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TRONOX 💥

EXECUTIVE SUMMARY: FINAL EIA REPORT

MODIFIED NAMAKWA SANDS EOFS PROJECT RESIDUE DISPOSAL PLAN

DMRE Reference Number: WC30/5/1/2/2/113 & 114 MR DHSWS Reference Number: WU16841

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 (EMPrs) 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 EOFS Project). For the EOFS Project to proceed, Tronox must modify the approved residue disposal plan (this project): this entails a single RSF to accommodate all fine residue from the project (as opposed to three smaller RSFs as per the current EOFS Project authorisation), an amendment to the approach to backfilling and the upgrade of infrastructure.

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

<u>Changes in the Final EIA Report and Executive Summary</u> vis-a-vis the EIA Report released for public comment are italicised and underlined for easier reference.

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

No	Description			
LN1 (requiring BA)				
9	 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. 			
10	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.			
19A	 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: (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. 			
51	The expansion of structures in the coastal public property where the development footprint will be increased by more than 50 m ² , 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.			
54	 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 			

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

REUT/LAWM

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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.

No	Description		
<u>Category B</u> (requiring <u>S&EIR</u>)			
7	The disposal of any quantity of hazardous waste to land.		
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).		
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.		

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. An application was lodged on 3 July 2020.

Table 3: NWA water use activities applicable to project

No	Description
	<u> </u>

g Disposing of waste in a manner which may detrimentally impact on a water resource.

Tronox will request that their approved EMPrs are amended through this EIA process to include the project activities.

Tronox submitted 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. HWC responded that there was no reason to believe that the project will impact on heritage resources, and no further action was required.

3 ENVIRONMENTAL PROCESS

The EIA Regulations, 2014 define the approach to the S&EIR process, which consists of three phases: the Pre-Application Phase, Scoping Phase and an Impact Assessment Phase (the current phase) (see Figure 2).



Figure 2: S&EIR Process

The key objectives of the Impact Assessment Phase are to:

- Assess in detail the potential environmental and socioeconomic impacts of the project;
- Identify environmental and social mitigation measures to address the impacts assessed; and
- Obtain contributions from stakeholders (including the applicant, consultants, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented and addressed; and
- Produce an EIA Report that will assist DMRE to decide whether (and under what conditions) to authorise the proposed project.

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 semidesert 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.



Figure 3: View towards RSF location

The Mine falls within the Matzikamma Local Municipality (MLM) in the West Coast District Municipality of the Western Cape. Residents closest to the Mine comprise farmers and farmworkers. The nearest formal communities of Vredendal, Lutzville and Koekenaap are located more than 50 km to the south-east of the Mine and accommodate more than 80% of Tronox employees. Population density is very low at 5.5 people per km² in the MLM.

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):

- The current EMP requires backfill to be returned to natural topography; however, the proposed methodology and depth of mining does not allow for this to be achieved safely and therefore the approach to backfilling will be amended as follows:
 - Returning RAS tailings overburden by haul truck, to a minimum depth of 1 m in portions of the 8 m deep mining pit;
 - Tipping (single stacking¹) sand tailings by haul truck to a minimum depth of 1 m in portions of the 8 m deep mining pit; and
 - Deeper backfilling of sand tailings with conveyor and stacker systems at two discrete areas referred to as Sand Tailings Facilities (STFs)² in the East OFS pit to accommodate the surplus sand tailings from the void in the remainder of the pit.

This change in approach to sand tailings backfilling would result in a profiled and rehabilitated void which is an average of 7 m deep across most of the East Mine, as well as two areas of deeper backfill (the STFs) that would protrude on average 14 m above the mined out floor.

- Establishing a ~400 ha, ~66 Mm³ (volumetric capacity) RSF 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;
- Establishing a 50 ha 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.

¹ 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).

² 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).

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Figure 4: Key project aspects within EOFS Project layout and indicative mining sequence

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 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 the necessary approvals for the project by mid-2021.

6 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.

Feasible and reasonable alternatives that were assessed in the Impact Assessment Phase include:

 Alternative containment alternatives, which were comparatively analysed for the RSF and Overburden stockpile, primarily considering the impacts on groundwater and groundwater impact receptors; and • No Go alternative, which was 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.

