Visual Impact Assessment for the Proposed Khulu TSF and Capital Projects at the Dwarsrivier Chrome Mine

Project Number:

ENG014

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DECLARATION OF INDEPENDENCE

I, Andy Pirie declare that:

- I act as an independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the expertise in conducting the specialist study relevant to this application, including knowledge of the various acts, regulations and any guidelines that have relevance to the proposed project;
- I will comply with the acts, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the study;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; and
- All the particulars furnished by me are true and correct.

Andy Pirie

ACRONYMS AND ABBREVIATIONS

DEM	Digital Elevation Model
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EMP	Environmental Management Programme
GIS	Geographical Information Systems
ha	Hectares
IFC	International Finance Corporation’
km	Kilometres
LoM	Life of Mine
m	Metres
m^2	Square metres
m^3	Cubic metres
mamsl	metres above mean sea level
mtpa	Million tons per annum
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MRA	Mining Right Area
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
ROM	Run of Mine
TSF	Tailings Storage Facility
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment

GLOSSARY OF TERMS

Zone of Potential Influence

The area defined as the radius about an object beyond which the visual impact of its most visible features will be insignificant.

Landscape Character

The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings and roads.

Sense of Place

Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. According to Lynch (1992), sense of place "is the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own".

Aesthetic Value

Aesthetic value is the emotional response derived from the experience of the environment with its particular natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes. The aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character and sense of place.

Visibility

The area/points from which project components will be visible. The visibility is determined through a viewshed analysis.

Viewshed

The two dimensional spatial pattern created by an analysis that defines areas, which contain all possible observation sites from which an object would be visible.

Visual Intrusion

The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.

Visual Exposure

The visual exposure is the relative visibility of a development or feature in a landscape (Oberholzer, 2005). The visual exposure decreases as the distance between the development/feature and visual receptor increases.

Visual Absorption Capacity

The Visual Absorption Capacity (VAC) is the potential of the landscape to conceal the proposed development as a result of topography, vegetation or synthetic features (Oberholzer, 2005).

Visual receptor

A viewer or viewpoint from where the proposed development is visible.

EXECUTIVE SUMMARY

Hydrospatial (Pty) Ltd was appointed by EnviroGistics (Pty) Ltd (hereafter “EnviroGistics”) to undertake a Visual Impact Assessment (VIA) for the proposed Khulu Tailings Storage Facility (TSF) and Capital Projects at the Dwarsrivier Chrome Mine (hereafter “DCM” or the “Mine”). This report has been prepared for EnviroGistics who are currently undertaking the Environmental Authorisation process for the proposed project.

The Mine is situated approximately 60 kilometres (km) north-west of Lydenburg, 25 km south of Steelpoort and 63 km north-east of Roossenekal in the Limpopo Province.

Due to the limited infrastructure height of the capital projects (establishment of diesel and emulsion batching infrastructure, main parking extension at the Mine, widening of an access road and an access crossing between the plant and North Mine), the focus of this VIA is solely on the proposed TSF.

DCM is currently depositing tailings material at the existing North Tailings Storage Facility (North TSF) at the eastern side of their process plant on the Remaining Portion of the Farm Dwarsrivier 372KT. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years. For this reason additional storage capacity on site is required.

The Mine initially identified seven (7) potential sites for the proposed new TSF. A number of studies were undertaken as part of a site selection process and TSF Option B was selected as the most favourable site for the establishment of the Khulu TSF.

Due to the mountainous topography and bushveld vegetation of the region, the study area for the VIA was defined as a 5 km radius around the proposed Khulu TSF. Beyond a 5 km radius, it is highly unlikely that the TSF will exert any visual exposure.

The following were the main findings of the study:

- The regional topography can be described as undulating with numerous mountain ridges and valleys;
- The study area falls within the Sekhukhune Mountain Bushveld with vegetation characterised as open and closed broad leafed savannah on hills and mountain slopes (Mucina & Rutherford, 2006). According to the 2018 South African National Land Cover map (GeoTerraImage, 2019), the land cover of the study area consists mostly of grassland, forested land, cultivated areas and mining areas;
- The landscape of the study area can be broadly divided into two main categories:
    - Natural areas – consisting of natural bushveld areas; and
    - Mining areas – consisting of mine dumps, bare areas and mine infrastructure.
- The visual receptors identified within the study area include:
    - Houses;
    - Lodges; and
    - Motorists travelling on roads within the study area.

- The natural mountainous bushveld sense of place has largely been converted into a mining landscape by the existing mines in the area;
- The cultural landscape of the region is characterised by a rural area that has extensively been disturbed by mining activities and in the recent past by agricultural activities;
- Viewshed modelling indicated that the proposed Khulu TSF will affect much of the same area and visual receptors that are already visually disturbed by the existing TSFs in the area;
- The visual quality of the area prior to any mining activities would have been high, with the bushveld and mountainous landscape that would have fully characterised the area. However, much of this has been converted and the dominant land use in the area is now mining. The remaining bushveld and mountainous backdrops still provides scenic views, and for this reason, a medium scenic quality was assigned to the study area.
- In terms of the VAC, the mountainous terrain on either side of the Dwars River conceals views of the Khulu TSF to within the valley. The vegetation immediately surrounding the Khulu TSF site is fairly open, as this area was previously used for agriculture, and therefore, the vegetation will provide very little cover to conceal the proposed TSF. Further away from the TSF, particularly along the rivers, thicker vegetation occurs, which will conceal views of the TSF. Taking into account the general vegetation and topography of the study area, the VAC was determined to be moderate;
- Due to a number of existing TSFs in the area, as well as other mine infrastructure, the visual intrusion of the proposed Khulu TSF in the landscape was determined to be low;
- The viewer sensitivity of the proposed TSF from farmhouses in the area was determined to have a moderate sensitivity, as the area is already dominated by mining activities. Motorists travelling on the main roads in the area will pass a number of mining activities other than the proposed TSF, and the lodges in the area provide accommodation for people working on the mines and are therefore dependent on the mines. The viewer sensitivity of motorists and the lodges wass determined to be low; and
- The impact assessment indicated that all impacts would have a medium significance pre-mitigation, with most achieving a low significance post-mitigation.

In summary, the natural bushveld landscape of the area has already been altered by mining activities. The proposed mine infrastructure is in line with the current land use and will add to the already altered landscape. It is not foreseen that the current visual quality of the area will be significantly altered by the proposed Khulu TSF. It is therefore the opinion of the specialist that the project can commence, provided that the recommendations and mitigation measures provided in Table 7-1 are implemented.

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1 INTRODUCTION AND BACKGROUND

1.1 Terms of Reference

Hydrospatial (Pty) Ltd was appointed by EnviroGistics (Pty) Ltd (hereafter "EnviroGistics") to undertake a Visual Impact Assessment (VIA) for the proposed Khulu Tailings Storage Facility (TSF) and Capital Projects at the Dwarsrivier Chrome Mine (hereafter "DCM" or the "Mine"). This report has been prepared for EnviroGistics who are currently undertaking the Environmental Authorisation process for the proposed project.

1.2 TSF Site Selection

A site selection for the proposed Khulu TSF was undertaken as part of the scoping phase of the project (Hydrospatial, 2021). Four TSF options were assessed, namely, TSF B, C, D and F (Figure 1-1). The site selection was based on the visible area and the number of visual receptors affected by each of the four TSF options. The outcome of the site selection is indicated in Table 1-1, with rank 1 indicating the most favourable option and rank 4 the least favourable option. Although TSF B was the least favourable option from a visual perspective, it was the most favourable option overall based on a number of other studies, and will therefore be assessed in this study as the preferred site.

Table 1-1: Summary of the visible areas, number of visual receptors impacted and site selection rank

TSF Option	Visible Area (km^2)	No. of Visual Receptors Impacted	Rank*
TSF F	21.5	5	1
TSF C	27.4	12	2
TSF D	30.5	13	3
TSF B	40.6	15	4

* Rank 1 indicates the most favourable option with the least favourable option being rank 4

1.3 Project Description

A description of the proposed projects was obtained from the "Draft Scoping Report for the new Khulu Tailings Storage Facility (TSF) and other Capital Projects" (EnviroGistics, 2021) and is summarized below. Only the Khulu TSF (preferred Option B) is assessed in this study, as the other projects are small and will not result in any conceivable visual impacts.

1.3.1 Project 1: Khulu TSF and Associated Infrastructure

Dwarsrivier Mine is currently depositing tailings material at the existing North Tailings Storage Facility (North TSF) at the eastern side of their process plant on the Remaining Portion of the Farm Dwarsrivier 372KT. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years. For this reason additional storage capacity on site is required.

