



Scientific Aquatic Services

Applying science to the real world

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Date: Thursday, 28 September 2023

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Attention: Ms. Zinzi Portia Xakayi

RE: VISUAL COMPLIANCE STATEMENT FOR THE PROPOSED MOKOPANE WATER TREATMENT WORKS (WTW) AND ASSOCIATED ACCESS ROAD INFRASTRUCTURE, LIMPOPO PROVINCE.

1 INTRODUCTION AND BACKGROUND SETTING

Scientific Aquatic Services (Pty) Ltd (SAS) was appointed by Zutari (Pty) Ltd (Zutari) to conduct a Faunal and Floral Assessment for the proposed Mokopane water treatment works (WTW) and associated infrastructure, within the Limpopo Province. The proposed Mokopane WTW as well as the associated infrastructure will henceforth collectively be referred to as the “**focus area**”. The focus area encompasses two sites, namely the Mokopane WTW Alternative site and associated Access Road, and the Mokopane WTW Preferred site (where no access road will be required as there is existing access). For a visual representation of the location of the focus area, please refer to Figures 1 and 2.

The focus area is situated approx. 4 kilometres (km) southeast of Mokopane. The access road will connect to an existing (unnamed) road that links to the R518; the focus area is situated to the west of the R518. A Basic Assessment Report (BAR) will be compiled for the proposed Mokopane WTW. The overall objective of the proposed development is to supply potable water for commercial and residential purposes. The technical features of the scheme proposed in the Mogalakwena Water Master Plan (MWMP) (as provided by the proponent) include the following:

- A raw water pipe from the farm Pruissen (where it connects to the bulk water pipeline from Flag Boshielo Dam) to the new WTW (i.e., the focus of this report). This works will supply potable water to Mokopane Central Business District (CBD) and town areas.
- The raw water pipe will continue from the WTW at Mokopane, northwards to the rural town area of Sekuruwe where a second WTW will be constructed. This WTW will be able to provide potable water to mining clients and residents for various rural villages.
- Mining water users will also be able to draw water from the raw water line at various points towards Sekuruwe. This will be handled by means of offtake agreements.

Scientific Aquatic Services (Pty) Ltd

Reg No: 2022/495100/07

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Stephen van Staden

Director

2 PURPOSE OF THIS REPORT

The Visual Compliance Statement entails a process of data collection, spatial analysis, visualisation and interpretation to describe the quality of the landscape prior to development taking place and then identifying possible visual impacts after development. Assessing visual impacts are difficult as it is very subjective due to a person's perception being affected by more than only the immediate environmental factors (Oberholzer, 2005).

This report, after consideration and description of the visual integrity of the focus area, must guide the proponent, authorities and Environmental Assessment Practitioner (EAP), by means of recommendations, as to the suitability of the focus area for the intended land use, from a visual resource management and aesthetic point of view. This report should furthermore serve to inform the planning, design and decision-making process as to the layout and nature of the proposed development activities.

3 LEGAL, POLICY AND PLANNING CONTEXT FOR VIA'S

Oberholzer (2005) indicates that current South African environmental legislation governing the EIA process, which may include consideration of visual impacts if this is identified as a key issue of concern, is the National Environmental Management Act (NEMA) (Act 107 of 1998). This includes the 2014 NEMA EIA regulations as amended (published in General Notice (GN) No. R.982 as well as R 983 Listing Notice 1, R 984 Listing Notice 2 and R 985 Listing Notice 3).

In addition, the following acts and guidelines are applicable (Oberholzer, 2005):

National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

This act was developed in 2003 for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes:

- Restricted activities involving national and protected parks:
- 48(1) Despite other legislation, no person may conduct commercial prospecting, mining, exploration, production, or related activities–
 - (a) in a special nature reserve, national park, or nature reserve
 - (b) in a protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs; or
 - (c) in a protected area referred to in section 9(b), (c) or (d).

According to the **SAPAD (2023, Q1) database¹**, the focus area is located directly within a protected area, namely the **Fossil Hominid Sites of SA**. Additionally, the focus area is located within 10 km of an additional protected area, namely the **Glenesk Private Nature Reserve** (~ 6 km northeast of the focus area). It is important to note that the Fossil Hominid Sites of SA are also considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO) site (<https://whc.unesco.org/en/list/915/>). Development activities within these sites will be limited to the considerations and stipulations as stated in the NEMPAA.

The undulating landscape containing the Fossil Hominid Sites of South Africa comprises dolomitic limestone ridges with rocky outcrops and valley grasslands, wooded along watercourses and in areas of natural springs. Most sites are in caves or are associated with rocky outcrops or water sources. The serial listing includes the Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs, and the Makapan Valley and Taung Skull Fossil Site. The Taung Skull, found in a limestone quarry at Dart Pinnacle amongst numerous archaeological and palaeontological sites south-west of the

¹ **SAPAD (2023)**: The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the "System of Protected Areas", which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

Sterkfontein Valley area, is a specimen of the species *Australopithecus Africanus*. Fossils found in the many archaeological caves of the Makapan Valley have enabled the identification of several specimens of early hominids, more particularly of *Paranthropus*, dating back between 4.5 million and 2.5 million years, as well as evidence of the domestication of fire 1.8 million to 1 million years ago. Collectively these sites have produced abundant scientific information on the evolution of modern humans over at least the past 3.5 million years. They constitute a vast reserve of scientific information, with enormous potential.

The components of the Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs together with Makapan Valley and Taung Skull Fossil Site are currently protected as National Heritage sites in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999). In terms of this legislation, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

Management of each site is guided by the World Heritage Convention Act (Act No 49 of 1999); the National Environmental Protected Areas Act (Act No 57 of 2003), the National Environmental Management Act (Act No 107 of 1998), the National Environmental Management Biodiversity Act (Act No 10 of 2004) and the Physical Planning Act, 1967 (Act No. 88 of 1967). In terms of these pieces of legislation, mining or prospecting is completely prohibited in a World Heritage Site and all developments are subjected to environmental impact assessments.

There are also site management plans for each of the sites as well as monitoring and evaluation programmes for each.

National Heritage Resources Act (Act No. 25 of 1999)

This provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.

Advertising on Roads and Ribbons Act (Act No. 21 of 1940)

Visual pollution is controlled, to a limited extent, by the Advertising on Roads and Ribbons Act (Act 21 of 1940), which deals mainly with signage on public roads.

