Tronox KZN Sands (Pty) Ltd

ENVIRONMENTAL MANAGEMENT PROGRAMME

Fairbreeze Mine Extension into Heleza Moya Farm

DMRE REF: 30/5/1/2/2/123MR
APRIL 2024

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Tronox KZN Sands (Pty) Ltd

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Fairbreeze Mine Extension into Heleza Moya Farm

WSP

Building 1, Maxwell Office Park
Magwa Crescent West, Waterfall City
Midrand, 1685
South Africa

Phone: +27 11 361 1300

WSP.com

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Checked by	Phindile Mashau	Phindile Mashau
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1 INTRODUCTION

1.1 BACKGROUND

Tronox KZN Sands (Pty) Ltd (Tronox) has operated the Fairbreeze mineral sands mine, located south-west of Mtunzini, for nearly 10 years. The mine comprises four approved mining areas (Pits A, B, C and C-Extension), an onsite primary wet plant (PWP) and a fines residue storage facility (RSF). Heavy mineral concentrate from the PWP containing ilmenite, zircon, rutile and other mining co-products, is transported by road to Empangeni to the Tronox Central Processing Complex (CPC) which includes a Mineral separation plant and smelter where titanium dioxide and pig iron are produced.

In 2022 Tronox acquired the 118 ha Heleza Moya property, located between the Fairbreeze PWP and the Pit B mining area, and incorporated this property into the Fairbreeze Mining Rights Area (MRA). Tronox is now making application to extend mineral sands mining into parts of Heleza Moya to enable this area to be mined together with the approved Pit B orebody (FBB) which lies to the immediate north and west of Heleza Moya. The Heleza Moya property in relation to the full MRA, approved infrastructure and mining areas is shown in Figure 1-1, together with the Heleza Moya property.

The proposed extension of mining from FBB into the upper portion of the Heleza Moya site is a mining extension only. There is no primary infrastructure other than routine mining infrastructure (pumps, sumps, local power) being developed. Mining methods are unchanged. Consequently, this environmental management program document which follows reflects the standard Fairbreeze EMP. Following the standard mitigation presented for each environmental component, a section titled “Heleza Moya” has been inserted in which any site specific new mitigation proposed by specialists is captured to supplement the standard EMP, should unique circumstances at Heleza Moya require specific mitigation. In instances where the standard Fairbreeze EMP mitigation measures are considered adequate, a statement will be included indicating that no additional mitigation is required over and above application of the standard EMP. Thus, each specialist was asked to evaluate the Fairbreeze EMP measures, relative to their discipline, and comment specifically on the adequacy of such measures, or supplement them.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP Group Africa (Pty) Ltd (WSP) has been appointed in the role of independent Environmental Assessment Practitioner (EAP) to undertake the EIA process for the proposed Fairbreeze extension, as well as to develop this EMPr.

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	Phindile Mashau
Postal Address	Maxwell Office Park Magwa Crescent Building 1, West, Midrand, 1685
Telephone	+27 11 552-4300
Fax	011 361 1381
E-mail	phindile.mashau@wsp.com
EAP Registrations/ and Qualifications	**Qualifications:** BSc. (Honours) Environmental Management; and BSc. Environmental Management - Chemistry Stream. **Registrations:** Registered Environmental Assessment Practitioner (Registration Number: 2019/1005)

1.3 ENVIRONMENTAL MANAGEMENT PROGRAMME STRUCTURE

For the purposes of demonstrating 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 1.4 Section 1.5
(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 2
(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 2.2
	(i) planning and design;	
	(ii) pre-construction activities;	

	Legislated requirements as per the NEMA GNR 326	Relevant Report Section
	(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 5
	(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 4.3 Section 6
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 4.1 Section 6
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 4.1 Section 5
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 5
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 4.3 Section 5 Section 6
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	Section 4.5
(m)	an environmental awareness plan describing the manner in which-	Section 4.2
	(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

1.4 PROJECT DESCRIPTION

1.4.1 PROJECT LOCATION

The proposed project area is in the uMhlathuze Local Municipality that falls under the King Cetshwayo District Municipality in the province of KwaZulu-Natal (Figure 1-1). The mining rights area is also bound to the east by the Umlalazi Nature Reserve and Mondi plantations.

The property information related to Heleza Moya Farm is provided in Table 1-3. The property was under the ownership of Heleza Moya Farming (Pty) Ltd, however Tronox has now acquired this farm portion. The total footprint of the current Fairbreeze mining lease area is approximately 4 120 hectares (ha) and Heleza Moya will add approximately 118.6 ha to the mining footprint, where 64.15 ha of this mineral resource has been identified as the mineable reserve with an identified topsoil and laydown area of 9.4 ha. The economical portion and proposed mining area is located towards the northern boundary of the Heleza Moya Farm (along the FBB orebody).

