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CONSULTING

EIA REPORT

TITLE: Visual Impact: Nzhelele Triangle Transmission Project (SA part)

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1 Introduction

This is an EIA report on the assessment of the visual impact of the proposed transmission line between the Nzhelele substation in South Africa and the Triangle substation in Zimbabwe. This report covers only the South African part from the Nzhelele substation up to the border between South Africa and Zimbabwe.

2 Study area

The study area is located between the proposed Nzhelele substation (approximately 20km to the west of Tshipise) in the Limpopo Province and the border between South Africa and Zimbabwe. The location of the study area and various alternatives for the alignments are shown in Figure 1.

3 Terms of Reference

General terms of reference for environmental impact assessment and environmental management programmes were provided.

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 as worst-case scenarios.
- The analyses use the alignments given (centre lines of corridors) with pylons spaced at 400m intervals (assumed) – these are not necessarily the final positions of the pylons.
- For the analyses a pylon height of 60m was used.

5 Analysis

5.1 Viewshed and viewing distance

Viewshed analyses (proportional viewshed) 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 reduction of visibility with distance (exponential decay) was combined with the viewshed and the results are shown in Figures 2 to 4.

5.2 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. The DTM with 90m pixels was extracted from the SRTM. Visual exposure scores range from -3 to 3; negative values indicate a reduction in visual exposure, positive values an increase in visual exposure.

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°	1
10-15°	2
15-20°	3
> 25°	3

The scores above assume that structures on steep slopes and ridges would be more exposed that 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	3
North	2
East	1
South	-1
West	1

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 direction
- 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.

Landforms

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) 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	-3
Midslope drainages, shallow valleys	-1
Upland drainages, headwaters	-1
U-shape valleys	-2
Plains	1
Open slopes	2
Upper slopes, mesas	3
Local ridges, hills in valleys	3
Midslope ridges, small hills in plains	3
Mountain tops, high ridges	3

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) with radii of 900m and 1050m, 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
Ridge, hilltop, canyon edge	3
Upper slope	3
Mid slope	2
Flat slope	1
Lower slope	-1
Valleys, cliff base	-2

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	-3
-60 – -30	-2
-30 – 0	-1
0 – 30	1
30 – 60	2
> 60	3

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
Low STD values	3
	2
	1
	-1
	-2
High STD values	-3

Final Visual Exposure Raster

The above mentioned six raster datasets were summed and the result is shown in Figure 5 (stretched raster, 2.5 standard deviations)

5.3 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 6).

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

5.4 Viewer sensitivity

A viewer sensitivity raster dataset was created using the following datasets:

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

- Landcover 2000

The sensitivity of viewers (visual receptors) is closely related to the activities taking place (land use) as well as natural features. Values between -3 and 3 were assigned to the topographic data, such that -3 represents existing topographic data that reduce the visual sensitivity (e.g. high urban density, infrastructure) and 3 represents data that increase the visual sensitivity (e.g. nature reserve, parks, heritage site). The individual ratings are given in Tables 7 and 8

Table 7 Ratings of topographical data

Name	Score
ANTI EROSION WALL	1
ARTERIAL ROUTE	-2
BORDER CUSTOMS	-1
BRIDGE	1
CANAL	-1
CARAVAN PARK	1
CEMETERY	1
CONSERVATION	3
CONTAINER DEPOT	-2
CONVEYOR BELT	-1
CULTIVATED LAND	-1
CUTTING	-1
DAM	1
DAM WALL	1
DIGGING	-2
DRIVE IN THEATER	1
EMBANKMENT	1
EXCAVATION	-2
FENCE	-1
FISH FARM	-1
FLOOD BANK	1
FOUNTAIN	1
GARDEN	1
GOLF COURSE	2
GRAVE	1
HIGH URBAN DENSITY	-2
HOSPITAL	-1
HOT SPRING	1

Name	Score
MINE DUMP	-3
MINE DUMP TOP	-3
NATIONAL ROUTE	-3
NON-PERENNIAL CENTER LINE	1
NON-PERENNIAL EXTENT	1
NON-PERENNIAL PAN	1
OPEN CAST MINE	-3
ORCHARD VINEYARD	-1
OTHER ACCESS	-1
PERENNIAL CENTER LINE	2
PERENNIAL EXTENT	2
PERENNIAL PAN	2
PLANTATION	-2
POWER LINE: DISTRIBUTION	-2
PROTECTED AREA	3
RECREATION AREA	1
REFUSE DUMP	-3
RIFLE RANGE	-1
RIVER BUFFER ZONE	2
SCENIC LANDSCAPE FEATURE	3
SCHOOL AREA	-1
SECONDARY ROAD	-1
SEWERAGE WORKS	-2
SIPHON	-1
SLIMES DAM	-3
SLIMES DAM TOP	-3
STADIUM	-1
STANDARD	-3

Name	Score
HOTEL	1
LANDING STRIP	-1
LARGE BUILDING	-1
LOW URBAN DENSITY	-1
MAIN ROAD	-2
MARSHALING LINE	-2
MILITARY CAMP	-1

Name	Score
STREET	-1
TRACK FOOTPATH	1
TREE LINE	-2
WALL	1
WATER TANK	-1
WEIR	1
WOODLAND	-2

Land cover	Score
Forest (indigenous)	2
Woodland	-3
Thicket, Bushland, Bush Clumps & High Fynbos	-2
Waterbodies	1
Wetlands	1
Bare Rock & Soil (natural)	3
Degraded Forest and Woodland	3
Degraded Thicket, Bushland, etc	3
Cultivated, permanent, commercial, irrigated	-1
Cultivated, temporary, commercial, irrigated	-1
Cultivated, temporary, commercial, dryland	-1
Cultivated, temporary, subsistance, dryland	-1
Urban / Built-up residential	-2
Urban / Builtup : rural cluster	-2
Urban / Built-up : residential, formal suburbs	-2
Urban / Built-up : residential, formal township	-2
Urban / Built-up : residential, informal township	-2
Urban / Built-up : commercial - mercantile	-3
Urban / Built-up : industrial / transport : light	-3
Mines & Quarries (surface-based mining)	-3

The viewer sensitivity raster dataset (see Figure 7) was combined with the final visual exposure dataset to obtain the modelled visual sensitivity raster dataset which is shown in Figure 8.

Locations of the photographs taken during the site visit (January 2014) are shown in Figure 9. Selected sites (see Figure 10) of various modelled visual sensitivities were

subjected to a visual contrast rating to ground truth 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 11 to 20.

Generally, there is a good agreement between the modelled visual sensitivity and the visual contrast rating. Occasional slight offsets are due to the fact that the visual contrast rating tends to me more site specific (local) while the modelled visual sensitivity tends to be more regional.

5.5 Visual Impact

The potential visual impact is determined by extracting the visual sensitivity values at each pylon position (assumed) and interpolating them over an area that is covered by a 3 km buffer and combining these with the viewshed and the reduced visibility over distance (see Figures 21 to 23). A comparison of the provided alternatives is given as follows:

Table 9 Comparison of alternatives

Alternative	Area (ha)	Sum of Visual Impact
Alt 1	34667.0	17427
Alt 2 & 2A	37997.0	19818
Alt 2 & 2B	35274.0	18504

The values in the table above are calculated statistics of the visual impact raster cells that cover the 3000m visual limit buffer around the respective alternatives.

6 Conclusion

The analysis shows that in terms of visual impact, Alternative 1 is the best option.

7 Impact Assessment

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
- Substation
- Burrow pits

- Power line
- Access Roads

Table 11 Impact assessment

Nature of Impact	Probability	Duration	Scale	Magnitude/ Severity	Significance	Comment
CONSTUTION PHASE: CAMPS						
Visual scars in the landscape due clearing of vegetation, off-road driving and poor erosion control	4	3	2	6	44	Moderate, can be reduced by rehabilitation
CONSTRUCTION PHASE: SUBSTATION						
Visual scar in the landscape, due to clearing of vegetation	5	5	2	6	65	High, can significantly be reduced by effective use of vegetation as shield
CONSTRUCTION PHASE: BURROW PITS						
Excavations and associated erosion leave visual scars in the landscape	4	4	2	6	48	Moderate, can be reduced by rehabilitation
OPERATIONAL PHASE: SUBSTATION						
Visual intrusion by substation structures	5	5	1	6	60	Moderate but can be reduced by mitigation measures (see Section 8)
OPERATIONAL PHASE: POWER LINE						
Visual intrusion by pylons	5	5	2	6	65	High, but can be reduced by mitigation measures (see Section 8)
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						
Visual scars in the landscape due to poor erosion control	4	4	2	6	48	Moderate, can be reduced by proper management

8 General mitigation measures

The most important mitigation measure is planning and design in such that the transmission line is placed is 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.
- Existing linear features: Placing new linear structures alongside existing linear features will reduce the overall 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. Generally, the overall area has fairly dense vegetation which could be utilised as a very effective shield.
- 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.

9 References

1. WEISS, A. 2001. Topographic Position and Landforms Analysis. Poster presentation, ESRI User Conference, San Diego, CA.

2. THE LANDSCAPE INSTITUTE with THE INSTITUTE OF ENVRIONMENTAL MANAGEMENT AND ASSESSMENT. 2002. Guidelines for Landscape and Visual Impact Assessment. Second Edition, Spon Press, New York.

