Tronox KZN Sands (Pty) Ltd

INTEGRATED ENVIRONMENTAL AUTHORISATION FOR THE PORT DURNFORD MINE, KWAZULU-NATAL

Draft Environmental Management Programme Report

41106008-REP-00015
APRIL 2025

PUBLIC

Tronox KZN Sands (Pty) Ltd

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 41106008

OUR REF. NO. 41106008-REP-00015

DATE: APRIL 2025

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ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

Draft Environmental Management Programme Report

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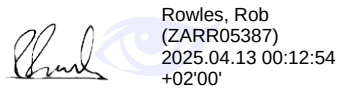
QUALITY CONTROL

Issue/revision	First issue
Remarks	
Date	April 2025
Prepared by	Rob Rowles
Signature	 Rowles, Rob (ZARR05387) 2025.04.13 00:12:54 +02'00'
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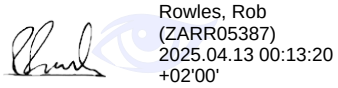
Signature	 Rowles, Rob (ZARR05387) 2025.04.13 00:13:20 +02'00' pp
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Project number	41106008
Report number	41106008-REP-00015

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1 INTRODUCTION

An Environmental Management Programme Report (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced.”

This EMPr has been compiled in accordance with Appendix 4 of GNR 982, in compliance with section 24N of NEMA, with the purpose of ensuring that negative impacts are mitigated, and positive effects are enhanced through a process of continual improvement, during all the project phases, namely planning, pre-construction, construction, operational and decommissioning of the Port Durnford Mining operation.

1.1 BACKGROUND

Tronox KZN Sands Pty Ltd (Tronox) holds a prospecting right (PR) (Reference: KZN 30/5/1/1/2/296 PR) in respect of ilmenite, rutile and zirkon on the farms:

- Sub 1 and Remainder of Lot 102 uMlalazi No. 13860;
- Sub 1,2 and Remainder of Lot 131 uMlalazi No. 14098;
- Sub 1 and Remainder of Lot 103 uMlalazi No. 13880;
- Sub 2,3 and Remainder of Lot 104 uMlalazi No. 13853; and
- Sub 1 and Remainder of Lot Hibbert No. 15714.

This PR (Waterloo PR) was renewed by the DMRE pursuant to Section 18 of the MPRDA.

Historically, Tronox held the following two prospecting rights in terms of Section 17 of the MPRDA:

- DMRE Ref: KZN 30/5/1/1/2/10708 PR (formerly 771 PR) in respect of ilmenite, rutile, zirkon and heavy minerals on the farms measuring 3 945.95 ha in extent in the uMhlathuze Municipality, KwaZulu-Natal province (the Port Durnford PR); and
- DMRE Ref: KZN 30/5/1/1/2/279 PR in respect of ilmenite, rutile, zirkon and heavy minerals on the farms measuring 258.27 hectares in extent in the uMhlathuze Municipality, KwaZulu-Natal province (the Penarrow PR).

Tronox has applied to convert these PRs into a consolidated Mining Right (MR) and seeks Environmental Authorisation (EA) to mine for heavy minerals (general), Garnet (Abrasive), Kyanite, Leucoxene (heavy mineral), Monazite (heavy mineral), Rutile (heavy mineral), Silica Sand and Zirkonium ore. A full Environmental Impact Assessment (EIA) Process comprising scoping and impact assessment phases is required to support this MR Application.

The proposed mining rights area (MRA) is 4087 ha in extent and falls within portions of the uMlalazi and uMhlathuze Local Municipalities, under the King Cetshwayo District Municipality. The boundary of the MRA is approximately 15 km south-west of Richards Bay, 0.5 km north-east of Mtunzini (measured from Zini River Estate) and is adjacent to the following settlements / towns; Port Dunford, Esikhawini, Gobandlovu; and KwaDlangezwa (Figure 1-1).

WSP Group Africa (Pty) Ltd (WSP) has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA Process and development of an EMPr required in terms of the following legislation:

- Mineral and Petroleum Resources Development Act (MPRDA)
- NEMA for the submission of an application for EA in respect of activities identified in terms of Listing Notices 1, 2 and 3 of the EIA Regulations; and specifically, Appendix 4 of the EIA Regulations, and
- NEM:WA and the list of waste management activities (GN 921:2013, as amended), requiring submission of a WML application.

Given that this project is a mining project, the DMRE is the Competent Authority (CA) for the EA Application.

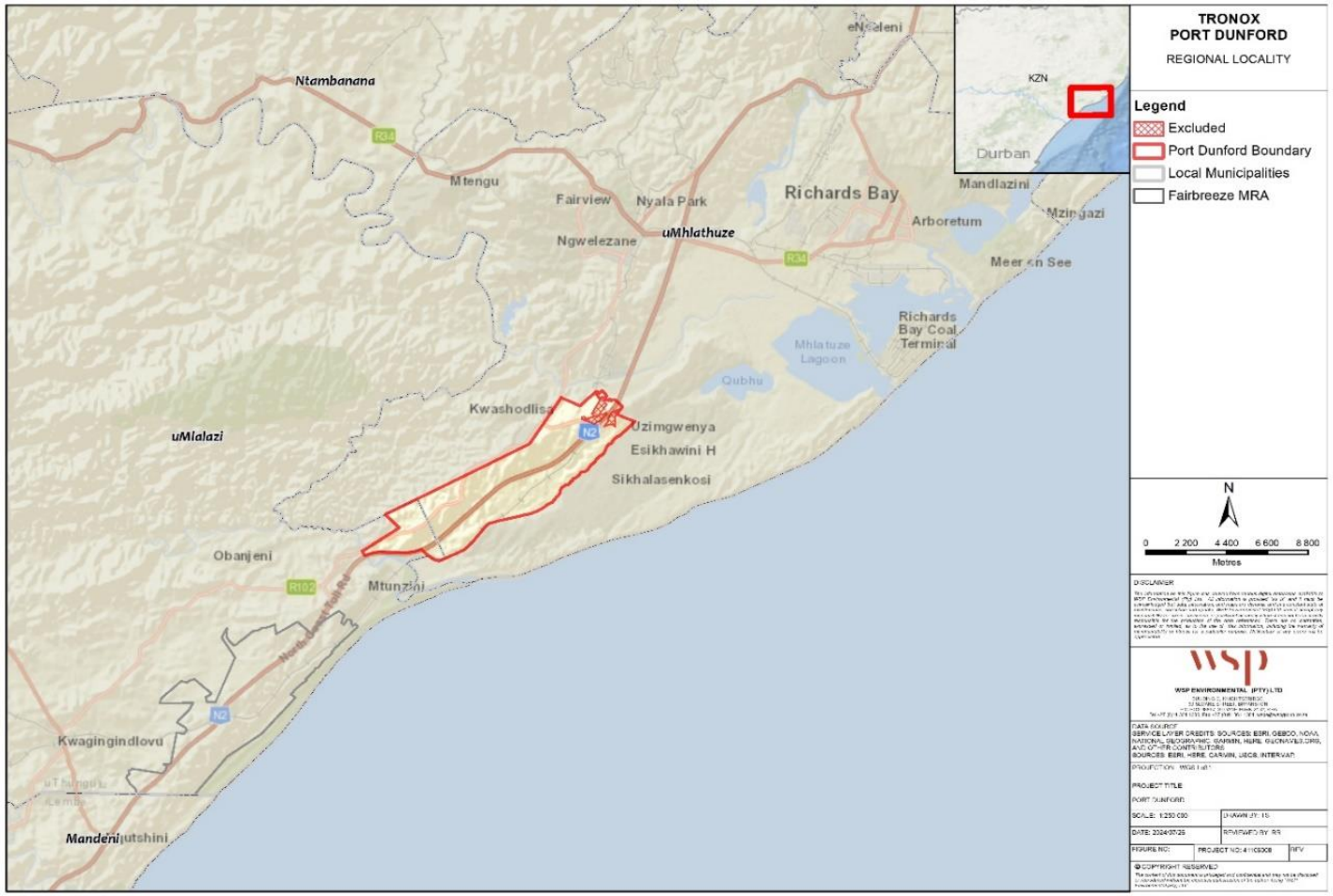

Figure 1-1 - Project locality

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP Group Africa (Pty) Ltd (WSP) has been appointed in the role of independent EAP to undertake the EIA process for the proposed Port Durnford Mining operation. This EMPr has been drafted with specialist input to supplement the Draft Environmental Impact Assessment Report (DEIAR).

Table 1-1 outlines the details of the EAP and their expertise. The EAP Curriculum Vitae is attached in Appendix 1.

Table 1-1 – Details and Expertise of the EAP

Name of Consultant	WSP Group Africa (Pty) LTD
Contact Person	Rob Rowles – EAP and ESIA Coordination Brent Baxter – Project Director
Postal Address	Maxwell Office Park Magwa Crescent Building 1, West, Midrand, 1685
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E-mail	rob.rowles@wsp.com brent.baxter@wsp.com
EAP Registrations/ and Qualifications	**Rob Rowles:** **Qualifications:** MSc. Environmental Management **Registrations:** Registered Environmental Assessment Practitioner (Registration Number: 2022/5395)

1.3 ENVIRONMENTAL MANAGEMENT PROGRAMME STRUCTURE

To demonstrate legal compliance, Table 1-2 cross-references the sections within the EMPr with the requirements as per Appendix 4 of GNR 326 of 2017.

Table 1-2 – Legislation Requirements as detailed in Appendix 4 of GNR 326

	Legislated requirements as per the NEMA GNR 326	Relevant Report Section
(a)	details of-	
	(i) the EAP who prepared the EMPr; and	Section 1.2
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.2 Appendix 1
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Section 3
(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Section 3.3 Section 6
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Section 6
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.2 Section 7

	Legislated requirements as per the NEMA GNR 326	Relevant Report Section
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.1 Section 7
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5.1 Section 6
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 6
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5.2 Section 6 Section 7
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	Section 5.4
(m)	an environmental awareness plan describing the manner in which-	Section 6
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority	N/A

2 PROJECT DESCRIPTION

This section provides a description of the location of the project area and the details associated with each phase of the project. The description encompasses the activities to be undertaken during the construction and operational phases, as well as the consideration for site accessibility, water demand, supply, storage, and site waste management.

2.1 PROJECT LOCATION

The proposed project area is located in the uMlalazi and uMhlathuze Local Municipalities in the King Cetshwayo District Municipality, Kwa Zulu-Natal (KZN). It is located approximately 15 km south-west of Richards Bay and has the following settlements or towns adjacent to different parts of the MRA; Mtunzini, Port Durnford, Esikhawini, Gobandlovu and KwaDlangezwa

The N2 highway and Durban-Richards Bay rail line run from south-west to north-east through the MRA. The N2 highway roughly divides the MRA in half along a south-west to north-east axis, while the southern extent of the MRA boundary follows the rail line until the rail line deviates to the north-east to run close to the southern side of the N2. The R102 (old coastal road) runs through the western/north-western corner of the MRA. In addition, there are several local roads providing access to adjacent towns and settlements that cut across the MRA, roughly in a north-south direction, connecting to either the N2 or the R102.

Table 2-1 provides a list of the properties (and owners) within the proposed Port Durnford MRA. The land portions that fall within the MRA are indicated in Table 2-1. There are further subdivisions of land associated with linear infrastructure (roads and rail), but these are not listed as they have been excluded as no relocation of national or provincial linear infrastructure is proposed.

Table 2-1 - Description of Properties

PROPERTY INFORMATION	DETAILS
Farm Name	**Port Durnford** Portion 0 of Farm Richard 16802, Phalane Community Trust Portion 0 of Farm Birkett 16832, Phalane Community Trust Portion 0 of Farm Ruth 16833, Phalane Community Trust **Waterloo** Portion 0 of Farm Umlalazi 14098, Waterloo Estates CC Portion 1 of LOT 131 uMlalazi 14098, Pondwane Enterprises Trust Portion 2 of Farm Umlalazi 14098, Phalane Community Trust Portion 0 of Farm Umlalazi 13853, Makhanda Pty Ltd Portion 0 of Farm Umlalazi 13880, Duleen Estates CC **Penarrow** Portion 0 of Farm Umlalazi 13602, Phalane Community Trust Portion 1 of LOT 132 Umlalazi 13602, Phalane Community Trust
Application area (hectares)	4454
Magisterial District	King Cetshwayo District Municipality

PROPERTY INFORMATION	DETAILS
Distance and direction from the nearest town	The Port Durnford study project area is adjacent to the following towns at different points along the Mining Right (MR) application boundary: ■ 200 m North-East from Mtunzini; ■ 60 m North-North-West from Port Dunford; ■ 200 m North-West from Esikhawini; and ■ 200 m North-East from Gobandlovu.
21-digit surveyor general code for each farm portion	**Port Dunford** Portion 0 of Farm Richard 16802: N0GU00000001680200000 Portion 0 of Farm Birkett 16832: N0GU00000001683200000 Portion 0 of Farm Ruth 16833: N0GU00000001683300000 **Waterloo** Portion 0 of Farm uMlalazi 14098: N0GU00000001409800000 Portion 1 of Farm uMlalazi 14098: N0GU00000001409800001 Portion 2 of Farm uMlalazi 14098: N0GU00000001409800002 Portion 0 of Farm Umlalazi 13853: N0GU00000001385300000 Portion 0 of Farm uMlalazi 13880: N0GU00000001388000000 **Penarrow** Portion 0 of Farm Umlalazi 13602: N0GU00000001360200000 Portion 1 of Farm Umlalazi 13602: N0GU00000001360200001

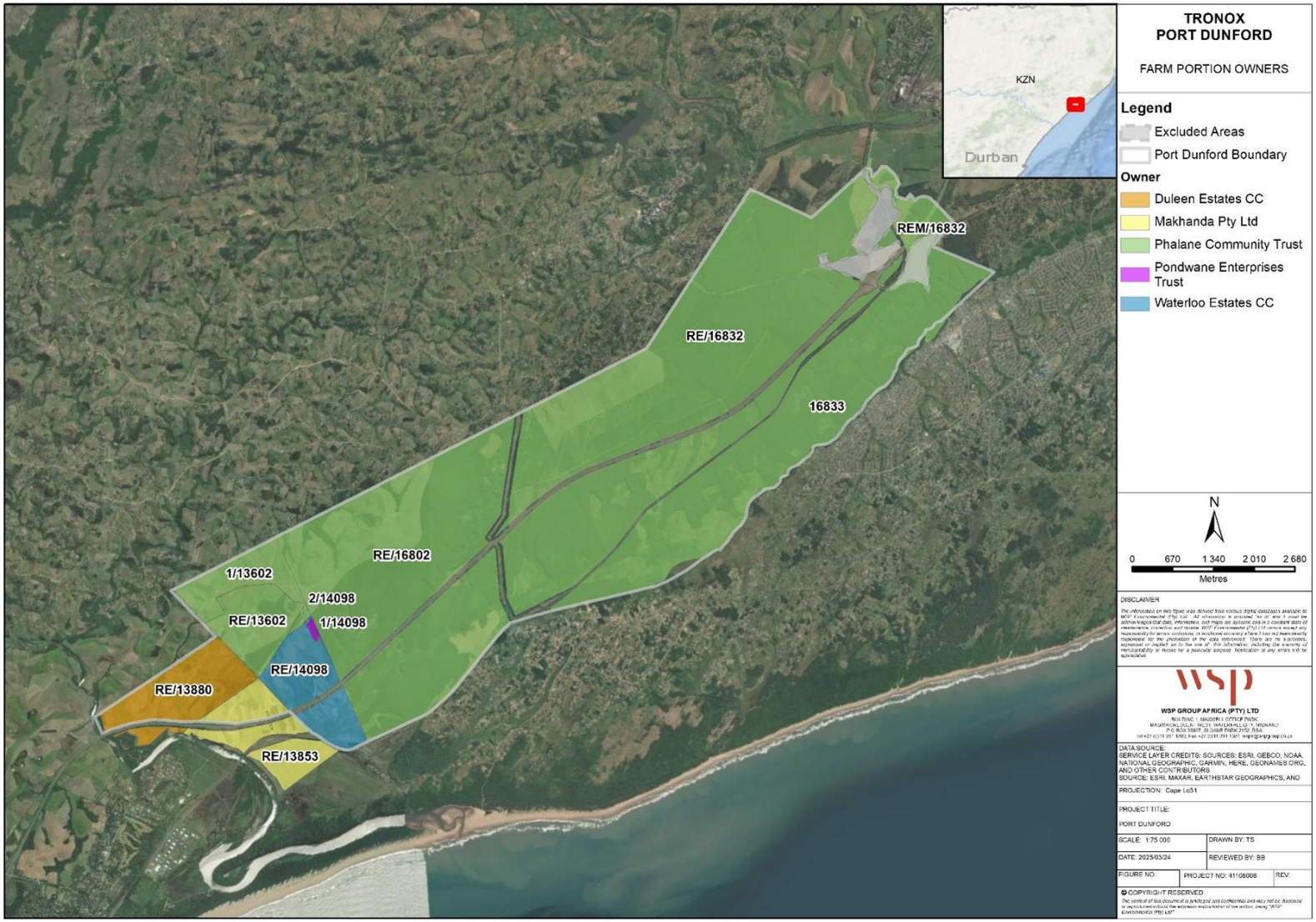


Figure 2-1 - Land ownership of properties within the MRA

2.2 PROJECT OVERVIEW

2.2.1 PROJECT CONTEXT

The proposed Port Dunford mining operation was initially conceptualised in 2007 but was not advanced further at that stage. In 2015 Tronox commissioned Hatch (Pty) Ltd (Hatch) to complete a concept study for the development of a mining operation at Port Durnford. This was followed by a Pre-Feasibility Study (PFS) undertaken by Hatch that concluded in November 2020. The study assessed multiple mining methods, mine configurations and rates of mining and, following technical and financial evaluation, determined that the Port Durnford mining operation should be a stand-alone operation (not an extension of the existing Fairbreeze operation) and should be mined in two phases.

Phase 1 would last 10 years from 2025-2035 at a low production rate of 70,400 tpa, operating for five consecutive working days in the month, while Phase 2 would be a large-scale opencast mining operation from 2036-2074 at a design production rate of 3000 tph, 24 hours per day and operating for 365 days a year.

In 2022 an EIA process was commissioned by Tronox. WSP was appointed to undertake the ESIR Process. The early studies refined the on-site understanding of sensitive aspects within the MRA, such as wetland and sensitive vegetation delineation. Consequently, Tronox revised both the mine plan and mining schedule to avoid these high-sensitivity areas to the extent possible. This reduced the area available for both mining and residue deposition during Phase 2, which saw the life of mine (LOM) reduced by five years from 2074 to end in 2069. This change in the mine plan and schedule required the materials balance to be rerun. The materials balance reflects the volumes of coarse and fine sand tailings that need to be handled and disposed of at points in time as the mine progresses. Consequently, the RSF and sand tails concept designs had to be revisited together with the sites available for residue disposal. These changes could not be accommodated in the original EIA timeframes.

For this reason, Tronox lodged a new mining rights application in May 2024, which was subsequently formally accepted by the DMRE on 19 July 2024 (DMRE Ref: KZN 30/5/1/2/2/10133MR). The current EIA is thus a new S&EIR Process in support of the revised mining rights application. The project description presented in this report is thus informed by the Hatch PFS and subsequent refinements to the development plan.

The scope of the proposed Port Durnford mining operation is described in this section. No changes are needed at the Fairbreeze Mine, which receives Phase 1 ROM, or at the Tronox Central Processing Complex (CPC - comprising Mineral Separation Plant (MSP) and smelter) in Empangeni that receives the Phase 2 concentrate from the Port Durnford Primary Wet Plant (PWP).

2.2.2 SCOPE OF THE PROJECT

The proposed project is for the mining of heavy minerals (general), Garnet (Abrasive), Kyanite, Leucoxene (heavy mineral), Monazite (heavy mineral), Rutile (heavy mineral), Silica Sand and Zirkonium ore to produce:

- Titanium dioxide (TiO_2) pigment that is used in paints, plastics, paper laminates, ink and the food market;
- Titanium metal;
- Welding consumables;

- Titanium feedstocks used in the manufacture of brake pads, roof tiles and in the glass industry; and
- Zirkon used for the manufacturing of ceramics, foundry, refractory, zirkonia and other zirkon chemicals.

The proposed mining activities, as amended, will be undertaken in two phases:

- Phase 1, a low-rate mining operation at approximately 70,400 tpa for approximately 10 years from 2025 to 2035, and
- Phase 2, a full-scale operation at a design production rate of 3000 tph, 24 hours per day and operating for 365 days a year until close of mine in 2069 (previously 2074).

The Tronox existing Fairbreeze operation will conclude its life of mine in 2037, and it is intended that the Port Dunford mining activities will facilitate the continuation of Tronox mining operations in the area. This mining project will ensure a continued feed of heavy mineral concentrate to the KZN MSP in Empangeni.

2.3 Phase 1- Low Rate Operation

The proposed Phase 1 mining operations will be situated on the Remainder of Richards 16802. This land is owned by the iNkosi Phalani Community Trust and is currently under lease to Mondi for commercial forestry use.

The proposed location for the Phase 1 operation and infrastructure is indicated in Figure 2-2, while a 3D visualisation of the site is provided in Figure 2-3. The Phase 1 mining area and supporting infrastructure footprint will be less than 10 ha in extent.

2.3.1 PHASE 1 MINING

Phase 1 will have a mining footprint of 4.9 ha. The pit depth will be between 8-10 m and will continue for approximately 10 years between 2025-2035. The mining rate will be up to 100 tph and up to 70 400 tpa. There will only be five (5) days of mining per month, for 12 hours a day on the days that mining takes place.

No processing on the Port Durnford site is proposed as part of the Phase 1 mining operation. ROM material will be transported to Fairbreeze mine by truck on public roads for further processing.

The material will be fed into the Fairbreeze PWP together with Fairbreeze ROM, within the approved rate of production at Fairbreeze. The produced HMC will be handled as a Fairbreeze product (transported to the Tronox Empangeni MSP) and fine residue and coarse tailings will be disposed of within Fairbreeze RSF facilities and mined out areas, respectively. It is expected that 4 x 34 t trucks will be used to transport the mined material and that 9 truck cycles per day will occur for the 5 days each month that the site is being actively mined. The transport routes are described in more detail in the section that follows.

At Fairbreeze, the material will be offloaded in active working areas where it will be hydraulically reclaimed and pumped to the existing Fairbreeze PWP for processing together with the Fairbreeze ROM feed. No changes to the PWP throughput capacity at Fairbreeze are needed, and coarse and fine residues will be disposed of at Fairbreeze as part of the Fairbreeze approved coarse sand backfill to pit and fine residue disposal to RSF. The concentrate will be trucked to the existing MSP located at the CPC in Empangeni as part of the Fairbreeze product.

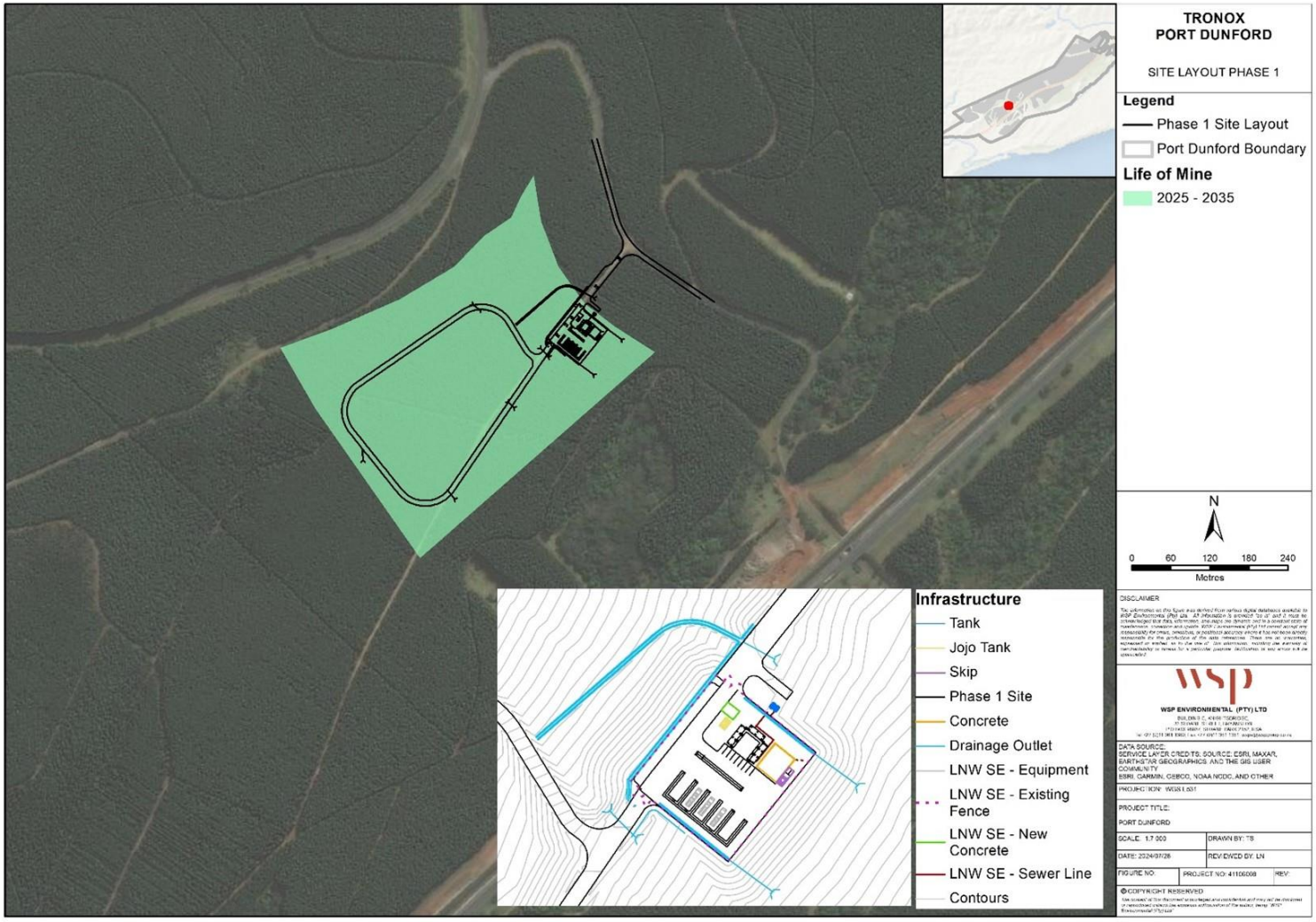
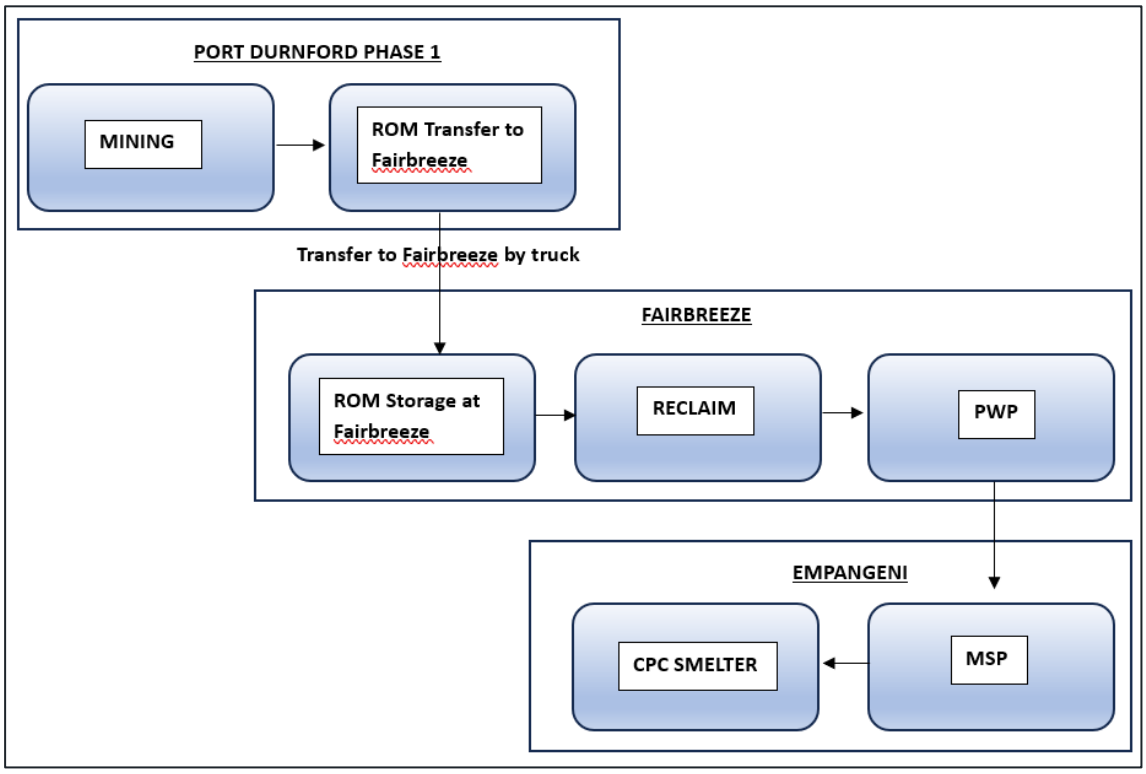


Figure 2-2 - Proposed Phase 1 layout and infrastructure

Figure 2-3 - A 3D visualisation of the Phase 1 Layout

The materials flow from the Phase 1 site through the Fairbreeze PWP and to the Empangeni CPC is indicated in Figure 2-4.

Figure 2-4 - Phase 1 Process flow diagram



2.3.2 PHASE 1 SITE INFRASTRUCTURE

The infrastructure associated with the Phase 1 site is described in greater detail below. The site configuration is indicated in Figure 2-2. There will be no accommodation on site. The site will include:

- Conservancy Septic tank system – 2 x 6000 l conservancy tanks placed under ground;
- Mining equipment parking area (Gravel with 2 x layers & insitu);
- Workshop laydown area (Concrete stand with 2 x steel containers);
- Water storage tanks (2 x 10 kl tanks);
- Internal water reticulation (Reticulation to offices & ablutions);
- Offices and ablution and septic tank (2 x 12 m units & 1 x 9 m unit);
- Internal electrical reticulation (Estimated ADMD to be 14.7 kW);
- External lighting that will turn on and off automatically;
- LDV parking area (1 x G6 layer with RIP & compacted base);
- Guard house (Concrete stand with 1 x steel container);
- Security fence (2.1 m high fence & 1.2 m perimeter fence);
- A 200 m gravel access road to connect the Phase 1 site to the district road that connects to the R102;
- A general and hazardous waste storage area; and

- Fuel and Lubricant Storage: fuel tanks will be supported on a concrete surface bed with edge thickenings. A concrete bund wall will be constructed surrounding the fuel tanks. It is anticipated that a 23 m^3 storage tank will be provided and it is estimated that 153 422 litres will be utilised per annum.

There will be no hard stand stockpile area. The mined material will be mined, loaded and transported directly to Fairbreeze.

2.3.2.1 Water Supply

The primary water use on site will be dust suppression, with an estimated 4 800 m^3 of water per annum required.

With the options to connect to the nearest Municipal Supply point, install a borehole or utilise water carts to supply the Phase 1 site. Tronox have opted to utilise 10-18 kl water trucks to cart 6 kl of municipal water to the site, to be stored in 2 x10 kl JoJo tanks. The JoJo tanks will be elevated on a steel structure. The municipal water supply points considered are:

- Potable water sourced from the Port Durnford Clinic: 28°54'57.15"S 31°49'42.06"E, which is 2.3 km from the Phase 1 site;
- Alton bulk water point: 28°44'45.38"S 32° 1'29.68"E, which is 34 km from the site; and
- The Empangeni Bulk water Point: 28°44'58.29"S 31°53'6.88"E, which is 23 km from the site.

2.3.2.2 Electrical Supply

Power will be required to service the administration offices. The average monthly consumption required is expected to be 2 741 kWh. Tronox plans to utilise an Eskom Overhead Power line connection with an inverter and batteries for a backup power supply. A miniature substation (MSS) will be required for stepping down the Eskom 22 kV to 400 V for the mine offices distribution.

2.3.2.3 Employment

It is currently estimated that there will be 25 employment opportunities created through the proposed Phase 1 mining operation.

2.3.2.4 Haulage Routes

Route 1 (illustrated in red in Figure 2-5 below) is the preferred route. This route makes use of existing public roads. From the Port Durnford mining area and laydown yard the trucks would take the R102 road, westbound for 10 km to the Hely Hutchinson Road intersection. Turning left at this intersection and then right (passing through the Mtunzini Tollgate) onto the N2 south bound for 6 km until the #290 Bridge #4 Fairbreeze Mine off-ramp. The Phase 1 ROM material will be offloaded at Fairbreeze at a site approximately 400 m from the offramp where Fairbreeze mining is taking place. The total distance travelled would be 18.7 km, at an average estimated speed of 53 km/hr. The average anticipated trip time would be 21 minutes in one direction. Route 1 is the preferred alternative for travel time, road maintenance and accounting for risk.

Note: This transport route will be used for the first 10 years of mining during Phase 1. Once Phase 2 commences, all ROM will be slurried at the mine face and pumped to the Port Durnford PWP for processing as the PWP, which will have been constructed on the Port Durnford site by that time.

Equally, it's important to understand that the Phase 1 Port Dunford operation supplies ROM material to Fairbreeze to make up production tonnages at Fairbreeze. Consequently, once offloaded at active

production areas at Fairbreeze, there is no return linkage to the Port Dunford operation, and all process residues (fine materials and coarse sands) are handled within the permitted limits of the Fairbreeze operation.

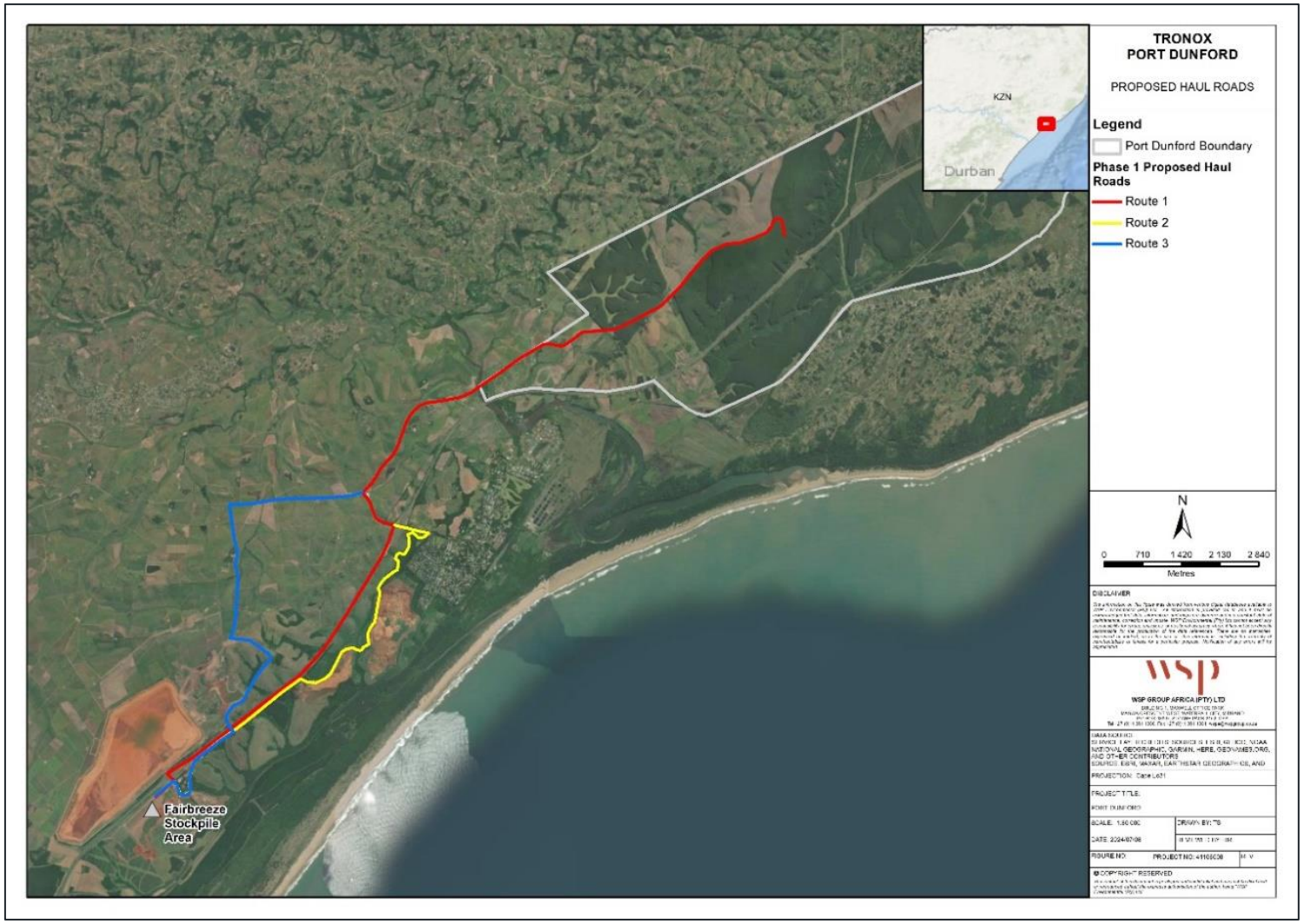


Figure 2-5 - Proposed Phase 1 ROM transport routes from Port Durnford to Fairbreeze

2.4 Phase 2 - Full-scale Mining Operation

The infrastructure for Phase 2 will be constructed during the later part of the Phase 1 mining period (2025-2036), however, mining and processing for Phase 2 will only commence in 2036.

The proposed Phase 2 operation comprises opencast mining, on-site processing of ROM material in a PWP) the on-site backfill and disposal of both coarse and fine sand tailings from the PWP and the transport of heavy mineral concentrate to the existing Tronox MSP located in Empangeni within the Tronox CPC. At the MSP the concentrate is further beneficiated to yield the target minerals. Coarse sand tailings that are not separated out at the PWP and are thus transported to the MSP as part of the concentrate, but which do not yield product, are returned to the mine and are reintroduced into the coarse sand tailings backfill stream.

The Port Durnford mining footprint is 1 132 ha that will be mined over a 33-year period, between 2036-2069. The planned rate of mining will be 3,000 tph, 24 hours a day, 365 days a year.

The revised Phase 2 layout is presented in Figure 2-6. Key changes in this layout are described below and discussed in more detail as part of the project description. In summary, the mine plan has been revised to avoid sensitive habitats to the extent possible. No mining takes place south of the railway line or N2 in the revised mine plan. This has shortened the life of mine by approximately five years.

Similarly, the sand tailings deposition areas have been moved from areas south of the railway line that are largely comprised of wetlands. Additional sand tailings areas have been identified and are indicated. Some of these (A1, A2, A3 complex and 8B) are located on unmined land. Sand dumps 3, 4 and 5 will largely be developed over the backfilled pit areas although some extension beyond the pit limit does occur for sand dump 5.

The return water dam for RSF 9 has been moved to the southern side of the dam to minimise impact to a sensitive natural forest area north of RSF 9. The PWP was aligned to the west to accommodate the siting of a RWD for RSF C. RSF C has been expanded through the inclusion of a fourth compartment on its eastern side, labelled P4 below, and the locations of enabling and support infrastructure are better defined including on-site roads and the positions of topsoil stockpiles.

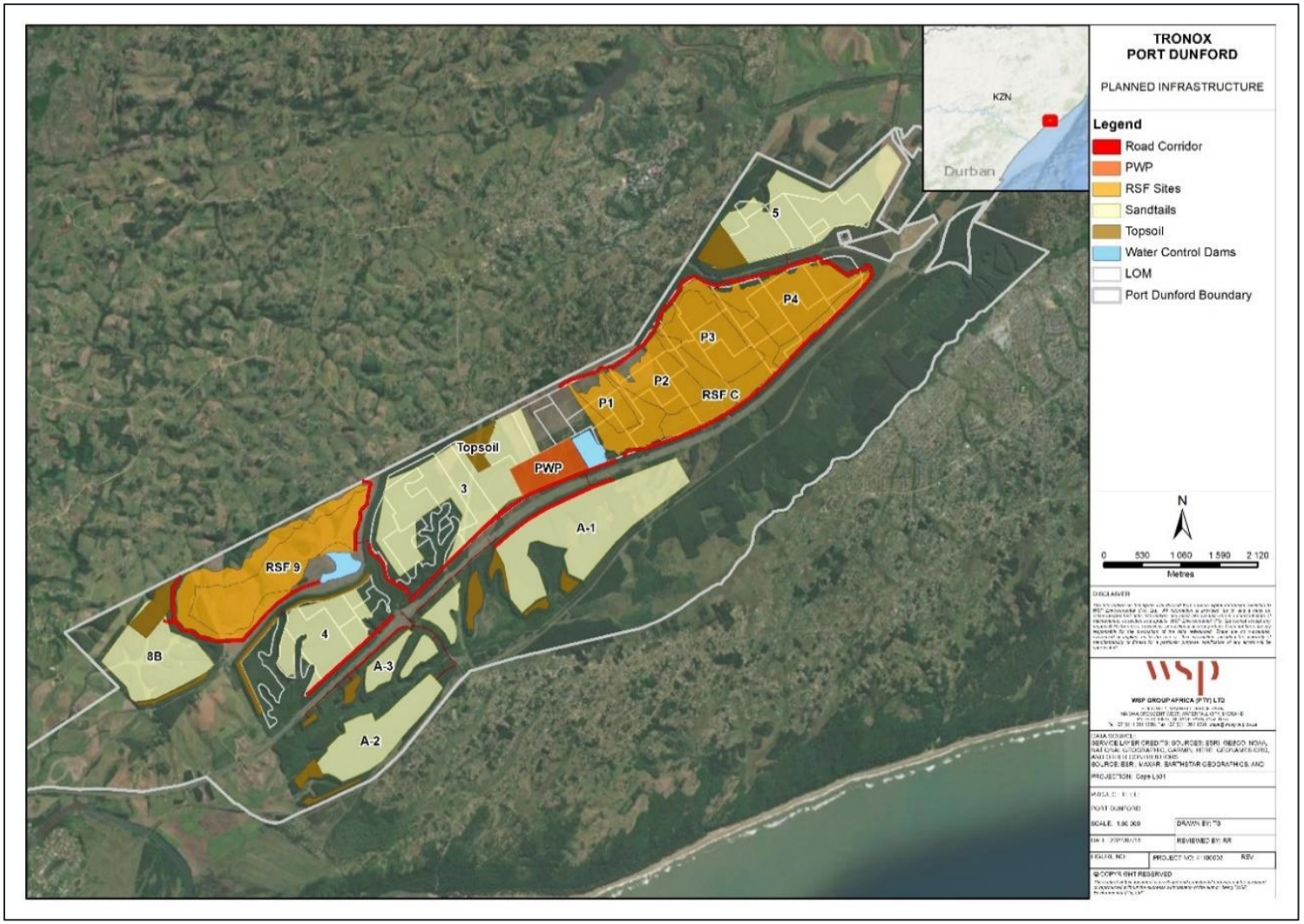


Figure 2-6 - Proposed Phase 2 layout and infrastructure

2.4.1 PHASE 2 MINE PLAN

The planned mining schedule (mine block plan including time sequencing) is presented below in Figure 2-7. with mining blocks grouped into 5-year units for ease of interpretation of mine progress through time. On this plans the position of the RSFs (orange outline) and the sand dumps (beige outline) are also indicated together with the position of the PWP (orange rectangle).

Mining will commence for Phase 2 in 2035 at the site of the Phase 1 pit to complete mining in that block. Thereafter, the active mining window moves to a position immediately east to the PWP and sequentially progresses in an easterly direction until the eastern extent of the mine is reached in 2061.

In 2051, mining will also be initiated in the western extent of the proposed mining footprint and progress in an easterly direction back towards the PWP, with the final block that lies immediately north of the PWP, being mined in 2069.

From Figure 2-8 the RSF 9 in the west of the site will be developed on unmined ground while RSF C, in the east of the site, will be developed sequentially on the pit floor as each corresponding five-year mining block has been completed, space becomes available. During these periods the washed sand tailings cannot be backfilled into the pit and consequently must at times be deposited on surface. All pit areas will be backfilled with either coarse sand tailings or fine residue (within the RSF). The sand dump positions (beige outline) reflect where a sand dump will be developed above the current ground surface and will remain as a permanent aboveground feature on the post mining landscape. Similarly, RSF Site C will also end at a height above the current ground surface.

