Modified Namakwa Sands East OFS Project Residue Disposal Plan

Scoping Report

Report Prepared for

Tronox Mineral Sands (Pty) Ltd

Report Number 548215/3

DMRE Reference Number: To be provided
DHSWS Reference Number: To be provided

Report Prepared by

srk consulting

June 2020
Modified Namakwa Sands East OFS Project Residue Disposal Plan

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SRK Consulting (South Africa) (Pty) Ltd.
The Administrative Building
Albion Spring
183 Main Rd
Rondebosch 7700
Cape Town
South Africa

e-mail: capetown@srk.co.za
website: www.srk.co.za
Tel: +27 (0) 21 659 3060
Fax: +27 (0) 86 530 7003

SRK Project Number 548215

June 2020

Compiled by: Matthew Law
Principal Environmental Consultant
Sue Reuther
Principal Environmental Consultant

Peer Reviewed by: Chris Dalgliesh
Principal Environmental Consultant

Email: mlaw@srk.co.za

Authors: Sue Reuther, Matthew Law
Profile and Expertise of EAPs

SRK Consulting (South Africa) Pty Ltd (SRK) has been appointed by Tronox Mineral Sands (Pty) Ltd (Tronox) to undertake the Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA).

SRK Consulting was established in 1974 and comprises over 1,400 professional staff worldwide, offering wide-ranging expertise in the natural resources and environmental sectors. SRK’s Cape Town environmental department has a proven track record of managing large, complex environmental and engineering projects in the Western Cape, Africa and internationally. SRK has rigorous quality assurance standards and is ISO 9001 certified.

As required by NEMA, the qualifications and experience of the key independent Environmental Assessment Practitioners (EAPs) undertaking the EIA are detailed below and Curriculum Vitae provided in Appendix A.

**Project Director and Reviewer:** Christopher Dalgliesh, BBusSc (Hons); MPhil (EnvSci)
Registered EAP No. 2019/413
Chris Dalgliesh is an SRK Director and Principal Environmental Consultant with over 33 years’ experience, primarily in Southern Africa, West Africa, South America, the Middle East and Asia. Chris has worked on a wide range of projects, notably in the natural resources, Oil & Gas, waste, infrastructure and industrial sectors. He has directed and managed numerous Environmental and Social Impact Assessments (ESIAs), in accordance with international standards (e.g. IFC). He regularly provides high level review of ESIAs, frequently directs Environmental and Social Due Diligence studies and monitors project on behalf of financial institutions, and also has a depth of experience in Strategic Environmental Assessment (SEA) and Resource Economics.

**Project Manager:** Matthew Law, BSc Hons; MCom (Environmental Economics)
Registered EAP No. 2019/488
Matthew Law has almost 15 years of experience in environmental management throughout Southern Africa, including EIA (for environmental, mining, waste, water and heritage permits), Environmental Management Programmes (EMPrs) and Environmental Auditing. Matthew also undertakes, or contributes to, Socio-Economic Impact Assessments (SIAs). Matthew has managed or participated in more than 100 projects in the mining, infrastructure development, commercial and industrial sectors, providing him with a broad range of experience, detailed legislative knowledge, and understanding of environmental challenges.

**Project Consultant:** Sure Reuther, BSc Hons (Econ); MPhil (EnvMgmt)
Registered EAP No. 2020/425
Sue Reuther is an Associate Partner and Principal Environmental Consultant with more than 15 years of experience in the environmental assessment sector. She has been involved in a variety of EIAs, SIAs and Visual Impact Assessment, strategic State of Environment Reporting, Environmental Management Frameworks (EMF) and the compilation of EMPr. Sue has experience in mining, infrastructure, marine and energy-related projects in Southern Africa, West Africa, South America and the Middle East.

Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.
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.
EXECUTIVE SUMMARY: SCOPING REPORT
MODIFIED NAMAKWA SANDS EOFS PROJECT RESIDUE DISPOSAL PLAN
SRK Reference Number: 548215

1 INTRODUCTION
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 (EMPs) and within an authorised mining area (see Figure 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 EOSF 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 residue from the project (as opposed to three smaller RSFs as per the current EOFS Project authorisation), 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 within an authorised mining area (see Figure 1).

SRK has determined that the proposed project triggers activities listed in terms of LN 1 of the EIA Regulations, 2014 (see Table 1) in addition to those activities already authorised, requiring an EA application via a BA process.

See page 6 for details on how you can participate in the process.

2 GOVERNANCE FRAMEWORK
Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an Environmental Authorisation (EA) issued by the competent authority, in this case, the Department of Mineral Resources and Energy (DMRE). The EIA Regulations, 2014, promulgated in terms of NEMA, govern the process, methodologies and requirements for the undertaking of EIAs in support of EA applications. The EIA Regulations are accompanied by Listing Notices (LN) 1-3 that list activities that require EA.

The EIA Regulations, 2014 lay out two alternative authorisation processes. Depending on the type of activity that is proposed, either a BA process or a Scoping and Environmental Impact Reporting (S&EIR) process is required to obtain EA: LN 1 lists activities that require a BA process, while LN 2 lists activities that require S&EIR. LN 3 lists activities in certain sensitive geographic areas that require a BA.

SRK has determined that the proposed project triggers activities listed in terms of LN 1 of the EIA Regulations, 2014 (see Table 1) in addition to those activities already authorised, requiring an EA application via a BA process.

Table 1: Listed NEMA activities triggered by the project

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>The development of infrastructure exceeding 1 000 m in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 m or more; or (ii) with a peak throughput of 120 litres per second (l/s) or more.</td>
</tr>
<tr>
<td>10</td>
<td>The development and related operation of infrastructure exceeding 1000 m in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes-with an internal diameter of 0,36 m or more; or with a peak throughput of 120 l/s or more.</td>
</tr>
<tr>
<td>19A</td>
<td>The infilling or depositing of any material of more than 5 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m³ from: (i) the littoral active zone, an estuary or a distance of 100 m inland of the high-water mark of the sea or an estuary, whichever distance is the greater.</td>
</tr>
<tr>
<td>51</td>
<td>The expansion of structures in the coastal public property where the development footprint will be increased by more than 50 m², excluding such expansions within existing ports or harbours where there will be no increase in the development footprint of the port or harbour and excluding activities listed in activity 23 in Listing Notice 3 of 2014, in which case that activity applies.</td>
</tr>
<tr>
<td>54</td>
<td>The expansion of facilities: (v) within a distance of 100 m inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of: (e) infrastructure or structures where the development footprint is expanded by 50 m² or more.</td>
</tr>
</tbody>
</table>

NEM-WA makes provision for the listing of waste management activities that have, or are likely to have, a detrimental effect on the environment and may not be
Figure 1: Locality Plan
undertaken without a Waste Management Licence (WML) issued by the competent authority, in this case DMRE. The list of waste management activities published in terms of NEM:WA provides for various categories of waste activities: Category A lists activities that require a BA process, while Category B lists activities that require S&EIR as set out in the EIA Regulations, 2014 as part of the WML application process.

SRK has determined that the proposed project triggers activities listed in terms of Category B (see Table 2), requiring a WML application via an S&EIR process.

Table 2: Listed NEM:WA activities triggered by the project

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>LN1 (requiring BA)</td>
<td>7  The disposal of any quantity of hazardous waste to land.</td>
</tr>
<tr>
<td>7</td>
<td>10 The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).</td>
</tr>
<tr>
<td>11</td>
<td>The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right.</td>
</tr>
</tbody>
</table>

An integrated application process will be undertaken for EA and WML application. Since a full S&EIR process is required to inform an application for WML, Tronox is obliged to undertake an integrated S&EIR process for both applications, in accordance with the procedure stipulated in the EIA Regulations, 2014.

An amendment to Tronox’s Water Use Licence will be required for the project in terms of Section 21 of the National Water Act 36 of 1998 (NWA) from the Department of Human Settlements, Water and Sanitation (DHSWS). Water use activities that may be applicable to the project are listed in Table 3.

Table 3: NWA water use activities applicable to project

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Disposing of waste in a manner which may detrimentally impact on a water resource.</td>
</tr>
</tbody>
</table>

Tronox will request that their approved EMPs are amended through this EIA process to include the project activities and will submit a Notice of Intent to Develop (NID) to Heritage Western Cape HWC for the proposed demolition of three structures older than 60 years on the Mine site.

• Describe the affected environment and potential environmental issues and benefits arising from the proposed project that may require further investigation in the Impact Assessment Phase;
• Develop terms of reference for specialist studies to be undertaken in the Impact Assessment Phase;
• Provide stakeholders with the opportunity to participate in the process and identify any issues or concerns; and
• Produce a Scoping Report for submission to the relevant authorities.

Figure 2: S&EIR Process

Once the Scoping Phase has been completed, the Impact Assessment Phase will commence, in which the significance of potential impacts will be assessed and measures to avoid and/or mitigate negative impacts and enhance benefits will be determined.

4 DESCRIPTION OF THE SITE AND ENVIRONMENT

The Mine is located immediately inland of the coastline, and as such local topography comprises a coastal strip with rocky outcrops and wave-cut platforms, a sand covered coastal plain with vegetated dunes, moderately undulating inland plains and hills carved by ephemeral rivers and a relatively steep-sided valley along the Sout River estuary.

The topographical landscape of the study area has been modified by current mining activities, through backfilling, rehabilitation and revegetation.
The Mine lies in the drier northern part of the Western Cape, where climatic conditions are more typical of a semi-desert climate. Average annual rainfall at the Mine is ~50% lower than the regional annual average of 300 mm a year. Annual average temperature at Namakwa Sands is ~17˚C. Wind is predominately from the south and wind speeds average 4.5 – 4.6 m/s, but can reach more than 11.1 m/s.

The ephemeral Groot Goeraap and Sout Rivers are the main surface drainage features in the area. They are sandy and have broad channels. The mean annual runoff of the Sout River Catchment is low at 0.6 Mm3. Two ephemeral pans and a number of depressions occur in the study area (but none of these are known to be aquatic habitats and do not display wetland characteristics). A primary aquifer formed of Quaternary sediments and a secondary aquifer formed of Vanrhynsdorp Group and NMC bedrock underlie the East Mine.

The shoreline in the vicinity of Brand se Baai consists of a number of habitat types (high shore, intertidal and subtidal habitats), while the offshore environment is less diverse. Some 64 invertebrate species have been identified in the intertidal zone at Brand se Baai, none are classified as rare or endangered.

The project falls within the Succulent Karoo Biome, exhibiting the highest plant diversity of any arid ecosystem in the world. The predominant vegetation type of the region is Namaqualand Strandveld (Least Threatened). Namaqualand Sand Fynbos (Least Threatened) of the Fynbos Biome occurs on the inland plain. The approved EOFS Project area has been mined (or is approved for mining), and an extensive rehabilitation programme is underway.

The mining sector has a relatively high importance in the local economy and, together with agriculture, accounts for ~33% of employment. Overall unemployment of 14% correlates with relatively low average education levels. Although the number of people living below the poverty line decreased between 2011 and 2016 in the MLM, the poverty intensity increased slightly.

5 PROJECT AND PROCESS DESCRIPTION

The following changes to the authorised EOFS Project and additional infrastructure are proposed and require authorisation through this process (see Figure 4):

- Single stacking sand tailings and 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^1 by:
  - Returning RAS tailings overburden to the on average 8 m deep pit by haul truck, to a minimum depth of 1 m; and
  - Tipping (single stacking) sand tailings by haul truck to a minimum depth of 1 m in portions of the mining pit which have not been backfilled with RAS overburden;
- Establishing two new STFs (sand tailings stockpiles) in the East Mine pit to accommodate the surplus sand tailings from, but not all backfilled to, the void in the pit;
- Establishing a ~400 ha, 47.6 Mm3 (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 Mm3 in an area approved for mining east of the proposed RSF;
- Upgrading the seawater intake;
- Installing a 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 three years and four months, and Tronox therefore aim to receive all of the necessary approvals for the project by January 2021.

^1 This differs from the currently approved method of hauling and backfilling all sand tailings into the EOFS pit and therefore mimicking the pre-mining topography (elevation).
ALTERNATIVES

Appendix 2 Section 2 (h)(i) of the EIA Regulations, 2014, requires that all S&EIR processes must identify and describe feasible and reasonable alternatives.

Various alternatives were screened during the early planning stages of the project, and environmental, technical and financial risks and constraints associated with the STFs and RSF were considered. Location alternatives for these facilities were screened out by Tronox through this process.

Tronox has assessed that it is not financially feasible to install a geosynthetic liner at the RSF, and further investigation into various containment options are being undertaken.

Feasible and reasonable alternatives which will be assessed in the Impact Assessment Phase include:

- Alternative containment alternatives, which will be comparatively assessed for the RSF and overburden stockpile primarily assessing the impacts on groundwater; and
- No Go alternative, which will be considered in the EIA in accordance with the requirements of the EIA Regulations, 2014. The No-Go alternative entails no change to the status quo, in other words should the application for the modified residue disposal method proposed in this application be refused, the EOFS Project will not be technically feasible, and mining activities would cease in the East Mine in 2024. The financial viability of the Mine (operating out of the West Mine only) and smelter in Saldanha Bay would be threatened, and those employed directly at the East Mine would be retrenched.

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The impacts of a project are mostly linked to the sensitivity or tolerance of the receiving environment and proximity or absence of receptors, the extent or footprint and nature of the development, expected emissions and discharges and stakeholders’ perceptions. The key identified environmental issues – potential negative impacts and potential benefits of the project in its proposed setting – are listed below.

Certain impacts, while important, are considered likely to be less significant, including air quality, noise, marine ecology, socio-economic, heritage, traffic and climate change aspects.
8 PLAN OF STUDY FOR THE IMPACT ASSESSMENT

To address the potential issues and impacts identified thus far, the following specialist studies are proposed:

- Surface Water Impact Assessment;
- Hydrogeology Impact Assessment;
- Marine Ecology Impact Assessment;
- Biodiversity Impact Assessment; and
- Visual Impact Assessment.

Specialists will be required to provide detailed baseline information and to identify and assess the potential impacts of the proposed project within their particular field of study. In addition, specialists will be required to identify practicable mitigation and optimisation measures to avoid or minimise potential negative impact and/or enhance any benefits. SRK’s standard impact rating methodology will be employed in the assessment of impacts.

Once specialist studies have been completed, the results will be collated into an EIA Report and EMPr. The EIA Report and EMPr will be released for public comment through notifications to registered Interested and Affected Parties (IAPs). Key authorities will also be consulted as part of the process.

All comments received will be incorporated into a Comments Report which will be appended to the EIA Report. The EIA Report and EMPr will then be submitted to the DMRE for their consideration in decision-making.

9 STAKEHOLDER ENGAGEMENT

Stakeholder engagement is a key component of the S&EIR process and is being undertaken in accordance with Chapter 6 of the EIA Regulations, 2014. The stakeholder engagement activities related to the Scoping Phase are summarised in Table 3 below.

Relevant local, provincial and national authorities, conservation bodies, local forums and surrounding landowners and occupants have been directly notified of the S&EIR process and the release of the Scoping Report for comment.

Table 3: Stakeholder Engagement during Scoping

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Scoping Report to the Public</td>
<td>19 June 2020</td>
</tr>
<tr>
<td>Comment period</td>
<td>20 July 2020</td>
</tr>
</tbody>
</table>

HOW YOU CAN YOU PARTICIPATE IN THE EIA PROCESS

The Scoping Report is not a final report and can be amended based on comments received from stakeholders. Issues and concerns identified in the Scoping Study will assist in focussing the EIA and will be used to refine the terms of reference for specialist investigations. Stakeholders are therefore urged to participate:

REVIEW THE REPORT

The complete report is available on SRK’s website: www.srk.co.za – click on the ‘Recent Publications’ and then ‘Public Documents’ links.

Comments must reach SRK no later than 20 July 2020 to be included in the Final Scoping Report. Only registered IAPs will be notified of future opportunities to provide comments.

Relevant Organs of State have been automatically registered as stakeholders. According to the EIA Regulations, 2014 all other persons must request in writing to be placed on the register or submit written comments to be registered as stakeholders.