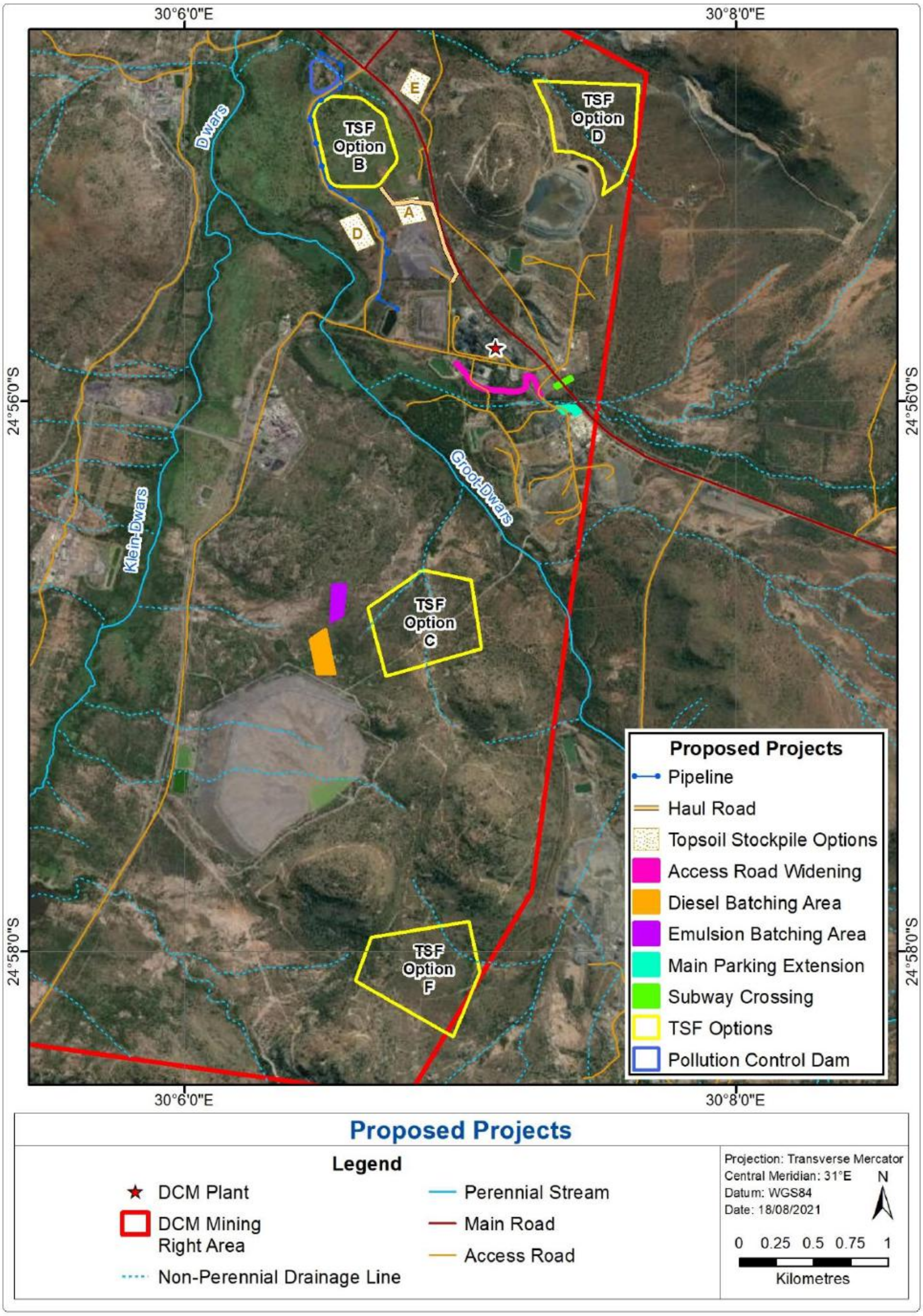

Figure 1-1: Proposed projects

The Mine initially identified seven (7) potential sites for the proposed new TSF, which have since been reduced to four (4) sites (TSF Options), namely Sites B, C, D and F. During the 2019 Site Selection Process, Site D was identified as the preferred site, however, subsequent to the 2019 Site Selection Process, further geotechnical and engineering studies were undertaken, which identified potential concerns for Site D, which include the proximity of a non-perennial tributary of the Dwarsrivier River to the site. Based on the initial view by the Environmental Assessment Practitioner (EAP), Site B was fatally flawed due to its location coinciding with that of the potential future Eskom substation, for which an Environmental Impact Assessment (EIA) has been granted and negotiations in terms of land use between the Mine and Eskom have commenced. In addition to this, the Eskom substation is no longer planned, which has reintroduced Site B into the overall assessment. The geotechnical and engineering studies have excluded Site F as a potential site alternative due to the distance of this site from the plant, reducing the number of areas considered to three (3).

The site alternatives, corresponding footprint areas and anticipated heights, are as follows:

- Site B: 22.5 hectares (ha), 42 m high;
- Site C: 28ha, 29 m high; and
- Site D: 21ha, 49m high.

The project will not involve typical tailings deposition techniques, but will involve the piping of tailings to a filter press facility from where the filter cake will be trucked to the new TSF. An operational life of about 20 years is currently considered as part of the design.

As previously mentioned, based on a site selection process, TSF B was selected as the most favourable site, and will be assessed in this study.

In addition to the above, the following infrastructure is proposed:

- Filter Press Facility (FPF) – tailings will be pumped as slurry from the Plant to a FPF where the tailings will be dewatered. The dewatered tailings will be transported from the FPF to the TSF using trucks;
- Pollution Control Dam (PCD) – to contain dirty water from the Khulu TSF;
- Silt trap – to settle out and reduce the silt that will report to the PCD;
- Pipeline – to transfer water between the proposed PCD and existing Lower Return Water Dam (RWD). The pipeline will mostly follow an existing mine road;
- Haul road – A 1 kilometre (km) haul road is proposed between the TSF and existing mine roads for the hauling of tailings from the new FPF. The haul road will mostly follow an existing road. The haul road will be operated clean, and runoff generated from the haul road will be allowed to drain into the clean environment. The road will be 5 m wide to allow access for one-way 30 ADT traffic; and
- Topsoil stockpile – three topsoil stockpile locations are being considered, namely, options A, D and E. Option A is the most favourable option as it occurs in an area that already has environmental authorisation for the clearance of vegetation as part of the discard dump extension.

1.3.2 Project 2: Diesel and Emulsion Batching

As the underground mining progresses in line with the approved Mining Works Programme, it is required that the surface infrastructure be adapted to suit the development of the mining operations. The surface developments are undertaken to provide efficient and safe operation from a life safety, environmental safety and cost-effective operation perspective. Given the current area of operation at South Shaft and considering the following five (5) year mining plan, the need to consider additional off-loading and bulk Storage of Emulsion and Diesel closer to the immediate work area to a surface position over current strikes at the South Shaft decline have arisen. The mine therefore identified the need to erect two (2) batching areas, for diesel and emulsion batching, respectively, to supply diesel and emulsion to the underground mining operations. The location of the diesel and emulsion batching areas are to the north-east of the old Two Rivers Platinum Mine (TRP) Tailings Storage Facility, with the Diesel Batching area just south of the new TRP tailings pipeline and the Emulsion Batching area just north of the pipeline. The project will include:

- Diesel Batching Area:
  - Construction of an access road, approximately 55 m in length and 6 m in width, to the Diesel Batching area; and
  - Due to the imposed limitations of the Mines Health and Safety Act, 29 of 1996, that limits the storage of hydrocarbons to 3 (Three) days of operation, the majority of the diesel, hydraulic oil and lube oil required will be stored at surface in a purpose designed and constructed terminal that provides the necessary life safety and environmental safety required. The project will involve the storage of two (2) horizontal, aboveground diesel tanks of 33 m^3 each (as well as a possible future 22 m^3 tank), a 40 m^3 API self-bunded tank (Isotainer) for Hydraulic Oil and a 20 m^3 API self-bunded tank for Lube Oil. A total combined storage of 148 m^3.
- Emulsion Batching Area:
  - Construction of an access road, approximately 80 m in length and 6 m in width, to the Emulsion Batching area;
  - No emulsion will be stored at the surface location and all product decanted will be stored underground at a purpose built depot located at Strike N15G / N17A. The surface location will be used for the express purpose of transferring emulsion from a designated road tanker, via the off-loading pipeline to the underground storage tanks; and
  - The mine intends storing a total of 60 (Sixty) tons (similarly 60 m^3) of Emulsion product underground, with no surface storage being done, and no pipeline inventory.
- General:
  - Parking and offloading area, with security offices at both areas (no dangerous goods storage is planned to take place at any time);

- Other internal roads will be required to access the various pipelines, these are however included into the overall clearance consideration of the project, and not as stand-alone roads; and
- The batching areas (diesel and emulsion) will feed into pipelines for underground use at both areas.

Clearance of indigenous vegetation will be required in the order of approximately 3 ha (including Diesel and Emulsion Batching and the access road).

1.3.3 Project 3: Main Parking Extension

The mine requires the expansion of the existing parking area at the Main Offices. The current parking area is about 0.8 ha with the parking bays not sufficient to cater for the number of vehicles. The current parking bay comprises of a paved surface area and steel roof parking bays. The same principle will be applied at the extension area, and no new entrances will be required. The planned parking bay extension will be located about 20 m from the Springkaanspruit.

Clearance of indigenous vegetation will be required in the order of approximately 0.5 ha.

1.3.4 Project 4: Widening of Access Road between South Shaft/Main Offices and Plant

An existing road provides access between the Main Office Buildings and the Plant. The current width of the road ranges between 5 m and 6 m. The mine is planning on increasing a section of 700 m of this road to a width of 16 m to allow for two-way traffic. The purpose is to improve the safe operation of traffic on this road.

Clearance of indigenous vegetation will be required in the order of approximately 0.3 ha.

1.3.5 Project 5: Access Crossing between Plant and North Mine

To ensure more optimal logistical management of traffic between the South Mine and the North Mine, and to reduce the number of vehicles on the regional road, the mine is planning on constructing a road under the regional road bridge to allow for access between the two areas.

Clearance of indigenous vegetation will be required in the order of approximately 0.2 ha.

1.4 Project Location and Study Area Definition

The Mine is situated approximately 60 kilometres (km) north-west of Lydenburg, 25 km south of Steelpoort and 63 km north-east of Roossenekal in the Limpopo Province (Figure 1-2).