Figure 2-7 - Proposed Phase 2 Life of Mine (LOM) Plan

Figure 2-8 - Proposed Phase 2 mining block plan showing 5-year mining windows

2.4.1.1 Sequence of mining activities

The basic sequence of mining activities is proposed as follows:

- Before mining starts, a minimum of 0.3 m of topsoil will be stripped. This material will preferably be placed directly onto an area available for rehabilitation. If that is not possible, it will be placed on a topsoil stockpile for later use. Topsoil stockpile locations have been identified for storing stripped topsoil for the duration of the Port Durnford development (Figure 2-6);
- 1.5m of subsoil will be stripped and stockpiled for the sites that will not be mined, such as RSF 9 and the sand tails dump sites. The subsoil will be stockpiled and used for rehabilitation. Reconstituted soil (67% course sands and 33% fines) will be used as a subsoil later prior to topsoil placement in the areas that will be mined;
- Then, the in-situ sands are mined. In the Port Durnford mine the sands are mineralised from surface to the base of the economic mining limit within the pit. Consequently, there is mineralisation even in the topsoil that is set aside;
- After a pit has reached the economic limit for mining, it becomes available to be backfilled. Backfill material comprised of the washed course tailings is used to backfill the open pits;
- Once the pit is backfilled to the design height, it becomes available for rehabilitation and topsoil is replaced; and
- The topsoiled areas are revegetated.

2.4.1.2 Mining Method

The proposed Port Durnford heavy mineral sands mine is an opencast sand mine, not dissimilar to the current Tronox Fairbreeze operation. The mining method will however differ. At Port Durnford mobile skid mounted Dozer Trap Mining Units (DTMUs) will be used within the active mining areas. The mining process entails dozing the sand material down to the DTMUs where it is combined with water and pumped to the PWP. Each DTMU is anticipated to be fed by two D11 dozers and a CAT390 excavator. A DTMU is equipped with a vibrating screen to separate oversize material and accompanied by a primary pump. Each DTMU is connected to a raw water feed pipeline, a ROM slurry delivery pipeline, and a power connection.

A typical DTMU is shown in Figure 2-9 for visual reference.

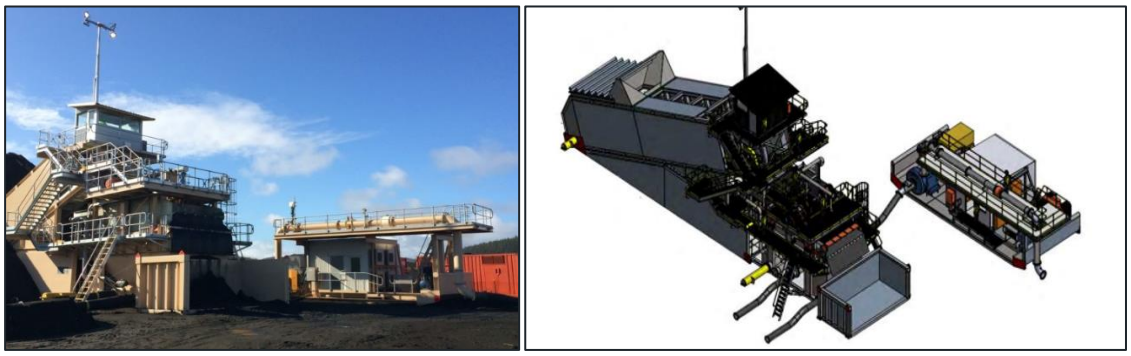


Figure 2-9 - A typical dozer trap mining unit (DTMU) showing the trap on the LHS into which material is dozed and an associated pump unit on the RHS

2.4.2 PHASE 2 MINERAL PROCESSING

The ROM material is processed at the Primary Wet Plant (PWP) to remove fine material from the plant feed and separate the non-mineralised sand fraction to produce a heavy mineral concentrate. The

ROM feed at Port Durnford is typically comprised of 76% coarse sand tails, and 20% sand tail fines with the remaining 4% being the heavy mineral concentrate (HMC) that is then transported off-site to the Tronox MSP in Empangeni.

The PWP will be designed to process 22,866,000 tpa ROM at a nominal rate of 3,000 tph. The process will produce the following output streams:

- Mined material is deslimed and placed through a spiral circuit to separate the coarse sand tailings (+45 µm);
- The coarse sand tailings will be used for backfilling and the establishment of the walls of the RSF facilities;
- The spiral concentrate is put through a magnetic separation circuit to remove the reject magnetite, which is fed back into the coarse tailings circuit;
- The non-magnetic material forms the Heavy Metal Concentrate (HMC); and
- The fine tailings (-45 µm) are collected from the desliming process, a thickener is added and process water retrieved before disposal on the residue storage facilities.

The PWP layout is indicated in Figure 2-10 (Hatch 2020) and the process flow for Phase 2 activities is presented in Figure 2-11 (Tronox 2022). The PWP layout includes:

- ROM feed preparation and fines removal area;
- Gravity and magnetic separation areas;
- Fine tails dewatering, treatment and pumping area;
- 33 kV sub-station and power factor correction (PFC) Yards and Eskom Yard;
- Raw and process water storage and distribution area: Raw water will be stored in a single 10,000 m^3 raw water dam. Process water will be stored in two 7,500 m^3 dams connected by a common overflow sump;
- Compressed air plant: The PWP will be serviced by a single compressed air facility comprising of two compressors, two air receivers and two air dryers;
- Potable water treatment plant: A standalone packaged potable water plant capable of supplying sufficient water for the total estimated personnel compliment;
- Sewage treatment plant: a plant will be developed to accommodate the onsite personnel. Processed effluent from this treatment plant will be pumped to the process water dam;
- Workshop and stores;
- HMC dewatering, stockpiling and reclaim area;
- MSP tails handling where non-mineralised sand tails returning from the MSP are received to be reincorporated into the course tailings backfill stream;
- Gypsum plant;
- Mine Complex including administration offices with parking, control room, change house, mess, security office, laboratory and sample room; and
- A fit-for-purpose and legally compliant fire water pumping station and distribution system at the PWP to be fed directly from the raw water dam.

The location of the PWP plant in relation to the mine plan is illustrated in Figure 2-12.

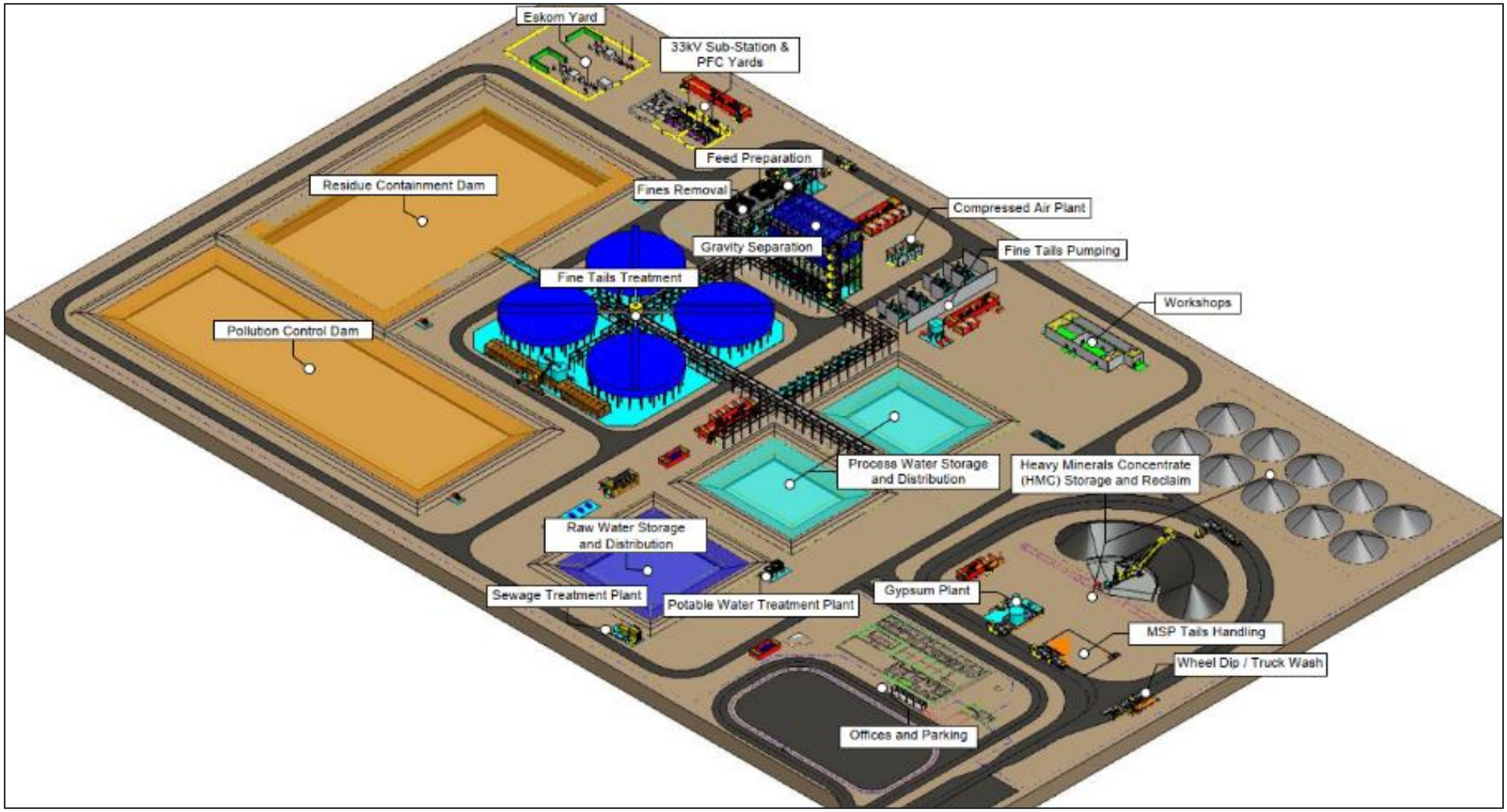


Figure 2-10 – The proposed Phase 2 PWP Layout

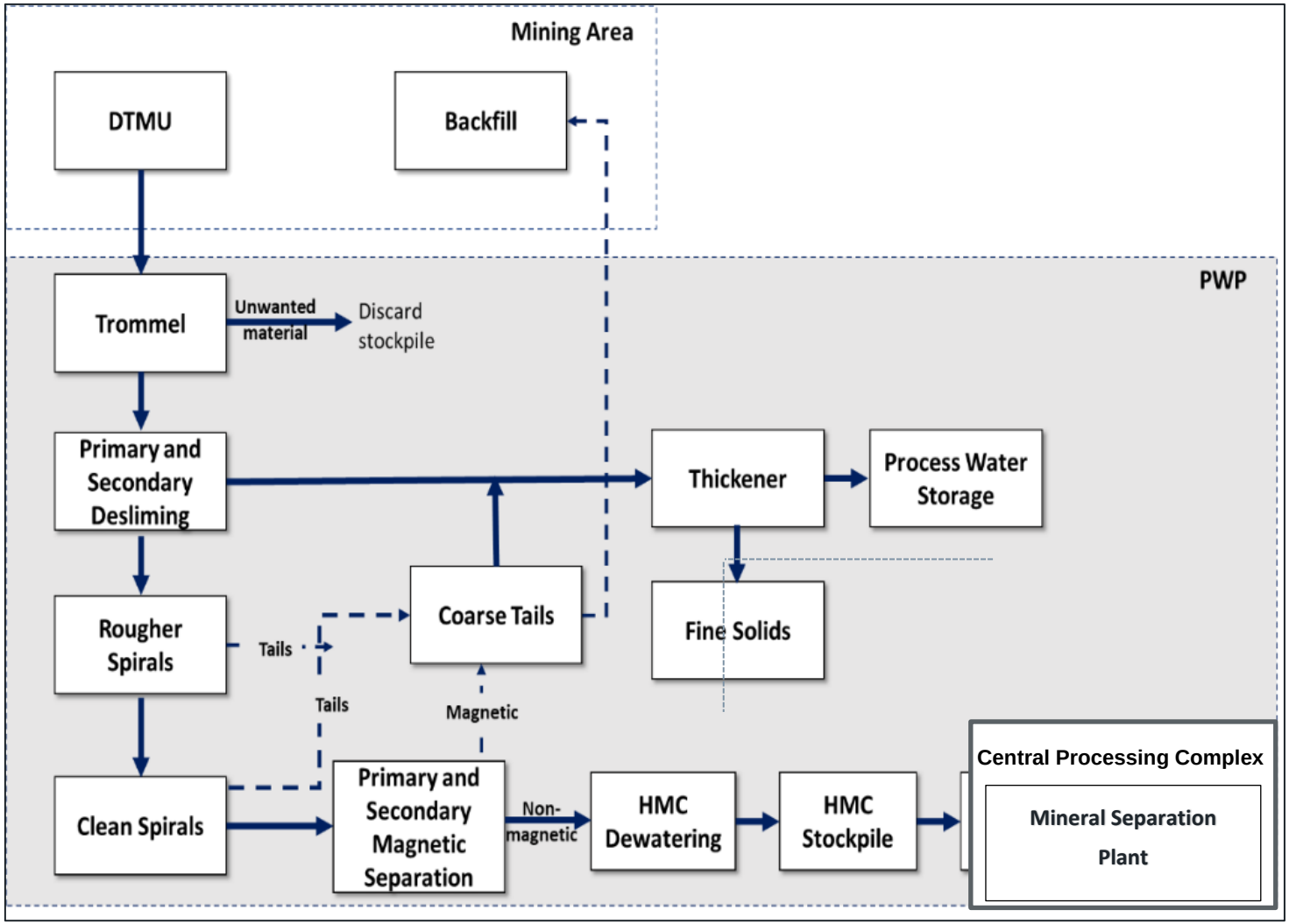


Figure 2-11 - Proposed Phase 2 Summary Process Block Diagram

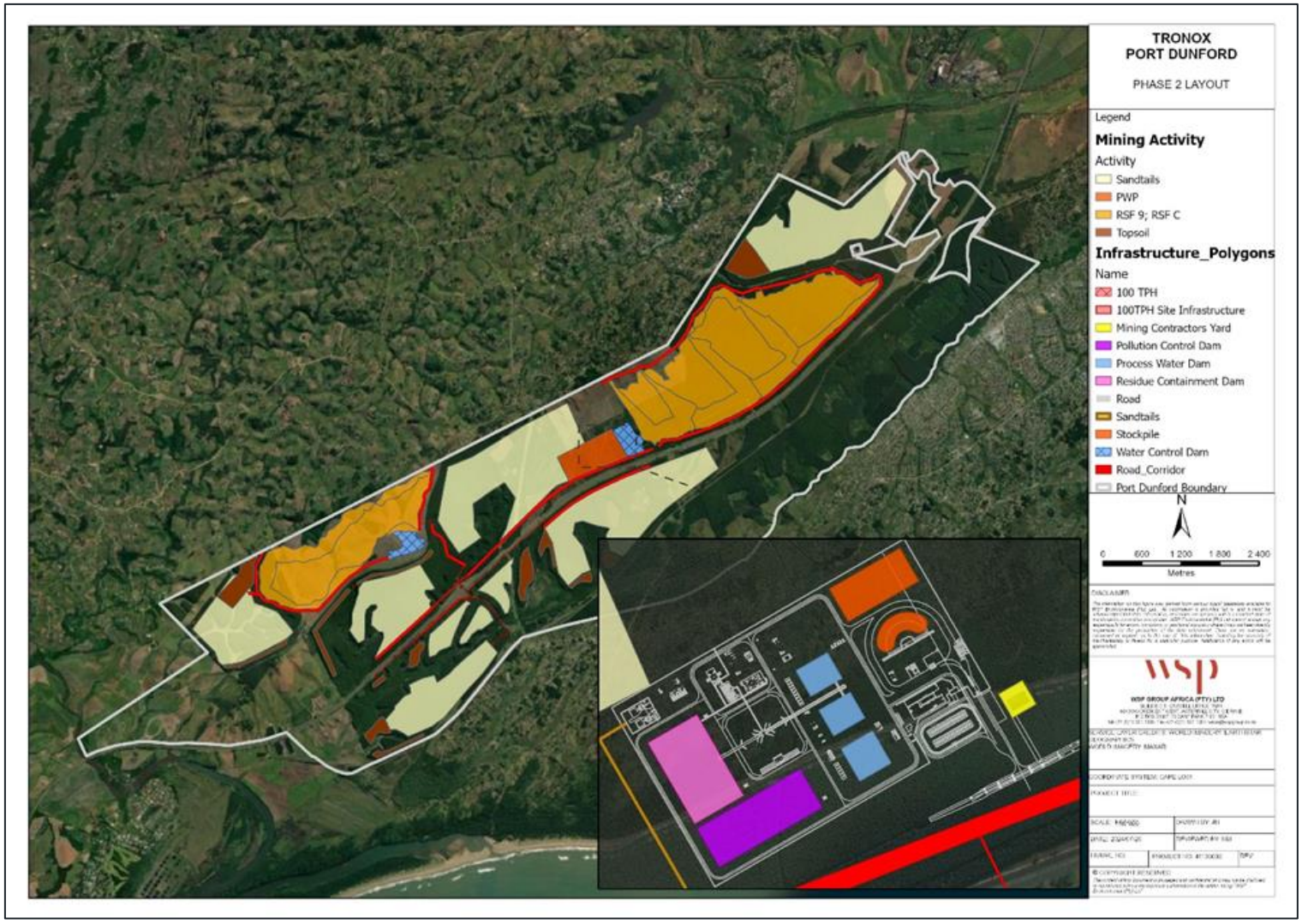


Figure 2-12 - PWP location and inset detail of the PWP site

2.4.3 SUPPORTING INFRASTRUCTURE

2.4.3.1 Water Supply

Raw water will be supplied to Port Durnford from the existing uMhlatuze bulk water supply station directly to the PWP raw water dam via a take-off from the main pipeline currently supplying water to Fairbreeze.

2.4.3.2 Power Supply

The power supply to the site will be from the adjacent Eskom grid via two 88 kV incoming overhead lines to the Port Durnford 33 kV substation passing through two 88/32 kV stepdown transformers. From the substation, power will be distributed to points within the site where it is needed via local powerlines.

2.4.3.3 Internal Haul Roads

Twenty-four kilometres (24 km) of haulage routes have been conceptually designed within the Mining Boundary. These haulage routes have been given a 40 m wide road servitude. They cater for haulage within the mining areas and pipeline service infrastructure. Where possible, existing haulage routes will be used and upgraded to accommodate the larger road servitudes. Where the haulage routes cross water courses, crossing structures will be designed and built across the water course. The planned haulage routes are illustrated in Figure 2-6.

2.4.3.4 New Road Infrastructure

The proposal is for a new access point to the proposed mine from the regional road R537 between the R102 and Port Durnford village, immediately to the north of the N2 underpass. An access point onto the N2 is planned off the R537, independent of the proposed mining project to grant improved access to the Port Durnford village and associated communities.

2.4.4 EMPLOYMENT OPPORTUNITIES

The Phase 2 mining operation at Port Durnford will be of similar scale to the current Fairbreeze operation (with 322 employees) and largely act as a replacement reserve as production tails off at Fairbreeze. Consequently, there will be few new job opportunities created; however, the Port Durnford operation provides opportunity for transition of the Fairbreeze workforce to the new operation.

2.4.5 WASTE STREAMS AND DISPOSAL

Two “waste streams” are produced from the proposed mining operation namely a **coarse sand tails** (>0.49 µm) that represents the bulk of the washed sand, which is returned to mined out areas as backfill and a fine residue (<1, 49 µm), which will be disposed of in the RSFs.

In addition, two material streams are returned from the CPC (Empangeni). These are an MSP course tailings and gypsum filter cake that are received from the MSP for disposal with the various tails products at the PWP at Port Durnford, as follows:

1. MSP coarse tails comprise of coarse tailings material entrained together with the mineral concentrate and sent to the MSP. This material is separated from the mineral concentrate during further beneficiation of concentrate at the MSP and returned to the mine site. The MSP course tailings are received by tip truck from the MSP in Empangeni. These are tipped directly into a slurry hopper where it is slurried before pumping directly into the rougher sand tails tank for disposal with

the sand tails at the PWP at Port Durnford. It is expected that total MSP tails received for disposal will be between 260 and 330 kt/ annum. Approximately 678 Mt of sand tails will be deposited during the planned LOM. Large sand tail stockpiles will be utilised for sand tails disposal from 2036 within the Port Durnford mining boundary, and

2. Gypsum filter cake from the MSP in Empangeni is received via truck at the PWP. The gypsum cake is fed into a materials handling hopper for re-slurring before being fed to the thickener underflow tank for disposal together with the fines to the RSF. It is estimated that between 4,800 and 9,600 t/annum of gypsum will be disposed of into the RSF feed stream each year.

2.4.5.1 Coarse Sand Tails Disposal

Material Balance

It is anticipated that the Port Durnford mining operation will have a sand tails material balance of approximately 678 Mt over the full LOM; thus between 15.6-18.5 million tons of sand per annum requiring handling and management. All 678 Mt of coarse sand tails over a planned 34-year mining period has been accounted for in the current mine plan.

Approximately 63Mt of coarse sand tailings will be used for RSF dam wall construction and the remaining 615.2 Mt will be used for pit backfill, for RSF capping or will be permanently deposited onto sand dumps.

Motivated by the presence of sensitive wetland and vegetation, the original sand tails location south of the N2 has been excluded from the mining plan. Tronox assessed different sand tails disposal alternatives and propose the following sand tails disposal for the Port Durnford mining operation:

- For the first 9 years of mining in Phase 2 (2036-2047), while opening and mining the pit area for the first compartment of RSF Site C, coarse sand tails (18.5 Mt) will be used in containment wall construction at RSF 9. 103Mt of sand tails will be deposited outside of the mining pit footprint at sand dump sites A1, A2, and A3 (south of the N2).
- Between 2041-2045, 40.4Mt will be used in RSF C compartment 1 and 2 wall construction;
- For 3 years (2043-2046) Backfill Area 8 will be used for the deposition of 34.5 Mt of sand tails with a further 3.3 Mt for the capping of RSF C P1 cell;
- In years 2047-2051, approximately 61.2 Mt of sand tails will be temporary stockpiled;
- For 3 years between 2048 and 2051, 220.9 Mt of sand tails will be backfilled in RSF C, P4. In 2051, 11 Mt of sand will be used to backfill or cap RSF site 9;
- The following 7 years (2052-2059) 103 Mt of sand will be used to backfill area 4. In this period, 4.3 Mt of sand will be backfilled into RSF C P4 and 6.9 Mt of sand will be used to cap RSF C, P1 (2055-56);
- For the last seven years of mining (2058-64), 104.3 Mt will be used in backfill area 5. In this time 8 Mt will be used in backfill area 3 and 8.5 Mt will be used to cap RSF P3.

Table 2-2 presents the proposed sand tails deposition schedule over the LOM. In this schedule the identified sand deposition areas have been called sand backfil" areas. These are not necessarily pit backfill areas but rather sites for permanent sand placement which will remain in the post mining landscape.

Table 2-2 - Sand Tails Deposition Schedule (Tronox , 2024)

SAND TAILS	CAPACITY (MT)	2036-2038	2039-2047	2045-2046	2047-2055	2054-2064	Post 2064
Backfill A1, A2, A3	106			-	-	-	
RSF Site 9	19			-	-	-	
RSF Site C (Phase 1)	19						
RSF Site C (Phase 2)	22						
RSF Site C (P1 Capping)	3						
Backfill 8	35						
Temporary Stockpile	61						
RSF Site C (Phase 3)	21						
Backfill RSF 9 (Capping)	12						
RSF Site C (P2 Capping)							
RSF Site C (Phase 4)	4						
Backfill 4	66						
RSF Site C (Phase 4)	4						
RSF Site C (P3 Capping)	8						
Backfill 5	89						
Backfill 3 (2064-67)	198	-		-	-	-	

The sand tails material will be transported to the sand tails stockpiles through feed pipelines that will run alongside roads on site. Cyclones will help deposit the sand tails on the top of each stockpile area, and a return water pipeline will recycle the water back to the primary wet plant. The existing road infrastructure will be utilised for the pipeline routing as far as possible. A soil berm will surround each sand tail dump to contain the sand tails and storm water runoff to ensure clean surface water does not flow into the pits or sand tail dumps.

The following information will apply to the sand tails deposition strategy, as taken into the EIA:

- The sand tails stockpiles have been designed with a 1:3 to 1:5 vertical height. Each stockpile will have a 100 m buffer from the stockpile to the nearest public infrastructure (roads, railways and residential areas) and a 32 m buffer to the nearest environmentally sensitive area. The sand tail dump stockpiles adjacent to the wetlands or sensitive areas will have a 1:7 to 1:5 (maximum) slope.
- Sand tailings stockpiles will vary in height, as indicated in Table 2-3 in which the design height of the surface of each sand dumped or RSF is provided in metres above the lowest point of the corresponding footprint and secondly, the height over the average footprint elevation. From this information, it is evident that RSF 9, for example, will on average be 23 m high, while sand tails dump A-1 will have an average height of approximately 44 m;

- Capping the RSF facilities with coarse sand will be subject to RSF stability and surface bearing capacity, which will be determined during detailed design and subsequent operational monitoring. The current scheduling assumption is a 4-meter sand cap;
- The mined-out pit volumes are included in the available airspace calculation for backfill areas 3, 4, and 5. In these areas, sand deposition will also occur above the original ground surface within the identified areas indicated below; and
- Utilising co-disposal of fines and coarse sand mix will be explored with this operation. There are reports of positive results with in-pit mixing with the aid of re-flocculation in deposition piping. This could result in better consolidation and water recovery, resulting in higher densities of the deposited residue and overall space saving.

Table 2-3 – Planned final heights of RSF and Sand dumps

RSF or Sand Dump	Height from lowest point	Height from mean NGL
RSF 9	48.4	23.4
RSF C	49.7	12.6
Sandtails A-1	57.6	43.9
Sandtails A-2	39.2	27.4
Sandtails A-3	34.2	23.4
Sandtails 3	61.1	28.3
Sandtails 4	67	28.9
Sandtails 5	70	24.9
Sandtails 8B	50.1	28.4

A total of 926.3 ha has been identified for coarse sand tails disposal within the Port Durnford Boundary, 136 ha within pit disposal, and 790.3 ha outside the mined-out areas as indicated on the Phase 2 layout (Figure 2-6).

2.4.5.2 Topsoil and Subsoil Management

For all areas that will be used for mining and mine infrastructure at Port Durnford, 30 cm of topsoil within the project footprint will be removed and kept aside for rehabilitation with the intent of returning 30 cm of topsoil to the re-profiled landform after backfilling of mined-out areas. This standard practice applies to the RSF Site 9, the mining footprint, sand tails dump areas and the PWP plant site. Wherever possible within the mining areas, topsoil will be stripped and placed directly on areas available for rehabilitation. When space has been depleted in the designated 44 ha of topsoil stockpile areas, topsoil or subsoil will be stockpiled and used as stormwater runoff berms around the sand tail deposition areas. The location of topsoil stockpile sites within the Port Durnford mining right boundary, as indicated in Figure 2-6.

1.5m of subsoil will be stripped and stockpiled at the sites that will not be mined, such as RSF 9 and the sand tails dump sites. This subsoil will be stockpiled and used for rehabilitation. Reconstituted soil (67% coarse sands and 33% fines) will be used as a subsoil later before topsoil placement in the areas that will be mined. The topsoil stockpiles will be afforded a 32 m buffer from the edge of the nearest wetland or delineated sensitive environmental area. Each topsoil stockpile area will be cleared of large trees or tree stumps the placement of soil. The height of stockpiles will not exceed 3m wherever possible, and stockpiles will be protected from stormwater erosion by use of soil diversion berms that will divert stormwater run-off around the stockpile. No road development over the surface of the topsoil stockpiles will be permitted to avoid unintended compaction of the valuable topsoil resource.

The topsoil and subsoil stockpiles will be grassed with a mix of indigenous grass seed, containing *Eragrostis tef* (Teff), *Eragrostis curvula* (Weeping lovegrass), *Cynodon dactylon* (Bermuda grass), *Cenchrus ciliaris* (Bloubuffels grass), *Panicum maximum* (Guinea grass), *Chloris gayana* (Rhodes grass), *Digitaria eriantha* (Smuts finger grass) and *Paspalum notatum* (Bahia grass). A vegetation canopy cover of 30-50% will be achieved on the topsoil stockpiles.

2.4.5.3 Fine residue deposition

Fine residue will need to be managed throughout the LOM, with last mining scheduled to take place in 2069. RSF capping and shaping of the sand tails dump sites with the remaining sand tails, will take place after 2069.

The RSF facilities will be constructed in a phased approach. The RSF dam walls will be constructed with coarse sand tails from the mining operation and compacted. The dam walls will be erected to the designed heights to create a “holding shell” for the incoming fine residue. Each RSF facility has a determined lifespan dictated by the design height and storage capacity. Once the RSF facility has reached its design capacity (design capacity in terms of storage volume and height) the facilities will be capped with coarse sand tailings and vegetated.

The RSF infill has been determined to be a Type 4 waste based on the waste classification concluded. Type 4 wastes do not require lining.

RSF Site 9 will have a Water Control Dam (WCD) to receive water from the RSF dams and intercepted stormwater falling within the managed RSF area. Excess water will be recovered from the surface of the RSF and under drainage system and returned for reuse in mining. The RSF dams will use a barge/turret system for excess water removal. The RSF sites will have herringbone, toe, and blanket drainage systems to assist in dewatering the fine tailings to aid stability and manage seepage and control the phreatic surface within RSF.

Stormwater control berms and trenches will be used to manage external water, with toe paddocks to contain material that washes from the RSF outer slopes while vegetation establishes. Each lift of the dam will be vegetated as soon as practically possible, after the lift has been completed and topsoil has been placed. This ensures the visual impact of the facilities is minimised to the extent possible and that a stable vegetation cover has developed on the RSF side slopes.

The fine residues disposal concept study and supporting concept designs have been updated (Epoch 2023). The typical drainage and design detail have been provided in Figure 2-13, below and RSF specific general arrangements provided in the subsections which follow. Note, these conceptual designs may be updated in the feasibility stage before Phase 2 commencement.

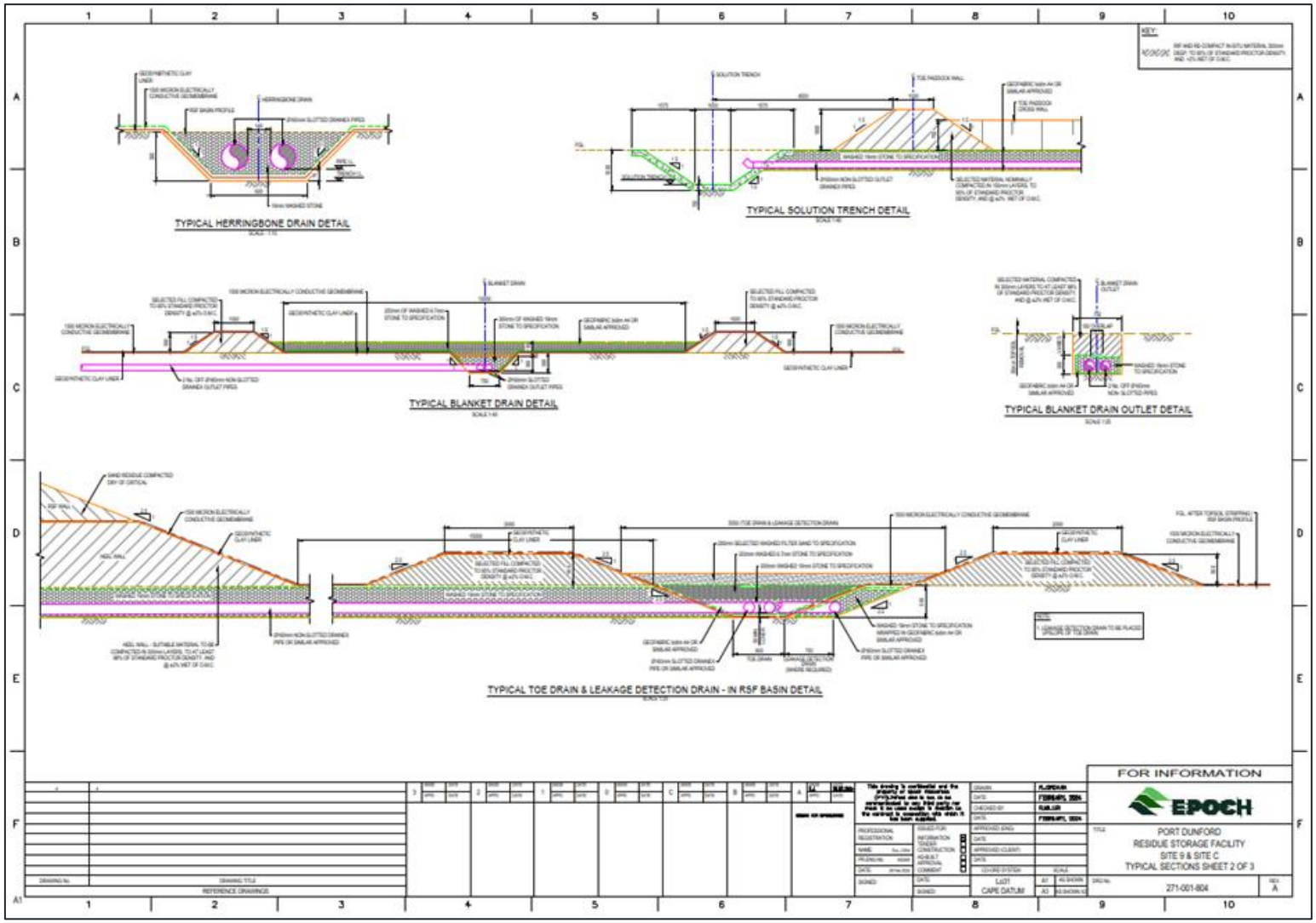


Figure 2-13 - Typical RSF Drainage Design Sections

RSF Site 9

RSF Site 9 will be built with the sand tailings material from the Phase 2 mining activity. After 11 years of Phase 1 mining, Phase 2 mining will start adjacent to the then-constructed PWP plant in 2037. The sand tails that are produced in the first block of Phase 2 mining will be used to construct the dam walls of RSF Site 9. RSF Site 9 will be situated in the southwestern side of the proposed mining footprint, on Portion 1/13602 and the remaining portion of 13602 of Lot 132. This property is leased by Mondi and owned by the iNkosi Phalane Community Trust. This RSF facility will be used for the first 6 years of mining in Phase 2. RSF Site 9 will be 268 ha in size and have a final height of approximately 23.4 m above mean footprint elevation, with the height from the lowest point of the footprint being close to 50 m. The facility will be designed to store up to 26.9 Mt of fines residue and 18.2 Mt of sands residue. The terminal rate of rise for Site 9 is 3.3 m/yr, meaning that the RSF facility, according to the preliminary design, will increase in height by up to 3.3 m per year.

Supporting Infrastructure

The Water Control Dam (WCD) for RSF Site 9 was relocated to the south-eastern side of the RSF to minimise impact on redesigned to avoid environmentally sensitive areas. This dam will be approximately 19 ha in extent and have an 870 000 m^3 storage capacity. A barge/ turret system will be used to transport water from the RSF to the WCD.

RSF Closure

It is anticipated that RSF Site 9 will be operational for 6 years and reach full capacity in 2042. Thereafter, capping of the RSF surface with coarse sand tailings will commence in 2046 if the surface of the RSF has dried out and stabilised sufficiently by that stage. Once backfilled, the site will be topsoiled in 2048. Outer slopes of the RSF will be topsoiled and vegetated as areas become available to stabilise the side slopes against erosion. The RSF will be returned to the landowner after confirmation that the chosen vegetation cover, has stabilised.

A conceptual design has been provided in Figure 2-14 below.

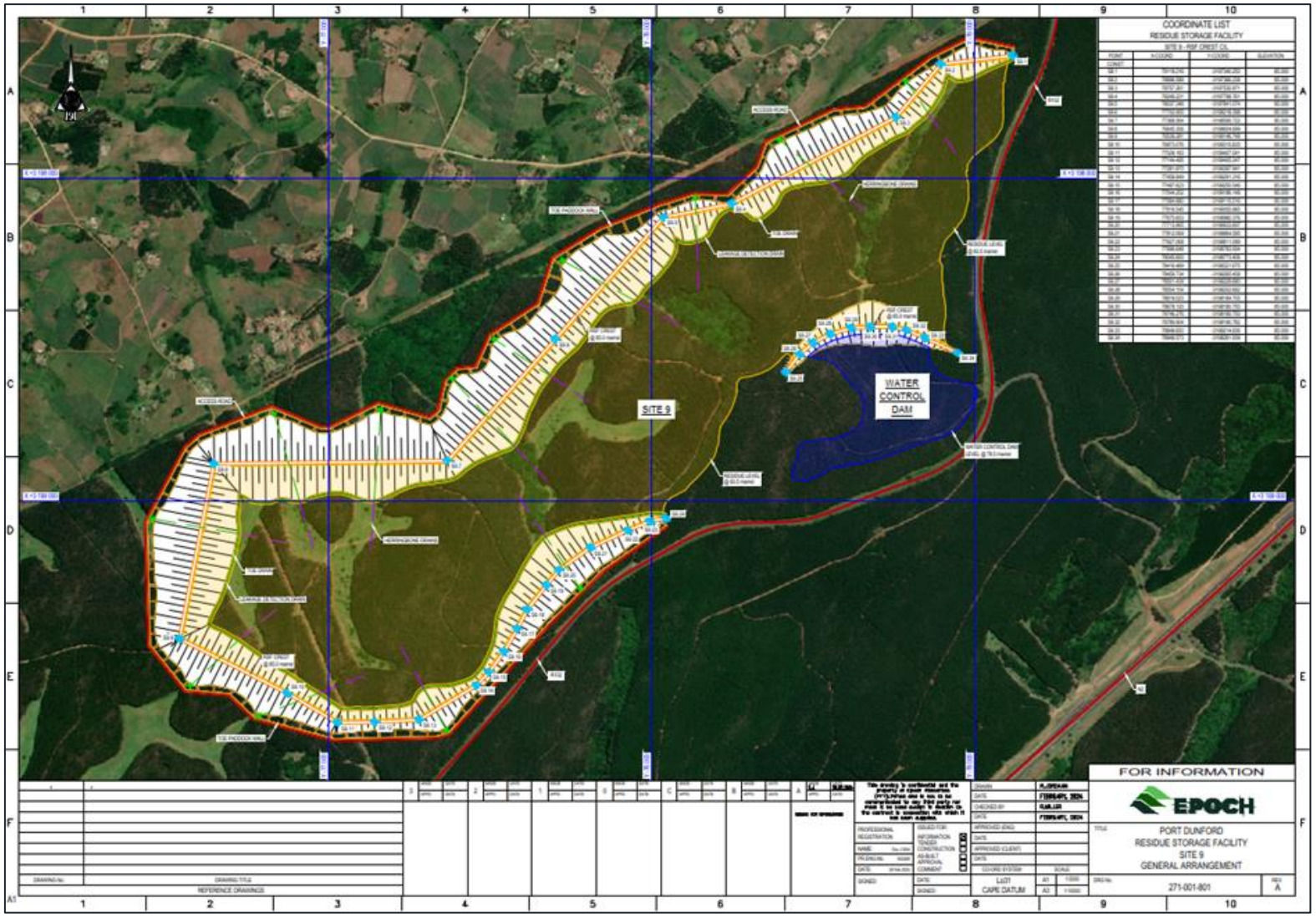


Figure 2-14 - RSF Site 9 General Arrangement Design indicating Impoundment walls and inundation area

RSF Site C

RSF Site C will be utilised during the Phase 2 mining activity. It will be located immediately east of the PWP plant. It will be built in four (4) sequential phases (P1- P4), utilising contiguous mined-out pit areas for fines storage capacity. The pit floor in this area dips from the north to the south. Consequently, the fines basin will deepen towards the south, which will ultimately be raised above current ground level using coarse sand containment walls. The phased development of RSF Site C is as follows:

- RSF C-P1 is expected to operate for 2.9 years and contain 12.7 Mt of fines and 19 Mt of sand tails. Phase 1 will be approximately 78 ha in size. This facility will be built at a Rate of Rise (RoR) of 9.8 m/yr;
- RSF C P2 is expected to operate for 8.1 years and contain 35.2 Mt of fines and 22 Mt of sand tails. Phase 2 will be approximately 121 ha in size. This facility will be built at a RoR of 5.1 m/yr;
- RSF C-P3 is expected to operate for 8.1 years and contain 40.2 Mt of fines and 21 Mt of sand tails. Phase 2 will be approximately 147ha in size. This facility will be built at a RoR of 5 m/yr; and
- RSF C-P4 is expected to operate for 8.3 years and contain 39.1 Mt of fines and 4 Mt of sand tails. Phase 2 will be approximately 162ha in size. This facility will be built at a RoR of 3.5 m/yr.

RSF Site C will be designed to store up to 127.3 Mt of Fines residue and 64.5 Mt of sands residue. The total footprint area of RSF Site C is expected to be 670 ha and the facility will have a final height of approximately 13 m above the average natural ground level, with a height of approximately 50 m from the lowest natural ground level within the footprint.

Supporting Infrastructure

A 13.75 ha, 540 000 m^3 Return Water Dam has been planned for RSF Site C. The dam will be located between RSF Site C P1 compartment and the PWP plant. The dam will be 500 m long, 275 m wide and will be 9 m high at its highest point (Figure 2-15).

RSF Closure

It is anticipated that RSF Site C will be operational for 27.5 years and reach full capacity in 2064. Thereafter, the site will be backfilled in 2069, affording the facility 4 years to dry out sufficiently for sand capping. Once the sand cap has been placed, it will be topsoiled and returned to the Landowner (lessee) thereafter.

Shortfall in fine residue disposal capacity

The combined capacity of RSF 9 and RSF C is taken up by 2064, which is five years before the end of mining. The deposition rate during the years leading up to this point in time (RSF C average monthly deposition rate) is 384,796 tonnes per month or 4.618 million tonnes per annum. This equates to an onsite fine residue disposal shortfall in the order of 23 million tonnes over the last five years of operation. This point is only reached in 2064, in 29 years. Tronox will need to find a solution to fine residue disposal during this time to prevent the mine life being curtailed.

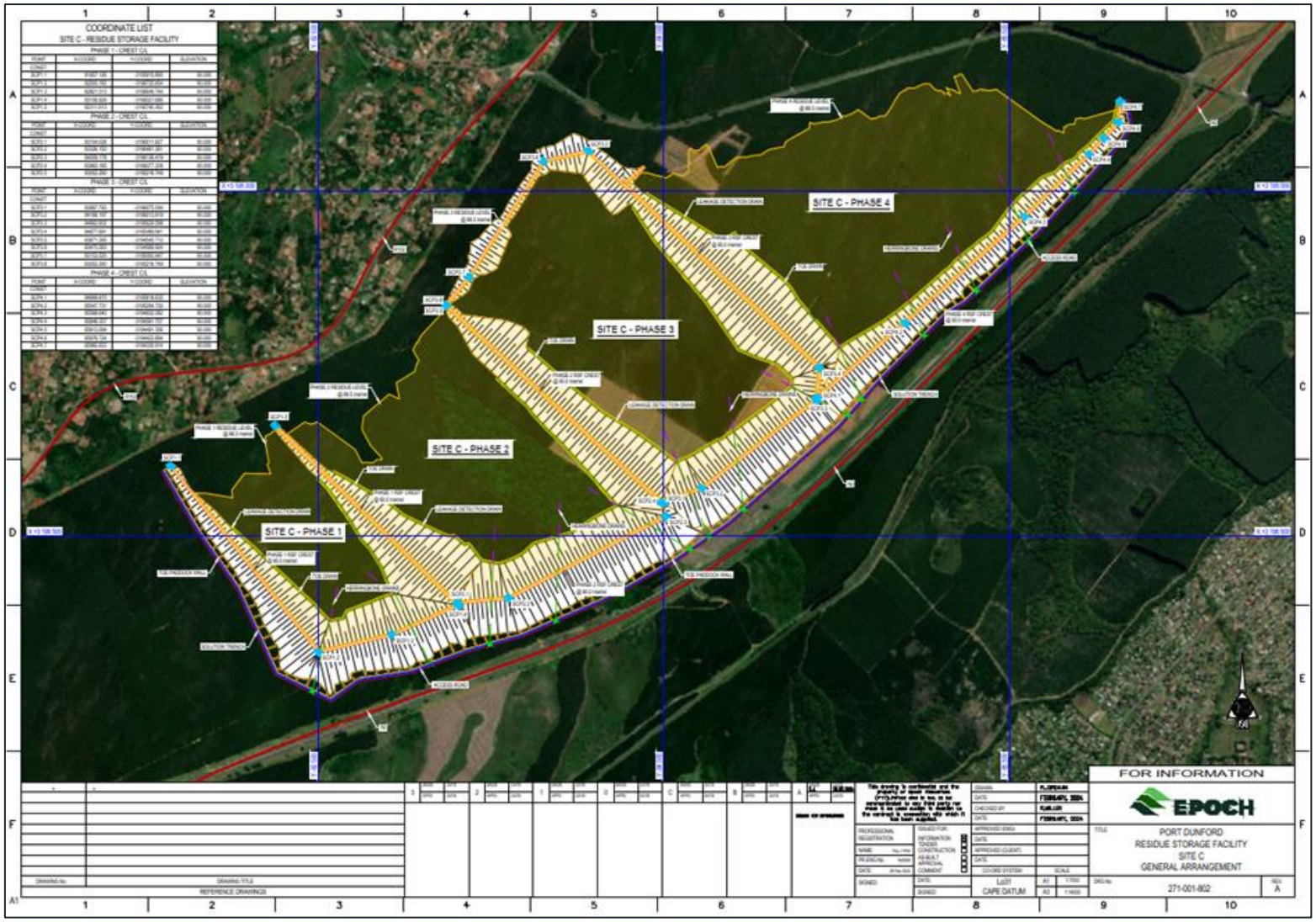


Figure 2-15 - RSF Site C General Arrangement Design indicating impoundment walls and inundation area

2.5 PROJECT ACTIVITIES PER PHASE

The following activities are anticipated for each phase of the proposed development. These activities will only commence after a Mining Right has been secured, as is typical for developments of this nature given the significant capital investment in advancing from prefeasibility to feasibility level investigation and design.