The financial, technical and environmental implications (risks) of the following liner design alternatives were considered and compared:

- Liner with the specifications of a Class C disposal facility at the RSF, i.e. base preparation layer and installation of a High-density polyethylene (HDPE) liner;
- Liner with the specifications of a Class D disposal facility, i.e. an engineered base compaction layer; and
- "No liner", i.e. in-situ material without base preparation (as is the design of RSF1 – RSF5 at the East Mine) with mitigation (e.g. groundwater interception boreholes).

The permeability of compacted in-situ soils (i.e. Class D containment) is likely to be three orders of magnitude higher than in the fine residue material (i.e. infiltration through initial layers of deposited fines will be lower than an engineered base preparation layer on in-situ material) (Epoch, 2020). As such, the no base preparation (or "no liner") alternative equates to a Class D liner in this circumstance. Tronox thus motivate that the "no liner" alternative (which in this case equates to a Class D liner alternative) is the only reasonable and feasible containment design alternative for the RSF and Overburden stockpile. SRK agrees that the "no liner" alternative is environmentally acceptable, based on the risk-based assessment.

STAKEHOLDER ENGAGEMENT

7

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 EIA Process are summarised in Table 4 below.

Relevant local, provincial and national authorities, conservation bodies, local forums and surrounding landowners and occupants <u>were</u> directly notified of the S&EIR process and the release of the Scoping Report for comment.

Table 4: Stakeholder Engagement during the EIA Process

Activity	Date
Advertise S&EIR Process and release Scoping Report for public comment	18 Jun 2020
Comment period on Scoping Report	20 Jun - 20 Jul 2020
Release EIA Report to registered IAPs for comment	8 Jan 2021
Comment period on EIA Report	9 Jan – 8 Feb 2021

Key issues raised by IAPs on the *EIA* Report are:

- Generally, no objections to the project were raised;
- Impacts on the coastal zone and vegetation must be minimised; and
- Dust suppression measures must be implemented.

8 ASSESSMENT OF POTENTIAL IMPACTS

The following specialist studies were undertaken to investigate key potential direct, indirect and cumulative impacts:

- Surface Water Impact Assessment;
- Groundwater Impact Assessment;
- Marine Ecology Impact Assessment;
- Freshwater Ecology Impact Assessment; and
- Visual Impact Assessment.

For all potentially significant impacts, the significance of the anticipated impact was rated without and with recommended mitigation measures. These impacts are presented in Table 5.

The significance of potential impacts of the proposed Project was determined in order to assist decision-makers. Relevant observations with regard to the overall impact ratings, assuming mitigation measures are effectively implemented, are:

- The predicted *air quality* impact, mainly associated with the potential creation of dust and resulting air quality effects, notably to the Cawood Saltworks, Joetsies Guesthouse, recreational users of Brand se Baai and the surrounding natural environment is rated as *very low* significance due to the distance of the project from the Cawood Saltworks and Brand se Baai, and the prevailing wind direction.
- The predicted *hydrological* impact of alterations to surface water flow patterns at the Mine is rated as *insignificant* as rainfall in the region is low, infiltration levels are high and the formation of non-draining basins is consistent with current mosaic of drainage patterns (i.e. natural basins and pans characterise the area) and will not discernibly affect higher order catchments.
- The predicted *groundwater* impact of contamination from process water infiltration is rated as *low* as groundwater is not considered fit for potable or agricultural use due to its high baseline salinity, and no existing groundwater users will be affected by potential changes to groundwater quality (regardless of containment alternatives selected).
- The predicted *marine ecology* impacts of the loss of Littorina habitat and marine pollution is rated as *insignificant* and *very low* respectively due to the low natural diversity of Littorina zone on the West Coast and disturbed nature of the seawater intake footprint.
- The predicted *ecological* impacts of a localised loss / change of floral habitat from physical disturbance, infiltration or seepage of saline water into the environment (particularly the Groot Goeraap and, potentially, Sout Rivers), and erosion due to altered surface water flow patterns are rated to be of *low* and *very low* significance.
- The predicted *socio-economic* benefit of increased revenue to government and economic investment during construction is rated as *very low* significance,
- The predicted *socio-economic* impacts of lower production at the Cawood Saltworks and a delayed return to the agricultural potential of the footprint of RSF6 are rated as *very low* significance (due to the distance of the project to these works) and *insignificant* respectively.
- The predicted *visual* impacts of altered sense of place and visual intrusion from earthworks and dust, as well as the altered topography of the East Mine are rated as