3. U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT. Manual 8431 – Visual Resource Contrast Rating. Available online at http://www.blm.gov/nstc/VRM/8431.html (viewed June 2006)

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.

5. BLAIR W.G.E. (1986). Chapter 13: Visual Impact Assessments in urban Environments. *In: Foundations for Visual Project Analysis,* edited by Smardon R. C., Palmer J, & Felleman J. State University of New York, College of Environmental Science and Forestry.

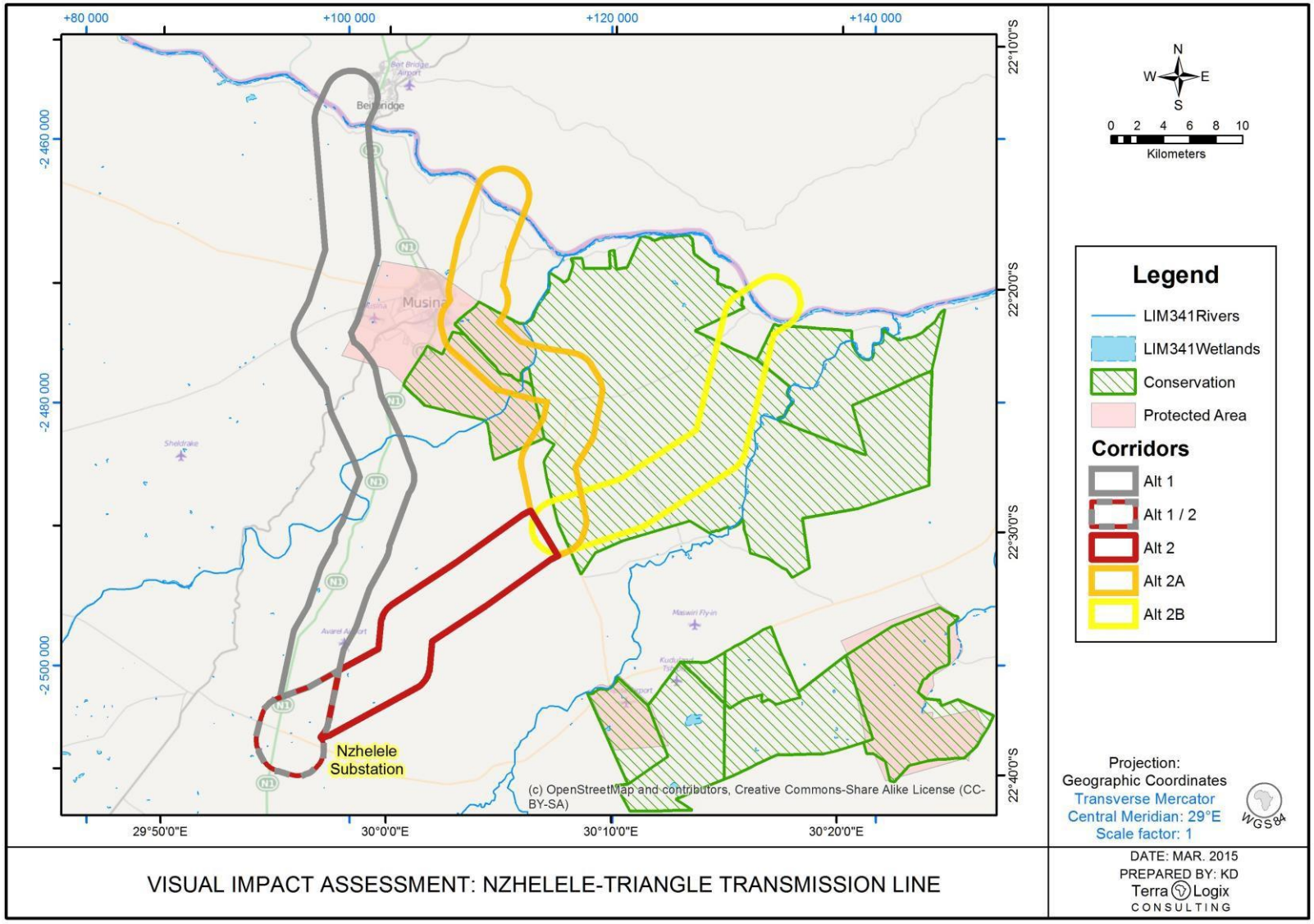

Figure 1 Locality map

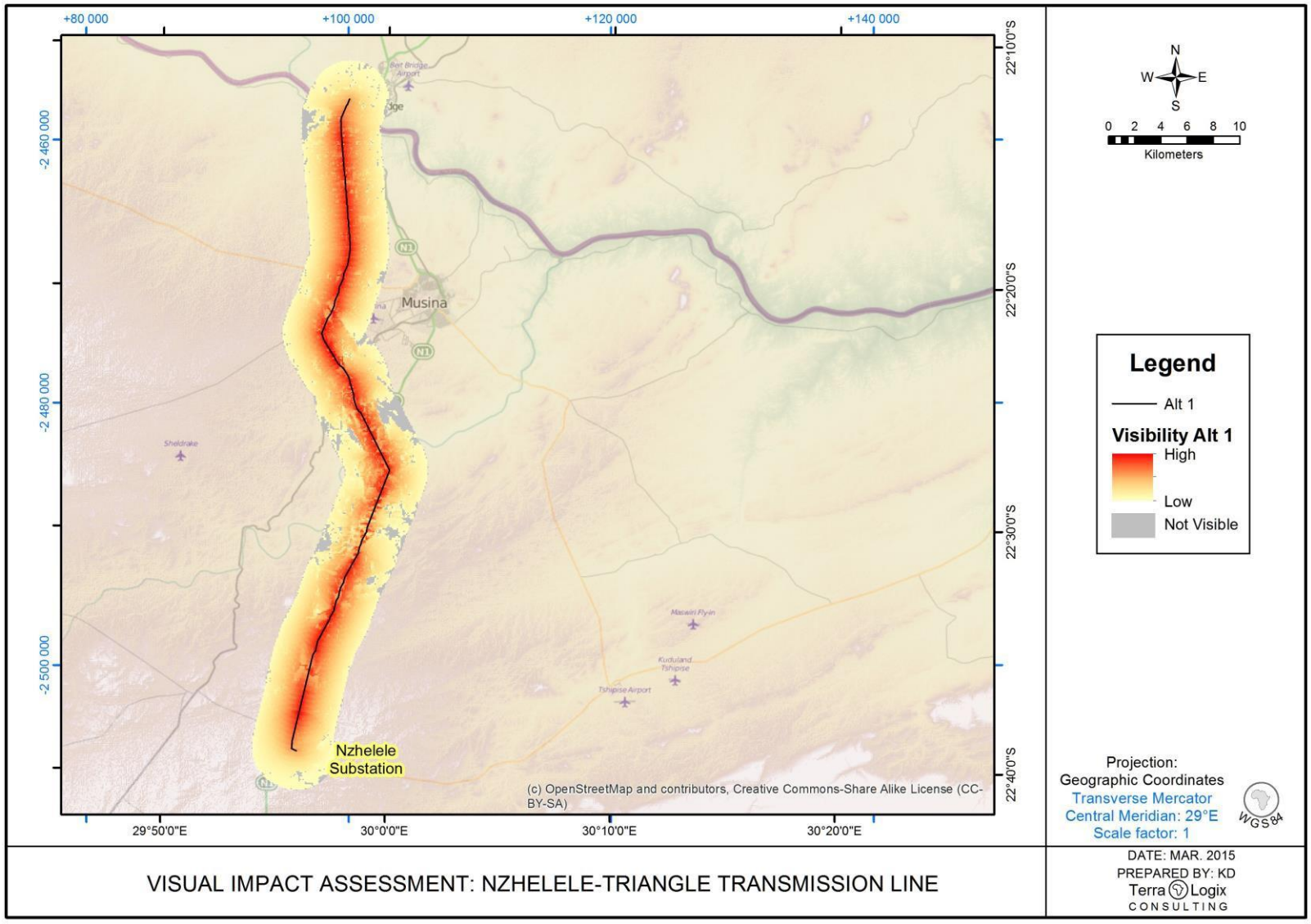

Figure 2 Viewshed combined with viewing distance for Alt 1

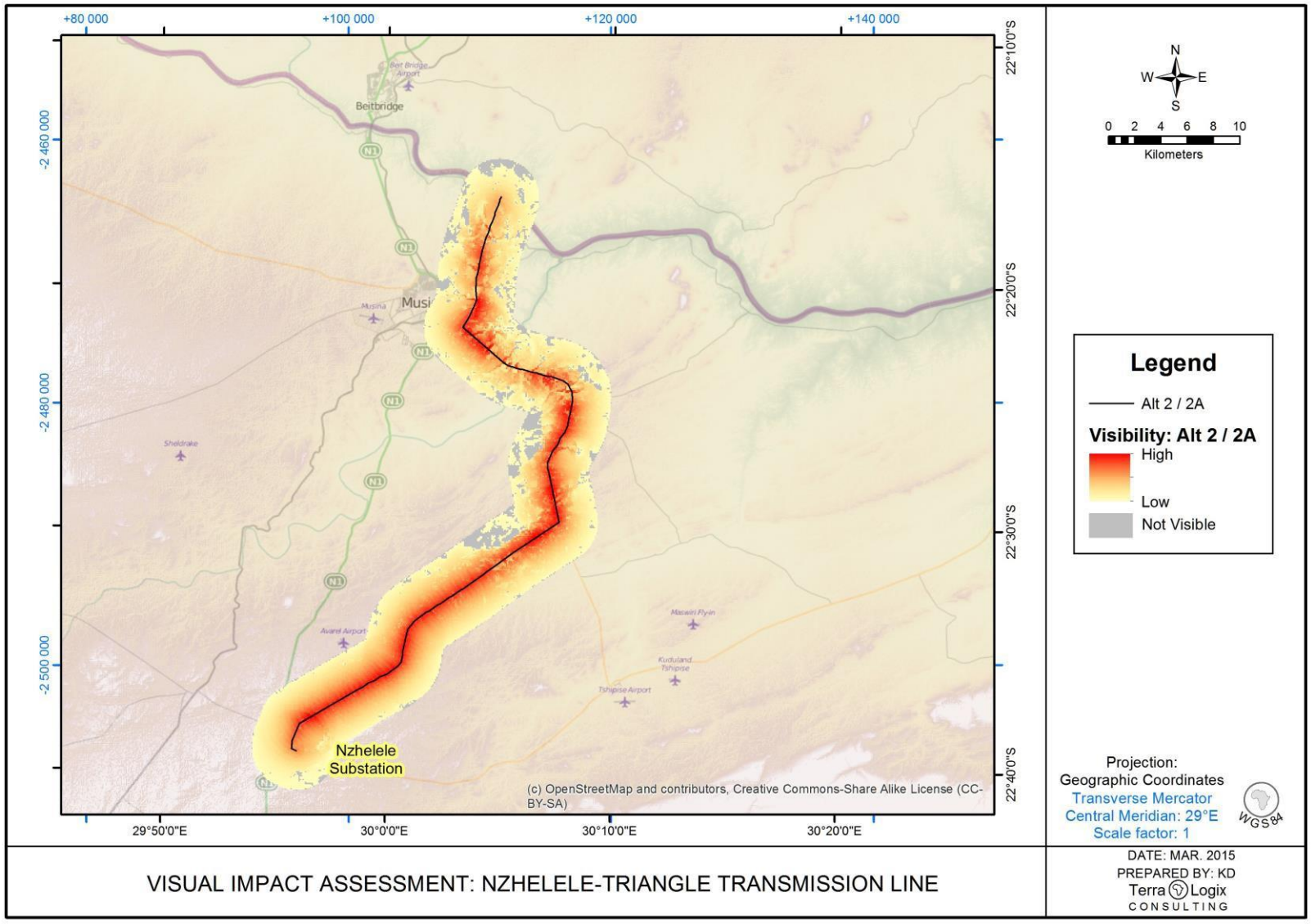

Figure 3 Viewshed combined with viewing distance for Alt 2 / 2A

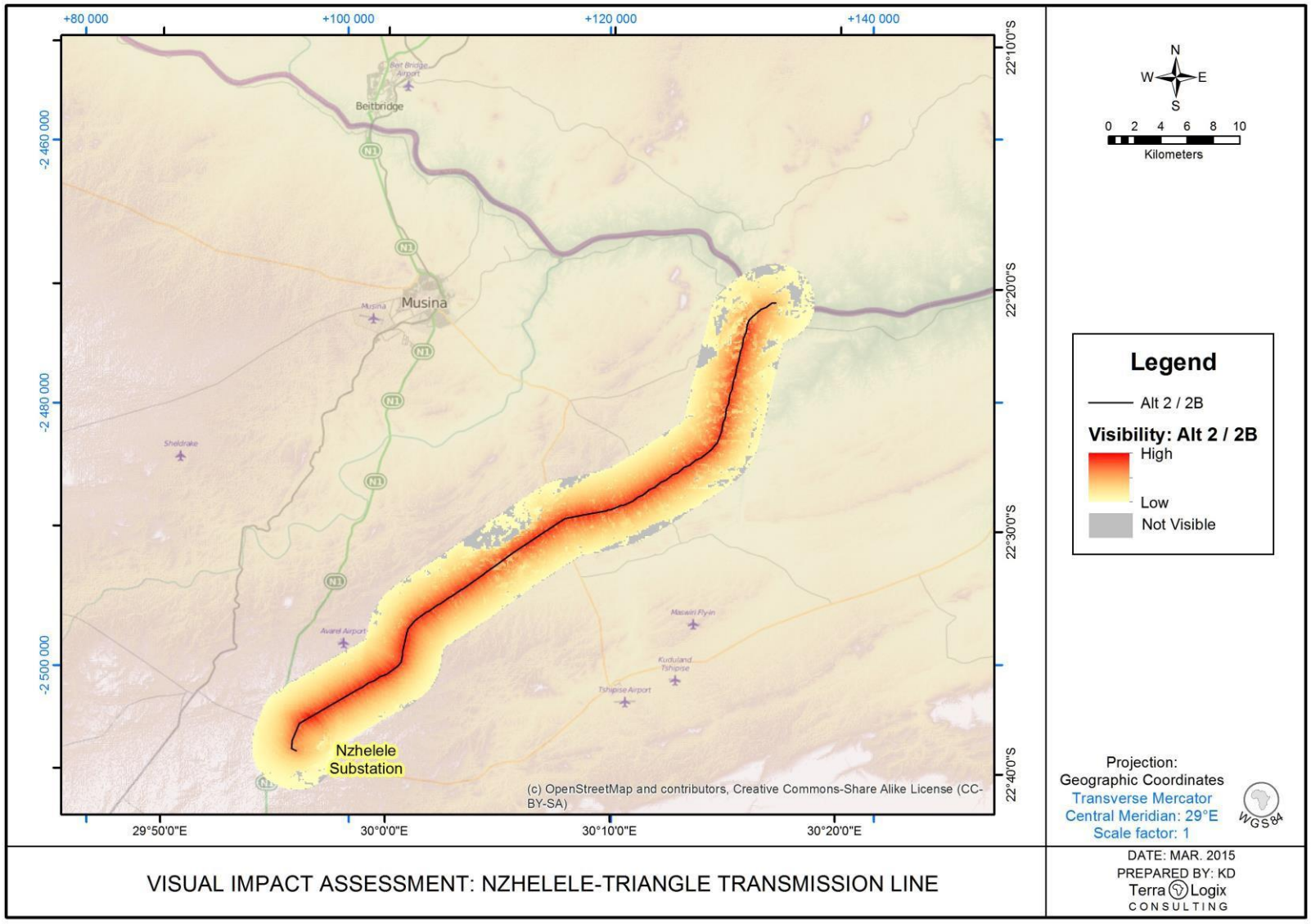

Figure 4 Viewshed combined with viewing distance for Alt 2 / 2B

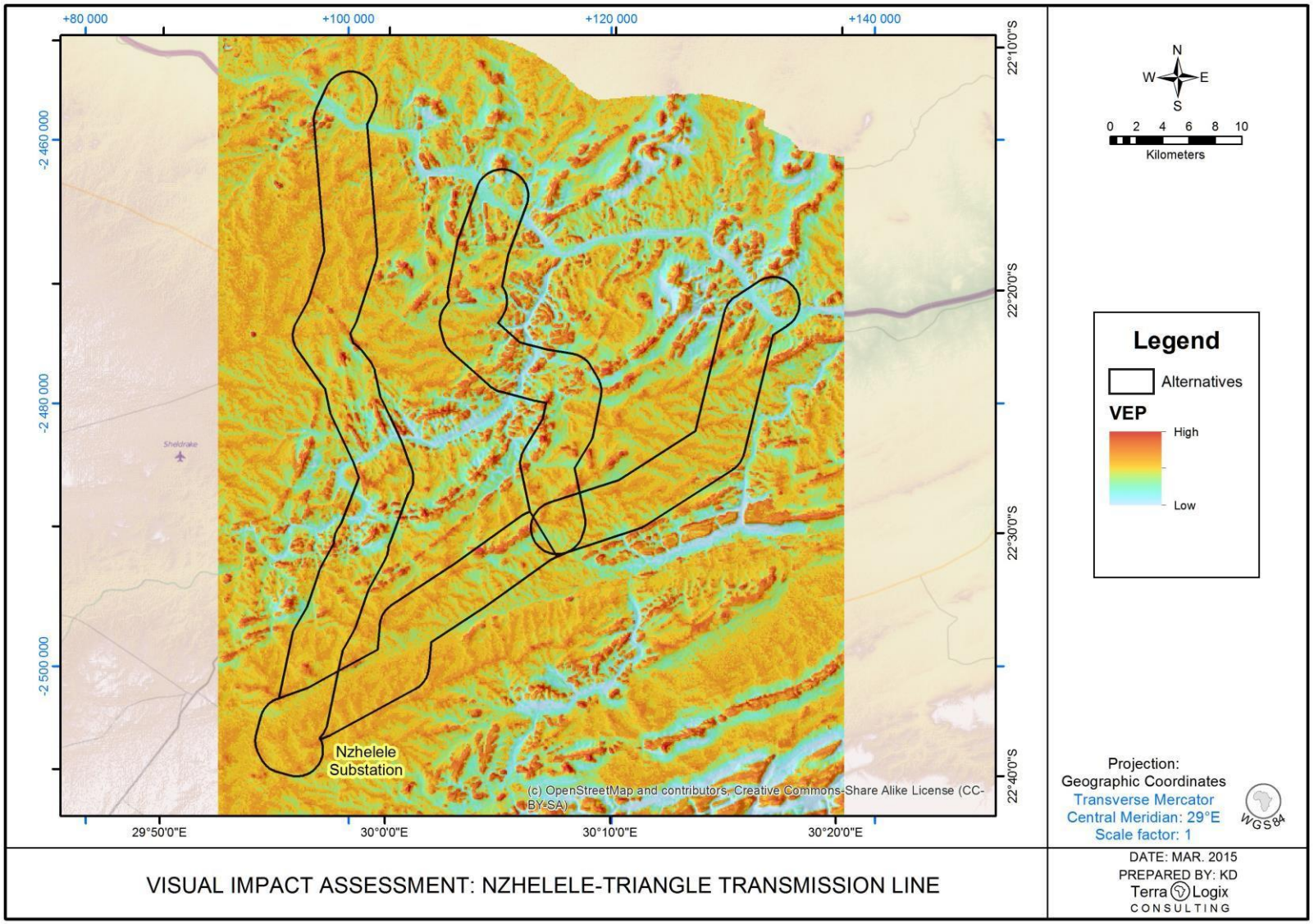

Figure 5 Visual exposure potential (VEP)