Table 1-3 - Description of the affected property

Farm Name	**Heleza Moya**
Application area	118.6 ha
Magisterial District	King Cetshwayo District Municipality
Distance and direction from the nearest town	The Fairbreeze Mine is located immediately south of Mtunzini town and extends southwards for approximately 12 km west of the N2 highway
ERF details	Portion 3 of Lot 88, Farm Emoyeni 9105
21 digit surveyor general code for each farm portion	**SG Office** | **Major Region** | **Minor Region** | **Erf / Farm Number** | **Portion Number** **N** 0 F U 0 0 0 0 0 0 0 0 9 1 0 5 0 0 0 0 3

1.4.2 ACTIVITY DESCRIPTION

1.4.2.1 Mining Activities

The detailed steps required for the mining of material from the ore body include the preparation of the mining area through the removal of vegetation and the stripping of topsoil. Specific topsoil stockpile areas have been identified and will be managed as per the current practice at Fairbreeze as defined by the existing amended EMPr (DC28/0036/2010).

The topsoil to be stripped is regarded as the uppermost surface layer of soil; it typically extends to a depth of 300 mm from the earth's surface. It has the highest concentration of organic matter and microorganisms and is where most of the earth's biological soil activity occurs, including plant growth. It is composed of mineral particles, organic matter, water and air. In preparation for mining, a 300 mm layer of topsoil will be stripped prior to the mining of ore. The material will be hauled to the designated topsoil stockpile.

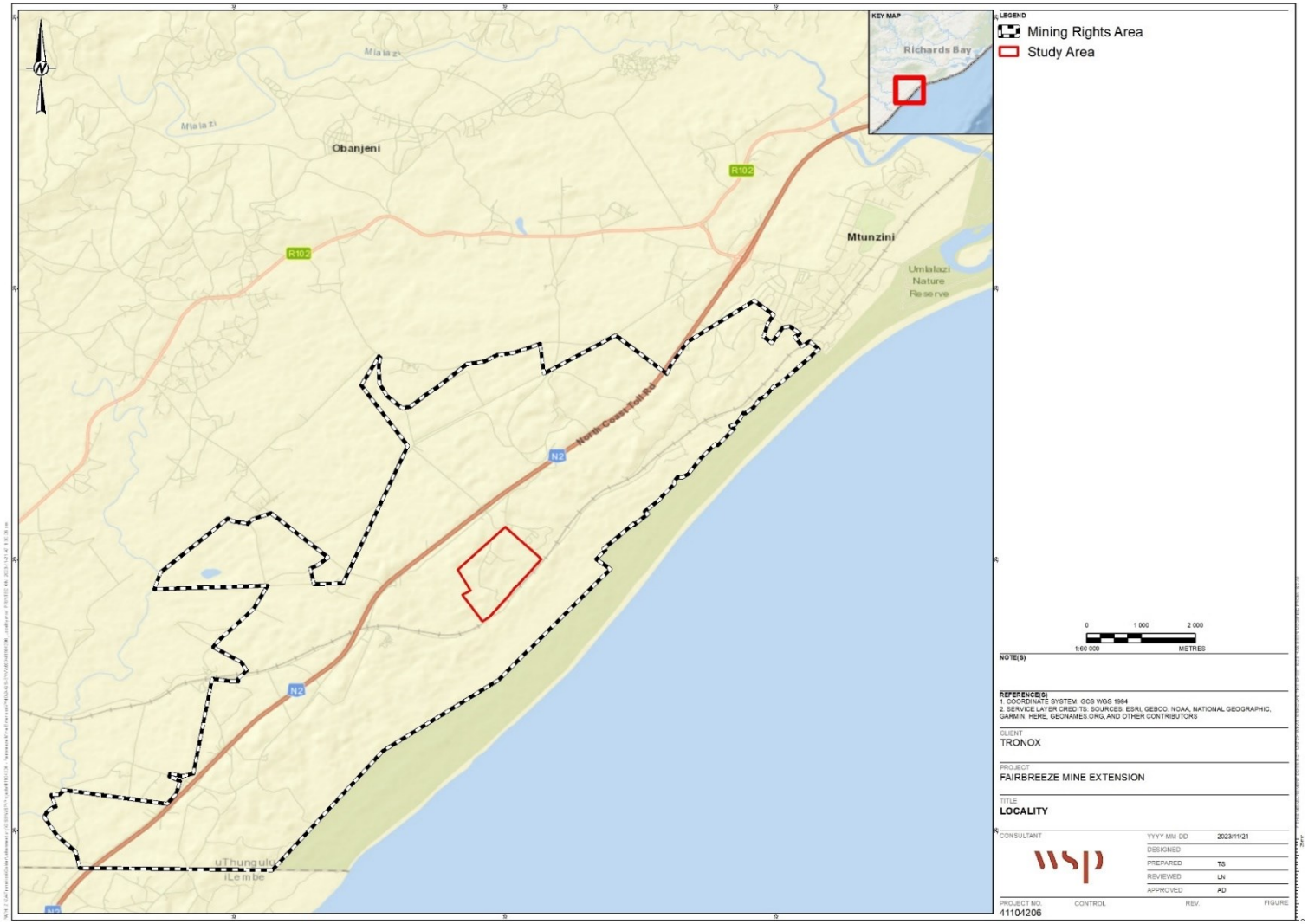


Figure 1-1 – Locality Map

The mining method employed at Fairbreeze Mine is Hydraulic Monitoring. A jet of high-pressure water is aimed at a mining face, thereby cutting into and loosening the in-situ sand so that it collapses onto the floor. The water acts as a carrier medium for the run of mine (ROM) sand, due to the high clay fines content contained in the ROM. The slurry generated by the monitors, flows to a collection sump where oversize material is removed, and the slurry is then pumped towards the Primary Wet Plant (PWP) through a system of booster pumps. The varying grade and slimes content requires the mining of different faces concurrently to reduce large variations. Up to six monitors and three pump stations (with a collection sump) will operate to produce rates of up to 2 160 tonnes per hour. This hydraulic mining method which is in use at the FBB pit will continue as the pit is extended to include the Heleza Moya ore body.