2.5.1 PLANNING PHASE

Tronox will conclude a detailed feasibility study should a mining right be secured. During this phase the feasibility of the operation, taking account of the recommendations of the EIA, will be reconfirmed. Similarly, detailed design of infrastructure and residue disposal facilities will take place, informed by high-resolution site survey (to design elevation accuracy) and detailed site geotechnical investigation to confirm founding conditions for major infrastructure and the RSF sites.

During this period, land access agreements will also need to be concluded, and all required permits and authorisations associated with the commencement of construction will need to be secured. In the case of the current operation, this will include finalisation of commercial agreements between Tronox and the landowner and between Tronox and the lessee. In relation to the lessee, it will be necessary to agree the timing of when site access is required and importantly, where standing timber should be left intact to meet the requirements of mine site screening and buffer areas.

Pre construction Phase

This phase includes the aspects required to action prior to the start of construction, including Species of Conservation Concern (SCC) search, and implementation of no-go fences on site,

2.5.2 CONSTRUCTION PHASE:

To give effect to site development and construction the following broad activities are anticipated:

- Development and improvement of access roads and on-site roads necessary for primary infrastructure development and access to initial mining areas where support infrastructure requires development (power, piping, pumping capacity, clean and dirty water management et cetera);
- Blocking off and physical demarcation of areas where roads will be developed, construction sites and associated laydown areas;
- Bringing external support infrastructure connections to site (power, roads, bulk water et cetera);
- Accessing areas previously afforested and relinquished by the lessee and/or landowner. The destumping of such areas in advance of topsoil stripping and commencement of bulk earthworks;
- Site establishment for the purpose of infrastructure construction. No Contractors or site staff will be resident on site;
- Commencement of topsoil stripping and bulk earthworks for primary infrastructure areas and RSF footprints (each to be developed immediately prior to required use as these are scheduled sequentially across the life of mine), and
- Commencement of construction of road infrastructure, mining support infrastructure and the primary wet plant and associated infrastructure.

2.5.3 OPERATIONAL PHASE:

- Mining to commence. One DTMU mines a 200 m by 100 m block at a time. Progressive backfilling and rehabilitation will then take place. It is anticipated that 4 years post the commencement of mining in a block, the mined area will be subject to rehabilitation.

- RSF and sand dump areas will follow a similar pattern; however the timing associated with return to RSF sites will be dictated by the drying time of the fine residue contained within each facility prior to capping of that facility with coarse sand. Similarly, the timescale in relation to sand dumps will be determined by the operational life of each sand dump, which varies based on contained volumes;
- Ongoing mining and ROM processing with ongoing coarse and fine residue disposal and heavy mineral concentrate leaving the site to the Empangeni CPC;
- Ongoing rehabilitation and release of rehabilitated land to the landowner within the agreed framework;
- Ongoing site and environmental management, monitoring and planning for site closure in keeping with legal requirements and conditions of permits licences and authorisations.

2.5.4 DECOMMISSIONING PHASE:

During the decommissioning phase the following activities are anticipated for infrastructure and rehabilitated mining areas and residue facilities remaining at the point that mining ceases;

- Processing infrastructure to be demolished and materials to be removed and disposed of in keeping with the related requirements of the detailed mine closure and rehabilitation plan, which would have been developed by that stage;
- Termination of all services to the area not essential for the maintenance of site during the decommissioning phase;
- Rehabilitation of all mining and non-essential infrastructure areas to be completed in keeping with the commitments of the detailed mine rehabilitation enclosure plan;
- Rehabilitation of remaining mine residue disposal facilities, capping of final cells of the RSF and reshaping of final topography, topsoiling and vegetation;
- Ongoing monitoring of post-closure impacts and success of rehabilitation as required in terms of the closure plan; and
- Monitoring programs to continue post-closure, where applicable.

2.5.5 REHABILITATION

Tronox plans to rehabilitate respective areas as per their standard protocol. Once an area has been mined, backfilled (or stockpiled) and shaped the rehabilitation begin and it occurs concurrently within the operational timeframe even though it is listed here as a separate activity. Tronox ’s standard rehabilitation protocol involves adding a 300 mm layer of topsoil to the shaped area (RSF, backfilled mining pit or sand tails stockpile), then revegetating the area with indigenous species.

With the vision of returning the post-mining land use to original land use (commercial forestry) it has been recommended to place 1.5m of subsoil prior to topsoil placement throughout the site. The subsoil will either be stripped and stockpiled from the areas that ware not mined (RSF 9 and sand dump sites) or a reconstituted subsoil layer comprised of 67% coarse sand and 33% fines will be used in the mined-out area before topsoil application.

End Land Use and Topography

Once mining is complete and the mined-out areas rehabilitated, the land will be returned to the landowner. The stated end land use will be a return of areas currently under commercial forestry to plantation forestry, unless otherwise indicated. This includes areas that will be rehabilitated, backfilled pits, sand dump areas and capped rehabilitated RSF sites. The timing at which these areas become

available to be returned to the landowner does differ, given the nature of the underlying landform, and as indicated in Figure 2-16.

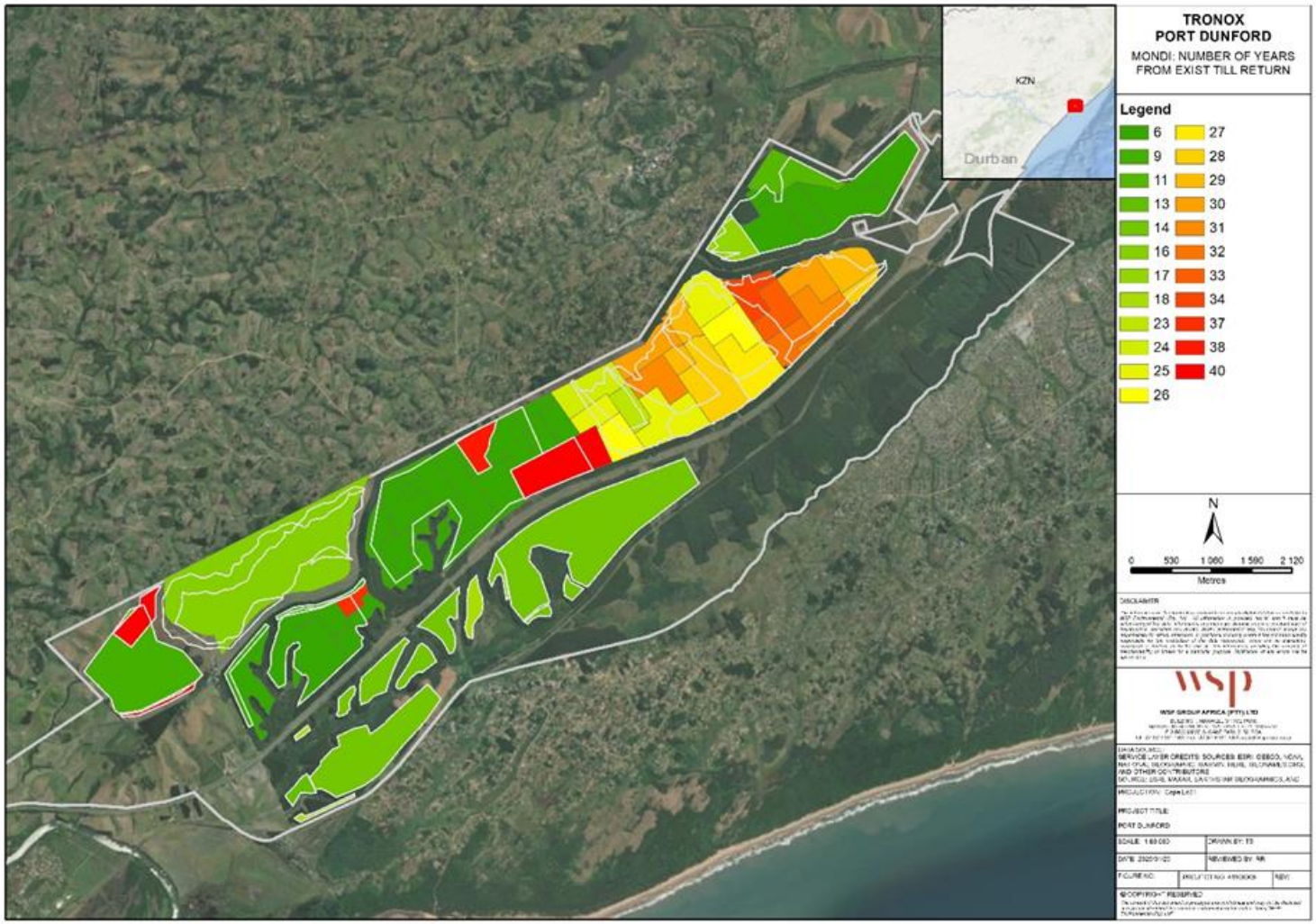


Figure 2-16 - Years from current land user out to return

The topography of the mined-out areas within the broader mining rights area is expected to change substantially. The RSF sites and sand tails deposition areas will leave permanent elevated features on the landscape.

The pre-mining and post-mining topographic surface is presented in Figure 2-17. The natural valleys and peaks are depicted by green and red, respectively. The elevated RSF dam walls and sand tails deposition areas become prominent features in the post-mining landscape. Consequently, the post-mining topography will be different from the current topography. The height of the permanent landforms associated with sand dumps and residue facilities, as indicated in Table 2-4 in relation to the lowest point on the footprint and the average elevation of the footprint.

Table 2-4 - Heights of Sand Dumps and RSF facilities

Item	Height from lowest point (m)	Height from mean NGL (m)
RSF 9	48.4	23.4
RSF C	49.7	12.6
Sandtails A-1	57.6	43.9
Sandtails A-2	39.2	27.4
Sandtails A-3	34.2	23.4
Sandtails 3	61.1	28.3
Sandtails 4	67	28.9
Sandtails 5	70	24.9
Sandtails 8B	50.1	28.4

It is possible that as deposition technology advances and improves, the stockpiling within the RSF areas may become more efficient, and the ultimate heights of the RSFs may not be as high as presently predicted. The height estimates are based on current deposition techniques and density data. This is a worst-case scenario”

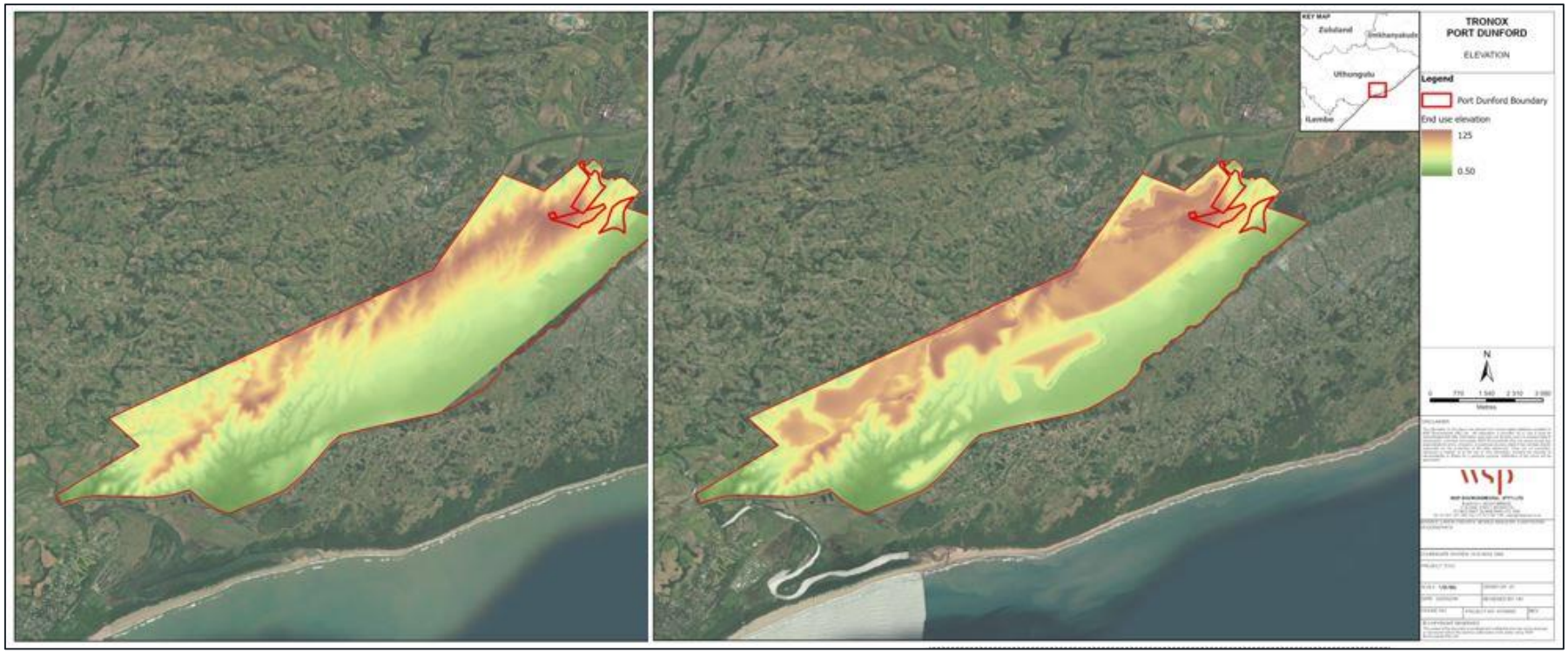


Figure 2-17 - Pre mining (LHS) and Post Mining (RHS) Topography

The planned end-use topography in the project footprint will differ from the current topography. Where there is a natural valley slope and depression in the proposed sand dump 8 area, for example, there will be a permanent sand dump standing 50m tall from the current valley bottom ground level. RSF 9 will be elevated to 49m above the current ground level. RSF C area will be 50m above the current ground level. The sand dump stockpiles in area 4, 5 and A1, A2 and A3 will also be elevated 67m, 70m, 57m, 39m, and 34m respectively, permanently above the current ground levels. The three small sand tail dump sites associated with A3, however, have been recommended to be removed from the mine plant to become part of a “no-go” biodiversity corridor area.

The following changes have been made to the proposed mine plan to accommodate for the environmental sensitivities and amended mine plan:

- The mining and sand dump areas proposed south of the N2 in the initial plan were reallocated within the MR boundary;
- The mining areas (MR boundary) have been reduced in size from 4733 ha to 4454 ha;
- The LOM has reduced from the initial 50-year mine plan to 45 years;
- The MR boundary was amended to exclude 3 areas in the northern corner of the MR boundary;
- Sand tails Area 8 in Pennarow on the western side of the mining footprint has been included as a stockpile area;
- The RSF footprints have increased and the location of their associated RWD have changed in response to environmental sensitive areas within the original footprint areas;
- Topsoil stockpile areas have been identified within the MR boundary; and
- An internal haulage road network has been conceptually designed within the active mining areas.

These aspects above are reflected in orange in Figure 2-18 below.

Additionally, in response to specialist findings, a “No-Go biodiversity corridor” has been identified for exclusion from the proposed plan. With very sensitive biodiversity (vegetation, habitat and species) located here, “unacceptable biodiversity loss” would occur should this area be impacted. This posed a fatal flaw in the proposed mine plan. In response to this, a new exclusion zone has been proposed following the impact assessment phase as an exclusion mitigation measure. This exclusion zone is presented in red in Figure 2-18 below. **Since the initial design 668 ha of sensitive areas have been excluded from the mine development footprint.**

The exclusion areas have been removed from the MR application. It is proposed that these are to be set aside for biodiversity conservation and potentially offset mitigation. The potential biodiversity offsetting requirements and management thereof are separate from this EMPr’s scope.

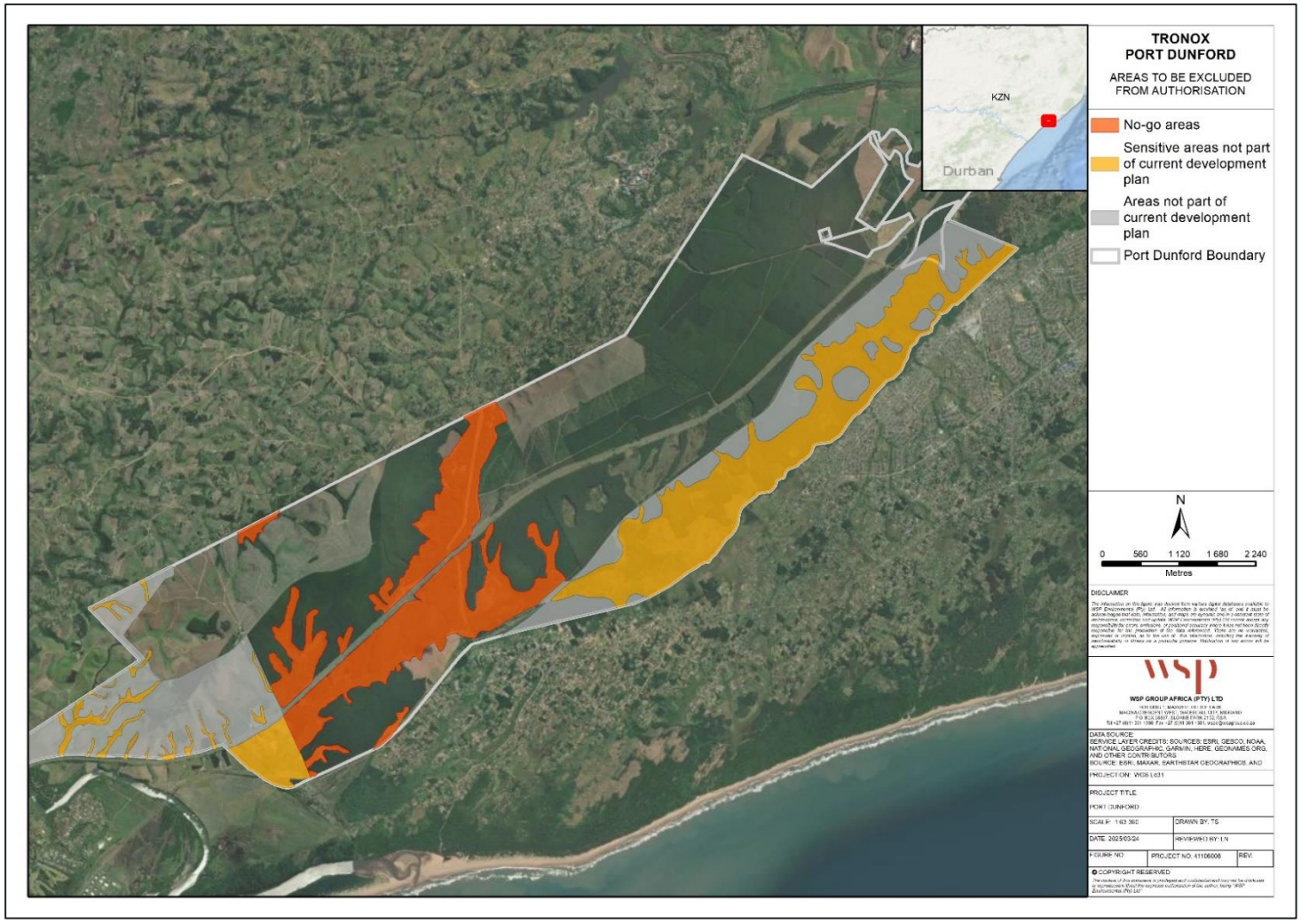


Figure 2-18 – Areas of exclusion from the mine plan

3 ENVIRONMENTAL SENSITIVITY

Specialist assessments were conducted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes, which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e., “the Protocols”), or Appendix 6 of the EIA Regulations, depending on which legislation apply to the assessment under consideration.

The proposed Port Durnford site was assessed by 23 independent specialists as part of the ESIA Process which have informed this EMPr. Preliminary environmental sensitivity maps have been compiled based on the sensitivities and buffers outlined in the specialist studies.

The maps provided below illustrate the respective sensitivities within the MRA pertaining to the wetlands (Figure 3-1), cultural heritage (Figure 3-2) and terrestrial ecological sensitivity (Figure 3-3).

3.1 WETLAND SENSITIVITY

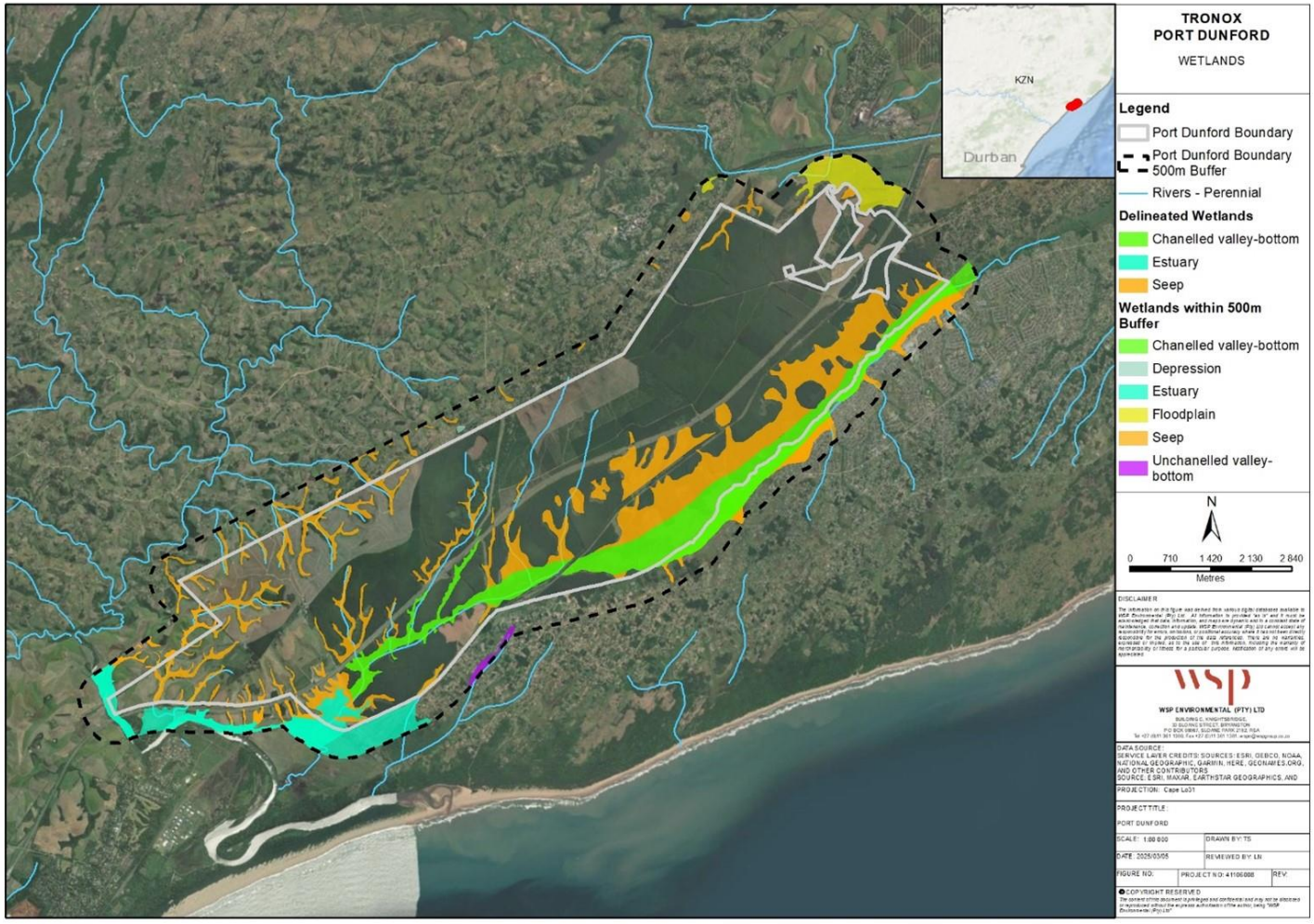


Figure 3-1 - Delineated wetland in relation to the proposed infrastructure

3.2 CULTURAL HERITAGE SENSITIVITY

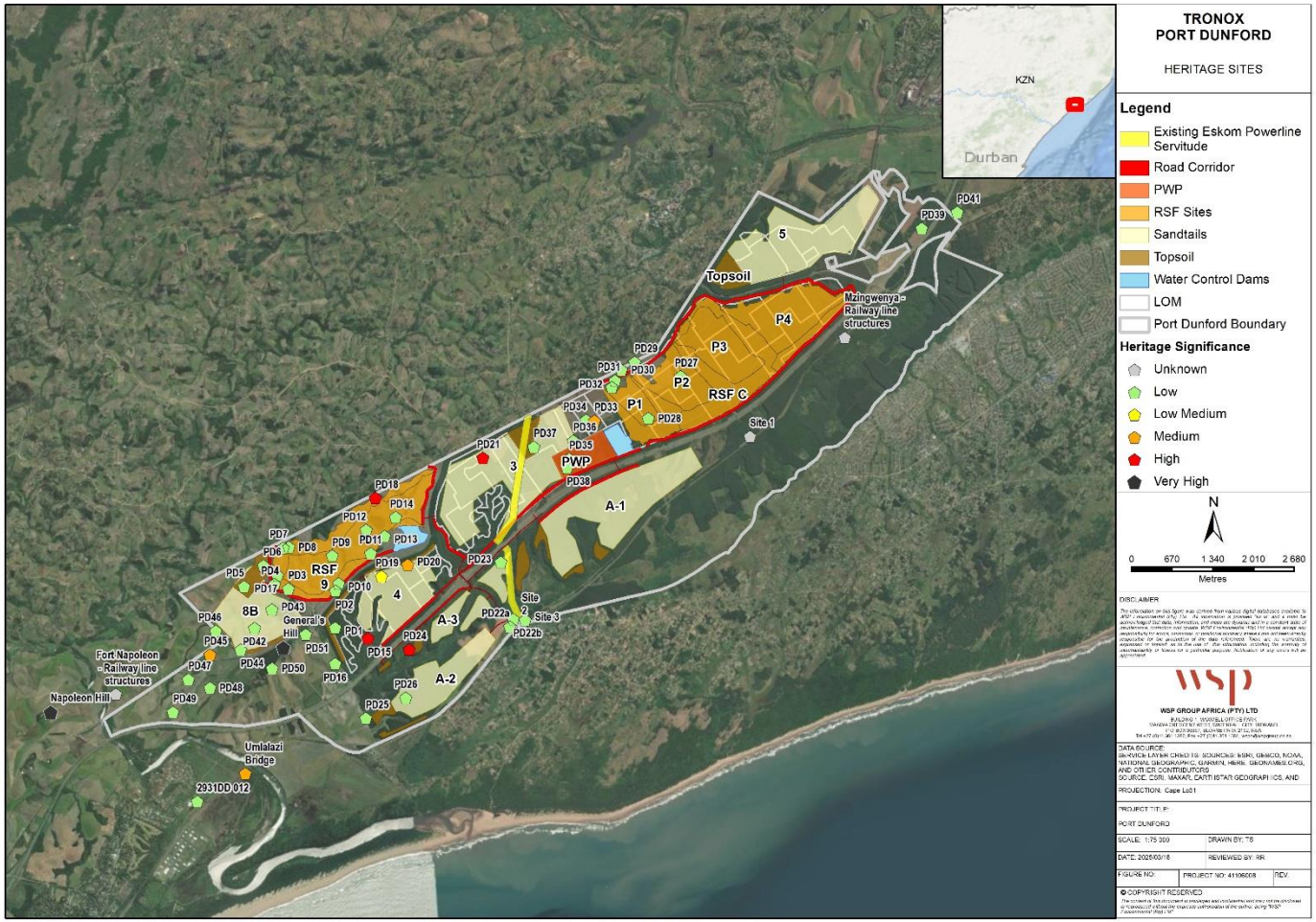


Figure 3-2 - Heritage resources identified in the study area

3.2.1 ECOLOGICAL SENSITIVITY (ANIMAL AND PLANT SPECIES)

In spite of mine plan amendments during the initial scoping phases and RSF 9 amendment design alignments to reduce the amount of natural and sensitive vegetation to be affected by RSF 9, there remains areas of Very High and High SEI biodiversity (both vegetation and terrestrial) within the current mine plan Eucalyptus plantations cover 70% of the MRA and 89% of the proposed development footprint. The remaining natural habitat comprises a combination of coastal forest, swamp forest, grasslands and wetlands.

There were sensitive areas within the proposed MRA that, if cleared for mining would be considered “unacceptable loss”, a fatal flaw, and as a result were excluded as a “No-Go area” from the proposed mining plan. With the excluded “no-go” area there remain 44ha of Very High and High SEI areas within the development footprint. For these areas that cannot be avoided, a biodiversity offset plan will need to be actioned and authorised. These areas of biodiversity loss are highlighted below, however, the management of the planned offsetting for these areas is not included in the EMPr, as this will be addressed separately in a Biodiversity Offset Concept Plan.

3.2.1.1 Areas of biodiversity Loss

Figure 3-3 illustrates how the areas of biodiversity loss have been grouped into three clusters, the Western Cluster, the Central Cluster and the Eastern Cluster of the mine footprint. Figure 3-4 illustrates the wetland habitat that will be lost in the current mine layout.

Western Cluster: This cluster consists of vegetation units 1 to 5, varying in sizes from 0.5 ha to 3.9 ha, and a total of 15.2 ha of Coastal Lowland Forest. Vegetation units 3, 4 and 5 are indicated as multiple polygons; however, the distinction is only made to indicate the portion of the polygon that intersects with CBA areas and to depict two distinct areas.

The infrastructure associated with the cluster is RSF 9. One part of portion 3 is considered CBA Irreplaceable (2.2ha), while the entire portion 3 consists of Southern Mesic Coastal Lowland Forest, which is designated as Critically Endangered (CR) by the provincial listing. Both sections of portion 5 are considered Maputaland Moist Coastal Forest and are considered Endangered (EN) by provincial listing (4.5 ha).

Central Cluster. This cluster has been excluded from the mine plan as a “No-Go” area. It consists of portions 7 to 12 with varying in size from 0.4ha to 14.0ha, and a total of 58.1ha of Coastal Lowland Forest. The infrastructure that was associated with the cluster included LOM, Sand tails and Topsoil stockpiles.

A total of four portions (9, 10, 11, 12) are considered CBA Irreplaceable (16ha), while the portions 7, 8, 9 and 10 consists of Maputaland Lowland Coastal Forest (total of 49ha), which is designated as EN by the provincial listing.

According to the Indigenous Forest Patches spatial data (DWAF), Portions 8, 9 and 10 coincide with Indigenous Forest Patches. These are designated as VI1: KZN Coastal Forests and described as Zonal and Intrazonal Forests.

Eastern Cluster. This cluster consists of vegetation units 13 (1ha) and 14 (27ha) for a total of 28ha of Coastal Lowland Forest. The infrastructure associated with the cluster includes LOM and RSF C.

None of these portions are considered CBA while the portion 13 consists of EN Maputaland Lowland Coastal Forest entirely.

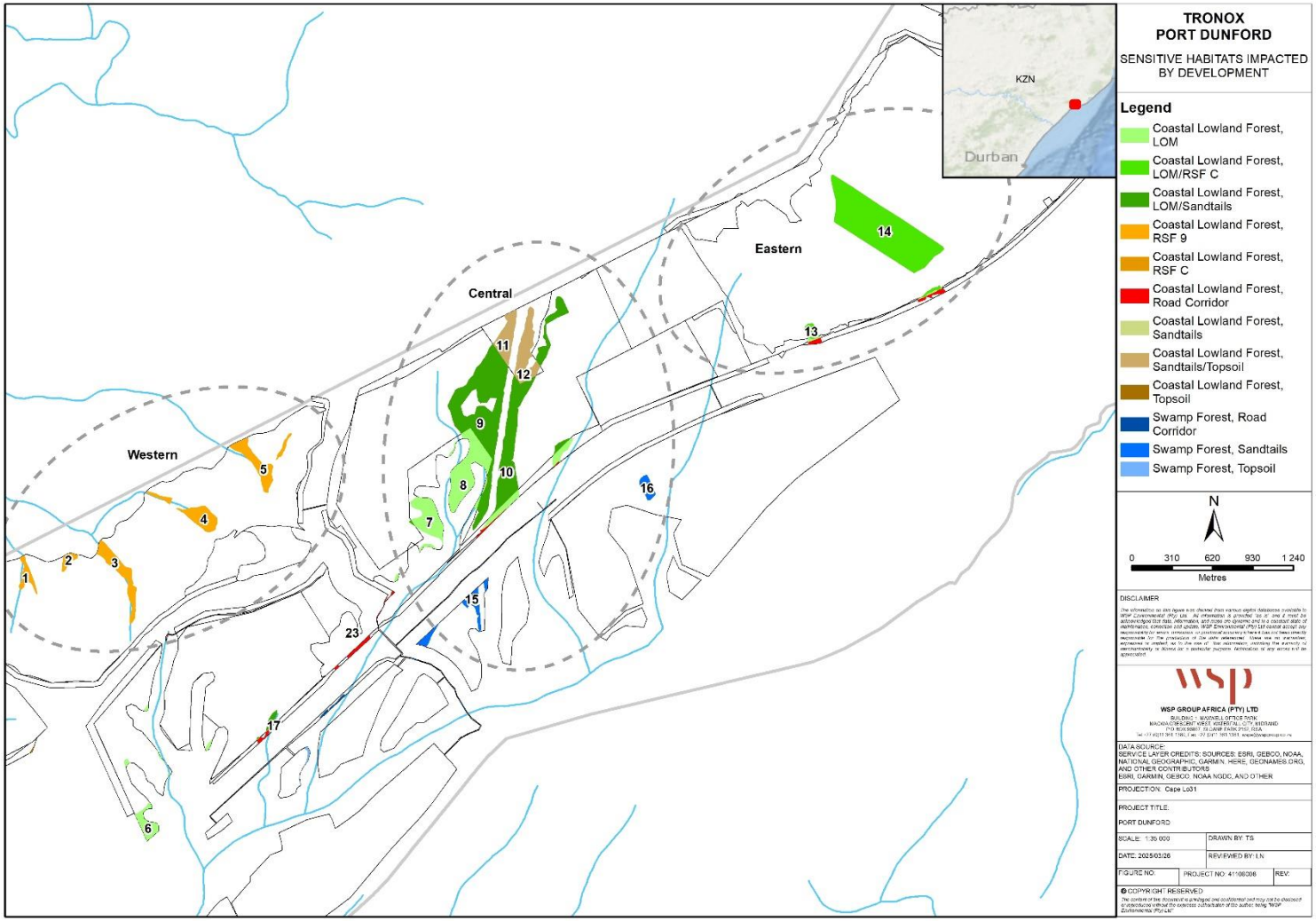


Figure 3-3 – Sensitive habitat units impacted by the current mine plan

Figure 3-4 - Wetland habitat loss within the current mine plan

Table 3-1 details the biodiversity areas that will be lost to the planned development and Table 3-2 details the anticipated wetland areas that will be lost.

Table 3-1 – Areas of high biodiversity value that will be lost

Aspects	Area (ha)
Lowland Coastal Forest	27 ha (RSF C)
	1 ha (LOM)
	16 ha (RSF 9)
Swamp Forest	1.4 ha (Sand Tails Dump A-1)
Grand Total	**45 ha**

Table 3-2 – Anticipated wetland loss (ha) associated with the Port Durnford Mine

Infrastructure	Wetland Loss Area (Ha)
LOM/RSF C	3.45
Road Corridor	2.15
RSF 9	35.86
Sand tails/Topsoil	82.14
Grand Total	123.6

Avoidance, mitigation, and Offsetting

Motivated by the specialist recommendations and need to avoid certain sensitive areas within the proposed mining footprint, a “no-go” corridor area has been identified within the proposed mine plan. presented in Figure 3-5. This corridor seeks to exclude the majority of the Very High and High SEI identified within the MRA.

The No-go corridor and proposed offset plan could effectively link a regional landscape corridor from the north of the site to the coastal areas, south of the site (Figure 3-6). These areas are not linked at present, and if realised, could create a valuable biodiversity corridor between the coastal environment and the inland biodiversity corridor areas, influencing and impacting both the uMlalazi estuary and the uMlathuze systems. This concept is supported conceptually by the respective specialists who provided input into the EIA.

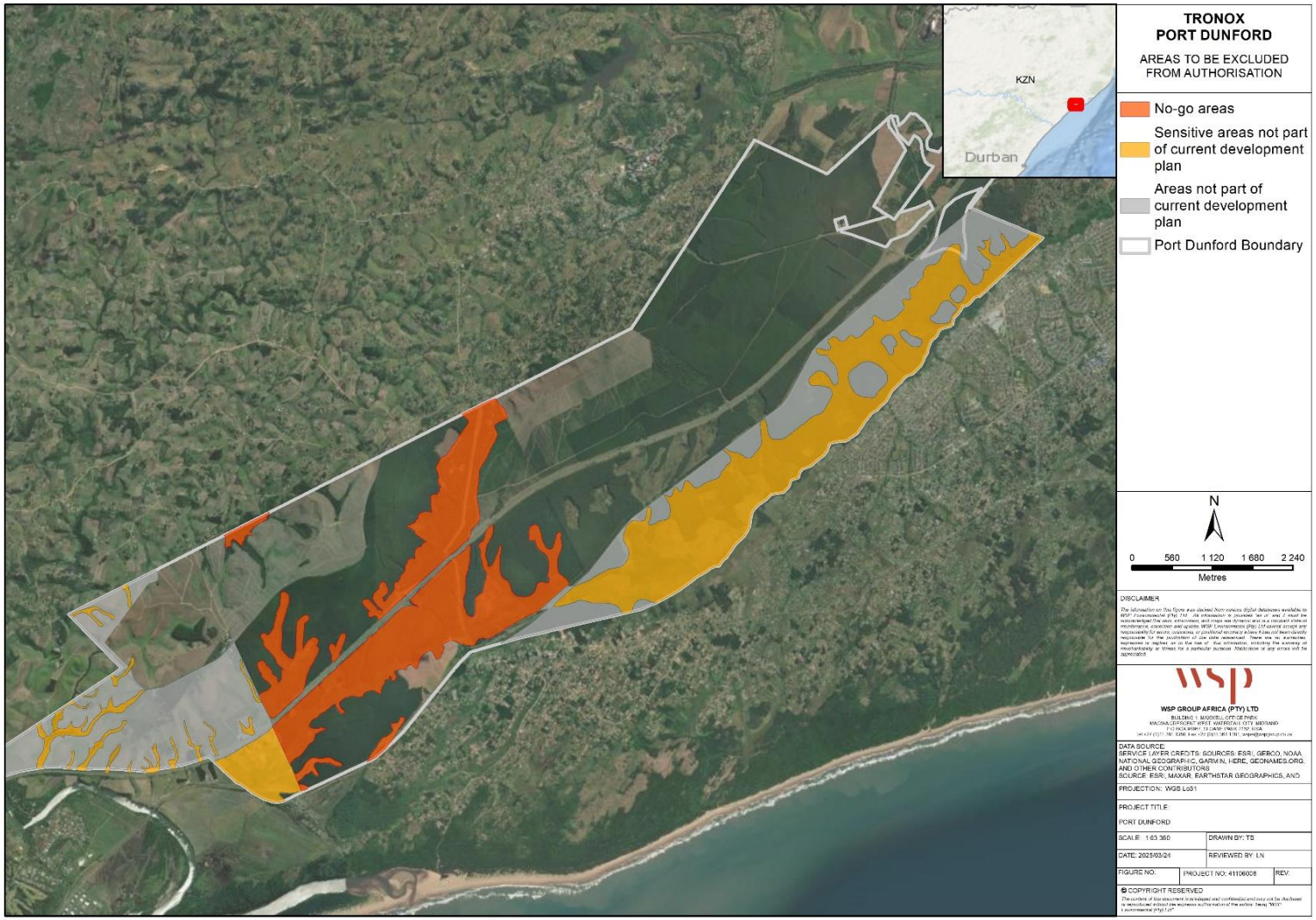


Figure 3-5 - Exclusion Areas – the No-Go Corridor and proposed offset area

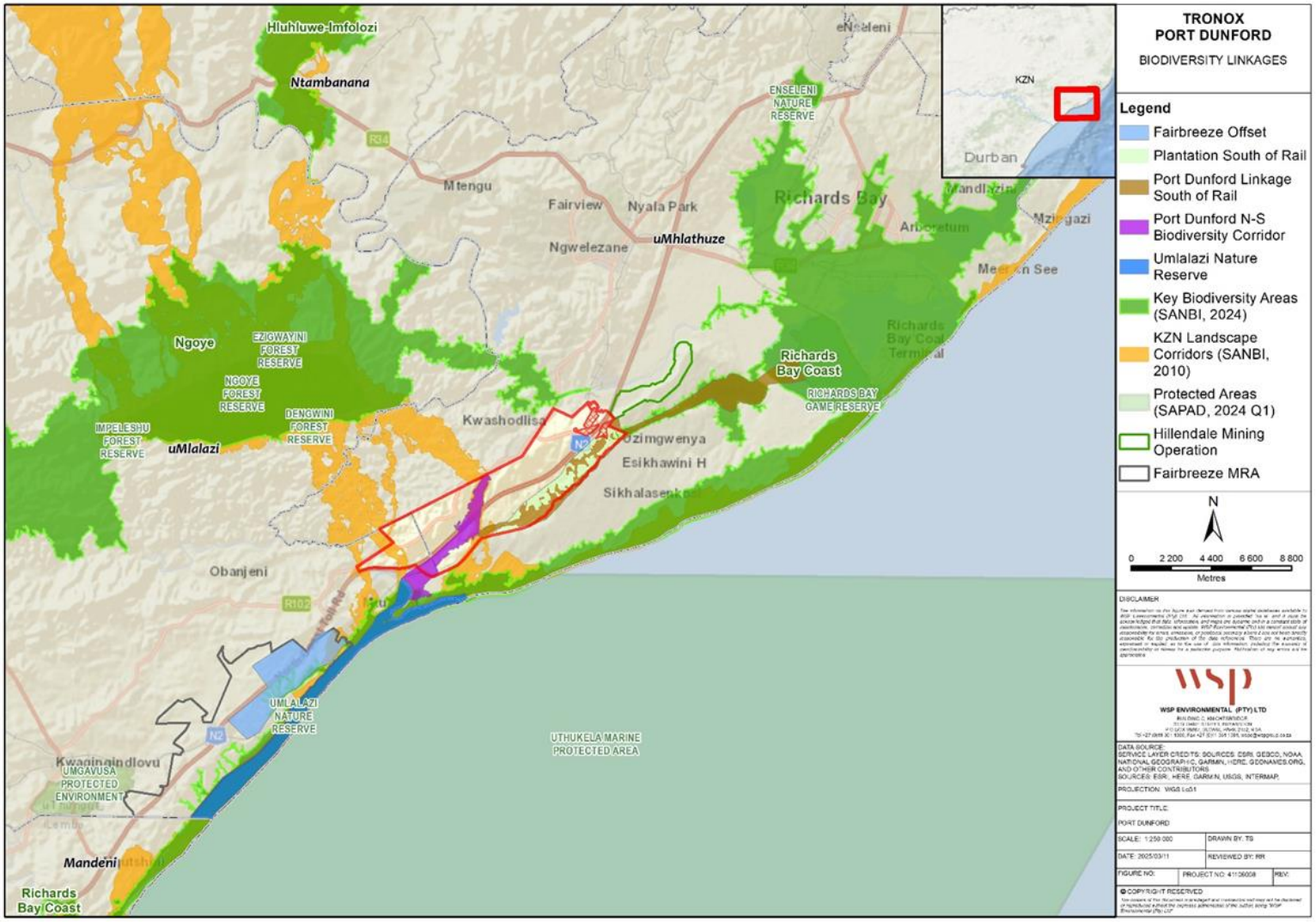


Figure 3-6 - The Port Durnford exclusion zone within a regional context

3.2.2 OFFSET

In addition to those areas excluded in the “No-Go” exclusion corridor, there will be areas of high biodiversity sensitivity that will be impacted by the mine plan that cannot be excluded or avoided. With reference to Figure 3-3 these areas include 10 ha of direct loss of forest and 124 ha of wetland.

