental Action Plan (NEMA 2009) the major tourist attractions in the Kajiado District are national parks (managed by Kenya Wildlife Services), game reserves (managed by county councils) and wildlife conservancies (privately owned by individuals or communities). There are no national parks or game reserves in the Study Area (IUCN and UNEP 2010). There are a few community based conservancies in the Study Area, namely those belonging to the Olerai community (commonly known as the Kitangela Game Conservation Area, east of the Kiserian-Isinya road) (KWS 2008) and conservancies established by the Elangata Wuas Ecosystem Management Programme (EWCMP) in 1992 for the Elangata Wuas and Kilonito communities (International Development Research Centre

(Canada) 1993; Anon. 1994; Meshack, Odera, and Ochuodho 2007). Eco-tourism is an important aspect of the EWCMP and a couple of eco-tourism camp sites were built in the region of which the Molokua and Kilonito sites are within the Study Area (Safari Seekers 2011). It is worth noting that these camp sites are powered by wind and solar energy (Meshack, Odera, and Ochuodho 2007). The Kilonito camp site is located in the Valley just below the proposed wind farm site, but views from here are unlikely to include many turbines (if any at all). It may be that users of the trails and other amenities will be more exposed to turbines than from the camp site. The Molokua camp site is approximately 15km from the nearest turbine location and from the viewshed map should not have any view of the wind farm.

The Rift Valley Escarpment is a major tourist attraction in Kenya for the scenic views it provides of the Rift Valley. There are a number of resorts and lodges along the top of the escarp in the Study Area and they offer trails into, and scenic views of, the Rift Valley. Although the focus of these views is towards the Rift Valley some of the lodges are in close proximity to the wind farm site and many views along the escarp will include wind turbines.

5 Design Guidance and Planning Context

- 6.1 Local Policy
- 6.2 Regional Policy
- 6.3 National Policy
- 6.4 Equatorial Policy

5.1 Zone of Theoretical Visibility (ZTV)

GED Ltd. carried out a computer automated study of the zone of theoretical visibility. The purpose of this exercise is to identify the 'theoretical' extent and degree of visibility of turbines. This is a theoretical exercise because it is based on topography only at 10m contour intervals and does not allow for intermittent screening provided by, for example, hedgerows, forests or buildings and does not involve the actual height of crests (but using the nearest 10m contour below). Thus the ZTV map, assuming no screening, represents a worse than 'worse-case-scenario' with respect to viewing exposure. For the purposes of this project a radius of 30km was used for the ZTV.

5.2 Identification of Viewshed Reference Points as a Basis for Assessment

The results of the ZTV analysis provide the basis for selection of Viewshed Reference Points (VRP's), which are the locations used to study the visual and landscape impact of the proposed wind farm in detail. It is not warranted to include each and every single location that provides a view of this development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the project. Instead, the assessors endeavoured to select a variety of location types that would provide views of the proposed wind farm from different distances, different angles and different contexts. This involves desk study analysis using the ZTV map and fieldwork to establish likely visibility and

the relative sensitivity of the VRP locations as well as the grid coordinates of positions from which photomontages can be prepared.

The impact of the proposed development upon landscape is assessed, in this instance, using 4 distinct categories of receptor type as listed below;

- Key Views;
- Local Community views;
- Centres of Population; and
- Major Routes.

In the interests of providing a clear and concise report that focuses on the fundamental landscape and visual issues of the proposal, the VRP's will be grouped for assessment in relation to the above receptor types. Where a VRP might have been initially selected for more than one reason it will be assessed according to the primary criteria for which it was chosen, or alternatively, considered as a 'key view' due to its increased relevance. The characteristics of each VRP receptor type are described below.

5.2.1 Key Views

These VRP's are at features or locations that are significant at the regional or national or even international level, typically in terms of heritage, recreation or tourism. They are locations that attract a significant number of viewers who are likely to be in a reflective or recreational frame of mind possibly increasing their appreciation of the landscape around them. The location of this receptor type is usually quite specific. A VRP may also be placed in the key view category if it is applicable to several selection criteria and likely to be a pivotal view in the context of the assessment.

