# Modified Namakwa Sands East OFS Project Residue Disposal Plan:

## Visual Impact Assessment

**Report Prepared for**

**Tronox Mineral Sands (Pty) Ltd**

**Report Prepared by**

srk consulting

**Report Number 548215/VIA**

**November 2020**

# Modified Namakwa Sands East OFS Project Residue Disposal Plan: Visual Impact Assessment

# Tronox Mineral Sands (Pty) Ltd

**SRK Project Number 548215/VIA**
**November 2020**


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# Profile and Expertise of Specialists

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Tronox Mineral Sands (Pty) Ltd (Tronox) to undertake an Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA). SRK has appointed a team of professionals to conduct the Visual Impact Assessment as part of the EA process. SRK Consulting comprises over 1 400 professional staff worldwide, offering expertise in a wide range of environmental and engineering disciplines. SRK's Cape Town environmental department has a distinguished track record of managing large environmental and engineering projects, extending back to 1979. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

In accordance with the EIA Regulations, 2014, the qualifications and experience of the key individual specialists involved in the study are detailed below.

**Project Review:** Christopher Dalgliesh, BBusSc (Hons); MPhil (EnvSci)
*Registered Environmental Assessment Practitioner (EAP) No. 2019/413*
Chris Dalgliesh is a Partner and Principal Environmental Consultant with over 33 years' experience, primarily in South Africa, Southern Africa, West Africa and South America (Suriname). Chris has worked on a wide range of projects, notably in the natural resources, Oil & Gas, waste, infrastructure (including rail and ports) and industrial sectors. He has managed and regularly reviews Visual Impact Assessments. He has directed and managed numerous Environmental and Social Impact Assessments (ESIAs) and associated management plans, in accordance with international standards. He regularly provides high level review of ESIAs, frequently directs Environmental and Social Due Diligence studies for lenders, and also has a depth of experience in Strategic Environmental Assessment (SEA), State of Environment Reporting and Resource Economics. He holds a BBusSci (Hons) and M Phil (Env).

**Specialist Consultant**: Sue Reuther, BSc (Hons); MPhil (EnvMgmt)
*Registered Environmental Assessment Practitioner (EAP) No. 2020/425*
Sue Reuther is a Principal Environmental Consultant and Associate Partner with more than 15 years of experience, primarily in South Africa, Southern and West Africa and South America (Suriname). She has managed complex EIAs for a wide range of projects in the infrastructure, mining, coastal and industrial sectors. Sue undertakes and reviews visual impact assessments since 2006 for a range of developments, including infrastructure, mining and alternative energy projects in South Africa and Africa, and has extensive experience with strategic environmental planning. Sue holds a BSc (Hons) (Economics) and MPhil (Env Mgmt).

# Statement of SRK Independence

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# Disclaimer

The opinions expressed in this report have been based on the information supplied to SRK by Tronox. SRK has exercised all due care in reviewing the supplied information, but conclusions from the review are reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

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# Acronyms and Abbreviations

| | |
|---|---|
| amsl | Above Mean Sea Level |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| GIS | Geographic Information Systems |
| ha | hectares |
| HM | Heavy Minerals |
| LoM | Life of Mine |
| Mtpa | Million tonnes per annum |
| NEMA | National Environmental Management Act 107 of 1998 |
| OFS | Orange Feldspathic Sand |
| RAS | Red Aeolian Sand |
| SRK | SRK Consulting (South Africa) (Pty) Ltd |
| ToR | Terms of Reference |
| VAC | Visual Absorption Capacity |
| VIA | Visual Impact Assessment |

# Glossary

| | |
|---|---|
| Aspect | The direction a slope faces with respect to the sun. |
| Landscape Integrity | The compatibility of the development/visual intrusion with the existing landscape. |
| Landscape Unit | Portion of an area with similar morphological characteristics. |
| Sense of Place | The identity of a place related to uniqueness and/or distinctiveness. Sometimes referred to as genius loci meaning 'spirit of the place'. |
| Viewshed | The topographically defined area from which the project *could* be visible. |
| Visibility | The area from which the project components would actually be visible and which depends upon topography, vegetation cover, built structures and distance. |
| Visual Absorption Capacity | The potential for the area to conceal the proposed development. |
| Visual Character | The elements that make up the landscape including geology, vegetation and land-use of the area. |
| Visual Exposure | The zone of visual influence or viewshed. Visual exposure tends to diminish exponentially with distance. |
| Visual Impact | A change to the existing visual, aesthetic or scenic environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities. |
| 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 Quality | The experience of the environment with its particular natural and cultural attributes. |
| Visual Receptors | Potential viewers (individuals or communities) who are subjected to the visual influence of a project. |

# 1 Introduction

## 1.1 Background

Tronox Mineral Sands (Pty) (Ltd) (Tronox) mines heavy mineral sands at the existing Namakwa Sands Mine at Brand se Baai, using open-cast strip-mining methods at the East Mine and West Mine, in accordance with approved Environmental Management Programmes (EMPrs) and within an authorised mining area (see Figure 1-1).

The East Mine is currently a shallow mine, where mining of only the top Red Aeolian Sand (RAS) layer occurs. Mined material (sand ore) is processed at the Primary Concentration Plant at the East Mine (PCP East) to produce a heavy mineral concentrate (HMC). Waste products from the PCP East include sand tailings (coarser material) and (finer) residue called fines. Sand tailings are backfilled into the mining void(s), and slurried residue is disposed of in Residue Storage Facilities (RSFs).

Tronox is authorised to also mine and process the deeper Orange Feldspathic Sand (OFS) resource underlying the RAS material at the East Mine (known as the EOFS Project). For the EOFS Project to proceed, Tronox must modify the approved residue disposal plan (this project): this entails a single RSF to accommodate all fine reside from the project (as opposed to three smaller RSFs as per the current EOFS Project authorisation), change to the backfilling methodology including two large Sand Tailings Facilities (STFs) (sand tailings stockpiles) and the upgrade of infrastructure.

SRK Consulting (South Africa) Pty Ltd (SRK) has been appointed by Tronox to undertake the Scoping and Environmental Impact Reporting (S&EIR, also referred to as EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA) and the NEM: Waste Act 59 of 2008 (NEM: WA). The EIA process is being undertaken in accordance with the EIA Regulations, 2014. A Visual Impact Assessment (VIA) is one of the specialist studies commissioned for the EIA.

## 1.2 Terms of Reference

The primary aims of the study are to describe the visual baseline, assess the visual impacts of the project and identify effective and practicable mitigation measures. More specifically, the ToR for the study are as follows:

- Describe the baseline visual characteristics of the study area, including landform, visual character and sense of place, and place this in a regional context;
- Identify potential impacts of the project on the visual environment through analysis and synthesis of the following factors:
  - Visual exposure;
  - Visual absorption capacity;
  - Sensitivity of viewers (visual receptors);
  - Viewing distance and visibility; and
  - Landscape integrity;
- Assess potential the impacts of the project on the visual environment and sense of place using the prescribed impact assessment methodology (see Appendix C);
- Identify and assess the direct, indirect and cumulative impacts (pre- and post-mitigation) of the proposed project (and alternatives, if applicable) on visual resources in relation to other proposed and existing developments in the surrounding area;
- Recommend practicable mitigation measures to avoid and/or minimise impacts and/or optimise benefits; and

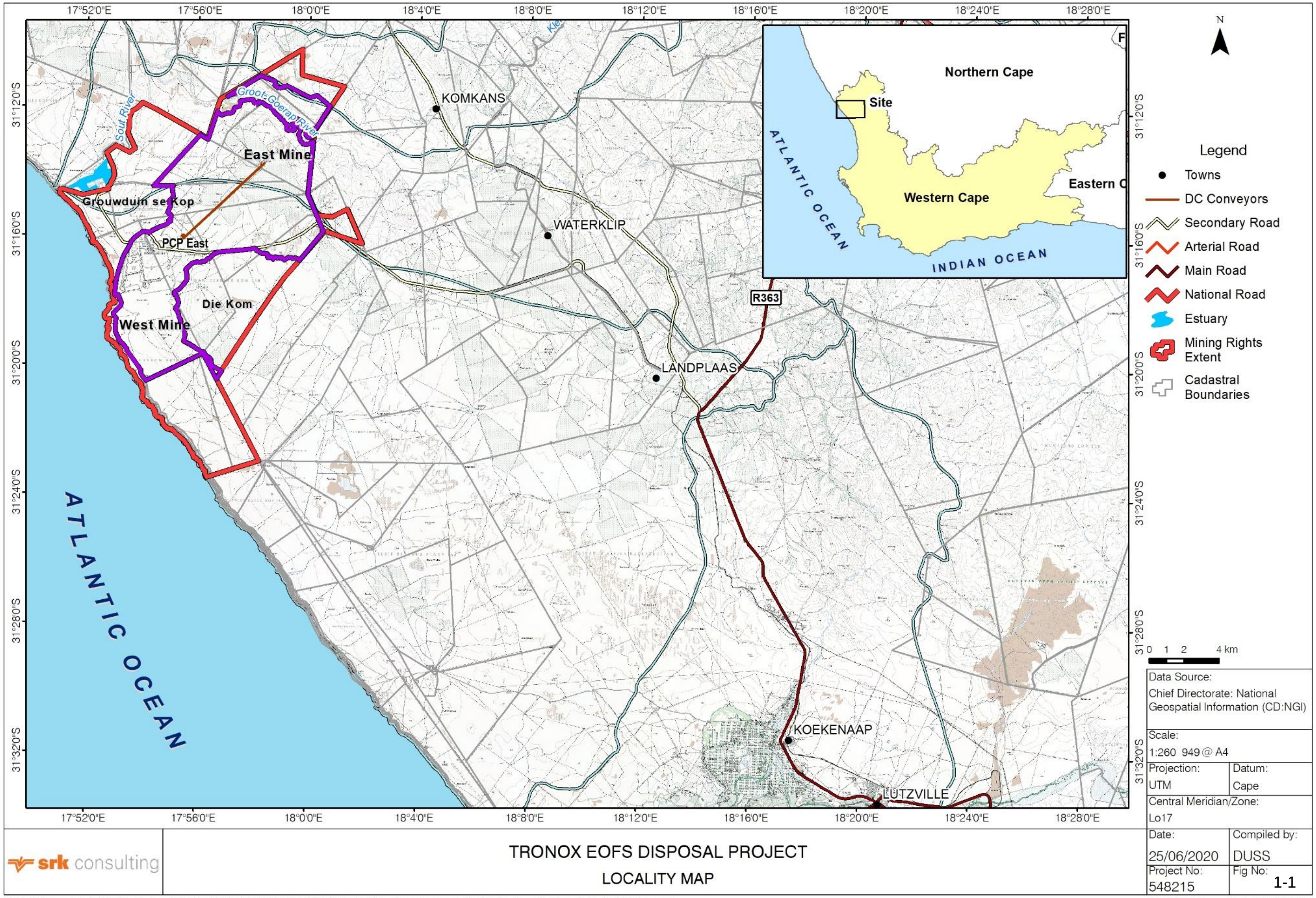
- Recommend and draft a monitoring campaign to ensure the correct implementation and adequacy of recommenced mitigation and management measures, if applicable.

## 1.3 Content of the Report

The EIA Regulations, 2014 (R982 of 2014, as amended by R326 of 2017), prescribe the required content of a specialist report prepared in terms of the EIA Regulations, 2014. These requirements, and the sections of this VIA in which they are addressed, are summarised in Table 1-1.

**Table 1-1: Required content of a specialist report**

| App 6 | Item | Section |
|---|---|---|
| (a) (i) | Details of the specialist who prepared the report; | Page ii |
| (a) (ii) | Expertise of that specialist to compile a specialist report, including a curriculum vitae, | Page ii, App A |
| (b) | A declaration that the specialist is independent in a form as may be specified by the competent authority; | App B |
| (c) | An indication of the scope of, and the purpose for which, the report was prepared; | 1.2 |
| (cA) | An indication of the quality and age of base data used for the specialist report; | 2.4, 2.5 |
| (cB) | A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change; | 4, 6.6 |
| (d) | The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment; | 2.4 |
| (e) | A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used; | 2.3 |
| (f) | Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives; | 5, 6 |
| (g) | An identification of any areas to be avoided, including buffers; | 5.1 |
| (h) | A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers; | Figure 5-2 |
| (i) | A description of any assumptions made and any uncertainties or gaps in knowledge; | 2.5 |
| (j) | A description of the findings and potential implications of such findings on the impact of the proposed activity or activities; | 6, 7 |
| (k) | Any mitigation measures for inclusion in the EMPr; | 6 |
| (l) | Any conditions for inclusion in the environmental authorisation; | 6 |
| (m) | Any monitoring requirements for inclusion in the EMPr or environmental authorisation; | 6 |
| (n) (i) | A reasoned opinion whether the proposed activity or portions thereof should be authorised; | 7.2 |
| (n) (iA) | A reasoned opinion regarding the acceptability of the proposed activity or activities; | 7.2 |
| (n) (ii) | If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan; | 6 |
| (o) | A description of any consultation process that was undertaken during the course of preparing the specialist report; | n/a |
| (p) | A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and | n/a |
| (q) | Any other information requested by the competent authority. | n/a |




TRONOX EOFS DISPOSAL PROJECT

LOCALITY MAP

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Revision: A Date: 01 09 2020

# 2 Methodology

Visual impacts are a function of the physical transformation of a landscape on account of the introduced object, and the experiential perceptions of viewers.

Given the subjective nature of visual issues, assessing the visual impacts of a project in absolute and objective terms is not achievable. Thus, qualitative as well as quantitative techniques are required.

In this VIA, emphasis has therefore been placed on ensuring that the methodology and rating criteria are clearly stated and transparent. The focus of the study is to determine the character and sensitivity of the visual environment, identify visual receptors and viewing corridors and identify and assess potential visual impacts and mitigation measures. Impact assessment ratings are motivated and, where possible, assessed against explicitly stated and objective criteria.

## 2.1 Guidelines

Relevant guidelines that provide direction for visual assessment include the Department of Environmental Affairs and Development Planning's (DEA&DP) "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes" (DEA&DP, 2005), the International Finance Corporation (IFC) "Environmental, Health, and Safety Guidelines: Mining" (IFC, 2007) and the Landscape Institute's "Guidelines for Landscape and Visual Impact Assessments" (2013), which have been considered in this VIA.

The IFC (2007) guidelines list likely sources of visual impacts for mining and promote the incorporation of visual impact assessment in the EIA process, particularly in post-closure planning. They also list possible visual mitigation measures in the mining context.

DEA&DP's Guideline (2005) identifies typical components of a visual study:

- Identification of issues and values relating to visual, aesthetic and scenic resources through involvement of stakeholders;
- Identification of landscape types, landscape character and sense of place, generally based on geology, landforms, vegetation cover and land use patterns;
- Identification of viewsheds, view catchment area and the zone of visual influence, generally based on topography;
- Identification of important viewpoints and view corridors within the affected environment, including sensitive receptors;
- Indication of distance radii from the proposed project to the various viewpoints and receptors;
- Determination of the visual absorption capacity (VAC) of the landscape, usually based on topography, vegetation cover or urban fabric in the area;
- Determination of the relative visibility, or visual intrusion, of the proposed project;
- Determination of the relative compatibility or conflict of the project with the surroundings; and
- A comparison of the existing situation with the probable effect of the proposed project.

Projects that warrant a visual specialist study include those:

- Located in a receiving environment with:
  - Protection status, such as national parks or nature reserves;
  - Proclaimed heritage sites or scenic routes;
  - Intact wilderness qualities, or pristine ecosystems;
  - Intact or outstanding rural or townscape qualities;
  - A recognized special character or sense of place;

- Outside a defined urban edge line;
- Sites of cultural or religious significance;
- Important tourism or recreation value;
- Important vistas or scenic corridors;
- Visually prominent ridgelines or skylines; and/or

- Where the project is:
  - High intensity, including large-scale infrastructure;
  - A change in land use from the prevailing use;
  - In conflict with an adopted plan or vision;
  - A significant change to the fabric and character of the area;
  - A significant change to the townscape or streetscape;
  - A possible visual intrusion in the landscape; or
  - Obstructing views of others in the area.

In terms of the guideline the proposed modification of the EOFS Residue Disposal Plan can be classified as a Category 5 development, which includes *quarrying and mining activities with related processing plants*. As the project is situated within a disturbed or degraded site, a moderate visual impact is expected (see Table 2-1), which introduces:

- Some change in the visual character of the area; and
- A new development or adds to existing development in the area.

Such a project typically warrants a Level 3 assessment (see Table 2-2), which includes the following steps:

- Identification of issues and site visit;
- Description of receiving environment and proposed project;
- Establishment of view catchment area, view corridors, viewpoints and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night; and
- Description of alternatives, mitigation measures and monitoring programmes.