REGISTER OR PROVIDE YOUR OPINION

Send written comments and/or requests to be registered on the project database to:

Kelly Armstrong
Email: karmstrong@srk.co.za
Tel: + 27 21 659 3060, Fax: +27 21 685 7105
Postnet Suite #206, Private Bag X18, Rondebosch, 7701

Please provide your name, contact details and an indication of any direct business, financial, personal or other interest you may have in the application.
EAP Affirmation

Section 16 (1) (b) (iv), Appendix 1 Section 3 (1) (r), Appendix 2 Sections 2 (i) and (j) and Appendix 3 Section 3 (s) of the Environmental Impact Assessment (EIA) Regulations, 2014 (promulgated in terms of the National Environmental Management Act 107 of 1998 (NEMA), require an undertaking under oath or affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

- The correctness of the information provided in the report;
- The inclusion of comments and inputs from stakeholders and interested and affected parties;
- Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; and
- The level of agreement between the EAP and interested and affected parties on the Plan of Study for undertaking the environmental impact assessment.

SRK and the EAPs managing this project hereby affirm that:

- To the best of our knowledge the information provided in the report is correct, and no attempt has been made to manipulate information to achieve a particular outcome. Some information, especially pertaining to the project description, was provided by the applicant and/or their subcontractors. In this respect, SRK’s standard disclaimer (inserted in this report) pertaining to information provided by third parties applies.

- To the best of our knowledge all comments and inputs from stakeholders and interested and affected parties have been captured in the report and no attempt has been made to manipulate such comment or input to achieve a particular outcome. Written submissions are appended to the report while other comments are recorded within the report. For the sake of brevity, not all comments are recorded verbatim and are mostly captured as issues, and in instances where many stakeholders have similar issues, they are grouped together, with a clear listing of who raised which issue(s).

- If applicable, information and responses provided by the EAP to interested and affected parties are clearly presented in the report. Where responses are provided by the applicant (not the EAP), these are clearly indicated.

- With respect to EIA Reports, SRK will take account of interested and affected parties’ comments on the Plan of Study and, insofar as comments are relevant and practicable, accommodate these during the Impact Assessment Phase of the EIA process.

Matthew Law

Name

Signature

15 June 2020

Date
## Applicant’s Details

<table>
<thead>
<tr>
<th>DMRE Reference No</th>
<th>To be confirmed</th>
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<tr>
<td>Name of Applicant</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
</tr>
<tr>
<td>Company Registration</td>
<td>1998/001039/07</td>
</tr>
<tr>
<td>Responsible Person</td>
<td>Mr Marius Vlok</td>
</tr>
<tr>
<td>Postal Address</td>
<td>PO Box 435 Vredenburg 7380</td>
</tr>
<tr>
<td>Telephone</td>
<td>+27 27 217 3042</td>
</tr>
<tr>
<td>Cell</td>
<td>+27 83 709 6556</td>
</tr>
<tr>
<td>Facsimile</td>
<td>+ 27 27 217 3100</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:marius.vlok@tronox.com">marius.vlok@tronox.com</a></td>
</tr>
<tr>
<td>Application Area</td>
<td>Matzikama Local Municipality in the Western Cape. Co-ordinates: Lat: 31° 14' 09.90&quot; S; Long: 17° 57' 32.00&quot; E Also see Figure 3-5</td>
</tr>
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<td>Holder of Mining Rights</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
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<td>WC30/5/1/2/2/113 WC30/5/1/2/2/114 WC30/5/1/2/2/100400MR</td>
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<td>Type of minerals for which rights are held</td>
<td>Type Codes: HM Type: Heavy Minerals suite Commodities: Ilmenite (no commodity code); Rutile (commodity code Rt); Leucoxene (commodity code Lx); and Zircon (commodity code Zr). And associated minerals including Garnets (commodity code Gm); Kyanite (commodity code Ky); Monazite (commodity code Mz); Silica Sand (commodity code QD); and Cassiterite (no commodity code).</td>
</tr>
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## Acronyms and Abbreviations

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<td>ADT</td>
<td>Articulated Dump Truck</td>
</tr>
<tr>
<td>AEL</td>
<td>Air Emissions Licence</td>
</tr>
<tr>
<td>ART</td>
<td>Anti-Retroviral</td>
</tr>
<tr>
<td>BA</td>
<td>Basic Assessment</td>
</tr>
<tr>
<td>CBA</td>
<td>Critical Biodiversity Area</td>
</tr>
<tr>
<td>CIA</td>
<td>Cumulative Impact Assessment</td>
</tr>
<tr>
<td>DCC</td>
<td>Dual Carry Conveyor</td>
</tr>
<tr>
<td>DEA&amp;DP</td>
<td>Department of Environmental Affairs and Development Planning</td>
</tr>
<tr>
<td>DEA: O&amp;C</td>
<td>Department of Environmental Affairs: Oceans and Coasts</td>
</tr>
<tr>
<td>DMRE</td>
<td>Department of Mineral Resources and Energy</td>
</tr>
<tr>
<td>DHSWS</td>
<td>Department of Human Settlements, Water and Sanitation</td>
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<tr>
<td>EA</td>
<td>Environmental Authorisation</td>
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<tr>
<td>EAP</td>
<td>Environmental Assessment Practitioner</td>
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<tr>
<td>EC</td>
<td>Electrical Conductivity</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>EMF</td>
<td>Environmental Management Framework</td>
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<td>EMP𝐫</td>
<td>Environmental Management Programme</td>
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<tr>
<td>EOFS</td>
<td>East Orange Feldspathic Sand</td>
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<tr>
<td>ESA</td>
<td>Ecological Support Area</td>
</tr>
<tr>
<td>FSP</td>
<td>Fine Scale Plan</td>
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<td>GA</td>
<td>General Authorisation</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GN</td>
<td>Government Notice</td>
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<tr>
<td>GVA-R</td>
<td>Regional Gross Value Added</td>
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<tr>
<td>HDPE</td>
<td>High-density polyethylene</td>
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<tr>
<td>HDSA</td>
<td>Historically disadvantaged South African</td>
</tr>
<tr>
<td>HIA</td>
<td>Heritage Impact Assessment</td>
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<tr>
<td>HM</td>
<td>Heavy Minerals</td>
</tr>
<tr>
<td>HMC</td>
<td>Heavy Mineral Concentrate</td>
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<tr>
<td>HWC</td>
<td>Heritage Western Cape</td>
</tr>
<tr>
<td>HWM</td>
<td>High Water Mark</td>
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<tr>
<td>IAP</td>
<td>Interested and Affected Party</td>
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<tr>
<td>IDP</td>
<td>Integrated Development Plan</td>
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<tr>
<td>IEM</td>
<td>Integrated Environmental Management</td>
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<td>LN</td>
<td>Listing Notice</td>
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<tr>
<td>LoM</td>
<td>Life of Mine</td>
</tr>
<tr>
<td>mamsl</td>
<td>Metres above mean sea level</td>
</tr>
<tr>
<td>mbgl</td>
<td>Metres below ground level</td>
</tr>
<tr>
<td>MAR</td>
<td>Mean Annual Runoff</td>
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<tr>
<td>MLM</td>
<td>Matzikama Local Municipality</td>
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MLRA  Marine Living Resources Act 18 of 1998
MPA  Marine Protected Area
MPRDA  Mineral and Petroleum Resources Development Act 28 of 2002
MSP  Mineral Separation Plant
NDBSP  Namakwa District Biodiversity Sector Plan
NDM  Namakwa District Municipality
NEMA  National Environmental Management Act 107 of 1998 as amended
NEM:AQA  National Environmental Management: Air Quality Act 39 of 2004
NEM:BA  National Environmental Management: Biodiversity Act 10 of 2004
NHRA  National Heritage Resources Act 25 of 1999
NID  Notification of Intent to Develop
NS  Namakwa Sands
NWA  National Water Act 36 of 1998
OD  Outside Diameter
OFS  Orange Feldspathic Sand
OFSM  Orange Feldspathic Sand – Mineralised
OFSW  Orange Feldspathic Sand – Waste
p.a.  Per annum
PCP  Primary Concentration Plant
RAS  Red Aeolian Sand
REDS  Regional Economic Development Strategy
RoD  Record of Decision
ROM  Run-of-Mine
RSF  Residue Storage Facility
S&EIR  Scoping and Environmental Impact Reporting
SAHRA  South African National Heritage Resources Agency
SANBI  South African National Biodiversity Institute
SCC  Species of Conservation Concern
SCP  Secondary Concentration Plant
SDF  Spatial Development Framework
SDO  Spatial Development Objectives
SLP  Social and Labour Plan
SoW  Scope of Works
SRK  SRK Consulting (South Africa) (Pty) Ltd
StatsSA  Statistics South Africa
STF  Sand Tailings Facility
TDS  Total Dissolved Salt
ToR  Terms of Reference
VEC  Valued Environmental and Social Components
WCD  West Coast District
WCDM  West Coast District Municipality
WMA  Water Management Area
WML  Waste Management Licence
WUL  Water Use Licence

Units

°C  Degrees celsius
ha  Hectare
km  Kilometre
km²  Square kilometre
km/h  Kilometres per hour
l  Litres
l/s  Litres per second
m  Metre
m³/h  Cubic metres per hour
Mm³  Million cubic metres
mm  Millimetre
m/s  Metres per second
mS/m  miliSiemens per metre
Mt  Million Tonnes
Ø  Internal diameter
tph  Tonnes per hour

Chemical Compounds

B  Boron
Cl  Chlorine
Fe₂TiO₅  Ilmenite
FeTiO₃·TiO₂  Leucoxene
N  Nitrogen
NO₂  Nitrogen dioxide
NOx  Oxides of nitrogen
PM  Particulate matter
SO₂  Sulphur dioxide (also sulfur dioxide)
TiO₂  Titanium dioxide
ZrSiO₄  Zircon
<table>
<thead>
<tr>
<th>Glossary</th>
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<tr>
<td>Attenuation</td>
<td>Processes that naturally transform contaminants to less harmful forms or immobilize contaminants so that they are less of a threat to the environment</td>
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<tr>
<td>Aquifer</td>
<td>An underground body of water.</td>
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<tr>
<td>Baseline</td>
<td>Information gathered at the beginning of a study which describes the environment prior to development of a project and against which predicted changes (impacts) are measured.</td>
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<tr>
<td>Biodiversity</td>
<td>The diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity</td>
</tr>
<tr>
<td>Community</td>
<td>Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area</td>
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<td>Conductivity</td>
<td>A surrogate measure of salinity based on the electrical conductivity produced through the ionic concentration of water.</td>
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<td>Construction Phase</td>
<td>The stage of project development comprising site preparation as well as all construction activities associated with the development.</td>
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<td>Consultation</td>
<td>A process for the exchange of views, concerns and proposals about a proposed project through meaningful discussions and the open sharing of information.</td>
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<td>Co-product</td>
<td>A secondary economic resource contained in the ore body.</td>
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<td>Cumulative Impacts</td>
<td>Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.</td>
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<tr>
<td>Ecology</td>
<td>The study of the interrelationships of organisms with and within their environment.</td>
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<tr>
<td>Ecosystem</td>
<td>The interconnected assemblage of all species populations that occupy a given area and the physical environment with which they interact.</td>
</tr>
<tr>
<td>Electrical Conductivity (in water)</td>
<td>Reflects the capacity of water to conduct electrical current, and is directly related to the concentration of salts dissolved in water.</td>
</tr>
<tr>
<td>Endemic / Endemism</td>
<td>Species unique (native or restricted) to a defined geographic location, i.e. ecological state of a species being unique to a defined geographic location.</td>
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<tr>
<td>Environment</td>
<td>The external circumstances, conditions and objects that affect the existence of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.</td>
</tr>
<tr>
<td>Environmental Authorisation</td>
<td>Permission granted by the competent authority for the applicant to undertake listed activities in terms of the NEMA EIA Regulations, 2014.</td>
</tr>
<tr>
<td>Environmental Impact Assessment</td>
<td>A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project.</td>
</tr>
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</table>
Environmental Impact Assessment Report
The report produced to relay the information gathered and assessments undertaken during the Environmental Impact Assessment.

Environmental Management Programme
A description of the means (the environmental specification) to achieve environmental objectives and targets during all stages of a specific proposed activity.

Ephemeral
A water body that does not flow or contain water year-round, in response to seasonal rainfall and run-off.

Fauna
The collective animals of a given region.

Feasibility study
The determination of the technical and financial viability of a proposed project.

Flora
The collective plants of a particular region, habitat or geological period.

Fossil
Rare objects that are preserved due to unusual circumstances.

Freeboard limit
The vertical distance between the crest of a dam (RSF) and the pond surface.

Grade
The relative richness of an ore OR slope.

Gangue
The commercially worthless material that surrounds, or is closely mixed with, a wanted mineral in an ore deposit.

Heritage Resources
Refers to something, e.g. a building, an area, a ritual, etc. that forms part of a community’s cultural legacy or tradition and is passed down from preceding generations.

Hydraulic
(The study of) water flow.

Hydrology
(The study of) surface water flow.

Impact
A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Independent EAP
An independent person with the appropriate qualifications and experience appointed by the Applicant to manage the Environmental Impact Assessment process on behalf of the Applicant.

Integrated Environmental Management
The practice of incorporating environmental management into all stages of a project’s life cycle, namely planning, design, implementation, management and review.

Life of Mine
The time in which the ore reserves of a mine will be extracted.

Mineral deposit
A naturally occurring body of minerals which is wholly or partly of economic value. The value lies in the ore minerals and not the body of minerals as a whole.

Mining Right
A right to enter upon and occupy a specific piece of ground (in South Africa) for the purpose of working it for the extraction or collection of minerals.

Mitigation measures
Design or management measures that are intended to avoid and / or minimise or enhance an impact, depending on the desired effect. These measures are ideally incorporated into a design at an early stage.

Non-draining catchment
A catchment that does not drain even in rare rainfall events.
<table>
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<tr>
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<tr>
<td>Operational Phase</td>
<td>The stage of the works following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.</td>
</tr>
<tr>
<td>Palaeochannel</td>
<td>A remnant of an inactive river or stream channel that has been filled or buried by younger sediment.</td>
</tr>
<tr>
<td>Particulate matter</td>
<td>Broad term used for fine particles found in the ambient atmosphere, including soil dust, dirt, soot, smoke, pollen, ashes, aerosols and liquid droplets.</td>
</tr>
<tr>
<td>Rating</td>
<td>A classification of something based on a comparative assessment of their quality, standard, or suitability.</td>
</tr>
<tr>
<td>Ranking</td>
<td>A position in a hierarchy or scale.</td>
</tr>
<tr>
<td>Residue</td>
<td>The (fine) material left over after the process of separating the valuable fraction from the uneconomic fraction of an ore.</td>
</tr>
<tr>
<td>Residue Facility</td>
<td>A mining and mineral process wastes or by-products storage facility and deposit, as well as associated water containment and diversion structures, including tailings dams, water dams and mineral waste dumps and stockpiles.</td>
</tr>
<tr>
<td>Residue Storage Facility</td>
<td>A storage facility for all fine waste products from a processing plant.</td>
</tr>
<tr>
<td>Scoping</td>
<td>A procedure to consult with stakeholders to determine issues and concerns and for determining the extent of and approach to an EIA (one of the phases in an EIA). This process results in the development of a scope of work for the EIA and specialist studies.</td>
</tr>
<tr>
<td>Slurry</td>
<td>A watery mixture of fine or coarse sands of insoluble matter suspended (not dissolved) in water.</td>
</tr>
<tr>
<td>Supernatant Pool</td>
<td>Pool of liquid lying above a solid residue after settlement.</td>
</tr>
<tr>
<td>Specialist study</td>
<td>A study into a particular aspect of the environment, undertaken by an expert in that discipline.</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.</td>
</tr>
<tr>
<td>Sustainable development</td>
<td>Sustainable development is generally defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.</td>
</tr>
<tr>
<td>Tailings</td>
<td>Tailings are the materials left over after the process of separating the valuable fraction from the uneconomic fraction of an ore. Tailings are distinct from overburden, which is the waste rock or materials overlying an ore or mineral body that are displaced during mining without being processed. Particulate size in tailings at NS are either coarse or fine (fines).</td>
</tr>
<tr>
<td>Vadose Zone</td>
<td>The part of earth between the land surface and the groundwater level.</td>
</tr>
<tr>
<td>Waterbody</td>
<td>A body of water forming a physiographical feature, for example the sea.</td>
</tr>
<tr>
<td>Watercourse</td>
<td>A natural freshwater feature, including pans.</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 Background and Introduction

Tronox Mineral Sands (Pty) (Ltd) (Tronox) operates a heavy minerals mining business which includes the existing Namakwa Sands Mine (Tronox Namakwa Sands – NS) at Brand se Baai and a Mineral Separation Plant (MSP) near Koekenaap on the West Coast of South Africa (see Figure 1-1). At the Namakwa Sands Mine, heavy mineral sands are mined using open-cast strip-mining methods at the East Mine and West Mine, in accordance with approved Environmental Management Programmes (EMPs) and within an authorised mining area (see Figure 1-2).