Due to the mountainous topography and bushveld vegetation of the region, the study area was defined as a 5 km radius around the proposed Khulu TSF (TSF B). Beyond a 5 km radius, it is highly unlikely that the Khulu TSF will exert any visual exposure.

1.5 Legislative Requirements and Guidelines

The following international and national legislative requirements and guidelines are relevant to the VIA study:

1.5.1 International

The European Landscape Convention (ELC) created by the Council of Europe, was the first international convention to focus exclusively on landscapes. The purpose of this convention is to promote effective management and planning of landscapes. It was signed by the United Kingdom government in 2006 and became binding from 2007. Public documents that explore the impacts of large scale developments, as defined in the ELC, on any landscape should take into account the effects of these developments. A landscape means "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" i.e. the natural, visual and subjectively perceived landscape, (Contesse, 2011; European Landscape Convention, 2007).

There is no regional or local scale legislation pertaining to mining activities and Visual Impact Assessments (VIAs) exclusively but VIAs are relevant to the International Finance Corporation's (IFC) Performance Standards and this will be treated as a best practice guideline.

IFC Performance Standard 3: Resource Efficiency and Pollution Prevention is applicable to the VIA. Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional and global levels. For the purposes of this Performance Standard, the term 'pollution' is used to refer to both hazardous and non-hazardous chemical pollutants in the solid, liquid, or gaseous phases, and includes other components such as pests, pathogens, thermal discharge to water, GHG emissions, nuisance odours, noise, vibration, radiation, electromagnetic energy and the creation of potential visual impacts including light (IFC, 2012).

The Environmental, Health and Safety Guidelines for Mining therefore need to be considered (World Bank, 2007):

"Mining operations, and in particular surface mining activities, may result in negative visual impacts to resources associated with other landscape uses such as recreation or tourism. Potential contributors to visual impacts include high walls, erosion, discoloured water, haul roads, waste dumps, slurry ponds, abandoned mining equipment and structures, garbage and refuse dumps, open pits, and deforestation. Mining operations should prevent and minimise negative visual impacts through consultation with local communities about potential post-closure land-use, incorporating visual impact assessment into the mine reclamation process. Reclaimed lands should, to the extent feasible, conform to the visual aspects of the surrounding landscape. The reclamation design and procedures should take into consideration the proximity to public viewpoints and the visual impact within the context of the viewing distance. Mitigation measures may include strategic placement of screening materials including trees and use of appropriate plant species in the reclamation phase as well as modification of the placement of ancillary and access roads."

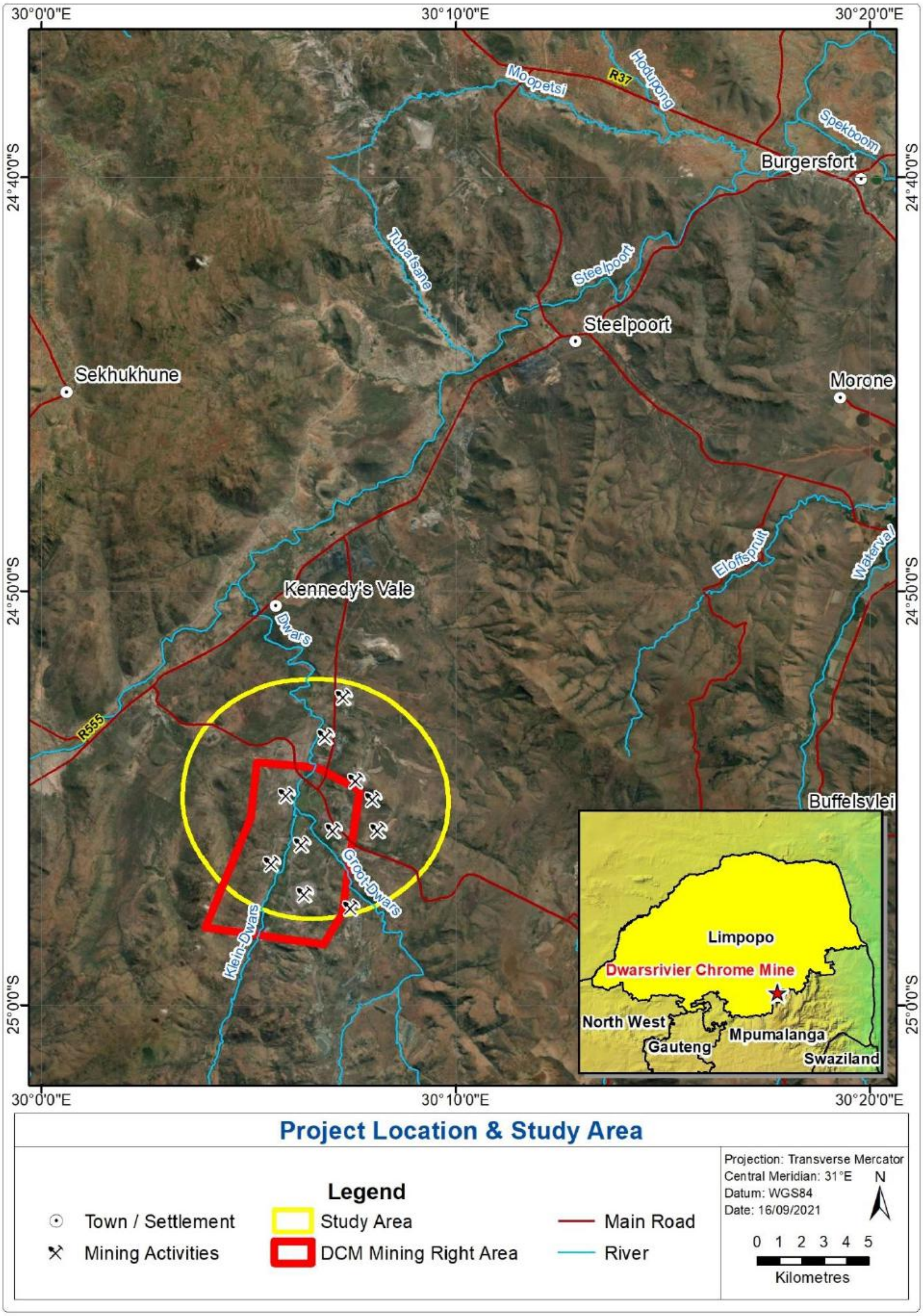

Figure 1-2: Location of the project and study area

1.5.2 National

At a national level, the following legislative documents potentially apply to the VIA:

- Regulations in Chapter 5 (Integrated Environmental Management) of the NEMA and the Act in its entirety. The Act states that “the State must respect, protect, promote and fulfil the social, economic and environmental right of everyone…” Landscape is both moulded by, and moulds, social and environmental features;
- Section 23(1)(d) of the MPRDA, where it is mentioned that a mining right will be granted if “the mining will not result in unacceptable pollution, ecological degradation or damage to the environment”. Visual pollution is a form of environmental pollution and therefore needs to be considered under this section. Holders of rights granted in terms of the MPRDA must at all times give effect to the general objectives of integrated environmental management laid down in Chapter 5 of the NEMA. The Regulations promulgated in terms of the NEMA, with which holders of rights must comply, provide for the assessment and evaluation of potential impacts, and the setting of management plans to mitigate such impacts.
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and related provincial regulations – in some instances there are policies or legislative documents that give rise to the protection of listed sites. The NHRA states that it aims to promote “good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed for future generations”. A holistic landscape whose character is a result of the action and interaction and/or human factors has strong cultural associations as societies and the landscape in which they live are affected by one another in many ways; and
- Section 17 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) sets out the purposes of the declaration of areas as protected areas which includes the protection of natural landscapes. Landscapes are defined by the natural, visual and subjectively perceived landscape; these aspects of a landscape are intertwined to form a holistic landscape context.

Further to the above, the document: “Guideline for involving visual and aesthetic specialists in EIA processes” (Oberholzer, 2005) was used as a guideline.

2 SCOPE OF WORK

The scope of work included the following:

- Provide a baseline (pre-construction) description of the visual and aesthetic characteristics of the study area;
- Provide a visual and aesthetic evaluation of the proposed project; and
- Conduct an impact assessment to assess the visual impacts of the proposed project.

3 METHODOLOGY

3.1 Site Investigation

A site investigation was undertaken on 20 May 2021. The purpose of the site investigation was to investigate the visual and aesthetic characteristics of the landscape and sense of place of the study area, as well as to assess the visibility of the proposed project from viewpoints.

3.2 Baseline Visual and Aesthetic Environment

The purpose of the baseline is to provide a current (pre-construction) description of the study area in terms of the visual and aesthetic characteristics of the landscape. This was done by:

- Assessing aerial imagery of the area;
- Conducting a site visit;
- Assessing the topography of the study area by generating a Digital Elevation Model (DEM); and
- Reviewing literature on the project and general area.

3.3 Visual and Aesthetic Evaluation

The following criteria was used in the visual and aesthetic evaluation:

3.3.1 Visibility and Visual Exposure

The visibility of the project was determined through a viewshed analysis. A viewshed indicates areas within the landscape from where the project will and will not be visible. A DEM for the study area was generated from 5 m topographical contours of the area. The infrastructure height together with the DEM and an average viewer height of 1.7 m, were input into the viewshed analysis tool in the ArcGIS 10.2 3D Analyst extension, in order to generate the viewsheds. Two viewsheds were generated as follows:

- **Existing TSF Viewshed:** A viewshed of the existing TSFs in the study area was generated to establish the degree of the current visibility of these TSFs in the landscape. The location of the existing TSFs is indicated on Figure 5-3 and include:
    - Dwarsrivier Mine North TSF (20 m high);
    - Dwarsrivier Mine old TSF (15 m high);
    - Two Rivers Mine old TSF (50 m high);
    - Two Rivers Mine new TSF (80 m high);
    - Tweefontein Samancor TSF (10 m high); and
    - Thorncliffe Mine TSF (15 m high).
- **Proposed Khulu TSF Viewshed:** The proposed height of 42 m for the Khulu TSF was used to generate a viewshed.

