

EIA REPORT

TITLE: Visual Impact: Arnot-Gumeni Transmission Project

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1 Introduction

The area between Arnot and Machadodorp, Mpumalanga, is the subject of this EIA report on the visual impact of the proposed new 400 kV transmission line between the Arnot and Gumeni substations.

2 Study area

The study area is shown in Figure 1 and has its centre approximately at Y-102278 X+2859789 (WG29). The site was visited during November 2011 as well as February 2012.

The three alternatives for the alignment to be evaluated are shown in Figure 2.

3 Terms of Reference

The terms of reference as provided are as follows:

- Description of visual landscape of the study area, with specific focus on topographical features that offer impact mitigation opportunities and constraints.
- Description of the area from which the project can be seen (the viewshed), as well as the viewing distance.
- An assessment of the visual absorption capacity of the landscape (i.e. the capacity of the landscape to visual absorb structures and form placed upon it).
- The appearance of transmission line from important or critical viewpoints within established and existing planned land uses /activities.
- The identification of potential impact (positive or negative, including cumulative impacts, if relevant) of the proposed development on the visual landscape during

construction and operation

- The identification of mitigation measures for enhancing benefits and avoiding, reducing or mitigating negative impact and risks (to be implemented during design, construction and operation of the transmission line)
- The formulation of a simple system to monitor impacts, and their management, based on key indicators.
- The specialist will be required to attend two integration meetings and where necessary specialist will be requested to attend public participation meetings.
- The specialist will be required to adhere and comply to the NEMA regulation as well as provincial and national authorities policies.

4 Assumptions and Limitations

The following assumption and limitations are relevant:

- The analyses are based on available data at a scale of 1:50 000 and smaller
- A detailed aerial photograph was not provided
- The analyses do not take any vegetation cover into account and can thus be regarded worst-case scenarios.

5 Analysis

5.1 Visual Exposure Analysis

Visual exposure analysis uses the digital terrain model (DTM) and derivatives thereof to determine to what extent the topography of the study area exposes or hides human structures.

Slope

The slopes were derived from the DTM and the produced raster dataset (in degrees) was classified into the following visual exposure (VE) scores:

Table 1 VE scores for slope

Slope	Visual Exposure Score
< 5°	1
5-10°	2
10-15°	3
15-20°	4
> 20°	5

The scores above assume that structures on steep slopes and ridges would be more exposed than those situated on flat slopes (for example a flat valley bottom).

Aspect

The aspect, derived from the DTM was classified into the following VE scores:

Table 2 VE scores for aspect

Aspect	Visual Exposure Score
Flat	5
North	4
East	3
South	2
West	3

The scores are based on the following assumptions:

- structures on flat areas are illuminated by the sun during the whole day and visible from all directions

- Structures on north facing slopes are predominantly illuminated by the sun during the day but not visible from the south
- Structures on west- and east-facing slopes are illuminated by the sun during one part of the day and in the shade during the other part of the day.
- Structures on south-facing slopes are mostly in the shade.

Landform position

Certain landforms will expose structures more than others. Structures located on top of a ridge will be more visible than structures located in a deep canyon. The DTM and the Topographic Position Index (TPI) as defined by Weiss [1] were used to determine a landform raster dataset. For the analysis, focal statistics with annulus neighbourhoods (ESRI, Arcgis 10.0) with radii of 150m & 300m and 1860m & 2010m were used. The landform types are classified in terms of visual exposure as follows:

Table 3 VE scores for landforms

Landform Type	Visual Exposure Score
Canyons, deeply incised streams	1
Midslope drainages, shallow valleys	2
Upland drainages, headwaters	2
U-shape valleys	2
Plains	3
Open slopes	3
Upper slopes, mesas	4
Local ridges, hills in valleys	4
Midslope ridges, small hills in plains	4
Mountain tops, high ridges	5

Slope Position

The visibility of structures positioned on slopes is dependent on where the structures are positioned. Structures on upper slopes and ridges are prone to be more visible than structures in on lower slopes or in valleys. Using the DTM and the TPI analysis with a focal statistics annulus neighbourhood (ESRI, Arcgis 10.0) with a radius of 1000m, the

slope position raster dataset was determined. The slope position is classified in terms of VE as follows:

Table 4 VE scores for slope position

Slope Position	Visual Exposure Score
Valleys, cliff base	1
Lower slope	2
Flat	3
Mid slope	4
Upper slope	5
Ridge, hilltop, canyon edge	5

Relative elevation

The visibility of a structure at any given position is *inter alia* determined by that position's elevation relative to the elevation of the surrounding topography. If at any given position, most of the immediate surrounding topography has a higher elevation any structure would be less visible than if most of the immediate surrounding topography has a lower elevation. For this analysis the mean elevation of a focal statistics circular neighbourhood (ESRI, Arcgis 10.0) with a radius of 1000m was determined and subtracted from the DTM. In the resulting raster dataset, negative values indicate surrounding topography with a higher elevation and positive values indicate surrounding topography with a lower elevation. Using a tower height of 60m the dataset was classified as follows:

Table 5 VE scores for relative elevations

Relative elevation	Visual Exposure Score
< -60	0
-60 – 0	2
0 – 60	4
> 60	5

Ruggedness

Ruggedness refers to the topographic diversity of an area. It is assumed that if at any given position the surrounding topography is very homogenous, any structure will be easier visible than if the surrounding topography is diverse. Ruggedness was determined by calculating the standard variation of the DTM using a focal statistics circular

neighbourhood (ESRI, Arcgis 10.0) with a radius of 1000m. The resulting raster dataset was classified into 5 classes using the “Natural Breaks (Jenks)” method (Arcgis 10.0) as follows:

Table 6 VE scores for ruggedness

Ruggedness	Visual Exposure Score
High STD values	1
	2
	3
	4
Low STD values	5

Final Visual Exposure Raster

The above mentioned five raster datasets were summed and then smoothed by the Majority Filter technique (Arcgis 10.0) and then adjusted back to a scale of 1-5 (reclassified into 5 natural breaks intervals).

The dataset was then classified into the following five categories (see Figure 3):

Table 7 Visual exposure categories

Visual Exposure Category	Visual Exposure Score
Very low	1
Low	2
Moderate	3
High	4
Very High	5

5.2 Visual Absorption Capacity

Visual absorption capacity (VAC) is a measure of the ability of topographical features to hide introduced structures. It is thus the inverse of the visual exposure analysis (See Figure 4). Comparative scores are as follows:

Table 8 Visual exposure vs. visual absorption capacity

Visual Exposure	Visual Absorption
1 - Very Low	5 - Very High
2 - Low	4 - High
3 - Moderate	3 - Moderate
4 - High	2 - Low
5 - Very High	1 - Very Low

For analytical purposes it is preferred to use the Visual Exposure scores.

5.3 Land use analysis

A land use raster dataset was created using the following datasets:

- Land-use (ENPAT)
- Conservation (ENPAT)
- Natural Features (ENPAT)
- Formal protected Areas (SANBI)
- Informal protected areas (SANBI)
- Topographic data (NGI)
- Landcover 2000

Viewer sensitivity values between one (1) and five (5) were assigned to the different land uses, such that one (1) represents low sensitivity and five (5) represents high sensitivity.

The viewer sensitivity raster dataset (see Figure 5) was combined with the final visual exposure dataset to obtain the modelled visual sensitivity raster dataset which was rescaled to 1-5 (see Figure 6).

During the site visits, representative areas (see Figure 7) of high and low modelled visual sensitivity were subjected to a visual contrast rating to groundtruth the computer modelling. The contrast rating is based on the methods given by the Landscape Institute & IEMA [2], the BLM [3], Smardon [4], and Blair [5]. The method involves describing the existing landscape and the planned development in terms of land, water, vegetation and structures, followed by rating the contrast between the existing elements and the planned

elements. In each case, the visual contrast is plotted against the modelled visual sensitivity show the comparison between computer (GIS) modelling and field observations. Photographs that were taken during the site visit form part of the site description. The site assessments are given in Figures 8 to 19.

6 Visual Impact

Viewshed analyses for the different alternatives were done to determine the modelled visibility, limited to a distance of 3000m. At a distance of more than 3000m a power line becomes such a small component of the visual scene that it is regarded as insignificant. The viewshed results were reclassified into five classes. Class 5 represents portions of an alignment that can be seen from many locations, class 1 represents portions of an alignment that can be viewed from a few locations. The results are shown in Figures 20 to 22.

The visual impact is modelled by combining the visual sensitivity with the viewshed results – the results are shown in Figures 23 to 25.

A comparison of the provided alternatives (June 2012, see Figure 2) is given as follows:

Table 9 Comparison of alternatives

Alternative	Length (km)	VIA sum
1	56.7	2458
3	59.6	2696
5	52.5	2185

The values in the table above are calculated by summing the visual impact raster cells that are covered by the respective alternatives. Working with raster datasets with a 100m pixel resolution, the summed cells represent 100m wide corridors.

7 Conclusion

The analysis shows that in terms of visual impact, Alternative 5 is the best option.