5.2.2 Local Community Views

This type of VRP represents those people that live and/or work in the locality of the wind farm, usually within a 5km radius of the site. Although the VRP's are generally located on local level roads they also represent similar views that may be available from adjacent houses. The precise location of this VRP type is not critical, however, clear elevated views are preferred, particularly when closely associated with a cluster of houses. Coverage of a range of viewing angles using several VRP's is necessary in order to sample the spectrum of views that would be available from surrounding dwellings.

5.2.3 Centres of Population

VRP's are selected at centres of population primarily due to the number of viewers that are likely to experience that view. The relevance of the settlement is based on the significance of its size in terms of the Study Area or its proximity to the site. The VRP may be selected from any location in the public domain that provides a clear view either within the settlement or in close proximity to it.

5.2.4 Major Routes

These include national and regional level roads and rail lines and are relevant VRP locations due to the number of viewers potentially impacted by the proposed development. The precise location of this category of VRP is not critical and might be chosen anywhere along the route that provides clear views towards the proposal site, but with a preference towards

close and/or elevated views. Major routes typically provide views experienced whilst in motion and these may be fleeting and intermittent depending on screening by intervening vegetation or buildings.

Table 1: Outline Description of Viewshed Reference Points (VRP's)

Local Community Views		
VRP No.	Location	Direction of view
VRP4	North of proposed site, 1.5km from nearest turbine.	S
VRP5	Small settlement (Ilyagaleni) east of the proposed site, 3km from nearest turbine.	NW
VRP7	In Rift Valley near a small settlement (Kilonito) south-west of site, 4.6km from nearest turbine.	NE
VRP8	North-west of site on a local road, 12.5km from nearest turbine.	S
Centres of Population		
VRP No.	Location	Direction of view
VRP2	Isinya on the A104.	W
VRP3	Kajiado on the A104.	NW
VRP6	Elangata Wuas	NNE
Major Routes		
VRP No.	Location	Direction of view
VRP1	Kiserian-Isinya road, near the Orly Aerodrome	SW
VRP2	A104 just south of Isinya	W
VRP9	C58 near a number of Maasai villages	SE

6 Estimation of Impact on Landscape from VRPs

This part of the study is concerned with a detailed assessment of the impact of the proposed development on the landscape. This comprises the production of photomontages or visual simulations of the proposal as viewed from the VRPs as well as an estimation of the impact from each one.

Estimation of landscape and visual impacts is reached using both quantitative and qualitative factors. It comprises four parts, as follows:

- Landscape sensitivity of each VRP location;
- Visual presence of the wind farm;
- Aesthetic impact of the wind farm on its landscape context; and
- Significance of the impact.

These factors are explained in outline below.

6.1 Sensitivity of VRP's

Sensitivity in this study is concerned with the acceptability of change to the landscape in respect of various attributes and features to which values might be attached for both the landscape itself and the people who view and/or use it. Values might be due, for instance, to the attractiveness, use and/or importance of these attributes and features in the public mind. The Study Area is assessed for sensitivity of the context of specific VRP locations, taking into account views of the surrounding landscape. The evaluation is based on common sense, observation and professional knowledge. Sensitivity plays a major part in the later determination of the significance of impact.

A five-point scale is used by landscape consultants to indicate the degree of landscape sensitivity of VRP's from Very Low, Low, Medium, High and Very High. This process is similar to that proposed by the Department of the Environment and Local Government in their Landscape Guidelines issued for consultation (Anon., 2000). This exercise is important as an indication of the relative sensitivity of a location. No systematic aggregation of the results for the different criteria is used to indicate sensitivity.