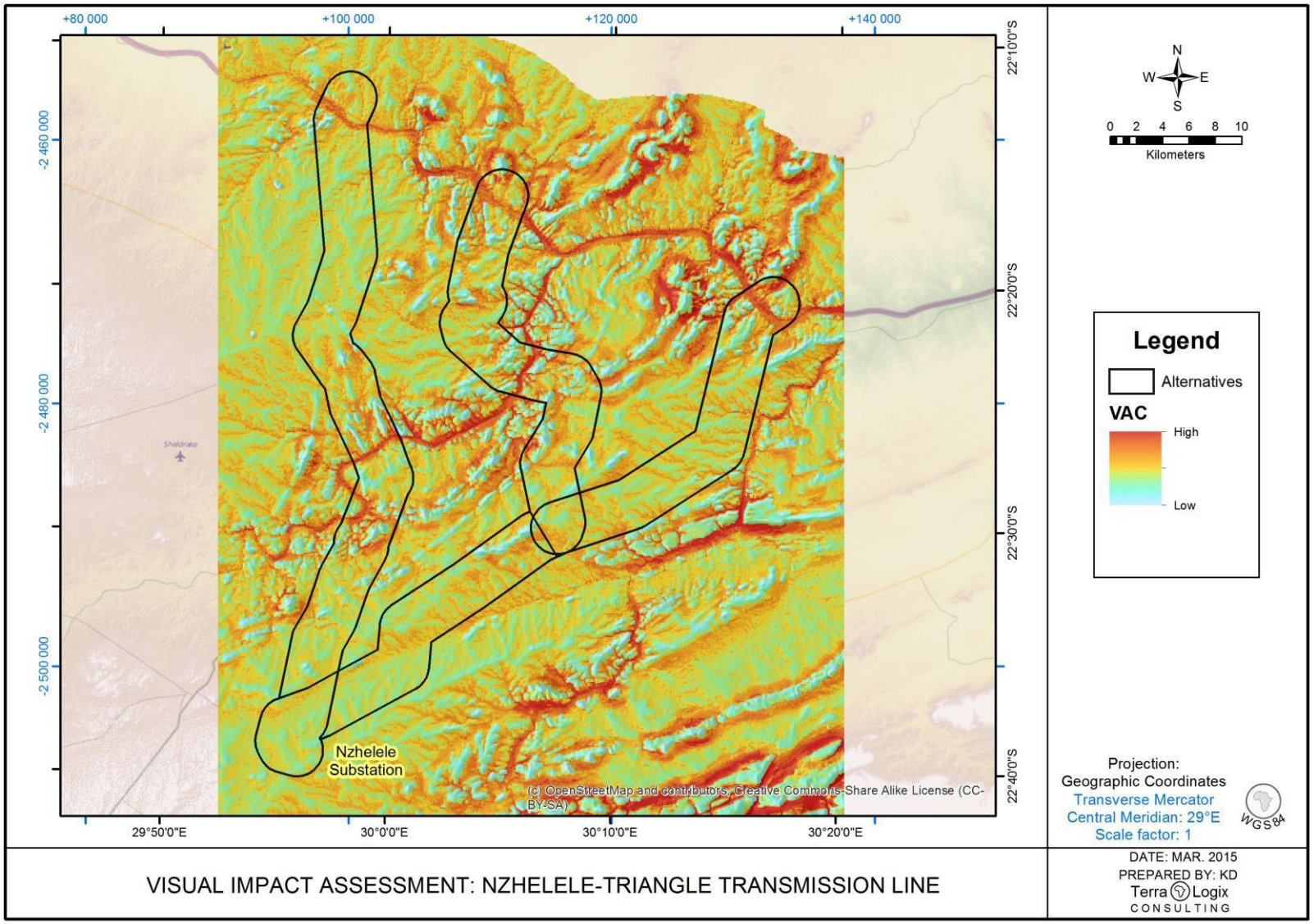

Figure 6 Visual absorption capacity (VAC)