8 Impact Assessment

The significance of the visual impact was assessed using the following criteria:

Table 10 Significance rating

Aspect	Description	Weight
Probability (P)	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration (D)	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale (S)	Local	1
	Site	2
	Regional	3
Magnitude/Severity (M)	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	≤20
	Low	>20 ≤40
	Moderate	>40 ≤60
	High	>60

The following associated activities were assessed:

- Construction camps
- Burrow pits
- Power line
- Access Roads

Table 11 Impact assessment

CONSTRUCTION PHASE: CAMPS					
Nature of Impact	Probability	Duration	Scale	Magnitude/ Severity	Significance
Visual scars in the landscape due clearing of vegetation, off-road driving and poor erosion control	4	4	2	6	48: Moderate, can be reduced by rehabilitation
CONSTRUCTION PHASE: BURROW PITS					
Nature of Impact	Probability	Duration	Scale	Magnitude/ Severity	Significance
Excavations and associated erosion leave visual scars in the landscape	4	4	2	6	48: Moderate, can be reduced by rehabilitation
OPERATIONAL PHASE: POWER LINE					
Nature of Impact	Probability	Duration	Scale	Magnitude/ Severity	Significance
Visual intrusion by pylons	5	5	2	6	65: High, but can be reduced by mitigation measures
Visual intrusion by power lines	5	5	1	2	40: Low
Visual scars due to poor erosion control at pylon foundations	4	4	1	6	44: Moderate can be reduced by proper management
OPERATIONAL PHASE: ACCESS ROADS					
Nature of Impact	Probability	Duration	Scale	Magnitude/ Severity	Significance
Visual scars in the landscape due to poor erosion control	4	4	2	6	48: Moderate, can be reduced by proper management

9 General mitigation measures

The most important mitigation measure is planning and design in such that the transmission line is placed in such a manner that the visual intrusion is either avoided or limited as far as possible.

Secondarily, it is important that during the construction phase the short term visual disturbance is kept to a minimum that any such disturbance is adequately rehabilitated such that no long term disturbance remains.

General mitigation measures include the following:

- **Colour/Coating:** Using a coating on the steel that is darker than galvanized steel will reduce the visual impact.
- **Erosion:** special attention to erosion control is important as erosion tends to develop long term scars in the landscape.
- **Clearing of vegetation:** Any clearing of vegetation should be limited to cutting only – no earth moving equipment. Clearing of any vegetation that would provide a screening effect should be avoided.
- **Access Roads:** Use existing roads and tracks as far as possible
- **Rehabilitation:** Any temporary disturbance should be rehabilitated as soon as possible to reduce the effects of erosion.

10 References

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4. SMARDON R.C. 1979. Prototype Visual Impact Assessment Manual. School of Landscape Architecture, State University of New York, College of Environmental Science and Forestry.
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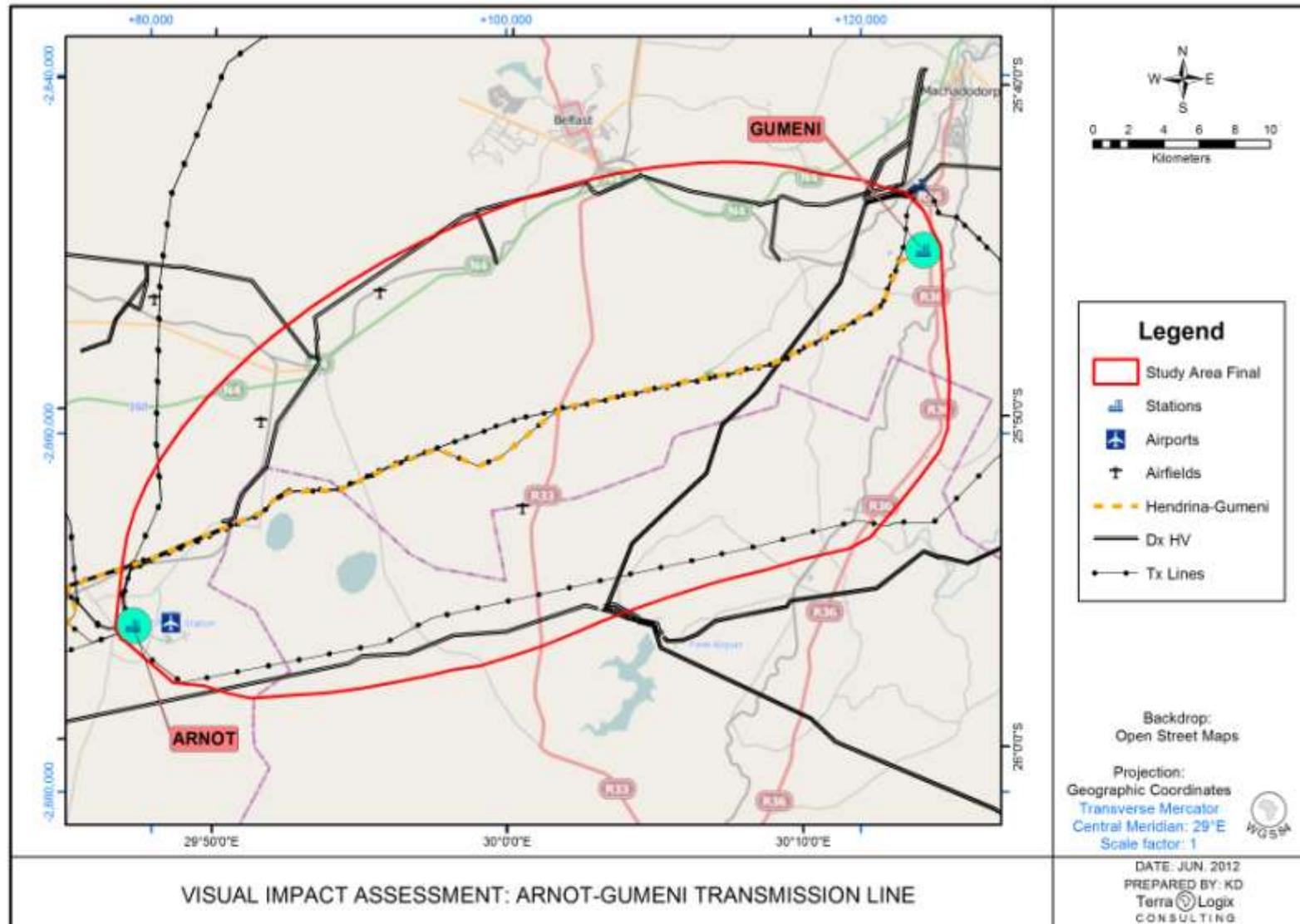