The purpose of generating two viewsheds was to determine whether there would be an increase in the current visibility of the TSFs in the landscape should the Khulu TSF be constructed.

The visual exposure is the relative visibility of a development or feature in a landscape (Oberholzer, 2005). The visual exposure decreases as the distance between the development/feature and visual receptor increases. The visual exposure for the project was determined to be:

- High – between 0 to 2 km;
- Medium – between 2 to 4 km; and
- Low – between 4 to 5 km.

3.3.2 Visual/Scenic Quality

The visual quality is determined to be high when:

- The landscape offers dramatic, rugged topography and/or visually appealing water forms are present;
- Pleasing, dramatic or vivid patterns and combinations of landscape features and vegetation are found;
- The landscape is without visually intrusive or polluting urban, agriculture or industrial development (i.e.it reveals a high degree of integrity); and/or
- Outstanding or evocative features and landmarks are present; and
- The landscape/townscape is able to convey meaning.

3.3.3 Visual Absorption Capacity

The Visual Absorption Capacity (VAC) is the potential of the landscape to conceal the proposed development as a result of topography, vegetation or synthetic features (Oberholzer, 2005). The criteria used to assess the VAC is indicated in Table 3-1.

Table 3-1: Visual absorption capacity criteria

High	Moderate	Low
The area is effectively able to screen visual impacts: • Undulating or mountainous topography and relief; • Good screening vegetation (high and dense); • Is highly urbanised in character; and • Existing development is of a scale and density to absorb the	The area is partially able to screen visual impacts: • Moderately undulating topography and relief; • Some or partial screening vegetation; • A relatively urbanised character; and • Existing development is of a scale and density to absorb the visual impact to some extent.	The area is not able to screen the visual impacts: • A flat topography; • Low growing or sparse vegetation; • Is not urbanised; and • Existing development is not of a scale and density to absorb the visual impact to some extent.

visual impact.		

3.3.4 Visual Intrusion

Visual intrusion is the level of compatibility or congruence of a project with the particular qualities of the area, or its 'sense of place' (Oberholzer, 2005). The criteria used to assess the visual intrusion is indicated in Table 3-2.

Table 3-2: Visual intrusion criteria

High	Moderate	Low
The development /activity results in a noticeable change or is discordant with the surroundings: • Is not consistent with the existing land use of the area; • Is not sensitive to the natural environment; • Is very different to the urban texture and layout; • The buildings and structures are not congruent / sensitive to the existing architecture / buildings; and • The scale and size of the activities are different to nearby existing activities.	The development/activity partially fits into the surroundings but is clearly noticeable: • Is moderately consistent with the existing land use of the area; • Is moderately sensitive to the natural environment; • Is moderately consistent with the urban texture and layout; • The buildings and structures are moderately congruent / sensitive to the existing architecture / buildings; and • The scale and size of the activities are moderately similar to nearby existing activities.	The development/activity results in a minimal change to the surroundings and blends in well: • Is consistent with the existing land use of the area; • Is highly sensitive to the natural environment; • Is consistent with the urban texture and layout; • The buildings and structures are congruent / sensitive to the existing architecture / buildings; and • The scale and size of the activities are similar to nearby existing activities.

3.3.5 Viewer Sensitivity

Visual receptors inform the viewer sensitivity. The criteria used to assess the viewer sensitivity is indicated in Table 3-3.

Table 3-3: Viewer sensitivity criteria

High	Moderate	Low
• Residential areas; • Lodges, resorts and hotels; • Nature reserves; and • Scenic routes / trails.	• Sporting and recreational areas; and • Places of work.	• Industrial areas; • Active mining areas; and • Severely degraded areas.

3.4 Impact Assessment

The impact assessment methodology used to rate the potential visual impacts pre- and post-mitigation is provided below. The evaluation of impacts is conducted in terms of the criteria detailed in Table 3-4 to Table 3-9. The various impacts of the project are discussed in terms of impact status, extent, duration, probability and intensity. Impact significance is the sum of the impact extent, duration, probability and intensity, and a numerical rating system is applied to evaluate impact significance. Therefore, an impact magnitude and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance in Table 3-9. The various components of impact methodology are discussed below.

3.4.1 Impact Status

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. The nature of the impact can be described as negative, positive or neutral (Table 3-4).

Table 3-4: Impact status

Rating	Description	Quantitative Rating
Positive	A benefit to the receiving environment.	P
Neutral	No cost or benefit to the receiving environment.	-
Negative	A cost to the receiving environment.	N

3.4.2 Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent or affects a wide area. Impact extent can be site-specific (within the boundaries of the development area), local, regional or national and/or international (Table 3-5).

Table 3-5: Extent of the impact

Rating	Description	Quantitative Rating
Low	**Site-specific**; occurs within the site boundary.	1
Medium	**Local**; extends beyond the site boundary; affects the immediate surrounding environment (i.e. up to 5 km from the project site boundary).	2
High	**Regional**; extends far beyond the site boundary; widespread effect (i.e. 5 km and more from the project site boundary).	3
Very High	**National and/or international**; extends far beyond the site boundary; widespread effect.	4

3.4.3 Impact Duration

The duration of the impact refers to the time scale of the impact or benefit (Table 3-6).

Table 3-6: Duration of the impact

Rating	Description	Quantitative Rating
Low	**Short-term**; quickly reversible; less than the project lifespan; 0 – 5 years.	1
Medium	**Medium-term**; reversible over time; approximate lifespan of the project; 5 – 17 years.	2
High	**Long-term**; permanent; extends beyond the decommissioning phase; >17 years.	3

3.4.4 Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring (Table 3-7).

Table 3-7: Probability of the impact

Rating	Description	Quantitative Rating
Improbable	Possibility of the impact materialising is negligible; chance of occurrence <10%.	1
Probable	Possibility that the impact will materialise is likely; chance of occurrence 10 – 49.9%.	2
Highly Probable	It is expected that the impact will occur; chance of occurrence 50 – 90%.	3
Definite	Impact will occur regardless of any prevention measures; chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures; chance of occurrence >90% and is likely to result in in cumulative impacts.	5

3.4.5 Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project (Table 3-8).

Table 3-8: Intensity of the impact

Rating	Description	Quantitative Rating
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	+5
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	+4
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue,	+3

Rating	Description	Quantitative Rating
	albeit in a modified, beneficial way.	
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	+2
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	+1
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	0
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected.	-1
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	-2
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	-3
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	-4
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	-5

3.4.6 Impact Significance

The impact magnitude and significance rating is utilised to rate each identified impact in terms of its overall magnitude and significance (Table 3-9).

Table 3-9: Impact magnitude and significance rating

Impact	Rating	Description	Quantitative Rating
Positive	**High**	Of the highest positive order possible within the bounds of impacts that could occur. +	+12 to -16
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort	+6 to -11

Impact	Rating	Description	Quantitative Rating
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming	+1 to –5
No Impact	No Impact	Zero Impact	
Negative	**Low**	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	-1 to -5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required	-6 to -11
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	-12 to -17

4 ASSUMPTIONS AND LIMITATIONS

The following are assumptions and limitations of the study:

- 5 m topographical contours were used to model the viewshed as they were the best available elevation data for the study area. Due to the fairly course scale contours used, there could thus be areas that may or may not be visible;
- It should be understood that VIAs can be subjective, based on the specialists visual and aesthetic experience of the study area;
- The average height of a viewer in the landscape was assumed to be 1.70 m; and
- The viewshed modelling only considered the topography of the terrain of the study area and not the vegetation, and can therefore be considered a worst-case visibility scenario.

5 BASELINE VISUAL AND AESTHETIC ENVIRONMENT

5.1 Topography

The topography of an area in which a project is located, plays an important role in the visibility of a project. For instance, in mountainous areas, a project may be concealed within a valley and not be visible to visual receptors. However, if a project is developed on top of a mountain, or in an open flat area, it may be visible to many visual receptors. Figure 5-1 demonstrates the role that the topography plays in the visibility of a project.

The regional topography can be described as undulating with numerous mountain ridges and valleys (Figure 5-3). A mountain ridge runs along the western boundary of the Mining Right Area (MRA), where a maximum elevation of approximately 1 630 metres above mean sea level (mamsl) is reached. From this ridge, the elevation drops off to approximately 900 mamsl near the confluence of the Klein and Groot Dwars Rivers. A number of koppies and hills are located along the central eastern part of the study area.