The criteria used to estimate the sensitivity of VRPs include those listed below (no relative importance is inferred by the order of listing):

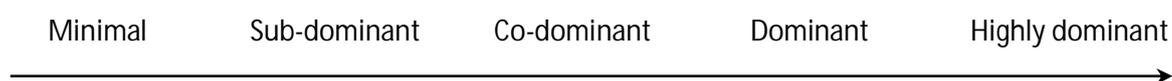
- Intensity of use, popularity (number of viewers);
- Likely mental disposition of viewers (e.g. commuters hurriedly driving on busy national route versus golfers enjoying panoramic views in a leisure mode);
- Recreational facility;
- Provision of elevated panoramic views;
- Sense of remoteness and/or tranquillity;
- Presence of water (river, lake, sea);
- Mountains present;
- Ruggedness of landform / exposure of rock outcrops;
- Degree of perceived naturalness;
- Presence of striking or noteworthy features (distinctiveness and memorability);
- Historical, cultural and / or spiritual significance evident or sensed;
- Rarity or uniqueness (including noteworthy representativeness of a landscape type);
- Integrity of character (condition / intactness);
- Sense of place (special sense of wholeness and harmony); and
- Sense of awe.

Those locations which are deemed to satisfy many of the above criteria (for example, popular recreational places providing distinctive and highly memorable views from elevated positions involving say, rugged mountains and water, wild and remote in character) tend to be higher in terms of sensitivity than those which do not (e.g. non-recreational areas of strongly anthropogenic character without striking features and no sense of place). This is

addressed under the 'Character and Sensitivity of the Existing Landscape' section for each VRP receptor type.

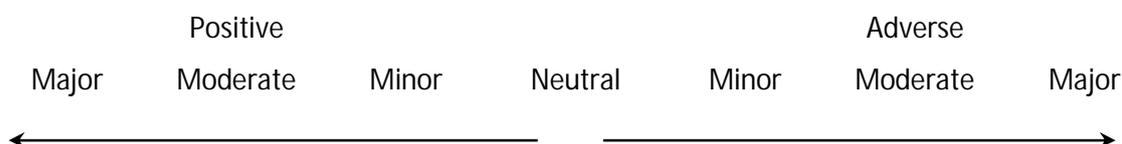
6.2 Visual Presence of the Wind Turbines

This concerns how visually dominant the wind turbine is on the landscape and is synonymous with the concept of magnitude. Note that a strong visual presence is not synonymous with adverse impact. It is assessed using the following five-point scale:



6.3 Aesthetic Impact of the Wind Turbines on the Landscape

This concerns the aesthetic relationship of the wind turbines to their context and whether it results in a negative or positive change. The aesthetic impact of wind turbines will be classified from each of the selected VRPs using the following seven-point scale:



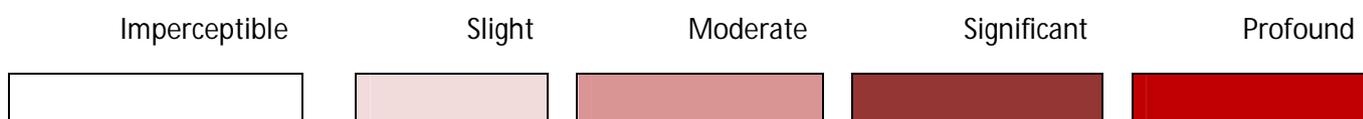
6.4 Significance of Impact

The significance of the impact of the development is determined by the following:

- Sensitivity of VRPs, as previously estimated;
- Visual presence of the wind turbine, as previously estimated; and
- Aesthetic impact on the landscape, as previously estimated.

Significance of impact is summarised on the following scale:

Level of Impact	Description
Imperceptible	An impact capable of measurement but without noticeable consequences
Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An impact that changes the character of the environment in a manner that is consistent with existing and emerging trends.
Significant	An impact, which by its character, magnitude duration or intensity alters a sensitive aspect of the environment
Profound	An impact which obliterates sensitive characteristics



The method for assessing the development involves a description of the views and an estimation of landscape sensitivity. This is followed by an evaluation of the visual presence and the landscape aesthetic impact of the proposed wind farm and, finally, an estimation of the significance of impact.

6.5 Cumulative Impact

In addition to the assessment criteria described above, an estimation of the contribution of the proposed scheme towards the overall cumulative impact of wind energy developments within the Study Area is also provided. This is assessed in relation to other existing or permitted (but yet to be constructed) wind farms. Cumulative impacts will only not be dealt with here as there are no other operational or proposed wind farms within 30km of the proposed wind farm.