Figure 1 Locality map

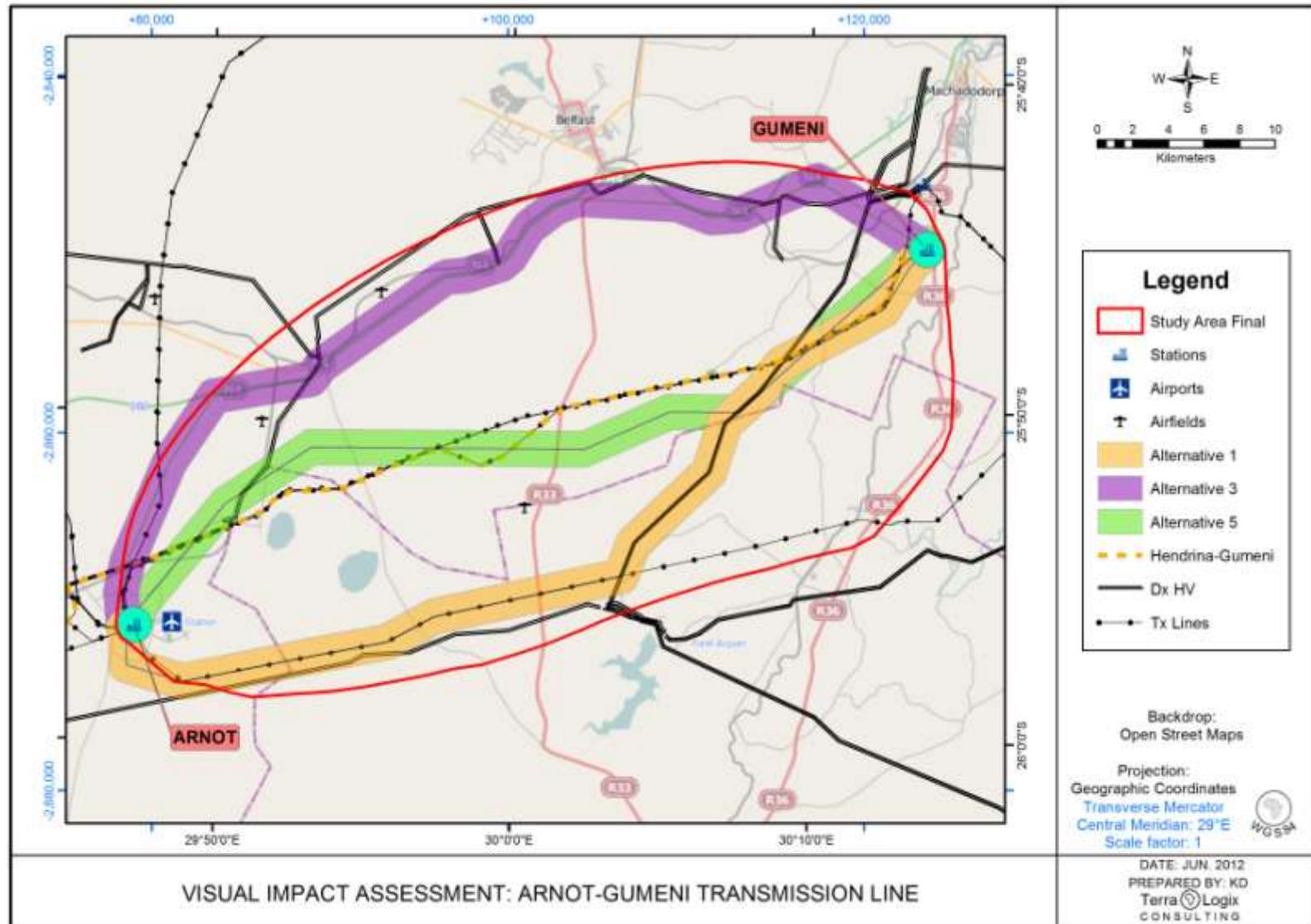


Figure 2 Alignment alternatives

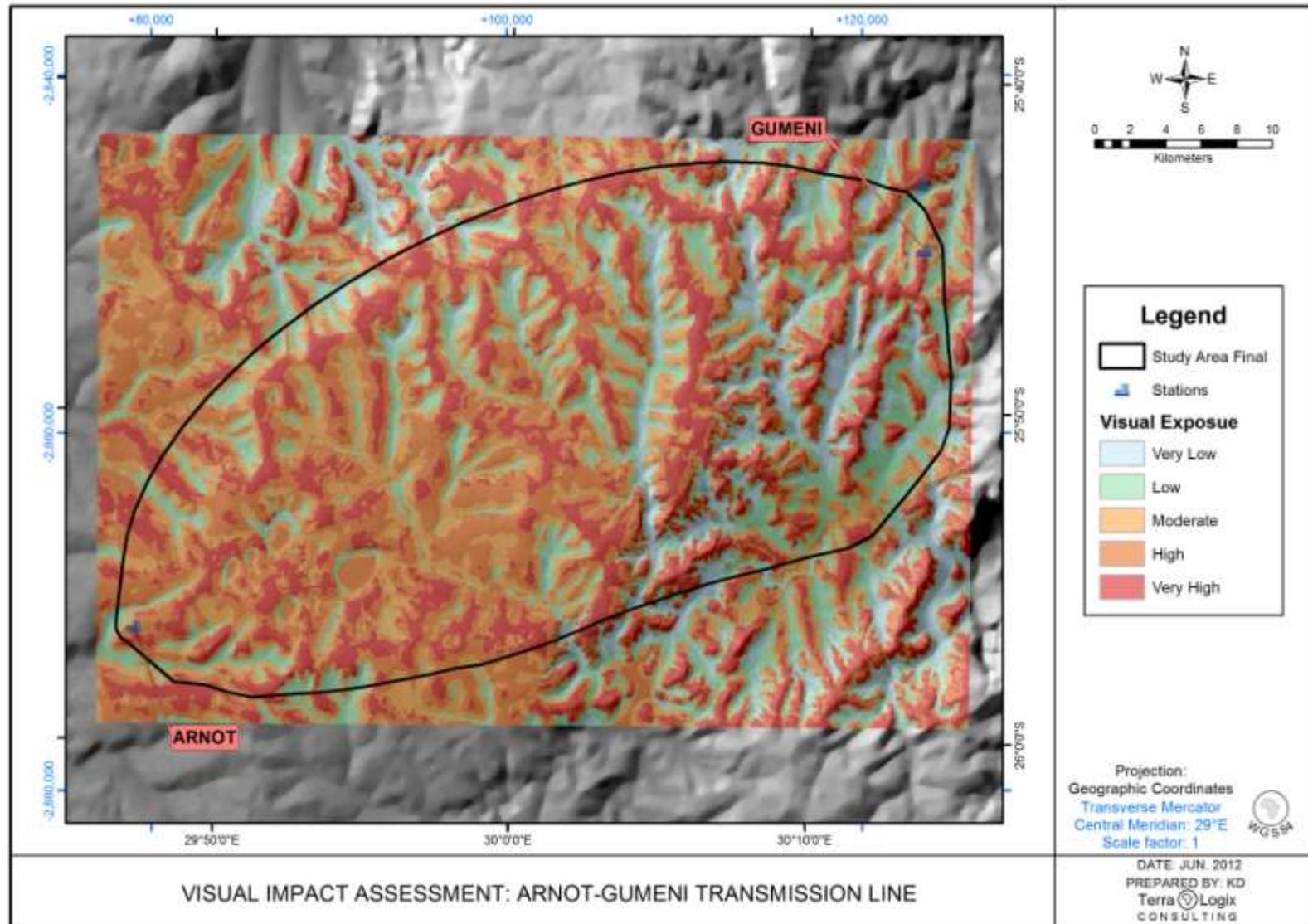


Figure 3 Visual exposure analysis

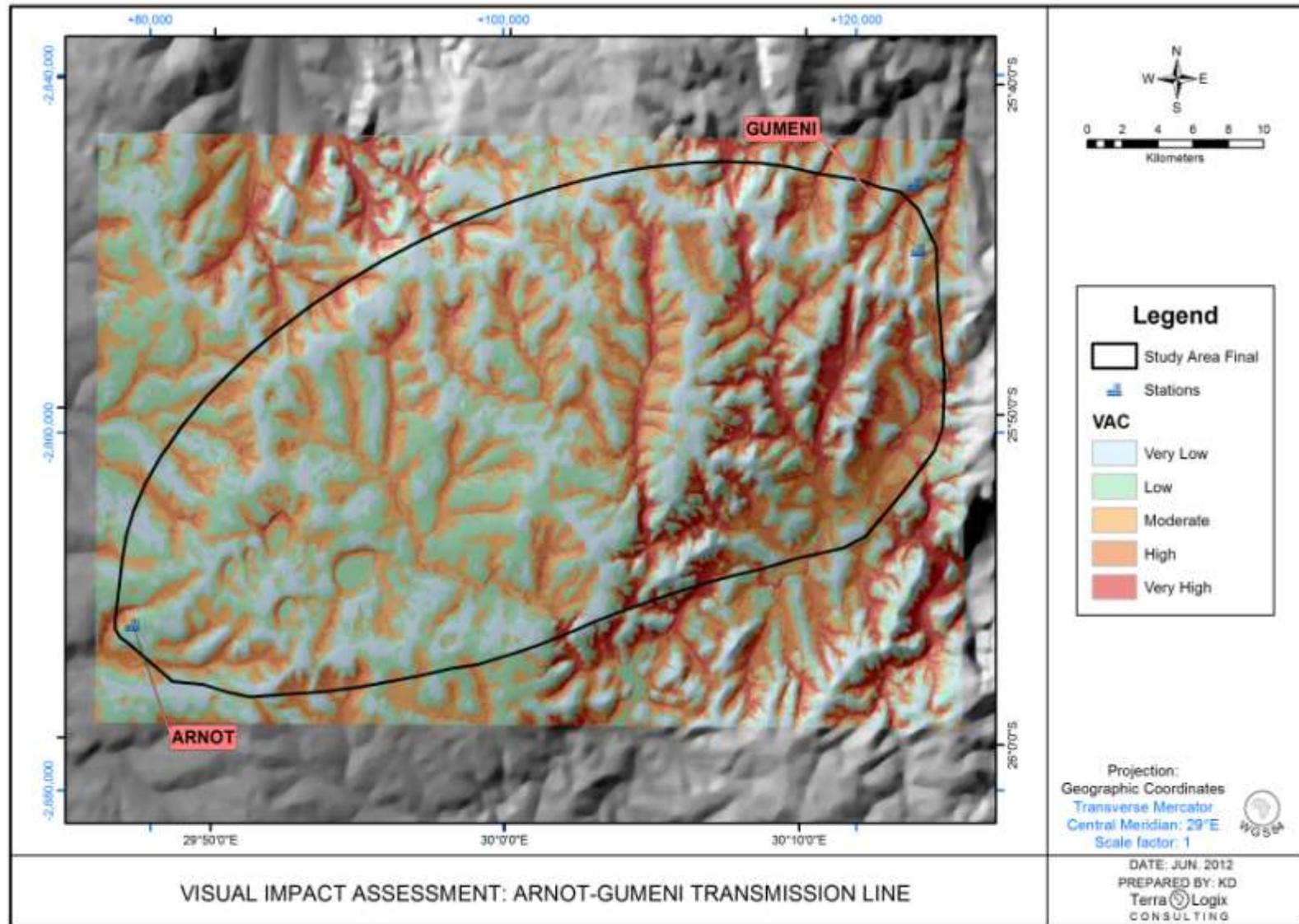


Figure 4 Visual absorption capacity

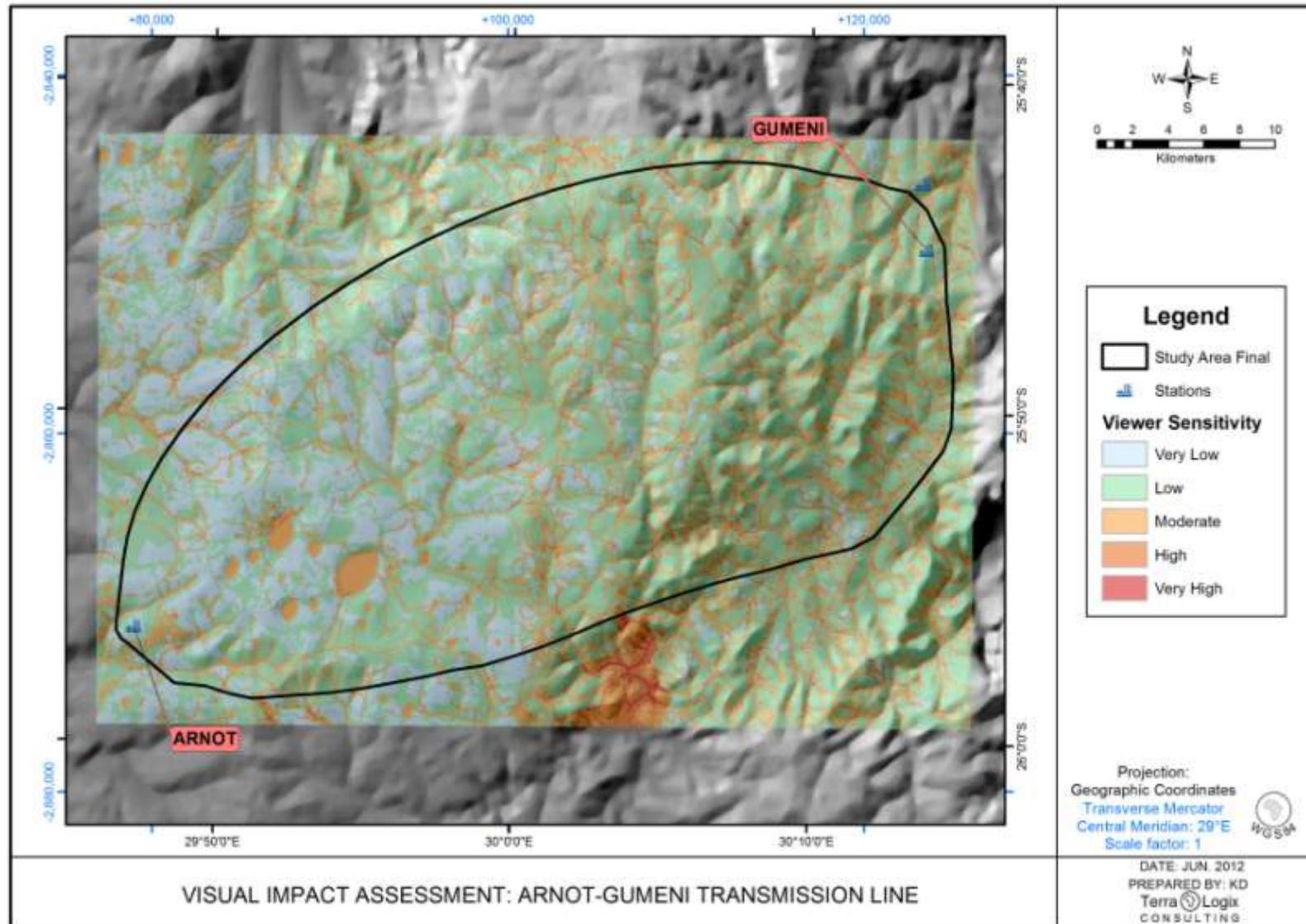


Figure 5 Viewer sensitivity

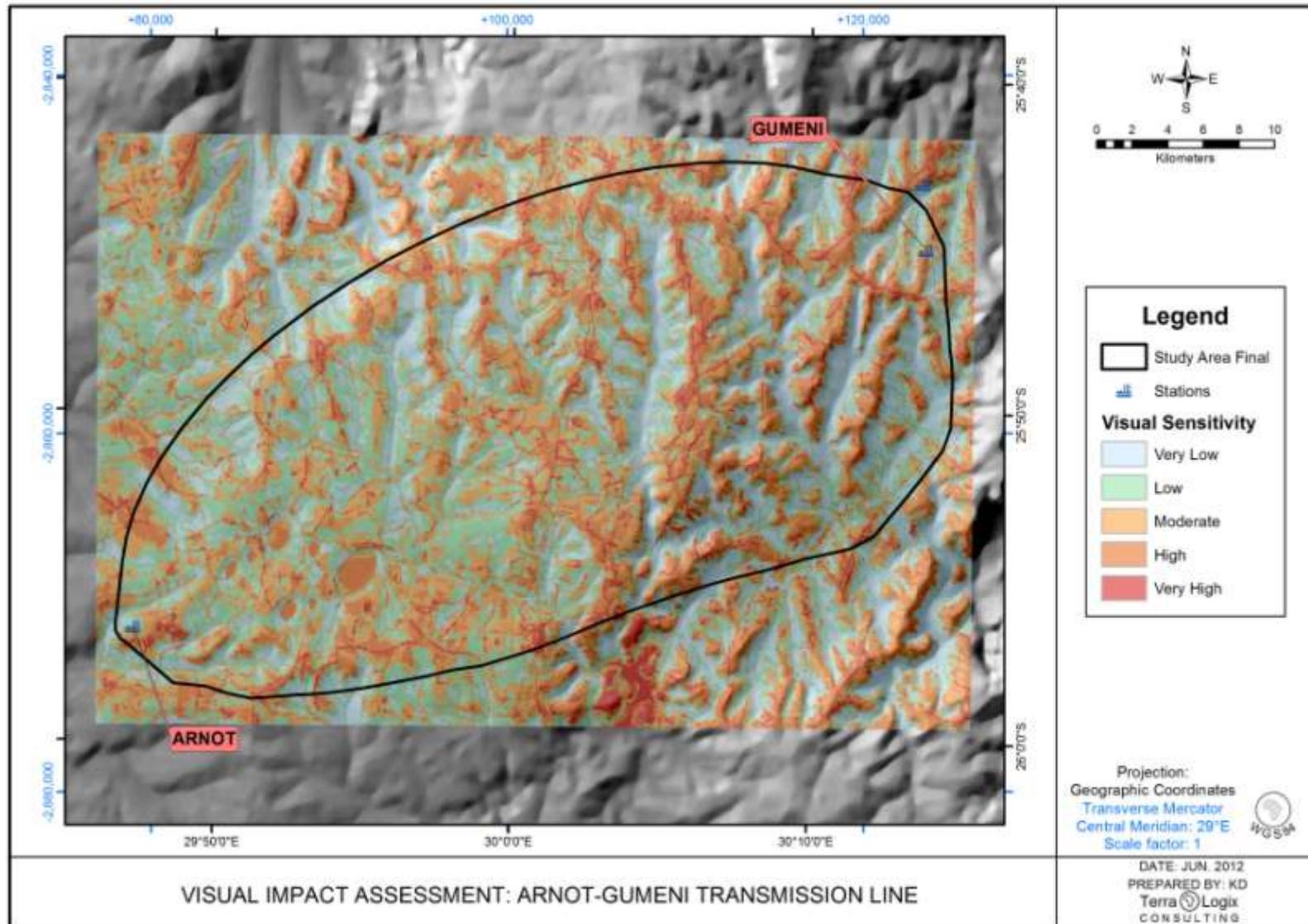


Figure 6 Visual sensitivity

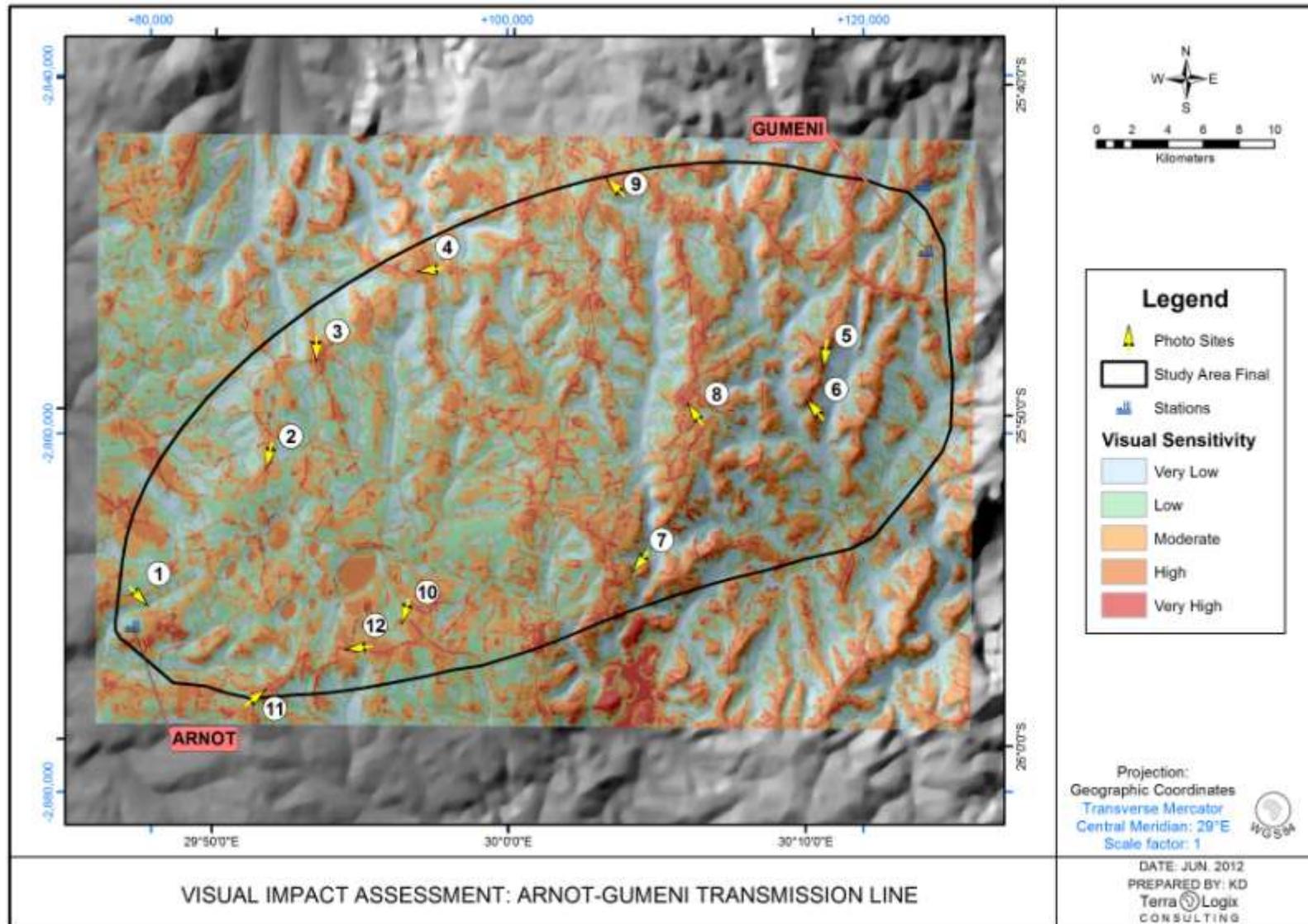


Figure 7 Photo sites



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain	regular simple shape (grass), and blocky (trees in the background)	linear (tar road, power lines)
	Line	diffuse edge	weak, irregular	Horizontal band dominant
	Colour	green with some light brown	green with some light brown	dark grey
	Texture	mostly fine	fine to coarse	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X				X		
	Line		X			X					X		
	Colour		X					X				X	
	Texture			X					X				X