**Table 2-1: Expected visual impact significance**

| Type of environment | Type of development | | | | |
|---|---|---|---|---|---|
| | Cat 1 | Cat 2 | Cat 3 | Cat 4 | Cat 5 |
| Protected / wild areas | Moderate | High | High | Very high | Very high |
| High scenic, cultural, historical value | Minimal | Moderate | High | High | Very high |
| Medium scenic, cultural, historical value | Little or none | Minimal | Moderate | High | High |
| Low scenic, cultural, historical value / disturbed | Little or none Possible benefits | Little or none | Minimal | Moderate | High |
| Disturbed or degraded sites | Little or none Possible benefits | Little or none Possible benefits | Little or none | Minimal | Moderate |

**Table 2-2: Recommended approach for visual assessment**

| Approach | Type of issue | | | | |
|---|---|---|---|---|---|
| | 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 visual input | Level 2 visual input | Level 3 visual assessment | Level 4 visual assessment | |

## 2.2 Approach

The approach adopted for the VIA is intended to be as accurate and thorough as possible. Analytical techniques are selected to endorse the reliability and credibility of the assessment.

The approach to and reporting of the VIA study comprises three major, phased elements (as summarised in Figure 2-1 below):

- Description of the visual context;
- Identification and discussion of the potential visual impacts; and
- Assessment of those potential impacts.

Visual impacts are assessed as one of many interrelated effects on people (i.e. the viewers and the impact of an introduced object into a particular view or scene) (Young, 2000). In order to assess the visual impact the project has on the affected environment, the visual context (baseline) in which the project is located must be described. The inherent value of the visual landscape to viewers is informed by geology/topography, vegetation and land-use and is expressed *as Visual Character* (overall impression of the landscape), *Visual Quality* (how the landscape is experienced) and *Sense of Place* (uniqueness and identity).

Visual impact is measured as the change to the existing visual environment caused by the project as perceived by the viewers (Young, 2000). The visual impact(s) may be negative, positive or neutral (i.e. the visual quality is maintained). The magnitude or intensity of the visual impacts is determined through analysis and synthesis of the visual absorption capacity (VAC) of the landscape (potential of the landscape to absorb the project), viewshed (zone of visual influence or exposure), visibility (viewing distances), compatibility of the project with landscape integrity (congruence), and the sensitivity of the viewers (receptors).

Sources of visual impacts are identified for the construction, operational and post-closure phases of the project. The significance of those visual impacts is then assessed using the prescribed impact rating methodology, which includes the rating of:

- Impact consequence, determined by extent, duration and magnitude/intensity of impact (see above);
- Impact probability;
- Impact significance, determined by combining the ratings for consequence and probability; and
- Confidence in the significance rating.

The significance rating methodology is described in more detail in Appendix C.

Mitigation measures recommended to avoid and/or reduce the significance of negative impacts, or to optimise positive impacts, are identified for the project. Impact significance is re-assessed assuming the effective implementation of mitigation measures.

## 2.3 Method

The following method was used to assess the visual context (baseline) for the project:

1. Describe the project using information supplied by the proponent and EIA team;
2. Collect and review visual data, including data on topography, vegetation cover. land-use and other background information;
3. Undertake fieldwork, comprising a reconnaissance of the study area, particularly the project site and key viewpoints. The objectives of the fieldwork were to:
   - Familiarise the specialist with the site and its surroundings;

- Identify key viewpoints / corridors; and
- Determine and groundtruth the existing visual character and quality in order to understand the sensitivity of the landscape.

Visual 'sampling' using photography was undertaken to illustrate the likely zone of influence and visibility. The location of the viewpoints was recorded with a GPS.

4. Undertake a mapping exercise to define the visual character of the study area and identify sensitive areas, opportunities and constraints; and
5. Identify sensitive receptors.

The following method was used to assess the visual impact of the operation:

1. Determine the visual zone of influence using a GIS model to calculate the viewshed based on the dimensions of the extension;
2. Make field observations at key viewpoints to determine the likely distance at which visual impacts will become indistinguishable;
3. Rate impacts on the visual environment and sense of place based on a professional opinion and the prescribed impact rating methodology, considering the location of proposed project components in an existing mine site;
4. Recommend practicable mitigation measures to avoid and/or minimise impacts; and
5. Provide environmental management measures to be included in the Environmental Management Programme for the project (EMPr).

## 2.4 Data

A site visit was undertaken on 5 November 2019. The site visit duration and timing was appropriate to provide the specialist with impressions of the site and surroundings, as the area does not change seasonally. In addition, observations made during previous site visits were also taken into considered.

The following additional information sources were used:

- Maps indicating the location and layout of the project;
- Topographic data, including spatial files with 5 m contours obtained from the Department of Rural Development and Land Reform;
- Aerial images;
- Other specialist studies for the EIA and/or other available literature on geology, vegetation, land use, receptors etc.; and
- Mine plan in dxf format provided by Tronox, providing the footprint of facilities, including 3D information on the mine floor and RSF and STFs elevations.

The information is sufficiently recent and detailed to provide appropriate inputs into the VIA.

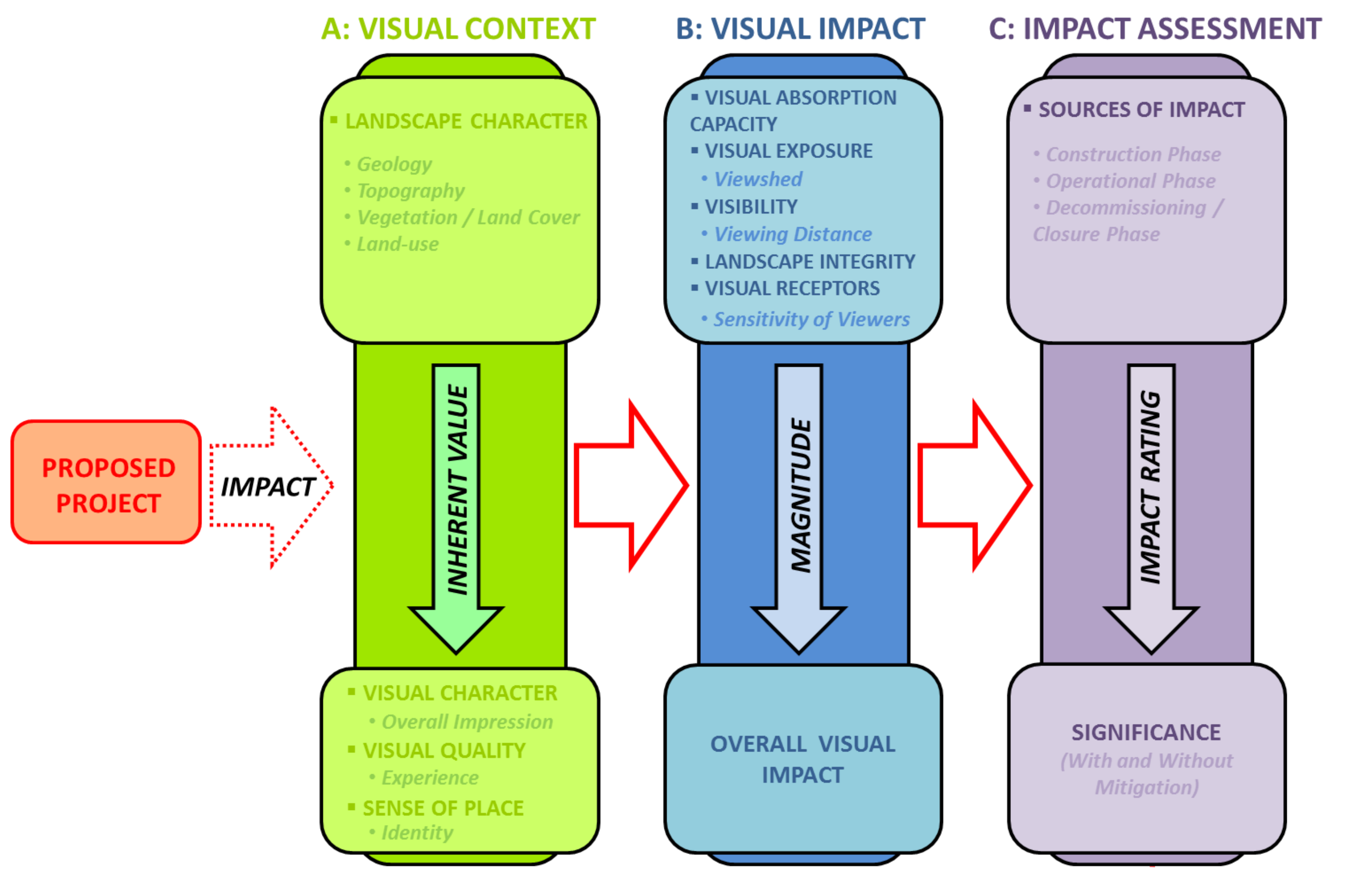
## 2.5 Assumptions and Limitations

As is standard practice, the VIA is based on a number of assumptions and is subject to certain limitations, which should be borne in mind when considering information presented in this report. These assumptions and limitations include:

- VIA is not, by nature, a purely objective, quantitative process, and depends to some extent on subjective judgments. Where subjective judgments are required, appropriate criteria and motivations for these have been clearly stated.

- The study is based on technical information supplied to SRK, which is assumed to be accurate. This includes the proposed locations, dimensions and layouts of the project components;
- The study focuses on the components of the project that are anticipated to have the greatest visual impact because of their height and/or scale, namely the RSF and STFs, and the change in topography across the remainder of the mine pit due to single stack (only) backfill;
- The study area is defined as the area within a ~15 km radius of the site, as the visual impact beyond this distance can be considered negligible;
- The viewshed calculation uses 5 m contour intervals. The viewshed is based on the heights of the RSF and STFs above mean sea level (see Sections 3.2.1 and 3.2.2). The viewshed depicts the area from which the project might be visible. It does not take localised undulations, vegetation and existing man-made structures - which may obscure views - into account. This means that the project is not necessarily visible from everywhere within the viewshed, i.e. from some places the project may be obscured by existing structures, vegetation or local variations in topography. It therefore indicates a “maximum exposure” or “worst case” scenario; and
- This study does not provide motivation for or against the project, but rather seeks to give insight into the visual character and quality of the area, its VAC and the potential visual impacts of the project.

The findings of the VIA are not expected to be affected by these assumptions and limitations.




| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>APPROACH AND METHOD | Project No.<br>548215 |

**Figure 2-1: Approach to and method for the VIA**

# 3 Project Description

This section provides a summary of the proposed modification of the EOFS Residue Disposal Plan and focuses on elements that are relevant to the VIA. A more detailed project description is provided in the EIA Report for the project.

## 3.1 Project Location

The Mine is located at Brand se Baai which lies in the magisterial district of Vanrhynsdorp, in the Matzikama Local and West Coast District Municipalities of South Africa (MLM and WCDM respectively). The Mine area is remote, with the nearest formal community of Koekenaap located more than 50 km to the south-east of the Mine site. The Mine nearest town (Lutzville) lies ~63 km to the south-east along the R363 (see Figure 1-1).

The Mine is located within the Namaqualand Coastal Sub-region of the Cape Floristic Region, and the surrounding areas are underlain by unconsolidated and semi consolidated sediments of Quaternary age (the economic resource). The study area and its surrounds experience an arid climate with hot dry summers with very low rainfall during winter.

The Mine area has been significantly transformed through surface mining activities which have caused scarring (due to stripping of vegetation) and large man-made landforms (e.g. RSFs, stockpiles and voids - see Figure 3-1), and linear infrastructure such as the Dual Carry Conveyor (DCC), pipelines and haul roads. The topographical landscape in the authorised mining area has been significantly modified by mining activities, although an extensive rehabilitation programme is underway:

- Approximately 6 200 ha have been cleared for mining (44% of the ~14 000 ha area which has been approved for mining); and
- Of the area cleared for mining, 2 300 ha (37%) are in advanced stage of rehabilitation, and 2 400 ha (39%) are under active rehabilitation (see Appendix D);

The Mine also comprises long-term surface infrastructure to support mining, including administration and workshop buildings, large primary and secondary concentration plants, a seawater pump station near Brand-se-Baai, fresh water and seawater storage dams and eleven RSFs (fines dams) with a surface area of ~600 ha (see Figure 3-2), tailings and rejects stockpiles, a wide network of haul roads and conveyors (see Figure 3-3) and earthmoving machinery and equipment.

This project components considered in this VIA are associated with operations that take place within Tronox's East Mine only, and located in areas that have been mined previously.

| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>View of the PCP West from the R363 | Project No.<br>548215 |
|---|---|---|

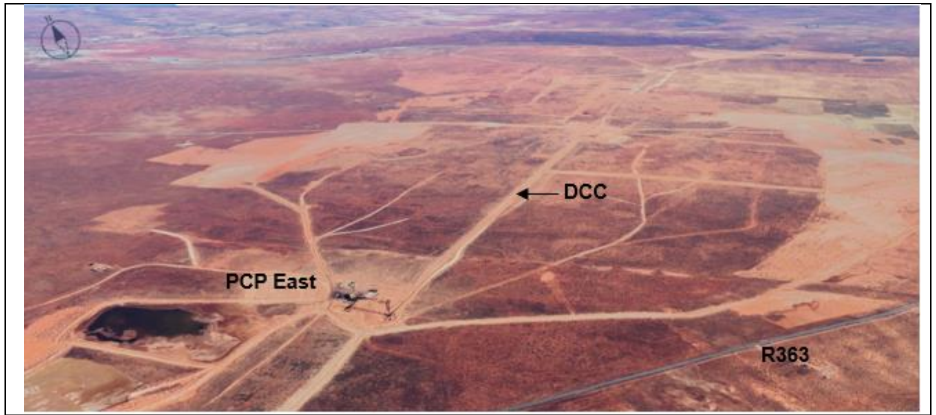
**Figure 3-1: View of the PCP West from the R363**

*Source: SRK Consulting* (2017)

| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>View of RSF 5 in West Mine from the coast | Project No.<br>548215 |

**Figure 3-2: View of RSF 5 in the West Mine (wall height ~40 m)**

*Source: SRK Consulting* (2017)




| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>View of DCC route across the East Mine | Project No.<br>548215 |

**Figure 3-3: View of DCC route across the East Mine**

*Source: Google Earth, 2020*

## 3.2 Proposed Modification of the EOFS Residue Disposal Plan

The currently approved method of residue disposal for the authorised EOFS Project entails hauling and backfilling all sand tailings into the EOFS pit; the backfilled pit therefore mimics the pre-mining topography (elevation). The following key changes to the authorised EOFS Project and additional infrastructure are proposed (see Figure 3-6):

- Change in the backfilling method and topography through:
  - Single stacking sand tailings and/or RAS tailings overburden in the approved EOFS pit by haul truck, leaving a profiled and rehabilitated void which is an average of 7 m deep across most of the East Mine; and
  - Backfilling the surplus of sand tailings in two new STFs in the East Mine pit;
- Establishing a ~400 ha, 66 $Mm^3$ (volumetric capacity) RSF (RSF 6) for the controlled disposal of fine residue generated by the EOFS project (as opposed to three separate, smaller fine residue facilities which were approved in the original application) and associated residue and return water pipelines and pumps;
- Establishing a 50 ha Interim RAS tailings overburden stockpile with a capacity of 3.15 $Mm^3$ in an area approved for mining east of the proposed RSF;
- Upgrading the seawater intake;
- Installing a 7.6 km long 22 kV overhead powerline; and
- Demolishing three structures within the East OFS pit, each more than 60 years old.

The RAS resource in the East Mine will deplete in mid-2024, and therefore the EOFS Project must come online by this date. Detailed design and construction will take ~40 months.

The project will take place within an active mine and in an area authorised for further mining. The Interim RAS tailings overburden stockpile and the additional infrastructure will blend in with existing mine activities. They are not expected to have a significant visual impact during construction or operations and will be removed during closure, and not cause a permanent visual impact.

The RSF and STFs will remain after closure. They are thus considered the key project elements to be assessed in this VIA. Aspects critical for the visual analysis are described in more detail below.

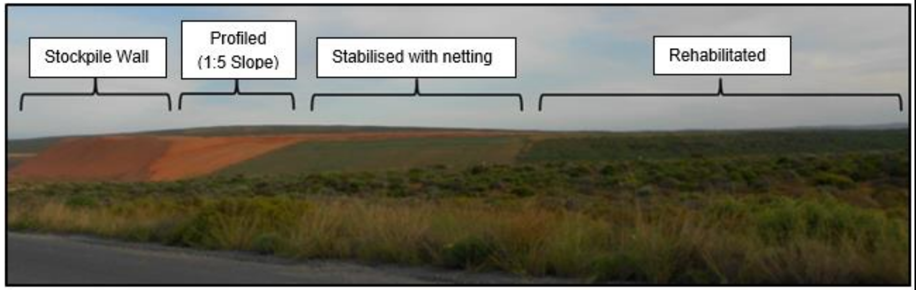
### 3.2.1 RSF

The RSF will have a ~400 ha footprint. RSF walls will be built from sand tailings and up to 25.5 m high, sloping at ~26.6° (1:2) during construction / operation and with a crest width of ~30 m. The RSF will have a flat surface, elevated ~ 101.5 m amsl. The (unfilled) RSF will assume its final dimensions and shape early during operations, in preparation to receive fines.