To compensate for these areas that will be lost to the mining footprint, a total of 266 ha of Maputaland Lowland Forest must be offset and 123 ha of wetland (like for like ecosystem target) and 669 (ecosystem conservation target).

An approved Offset Management Plan by EKZNW must be in place prior to the clearing of the vegetation highlighted in Figure 3-5.

3.3 IMPACT ASSESSMENT OUTCOMES

This assessment process concluded that the proposed project will involve activities which will lead to several direct and indirect negative impacts, varying in terms of consequence and probability. Positive impacts are limited to the creation and retention of employment opportunities, and the anticipated significant economic to the local GDP associated with heavy mineral sand mining. The proposed project will have a negative environmental impact, the most significant of which is associated with direct biodiversity loss from within the proposed mining footprint of areas with Very high and High SEI.

It is the EAP and specialists' opinion, that the creation of the No-Go biodiversity corridor as an exclusion mitigation and the application for Offset Management Plan approval for the biodiversity loss within the mine plan, are acceptable compensation for the biodiversity loss that will be realised from the proposed project footprint.

Mitigation measures have been developed and recommended for the foreseen impacts and are presented within the EMPr. The mitigation measures are necessary to ensure that the project is planned, constructed, operated and decommissioned in an environmentally responsible manner. It is imperative that all impact mitigation recommendations contained in the EMPr, of which the EIA took cognisance, are legally enforced.

A summary of the significant impacts and corresponding significance ratings for the proposed Port Durnford Mining Operation is provided in Table 3-3 below.

Table 3-3 – Impact Assessment Summary Table (Phase 1 and 2)

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Construction Phase			
Social Impacts			
Pre-mining activities	Contribution to the gross national product	Moderate (Positive)	High (Positive)
Pre-mining activities	Increase in economic development	Low (Positive)	Moderate (Positive)
Pre-mining activities	Employment opportunities	Very Low (Positive)	Moderate (Positive)
Pre-mining activities	Community investment (SLP)	Moderate (Positive)	High (Positive)
Pre-mining activities	Increased pressure on municipal services	High	Moderate
Pre-mining activities	Intrusive Impacts (dust, noise, visual)	Moderate	Moderate
Pre-mining activities	Community-related health and safety	High	Moderate
Soils, Land Capability, Land Use and Hydropedology			
Temporary Infrastructure Area & PWP	Destruction of the existing Land Capability	High	High
Biodiversity			
Vegetation clearing, construction of infrastructure, excavation, stockpiling and dumping	Loss of habitat and loss and displacement of invertebrate species of conservation concern	High	High
Open-cast mining	Destruction of key avian habitat - Coastal Lowland Forest	Very High	Moderate
Residue Storage Facilities (RSFs)	Destruction of key avian habitat - Coastal Lowland Forest and wetland	Very High	Moderate
Sand tails areas	Destruction of key avian habitat - Coastal Lowland Forest and grassland/wetland	Very High	Moderate
Open-cast mining and associated infrastructure	Habitat degradation of aquatic avifaunal habitat in the Mlalazi Estuary -Phase 2	High	Moderate
Open-cast mining and associated infrastructure	Habitat degradation of aquatic avifaunal habitat in the Mhlatuze Estuary - Phase 2	High	Moderate
Operational phase			
Social			
Phase 1& 2 mining activities	Preferential employment	Moderate (Positive)	High (Positive)
Phase 1& 2 mining activities	Skill development and training	Low (Positive)	Moderate (Positive)
Phase 1& 2 mining activities	Increased traffic levels	High	Moderate
Phase 1& 2 mining activities	The decline in property value	High	Moderate
Phase 1& 2 mining activities	Access routes	High	Moderate
Visual			
Opencast mining activities (small-scale)	Opencast mining activities (small-scale)	Moderate	Moderate
Opencast mining activities (large-scale)	Opencast mining activities (large-scale) and associated night-time light pollution	Moderate	Moderate

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Phase 2 mining activities	Formation of dust plumes	Moderate	Moderate
Phase 2 mining activities	Haulage by road of waste stream material to Port Durnford for disposal	Moderate	Moderate
Phase 2 mining activities	Presence of visually intrusive PWP complex and infrastructure and associated night-time light pollution	Moderate	Moderate
Phase 2 mining activities	Progressive increase in height and expansion of RSFs and sand tails dumpsites	Moderate	Moderate
Phase 2 mining activities	Permanent alteration of site topography and land cover	High	Moderate
Traffic			
Phase 2 Stage 1 (From 2036)	Additional traffic generated Phase 2 -PWP Port Dunford to CPC Empangeni	Moderate	Moderate
Phase 2 Stage 4 (From 2051)	Additional traffic generated -Phase 2 ROM crossing P537	High	Moderate
Phase 2 Stage 4 (From 2051)	Additional traffic generated -Phase 2 PWP Port Dunford to CPC Empangeni	Moderate	Moderate
Phase 2 Stage 4 (From 2051)	Additional traffic generated Phase 2 -PWP Port Dunford to CPC Empangeni	Moderate	Moderate
Property			
Phase 2 mining activity	Visual Impact Phase 2 2036 to 2069	High	Moderate
Phase 2 mining activity	Atmospheric / Dust Impact Phase 2 2036 to 2069	High	High
Phase 2 mining activity	Cumulative / Sence of place Impact Phase 2 2036 to 2069	Moderate	Moderate
Heritage			
Phase 1& 2 mining activities	Loss of cultural heritage (archaeological and/or historical) sites	Moderate	Moderate
Palaeontology			
Phase 1& 2 mining activities	Loss of fossil heritage in the Berea Formation (Qb) of the Quaternary	Very High	Moderate
Phase 1& 2 mining activities	Loss of fossil heritage in the Quaternary geological layer	Moderate	Moderate
Soils, Land Capability, Land Use and Hydropedology			
Mining Pits (all Phase 2 Pits, also including the Phase 1 Pit); and Above Surface constructed RSF & Sand Tailings footprints	Destruction of the existing Land Capability	High	High
Mining Pits (extensive / numerous, before being later repurposed)	Loss of soil depth/volume - due to understripping - Mining pits	High	Moderate
Mining Pits (extensive / numerous, before being later repurposed)	Significantly reduced Recharge in the extensive Mining Pit footprints	High	High
Backfilling of mined-out Pits. Including: All Pits (backfilled with Sand Tailings only); and repurposed RSF C (backfilled with Fines, inside internal Sand Tailings walls)	Large temporary (over a long period) increases in recharge and interflow water volumes	High	High
Deposition Above Surface, Outside of mining footprints.	Large temporary (over a long period) increase in Recharge to groundwater (vertically downward)	High	High

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Including: RSF 9 (Fines deposited within a Sand Tailings starter wall); and Sand Tailings dumps A-1, A-2, A-3 complex, and 8B (Sand Tailings only)	and Interflow (laterally downslope) water volumes		
PWP (and Temporary Infrastructure Area, if still existing)	Reduced volume of infiltrated water reporting to the base of the previous Pits post-rehabilitation	High	Moderate
Rehabilitation of Above Surface deposited Fines. RSF 9	After Rehabilitation, the Recharge and Interflow components will be reduced	High	High
Rehabilitation of Above Surface deposited Sand Tailings dumps: A-1, A-2, A-3 complex, and 8B	Recharge and Interflow will be significantly reduced below the sand dumps compared with the pre-mining condition	Very High	High
Mining Pits (extensive / numerous, before being later repurposed)	Loss of soil depth/volume - due to understripping - Above surface	High	Moderate
Rehabilitation of Mining Pits that were backfilled with Sand Tailings only (re-purposed Sand Tailings sites 3, 4, and 5). Includes: All Pits (except repurposed RSF C)	Unacceptable soil erosion due to proposed 1:3 side slopes, and Topsoiling depth	High	Moderate
Rehabilitation of Above Surface deposit. Includes: RSF 9 (Fines were deposited, inside a	Unacceptable soil erosion / depth due to proposed 1:3 side slopes, and Topsoiling with only 30cm of orthic A-horizon Topsoil	High	Moderate

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Sand Tailings starter wall)			
Rehabilitation of Above Surface deposited Sand Tailings Dumps. Includes: A-1, A-2, A-3 complex, and 8B	The excessive height and slope will result in excessive soil erosion, thus also resulting in significant sedimentation of the surrounding area	Very High	High
Ground Water/ Hydrogeology			
Dewatering in mining areas	Lowering of water levels around the mine	Moderate	Moderate
Contamination of groundwater because of deposition of material into RSF C as mining progresses	Deterioration of groundwater quality	Moderate	Moderate
Wetlands			
LOM Opencast pit, RSF, Topsoil and Course Tails Stockpiles, Road Corridors	Wetland habitat loss within the footprint of surface infrastructure, LOM, RSFs, stockpiles. Total of 124 ha to be lost. - Phase 2	Very High	High
Topsoil and Course Tails Stockpiles, Road Corridors	Wetland habitat degradation through altered geomorphological characteristics (sedimentation & erosion) in downstream wetlands - Phase 2	Moderate	Moderate
Biodiversity: Avifauna, Herpetofauna, Invertebrates, Mammals			
Open-cast mining	Destruction of key avian habitat - Coastal Lowland Forest	Very High	Moderate
Residue Storage Facilities (RSFs)	Destruction of key avian habitat - Coastal Lowland Forest and wetland	Very High	Moderate

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Sand tails areas	Destruction of key avian habitat - Coastal Lowland Forest and grassland/wetland	Very High	Moderate
Open-cast mining and associated infrastructure	Habitat degradation of aquatic avifaunal habitat in the Mlalazi Estuary -Phase 2	High	Moderate
Open-cast mining and associated infrastructure	Habitat degradation of aquatic avifaunal habitat in the Mhlatuze Estuary - Phase 2	High	Moderate
Vegetation clearing, mining, dumping, stockpiling and construction of infrastructure	Habitat loss	High	High
Open-cast mining and associated infrastructure	Erosion and subsequent siltation of aquatic habitat	Moderate	Moderate
Open-cast mining and associated infrastructure	Edge effects, fragmentation and degradation	High	High
Open-cast mining and associated infrastructure	Direct mortality	Moderate	Moderate
Vegetation clearing, construction of infrastructure, excavation, stockpiling and dumping	Loss of habitat and loss and displacement of invertebrate species of conservation concern	High	High
Clearing of vegetation and physical mining procedures	Loss of ecological connectivity and subsequent loss of dispersal	High	High
Vegetation clearing and earth works, Vehicle/machinery collisions, Hunting/snaring by construction workers	Loss of mammal species of conservation concern	High	Moderate
Increased sensory disturbance from dust or noise generation			
Vegetation clearing and earth works	Direct loss and disturbance of natural habitat (Without buffer applied as part of mitigation)	High	Moderate
Vegetation clearing and earth works	Fragmentation of natural habitat	High	Moderate
Vegetation clearing and earth works	Direct loss and disturbance of natural habitat	Very High	High
Job-seeking population and "urbanization"	Illegal utilisation of resources and displacement of invertebrate species of concern	Moderate	Moderate
Vegetation clearing and earth works	Direct loss and disturbance of natural habitat	Very High	High
Vegetation clearing and earth works	Direct loss and disturbance of natural habitat (Without buffer applied as part of mitigation)	High	Moderate
Vegetation clearing and earth works	Fragmentation of natural habitat - Terrestrial Flora and Mammals	High	Moderate
Vegetation clearing and earth works	Loss of mammal species of conservation concern	High	Moderate
Mechanical mining of the run-of-mine (ROM) material and Progressive backfilling and rehabilitation	Changes in water quantity or flow regime	Moderate	Moderate
Closure and Decommissioning			
Social			
Decommissioning phase	Downscaling and retrenchment	Low	Moderate

ACTIVITY	POTENTIAL IMPACT	SIG. WITHOUT MITIGATION	SIG. WITH MITIGATION
Dewatering in mining areas	Recovery of water levels	Moderate	Moderate
Decommissioning and removal of infrastructure Rehabilitation activities including spreading of topsoil and revegetation of disturbed footprints.	Wetland habitat degradation due to erosion, sedimentation, water quality deterioration and spread of AIP	Moderate	Moderate
Radiology			
Commissioning of an RSF, radionuclides contained in the material leach from the TSF to the underlying strata	Leaching and migration of radionuclides from the TSF during the post-closure phase of the Port Dunford Mine	Moderate	Moderate
Social			
	Local Economy	Moderate (Positive)	High (Positive)
Soils, Land Capability, Land Use and Hydropedology			
All Mineral Sand Mines (previous, existing, and proposed) in the immediate Region.	Loss of post-rehabilitation Soil Quality due to the following factors: - loss of soil depth / volume due to understripping / stockpiling / replacement of Topsoils (orthic A-horizon) and Subsoils (most suitable: red apedal, yellow-brown apedal, neocutanic, and E-horizon soils where the E is yellow in the dry	Very High	Moderate
	state; as well as less suitable types where encountered in other areas); - increased Soil Erosion due to post-mining slopes exceeding 1:7 (8 °) or 1:5 (11.3°) in certain areas (Residue Storage Facilities, and Sand Tailings Dumps), potentially resulting in sedimentation of drainage lines / wetlands / associated indigenous bush areas; - reduced Soil Fertility mostly due to the non-replacement of Topsoil (orthic A-horizon) on the immediate surface during rehabilitation; - increased soil compaction, and; - potential soil pollution.		
All Mineral Sand Mines (previous, existing, and proposed) in the immediate Region.	Reduced post-rehabilitation Land Capability class / potential	Very High	Moderate
All Mineral Sand Mines (previous, existing, and proposed) in the immediate Region.	Reduced post-rehabilitation Land Use	Very High	Moderate
All Mineral Sand Mines (previous, existing, and proposed) in the immediate Region.	Altered post-rehabilitation Hydropedological Soil Types, due to their previous destruction during the course of mining related operations	High	Moderate
All Mineral Sand Mines (previous, existing, and proposed) in the immediate Region.	Loss of post-rehabilitation Soil Quality	Very High	Moderate

4 ENVIRONMENTAL MANAGEMENT OBJECTIVES

To facilitate compliance to the EMPr by appointed Contractors and sub-Contractors, it is required that all onsite personnel are aware of the requirements of the EMPr as well as the prescribed penalties should a non-conformance be identified during the construction, operation and decommissioning activities.

Further to the above, appointed Contractors and sub-Contractors will also be required to comply with all relevant legislation and standards.

4.1 EMPR OBJECTIVES

The EMPr has the following objectives:

- Identify mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the mine;
- Ensure that all the phases of the proposed project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced;
- Identify entities responsible for the implementation of the measures and outline functions and responsibilities;
- Create management structures that address the concerns and complaints of interested and affected parties (I&APs) with regards to the proposed project;
- Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation; Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Train onsite personnel regarding their environmental obligations; and
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

4.2 ENVIRONMENTAL OBJECTIVES AND TARGETS

To facilitate compliance to the EMPr, Tronox must comply with all relevant legislation and standards and make all personnel aware of the requirements of the EMPr, as well as the prescribed penalties should a non-conformance be identified during the different phases of the proposed Project.

It is recommended that environmental objectives (as outlined in this document) be emphasised as minimum requirements. Objectives include:

- Encourage good management practices through planning and commitment to environmental issues; and
- Provide rational and practical environmental guidelines to:
    - Minimise disturbance of the natural environment;
    - Minimise fugitive emissions;
    - Minimise the impact of added traffic on the area;
    - Ensure surface and groundwater resource protection;

- Prevent or minimise all forms of pollution;
- Protect indigenous flora and fauna;
- Prevent soil erosion;
- Promote sustainable use of resources;
- Adopt the best practical means available to prevent or minimise adverse environmental impacts;
- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Promote the reduction, reuse, recycling and recovery of waste;
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste;
- Describe all monitoring procedures required to identify impacts on the environment;
- Define how the management of the environment is reported and performance evaluated; and
- Train onsite personnel regarding their environmental obligations.

4.2.1 MANAGEMENT AND MITIGATION MEASURES

The mitigation and management measures have been prepared in a tabular format and are laid out with the headings given below:

- Aspect: Describes the aspect to be impacted. If no impacts were identified for a particular environmental aspect e.g., geology, then these have not been included.
- Objective: the objective needed to protect the environmental component in terms of the impacts identified in Section 3.
- Detailed description of the aspect of the activity: This is in accordance with NEMA EIA Regulations 33c.
- Measures, criteria or principles: the commitments made to meet the objectives.
- Mining stage: indicates the stage in the life of the mine when measures, criteria or principles have effect i.e.:
  - Planning (P),
  - Pre-Construction (PC);
  - Construction (C),
  - Operation (O), and
  - Decommissioning (D)

It is important to note that alternative principles, measures and criteria may be identified and used during the life of the project to ensure the management objectives are met. Ultimate responsibility for meeting all commitments in this section lies with Tronox, and Contractors will be required to meet Tronox ’s requirements in this regard.

5 MANAGEMENT PROCEDURES AND ADMINISTRATIVE REQUIREMENTS

5.1 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

Formal responsibilities are necessary to ensure that key management measures/procedures are executed. Tronox Tronox will be responsible for the overall control of the project site during the pre-construction, construction, operation, decommissioning and rehabilitation phases of the project.

Table 5-1 provides a high-level outline of the various roles and responsibilities of the project. The specific responsibilities as per the various periods within which the measures contemplated in the EMPr must be implemented have been included in Table 6-2.

Table 5-1 – Roles and Responsibilities

Designation	Roles and Responsibility
Proponent / Holder of the EA **(Tronox)**	▪ Tronox will be the holder of EA, permits and licenses and therefore ultimately responsible for the implementation of the EMPr during all phases of the project. Tronox is a certified ISO14001 company which includes fulfilling the approved environmental policy. ▪ Must ensure adherence to all conditions within the EA. ▪ Must appoint the Environmental Control officer (ECO) from the start of construction. ▪ The competent authorities must be notified of the details and contact numbers of the appointee in writing for record and communication purposes. ▪ Appoint a capable and suitably qualified and independent external Environmental Auditor (EAud) to monitor and audit compliance with the EMPr on a regular basis. ▪ The EAud must be independent of Tronox and the details of the appointment to be submitted to the CAs. Tronox to ensure that all appointed Contractors are bound to implement the EMPr as it applies to the Contractors' line of work. ▪ Should any activity be planned on the site that requires an EA, permit or license approval, which is not covered by existing authorisations or approvals, appropriate applications for authorisations and approvals must be lodged with the CAs. These include listed activities in terms of the NEMA, NEMWA, NWA and MPRDA as well any other Specific Environmental Management Acts (SEMAs) and regulations. ▪ Tronox senior management to report major environmental incidents and major EMPr non-compliances (that could result in notable environmental damage or pollution) to the competent authorities as per applicable legislation and regulatory requirements by means of the existing TRONOX Tronox incident reporting system.
Environmental Auditor (EAud)	▪ The EAud to conduct regular audits of the project site and surroundings to verify EMPr and environmental legal compliance. ▪ The EAud to act as guide and advisor to the PM, ECO and Tronox in matters related to EMPr implementation and environmental legal compliance.

Designation	Roles and Responsibility
	▪ The EAud to compile and submit annual environmental compliance audit reports to Tronox and competent authorities during all project phases. ▪ The EAud (or alternative independent consultant) to attend environmental monitoring committee meetings (as arranged by the PE).
Project Engineer (PE)	▪ Appointing the appropriately qualified Contractor to co-ordinate, supervise and expedite different action plans. ▪ Ensuring adherence to the DMRE conditions of authorisation and any other laws and standards relevant to the construction activities. ▪ Ensuring all elements of the work undertaken are properly and competently directed, guided and executed at appointed stages of the project. ▪ Ensuring adherence to statutory safety, health and environment (SHE) standards and ensuring that construction activities comply with the EMPr. ▪ Monitoring the site and services corridor daily to ensure compliance. ▪ Overall responsibility and accountability for the site during the construction phase. ▪ Avoiding and/or mitigating adverse impacts on the environment by the appropriate design and construction. ▪ Ensuring transparency in their operation and environmental management of the site and line corridor. ▪ Managing the Contractor's compliance and ensure documentation management. ▪ Ensuring that the Contractor has a copy of the EMPr, ESIR and all relevant environmental permits and authorisations.
Contractors (C)	▪ Managing and operating their activities with due care and diligence. ▪ Contractors to familiarise themselves with the EMPr and to ensure that contract prices allow for environmental legal compliance and costs. ▪ Contractors to ensure that their workforce, sub-Contractors and suppliers comply with all elements of the EMPr and EAs, licenses and permits. ▪ Contractors to implement EMPr amendments, EMPr procedures and written EMPr instructions issued to them by the ECO, within the timeframe specified by the ECO in the EMPr procedure or instruction. ▪ Ensuring that stakeholder interest is reported to the ECO. ▪ Maintaining relevant documentation for review by the ECO. ▪ Contractors to be responsible for rectifying and rehabilitating, at their own expense, any environmental damage caused by their activities on the construction site and surroundings. Measures to repair damage and rehabilitate the affected area must be approved and signed off by the ECO. ▪ Contractors shall nominate a capable and suitably qualified staff member as SHE officer to supervise the implementation of the EMPr as it applies to the nature of the contract with Tronox.
Environmental Control Officer (ECO)	▪ Undertaking ongoing monitoring of the construction site through regular site visits and record key findings. This includes photographic monitoring of the construction site. The frequency of these visits will be determined by the stage of the project. ▪ Advising the Project Manager and the Contractors on environmental matters during the construction phase of the development. ▪ Contacting specialists for site inspections as required.

Designation	Roles and Responsibility
	▪ Monitoring implementation of the EMPr and all authorisations by the Contractor. ▪ Advising the project manager on actions or issues impacting on the environment and providing appropriate recommendations to address and rectify these matters. ▪ The ECO will arrange, attend and record the proceedings of regular environmental monitoring committee meetings to discuss environmental issues, public complaints and the necessary corrective action required to minimise environmental impacts with the ECO, Contractors' SHE officers, EAud, registered IAPs (who wishes to be part of such a committee) and representatives from competent authorities (who wishes to be part of such a committee).
Public Relations Officer (PRO)	▪ Design and implement a public and stakeholder communication strategy. ▪ The Tronox environmental monitoring committee meetings will be held regularly in order to maintain open lines of communication between Tronox and the environmental committee members and to provide a forum to raise concerns, comments and complaints about the construction and implementation of the project. ▪ Inform / remind environmental committee members about the complaints register and procedures for lodging a complaint and provide feedback on complaints received since the previous meeting. ▪ Identify unresolved issues and disputes and discuss the need for dispute resolution (see Dispute Resolution) and inform/remind environmental committee members about their right to contact the EA to discuss unresolved issues and disputes regarding environmental matters.

Legislation requires that Tronox (via the appointed Contractor/s) must develop an environmental awareness plan that describes the manner in which Tronox intends to inform employees of any environmental risks that may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment. In recognition of the need to protect our environment, environmental management should not only be seen as a legal obligation but also as a moral obligation.

It is important to ensure that all relevant personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental degradation and harm.

To achieve effective environmental management, employees, Contractors (including subcontractors) must be aware of the responsibilities in terms of the relevant environmental legislation and the contents of the EMPr, conditions of the EA.

Tronox will provide appropriate resources to facilitate social and environmental awareness training during the construction, operational and decommissioning phases of the project. Tronox will require that all managers associated with the project adhere to the mitigation/management measures detailed in the EMPr and identify, evaluate, and minimise risks to the social, physical and biophysical environments. This will be implemented by educating employees in social and environmental matters and responsibilities relating to the performance of their assigned tasks. Furthermore, employees will be entrusted to maintain the necessary level of environmental performance for their activities.

Contractors, and their associated subcontractors will also need to demonstrate compliance with mitigation/ management measures included in the EMPr.

The methodologies described in the ensuing sections must be used to implement and ensure environmental and social awareness and competence.

5.1.1 PROCEDURES FOR ENVIRONMENTAL EMERGENCIES

Tronox has an existing Emergency Procedure which will be applied during all phases of activities of the Project. All employees and Contractors will receive basic training in applicable sections of the Emergency Procedure. Procedures will be put in place for the following environmental emergencies:

- Fires;
- Pipe bursts;
- Residue overflows; and
- Hydrocarbon spillages, and other unforeseen spillages.

5.1.2 INTERNAL COMMUNICATION

Internal Communication of environmental issues to ensure environmental awareness will be achieved by using any combination of the following means:

- Meetings;
- Memos;
- Notice boards;
- Briefs;
- Reports;
- Monthly themes;
- Daily operational bulletins;
- Newsletter;
- E-mail;
- Telephone; and
- Induction training.

5.1.3 STANDARD MEETINGS

The following standard meetings will be held at specific times to ensure that environmental and social awareness, potential problems, complaints etc. are heard and addressed proactively:

- Safety, Health and Environmental Meetings will be held weekly (during construction) and monthly (during operation) by the relevant personnel; environmental and social issues will form part of the agenda;
- Safety, Health and Environmental Meetings will be held monthly by the Senior Management; and
- Communication between all personnel and Senior Management will be facilitated through the appropriate reporting lines, or by using complaint and incident forms.

5.1.4 ENVIRONMENTAL AND SOCIAL TALK TOPICS

Monthly environmental and social talk topics must be compiled and distributed/shared to relevant personnel and must be displayed on appropriate notice boards or shared by whatever means established on site. As a minimum, the following topics must be considered during the course of the construction phase:

- Water Quality;
- Water Use and Consumption;
- Air Quality i.e. dust;
- Power Consumption and Energy Efficiency;
- Waste Management;
- Fauna and Flora;
- Emergency Procedures;
- Incidents Reporting;
- Systems;
- Noise;
- Heritage Impacts;
- Health Risks (such as HIV/ Aids); and
- General Awareness (e.g. World Environment Day, National Arbour Day).

5.1.5 GENERAL COMMUNICATIONS

Communication to the community, government, landowners, neighbouring farmers, environmental groups, non-government organisations and other stakeholders will be communicated to ensure environmental and social awareness by means of the following:

- E-mail;
- Telephone; or
- Formal meetings.

5.1.6 TRAINING

It is important to ensure that all personnel, Contractors and their sub-Contractors have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. As a minimum, environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the EMPr and the environmental specifications as they apply to the project;
- Employees must undergo training for the operation and maintenance activities associated with project and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated;
- Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Officer; and
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

The following facets to training form part of this Environmental and Social Awareness Plan:

- **Induction:** Environmental and social awareness training will be given at induction when personnel join the company and/or return from leave. Induction training will also be given to visitors entering the site. Induction training will include, inter alia:
    - A discussion on the environment concept, what it comprise of and how do we interact with it;
    - A description on the components and phases of the project;

- A general account of how the mine and its associated activities can affect the environment, giving rise to what are called environmental impacts;
- A discussion on what staff can do in order to help prevent the negative environmental impacts from degrading the environment i.e. environmental impact management.

- **Job Specific Training:** Job specific training programmes will be developed as and when required. The programs will be based on the significant environmental and social aspects/ impacts that are identified during regular audits and site inspections. Supervisory staff will be equipped with the necessary knowledge and information to guide their employees on environmental and social aspects applicable to performing a specific task.
- **Competency Training:** The Environmental Officer will be responsible for the environmental and social competency and awareness training of Middle Management and supervisors. This training will be performed both on a one-on-one basis and through workshops and presentations. Competence and the effectiveness of training and development initiatives will be determined through the following methods:

  - Trend analysis of incidents reported; and
  - Analysis of work areas during visits and audits.

  The process to declare the competency of personnel is documented in the ISO9001 procedure. This plan will be amended periodically in light of operational changes, learning experienced during its implementation and other activities that can affect the risk profiles.

- **Training Records**: Training can be done either in a written or verbal format, but will be in an appropriate format for the receiving audience. Persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the EMPr. The attendance registers must be kept on file.

5.2 MONITORING

The Contractor SHE Officer will monitor the day-to-day site activities on an ongoing basis and will produce weekly monitoring reports during construction. The independent external ECO will undertake regular audits to ensure compliance with the EMPr and conditions of the environmental authorisation during the construction activities and will report to the Project Engineer should any non-compliance be identified or corrective action deemed necessary.

During the operational phase, Tronox must establish, implement and maintain a procedure to monitor and measure, on a regular basis, the key characteristics of the operations that may have a significant environmental impact. The procedure shall include the documenting of information to monitor performance, applicable operational controls and conformity with the operation's environmental objectives and targets.

Monitoring requirements as recommended by the respective specialists have been provided in this EMPr.

All the conditions outlined in the EMPr will be subject to required internal day-to-day monitoring and external compliance monitoring. Where required, any specific additional monitoring has been outlined in the EMPr.

5.3 NON-CONFORMANCE AND CORRECTIVE ACTION

The auditing of the construction and operational activities may identify non-conformances to the EMPr and conditions of the EA. Non-conformances may also be identified through incidents, emergencies or complaints recorded. In order to correct non-conformances, the source must be determined, and corrective actions must be identified and implemented.

5.3.1 COMPLIANCE WITH THE EMPR AND CONDITIONS OF THE ENVIRONMENTAL AUTHORISATION

The Port Durnford EIA will have its own specified conditions of EA to adhere to as presented by DMRE. These conditions will be appended to this list, but at a minimum, Tronox must:

- Keep a copy of the EMPr and conditions of the environmental authorisation will be available onsite at all times for the duration of the construction and operational activities;
- Ensure that all persons employed by a Contractor or their sub-Contractors abide by the requirements of the EMPr and conditions of the environmental authorisation;
- Ensure that any members of the workforce found to be in breach of any of the specifications contained within the EMPr and conditions of the environmental authorisation may be ordered by the Site Manager to leave the site. A Contractor may not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMPr and conditions of the EA;
- Should a Contractor be in breach of any of the specifications contained in the EMPr and conditions of the environmental authorisation, the Project Engineer will, in writing, instruct the Contractor responsible for the incident of non-compliance regarding corrective and/or remedial action required, specify a timeframe for implementation of these actions, implement a penalty and/or indicate that work will be suspended should non-compliance continue;
- Should non-compliance continue, further written notification will be forwarded to the Contractor responsible for the incident of non-compliance outlining the required corrective and/or remedial action, the timeframe for implementation, penalties and/or work will be suspended as specified previously; and
- Ensure that Departmental officials be given access to the property referred to in the EIAR and EMPr for the purpose of assessing and/or monitoring compliance with the EMPr and conditions of the EA, at all reasonable times.

5.3.2 DUTY OF CARE

Under Section 28 of the NEMA, all personnel involved with the construction and operational activities onsite will be responsible for implementing measures to prevent pollution or degradation of the environment from occurring, continuing or recurring. Failure to comply with the above conditions is a breach of the duty of care. If such harm is unavoidable, steps must be taken to minimise and rectify such pollution or degradation of the environment.

5.4 DOCUMENTATION AND REPORTING

The following documentation must be kept onsite in order to record compliance with the EMPr and conditions of the EA:

- Record of complaints; and
- Record of emergencies and incidents.

The Contractor will be required to report on the following:

- Environmental incidents involving Contractor/ employees and/or the public;
- Environmental complaints and correspondence received from the public; and
- Incidents that cause harm or may cause harm to the environment.

The above records will form an integral part of the ECO's reports and records thereof maintained for the duration of the project. These records will be kept with the EMPr and conditions of the EA and will be made available for scrutiny if so, requested by the PE or his delegate and the ECO.

The Contractor will ensure that the following information is recorded for all environmental complaints/incidents/emergencies:

- Date of complaint/incident/emergency;
- Location of complaint/incident/emergency;
- Nature of complaint/incident/emergency;
- Causes of complaint/incident/emergency;
- Party/parties responsible for causing complaint/incident/emergency;
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident/emergency;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent the reoccurrence of the complaint/incident/emergency;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions;
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented; and
- Copies of all correspondence received regarding complaints/incidents/emergency.

An onsite environmental file must be maintained throughout all phases of the Project. Digital copies of relevant documentation may be kept in addition to hard-copy documents. This file is to be made available at the request of the auditor, ECO, Applicant or similar monitoring body. A digital photographic record will be kept showing before, during and post-rehabilitation evidence of the project. The photographic record can also be used in cases of damage claims if they arise. Each image must be dated and a brief description note attached. The photographic record and weekly inspection log may be combined.

6 ENVIRONMENTAL MANAGEMENT PROGRAMME

As an extension of the EA , the EMPr contains guidelines, operating procedures, rehabilitation and pollution control requirements that will be binding to the onsite personnel working for, or on behalf of Tronox . It is essential that the EMPr be carefully studied, understood, implemented and adhered to at all times.

In instances where the method statements provided by the Contractor conflict with the EMPr, such conflicts will be discussed between the PE, ECO and Contractor and if unresolved, the EMPr will take precedent.

The following assumptions have been made in the development of the environmental specification/ESMS in this site-specific EMPr:

- An environmental file containing the information/documentation required by this site-specific EMPr is to remain onsite and to be made available at the request of the auditor or similar monitoring body; and
- For ease of reference, any person(s) employed to assist in the Project (i.e. Contractors, sub-Contractor and permanent and temporary staff) will be collectively referred to as ‘onsite personnel’.

It should be noted that at this point of the Project planning process, the necessity for and timing of the decommissioning phase is unknown. Before decommissioning, the holder of the EA will need to follow the related legal permitting process in terms of NEMA and other legislation applicable at the time. The future associated permitting process will further supplement any commitments made within this document.

This EMPr was drafted at a pre-authorisation and feasibility stage. In the final design/ feasibility stages, the EMP must be reviewed for applicability against the final design and be amended at that stage if needed.

Table 6-1 outlines the general EMPr commitments for the proposed Port Durnford mining operations.

6.1 PLANNING AND DESIGN PHASE

Table 6-2 – Planning Phase EMPr Requirements

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Planning and Design							
Details of the aspect: As an outcome of the ESIR, Tronox was required to amend their mining plan as part of the feasibility phase for the proposed Phase 2 mining activity. These amendments pertain to the exclusion areas, and final design layouts of mining infrastructure.							
The Mine Plan must reflect the "No-Go" biodiversity exclusion corridor.	D1	This exclusion zone must reflect on future mine plans and be managed as no-go areas for any future mine development.	Planning/ Operation/ Closure	TRONOX Tronox	Amended mine plan	The SCC and vegetation regeneration must be monitored in this area. Rehabilitation and monitoring measures must be upheld in this area.	Revise and update Mine plan.
Infrastructure detailed design (Roads, pipelines, sand tail dumps)	D2	The detailed design of the Phase 2 infrastructure must avoid ingress of environmentally sensitive areas within the MRA. During final design (detailed feasibility stage) the final designs for each sand damp and RSF must indicate the maximum allowable toe line position (buffer or exclusion zone) and all infrastructure supporting the design (service roads, toe paddocks for water containment, clean water diversion trenches to route stormwater around facilities, under drainage or interception pipelines, return water sumps or dams et cetera) must be located inside the final design footprint and must not encroach upon the identified buffer zone or exclusion zone boundary.	Planning	Tronox TRONOX	Avoidance of sensitive areas indicated on feasibility design drawings.	Resubmission and approval of updated layout plan	Apply for Part 2 amendment of EA should sensitive areas be disturbed by future designs.
Investigate the feasibility of joining RSF 9 with Sand Dump 8 to maximise sand tails storage space.	D3	Initiate design consideration in feasibility phase.	Planning	Tronox TRONOX	Amended design of mine plan	-	Apply for Part 2 amendment of EA should sensitive areas be disturbed by future designs.
Amended mine plan to remove mining infrastructure that overlaps with delineated wetland areas.	D4	Amended mine plan and sand dump detail design	Planning	Tronox TRONOX	Amended mine plan	-	-
Updated mine materials balance and handling schedule.	D5	Update the mine materials balance and materials handling schedule associated with mine plan revision during feasibility. This revision must respond to the recommendations of the impact assessment, which has constrained mining footprint and residue disposal footprints	Planning	Tronox TRONOX	Updated materials balance	-	
Develop a post-mining landform model.	D6	Develop a post-mining landform model that is integrated with the mine planning and materials scheduling processes to ensure that any changes to the mining or materials handling plans are	Planning/ /Operation	Tronox TRONOX	Updated post-mining landform model	-	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		modelled through to completion in relation to final landform. During the operational life of the mine, any time that the mine plan or materials schedule is materially changed, the post mining landform model must be updated, inclusive of strategic planning cycles at the mine Ensure that the final landform model accounts for the recommendations in relation to maximum allowable slope resulting from this EIA. In addition, that the final toe line of the end landform in the post mining landscape is understood to ensure that the facilities are constructed in the manner that the permanent landform can be achieved. This is important because these facilities are built close to, or in certain instances are directly adjacent to, buffer zones and exclusion zones and there is no opportunity to doze down slopes to achieve final landforms later to achieve rehabilitation goals in relation to slip. This must be accommodated in front end design.					
Investigate utilising sand dump 8 first to potentially negate the need for the use of the A1 and A2 sites.	D7	Adjust the deposition schedule to begin sand tails deposition at sand dump 8 to reduce the demand on the other sites.	Planning	Tronox	Amended deposition schedule	-	Amended mine plan and deposition schedule
Reduce the number and height of the planned sand tail dumps and topsoil storage sites	D8	As a key land use recommendation, Tronox must attempt to reduce both the number and height of the planned sand tails dumpsites.	Planning	Tronox	Reduced sand tails dump footprint and materials balance	-	Amended mine plan and deposition schedule
Securing appropriate zoning	D9	Lodge a Rezoning Application for affected areas, aligning with municipal and regional development plans.	Planning	Tronox TRONOX	Rezoning approval, land use compliance	Monitor municipal approvals and compliance with zoning regulations.	Adjust land use plans and zoning as required by municipal guidelines.
Minimize the impact on Mondi's current water use licensing	D10	Assess and address water use licensing requirements closer to the time of land transfer.	Planning	Tronox TRONOX	Water quality, catchment health	Monitor water quality and usage throughout the mining and rehabilitation phases.	Apply for necessary licenses and modify operations to comply with regulations.
Water management design	D11.1	Design stormwater management trenches and outflows to manage the increase in toe seepage from the sand tails dumps, sand dump 8 in particular.	Planning	Tronox TRONOX	As-built drawings Regulation GN704 compliance	Internal and external audits	Update design / construction plan for other coarse sand tailings deposition areas. Consult with specialist where required
	D11.2	Undertake detailed survey of the entire site that stands to be affected by the proposed development to ensure that accurate survey information is available to inform detailed design. Redo the flood line analysis once detailed survey information is available to confirm the positioning	Planning	Tronox TRONOX	Updated survey Updated design layout	-	Updated survey Updated design layout

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		of infrastructure in relation to the recalculated flood lines. Reposition infrastructure that falls within the 100 year flood line to ensure that it lies outside the flood line					
	D11.3	Design the primary RWD to contain run-off from a hundred year peak rainfall event	Planning	Tronox TRONOX	Updated design layout	-	Updated RWD layout
	D11.4	Design sediment containment dams for each sand dump, taking account of the local topography. Specifically, ▪ for Sand dump A 1 the need for two dams is anticipated to contain drainage given the shape of the dump due to the need to avoid of critical biodiversity habitat and designated no-go area, ▪ for Sand dump 5, two containment dams are also anticipated given the proximity of the sand dump to the MRA boundary and local topography, which sees this footprint drained by two streams, ▪ for Sand dump 8, it is anticipated that the designed containment dam will necessitate revision of the dump footprint to accommodate positioning of the containment dam immediately adjacent to the MRA boundary, and ▪ for Sand dump A 2, given the extremely flat topography adjacent to the Amanzamnyama River at this point, ensure that sediment from this facility can be contained both in the direction of the river to the north and the drainage line to the south-west ▪ Ensure that containment dams associated with the standard dams are equipped with adequate pump and pipe capacity to maintain the containment dams in an empty condition accounting for the operational water balance reporting to these facilities and required pollution prevention containment volumes	Planning	Tronox TRONOX	Updated storm water design layout	-	Updated sediment containment dam design layout
	D11.5	Fines delivery pipeline design. The pipeline delivery system must: Have pressure drop sensors that trigger an alarm system in the PWP control room that automatically shuts off the triggered pumps, Design pipeline routing to avoid stream and river crossings, where possible,	Planning	Tronox TRONOX	Updated pipe delivery system design and layout	-	Updated drawings

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Re-route the RSF 9 fines delivery and associated return water pipelines around the defined No Go area to avoid the crossing of the tributary of the Amanzamnyama. Design containment berms running parallel to the fines delivery pipeline to ensure that in the event of pipe leakage or failure, the ultrafine material can be contained within the pipeline servitude itself. Figure 6-1 shows the proposed pipeline and road route realignment to avoid sensitive no-go areas.					
Sediment management design	D12	A comprehensive sediment management plan will be developed prior to construction and implemented over the life of the project.	Planning	Tronox TRONOX ECO Contractor	Sediment management plan	Internal and external audits	Update plan when required
Storm Water Management Plan design	D13	A detailed site-wide stormwater management plan, in compliance with the Regulation GNR. 704 and Regulation 77 of the National Water Act, will be developed prior to construction and implemented over the life of the project.	Planning	Tronox TRONOX ECO Contractor	Stormwater management plan	Internal and external audits	Update plan when required
Sand tails dump design	D14	The design of the sand tailings disposal facilities will include concurrent rehabilitation and perimeter runoff and sediment management infrastructure.	Planning	Tronox TRONOX ECO Experienced tailings operator	Design and as-built drawings	Internal and external audits	Updated drawings
Minimise and control the impact of climate change on the project – sand tails dumps	D15	Where possible, control ponds must designed and be constructed downstream of the dumps to catch runoff from the dumps.	Planning	Tronox TRONOX ECO Contractor	Design and as-built drawings	Internal and external audits	Updated drawings
Minimise and control the impact of climate change on the project – Water supply and availability (Phases 1 and 2)	D16	A Water Conservation and Water Demand Management plan will be developed and implemented for the site to maximise re-use and recycling of water.	Planning	Tronox TRONOX ECO Contractor	Water Conservation and Water Demand Management Plan Water consumption data	Internal and external audits	Update Water Conservation and Water Demand Management Plan
Minimisation or reduction of Cumulative loss of flora species of conservation concern	D17	Survey patches of natural habitat within the finalised Project footprints prior to vegetation clearing to identify and count flora SCC.	P/C/O	Tronox TRONOX	Identification and relocation of flora SCC	Survey reports, vegetation health, and species identification in affected areas.	Relocation of flora SCC to designated in-situ or ex-situ sites as necessary under appropriate permits.
Minimisation or reduction of habitat loss and disturbance	D18.1	Amend project layout to avoid forest habitat patches. Should the 44ha of forest within the final mine plan not be avoided, these areas must be offset in an approved offset management plan.	Planning	Tronox TRONOX	Approved Offset management plan by EKZNW. Reduced habitat loss in forested areas	Offset management reporting as required by the offset management plan.	Re-assess layout and adjust construction footprint if any unintended habitat loss occurs.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	D18.2	Offsetting of 23 ha CBA forest, 6.12 ha CBA grassland, and 96 ha non-CBA forest in an approved Offset Management Plan. The offset target areas to be confirmed in an approved Offset Management Plan.	Planning	Tronox TRONOX	A EKZNW approved Offset Management Plan. Area offset in line with habitat loss	Offsetting tracking and GIS mapping	Modify offsetting strategies if new areas of habitat loss are identified.
	D18.3	Ensure biodiversity offset area achieves Protected Area status	Planning	Tronox TRONOX	Offset area legally protected	Legal review and field verification	Modify offset area boundaries if legal protection is not achieved
	D18.4	Tronox must make funds available for the implementation of the Biodiversity Offset Management Plan.	Planning	Tronox TRONOX	Offset costs provided in the financial provision calculations.	Auditing	The committed implementation of the BOP pre-construction.
Avoidance of natural habitat	D19	Amend the mine plan and design layout to reroute infrastructure around (not through) areas of natural vegetation and habitat.	Planning	Tronox TRONOX	Amended mine plan	Auditing	Adjusted infrastructure layouts
Minimise the increased pressure on municipal services	D20	Tronox must consult with the local municipality to achieve sustainable municipal connections and services.	Planning	Tronox TRONOX	Recorded communication with the local municipality regarding municipal services.	Quarterly recruitment data; records of meetings with the municipality	Implementation of sustainable municipal connections.
Municipal Planning	D21	It is recommended that Tronox engage with the municipality regarding its future plans so that these can be included in the municipal planning such as the IDP.	Planning	Tronox TRONOX			Inclusion in the upcoming municipal IDP.
Prevent failure or breach of the RSF	D22	An emergency preparedness and response plan (EPRP) for the RSF will be prepared based on a credible RSF breach analysis, considering the impacts of climate change.	Planning	Tronox TRONOX	Emergency preparedness and response plan for the RSF	Regular training, awareness and updates of the RSF EPRP	Contain RSF failure
Minimisation or reduction of Cumulative loss, disturbance, and fragmentation of natural habitat	D23	Amend the proposed Project layout to avoid impacting patches of forest habitat with buffers of 200 m around forest patches with ‘Very High’ SEI scores, and 100 m around those with ‘High’ SEI scores.	Planning	Tronox TRONOX	No impacts to forest habitats with high SEI scores	Field verification and mapping of impacted areas, buffer zones, and development footprints.	Adjust project design if necessary to avoid or minimise further impacts on forest patches with high SEI scores.
Ex Situ Breeding Program for PRF	D24	Develop and implement an ex situ breeding program for PRF	Planning	Tronox TRONOX	Successful breeding and reintroduction of PRF	Breeding success and reintroduction monitoring	Revise breeding program if failure to reintroduce PRF occurs
Reduction of avian mortality from electrical infrastructure	D25	Place pylons in transformed areas and use bird-friendly designs	P/PC	Tronox	No recorded bird electrocutions or collisions	Avian monitoring programme	Modify infrastructure design if bird mortality is recorded.