Municipal Systems Act (Act 32 of 2000)

In terms of the Municipal Systems Act (Act 32 of 2000), it is compulsory for all municipalities to initiate an Integrated Development Planning (IDP) process in order to prepare a five-year strategic development plan for the area under their control. The IDP process, specifically the spatial component is based in certain areas and provinces on a bioregional planning approach to achieve continuity in the landscape and to maintain important natural areas and ecological processes. The focus area is situated within the Mogalakwena Local Municipality and the Waterberg District Municipality, of which both IDPs for 2022/2023 are available.

According to the Mogalakwena Local Municipality Final IDP (2023) there is a need for water treatment infrastructure within the municipality to ensure more households obtain water of compliant standards.

Department of Forestry, Fisheries and the Environment (DFFE)'s National Environmental Screening Tool (2023).

According to the "Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes ("the Protocols") published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the Environmental Assessment Practitioner (EAP) must verify the current use of the site in question and its environmental sensitivity as identified by the Screening Tool to determine the need for specialist inputs in relation to the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). The Protocols

must be complied with for every new application for Environmental Authorisation that is submitted after 9 May 2020.

This document serves as the Visual (Landscape) Site Sensitivity Verification Report for the proposed Mokopane WTW, within the Limpopo Province. The Mokopane WTW requires environmental authorisation in terms of the NEMA EIA Regulations (2014), as amended and a Water Use Licence (WUL).

There was no sensitivity rating, thus the landscape was deemed to have no sensitivity in terms of aesthetic impacts.

Other

- Visual and aesthetic resources are also protected by local authorities, where policies and by-laws relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc. have been formulated; and
- Other decision-making authorities such as the Department of Mineral Resources and Energy (DMRE), or the local authorities, in terms of their particular legislative frameworks, may also require VIAs to support informed decision-making.

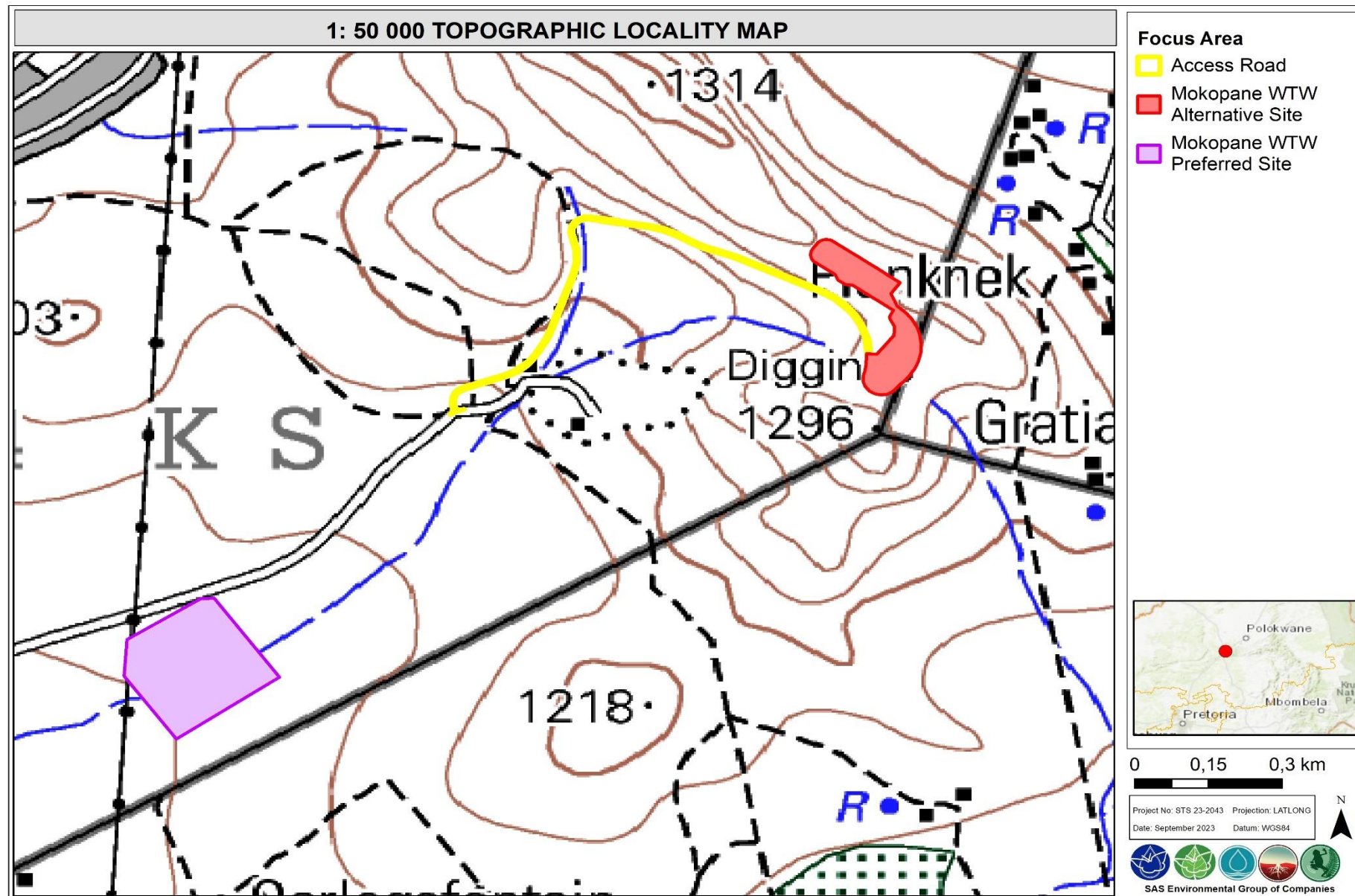


Figure 1: 1:50 000 Topographical map depicting the location of the focus area in relation to the surrounding region.