The closure objective for residue stockpiles is to return these facilities to their pre-mining land use both physically and ecologically (i.e. low-density stock agriculture) as soon as practically possible after the completion of residue deposition.

The existing closure methods for fine residue disposal facilities at the Mine, which will be applied to the RSF, are as follows:

- Cap RSF dam crests with tailings (in this case, RAS tailings overburden from the overburden stockpile) to have a free draining, safe and stable surface;
- Profile side slope to a slope not exceeding 1:5 (~10°) to produce an overall profile that mimics and/or is congruent with the natural topography, eliminating any geometric patterns and/or profiles (see Figure 3-4);
- Take surface water flow / drainage into consideration during final profiling and sloping of fine residue dams wall in order to prevent erosion;
- Cover the profiled RSFs (walls and crests) with a growth medium (average depth of 50 mm), protected with windbreaks (see Figure 3-4); and
- Establish sustainable indigenous vegetation cover on RSFs (walls and crests) that will support the overall closure criteria for the Mine (see Figure 3-4).




| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Residue stockpile wall rehabilitation | Project No.<br>548215 |
|---|---|---|

**Figure 3-4: Residue stockpile wall rehabilitation at Namakwa Sands**

The key issue for RSF closure is how to gain access onto the unconsolidated fines surface (the top 5 m to 10 m of the fine residue body) to place the capping layer. Although financial provision has been made for the closure of RSFs, Tronox has only partially achieved functional closure on one of their RSFs. This is because it has been uncertain whether surface layers of RSFs (that have reached capacity) have consolidated (hardened) to a point where it is safe to implement closure activities.

### 3.2.2 STFs

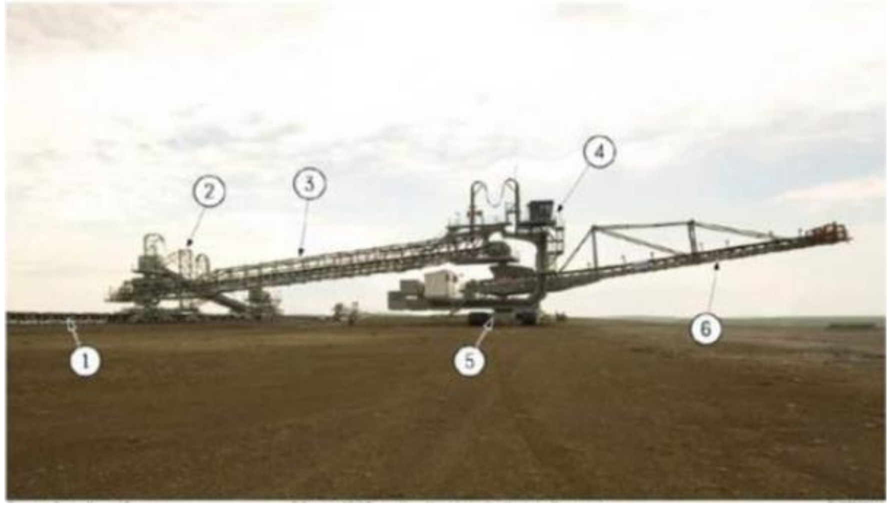
STF 1 will be square with a ~290 ha footprint, each side measuring 1 700 m. STF 2 will be rectangular with a ~250 ha footprint and sides measuring1 900 m x 1330 m.

Each STF will rise up to 13 m above the highest point of the post mining ground level (which is ~7 m above the highest point of the current pre-mining ground level). STFs will have a flat surface, elevated ~155 m amsl for STF 1 and ~141 m amsl for STF 2, which is at a lower elevation. STF outer walls will slope at 35°. The STFs will be built through ongoing deposition of sand tailings over more than 20 years of East Mine operation, and thus increase in height gradually.

Crawler mounted stackers with a 35 m boom and spreader units (see Figure 3-5) will be mounted on ~1.6 km long branch conveyors, installed perpendicular to the DCC, which will feed tailings to the stacker. Spreader units on the stackers will disperse sand tailings and build the STFs. As the mining face advances, the branch conveyors (and mounted stackers) will be moved forward. Building of the STFs (i.e. sand tailings disposal) will therefore follow the progression of mining (parallel to the DCC at STF 1 and perpendicular to the DCC at STF 2).

The existing closure methods for residue stockpiles at the Mine, which will be applied to the STFs, are as follows:

- Profile the mostly flat – perhaps slightly convex - STF top surface to be free-draining and stable without pooling of water;
- Profile walls to a slope not exceeding 1:5 (~10°) (see Figure 3-4);
- Take surface water flow / drainage into consideration during final profiling and sloping of the stockpile wall in order to prevent erosion;
- Cover the profiled stockpile with a growth medium (average depth of 50 mm), protected with windbreaks (see Figure 3-4); and
- Establish sustainable indigenous vegetation cover on the stockpile that will support the overall closure criteria for the Mine.




Key components include 1 – shiftable conveyor, 2 – rail-mounted tripper, 3 – link conveyor, 4 – crawler-mounted spreader, 5 – spreader undercarriage and 6 – spreader boom

| srk consulting | TRONOX EOFS DISPOSAL PROJECT VIA<br>Residue stockpile wall rehabilitation | Project No.<br>548215 |
|---|---|---|

**Figure 3-5: Main stacker unit**

*Source:* (Flour, 2019)

## 3.3 No-Go Alternative

The No-Go alternative will be considered in the study in accordance with the requirements of the EIA Regulations, 2014.

Should the application for the modified residue disposal method proposed in this application be refused, the East OFS project will not be technically feasible, and mining activities would cease in the East Mine in 2024.

The No-Go alternative thus means that the modified EOFS Residue Disposal Plan is not implemented, i.e. that the RSF and STFs, as part of the amended tailings backfill plan, are not established. The proposed RSF and STF sites have already been disturbed by mining, and profiled to mimic prior landforms, which will be further rehabilitated as part of the current mine closure.

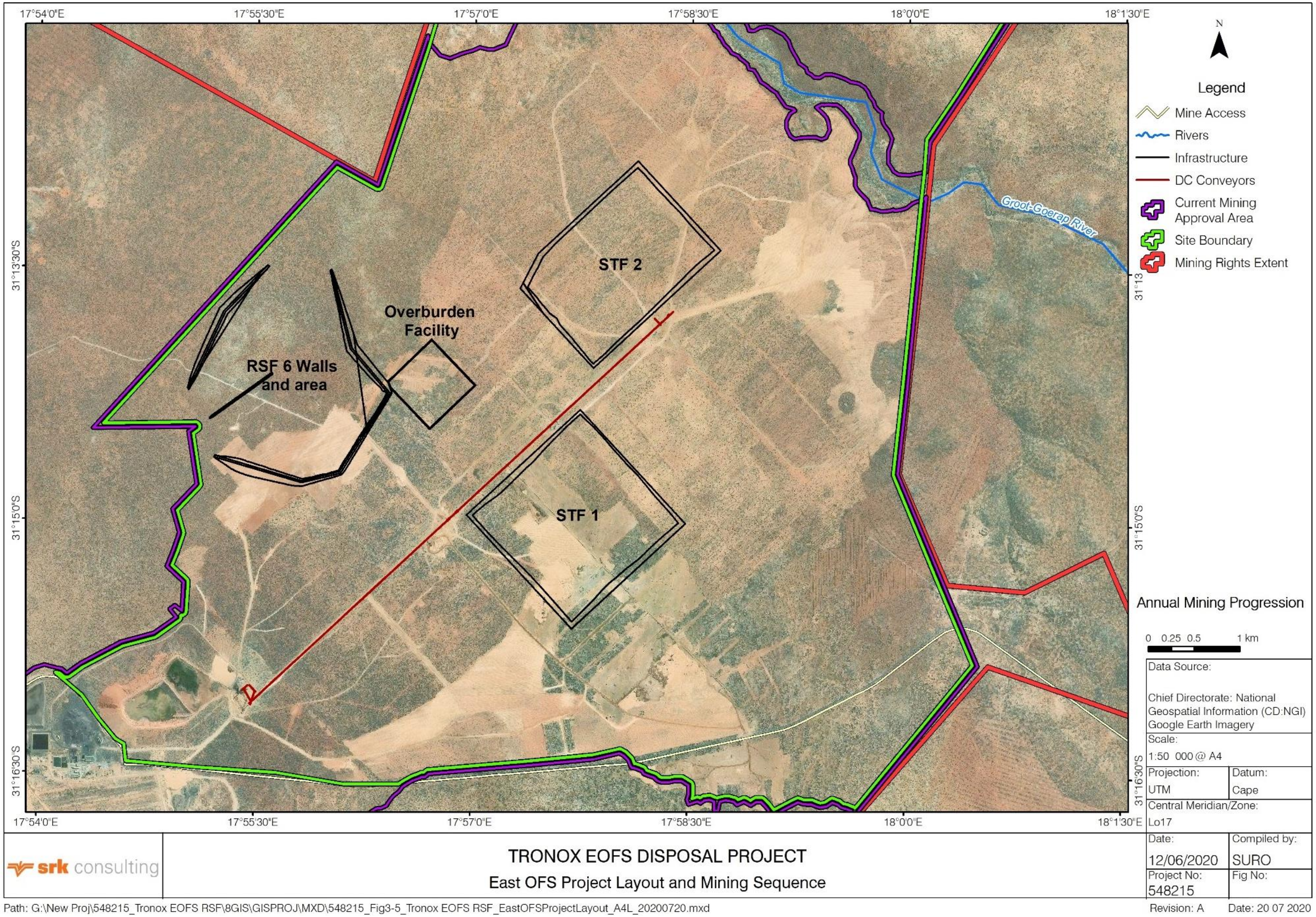



**Figure 3-6: Project components within Namakwa Sands East Mine**

# 4 Visual Context (Affected Environment)

The following description of the affected environment focuses on the *Visual Character* of the area surrounding and including the project (the study area) and discusses the *Visual Quality* and *Sense of Place*[1]. This baseline information provides the context for the visual analysis.

## 4.1 Landscape Character

Landscape character is the description of the pattern of the landscape, resulting from particular combinations of natural (physical and biological) and cultural (land use) characteristics. It focuses on the inherent nature of the land rather than the response of a viewer (Young, 2000).

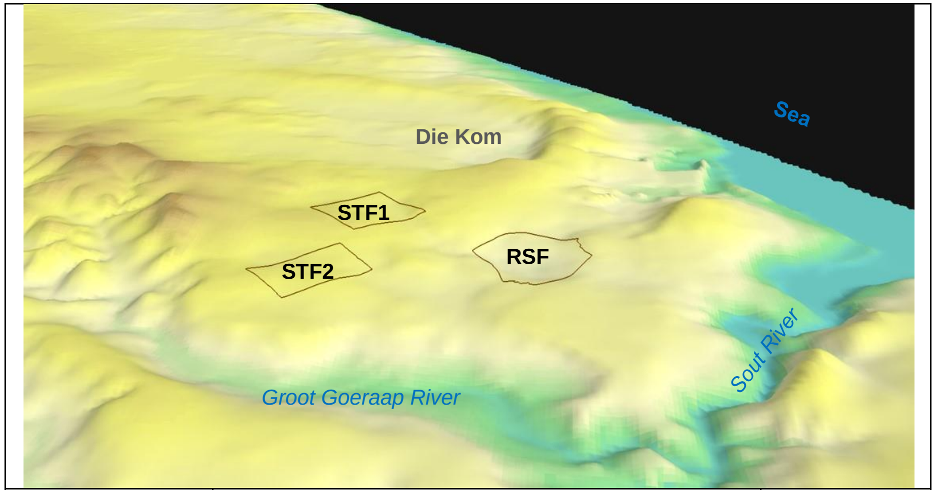
### 4.1.1 Geology and Topography

The geology and topography of the area, together with the semi-arid climate and the proximity to the coast, have determined the basic landscape features and visual elements of the study area. The Mine (study area) is underlain by Pre-Cambrian age metamorphic rocks of the Namaqualand Metamorphic Complex and the Van Rhynsdorp Group formed under conditions of high pressure and temperature as discrete grains of valuable and non-valuable heavy minerals.

The coastal strip is characterised by a high energy wave environment and rocky shoreline with sheltered bays and beaches. From the coastline moving inland, the topography rises to an undulating inland plain carved by non-perennial rivers (see Figure 4-1 and Figure 4-2).

The East Mine is gently undulating at an elevation of 80 – 120 m amsl. The area rises to 200 m amsl towards the east and falls steeply towards the Sout River and Groot-Goerap River to the west and north.

A number of hills or 'koppies' are located throughout the landscape including Peddie-se-Kop (139 m amsl) and Grouduin-se-Kop (147 m amsl) to the north of the mine, Sandkop (216 m amsl) to the east of the mine and Kalkbaken-se-Kop (158 m amsl) to the south of the mine. A ridgeline ~130 m amsl is a dominant landform between the Klein and Groot Goerap rivers north of the East Mine. Die Kom is a local depression situated south of the East Mine.



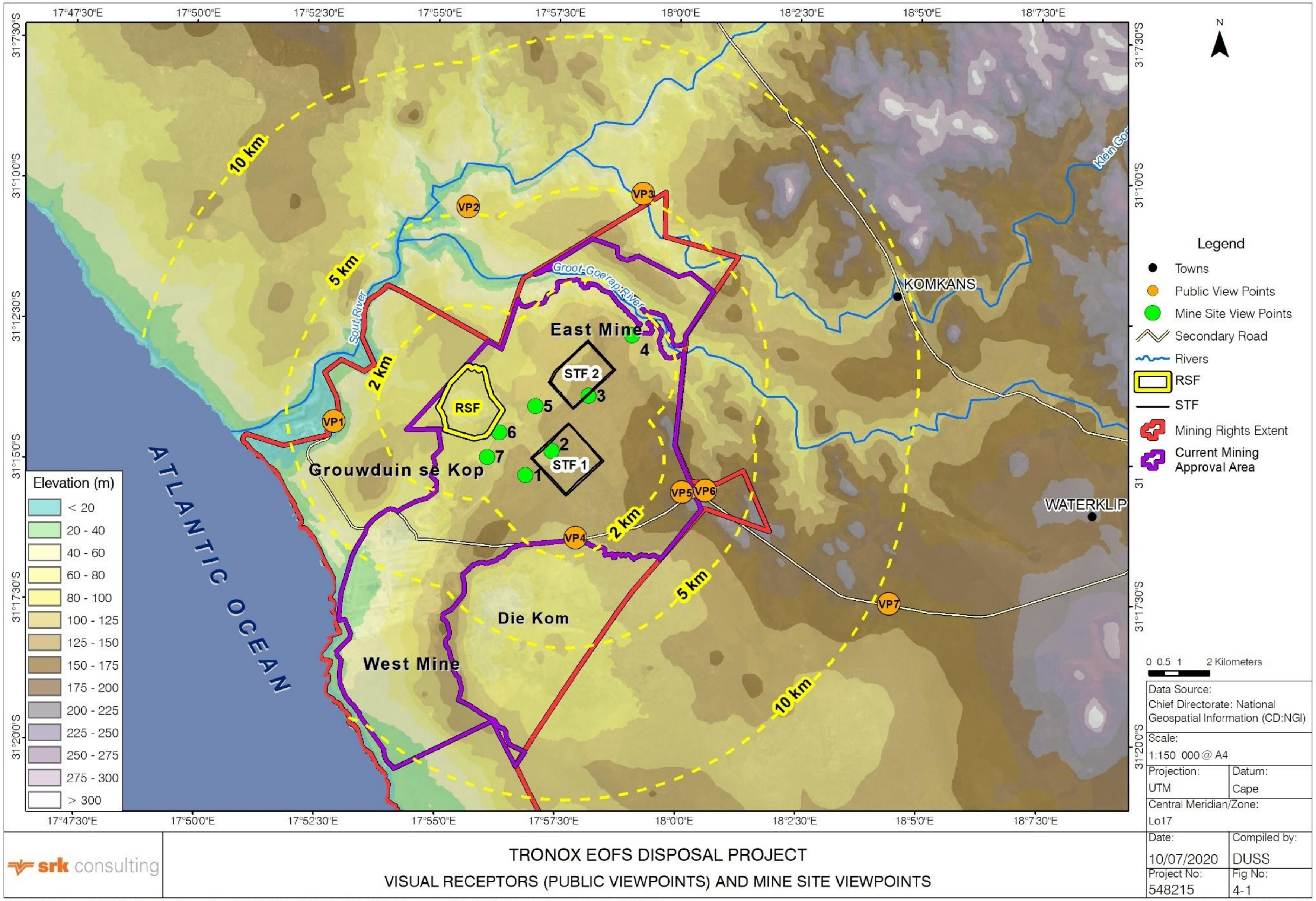

| srk consulting | TRONOX EOFS DISPOSAL PROJECT VIA<br>Topography of project area | Project No.<br>548215 |
|---|---|---|

**Figure 4-1: Topography of the project area (looking south-east)**

Future locations of RSF and STFs are indicated.