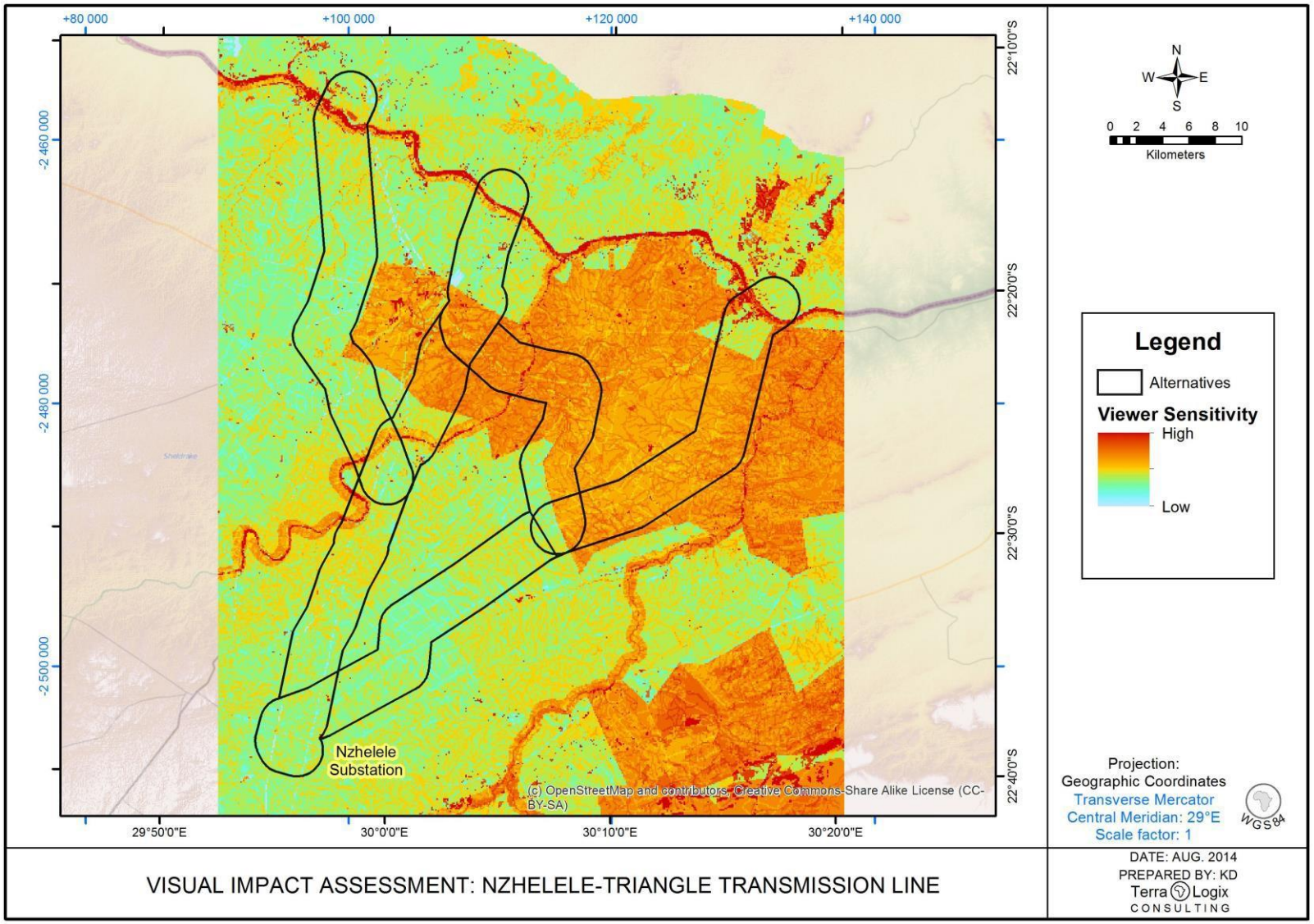

Figure 7 Viewer sensitivity

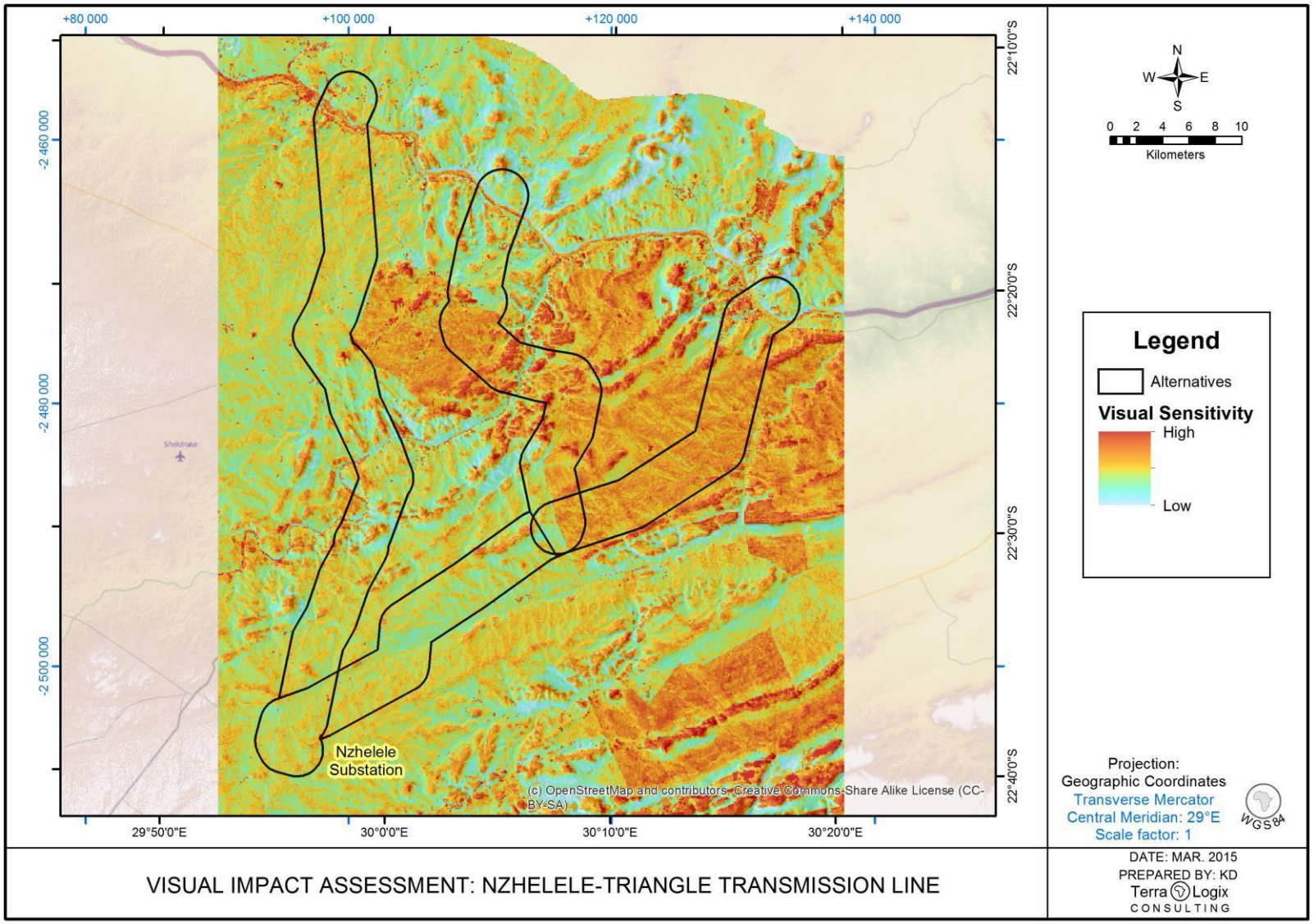

Figure 8 Visual Sensitivity

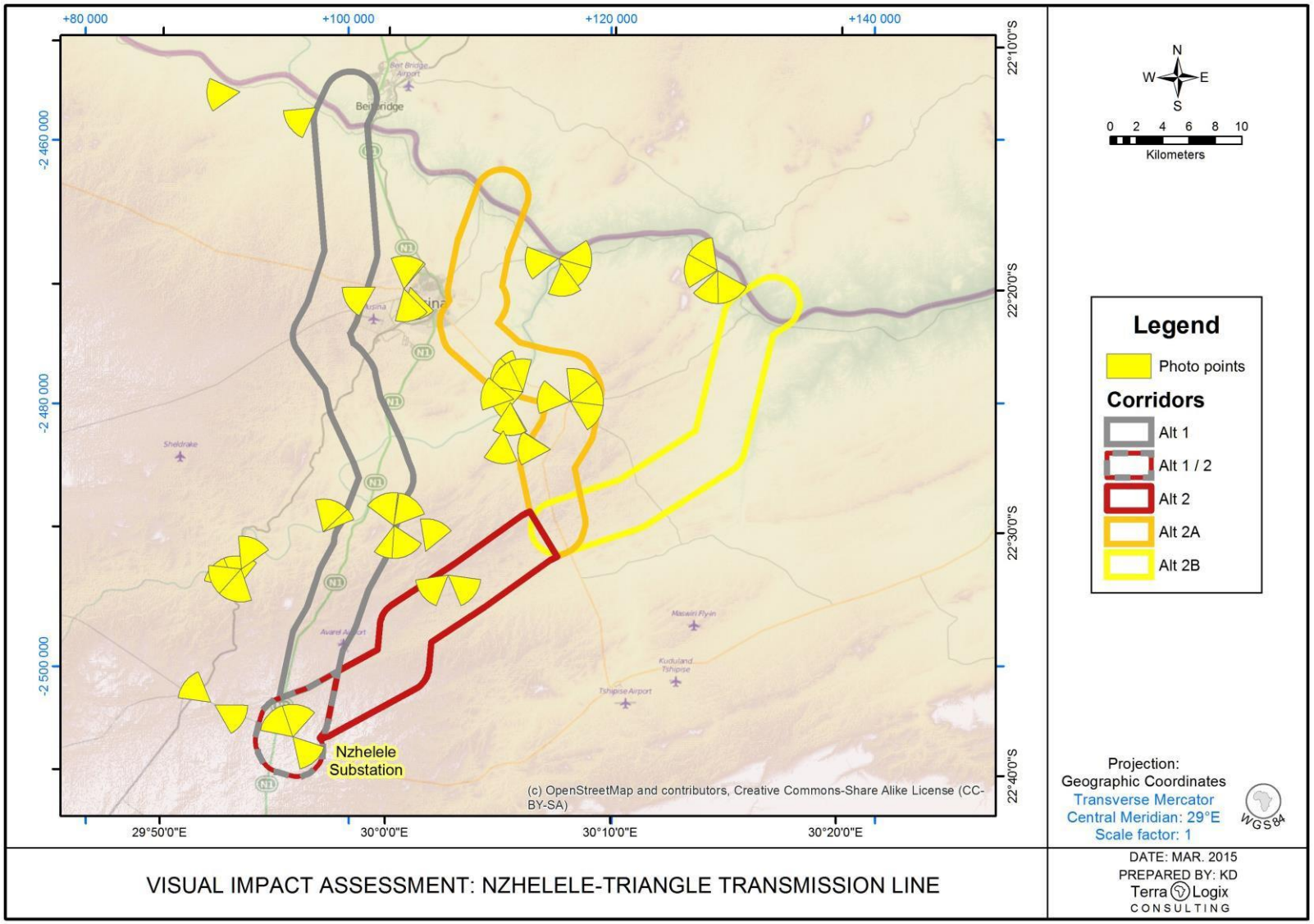

Figure 9 Site visit photo positions

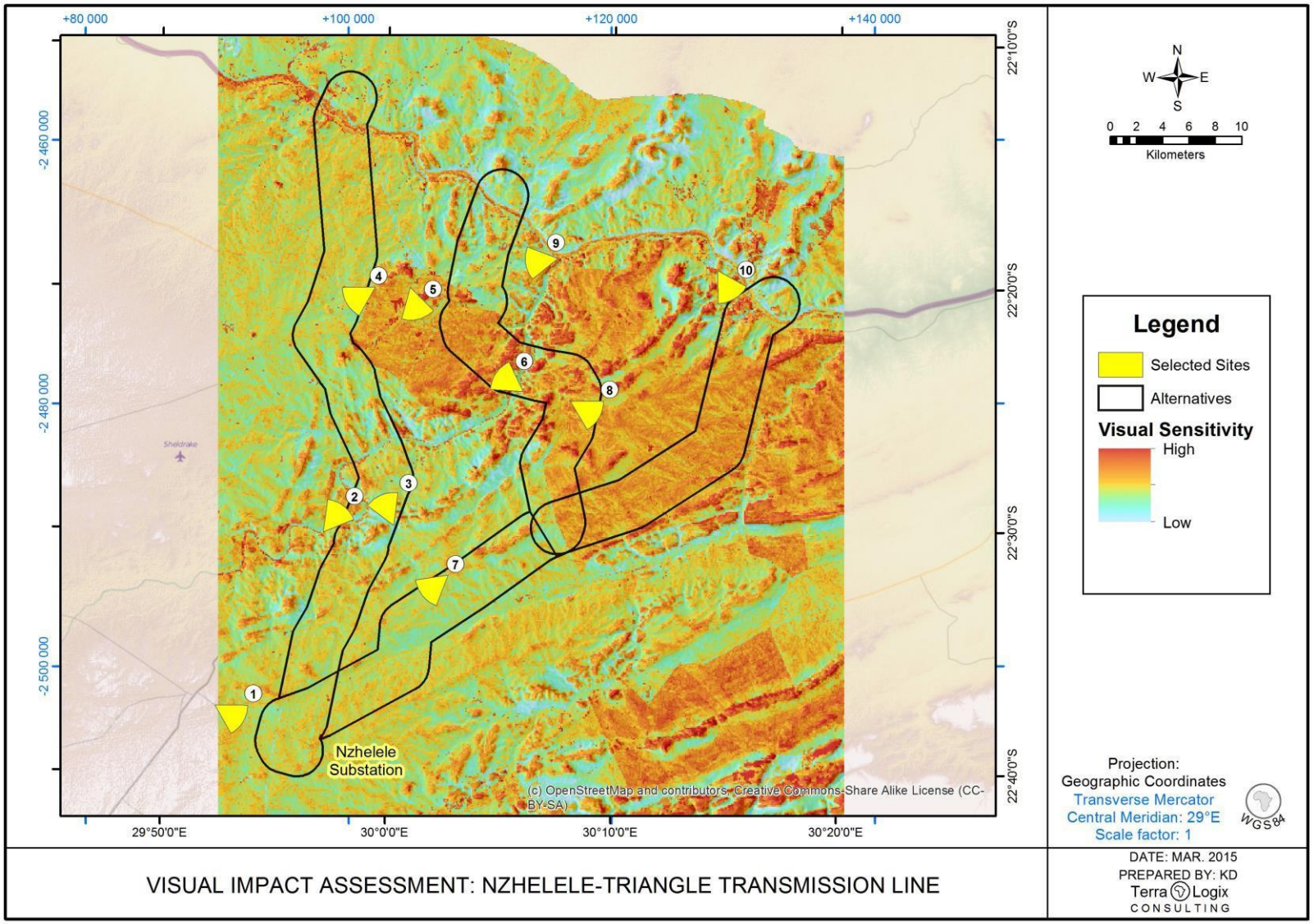

Figure 10 Selected sites for visual contrast rating

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	rolling terrain with mountains in distant background, medium complexity	round tee tops (domed)	linear (tar road)
	Line	diffuse edge	weak, irregular	curving band , bold
	Colour	blue-grey in distant background	green	dark grey
	Texture	mostly fine, coarse in distant background	medium, dense, irregular	fine

Proposed Activity Description

		Land/Water	Vegetation	Structures
Elements	Form	linear forms: servitude / access roads (gravel)	linear forms created by clearings (servitude / access roads / subst.)	lattice towers, power lines, rectangular blocks (substation)
	Line	bold band	regular lines: edge effect of servitude / access roads	bold horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey , brown
	Texture	fine	fine	fine / coarse, regular

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	

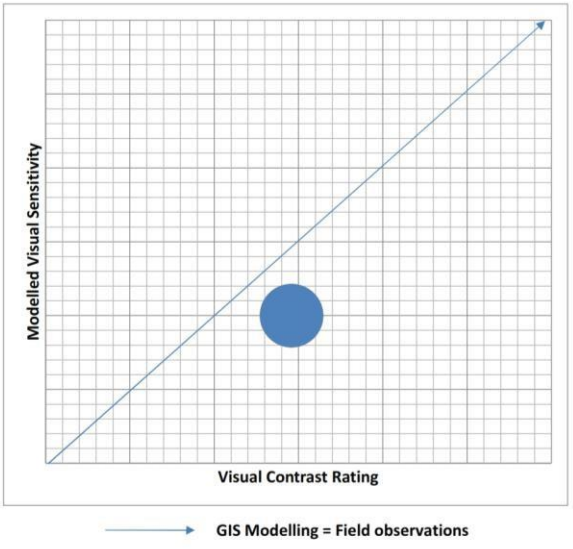

Figure 11 Site 1

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	flat terrain, linear braided stream, medium complexity	round tee tops (domed)	none
	Line	band, bold, curving	weak, irregular	none
	Colour	brown, blush grey	light to dark green	none
	Texture	fine	medium, dense, irregular	none

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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		

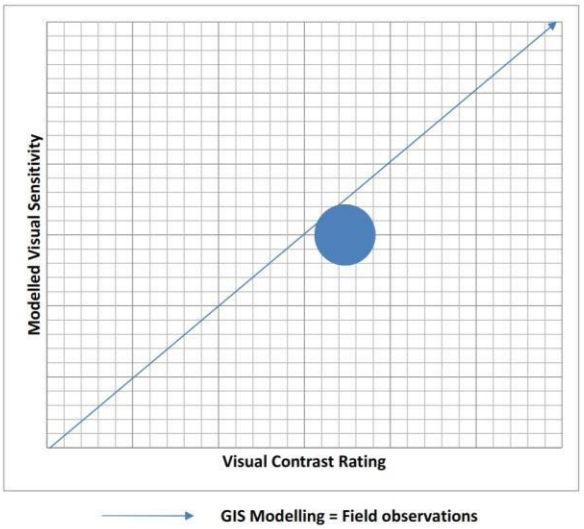

Figure 12 Site 2

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	gently sloping terrain with rounded hill tops, high complexity	smooth regular pasture, round tee tops (domed)	regular, linear (foreground only)