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medium significance due to the visibility of the Mine and persistence of impacts in the (very) long term, but noting the absence of sensitive receptors locally.

- The predicted *traffic* impact during construction is rated as *insignificant* due to low baseline traffic levels and number of deliveries required for the project.
- The predicted *heritage* impact of a loss of structures older than 60 years is rated as *insignificant*.
- The No-Go alternative entails the cessation of mining activities in the East Mine in 2024 (effectively cancelling the approved East OFS Project). As such, air quality, groundwater, ecology and visual benefits of the No-Go alternative are rated *low* to *medium* significance, while the socio-economic impact of the No-Go alternative is rated *very high* significance.

There is no difference in the significance of impacts regardless of the process water pipeline route alternative selected.

Table 5 summarises the impacts assessed in the EIA, including their significance before and after the implementation of essential mitigation measures. Negative impacts are shaded in red, while benefits are shaded in green.

	Significance rating					
Impact	Without	With				
	mitigation	mitigation				
Air Quality Impact						
	Project					
	Low	Very low				
Nuisance caused by increased	No-Go Alternative					
particulate matter	Low					
concentrations and dust fallout	Insignificant	Insignificant				
	No-Go Alternative					
	Insignificant					
Hydrology Impact						
	Project					
Alterations to surface water	Insignificant	Insignificant				
flow patterns	No-Go Alternative					
	Insignificant					
Groundwater Impact						
	Project					
Groundwater contamination	Medium	Low				
Groundwater containination	No-Go Alternative					
	Low					
Marine Ecology Impacts						
Loss of Littoring habitat in the	Project					
de-aeration sumn	Insignificant	Insignificant				
development footprint	No-Go Alternative					
	Very Low					
Pollution of the marine	Project					
ecosystem and seawater	Medium	Low				
contamination	No-Go Alternative					
	Insignificant					
Aquatic and Terrestrial Ecology	mpacts					
	Proj	ect				
Degradation of natural	Medium	Low				
ephemeral pans	No-Go Alternative					
	Low					

Impact	Significance rating	
Impact	mitigation	mitigation
	Proje	ect
Vegetation loss from increased	Medium	Very low
erosion	No-Go Alte	ernative
	Low	
	Proje	ect
Vegetation loss from the	Very Low	Very low
installation of pipelines	NO-GO AILE	, induve
	Proje	ert
Physical disturbance to aquati	Low	Verv low
ecosystems	No-Go Alte	ernative
	Insignificant	
Changes in plant communities	Proje	ect
	Low	Very low
in the Sout River	No-Go Alte	ernative
	Insignifi	icant
	Proje	ect
Changes in plant communities	Low	Very low
In the Groot Goeraap River	NO-GO AIte	ernative
Socio-economic Impacts	Insignin	icant
Socio-economic impacts	Proie	ect
Delayed return to the	Insignificant	Insignificant
agricultural potential of the	No-Go Alte	ernative
footprint of RSF6	Insignifi	icant
	Proje	ect
ncreased revenue to	Insignificant	Very low
investment during construction	No-Go Alternative	
0	Very H	ligh
Dealing in anodustical at the	Proje	PCT
Course of Coltrary la	LOW	very low
Lawood Saltworks	No-Go Alte	prnative
Cawood Saltworks	No-Go Alte Insignifi	ernative icant
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Cumulative impacts, and socio-economic benefits, in the region mainly derive from agricultural activities and mining. In the context of the project, cumulative impacts

Table 5: Summary of Impacts

on groundwater contamination, terrestrial ecology and a change in sense of place will be suitably mitigated through strict implementation of the EMPr. At some point the cumulative (sense of place) impacts of mining in the area may reach a threshold beyond which the relevant authority may not be prepared to grant EA. This threshold cannot be readily determined.