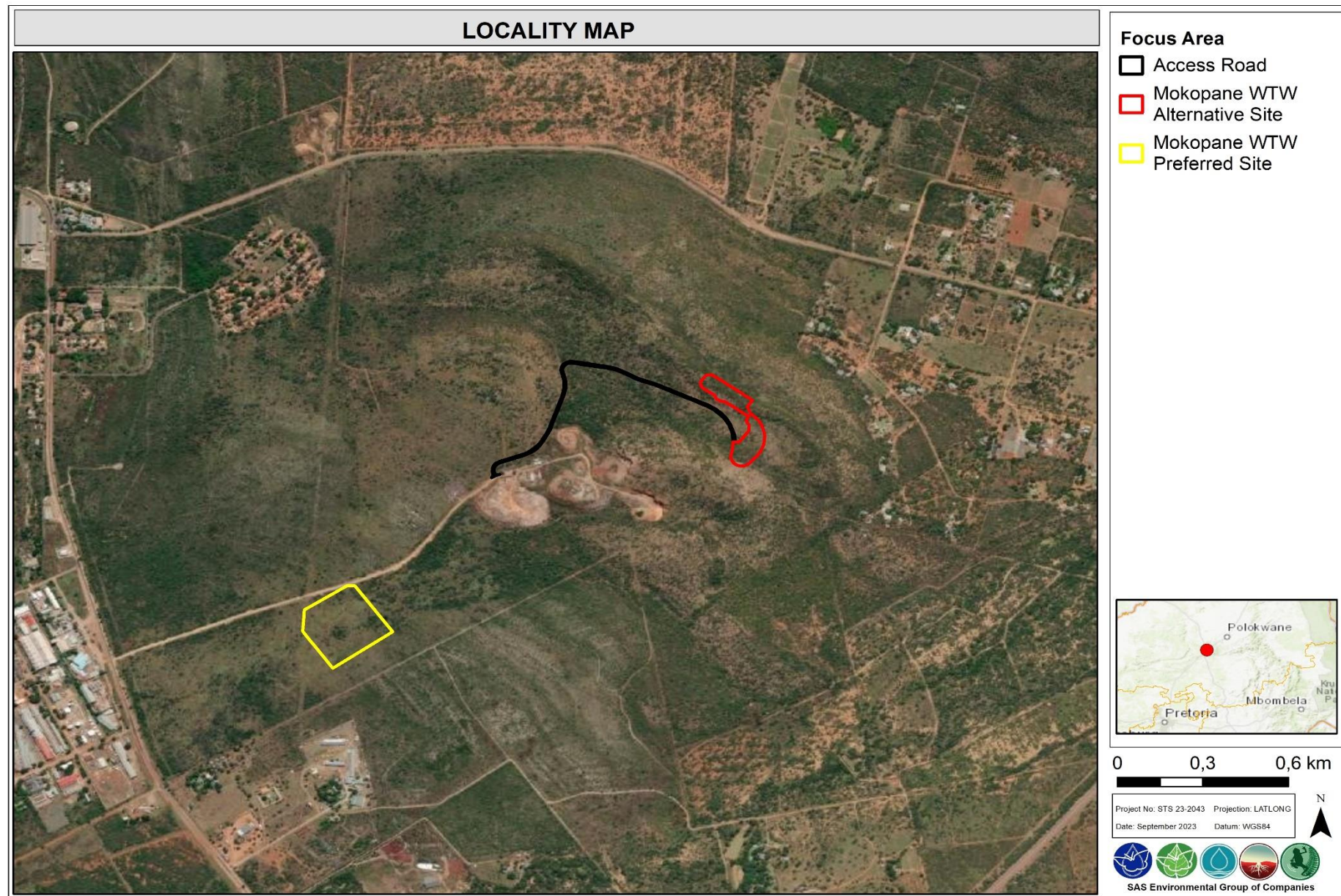


Figure 2: Digital satellite image depicting the location of the focus area in relation to the surrounding region.

4 METHOD OF ASSESSMENT

4.1 Desktop Assessment

The method of assessment for this report is based on a spatial analysis of the focus area and the surrounding areas, using Geographic Information Systems (GIS) such as Planet GIS, ArcGIS, Global Mapper as well as digital satellite imagery, photographs, various databases and all available data on the planned infrastructure. The desktop assessment served to guide the field assessment through identifying preliminary areas of importance in terms of potential visual impacts.

The desktop study included an assessment of the current state of the environment of the area including the climate of the area, topography, land uses and land cover with data obtained from the websites of the South African National Biodiversity Institute (SANBI) and the Agricultural Research Council (ARC). All databases used were published within the last 5 years and contain up to date and relevant information.

During the desktop assessment, which took place prior to and in preparation of the field assessment, the 1:50 000 topographical map, as well as high definition aerial photographs from Google Earth Pro were used to identify the dominant landforms and landscape patterns. These resources together with digital elevation data were utilised to establish a parameter within which potential sensitive receptors were to be identified via Google Earth Pro. These parameters can henceforth be referred to as the “visual assessment zone”. Based on the rural setting of the area, and the proposed infrastructure on the outskirts of town, the visual assessment zone encompasses a 2 km radius of the focus area. The potentially sensitive receptors identified within the visual assessment zone during the desktop assessment was verified during the field assessment.

4.2 Field Assessment

The field assessment was undertaken during the spring season on the 29th of August 2023 for the focus area. The season within which the VIA takes place is irrelevant as the vegetation screening factor will remain similar. Seasonal colour variation will however be evident between winter and summer.

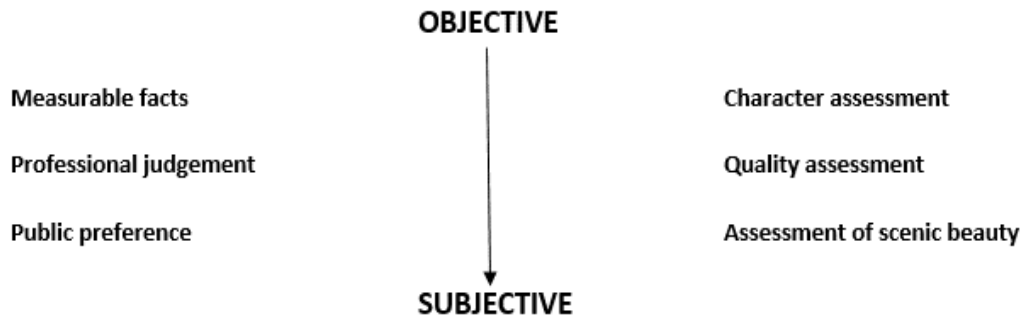
The field assessment included a drive-around and on-foot survey of the study area and in the immediate vicinity thereof and a drive-around of the surrounds, to determine the visual context within which the proposed project is to be developed. Focus was placed on assessing the potentially sensitive receptors identified within the visual assessment zone, these included farmsteads and prominent roads within the area. Points from where the proposed infrastructure was determined to be visible were recorded (making use of Global Positioning Systems (GPS) to confirm these aesthetically sensitive viewpoints and potential sensitive visual receptors in relation to the proposed project.