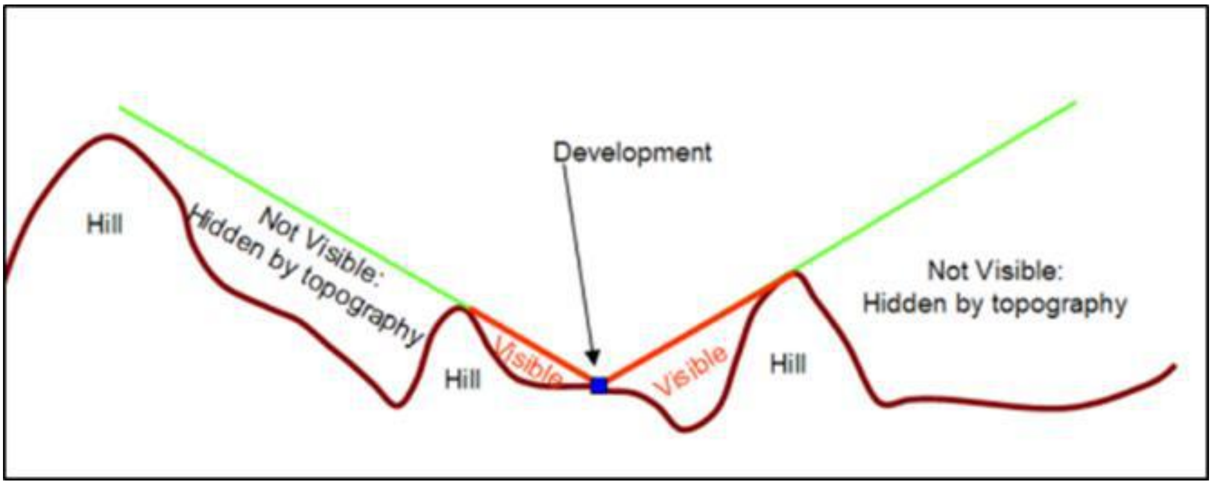

Figure 5-1: The role of topography in the visibility of a project

5.2 Land Cover/Use

Similar to topography, the land cover/use of an area plays an important role in the visibility of a project. Tall dense vegetation can conceal a project from visual receptors, while projects located in open areas consisting of grassland vegetation, are likely to be more visible to receptors.

The study area falls within the Sekhukhune Mountain Bushveld with vegetation characterised as open and closed broad leafed savannah on hills and mountain slopes (Mucina & Rutherford, 2006). Figure 5-2 provides an indication of the typical vegetation of the study area. According to the 2018 South African National Land Cover map (GeoTerraImage, 2019), the land cover of the study area consists mostly of grassland, forested land, cultivated areas and mining areas (Figure 5-4).

Figure 5-2: Typical vegetation within the study area

5.3 Landscape Characterisation

The landscape of the study area can be broadly divided into two main categories:

- Natural areas – consisting of natural bushveld areas; and
- Mining areas – consisting of mine dumps, bare areas and mine infrastructure.

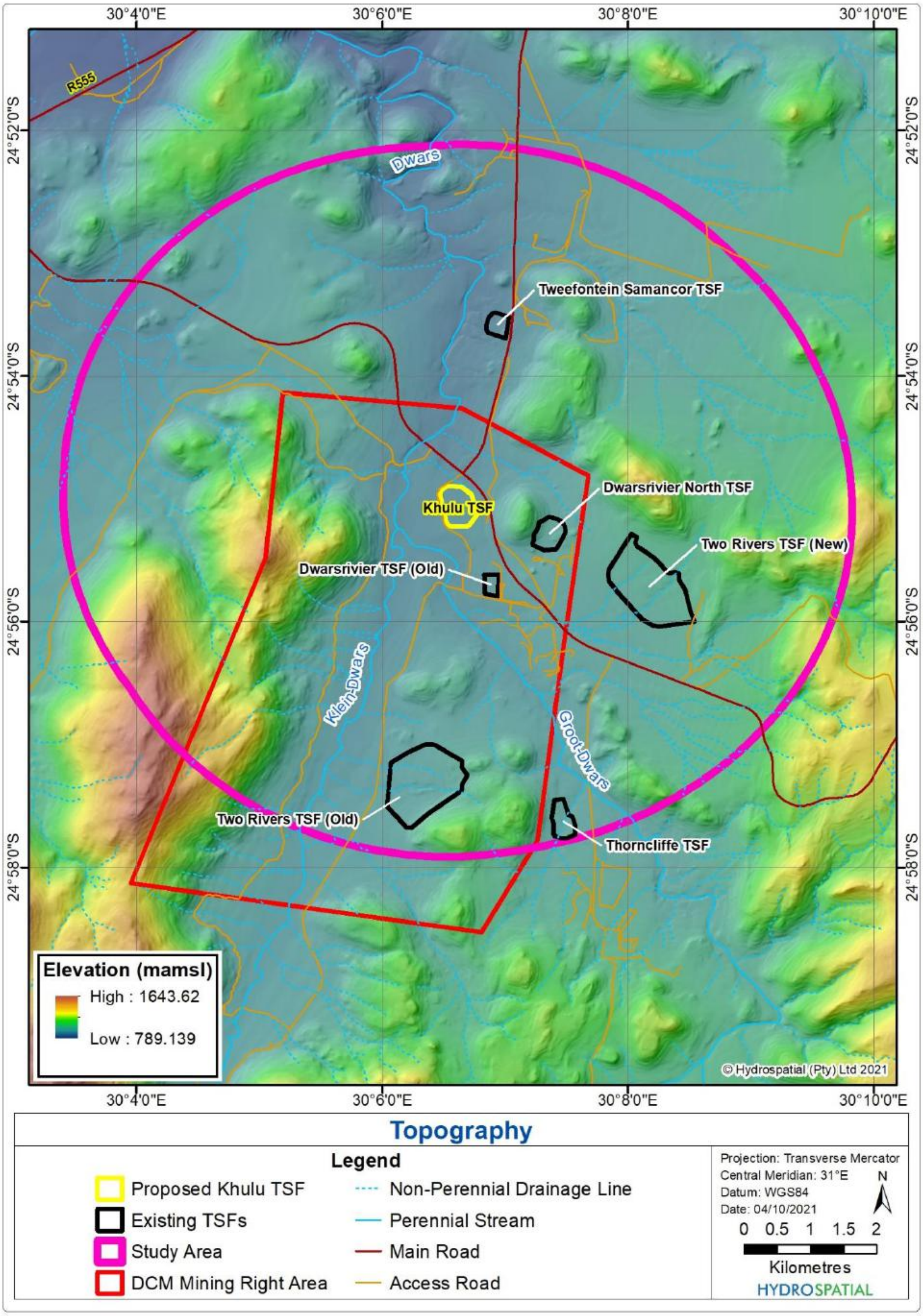

Figure 5-3: Topography of the study area

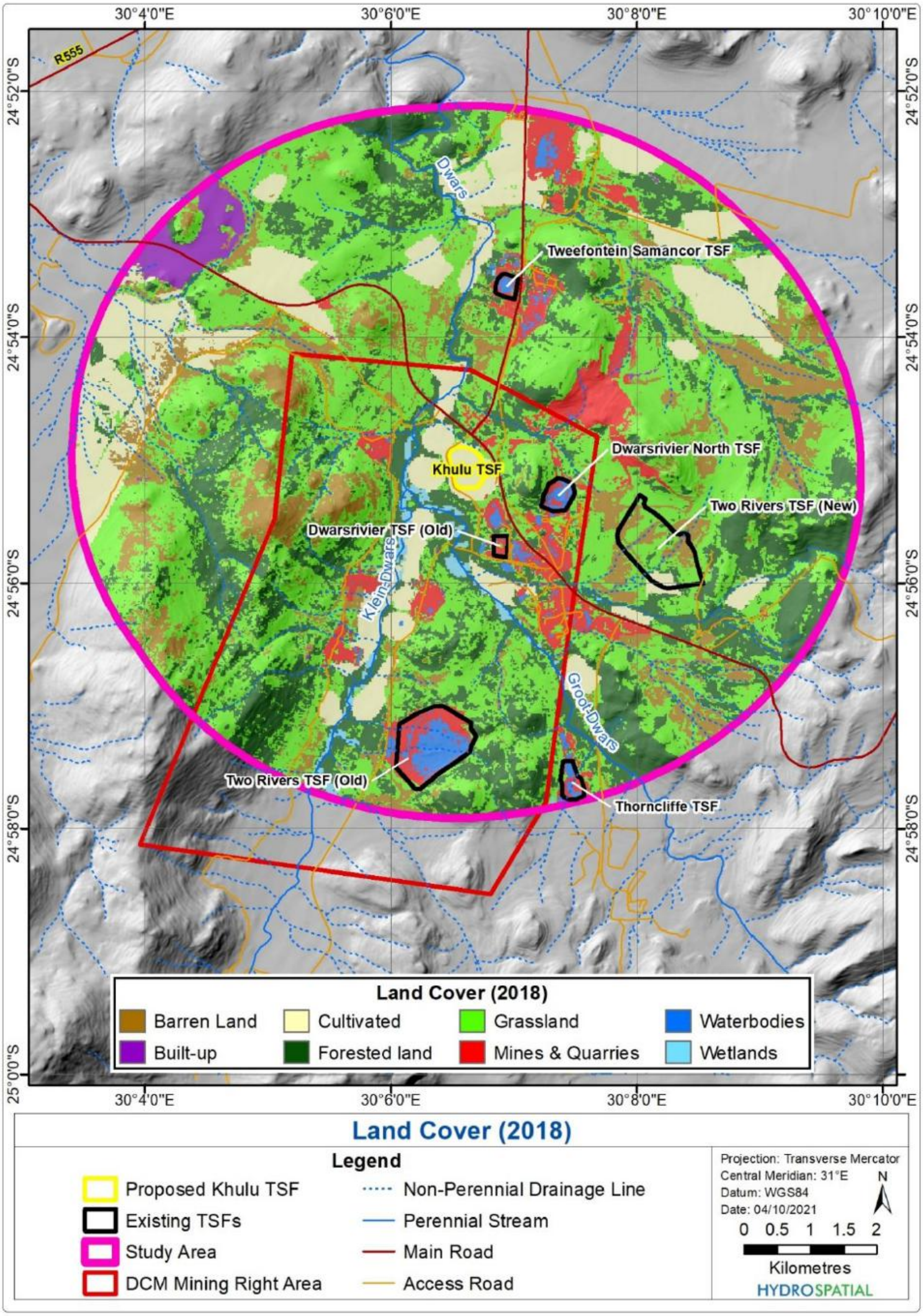

Figure 5-4: Land cover of the study area

5.4 Visual Receptors

The following visual receptors have been identified within the study area and are indicated on Figure 5-5:

- Houses;
- Lodges; and
- Motorists travelling on roads within the study area.