Current operations at the Namakwa Sands Mine, future expansions of the Namakwa Sands Mine and Tormin and saline groundwater infiltration at the Cawood Saltworks are expected to contribute to the cumulative loss of floral habitat and groundwater contamination in the area. Cumulative impacts are therefore generally rated as being of medium significance, while the cumulative socioeconomic benefit of mining and agriculture in this socioeconomically stressed region is considered to be very high.

As regards climate change, the CO₂ emissions and loss of carbon sequestration capacity associated with the project represent a relatively insignificant percentage of South Africa's total GHG emissions per year, and the impact is considered to be insignificant.

Key recommendations, which are considered essential, are:

- Implement the EMPr to guide construction and operations activities and to provide a framework for the ongoing assessment of environmental performance;
- Profile, re-vegetate and stabilise RSF, STFs and Overburden stockpile walls with windbreaks as soon as practically possible (i.e. during operations);
- Continue to monitor dust fallout on the Mine boundary and respond to exceedances of fall-out limits as specified in the most recent dust control regulations (currently National Dust Control Regulations, 2013);
- Install an additional borehole (in the approximate location of -31.221185°S and 18.000656°E) to the quarterly monitoring network near the boundary of the Groot Goeraap River;
- Install two boreholes (in the approximate locations of -31.224872°S;17.895495°E and -31.234620°S;17.892371°E) to the quarterly monitoring network near the north-west boundary (towards the Sout River);
- Apply additional mitigation measures if monitoring data shows a significant variation in groundwater depth (>6m) or quality compared to the modelled outputs;
- Install stormwater a diversion berm(s) downgradient of STF2 to prevent runoff and erosion downgradient of this facility;
- Restrict access by all construction and operations staff to the approved Mining Right Area; and
- Amend the WUL for the Mine to include the project.

9 CONCLUSIONS

The EIA Report has identified and assessed the potential biophysical and socio-economic impacts associated with the modified the Namakwa Sands East OFS Project Residue Disposal Plan, which entails construction of an additional RSF, a change to the approach to tailings backfill and upgrade of infrastructure at the Namakwa Sands Mine at Brand se Baai, West Coast District Municipality.

In terms of Section 31 (n) of NEMA, the EAP is required to provide an opinion as to whether the activity should or should not be authorised. In this section, a qualified opinion is ventured, and in this regard SRK believes that sufficient information is available for DMRE to take a decision.

The project will result in unavoidable adverse environmental impacts, although these are of limited intensity assuming the implementation of recommended mitigation and are not considered unacceptably significant. In addition, the project will ensure the ongoing regional socio-economic benefit of Namakwa Sands' East Mine operations over the next 25 to 35 years.

The public participation process conducted during the EIA process has given stakeholders the opportunity to assist with the identification of issues and potential impacts, and to submit their comments. Various Organs of State submitted comments, and none raised objections or fatal flaws.

Working on the assumption that Tronox is committed to ensuring that the project is operated and constructed to high standards, achieved through implementation of the recommended mitigation measures and ongoing monitoring of performance, SRK believes, and the EIA Report demonstrates, that through effective implementation of the stipulated mitigation measures, the adverse impacts can be reduced to levels compliant with national standards or guidelines. SRK agrees that the "no liner" alternative is environmentally acceptable, based on the risk-based assessment.

SRK is of the opinion that on purely 'environmental' grounds (i.e. the project's potential socio-economic and biophysical implications) the application as it is currently articulated should be approved, provided the essential mitigation measures are implemented. Ultimately, however, the DMRE will need to consider whether the project benefits outweigh the potential impacts (and if the negative socio-economic impact of the No-Go alternative is acceptable in the context of relatively low significance biophysical impacts of the development alternative).

If approved, it is SRK's opinion that the authorisation should be valid for a period of 10 years.

The Final EIA Report is now being submitted to DMRE for decision-making.