4.3 Assumptions and Limitations

- No specific national legal requirements for VIAs currently exist in South Africa. However, the assessment of visual impacts is required by implication when the provisions of relevant acts governing environmental management are considered and when certain characteristics of either the receiving environment or the proposed project indicate that visibility and aesthetics are likely to be significant issues and that visual input is required (Oberholzer, 2005);
- Due to a lack of visual specialist guidelines within the Limpopo Province, the “Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process” (Oberholzer, 2005), prepared for the Western Cape Department of Environmental Affairs & Development Planning, was used;
- Distance and terrain plays a critical role when assessing visual impacts of an area. All potential sensitive receptors located within a 2 km radius, were identified on a desktop-level, some of which would then be verified during the field assessment. Since the proposed infrastructure is located in a rural area, only the Planknek AH settlement and surrounding roads and light industrial / warehousing area and isolated farmsteads were assessed. It should be noted that

the visibility of an object decreases exponentially the further away the observer is from the source of impact;

- At the time of the assessment the detail of the WTW were unknown, i.e. the heights of the proposed infrastructure, as such no viewsheds were undertaken;
- Since the access road is an existing road within the town, it was deemed unnecessary to assess from a visual perspective as the impact is already present; and
- Abstract or qualitative aspects of the environment and the intangible value of elements of visual and aesthetic significance are difficult to measure or quantify and as such depend to some degree on subjective judgments. It therefore is necessary to differentiate between aspects that involve a degree of subjective opinion and those that are more objective and quantifiable, as outlined in the diagram below (The Landscape Institute and Institute of Environmental Management and Assessment (LI IEMA, 2002).



5 RESULTS OF INVESTIGATION

5.1 Public Involvement

A public involvement process will be initiated as part of the Environmental Impact Assessment (EIA) authorisation process, at which time stakeholders are invited to provide input concerning the proposed development. Any concerns regarding visual impacts will be addressed through this process.

5.2 Development Category and Level of Impact Assessment

Through application of the VIA methods of assessment as presented in Appendix A, it was determined that the proposed project can be defined as a Category 5 development, which includes treatment facilities. In line with the above, a Level 4 Assessment should be undertaken.

Based on the outcome of the desktop and field assessments, it is evident that the Mokopane WTW preferred site was exposed to recent (2019) tree harvesting, whereas the Mokopane WTW alternative site and associated access road has been without any notable, historical impacts. Furthermore the desktop and field assessments indicated that there are very limited potential sensitive receptors situated within the visual assessment zone, comprising the Planknek Agricultural Holding (AH) settlement and its gravel roads east of Mokopane WTW alternative site, the N1 national highway to the south and R518 to the west of the Mokopane WTW preferred site. The landscape has undergone anthropogenic changes such as the establishment of the Holdings, industrial area (located west of the Alternative WTW), landfill and quarry and roads. Additionally there are no visual receptors in the immediate vicinity of the Mokopane WTW preferred site, as it is located on vacant land to the east of the R518 road. Even though the Mokopane WTW alternative site is located on the side of a hill, the viewshed is limited to the receptors of the Planknek AH and N1 national road.

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact, thus in this context there are sparse receptors present, consequently there are not likely many visual impacts experienced. As such, the potential visual impact of the proposed infrastructure is likely to be minimal and will not be significantly visually intrusive on the receiving environment. In light of the above, the proposed infrastructure is likely to have a low visual impact on the receiving environment, therefore a Level 1 Assessment was undertaken.

5.3 Description of the Receiving Environment

To holistically describe the receiving environment, this section of the report aims to determine the intrinsic value of the receiving landscape including aspects of the natural, cultural and scenic landscape, taking both tangible and intangible factors into consideration. General views of the landscape associated with the focus area and surrounds with respect to the vegetation and landscape of the focus area and the overall character are indicated below.



Figure 3: General view of the proposed Mokopane WTW preferred site, where vegetation is continuous and industrial infrastructure is present (left) and the Mokopane WTW alternative site area where the woody component is dominant and the terrain is sloping (right).

Climate:

As a result of climate variations throughout the year, the appearance and perception of the landscape within the surroundings of the focus area changes with the seasons in terms of the chroma of the area. Early morning and evening mist often associated with these areas, can limit the visibility of the focus area at different times during the day, particularly at further distances. Since the Limpopo Province falls within the region that is characterised by summer rainfall, the visibility of the focus area is likely to be lower during the summer months. Seasonal variation may have some effect on the area from where project components would potentially be visible, with visibility expected to be slightly higher during the winter months when seasonal screening effects from vegetation is somewhat lowered.

Land Use and Visual Receptors

The Mokopane WTW alternative site comprises mountain bushveld vegetation where prominent outcrops was only present at the higher elevations/ crest of the ridge. The Planknek AH is situated directly east of the Mokopane WTW alternative site with its proposed access road going up the hill. There is a landfill and quarry on top of the hill, which has resulted in visual scarring of the landscape. The Mokopane WTW preferred site is located on the other side of the hill, on vacant land characterised by plateau bushveld, with the only receptors in its immediate vicinity being light industrial / warehousing landuses to the west and the south-west, along with some smallholding to the south.

There are a limited number of potential sensitive receptors in the area which include; the Planknek AH settlement and its associated gravel roads, some informal settlement, isolated farmsteads, the N1 national road, the R518 road, several other local roads and the light industrial area (this receptor will however have a low sensitivity due to workers being used to seeing industrial structures and focusing at the work at hand rather than the surrounding environment). In light of the above, the receiving environment is already visually impacted by anthropogenic activities and infrastructure. Based on the field assessment in support of digital satellite imagery, the majority of the holdings within the Planknek AH has well established tall vegetation, as such this vegetation assists in obscuring or screening the proposed Mokopane WTW alternative site and its associated access road. Depending on the height of the proposed Mokopane WTW alternative site, the top of the infrastructure may be slightly visible from certain vantage points within the Planknek AH. Due to the Mokopane WTW preferred site located on the other side of the hill the residents of the Planknek AH will not have a clear line of sight thereof.

As noted in Section 3, according to the **SAPAD (2023, Q1) database** the focus area is located directly within a protected area, namely the **Fossil Hominid Sites of SA**. Additionally, the focus area is located within 10 km of an additional protected area, namely the **Glenesk Private Nature Reserve** (~ 6 km northeast of the focus area). It is important to note that the Fossil Hominid Sites of SA are also

considered a United Nations Educational, Scientific, and Cultural Organisation (UNESCO) site. Development activities within these sites will be limited to the considerations and stipulations as stated in the NEMPAA.