5.5 Sense of Place

Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. According to Lynch (1992), sense of place is "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own".

Mining activities within the study area, primarily from the Dwarsrivier Chrome Mine, Two Rivers Mine, De Groote Boom Mine, Samancor Tweefontein Mine and Thorncliffe Mine, characterise the landscape. The natural bushveld sense of place has largely been converted into a mining landscape.

5.6 Protected Areas

No protected areas fall within the study area.

5.7 Cultural Landscape

According to HCAC (2021), the cultural landscape of the region is characterised by a rural area that is extensively disturbed by mining activities and in the past by agricultural activities. From the archaeological database of the general area archaeological settlements show different land use patterns. Many agriculturally orientated societies (making Eiland, Leolo and Marateng pottery) built their villages in the valleys near cultivatable alluvium. Others (probably Ndebele) built terraced settlements on basal slopes of the valley edge, while farm labourers usually lived in the valleys as well. During the 19th Century, farmers lived around the edge of high meadows as a measure of protection. A few Middle Iron Age Eiland sites were also cited in this plateau environment.

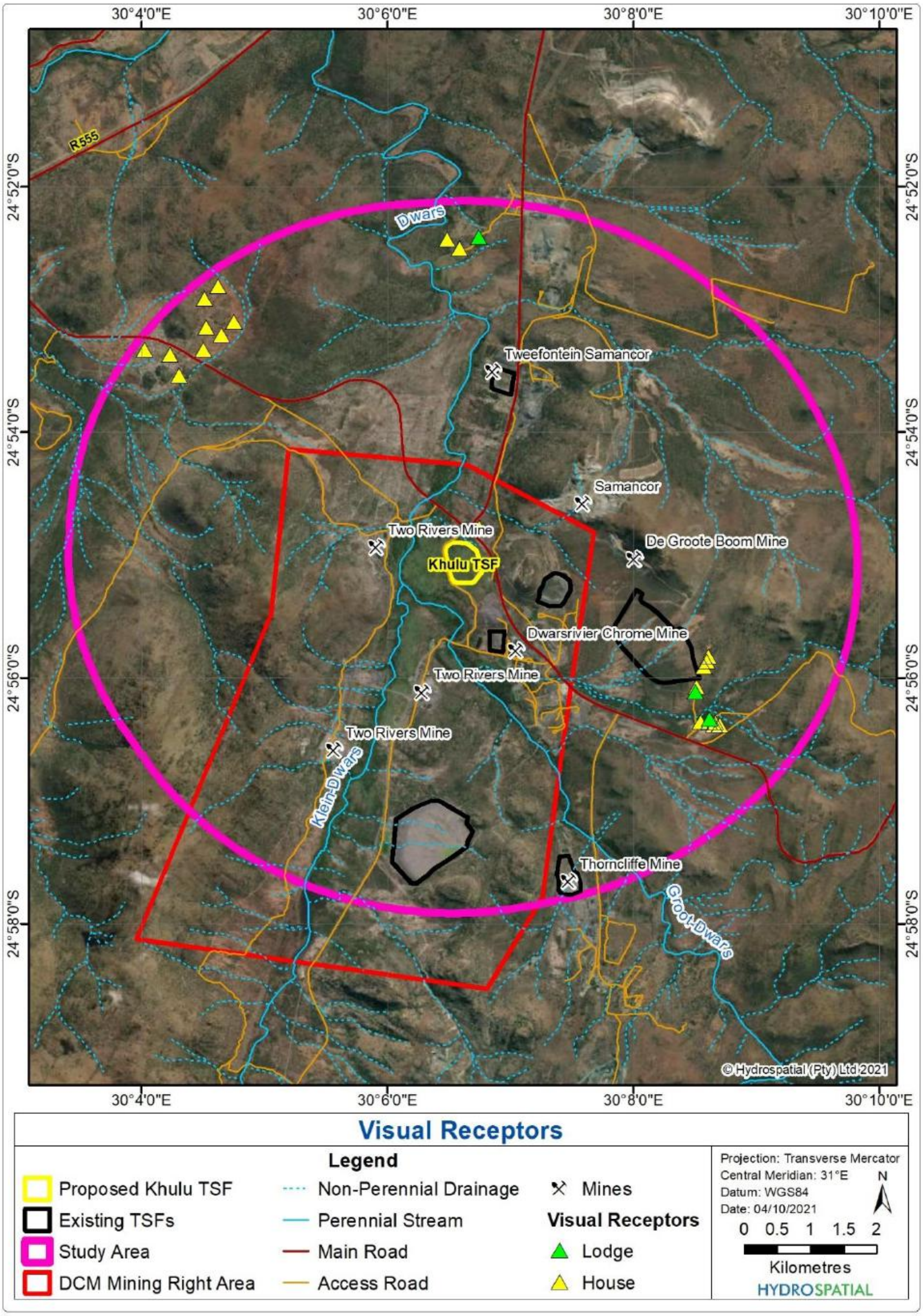

Figure 5-5: Visual receptors within the study area

6 VISUAL AND AESTHETIC EVALUATION

6.1 Visibility and Visual Exposure

Viewshed analysis modelling was undertaken to determine the visibility of the project. Two viewsheds were generated as follows:

- **Existing TSFs Viewshed:** A viewshed of the existing TSFs in the study area was generated to establish the degree of the current visibility of these TSFs in the landscape. The existing TSFs include:
  - Dwarsrivier Mine North TSF (20 m high);
  - Dwarsrivier Mine old TSF (15 m high);
  - Two Rivers Mine old TSF (50 m high);
  - Two Rivers Mine new TSF (80 m high);
  - Tweefontein Samancor TSF (10 m high); and
  - Thorncliffe Mine TSF (15 m high).
- **Proposed Khulu TSF Viewshed:** The proposed height of 42 m for the Khulu TSF was used to generate a viewshed.

The purpose of generating two viewsheds was to determine whether there would be an increase in the current visibility of the existing TSFs in the landscape should the Khulu TSF be constructed.

The visual exposure is the relative visibility of a development or feature in a landscape (Oberholzer, 2005). The visual exposure decreases as the distance between the development/feature and visual receptor increases. The visual exposure for the project was determined to be:

- High – between 0 to 2 km;
- Medium – between 2 to 4 km; and
- Low – between 4 to 5 km.

6.1.1 Existing TSFs Visibility

The existing TSFs viewshed is indicated on Figure 6-1 along with the affected visual receptors. The viewshed indicated that the existing TSFs are mostly visible along the valleys of the Klein Dwars, Groot Dwars and Dwars Rivers. The mountain ridges that run along the western and north-eastern DCM mining right boundary prevents the TSFs from being visible from the western and north-eastern parts of the study area. A number of houses and three lodges are already affected by views of the existing TSFs. Motorists travelling along the main roads within the study area will experience closeup views of the existing TSFs, especially the large new Two Rivers Mine TSF.

6.1.2 Proposed Khulu TSF Visibility

The Khulu TSF viewshed and affected visual receptors is indicated on Figure 6-2. The viewshed indicated that the proposed TSF will mostly be visible along the valleys of the rivers, with views from the western and eastern parts of the study area blocked by mountain ridges. The visible area of the Khulu TSF covers much of the same area as the existing TSFs. The same visual receptors that are already impacted by the existing TSFs will be impacted by the Khulu TSF. The lodges within the visible area, namely the Escal Lodge and Chrome Valley Lodge, primarily provide accommodation for contractors and consultants working on the mines in the area. The same main roads affected by the existing TSFs will also be impacted by the Khulu TSF. Mining activities are the main land use within the high and medium exposure areas.

Table 6-1 shows the visible areas within the study area, number of affected visual receptors, and the length of main road within the visible area for both the existing TSFs and Khulu TSF. The existing TSFs have a larger visible area in comparison to the Khulu TSF. Both viewsheds affect the same visual receptors, whilst the Khulu TSF will impact on a slightly longer length of main road.