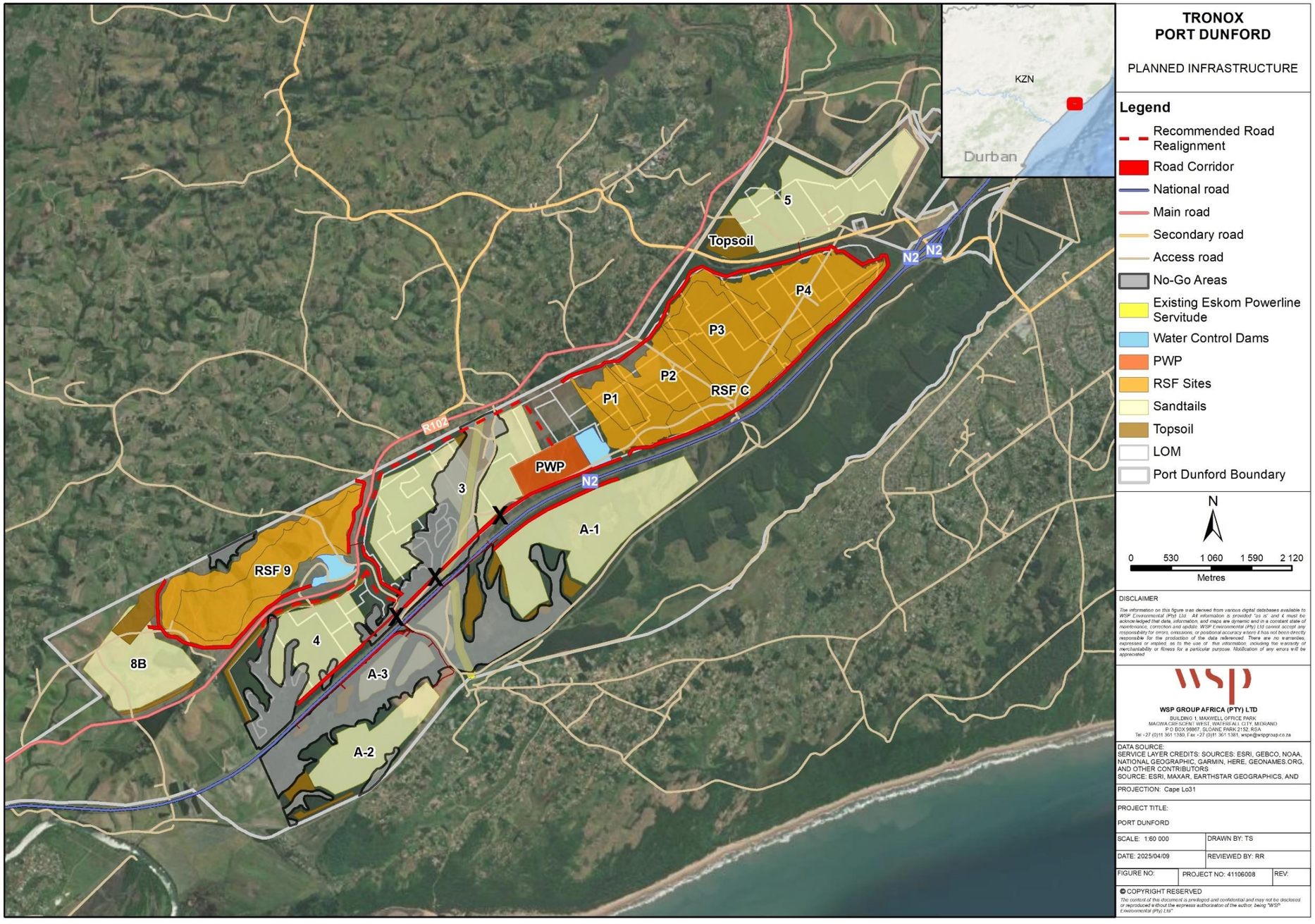


Figure 6-1 - Proposed road and pipeline realignment

6.2 PRE-CONSTRUCTION PHASE

Table 6-3 – Pre-Construction Phase EMPr Requirements

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Mitigate impacts on potential graves Location: 28°53'47.10"S 31°48'4.20"E. Located close (15m) to the northern boundary of the proposed RSF Site 9, this site may not be directly impacted by mining activity however could be impacted should a haulage road or pipeline route be established here.	PC1.1	PD18 – Potential grave If the site will be impacted by mining related activities, the grave and human remains will be removed and consultation with the community will be undertaken.	Pre-construction	Tronox TRONOX	National Heritage Resources Act (Act 25 of 1999) Heritage Permit	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required.
Mitigate impacts on known and claimed graves.	PC1.1	In terms of various known and claimed graves and grave sites, once the issues related to the claimant families have been resolved, and the correct individuals have been identified, a Phase 2 heritage impact assessment and permit application process must be undertaken.	Pre-construction	Tronox TRONOX Heritage practitioner	National Heritage Resources Act (Act 25 of 1999) Phase 2 HIA report Heritage Permit	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required.
Mitigate impacts on cultural heritage resources. Location: 28°54'29.00"S 31°48'8.20"E. Located within a proposed mining area planned for 2056.	PC1.2	PD19 & PD20– Early Forester's house remains and encampment The foundations will be mapped, and the rubbish dump will be partially excavated or sampled.	Pre-construction	Tronox TRONOX Heritage practitioner	National Heritage Resources Act (Act 25 of 1999) Map and samples	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required.
Minimisation or reduction of impact from disturbance and fragmentation of habitats	PC2	Apply buffer zones (e.g., 200m or 100m) around identified habitats with high ecological value to avoid direct disturbance. Delineate these buffer zones. A 32m buffer area must be maintained between the slopes toe slope and the wetland/ waterbody.	PC/O	Tronox TRONOX	No disturbance to habitats within established buffer zones	Periodic inspections to ensure that development is within designated buffer zones.	Modify construction methods or project layout to avoid buffer zone breaches.
Visual screening management	PC3	Plan and establish a visual screen of existing plantation trees, or otherwise plant where needed, of ideally 100 m wide but not less than 50 m wide around boundary of all opencast mining areas. This screen to be managed in x 3 linear rotational harvest zones, to always ensure three height cohorts.	PC/O	Tronox TRONOX	Continuous presence of a dense, multi-layered tree screen around RSFs and sand tail dumps.	Bi-annual aerial/satellite imaging and on-site visual inspections.	Replant missing or sparse sections, adjust harvesting schedule to maintain screen integrity.
Understand what SCC are present in the natural areas within the natural areas within the MRA	PC4.1	Prior to vegetation clearing, any patches of natural habitat that are located within any planned construction footprints should be surveyed by a botanist to identify and count potentially affected flora SCC.	P/PC	TRONOX v	Survey results	Conducted by a botanist	Finings to inform the biomonitoring plan.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimisation or reduction of impact on flora species of conservation concern	PC4.2	Develop and implement a Flora SCC Management Plan to manage flora SCC within proposed development footprints, including potential rescue and relocation strategies as per required permits.	P/PC	Tronox TRONOX	Effective management of flora SCC during development	Monitoring and reporting on flora SCC relocation, survival, and recovery.	Undertake further rescue and relocation activities, if initial efforts fail to ensure species survival.

6.3 CONSTRUCTION, OPERATIONAL AND DECOMMISSIONING PHASE

The construction phase pertains to the construction and establishment of the Phase 1 campsite and the PWP Plant. The operational phase activities pertain to the operational activities in Phase 1 and Phase 2. The Decommissioning Phase activities are those associated with the decommissioning and closure of the mining operation.

Table 6-4 includes measures for the construction (C), operational (O), and decommissioning (D) phases for both Phase 1 and 2.

Table 6-4 - Environmental management programme commitments for the Port Durnford Mining operations.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Soils							
Details of the aspect: The nature of mining involving the removal of mineral resources from beneath the land surface impacts the soils (quality and integrity), the nature in which water relates to the soils during mining and post-mining and consequently, the post-mining end land use. Of the 2087 ha of proposed mining footprint, 1863ha (89%) is under commercial forestry plantations. The soils, land use and hydropedology assessment provided valuable insight as to the nature of the soils being impacted by the proposed development, how the soils, agricultural potential and surrounding areas might be impacted by the proposed mining development, and what the end land use may realistically look like in terms of suitability of end land use.							
Minimise or prevent deterioration of soil quality and quantity	S1	A comprehensive soil and land use capability and hydropedology management plan will be developed prior to construction and implemented over the life of the project.	C/O/D	TRONOX Tronox /ECO/CONTRACTOR	Soil management plan developed and implemented	Review of soil and land use capability and hydropedology management plan	Revise and update plan as necessary based on findings
Minimise loss of soil depth/volume - due to under stripping at the Phase 1 construction camp and for the PWP Plant. Minimise loss of soil quality due to compaction.	S2.1	De-stump the footprint area and schedule to favour live soil placement where possible.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Live soil placement maximised where feasible	Site inspections and verification of scheduling	Adjust scheduling to maximise live soil placement
	S2.2	Strip 30cm Topsoil (orthic A-horizon) and stockpile topsoil in dedicated topsoil stockpiles. 150cm of subsoil must be stripped and stockpiled from the development areas that will not be mined (RSF 9 and sand dump stockpile areas).	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Topsoil stripped and stockpiled separately to subsoil stockpiles	Visual inspections and record-keeping of stripping and stockpiling activities	Reconfigure stockpiles if mixing occurs
	S2.3	When used for rehabilitation, 150cm of sub soil or reconstituted (67% sand tails and 33% fines) subsoil must be placed on the shaped areas prior to the topsoil placement when there is insufficient subsoil volume available for rehabilitation.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	150cm of reconstituted or subsoil placed before topsoil in rehabilitation areas	Inspection of rehabilitation sites and photographic evidence	Correct placement if order is incorrect

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise loss of soil quality due to compaction. Minimise loss of soil volume / quality - due to erosion, also resulting in sedimentation of the surrounding area.	S3.1	Ideally strip and stockpile soils in the dry state.	C/O/D	TRONOX Tronox /ECO/CONTRACTOR	Soils stripped and stockpiled in dry conditions	Weather monitoring and inspection of operations	Adjust the stripping schedule to avoid wet conditions
	S3.2	Utilise tracked machinery for soil stripping/stockpiling operations due to lower point loading.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Tracked machinery used for stripping and stockpiling	Equipment logs and site audits	Ensure compliance through additional training or machinery replacement
	S3.3	Utilise dedicated routes, thereby preventing unnecessary widespread compaction.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Dedicated traffic routes established and followed	Periodic site audits and vehicle tracking	Restrict unauthorised movement and reinforce designated routes
Minimise loss of soil volume / quality - due to erosion, also resulting in sedimentation of the surrounding area.	S4.1	Ensure slopes on stockpiles that face wetlands are shaped ≤1:5 as a minimum (ideally 1:7). Slopes that do not face water courses can be shaped at 1:3.	C/O/D	TRONOX /ECO/CONTRACTOR	Stockpile slopes within required limits	Surveying and slope stability assessments	Regrade slopes to meet required specifications
	S4.2	Revegetate Subsoil stockpile using locally indigenous (to the site) grasses, after ameliorating soil fertility.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Subsoil stockpiles revegetated and monitored for invasive species	Vegetation cover assessments and invasive species monitoring	Implement intervention measures such as reseeding or invasive species removal
	S4.3	Topsoil stockpiles should naturally revegetate without fertilisation or seeding, but if not then intervention will be required. Monitor/remove alien invasive vegetative species.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Topsoil stockpiles naturally revegetate or require intervention	Visual inspections and vegetation assessments	Introduce seeding or fertilisation if revegetation is inadequate
	S4.4	Given the limited space available for soil stockpile footprints on the site, it is recommended to increase these stockpile heights above 3m (normal recommended height when storage space is available) where necessary.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Stockpile heights adjusted based on available space	Regular surveys of stockpile dimensions	Adjust height or relocate material if exceeding safe limits
	S4.5	Practice rollover topsoil rehabilitation. Instead of stockpiling soil from mining Pit footprints, it is wherever possible recommended to rather practise continually ongoing sequential rolling over rehabilitation topsoiling operations throughout the entire Phase 2 Life of Mine, where topsoil stripped from one Pit footprint is immediately utilised to topsoil another Pit area where backfilling has been completed.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Rollover topsoil rehabilitation practised	Review of rehabilitation schedule and field verification	Implement rolling over method wherever feasible
Minimise loss of soil quality - due to reduction in soil fertility.	S5	Ameliorate stockpile soil fertility, as necessary, and as indicated by soil analysis.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Stockpile soil fertility maintained at optimal levels	Soil analysis reports and nutrient testing	Apply necessary soil amendments based on test results

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise loss of soil quality - due to soil contamination by hydrocarbons and other chemicals, resulting in secondary impacts on surface and sub-surface water.	S6.1	The Temporary Infrastructure Area and PWP should be designed to include the following precautions: Separate storage of fuels and chemicals under roofing and on concrete pads that incorporate appropriately sized sumps and bund walls	C/O	Tronox TRONOX /ECO/CONTRACTOR	Fuels and chemicals stored safely with bunding	Inspections of storage areas and bund integrity	Repair or reinforce containment measures as needed
	S6.2	Construction of concrete pads for workshops.	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Workshops constructed with concrete pads	Site inspections and engineering checks	Rectify or reinforce pads if deficiencies are identified
	S6.3	Construction of lined dirty water incept drains in downslope positions of the PWP (not necessary for Temporary Infrastructure site), these flowing through oil/sediment traps before draining into a lined return water dam.	C/O	Tronox TRONOX /ECO/CONTRACTOR	Lined dirty water incept drains installed and functional	Drainage inspections and water quality monitoring	Repair or improve drainage system if contamination is detected
	S6.4	The construction of unlined clean stormwater diversion drains upslope of the PWP (not necessary for temporary Infrastructure site), these being built close to the contour in order to encourage infiltration. The drain/s should discharge onto the soil surface in a midslope position. A concrete energy dissipating structure should be constructed at this discharge point, functioning to both reduce the velocity of the water flow, as well as to spread the discharge over a broader area (thus promoting infiltration into the surrounding sandy soils).	C/O	Tronox TRONOX /ECO/CONTRACTOR	Unlined clean stormwater diversion drains installed and functioning	Site inspections and hydrological assessments	Modify or maintain drains if water diversion is ineffective
Minimise erosion of soil into the first Mining Pit, plus highwall slumping - due to runoff erosion from upslope surrounding areas	S7	Construct runoff diversion berm in all upslope positions at least 10m from the pit highwall, utilising soil (not topsoil).	C/O	Tronox TRONOX /ECO/CONTRACTOR	Runoff diversion berms constructed in correct locations	Surveying and visual inspections	Rebuild or reposition berms if ineffective or displaced
Aspect: Land Use Capability							
Details of the aspect: The intent is to return the end land use back to commercial forestry post-mining. The soils specialist has recommended that certain parameters to slope and soil handling be caried out to ensure that commercial agriculture and adequate rehabilitation be possible post ming. The nature of mining involving the removal of mineral resources from beneath the land surface impacts the soils (quality and integrity), the nature in which water relates to the soils during mining and post-mining and consequently, the post-mining end land use. Of the 2087 ha of proposed mining footprint, 1863ha (89%) is under commercial forestry plantations. The soils, land use and hydropedology assessment provided valuable insight as to the nature of the soils being impacted by the proposed development, how the soils, agricultural potential and surrounding areas might be impacted by the proposed mining development, and what the end land use may realistically look like in terms of suitability of end land use.							
Minimise destruction of the existing Land Capability (class - as defined for Pre-Mining) potential. These include Grazing, and rarely Arable classes.	LU1	No mitigation is possible until the mining of the sites have been completed and have been rehabilitated (re-graded / topsoiled / fertilised / re-vegetated).	O/D	Tronox TRONOX /ECO/CONTRACTOR	Sites rehabilitated as per closure objectives	Regular site inspections and rehabilitation progress reports	Implement additional measures if rehabilitation is inadequate

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	S2.2	Mitigate with applying the reconstituted soil layers with 150cm subsoil and then 30 cm of topsoil.	O/D	Tronox TRONOX /ECO/CONTRACTOR	Soil layers applied as per specification	Soil depth measurements and photographic evidence	Reapply layers if depth does not meet requirements
Minimise destruction of the existing Land Use potential which includes very high potential *Eucalyptus* plantations (also suitable for highly demanding agricultural crops); as well as Grasslands, and occasional patches of indigenous bush (latter mostly in riparian/wetland/or steep areas).	LU2	Avoid the mining related disturbance of Wetland / Riparian areas as per the wetland related mitigation measures.	C/O	Tronox TRONOX /ECO/CONTRACTOR	No disturbance of sensitive areas outside those that have been specifically authorised to clear	Aerial surveys, ground inspections, and GIS mapping	Implement strict no-go zones and remedial wetland restoration if necessary
Minimise unacceptable soil erosion due to proposed 1:3 (18.4 ^{o}, terraced) side slopes, and Topsoiling depth due to capping with only 30cm of Topsoil (orthic A-horizon). Reduce poor soil properties (fertility & compaction) and consequently reduced Land Capability / Land Use potential, as compared with the pre-mining potential.	LU3.1	Side slopes to be shaped at ≤1:5 (11^{0}) but ideally1:7 (8^{o}) . Terracing is optional if side slopes are so reduced by correct reshaping. Slopes must be reduced as specified, from the proposed 1:3 (18.4° - terraced).	C/O/D	Tronox TRONOX /ECO/CONTRACTOR	Side slopes regraded as per design	Slope stability surveys and visual inspections	Regrade areas where slopes exceed 1:7
	LU3.2	Final rehabilitated pit profiles should be whale-backed in shape, with the apex height being raised to at least 15m above the original ground level. This height may be increased provided that side-slopes are maintained at ≤1:5 to ≤1: 7(ideally).	O/D	Tronox TRONOX /ECO/CONTRACTOR	Pit profiles shaped as per specifications	Aerial surveys and engineering assessments	Adjust profiles if they do not meet height and slope criteria
	LU3.3	Clean and dirty water control structures surrounding the pits must be maintained during rehabilitation, in order to trap sediment.	O/D	TRONOX v/ECO/CONTRACTOR	Water control structures intact and functional	Water quality testing and sediment capture efficiency assessments	Repair/replace structures as needed
	S2.2	Improve land capability and land use potential by capping with a 150cm (minimum) reconstituted 'soil' layer (mixing ratio: 33% Fines : 67% Sand);	O/D	TRONOX /ECO/CONTRACTOR	Soil cap applied as specified	Soil profile analysis and field inspections	Apply additional capping material if required
	S2.2	Place a 30cm layer of previously stockpiled Topsoil (orthic A-horizon) over this reconstituted layer.	O/D	TRONOX /ECO/CONTRACTOR	Topsoil applied correctly	Depth measurements and visual confirmation	Redistribute topsoil if layering is incorrect
	S5	Analyse soil fertility and ameliorate as required.	O/D	TRONOX /ECO/CONTRACTOR	Soil fertility optimised for vegetation growth	Periodic soil testing and nutrient assessments	Apply fertilisers or soil conditioners as needed
	S4.2	Revegetate with locally indigenous (to the site) grasses to stabilise the surface soils, until such time as an alternative sustainable land use is implemented (e.g. *Eucalyptus*).	O/D	TRONOX /ECO/CONTRACTOR	Vegetation established as planned	Vegetation cover assessments and biodiversity surveys	Reseed or introduce additional plant species if required
Preserve soil structure and fertility by practicing ongoing	S4.5	Wherever possible, practise continually ongoing sequential rolling over backfilling and rehabilitation topsoiling operations throughout the entire Phase 2, where topsoil stripped from	O/D	TRONOX /ECO/CONTRACTOR	Rolling rehabilitation implemented	Progress tracking and site audits	Adjust scheduling to maximise efficiency

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
sequential backfilling and topsoiling. Reduce the need for additional tailings dumps by utilizing Sand Tailings site 8B first. Improve land capability and future use potential by capping with subsoils and topsoil. Control water and sediment by establishing toe paddocks and berms.		one mining Pit footprint is immediately utilised to topsoil another Pit area where backfilling has been completed.					
	LU4.1	Avoid the presence of any surface water bodies. A 32m buffer area must be maintained between the slopes toeslope and the wetland/ waterbody.	O/D	TRONOX /ECO/CONTRACTOR	No artificial surface water bodies created	Aerial imagery and field surveys	Implement drainage and grading adjustments if water bodies form
	S2.2	Improve land capability and land use potential by capping with 150 cm of the originally stripped and stockpiled Subsoils. Note: no subsoil need be stripped in the areas that will be mined as these areas contain mineral value. In these cases, a 150cm reconstituted soil later must be placed prior to topsoil. Strip soil in Sand dump 8 area according to the stripping guide provided in Map 7 of the Soils assessment	O	TRONOX /ECO/CONTRACTOR	Subsoil cap applied correctly	Soil profile analysis and field inspections	Add additional subsoil where necessary
	S2.2	Place a 30 cm layer of previously stockpiled Topsoil (orthic A-horizon) over this Subsoil layer.	O	TRONOX /ECO/CONTRACTOR	Topsoil correctly layered	Depth measurements and photographic documentation	Redistribute topsoil if incorrectly placed
	LU4.2	Topsoiling operations conducted utilising tracked (rather than wheeled) machinery and also utilise dedicated traffic routes, this in order to limit soil compaction.	O	TRONOX /ECO/CONTRACTOR	Soil compaction minimised	Machinery logs and compaction testing	Adjust operations to reduce soil compaction
	S5	Analyse soil fertility and ameliorate as required.	O	TRONOX /ECO/CONTRACTOR	Soil fertility optimised for vegetation growth	Periodic soil testing and nutrient assessments	Apply fertilisers or soil conditioners as needed
	S4.2	Revegetate with locally indigenous (to the site) grasses to stabilise the surface soils, until such time as an alternative sustainable land use is implemented.	O	TRONOX /ECO/CONTRACTOR	Vegetation established as planned	Vegetation cover assessments and biodiversity surveys	Reseed or introduce additional plant species if required
	S7	Toe Paddocks and a Berm surrounding the feature must be established during construction, to trap water / sediment and prevent the siltation of downstream watercourses.	P/O	TRONOX /ECO/EXPERIENCED TAILINGS OPERATOR	Toe Paddocks and Berms in place	Engineering inspections and sediment capture assessments	Modify structures if not effectively containing sediment

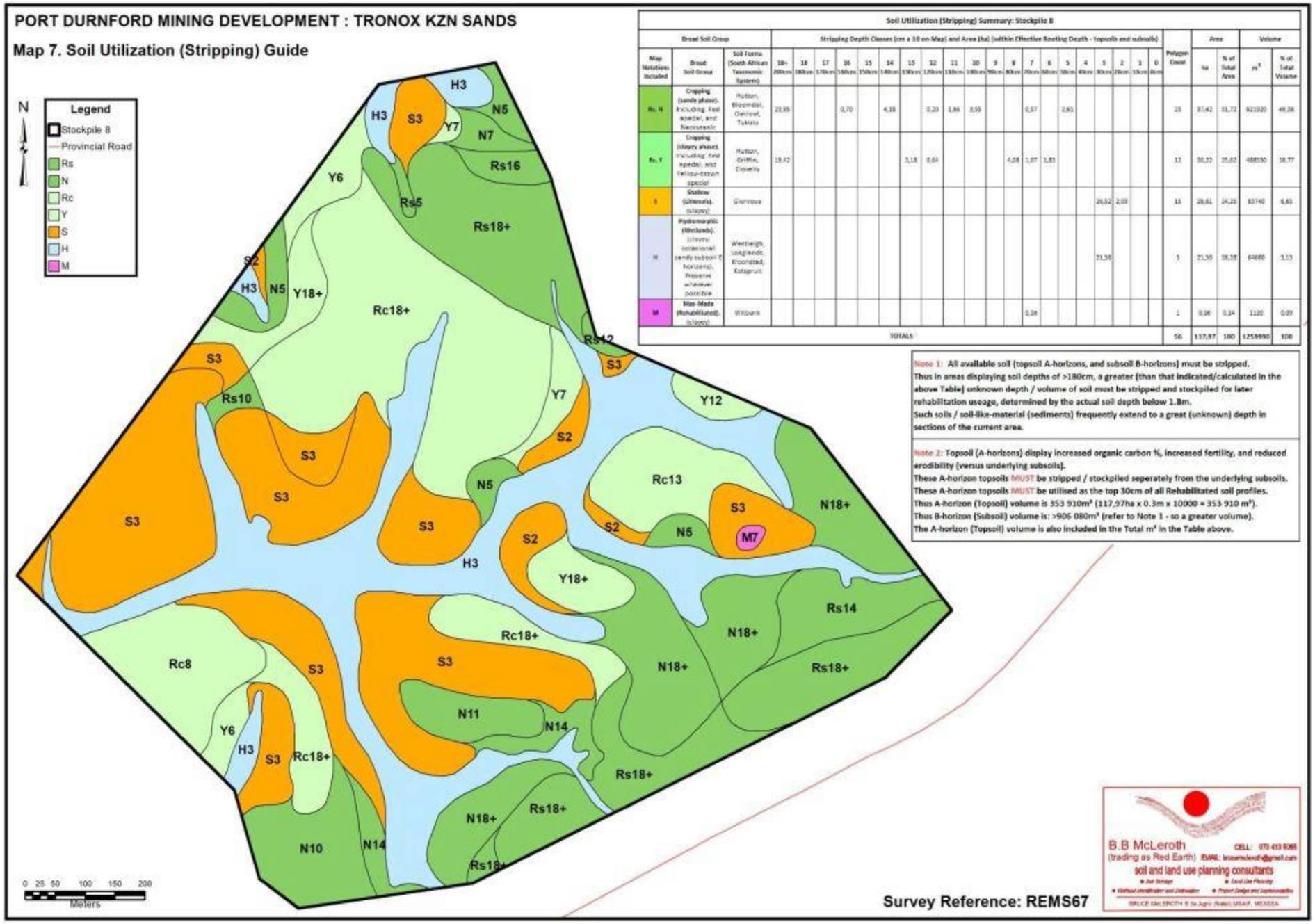


Figure 6-2 - Stripping guide for Sand tails Dump Area 8 - climate change

Reduction in soil erosion, improved land stability and capability, enhanced soil fertility, and successful revegetation with indigenous grasses, leading to a sustainable and rehabilitated landscape	LU5.1	Final slopes must be shaped to1:5 (11.3°) at a minimum, ideally 1:7 (8^{0}).	O/D	TRONOX /ECO/ CONTRACTOR	Slope stability surveys and visual inspections	Regrade areas where slopes exceed 1:7	Slope stability surveys and visual inspections
	LU5.2	Final rehabilitated Pit profiles (repurposed RSF C) should be whale-backed in shape, with the apex height being raised to approximately 15m above the original ground level. This height may be increased provided that side-slopes are maintained at ≤1:7(max 1:5).	O/D	TRONOX /ECO/ CONTRACTOR	Pit profiles formed as per specifications	Engineering assessments and drone imagery	Modify profiles if they do not meet criteria
	S7	A Berm (and Toe Paddocks when the feature height exceeds ground level) surrounding the RSF must be established during rehabilitation, in order to trap sediment.	O/D	TRONOX /ECO/CONTRACTOR	Sediment trapping measures installed	Sediment retention monitoring and maintenance checks	Repair structures if sediment control is insufficient
	S2.2	Improve land capability and land use potential by Topsoiling (capping) with a 150cm (minimum) Reconstituted 'soil' layer (mixing ratio: 33% Fines: 67% Sand)	O/D	TRONOX /ECO/CONTRACTOR	Grazing capability restored	Soil quality assessments and land use monitoring	Amend soil quality if needed to support grazing
	LU4.2	Topsoiling operation conducted utilising tracked (rather than wheeled) machinery and also utilise dedicated traffic routes, this in order to limit soil compaction.	O/D	TRONOX /ECO/ CONTRACTOR	Soil compaction minimised	Machinery logs and compaction testing	Adjust operations to reduce soil compaction
	S4.5	Practise rolling over rehabilitation topsoiling throughout the entire Life of Mine, where topsoil stripped in one area is immediately utilised to topsoil another area where deposition / backfilling has been completed	O/D	TRONOX /ECO/ CONTRACTOR	Rolling rehabilitation implemented	Progress tracking and site audits	Adjust scheduling to maximise efficiency
	S4.2	Revegetate with locally indigenous (to the site) grasses to stabilise the surface soils, until such time as an alternative sustainable land use is implemented. Monitor/remove alien invasive vegetative species.	O/D	TRONOX /ECO/ CONTRACTOR	Vegetation established as planned	Vegetation cover assessments and biodiversity surveys	Reseed or introduce additional plant species if required
Water management	LU6	No non-free draining depressions or hollows must be left on the slopes.	O/D	TRONOX / CONTRACTOR	Visual inspection	Auditing	Reshape depressions
Minimise the excessive height and slope in order to reduce excessive soil erosion, thus also avoiding significant sedimentation of the surrounding area together with poor soil properties (fertility & compaction), and droughty soil conditions.	LU1.5	Current Significance also assumes that soil erosion is reduced by re-grading side slope to ≤1:7 (8^{o} - terraced) (minimum 1:5), by correct reshaping [reduced from proposed 1:3 (18.4°)].	O/D	TRONOX /ECO/ CONTRACTOR	Slope stability surveys and visual inspections	Regrade areas where slopes exceed 1:7	Slope stability surveys and visual inspections
	LU7.2	Improve the post-rehabilitation land capability (to grazing) and future land use potential, by Topsoiling (final capping) with 150cm (minimum) of the originally stripped / stockpiled Subsoils.	O/D	TRONOX /ECO/ CONTRACTOR	Grazing capability restored	Soil quality assessments and land use monitoring	Amend soil quality if needed to support grazing
	S2.2	Place a 30cm layer of previously stockpiled Topsoil (orthic A-horizon) over this Subsoil layer.	O/D	TRONOX /ECO/ CONTRACTOR	Topsoil correctly layered	Depth measurements and photographic documentation	Redistribute topsoil if incorrectly placed
	LU4.2	Topsoiling operation conducted utilising tracked (rather than wheeled) machinery and also utilise dedicated traffic routes, this in order to limit soil compaction.	O/D	TRONOX /ECO/ CONTRACTOR	Soil compaction minimised	Machinery logs and compaction testing	Adjust operations to reduce soil compaction
	S5	Analyse soil fertility and ameliorate as required.	O/D	TRONOX /ECO/ CONTRACTOR	Soil fertility optimised for vegetation growth	Periodic soil testing and nutrient assessments	Apply fertilisers or soil conditioners as needed
	S4.2	Revegetate with locally indigenous (to the site) grasses to stabilise the surface soils, until such time as an alternative sustainable land use is determined. Monitor/remove alien invasive vegetative species.	O/D	TRONOX /ECO/ CONTRACTOR	Vegetation established as planned	Vegetation cover assessments and biodiversity surveys	Reseed or introduce additional plant species if required
Minimise unacceptable soil erosion / depth, and poor soil properties (fertility / compaction).	LU8.1	Demolish all infrastructure and associated foundations, concrete pads, tarred surfaces / paving; and remove rubble, scrap, waste material, and any potentially contaminated surface soils from site.	D	TRONOX /ECO/ CONTRACTOR	Infrastructure removed and site cleared	Demolition records and waste tracking	Ensure all waste is properly disposed of or recycled
	LU8.2	Close in the clean and dirty water drains, utilising the soil berms immediately upslope (this being the material excavated during their construction).	D	TRONOX /ECO/ CONTRACTOR	Water drains effectively closed	Hydrological monitoring and site inspections	Backfill and stabilise any remaining drainage pathways

	LU8.3	Reshape the associated RWD, remove contaminated sediments / soil, re-grade (re-shape) to slope ≤1:7 (8°), topsoil with soils removed during construction (Subsoils overlaid by Topsoil), ameliorate fertility, and re-vegetate.	D	TRONOX /ECO/ CONTRACTOR	Return Water Dam reshaped and free of contamination	Topographic surveys and soil testing	Rework reshaping and remove any remaining contamination
	LU5.1	Re-grade (re-slope) the PWP footprint area to be free draining and to approximate the topography of the surrounding area (considering shape, and slope ≤1:7 (8°), before topsoiling.	D	TRONOX /ECO/ CONTRACTOR	PWP area regraded to correct slopes and contours	Aerial surveys and visual inspections	Adjust grading where necessary to improve drainage
	S2.2	Replace 150 cm of the originally stripped and stockpiled Subsoils over the reshaped area.	D	TRONOX /ECO/ CONTRACTOR	Subsoil layer applied at correct depth	Depth measurements and site inspections	Apply additional subsoil where necessary
	S2.2	Then replace a 30 cm layer of previously stockpiled Topsoil over this Subsoil layer.	D	TRONOX /ECO/ CONTRACTOR	Topsoil correctly applied and evenly distributed	Soil profile analysis and field inspections	Redistribute or supplement topsoil if layering is incorrect
	LU4.2	Topsoil operation conducted utilising tracked (rather than wheeled) machinery and also utilise dedicated traffic routes, this in order to limit soil compaction.	D	TRONOX /ECO/ CONTRACTOR	Minimal soil compaction in rehabilitated areas	Machinery logs and compaction testing	Modify operations and use decompaction techniques if needed
	S5	Analyse soil fertility and ameliorate as required.	D	TRONOX /ECO/ CONTRACTOR	Soil supports sustainable vegetation growth	Periodic soil sampling and nutrient analysis	Apply soil amendments, fertilisers, or conditioners as needed
	S4.2	Revegetate only with locally indigenous (to the site) grasses to stabilise the surface soils, until such time as the selected sustainable land use is implemented. Monitor/remove alien invasive vegetative species	D	TRONOX /ECO/ CONTRACTOR	Vegetation cover established with native species	Vegetation surveys and biodiversity monitoring	Reseed or introduce additional indigenous species if necessary
Ensure implementation of pre-defined closure objectives, and Tronox 's key aims as follows: ■ safe and healthy post-mining environment, ■ economically viable and sustainable post-mining land use, ■ limited residual environmental Impacts, and ■ optimal post-mining social opportunities	LU9.1	Implement post-closure monitoring and maintenance programmes that should be continued until such time as all rehabilitated areas / facilities are demonstrated to be stable, non-erosive, non-polluting and sustainable in the long term (after Closure).	D	TRONOX /ECO/ CONTRACTOR	Ongoing site stability and ecological recovery	Regular inspections and sustainability assessments	Adjust management strategies to address emerging issues
	LU9.2	Adaptive management practices may need to be implemented to ensure that all predefined Closure objectives have been achieved.	D	TRONOX /ECO/ CONTRACTOR	Compliance with closure requirements	Review of monitoring data and stakeholder feedback	Modify mitigation strategies if targets are not met

Aspect: Hydropedology							
Details of the aspect: Hydropedology is a multidisciplinary field that studies the interactions between soil and water, integrating concepts from pedology, soil physics, and hydrology to understand how soils influence hydrological processes and vice versa, with applications in resource management and environmental planning. Understanding how water will interact with the current and future soil profiles is important to inform the management of both soil and water on the proposed site. It is understood that given the nature of the current soils that will remain on site and the proposed deposition plan, an increase in baseflow can be anticipated from the RSF and sand dump sites, implying that careful management will be required to manage the flow and seepage of water from the proposed infrastructure.							
Recharge in infrastructure footprint areas is offset by higher recharge within unlined clean stormwater drains	HP1	Construct unlined clean stormwater interception drains upslope of infrastructure footprint areas.	C	TRONOX	Functional stormwater drains	Site inspections and hydrological assessments	Maintain and clear drains as needed
Reduced risk of seepage-related erosion and improved water capture for reuse	HP2	Direct surface water on RSF to penstocks and spillways for reuse.	O	TRONOX	Effective water capture and controlled runoff	Water flow measurements and structural inspections	Repair and optimize drainage infrastructure as required
Hastened drying and stabilization of RSF, reducing recharge and interflow volumes	HP3	Reduce RSF slope to ≤1:7 (1:5 minimum), apply subsoil and topsoil and revegetate with water-demanding vegetation	O	TRONOX	Stable slopes with established vegetation	Vegetation cover assessments and soil stability surveys	Reseed and adjust slope gradients if necessary
Reduced erosion and improved infiltration	LU5.1	Reduced side slopes of rehabilitated pits to ≤1:7 (1:5 minimum) and maintain berms	D	TRONOX	Slopes reshaped and stable with reduced runoff	Slope stability assessments and aerial surveys	Regrade areas if slopes exceed design criteria
Improved post-rehabilitation land use potential and soil fertility	S2.2	Improve land capability by applying a 150 cm reconstituted soil layer and 30 cm topsoil	D	TRONOX	Soil layer applied per specifications and vegetation growth observed	Soil profile analysis and vegetation monitoring	Reapply soil layers or adjust fertility if necessary
Reduced reliance on stockpiles and reduced extent of tailings dumps	S4.5	Implement sequential backfilling and rehabilitation throughout the Life of Mine	O	TRONOX	Ongoing rehabilitation progress as per schedule	Site audits and progress tracking	Adjust sequencing strategy if delays occur
Encouraged infiltration and reduced runoff, mitigating reduced recharge	LU5.1	Reduce sand dump side slopes to ≤1:7 (1:5 maximum) and revegetate	CO	TRONOX	Stable slopes with vegetation cover	Slope and vegetation assessments	Regrade slopes and enhance vegetation cover as required
Restored pre-mining hydropedological/hydrological flow pathways as closely as possible	HP4	Demolish infrastructure, remove rubble, regrade and rehabilitate PWP site	D	TRONOX	Site cleared, regraded, and vegetated	Site inspections and hydrological monitoring	Implement additional rehabilitation if required
Aspect: Forestry							
Details of the aspect: Large portions of the proposed Port Durnford site have been under commercial timber plantations for most of the last century. These areas are intended to be returned to the landowner once mining operations have concluded. A body of knowledge, derived from previous studies, past forestry trials at the adjacent Hillendale mineral sands mining site, and published literature, has been evaluated. A site inspection of the rehabilitated slopes at Hillendale and Fairbreeze mines were undertaken to give the soils, forestry and Eap first hand knowledge and understanding on the rehabilitation status on the other two mine sites in the same area. This information has helped inform specialist recommendations pertaining to post-mining use of the land for forestry.							

Increased soil fertility and water retention in topsoil layers, supporting forestry productivity, especially in areas with proper management.	S2.2 S5	Topsoil management (30 cm), reconstituted subsoil (1.5 m), and intensive post-planting management (fertilization, legumes, *Acacia* species, higher density planting and early thinning).	O/D	TRONOX	Soil fertility, water retention capacity	Soil and water retention monitoring; forestry growth and yield performance evaluation.	Amend soil with fertilizers, manage water retention, and implement forestry management practices.
Stabilisation and suitable land use adaptation, ensuring long-term sustainability of non-commercial forestry.	D5	Redirect these areas towards indigenous vegetation and non-commercial forestry land use.	P/O/D	TRONOX	Vegetation growth, erosion control	Regular monitoring of vegetation cover and erosion on steep slopes.	Rehabilitate with suitable plant species and manage erosion.
Restoration of soil fertility over time, allowing for sustainable forestry production in the future.	S2.2	Reconstitute subsoil with a 1.5 m depth and a 30 cm topsoil layer. Ensure continuous topsoil management throughout mining phases, including rollover storage and re-spreading over mined areas.	C/O	TRONOX	Soil fertility, crop yield rates	Soil quality testing and crop performance evaluation over multiple seasons.	Reapply fertilizers, enhance water retention techniques, and amend the soil as necessary.
Improved water retention and reduced moisture loss, ensuring better conditions for forestry productivity.	FO1	Increase water retention capacity in the topsoil, ensuring a higher degree of rainfall interception.	O/D	TRONOX	Soil moisture content, water table levels	Monitor moisture content at various soil depths and track water table levels regularly.	Implement irrigation and water retention techniques to support vegetation.
Assess reforestation potential on RSFs, adapt management practices as required.	FO2	Develop a dedicated reforestation and management plan for RSFs. Research and monitor water availability and soil conditions.	O/D	TRONOX	Growth rates of planted vegetation, water availability in RSFs	Conduct research and data collection on RSF soil and water dynamics.	Adjust reforestation techniques based on data and conditions.
Securing land for mining and forestry operations with appropriate zoning, minimising conflict.	D6 D12	Lodge a Rezoning Application for affected areas, aligning with municipal and regional development plans.	P/C/D	TRONOX	Rezoning approval, land use compliance	Monitor municipal approvals and compliance with zoning regulations.	Adjust land use plans and zoning as required by municipal guidelines.
Minimized impact on Mondi's water use operations through proper planning and licensing.	D7	Assess and address water use licensing requirements closer to the time of land transfer.	P/D	TRONOX	Water quality, catchment health	Monitor water quality and usage throughout the mining and rehabilitation phases.	Apply for necessary licenses and modify operations to comply with regulations.
Facilitation of forestry activities after 12 years through effective land rehabilitation and management.	S2.2 S5	Implement intensive land rehabilitation and management, ensuring timely soil fertility restoration and water retention improvements.	O/D	TRONOX	Time until land is ready for planting, tree survival rate	Monitor progress of rehabilitation, including planting and growth stages of trees.	Focus on early management and fertilization to speed up recovery of land for forestry.