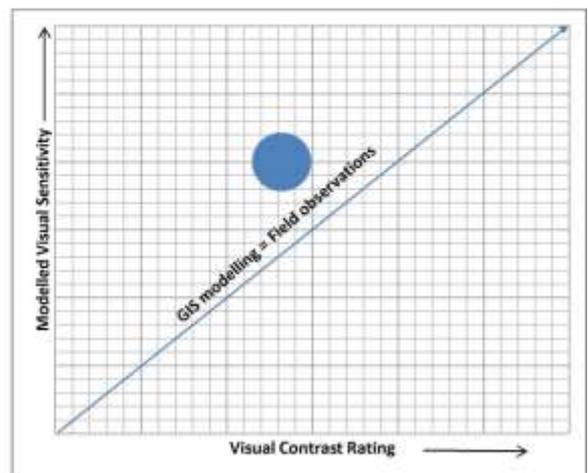


Figure 8 Site 1



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain	regular simple shape (grass), and sparse blocky (trees)	linear (tar road, power lines)
	Line	diffuse edge	weak, regular	focal band dominant / diagonal, horizontal
	Colour	green with some light brown	green with some light brown	dark grey
	Texture	mostly fine	Mostly fine	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	green to brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X				X		
	Line		X			X					X		
	Colour			X				X				X	
	Texture			X					X				X

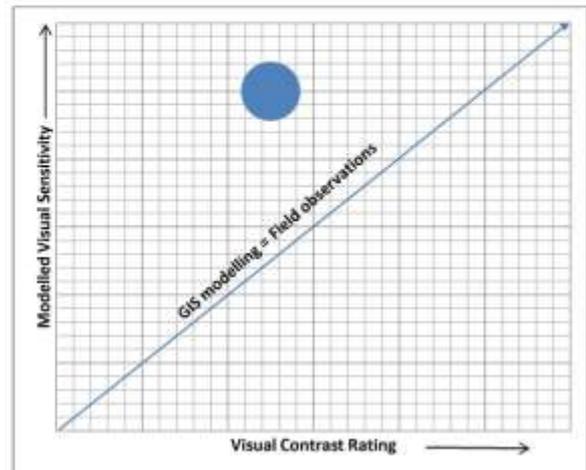


Figure 9 Site 2



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain	regular simple shape (grass), and blocky (trees)	linear (tar road, power lines), sparse blocks (buildings)
	Line	diffuse edge	strong, irregular	focal band dominant/ diagonal, horizontal lines
	Colour	green with some light	green	dark grey / red-brown
	Texture	mostly fine	fine / coarse	fine / coarse

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	green to brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X				X		
	Line		X				X					X	
	Colour			X				X			X		
	Texture			X				X				X	

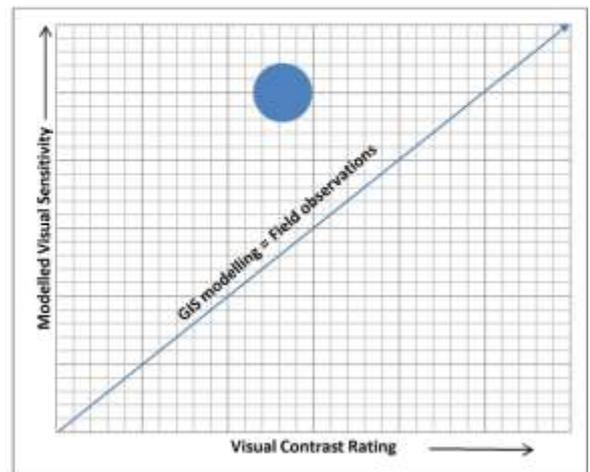


Figure 10 Site 3



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Flat terrain	medium spaced, blocky (trees) with patches (grass)	Sparse blocky (house)
	Line	diffuse edge green with some light	strong, irregular	Strong, horizontal and vertical
	Colour	brown	green	red-brown
	Texture	mostly fine	fine / coarse	coarse

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	green to brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X				X				X			
	Line		X			X						X	
	Colour			X				X			X		
	Texture			X				X			X		

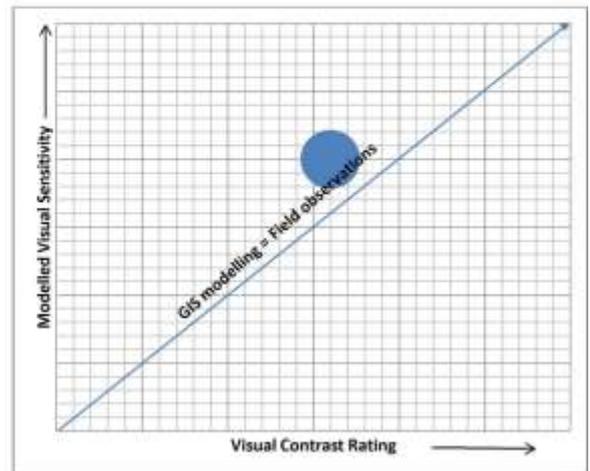


Figure 11 Site 4



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Midslope with valley to the left / Linear (gravel road)	even grass field with sparse blocks (trees)	Sparsly spaced, linear
	Line	digitate edge / band green with some light	weak, irregular	Moderate vertical
	Colour	brown	green	brown
	Texture	coarse	Mostly fine	coarse

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	green to brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form		X				X			X			
	Line			X			X				X		
	Colour			X				X			X		
	Texture			X				X				X	

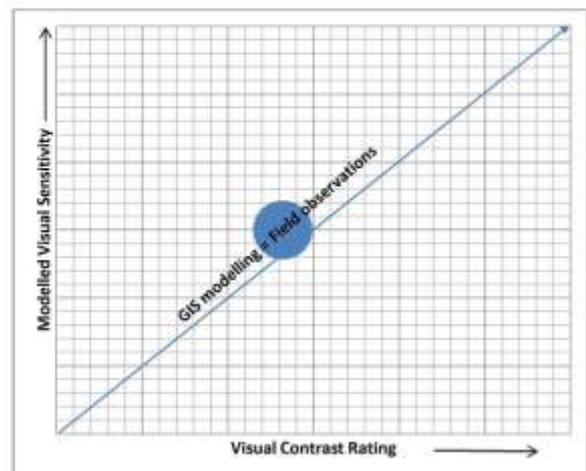


Figure 12 Site 5



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local ridge of undulating terrain, curving gravel road	patches of grass alternating with shrubs	None
	Line	diffuse edge / focal band	weak, irregular	None
	Colour	green and brown	mostly green	None
	Texture	fine to medium	fine to medium	None

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X			X			
	Line		X				X			X			
	Colour			X				X		X			
	Texture				X			X		X			

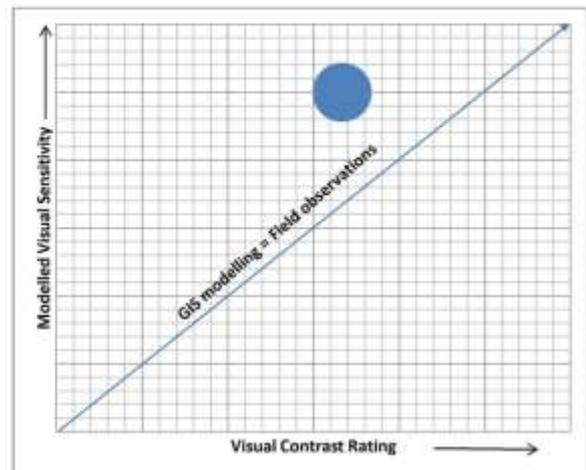


Figure 13 Site 6



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Sloping terrain/ focal band (gravel road)	even grass field with medium spaced blocks (shrubs)	Sparsely spaced, linear (power line)
	Line	digitate edge / band	weak, irregular	Moderate vertical
	Colour	brown	green	dark grey
	Texture	coarse / fine	fine to medium	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads (gravel)	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form		X				X						X
	Line			X			X						X
	Colour			X				X					X
	Texture			X				X					X

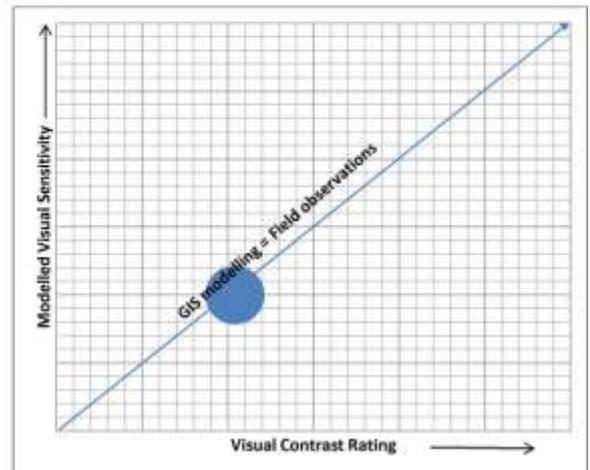


Figure 14 Site 7



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain	regular simple shape (grass), sparse blocky (small bunch of trees)	linear (fence and power lines)
	Line	diffuse edge	weak, regular	Straight, vertical more dominant
	Colour	green with some light brown	green with some light brown	dark grey
	Texture	mostly fine	fine	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X			X			
	Line	X				X				X			
	Colour		X					X			X		
	Texture			X				X				X	