Table 6-1: Visible areas, visual receptors and length of main road affected by the viewsheds

Viewshed	Total Visible Area within the Study Area (km^2)	No. of Visual Receptors in the Visible Area	Length of Main Road in the Visible Area (km)
Existing TSF viewshed	55.1	15	11
Khulu TSF viewshed	40.6	15	12.5

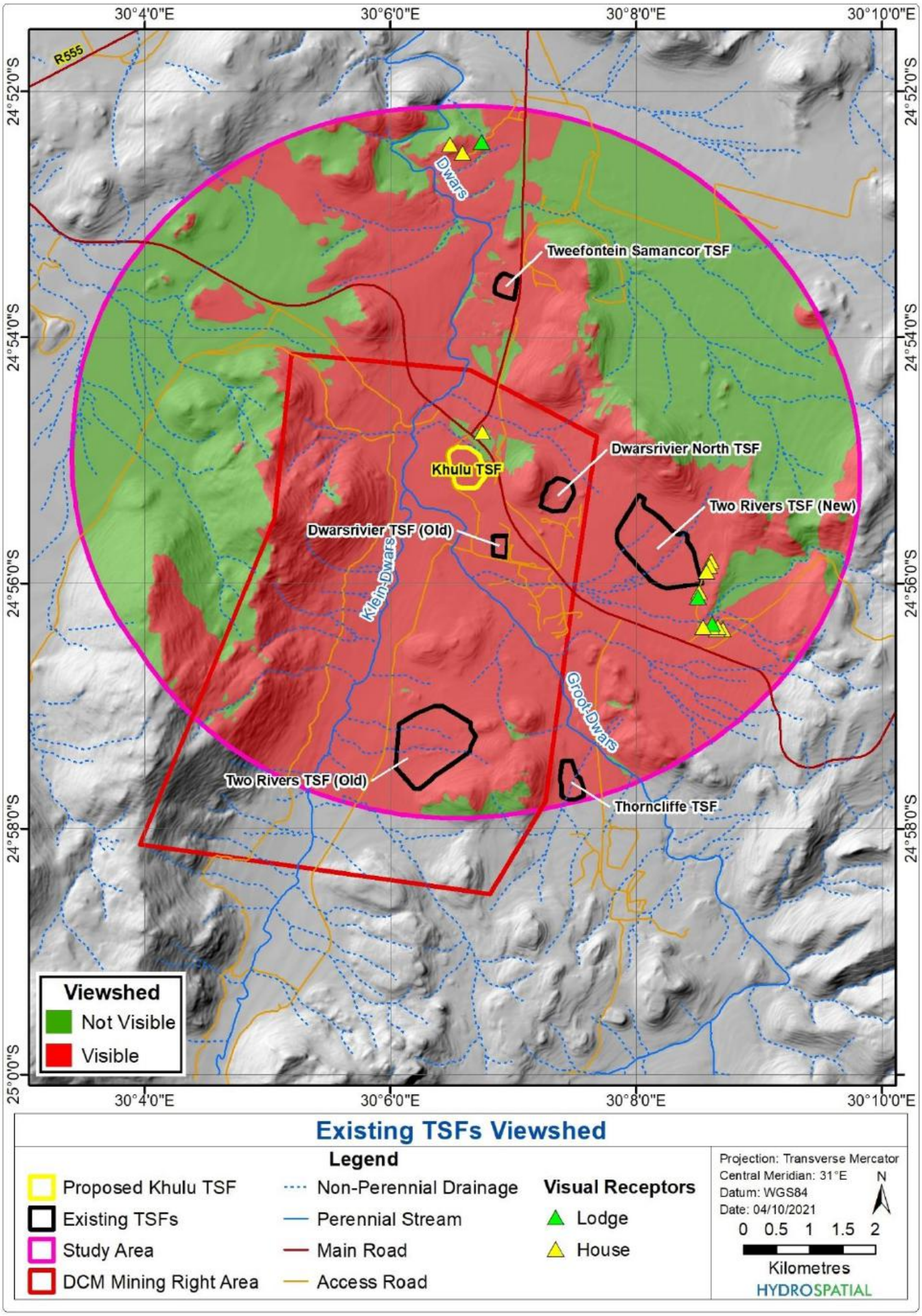

Figure 6-1: Existing TSF viewshed

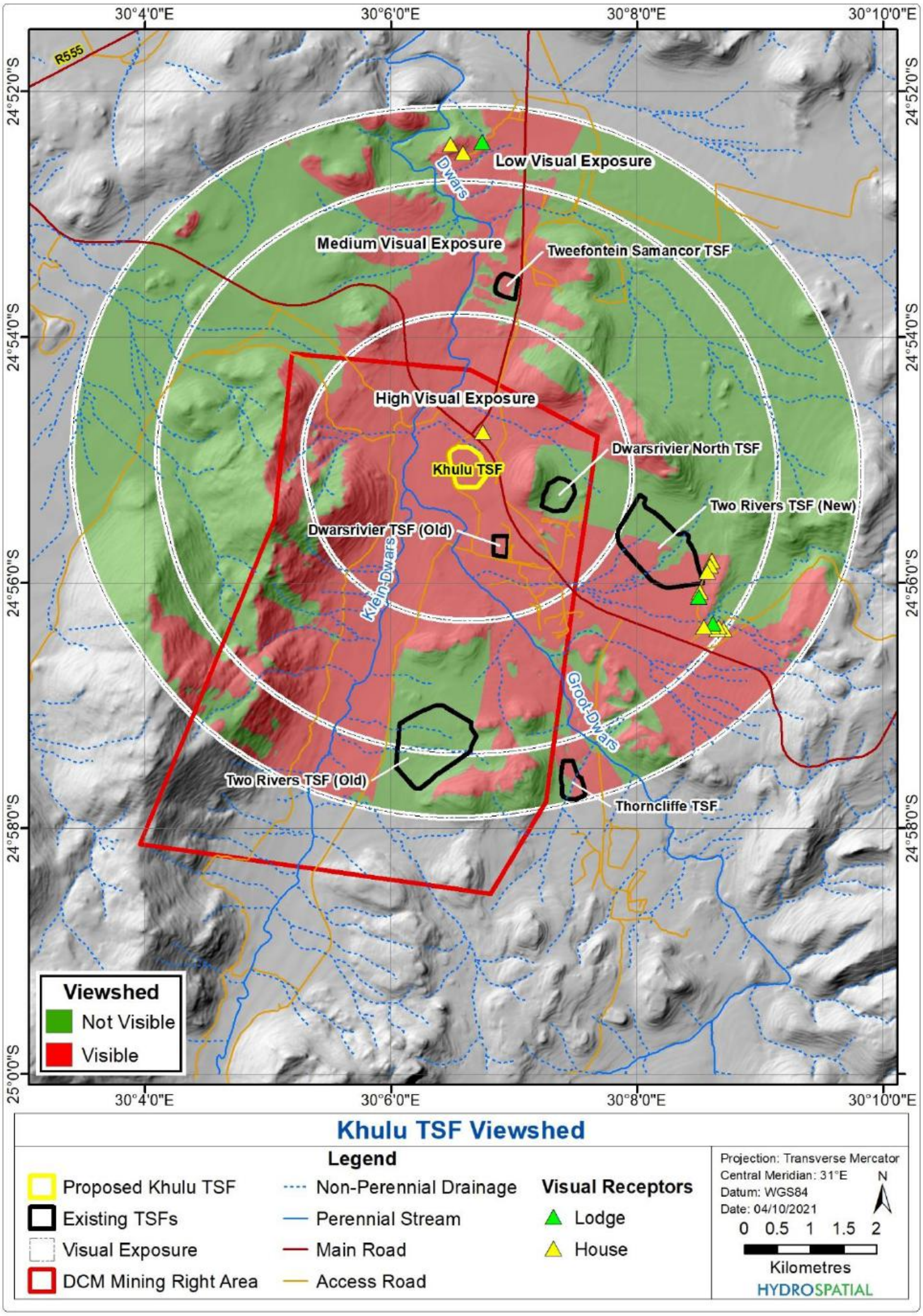

Figure 6-2: Khulu TSF viewshed

6.2 Visual/Scenic Quality

Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity and landscape quality and can be said to increase when:

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

Greater aesthetic value is also attached to places where:

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

The visual quality of the area prior to any mining activities would have been high, with the bushveld and mountainous landscape that would have fully characterised the area. However, much of this has been converted and the dominant land use in the area is now mining. The remaining bushveld and mountainous backdrops still provides scenic views, and for this reason, a medium scenic quality has been assigned to the study area.

6.3 Visual Absorption Capacity

The VAC is the potential of the landscape to conceal the proposed development as a result of topography, vegetation or synthetic features (Oberholzer, 2005). The mountainous terrain on either side of the Dwars River conceals views of the Khulu TSF to within the valley. The vegetation immediately surrounding the Khulu TSF site is fairly open, as this area was previously used for agriculture, and therefore, the vegetation will provide very little cover to conceal the proposed TSF (Figure 6-3). Further away from the TSF, particularly along the rivers, thicker vegetation occurs, which will conceal views of the TSF. Taking into account the general vegetation and topography of the study area, the VAC was determined to be moderate.

Figure 6-3: Westerly view from the main road over the proposed Khulu TSF site

6.4 Visual Intrusion

Visual intrusion is the level of compatibility or congruence of a project with the particular qualities of the area, or its 'sense of place' (Oberholzer, 2005). Due to a number of existing TSFs in the area, as well as other mine infrastructure, the proposed project is in line with the current land use of the area, and will have a low visual intrusion.

6.5 Viewer Sensitivity

The viewer sensitivity is summarised in Table 6-2.

Table 6-2: Summary of the viewer sensitivity of the Project

Visual Receptor	Comment	Rating
Houses and farmsteads	People living in the houses in the rural areas will be accustomed to mining in the area. However, views of mine dumps and mining activities is unlikely to be favourable.	Moderate
Motorists on roads	Views of existing TSFs and mining activities are evident along the main roads within the study area.	Low
Lodges	The lodges within the study area provide accommodation for people working on the mines and are therefore largely dependent on the mines.	Low

7 IMPACT ASSESSMENT

7.1 Project Phase Description

The potential impacts during the different phases of the project are discussed below.

7.1.1 Construction Phase

During the construction phase, vegetation clearance and topsoil stripping will take place. The construction phase will result in areas being cleared, increased presence of heavy machinery and the generation of dust.

7.1.2 Operational Phase

During the operational phase, tailings will be deposited on the TSF which will increase in height. The operational phase will result in the presence of heavy machinery and the generation of dust. Night-time lighting in the area will increase.

7.1.3 Rehabilitation and Closure Phase

The TSF will be rehabilitated and if vegetation will establish, re-vegetated. The rehabilitation phase will most likely result in the generation of dust, however, once rehabilitation has been successfully completed, a general positive impact is expected in comparison to the operational phase.