Aspect: Radiology							
Details of the aspect: In the KZN sand dunes, heavy minerals are associated with naturally occurring radionuclides from the U-238 and Th-232 decay series. As a result, it is expected that naturally occurring radionuclides will be present in the mined mineral sand (ore), any residues generated during the separation of heavy minerals, and the final heavy mineral concentrates and products. The International Atomic Energy Agency (IAEA) Safety Glossary (IAEA, 2018) classifies materials handled, processed, and produced from mining and mineral processing that contain naturally occurring radionuclides as Naturally Occurring Radioactive Material (NORM). Due to the presence of these radionuclides, NORM can potentially pose health risks to humans exposed to these materials. Due to the presence of naturally occurring radionuclides in the mineral sands deposit, Tronox was legally obligated to assess the potential radiological impact and safety of the Port Dunford Mine as part of the broader S&EIR. The purpose of the RPSA within this process, and as part of the overall Radiation Management Programme (RMP), is to demonstrate to the NNR and other stakeholders that the potential radiological impact from the Port Dunford Mine meets the compliance criteria for protecting members of the public against exposure to ionising radiation. Note: the concludes risk of radiation exposure to the general public from this project was very low. Radiation exposure through ground, surface water or dust exposure was considered a negligible risk.							
Reduced exhalation of radon gas, maintaining radiation exposure within regulatory limits.	R1	Wetting of facilities to reduce exhalation. Provide covering layers to increase diffusion length, allowing for decay of radon progeny before release.	O	TRONOX	Reduced radon exhalation rate.	▪ Periodic measurement of radon concentration in air. ▪ Check for coverage over RSFs, open pits, and stockpiles.	▪ Increase water application where necessary. ▪ Repair or replace covering layers if degradation occurs.
Reduction of airborne dust and particulate matter exposure.	R2	Wetting of material before feeding into DTMUs. Hydraulically transferred material deposited wet on stockpiles and pits. Use of water sprayers in PWP screening and crushing. Rehabilitation and vegetation of legacy stockpiles. Develop an air quality management plan and monitoring.	O	TRONOX	Reduced airborne particulate matter (PM_{10}, TSP).	▪ Continuous air quality monitoring (PM10, TSP) at upwind and downwind locations. ▪ Monthly review of dust suppression activities.	▪ Increase use of water sprays where dust exceeds limit. ▪ Ensure proper rehabilitation of stockpiles.
Containment of radionuclides within the RSFs and prevention of groundwater contamination.	R3	Develop strategies for managing extraneous water. Active remediation (cut-off trenches or pump and treat) for short to medium term. Implement Radon monitoring programme.	D	TRONOX	No significant increase in radionuclides in groundwater.	▪ Monthly groundwater quality monitoring (radionuclides). ▪ Check for effective functioning of water management systems.	Activate remediation measures if contamination levels exceed regulatory limits.
Safe removal of contaminated infrastructure, restoring site to regulatory compliance.	R4	Perform gamma radiation survey at infrastructure sites. Rehabilitation and clean-up for conditional/unconditional clearance by regulatory authority. RSFs and open pit areas must be covered with topsoil.	D	TRONOX	Compliance with gamma radiation survey results.	▪ Monitor decommissioning progress. ▪ Inspection for decontamination and clearance by regulatory authority.	Repeat decommissioning steps where contamination persists.
Reduced airborne radon and particulate matter post-closure.	R5	Rehabilitation and vegetation of legacy stockpiles. Implementation of the air quality management plan and monitoring.	D	TRONOX	Reduced radon and particulate levels in air.	▪ Quarterly air quality monitoring for radon and particulate matter. ▪ Annual review of rehabilitation success.	▪ Rehabilitate areas that do not meet vegetation goals. ▪ Increase dust suppression measures if

							radon or particulate matter exceeds limits.
Aspect: Property							
Details of the aspect: Concerns were raised about how the proposed mining development might impact property values in the surrounding areas, particularly Mtunzini and Zini Estate. The property value assessment used trends from several other smaller KZN coastal towns, combined with first-hand data collection and input from specialist studies, to understand the potential impacts on property values from the proposed mining development. The implementation of property value related mitigation measures pertain predominantly to mitigating the nuisance factors as identified and recommended by the air quality, noise and visual assessments.							
Enhancement of local employment opportunities and community benefits.	PR1	▪ Continued implementation of employment and CSR initiatives. ▪ Supporting local economic development through social investment programmes.	O	TRONOX	Number of local job opportunities created. CSR budget allocation.	Annual reporting on employment and CSR initiatives.	Adjust CSR projects based on community feedback and needs.
Reduction in visual impact over time.	S4.5 PC3	▪ Implementation of progressive rehabilitation to restore natural landscape. ▪ Landscaping and vegetation screening around key visual areas.	PC/O/D	TRONOX	Public perception surveys. Percentage of rehabilitated land.	Annual community perception survey. Site inspections.	Increase landscaping and rehabilitation efforts if concerns persist.
Minimise dust levels to prevent impact on nearby properties.	PR2	▪ Implement dust suppression measures as per AQ requirements and implement the air quality monitoring programme.	O	TRONOX	Dust fallout measurements (PM_{10}, TSP).	Continuous air quality monitoring. Regular community feedback.	Increase dust suppression if exceedances are detected.
Reduced noise levels at residential areas.	PR3	▪ Use of noise barriers and controlled operational hours. ▪ Regular equipment maintenance to reduce noise levels.	O	TRONOX	Noise level compliance with regulatory limits.	Regular noise monitoring. Community complaints tracking.	Modify operational hours if noise exceeds limits.
Minimise traffic-related disruptions.	PR4	▪ Traffic management plan to reduce peak-hour congestion. ▪ Road maintenance to minimise vehicle noise and dust.	O	TRONOX	Traffic flow analysis. Road maintenance status.	Regular traffic impact assessments.	Adjust traffic control measures as necessary.
Strengthened community relations and sustained tourism appeal.	PR5	▪ Continued engagement with the community. ▪ Enhancement of eco-tourism projects to preserve and promote the environmental value of the area.	O/D	TRONOX	Community satisfaction surveys. Visitor statistics for eco-tourism.	Quarterly engagement meetings with stakeholders. Feedback analysis.	Increase support for eco-tourism initiatives if needed.
Improved stakeholder relationships and issue resolution.	PR6	▪ Open communication channels for impact reporting and resolution.	O	TRONOX	Number of meetings held. Community feedback and resolution rate.	Quarterly or bi-annual meetings with residents.	Address concerns raised in meetings and follow up on resolutions.
Diversification of the local economy through sustainable tourism.	PR7	▪ Support local eco-tourism initiatives. ▪ Publicise mine rehabilitation efforts and sustainability actions to attract visitors.	O	TRONOX	Growth in eco-tourism investments. Tourist arrivals in the region.	Annual tourism impact assessment. Review of marketing efforts.	Increase investment in eco-tourism projects if visitor numbers decline.
Aspect: Heritage							
Detail description of aspect: There is a fairly large number of cultural heritage (archaeological and/or historical) sites, features and material present in the project area (Figure 3-2). These range from the Stone Age (ESA, MSA & LSA open-air scatters), Iron Age and more recent historical periods (related to the Anglo-Zulu War and sites associated with early forestry in the Port Durnford area). Although many of these sites are deemed of low significance due to the fact that they are either already demolished or severely impacted, many are of medium to high significance and several mitigation measures have been recommended to minimise or negate the impacts of development on them. It is important that should any activity be amended to this EA in the future, that cognisance of the existing heritage aspects of significance, location, and implication of disturbance be understood.							

Mitigate impacts to graves within the MRA 28°53'25.30"S 31°49'9.30"E. Located within a proposed mining area planned for 2064.	PC1	PD 21 – Possible grave sites The ancestral remains will be removed prior to mining (2064). The relocation of all graves will be undertaken by an organisation experienced in these matters.	O	▪ TRONOX ▪ Heritage practitioner	▪ National Heritage Resources Act (Act 25 of 1999) ▪ Heritage Permit	Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Mitigate impacts on cultural heritage resources (metal working activity) Location 28°53'5.10"S 31°50'17.10"E (Central point. Figure 12 in the HIA). These sites will be affected by the proposed project. Located in the proposed mining pit planned for excavation in 2038 and 2069 as well as part of the PWP site.	PC2	PD 33 – Metal working activity The site will be (partially) excavated, as it is located in the proposed mining pit planned for excavation in 2038 and 2069 as well as part of the PWP site.	O	▪ TRONOX ▪ Heritage practitioner	▪ National Heritage Resources Act (Act 25 of 1999) ▪ Heritage Permit	Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Mitigate impacts on cultural heritage resources Located outside of the current mining footprint.	PC2	Fort Napoleon and significant hills Although not currently planned, should these hills be mined, or have tailings facilities located nearby, or the sense of place be altered, the following mitigation measures will be implemented: ▪ Each hill that was identified as being related to the Anglo-Zulu War will be excavated in full (if it is to be impacted); ▪ Each hill will be rebuilt to its original shape and height after mining has occurred; ▪ After mining, each hill will get a commemorative ‘plaque’. This ‘plaque’ would be site specific and provide basic information regarding the site, including that it was mined and rebuilt; and ▪ A small site museum will be located somewhere nearby where the results of the excavations and historical searches would be shown.	C/O/D	▪ TRONOX ▪ ECO	▪ National Heritage Resources Act (Act 25 of 1999)	Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Mitigate impacts on significant cultural heritage resources Located outside of the development footprint	PC2	▪ Umlalazi Bridge ▪ Should the bridge be used for pipe crossings, the pipeline will be painted in a similar colour as the bridge. A permit from Amafa KZN Built Environment will be obtained for the modification/alteration of the bridge.	Pre-construction	▪ TRONOX ▪ Heritage practitioner	▪ National Heritage Resources Act (Act 25 of 1999) ▪ Heritage Permit	Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.

							▪ Consult with specialist where required.
Mitigate cultural heritage resources that are found accidentally.	H1	▪ Develop and implement a Chance Find Protocol for the project.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Chance Find Protocol ▪ National Heritage Resources Act (Act 25 of 1999)	Internal and external audits	Update Chance Find Protocol
Aspect: Palaeontology							
Details of the aspect: A Phase 1 Palaeontological Impact Assessment (PIA), including a desktop assessment and fieldwork survey, was conducted to identify and assess potential impacts on paleontological resources from the proposed mining development, such as damage from construction machinery and the destruction of fossils by various development activities. No palaeontology resource was found on the MRA however a chance find protocol must be utilised.							
Prevention of accidental destruction of significant fossil sites.	PA1	▪ ECO must survey for fossils before or after clearing, blasting, drilling, or excavating. ▪ ECO to be trained on local formations and fossils.	C/O	TRONOX	Number of pre-clearing and post-clearing inspections.	Routine inspections by the ECO. Site clearance reports.	Halt work and consult a palaeontologist if fossils are found.
Conservation of any significant palaeontological finds.	PA2	▪ Implementation of "chance fossil find" protocol.	C/O	TRONOX	Number of recorded fossil discoveries and reports to SAHRA.	Regular ECO oversight during site works.	Implement a 30 m no-go zone and notify SAHRA if fossils are found.
Compliance with heritage protection regulations.	PA3	▪ If fossils are found, mining must stop immediately within a 30 m radius. ▪ SAHRA must be contacted for further assessment and required mitigation.	C/O	TRONOX	Response time for fossil discoveries and mitigation.	On-site training for workers to recognise fossils.	Engage a palaeontologist for formal assessment and mitigation if needed.
Adherence to palaeontological and heritage conservation laws.	PA4	▪ Areas requiring permits from SAHRA must be identified and addressed. ▪ Section 37(2) agreement of OHSA to be signed with Contractors to ensure compliance.	P/O	TRONOX	Number of permits obtained where required.	- Compliance audits and reporting to SAHRA.	Cease activities in sensitive areas until proper permits are secured.
Confirmation that development is appropriate for the site.	PA5	▪ - Phase 2 mitigation to be undertaken only if fossils are discovered.	PC	TRONOX	Palaeontological assessment findings.	- Review and approval of palaeontological impact reports.	Adjust site plans if significant fossils are discovered.
Aspect: Geohydrology							
Detail description of aspect: The baseline groundwater quality is generally good. The modelled water quality with backfilling and residue material disposal during operations is generally better than the background water quality. Groundwater levels will be lowered during operations. However, backfilling into the pits will add water to the aquifer, which will reduce the duration of the impact and hence minimise the cone of depression. Together with the additional water, the model predicts a plume of dilution causing the groundwater quality to improve. No groundwater users have been identified in the area; therefore, the impact is limited to surface water resources. The model shows that the groundwater levels recover within two years after completion of mining. This new “steady state” water level is expected to be similar to pre-mining conditions.							
Monitor change in groundwater quantity and quality	GW1.1	Lost boreholes in the backfill areas will be replaced to check if there is any change in quality over time.	C/O	▪ TRONOX ▪ ECO	▪ Groundwater monitoring programme includes lost boreholes W3 and W6 ▪ Water quality limits as per the Catchment WQPLs and new WUL conditions	▪ Quarterly monitoring will be undertaken. The analytical suite for water samples will include pH and EC (and /or Total Dissolved Solids) with annual analyses	▪ A database will be established, where water quality fluctuation trends will be interpreted, and exceedances

Minimise change in groundwater quantity and quality	GW1.2	Monitoring of boreholes and surface water as per ground water and surface water monitoring plan.	C/O	▪ TRONOX ▪ ECO	Water quality limits as per the Catchment WQPLs and new WUL conditions	of pH, EC, TDS, nitrate, sulfate, total alkalinity, and metals. ▪ During Phase 2 mining, if trends remain stable or are decreasing, monitoring frequency can be reduced to bi-annual.	highlighted; this data will be used to inform management decisions. Based on this analysis, the monitoring frequency may be amended as considered necessary. ▪ Consult with specialist where required
Minimise change in groundwater quantity and quality	GW1.3	Sand tailings disposal facility 8B is situated directly above the Natal Metamorphic Province geology which has a lower hydraulic conductivity. Therefore, water cannot infiltrate easily into the aquifer. Modelling showed that there will be an accumulation of water during its operational time from 2047 to 2053. This additional water must be managed by digging trenches around it, collecting the water and managing the outflow from the trenches.	D/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Functional water containment infrastructure associated with Sand tailings disposal facility 8B ▪ As-built drawings ▪ Regulation GN704 compliance ▪ Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation	▪ Internal and external audits ▪ Monitoring of water levels in the Ojinjini River will be undertaken	▪ Update design / construction plan for Sand tailings disposal facility 8B. Consult with specialist where required.
	D8.1	Toe seepages may also occur to a lesser extent in the other coarse sand tailings deposition areas. This additional water must be managed by digging trenches around it, collecting the water and managing the outflow from the trenches.	D/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Functional water containment infrastructure associated with other coarse sand tailings deposition areas ▪ As-built drawings ▪ Regulation GN704 compliance ▪ Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation	▪ Internal and external audits ▪ Monitoring of toe seepages from coarse sand tailings deposition areas	▪ Update design / construction plan for other coarse sand tailings deposition areas. Consult with specialist where required
	GW1.4	Lost boreholes in the backfill areas will be replaced to check if there is any change in quality over time.	C/O	▪ TRONOX ▪ ECO	▪ Groundwater monitoring programme includes lost boreholes W3 and W6	▪ Quarterly monitoring will be undertaken. The analytical suite for water samples will	▪ A database will be established, where water quality

					▪ Water quality limits as per the catchment WQPLs and new WUL conditions	include pH and EC (and /or Total Dissolved Solids) with annual analyses of pH, EC, TDS, nitrate, sulfate, total alkalinity, and metals. ▪ During Phase 2 mining, if trends remain stable or are decreasing, monitoring frequency can be reduced to bi-annual.	fluctuation trends will be interpreted, and exceedances highlighted; this data will be used to inform management decisions. Based on this analysis, the monitoring frequency may be amended as considered necessary. ▪ Consult with specialist where required
Aspect: Hydrology and Water Balance							
Detail description of aspect: Modelling was undertaken to develop an understanding of what the surface water flow and recharge could be expected in a post-mining environment. The catchment areas downstream of the proposed mining infrastructure are sensitive areas that may be impacted by the proposed mining development. In each modelled scenario, the base flows in each micro-catchment are expected to experience a reduction in surface flow from the mining areas whilst mining is taking place in each catchment. The surface water baseflows post-mining/ development are anticipated to increase in each sub-catchment on a long-term basis. The risk of ultrafine sedimentation to the surrounding catchments and drainage areas is the biggest risk or potential impact to the surface water environment. In terms of unforeseen events, in the event of a failure or breach of the RSF Site 9, the Ntuze River and its tributaries, the Mlalazi and Bhadi Rivers, the Ojinjini River, and ultimately the Mlalazi Estuary, will become inundated. Similarly, the failure of RSF C will inundate Amanzamnyama, the nearby wetlands, and ultimately the Qhubu Lake. Although the risk of failure has a very rare likelihood of occurrence, the consequence of RSF failure would be catastrophic and result in adverse impacts							
Minimise or prevent deterioration in surface water quality	SW1.1	Site preparation for the proposed infrastructure will be confined to demarcated footprint areas to minimise soil disturbance and the probability of sedimentation of receiving watercourses.	C	▪ TRONOX ▪ ECO ▪ Contractor	Water quality limits as per the Catchment WQPLs and new WUL conditions	Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn)	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW1.2	Washing and servicing of vehicles and machinery will only be undertaken at designated, appropriately designed areas.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	Appropriate, designated facilities for washing and servicing vehicles and machinery	Monthly monitoring of oils and grease in surface waters upstream and downstream of construction and decommissioning activities will be undertaken.	Incident register will be kept to up to date and necessary actions executed based on incident.
	SW1.3	All storage areas for fuels and oils used will be appropriately bunded, and spill kits will be in place as per Tronox 's SOP.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Appropriately bunded facilities for hazardous substances, adequate spill kits available ▪ As-built drawings	Monthly monitoring of oils, and grease in surface waters upstream and downstream of construction and decommissioning	Incident register will be kept to up to date and necessary actions executed based on incident.

						activities will be undertaken.	
	SW1.4	On-site personnel will be trained to use spill kits to contain and clean up any leakages or spills of fuels, oils, and grease as per Tronox 's SOP.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	Training and awareness material	Internal and external audits	Updated training and awareness plan
	SW1.5	Timely and effective clean-ups will be administered in the event of hydrocarbon spillages occurring as per Tronox 's SOP.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	No hydrocarbons detected in monitoring data	Monthly monitoring of oils, and grease in surface waters upstream and downstream of construction and decommissioning activities will be undertaken.	Incident register will be kept to up to date and necessary actions executed based on incident.
	SW1.66	All waste and hazardous waste must be managed as per Tronox 's SOP.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Norms and Standards for Storage of Waste ▪ As-built drawings	Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW1.7	Where feasible, precast concrete will be used where required for construction to limit extended construction work.	C	▪ TRONOX ▪ ECO ▪ Contractor	Limited laydown area for construction work	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident.
	SW1.8	Runoff from dirty water management areas will be directed to the stormwater management infrastructure and not be allowed to flow into the natural environment. Contaminated stormwater will be contained and pumped to the plant over time.	O/D	▪ TRONOX ▪ Contractor	Water quality limits as per the Catchment WQPLs and new WUL conditions	Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn)	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW1.9	The footprint or catchment of dirty water management areas within the site will be minimised and clean water management areas will be maximised, as far as possible, to ensure minimal water quality impact on the generated site runoff.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	Water quality limits as per the Catchment WQPLs and new WUL conditions	Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn)	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.

	S7	Berms will be erected around the sand tailings disposal facilities footprint to contain sediments and runoff to prevent it from reaching the receiving surface water resources.	O	▪ TRONOX	Water quality limits as per the Catchment WQPLs and new WUL conditions	Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn)	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW1.10	General housekeeping and maintenance of stormwater infrastructure (including berms, de-silting of dams and conveyance channels and clean-up of leaks) will be undertaken throughout the life of the project.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	Stormwater infrastructure maintenance plan / procedure in accordance with the Regulations GN 704	Internal and external audits	Update plan / procedure when required
	SW1.11	General and other forms of waste will be collected and disposed of into clearly marked skip bins that can be collected by approved Contractors for disposal to appropriate disposal sites.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	Waste management plan / procedure in accordance with the National Environmental Management Waste Act	Internal and external audits	Update plan / procedure when required
	SW1.12	Proposed areas for rehabilitation and closure works will be demarcated and minimised as far as possible, to minimise the unnecessary expansion of the footprint of disturbance. Movement of vehicles and machinery will be confined to designated haul and access roads, as far as practicable.	O/D	▪ TRONOX ▪ Contractor	Rehabilitation and closure plan containing measures to minimise footprint disturbance	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident.
	SW1.13	Sediment and erosion control measures will remain in place until the completion of demolition and rehabilitation activities, to minimise entry of sediment into watercourses.	D	▪ TRONOX ▪ Contractor	Water quality limits as per the Catchment WQPLs and new WUL conditions	Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn)	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
Minimise or prevent deterioration in surface water quality	SW1.14	Stormwater infrastructure will remain in place to contain runoff from dirty water management areas until the completion of demolition and rehabilitation activities.	D	▪ TRONOX ▪ Contractor	Functional stormwater infrastructure ensuring dirty water containment	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise or prevent deterioration in surface water quality	SW1.15	Strategic removal of surface infrastructure will be implemented so that potentially contaminated runoff is diverted away from designated clean water areas. This may be achieved by temporarily retaining stormwater infrastructure to divert dirty water from clean areas while the potentially contaminating sources are decommissioned. Remaining infrastructure and stormwater infrastructure will be maintained to prevent water quality contamination from runoff from the remaining areas.	D	▪ TRONOX ▪ Contractor	Functional stormwater infrastructure ensuring dirty water containment	Internal and external audits	Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise or prevent deterioration in	SW1.16	Infrastructure such as PCDs will be emptied of residual material before decommissioning.	D	TRONOX Contractor	Rehabilitation and closure plan containing measures related to infrastructure	Internal and external audits	Incident register will be kept to up to date and

surface water quality					decontamination prior to demolition		necessary actions executed based on incident.
Minimise risk of erosion	SW2.1	Where feasible, construction will be undertaken during the dry period to minimise soil erosion by overland flow and subsequent sedimentation in nearby watercourses.	C	TRONOX Contractor	Water quality limits as per the Catchment WQPLs and new WUL conditions	▪ Monthly monitoring of Total Dissolved Solids (TDS), Aluminium (Al), and Manganese (Mn) ▪ Regular monitoring of the areas where dust suppression is proposed will be undertaken	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW2.2	Where feasible, demolition will be undertaken during the dry winter period to reduce sedimentation in the proximal watercourses and the immediate revegetation of cleared areas will be undertaken.	D	TRONOX Contractor		Monitoring as per SW24	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW2.3	Effective sediment and erosion control measures, such as sediment ponds, erosion berms, weep berms, vegetative filters or silt fences, will be installed before starting work to reduce the velocity of water flowing downslope and to minimise sediment entry into the watercourse.	O	TRONOX ECO Contractor	▪ Stormwater management plan for decommissioning containing effective sediment and erosion control measures ▪ As-built drawings ▪ Visual observations	▪ Internal and external audits ▪ Monitoring as per SW24	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Updated stormwater management plan
	SW2.4	Disturbed areas remaining after construction and not to be used for mining will be rehabilitated timeously, i.e., rip soils and revegetate.	C	TRONOX ECO Contractor	▪ Rehabilitation plan for post-construction containing measures for rehabilitation of disturbed areas ▪ Visual observations	▪ Internal and external audits ▪ Monitoring as per SW24	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW2.5	Bare surfaces downstream from the mine where sediment traps are not able to be implemented will be vegetated to limit erosion and runoff that might be carrying contaminants.	O	TRONOX ECO Contractor	▪ Rehabilitation plan for post-construction containing measures for rehabilitation of disturbed areas	▪ Internal and external audits ▪ Monitoring as per SW24	▪ Incident register will be kept to up to date and necessary actions

					▪ Visual observations		executed based on incident. ▪ Consult with specialist when required.
Prevent failure or breach of the RSF	SW3.1	An emergency preparedness and response plan (EPRP) for the RSF will be implemented based on a credible RSF breach analysis, taking the impacts of climate change into consideration.	O	TRONOX	Emergency preparedness and response plan for the RSF	Regular training, awareness and updates of the RSF EPRP	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
	SW3.2	Adequate construction supervision of the RSFs will be ensured.	C/O	TRONOX Experienced tailings operator	Lack of failure or breach of RSF	Quarterly stability assessments on RSFs will be conducted.	Update RSF construction plan / design and/or RSF EPRP, where necessary
	SW3.3	Regular inspections of the RSFs will be conducted to determine their condition and identify any anomalies and system malfunctions.	O/D	TRONOX Experienced tailings operator	Lack of failure or breach of RSF	Quarterly stability assessments on RSFs will be conducted.	Update RSF construction plan / design and/or RSF EPRP, where necessary
Pipeline Management	SW4	If necessary, construct containment paddocks at the foot slope should the potential released fines volume exceed the capacity of the bermed-off pipe servitude in the lower slope before control can be regained over the pipeline. Ensure regular inspections of the pipeline take place physically or via fixed camera or drone surveillance, All stormwater controls and discharge points associated with the access road and delivery pipeline and/or pipeline inspection tracks discharge into the mining area and not to the environment,	O	TRONOX	No pipe leaks entering watercourses	Auditing	Updated toe paddock designs. Inspection reports Discharge points designed to discharge into pits only.
Aspect: Geochemistry							
Detail description of aspect: Based on the mineralogy results, the mineral phases found to be present, and their weathering rate classification shown in it can be concluded that the mineral phases present in the MSP and RSF tailings were all inert (i.e., Quartz, Hematite, Zirkon, and Rutile) and very slow weathering (i.e., Microcline). The overall mineralogy of the MSP and RSF tailings samples indicates neither acid-generating minerals, nor buffering capacity in the samples. Based on the Geochemical abundance index (GAI), selenium (Se) was found to be enriched (i.e., a GAI ≥ 4), with all other metals and semi-metals recorded below the 12-fold enrichment factor. Based on ABA and NAG test results conducted on MSP and RSF tailings, both these samples are not acid generating. In terms of the classification of drainage quality, Drainage from RSF, PWP and MSP tailings were classified as neutral mine drainage, with a Low metal content at near-neutral pH values. Drainage from the gypsum classified as saline drainage, with a Low metal content at near-neutral pH values. The waste classification showed that MSP, PWP and RSF tailings classified as Non-hazardous, while Gypsum waste classified as Hazardous, causing serious eye damage, triggered by aluminium sulfate exceedance and for this reason, Gypsum waste would require the generation of a Safety Data Sheet (SDS) during handling or transportation. The risk assessment showed that there is potential risk to the aquatic or marine water resources from both the backfill and the RSF.						
Minimise change in groundwater and surface water quality	GC1	RSF tailings are to be disposed into a facility with a Class D barrier design.	O	TRONOX	▪ Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation	▪ Monitoring same as for GW1 ▪ Internal and external audit reports	▪ Incident register will be kept to up to date and necessary actions executed

					▪ Waste Classification and Management Regulations. GN R: 634 of 2013. ▪ National Norms and Standards for the assessment of waste for landfill disposal. GN R: 635 of 2013. ▪ As-built drawings		based on incident. ▪ Consult with specialist when required.
Minimise change in groundwater and surface water quality	GC2	Seepage and runoff from the RSF tailings disposal facility will be prevented from reaching the receiving environment, either through use of a Class C liner and stormwater controls – or the concentration of the constituents of concern must be decreased by not mixing the gypsum waste into the fine sand tailings before disposal in the RSF, as the leachate from the gypsum waste is enriched in metals.	C/O	TRONOX	▪ Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation ▪ Waste Classification and Management Regulations. GN R: 634 of 2013. ▪ National Norms and Standards for the assessment of waste for landfill disposal. GN R: 635 of 2013. ▪ As-built drawings	▪ Monitoring same as for GW1 ▪ Internal and external audit reports	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist when required.
Minimise change in groundwater and surface water quality	GC3	Once mining and processing begin at Port Durnford, sampling will be conducted for geochemical testing of RSF feed, coarse sand tailings (PWP), MSP tailings and gypsum, to ensure that their characterisation is as predicted.	O	TRONOX	Geochemistry characterisation report	▪ Monitoring same as for GW1 ▪ Internal and external audit reports	▪ Update EMPr, if required. ▪ Consult with specialist when required.
Gypsum waste is classified as Hazardous, with the potential to cause serious eye damage, triggered by aluminium sulfate exceedance and for this reason, Gypsum waste would require the generation of a Safety Data Sheet (SDS) during handling or transportation	GC4	Produce a SDS for gypsum handing and transportation.	O	TRONOX	Present in the safety file. Training records for the handling and transportation of gypsum.	▪ ECO and H&S auditing	-
Aspect: Climate change							
Detail description of aspect: This Climate Change Impact demonstrates that while the project will contribute to South Africa's GHG emissions, its overall impact is relatively small. Under a business-as-usual scenario, the project's contribution to the country's annual emissions is expected to peak at 0.04%, with maximum annual emissions of 137,462.17 tCO_2e (for Phase 2) during the operational phase. Emission intensities of 0.01 tCO_2e per ton of mineral sands processed in Phase 1 and 0.07 tCO_2e per ton in Phase 2 align with industry benchmarks, although further research is needed to refine comparable standards. Despite these findings, the project's GHG emissions fall within the medium-high impact range, highlighting the importance of rigorous mitigation strategies to reduce its carbon footprint.							

The assessment of climate change impacts on the project identified potential risks associated with increasing temperatures, variable precipitation patterns, and hydro-meteorological hazards, such as sea level rise, drought, and fires. Projections indicate that mean annual temperatures in the project area could rise by 1.7°C to 2.1°C by 2050, accompanied by an increase in extreme hot days. While annual precipitation trends remain uncertain, the potential for seasonal variability and intensified drought tendencies presents a challenge. Hydro-meteorological hazards, including rising sea levels and increased fire risk, are expected to intensify, becoming high-risk factors for the project by 2050. During the construction phase, which is expected to last 12 months, these risks are negligible due to the short timeframe. However, during the operational phase, these risks require careful monitoring and the implementation of effective mitigation measures to ensure the project's resilience. The risk assessment concluded that, with mitigation in place, the impacts during the operational phase could be managed and remain low.							
Reduce GHG emissions	CC1	Install telemetry in all construction and fleet vehicles and monitor driver behaviour in terms of speeding, excessive braking, idling and so on. Investigate incidents of excessive consumption.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel consumption data	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Reduce GHG emissions	CC2	It is noted in the Sustainability report in 2030 Tronox will explore fuel switching (e.g., biodiesel, hydrogen) and electrification for mining vehicles. This initiative will be implemented if found to be feasible and does not void warranty of vehicles.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel consumption data ▪ Feasibility study report	▪ Internal and external audits	▪ Update GHG emission plan ▪ Consult with specialist where required
Reduce GHG emissions	CC3	Investigate the feasibility of using diesel additives in mining and fleet vehicles. This will be implemented if found to be feasible and does not void warranty of vehicles.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel consumption data ▪ Feasibility study report	▪ Internal and external audits	▪ Update GHG emission plan ▪ Consult with specialist where required.
Reduce GHG emissions	CC4	Investigate feasibility of installing battery operated air-conditioning units in mining and fleet vehicles to prevent idling to keep cabins cool. Implement if found to be feasible.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel consumption data ▪ Feasibility study report	▪ Internal and external audits	▪ Update GHG emission plan ▪ Consult with specialist where required.
Reduce GHG emissions	CC5	Install high efficiency drives to reduce grid electricity consumption and GHG emissions. Where possible, fit variable speed drives to better match speed of drive with the load requirements.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel and electricity consumption data ▪ Feasibility study report	▪ Internal and external audits	▪ Update GHG emission plan ▪ Consult with specialist where required.
Reduce GHG emissions	CC6	Where possible, install compressor units with high efficiency motors and integrated variable speed drives, thereby reducing grid electricity consumption and GHG emissions.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Fuel and electricity consumption data ▪ Feasibility study report	▪ Internal and external audits	▪ Update GHG emission plan ▪ Consult with specialist where required.
Reduce GHG emissions	CC7	Develop and implement an energy management system based on ISO 50001 methodology at the plant to reduce energy consumption (and GHG emissions) from diesel and grid electricity consumption.	C/O	▪ TRONOX ▪ ECO	▪ Fuel and electricity consumption data ▪ ISO 50001 certification	▪ Energy management system monitoring and auditing	▪ Update relevant energy management system plans and procedures
Minimise and control the impact of climate change on the project –	CC8	The area in the immediate vicinity of the pit that will be graded to drain towards the pit will be limited.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Design and as-built drawings	▪ Internal and external audits	▪ Updated drawings

open pit water management							
Minimise and control the impact of climate change on the project – open pit water management	CC9	Diversion channels and ditches to direct non-contact water away from the pit will be constructed.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Design and as-built drawings	▪ Internal and external audits	▪ Updated drawings
Minimise and control the impact of climate change on the project – waste rock dumps	CC10	Where possible, the surface area of the dumps will be limited to minimise direct precipitation.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Design and as-built drawings	▪ Internal and external audits	▪ Updated drawings
Minimise and control the impact of climate change on the project – waste sand dumps	CC11	Diversion channels will be constructed to direct non-contact water around the dumps.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Design and as-built drawings	▪ Internal and external audits	▪ Updated drawings
Minimise and control the impact of climate change on the project – processing plant (Phase 2)	CC12	Reuse of process water at the processing plant will be reused to reduce process and raw water requirements.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Water consumption data ▪ Water Conservation and Water Demand Management Plan	▪ Internal and external audits	▪ Update Water Conservation and Water Demand Management Plan
Minimise and control the impact of climate change on the project – access roads and parking	CC13	Regular road maintenance on internal roads, main access roads and main haul roads will be undertaken.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Road maintenance plan ▪ Visual observations	▪ Internal and external audits	▪ Update road maintenance plan
Minimise and control the impact of climate change on the project – tailings (Phase 2)	CC14	Tailings designs will consider sufficient space to accommodate 100yr-24 hr storm event.	C/O	▪ TRONOX ▪ ECO ▪ Tailings engineer	▪ Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation ▪ Waste Classification and Management Regulations. GN R: 634 of 2013. ▪ National Norms and Standards for the assessment of waste for landfill disposal. GN R: 635 of 2013. ▪ As-built drawings ▪ Regulations GN 704	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change	CC15	The design of stormwater management system will take into consideration the projected increases in the number of precipitation days.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Functional stormwater infrastructure ensuring dirty water containment ▪ As-built drawings	▪ Internal and external audits	▪ Incident register will be kept to up to date and

on the project – tailings (Phase 2)							necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – tailings (Phase 2)	CC16	The construction and maintenance of diversion channels around the site will be considered to prevent mixing of 'clean' and 'dirty' stormwater runoff.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Functional stormwater infrastructure ensuring dirty water containment ▪ As-built drawings ▪ Regulations GN 704	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – tailings (Phase 2)	CC17	Operations of tailings will consider tailings are operated to maintain at least 1 m freeboard.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Regulations GN 704	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – power supply (Phases 1 and 2)	CC18	Additional power supply such as generators, and Uninterruptible Power Supplies (UPS) for temporary power during power outage will be considered.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Limited incidents related to power outages	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – power supply (Phases 1 and 2)	CC19	Eskom Overhead Power line connection with an inverter and batteries will be utilised for power supply backup.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Limited incidents related to power outages	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – Water supply and availability (Phases 1 and 2)	CC20	Supplementing the water supply with pit water recovery will be implemented, if possible.	O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Water Conservation and Water Demand Management Plan ▪ Water consumption data	▪ Internal and external audits	▪ Update Water Conservation and Water Demand Management Plan
Minimise and control the impact of climate change on the project – Water supply and	CC21	A Water Conservation and Water Demand Management plan will be developed and implemented for the site to maximise re-use and recycling of water.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Water Conservation and Water Demand Management Plan ▪ Water consumption data	▪ Internal and external audits	▪ Update Water Conservation and Water Demand Management Plan

availability (Phases 1 and 2)							
Minimise and control the impact of climate change on the project – Water supply and availability (Phases 1 and 2)	CC22	Climate change projections will be incorporated into water supply planning and infrastructure design to account for potential changes in water availability.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Water Conservation and Water Demand Management Plan ▪ Water consumption data ▪ Infrastructure design reports	▪ Internal and external audits	▪ Update Water Conservation and Water Demand Management Plan ▪ Update Infrastructure design reports
Minimise and control the impact of climate change on the project – Water supply and availability (Phases 1 and 2)	CC23	Reuse of water will be maximised.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Water Conservation and Water Demand Management Plan ▪ Water consumption data	▪ Internal and external audits	▪ Update Water Conservation and Water Demand Management Plan ▪
Minimise and control the impact of climate change on the project – likelihood of dust impacts (Phases 1 and 2)	CC24	Dust control and suppression measures, such as the application of water on unpaved roads and during material handling, will be implemented as per Tronox 's SOP.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Dust Control Regulations	▪ Internal and external audits ▪ Air quality monitoring programme as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – likelihood of dust impacts (Phases 1 and 2)	CC25	Modifying or ceasing loading activities during dry and windy conditions will be undertaken, when possible.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Dust Control Regulations ▪ National Ambient Air Quality Standards	▪ Internal and external audits ▪ Air quality monitoring programme as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – likelihood of dust impacts (Phases 1 and 2)	CC26	Double handling of material must be avoided, where possible.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Dust Control Regulations ▪ National Ambient Air Quality Standards	▪ Internal and external audits ▪ Air quality monitoring programme as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – likelihood of dust impacts (Phases 1 and 2)	CC27	The drop height of the material from truck loads will be minimised.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Dust Control Regulations ▪ National Ambient Air Quality Standards	▪ Internal and external audits ▪ Air quality monitoring programme as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident.

Minimise and control the impact of climate change on the project – health and safety (Phases 1 and 2)	CC28	A comprehensive heat stress management plan that outlines procedures, responsibilities, and actions to prevent and address heat-related health issues, will be developed and implemented.	C/O	▪ TRONOX ▪ Contractor	▪ Heat stress management plan	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – health and safety (Phases 1 and 2)	CC29	Modifying work schedules to minimise outdoor activities during the hottest parts of the day, such as rescheduling strenuous tasks to cooler morning or late afternoon hours, must be considered.	C/O	▪ TRONOX ▪ EO ▪ Contractor	▪ Limited incidents related to heat and dehydration	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – health and safety (Phases 1 and 2)	CC30	Training sessions will be conducted to educate workers about the signs of heat stress, preventive measures, and the importance of early intervention as well as the importance of drinking water to stay hydrated.	C/O	▪ TRONOX ▪ Contractor	▪ Training and awareness plan ▪ Limited incidents related to heat and dehydration	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – health and safety (Phases 1 and 2)	CC31	Where possible, lightweight, breathable, and light-coloured clothing that offers protection from the sun while allowing better heat dissipation, will be provided.	C/O	▪ TRONOX ▪ Contractor	▪ Limited incidents related to heat and dehydration	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – health and safety (Phases 1 and 2)	CC32	Implementing dust management measures, such as revegetation of steep slopes, on the RSF and sand tailings stockpile dumps that will be between 40-90m higher than the current surface level, will be considered.	O	▪ TRONOX	▪ National Dust Control Regulations ▪ National Ambient Air Quality Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project –RSF and sand tail stockpile dumps	CC33	Where possible, the surface area of the dumps will be limited to minimise direct precipitation.	C/O	▪ TRONOX ▪ ECO ▪ Contractor	▪ Same as for CC10	▪ Same as for CC10	▪ Same as for CC10
Minimise and control the impact of climate change	CC34	Existing Early Warning Systems (EWS) in the project area will be identified and utilised. EWS are designed to provide communities with advanced notice of imminent flood events	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ Identified Early Warning Systems	▪ Internal and external audits	▪ Incident register will be kept to up to

on the project – buildings (Phase 1 and 2)		based on weather forecasts, recorded rainfall, or rising water levels upstream. They also help in implementing protocols for mitigating flood impacts.					date and necessary actions executed based on incident.
Minimise and control the impact of climate change on the project – buildings (Phase 1 and 2)	CC35	Flood management measures will be implemented for the project (e.g., installation of flood defences).	C/OD	▪ TRONOX ▪ ECO ▪ Contractor	▪ Flood management plan ▪ As-built drawings	▪ Internal and external audits	▪ Update flood management plan when required
Minimise and control the impact of climate change on the project – buildings (Phase 1 and 2)	CC36	Emergency response policies and protocols will be identified and incorporated into the project.	C/O/D	▪ TRONOX ▪ Contractor	▪ Emergency preparedness and response plan containing measures related to floods	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Update Emergency preparedness and response plan when required
Minimise and control the impact of climate change on the project – Water Quality and Water Control Dams	CC37	Regular maintenance and testing of the control and instrumentation systems will be conducted as per Tronox 's SOP..	C/O	▪ TRONOX ▪ ECO	▪ Dam operating procedure ▪ Infrastructure maintenance plan	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Update dam procedures and plans when required
Aspect: Air Quality							
Detail description of aspect: Air pollution associated with dust fallout is a common impact associated with large-scale open pit sandmining. The activities associated with material handling, haulage and wind erosion in large areas of unvegetated working areas for extended periods of time can contribute to air pollution through dust fallout to surrounding areas. The impact of dust fallout was a major point of concern raised within the scoping phase during public consultation. The results of the air quality impact assessment indicate that, for Phases 1 and 2, $PM_{2.5}$ and PM_{10} concentrations are predicted to be well below the relevant NAAQS for the operational phase. The highest predicted concentrations are near the Fairbreeze Primary Wet Plant (PWP site), with those concentrations predicted to remain near the source and not extend past the proposed fence line, remaining below the relevant NAAQS. The sensitive receptors within the fence line (Forest Inn and the Macadamia Farms) are not anticipated to be impacted by $PM_{2.5}$ and PM_{10} for the duration of the mining operations. For Phase 2 (all scenarios), dust fallout rates are predicted to exceed the National Dust Control Regulations residential standard at some sensitive receptors in proximity (within 1 km) of the site boundary and within the MRA. Notably, the maximum fence line concentrations exceed the non-residential standard. The predicted exceedances extend up to 500 m north-northwest and south-southwest of the proposed boundary. The source of expected dust fallout exceedances beyond the site boundary are the proposed sand stockpiles and RSF Facilities. For Phase 2, dust fallout rates are predicted to exceed the National Dust Control Regulations residential standard at representative receptors in close proximity (within 1 km) of the site boundary. Notably, the maximum fenceline concentrations exceed the non-residential standard. The predicted exceedances extend up to 500 m north-northwest and south-southwest of the proposed boundary. The nearest sources contributing to the exceedances beyond the site boundary include the sand stockpiles. Notably the highest predicted fallout rates occur in proximity to the Fairbreeze Primary Wet Plant (PWP) and dozer trap mining units (DTMUs).							
Air emissions will be managed to minimise nuisance	AQ1	Construction / decommissioning activities will be communicated with local communities, so that activities with the greatest potential to generate emissions are planned during periods	C/D	▪ TRONOX ▪ ECO	▪ Consultation records ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be

effects and prevent health effects		of the day that will result in the least disturbance. Information regarding construction / decommissioning activities will be provided to all local communities, such as: ▪ Proposed working times; ▪ Anticipated duration of activities; ▪ Explanations on activities to take place and reasons for activities; and ▪ Contact details of a responsible person on site should complaints arise.		▪ Contractor			kept to up to date and necessary actions executed based on incident.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ3	Exposed areas not used for operations will be identified and revegetated to reduce the amount of dust available for wind entrainment.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ4	Access control to exposed areas will be controlled reducing activity and wind entrainment.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ5	Reduced speeds of vehicles over exposed surfaces will be ensured to minimise vehicular entrainment as per Tronox 's SOP.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.

Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ6	When possible, material handling activities will not be undertaken during windy conditions (greater than 6m/s).	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ7	A dust fallout monitoring network will be developed and implemented around the proposed development fence line, to determine dust emissions from the proposed mining related activities at the surrounding receptors.	C/O/D	▪ TRONOX ▪ ECO	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards[1]	▪ Monthly dust fallout monitoring is to be undertaken at the monitoring stations indicated in Figure 8-16 of the Air Quality Report. ▪ The monitoring programme will include an active particulate matter monitoring station, with a meteorological station, placed to the north, east, south, and west of the proposed development fencelin.	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ8	A mechanism to record and respond to complaints will be developed and implemented.	C/O/D	▪ TRONOX ▪ ECO	▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed

[1] Non-residential monitoring may be conducted in the event that exceedances of the National Dust Control Residential Standards are identified at the proposed monitoring locations

							based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ9	Wetting of material prior to feeding into the DTMUs will be implemented.	O	▪ TRONOX	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ11	Water sprayers will be used in the PWP screening and crushing processes.	O	▪ TRONOX	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Air emissions will be managed to minimise nuisance effects and prevent health effects	AQ12	Legacy stockpiles and backfilled areas will be rehabilitated and vegetated.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ National Ambient Air Quality Standards ▪ National Dust Control Regulations Residential Standards ▪ Rehabilitation plans for legacy stockpiles and backfilled areas ▪ Visual observations	▪ Internal and external audits ▪ Air quality monitoring programme, as per Ref AQ7	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.

Aspect: Noise							
Detail description of aspect: Baseline monitoring indicated current day-time noise levels were below the suburban guideline rating level of 50 dB(A) at two of the eight receptor monitoring locations. At night, average noise levels at all monitoring locations exceeded the suburban guideline rating level of 40 dB(A). From the day-time and night-time monitoring campaigns it is evident that the current noise climate surrounding the site is predominantly traffic-related, with influences from natural sources like birds and insects. For Phase 1, day-time noise levels at all the receptor locations are predicted to remain the same, with no increases in the current baseline noise levels as a result of the Phase 1 operations. As per the SANS 10103:2008 guidelines, this will result in “little” community/group response. Highest noise levels are predicted around the Phase 1 operational area. Noise levels decrease as distance from the sources increase, with levels dropping below the industrial guideline level (70 dB(A)) onsite. Off-site noise levels are below the suburban guideline level of 50 dB(A). Based on these results, acoustic impacts of the Phase 1 operations are not predicted and noise-related complaints from receptors are not anticipated. For Phase 2, current day-time noise levels (monitored) at three receptor locations are predicted to increase by between 0.1 and 0.9 dB(A) with the introduction of the Phase 2 mining operations. Noise levels at all other receptors are predicted to remain the same. It is noted that such increases at these three locations are well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. Such increases are also well below the IFC threshold for annoyance of 3 dB(A). For Phase 2, current night-time noise levels (monitored) at two receptor locations are predicted to increase by between 0.1 and 0.8 dB(A) with the introduction of the Phase 2 mining operations. Noise levels at all other receptors are predicted to remain the same. It is noted that such increases at these locations are well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. Such increases are also well below the IFC’s threshold for annoyance of 3 dB(A). The highest noise levels are predicted at the PWP and at the active pit where the DTMUs will be located. Noise levels decrease as the distance from the sources increases, with levels dropping below the industrial guideline level (70 dB(A) (day) and 60 dB(A) (night)) onsite. Based on both the day and night-time results, acoustic impacts of the Phase 2 operations are not predicted and noise-related complaints from receptors are not anticipated.							
Minimise noise impacts	N1	When working near a potential sensitive receptor, the number of simultaneous activities will be limited to a minimum, as far as possible.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N2	Noise control devices, such as temporary noise barriers and deflectors for high-impact activities, and exhaust muffling devices for combustion engines, will be used.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N3	Where possible, select equipment with the lowest possible sound power levels.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed

							based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N4	It will be ensured that equipment is well-maintained to avoid additional noise generation.	C/O/D	▪ TRONOX ▪ ECO ▪ Contractor	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N5	Acoustic enclosures will be installed for equipment causing radiating noise.	O	▪ TRONOX	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N6	Noise sources must be located in less sensitive areas to take advantage of distance and shielding.	O	▪ TRONOX	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.