Since the Mokopane WTW alternative site is situated on the side of a hill, at a higher elevation, facing the Planknek AH settlement the potential visual impact is considered higher than the Mokopane WTW preferred site, which is in closer proximity to the light industrial / warehousing area. As such, with the focus area located directly within the Fossil Hominid Sites of SA, from a visual perspective the Mokopane WTW preferred site is preferred.

Furthermore, since the Mokopane WTW infrastructure proposed, is to assist in providing more residents with potable water, the community is unlikely to be opposed to the development thereof and accept any negative, albeit limited impact on the visual landscape.

Topography

The local topography of the immediate focus area is sloping as it is situated on the side of a hill, which form part of the skyline, with the larger area displaying mountain ranges interspersed with settlements. With the Mokopane WTW alternative site situated on a higher elevation the proposed infrastructure is likely to have a broader viewshed than that of the Mokopane WTW preferred site.

The views from the Planknek AH settlement in the direction of the proposed Mokopane WTW alternative site are of a largely natural (rural) landscape. Anthropogenic activities include the landfill and quarry on top of the hill and powerlines. The N1 national road and R518 road also represent a linear strip in the landscape. Furthermore, when considering the broader landscape the topography is considered undulating, hence the proposed infrastructure will be screened from view from certain vantage points in the landscape.

Vegetation Cover

The focus area falls within a single biome and bioregion according to Mucina & Rutherford (2012) namely; Savanna Biome and the Central Bushveld Bioregion. The Polokwane Plateau Bushveld vegetation type characterises the region. Based on the field assessment the Mokopane WTW alternative site is characterised by mountain bushveld and the vegetation structure thereof can be described as a short-to-tall, semi-closed bushveld dominated by broadleaf tree species. The Mountain Bushveld is largely intact, and no persistent negative impacts were noted.

The overall vegetation structure of the Plateau Bushveld within the Mokopane WTW preferred site can be described as a short-tall, open bushveld; however, within the few sections where tree harvesting has not taken place, the vegetation takes on a more closed structure. The disturbance from tree harvesting and lack of fire have resulted in a degraded graminoid layer where a dense dominance of *Heteropogon contortus* was noted (STS, 2023).

Overall the vegetation cover of the focus area and surroundings is dense and continuous, which will be able to assist in the absorption of the proposed infrastructure to a degree.

Vegetation clearing will form part of the construction phase of the proposed project, which will lead to a visual impact on the surrounding environment, however with the area comprising gravel roads where vegetation has been cleared, the vegetation clearing during construction is not unusual, hence the visual impact is expected to be moderately low. It should however be noted that the vegetation clearing associated with the Mokopane WTW alternative site may have a somewhat higher visual impact as it is at a higher elevation. As noted higher up in the report, the holdings within the Planknek AH have well established and tall vegetation associated with the buildings therefore the vegetative component will be able to assist in absorbing the proposed infrastructure.

Visual Absorption Capacity (VAC)

Taking the topography and vegetative component of the area into consideration the VAC of the area is considered medium, indicating that the proposed project will be moderately absorbed in the area resulting in a relatively low visual intrusion, depending on the vantage point. The undulating terrain and bushveld vegetation of the area are the main contributing factors to the medium VAC. The proposed infrastructure at the Mokopane WTW preferred site is considered to blend in more with the surrounding existing light industrial / warehousing infrastructure than the proposed infrastructure at the Mokopane WTW alternative site, which is at a higher elevation and surrounded by holdings (lower buildings).

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. It is created by the land use, character and quality of a landscape, as well as by the tangible and intangible value assigned thereto. The sense of place associated with the focus area is related to the landscape character type, defined as a rural area with sloping terrain surrounded by mountainous terrain, dominated by bushveld vegetation where limited anthropogenic activities are taking place. The sense of place of the area can be described as calm, peaceful and tranquil with limited movement. During the field assessment no footpaths were evident within the focus area, thus limited to no movement occurs in the focus area. The sense of place is however not unique to the focus area as it extends to the larger Limpopo region. The sense of place will be disrupted during the construction phase of the project, as increased vehicular and human movement will occur within the focus area, shifting the sense of place to busy and loud. However once the WTW is operational the sense of place will be restored to a degree.

Night-time lighting

The focus area in its current state contains no direct lighting sources, however with the proposed Mokopane WTW alternative situated adjacent to the Planknek AH settlement and the Mokopane WTW preferred site situated adjacent to the light industrial / warehousing area and isolated farmsteads that act as sources of high-level night-time lighting. The lighting environment of the region is therefore considered Suburban with medium district brightness (Zone E3). This corresponds with Bortle's Scale – indicating that the focus area falls within a Class 4 area (rural / suburban transition) where there is low light pollution, with distinct and large objects on the ground that have lights. Furthermore, it is evident that on a cloudy night the lights will be visible in the distance. As a result of the existing night-time light sources, lighting levels are not expected to significantly increase in this area due to the proposed infrastructure. The proposed project is expected to contribute to the effects of sky glow and artificial lighting in the region to a limited degree, particularly as a result of stationary lighting sources including security lighting, however this impact will not be highly significant due to the high level of existing night time lighting associated with the surrounding settlement and mines.

Receptor Views and Visual Model

The figures below indicate specific viewpoints in the surrounding area. At the time of assessment a detailed design of the proposed WTW was not provided as such no detailed simulations were undertaken.



Figure 4: Typical example of a bulk water treatment works.

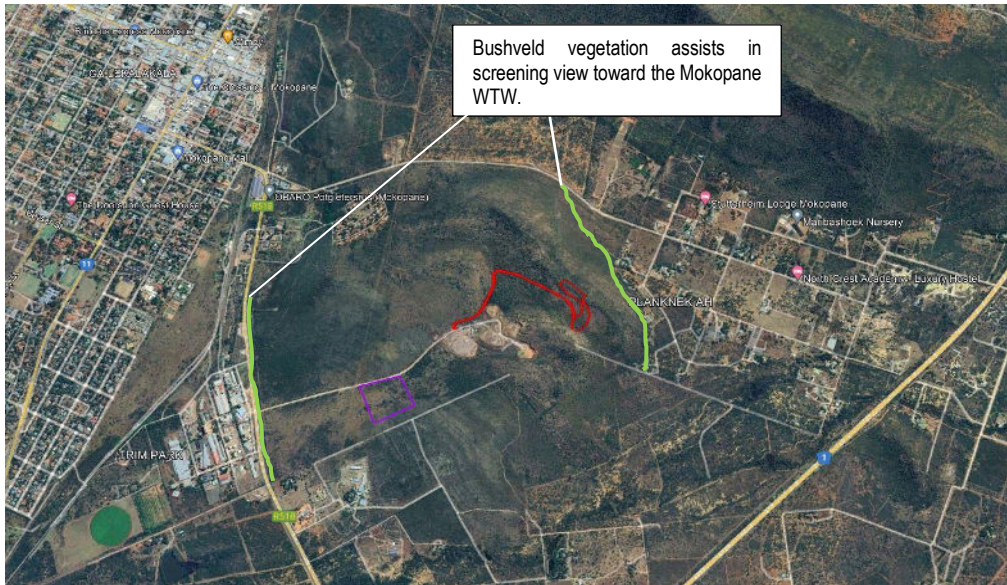


Figure 5: Visual model of the area surrounding the focus area. The bushveld vegetation of the area will mostly screen the view of the proposed infrastructure.