At the PWP the heavy minerals will be separated from the sand, silt and clay fractions. The heavy mineral concentrate will then be trucked to Tronox CPC at Empangeni for refinement. The fine discard or slimes material from the PWP will be pumped to an existing licenced Residue Storage Facility (RSF); while the coarse discard or tailings will be pumped back to the mining area to backfill the mining void. The mined-out areas will be rehabilitated to achieve a pre-mining land capability.

To move from the FBB mining area onto the Heleza Moya area, some of the mining components will need to be relocated. These components include the mining pump stations which are installed by excavating the ore body mechanically and installing the pump stations such that the ROM slurry can flow to the collection sumps under gravity. The high-pressure water lines would also need to be extended from the current FBB area onto Heleza Moya to power the hydraulic monitors.

Backfilling of the mined-out areas will be undertaken once mining in an ore body (or part thereof) is completed, and the backfilling infrastructure is in place. Sand tails and return water pipelines will also be installed in areas post mining, either located on previously mined footprint or along the perimeter of the mining footprint, based on practical on-site considerations. Backfilling will be undertaken with coarse dewatered sand that will be returned from the PWP and distributed with the open-end method. Backfilling will be undertaken so that no mining void remains, but the post-mining surface will be lower than the original surface due to the removal of the slimes component from the sand.

Once the mining area is backfilled it will be contoured mechanically to assure slopes blend into the current landscape. The topsoil stockpiled before the mining will be returned and the area will be vegetated as per the rehabilitation process implemented on the current Fairbreeze Mine areas..

1.4.2.2 Silt management

The slurry will flow to a pump station from where it will be pumped to the existing PWP. The PWP is located immediately adjacent to the Heleza Moja area (see Figure 1-2). At the PWP the heavy minerals will be separated from the sand, silt and clay fraction. The heavy mineral concentrate will then be trucked by road to Tronox CPC at Empangeni for refinement. The fine rejects or slimes material from the PWP will be pumped to an existing RSF; while the coarse discard or tailings will be pumped back to the mining area to backfill the mining void.