7 Visual Impact Assessment of VRP's

Each VRP is assessed in terms of:

- Character and Sensitivity of the Existing Views
- Impact Assessment
- Visual Presence
- Aesthetic Impact
- Significance of Impact

7.1 Local Community Views

Applicable VRP's:		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
VRP4	North of proposed site.	S	1.5km	7
VRP5	Small settlement (Ilyagaleni) east of the proposed site.	NW	3km	20
VRP7	In Rift Valley near a small settlement (Kilonito) south-west of site.	NE	4.6km	3
VRP8	North-west of site on a local road.	S	12.5km	-40

7.1.1 Character and Sensitivity of Existing Views

VRP4 and VRP5 are located on the OI Doinyo Narok plateau on which the turbines will be installed. The plateau is elevated above the surrounding land and neither of these VRPs will provide elevated panoramic views of the wind farm. The landscape of VRP4 and 5 is undulating and contains occasional prominent rock outcrops. Views tend to be short distance due to the hills. It is, like much of the Study Area, a rural landscape with

homesteads scattered throughout. Vegetation is grassland with some low trees and shrubs. Views from VRP5 contain more buildings since it is close to a small village. A number of communication towers are visible on the hills.

VRP7 and 8 are in the Rift Valley and the wind turbines, where visible, will be exposed against the skyline above the escarp. The escarp forms a long ridge of high hills or mountains to the east, while the valley floor is relatively flat or gently undulating. The region is less populated than on the plateau and also less accessible. Sites near VRP8 can potentially provide long distance, scenic views of hills and mountains of the escarp to the south.

VRP4 and 5 are considered of low sensitivity due to relatively confined views and plentiful signs of human activity (e.g. structures, buildings and transformed vegetation). VRP7 has a medium sensitivity due to the sense of remoteness of the landscape, while VRP8 is deemed to have a high sensitivity since here there is also the potential for scenic views of the Rift Valley Escarp to the south.

7.1.2 Impact Assessment

Visual Presence

The wind turbines will be Dominant in views from VRP4, 5 and 7 due to their proximity. From VRP8 only rotors and nacelles are likely to be visible, and since it is more than 12km from the nearest turbine the visual presence of the wind turbines will be minimal in views.

Aesthetic Impact

The turbines are prominent against the horizon from VRP4 and there are few other man-made structures to influence the view. The composition of this specific view can be considered aesthetically pleasing in that the turbines seem to follow the curve of the road on either side. The aesthetic impact of the turbines on views from VRP4 is therefore expected to be Minor Adverse.

Wind turbines are prominently exposed against the horizon at VRP5 and the pattern produced by the layout is uncluttered. However, there are other structures in the view which detracts from the aesthetic of the view, such as the road sign in the foreground, telephone lines crossing the view, and communication towers on hills in the background. A Moderate Adverse aesthetic impact is expected.

The pattern created by the layout as seen from VRP7 is a relatively uncluttered line of turbines exposed against the horizon. Buildings and white and blue signboards in the foreground detracts from the view as it introduces contrasting elements into the view. Due to their distance from the viewpoint the turbines do not appear out of scale with buildings in the foreground. A Minor Adverse aesthetic impact is expected for VRP7.

The wind turbines will have very little effect on views from VRP8 due to the distance involved and the small number of turbines that will be visible from here. A Minor Adverse effect is expected since some views are likely to include rotating blades which will draw attention to the wind farm.

7.1.3 Significance of Impact

Low sensitivity and minor adverse aesthetic impact indicate a slight significance of impact for VRP4 even though the turbines are dominant in the view. The significance of impact will be moderate for VRP5 due to the dominant visual presence of turbines and their moderate adverse aesthetic impact on the view. VRP7 has a medium sensitivity to the development

due to its sense of remoteness, and the visual presence of turbines on the ridge above the viewpoint will be dominant, but the aesthetic impact is minor adverse. A moderately significant impact is therefore expected for VRP7. VRP8 has a high sensitivity, but due to its distance from the wind farm site the significance of impact is expected to be slight.