	Line	bold, butt edge	weak, irregular	vertical, horizontal, bold (foreground only)
	Colour	brown	light to dark green	grey, brown (foreground only)
	Texture	fine / coarse	fine, dense, regular / medium, dense, irregular	dens, regular (foreground only)

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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	

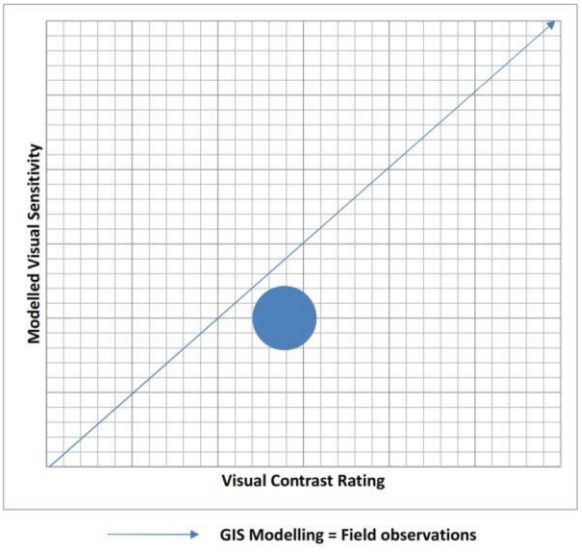

Figure 13 Site 3

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	flat terrain / linear, parallel (dirt road), low complexity	round tee tops (domed)	regular, linear (fence, powerline)
	Line	weak / bold band	weak, irregular	vertical, horizontal, bold
	Colour	brown	light to dark green	dark green, black
	Texture	fine	medium, dense, irregular	medium, dens, regular

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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	

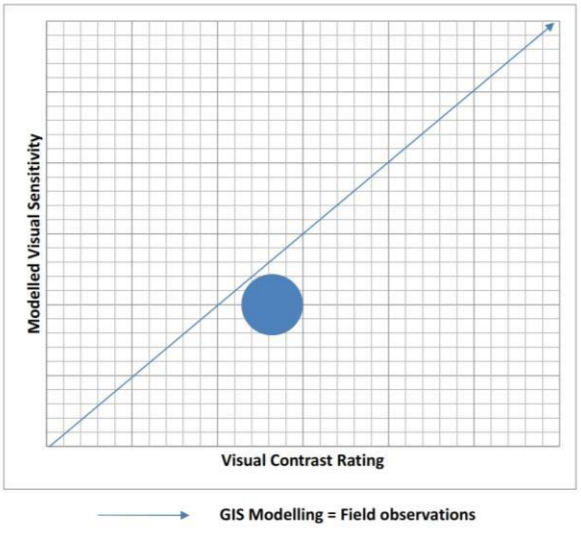

Figure 14 Site 4

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	flat terrain / rounded hill top, medium complexity	flat pasture, irregular shrubs, round tee tops (domed)	regular, linear (power line, tar road) / blocks (houses)
	Line	weak, diffuse edge	weak, irregular	vertical, horizontal, bold, band
	Colour	green, brown	light to dark green	red-brown, grey, white
	Texture	fine / coarse	fine to medium, dense, irregular	fine to coarse, dens, regular

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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	

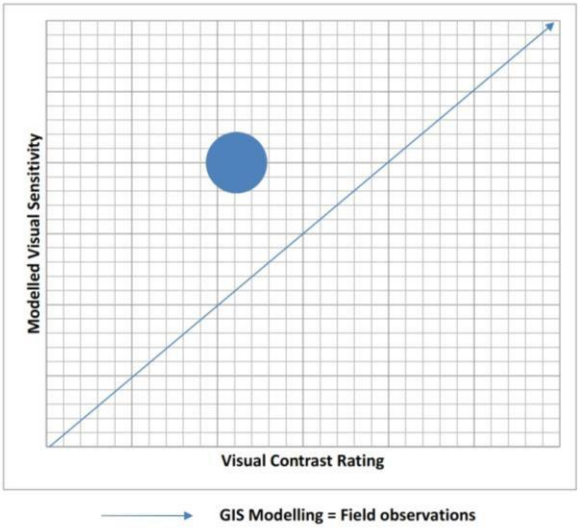

Figure 15 Site 5

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	flat river valley / round hill top, high complexity	irregular shrubs, round tee tops (domed)	none
	Line	diffuse edge	weak, irregular	none
	Colour	light brown, green	light to dark green	none
	Texture	fine to coarse	medium, dense, irregular	none