Mined material is processed at Primary Concentration Plants (PCP West and PCP East) to produce a heavy mineral concentrate (HMC), which is pumped to the Secondary Concentration Plant (SCP) also located at the Mine (see Figure 1-2). Waste products from primary processing at the PCP East include sand tailings (coarser material) and (finer) residue, called fines. Sand tailings are backfilled into the mining void(s), and residue is deposited in Residue Storage Facilities (RSFs).

The East Mine (the site or study area) is currently a shallow mine, where mining of only the top Red Aeolian Sand (RAS) layer occurs. Tronox is authorised to also mine and process the deeper Orange Feldspathic Sand (OFS) resource underlying the RAS material at the East Mine, referred to as the East OFS (or EOFS) Project. For the East OFS Project to proceed, Tronox must modify the Namakwa Sands East OFS Project Residue Disposal Plan (the project), which entails construction of an additional RSF, establishment of two large Sand Tailings Facilities (STFs) (sand tailings stockpiles) and upgrade of infrastructure.

The National Environmental Management Act 107 of 1998 (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014 (promulgated in terms of NEMA) warrant that listed activities require Environmental Authorisation (EA). The National Environmental Management: Waste Act 59 of 2008 (NEM:WA) and the List of Waste Management Activities promulgated in terms of NEM:WA warrant that listed activities require a Waste Management License (WML). The Department of Mineral Resources and Energy (DMRE) is the competent authority for mining-related projects. A Scoping and Environmental Impact Reporting (S&EIR, also referred to as an EIA) process is required to support an application for EA and WML.

Tronox appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to undertake the S&EIR process required in terms of the NEMA and the EIA Regulations, 2014 for the project.

1.2 Purpose of the Report

This document is intended to guide the EIA process and specialist studies by:

- Providing an overview of the legal requirements with regard to the proposed project, a description of the proposed project and anticipated environmental and social issues and impacts that will be further investigated in the EIA; and

- Setting out the scope of the EIA process and the Terms of Reference (ToR) for specialist studies and outlining the approach and methodologies to be used in the EIA process, e.g. the proposed impact rating methodology.

This report will be submitted to DMRE for their acceptance.
Figure 1-1: Locality map
Figure 1-2: Mine layout
1.3 Scope of Work

Tronox requires that an EIA process be conducted and the associated reports produced and submitted to the competent authority (in this case DMRE), to inform DMRE’s decision whether to issue the necessary environmental authorization for the project.

In broad terms the Scope of Works (SoW) includes:

- Conducting an S&EIR process compliant with the EIA Regulations, 2014 for the project;
- Submitting applications through the EIA process for:
  - EA in terms of NEMA;
  - WML in terms of NEM:WA;
  - Amendment of the Environmental Management Programme (EMPr) in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA);
  - Water Use Authorisation (WUA) in terms of the National Water Act 36 of 1998 (NWA); and
  - Heritage approval in terms of the National Heritage Resources Act 25 of 1999 (NHRA);
- Conducting the associated stakeholder engagement (public participation) process, including consultation with relevant authorities, in compliance with the requirements of the EIA Regulations, 2014 and other applicable legislation; and
- Updating the EMPr for the Mine to include site-specific mitigation.

The “battery limits” of the project considered and assessed by the EIA process includes:

- A single~400 ha RSF with a storage capacity of up to 47 million m$^3$ (Mm$^3$) for residue (fines) disposal (as opposed to three smaller RSFs as contemplated in the existing EA for the East OFS project);
- A modified method for disposal of sand tailings$^1$ entailing single-stack$^2$ backfilling of sand tailings in the East OFS pit by haul truck and construction of two large STFs in the East Mine pit;
- A 50 ha interim (RAS tailings) overburden stockpile with a capacity of 3.15 Mm$^3$ in an area approved for mining in the East Mine;
- Expansion of the seawater intake, including new de-aeration sump and high-lift pump foundation;
- Fine residue and return water transfer pipelines;
- An overhead powerline; and
- Demolition of two abandoned farmhouses and an outhouse.

The following aspects are excluded from the SoW:

- Tronox were issued an EA in March 2012 in terms of NEMA for the East OFS project. This EA (also) constitutes NEMA approval for mining in terms of the Transitional Provisions of the EIA Regulations, 2014, since the excavation of the East OFS test pit meets the NEMA requirement for commencement of this activity, and the EA remains valid.
- Tronox has advised that they consider their original approval to mine (and associated EMPr approval by the DMRE) in the East Mine to constitute EA for the clearing of indigenous vegetation.

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$^1$ Sand tailings are currently trucked to the pit and backfilled at the East Mine, and Tronox raised safety and technical concerns associated with this method if applied to the project.

$^2$ Only replacing a single layer of tailings to the pit by haul truck.
including vegetation under rehabilitation in all areas originally approved for mining. Assessment of and application for the clearance of indigenous vegetation is thus excluded from the SoW of this EIA;

- Tronox must appoint a competent person to recommend a design for the RSF and STFs which prevents contamination of the receiving environment, notably groundwater. Design must be guided by a risk-based analysis, in compliance with the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits. This aspect is excluded from the SoW of this EIA; and

- Compliance with the Regulations Regarding the Safety of Dams, 2012 must be ensured by Tronox and is excluded from the SoW of this EIA.

1.4 Structure of this Report

This report describes the proposed activity and its context, details the stakeholder engagement process, presents the results of the Scoping Phase and sets out the Plan of Study for the Impact Assessment Phase. The report consists of the following sections:

**Section 1: Introduction**

Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitation applicable to the study.

**Section 2: Governance Framework and Environmental Process**

Provides a brief summary and interpretation of the relevant legislation as well as pertinent strategic planning documents and outlines the approach to the environmental process.

**Section 3: Project Description**

Describes the location and current status of the site and provides a brief summary of the surrounding land uses as well as background to and a motivation for the proposed project.

**Section 4: Description of the Affected Environment**

Briefly describes the biophysical and socio-economic characteristics of the affected environment that will be considered in the assessment of potential project impacts.

**Section 5: Stakeholder Engagement**

Details the stakeholder engagement activities conducted and planned for the Scoping Phase.

**Section 6: Potential Environmental and Social Impacts**

Identifies the potential impacts associated with the proposed project that will require investigation during the Impact Assessment Phase.

**Section 7: Plan of Study for the EIA**

Presents the proposed approach to the Impact Assessment Phase, outlines the methodology that will be adopted to assess potential impacts during the Impact Assessment Phase, identifies the specialist studies that are required and proposes the preliminary ToR for these studies, as well as the scope of the high level Cumulative Impact Assessment (CIA).

**Section 8: Conclusions and Recommendations**

Summarises the key findings of the Scoping Phase and outlines the way forward in the Impact Assessment Phase.
1.5 Content of Report

The EIA Regulations, 2014 (GN R982, which came into effect on 8 December 2014, as amended by GN R326 of 2017, Appendix 2), prescribe the required content in a Scoping Report. These requirements and the sections of this Scoping Report in which they have been addressed, are summarised in Table 1-1.

Table 1-1: Required Contents of a Scoping Report

<table>
<thead>
<tr>
<th>GN 982, App 2 Ref.:</th>
<th>Requirement</th>
<th>Section Ref.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) (a)</td>
<td>Details of:</td>
<td></td>
</tr>
<tr>
<td>(2) (a) (i)</td>
<td>The EAP who prepared the report</td>
<td>i</td>
</tr>
<tr>
<td>(2) (a) (ii)</td>
<td>The expertise of the EAP, including a Curriculum vitae</td>
<td>ii, Appendix A</td>
</tr>
<tr>
<td>(2) (b)</td>
<td>Location of the activity, including:</td>
<td></td>
</tr>
<tr>
<td>(2) (b) (i)</td>
<td>21 digit Surveyor General code of the property / properties</td>
<td>Table 3-1</td>
</tr>
<tr>
<td>(2) (b) (ii)</td>
<td>Physical address and farm name (where available)</td>
<td>n/a</td>
</tr>
<tr>
<td>(2) (b) (iii)</td>
<td>The coordinates of the boundary of the property/ properties (Where (2) (b) (i) and (2) (b) (ii) are not available)</td>
<td>Figure 3-4</td>
</tr>
<tr>
<td>(2) (c)</td>
<td>A plan indicating the location of the proposed activity/ activities and associated infrastructure, or:</td>
<td></td>
</tr>
<tr>
<td>(2) (c) (i)</td>
<td>For linear activities: a description and coordinates of the corridor in which the proposed activity/ activities is to be undertaken</td>
<td>n/a</td>
</tr>
<tr>
<td>(2) (c) (ii)</td>
<td>On land where the property has not been defined, the coordinates within which the activity is to be undertaken</td>
<td>n/a</td>
</tr>
<tr>
<td>(2) (d)</td>
<td>A description of the scope of the proposed activity, including</td>
<td></td>
</tr>
<tr>
<td>(2) (d) (i)</td>
<td>All listed and specified activities triggered</td>
<td>2.1.1.1</td>
</tr>
<tr>
<td>(2) (d) (ii)</td>
<td>A description of activities to be undertaken, including associated infrastructure</td>
<td>3</td>
</tr>
<tr>
<td>(2) (e)</td>
<td>A description of the policy and legislative context</td>
<td>2</td>
</tr>
<tr>
<td>(2) (f)</td>
<td>Motivation for need and desirability for the proposed development</td>
<td>3.6</td>
</tr>
<tr>
<td>(2) (h)</td>
<td>A full description of the process followed to reach the proposed preferred activity, site and location within the site, including</td>
<td></td>
</tr>
<tr>
<td>(2) (h) (i)</td>
<td>Details of all alternatives considered</td>
<td>3.8</td>
</tr>
<tr>
<td>(2) (h) (ii)</td>
<td>Details of public participation process undertaken, including copies of the supporting documents and inputs</td>
<td>5</td>
</tr>
<tr>
<td>(2) (h) (iii)</td>
<td>A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them</td>
<td>To be provided in Final Scoping Report / EIA Report</td>
</tr>
<tr>
<td>(2) (h) (iv)</td>
<td>The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects</td>
<td>4</td>
</tr>
<tr>
<td>(2) (h) (v)</td>
<td>The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed or mitigated</td>
<td>6</td>
</tr>
<tr>
<td>(2) (h) (vi)</td>
<td>The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks</td>
<td>7.9</td>
</tr>
<tr>
<td>(2) (h) (vii)</td>
<td>Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected, focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects</td>
<td>6</td>
</tr>
<tr>
<td>(2) (h) (viii)</td>
<td>Possible mitigation measures that could be applied and level of residual risk</td>
<td>6.3</td>
</tr>
<tr>
<td>(2) (h) (ix)</td>
<td>Outcome of the site selection matrix</td>
<td>3.8</td>
</tr>
<tr>
<td>GN 982, App 2 Ref.:</td>
<td>Requirement</td>
<td>Section Ref.:</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>(2) (h) (x)</td>
<td>If no alternative development locations for the activity were investigated, the motivation for not considering such</td>
<td>3.8</td>
</tr>
<tr>
<td>(2) (h) (xi)</td>
<td>A concluding statement indicating the preferred alternative development location within the approved site</td>
<td>3.8</td>
</tr>
<tr>
<td>(2) (i)</td>
<td>A plan of study for the EIA, including:</td>
<td></td>
</tr>
<tr>
<td>(2) (i)</td>
<td>A description of the alternatives to be considered and assessed including the option of not proceeding</td>
<td>3.8</td>
</tr>
<tr>
<td>(2) (i) (ii)</td>
<td>A description of the aspects to be assessed as part of the environmental impact assessment process</td>
<td>6</td>
</tr>
<tr>
<td>(2) (i) (iii)</td>
<td>Aspects to be assessed by specialists</td>
<td>7.3, 7.7</td>
</tr>
<tr>
<td>(2) (i) (iv)</td>
<td>A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists.</td>
<td>7.9</td>
</tr>
<tr>
<td>(2) (i) (v)</td>
<td>A description of the proposed method of assessing duration and significance</td>
<td>7.9</td>
</tr>
<tr>
<td>(2) (i) (vi)</td>
<td>An indication of the stages at which the competent authority will be consulted</td>
<td>7.2</td>
</tr>
<tr>
<td>(2) (i) (vii)</td>
<td>Particulars of the public participation process that will be conducted during the environmental impact assessment process</td>
<td>7.5</td>
</tr>
<tr>
<td>(2) (i) (viii)</td>
<td>A description of the tasks that will be undertaken as part of the environmental impact assessment process</td>
<td>7</td>
</tr>
<tr>
<td>(2) (i) (x)</td>
<td>Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored</td>
<td>6.3</td>
</tr>
<tr>
<td>(2) (j)</td>
<td>Undertaking under oath or affirmation by the EAP in relation to:</td>
<td></td>
</tr>
<tr>
<td>(2) (j) (i)</td>
<td>The correctness of the information provided in the report</td>
<td>lii</td>
</tr>
<tr>
<td>(2) (j) (ii)</td>
<td>The inclusion of comments and inputs from stakeholders and interested and affected parties</td>
<td></td>
</tr>
<tr>
<td>(2) (j) (iii)</td>
<td>Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties</td>
<td></td>
</tr>
<tr>
<td>(2) (k)</td>
<td>An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment</td>
<td>lii</td>
</tr>
<tr>
<td>(2) (l)</td>
<td>Any specific information required by the competent authority</td>
<td>n/a</td>
</tr>
</tbody>
</table>

### 1.6 Assumptions and Limitations

As is standard practice, this Scoping Report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- It is assumed that information provided by Tronox, their legal advisers and other consultants and specialists is accurate;
- It is assumed that the original authorisations to mine do authorise clearing of pristine vegetation or vegetation under rehabilitation in the area originally approved for mining;
- It is assumed that Tronox will appoint a competent person to recommend a design concept for the RSF and STFs, which manages the risk of contamination of the receiving environment, notably groundwater. Design must be guided by a risk-based analysis, in compliance with the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits. This will also inform the EIA Report.
- A more detailed project description will be presented in the EIA Report; and
• Detailed assessment of the potential positive and negative environmental impacts of the proposed development will only be undertaken during the Impact Assessment Phase.

Notwithstanding the above, SRK is confident that these assumptions and limitations do not compromise the overall findings of this report.
2 Governance Framework and Environmental Process

2.1 South African Legislation

There are a number of regulatory requirements at local, provincial and national level with which the project must conform. Key environmental legal requirements include the following:

- National Environmental Management Act 107 of 1998 (NEMA);
  - EIA Regulations, 2014, promulgated in terms of NEMA;
  - Financial Provisioning Regulations 2015, promulgated in terms of NEMA;
- National Environmental Management: Waste Act 59 of 2008 (NEM:WA);
  - Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, promulgated in terms of NEM:WA;
  - National Norms and Standards for Disposal of Waste to Landfill;
- Mineral and Petroleum Resources Development Act 28 of 2002, as amended (MPRDA);
- National Water Act 36 of 1998 (NWA);
  - Regulations Regarding the Safety of Dams in Terms of Section 123(1) of the NWA, promulgated in terms of the NWA;
- National Heritage Resources Act 25 of 1999 (NHRA);
- National Environmental Management: Integrated Coastal Management Act 24 of 2008 (NEM:ICMA);
- National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA); and
- Dust Control Regulations, 2013.