Applicable VRP's:		Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact
VRP4	North of proposed site.	Low	Dominant	Minor Adverse	Slight
VRP5	Small settlement (Ilyagaleni) east of the proposed site.	Low	Dominant	Moderate Adverse	Moderate
VRP7	In Rift Valley near a small settlement (Kilonito) south-west of site.	Medium	Dominant	Minor Adverse	Moderate
VRP8	North-west of site on a local road.	High	Minimal	Minor Adverse	Slight

7.2 Centres of Population

Applicable VRP's:		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
VRP2	Isinya on the A104.	W	18km	~30
VRP3	Kajiado on the A104.	NW	16km	~30
VRP6	Elangata Wuas	NNE	15.2km	~60

7.2.1 Character and Sensitivity of Existing Views

Rapid unplanned urbanisation and increased migration into urban areas is a common concern in Africa and Kenya is no exception. Townships are ever changing and views from them will change continuously as new developments and structures are built to accommodate the increasing populations. This is particularly the case for settlements close to Nairobi since the influx of migrants are most pronounced for this city. In terms of quality of existing views the fact that expansion of settlements occurs in a haphazard or unplanned way means that views are often complex with many contrasting and aesthetically unpleasant elements. Informal settlements are a common feature of this landscape.

Views from here will be complex and will include a variety of man-made structures and elements, and the proximity of the town to the rapidly expanding Nairobi to the north means that these urban and peri-urban features are likely to increase in future. The township of Isinya is also surrounded by very large greenhouse complexes (Fig. 3). Views from VRP2 are therefore considered to have a low sensitivity to the proposed development.



Figure 3 Google Earth image showing the township of Isinya and the large greenhouse structures in the vicinity of the town.

Kajiado is the administrative centre for the Kajiado District. It is further away from Nairobi than Isinya, but continuing urbanisation means that it is also expanding. Views from here will be similarly complex and will include many contrasting features. Views from VRP3 will also have a low sensitivity to the development.

Elangata Wuas is located in the Rift Valley near the Turoka River. The region is sparsely populated and the settlement small. Views from here will be of higher quality than from Kajiado or Isinya as the effects of urbanisation is less prominent. The landscape here is relatively flat and views of the distant mountains and hills of the escarpment are common. A medium sensitivity to the development is expected for VRP6.

7.2.2 Impact Assessment

Visual Presence

The distances involved mean that the turbines do not dominate the landscape. Their visual presence is therefore seen as minimal for all three VRPs.

- **Aesthetic Impact**

The view from VRP2 is relatively unremarkable. The landscape is flat with the slight rise of the OI Doinyo Narok plateau in the background and homesteads scattered throughout. The turbines are arranged in two uncluttered groups along that ridge. The bright colours of the buildings in the foreground, and some of those scattered further afield, detract from the view as they contrast strongly with the shades of green of the countryside. The aesthetic impact of the turbines is therefore seen as minor adverse at VRP2.

The view from VRP3 is typical for a rural village in Africa, and is similar to that from VRP2. Since it is from inside the township brightly coloured buildings and other urban structures

dominate the view. The rise of the Ol Doinyo Narok plateau can be seen in the distance with turbines lining the top of the plateau. In this case the line appears more cluttered but at this distance the effect is not noticeable, particularly with the cluttered appearance of the buildings in the foreground. The aesthetic impact is seen as neutral for VRP3.

The view from VRP6 is dominated by the riverine vegetation in the middle ground with the mountains of the escarpment as a distant backdrop. The arrangement of turbines on the ridge is somewhat cluttered and some of them are located slightly down from the top of the ridge. This breaks the horizon line and adds to the cluttered appearance. The aesthetic impact at VRP6 is seen as moderate adverse.

7.2.3 Significance of Impact

The main populated centres are far from the proposed wind farm site and the significance of impact is slight to imperceptible for viewpoints VRP2, 3 and 6 corresponding to Isinya, Kajiado and Elangata Wuas respectively.