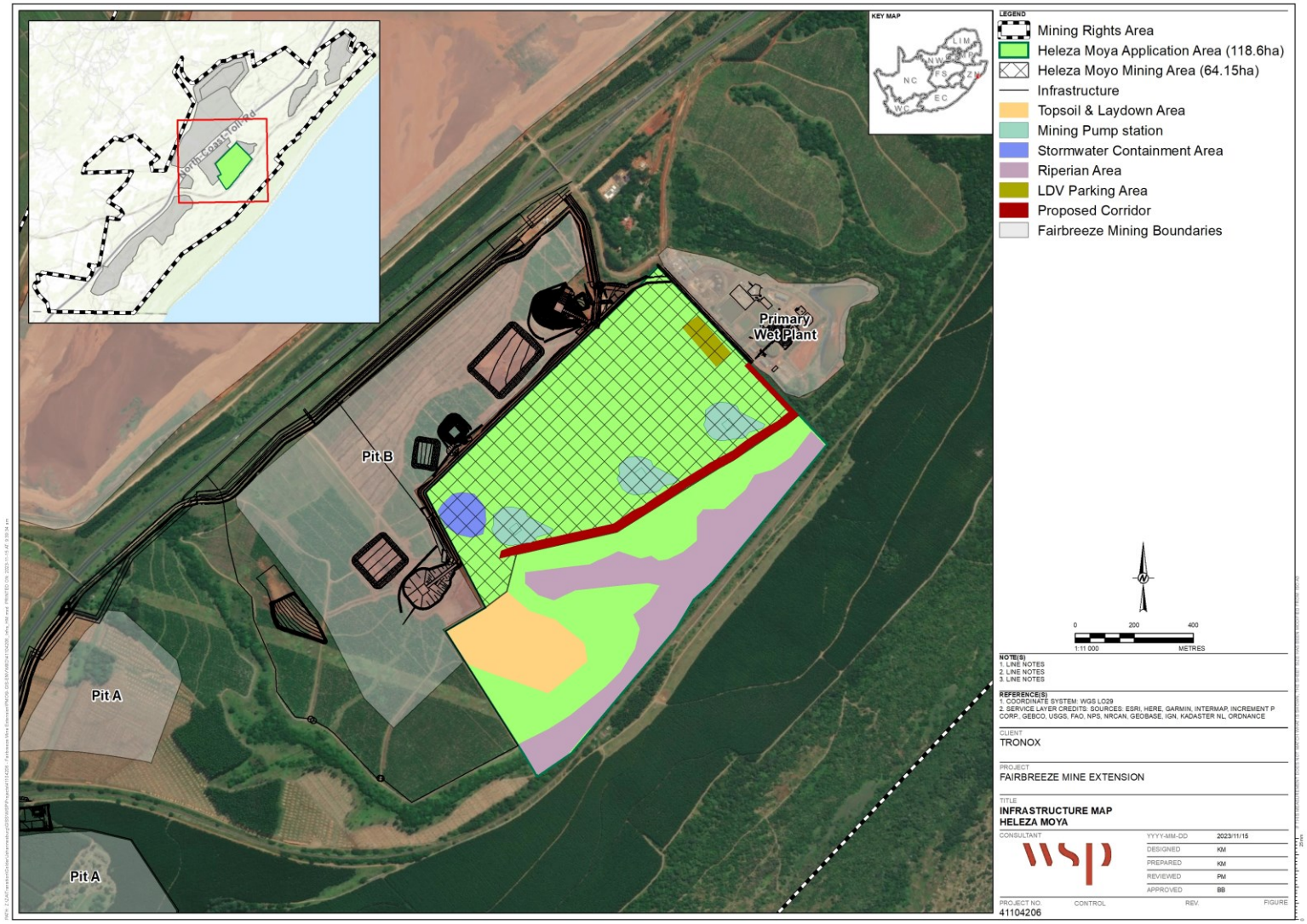


Figure 1-2 - PWP and FBB locations in relation to Heleza Moya

1.4.2.3 Rehabilitation and closure

The mined-out areas will be rehabilitated with the aim of achieving a pre-mining land capability. Once mining is completed in an area, backfilling of the area with sand tailing will commence, i.e., active rehabilitation. Sand will be pumped directly from the processing plant to the void area. The process water used to transport the sand, after deposition will gravitate to a low point in the mining void from where it will be collected and returned to the PWP for re-use. Sand tails and return process water pipelines will therefore be installed in areas post mining either located on previously mined footprint or along the perimeter of the mining footprint based on practical on-site considerations.

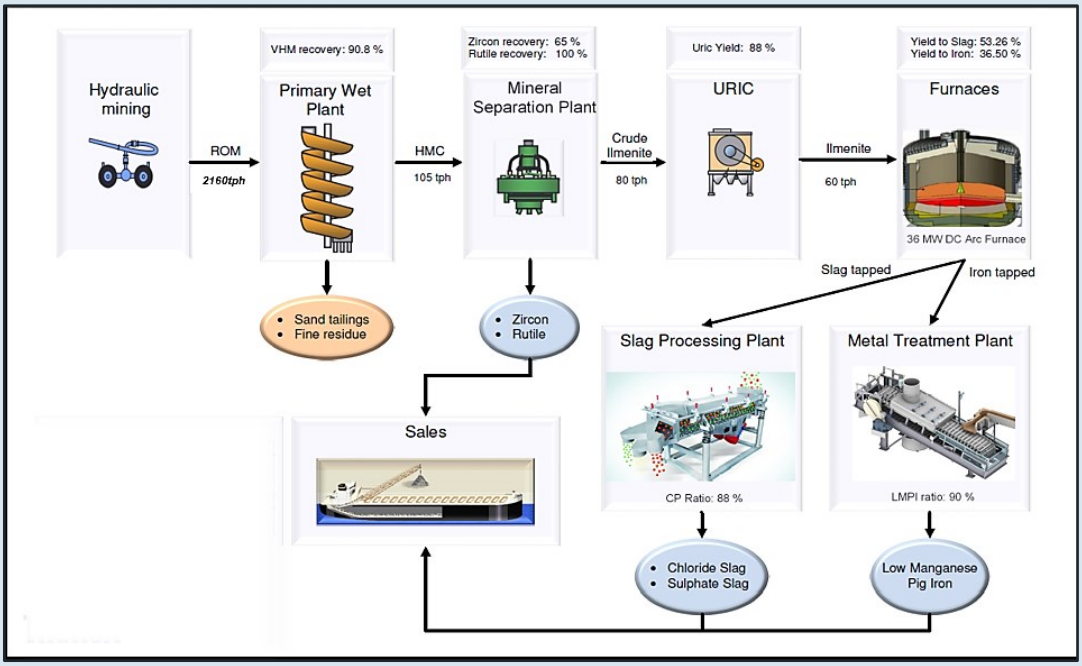
Once the mining area is backfilled it will be contoured mechanically to assure slopes blend into the current landscape characteristics. The topsoil stockpiled before the mining will be returned and the area will be vegetated as per the rehabilitation process implemented on the current Fairbreeze mine areas and as recommended in the current EMPr. Maintenance and after care of the revegetated areas will be implemented for a minimum of 3 years after closure in accordance with the approved EMPr to ensure that pre-mining land capability is achieved. Furthermore, rehabilitation measures for specific components will be considered should it differ to the generic EMPr recommendations.

1.4.3 SUMMARY OF THE ACTIVITIES TO BE UNDERTAKEN

An overview of the activities and the activity infrastructure proposed for Heleza Moya Farm is provided in the table below.