*Source: Spatial data provided by Tronox (A. de Beer, 1 July 2020)*

[1] These terms are explained in the relevant sections below.




TRONOX EOFS DISPOSAL PROJECT

VISUAL RECEPTORS (PUBLIC VIEWPOINTS) AND MINE SITE VIEWPOINTS

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The topographical landscape of the study area has been significantly modified by current mining activities, though backfilling, rehabilitation and revegetation have fairly successfully mitigated visual impacts (see Appendix D).

The soils throughout the area are predominantly red and yellow medium-grained sands and are predominantly wind-blown sands originating from the marine deposition (Golder Associates, 2008). The soils generally have a low nutrient reserve and low fertility and have extremely low water holding capacity, making rehabilitation processes difficult.

### 4.1.2 Vegetation

The predominant vegetation type of the region is Namaqualand Strandveld of the Succulent Karoo Biome. Plant diversity of this vegetation type is relatively low compared to other Namaqualand Succulent Karoo vegetation types. Namaqualand Sand Fynbos of the Fynbos Biome occurs on the inland plain, and a thin strip of Namaqualand Seashore vegetation occurs along the coast. The vegetation of the area consists of low coastal shrub up to 1.5 m high, typical of much of the West Coast. The vegetation is pruned by the salty onshore sea breeze. There are very few trees throughout the landscape. Many of the trees that have been planted to provide shade or wind protection are not indigenous to the area. Isolated stands of alien trees (e.g. *Eucalyptus)* occur around windmills and farmsteads. Windrow hedges have been planted to protect agricultural fields (mostly dryland wheat) from the wind.

Vast expanses of vegetation have been cleared for mining, although an extensive rehabilitation programme is underway. Rehabilitation has been relatively successful, although the poor soils, low rainfall and the sheer size of the affected areas are complex challenges (see Appendix D). The project will take place in an area where mining is currently taking place and/or approved.

### 4.1.3 Land Use

Mining and extensive, low-intensity agriculture and small stock farming are the primary land uses in the wider study area, although tourism is of increasing significance in the region. Isolated farmsteads and labourers' cottages are sparsely scattered throughout the region. Many of these are now derelict and unoccupied, possibly because farming has not proved viable. Those farmsteads that remain tend to be located around the few natural water sources. An extensive network of sandy / gravel farm roads connects the various farms. On some of the farms, tracts of land have been cleared of natural vegetation and planted with crops. Borrow pits, exploration trenches and diggings are scattered throughout the landscape, but many are no longer used or have been abandoned. These borrow pits / diggings and the fallow croplands present as scars in the landscape accentuated by exposed bright red soils.

The commercial saltworks (Cawood) to the immediate north of the mine has dramatically altered the estuary of the Sout River, with large evaporation dams located in and along the southern boundary of the estuary.

The mine area, in which the project is located, has been highly transformed due to surface mining activities resulting in scarring (due to stripping of vegetation) (see Figure 3-3) and large man-made landforms (e.g. tailings dams, stockpiles and voids) (see Figure 3-1). The mine precinct comprises long-term surface infrastructure to support mining, including administration and workshop buildings, large primary and secondary concentration plants, a seawater pump station near Brand-se-Baai, fresh water and seawater storage dams, immense slimes dams (see Figure 3-2) and evaporation dams, tailings and rejects stockpiles, a wide network of haul roads and conveyors and earthmoving machinery and equipment. Electricity supply is drawn from the national grid from various sites and water is supplied to the mine via a water pipeline from the Lower Olifants Irrigation

Scheme from a take-off point near Koekenaap (Golder Associates, 2008).

## 4.2 Visual Character

Visual character is descriptive and non-evaluative, which implies that it is based on defined attributes that are neither positive nor negative. It refers to the overall experience and impression of the landscape, such as natural or transformed (see Figure 4-4). Typical character attributes, used to describe the visual character of the affected area and to give an indication of potential value to the viewer, are provided in Figure 4-4.

A change in visual character cannot be described as having positive or negative attributes until the viewer's response to that change has been taken into consideration. The probable change caused by the project is assessed against the existing degree of change caused by previous development.

The basis for the visual character of the region is provided by the geology, vegetation and land use of the area, giving rise to a predominantly undulating landscape under predominantly natural cover with significant influence from the ocean with limited rural activities and isolated farmsteads. Most of the wider area can therefore be defined as a *natural transition landscape* as it is mostly natural scenery, but rural elements and artefacts are visible in the landscape (see Appendix D).

The Mine is a substantially modified landscape with high levels of visual impact caused by earthmoving, scarring and associated infrastructure and activities e.g. water pipeline and powerline along the access road. Backfilling, rehabilitation and revegetation have fairly successfully mitigated visual impacts; nevertheless, mining results in a *highly transformed landscape* visual character (see Appendix E).

## 4.3 Visual Quality

Aesthetic value is an emotional response derived from our experience and perceptions. As such, it is subjective and difficult to quantify in absolute terms. Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity (Crawford, 1994). Landscape quality can be said to increase when:

- Topographic ruggedness and relative relief increases;
- Water forms are present;
- Diverse patterns of grasslands, shrubs and trees occur;
- Natural landscape increases and man-made landscape decreases; and
- Where land use compatibility increases.

The visual quality of the area can be experienced through a number of views (Figure 4-3). These views include:

- Complex rolling views from and across the valleys towards the mountains;
- Extended (long) closed views from vantage points looking out across the valley towards the mountains; and
- Short closed views to nearby mountains and in the Koue Bokkeveld.

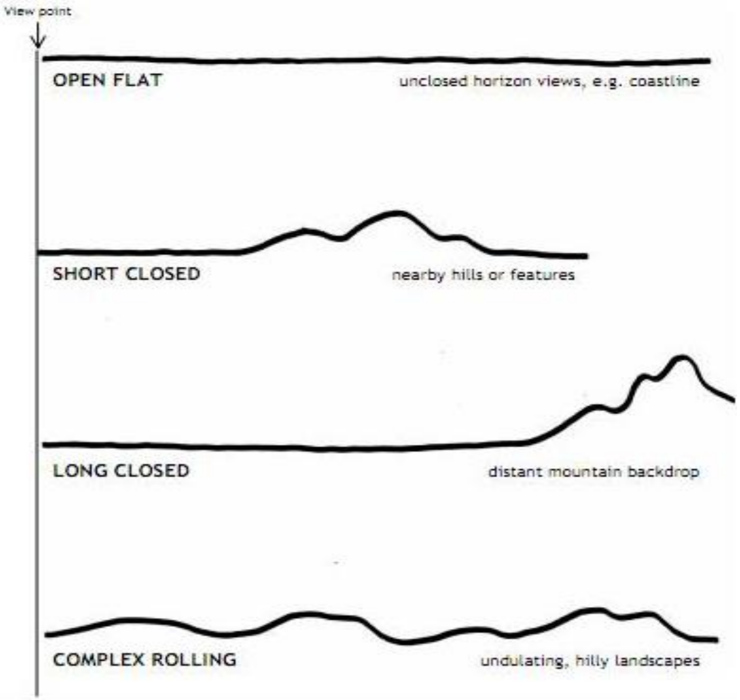



**Figure 4-3: Types of views in the landscape**

*Source: (CNDV, 2006)*

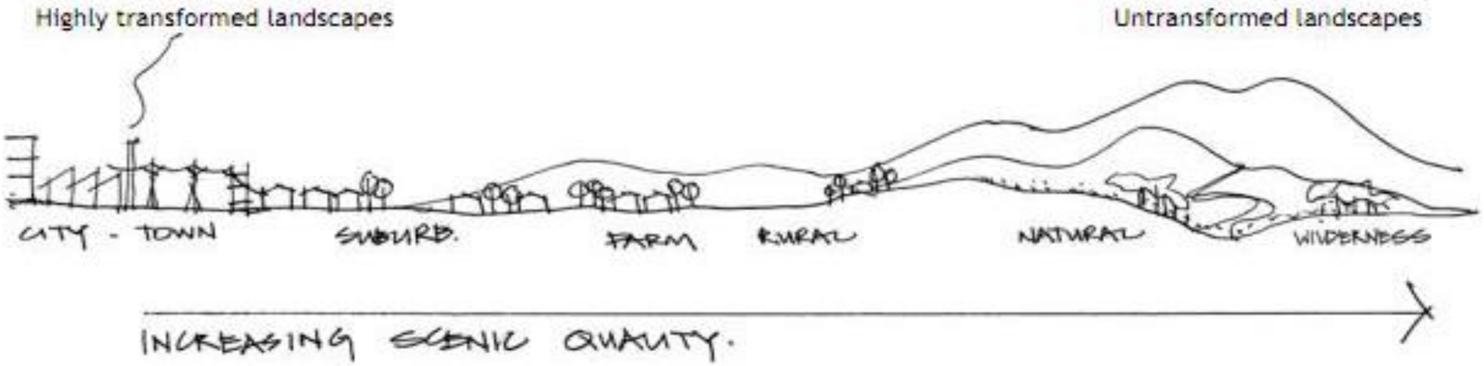
The visual quality of the overall area is largely due to the open, stark character of the landscape with limited human influence. Views over the Atlantic Ocean contribute to this sense of 'openness'. This changes significantly, however, when the viewer experiences the immense operation at the mine and its impact on the landscape. In some ways the scale of mining operations is strangely congruent with the vastness of the landscape, although the immense man-made landforms (e.g. tailings dam) and mining infrastructure (e.g. concentration plants) become incongruent as receptors get closer to these elements.

The Sout River, Klein-Goerap River and the Groot-Goerap River have created erosive landforms which provide interest in the landscape, thereby increasing the visual quality. The dynamic coastline of rocky outcrops and sandy beaches increase the visual quality of the coastal strip.

The low-growing character of the vegetation does not add any visual interest, although the predominantly natural state of the landscape and lack of human influence (beyond the influence of the mine) creates a sense of 'starkness'.

Elements that detract from visual quality in the study area include the electrical and water supply network to the Mine, scarring from previous diggings and borrow pits, the concentration plants and conveyors and rehabilitation fencing.

| Highly Transformed Landscape – Urban/Industrial | Transition Landscape | Modified Rural Landscape | Natural Transition Landscape | Untransformed Landscape – Natural |
|---|---|---|---|---|
| Substantially developed landscape. High levels of visual impact associated with buildings, factories, roads and other related infrastructure (e.g. powerlines). | Transitional landscape associated with the interface between, rural, agricultural area and more developed suburban or urban zones. | Typical character is rural landscape, defined by field patterns, forestry plantations and agricultural areas and associated small-scale roads and buildings. | A changing landscape character associated with the interface between natural areas and modified rural / pastoral or agricultural zones. | No / minimal impact associated with the actions of man. National parks, coastlines, pristine forest areas. |




*Source:* (CNDV, 2006)

(Shan Ding Lu, 2009)

(Night Jar Travel South Africa, 2012)

(Boschkloof, 2012)

**Figure 4-4: Typical visual character attributes**

## 4.4 Visual Receptors

The remoteness of the project area means that there is a very limited number of receptors. Potential viewers of the RSF and backfilled topography, including STFs, are briefly described below and linked to public viewpoints (VP) indicated in Figure 4-2:

- **Motorists** (VP4, VP5, VP7): The district road (R363) leading into the mine is used sporadically by the local farming community, the occasional visitor from outside the area and daily by mine employees and contractors. This road is one of the few public roads providing vehicular access to the coast. This road bisects and terminates in the mine, and the receptors travelling through this area have a clear view of mining operations.
- **Farmers and farm labourers** (VP2, VP3, VP6): Some farmers and farm labourers in the region are currently exposed to portions of the existing mining operation, primarily during transit to farms and residences. Occupied homesteads are typically shielded by topography, e.g. ridgelines, and at considerable distance from the East Mine (more than 5 km).
- **Holiday makers and recreational users** (VP8): Holiday makers and occasional visitors come to the coast to fish or camp. The mine and its operations are not currently visible to holiday-makers visiting many of the bays along the coastline, especially those holiday-makers who approach the area from the south (as they do not have to travel through the mine, although the area to the south has been affected by other smaller scale mining and activities that have marked the environment).
- **Saltworks employees and residents** (VP1): The employees at the Cawood saltworks use the district road through the mine to access the saltworks. These employees are currently exposed to the Namakwa Sands operation.

## 4.5 Sense of Place

Our sense of a place depends not only on spatial form and quality, but also on culture, temperament, status, experience and the current purpose of the observer (Lynch, 1992). Central to the idea of 'sense of place' or *Genius Loci* is identity. An area will have a stronger sense of place if it can easily be identified, that is to say if it is unique and distinct from other places. Lynch defines 'sense of place' as "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid or unique, or at least a particular, character of its own" (Lynch, 1992).

It is often the case that sense of place is linked directly to visual quality and that areas / spaces with high visual quality have a strong sense of place. However, this is not an inviolate relationship and it is plausible that areas of low visual quality may have a strong sense of place or – more commonly – that areas of high visual quality have a weak sense of place. The defining feature of sense of place is uniqueness, generally real or biophysical (e.g. trees in an otherwise treeless expanse), but sometimes perceived (e.g. visible but unspectacular sacred sites and places which evoke defined responses in receptors). In this context Cross (2001) identified six categories of relationships with place (Table 4-2): biographical, spiritual, ideological, narrative, cognitive and dependent.

**Table 4-2: Relationship to place**

| Type of Relationship | Process |
|---|---|
| Biographical (historical and familial) | Being born in and living in a place. Develops over time |
| Spiritual (emotional, intangible) | Feeling a sense of belonging |
| Ideological (moral and ethical) | Living according to moral guidelines for human responsibility to place<br>Guidelines may be religious or secular |
| Narrative (mythical) | Learning about a place through stories, family histories, political accounts and fictional accounts |
| Cognitive (based on choice and desirability) | Choosing a place based on a list of desirable traits and lifestyle preferences |
| Dependent (material) | Constrained by lack of choice, dependency on another person or economic opportunity |

*Source: Adapted from Cross* (2001)

Tourism can sometimes serve as an indicator of sense of place insofar as it is often the uniqueness (and accessibility) of a space / place which attracts tourists.

The region in which the Namakwa Sands mine is located has scenic value in terms of its open stark setting and sense of wilderness invoked when visiting, partly due to the relatively limited human influence throughout the region. The landscape has a distinct and dramatic character. The region has high visual-spatial qualities related to the predominantly natural landscape, and the sense of place has value independent of sensitive visual receptors, of which there are few in the area. The region does not, however, have an immediately recognisable sense of place as there are few defining or unique features.

Within the study area, the mining operations have had and continue to have a significant influence on the sense of place. Due to the permanence of mining structures, sense of place will be affected in the long term and is thus an important consideration. Areas where receptors are screened from existing operations at the Mine are considered to confer a more distinct sense of place.

The relationship of receptors in the study area (refer to Section 5.3) to place may be predominantly biographical. Cognitive or dependent. A farmer or farm labourer, for example, whose family has worked in the area for generations will have a spiritual attachment to the region. Visitors to the Brand-se-Baai coastal area may have decided to visit because they were (cognitively) enticed by the scenic characteristics of the area (dynamic coast, undulating topography and sense of wilderness). Receptors associated with the saltworks depend on the specific characteristics of the Sout River mouth to produce the salt that generates revenue for the business.

# 5 Analysis of the Magnitude of the Visual Impact

The following section outlines the analysis that was undertaken to determine the **magnitude or intensity** of the overall visual impact resulting from the project. Various factors were considered in the assessment, including:

- Visual exposure;
- Visual absorption capacity;
- Sensitivity of visual receptors;
- Visibility and viewing distance; and
- Integrity with existing landscape / townscape.

The analysis of the magnitude or intensity of the visual impact, as described in this section, is summarized and integrated in Table 5-6 and forms the basis for the assessment and rating of the impact as documented in Section 6.

## 5.1 Visual Exposure

Visual exposure is determined by the zone of visual influence or viewshed. The viewshed is the topographically defined area that includes all the major observation sites from which the project *could* be visible. The viewshed analysis assumes maximum visibility of the project in an environment stripped bare of vegetation and structures. It is therefore important to remember that the project is ***not necessarily visible from all points within the viewshed,*** as views may be obstructed by visual elements such as trees, dense scrub, built structures and/or localised variations or irregularities in topography.

Initial screening of the East Mine resulted in the following observations:

- Eastern portions of the approved mining area are more elevated and visually exposed and deemed less suitable from a visual perspective for the placement of the facilities;
- Western portions of the approved mining area are lower-lying and less visually exposed and deemed most suitable from a visual perspective for the placement of the facilities; and
- Central portions of the study area are somewhat screened from sensitive receptors at Brand se Baai and deemed reasonably suitable from a visual perspective for the placement of the facilities.