Applicable VRP's:		Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact
VRP2	Isinya on the A104.	Low	Minimal	Minor Adverse	Imperceptible
VRP3	Kajiado on the A104.	Low	Minimal	Neutral	Imperceptible
VRP6	Elangata Wuas	Medium	Minimal	Moderate Adverse	Slight

7.3 Major Routes

Applicable VRP's:		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
VRP1	Kiserian-Isinya road, near the Orly Aerodrome	SW	16.4km	~16
VRP2	A104 just south of Isinya	W	18km	~30
VRP9	C58 near a number of Maasai villages	SE	19.4km	~20

7.3.1 Character and Sensitivity of Existing Views

The landscape around VRP1 is flat to gently undulating and long, open vistas occur on the higher ground. Originally the land was used by Maasai pastoralists for grazing for their livestock, but it is increasingly used for horticultural crops. A private airfield is located not far from VRP1. Vegetation is grassland with occasional low trees, and homesteads and farm buildings are scattered throughout the region. VRP1 is considered of medium sensitivity due to the open vistas in which man-made structures and anthropogenic elements are common.

VRP2 is discussed under Centres of Population above.

VRP9 is located in the Rift Valley. The landscape is generally flat to undulating with long open vistas possible to the south from elevated viewpoints. The region has a low population

density although homesteads and Maasai villages are often in views, as are other signs of human activity. High bush and trees often limit views in the vicinity of VRP9 but further afield open grassland is more common. VRP9 has a medium sensitivity to the development.

7.3.2 Impact Assessment

- Visual Presence

All three VRPs will have a minimal visual presence due to their long distances from the turbines.

- Aesthetic Impact

The homogeneity of the land cover and open vista produces a pleasant view. The turbines in the distance appear uncluttered and do not detract from this view. There are homesteads in the middle distance but they fit in well with the landscape. A neutral aesthetic impact is predicted for VRP1.

VRP2 shows a minor adverse aesthetic impact (see Centres of Population above).

There are a couple of elements in the view of VRP9 that detracts from its quality, namely power lines, pylons and areas of exposed earth. These produce a sense of disturbance in the scene and the wind turbines on the horizon are unlikely to increase this sense. A neutral aesthetic impact is therefore expected for VRP9.

7.3.3 Significance of Impact

The major routes in the Study Area are too far from the proposed wind farm site for views to be much affected. For VRP1 and VRP9 the significance of impact will be imperceptible, and for VRP2 it will be slight.

Applicable VRP's:		Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact
VRP1	Kiserian-Isinya road, near the Orly Aerodrome	Medium	Minimal	Neutral	Imperceptible
VRP2	Isinya on the A104.	Low	Minimal	Minor Adverse	Imperceptible
VRP9	C58 near a number of Maasai villages	Medium	Minimal	Neutral	Imperceptible

8 Discussion and Conclusion

A table is provided below which summarises the visual impact assessment of the 9 VRP's used above. A discussion of the results and a general conclusion on the overall anticipated impact follow.

Imperceptible	Slight	Moderate	Significant	Profound
				

Key Views

Applicable VRP's:	Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact
There are no Key Views, as defined above for this development, within the Study Area.				

Local Community Views

Applicable VRP's:	Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact	
VRP4	North of proposed site.	Low	Dominant	Minor Adverse	Slight
VRP5	Small settlement (Ilyagaleni) east of the proposed site.	Low	Dominant	Moderate Adverse	Moderate
VRP7	In Rift Valley near a small settlement (Kilonito) south-west of site.	Medium	Dominant	Minor Adverse	Moderate
VRP8	North-west of site on a local road.	High	Minimal	Minor Adverse	Slight

Centres of Population

Applicable VRP's:	Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact	
VRP2	Isinya on the A104.	Low	Minimal	Minor Adverse	Imperceptible
VRP3	Kajiado on the A104.	Low	Minimal	Neutral	Imperceptible
VRP6	Elangata Wuas	Medium	Minimal	Moderate Adverse	Slight

Major Routes

Applicable VRP's:	Sensitivity	Visual Presence	Aesthetic Impact	Significance of Impact	
VRP1	Kiserian-Isinya road, near the Orly Aerodrome	Medium	Minimal	Neutral	Imperceptible
VRP2	Isinya on the A104.	Low	Minimal	Minor Adverse	Imperceptible
VRP9	C58 near a number of Maasai villages	Medium	Minimal	Neutral	Imperceptible

Landscape Sensitivity

Currently there are no wind farms with turbines of this size or height in Kenya (according to a newspaper report there is a wind farm with 50m turbines in the Ngong Hills area). There are few structures outside Nairobi that can be compared with wind turbines in terms of height and visibility. However, it is expected that wind farms will form an important part of reaching renewable energy objectives for the country, and this means that wind farms are likely to be a common feature of landscapes in Kenya. The landscape sensitivity assessment was done with this in mind.