Table 1-4 – Mining operation

Aspect	Description
Location	The mining operations will be located on Remainder of Portion 3 of Lot Emoyeni No. 9105
Mining rate	2 160 tph
Mining process	The proposed mining process will involve Heleza Moya ROM material being mined using hydraulic mining method. The heavy mineral concentrate (HMC) will be trucked to the Tronox CPC for further beneficiation process
Mining programme	Mining is intended for a 15-year period, between 2024 and 2039
Mineral processing	The hydraulically reclaimed ROM slurry will be pumped to the existing Fairbreeze PWP for processing. The heavy mineral concentrate will then be trucked by road to Tronox CPC at Empangeni for refinement. The fine discard or slimes material from the PWP will be pumped to an existing RSF while the coarse discard or tailings will be pumped back to the mining area to backfill the mining void.

Aspect	Description
	
Project layout and infrastructure	Equipment from the FBB ore body will be relocated and used at Heleza Moya. In addition, the following infrastructure and areas will also be further implemented to accommodate mining operations at Heleza Moya. ■ mine access roads and inpit roads; ■ Designated Light Duty Vehicle (LDV) parking; ■ Corridor (3.6 ha) (Heleza Moya to PWP); ■ Topsoil stockpile (40 m x 40 m x10 m) and laydown area (9.4 ha) ■ Three pump stations along the corridor; and ■ Stormwater management infrastructure.
Associated infrastructure	**Power supply:** Eskom's existing 88kV powerline supplies electricity to the buildings that are currently located on the property. No additional powerlines will be required for the operation of Heleza Moya. **Water supply:** Water supply to the operation will be from the existing Mthlathuze pipeline supply. No additional volume will be required.
Employment requirements	It is currently estimated that the employment opportunities available will remain the same as the current Faibreeze mine operation, However, contractors will be used in site establishment and site preparation for Heleza Moya.

1.5 PROPOSED PROJECT DEVELOPMENT ACTIVITIES

The following activities are anticipated for each phase of the project:

1.5.1 PRE-CONSTRUCTION PHASE

- Obtaining the rights to mine the land; and
- Prior to site establishment all authorisations need to be in place.

1.5.2 CONSTRUCTION PHASE

- Bulk earthworks;
- Development and relocation of required service infrastructure on the site;
- Development of access roads;
- Site establishment;
- Topsoil stripping; and
- Construction of project components.

1.5.3 OPERATIONAL PHASE

- Mining to commence;
- Progressive backfilling and rehabilitation to take place. Anticipated that 2-4 years post the commencement of mining in a block, this area will be subject to rehabilitation;
- Ongoing processing and supporting activities; and
- Disposal of wastes from the mining process.

1.5.4 DECOMMISSIONING PHASE

- Plant to be demolished and materials to be removed;
- Termination of all services to the area; and
- Rehabilitation of all areas to be completed sufficiently to meet relevant commitments of the closure plan.

1.5.5 CLOSURE AND POST-CLOSURE

- Ongoing monitoring of post-closure impacts and success of rehabilitation as required in terms of the closure plan.

2 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. A summary of the DFFE screening tool and the specialist sensitivity verification are detailed in Table 2-1 below.

Table 2-1 - Assessment Protocols and Site Sensitivity Verifications

Specialist Assessment	DFFE Screening Tool Sensitivity	Specialist Sensitivity Verification (with mitigation)
Agricultural Assessment	Very High Sensitivity	Very High Sensitivity
Terrestrial Biodiversity Impact Assessment	Very high Sensitivity	Low Sensitivity
Aquatic Biodiversity Impact Assessment	Very High Sensitivity	N/A
Plant Species	Low Sensitivity	Low Sensitivity
Animal Species	Medium Sensitivity	Low Sensitivity
Archaeological and Cultural Heritage Impact Assessment	High Sensitivity	Low Sensitivity
Civil Aviation	Medium Sensitivity	N/A
Defence	Low Sensitivity	N/A
Palaeontology Impact Assessment	High Sensitivity	Low Sensitivity

2.1 SENSITIVITY MAPPING AND DEVELOPMENT ENVELOPE

The Heleza Moya site was assessed by the specialists as part of assessments and subsequent fieldwork. Preliminary environmental sensitivity maps (**Figure 2-1** to **Figure 2-4**) have been compiled based on the sensitivities and buffers outlined in the specialist studies.