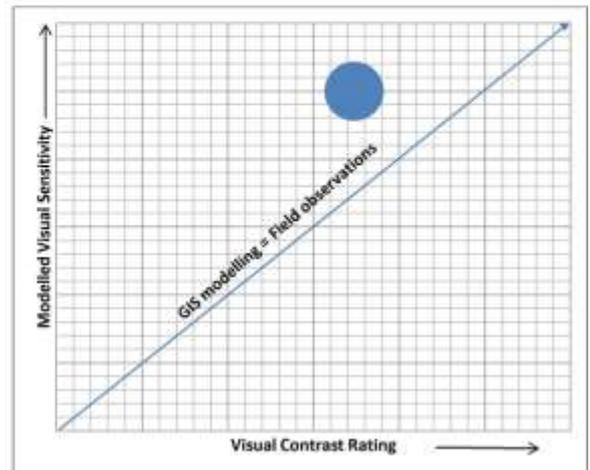


Figure 15 Site 8



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Flat terrain	regular simple shape (grass); sparse blocky (small bunch of trees)	linear (fence, tar road), Blocks (buildings)
	Line	diffuse edge	weak, regular	Horizontal band, Straight lines vertical more dominant
	Colour	green with some light brown	green with some light brown	dark grey / white, red-brown
	Texture	mostly fine	fine / coarse	fine / coarse

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X											
	Line	X				X				X			
	Colour		X					X				X	
	Texture			X				X				X	

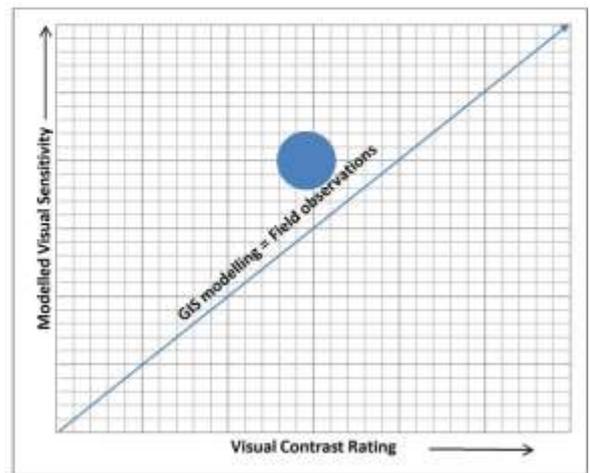


Figure 16 Site 9



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Flat terrain / mine dump (3D Mass)	regular simple shape (grass), sparse blocky (bunch of trees)	dense, concentrated blocks and lines (mine infrastructure)
	Line	Transitional Edge	weak, irregular	Straight, mostly vertical and horizontal
	Colour	black	green with some light brown	white, grey
	Texture	coarse	fine/ coarse	coarse

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form		X				X						X
	Line		X				X						X
	Colour			X				X					X
	Texture			X				X					X

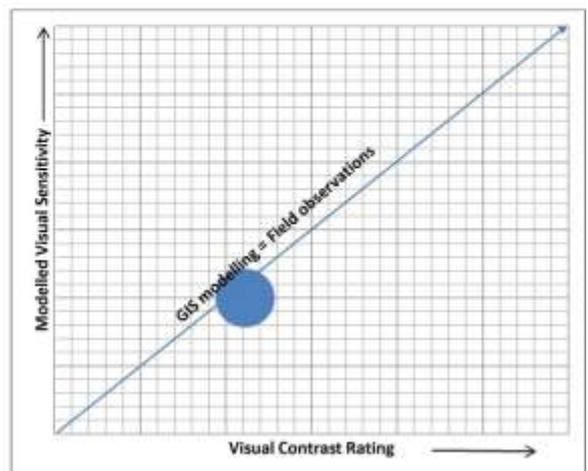


Figure 17 Site 10



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain, linear gravel road	regular simple shape (grass), sparse blocky (bunch of trees)	None
	Line	diffuse edge / focal band	weak, irregular	None
	Colour	green / light brown	green with some light brown	None
	Texture	mostly fine	fine / coarse	None

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X					X			X			
	Line	X				X				X			
	Colour		X					X			X		
	Texture			X				X				X	

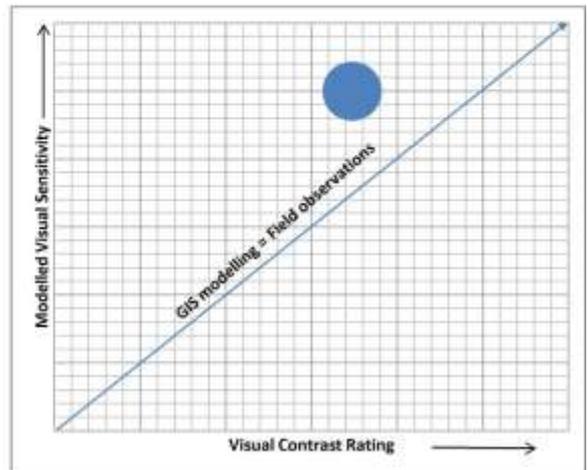


Figure 18 Site 11



Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	Local high of rolling terrain, linear gravel road	regular simple shape (grass), sparse blocky (bunch of trees)	Linear (power lines)
	Line	diffuse edge / focal band	weak, irregular	Straight, vertical dominant
	Colour	green / light brown	green with some light brown	grey, brown
	Texture	fine	fine / coarse	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	Linear forms: servitude / access roads	Linear forms created by clearings (servitude / access roads)	Lattice Towers, power lines
	Line	Bands	regular lines: edge effect of servitude / access roads	Strong, Horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine / medium

Contrast Rating

		Land/Water				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form		X				X					X	
	Line		X				X					X	
	Colour			X				X				X	
	Texture			X				X				X	