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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		

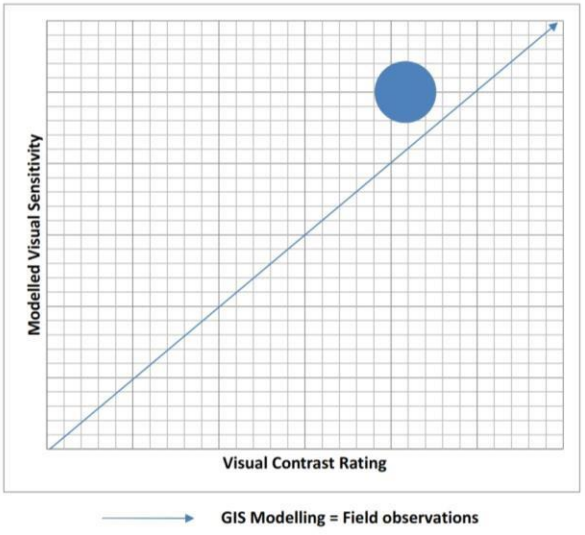

Figure 16 Site 6

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	flat terrain, low compexity	irregular shrubs, round tee tops (domed)	linear (fence, power lines)
	Line	n/a	weak, irregular	mainly horizontal, some vertical , weak
	Colour	brown	light to dark green	light grey
	Texture	coarse	coarse, dense, irregular	fine, regular

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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	

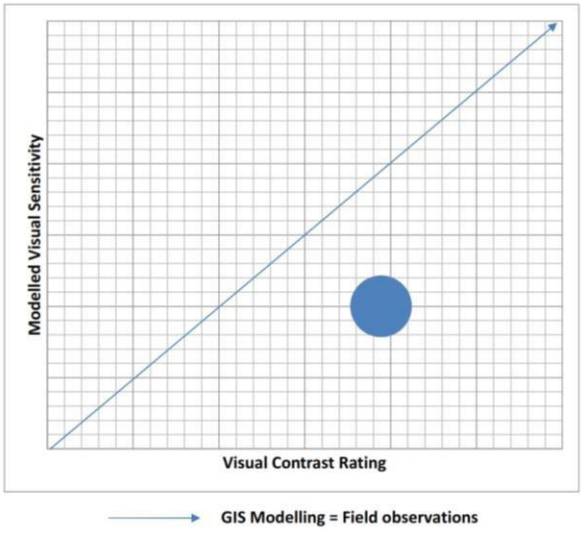

Figure 17 Site 7

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	linear /local elevated area of low rolling terrain, low compexity	irregular shrubs, round tee tops (domed)	none
	Line	strong band / linear, silhouette line (skylines)	weak, irregular	none
	Colour	brown	light to dark green	none
	Texture	fine	coarse, dense, irregular	none

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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		

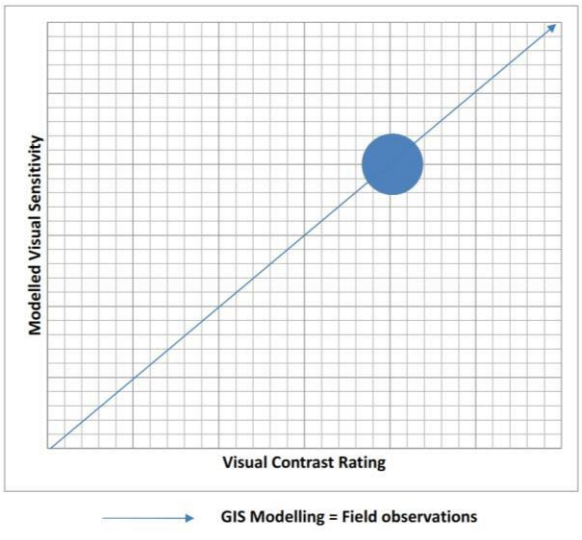

Figure 18 Site 8

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	linear /low rolling terrain, hills in background, medium complexity	irregular shrubs, round tee tops (domed)	none
	Line	bold band / diffuse edge	weak, irregular	none
	Colour	brown to blue-grey	light to dark green	none
	Texture	coarse	coarse, dense, irregular	none

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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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		

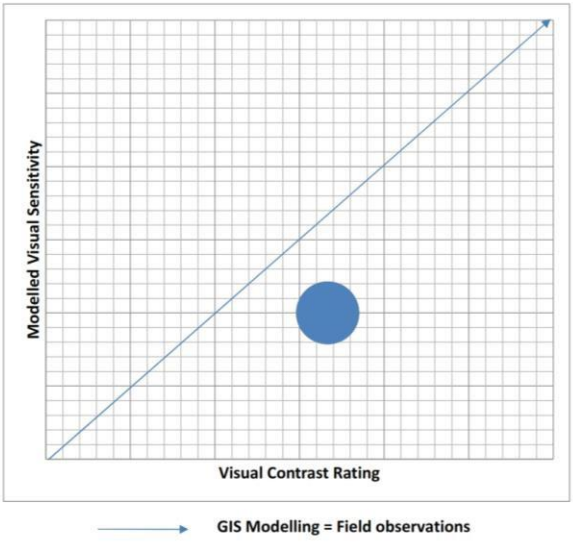

Figure 19 Site 9

Characteristic Landscape Description

		Land/Water	Vegetation	Structures
Elements	Form	local elevated area of low rolling terrain, low compexity	irregular shrubs, round tee tops (domed)	linear (power lines)
	Line	linear, silhouette line (skylines)	weak, irregular	horizontal, weak
	Colour	brown to blue-grey	light to dark green	dark grey
	Texture	fine	coarse, dense, irregular	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	bold band	regular lines: edge effect of servitude / access roads	bold, horizontal, vertical and diagonal
	Colour	brown	green to brown	steel grey
	Texture	fine	fine	fine, regular