7.2 Cumulative Impacts

Cumulative impacts result from the incremental impact of proposed activities on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The proposed project will cumulatively add to the historical and active mining in the area. Since the landscape has already been transformed by mining activities, it is not foreseen that the visual quality of the area would be further significantly reduced. The visual quality, will however, be improved once rehabilitation has been successfully implemented.

7.3 Impact Assessment and Mitigation Measures

The pre- and post-mitigation impact assessment for the construction, operational and decommissioning and rehabilitation phases are provided in Table 7-1.

Table 7-1: Impact assessment

Phase	Activity	Impact Description	Pre-Mitigation					Mitigation/Management Measures & Recommendations	Post-Mitigation				
			Extent	Duration	Probability	Intensity	Significance		Extent	Duration	Probability	Intensity	Significance
Construction Phase	Removal of vegetation and stripping of topsoil's.	Creation of a bare areas and the generation of dust.	Local (2)	Short-term (1)	Probable (2)	Minor (-2)	Medium (-6 to -11)	Vegetation clearance should be kept to an absolute minimum. Exposed areas should be vegetated as soon as possible. Dust suppression measures should be implemented to limit the generation of dust.	Site-specific (1)	Short-term (1)	Improbable (1)	Negligible (-1)	Low (-1 to -5)
Construction Phase	The presence and use of heavy machinery, trucks and vehicles for construction purposes.	The movement of vehicles and heavy machinery during the construction phase will create a visual presence and will generate dust.	Local (2)	Short-term (1)	Probable (2)	Minor (-2)	Medium (-6 to -11)	Due to the existing mining in the area, vehicles and heavy machinery are already present and are not uncommon. Trees should be planted along the main roads to conceal the TSF from motorists. Dust suppression measures should be implemented to limit the generation of dust.	Site-specific (1)	Short-term (1)	Improbable (1)	Negligible (-1)	Low (-1 to -5)
Operational Phase	Deposition of tailings on the TSF.	The TSF will increase in size and will therefore be more visible.	Regional (3)	Long-term (3)	Highly Probable (3)	Minor (-2)	Medium (-6 to -11)	There are no real mitigation measures as the TSF will increase in height and will be approved for a certain height, however, the TSF should be vegetated as soon as practicably possible and should not exceed the approved height.	Local (2)	Medium-term (2)	Improbable (1)	Negligible (-1)	Medium (-6 to -11)

Phase	Activity	Impact Description	Pre-Mitigation					Mitigation/Management Measures & Recommendations	Post-Mitigation				
			Extent	Duration	Probability	Intensity	Significance		Extent	Duration	Probability	Intensity	Significance
Operational Phase	The presence of a new TSF in the landscape.	Impact on the cultural and heritage landscape.	Regional (3)	Long-term (3)	Probable (2)	Minor (-2)	Medium (-6 to -11)	The natural landscape of the area has already been altered by mining. The proposed mine infrastructure is in line with the current land use and will add to the already altered landscape. It is not foreseen that the current visual quality of the area will be significantly altered by the proposed TSF. However, it is recommended that the TSF is vegetated as soon as practicably possible, and that the associated infrastructure is painted earthy colours to blend into the landscape.	Local (2)	Medium-term (2)	Improbable (1)	Negligible (-1)	Medium (-6 to -11)
Operational Phase	Operation of the TSF and security measures.	Additional night lighting from the TSF and associated infrastructure.	Regional (3)	Long-term (3)	Probable (2)	Average (-3)	Medium (-6 to -11)	Down lighting and lighting shields should be used as far as possible.	Local (2)	Short-term (1)	Improbable (1)	Negligible (-1)	Low (-1 to -5)
Operational Phase	The presence and use of heavy machinery, trucks and vehicles during the operational phase.	The movement of vehicles and heavy machinery during the operational phase will create a visual presence and will potentially generate dust.	Local (2)	Long-term (3)	Probable (2)	Minor (-2)	Medium (-6 to -11)	Machinery, trucks and vehicles are already present in the area and are unlikely create any additional significant presence. Trees should be planted along the main roads to conceal activities from motorists. Dust suppression measures should be implemented to limit the generation of dust.	Site-specific (1)	Short-term (1)	Probable (2)	Negligible (-1)	Low (-1 to -5)

Phase	Activity	Impact Description	Pre-Mitigation					Mitigation/Management Measures & Recommendations	Post-Mitigation				
			Extent	Duration	Probability	Intensity	Significance		Extent	Duration	Probability	Intensity	Significance
Rehabilitation and Closure Phase	Removal of infrastructure and rehabilitation of the TSF.	The removal of infrastructure and the rehabilitation of the TSF will visually improve the area.	Regional (3)	Long-term (3)	Probable (2)	Minor (-2)	Medium (-6 to -11)	The removal of infrastructure associated with the TSF should be undertaken. The TSF should be vegetated to blend into the surrounding area.	Site-specific (1)	Medium-term (2)	Improbable (1)	Negligible (-1)	Low (-1 to -5)

8 CONCLUSIONS AND RECOMMENDATIONS

The following provides a summary of the main findings of the study:

- The regional topography can be described as undulating with numerous mountain ridges and valleys;
- The study area falls within the Sekhukhune Mountain Bushveld with vegetation characterised as open and closed broad leafed savannah on hills and mountain slopes (Mucina & Rutherford, 2006). According to the 2018 South African National Land Cover map (GeoTerraImage, 2019), the land cover of the study area consists mostly of grassland, forested land, cultivated areas and mining areas;
- The landscape of the study area can be broadly divided into two main categories:
  - Natural areas – consisting of natural bushveld areas; and
  - Mining areas – consisting of mine dumps, bare areas and mine infrastructure.
- The visual receptors identified within the study area include:
  - Houses;
  - Lodges; and
  - Motorists travelling on roads within the study area.
- The natural mountainous bushveld sense of place has largely been converted into a mining landscape by the existing mines in the area;
- The cultural landscape of the region is characterised by a rural area that has extensively been disturbed by mining activities and in the recent past by agricultural activities;
- Viewshed modelling indicated that the proposed Khulu TSF will affect much of the same area and visual receptors that are already visually disturbed by the existing TSFs in the area;
- The visual quality of the area prior to any mining activities would have been high, with the bushveld and mountainous landscape that would have fully characterised the area. However, much of this has been converted and the dominant land use in the area is now mining. The remaining bushveld and mountainous backdrops still provides scenic views, and for this reason, a medium scenic quality was assigned to the study area.
- In terms of the VAC, the mountainous terrain on either side of the Dwars River conceals views of the Khulu TSF to within the valley. The vegetation immediately surrounding the Khulu TSF site is fairly open, as this area was previously used for agriculture, and therefore, the vegetation will provide very little cover to conceal the proposed TSF. Further away from the TSF, particularly along the rivers, thicker vegetation occurs, which will conceal views of the TSF. Taking into account the general vegetation and topography of the study area, the VAC was determined to be moderate;

- Due to a number of existing TSFs in the area, as well as other mine infrastructure, the visual intrusion of the proposed Khulu TSF in the landscape was determined to be low;
- The viewer sensitivity of the proposed TSF from farmhouses in the area was determined to have a moderate sensitivity, as the area is already dominated by mining activities. Motorists travelling on the main roads in the area will pass a number of mining activities other than the proposed TSF, and the lodges in the area provide accommodation for people working on the mines and are therefore dependent on the mines. The viewer sensitivity of motorists and the lodges wass determined to be low; and
- The impact assessment indicated that all impacts would have a medium significance pre-mitigation, with most achieving a low significance post-mitigation.

In conclusion, the natural landscape of the area has already been altered by mining activities. The proposed mine infrastructure is in line with the current land use and will add to the already altered landscape. It is not foreseen that the current visual quality of the area will be significantly altered by the proposed Khulu TSF. It is therefore the opinion of the specialist that the project can commence, provided that the recommendations and mitigation measures provided in Table 7-1 are implemented.

9 REFERENCES

Arriaza, M. 2004. Assessing Visual Quality in Rural Landscapes. Landscape and Urban Planning, Vol. 69, Issue 1 pg 115-125, 15 July 2004.

Cornell, D.H., Thomas, R.J., Moen, H.F.G, Reid, D.L., Moore J.M. and Gibson, R.L. 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R.and Thomas, R.J. (Eds.), The Geology of South Africa. Geological Society of South Africa, Council for Geoscience, Pretoria, 325-380.

Crawford, D. 1994. Using remotely sensed data in landscape visual quality assessment, Landscape and Urban Planning. 30: 17-81.

EnviroGistics. 2021. Draft Scoping Report for the new Khulu Tailings Storage Facility (TSF) and other Capital Projects. Ref.: 21828_F2. 22 July 2021.

GeoTerraImage. 2019. South African National Land-Cover 2018. Report & Accuracy Assessment. Version 004, 25-09-2019.

HCAC. 2021. HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED NEW KHULU TAILINGS STORAGE FACILITY AND ASSOCIATED INFRASTRUCTURE PROJECT, DWARSRIVIER CHROME MINE, LIMPOPO PROVINCE. Project number: 2169. September 2021.

Hydrospatial. 2021. Visual Assessment Scoping & Site Selection Study for the Proposed Khulu Tailings Storage Facility at the Dwarsrivier Chrome Mine.

Lynch, K. 1992. Good City Form, The MIT Press, London. p131

Oberholzer, B. 2005. Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Ramsay, J. 1993. Identification and assessment of aesthetic values in two Victorian forest regions. More than meets the eye: identifying and assessing aesthetic value. Report of the Aesthetic Value Workshop held at the University of Melbourne.