2.1.1 SOIL SENSITIVITY

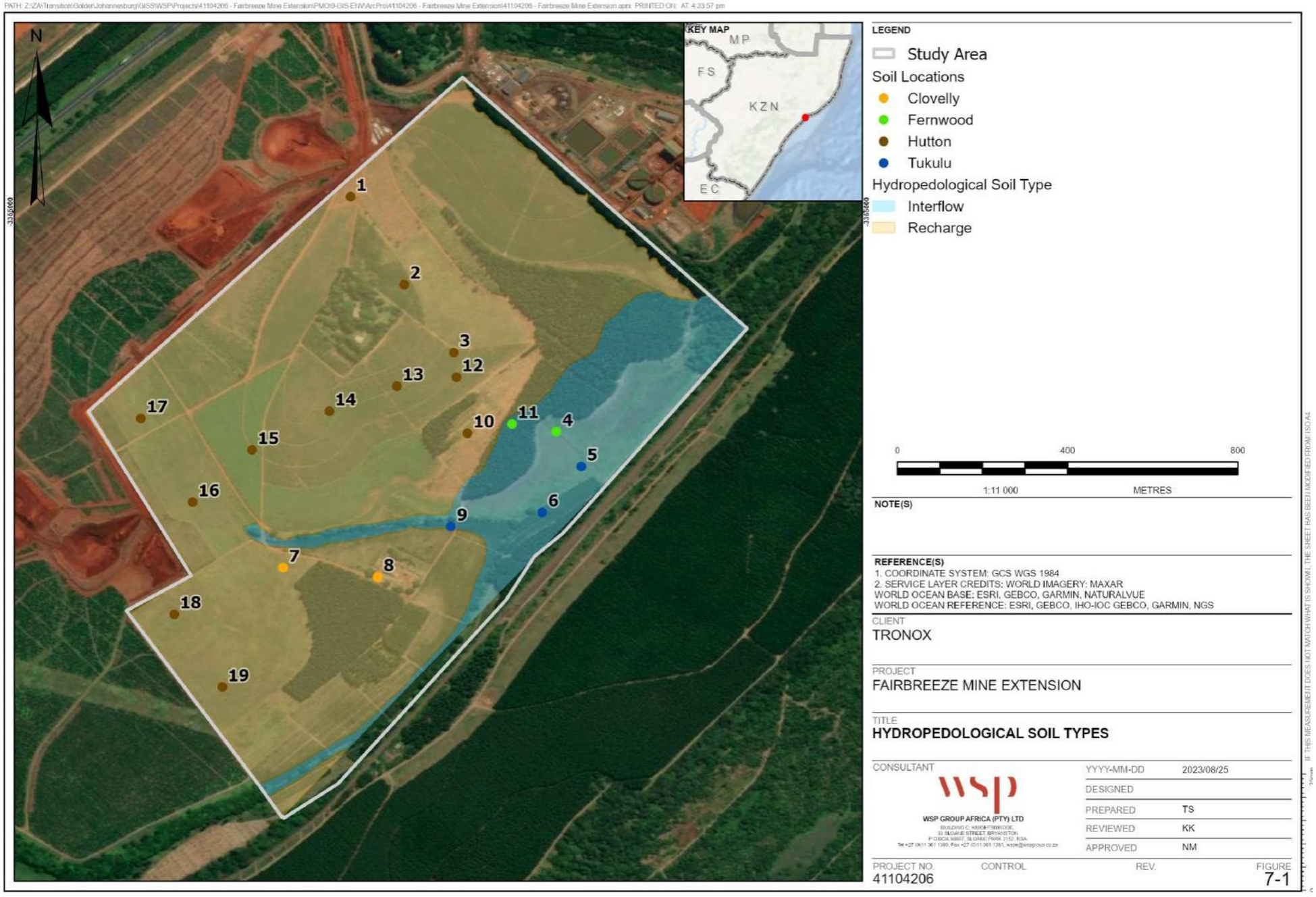


Figure 2-1 - Soil types identified on site

2.1.2 AGRICULTURAL SENSITIVITY

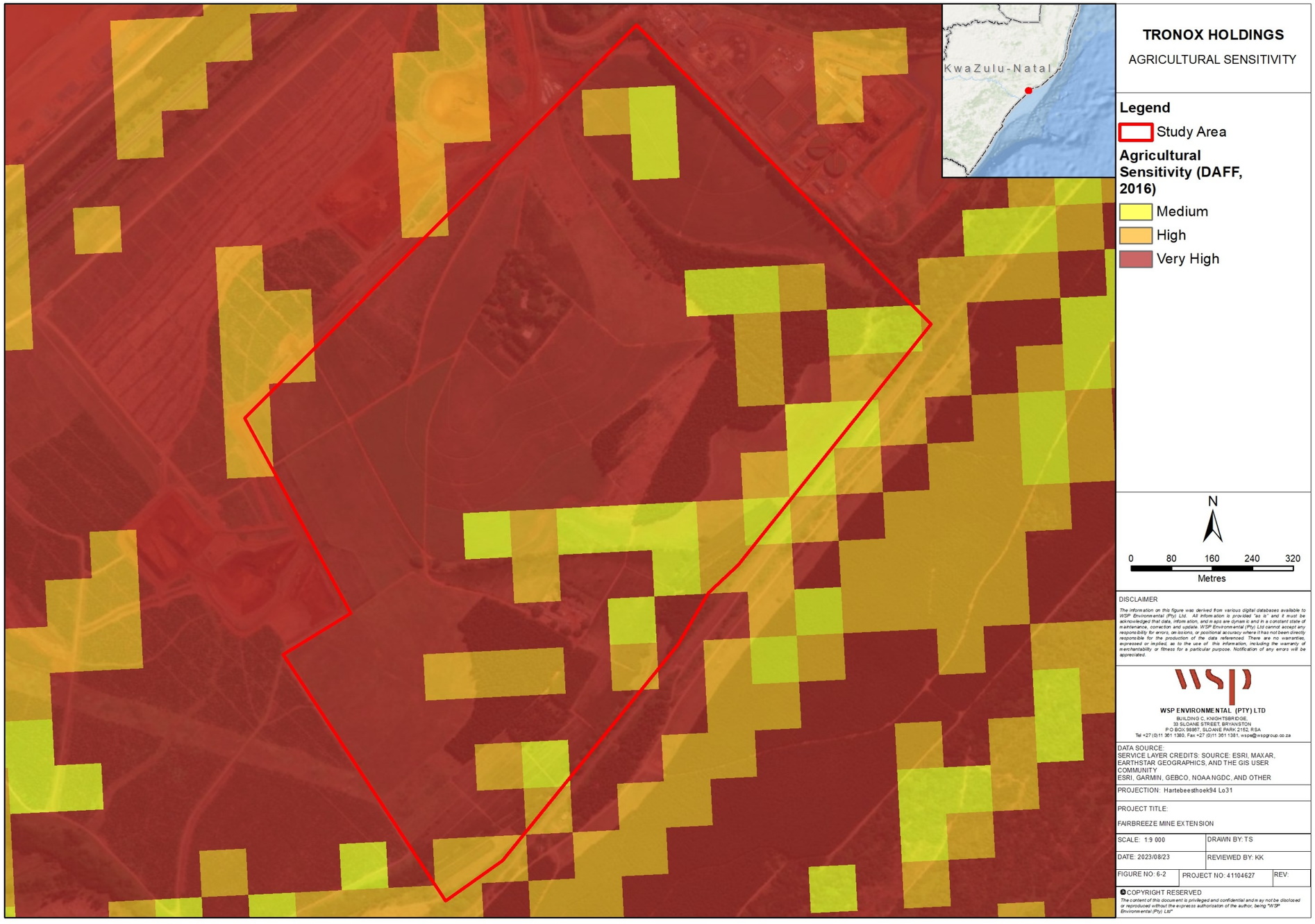