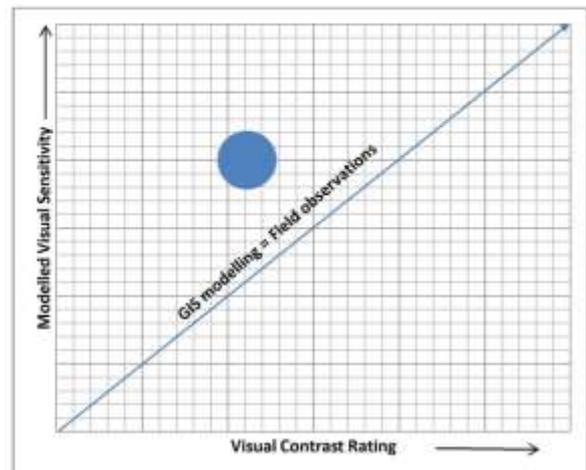


Figure 19 Site 12

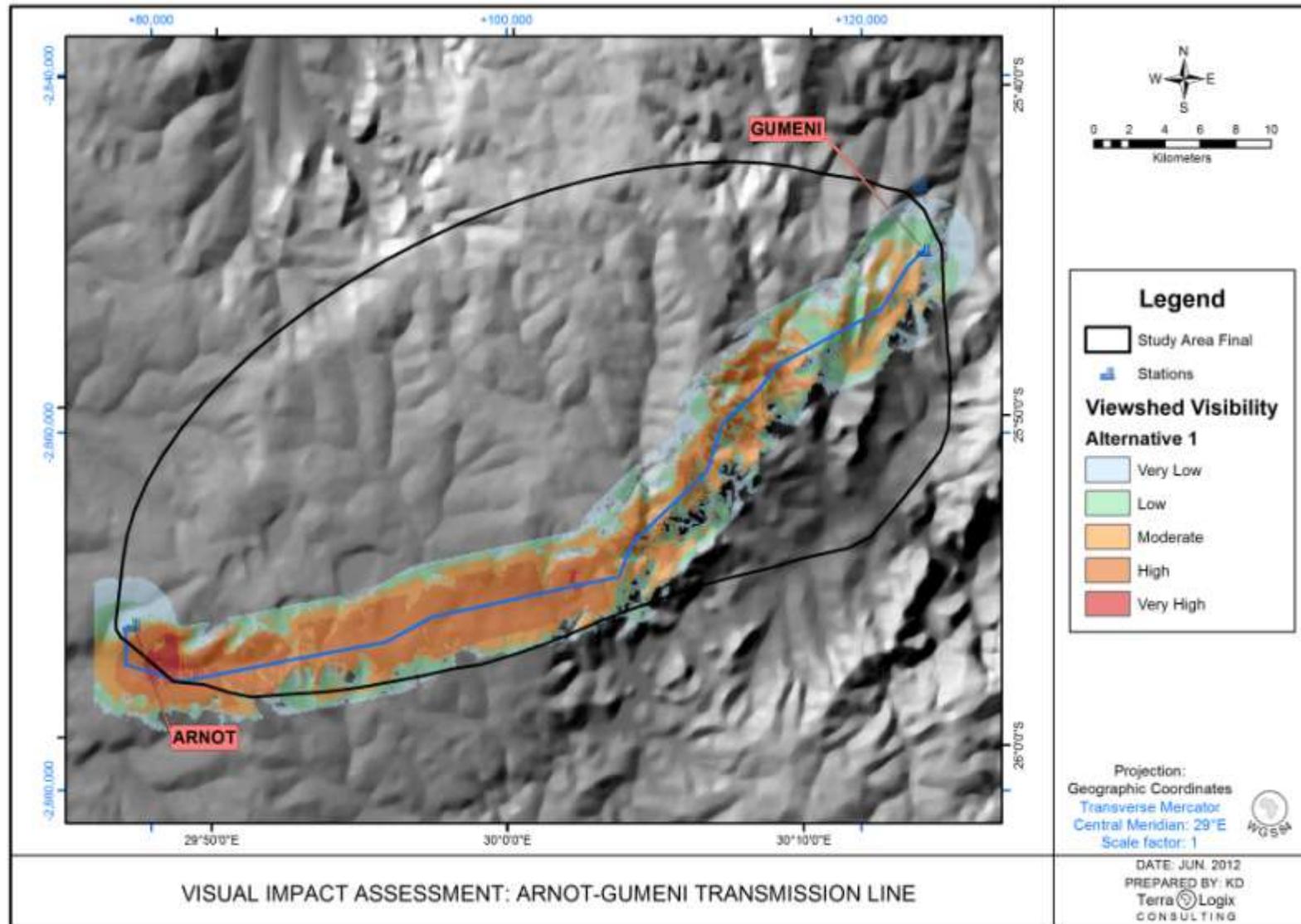


Figure 20 Viewshed analysis for Alternative 1

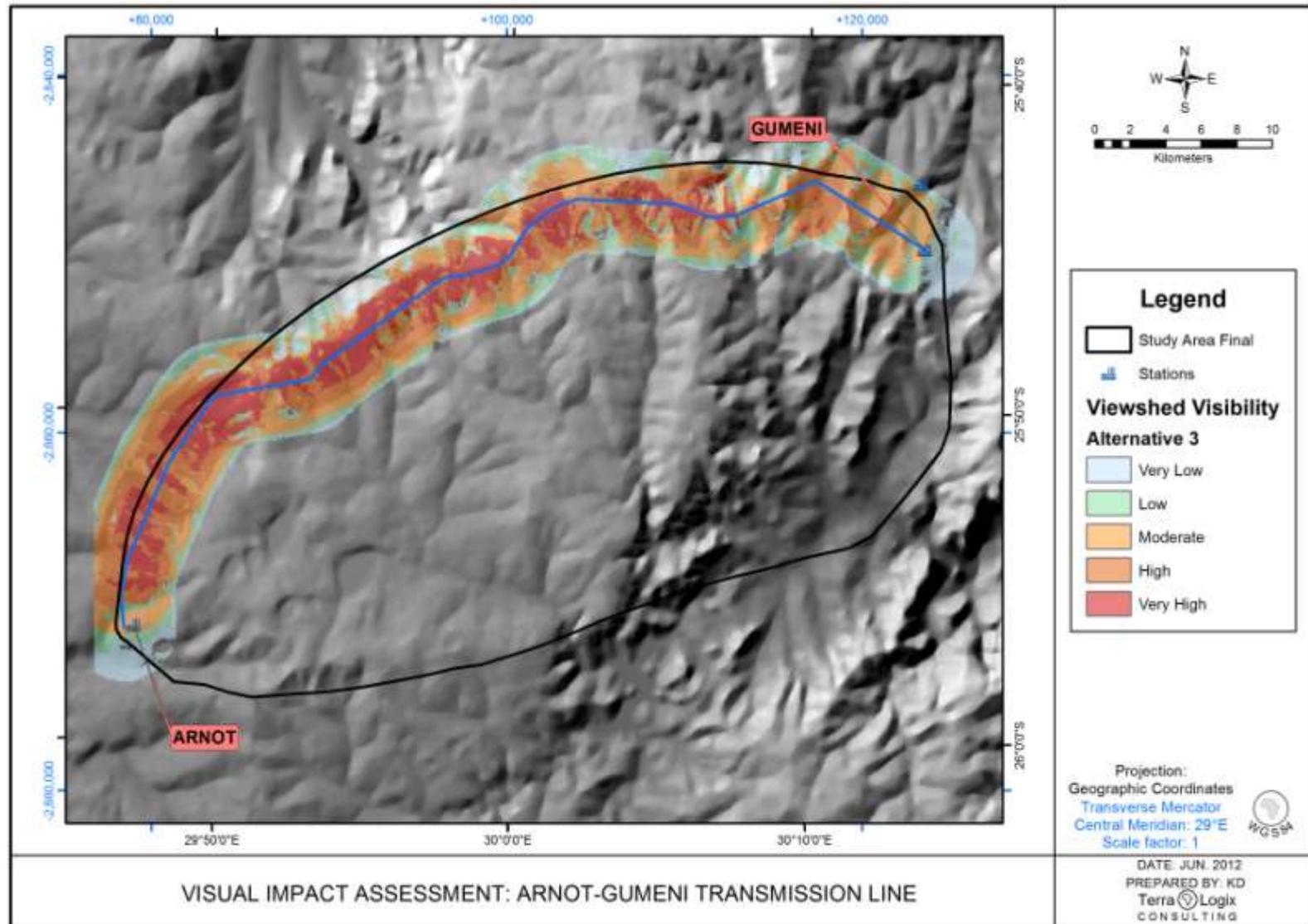


Figure 21 Viewshed analysis for Alternative 3

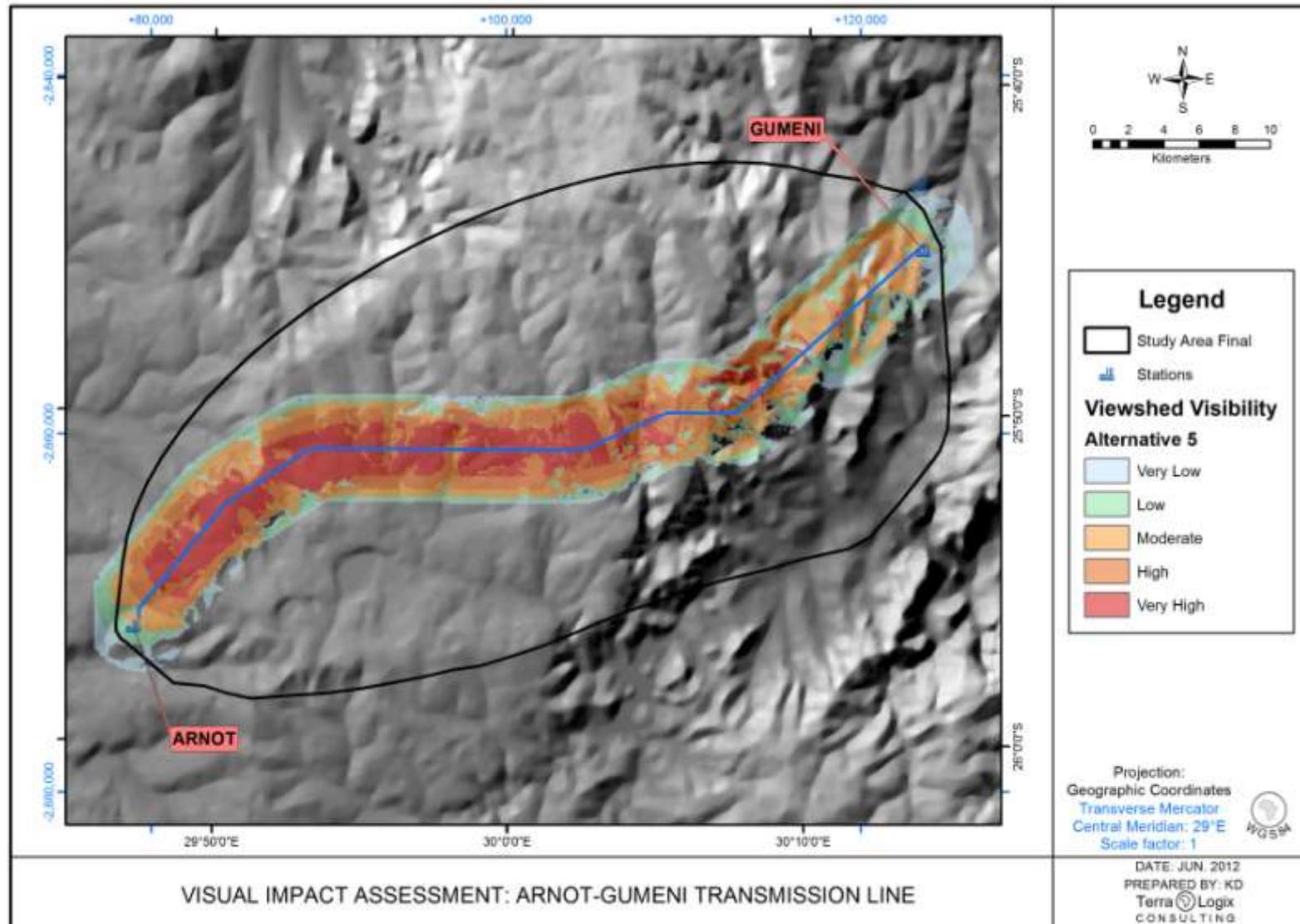