A brief summary of SRK’s understanding of the relevant Acts and Regulations that are applicable to this study is provided below. Note that other legislative requirements may also pertain to the project. As such, the summary provided below is not intended to be definitive or exhaustive, and serves only to highlight key environmental legislation and obligations.

2.1.1 National Environmental Management Act 107 of 1998

NEMA establishes a set of principles which all authorities have to consider when exercising their powers. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

Section 28(1) states that “every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:
• Assessing the impact on the environment;
• Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
• Ceasing, modifying or controlling actions which cause pollution/degradation;
• Containing pollutants or preventing movement of pollutants;
• Eliminating the source of pollution; and
• Remedying the effects of the pollution.

Legal requirements for this project:

Tronox has a responsibility to ensure that the proposed activities and the S&EIR process conform to the principles of NEMA. In terms of Section 28 of NEMA, the proponent is obliged to take actions to prevent pollution or degradation of the environment, and to ensure that the environmental impacts associated with the project are considered, and mitigated where possible.

2.1.1.1 EIA Regulations, 2014

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA issued by the competent authority (DMRE). In this context, the EIA Regulations, 2014\(^3\), promulgated in terms of NEMA, govern the process, methodologies and requirements for the undertaking of EIAs in support of EA applications. Listing Notices 1-3 in terms of NEMA list activities that require EA (“NEMA listed activities”).

The EIA Regulations, 2014 lay out two alternative authorisation processes. Depending on the type of activity that is proposed, either a Basic Assessment (BA) process or a S&EIR process is required to obtain EA. Listing Notice 1\(^4\) lists activities that require a BA process, while Listing Notice 2\(^5\) lists activities that require S&EIR. Listing Notice 3\(^6\) lists activities in certain sensitive geographic areas that require a BA process.

The regulations for both processes – BA and S&EIR – stipulate that:

• Public participation must be undertaken as part of the assessment process;
• The assessment must be conducted by an independent EAP;
• The relevant authorities must respond to applications and submissions within stipulated time frames;
• Decisions taken by the authorities can be appealed by the proponent or any other Interested and Affected Party (IAP); and
• A draft EMPr must be compiled and released for public comment.

GN R982 of 2014 (Appendix 1-5) sets out the procedures to be followed and content of reports compiled during the BA and S&EIR processes.

The NEMA National Appeal Regulations\(^7\) make provision for appeal against any decision issued by the relevant authorities. In terms of the Regulations, an appeal must be lodged with the relevant authority in writing within 20 days of the date on which notification of the decision (EA) was sent to the

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\(^3\) GN R982 of 2014, as amended by GN R326 of 2017
\(^4\) GN R983 of 2014, as amended by GN 327 of 2017
\(^5\) GN R984 of 2014, as amended by GN 325 of 2017
\(^6\) GN R985 of 2014, as amended by GN 324 of 2017
\(^7\) GN R993 of 2014, as amended by GN R205 of 2015.
applicant or IAP (as applicable). The applicant, the decision-maker, IAPs and organs of state must submit their responding statement, if any, to the appeal authority and the appellant within 20 days from the date of receipt of the appeal submission.

The proposed project includes activities that are listed in terms of the EIA Regulations, 2014 (see Table 2-1).

<table>
<thead>
<tr>
<th>No.</th>
<th>Listed activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water.</td>
<td>A 3 400 m long RSF return water pipeline will be installed on the south-eastern boundary of the East OFS mine (see Figure 3-9). The pipeline will have an internal diameter (Ø) of 340 mm with a maximum throughput of 1 143 m³/hour (i.e. 320 l/s).</td>
</tr>
<tr>
<td></td>
<td>(i) with an internal diameter of 0.36 metres or more; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) with a peak throughput of 120 litres per second (l/s) or more.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The development and related operation of infrastructure exceeding 1000 m in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes-with an internal diameter of 0.36 metres or more; or with a peak throughput of 120 litres per second or more.</td>
<td>Two 3 400 m long fines residue pipelines will be installed on the south-eastern boundary of the East OFS mine (see Figure 3-9). Both of these Ø 340 mm pipelines will have a maximum throughput of 908 m³/hour (i.e. 260 l/s).</td>
</tr>
<tr>
<td>19A</td>
<td>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:</td>
<td>The seawater intake will be upgraded to include a new de-sanding sump and new foundation for high-lift pumps. These upgrades will entail the deposition of material (concrete foundations) within 100 m of the high water mark.</td>
</tr>
<tr>
<td></td>
<td>(ii) the littoral active zone, an estuary or a distance of 100 m inland of the high-water mark of the sea or an estuary, whichever distance is the greater.</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>The expansion of structures in the coastal public property where the development footprint will be increased by more than 50 square metres, excluding such expansions within existing ports or harbours where there will be no increase in the development footprint of the port or harbour and excluding activities listed in activity 23 in Listing Notice 3 of 2014, in which case that activity applies.</td>
<td>The seawater intake will be upgraded to include a new de-sanding sump and new foundation for high-lift pumps. These upgrades will have a total extent of ~120 m² within 100 m of the high water mark.</td>
</tr>
<tr>
<td>54</td>
<td>The expansion of facilities:</td>
<td>The seawater intake will be upgraded to include a new de-sanding sump and new foundation for high-lift pumps. These upgrades will have a total extent of ~120 m² within 100 m of the high water mark.</td>
</tr>
<tr>
<td></td>
<td>(v) within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e) infrastructure or structures where the development footprint is expanded by 50 square metres or more</td>
<td></td>
</tr>
</tbody>
</table>

Tronox obtained EA in 2012 for the East OFS project and commenced before the EIA Regulations, 2014 came into effect. Listed activities related to the physical act of mining and associated infrastructure (in this case, Listing Notice 2, Activity 17: Any activity including the operation of that activity which requires a Mining Right) are thus considered authorised in terms Regulation 54A of the EIA Regulations, 2014: Transitional Provisions.

Furthermore, activities related to dam construction (Listing Notice 1 Activity 13 and Listing Notice 2 Activity 16) are not considered to be triggered by the project, as the RSF is not a water storage facility. Similarly, no decommissioning of existing facilities, structures or infrastructure is planned.
Legal requirements for this project:

Tronox is obliged to amend their EMPr apply for EA for the listed activities in Table 2-1 and, since a full S&EIR process is required to inform an application for waste management activities (see Section 2.1.2), to undertake an S&EIR process in support of the application, in accordance with the procedure stipulated in the EIA Regulations, 2014.

2.1.2 Financial Provision Regulations, 2015

Sections 44 (aE), 44 (aF), 44 (aG) and 44 (aH) of NEMA make provision for the promulgation of regulations relating to environmental liability and financial provisions. In this context, the Financial Provisioning Regulations, 2015 (GN R1147 of 2015), promulgated in terms of NEMA, govern the financial provision for the costs associated with undertaking management, rehabilitation and remediation of environmental impacts of prospecting, exploration, mining and production operations through the lifespan of such operations and latent or residual environmental impacts.

The regulations define:

- The method for determining financial provision for annual rehabilitation, final rehabilitation and the remediation of latent environmental impacts;
- Financial vehicles available for financial provision;
- The requirements for the review, assessment and adjustment of financial provision;
- The responsibilities of the holder of a right or a permit;
- Powers of the Minister; and
- Requirements for care and maintenance.

Legal requirements for this project

Tronox must determine the financial provision in the EIA Report and provide proof of payment or the arrangements to provide the financial provision prior to commencing the activity. Tronox is obliged to update their financial provision to include aspects of the project within one year of approval, and annually thereafter.

2.1.2 National Environmental Management: Waste Act 59 of 2008

The NEM:WA aims to (amongst other things) regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

The Act makes provision for the listing of waste management activities that have, or are likely to have, a detrimental effect on the environment and may not be undertaken without a WML issued by the competent authority. The competent authority for WML applications for mining operations is the DMRE. NEM:WA must be read in conjunction with NEMA (see Section 2.1.1). The principles of NEMA and the NEMA EIA Regulations, 2014 are applicable to the application process for WMLs.

Two categories of listed waste management activities were published in terms of NEM:WA in GN R921 of 2013. A person wishing to undertake:

- An activity listed under Category A, must conduct a BA process,
- An activity listed under Category B, must conduct a S&EIR process,

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8 As amended by FN 332 of 2014, GN 633 of 2015 and GN 1094 of 2017
as set out in the NEMA EIA Regulations, 2014, as part of the WML application process.

The Act makes provision for a single environmental assessment process in instances where both EA and WML applications are required. A separate application form must be submitted at the beginning of the EIA process, and additional stakeholder engagement (advertising) would apply to an EIA process for a WML application.

The proposed project includes waste management activities that are listed in terms of NEM:WA (see Table 2-2).

### Table 2-2: NEM:WA listed waste management activities applicable to the proposed project

<table>
<thead>
<tr>
<th>Category B: Requiring a S&amp;EIR Process</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal of waste on land</td>
<td></td>
</tr>
<tr>
<td>7 The disposal of any quantity of hazardous waste to land.</td>
<td>Residue stockpiles and deposits are defined as hazardous waste in Schedule 3 of NEM:WA regardless of their chemical composition. The disposal of fines in the RSF will trigger this activity.</td>
</tr>
<tr>
<td>Construction of facilities and associated structures and infrastructure</td>
<td></td>
</tr>
<tr>
<td>10 The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).</td>
<td>The construction of the RSF and associated pipelines, return water pipelines and the overburden stockpile will trigger this activity.</td>
</tr>
<tr>
<td>11 The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right.</td>
<td>The construction of the RSF and the overburden stockpile will trigger this activity.</td>
</tr>
</tbody>
</table>

### Legal requirements for this project:

Tronox is obliged to apply for a WML for the listed activities in Table 2-2 and to undertake an S&EIR process in support of the application, in accordance with the procedure stipulated in the EIA Regulations, 2014.

#### 2.1.2.1 Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015

Section 69 (IA) of NEM:WA makes provision for the promulgation of regulations for the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation. The Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits, promulgated in terms of NEM:WA (GN R632 of 2015), fulfil this purpose.

The amendment of the Regulations through GN 990 of 2018 removed the requirement that barrier systems for all facilities containing contaminated water or material must comply with the National Norms and Standards for the Disposal of Waste to Landfill (GN 636 of 2013). Instead, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis. The risk analysis must be based on a physical, chemical and mineral content characterisation of the residue.

### Legal requirements for this project:

As the RSF will be developed for the disposal of mining residue, the planning, design, operation and decommissioning of the facility must comply with the requirements of GN R632 of 2015.

Tronox must appoint a competent person to recommend a design for the RSF which manages contamination of the receiving environment, notably groundwater. Design must be guided by a risk-based analysis. This will also inform the EIA Report, which will provide information on site selection, impact assessment, management and monitoring.
2.1.3 Mineral and Petroleum Resources Development Act 28 of 2002

The MPRDA makes provision for equitable access to and sustainable development of South Africa’s mineral and petroleum resources and aims to inter alia provide for security of tenure in respect of prospecting, exploration, mining and production operations. In terms of previous mining legislation, mineral rights were held privately by landowners (and in some instances by the State), but the MPRDA vests all mineral rights in the State. The fundamental principles of the MPRDA are:

- Mineral resources are non-renewable;
- Mineral resources belong to the nation and the State is the custodian;
- Protection of the environment for present and future generations to ensure sustainable development of the resources by promoting economic and social development;
- Promotion of local and rural development of communities affected by mining;
- Reformation of the industry to bring about equitable access to the resources and eradicating discriminatory practices; and
- Guaranteed security of tenure.

Section 5A of the MPRDA states that no person may prospect for or remove, mine, conduct technical co-operation operations, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on any area without (a) an environmental authorisation, (b) a permission, permit or right and (c) giving the landowner or lawful occupier of the land in question at least 21 days’ written notice.

Chapter 4 of the MPRDA deals with Mineral and Environmental Regulation and provisions with regard to application for a Mining Right are set out in Section 22. Section 22 indicates that a Mining Right can only be issued on EA in terms of NEMA, and Section 37 confirms that the principles set out in the NEMA apply to all prospecting and mining operations and that these operations must be carried out in accordance with the generally accepted principles of sustainable development.

Section 102 of the MPRDA indicates that a … Mining Right, EMPs and EA (issued in terms of NEMA), may not be amended or varied without the written consent of the Minister.

**Legal requirements for this project**

Tronox has a Mining Right and EMPs approved in terms of the MPRDA and is thus authorised to mine and process ore and to dispose of mining residue at various approved facilities at Namakwa Sands. Tronox must amend their approved EMPs to authorise the new aspects introduced by this project. Tronox will request that their approved EMPs are amended through this EIA process to include these activities, and it is assumed that the DMRE will consider their request when deciding whether or not to issue EA and a WML for the project.

2.1.4 National Water Act 36 of 1998

Water use in South Africa is controlled by the NWA. The executive authority is the Department of Human Settlements, Water and Sanitation (DHSWS). The NWA recognises that water is a scarce and unevenly distributed national resource in South Africa. Its provisions are aimed at achieving sustainable and equitable use of water to the benefit of all users and to ensure protection of the aquatic ecosystems associated with South Africa’s water resources. The provisions of the Act are aimed at discouraging pollution and wastage of water resources.

In terms of the Act, a land user, occupier or owner of land where an activity that causes or has the potential to cause pollution of a water resource has a duty to take measures to prevent pollution from occurring. If these measures are not taken, the responsible authority may do whatever is necessary
to prevent the pollution or remedy its effects, and to recover all reasonable costs from the responsible party.

Section 21 of the NWA specifies a number of water uses, including:

(a) taking water from a water resource;
(b) storing water;
(c) impeding or diverting the flow of water in a watercourse;
(d) engaging in a stream flow reduction activity contemplated in section 36;
(e) engaging in a controlled activity identified as such in section 37 (1) or declared under section 38 (1);
(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
(g) disposing of waste in a manner which may detrimentally impact on a water resource;
(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
(i) altering the bed, banks, course or characteristics of a watercourse; and
(k) using water for recreational purposes.

These water uses require authorisation in terms of Section 22 (1) of the Act, unless they are listed in Schedule 1 of the NWA, are an existing lawful use, fall under a General Authorisation issued in terms of Section 39 or if the responsible authority waives the need for a licence.

**Legal requirements for this project:**

The proposed project activities are likely to trigger water uses in terms of section 21 (g) (and possibly 21 [a]) of the NWA. It is thus expected that an amendment to Tronox’s Water Use Licence (WUL) will be required from the competent authority, in this case DHSWS.

2.1.4.1 Regulations Regarding the Safety of Dams, 2012

Section 123 (1) of the NWA makes provision for the promulgation of regulations relating to the safety of dams. In this context, the Regulations Regarding the Safety of Dams, 2012 (GN R139 of 2012), promulgated in terms of the NWA, govern the requirements for dams with a safety risk.

The regulations define the following:

- Methods to determine whether a dam is classified as having a safety risk;
- Requirements for the classification of dams (with a safety risk);
- Requirements for licencing to construct, enlarge, alter or repair a dam with a safety risk;
- Dam design requirements;
- Licencing requirements to impound water in a dam with a safety risk;
- Operation and maintenance requirements;
- Emergency preparedness;
- Record keeping; and
- Safety evaluation.
Legal requirements for this project:

Although Tronox advises that the design aims to ensure that the RSF is not classified as “a dam with a safety risk” (i.e. that the facility will not store more than 50,000 m³ of water under normal operating conditions), the proponent must verify this during operations. If the RSF is found to contain more than 50,000 m³ of water under normal operating conditions then Tronox will be required to classify the facility, comply with design requirements based on this classification and apply for the facility to be licensed as a dam with a safety risk.

2.1.5 National Heritage Resources Act 25 of 1999

The protection and management of South Africa’s heritage resources are controlled by the NHRA. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In the Western Cape, SAHRA has delegated this authority to Heritage Western Cape (HWC). In terms of the Act, historically important features such as graves, trees, archaeological artefacts/sites and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection.