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	

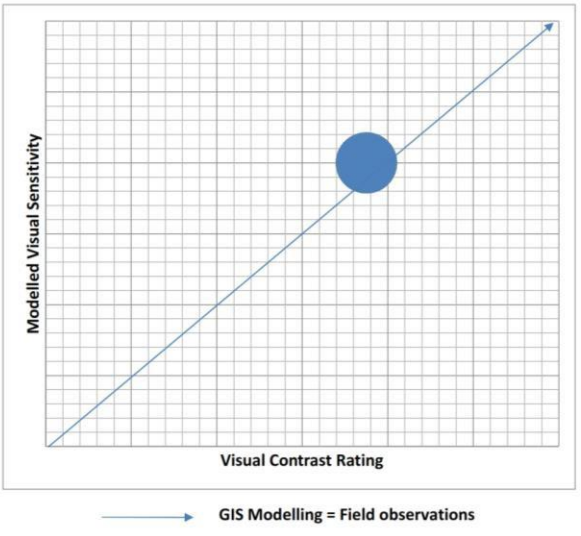

Figure 20 Site 10

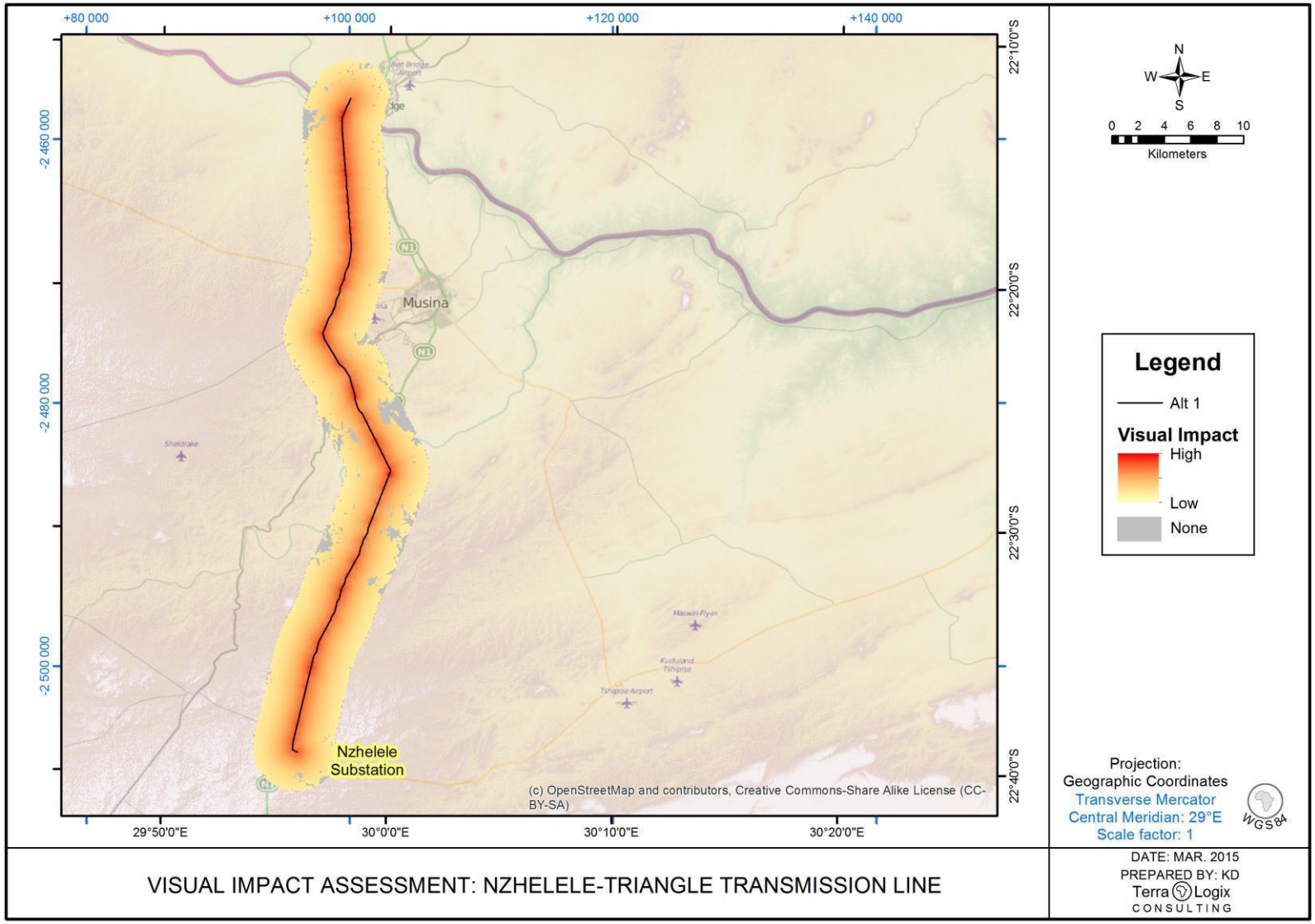

Figure 21 Visual impact, Alternative 1

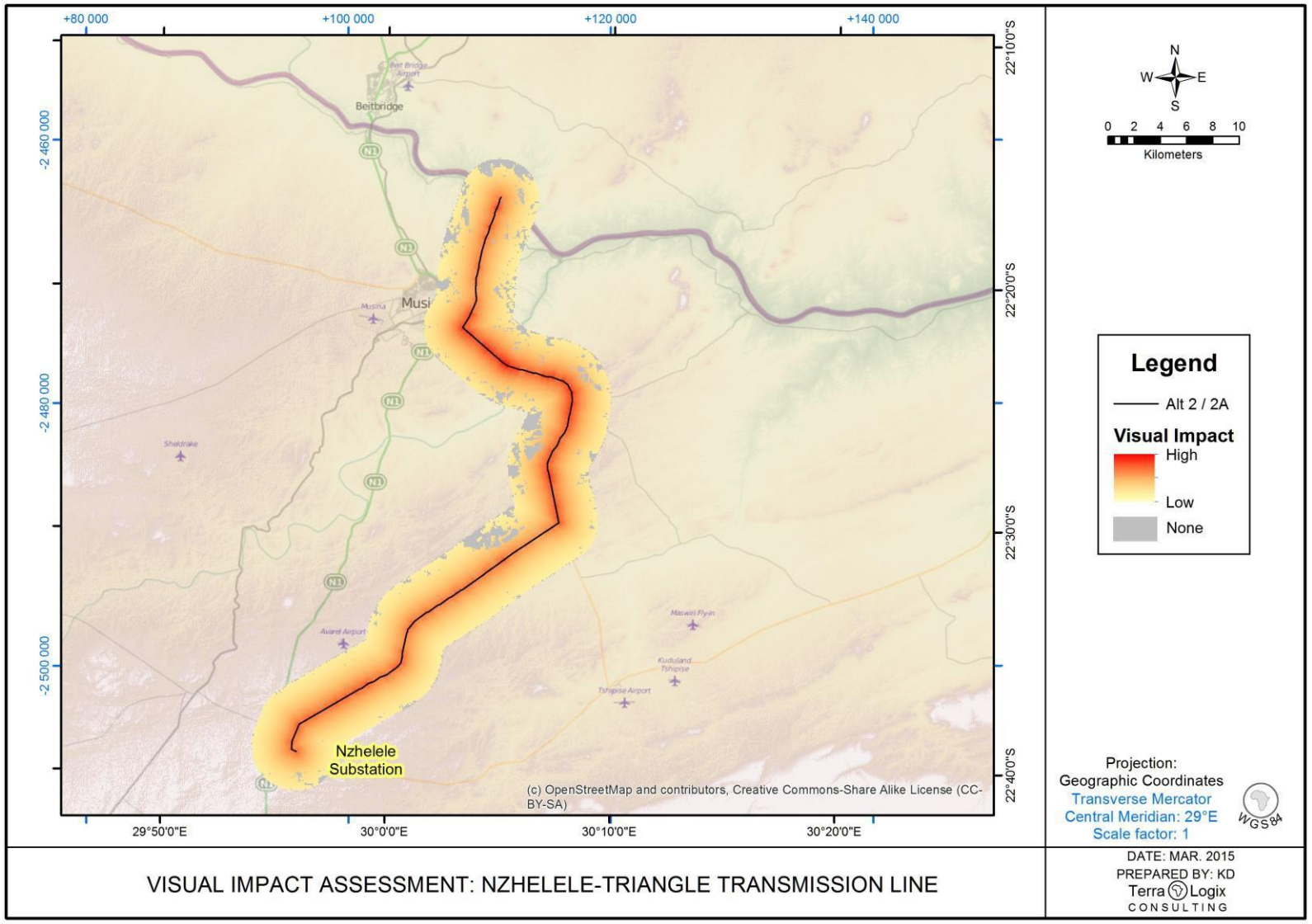

Figure 22 Visual impact, Alternative 2 / 2A

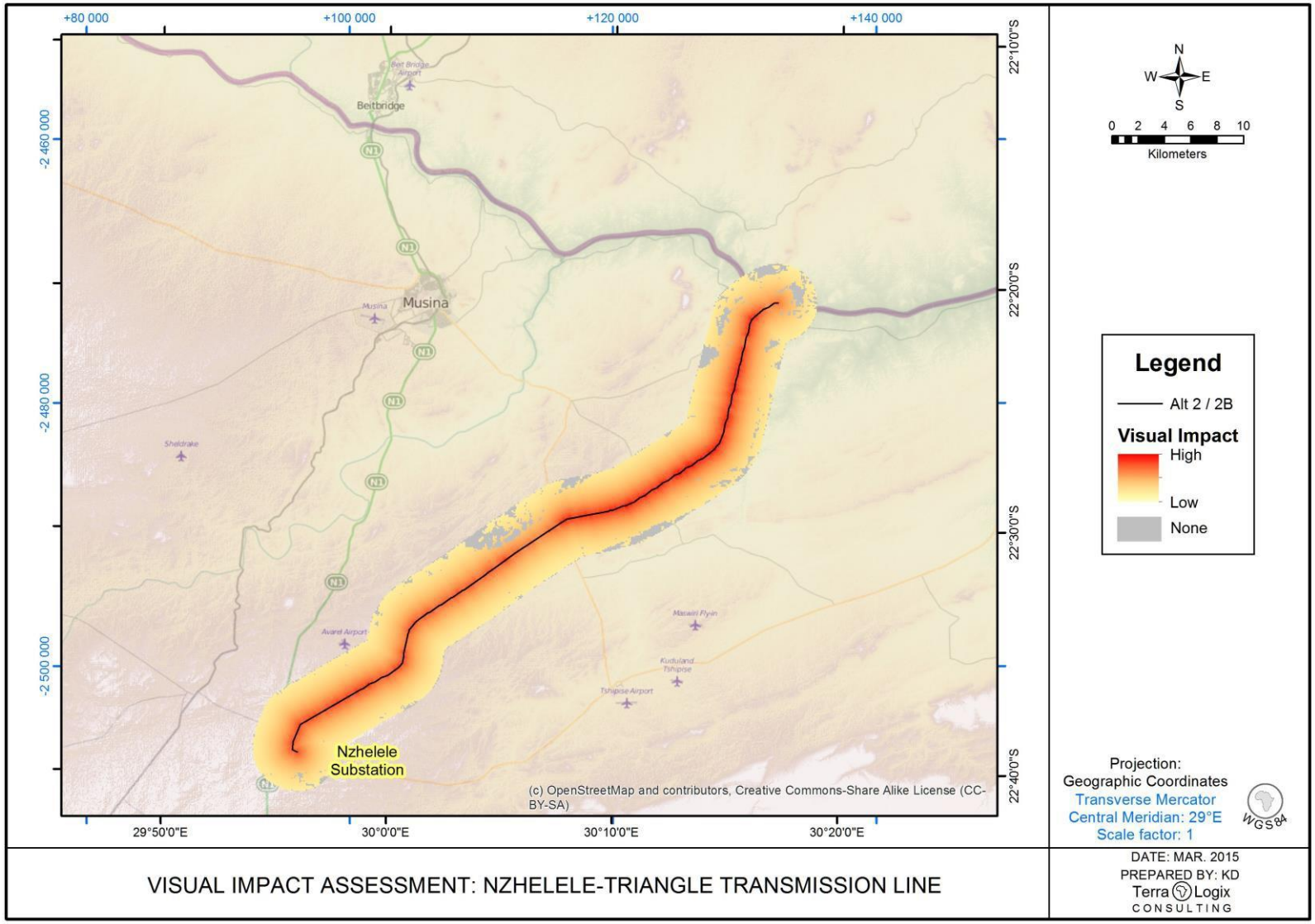

Figure 23 Visual impact for Alternative 2 / 2B