The proposed RSF and STFs are located in the less visually exposed western and central portions of the East Mine.

Analysis of the viewsheds of the RSF and STFs (see Figure 5-2) leads to the following observations:

- The facilities at the Mine will be located within an existing mining area and partially screened by surrounding ridgelines;
- The facilities may be visible from most areas in the foreground (0-2 km) (see Table 5-2), which extends over most of the East Mine and the plateau between the west of the East Mine and the Sout River. All of these areas fall within the current Mining Rights Extent;
- The facilities may be visible in the middleground (2-5 km) from higher elevations west of the Sout River, the ridge north of the Goerap River and from northern portions of Die Kom and the West Mine;

- The RSF may be visible in the background (5-10 km) from most of the elevated areas north-west and south-east of the East Mine, and from isolated elevations north-east of the East Mine;
- The facilities are not expected to be visible from costal areas in the region nor from most district roads. Users of the district road will only be able to view the facilities from within the Mining Rights Extent; and
- As the highest point of the STFs lies 50 - 60 m higher than the highest point of the RSF (relative to mean sea level), they are more visually exposed than the RSF.

The RSF and STFs will be visible from most areas within 5 km (in the middleground). They will also be visible from many lower-lying areas up to 10 km away (in the background), particularly to the north-east and south, where the mine area is not obscured by ridge lines.

Though man-made structures may limit visual exposure, there are no existing large mine facilities (such as those in the West Mine) to shield the RSF and STFs from those visually most exposed areas to the north-east and south. Similarly, vegetation is low and does not reduce limit visual exposure.

The visual exposure of the facilities, especially the more prominent STFs, is thus deemed ***high.***

## 5.2 Visual Absorption Capacity

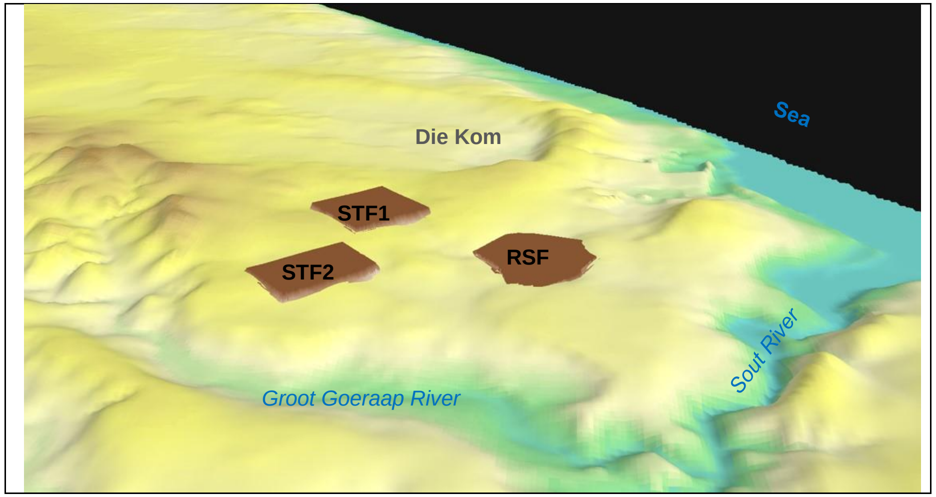
The VAC is the potential for an area to conceal and assimilate the proposed project. Criteria used to determine the VAC of the affected area are defined in

Table 5-1. The VAC of an area is increased by:

1. Topography and vegetation that is able to provide screening and increase the VAC of a landscape;
2. The degree of urbanisation compared to open space. A highly urbanised landscape is better able to absorb the visual impacts of similar developments, whereas an undeveloped rural landscape will have a lower VAC; and
3. The scale and density of surrounding development.

These factors frequently apply at different scales, by influencing the VAC in the foreground (e.g. dense bush, small structures), middleground and background (e.g. tall forests, hills, cityscapes).

The VAC of the project area is somewhat increased by the gently undulating topography and ridgelines present in the otherwise wide-open landscape. The RSF and STFs lie at the foot of hills rising towards the east and the Groot Goeraap River (see Figure 5-1). These features can both conceal and absorb the immense scale of the RSF and STFs to some extent.




| srk consulting | TRONOX EOFS DISPOSAL PROJECT VIA<br>Facilities projected within local topography | Project No.<br>548215 |
|---|---|---|

**Figure 5-1: Facilities projected within local topography (looking south-east)**

RSF and STFs are shown at scale to surrounding landscape.

*Source: Spatial data provided by Tronox (A. de Beer, 1 July 2020)*

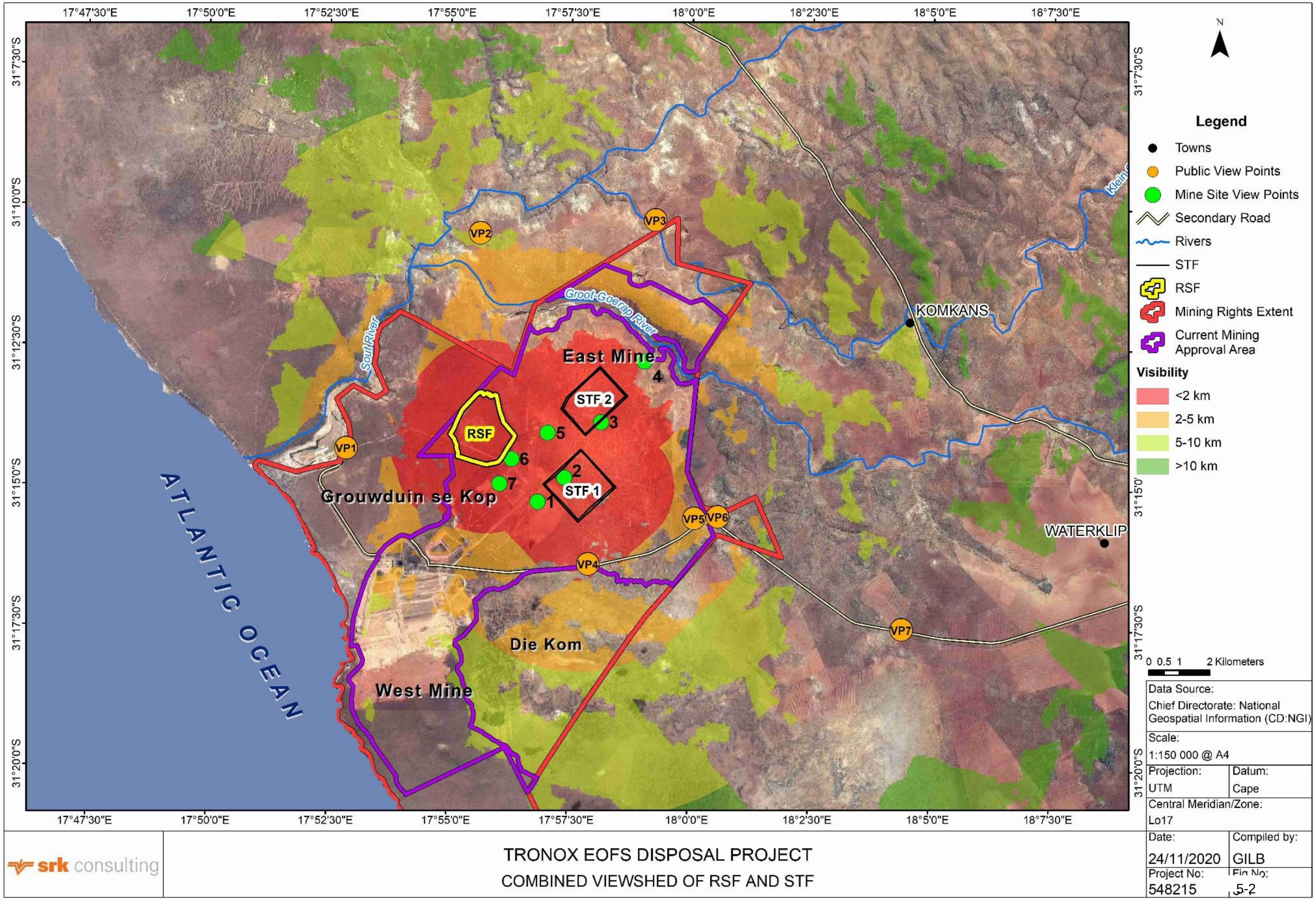



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**Table 5-1: Visual absorption capacity criteria**

| High | Moderate | Low |
|---|---|---|
| The area is able to absorb the visual impact as it has:<br>• Undulating topography and relief<br>• Good screening vegetation (high and dense)<br>• Is highly urbanised in character (existing development is of a scale and density to absorb the visual impact). | The area is moderately able to absorb the visual impact, as it has:<br>• Moderately undulating topography and relief<br>• Some or partial screening vegetation<br>• A relatively urbanised character (existing development is of a scale and density to absorb the visual impact to some extent. | The area is not able to absorb the visual impact as it has:<br>• Flat topography<br>• Low growing or sparse vegetation<br>• Is not urbanised (existing development is not of a scale and density to absorb the visual impact to some extent.) |
| <br>*http://www.franschhoek.co.za* | <br>*http://wikipedia.org* | <br>*http://www.butbn.cas.cz* |
| <br>*http://commons.wikimedia.org* | <br>*http://blogs.agu.org* | <br>*http://fortheinterim.com* |

The facilities will form part of an existing mining operation that involves surface mining of vast areas and construction of other large man-made landforms such as RSFs and stockpiles, which will remain as topographical features after closure. Although the proposed new RSF and STFs are not located in the immediate vicinity of existing residue facilities, these mine features will visually absorb the new facilities to a certain extent.

The low growing vegetation of the area and lack of trees will not increase the VAC.

The study area has a ***moderate*** VAC.

## 5.3 Sensitivity of Visual Receptors

Receptors are important insofar as they inform visual sensitivity. The sensitivity of viewers is determined by the number and nature of viewers. Viewers can be deemed to have:

4. High sensitivity if they view the project from e.g. residential areas, nature reserves and scenic routes or trails;
5. Moderate sensitivity if they view the project from e.g. sporting or recreational areas or places of work; and
6. Low sensitivity if they view the project from or within e.g. industrial, mining or degraded areas, or are transient viewers on roads.

The sensitivity of potential viewers identified in Section 4.4 is described below:

- **Motorists** (VP4, VP5, VP7): Motorists are considered to have relatively low sensitivity, as their view of a development is transient. In addition, the relatively few and regular users of the remote roads in the project area may already be inured to mining activity and will, therefore, be less sensitive to increased mining activity in the area.
- **Farmers and farm labourers** (VP2, VP3, VP6): Viewers from residential areas are considered to have high sensitivity. However, visibility of the RSF and STFs from farmsteads in the region is likely to be low, as they are located more than 5 km from the facilities and are often screened by the topography (e.g. ridgelines). Many of the farmers and labourers are already exposed at times to existing mining operation, and the proposed activities will be perceived as an extension of operations.
- **Holidaymakers and recreational users** (VP8): Recreational users are considered highly sensitive receptors. However, the RSF and STFs are not expected to be visible from the coast, and the facilities would be in the background and visually absorbed by equally large West Mine facilities located in the foreground for these viewers.
- **Saltworks employees and residents** (VP1): Visual receptors at places of work are considered to have moderate sensitivity. The employees at the Cawood saltworks use the district road through the mine to access the saltworks. These employees have therefore been exposed to the Namakwa Sands operation and are already partly accustomed to it. The proposed activities will be perceived as an extension of operations. A ridgeline to the east of the saltworks will screen the facilities from the Cawood saltworks site.

The remoteness of the project area ensures that there are only a very limited number of receptors. The facilities are not readily visible to highly sensitive viewers (residents and holidaymakers), while those receptors that are more likely to see the facilities have lower visual sensitivity (motorists and employees). Overall, the sensitivity of visual receptors potentially affected by the visual impact of the project is considered ***low*** because of their previous and ongoing exposure to existing facilities and infrastructure at the Mine.

## 5.4 Viewing Distance and Visibility

The distance of a viewer from an object is an important determinant of the magnitude of the visual impact. This is because the visual impact of an object diminishes / attenuates as the distance between the viewer and the object increases. Thus, the visual impact at 1 000 m would, nominally, be 25% of the impact as viewed from 500 m. At 2 000 m it would be 10% of the impact at 500 m (Hull and Bishop, 1988 in (Young, 2000)).

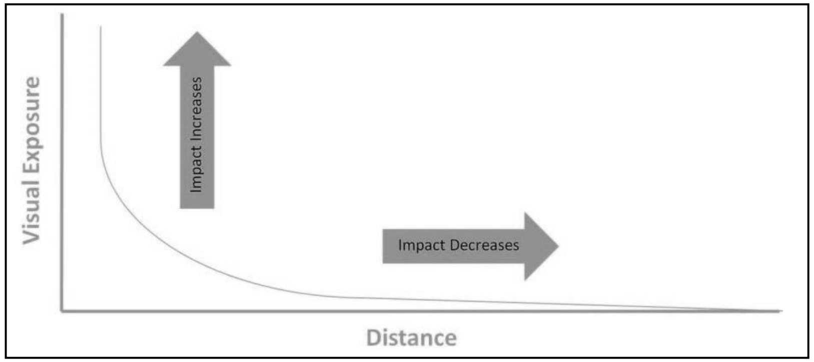


**Figure 5-3: Visual exposure vis-a-vis distance**

*Source: adapted from Hull and Bishop, 1998 in* (Young, 2000)

Three basic distance categories can be defined for a project of this scale (as discussed and represented in Table 5-2): foreground, middleground and background.

A range of public viewpoints were selected to indicate locations from where receptors may view the project. Public viewpoints are shown in Figure 4-2 and listed in Table 5-5. Current views from these points are shown in Appendix D. Mine activities are currently visible from:

- VP2: Areas stripped of vegetation in the background;
- VP4: Rehabilitation areas in the foreground; and
- VP5: Area stripped of vegetation in the foreground and rehabilitation areas in the middleground.

**Table 5-2: Distance Categories**

| | |
|---|---|
| **FOREGROUND (0 – 2 km)** | The zone where the proposed project will dominate the frame of view. Mining activities and infrastructure will be *highly visible* unless obscured. |
| **MIDDLEGROUND (2 - 5 km)** | The zone where colour and line are still readily discernible. Mining activities and infrastructure will be *moderately visible* but will still be easily recognisable. |
| **BACKGROUND (5 -10 km)** | This zone stretches from 5 km to 10 km. Objects in this zone can be classified as *marginally visible* to *not visible*. |

The predicted visibility of the RSF and STFs from each viewpoint is described in Table 5-4, based on the visibility criteria in Table 5-3.

The visibility of the project can be summarised as follows:

- The facilities will be visible in the foreground from viewpoints along the district road once it enters the Mining Right Area, where current mining activities are also visible;
- The facilities are visible in the middleground to viewers on the Rooivleitjie road to the north-west;
- The facilities are not visible from other selected viewpoints; and
- Most receptors are located in the background, from where the RSF and STFs are not clearly discernible and will partially blend with other ongoing mining activities.

Overall, the visibility of the project is ***low*** due to the low number of affected receptors in the foreground and middleground.

**Table 5-3: Visibility criteria**

| | | |
|---|---|---|
| **NOT VISIBLE** | Project cannot be seen | |
| **MARGINALLY VISIBLE** | Project is only just visible / partially visible (usually in background zone) |  |
| **VISIBLE** | Project is visible although parts may be partially obscured (usually in middleground zone) |  |
| **HIGHLY VISIBLE** | Project is clearly visible (usually in foreground or middleground zone) |  |

## 5.1 Compatibility with Landscape Integrity

Landscape (or townscape) integrity refers to the compatibility of the development / visual intrusion with the existing landscape. The landscape integrity of the project is rated based on the relevant criteria listed in Table 5-5.

**Table 5-4: Landscape integrity**

| Criterion | Landscape integrity | | |
|---|---|---|---|
| | High | Moderate | Low |
| | The project is: | | |
| Consistency with existing land use of the area | Consistent | Moderately consistent | Not consistent / very different |
| Sensitivity to natural environment | Highly sensitive | Moderately sensitive | Not sensitive |
| Consistency with urban texture and layout | Consistent | Moderately consistent | Not consistent / very different |
| Congruence of Buildings / structures with / sensitivity to existing architecture / buildings | Congruent / sensitive | Moderately congruent / sensitive | Not congruent / sensitive |
| Scale and size relative to nearby existing development | Similar | Moderately similar | Different |

The RSF and STFs are located in a vast active mining area, and as such the facilities replicate and are consistent with the existing (transformed / mining) land use at a local scale. They are inconsistent with the stark open wilderness type environment surrounding the mine.