Section 38 of the NHRA requires that any person who intends to undertake certain categories of development must notify HWC at the very earliest stage of initiating such a development and must furnish details of the location, nature and extent of the proposed development. A Notice of Intent to Develop (NID), which provides details regarding the location, nature and extent of the proposed development. After review of the NID, HWC decides whether a HIA will be required.

Section 38 also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that, if such an assessment is deemed adequate, a separate HIA is not required. There is however the requirement in terms of Section 38 (8) for the consenting authority (in this case the DMR) to ensure that the evaluation of impacts on the heritage resources fulfils the requirements of the relevant heritage resources authority (HWC), and that the comments and recommendations of the heritage resources authority are taken into account prior to the granting of the consent.

Section 38(1) of the NHRA specifies activities that trigger the need for the proponent to notify HWC of the proposed development, in order for HWC to determine the need for further Heritage Assessment.

Legal requirements for this project:

The project and associated infrastructure trigger the following category in Section 38(1) of the NHRA:

(c) Any development or activity that will change the character of a site (i) exceeding 5,000 m² in extent, (ii) involving three or more existing erven or subdivisions thereof.

In addition, three structures older than 60 years will be demolished. Tronox must submit a Notice of Intent to Develop (NID) to HWC and then undertake any assessments deemed necessary by HWC. The assessment of heritage impacts of the demolition of these structures will be undertaken as part of the EIA process.

2.1.6 National Environmental Management: Integrated Coastal Management Act 24 of 2008

NEM: ICMA provides for the integrated management of the coastal zone, including the promotion of social equity and best economic use, while protecting the coastal environment.

Chapter 7 of the Act establishes integrated permitting procedures and other measures to ensure the protection and sustainable use of the coastal zone and its resources. This includes the requirement that adequate consideration be given to the objectives of this Act when considering applications for
EA (and planning authorisation) for any development within the coastal zone, and the consideration of impacts on coastal public property, the coastal protection zone and coastal access land.

Chapter 8 of the Act establishes an integrated system for regulating the disposal of effluent and waste into the sea. In terms of Section 69, a coastal waters discharge permit (CWDP) is required from the DEA for the discharge of effluent into coastal waters.

**Legal requirements for this project:**

Although Tronox do not propose any marine discharge, and new infrastructure will be restricted to the Tronox approved mining area, the project requires the development of infrastructure in the coastal protection zone (broadly defined as within 1 km of the high water mark of the sea in rural areas). Impacts on the coastal environment will be assessed in the EIA.

### 2.1.7 National Environmental Management: Air Quality Act 39 of 2004

The NEM:AQA lists activities that generate atmospheric emissions that have or may have a significant detrimental effect on the environment and require licensing in terms of NEM:AQA. An Atmospheric Emission Licence (AEL) from the competent authority is required for these activities, which are listed in GN 893 of 2013. All applications must conform to the requirements of NEMA and the application must be accompanied by “such documentation and information as may be required by the licensing authority”.

**Legal requirements for this project:**

The proposed project does not include activities listed in terms of NEM:AQA. An AEL is therefore not required.

### 2.1.8 Dust Control Regulations, 2013

Section 32 of NEM:AQA makes provision for the promulgation of regulations for any matter necessary for the implementation or application of NEM:AQA. In this context, the Dust Control Regulations, promulgated in terms of NEM:AQA (GN R827 of 2013) prescribe general measures for the control of dust in all areas.

GN R827 of 2013 specifies the following:

- Dustfall standards;
- Dustfall and air quality monitoring;
- Dust management; and
- Offences and penalties.

**Legal requirements for this project:**

*In terms of GN R632 of 2015 (see Section 2.1.2.1) Tronox must comply with this regulation. Dust management for the proposed project will be incorporated into Tronox existing dust management, monitoring and reporting programme.*

### 2.2 Planning Policy Framework

This section discusses a number of key formal planning policies relevant to the project. As Tronox operations are of regional socio-economic significance, provincial plans are considered in this section, in addition to regional and local policies. The policies and plans briefly discussed below include regional and local development and spatial plans, such as the:
• Integrated Development Plans (IDPs) for district and local municipalities, which identify the specific needs in, and formulate desirable developments for, municipalities;

• Spatial Development Frameworks (SDFs) for the province, district and local municipalities, which translate the aims of the IDP into a spatial dimension and, together with the IDP, aim to give effect to the national imperative to increase economic growth and promote social inclusion whilst ensuring that such growth is environmentally sustainable;

• The West Coast District Regional Economic Development Strategy (REDS); and

• The systematic plan for a protected area system in the Knersvlakte region of Namaqualand.

2.2.1 The Western Cape Spatial Development Framework (2014)

The Western Cape Provincial SDF is a spatial planning document that guides district and local spatial initiatives such as IDPs and SDFs. The Western Cape Provincial SDF sets out to put in place a coherent framework for the Province’s urban and rural areas that:

• Gives spatial expression to the national and provincial development agendas;

• Serves as basis for coordinating, integrating and aligning ‘on the ground’ delivery of national and provincial departmental programmes;

• Supports municipalities in fulfilling their municipal planning mandate in line with the national and provincial agendas; and

• Communicates government’s spatial development intentions to the private sector and civil society.

The Provincial SDF identifies a number of policy objectives. Of most relevance to the project, Policy R3 (“Safeguard the Western Cape’s agricultural and mineral resources, and manage their sustainable use”) states the following:

• The location of mineral deposits and known reserves of construction materials in municipal SDFs must be recorded;

• Land use policies that reserve mineral deposits for possible use must be introduced and applied (subject to environmental authorisation);

• Ecosystem requirements must be reconciled with conflicting land development pressures through proactive spatial planning, and application of a land use management system that safeguards biodiversity, protects resources and opens up opportunities for improved livelihoods and jobs; and

• New mine ventures should first take place in transformed areas.

2.2.2 West Coast District Municipality Integrated Development Plan (2017 - 2022)

The West Coast District Municipality (WCDM) IDP recognises mining in the West Coast District (WCD) as a contributing factor towards South Africa’s mining industry with the major ore terminal at the Port of Saldanha. However, the most recent draft of the IDP indicates mining and quarrying to be of the smallest regional economic sectors (approximately 1%).

Furthermore, the IDP also notes a high level of poverty in the WCDM and a need to enhance job creation projects that alleviate poverty.

The strategic objectives of the WCDM’s IDP include:

• Ensuring environmental integrity for the West Coast;

• Pursuing economic growth and facilitation of job opportunities by inter alia:
• Promoting social well-being of the community;
• Promoting bulk infrastructure development services; and
• Ensuring good governance and financial viability.

Regarding the Matzikama Local Municipality (MLM), the IDP emphasises that “upliftment of the community through sustainable economic development”, the “promotion of local economic development (to) make Matzikama an attractive investment destination”, and a “reduction of poverty through (the) promotion of job creation”, as well as the “promotion of a clean and healthy environment” are key development priorities.

The WCDM IDP also lists various environmental sector plans have that been developed to ensure environmental integrity for the West Coast. Among a few are Estuary Management Plans for the Bergriver, Olifantsriver and Verlorensvlei, an Integrated Coastal Management Programme incorporating all five local municipalities and various initiatives to eradicate alien vegetation while contributing towards economic upliftment.

2.2.3 West Coast District Municipality Spatial Development Framework (2020)

The purpose of the WCDM’s SDF (2020) is to provide a tool that guides spatial development at District level. The SDF contextualises the Spatial Development Objectives (SDOs) presented in the Framework by describing spatial development challenges in the following three themes:

1. The built environment;
2. The socio-economic environment; and
3. The biophysical environment.

The SDF recognises that development is critical, especially in the north of the District and in other rural areas, but that sensitive cultural and biophysical resources need to be protected, and that tourism has significant growth potential as an industry in the long term.

The Spatial Development Objectives (SDOs) focus on economic development and tourism, housing, the provision of infrastructure and the promotion of renewable energy projects, sustainable water management and the protection and conservation of environmental resources.

The four main SDO’s are categorised into two main spatial goals for the WCD, namely:

- **Goal 1: Growth and development opportunities in key sectors/locations:**
  - SDO 1: Align the future settlement patterns of the WCDM with areas of real/proven economic potential without compromising conservation objectives and biodiversity.
  - SDO 2: Promote integrated human settlement planning to enhance spatial transformation, social wellness and community safety; and
  - SDO 3: Align future development along transport routes and economic infrastructure.

- **Goal 2: Areas that need to be protected:**
  - SDO 4: Promote sustainable utilisation of the District’s natural resource base to extract economic development opportunities.

These SDOs are encapsulated spatially in the SDF Plan – see Figure 2-1.

Regarding mining specifically, the SDF:

- Indicates that certain mineral deposits in the region are not being exploited, and that the sector has the potential to make a more significant contribution to the WCDM economy; and
2.2.4 West Coast District Municipality Second Generation Coastal Management Programme (2019 – 2024)

The Vision of the WCDM Second Generation Coastal Management Programme (2019) is:

“We, the people of the West Coast District, celebrate the diversity, richness and uniqueness of our coast and its communities. The coastal environment will be effectively managed to ensure a balance between ecological integrity, sustainable livelihoods and cultural values. The coast will be a safe, clean and healthy asset with equitable access and opportunities for all communities, now and in the future.”

Relevant coastal management priorities were determined to guide coastal zone management in the WCDM. The priorities are based on a situational analysis, including challenges to coastal protection in the WCDM. The priorities are to:

- Improve cooperative governance and clarify institutional arrangements;
- Facilitate coastal access;
- Ensure that coastal planning and development is conducted in a manner that ensures the protection and rehabilitation of the coastal zone;
- Enhance compliance monitoring and enforcement efforts in the District;
- Ensure effective management of estuarine resources in the WCDM;
- Protect, manage and sustain use of natural resources;
- Manage heritage resources within the District;
- Effectively manage and control pollution in the coastal zone;
- Ensure the socio-economic development of coastal communities; and
- Develop and facilitate awareness, education, training, capacity building and information gathering in the District.

The WCDM Coastal Management Plan (2019) notes that the mining has the potential to enhance the economic status of the WCDM and to create significant jobs in the area. However, it also acknowledges that this activity has the potential to significantly impact on the biodiversity and negatively affect the regional eco-tourism industry.
Figure 2-1: West Coast District SDF Plan
2.2.5 Matzikama Local Municipality Integrated Development Plan (2017 – 2022)

The Matzikama Local Municipality (MLM) IDP (2017 – 2022) Third Review (2020) is the over-arching municipal strategic plan with the main purpose of articulating the vision of MLM and how it should be accomplished.

The IDP identifies the following key challenges, or focus areas, to development in the region:

- Poverty and unemployment;
- Inadequate access to housing;
- Health and education;
- Waste management; and
- Infrastructure development.

Strategic goals of the IDP to address these challenges are to:

- Provide municipal basic services to meet demands of growing population and development challenges;
- Maintain sufficient revenue sources to enable the municipality to meet its constitutional obligations;
- Coordinate, facilitate and stimulate sustainable economic development through strategy, policy and programme development;
- Reduce poverty levels;
- Maintain sufficient organizational resources, enhance the involvement of the public in the development and decision making processes and provide ethical and professional services to support the needs of the communities;
- Provide opportunities to officials and councillors for the development of professional and leadership skills and enhance employment equity in the organization; and
- Develop and sustain the spatial, natural and built environment.

The IDP also refers to the disproportionate contribution that the mining sector makes to social development initiatives (relative to their contribution to Regional Gross Value Added [GVA-R]) through mining companies’ implementation of their Social and Labour Plans (SLPs), and highlights that there is economic potential from the exploitation of additional mineral resource deposits in the region.

With regard to Ward 8 specifically (in which the Mine and MSP are located), the IDP identifies housing shortages and unemployment as key development challenges here.

2.2.6 Matzikama Local Municipality Spatial Development Framework (2019)

The MLM SDF is intended to be read with the IDP (2017 – 2022) for the region, and therefore does not provide any detail regarding regional development priorities. The plan rather seeks to implement the plans and policies presented in the IDP by specifying spatial priorities for specific urban settlements in the District Municipality, and therefore has limited relevance to the Mine or project.

2.2.7 Sout River Estuarine Management Plan (2019)

The Sout River Estuarine Management Plan (2019) provides the vision of the future desired state of the Sout River estuary and guide the management of human activities in and around the system by setting out strategic objectives, management priorities and detailed management strategies with actions/activities.
The strategic objectives of the plan are as follows:

- Improve and maintain the ecological health and functioning of the Sout River estuary;
- Conserve the biodiversity of the Sout River estuary;
- Minimise impacts associated with developments and proposed changes in land use, including infrastructure and agriculture;
- Manage the Sout River estuary well through effective co-operative governance;
- Regulate socio-economic benefits, and improve resilience in the face of climate change, to ensure the sustainable use of the Sout River estuary and its resources; and
- Understand and communicate the scientific aspects, importance and value of the Sout River estuary.

2.2.8 Systematic Plan for a Protected Area System in the Knersvlakte region of Namaqualand (1999)

This systematic conservation plan identifies a system of areas to conserve the unique plant patterns and processes in the Knersvlakte region of the Succulent Karoo, and identifies immediate priorities, in terms of land parcels, for acquisition for conservation of this region.

The Mine falls outside of the area identified for the conservation of the Knersvlakte, and therefore this conservation plan has no impact on the project, and the project will not affect the implementation of this plan.

2.2.9 Tronox Namakwa Sands Corporate Environmental Policy

Tronox Namakwa Sands Corporate Environmental Policy is as follows:

*Tronox Namakwa Sands is a Heavy Mineral Sand Producer on the West Coast of South Africa and is committed to conserving environmental resources, preventing adverse impacts to the environment and fostering sustainable development.*

The following principles are embodied in the Tronox Namakwa Sands Environmental Management System:

- Compliance with all applicable laws and regulations;
- Identification and assessment of environmental aspects;
- Setting and reviewing environmental objectives and targets;
- Prevention of pollution; and
- Striving for continual improvement.

To achieve these principles, Tronox Namakwa Sands will:

- Allocate adequate financial and human resources;
- Implement environmental awareness and environmental training;
- Evaluate the effectiveness of environmental performance;
- Engage stakeholders in matters of common concern;
- Operate an ISO14001 compliant Environmental Management System;
- Demonstrate active stewardship of biodiversity; and
• **Promote good relationships with and enhance the capacities of local communities.**

### 2.3 Environmental Assessment Process

The general approach to this study is guided by the principles contained in Section 2 of NEMA and those of Integrated Environmental Management (IEM).

NEMA lists a number of principles that apply to the actions of organs of state and that also serve as reference for the interpretation of environmental legislation and administration of environmental processes. The principles most relevant to environmental assessment processes and projects for which authorisation is required are summarised below.

**Principles relevant to the EIA process:**
- Adopt a risk-averse and cautious approach;
- Anticipate and prevent or minimise negative impacts;
- Pursue integrated environmental management;
- Involve stakeholders in the process; and
- Consider the social, economic and environmental impacts of activities.

**Principles relevant to the project:**
- Place people and their needs at the forefront of concern and serve their needs equitably;
- Ensure development is sustainable, minimises disturbance of ecosystems and landscapes, pollution and waste, achieves responsible use of non-renewable resources and sustainable exploitation of renewable resources;
- Assume responsibility for project impacts throughout its life cycle; and
- Polluter bears remediation costs.

This S&EIR process complies with these principles through its adherence to the EIA Regulations, 2014, and associated guidelines, which set out clear requirements for, *inter alia*, impact assessment and stakeholder involvement (see below), and through the assessment of impacts and identification of mitigation measures during the Impact Assessment Phase.

In accordance with the IEM Information Series (DEAT, 2004), an open, transparent approach, which encourages accountable decision-making, has been adopted.
Although various environmental authorisations, permits or licences are required before the proposed project may proceed, the regulatory authorities are committed to the principle of cooperative governance and in order to give effect to this principle, a single S&EIR process is required to inform all applications. To this end, a single EIA Report will be compiled and will be submitted to the DMRE in support of the application for an EA of NEMA listed activities and for a WML for NEM:WA listed activities.

Supplementary applications will be made as required for the remaining authorisations, including WUL, HWC comment and amendment of the existing EMPr.