Figure 2-2 - Agricultural sensitivity map

2.1.3 ECOLOGICAL SENSITIVITY (ANIMAL AND PLANT SPECIES)

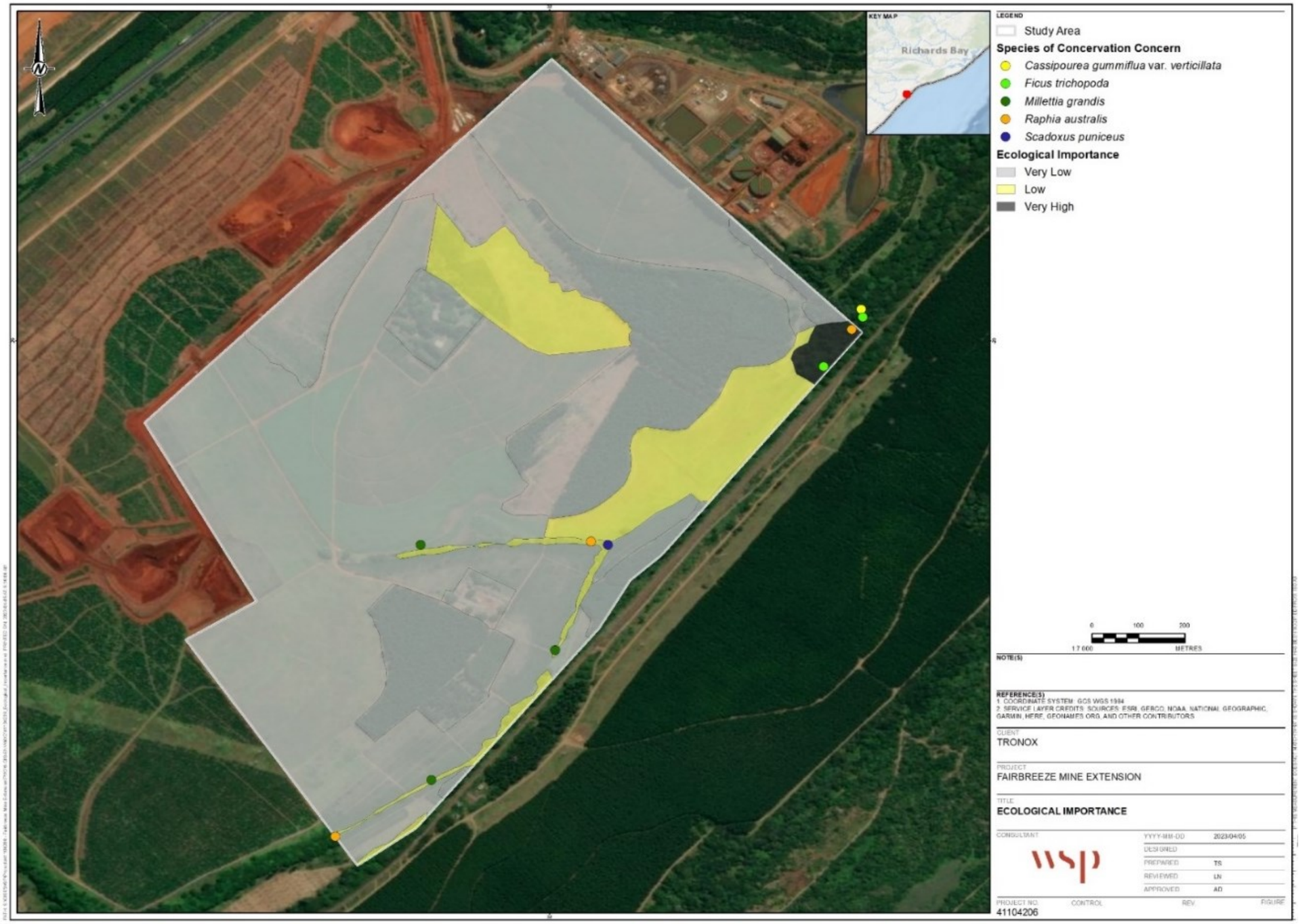


Figure 2-3 - Areas of ecological importance