The facilities will change the local topography by creating elevated features in a locally flat or slightly depressed area. The features will be recognisable as man-made due to steeper angles and geometric dimensions, although the design will take advantage of the local topography to reduce construction of artificial retaining walls and berms that may contrast with natural slopes in the area. Prior to successful rehabilitation, the unvegetated features will also contrast with the natural environment. With successful rehabilitation, moderate sensitivity to the natural environment is achievable.

The active mine contains large mining infrastructure and facilities, such as the existing slimes dams at the West Mine, each of comparable extent to the proposed facilities but roughly twice the height. No facilities of comparable size currently exist in the East Mine. However, at a mine-scale, the RSF and STFs are similar in scale and size to existing facilities and may be perceived and viewed as an expansion or replication thereof. The RSF and STFs are also similar in scale to the naturally elevated and undulating topography east and north-east of the Mine.

The project is deemed to have ***moderate*** integrity with the surrounding landscape.

**Table 5-5: Visibility from viewpoints**

| Viewpoint # | Location | Co-ordinates | Direction of view | Potential Receptors | Visibility |
|---|---|---|---|---|---|
| VP1 | Saltworks | 31° 14' 22" S<br>17° 52' 50" E | Looking east | Residents and workers at Saltworks | Not Visible<br>A ridgeline screens the RSF and STFs. |
| VP2 | Rooivleitjie | 31° 10' 31.2" S<br>17° 55' 35.4" E | Looking south-east across Groot-Goerap River | Farm labourers (Rooivleitjie is vacant) | Visible<br>The facilities are visible in the background (>5 km) but become more visible as a viewer progresses along the road towards the Mine. |
| VP3 | Farm road on an elevated point | 31° 31'43.7" S<br>18° 16' 56.5" E | Looking south across the Klein-Goerap River | Farm labourers (*Houtkraal* buildings are vacant) | Not Visible<br>A ridgeline screens the RSF and STFs. |
| VP4 | District road | 31° 16' 24.1" S<br>17° 57' 52.1" E | Looking north-west | Motorists using the district road | Highly Visible<br>The RSF and STFs are visible in the foreground (<2 km) but blend with the mining activities already visible from this viewpoint. |
| VP5 | District road near Joetsies | 31° 15' 34.47" S<br>18° 0' 17.06" E | Looking north-west | Motorists using the district road and residents and visitors to Joetsies | Marginally Visible<br>Facilities are visible in the middleground (2-5 km), partially screened by the undulating topography and blending with the mining activities already visible from this viewpoint. |
| VP6 | Access road to Joetsies and Hendriksvlei | 31° 15' 32.56" S<br>18° 0' 33.19" E | Looking north-west | Residents and visitors to Joetsies and Hendriksvlei | Not Visible<br>A ridgeline screens the RSF and STFs. |
| VP7 | District road near the farmsteads of Kalkvlei and Karoovlei | 31° 17' 31.77" S<br>18° 04' 23.04" E | Looking west | Motorists using the district road and residents at the farmsteads | Not Visible<br>Topography screens the RSF and STFs. |

## 5.2 Magnitude of the Overall Visual Impact

Based on the above criteria, the magnitude or intensity of the overall visual impact that is expected to result from the project has been rated. Table 5-6 provides a summary of the criteria, a descriptor summarizing the status of the criteria and projected impact magnitude ratings.

The overall magnitude of the visual impact that is expected to result from the project is rated as ***moderate***. The high visual exposure of the project is moderated by the low number and low visual sensitivity of viewers, with associated low visibility, and the moderate compatibility of the project with the existing land use and landscape.

**Table 5-6: Magnitude of Overall Visual Impact**

| Criteria | Rating | Comments |
|---|---|---|
| Visual Exposure (Viewshed) | High | The facilities will be visible from most areas located within 5 km of the project, and large continuous areas up to 10 km away. There are no existing large mine facilities that will shield the facilities towards the most exposed areas. |
| Visual Absorption Capacity | Moderate | The gently undulating topography and ridgelines in the otherwise wide-open landscape can both conceal and absorb the immense scale of the RSF and STFs to some extent. |
| Viewer Sensitivity (Receptors) | Low | Visual receptors exposed to the project (motorists and employees) have low visual sensitivity and previous and ongoing exposure to the Mine. |
| Viewing Distance and Visibility | Low | Few receptors are affected in the foreground and middleground. |
| Landscape Integrity | Moderate | Size and scale consistent with the existing (transformed / mining) land use and similar to natural topography |

# 6 Impact Assessment and Mitigation Measures

The following section describes the visual impacts anticipated during the construction, operations and post-closure phases of the project, and assesses the significance of these impacts utilising the impact rating methodology presented in Appendix C.

Possible measures to avoid, mitigate or compensate visual impacts will be considered and recommended, depending on the severity of impacts and the feasibility of measures. The mitigation hierarchy and sample measures are provided below (DEA&DP, 2005):

- Avoid, e.g. by re-examining the need for the proposed project, relocating the project or re-designing the project;
- Mitigate (reduce), e.g. through adjustments to the siting and design of the project, careful selection of finishes and colours, use of earthworks (such as berms) and planting to provide visual screening and dust control where required;
- Rehabilitate and restore, e.g. through on-site and off-site landscape rehabilitation of areas affected by the project, which may include re-instating landforms and natural vegetation, provision of landscaped open space etc.;
- Compensate and offset, where avoidance or mitigation cannot achieve the desired effect; and
- Enhance, where the proposed project is located in run-down areas or degraded landscapes.

The project relates to additional facilities in an active authorised mine, and the range of potential visual impacts is thus smaller than it would be for a greenfield mining project. Nevertheless, as is anticipated for most mining projects, visual impacts are expected to be significant, though some can be mitigated. Visual and aesthetic impacts are likely to result from the following project interventions and/or activities:

- Earthworks during construction of the additional infrastructure;
- Dust generated during construction and operations;
- Visual intrusion of the RSF and STF during operations and post-closure; and
- Altered topography across the mine pit due to shallower backfill.

The visual and aesthetic impacts generated by the project are likely to be associated with visual intrusion and changes to sense of place.

## 6.1 Altered Sense of Place and Visual Intrusion caused by Earthworks and Dust during Construction

The construction of the RSF and associated infrastructure will generate visual impacts related to earthworks, installation of conveyors, vehicles/plant/machinery and workers on site. Such impacts are typically limited to the immediate area surrounding the site and the construction period. The walls of the RSF will be built with construction vehicles (mine tipper trucks), plant and machinery, which will also be used for shaping of the walls and to construct the associated infrastructure.

Besides single-stack backfilling of the mined out East Mine pit, STFs will be established via ongoing deposition of sand tailings throughout the East Mine operation, and these facilities are thus not associated with a discrete construction phase, other than the installation of conveyors for transporting of sand tailings, stackers to deposit tailings and associated infrastructure.

The activities associated with the construction of the RSF and initial establishment of the STFs, as well as the conveyors, vehicles/plant/machinery and workers required during construction, are consistent with the ongoing mining activity at the site, and are thus not expected to affect the sense of place or present an (additional) visual intrusion.

Dust from earthworks and from vehicles (on haul roads) is visually unappealing and may detract from the visual quality of the area. These visual impacts are often intermittent, i.e. not continuous. Dust generation from RSF / STF construction is similar to dust generated by ongoing mining activities at the East Mine, and thus not expected to be perceived as a discrete (additional) impact.

As such, only negligible change in the sense of place and visual intrusion are expected as a result of the project, since construction and the change in the state of the site (earthworks, construction equipment and dust generation) can be considered congruent with the current land use of the area (the RSF and STFs will be located within and adjacent to the East Mine pit within an active mining operation). Construction activities will be consistent with the operations at the East Mine and it is unlikely that receptors will be distinctly aware of additional vehicles/plant/machinery and workers required to install the conveyors and stackers and build the RSF during construction.

Construction activities have a greater impact within the foreground (<2 km). Only motorists on the district road through the Mining Rights Area would be affected at that distance. The transient nature of views when travelling, and the historic exposure of frequent travellers on this road to the visual impact of the existing Mine will reduce the significance of the visual (and sense of place) impact of construction activities on these receptors.

The impact is assessed to be of ***very low*** significance without and with the implementation of mitigation (Table 6-1).

**Table 6-1: Altered sense of place and visual intrusion during construction**

| | *Extent* | *Intensity* | *Duration* | *Consequence* | *Probability* | *Significance* | *Status* | *Confidence* |
|---|---|---|---|---|---|---|---|---|
| **Without mitigation** | Local | Medium | Short-term | Very Low | Definite | **VERY LOW** | -ve | High |
| | 1 | 2 | 1 | 4 | | | | |
| **Mitigation Measures**: <br>• Prepare / review a detailed dust suppression / control management programme, such as regular wetting and/or use of non-contaminating agents, to reduce dust from dust-generating facilities (e.g. roads), especially during the dry season and when conditions are windy.<br>• Ensure speed limits on all haul / internal roads are respected at all times.<br>• Utilise existing haul roads as far as possible. If new roads are required, locate these on disturbed areas as far as possible. | | | | | | | | |
| **With mitigation** | Local | Medium | Short-term | Very Low | Probable | **VERY LOW** | -ve | High |
| | 1 | 2 | 1 | 4 | | | | |

## 6.2 Altered Sense of Place and Visual Intrusion caused by the RSF and STFs during Operations

RSFs and STFs are immense intrusions and seldom congruent with the surrounding landscape, even thoroughly transformed landscapes such as the Namakwa Sands Mine. Unavoidably, the proposed facilities are likely to transform the landscape to a certain extent. The RSF and STFs will be readily distinguishable from natural landforms in the area insofar as they will assume a different, angular geometry. The side slopes will be initially steeper and more regular than natural features, and the (top) surface will be (unnaturally) flat and uniform. During operation, when the facilities are in use, they will also have a contrasting and discordant colour compared to the surrounding landscape.

However, many of the project visual aspects will be compatible with and effectively absorbed by the mine in which the facilities will be located. The colour of the unrehabilitated facilities is similar to that of stripped soil in the surrounding mining area. Associated infrastructure will be located within or on the walls of the RSF (e.g. fines and return water pipelines) and STF (e.g. conveyors) or within the East Mine pit. As such, most of the additional infrastructure will be comparable to infrastructure already located within the East Mine, except for the stackers that will operate at each STF.

These enormous units (see Figure 3-5) and the associated link conveyors will be partly elevated above the STFs. They will thus be visible from a distance and appear outsized relative to other plant currently used at the East Mine. Conveyors and stackers will also introduce additional, and elevated, light sources at night, though their light is likely to be perceived as an extension of existing plant / conveyer lighting at the East Mine.

The (unfilled) RSF will assume its final dimensions and shape early during operations, in preparation to receive fines. The more prominent (higher and more elevated) STFs will be built through ongoing deposition of sand tailings over more than 20 years of East Mine operation, and thus increase in height gradually.

The RSF and STFs, which will be the largest facilities in the East Mine, and associated stackers may further expand the overall viewshed of the mine area (see Figure 5-2), particularly in the far background (>10 km) where the East Mine is not currently readily noticed. However, this will mostly occur in the later years of East Mine operation, when the STFs are higher (and the stackers and link conveyors more elevated).

The significance of the visual (and sense of place) impact of the project to receptors will be somewhat reduced by the fact that receptors have become accustomed to the existing mine. The RSF and STFs will screen portions of each other from many viewpoints. The remoteness of the project area also ensures that there are only a limited number of receptors and as such, the extent is rated as regional, while the duration is rated medium-term.

As noted in Section 5.1, the proposed RSF and STFs are located in the less visually exposed western and central portions of the East Mine, outside more exposed positions. The size and number of required East Mine tailings facilities is dictated by operational requirements and cannot be significantly altered without affecting project feasibility. Ongoing dust management and rehabilitation are thus the key feasible mitigation measures. Since the RSF walls will be constructed early in operations, it is possible that revegetation could commence before the end of operations. As the STFs are built through accumulated tailings deposition throughout operation, revegetation can likely only commence at the end of operations.

The impact is assessed to be of ***medium*** significance without and with the implementation of mitigation (Table 6-2).

**Table 6-2: Altered sense of place and visual intrusion caused by the facilities during operations**

<table>
<tr><th></th><th>Extent</th><th>Intensity</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Significance</th><th>Status</th><th>Confidence</th></tr>
<tr><td rowspan="2">Without mitigation</td><td>Region</td><td>Medium</td><td>Medium</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">-ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>6</td></tr>
<tr><td colspan="9">Mitigation Measures:<br>• Install no or indirect low intensity lighting on remote (mobile) plant (e.g. stackers and conveyors), if possible.<br>• Commence revegetation of the RSF walls as soon as possible, and during operations if possible.<br>• Revegetate non-active STF faces / slopes as soon as possible, and concurrent to ongoing deposition at the active face.<br>• Monitor dust generation from the RSF and STFs and implement dust suppression/control measures (e.g. windbreaks) if required.<br>• Ensure that associated infrastructure is placed so as to be screened by the RSF and STFs as far as possible.</td></tr>
<tr><td rowspan="2">With mitigation</td><td>Region</td><td>Medium</td><td>Medium</td><td>Medium</td><td rowspan="2">Probable</td><td rowspan="2">MEDIUM</td><td rowspan="2">-ve</td><td rowspan="2">High</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>6</td></tr>
</table>

## 6.3 Altered Sense of Place and Visual Intrusion caused by the RSF and STFs Post-Closure

Tronox will close and rehabilitate the RSF and backfilling areas (including the STFs) in accordance with methods prescribed in the EMPr for the project. The closure objective for the entire mining area (including tailings facilities) is to return the site to the pre-mining land use (see Section 3.2). The sides of the RSF and STFs will be profiled to a slope not exceeding 1:5, capped and revegetated (see Figure 3-4) to mimic the surrounding undulating landscape as far as possible. However, the project is likely to result in post-closure visual impacts for a number of reasons.

The closed facilities are likely to remain an unnatural form in the landscape as they will have very large regular shapes with flat tops. Tronox advises that operational requirements limit the possibility of mimicking a natural undulating surface on the expansive STFs. It is noted, however, that three large facilities are expected to be more congruent with the landscape than a larger number of smaller facilities.

Also, rehabilitation is challenging in this area. Vegetation is slow growing, and rehabilitation experience at East Mine indicates that vegetation cover which reasonably mitigates the visual impact of scarring from a distance is only likely to be achieved after ~20 years or more (see Figure 6-1). Rehabilitation success will also depend on the quality of topsoil used to slope and cap the RSF and STFs, noting that “topsoil” removed during mining is derived from RAS tailings backfilled after previous mining. Topsoil and seed bank might thus be of poorer quality during this second round of rehabilitation.

During the rehabilitation process, green wind screens (shade cloth) will be installed on the RSF and STFs to encourage establishment of groundcover. This green material is incongruent with the natural colour and texture of the surrounding vegetation and may compromise the rural and traditional sense of place of the area. However, similar material will be installed throughout the mine to assist with revegetation, and is already visible from several public and mine site viewpoints (see Appendix D and E). As such, receptors will have been exposed to such wind screens at the existing Mine.

Without successful rehabilitation, the larger RSF and more prominent STFs will intrude both in terms of their shape and colour, and be visible as incompatible elements in the landscape over a distance of more than 10 km.

Over time and with ongoing and successful rehabilitation, the visibility of the RSF and STFs will reduce. After ~20 years of rehabilitation, the facilities are likely to blend more effectively into the landscape, especially when viewed in the background. In some ways the scale of the facilities is strangely congruent with the vastness of the landscape, especially when viewed from a distance. The remoteness of the project area ensures that there will be a limited number of receptors in the long-term.

As noted in Section 5.1, the proposed RSF and STFs are located in the less visually exposed western and central portions of the East Mine, avoiding more exposed positions. The size and number of required East Mine tailings facilities is dictated by operational requirements and cannot be significantly re-designed without affecting project feasibility. Rehabilitation is thus the key feasible mitigation measures. Shaping the sides of the RSF and STFs to mimic more natural slopes and shaping the top of the STFs to mimic undulating topography would make the facilities appear more natural and further mitigate visual impacts. Tronox advises that shaping the top of the STFs presents operational constraints, and that they will largely remain flat. However, options to achieve a more sloped / undulating top should be further investigated.

Area under natural vegetation cover

Area under rehabilitation for ~8 years, at mine site viewpoint 4

Area under rehabilitation for ~12 years (provided by C Le Roux)

Area under rehabilitation for ~17 years (provided by C Le Roux)

| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Vegetation growth at different stages of mine rehabilitation | Project No.<br>548215 |

**Figure 6-1: Vegetation growth at different stages of mine rehabilitation**

The impact is assessed to be of ***high*** significance without mitigation and of ***medium*** significance with the implementation of mitigation (Table 6-3).