The study will also be guided by the requirements of the EIA Regulations, 2014 (see Section 2.1.1.1), which are more specific in their focus and define the detailed approach to the S&EIR process, as well as relevant guidelines published by the DEA and DEA&DP9, including:

- DEA&DP’s EIA Guideline and Information Document Series (DEA&DP, 2013), which includes guidelines on Generic ToR for EAPs and Project Schedules, Public Participation, Alternatives, Need and Desirability, Exemption Applications and Appeals, an information;
- DEA’s Public Participation Guideline in terms of NEMA EIA Regulations (DEA, 2017); and
- DEA’s Guideline on Need and Desirability (DEA, 2017a).

The competent authority for this project is DMRE. Supplementary applications will be made as required for the remaining authorisations.

### 2.3.1 Submission of Applications

Various environmental authorisations, permits or licences are required before the proposed project may proceed. In most cases application forms must be submitted at the outset of the S&EIR process. The required authorisations and their status are listed in Table 2-3.

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9 As no specific guidelines are available from DMRE, reference is made to DEA and DEA&DP guidelines.
2.3.2 S&EIR Process and Phasing

The S&EIR process consists of three phases, namely the Pre-Application Phase, Scoping Phase (*the current phase*) and an Impact Assessment Phase (see Figure 2-2 below).
The objectives of the Pre-Application Phase are to:

- Identify stakeholders, including neighbouring landowners / residents and authorities;
- Compile a draft Scoping Report describing the affected environment and present an analysis of the potential environmental issues and benefits arising from the proposed project that may require further investigation in the Impact Assessment Phase;
- Develop ToR for specialist studies to be undertaken in the Impact Assessment Phase;

The objectives of the Scoping Phase are to:

- Inform stakeholders of the proposed activity, feasible alternatives and the S&EIR process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify any issues and concerns associated with the proposed activity, review specialist study ToR and the Plan of Study for EIA; and
- Submit a Scoping Report to the relevant authorities (in this case, DMRE and DHSWS).

The aims of the Impact Assessment Phase are to:

- Inform and obtain contributions from stakeholders, including relevant authorities, the public and local communities and address their relevant issues and concerns;
- Build capacity amongst stakeholders during the S&EIR process so that they may actively and meaningfully participate;
- Document and contextualise the biophysical baseline conditions of the study area and the socio-economic conditions of affected communities;
- Assess in detail the potential environmental and socio-economic impacts of the project;
- Identify environmental and social mitigation measures to avoid and/or address the impacts assessed; and
- Develop and/or amend environmental and social management plans based on the mitigation measures developed in the EIA Report and EMP.
3 Project Description

The project design information in this chapter reflects the information available at the time of the compilation of the Scoping Report. However, since the design and EIA are being undertaken concurrently, the project description will evolve and be refined during the final stages of the EIA process.

3.1 Introduction

This project is associated with operations that take place within Tronox's East Mine only (see Figure 1-2) and does not relate to operations in the West Mine. This project description therefore focuses on the East Mine at Namakwa Sands as it relates to the project. Details of surface infrastructure at the East Mine site are described in more detail in Section 3.9 below.

Note that descriptions of operations at the Namakwa Sands Mine are drawn from EMPRs for the existing Mine area and are at times reproduced verbatim. These source documents include:

- EIA for Namakwa Sands West Mine Residue Storage Facility 6 (SRK, 2017);
- Expansion into Satellite Deposits EMP (SRK, 2014);
- The Namakwa Sands Consolidated EMP (Golder, 2008); and
- The EMP Addendum: Namakwa Sands Proposed Mine plan expansion and Resource Definition Drilling Programme (Golder, 2011).

3.2 Resource / Reserve Estimate

A Mineral Resource is defined as ‘concentration or occurrence of material of intrinsic economic interest in or on the earth’s crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction’ (JORC, 2004). An Ore Reserve is the economically mineable part of a measured and/or indicated Mineral Resource, including diluting materials\(^\text{10}\), allowances for losses that may occur when the material is mined, and the consideration of modifying factors\(^\text{11}\) (JORC, 2004).

Tronox has undertaken prospecting in the East Mine OFS resource to declare an ore (or mineral) reserve of ~164 Mt. Tronox anticipate ~8.6 Mt ROM from the East OFS project per annum (Mtpa) over a 19 year period (i.e. until 2040).

3.3 Description of the East OFS Project Area

The Mine is located at Brandse Baai which lies in the magisterial district of Vanrhynsdorp, in the MLM and WCDM of South Africa. The Mine is ~63 km north west of Lutzville by road on 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.

Tronox existing mining operations are covered by two converted Mining Rights, namely WC30/5/1/2/2/113 and WC30/5/1/2/2/114 and a third new Mining Right, namely

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\(^{10}\) Diluting materials are non-ore materials that are mined together with the ore as ore and surrounding materials cannot be cleanly separated during ore lifting.

\(^{11}\) Modifying factors include realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental considerations.
WC30/5/1/2/2/100400MR issued by DMRE in terms of the MPRDA on 18 August 2008 and 22 February 2016 respectively – see area demarcated with red on Figure 1-2. This area consists of the 13 properties listed in Table 3-1. Tronox is authorised in terms of the MPRDA to operate (prospect and mine) within this Mining Right Area in terms of a number of existing approved EMPrs.

The Mining Rights cover 19 144 ha of land of which ~14 000 ha has been authorised for mining (see purple boundary on Figure 1-2), and has either already been transformed, or is scheduled for mining in the future.

Tronox extracts HM using open-cast strip-mining methods from the East Mine and the West Mine – see Figure 1-2 and Table 3-1 – properties to which this application relates are indicated in bold, and the Mine precinct comprises long-term surface infrastructure to support mining, including administration and workshop buildings, two large PCPs and an SCP, a seawater pumpstation (intake) near Brand-se-Baai, fresh water and seawater storage dams and eleven RSFs (fines dams) with a total surface area of ~600 ha (see Figure 3-2 and Figure 3-4), tailings and rejects stockpiles, a wide network of haul roads and conveyors (see Figure 3-3) and earthmoving machinery and equipment.

Table 3-1: Existing Namakwa Sands Mine properties

<table>
<thead>
<tr>
<th>Farm Name</th>
<th>Area (ha)</th>
<th>Surface Owner</th>
<th>SG Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West Mine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartebeeste Kom 156, Portion 1</td>
<td>2096</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015600001</td>
</tr>
<tr>
<td>Rietfontein Extension 151, Portion 2</td>
<td>475</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015100002</td>
</tr>
<tr>
<td>Graauwduinen 152, Remainder of Portion 1</td>
<td>2837</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015200001</td>
</tr>
<tr>
<td>Graauwduinen 152, Remaining Extent</td>
<td>1736</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015200000</td>
</tr>
<tr>
<td>Graauwduinen 152, Portion 2 (Afgunst)</td>
<td>599</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015200002</td>
</tr>
<tr>
<td><strong>East Mine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goeraap 140 Portion 17</td>
<td>244</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000014000017</td>
</tr>
<tr>
<td>Rietfontein Extension, 151, Remaining Extent</td>
<td>2231</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015100000</td>
</tr>
<tr>
<td>Houtkraal 143, Remainder of Portion 2</td>
<td>645</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000014300002</td>
</tr>
<tr>
<td>Houtkraal 143, Portion 5</td>
<td>1780</td>
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<td>C07800000000014300005</td>
</tr>
<tr>
<td>Houtkraal 143, Remaining Extent</td>
<td>870</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000014300000</td>
</tr>
<tr>
<td>Rietfontein Extension, 151, Portion 1</td>
<td>1621</td>
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<td>C07800000000015100001</td>
</tr>
<tr>
<td>Hartebeeste Kom 156, Portion 2</td>
<td>1723</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015600002</td>
</tr>
<tr>
<td>Hartebeeste Kom 156, Portion 3</td>
<td>1777</td>
<td>Tronox Mineral Sands (Pty) Ltd</td>
<td>C07800000000015600003</td>
</tr>
</tbody>
</table>

The Mine area has been 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 on the East and West Mines (out of an area of ~14,000 ha 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 being actively rehabilitated (39%);

This project is associated with operations that take place within Tronox’s East Mine only (referred to as the study area), and both STF Site 1 and STF Site 2 are located in areas that have been mined previously.

Figure 3-1: View of the PCP East from the haul road at the DCC

Figure 3-2: Residue Storage Facility (RSF) 5 in the West Mine – wall height is ~40m

Source: SRK Consulting (2017)
3.4 Surrounding Land Use

The ephemeral Groot Goeraap and Sout Rivers are the main regional surface drainage features. The Sout River lies north of the existing mining areas and flows in a westerly direction. The Groot Goeraap River drains in a westerly direction from the (East Mine) mining area into the Sout River (see Figure 1-2).

Land use in the vicinity of the Mine is strongly informed by the regional climate, particularly the limited rainfall and poor quality groundwater. The wider area is largely agricultural, mostly given over to low intensity sheep farming, although tourism is of increasing significance in the region.

Isolated farmsteads and labourers’ cottages are sparsely scattered throughout the region, typically located around the few reliable 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 coastal strip is considered to be a largely uninhabited, distinguishable topographical unit within the regional landscape. In this unit, rocky outcrops and wave-cut platforms, are separated by isolated beaches in small bays, and a primary dune belt. Brand se Baai is one of the many small bays along the coast. The coastal strip is a popular recreational area for farmers and residents of nearby towns with numerous informal camping sites located along the coast – one such camp site is located at Brand se Baai.

A commercial saltworks (Cawood Saltworks) on the Sout River is more than 2.5 km to the north of the East Mine boundary, and has altered this estuary, with large evaporation dams located in and along its southern boundary (see Figure 3-4).

A small privately-owned Bed and Breakfast, Joetsies Guesthouse, is located on Mine owned property ~8 km south east of the active East Mine area on the R363.
3.5 East OFS Project Background

Currently only the surface RAS is mined in the East Mine to a maximum depth of about 6m, using a conventional open pit panel mining method (excavation).

Prior to mining, vegetation is cleared, and topsoil is harvested to a depth of 5 cm for use in concurrent rehabilitation. Following site preparation, front end loaders excavate the ore (RAS) and deposit it into haul trucks, which transport the ore to the nearest moveable grizzly feeder at a branch conveyor. Branch conveyors then transport the ore to the DCC which conveys the ore to the East Mine PCP ROM stockpile.

Tailings are returned from the PCP East by the DCC to branch conveyors and grizzly feeders from where trucks haul and tip the material to the (relatively shallow) pit for backfilling (i.e. the material is single stacked with haul trucks and not mechanically spread).

Fine residue from the PCP East is pumped to the active East Mine RSF (currently East Mine RSF 5).

Once the pit of each mining block is backfilled it is profiled / shaped, and windbreaks are installed. Harvested topsoil is then spread in rehabilitated areas during growing seasons to enhance rehabilitation success. Rehabilitated areas are monitored to determine rehabilitation success.

The East Mine RAS Life of Mine extends until 2024.

Figure 3-4: East Mine Operations

In order to continue operations at the East Mine beyond 2024, Tronox is authorised to Mine the deeper OFS resource to a depth of ~35 m and to upgrade the PCP East in order to process East OFS ore.

Mining of OFS in the East Mine (the East OFS project) will involve the following activities:

1. Site preparation:
a. Physically marking out area to be mined;

b. Vegetation clearing and topsoil harvesting to a depth of 5 cm; and

c. Removal of previously backfilled 1 m – 3 m deep RAS tailings horizon (“RAS tailings overburden”).

2. Ore extraction and transport:

a. Excavation of OFS ore (no drilling or blasting is required) to an average depth of 7 m; and

b. Transport ore by front end loaders or haul trucks to the DCC and onto the PCP East.

3. Processing:

a. Primary Concentration at the upgraded PCP East; and

b. Secondary Concentration.

4. Overburden, tailings and residue management.

a. Tailings placement
   i. Single stacking sand tailings in the approved East OFS pit by haul truck; and / or
   ii. Stacking sand tailing by means of conveyor systems onto the two proposed STFs.

b. Residue disposal in a new RSF;

c. RAS tailings overburden stockpiling (during initial phases) in an interim stockpile and subsequent replacement into the pit (see Section 3.10.1); and

d. Profiling stockpiles, RSF side slopes and partially backfilled East OFS pit.

5. Rehabilitation of backfilled areas:

a. Topsoil placement and levelling;

b. Wind break establishment;

c. Revegetation;

d. Monitoring (success of) rehabilitation; and

e. Maintenance and aftercare activities.

As is the case currently, seawater will be used to process East OFS ore, and the beneficiation process will not require chemical processes or treatment (besides separation of material using a flocculant).

Although Tronox has been granted EA for the East OFS project, detailed planning has demonstrated that a number of changes to the approved approach to sand tailings and residue management, as well as additional infrastructure, are required. These changes and additional infrastructure are the subject of this EIA process (and referred to as “the project”). The project description chapter therefore focusses predominantly on these changes only.

3.6 Project Motivation

Tronox employs more than 1 000 people at the Mine, MSP and smelter directly (including 174 people with dedicated employment at the East Mine). These facilities also sustain many more indirect employment opportunities in the region. A number of companies and enterprises in surrounding towns, and in the district, rely on the Mine to operate. According to the previous Matzikama SDF (2010), the Namakwa Sands mine was estimated to employ, directly or indirectly, up to 60% of employed people in the local municipality (Headland, 2014).
The Mine also procures approximately R900 million of goods and services annually from operations at the Mine and MSP in the local economy and contributes approximately R100 million annually in royalties to the government, and a far larger sum in company taxes.

Namakwa Sands therefore plays a very important function as a local and regional economic driver.

The current approved LoM is until 2043, and there are sufficient resources in the West Mine to continue mining until this date. The RAS resource in the East Mine will be exhausted in 2024, and operations at the East Mine would cease at this date should the East OFS project not proceed, and Namakwa Sands’ revenue would drop significantly, and ~25% of the Mine staff complement would be retrenched.

Tronox benefits from economies of scale by processing mineral sands at the SCP and MSP – i.e. hard costs are relatively fixed at these facilities up to their maximum production capacity. Tronox advises that without the concentrate feed from the East Mine PCP (and the revenue that this feed generates), the Mine could operate at a loss and become sub-economic (and close).

Furthermore, once the RAS resource in the East Mine is exhausted (in 2024), ilmenite, zircon and rutile outputs are expected to decrease by ~50%. This reduction would be offset by minerals extracted from East OFS ore once the East OFS project is operational. Once East Mine OFS production comes on stream, the West Mine will also be able to increase production since Tronox expects blending of East and West OFS ore to increase overall recovery from the West Mine. Without the East OFS project, the ilmenite feed at Tronox’s smelter in Saldanha Bay would need to be supplemented by external sources by 2033 (i.e. imported), significantly affecting the profitability of this beneficiation facility.

The approved sand tailings disposal strategy to the mining void is flawed in the sense that multiple stacking layers would be required (see Box 1 below). The sand tails inherently contain nearly no clay material, and Tronox would end up stacking in a very loose, sandy beach type configuration. In the past when Tronox has attempted this, it has resulted in haul truck roll-overs and multiple vehicle failures. Tronox therefore deem this option as a significant threat to Safe Operations, which is Tronox’s primary Corporate Value, and therefore not feasible – and the specific motivation for this application.

The only feasible (safe) alternative would be to use multiple mechanical tailings stackers to distribute the sand tailings material evenly over the mining void. This would come at significant additional Capex and Opex to Tronox, which would place the financial feasibility of the project at risk.
3.7 Modified Project and Infrastructure Requirements

The following changes to the authorised East OFS project and additional infrastructure are proposed and require authorisation through this process:

- Single stacking sand tailings and RAS tailings overburden in the approved East OFS pit by haul truck, leaving a profiled and rehabilitated void which is an average of 7 m deep across most of the East Mine:
  - Returning RAS tailings overburden to the on average 8 m deep pit by haul truck, to a minimum depth of 1 m (see Section 3.10.5); and
  - Tipping (single stacking – see Box 1) sand tailings by haul truck to a minimum depth of 1 m in portions of the mining pit which have not been backfilled with RAS overburden (see Section 3.10.5).