Figure 6: View from the Planknek AH settlement directly north east of the proposed Mokopane WTW. At this view point in the Planknek AH the hill and bushveld vegetation screens the view towards the Mokopane WTW alternative site (dashed red arrow).



Figure 7: View from the light industrial area directly west of the focus area. At this view point portions of the Mokopane WTW preferred site may be visible between the bushveld vegetation (Red arrow). The Mokopane WTW alternative site will not be visible due to it situated on the other side of the hill (dashed red arrow).

6 IMPACT STATEMENT

Since the proposed Mokopane WTW alternative site is situated adjacent to the Planknek AH settlement and the Mokopane WTW preferred site adjacent to light industrial / warehousing and both WTW in the vicinity of the Mogalakwena landfill site, the landscape has been degraded by anthropogenic changes and the receptors located within the receiving environment have grown accustomed to an altered landscape.

As discussed, the Mokopane WTW alternative site will have a higher visual impact than the Mokopane WTW preferred site, due to the Mokopane WTW alternative site situated at a higher elevation and located adjacent to the Planknek AH where people reside, whereas the Mokopane WTW preferred site is situated in the vicinity of the light industrial / warehousing area where people are working and thus focusing less on the surrounding environment. Therefore from a visual perspective the analogous with the preferred option.

When considering the development phases of the proposed project, the construction phase will have the highest visual intrusion due to the removal of vegetation and levelling of the ground in preparation for the proposed WTW, with increased vehicular movement in the area, temporarily altering the sense of place of the area as well. The points below briefly describe the visual impacts the proposed project will have during the construction and operational phases:

- The sense of place of the area will shift from calmness and tranquillity to busy due to vehicular movement in the area during the preparation of the area and removal of vegetation for the proposed WTW;
- Visual contrast to the surrounding environment may occur during earthworks and construction activities and the yellow construction vehicles may be clearly noticeable from the green and brown background formed by the vegetation, and hill with outcrops as well as the landfill site;
- Direct visual exposure of the construction activities will occur for road users traveling on the N1 national road and R518 road, within a limited distance and of a limited duration, as well as indirectly through fugitive dust generated by the earthworks on a windy day; and
- The sources of lighting associated with the proposed WTW will contribute somewhat to the effects of night time lighting and skyglow.

Table 1: Impact assessment overview for the proposed Mokopane WTW Preferred site.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Impact on Landscape Character and Sense of Place	Short-term	Local	Low - negative	Slightly detrimental	Certain	Low - negative	* The development footprint and disturbed areas surrounding the proposed Mokopane WTW should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum; and * All construction areas must be kept in a neat and orderly condition at all times and fenced off.	Short-term	Site-specific	Low - negative	Negligible	Certain	Low - negative
Visual intrusion impacts	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	* Construction and operation activities should be kept as short as possible, to reduce the visual intrusion on the receiving environment; * The height of structures should be as low as possible, where this can be achieved without increasing the infrastructure footprint; * Appropriate use of colours must be considered, it is recommended that neutral colours, such as shades of browns are to be utilised. Reflective materials are to be avoided as far as possible; and * It must be ensured that the roadside vegetation along the R518 road, with particular mention of the trees and shrubs, be retained in order to partly obscure the view toward the proposed development.	Short-term	Site-specific	Low - negative	Negligible	Certain	Low - negative
Visual exposure and visibility impacts	Medium-term	Local		Moderately detrimental	Certain	Moderate - negative	* Construction and operation activities should take place as quickly as possible, to reduce the visual exposure to the impacted area; and * Housekeeping of the site during construction and operational activities must be maintained at a high standard. The site should be screened through the use of a fence which will result in a more unified and tidy appearance.	Short-term	Site-specific	Low - negative	Negligible	Certain	Low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Impacts due to Night time lighting	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	* As far as possible, operational activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow; * An engineer may be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass; * Outdoor lighting must be strictly controlled; * The use of high light masts and high pole top security lighting should be avoided along the periphery of the buildings; * Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass; * Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Only “full cut-off” light fixtures that direct light only below the horizontal must be used on the buildings; * Censored and motion lighting may be installed to prevent use of lights when not needed. * Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light’s purpose; * The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts; and * Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night-time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow (BLM, 2013).	Short-term	Site-specific	Moderate - negative	Slightly detrimental	Certain	Low - negative

Table 2: Impact assessment overview for the proposed Mokopane WTW alternative site.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Impact on Landscape Character and Sense of Place	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	* The development footprint and disturbed areas surrounding the proposed Mokopane WTW should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum; and * All construction areas must be kept in a neat and orderly condition at all times and fenced of. * By ensuring that the surrounding bushveld vegetation is retained, the proposed WTW will be screened either partly or fully from the receiving environment, at certain vantage points; * With the proposed WTW situated within the Fossil Hominid Sites of SA, it must be ensured that the heights of the proposed infrastructure be kept as low as possible without increasing the footprint considerably.	Short-term	Local	Moderate - negative	Slightly detrimental	Certain	Moderate - negative
Visual intrusion impacts	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	* Construction and operation activities should be kept as short as possible, to reduce the visual intrusion on the receiving environment; * The height of structures should be as low as possible, where this can be achieved without increasing the infrastructure footprint; * Areas where the proposed WTW will be significantly visually intrusive, it is recommended that negotiations be undertaken with the individual parties to assist in screening (partially or fully) their homestead with a line of trees or clear fence, to reduce the visual intrusion; * Appropriate use of colours must be considered, it is recommended that neutral colours, such as shades of browns are to be utilised. Reflective materials are to be avoided as far as possible; and * It must be ensured that the roadside vegetation along the R518 road, with particular mention of the trees and shrubs, be retained in order to partly obscure the view toward the proposed development.	Short-term	Local	Moderate - negative	Slightly detrimental	Certain	Moderate - negative
Visual exposure and visibility impacts	Medium-term	Local		Moderately detrimental	Certain	Moderate - negative	* Construction and operation activities should take place as quickly as possible, to reduce the visual exposure to the impacted area; and * Housekeeping of the site during construction and operational activities must be maintained at a high standard. The site should be screened through the use of a fence which will result in a more unified and tidy appearance.	Short-term	Local	Moderate - negative	Slightly detrimental	Certain	Moderate - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Impacts due to Night time lighting	Medium-term	Local	Moderate - negative	Moderately detrimental	Certain	Moderate - negative	* As far as possible, operational activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow; * An engineer may be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass; * Outdoor lighting must be strictly controlled; * The use of high light masts and high pole top security lighting should be avoided along the periphery of the buildings; * Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass; * Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Only "full cut-off" light fixtures that direct light only below the horizontal must be used on the buildings; * Censored and motion lighting may be installed to prevent use of lights when not needed. * Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose; * The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent reduces skyglow and wildlife impacts; and * Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night-time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow (BLM, 2013).	Short-term	Local	Moderate - negative	Slightly detrimental	Certain	Moderate - negative