**Table 6-3: Altered sense of place and visual intrusion caused by the RSF and STFs during post-closure**

| | Extent | Intensity | Duration | Consequence | Probability | Significance | Status | Confidence |
|---|---|---|---|---|---|---|---|---|
| **Without mitigation** | Region | Medium | Long-term | High | Probable | **HIGH** | -ve | High |
| | 2 | 2 | 3 | 7 | | | | |
| **Mitigation Measures**: • Remove all associated infrastructure and rehabilitate the disturbed footprints. • Decommission and remove lighting as soon as possible. • Shape sides of the RSF and STFs to mimic more natural slopes. • Investigate options to shape STF tops to be slightly sloped / undulating. • Ensure effective revegetation of the RSFs and STFs (as well as all other disturbed areas). • Remove rehabilitation wind screens as soon as vegetation is viable. | | | | | | | | |
| **With mitigation** | Region | Low | Long-term | Medium | Probable | **MEDIUM** | -ve | High |
| | 2 | 1 | 3 | 6 | | | | |

As rehabilitation is critical to mitigating the post-closure impact, the following monitoring measures are recommended:

- Monitor rehabilitation success until vegetation is stable (minimum of 5 years), i.e. vegetation cover is sufficiently established to prevent wind and water erosion and vegetation structure is sufficiently diverse to continue seeding independently, and for 5 years after closure.
- Compare the revegetation rate on the RSF and STFs with other revegetation rates achieved at the mine. If revegetation appears slower after 3-5 years, identify means of improving revegetation success, e.g. through additional seeding.

## 6.4 Altered Sense of Place Post-Closure due to Shallower Backfill

Tronox proposes to amend the backfilling methodology, i.e. by single stacking sand tailings and/or RAS tailings overburden in the approved EOFS pit, and backfilling surplus sand tailings in two STFs (assessed in Sections 6.2 and 6.3). As a consequence, the EOFS pit area (with the exception of the STFs) will be a profiled and rehabilitated void (more accurately, a depression) across most of the East Mine, on average 7 m deeper than current ground level.

The East Mine pit extends over ~4 500 ha. The RSF and STFs occupy ~800 ha of the East Mine pit, leaving ~3 700 ha of the East Mine pit as a profiled and rehabilitated depression post-closure.

Due to the scale of the pit and assuming the pit edges are profiled, the 7 m drop in landscape elevation is likely to present and be perceived as the new, acceptable normal and visual impacts are not expected to be noticeable or readily discernible, nor impact on the post closure sense of place. Ironically, a smaller pit and/or series of smaller pits would not be perceived as a potentially natural depression(s), and would lead to more pronounced visual impacts.

The impact is assessed to be of ***low*** significance without and with the implementation of mitigation (Table 6-4).

**Table 6-4: Altered sense of place post-closure due to shallower backfill**

| | Extent | Intensity | Duration | Consequence | Probability | Significance | Status | Confidence |
|---|---|---|---|---|---|---|---|---|
| **Without mitigation** | Region | Low | Long-term | Medium | Possible | **LOW** | -ve | High |
| | 2 | 1 | 3 | 6 | | | | |
| **Mitigation Measures**: <br>• Contour the edges of the pit where necessary to achieve natural, organic slopes connecting to unmined areas. | | | | | | | | |
| **With mitigation** | Region | Low | Long-term | Medium | Improbable | **LOW** | -ve | High |
| | 2 | 1 | 3 | 6 | | | | |

## 6.5 The No-Go Alternative

The No Go alternative entails no change to the *status quo*, in other words, no additional tailings facilities and closure and rehabilitation of the East Mine in 2024 (see Section 3.3).

Mining would also cease – and rehabilitation commence – earlier with the No-Go alternative. It is expected that visual impacts of the existing East Mine would be significantly mitigated through rehabilitation by ~2044, some 25 years earlier than if the project is implemented (and mining continues).

## 6.6 Cumulative Impact

Figure 6-2 presents the matrix used to evaluate the cumulative visual impacts of the project on the sense of place of the study area. This matrix presents the relationship between two quantities; severity of impacts (importance and magnitude) and extent of impact (geographic size).

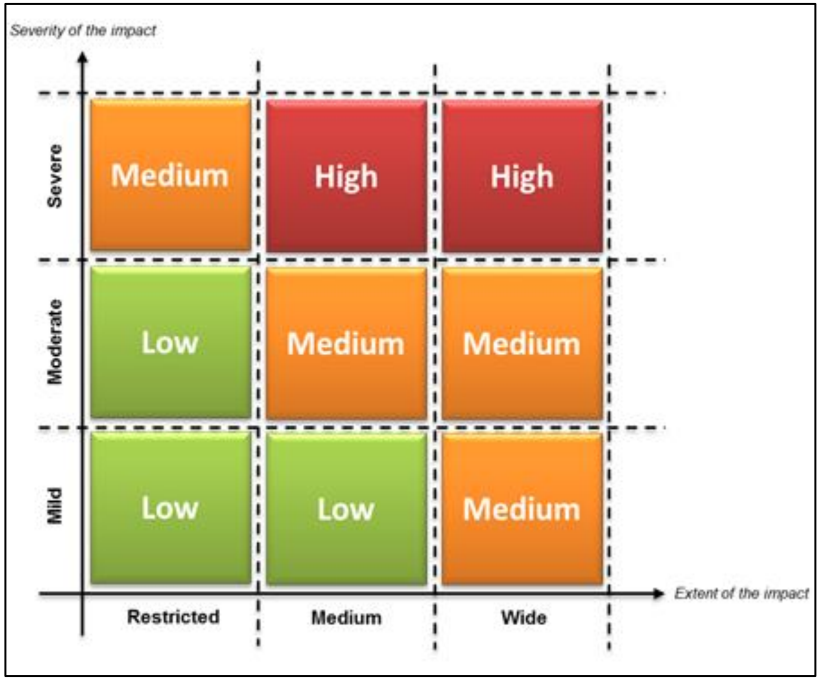


**Figure 6-2: Cumulative impact evaluation matrix**

The project is located within an active mine that has been subjected to mining activities for many years. The Namakwa Sands Mine contains other very large tailings facilities and vast areas have been stripped of vegetation. The project will thus add to the cumulative visual impact of mining activities in the area.

However, this existing visual impact is taken into account in the baseline, and the presence of the active mine and other tailings facilities partially mitigates some of the visual impacts of the project.

Tronox is currently applying for further expansions of the Namakwa Sands Mine, which will result in additional vegetation clearing and installation of mining infrastructure and facilities. This will further exacerbate visual impacts of already authorised activities (e.g. East Mine and West Mine) and the project. Specifically, the visually scarred area will increase, and differences in texture and topography will remain visible for the long term until rehabilitation has sufficiently advanced to form a contiguous vegetation cover. As further expansions will form part of the same mining complex, the impacts will be largely perceived as part of existing mining. However, expansion may affect new viewpoints from where mining activities could previously not be seen. The cumulative impact is reduced by the low number of sensitive receptors in the area.

In the wider region, large areas have been cleared for dryland agriculture and present as open, unvegetated strips in the landscape

There are no other projects or developments in this remote area that significantly impact on the sense of place and visual quality of the area. The few farmsteads and traditional windmills enhance rather than detract from the sense of place and visual quality.

The *severity* of the cumulative visual impact of the existing mine, proposed RSF and STFs and anticipated future mine expansions on the visual quality of the landscape and the sense of place is broadly rated as moderate, and is assessed to be of a medium *extent*. The cumulative impact is thus assessed to be of ***medium*** significance.

# 7 Findings and Recommendations

The VIA describes and interprets the visual context or affected environment in which the project is located: this provides a visual baseline or template and aims to ascertain the aesthetic uniqueness of the project area. To better understand the *magnitude* or *intensity* of visual and sense of place impacts, the capacity of the project area and receptors to accommodate, attenuate and absorb impacts was analysed in considerable detail. To assess impact significance, the project was "introduced" into the baseline, taking account of the attenuating capacity of the project area.

## 7.1 Findings

The following findings are pertinent:

- Tronox proposes the construction of a new RSF and a change to the backfilling strategy that involves the establishment of two STFs, and associated infrastructure at the East Mine of the Namakwa Sands Mine at Brand se Baai, West Coast District, Western Cape. The facilities will have footprints of ~250 ha (STF2) to 400 ha (RSF), and rise 13 m to 20 m above future post-mining ground level;
- The basis for the **visual character** of the region is provided by the geology / topography, vegetation and land use of the area, giving rise to a predominantly undulating landscape under predominantly natural vegetation cover with limited rural activities and isolated farmsteads. Most of the region can therefore be defined as a *natural transition landscape* as it is mostly natural scenery but rural elements are visible in the landscape. The Namakwa Sands Mine is a substantially modified landscape with high levels of visual impact caused by earthmoving, scarring and associated infrastructure and activities e.g. water pipeline and powerline along the access road. Very large tailings facilities exist in the West Mine, south of and adjacent to the project area. This results in a *highly transformed landscape* visual character;
- The **visual quality** of the overall area is largely determined by the open, stark character of the landscape with limited human influence. This changes significantly, however, when the viewer experiences the immense operation at the Mine and its impact on the landscape. In some ways the scale of mining operations is strangely congruent with the vastness of the landscape, although the immense man-made landforms and mining become incongruent when viewed in close proximity to these elements;
- The region has scenic value in terms of its open stark setting and sense of wilderness invoked when visiting, partly due to the relatively limited human influence throughout the region. Within the study area, the mining operations have had, and continue to have, a significant influence on **sense of place**;
- The **viewshed** indicates that the RSF and STFs will be visible from most areas within 5 km (in the middleground), and over larger distances from the north-east and south.
- The **visual absorption capacity** of the area is somewhat increased by the gently undulating topography and ridgelines present in the otherwise wide-open landscape. The RSF and STFs lie at the foot of hills rising towards the east and the Groot Goeraap River, which can serve to partially conceal and absorb/assimilate the immense scale of the RSF and STFs.
- The remoteness of the project area ensures that there are only a very limited number of **receptors**. The facilities are not readily visible to highly sensitive viewers (residents and holidaymakers), while those receptors that are more likely to see the facilities have lower visual sensitivity (motorists and employees).

- Overall, the **visibility** of the project is low due to the low number of affected receptors in the foreground and middleground.
- Although the RSF and STFs will be immense facilities, they are located in a vast active mining area, which increases the **landscape integrity** as the project can be considered to be consistent with the existing land use at a local scale. They are inconsistent with the stark open wilderness type environment surrounding the mine.
- The construction of the RSF and associated infrastructure will generate visual impacts related to earthworks and the conveyors, stackers, vehicles/plant/machinery and workers on site. The impact is assessed to be of *very low* significance without and with the implementation of mitigation*;*
- Tailings facilities are massive scale intrusions and seldom congruent with the surrounding landscape, even thoroughly transformed landscapes. The significance of the visual (and sense of place) impact to receptors will be reduced as receptors have become accustomed to mining infrastructure within the East Mine. The visual impact of the facilities and associated infrastructure (notably stackers) during operation is assessed to be of *medium* significance without and with the implementation of mitigation;
- Although the slopes of the facilities will be rehabilitated and sloped to match the surrounding landscape as far as possible, revegetation is slow and possibly less successful due to the use of previously mined tailings. As such, the closed facilities are likely to remain an unnatural form in the landscape for 20 years and more. The impact is assessed to be of *high* significance without mitigation and of *medium* significance with the implementation of mitigation.
- Existing mining in the area is one of a number of factors mitigating visual impacts. At some point the cumulative (sense of place) impacts of mining in the area may reach a threshold beyond which the relevant authority may not be prepared to grant EA. This threshold cannot be readily determined.

## 7.2 Conclusion

Unavoidably, the RSF and STFs (and the associated infrastructure) will further transform an already transformed the landscape and expand the overall viewshed of the mine area, particularly in background areas. However, the facilities will not be readily visible to more sensitive viewers (such as holidaymakers), and present transient views to any receptors in the foreground (notably motorists). As such, the remoteness of the project area provides some mitigation.

Furthermore, due to the scale of the pit, the 7 m drop in landscape elevation is not expected to be noticeable or readily discernible, nor impact on the post closure sense of place. (Ironically, a smaller pit and/or series of smaller pits would have more pronounced visual impacts.)

Receptors are accustomed to mining infrastructure at the Mine, and the project will be viewed as a component of the Namakwa Sands Mine, which reduces the visual (and sense of place) impact to receptors.

Construction and operation phase visual impacts are deemed acceptable. The acceptability of post-closure impacts critically depends on the successful shaping of slopes and revegetation of the facilities. On the assumption that the mitigation measures listed in Sections 6 are implemented and that acceptable vegetation cover is achieved over a ~20-year period, the specialist is of the opinion that visual impacts of the project are acceptable and, from a visual perspective, there is no reason not to authorise the project.

## Prepared by


**Sue Reuther**

Principal Environmental Consultant

## Reviewed by


**Chris Dalgliesh**

Partner

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# Appendix A

# Specialist CV

# Sue Reuther
## Principal Consultant

| | |
|---|---|
| **Profession** | Environmental Consultant |
| **Education** | MPhil (Environmental Management), University of Cape Town, 2004<br>BSc (Hons), (Economics), University College London, 2001 |
| **Registrations/ Affiliations** | Registered Environmental Assessment Practitioner (EAP): Number 2020/425<br>Member, IAIAsa |

## Specialisation

Environmental impact assessments, economic and resource economic impact assessment, environmental control officer, state of the environment reporting (including environmental management frameworks), visual impact assessment.

## Expertise

Sue Reuther has been involved in environmental assessment sector in South Africa, Africa and Latin America for the past 16 years. Her expertise includes:

- A variety of environmental impact assessment and management projects, including IFC / PS compliant processes, strategic assessments and spatial planning projects, in South Africa, Africa (Mozambique, Angola, DRC, Guinea and Liberia) and South America (Suriname) for a range of projects, including mining, infrastructure, oil and gas and coastal and marine developments;
- Environmental and Social Due Diligence (ESDD) reviews against Good International Industry Practice (GIIP) in Angola, Israel, Ethiopia and DRC; and
- Socio-economics and resource economics specialist input and assessments in South Africa, Suriname, DRC, Tanzania and Uganda; and
- Visual impact assessments for mines and energy infrastructure.

She has 2 years of previous experience in strategy and financial research and assessment (London).

## Employment

| | |
|---|---|
| **2005 - present** | SRK Consulting (Pty) Ltd, Associate Partner and Principal Environmental Consultant |
| **2003 - 2004** | University of Cape Town (UCT), MPhil Environmental Management |
| **2001 - 2002** | JPMorgan Chase, Equity Research Analyst, London |
| **2000 (Jul - Oct)** | Chase Manhattan Bank, Financial Institutions Analyst, London |
| **1998 - 2001** | University College London (UCL), BSc (Honours) Economics, London |

## Publications

A number of publications, in *Development Southern Africa* and for JPMorgan.

I have been interviewed and quoted in numerous environmental and sustainability articles published in the press and sector specific journals, including *Urban Green File, Mining World, Construction World, Environmental Management and Civil Engineering*.

I hold guest lectures to UCT 4$^{th}$ year / post-graduate students on EIA/EMF since 2014.