- Establishing two new STFs (sand tailings stockpiles) in the East Mine pit to accommodate the surplus sand tailings from, but not all backfilled to, the void in the pit (STF 1 and STF 2 in Figure 3-11 – see Section 3.9.1).

- Establishing a ~400 ha, 47.6 million m³ (volumetric capacity) RSF (RSF 6) for the controlled disposal of fine residue generated by the East OFS 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 (see Section 3.9.3).

- Establishing a 50 ha Interim RAS tailings overburden stockpile with a capacity of 3.15 Mm³ in an area approved for mining east of the proposed RSF (see Figure 3-11 and Section 3.9.2).

- Upgrading the seawater intake (see Section 3.9.4).

- Installing a 22 kV overhead powerline (see Section 3.9.5).

- Demolishing three structures within the East OFS pit, each more than 60 years old (see Section 3.9.6).

3.8 Project Alternatives

Appendix 2 Section 2 (h)(i) of the EIA Regulations, 2014, requires that all S&EIR processes must identify and describe alternatives to the proposed activity that are ‘feasible and reasonable’. Different types or categories of alternatives can be identified, e.g. location alternatives, type of activity, design

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12 This differs from the currently approved method of hauling and backfilling all sand tailings into the East OFS pit and therefore mimicking the pre-mining topography (elevation).

13 Two STFs are optimal from an OpEx and safety perspective and are required to allow for blending of ore of different grades from different mine locations, and to provide independent and continuous disposal capacity if one STF is not operational (e.g. during stacker relocation).

14 The Regulations Regarding the Planning and Management of Residue deposits and Stockpiles also require the consideration of site alternatives.
or layout alternatives, technology alternatives and operational alternatives. The ‘No-Go’ or ‘No Project’ alternative must also be considered.

Not all categories of alternatives are applicable to all projects. However, the consideration of alternatives is inherent in the design process and the identification of mitigation measures, and therefore, alternatives have been and will be taken into account in the design and S&EIR processes.

A number of environmental, technical and financial risks and constraints associated with the East OFS project (particularly pertaining to the STFs and RSF) have been identified by Tronox and their consultants. Alternatives have been considered to address these risks and constraints, which include:

- Contamination;
- Increase in groundwater quantity / groundwater mounding (and groundwater intrusions into terrestrial and aquatic environments);
- Loss of sense of place (to recreational users of the coastline, local residents and at closure);
- The cost of construction (CapEx) of the RSF and operational costs (OpEx) (to backfill sand tailings); and
- Safety of operations for the backfilling of tailings.

3.8.1 Location / Site Alternatives

The primary subject of this application is a change in the approach to the approved residue management method for the East OFS project, in order to reduce CapEx and OpEx (and enhance the economic feasibility of the project), and to ensure the technical feasibility of the project. Since subject of the application is a modified approach, the location of the project is fixed. Furthermore, the location of the heavy mineral deposit is fixed, and has dictated the existing Mine / process plant locations.

It is not economically viable to transport sand tailings or fine residue for disposal to a remote location, and therefore different sites for the STFs and RSF (other than within the East Mine) have not been considered. However, in order to address financial, sense of place, environmental and safety risks of the facilities, alternative (feasible) locations for the RSF were considered in the East Mine, and a Screening Study was conducted to identify envelopes which are suitable for construction of the STFs.
Figure 3-5: Proposed East OFS infrastructure and layout
The outcomes of the Screening Study are summarised below – further detail will be provided in the EIA Report.

3.8.1.1 RSF Site Assessment

Although the 2012 authorisation for the East OFS project includes three smaller RSFs, subsequent engineering studies conducted by Tronox concluded that these facilities are neither operationally practical nor sufficient for the management of the fine residue from the East OFS ore body. Therefore, Tronox proposes to build a single RSF for the controlled disposal of all fine residue that will be generated by the East OFS project.

In addition to the alternatives considered in the 2012 EIA for the East OFS project, and a subsequent technical feasibility analysis of alternative locations for the RSF in the East Mine, the following two alternative, technically feasible sites in the East Mine for the RSF were identified by Tronox (see Figure 3-6):

- RSF Option 1 – located in a depression on the western boundary of the East Mine, east of Grouwduin se Kop; and
- RSF Option 2 – located in a valley known as Langlaagte in the south-east of the East Mine.

Figure 3-6: RSF location alternatives considered during screening

RSF Option 1 is preferred by Tronox from a technical (operability) and CapEx and OpEx perspectives. RSF Option 2 (site) is also an ideal location (site) for STF 1 from an operational perspective (see Section 3.8.1.2), and therefore if this site was selected for the RSF, an alternative site for STF 1 would need to be identified.

In order to rate the suitability of site alternatives, relevant screening disciplines were identified, viz. groundwater, surface water and visual. For each discipline, aspects were identified against which
to assess the suitability of area approved for mining in the East Mine for the RSF. The suitability of the area was assessed and mapped on this basis. Aspects and, thereafter, disciplines were weighted in terms of their relative importance, and the integrated (pre-mitigation) suitability for each site was determined (scored/rated).

The key outcome of this assessment (noting that both sites are located within the approved mining boundary) was that neither RSF Option 1 nor RSF Option 2 is fatally flawed in terms of the potential groundwater, surface water and visual impacts of the RSF – i.e. both sites are suited to the RSF. Therefore, RSF Option 2 has therefore been screened out by Tronox (as RSF Option 1 is preferred site for RSF 6 from a technical and financial perspective).

3.8.1.2 STF Site Screening

Tronox identified the following two preferred sites for the STFs which align with the current EOFS Mine Plan (they are located in the general locations where Tronox intend to commence mining), and which would be technically feasible to construct and operate (see Figure 3-7):

- STF Site 1 – located in a valley known as Langlaagte in the south-east of the East Mine; and
- STF Site 2 – located adjacent to the DCC in the north west of the East Mine.

![Figure 3-7: STF location alternatives and suitability envelopes identified during screening](image)

In order to rate and rank the suitability of sites identified by Tronox and other potential STF site envelopes identified by SRK within the East Mine boundary, relevant screening disciplines were identified, viz. groundwater, surface water and visual. For each discipline, aspects were identified against which to assess the suitability of the two identified STF sites and the Screening Study area for the STFs, the suitability of the Screening Study area was assessed and mapped on this basis, and an integrated suitability map of the Screening Study area was produced (taking account of the relative
importance of aspects and disciplines considered). Site envelopes were identified based on the integrated, weighted suitability of the Screening Study area for the facilities. Thereafter, the (pre-mitigation) suitability for each site and site envelope was determined for each discipline (scored/rated).

The key outcome of this assessment (noting that both sites are located within the approved mining area) was that neither STF Site 1 nor STF Site 2 is fatally flawed in terms of the potential groundwater, surface water and visual impacts of the STFs – i.e. both preferred sites identified by Tronox are suitable for the facilities. Other potential locations for STFs considered in the Screening Study have therefore screened out by Tronox as STF Site 1 and STF Site 2 are optimal from a technical and financial perspective.

3.8.2 Activity Alternatives

No activity alternatives (other than the No-Go alternative) are considered by the proponent and activity alternatives (other than the No-Go alternative) are not considered further in the EIA process.

3.8.3 Design Alternatives

Liners for waste storage and disposal facilities reduce the infiltration of contaminants (in this case, seawater) into the environment, and function as a leachate detection, control and collection mechanism. Effective liners can therefore minimise changes to groundwater quality and quantity.

The **Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits** specify requirements for the management of residue stockpiles and deposits (for example, containment barriers) based on the type of the residue and potential risk to the environment. The regulations allow for a risk based approach to design (i.e. design and management measures, including containment, should be commensurate with the level of risk posed to the environment).

Preliminary investigations into the characteristics of the fines and tailings have indicated that:

- Fines residue (in the RSF): the leachable concentrations of Chlorine (Cl), Boron (B) and Total Dissolved Salt (TDS) in the leachate from East OFS processing will categorise this residue a Type 3 Waste; and

- Overburden RAS tailings: this residue has been assumed a Type 4 waste as a) this waste is similar to East OFS tailings to be produced by the PCP East\(^{15}\), and b) process (sea) water and other chemicals (especially TDS) will have leached from this waste over time.

In the absence of a risk-based motivation to design, Type 3 wastes (fines) require a disposal facility that is designed to the prescribed standards of a Class C landfill, i.e. including the installation of a geosynthetic liner. Type 4 wastes (tailings) require a disposal facility that is designed to the prescribed standards of a Class D landfill, i.e. the *in-situ* preparation of a 150 mm thick engineered base layer.

Nevertheless, in order to assess the relative risk posed to the environment and to guide a risk based approach to the design of the facility, Tronox, their appointed design consultants and SRK hydrogeologists are currently considering and comparing the financial, technical and environmental implications (risks) of the following liner design alternatives for the RSF:

- A liner with the specifications of a Class C disposal facility, i.e. base preparation layer and the installation of a High-density polyethylene (HDPE) liner;

- A liner with the specifications of a Class D disposal facility, i.e. an engineered base compaction layer; and

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\(^{15}\) Sand tailings: the leachable concentrations of Cl, B and TDS in the leachate from East OFS processing categorise this residue a Type 4 Waste.
• No liner (as is the design of SD1 – SD5 at the East Mine) with mitigation (e.g. groundwater interception boreholes).

Based on previous financial viability assessments and a financial viability assessment of the East RSF project, Tronox has advised that it is not financially feasible to install a geosynthetic liner at the RSF (and this alternative is therefore screened out by Tronox), and that the in-situ preparation of the 150 mm thick base layer would affect project viability significantly (and is therefore not preferred by Tronox).

In order to assess the relative risk posed to the environment and to guide a risk based approach to the design of the overburden stockpile, Tronox, their design consultants and SRK hydrogeologists are currently considering the financial, technical and environmental implications (risks) of the following liner design alternatives for the RAS overburden stockpile:

• A liner with the specifications of a Class D disposal facility, i.e. an engineered base compaction layer will be installed; and
• No liner (the current, approved backfill strategy).

The results of these assessments (financial, technical and environmental) will be presented in the EIA Report and alternative liner technologies will be comparatively assessed, primarily assessing the impacts on groundwater.

3.8.4 Technology Alternatives

Return Water Recovery

No technology alternatives (other than the No-Go alternative) are considered in this EIA process; however, Tronox has in the past investigated a number of alternatives to return process water from the RSF. These include:

• Barge decant – as is proposed;
• Penstock intakes – not viable as this alternative requires gravity feed; and
• Underdrainage – not financially viable.

Barge decant technology (including a tailings embankment) has been selected by Tronox as the preferred alternative for the recovery of process water. This system will include a floating barge/inlet with a semi-mobile pump installed on an access ramp at the supernatant pool (see below).

Co-disposal of Fines and Tailings

Over the past ten years Tronox has investigated co-disposal of tailings and fines at the Mine, but none of the options investigated by Tronox are financially viable.

Tailings Backfill Strategy

Tronox is currently authorised to haul and backfill all sand tailings from existing load-out bins at the DCC into the East OFS pit. Since only a very small proportion (~4%) of processed OFS reports as product, the remaining residue (~96%) is either disposed of in RSFs or backfilled (tipped) into the shallow void, almost to pre-mining ground level, and thereafter profiled to very closely mimic pre-mining topography. However, further analysis of deeper mining of OFS has demonstrated to Tronox that this approach to sand tailings disposal will not be feasible because haul trucks can tip under these conditions (posing a safety risk) or get stuck when driving over thick backfilled layers of sand tailings leading to mechanical breakdowns (drivetrain failure) and delays, with concomitant increased operational costs and decreased production.
The revised sand tailings disposal method (construction of STFs) is therefore a technology alternative to the approved sand tailings disposal methodology.

3.8.5 No-Go Alternative

The No-Go alternative will be considered in the EIA 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 financial viability of the Mine (operating out of the West Mine only) and smelter in Saldanha Bay would be threatened, and those employed directly at the East Mine would be retrenched.

3.9 Project Design and Construction

The following section outlines the approach to construction of the infrastructural components and upgrades as listed in Section 3.7.

3.9.1 Design and Construction of STFs

3.9.1.1 Design and Layout

Conceptual designs of the STFs will be provided in the EIA Report.

Each stockpile will be a maximum of ~14 m high (~12 m above the post mining ground level, and ~7 m above the current ground level – see Figure 3-8). The STF outer walls will be built at a slope (angle of repose) of 35° and will have a flat surface.

STF 1 will have a footprint of ~290 ha and a length and width of 1 700 m, at the location indicated in Figure 3-11. STF 2 will have a footprint of ~250 ha and a length of 1 900 m and a width of 1330 m, at the location indicated in Figure 3-11.

3.9.1.2 Capacity and Lifespan

STF 1 and STF 2 will have storage capacities of approximately 97 Mm³ and 60 Mm respectively. The combined capacity of these facilities is sufficient to accommodate approximately 23 years of sand tailings production from the East OFS project.

3.9.1.3 Base Preparation

Base preparation requirements and design, if any, will be described in the EIA Report.

3.9.1.4 Establishment / Construction

Following the initial advance (excavation) of the mining face within the designated STF sites, crawler mounted stackers and spreader units will be mounted on ~1.6km 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 – see Figure 3-11).

3.9.2 Design and Construction of RSF 6

3.9.2.1 Design and Layout

The conceptual design of RSF 6 is included as Appendix C.
The walls of the facility will be a maximum of 20 m high and will be built at a slope of 26.6°. The facility will have a ~400 ha footprint, located north of the PCP East and on the northern boundary of the East Mine (see Figure 3-11).\textsuperscript{16}

### 3.9.2.2 Capacity and Lifespan

The RSF (6) will have a volumetric capacity (for slurried fines) of 47.6 Mm\(^3\), sufficient to store approximately 28.6 Mm\(^3\) of dry-fine residue equating to approximately 23 years of fines production from the East OFS project (noting that constant dewatering will take place during operations).

### 3.9.2.3 Base Preparation

Base preparation requirements and design, if any, will be described in the EIA Report.

### 3.9.2.4 Wall Construction

Walls of the facility will be built from sand tailings transported from the PCP East by conveyor during the first four months of the East OFS mining operation (see Section 3.10.5). Both the internal and external slopes of the walls will be constructed at approximately 26.6° (1:2), with a crest width of approximately 30 m.

\textsuperscript{16} Mining is approved on the RSF footprint and the RAS resource will be mined in most of the footprint of this facility.
Figure 3-8: Schematic of EOFS approach to sand tailings disposal
3.9.2.5 Pump and Pipeline Installations

Two 3 400 m long fine residue pipelines and one 3 400 m long return water pipeline will be installed on the south-eastern boundary of the East OFS mining project (see Figure 3-9).

Two pumps will be installed (one on a floating barge in the supernatant pool of the RSF and the other in a pumphouse on the RSF wall) to pump recovered water from the RSF through a return water pipeline to the existing process water dam at the PCP East. The Ø340 mm fine residue pipeline will have a maximum throughput of 908 m³/hour (i.e. 260 l/s), and the Ø340 mm return water pipeline 1 143 m³/hour (i.e. 320 l/s).

Two additional (and identical) stormwater pumps will pump return water to the PCP East via the return water pipeline during storm conditions. In other words, a maximum pumping capacity of 1 816 m³/hour will be available during storm conditions.

Figure 3-9: RSF and associated pipelines
3.9.3 Design and Construction of Interim RAS Tailings Overburden Stockpile

3.9.3.1 Design and Layout
A conceptual design of the Interim RAS tailings overburden stockpile will be described in the EIA Report.
The stockpile will have an approximate height of ~5.6 m. The stockpile will have a footprint of ~50 ha and a length and width of 700 m, at the location indicated in Figure 3-11.

3.9.3.2 Capacity and Lifespan
The overburden stockpile will have a capacity of approximately 3.15 Mm³. The stockpile is an interim measure and will be used until portions of the mined out East OFS pit become available to receive RAS tailings overburden (at which stage disposal at the RAS tailings overburden stockpile will cease).