7 CONCLUDING REMARKS

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact. The outcome of the desktop and field assessments indicated that the only sensitive receptors within the visual assessment zone comprise the Planknek AH settlement, the N1 national road and R518 road and isolated farmsteads. Based on the field and desktop assessments the Mokopane WTW alternative site is situated at a higher elevation and located adjacent to the Planknek AH where people reside, whereas the Mokopane WTW preferred site is situated in the vicinity of the light industrial / warehousing area where people are working and thus focusing less on the surrounding environment. Therefore the Mokopane WTW alternative site will have a higher visual impact than the Mokopane WTW preferred site, concluding from a visual perspective the Mokopane WTW preferred site is the preferred option.

The proposed Mokopane WTW is therefore analogous to a low sensitivity from a visual and aesthetic viewpoint, as likely presented by the DFFE Screening Tool.

Based on the findings of the visual assessment, the proposed WTW is expected to have a minimal visual impact on the receiving environment. It is therefore the opinion of the specialist that the project be considered favourably from a visual resource management perspective.

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APPENDIX A – METHOD OF ASSESSMENT

Level of Assessment

The following methods of assessment for determining the level of detail of the assessment was utilised in this report (Oberholzer, 2005):

Table A1: Categories of development and impact severity.

Type of environment	Category 1 development	Category 2 development	Category 3 development	Category 4 development	Category 5 development
Protected/wild areas of international, national or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural, historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance/disturbed	Little or no visual impact expected, possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites/run down areas/wasteland	Little or no visual impact expected, possible benefits	Little or no visual impact expected, possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

The following key provides an explanation to the categories of development:

Category 1 development:

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

Category 2 development:

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

Category 3 development:

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

Category 4 development:

e.g. medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5 development:

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

The following box explains the nature of the impacts:

Very high visual impact expected:

Potentially significant effect on wilderness quality or scenic resources;
Fundamental change in the visual character of the area;
Establishes a major precedent for development in the area.

High visual impact expected:

Potential intrusion on protected landscapes or scenic resources;
Noticeable change in visual character of the area;
Establishes a new precedent for development in the area.

Moderate visual impact expected:

Potentially some effect on protected landscapes or scenic resources;
Some change in the visual character of the area;
Introduces new development or adds to existing development in the area.

Minimal visual impact expected:

Potentially low level of intrusion on landscapes or scenic resources;
Limited change in the visual character of the area;
Low-key development, similar in nature to existing development.

Little or no visual impact expected:

Potentially little influence on scenic resources or visual character of the area;
Generally compatible with existing development in the area;
Possible scope for enhancement of the area.

From the above, the severity of the impact determines the level of the assessment:

Table A2: Impact assessment level of input determination.

Approach	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	Very high visual impact expected
Level of visual input recommended	Level 1	Level 2	Level 3	Level 4	

The following box explains the inputs required at each level of assessment. As indicated in Section 5.2, a Level 4 assessment is required for the proposed project (Oberholzer, 2005).

Level 1 input:

Identification of issues, and site visit;
Brief comment on visual influence of the project and an indication of the expected impacts / benefits.

Level 2 input:

Identification of issues raised in scoping phase, and site visit;
Description of the receiving environment and the proposed project;
Establishment of Receptor Site area and receptors;
Brief indication of potential visual impacts, and possible mitigation measures.

Level 3 assessment:

Identification of issues raised in scoping phase, and site visit;
Description of the receiving environment and the proposed project;
Establishment of Receptor Site area, view corridors, viewpoints and receptors;
Indication of potential visual impacts using established criteria;
Inclusion of potential lighting impacts at night;
Description of alternatives, mitigation measures and monitoring programmes.
Review by independent, experienced visual specialist (if required).

Level 4 assessment:

As per Level 3 assessment, plus complete 3D modelling and simulations, with and without mitigation.
Review by independent, experienced visual specialist (if required).

APPENDIX B – NIGHT TIME LIGHTING

To understand the potential visual impacts from night lighting, it is important to understand the existing lighting levels. The Institute of Lighting Engineers (ILE) (2011) identifies five environmental zones for exterior lighting control and with which to describe the existing lighting conditions within the landscape (Table I1). These environmental zones are supported by design guidance for the reduction of light pollution, which can then inform proposed mitigation measures and techniques. Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

Table E1: Environmental zones for night-time lighting.

Environmental Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically Dark	National Parks, Areas of Outstanding Natural Beauty etc.
E2	Rural	Low District Brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium District Brightness	Small town centres or suburban locations
E4	Urban	High District Brightness	Town/city centres with high levels of night-time activity

Stationary lights facing upward are significant contributors to light pollution and causes sky glow and glare, while light facing in a horizontal direction can be visible for long distances, lead to light trespass (light falling outside the desired area of illumination) and be disturbing to viewers and vehicles. Sky glow refers to the night-time brightening of skies, caused by the scattering and redirecting of light in the atmosphere, by water droplets and dust in the air, back towards the ground. Such stray light mostly comes from poorly designed and improperly aimed light, and from light reflected from over-lit areas (ASSA, 2012). Lighting from vehicles within rural areas will generally be more intrusive than in urban settings and, therefore, will have a potentially greater impact due the general lack of existing ambient light within areas further away from the proposed incline shaft areas.