The landscape of the Study Area includes three physiographic types – the Ol Doinyo Narok Plateau and escarpment on which the proposed wind farm will be located, the Rift Valley west of the escarpment and the Kapiti Plains east of the plateau. The plateau is the remnant of the uplift event that initiated the tectonic rift in this region. West of the plateau and escarpment, the Rift Valley is relatively flat with longitudinal basins and occasional dormant volcanoes. East of the plateau the landscape drops off more gradually and is relatively flat with gentle undulations – low hills with shallow river valleys. The plateau provides views of the Rift Valley to the west and plains to the east. It also provides a backdrop of high hills or mountains for views from within the Rift Valley. This is much less the case for views from the Kapiti Plains. The Rift Valley is an important tourist attraction and scenic views from the top of the escarpment are particularly valued by tourists. There are a number of lodges and viewpoints north of the proposed wind farm site which attract tourists. However, scenic views are of the Rift Valley and therefore mostly aimed away from the wind farm site. In other words the wind farm is unlikely to detract from scenic views of the Rift Valley.

There is only one VRP which is deemed to be highly sensitive to wind turbines on top of the escarpment and it occurs north of the site in the Rift Valley where there are a couple of areas elevated above the surrounding lowlands and from where scenic views of the escarp to the south are possible. A number of VRP's have medium sensitivity to the development and this is mostly due to their location in the Rift Valley where there is a sense of remoteness and relatively few signs of human activity, and where the escarpment often forms a backdrop of mountains to views. Other VRP's are designated low sensitivity due to increasing human population and development pressure in these areas, particularly on the plateau and Kapiti plains as approaches the satellite settlements of Nairobi.

Visual Presence

Visual exposure to the wind farm is strongly related to distance of the viewer from the turbines, but it also relates to how much of the wind farm is visible. The three VRP's where visual presence of turbines is dominant are located near the proposed site. Their visual presence at VRP4 and 5 is dominant, and not highly dominant, because the topography in those areas is such that only a few turbines and parts of turbines are visible at a time.

Visual presence at other VRP's are minimal due to their distances from the proposed site.

Aesthetic Impact of the Wind Farm

The highest rating is Moderate Adverse, and this is attributed to VRP5 and VRP6. At VRP5 the arrangement of turbines on the horizon is almost optimal but it combines with other structures in the view in such a way that the scene appears cluttered. At VRP6 the view has scenic mountains in the distant backdrop but a number of turbines are located partway down the mountain. This draws attention to the distant wind farm and detracts from the scenic view.

Other VRP's are rated minor adverse or neutral.

Overall Significance of Impact

The highest significance rating for the VRP's in this study is Moderate. VRP5 is rated moderate due to a moderate adverse aesthetic impact and dominant visual presence, while VRP7 has medium landscape sensitivity and dominant visual presence. The other VRP's are rated Slight or Imperceptible due to combinations of low landscape sensitivities and long viewing distances.

The overall significance of impact for the proposed Kipeto Wind Farm is therefore considered to be Moderate in line with the highest summary impact for VRP's. A moderate significance of impact is defined as: '*An impact that changes the character of the environment in a manner that is consistent with existing and emerging trends.*'

9 Proposed Mitigation Measures

In line with the World Bank Group Environmental, Health and Safety Guidelines for Wind Energy (World Bank Group 2007) the following mitigation measures are included:

- Minimize presence of ancillary structures on the site by avoiding fencing, minimizing roads, burying intraproject power lines, and removing inoperative turbines;
- Avoid steep slopes, implement erosion measures, and promptly revegetate cleared land with native species only;
- Maintain uniform size and design of turbines (e.g. direction of rotation, type of turbine and tower, and height);
- Paint turbines a uniform, matt non-reflective colour, while observing air navigation marking regulations;
- Avoid including lettering, company insignia, advertising, or graphics on the turbines.

10 References

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