3.9.3.3 Base Preparation
Base preparation requirements and design, if any, will be described in the EIA Report.

3.9.3.4 Establishment / Construction
RAS tailings will be excavated with ADTs in advance of mining, and transported by haul truck to the Interim RAS tailings overburden stockpile and back-tipped here during initial stages of mining until portions of the mined out East OFS pit has been backfilled with 1 m of tailings and can receive RAS tailings overburden.

3.9.4 Upgrades to Seawater Intake
Currently seawater is abstracted at the seawater intake and pumped to the seawater dam located at the SCP. This dam supplies seawater to reservoirs servicing processing plants. Although Tronox is authorised in terms of NEMA to upgrade seawater intake infrastructure and increase the seawater abstraction volume to 57.6 Ml/day for the East OFS project the existing intake does not have the capacity to supply the upgraded PCP East with enough water, and therefore a number of upgrades to the seawater intake and infrastructure have already been authorised (by DMR) oved for the East OFS project. Further upgrades are proposed as part of this application, including:

- A new de-sanding sump with a footprint of ~40 m²; and
- New foundation for high-lift pumps with a footprint of ~40 m².

Conceptual designs and an indication of the footprints of the new de-sanding sump and foundation for high-lift pumps is provided in Figure 3-10.

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17 The following additional or upgraded infrastructure is required and is approved:
- Installation of more effective pumps (including a <50 m² expansion of the existing pumpstation);
- Enlarging the gully and suction cage;
- Excavation (by blasting) of the intake gully;
- An additional below ground pipeline from the sea water intake to the proposed sea water buffer dam, in the existing pipeline corridor (4.9 km);
- A new booster pumpstation mid-way between existing booster station and proposed buffer dam;
- Additional lined sea water buffer dam with a capacity of up to 40 000 m³ at a location in the vicinity of the existing sea water dam;
- New pipeline from the sea water dam to the PCPE in the existing pipeline corridor within the Mine footprint;
- Raw water dam for PCPE with a capacity of 20 000m³; and
- Associated pumping infrastructure at the proposed new PCPE raw water dam.

This infrastructure is authorised in amended EMPs – DMR Reference Numbers: WC30/5/1/2/3/2/1(113) EM and WC30/5/1/2/3/2/1(114) EM - and EA - DEA&DP Reference Number 16/3/1/1/F3/10/3033/14 dated September 2015.
3.9.5 Construction of Powerline

A 7.6 km long 22 kV overhead powerline from the Main Consumer Substation to the PCP East will be constructed. Powerline will also be extended to the RSF.

3.9.6 Demolition of Farmhouses

During RAS mining, two farmhouses and an outhouse were retained in the East Mine in order to enhance the post-mining visual character of the Mine. This was technically feasible because RAS mining is a relatively shallow operation. However, the structural integrity of these houses will be compromised by deep OFS mining in the surrounding area and Tronox therefore proposes to demolish them prior to East OFS mining.
3.9.7 **Construction Traffic**

Very limited additional (public) road traffic will be generated by vehicles delivering new equipment, which will include pipelines, other minor plant and equipment (e.g. new stackers and spreaders).

Baseline road traffic in the area surrounding the Mine is exceptionally low (almost exclusively associated with Mine operations), and the increased road traffic is very conservatively estimated to be an average of fewer than three additional deliveries per week over a one-year period. At times however, the frequency of deliveries may increase to two delivery trucks per day for periods of no longer than one month at a time.

3.9.8 **Water Demand and Supply**

Tronox utilises water from two sources, namely freshwater from Koekenaap and saline water from the seawater intake located on the coast.

As civil works for the project (the modifications to the disposal plan) will be limited to the construction of the RSF and seawater intake, little additional water will be required for construction, and will not differ significantly from water requirements for mining and processing at the Mine. Additional water supply and storage capacity is not necessary for construction.

3.9.9 **Air Quality Management**

Sources of emissions during the construction phase include dust generated by construction vehicles and bulk earthworks, as well as exhaust emissions. These will not add to normal operational emissions are already generated during mining operations. Furthermore, the nearest sensitive receptor (the Cawood Salt Works) is located more than 3 km from proposed construction areas.

Dust suppression measures implemented at the Mine will be used during construction. Seawater or non-contaminating chemicals will be applied to active construction areas to prevent entrainment of dust by vehicles.

3.9.10 **Noise and Vibration Management**

Sources of noise and vibration during construction include construction vehicles and machinery. Mining, processing and the operation and vehicles are already sources of noise and vibration at the Mine and there have been no complaints about operational noise. It is very unlikely that construction activities will materially affect noise receptors, which are located more than 3 km away.

3.9.11 **Workforce**

An additional ~25 people will be employed as staff members from Feasibility Phase to Implementation Phase. An estimated 800 temporary construction jobs will be generated over the one year construction period.

3.9.12 **Investment**

Tronox estimates the CapEX to modify the East Mine and construct additional infrastructure required for the East OFS project at R2.27 billion. The proposed development will allow the Mine to continue its operations and procure approximately R900 million worth of goods and services annually from in the local economy and contribute approximately R100 million annually in royalties.

3.9.13 **Construction Schedule**

The RAS resource in the East Mine will deplete in mid-2024, and therefore the East OFS project must come online by this date. Detailed design and construction will take two years and two months, and
one year and two months respectively (i.e. a total of 3 years and four months). Tronox therefore aim to receive all of the necessary approvals for the project by January 2021.

### 3.10 East OFS Project Operations

Although this application relates only to changes in the East OFS project disposal plan (referred to as the project), it is necessary to provide a description of the overall operations of the East OFS project in order to describe how the proposed modifications fit in to the overall East OFS project mine plan.

#### 3.10.1 Site Preparation

Mining areas will be cleared of all vegetation and the top 5cm of topsoil will be harvested with bulldozers before mining takes place. Topsoil will either be stockpiled temporarily or transported directly to backfilled areas where it will be used for rehabilitation.

Overburden (RAS tailings from previous mining in the area) will be excavated in advance of mining and initially stored in an interim overburden facility east of the proposed RSF (see Figure 3-11). Thereafter it will be backfilled into the pit prior to rehabilitation (see Section 3.11.2).

Two new ROM tips (which are already authorised) will be installed in the East Mine during initial site preparation – ROM Tip 1 near the Start-up Pit, and ROM Tip 2 near the site of STF 2. Branch conveyors will connect the ROM tips to the DCC.

![Figure 3-11: East OFS project layout and indicative mining sequence](image)

#### 3.10.2 Ore Extraction and Transport

Following site preparation (topsoil clearing and RAS tailings overburden removal), front end loaders will excavate OFS ore to an average depth of 7 m and will load the ore to haul trucks, which will
transport the ore to the nearest ROM Tip. ROM will be conveyed from the tips to the DCC, and on to the PCP East ROM Stockpile.

East OFS mining will start simultaneously on the footprint of STF 1 and at the Start-up Pit\(^{18}\). From the Start-up Pit, mining will advance perpendicular to the DCC in a north-easterly direction towards the footprint of STF 2 towards the Groot-Goeraap River (see Figure 3-11). Mining at STF 2 will proceed across the footprint of this facility in a south-easterly direction parallel to the DCC before moving in a southerly direction (see Figure 3-11).

Tronox plans to mine 8.6 Mtpa of East OFS for the life of the project.

### 3.10.3 Seawater Abstraction and Storage

Seawater will be abstracted at the seawater intake and pumped to the seawater dam located at the SCP (see Figure 3-4), from where it will be pumped to the PCP East for processing East OFS ore as is currently the case.

### 3.10.4 Processing

#### 3.10.4.1 Primary Concentration

Ore on the DCC will be transported to the new ROM stockpile via a new ROM feed conveyor. A withdrawal tunnel at the ROM stockpile will convey ROM to the existing PCP East feed conveyor and ultimately to the Feed Preparation Building at a wet setpoint\(^{19}\) of 1 066 tonnes per hour (tph) (1 345 tph dry). Process (sea) water will be added in the Feed Preparation Building (from the existing Process Water Storage Dam) and the ore milled and screened. Oversize will be transported back to the PCP East feed conveyor for further milling.

Fine residue will then be removed from the slurry in cyclones. Overflow and excess water from the cyclones will gravitate to the new thickener feed tank. Slurry from the thickener feed tank will then be pumped to a new thickener system where flocculant will be added. Overflow from the thickener system will be gravity fed to the existing process water dam and underflow will report to the fine residue transfer tank before being re-slurried and pumped initially to the existing East Mine RSF 4 and RSF 5 and ultimately to the new East Mine RSF (see Section 3.10.6).

The concentrate from the fines removal cyclones will be fed to spirals where tailings will be extracted. Concentrate from the spirals will then be pumped to the SCP for further processing. Tailings will be dewatered (as far as possible) in cyclones and sent for disposal (see Section 3.10.5).

No chemicals other than flocculant are used in processing; however, seawater elevates salinity levels in residue (sand tailings and fines).

Note that the OFS material in the East Mine has a higher fines content and a lower grade than the RAS material. It also “sticky” and contains lumps composed of agglomerated mineral sands particles. Due to the difference in ore characteristics, processing of OFS ore at the existing PCP East (as-is) is not possible and upgrades/modifications are therefore required and are already authorised\(^{20}\).

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\(^{18}\) A pit that will be excavated (mined) by Tronox in the initial stages of the East OFS project to create airspace for the disposal of tailings at the start of the project.

\(^{19}\) The design, or target, throughput.

\(^{20}\) The following additional or upgraded infrastructure is required and is approved:

- New ROM stockpile feed conveyor;
- New ROM stockpile with a withdrawal tunnel and belt feeders to three withdrawal points;
- New mills in the Feed Preparation Plant;
- Upgraded cyclones with new spigots and vortex finders;
- New thickener system including two new 35 m diameter thickeners and a new Flocculant Plant;
3.10.4.2 Secondary Concentration

Secondary concentration is undertaken at the SCP at the Mine (see Figure 1-2). The SCP will receive concentrate from the upgraded PCP East at a predetermined grade and separates the magnetic (ilmenite) from the non-magnetic (zircon, rutile and leucoxene) material. During separation, valuable heavy minerals are upgraded.

Fine residue is also produced at the SCP and is disposed of at the authorised, active fines disposal facility in the West Mine.

3.10.4.3 Mineral Separation

Mineral separation is currently undertaken at the MSP near Koekenaap, where the magnetic stream from the SCP is treated to produce ilmenite for the Smelter and the non-magnetic stream is treated to produce zircon and rutile final products. This process will remain unchanged.

3.10.5 Sand tailings management

3.10.5.1 Sand Tailings Transport

Dewatered, moist tailings will be conveyed from the dewatering cyclones to the DCC on an existing tailings conveyor. The DCC will then transport sand tailings to the active mining block.

During initial stages (first ~4 months) of mining, tailings will be conveyed to a spreader unit at the RSF and used to build for the RSF wall. Thereafter, ADTs will continue to haul sand tailings from load-out bins at the DCC and backfill mined out areas of the East OFS pit to a minimum depth of 1 m (only) or the STFs.

Both STFs will be operational throughout the life of the East OFS project.

3.10.5.2 Pit Dewatering

Sand tailings will have 20% moisture content at disposal and Tronox estimate that 12% of this water seeps out over time. Pit dewatering is required to remove the water seeping from the STFs out of the pit and back to the PCP East. The system will consist of a submersible pump in the pit pumping to a transfer tank, and transfer pumps pumping the water back to the new thickener feed tank at PCP East.

3.10.5.3 Erosion Management

Wind will erode the walls of the STFs and wind erosion protection (netting) will be placed on embankments on inactive slopes only.

- New Thickener Feed Tank;
- Two scrubbers to liberate oversize feed from the new ROM stockpile;
- Additional tailing spirals for dewatering;
- Small annex building for new spirals; and
- New raw water dam for the East CPE with a capacity of 20 000m³.

This infrastructure is authorised in amended EMPs – DMR Reference Numbers: WC30/5/1/2/3/1(113) EM and WC30/5/1/2/3/1(114) EM - and EAs - DEA&DP Reference Numbers 16/3/1/2/F3/10/3033/14, dated March 2012 and September 2015 respectively.
3.10.6 Fine Residue Management

3.10.6.1 Fine Residue Transport

Following thickening at the PCP East, fine residue will initially be pumped in existing pipelines to East Mine RSF 4 and RSF 5. Once the new RSF has been constructed, fine residue will be pumped to the new facility in two new fines transfer pipelines (see 3.9.3.5).

Tronox anticipates that a fines density of 1.09 t/m³ will be maintained and that the volume of seawater in fines will be ~85% (by mass).

3.10.6.2 Process Water Recovery

Capturing and removing water from RSFs is a high priority, to increase the rate of compaction/consolidation (the smaller the supernatant pool is kept, the higher the rate of surface consolidation), reduce the demand for seawater (and electricity) and minimise percolation of seawater into the environment.

It is anticipated that, on average, 900 m³/hr of water will be recovered from the RSF supernatant pool, though pumps will have sufficient capacity to return 1800 m³/hr in the event that this volume is available, e.g. following a storm event (see Section 3.9.3.5).

3.10.6.3 Freeboard Limit

A freeboard limit of 2 m will be applied at the new RSF.

3.10.6.4 Stability and Erosion Management

The loose composition of the tailings will lead to some settling of the RSF walls, mostly while under construction. Deposition of fines may increase the loading of the internal embankment slope, causing further settling.

Wind will erode the walls of the facility and wind erosion protection (netting) will be placed on outer embankments.

3.10.6.5 Surface and Stormwater Management

Stormwater diversion trenches and bunds will be installed to divert stormwater away from the RSF (see Appendix A – stormwater emanating from the east and south west of the RSF will be discharged to the south, and stormwater emanating from the north and west of the RSF will be discharged to the north west).

Both the Mine and MSP are compliant with the requirements of NWA Regulation 704 which require that clean and dirty water streams are kept separate to prevent contamination and minimise the use of clean water.

3.10.7 Ancillary Mine Facilities

Tronox has erected various office, ablution, medical and workshop facilities for the East Mine and these will continue to be used for mining activities associated with the East OFS project.

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21 The East Mine RSFs 4 and 5 are estimated to have 300,000 m³ and 2.5 Mm³ of capacity remaining and available at the termination of RAS mining in the East Mine respectively. This storage capacity would provide approximately 12 months of residue storage for the East OFS project.
3.10.8 Electricity Demand

Eskom currently supply the Mine with 30 MVA electrical supply capacity. An additional 3.5 MVA will be required for the project.

Initial communications with Eskom indicate that this additional capacity is available.

3.10.9 Water Demand

Tronox utilises water from two sources, namely freshwater from Koekenaap and seawater from the seawater intake located on the coast (see Figure 3-4).

Water use requirements are as follows:

- Freshwater for domestic purposes as well as make-up water used to remove salt from the magnetic and non-magnetic concentrates produced at the SCP; and
- Seawater in the PCP West and East as well as for magnetic and non-magnetic separation at the SCP.

No additional freshwater will be required for the project.

3.10.10 Effluent and Wastewater Management

As only relatively few additional employees will be employed (taking into account total employment at the Mine), very little additional domestic effluent and wastewater will be generated by the project.

Domestic wastewater at the East Mine is collected and treated in the existing sewage treatment plant. Process water from the primary and secondary concentration plants is recycled, with some water losses to evaporation and seepage from (moist) fines and tailings deposited in STFs, the RSF and mined out areas.

3.10.11 Solid Waste Management

Hazardous waste will be collected and temporarily stored on-site for collection by registered waste management companies.

Domestic waste, defined as waste that does not pose an immediate threat to man or the environment, will be collected and taken to the existing private, licensed off-site solid waste disposal site.

3.10.12 Air Quality Management

Tronox implements dust suppression measures to reduce dust emissions from exposed areas such as haul roads, areas under rehabilitation, the mining face and stockpiles. This practice will continue for the East OFS project.

The Mine currently experiments with different types and combinations of dust control measures and is in the process of determining the most sustainable method.

The following general dust mitigation measures will continue to be applied in the East Mine:

- Water or non-contaminating chemicals will be applied to un-surfaced roads to prevent entrainment of dust by vehicles;
- The size of areas exposed by the removal of topsoil and vegetation will be minimised as far as possible;
- Mined-out areas as well as other disturbed areas will be revegetated and stabilised with windbreaks as soon as practically possible;