The ILE (2011) recommends that, to maintain the night-time setting, lighting within the identified zone should have minimal illumination into the sky as well as to adjacent viewpoints.

Bortle Dark Sky Scale

The Bortle Dark Sky Scale was developed by John Bortle "based on nearly 50 years of observing experience," to describe the amount of light pollution in a night sky. It was first published in a 2001 Sky & Telescope article. The results are documented on this map below. To facilitate learning and using the scale, Bortle's indicators of sky brightness have been adapted as a table (below), including the colour codes used in available light pollution chart.

Number Code	Map Color Code	Label	Sky Mag.	Naked Eye Limit Mag.	320mm Limit Mag.	Triangulum Galaxy visible?	Andromeda Galaxy visible?	Central Galaxy visible?	Zodiacal light visible?	Light Pollution	Clouds	Ground Objects
1		excellent dark sky	22.00–21.99	≥ 7.5	> 17	obvious	.	casts shadows	striking	airglow apparent	.	visible only as silhouettes
2		average dark sky	21.99–21.89	7.0–7.49	16.5	easy with direct vision	.	appears highly structured	bright, faint yellow color	airglow faint	dark everywhere	large near objects vague
3		rural sky	21.89–21.69	6.5–6.99	16.0	easy with averted vision	.	complex structure	obvious	LP on horizon	dark overhead	large distant objects vague
4		rural/suburban transition	21.69–20.49	6.0–6.49	15.5	difficult with averted vision	obvious	only large structures	halfway to zenith	low LP	lit in distance	distant large objects distinct
5		suburban	20.49–19.50	5.5–5.99	14.5–15.0	.	easy with direct vision	washed out	faint	encircling LP	brighter than sky	.
6		bright suburban	19.50–18.94	5.0–5.49	14.0–14.5	.	easy with averted vision	visible only near zenith	.	LP to 35°	fairly bright	small close objects distinct
7		suburban/urban transition	18.94–18.38	4.5–4.99	14.0	.	difficult with averted vision	invisible	.	LP to zenith	brilliantly lit	.
8		city sky	< 18.38	4.0–4.49	13	.	.	.	.	bright to 35°	.	headlines legible
9		inner city sky	.	≤ 4.0	.	.	.	.	.	bright at zenith	.	.

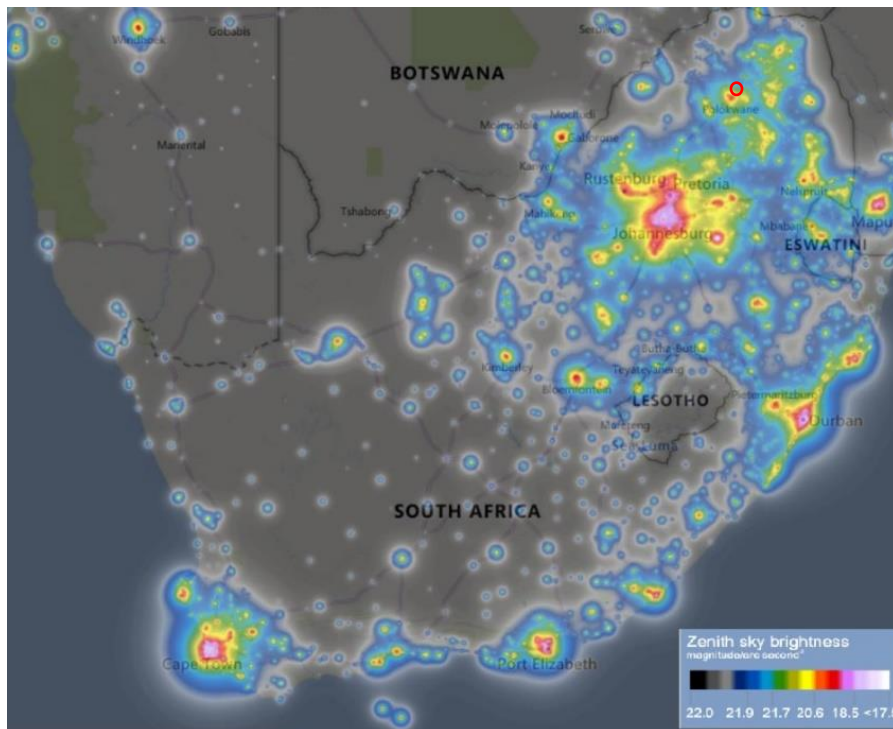


Figure B1: Light pollution map of South Africa (The World Atlas of the Artificial Night Sky Brightness) red circle indicates the location of the proposed Mokopane WTW.

APPENDIX C – INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS and its staff reserve the right to, at their sole discretion, modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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APPENDIX D – SPECIALIST INFORMATION

Details of the specialist who prepared the report

Stephen van Staden MSc Environmental Management (University of Johannesburg)
 Sanja Erwee BSc Zoology (University of Pretoria)

The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
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E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

Specialist Declaration

I, Stephen van Staden, declare that -

- I act as the 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 expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- 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;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist



**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF **STEPHEN VAN STADEN****

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource discipline lead, Managing member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum;
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland assessment short course Rhodes University	2016
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2013

Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016
Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

SELECTED PROJECT EXAMPLES OUT OF OVER 2000 PROJECTS WORKED ON

- 1 Mining: Coal, Chrome, PGM's, Mineral Sands, Gold, Phosphate, river sand, clay, fluorspar
- 2 Linear developments
- 3 Energy Transmission, telecommunication, pipelines, roads

- 4 Minerals beneficiation
- 5 Renewable energy (wind and solar)
- 6 Commercial development
- 7 Residential development
- 8 Agriculture
- 9 Industrial/chemical

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant species and Landscape Plan
- Freshwater Offset Plan
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Soil Monitoring
- Soil Mapping

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions.



**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF **SANJA ERWEE****

PERSONAL DETAILS

Position in Company	GIS Technician and Visual Specialist
Joined SAS Environmental Group of Companies	2014

EDUCATION

Qualifications

BSC Zoology (University of Pretoria)	2013
--------------------------------------	------

Short Courses

Global Mapper	2015
SANBI BGIS Course	2017
Global Mapper Lidar Course	2017
ESRI MOOC ARCGIS Cartography	2018

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Western Cape Free State

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

- Desktop Freshwater Delineation
- Plant species and Landscape Plan

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

GIS

- Mapping and GIS for various sectors and various disciplines (biodiversity, freshwater, aquatic, soil and land capability).