Minimise noise impacts	N7	Acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 will be installed, to minimise the transmission of sound through the barrier. Barriers will be located as close to the source or to the receptor location to be effective.	O	▪ TRONOX	▪ South African National Standards (SANS) 10103:2008 guidelines ▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N8	A mechanism to record and respond to complaints will be developed and implemented.	C/O/D	▪ TRONOX ▪ ECO	▪ Complaints register	▪ Internal and external audits	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with specialist where required.
Minimise noise impacts	N9	One round of environmental noise monitoring will be conducted after the commissioning of Phase 2 operations, to confirm noise levels in the surrounding communities and identify the need for additional mitigation or additional monitoring campaigns.	O	▪ TRONOX ▪ ECO	▪ South African National Standards (SANS) 10103:2008 guidelines	▪ Once-off day-time and night-time monitoring after commissioning of Phase 2, at the localities indicated in Table 6 and Figure 10 of the Environmental Acoustic Impact Assessment Report.	▪ If elevated noise levels are detected, then further monitoring campaigns will need to be considered.
Aspect: Flora							
Details of the aspect: The study area is located in the Indian Ocean Coastal Belt Biome, with embedded elements of the Forest Biome. The broader coastal region is termed the Maputaland-Pondoland-Albany Hotspot on account its rich biodiversity attributes. According to the 2018 SANBI mapping of South Africa's regional vegetation types, the study area consists of five primary regional vegetation types, namely Northern Coastal Forest (Foz7), Swamp Forest (Foa2), Maputaland Coastal Belt (CB1), KwaZulu-Natal Coastal Belt (CB3) and Subtropical Alluvial Vegetation (Aza7). These vegetation types have been parsed into several 'subtypes' at a provincial level, all of which are considered threatened with conservation statuses that range from Vulnerable to Critically Endangered. Impacts are associated with the clearance of vegetation during construction phase, clearing and earthworks during operational phase (Natural forest in the Western Cluster, Central Cluster, Eastern Cluster, and Southern Cluster) and the clearing and dismantling of infrastructure in the closure phase. Cumulative impacts arise from vegetation clearing, earthworks, social impacts (subsistence hunting) and an increase from disturbances from dust and noise.							
Minimisation or reduction of fragmentation and	FL1	Develop a Forest Rehabilitation Plan for restoring areas of forest disturbed during mining, designed by specialist rehabilitation ecologists with expertise in swamp and coastal forest restoration.	C/O/D	TRONOX	Successful restoration of disturbed forest areas	Monitoring of rehabilitation progress, assessment of	Adapt and refine rehabilitation strategies to

disturbance of forest habitats						ecological recovery in disturbed areas.	improve success, apply additional restoration techniques if needed.
Minimisation or reduction of Cumulative loss, disturbance, and fragmentation of natural habitat	FL2	Amend the proposed Project layout to avoid impacting patches of forest habitat with buffers of 200 m around forest patches with 'Very High' SEI scores, and 100 m around those with 'High' SEI scores.	C/O	TRONOX	No impacts to forest habitats with high SEI scores	Field verification and mapping of impacted areas, buffer zones, and development footprints.	Adjust project design if necessary to avoid or minimise further impacts on forest patches with high SEI scores.
Minimisation or reduction of Cumulative loss of flora species of conservation concern	FL3	Survey patches of natural habitat within the finalised Project footprints prior to vegetation clearing to identify and count flora SCC. Conduct search and rescue of mammals, herpetofauna and invertebrates for SCC prior to clearing areas of indigenous vegetation.	C/O	TRONOX	Identification and relocation of flora SCC	Survey reports, vegetation health, and species identification in affected areas.	Relocation of flora SCC to designated in-situ or ex-situ sites as necessary under appropriate permits.
Minimisation or reduction of spread of alien invasive species	FL4.1	Implement an AIS Control and Eradication Plan for the entire study area and all phases.	C/O/D	TRONOX	Successful control and reduction of AIS across the project footprint	Monitoring of AIS presence and spread using field surveys and mapping.	Additional AIS control measures and follow-up treatments to be conducted as required.
	FL4.2	Implement species-specific control methods for AIS using both chemical and mechanical control approaches, as outlined in the AIS Control and Eradication.	C/O/D	TRONOX	Reduction in AIS presence in the project area	Regular surveys for AIS, monitoring of control methods' effectiveness.	Implement follow-up treatments, including reseeding or mechanical control of AIS as required.
Minimisation or reduction of loss of ecosystem goods and services to local communities	FL5	Commit to ongoing consultation with local community members to identify priority ecosystem services that may be threatened and develop management options.	C/O/D	TRONOX	Continued engagement with communities on ecosystem service issues	Records of consultation meetings, community feedback, and prioritised management options.	Address community concerns through adaptive management and compensatory measures where required.
Minimisation or reduction of disturbance from vehicle/machinery collisions with flora species of conservation concern	FL6	Ensure that vehicles and machinery do not travel beyond the marked clearing footprints and designated access roads.	C/O	TRONOX	Reduced incidence of vehicle collisions with flora SCC	Vehicle movement monitoring, and reporting of incidents in flora SCC areas.	Adjust vehicle routes to avoid areas with high concentrations of flora SCC or implement vehicle speed limits.
Minimisation or reduction of disturbance of forest habitat and fragmentation	FL7	Maintain corridors of natural habitat between development footprints, avoiding obstruction by infrastructure such as fences.	C/O	TRONOX	Continued habitat connectivity across the landscape	Habitat connectivity and movement corridor mapping, post-development.	Remove or modify obstructing infrastructure to restore habitat connectivity.

Minimisation or reduction of impacts from loss of ecosystem services	FL8	Continue community consultation and implement a compensatory ecosystem service management plan to address the loss of essential services (e.g., medicinal plants, water sources).	O/D	TRONOX	Identification of impacted ecosystem services and compensatory actions	Monitoring ecosystem service usage and consultation feedback with affected communities.	Adjust the compensatory plan based on community needs and ecosystem recovery.
Aspect: Fauna							
Details of the aspect: The impacts to fauna are associated with clearing and earthworks activities. During construction, phase activities may result in direct loss and disturbance of natural habitat, fragmentation of natural habitat, and loss of mammal species of conservation concern. The impacts associated with the clearing and earthworks associated with the operational phase of phase 2 include a direct loss and disturbance of natural habitat, fragmentation of natural habitat and loss of mammal species of conservation concern. Several mammal SCC are known to occur or are likely to occur in forest habitat the study area. Cumulative impacts are associated with an increase of sensory disturbance from dust and noise.							
Minimisation or reduction of habitat loss and disturbance	FA1	Buffers of 32m will remain around the “No-Go” biodiversity corridor.	C	Tronox	Reduced habitat loss around key habitat patches	Spatial analysis, buffer zone checks	Adjust buffer zones if construction impacts are higher than anticipated.
Minimisation or reduction of habitat fragmentation	FA2.1	Align infrastructure with existing linear features.	P/PC/C/O	Tronox	Reduction in fragmentation of habitat patches	Visual inspections, GIS mapping	Re-align infrastructure to mitigate fragmentation where necessary.
	FA2.2	Restrict vegetation clearing to approved development footprints.	P/PC/C/O	Tronox	Reduced fragmentation of habitat	Site monitoring, GPS tracking	Adjust development plans if footprints are not strictly adhered to.
	FA2.3	Demarcate development footprints to prevent unnecessary clearing.	C/O	Tronox	Reduced fragmentation	Site inspections, flagging of boundaries	Increase demarcation inspections if unnecessary clearing is identified.
Phase 1 & 2 Operational Phase	FA3.1	Adherence to monitoring program for forest-dwelling mammal SCC.	P/PC/O	Tronox	Monitoring presence and population of mammal SCC	Continuous monitoring, population tracking	Revise monitoring strategy if SCC presence is not being adequately tracked.
	FA3.2	Prevent access to local hunters.	C/O	Tronox	Reduction in human-caused disturbance to mammal SCC	Site inspections, local enforcement	Increase patrols if hunter access is detected in prohibited areas.
Prevent significant loss of mammal species of conservation concern (SCC) (Phase 1)	FA4	No clearing of natural habitat in the construction phase.	C	Tronox	No direct loss of SCC habitat	Monitoring of SCC populations and habitat	Ensure continued no-clearing policy, with regular checks on SCC habitat.
Minimisation or reduction of cumulative habitat loss	FA5.1	Implement habitat protection measures such as buffer zones.	Cumulative Impact	Tronox	Reduced cumulative habitat loss	Environmental monitoring, GIS tracking	Adjust mitigation strategies based on cumulative impact monitoring results.

Minimisation or reduction of cumulative loss of mammal SCC	FA6.1	Implement biodiversity offset strategy.	C/O/D	Tronox	Reduced cumulative loss of SCC populations	Ongoing population surveys and habitat assessments	Adjust biodiversity offset strategy if cumulative impacts increase.
	FA6.2	Continued monitoring must continue for SCC during all project phases.	PC/C/O/D	Tronox	Healthy mammal SCC populations	Monitoring reports, wildlife tracking	Adjust monitoring protocols if unexpected declines in SCC populations occur.
	FA6.3	Implement wildlife-human interaction protocols for all workers.	C/O	Tronox	No increased wildlife mortality	Site inspections, awareness training feedback	Modify training and site protocols if wildlife mortality incidents increase.
Minimisation or reduction of mammal SCC mortality from operational activities	FA7	Erect barriers around construction trenches to prevent mammal entrapment.	C/O	Tronox	No entrapments or injuries in construction areas	Monitoring of trenches, wildlife rescue protocols	Immediate action to remove barriers if trapping incidents are reported.
Aspect: Avifauna							
Details of the aspect: Phase 1 does not pose a direct risk to avifauna, however there is an indirect impact risk of silt and sediment entering the Amanzamnyama River and then Umlalazi estuary. Similarly, the construction of the PWP plant, Control Water Dams for the Phase 2 operation does not pose risk to avifauna. For phase 2, the clearing and disturbance of areas of natural habitat pose the biggest threat to avifauna from the proposed project.							
Exclusion of key avian habitats from mining footprint. 213 ha of coastal lowland forest and 191ha of Woodland scrub has been excluded from the mining footprint. 668 ha of sensitive habitat in total. 45 ha of Very High SEI remain within the development footprint that will be lost.	AV1	Implementation an offset management plan for the loss of 45ha of Coastal Lowland Forest within the mining footprint should this not be avoided in the final mine plan.	P/PC/C/O/D	Tronox	No disturbance of excluded habitat areas	Aerial and ground surveys	Adjust mining plans if disturbances are detected
Minimising habitat destruction	AV2	Relocate infrastructure (roads, pipelines, topsoil stockpiles that intersect indigenous areas to areas that have already been disturbed.	P	Tronox	No habitat destruction in undisturbed areas	Site inspections	Relocate the stockpile if placed incorrectly
Aspect: Herpetofauna							
Details of the aspect: Through vegetation clearing, mining, dumping, stockpiling and the construction of the mining infrastructure, habitat loss will occur. Further erosion and siltation to wetlands and aquatic environments from mining activities, the potential for hydrocarbon spillages (or other chemicals) from vehicles and storage activities will cause an impact on herpetofauna. Mining and associated activities will also cause vibration, noise and air pollution, resulting in negative impact.							
Ex Situ Breeding Program for PRF	HF2	Develop and implement an ex situ breeding program for PRF.	O	Tronox	Successful breeding and reintroduction of PRF	Breeding success and reintroduction monitoring	Revise the breeding program if failure to reintroduce PRF occurs

Invasive Species Control and Eradication	HF3	Implement an AIS Control and Eradication Plan	O	Tronox	No spread of invasive species in sensitive habitats	Regular surveys for invasive species	Take immediate action to remove invasive species if detected
Protection of SCC	HF4	Movement barriers (plastic drift fences on either side of the road) must be erected along all road stretches within Very High SEI habitats with suitably wide underpasses allowing herpetofauna to be directed to crossings underneath the road. Underpasses must be at least 1 m wide and 1 m high, with a flat base, must be constructed every 50 m along drift fences, and must be maintained weekly to ensure that they are accessible, clean and fully functional. Automated camera equipment (fitted in lockable steel cages to prevent theft) must be installed at selected underpasses to monitor their efficiency and use by herpetofauna.	O	Tronox	Auditing	-	Presence of plastic drift fences
Aspect: Invertebrates							
Details of the aspect: Activities associated with vegetation clearing, dumping, stockpiling and construction of mining infrastructure associated with Phase 1 and Phase 2, resulting in habitat loss and displacement of SCC, loss of ecological connectivity, disorientation/poor intra-specific communication/displacement (due to vibrations caused) and illegal utilisation of resources and displacement of invertebrate species of concern.							
Avoid direct loss and displacement of invertebrate SCC	IB1	The practice of excavating trenches around the project area as a form of access control should be prohibited as such trenches act as 'pitfall and death traps' and a barrier to the dispersal of less mobile invertebrates.	PC	Tronox	No habitat disturbance in identified SCC areas	Field surveys and site inspections	Re-evaluate mining plan layout to avoid overlap with sensitive areas
Minimize disruptions to invertebrate populations during mining operations	IB2	Develop adaptive management strategies to reduce disturbance and maintain habitat quality.	O	Tronox	No significant increase in invertebrate disorientation/ invertebrate by-kills	Noise and vibration monitoring	Adjust operational schedules or methods to reduce noise impacts
Prevent illegal resource use and invertebrate displacement	IB3	Contractors and labour off-site, awareness programs, and monitoring by SHE officials.	PC/O	Tronox	No illegal harvesting of resources by personnel	Regular site inspections and labour monitoring	Increase awareness training and enforce strict access controls
Prevent illegal harvesting in natural habitats	IB4	Off-site accommodation for workers, environmental training, and monitoring.	PC/O	Tronox	No illegal resource use	Regular compliance checks	Enforce penalties for illegal resource use by personnel
Minimize disturbance during mining operations and provide for rehabilitation	IB5	Develop Veld Management Plan, use native species for landscaping, and provide safe translocation for SCC.	O	Tronox	No significant disturbance to invertebrate populations	Site inspections and ecological surveys	Rehabilitate affected areas and relocate SCC if needed
Reduce risk of invasive species predation and light disruption for invertebrates	IB6	Remove domestic waste quickly, control artificial lighting and use low UV-emitting lights.	O	Tronox	No increase in predation or disturbance from artificial lighting	Waste management audits and lighting inspections	Adjust lighting and waste management practices
Aspect: Aquatics							
Details of the aspect: Dust generation, siltation and spillages of material during hauling from the mining activity resulting in water quality modifications, and water quality deterioration (on various identified rivers), as well as undertaking of activities such as soil stripping, topsoil placement and sequential open cast mining with associated impact on the receiving environment. Considering the cumulative impacts, the proposed Project will potentially contribute to water and habitat quality modifications within aquatic ecosystems (through increased siltation for example).							
Minimise dust and sedimentation in the aquatic environment	AQUA1	Site preparation confined to demarcated footprint areas to minimise soil disturbance and sedimentation.	PC/C	Tronox	No significant increase in sedimentation at stream crossings	Water quality monitoring at stream crossings	Adjust construction practices or improve erosion control measures if sedimentation increases

Prevent water quantity modification	S7	Install stormwater control berms, monitor water flows to ensure they remain within acceptable limits.	O	Tronox	No significant modification of river baseflows	Streamflow monitoring	Adjust mining activities if baseflow modifications exceed acceptable limits
Prevent contamination from gypsum disposal	AQUA3	Install environmentally friendly barriers, monitor stormwater systems, and ensure proper containment during disposal.	O	Tronox	No significant water quality deterioration at Ntuze River	Water quality monitoring near disposal sites	Modify disposal methods or install additional containment measures if necessary
Aspect: Wetlands							
Details of the aspect: Impacts on wetlands were assessed for the proposed mining operation and associated infrastructure (PWP, open pit mining areas, RSF facilities, Water Control Dams (Return Water dams), Sand tails mounds (dumps), topsoil mounds and watercourse crossing infrastructure.							
Minimised sediment transport and erosion risks and Protection of water quality in receiving wetlands	W1	Site preparation limited to demarcated areas to minimise soil disturbance and sedimentation into wetlands. Construction to be undertaken in the dry season to minimise soil erosion. Road upgrades at watercourse crossings to be carried out during dry season.	C/O	Tronox /Contractor	Reduced soil disturbance Minimised sedimentation	Site inspections Sediment control checks	Re-adjustment of construction activities Erosion controls if sedimentation occurs
Reduced direct loss of wetland habitat Protection of wetlands from disturbance	W2	Reshape sand tailings and stockpiles to avoid wetlands. Maintain a 32m buffer around wetlands where stockpiles are placed. Limit construction activities to authorised areas.	C/O	Tronox /Contractor	Minimised wetland loss Maintained buffer zones	Regular footprint audits	Relocate stockpiles if necessary Restore disturbed areas
Restored hydrological balance in wetland habitats Mitigated hydrological impacts on wetland ecosystems	W3	Monitor potentially affected wetlands.	C/O	Tronox /Contractor	Maintained hydrological balance Collected monitoring data	Water quality and flow monitoring	Restore hydrological function if alteration occurs
Prevention of wetland burial Mitigation of RSF impacts on wetlands	W4	Regularly monitor the stability of RSFs. Prepare an Emergency Preparedness and Response Plan (EPRP). Conduct quarterly inspections of RSFs.	C/O	Tronox /Contractor	Maintained RSF stability Preparedness for emergency response	RSF inspections Emergency drills and readiness checks	Contain RSF failure Restore wetland habitats if affected
Successful rehabilitation and revegetation Protection of wetland ecosystems during decommissioning	W5	Re-profile rehabilitated landscapes. Conduct demolition during the dry season to reduce sediment transport. Immediately revegetate cleared areas.	D	Tronox /Contractor	Successful revegetation Minimal vegetation disturbance	Site restoration inspections Post-decommissioning audits	Replant and stabilise soil

Aspect: Estuarine							
Details of the aspect: The estuarine assessment identified various impacts during construction and operational phases, such as sediment delivery, dust deposition, hydrological changes, and chemical contamination, generally rated as low significance before and after mitigation. The biggest threat to the estuarine systems is that if reduced base flow and siltation entering the estuaries.							
Manage water quality	E1	Monitor water quality for contaminants (TSS, TDS, turbidity, oils, grease)	C/O/D	Tronox /Contractor	Water quality parameters are within acceptable limits	Regular sampling and testing	Implement additional containment measures if contamination is detected
Protection of estuarine habitat	E2.1	Restore natural land cover after topsoil removal from the Estuarine Functional Zone (EFZ)	O/D	Tronox /Contractor	Restored area with native vegetation	Post-restoration surveys	Rehabilitate with additional vegetation if required
	E2.2	Develop and implement a surface runoff management plan	O	Tronox /Contractor	No excessive sedimentation in estuaries	Water quality monitoring	Modify drainage systems if excessive sedimentation occurs
	E2.3	Ensure stormwater infrastructure is well maintained	O	Tronox /Contractor	Functional stormwater management system	Routine inspections	Repair and maintain stormwater infrastructure as needed
Prevention of RSF and sand tailings dump failure	E3.1	Conduct engineering reviews of RSFs and sand tailings disposal sites	O	Tronox /Contractor	Compliance with engineering best practices	Third-party engineering inspections	Redesign structures if risks are identified
	E3.2	Develop Emergency Preparedness and Response Plan for RSFs	O	Tronox /Contractor	Plan in place and drills conducted	Emergency drill reports	Update plan and increase training frequency if deficiencies noted
	E3.3	Regularly inspect and monitor RSFs for stability	O	Tronox /Contractor	No breaches or failures detected	Continuous monitoring with sensors and visual checks	Strengthen structural integrity if instability is detected
Managing changes in hydrological regimes	E4.1	Develop artificial breaching protocol for uMlalazi Estuary with EKZNW	O	Tronox /Contractor	Approved protocol in place	Collaborative review meetings	Revise protocol based on environmental data
	E4.2	Monitor baseflow changes in Mlalazi River	O	Tronox /Contractor	Stable estuarine mouth condition	Flow rate monitoring	Implement controlled breaching or flow augmentation if necessary
Cumulative impact management	E5.1	Monitor and manage changes in freshwater inflow to estuaries	O	Tronox /Contractor	Estuarine freshwater inflows maintained within acceptable limits	Long-term hydrological monitoring	Implement mitigation measures to supplement flows if necessary
	E5.2	Assess potential exacerbation of flow reductions from other activities	O	Tronox /Contractor	Comprehensive assessment completed	Data review and analysis	Adjust mining practices to minimise impact

Aspect: Social							
Details of the aspect: The SIA evaluated the expected social impacts of the project, categorising them into construction, operational, decommissioning, and cumulative impacts. During construction, positive impacts include economic contributions, enhanced local economic development, employment opportunities, and community investment. Mitigation measures focus on prioritising local employment, subcontracting, and infrastructure development, elevating the significance of these impacts from moderate to high. Negative construction impacts include loss of agricultural potential, increased pressure on municipal services, health and safety risks, and intrusive effects such as noise and dust pollution, with mitigation strategies reducing their severity. In the operational phase, preferential employment and skills development provide economic benefits, while intrusive impacts (noise, light, dust, and traffic), mining-related traffic, declining property values, land-use incompatibility, and livelihood disruptions present challenges. Implementing mitigation measures, such as environmental monitoring and engagement with local businesses, reduces these impacts. The decommissioning phase raised concerns about retrenchment, visual disturbances, and livelihood effects, which are mitigated through rehabilitation and post-closure community engagement. Cumulative impacts include strain on local services, addressed through municipal collaboration, while the local economy is strengthened through business support, resulting in a net positive impact post-mitigation.							
Economic contribution. The project is expected to have a positive impact on the national and local economy.	SC1.1	As stated in the SLP, it is recommended that Tronox give preference to communities near the Project regarding the benefits arising from the project because they will be the most affected. They should be considered for employment.	C/O	Tronox	Percentage of workforce and subcontractors from local communities.	Quarterly workforce and procurement reports; audits of Contractor employment records.	Increase outreach, training, and partnerships with local training institutions.
	SC1.2	As stated in the SLP, it is recommended that Tronox give preference to appropriate subcontractors located in the surrounding communities, followed by those found in the municipal area and those located elsewhere or outside the province	C/O	Tronox	Percentage of workforce and subcontractors from local communities.	Quarterly workforce and procurement reports; audits of Contractor employment records.	Increase outreach, training, and partnerships with local training institutions.
Increase In Local Economic Development. This is a positive impact.	SC2	Implement LED projects as specified in the SLP (include support to the Port Durnford bakery project, Port Durnford Aluminium Windows, doors, gates and glazing, Ongye Mountains Purified Water Youth Project, Poultry business for the Ntuze Area Youth and Kwa Dlangezwa Bricks and Blocks project). See Table 9-1 in the SIA for more detail.	C/O	Tronox	Number of projects initiated and operational.	Annual progress reports, site visits; and stakeholder engagement feedback.	Adjust funding, provide technical assistance, and engage alternative partners if delays occur.
Community investment. This is a positive impact.	SC3	According to the SLP, a Computer Centre and a science laboratory will be built in the high school as a career guidance programme. This project will be discussed and measured annually with the DMRE. The project will also be evaluated annually by the partners involved to identify possible areas for improvement that add value. The annual evaluation of the projects will be recorded and implemented if the necessary funds are available.	C	Tronox	Construction and operational status.	Annual evaluation with DMRE and project partners.	Identify and secure additional funding if required.
Reduce the loss of agricultural potential.	SC4.1	The land will be rehabilitated for post-mining forestry land use.	C/O/D	Tronox	Area rehabilitated as per closure plan	Annual rehabilitation assessments; satellite imaging	Implement corrective revegetation and erosion control measures
	SC4.2	A livelihoods restoration plan should be considered for those people who depend on the land for their livelihoods	C/O	Tronox	Number of affected individuals assisted	Bi-annual community engagement and impact assessment	Revise assistance programs; enhance alternative livelihood options
Minimise community-related health and safety risks	SC5	The mine has an HIV AIDS programme, which aims to deal with the effects HIV/AIDS has on its employees, the affected primary and extended family members, and the local community are included in the programme. Prevalence testing is done annually, voluntarily, and Tronox employees receive Anti-retroviral treatment. All Port Durnford mine employees will have access to Medical Aids with special provisions for HIV/AIDS-related illness. Furthermore, Port Durnford will put in place an HIV/AIDS awareness programme to educate the local community about the disease.	C/O/D	Tronox	Employee participation rate in awareness programs and treatment	Annual prevalence testing; health reports	Expand outreach programs; strengthen health partnerships
Public feedback	SC6	Develop a mechanism to record and respond to complaints	C/O/D	Tronox	Complaints recorded in the register	Auditing	Revision of lines of communication with the public.

Preferential employment.	SC7.1	A Port Durnford Mining Transitional Plan is in place to ensure the identification, procurement, subsequent management, and development of Historically Disadvantaged South Africans (HDSA) suppliers. The business forum also suggested a strategy during stakeholder engagement interviews; That all local businesses that benefit from the mine should be identified by address and confirmed by the village leader/induna.	O	Tronox	Percentage of procurement spend on HDSA suppliers	Bi-annual procurement reports; supplier audits	Increase supplier training and access to tenders
	SC7.2	The SLP states that once the Port Durnford mine is established, Port Durnford Mining will establish a Future Forum, and there will be a detailed analysis of the procurement spend in the local economy.					
	SC7.3	According to the SLP, a database of Exempted Micro Enterprises ("EMEs") / Qualifying Small Enterprises ("QSEs") will be maintained to evaluate new possible suppliers that can provide goods and services to Port Durnford Mining. In addition to maintaining an internal database, Port Durnford Mining will sign up for access to a national supplier database to expand the search for black women and youth-owned entities, and					
	SC7.4	Seeking to achieve BEE targets. Table 9-4 in the SIA presents these targets.					
Maximise skills development and training.	SC8	According to the SLP, the professionals-in-training Internship Programme (PIT) will cater to young professionals who have completed a degree and need on-the-job experience. The preferred skills will align with Port Durnford Mining's skills requirements.	O	Tronox	Number of interns trained and retained	Annual program review; feedback from participants	Enhance mentorship and retention strategies
Reduce adverse impacts on the livelihoods of local communities	SC9.1	Tronox must allow the community as much access to these resources during the operation phase as possible.		Tronox	Community access frequency; records of access requests granted	Annual review of community access reports	Improve community access policies; provide alternative resource access
	SC9.2	If the impacts on livelihood are unavoidable, the project may have to consider implementing an LRP.		Tronox	Implementation status of LRP; effectiveness of alternative livelihoods	Bi-annual assessment of affected households	Expand LRP programs if necessary; provide additional financial or training support
Meet social expectations from previous mining operations	SC10	The project must establish an ongoing stakeholder engagement to be as transparent as possible with the stakeholders regarding any developmental plans and implementation.		Tronox	Number of stakeholder meetings held; records of engagement outcomes	Quarterly stakeholder engagement reports	Increase frequency of engagement if issues persist; ensure transparency measures are maintained
Reduce the impacts associated with downscaling and retrenchment	SC11	The SLP states that during downscaling and retrenchment, consultation with employees through their representative union will be affected by section 189A of the Labour Relations Act	D	Tronox	Compliance with consultation requirements; number of retrenchment consultations held	Monitoring of labour consultations and compliance reports	Ensure retrenchment consultations are adequately conducted; support affected employees with reemployment initiatives
Aspect: Traffic							
Details of the aspect: The Traffic Impact Assessment (TIA) for the Port Durnford mining development evaluated traffic impacts across two phases. Phase 1 presents minimal traffic concerns due to a lower mining rate, while Phase 2 poses significant challenges as mining activities expand following the closure of the Fairbreeze operation. Phase 2 requires the construction of new internal roads, intersection upgrades off the N2, and improvements to Municipal Road P537 to support a design speed of 80 km/h. The TIA assessed traffic impacts along key routes, including the haulage route from Fairbreeze PWP to CPC in Empangeni, which is expected to generate 24 two-way heavy vehicle trips daily in Phase 1, requiring no mitigation. In Phase 2, increased mining activity leads to four progressive traffic stages, initially estimated to generate up to 236 heavy vehicle crossings per hour at Roads P537 and P535. However, a slurry transport system will replace truck haulage, significantly reducing actual traffic volumes.							

The TIA highlights access constraints at P537 and P535, recommending grade-separated crossings and a diamond-shaped intersection at P535 for safe N2 access. Impact significance ratings indicate that site establishment and Phase 1 operations have low impacts, while Phase 2 sees moderate to high impacts, particularly with heavy vehicle crossings at P537. Proposed mitigation measures, including road upgrades and interchange construction, help reduce these impacts to moderate levels. By 2069, during site closure, traffic volumes will decline, with a low impact rating both pre- and post-mitigation.							
Reduce impacts on Intersection 9	T1	The realignment of the southern approach of the intersection is required to ensure a minimum 10-degree angle on this approach from a sight distance / safety perspective. No other mitigation measures are required at this intersection.	O	Tronox	Intersection realigned to required angle	Monthly site inspection & compliance verification	Adjust road alignment if deviation is found
Reduce impacts on Intersection 10	T2	The realignment of the southern approach of the intersection is required to ensure a minimum 10-degree angle on this approach from a sight distance / safety perspective. No other mitigation measures are required at this intersection.					
Reduce impacts on Intersection 12	T3	The construction of a partial interchange, i.e. an Underpass / Overpass crossing P537 with marginal access on both sides of P537 which is separated by a physical median is required.			Completed construction according to design	Bi-monthly construction progress check	Adjust design if structural or access issues arise
Reduce impacts on Intersection 15	T4	The construction of a partial interchange, i.e. an Underpass / Overpass crossing P535 with marginal access on both sides of P535 which is separated by a physical median is required.					
Reduce impacts on Intersection 16	T5	The construction of the ramps and northern terminal with an additional right-turn lane on the south approach of P537 is required.			Completed construction according to design	Bi-monthly construction progress check	Adjust design if structural or access issues arise
Reduce impacts on Intersection 19	T6	The implementation of traffic signal control is required at the northern terminal of the P535 / N2 interchange.					
Reduce impacts on Intersection 20	T7	The construction of the ramps and southern terminal with an additional right-turn lane on the north approach of P537 is required.			Additional turn lane is constructed and operational	Monthly traffic flow assessment	Modify lane design if congestion persists
Reduce impacts on P537	T8	Will need to be upgraded to a design speed of 80km/h to comply with Provincial Safety standards			Road meets provincial safety standards	Bi-annual speed compliance checks	Redesign or apply traffic calming if speed compliance fails
Minimise impacts on road safety	T9.1	The mining operations will generate 7-axle side tipper trucks with 34-tonne payloads. These trucks are not compatible with light vehicle traffic and must be separated from the general light vehicle fleet as far as possible			No major safety incidents between heavy and light vehicles	Weekly traffic pattern analysis	Adjust routes or enforce truck restrictions if conflicts arise
	T9.2	The crossing of public roads by high volumes of heavy vehicle traffic is a large safety risk. The construction of partial interchanges (grade separation) is recommended at Intersections 11 and 12 (the accesses to the mining areas) to mitigate these risks.			Safe and efficient traffic flow	Monthly safety audit/checks	Modify interchange design if safety issues occur
	T9.3	The reconstruction of Road P537 to a design speed of 80km/h.			Road meets provincial safety standards	Bi-annual compliance inspection	Redesign or apply traffic calming if speed compliance fails
	T9.4	The construction of Public Transport Stops (PTS) is recommended on both sides, south of the partial interchange intersections on Road P535 and Road P537.			PTS fully operational and accessible	Quarterly infrastructure inspection	Repair or relocate stops if accessibility issues arise
	T9.5	The construction of paved sidewalks is recommended only at the accesses on Road P535 and Road P537 to link these accesses with the proposed Public Transport Stops (PTS).			Safe pedestrian access provided	Monthly inspection for damage or obstruction	Repair or remove obstacles if hazards occur
Minimise impacts in RSF Breach scenarios	T10.1	Failure of the RSF can potentially result in the temporary closure of Road R102 and the intersection between R102 and Road P537. During this period, traffic will have to be rerouted via the N2-28. The design of the required construction works, and the rerouting of traffic, is managed through a wayleave process that includes a Traffic Accommodation Plan			Successful rerouting plan implemented	Emergency traffic monitoring during incident	Adjust detour routes if congestion or delays arise

	T10.2	The required rerouting of traffic and construction works will only be of a short-term nature, i.e. approximately 3 to 6 months, during which time traffic can be redirected from the R102 onto the N2 at Mtunzini and Road P535			Effective traffic management with minimal disruption	Weekly traffic impact assessment during construction	Adjust routing or signage if congestion issues arise
Aspect: Visual							
Details of the aspect: The Visual Impact Assessment (VIA) for the proposed Port Durnford mining development identified several potential visual impacts, particularly concerning permanent infrastructure, RSF facilities, sand tail dumps, and changes to the local topography. Phase 1 impacts, including the presence of a site camp, laydown yard, and small-scale opencast mining activities, are expected to have low to moderate visibility, with forest screening providing some mitigation. In Phase 2, large-scale mining activities, night-time lighting, dust plumes, and haulage roads will have a moderate to high degree of visibility. The expansion of RSFs and sand dumps will significantly alter the landscape. Despite mitigation efforts, such as progressive rehabilitation and strategic placement of infrastructure, some features—especially sand dumps—will remain prominent even after closure. Cumulatively, the Port Durnford mine, alongside the nearby Fairbreeze, Hillendale, and proposed Zulti South mines, will contribute to the transformation of the regional visual landscape, characterised by coastal forests, wetlands, and agricultural land. However, given that existing mining activities occupy a relatively small portion of the visual study area, and with planned rehabilitation and reforestation, the long-term impact can be reduced. The eventual decommissioning of mining infrastructure will significantly alleviate visual disturbances, and if the land is restored for agriculture and timber, the long-term cumulative visual impact will be minimal, maintaining the pre-mining visual condition of the area.						
Minimise the presence of visually intrusive site camp and laydown yard and associated night-time light pollution	V1.1	Ensure all construction areas are appropriately maintained and kept in tidy order as per Tronox 's SOP.	C	Tronox /Contractor	No visible litter, organized storage, and clean work areas.	Weekly site inspections by environmental officer.	Immediate cleanup of cluttered areas and enforcement of housekeeping protocols.
	V1.2	Reduce the number and size of material laydown and waste storage areas to the extent feasible, and barricade these from view with shade netting/similar if needed.	C		Reduction in footprint of laydown areas, use of visual barriers.	Monthly assessment of material laydown areas.	Relocate/resize laydown areas and install additional screening if necessary.
	V1.3	Utilise security lighting that is movement activated rather than permanently switched on, to prevent unnecessary constant illumination.	C/O/D		Reduction in continuous light emissions.	Night-time site inspections, bi-annual energy audits.	Adjust or replace non-compliant lighting.
	V1.4	Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination.	C/O/D		Lighting levels within recommended guidelines.	Quarterly lighting assessments.	Adjust lighting intensity and positioning as required.
	V1.5	Reduce the height and angle of illumination from which lights are fixed as much possible while still maintaining the required levels of illumination.	C/O/D		Minimal light spill and glare.	Periodic night-time audits.	Adjust light mounting heights and angles accordingly.
	V1.6	Identify zones of high and Low lighting requirements, focusing on only illuminating areas to the minimum extent possible to allow security surveillance.	C/O/D		Light only in designated high-need zones.	Annual lighting assessment.	Reconfigure lighting zones based on security requirements.
	V1.7	Avoid up-lighting of structures by rather directing lighting downwards and focussed on the area to be illuminated.	C/O/D		Reduction in light pollution and glare affecting surrounding areas.	Monthly inspection of lighting installations and compliance audits.	Adjust lighting angles and replace fixtures if misaligned.
	V1.8	Fit all security lighting with 'blinkers' or specifically designed fixtures, to ensure light is directed downwards while preventing side spill. Light fixtures of this description are commonly available for a variety of uses and should be used to the greatest extent possible.	C/O/D		Security lighting is properly directed downward with minimal side spill.	Monthly inspection of lighting compliance; visual checks at night.	Install or replace blinkers on fixtures that do not meet requirements.
Minimise visual impacts from opencast mining activities (small-scale)	V2	Maintain a visual screen of existing plantation trees, or otherwise plant where needed, of ideally 100 m wide but not less than 50 m wide around the boundary of all opencast mining areas. This screen to be managed in x 3 linear rotational harvest zones, to always ensure three height cohorts. Refer to Figure 6-3 below for proposed tree screening locations.	O		Effective visual screening maintained at all times.	Quarterly monitoring of tree health and screen effectiveness.	Replant trees where gaps form and ensure rotational harvest management is adhered to.

Minimise impacts from opencast mining activities (large-scale) and associated night-time light pollution	V3	Maintain a visual screen of existing plantation trees, or otherwise plant where needed, of ideally 100 m wide but not less than 50 m wide around boundary of all opencast mining areas. This screen to be managed in x 3 linear rotational harvest zones, to always ensure three height cohorts.	C/O		Continuous presence of a dense, multi-layered tree screen around RSFs and sand tail dumps.	Bi-annual aerial/satellite imaging and on-site visual inspections.	Replant missing or sparse sections, adjust harvesting schedule to maintain screen integrity.
Presence of visually intrusive PWP complex and infrastructure and associated night-time light pollution	V4.1	Utilise security lighting that is movement activated rather than permanently switched on, to prevent unnecessary constant illumination.	C/O/D		Reduction in continuous light emissions.	Night-time site inspections, bi-annual energy audits.	Adjust or replace non-compliant lighting.
	V4.2	Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination.	C/O/D		Lighting levels within recommended guidelines.	Quarterly lighting assessments.	Adjust lighting intensity and positioning as required.
	V4.3	Reduce the height and angle of illumination from which lights are fixed as much possible while still maintaining the required levels of illumination.	C/O/D		Minimal light spill and glare.	Periodic night-time audits.	Adjust light mounting heights and angles accordingly.
	V4.4	Identify zones of high and Lowlighting requirements, focusing on only illuminating areas to the minimum extent possible to allow security surveillance.	C/O/D		Light only in designated high-need zones.	Annual lighting assessment.	Reconfigure lighting zones based on security requirements.
	V4.5	Avoid up-lighting of structures by rather directing lighting downwards and inwards focussed on the area to be illuminated and away from surrounding receptors.	C/O/D		No up-lighting, reduced sky glow.	Random night-time inspections.	Replace non-compliant fixtures with downward-focused lighting.
	V4.6	Fit all security lighting with ‘blinkers’ or specifically designed fixtures, to ensure light is directed downwards while preventing side spill. Light fixtures of this description are commonly available for a variety of uses and should be used to the greatest extent possible.	C/O/D		Light spill minimized to surrounding areas.	Bi-annual lighting compliance check.	Retrofit existing lights with appropriate fixtures.
Progressive increase in height and expansion of visually intrusive RSFs and sand tails	V4.1	Maintain a visual screen of existing plantation trees, or otherwise plant where needed, of ideally 100 m wide but not less than 50 m wide around boundary of all RSFs and sand tails dumps during operations. This screen to be managed in x 3 linear rotational harvest zones, to always ensure three height cohorts.	O		Continuous presence of a dense, multi-layered tree screen around RSFs and sand tail dumps.	Bi-annual aerial/satellite imaging and on-site visual inspections.	Replant missing or sparse sections, adjust harvesting schedule to maintain screen integrity.
	V4.2	Harvesting of existing plantation trees that are to serve as visual screens around mining areas and infrastructure is to cease 8 years or more before commencement of mining related activities in each area, from which point onwards these trees must be maintained as visual screens as described.	C		Mature and dense tree buffer established before mining begins.	Annual monitoring of plantation growth, density, and age.	Adjust harvesting schedules, delay or stagger cutting cycles to maintain screening effectiveness.
	V4.3	Ensure existing plantation trees to be retained as tree screens are structured into screening cohorts 6-8 years prior to commencement of mining activities or construction/deposition of sand dump/RSFs, to ensure adequate screening is provided. Similarly, additional timber screening trees to be planted 6-8 years prior to mining/dump construction that it is intended to screen.	C		Mature tree buffer established prior to mining.	Annual monitoring of plantation age and density.	Adjust harvesting schedules to ensure screen maintenance.
	V4.4	Tronox should engage with Mondi to include the relevant plantation tree screening management requirements in their commercial agreements, to ensure that Mondi maintain the required visual screens as specified for the duration of the mining operations.	C		Mondi agreements include visual screen requirements.	Annual contract compliance checks.	Amend agreements if plantation management deviates from requirements.

	V4.5	If possible, implement concurrent operational rehabilitation of the RSFs and sand tails side slopes to reduce the visual intrusion, including: ■ Shape RSFs and sand tails side slopes and crest to pre-determined maximum gradient/s which will prevent erosion and allow for adequate vegetation growth; ■ Place growth medium to a suitable depth and re-vegetate using a suitable mix of indigenous grass species; and ■ Investigate potential RSF and sand dump layout, design and final rehabilitation optimisation, i.e. creating combined landform between RSF 9 and Sand Dump 8B, which would create additional deposition volume between the landforms and provide potential for creating a more natural appearing final landforms.	C/O		Progressive rehabilitation of RSFs and dumps.	Bi-annual site assessments.	Accelerate rehabilitation where possible.
Prevent permanent alteration of site topography and land cover	V5.1	Shape the RSFs and sand tails to be as natural in appearance as possible.	C		RSFs/sand dumps with natural appearance.	Annual topographic surveys.	Adjust landform shaping where necessary.
	V5.2	Distribute topsoil over the RSFs and sand tails and actively revegetate (using grasses) to establish a vigorous and self-sustaining vegetation cover.	C/O		Established vegetation cover on RSFs.	Seasonal vegetation health surveys.	Reseed, fertilize, or introduce additional species as needed.

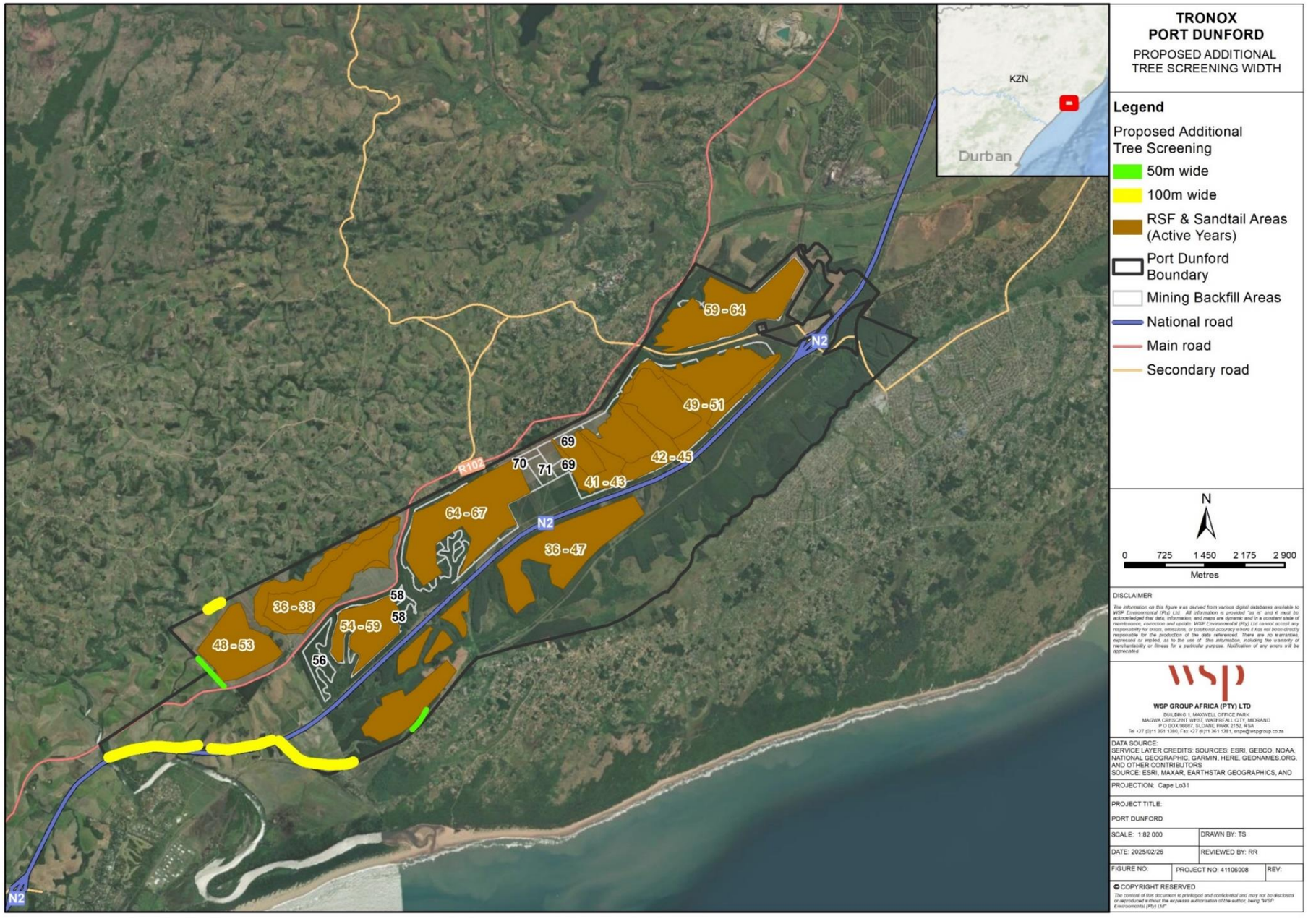


Figure 6-3 - Tree screening locations

7 ENVIRONMENTAL MONITORING PROGRAMME

The monitoring programmes detailed below were compiled by specialists during the impact assessment phase of the proposed Port Durnford project and are deemed adequate to mitigate impacts associated with the proposed activities. The required monitoring measures have been summarised and presented in Table 7-1 below.