Figure 22 Viewshed analysis for Alternative 5

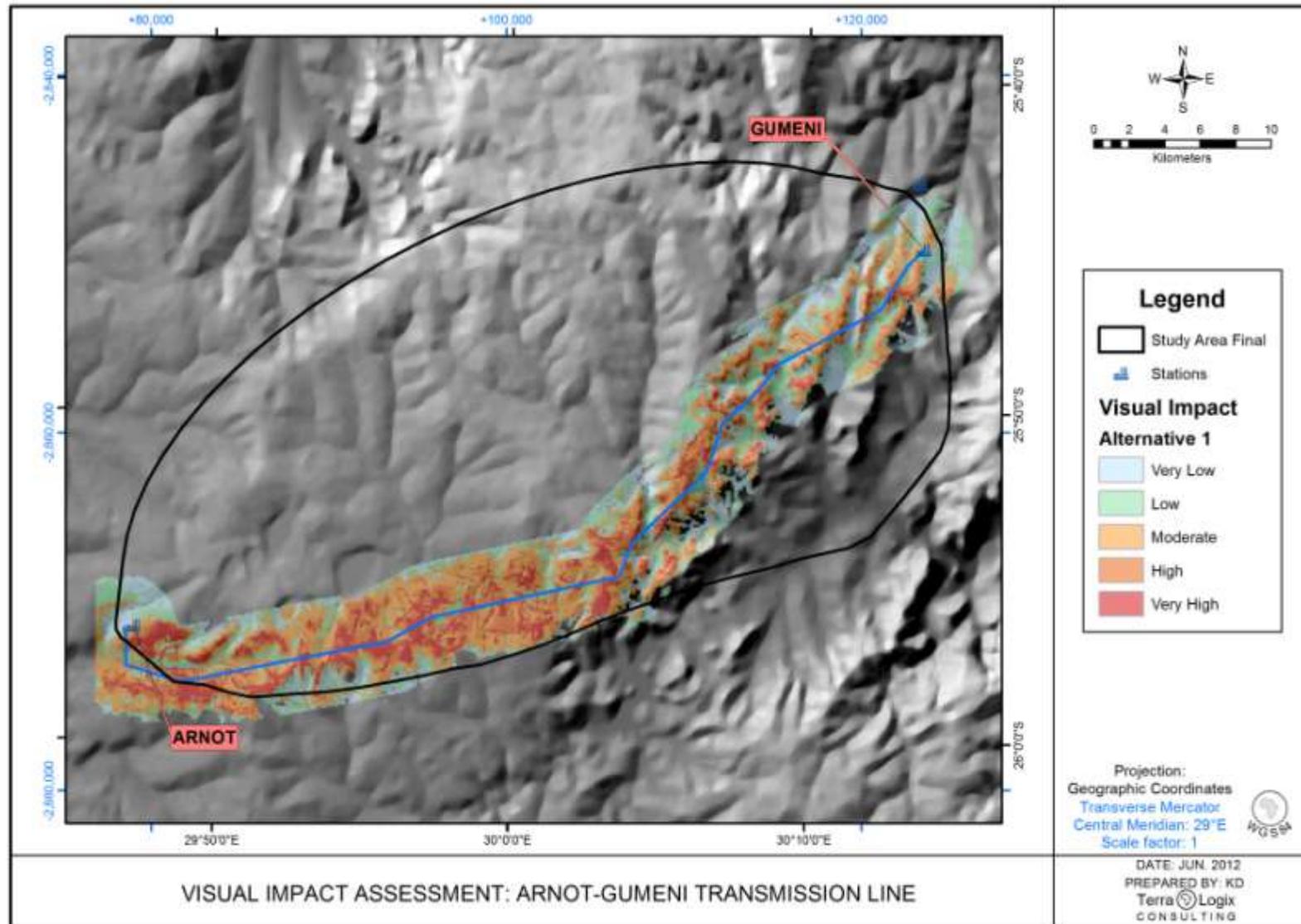


Figure 23 Visual Impact for Alternative 1

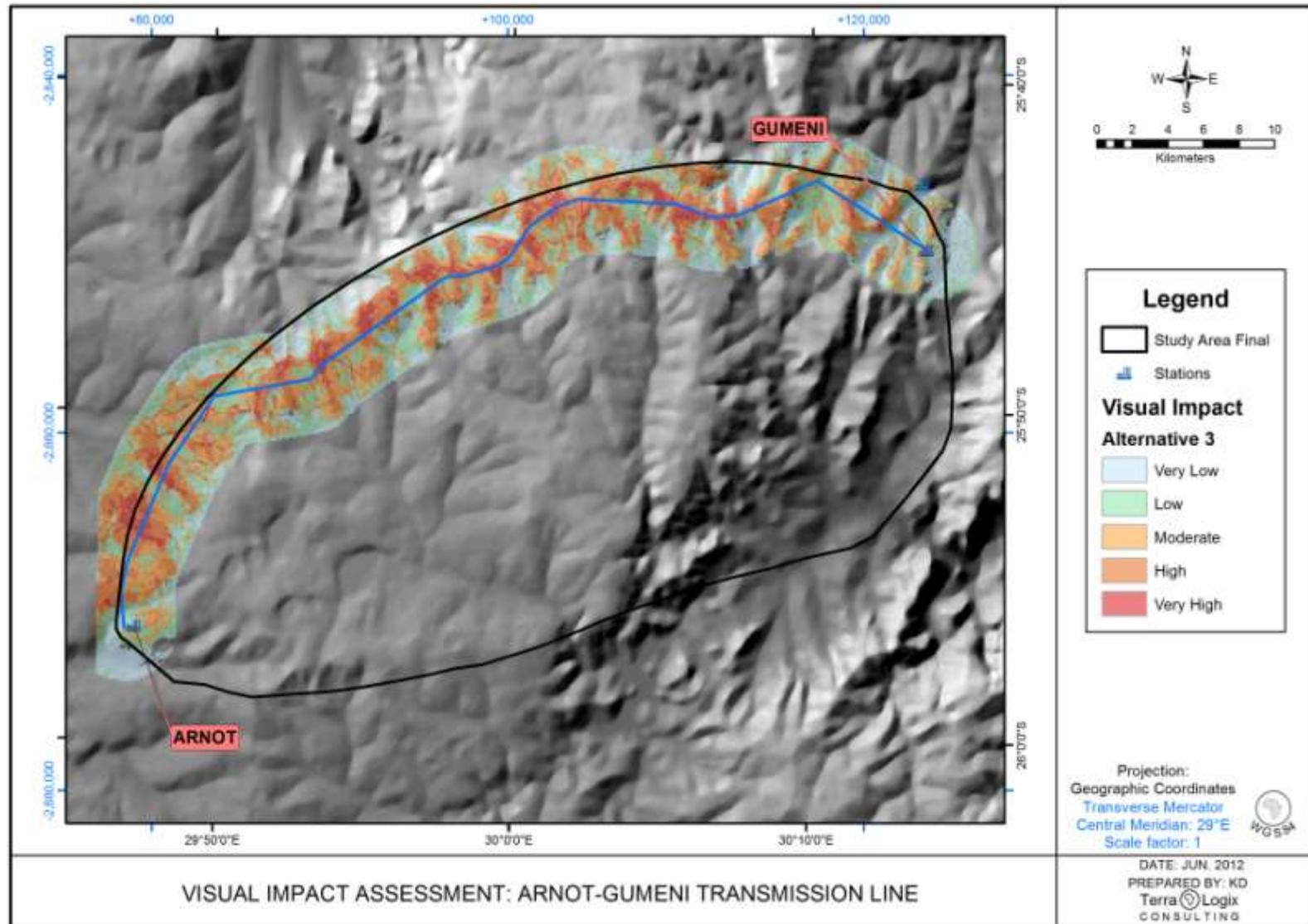


Figure 24 Visual Impact for Alternative 3

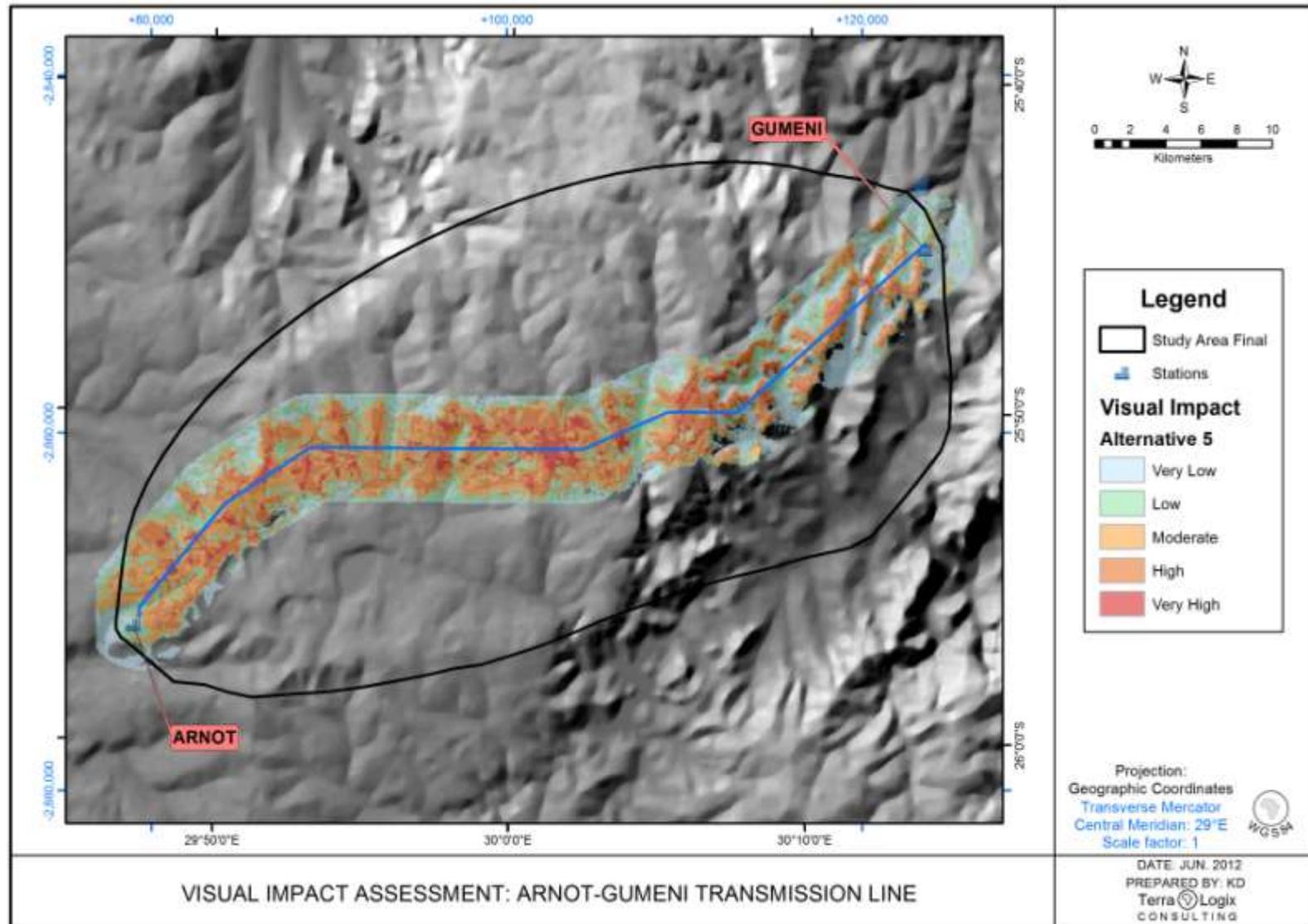


Figure 25 Visual impact for Alternative 5