## Languages

English – read, write, speak (Excellent)
German – read, write, speak (Excellent)
French – read, write, speak (Good)
Spanish – read, write, speak (Good)
Portuguese – read (Good)
Dutch – read, speak (Good)
Afrikaans – read, understand (Good)

# Sue Reuther
**Principal Consultant**

## Visual Assessments

- Eskom, Visual screening and baseline compilation to inform the selection of the preferred Eskom Kappa – Sterrekus transmission line corridor, Western Cape, South Africa, 2020, R90 000
- Anglo American Coal South Africa, Visual Impact Assessment (VIA) for proposed SACE Lifex Project at the Khwezela Colliery Operations, South Africa, 2020, R105,000
- Tronox Mineral Sands, Visual Impact Assessment (VIA) for proposed In-Pit Residue Storage Facility (RSF) and Sand Tailings Facility (STF) for the Namakwa Sands East Mine Orange Feldspathic Sands (East OFS) Project, South Africa, 2020, R95,000
- Tronox Mineral Sands, Visual Screening for site selection process for the Sand Tailings Facility (STF) and the preferred In-Pit Residue Storage Facility (RSF) for the Namakwa Sands East Mine Orange Feldspathic Sands (East OFS) Project, South Africa, 2019 – 2020, R35,000
- Department of Agriculture, Forestry and Fisheries, Review of Visual Impact Assessment (VIA) for a proposed Aquaculture Development Zone (ADZ) in Saldanha Bay, South Africa, 2017, R50,000
- Provincial Government Western Cape, Review of Visual Impact Assessment (VIA) for the construction of a bypass in Hermanus, South Africa, 2016, R50,000
- Mineral Sands Resources, Review of Visual Impact Assessment (VIA) for the Tormin mine expansion, South Africa, 2016, R130,000
- Vale, Visual Impact Assessment (VIA) of proposed phosphate mine in Monapo district, Mozambique, 2011 – 2012, US$15,000
- SRK Canada, Review of Visual Impact Assessment (VIA) of proposed new Sabodala Gold Mine, Senegal, 2010, US$70,000
- Eden District Municipality, Visual Impact Assessment (VIA) of proposed new Eden regional landfill, South Africa, 2009 – 2011, R80,000
- Transnet, Visual Impact Assessment (VIA) of proposed of dredging operations and new cranes at the Port of Cape Town, South Africa, 2006 – 2007, R30,500

## Environmental (and Social) Impact Assessments (EIA or ESIA)

- Tronox Mineral Sands, Screening study to provide environmental input into the site selection process for the Sand Tailings Facility (STF) and the preferred In-Pit Residue Storage Facility (RSF) for the Namakwa Sands East Mine Orange Feldspathic Sands (East OFS) Project, South Africa, 2019 – 2020, R300,000
- Tronox Mineral Sands, EIA for proposed construction and operation of an In-Pit Residue Storage Facility (RSF) and Sand Tailings Facility (STF) for the Namakwa Sands East Mine Orange Feldspathic Sands (East OFS) Project, South Africa, 2019 – 2020, R1,900,000
- Staatsolie Maatschappij Suriname, Environmental Management and Monitoring Plan (EMMP), including impact assessment, for Staatsolie's Cyclic Steam Stimulation (CSS) Enhanced Oil Recovery (EOR) project in the Tambaredjo oil field, Suriname, 2019 – 2020, $40,500
- Staatsolie Maatschappij Suriname, Environmental Management and Monitoring Plan (EMMP), including impact assessment, for Staatsolie's Polymer Flooding Enhanced Oil Recovery (EOR) project in the Tambaredjo oil field, Suriname, 2019, $64,000
- Maritime Authority Suriname, ESIA update for the Suriname River Dredging Project (SRDP), Suriname, 2019, US$172,000
- Staatsolie Maatschappij Suriname, ESIA for the construction of a new 36 MW HFO-fuelled power plant in the Saramacca District, Suriname, 2018 – 2019, US$125,000

**Sue Reuther**
**Principal Consultant**

- Sezigyn, EIA for Exploration Right Application, Offshore Block Orange Deep West, West Coast, South Africa, 2018, R150,000
- Ricocure, EIA for Exploration Right Application, Offshore Block 3B, West Coast, South Africa, 2018, R150,000
- Sezigyn, EIA for Exploration Right Application, Offshore Mid-Orange Basin, West Coast, South Africa, 2018, R150,000
- Mineral Sands Resources, Section 24G Application to apply for rectification of an unlawful activity, South Africa, 2018 - ongoing, R95,000
- Joule Africa, Initial Environmental and Social Assessment of the KPEP Hydropower Project, Cameroon, 2018, $10,800
- Impact Oil and Gas, EIA for 2D and/or 3D Seismic Survey in Orange Deep Basin, South Africa, 2017, R600,000
- City of Cape Town, EIA in support of a Waste Management Licence application for the operation of the Vissershok North Landfill, Cape Town, 2017 – 2018, R650,000
- Sungu Sungu, EIA for proposed 3D seismic survey in the offshore Pletmos Basin, South Coast, 2016 – 2018, R500,000
- Mineral Sand Resources, EIA for the Tormin Coastal Mine Expansion, Western Cape, 2016 – 2017, R1,500,000
- Department of Agriculture, Forestry and Fisheries (DAFF), Project Definition and EIA for a proposed Aquaculture Development Zone (ADZ) in Saldanha Bay, Western Cape, 2016 – 2018, R1,000,000
- Provincial Government Western Cape, Environmental Authorisation Amendment Application process for a section of the R310 upgrade at Spier, Western Cape, South Africa, 2015 – 2019, R100,000
- Transnet Capital Projects, EIA for the construction of additional substations, transmission infrastructures and area lighting masts near the Port of Saldanha, Western Cape, 2015 – 2016, R360,000
- Simo Petroleum, ESIA to IFC standards for the transportation and storage of fuel in Liberia, 2015 – 2016 (suspended), $175,000
- Simo Petroleum, ESIA to IFC standards for the transportation and storage of fuel in southern Guinea, 2015 – 2016 (suspended), $175,000
- Provincial Government Western Cape, EIA for the construction of a bypass in Hermanus, including EMP and Water Use Authorisation (WUA), Hermanus, Western Cape, 2014 – 2020, R3,100,000
- Lucky Star, Section 24G Application and Environmental Impact Assessment to apply for rectification of an unlawful activity, St. Helena Bay, Western Cape, 2015 – 2016, R330,000
- Sable Mining / West Africa Explorations (WAE), Cumulative Impact Assessment for WAE’s Nimba iron ore mine, Guinea, 2014 – 2015 (suspended), US$90,000
- Hatch Goba, BA and WUA for the proposed upgrade of a portion of Slent Road, City of Cape Town, South Africa, 2013 – 2015, R200,000
- Sonangol, ESIA and EMP for terrestrial aspects of the four landing sites of SOOC, Angola, 2013, US$47,000
- Maersk Oil Angola, ESIA and EMP for a 3D seismic survey in an offshore oil concession area, Angola, 2013, US$35,000
- Lucky Star (formerly: Oceana Brands), Review and Public Participation for AEL renewal for fishmeal plant in St. Helena Bay, St. Helena Bay, Western Cape, 2013, R40,000

- N.V. Energiebedrijven Suriname (EBS), ESIA and EMMP for construction of a new 84 MW power plant in Paramaribo, Suriname, 2013 – 2014, US$130,000
- Maersk Oil Angola, ESIA and EMP for prospect drilling of 6 wells in offshore Block 16, Angola, 2012 – 2013, US$35,000
- WesternGeco, ESIA and EMP for a 3D seismic survey in an offshore oil concession area, Angola, 2012, US$35,000
- Rare Metals Industries, Scoping study, including applications for AEL and WML, for construction of a specialty metals production complex, Saldanha, Western Cape, 2012 – 2014, R230,000
- WesternGeco, ESIA and EMP for a 3D seismic survey in an offshore oil concession area, Angola, 2012,US$35,000
- Staatsolie Maatschappij Suriname, Rapid Environmental Assessment and EMP for expansion of a power plant from 14 MW to 28 MW, Suriname, 2012 – 2013, US$100,000
- Transnet (TPT), Operational EMP for the Saldanha Terminal, including the Break Bulk and Bulk Terminals, Saldanha, Western Cape, 2012, R88,000
- AECOM (Pty) Ltd on behalf of Western Cape Department of Transport and Public Works, EIA and EMP for the proposed completion of the R45 road corridor near Malmesbury in the Western Cape, Western Cape, South Africa, 2012 – 2016, R600,000
- Provincial Government Western Cape, BA and EMP for proposed upgrade of Annandale Road, Stellenbosch, South Africa, 2011, R150,000
- Staatsolie Maatschappij Suriname, EIA and EMP for proposed construction of diesel, gasoline and LGP pipelines, Suriname, 2011 – 2012, US$120,000
- Premier Fishing, EIA, incl. EMP and applications for AEL and CWDP, for proposed re-establishment of fishmeal plant in Saldanha, Saldanha Bay, South Africa, 2011 – 2015, R1 200,000
- WesternGeco, EIA and EMP for proposed offshore 3D seismic survey of concession Block 20, Angola, 2010, US$30,000
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- BHP Billiton, Environmental and Social Impact Assessment of dredging operations, Suriname, South America, 2007 – 2008, US$500,000
- Transnet, EIA of proposed expansion of Transnet's Iron Ore Terminal at Port of Saldanha, Saldanha Bay, Western Cape, 2007 – 2008, R22 000,000
- BHP Billiton, ESIA of bauxite transport options, Bakhuis, Sipaliwini district, Suriname, South America, 2006 – 2008, US$2 000,000
- Transnet, EIA and EMP of deepening of Ben Schoeman Dock, Cape Town Harbour, Cape Town, Western Cape, 2006 – 2007, R1 500,000
- Provincial Government Western Cape, EIA and EMP for proposed upgrade of Main Road 108 in Gordon's Bay, Gordon's Bay, Western Cape, 2006 – 2007, R200,000

- Nassau IER, Initial Environmental Review of Phase 1 bauxite exploration activities in Nassau, Nassau Mountains, Suriname, South America, 2006, US$12,200
- BHP Billiton, ESIA and EMP of proposed bauxite mine, Bakhuis, Sipaliwini district, Suriname, South America, 2005 – 2008, US$4 000,000
- Provincial Government Western Cape, EIA and EMP for proposed upgrade of Trunk Road 2 in Somerset West, Somerset West, Western Cape, 2005 – 2006, R200,000

# Appendix B

# Specialist Declaration of Independence

**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

| | (For official use only) |
|---|---|
| File Reference Number: | |
| Date Received: | |

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

**PROJECT TITLE**

Namakwa Sands East OFS Residue Management Project DMRE REF: (WC) 30/5/1/2/2/113 & 114 MR

| | | | |
|---|---|---|---|
| Specialist: | SRK Consulting | | |
| Contact person: | Sue Reuther | | |
| Postal address: | Postnet Suite # 206, Private Bag X18, Rondebosch | | |
| Postal code: | 7701 | Cell: | 084 424 5197 |
| Telephone: | 021 659 3060 | Fax: | 086 530 7003 |
| E-mail: | sreuther@srk.co.za | | |
| Professional affiliation(s) (if any) | CEAPSA, IAIAsa | | |

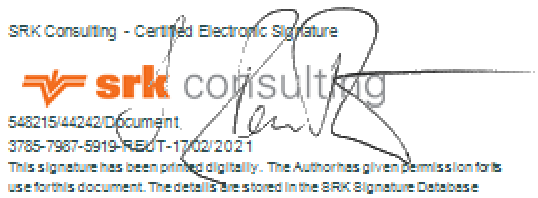
| | | | |
|---|---|---|---|
| Project Consultant: | SRK Consulting | | |
| Contact person: | Matthew Law | | |
| Postal address: | Postnet Suite # 206, Private Bag X18, Rondebosch | | |
| Postal code: | 7701 | Cell: | 082 471 7544 |
| Telephone: | 021 659 3060 | Fax: | 086 530 7003 |
| E-mail: | mlaw@srk.co.za | | |

4.2 The specialist appointed in terms of the Regulations_

I, Sue Reuther ______________________ , declare that --

General declaration:

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 Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, 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; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.




Signature of the specialist:

SRK Consulting (South Africa) (Pty) Ltd

Name of company (if applicable):

17 February 2021

Date:

# Appendix C

# Impact Assessment Methodology

## IMPACT RATING METHODOLOGY

The assessment of impacts will be based on specialists' expertise, SRK's professional judgement, field observations and desk-top analysis.

The significance of potential impacts that may result from the proposed mine expansion will be determined in order to assist decision-makers (typically by a designated authority or state agency, but in some instances, the proponent).

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur.

The criteria used to determine impact consequence are presented in the table below.

**Table 1: Criteria Used to Determine the Consequence of the Impact**

| Rating | Definition of Rating | Score |
|---|---|---|
| **A. *Extent***– *the area over which the impact will be experienced* | | |
| Local | Confined to project or study area or part thereof (e.g. expansion areas) | 1 |
| Regional | The region, which may be defined in various ways, e.g. cadastral, catchment, topographic | 2 |
| (Inter) national | Nationally or beyond | 3 |
| **B**. ***Intensity***– *the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources* | | |
| Low | Site-specific and wider natural and/or social functions and processes are negligibly altered | 1 |
| Medium | Site-specific and wider natural and/or social functions and processes continue albeit in a modified way | 2 |
| High | Site-specific and wider natural and/or social functions or processes are severely altered | 3 |
| **C**. ***Duration***– *the timeframe over which the impact will be experienced and its reversibility* | | |
| Short-term | Up to 2 years | 1 |
| Medium-term | 2 to 15 years | 2 |
| Long-term | More than 15 years | 3 |

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

**Table 2: Method Used to Determine the Consequence Score**

| ***Combined Score* (A+B+C)** | 3 – 4 | 5 | 6 | 7 | 8 – 9 |
|---|---|---|---|---|---|
| ***Consequence Rating*** | Very low | Low | Medium | High | Very high |

Once the consequence will be derived, the probability of the impact occurring will be considered, using the probability classifications presented in the table below.

**Table 3: Probability Classification**

| ***Probability**– the likelihood of the impact occurring* | |
|---|---|
| Improbable | < 40% chance of occurring |
| Possible | 40% - 70% chance of occurring |
| Probable | > 70% - 90% chance of occurring |
| Definite | > 90% chance of occurring |

The overall **significance** of impacts will be determined by considering consequence and probability using the rating system prescribed in the table below.

**Table 4: Impact Significance Ratings**

| | | **Probability** | | | |
|---|---|---|---|---|---|
| | | Improbable | Possible | Probable | Definite |
| **Consequence** | Very Low | **INSIGNIFICANT** | **INSIGNIFICANT** | **VERY LOW** | **VERY LOW** |
| | Low | **VERY LOW** | **VERY LOW** | **LOW** | **LOW** |
| | Medium | **LOW** | **LOW** | **MEDIUM** | **MEDIUM** |
| | High | **MEDIUM** | **MEDIUM** | **HIGH** | **HIGH** |
| | Very High | **HIGH** | **HIGH** | **VERY HIGH** | **VERY HIGH** |

Finally the impacts will be also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below.

**Table 5: Impact Status and Confidence Classification**

| ***Status of impact*** | |
|---|---|
| Indication whether the impact is adverse (negative) or beneficial (positive). | + ve (positive – a ‘benefit’) |
| | – ve (negative – a ‘cost’) |
| ***Confidence of assessment*** | |
| The degree of confidence in predictions based on available information, SRK’s judgment and/or specialist knowledge. | Low |
| | Medium |
| | High |

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity/development.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity/development.

- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity/development.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity/development.
- **HIGH**: the potential impact **will** affect the decision regarding the proposed activity/development.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

In the VIA, practicable mitigation and optimisation measures will be recommended and impacts will be rated in the prescribed way both without and with the assumed effective implementation of mitigation and optimisation measures. Mitigation and optimisation measures will either be:

- **Essential**: best practice measures which must be implemented and are non-negotiable; and
- **Best Practice**: recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Negative impacts (with mitigation) rated high or very high will be shaded in red, while positive impacts (with optimisation) rated high or very high will be shaded green.

# Appendix D

# Public Viewpoint Photographs

*Public viewpoint 1 from the saltworks looking east*

*Public viewpoint 2 from Rooivleitjie looking south-east across the Groot-Goerap River*

| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Public Viewpoints 1 and 2 | Project No.<br>548215 |
|---|---|---|

*Public viewpoint 3 from a farm road on an elevated point looking south across the Klein-Goerap River*

*Public viewpoint 4 from the district road looking west*

| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Public Viewpoints 3 and 4 | Project No.<br>548215 |

*Public viewpoint 5 from the district road near Joetsies looking north-west*

*Public viewpoint 6 from the access road to Joetsies and Hendriksvlei looking north-west*

| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Public Viewpoints 5 and 6 | Project No.<br>548215 |
|---|---|---|

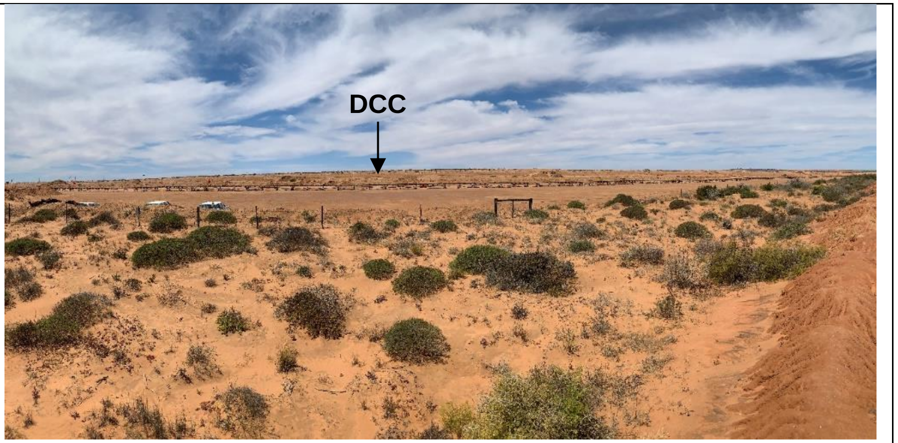
*Public viewpoint 7 from the district road and near the farmsteads of Kalkvlei and Karoovlei looking west*

| | | |
|---|---|---|
| srk consulting | **TRONOX EOFS DISPOSAL PROJECT VIA**<br>Public Viewpoint 7 | Project No.<br>548215 |

# Appendix E

# Mine Site Viewpoint Photographs

*Looking east from mine site viewpoint 1*




*DCC running in a south-westerly to north-easterly direction across the East mine, looking north-west at mine site viewpoint 4*

*Mine infrastructure at mine site viewpoint 3*

*Areas under rehabilitation near the Goerap River at mine site viewpoint 4*

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*Area under rehabilitation at mine site viewpoint 5*

*View towards RSF, looking north-east from mine site viewpoint 6*

*Area under rehabilitation at mine site viewpoint 7*

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