The monitoring requirements specified in the EMP must be supplemented to the existing and ongoing monitoring plan with Fairbreeze Mine. Table 7-1 provides the recommended monitoring conditions for the proposed Port Durnford operation.

Table 7-1 – Summary of the required monitoring measures

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
Surface water					
In-stream surface water quality	▪ To monitor surface water quality, to track water quality changes over time and to assess if these changes are related to the Port Dunford mining activities, to implement mitigation measures if required.	▪ Collect surface water samples monthly for chemical analysis by an accredited laboratory. ▪ Monitoring will continue for at least 5-years post-closure (or until a closure certificate is issued).	▪ South African Bureau of Standards (SABS) analysis is to be undertaken for samples collected from the monitoring points at the mine site as stipulated in the IWWMP, and WUL. ▪ South African National Standards (SANS) analysis is to be undertaken for samples collected from the monitoring points located at the siding area as stipulated in the IWWMP, and WUL. ▪ In-field measurements are made for pH and Electrical Conductivity (EC) (as a minimum) when samples are	▪ Results and findings will be compiled into a monthly site water quality monitoring report, with attached laboratory results. ▪ Surface water quality monitoring reports and data will be submitted to the authorities monthly.	▪ Investigate the cause of any non-compliance in surface water quality leaving the site (using the source – pathway – receptor model) and address the contaminant source with improved rehabilitation and/ or appropriate mitigation measures.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
			collected – to allow for immediate corrective action.		
In stream surface water flow	▪ To monitor surface water quality, to track water flow volume changes over time and to assess if these changes are related to the Port Dunford mining activities, to implement mitigation measures if required.	▪ Conduct in stream surface water monitoring annually.	▪ Measure in stream flow.	▪ To be included as part of the surface water quality monitoring report.	▪ A dedicated assessment of the increased for decreased flow is needed – to be followed by appropriate corrective action.
Biomonitoring	▪ To monitor the health and ecological integrity of aquatic life in surrounding catchment systems, and to track changes over time with the intention of assessing changes in relation to changing water quality and other potential mining impacts.	▪ Conduct aquatic bio-monitoring surveys annually. ▪ Biomonitoring will continue for at least 5-years post-closure (or until a closure certificate is issued)	▪ The SASS 5 bio-monitoring methodology is used to determine the aquatic health and ecological integrity of stream biodiversity. This approach includes an assessment of habitat availability for aquatic macro invertebrates (Integrated Habitat Assessment System), Fish Response Assessment Index as well as diatoms.	▪ Results and findings will be reported in an aquatic health assessment report delivered after each assessment.	▪ Investigate the cause of any bio-monitoring results that do not reflect improving trends in biodiversity or ecological health.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
Groundwater					
Groundwater quality	▪ To monitor ground water quality in both natural aquifers and mine workings, to track water quality changes over time and to assess if these changes are related to the Port Dunford mining activities, so as to implement mitigation measures if required. ▪ Groundwater quality monitoring will be undertaken to establish the following: • The impact of mine dewatering on the surrounding wetlands. • Groundwater inflow into the open pit areas. • Groundwater quality trends.	▪ Groundwater samples will be collected quarterly for chemical analysis by an accredited water laboratory and to determine groundwater levels. ▪ Monitoring of boreholes will continue for at least 5-years post-closure (or until a closure certificate is issued).	▪ Groundwater samples will be sent to an accredited water laboratory to be analysed for full South African Bureau of Standards (SABS) analysis for samples collected from the monitoring points at the mine site. ▪ Full South African National Standards (SANS) analysis is to be undertaken for samples collected from the monitoring points.	▪ Results and findings will be compiled into a quarterly water quality monitoring report, with attached laboratory results. ▪ An annual compliance water quality monitoring report will be compiled and submitted to the authorities for evaluation and comment.	▪ Investigate the cause of any non-compliance in borehole water qualities (using the source – pathway – receptor model) and develop appropriate mitigation measures to reduce the generation of contamination at source where possible, or to contain or intercept polluted groundwater movement towards sensitive receptors where this is necessary.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
	• The rate of groundwater recovery • Extent of possible contaminated groundwater plumes (providing data to confirm groundwater models and inform contaminant "source-pathway-receptor" analysis). • Potential contaminated groundwater does not impact surrounding groundwater users (neighbouring communities).				
Groundwater levels	▪ To monitor the piezometric (water table) levels in all boreholes, to determine the dewatering impacts of mining, and to measure the rate of recharge to	▪ Groundwater levels measured quarterly. ▪ Monitoring will continue for at least 5-years post-closure (or until a closure certificate is issued).	▪ The groundwater level is to be measured at the mines monitoring points.	▪ Results and findings will be compiled into a quarterly site groundwater water report.	▪ Reassess and revise groundwater management plan for the Port Dunford mine to manage and mitigate possible water contamination.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
	underground workings in closed mining areas.				
Surface rehabilitation					
Concurrent surface rehabilitation progress	▪ To monitor rehabilitation performance by measuring appropriate land parameters that allow the calculation of rehabilitation progress and rehabilitation backlogs, and to plan annual rehabilitation activities and to budget for the implementation of the plan.	▪ All progressive mining disturbance and rehabilitation progress on site will be monitored on a monthly basis by accurate survey measurement, with rehabilitation performance data being consolidated for reporting on an annual basis.	▪ The following land parameters are monitored to inform rehabilitation planning and performance assessment: • Company owned and company managed land (ha). • Areas altered for mineral extraction activities (ha). • Areas unavailable for rehabilitation (infrastructure areas) (ha). • Area available for rehabilitation (ha). • Total area rehabilitated (ha) and outstanding backlog.	▪ Rehabilitation performance will be reported annually to Tronox and DMRE (as per the requirements of the Financial Provisioning Regulations, 2015 (as amended)).	▪ Ensure that rehabilitation backlog is addressed so that the mine is compliant with commitments made in the annual rehabilitation plan, otherwise this may result in a penalty given by DMRE.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
Land capability	▪ To monitor post-closure land capability on rehabilitated areas, to compare performance against EMPr commitments.	▪ The land capability assessment will typically be a once-off exercise completed on rehabilitated land units (as these becomes available for assessment).	▪ Conduct a post-closure land capability assessment on rehabilitated areas (using a 100 m x 100 m grid), that includes measurement of the following key parameters for cover soils: • slope angle • soil depth • bulk density • soil pH • soil salinity • soil fertility (using typical agricultural analysis).	▪ Findings will be reported in a post-closure land capability report, after each assessment where achieved land capability will be compared with EMPr commitments.	▪ Modify rehabilitation plan to address any losses in land capability and report these in the annual rehabilitation plan or modify the post-closure land use plan to align with achieved post-closure land capability.
Soil fertility	▪ To achieve basal soil fertility levels that will support a self-sustaining vegetation cover (within 5 – 10-years of completion of rehabilitation).	▪ Annually for the five years, and every three years thereafter until fertility targets met.	▪ Determine the fertility level in rehabilitated soils by collecting representative soil samples for laboratory analysis.	▪ Findings will be reported in a soil fertility report, after each assessment.	▪ Apply adequate soil amelioration (physical and chemical) to provide a sustainable vegetation cover in support of the post-closure land use.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
			▪ Submit soil samples to an accredited soil laboratory to analyse for: • pH (KCl) • salinity (as electrical conductivity in mS/cm or resistance in Ω) • Fertility: P as Bray 1 and K • Organic carbon (Walkley Black) • Major cations: Ca, Mg and Na • Cation exchange capacity (CEC).		
Surface erosion	▪ To monitor rehabilitated areas for soil erosion to ensure that a self-sustaining vegetation cover is established that will minimise soil loss through raindrop impact and rainfall runoff erosion.	▪ Annually for the first three years, and every three years thereafter until fertility targets met.	Visual inspections of newly rehabilitated areas, to determine areas of erosion or potential erosion (noting areas of sheet, rill or gully erosion).	▪ Findings will be reported in an internal rehabilitation report after each assessment.	▪ Eroded areas will be stabilised by infilling and reshaping, and by establishing vegetation on the repaired areas/ bare patches, as required.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
Wetland	▪ Wetland condition monitoring ▪ Wetland vegetation monitoring ▪ Wetland erosion and sedimentation monitoring ▪ As per the locations presented in Section 7.3	▪ Three-year intervals ▪ Erosion and sedimentation monitoring to take place annually	▪ Wetland health ▪ Wetland vegetation ▪ Fixed point photography for the erosion and sedimentation monitoring	▪ Annual report	▪ To inform surface water and sediment management protocol
Estuarine	▪ Water Quality	▪ Annual	▪ In situ -temperature, salinity, pH. Dissolved oxygen, turbidity, chlorophyll	▪ Annual reporting	▪ To inform surface water and sediment management protocol
	▪ Water quality (discrete samples)	▪ Two year intervals	▪ Suspended sediment concentrations, dissolved nutrients	▪ To supplement the annual reports every second year	▪ To inform surface water and sediment management protocol
	▪ Sediment quality	▪ Two year intervals	▪ Grain size, total organic carbon, metals	▪ To supplement the annual reports every second year	▪ To inform surface water and sediment management protocol
Vegetation establishment composition and basal cover	▪ To ensure the even establishment of perennial species in the seed mix. ▪ To monitor the emergence and	▪ Monitoring of vegetation establishment, species composition and basal cover will be done annually for the first three years,	▪ Annual visual inspections for a period of five years on rehabilitated land to ensure that seed establishment has been successful and any	▪ Findings will be reported in a rehabilitation report after each assessment.	▪ Over seed any areas where seed germination has failed (and where soil conditions have proved to be suitable).

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
	transition to dominance of perennial species in years two and three. ▪ To ensure perennial species persist in the rehabilitated landscape.	and then every three years thereafter. ▪ Visually inspect rehabilitated pastures annually. ▪ In year three and then every three years thereafter, assess species composition, abundance and cover at fixed point survey sites.	germination or establishment failures (through poor seed quality, seed application, drought etc.) are noted. ▪ Successional changes in pasture species composition and abundance will be recorded visually for three years. ▪ In year three, fixed point vegetation monitoring sites will be established (one every 50 ha as a minimum), and the line transect or quadrat method will be used to determine species composition, species abundance and plant basal cover.		▪ Apply appropriate adaptive management strategies to correct any deterioration in the pasture species composition and abundance (e.g., review defoliation /fertilisation practices and modify according.
Forest rehabilitation Plan	▪ To be developed to help restore the forests that were cleared during mining	▪ To be specified by the relevant specialist	▪ To be determined by the relevant specialist	▪ The plan must contain a monitoring component so that the rehabilitation performance can be assessed and reported on.	▪

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
Invasive alien species	▪ To eradicate or control declared Category 1, 2 and 3 invader species on both rehabilitated land and on unmined areas within the mining rights area. ▪ To minimise the threat posed by invasive species to reinstated pasture lands, as well as natural ecosystems and habitats, and biodiversity. ▪ To increase the potential for natural systems to deliver improved ecological goods and services.	▪ Annually for the first three years after establishment of pastures on rehabilitated land (or weed clearance on virgin land), then every three years at least until closure.	▪ Conduct a visual inspection for invasive species over the site on a biannual bases for five years, focussing on areas where invasive species have been previously eradicated, and on rehabilitated areas where placed soils were stripped from areas that were infested with invasive species before mining.	▪ Findings will be reported in a rehabilitation report after each assessment.	▪ Review eradication/control measures and modify to improve effectiveness.
Mammals	▪ A monitoring programme for forest-dwelling mammals of SCC should be developed for the study area to assess the presence of mammal SCC, to estimate their population size, to determine their range-use/distribution and	▪ Annual monitoring during pre-construction, operational and closure phases.	▪ Assess and understand the presence of mammal SCC in the MRA, to estimate their population size, to determine their range-use/distribution.	▪ Annual monitoring report	▪ To inform biodiversity management within the MRA

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
	▪ The findings of the monitoring should be used to inform the development of species-specific management plans for the Mining Rights Area.				
Air quality	▪ To monitor reduction of fallout dust emanating from rehabilitated mining and infrastructures areas following the successful establishment of vegetation on these areas.	▪ Annually for five years, or until target reached.	▪ Use will be made of single dust buckets to monitor dust fallout, and where indicated bi-directional buckets will be installed to monitor imported and exported dust.	▪ Findings will be reported annually in an air quality assessment report.	▪ Improve vegetation cover on rehabilitated areas by either improving soil fertility, by over-seeding where cover is low, and by providing interim wind control measures (wind nets), where required, until the desired vegetation cover is achieved that reduces dust load to below threshold levels.
Radiation	▪ Tronox will need to action radiation monitoring for the surface water, sediments, groundwater, radon gas, and dust fallout for the proposed Port Durnford operation,	▪ Once pre-construction then annually	▪ Perform gamma radiation and dose rate surveys on a grid basis of all potentially affected areas for Phase 1; ▪ Collect soil samples at selected locations that coincide with selected locations that represent	▪ Findings will be reported annually in a radiation assessment report.	▪ Apply adaptive management practice should the presence of radio active material be found emanating from the mining operation.

Monitoring aspects	Monitoring objectives	Frequency and period of monitoring	Sampling analysis and parameters to be monitored	Reporting	Corrective action/ adaptive management
			potentially hot-spot areas identified during the gamma radiation survey for full-spectrum radio analysis of the U-238, U-235 and Th-232 decay chains; ▪ Perform an airborne radon gas survey in the operation area using RGMs on a campaign basis; ▪ Collect surface water, groundwater and sediment samples on an upstream and downstream basis that is representative of the mining operation area for full-spectrum radio analysis of the U-238, U-235 and Th-232 decay chains; and ▪ Perform full-spectrum analysis of an orebody (RoM), HMC, topsoil, and RSF material that will be generated and used as part of the mining operation.		

7.1 SURFACE WATER MONITORING PROGRAMME

A surface water monitoring programme is essential as a management tool to detect negative impacts as they arise and to ensure that the necessary mitigation measures are implemented. Monitoring frequencies specific to different phases of the project are described in the monitoring plan presented in Table 7-2 and the recommended monitoring points are illustrated in Figure 7-1. Water quality should be benchmarked against the approved IWULs 9once authorised) for the discharge and Water Quality Planning Limits (WQPL) applicable to the catchment. A consistent monitoring frequency needs to be maintained in order to determine whether the variations observed in the data set are due to seasonal factors or other events.

Table 7-2 – Surface Water monitoring programme

Monitoring Aspect / Impacts requiring monitoring	Monitoring and Inspection Methodology	Frequency	Duration	Location of monitoring stations	Reporting schedule	Performance indicator	Responsibility
Water Quality	It is recommended that Port Durnford establishes water quality monitoring Programme, where samples are collected monthly, and ensure the following: ▪ Monitoring should be established on all the sampled points used for baseline assessment, and the more points proposed by groundwater study, to assess quality as a result of baseflow. ▪ Monitor the parameters that form part of the new WUL. ▪ Monitoring the parameters against the catchment WQPLs.	Monthly monitoring is recommended during construction, operation, and decommissioning, and for at least three (3) years after closure or until rehabilitation has reached a sustainable state with no further changes.	Throughout the project life	See **Figure 7-1**	Monthly	High Total Dissolved Solids (TDS), Aluminium (AL), and Manganese (Mn)	Environmental Officer
Water quantity	▪ Streamflow monitoring should be conducted to detect any changes in the flow regime that might be resulting from project-related activities. ▪ Boreholes recommended by the groundwater study to monitor groundwater levels, should monitor fluctuations in baseflow ▪ Real-time streamflow data loggers can be used to capture real-time flows.	Daily flow meter data records should be kept in areas with an automatic monitoring system.	Operational Phase		Daily	Reduced streamflow/ baseflows	Environmental Officer

Monitoring Aspect / Impacts requiring monitoring	Monitoring and Inspection Methodology	Frequency	Duration	Location of monitoring stations	Reporting schedule	Performance indicator	Responsibility
RSF	▪ Regular infrastructure inspections should be conducted to determine their condition and identify any anomalies and system malfunctions. ▪ Conduct a stability assessment on RSFs - geotechnical data ▪ Inspect the RSFs and monitoring data with an experienced tailings operator ▪ Ensuring adequate construction supervision.	Quarterly	Operational Phase		Quarterly	Infrastructure malfunction	Experienced Tailings Operator
Rainfall data	▪ Real-time rainfall measurements using a tipping bucket rain gauge, if possible; and ▪ Alternatively, a bulk rain gauge can be used to capture the total amount of rainfall for each event.	After a rainfall event	Throughout the project life		Daily	Gaps in the data	Environmental Officer

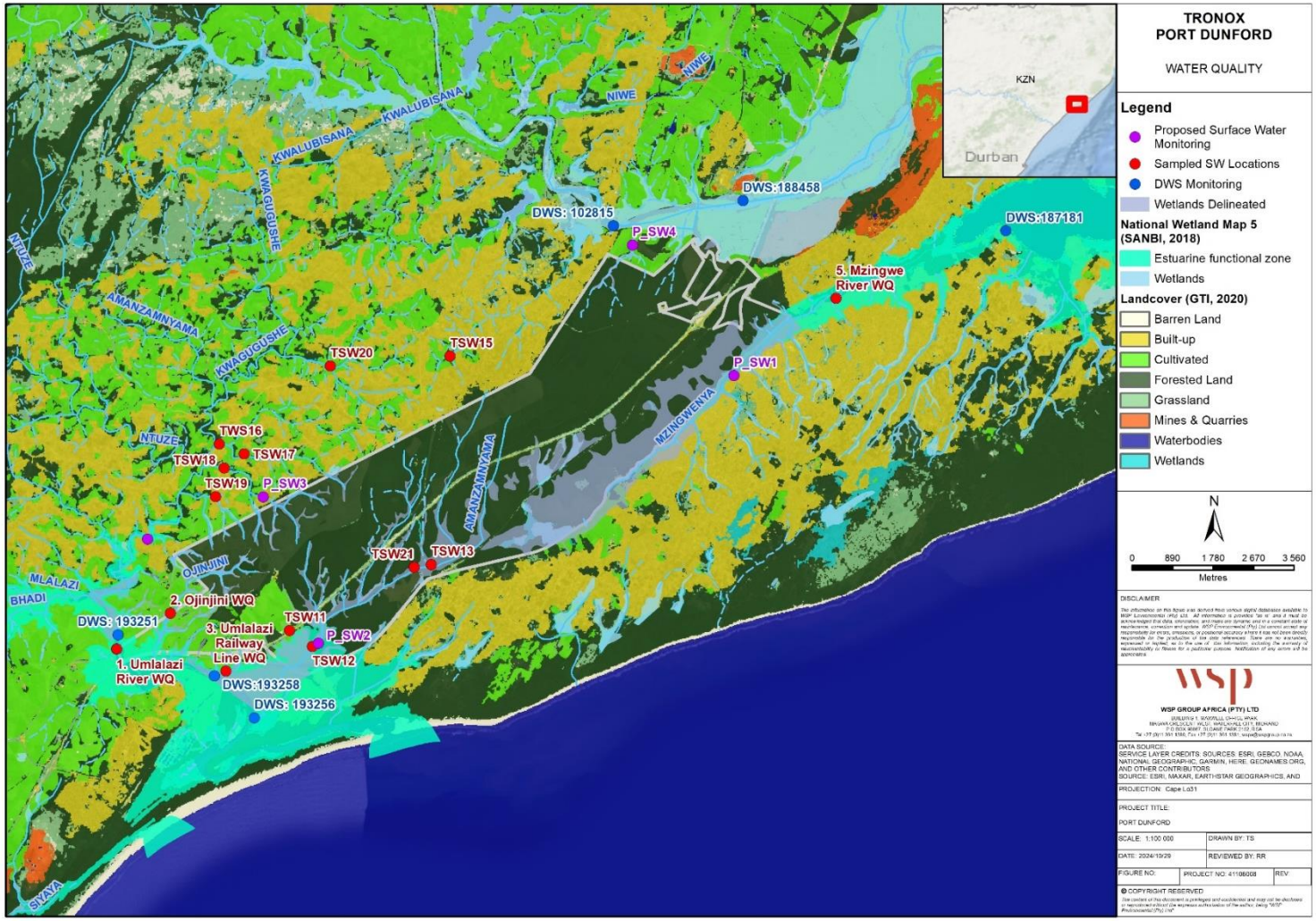


Figure 7-1 – Surface Water Quality Monitoring Points

7.2 GROUND WATER MONITORING PROGRAMME

The groundwater monitoring programme must be used to guide environmental management decision making, including taking remedial measures when water quality guidelines are exceeded. The groundwater monitoring boreholes should be distributed across the site, strategically situated to allow observation of groundwater quality fluctuation upgradient, within and downgradient of the potential contamination sources.

During the hydrocensus survey undertaken during the impact assessment phase of the proposed project, several boreholes were identified both within the site boundary and outside of this and it is anticipated that some of these boreholes will be destroyed during mining activities. The recommended monitoring boreholes are illustrated in Figure 7-2 which have been recommended based on the following factors:

- Existing boreholes that will not be destroyed by mining (W1, W5, W7, W11, W12, W14, TBH6, TBH 8 and TBH9).
- Boreholes that should be replaced if destroyed during mining (W3 and W6, these positions have been moved to outside the mining area).
- Additional proposed boreholes (P_BH1 to P_BH4).

The placement of these boreholes was selected to capture any potential plume development and to see what the water quality of the groundwater leaving the Por Durnford MRA is.

Five surface water monitoring points are also recommended (Figure 7-2):

- The Mzingwenya River (P_SW1).
- The Amanzamnyama River (P_SW2).
- Tributary of the KwaGugushe River (P_SW3).
- Tributary of the Mhlatuze river (P_SW4).
- Ojinjini River (P_SW5).

The geographic coordinates of the proposed monitoring points are presented in Table 7-3.

Figure 7-2 – Existing and proposed boreholes

Table 7-3 – Proposed system response monitoring network

Monitoring Points	Name	Longitude	Latitude	Description
Groundwater	W1	31° 53' 31.754" E	28° 52' 26.472" S	Existing
	W3	31° 51' 21.109" E	28° 51' 48.281" S	Replacement
	W5	31° 51' 37.620" E	28° 53' 13.920" S	Existing
	W6	31° 50' 39.003" E	28° 53' 24.193" S	Replacement
	W11	31° 49' 32.520" E	28° 54' 39.024" S	Existing
	W12	31° 47' 19.176" E	28° 54' 5.472" S	Existing
	W14	31° 48' 9.360" E	28° 55' 56.712" S	Existing
	TBH5a	31° 46' 43.464" E	28° 55' 14.916" S	Existing
	TBH6	31° 54' 27.072" E	28° 51' 4.212" S	Existing
	TBH8	31° 52' 40.800" E	28° 51' 42.840" S	Existing
	TBH9	31° 49' 39.000" E	28° 52' 55.380" S	Existing
	P_BH4	31° 47' 56.255" E	28° 55' 26.486" S	Proposed
	P_BH3	31° 48' 54.591" E	28° 54' 18.792" S	Proposed
	P_BH2	31° 52' 57.468" E	28° 52' 21.482" S	Proposed
	P_BH1	31° 52' 43.129" E	28° 51' 6.155" S	Proposed
	W7	31° 48' 55.152" E	28° 53' 21.948" S	Existing
Surface water	P_SW1	31° 53' 38.747" E	28° 52' 28.272" S	Proposed
	P_SW2	31° 48' 3.431" E	28° 55' 41.302" S	Proposed
	P_SW3	31° 47' 17.788" E	28° 53' 57.135" S	Proposed
	P_SW4	31° 52' 15.609" E	28° 50' 55.661" S	Proposed
	P_SW5	31° 46' 3.519" E	28° 55' 21.598" S	Proposed

7.2.1 MONITORING FREQUENCY

Phase 1:

- Quarterly monitoring
- To reduce costs this can be done by analysing a reduced set of parameters such as pH, EC, iron and manganese.
- Measure the water levels quarterly to establish the seasonal trend.

Phase 2:

- Quarterly monitoring for all parameters i.e. pH and EC (and /or Total Dissolved Solids)

- with annual analyses of pH, EC, TDS, nitrate, sulfate, total alkalinity, and metals.
- If trends remain stable or are decreasing, monitoring can be reduced to bi-annual.
- The monitoring must be incorporated into the groundwater monitoring programme.

A database must be established, water quality fluctuation trends interpreted, exceedances be highlighted, and this data must be used to inform management decisions on the groundwater status quo thereafter. Based on this analysis, the monitoring frequency may be amended as considered necessary.

7.3 WETLAND MONITORING PROGRAMME

The wetland monitoring plan will facilitate long term monitoring of a selection of potentially affected wetlands. The monitoring plan should span the construction, operation, and decommissioning phases of the project, with the intention of identifying any changes in wetland condition that may result from secondary, indirect impacts, such as altered hydrological regime, sediment transport or water quality deterioration. Ongoing monitoring allows for both expected and unexpected impacts to be identified, and adaptive management applied where appropriate, through the project lifespan. The wetland units suggested for inclusion in the monitoring plant are illustrated in Figure 7-3. Given the large extent of wetlands across the mine area, a subset of wetland units is proposed for monitoring. These systems represent wetlands expected to be affected by the various activities. Additional wetlands may be added to the monitoring plan based on infield observations during routine monitoring or audit of the mine's authorisations.

For the purpose of monitoring of the Port Dunford Mine wetlands, it is recommended that the wetland rehabilitation monitoring tool – WETRehabEvaluate (Walters et al., 2019) be used to guide the selection of appropriate monitoring tools and monitoring intervals. Based on the WETRehabEvaluate guideline document, the wetland monitoring approach is detailed in Table 7-4 below.

Table 7-4 - Summary of proposed nature, timing and frequency of wetland monitoring for the Port Dunford Mine.

Monitoring Activities	Tool	Timing	Frequency	Responsible Person
Wetland Condition (PES) monitoring	WetHealth V2 Level 1B or 2	Not Applicable	At a minimum 3-year interval	Wetland Ecologist
Erosion and sedimentation monitoring	Visual inspection and fixed-point photographic record maintained at locations of potential sediment erosion and transport	Late spring/Summer	Annually	Wetland Ecologist
Wetland vegetation monitoring	As per WETRehabEvaluate approach	Late spring/Summer	At a minimum 3-year interval	Wetland Ecologist

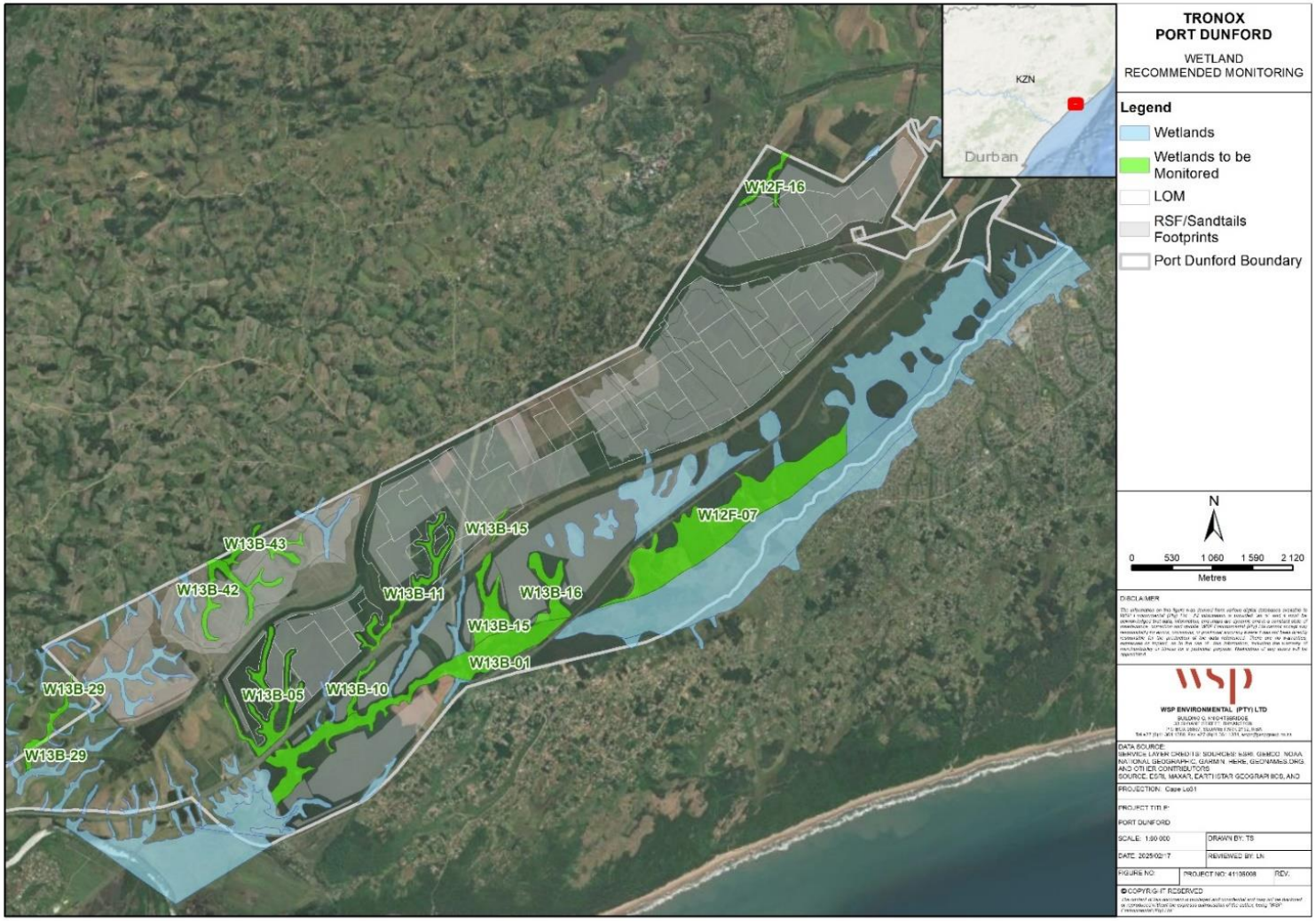


Figure 7-3 - Wetland HGM units proposed for inclusion in the wetland monitoring programme for Port Dunford Mine.

7.4 ESTUARINE MONITORING PROGRAMME

Chapter 6 of the EIA and Table 7-5 below provide a summary of the monitoring criteria recommended for estuarine monitoring.

The proposed scope of monitoring for Lake Cubhu and the uMlalazi and uMhlathuze estuaries during the life of the Port Durnford Mine is the same as for the baseline surveys, with the caveat that allowances must be made for incorporating additional indicators of environmental status if surface freshwater and/or groundwater resource monitoring reveals impacts of greater significance than anticipated in the specialist studies. For example, if metal concentrations are found to considerably and/or consistently exceed expected levels, then the analysis of metals in water should be included in the lake and estuary monitoring. Similarly, if monitoring in the lake and estuaries reveals limited or no impacts in several consecutive surveys, then consideration should be given to decreasing the scope and/or frequency of the monitoring.

Table 7-5 – Monitoring recommendations for surface freshwater and groundwater resources and Lake Cubhu and the uMlalazi and uMhlathuze estuaries

Specialist Study	Recommended Monitoring
Aquatic Biodiversity Baseline and Impact Assessment (surface freshwater resources)	**Water Quality** ▪ In situ water measurement - temperature, pH, conductivity and oxygen. ▪ Whole Effluent Toxicity (WET) samples collected at upstream and downstream points where possible. **Habitat Quality** ▪ Instream and riparian habitat integrity assessment (Index for Habitat Integrity (IHI), Version 2). ▪ Macroinvertebrate Instream biotope suitability determination (Integrated Habitat Assessment System (IHAS), Version 2.2). **Aquatic Macroinvertebrates** ▪ Aquatic macroinvertebrate assessment including the determination of ecological condition through Version 5 of the South African Scoring System (SASS5) and the Macroinvertebrate Response Assessment Index (MIRAI). **Fish** ▪ Fish assessment, including the evaluation of reference conditions and determination of ecological condition through the Fish Response Assessment Index (FRAI).
Hydrogeological Investigation (surface and groundwater freshwater resources)	**Phase 1 – Surface and borehole water monitoring** ▪ Quarterly surveys. ▪ Parameters - pH, Electrical Conductivity (and/or Total Dissolved Solids), iron, manganese, water level. **Phase 2 – Surface and borehole water monitoring** ▪ Quarterly surveys (possibly changing to biannual surveys). ▪ Parameters for annual survey - annual analyses of pH, Electrical Conductivity, Total Dissolved Solids, nitrate, sulphate, total alkalinity, metals, water level.

Specialist Study	Recommended Monitoring
Surface Water Baseline and Impact Assessment (surface freshwater resources)	▪ Surface water quality monitoring at monthly intervals through the life of the mine for parameters included in Water Use Licence. ▪ Streamflow monitoring to detect changes in the flow regime that might be resulting from project-related activities. ▪ Real-time rainfall measurements using a tipping bucket rain gauge, if possible; alternatively, a bulk rain gauge can be used to capture the total amount of rainfall for each event.
Draft Environmental Management Programme Report (surface freshwater resources/wetlands)	▪ Wetland condition monitoring at three-year intervals. ▪ Wetland vegetation monitoring at three-year intervals. ▪ Erosion and sedimentation monitoring annually (fixed point photography).
Estuarine Impact Assessment (lake and estuarine resources)	▪ Water quality (in situ) – temperature, salinity, pH, dissolved oxygen, turbidity, chlorophyll-a at yearly intervals. ▪ Water quality (discrete samples) – suspended sediment concentrations, dissolved nutrients at two-year intervals. ▪ Sediment quality – grain size, total organic carbon, metals at two-year intervals. ▪ Benthic macrofauna – species composition and abundance at two-year intervals. ▪ Fish – species composition and abundance at two-year intervals.

7.5 BIODIVERSITY MONITORING PROGRAMME

7.5.1 TERRESTRIAL BIODIVERSITY

The prescribed monitoring requirements for flora and mammals (category, methodology, frequency, mechanism for monitoring and responsible party) have been detailed in Table 7-6 below. The monitoring actions have been arranged according to the following project phases:

- Site Establishment / Construction;
- Phase 1 Operations;
- Phase 2 Operations; and
- Decommissioning and Closure.

Tronox has undertaken comprehensive terrestrial biodiversity monitoring at their other two sites Hillendale and Fairbreeze. The monitoring recommended in this section must supplement the monitoring work that is standard practice at the Hillendale and Fairbreeze monitoring sites.

Table 7-6 – Terrestrial biodiversity monitoring actions

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
1. SITE ESTABLISHMENT/CONSTRUCTION						
1.1	Alien invasive species	▪ Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on: • All sites disturbed during site establishment and construction; • Areas of natural habitat adjacent to disturbed sites. ▪ Monitoring should assess species type and density. These data should inform the scope of ongoing alien invasive species control.	Wet/growing season	Annual	Annual monitoring report	Project manager
1.2	Mammal SCC	▪ A monitoring programme for forest-dwelling mammal SCC should be developed for the study area; ▪ The aims of the monitoring programme should be used to assess the presence of mammal SCC, estimate their population size, and determine their range-use/distribution; and ▪ The findings of the monitoring should then be used to inform the development of species-specific management plans for the Mining Rights Area.	Ongoing	Annual & Ongoing	Annual monitoring report	Project manager
2. PHASE 1 - OPERATIONS						
2.1	Alien invasive species	▪ Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on:	Wet/growing season	Annual & Ongoing	Annual monitoring reports	Environmental manager

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
		• All sites disturbed by site establishment and construction activities and operational activities, and • Areas of natural habitat adjacent to disturbed sites. ▪ Monitoring should assess species type and density. These data should inform the scope of ongoing alien invasive species control.				
3. PHASE 2 - OPERATIONS						
3.1	Alien invasive species	▪ Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on: • All sites disturbed by site establishment and construction activities and operational activities, and • Areas of natural habitat adjacent to disturbed sites. ▪ Monitoring should assess species type and density. These data should inform the scope of ongoing alien invasive species control.	Wet/growing season	Annual & Ongoing	Annual monitoring reports	Environmental manager
3.2	Rehabilitation	Monitoring of rehabilitated forest patches should be conducted during Phase 2 Operations, as per the methods and frequency prescribed in the approved Forest Rehabilitation Plan. Aspects that should be considered include, inter alia flora species composition, vegetation structure, soil properties and fauna species composition	Wet/growing season	As prescribed in the approved Forest Rehabilitation Plan	Monitoring reports	Environmental manager
4. DECOMMISSIONING AND CLOSURE						

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
4.1	Alien invasive species	▪ Alien invasive species monitoring should be conducted on an annual basis during decommissioning, and for a period of five years following closure. Monitoring should focus on all sites disturbed during mining, including rehabilitated sites. ▪ Monitoring should assess species type and density. These data should inform the scope of ongoing alien invasive species control.	Wet/growing season	Annually during decommissioning & for a period of five years after closure.	Annual monitoring reports	Environmental manager
4.2	Rehabilitation	Monitoring of rehabilitated forest patches should be conducted during Decommissioning and Closure, as per the methods and frequency prescribed in the approved Forest Rehabilitation Plan.	Wet/growing season	As prescribed in the approved Forest Rehabilitation Plan	Monitoring reports	Environmental manager

7.5.2 AQUATIC BIODIVERSITY

The Aquatic Biodiversity monitoring programme has been developed for the monitoring the preservation of the aquatic ecosystems associated with the proposed mine and will be implemented as detailed in Table 7-7 below.

The aquatic biomonitoring programme must be conducted by a suitably qualified Aquatic Scientist (i.e., holds a valid SASS5 certificate issued by the department of Water and Sanitation and is registered with SACNASP), and must be adhered to throughout the LoM and must go on until there is no noticeable impact following the end of LoM.

Table 7-7 – Aquatic biomonitoring programme

Method and Aquatic Component of Focus	Details
Water Quality: *In situ* water tests focusing on: ▪ Temperature; ▪ pH; ▪ Conductivity; ▪ Dissolved oxygen. *Ex situ* Water Quality: ▪ Analysis of selected chemical parameters (see Table 7-4 of the Aquatic Biodiversity Baseline and Impact Assessment).	*In situ* water quality should be tested by means of portable meters at each monitoring site. *Ex situ* water quality analysis should be conducted at a *South African National Accreditation System* (SANAS) accredited laboratory. Results must be compared to baseline results and RQOs (see Table 7-4 of the Aquatic Biodiversity Baseline and Impact Assessment) to determine the extent of change
Habitat Quality: Instream and riparian habitat integrity by means of the Index for Habitat Integrity (IHI); and Integrity of macroinvertebrate habitat by means of the Integrated Habitat Assessment System (IHAS).	The IHAS and IHI must be applied at the same sites as in this study to determine the extent of change from baseline results.
Aquatic Macroinvertebrates: Aquatic Macroinvertebrate assemblages must be assessed by means of the SASS5 protocol (or latest version). The Macroinvertebrate Response Assessment Index (MIRAI) must be applied to determine the PES.	The SASS5 and MIRAI results must be compared to the baseline results and RQOs (see Table 7-5 and Table 7-6 of the Aquatic Biodiversity Baseline and Impact Assessment).
Diatoms Assessment: Diatoms samples must be collected, preserved and transported to the laboratory for analysis.	Samples must be collected at the same sites as in this study to determine the extent of change from baseline results.
Fish: Fish assessments must be carried to species level where possible	Sampling of fish must be undertaken by means of the standard electro-narcosis technique. Other methods such cast nets may be used were necessary. Results must be compared to the baseline results and RQOs (see Table 7-7 of the Aquatic Biodiversity Baseline and Impact Assessment)

7.6 AIR QUALITY MONITORING PROGRAMME

A dust fallout monitoring network must be implemented around the proposed development to determine dust emissions from the proposed construction activities at the surrounding receptors.

The proposed dust fallout monitoring network is illustrated in Figure 7-4. Due to the sensitive nature of the surrounding areas, monitoring locations at/near sensitive receptors (residential monitoring) is prioritised over fenceline receptors (non-residential monitoring). The monitoring locations were determined by the predicted dust fallout dispersion for each proposed phase assessed in previous sections; potential location security such as schools, gated communities, government buildings; and facilities with pre-existing security measures, such as electrical terminals. Non-residential monitoring may be conducted, in the event that exceedances of the National Dust Control Residential standards are identified at the proposed monitoring locations.

Given that the dominant winds occur in a south-west to north-east direction, it is further recommended that active particulate matter monitoring stations, with a meteorological station, be placed to the south, west, north and east of the proposed development fenceline. The most suitable location identified south of the MRA is within the Mtunzini estate as illustrated in Figure 7-4 and provided in Table 7-8.

Figure 7-4 – Proposed monitoring network

Table 7-8 – Proposed Air Quality monitoring points

Proposed Monitoring	Receptor Type	Distance from Site Boundary (km)	Direction from Site Centre	Latitude (°S)	Longitude (°E)
Dust Fallout	Residential	0.13	NW	28.897259°	31.795057°
Dust Fallout	Residential	0.49	NNW	28.883519°	31.817226°
Dust Fallout	Residential	0.20	NNW	28.879649°	31.832505°
Dust Fallout	Residential	0.22	N	28.871952°	31.847319°
Dust Fallout	Residential	0.70	N	28.851660°	31.856353°
Dust Fallout	Residential/ School	1.19	ENE	28.854989°	31.913119°
Dust Fallout	Residential/ School	0.70	E	28.865156°	31.911664°
Dust Fallout	Residential/ School	0.30	E	28.876586°	31.895398°
Dust Fallout	Residential	0.85	SSE	28.907244°	31.869153°
Dust Fallout	Residential/ School	0.97	S	28.920732°	31.840399°
Dust Fallout	Residential	0.72	SSW	28.929885°	31.821172°
Dust Fallout	Residential	1.52	SW	28.943714°	31.761646°
Particulate Monitor	Residential	1.48	SW	28.943295°	31.762132°

7.7 NOISE MONITORING PROGRAMME

It is recommended that one round of environmental noise monitoring is conducted after commissioning of Phase 2 operations to confirm noise levels in the surrounding communities and identify the need for additional mitigation or additional monitoring campaigns. If elevated noise levels are detected then further monitoring campaigns will need to be considered.

No monitoring requirements have been recommended for the Phase 1 construction or operation, given the small scale of the planned development and insignificant noise impact anticipated from this phase.

7.8 RADIATION MONITORING

Tronox will need to action radiation monitoring for the surface water, sediments, groundwater, radon gas, and dust fallout for the Port Durnford operation. The following is recommended to be undertaken:

- Perform gamma radiation and dose rate surveys on a grid basis of all potentially affected areas for Phase 1;
- Collect soil samples at selected locations that coincide with selected locations that represent potentially hot-spot areas identified during the gamma radiation survey for full-spectrum radio analysis of the U-238, U-235 and Th-232 decay chains;
- Perform an airborne radon gas survey in the operation area using RGMs on a campaign basis;
- Collect surface water, groundwater and sediment samples on an upstream and downstream basis that is representative of the mining operation area for full-spectrum radio analysis of the U-238, U-235 and Th-232 decay chains; and
- Perform full-spectrum analysis of an orebody (RoM), HMC, topsoil, and RSF material that will be generated and used as part of the mining operation. This will be complementary to the results already available and will only be possible once samples are available.

Once the baseline site characterisation for Phase 1 of the operation is completed, a baseline site characterisation report should be compiled that documents all the results and presents the potential public radiation exposure under baseline conditions.

The proposed radiological monitoring programme for the operation includes recommendations for the monitoring of surface water, groundwater, sediment, environmental radon, as well as dust fallout, including the frequency and type of analysis. Most monitoring points that are part of the monitoring programme coincide with the monitoring programme for the environmental pathways (e.g., soils surface water and groundwater).

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