2.1.4 CULTURAL HERITAGE SENSITIVITY

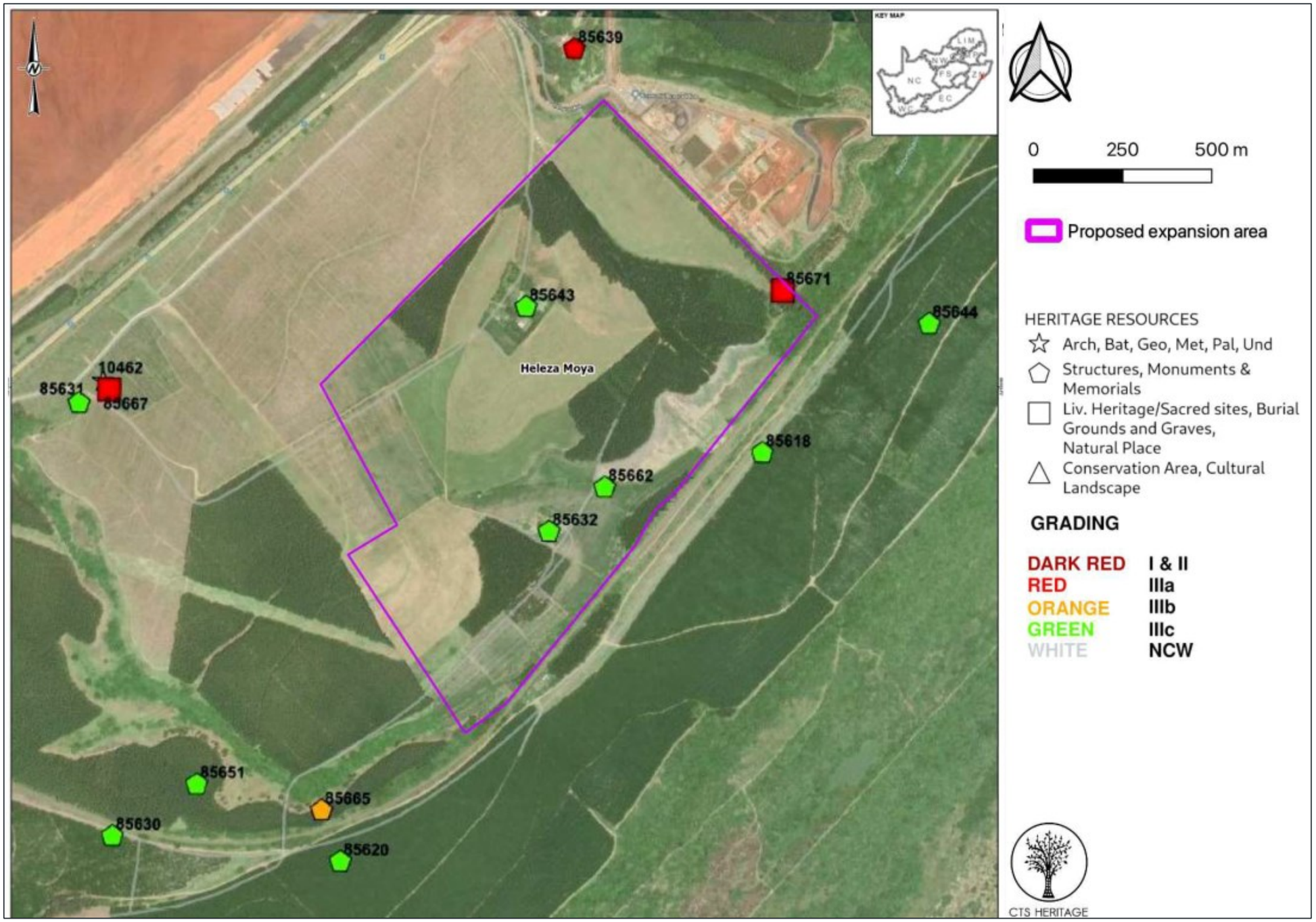


Figure 2-4 - Heritage resources identified in the study area

2.1.5 WETLAND SENSITIVITY

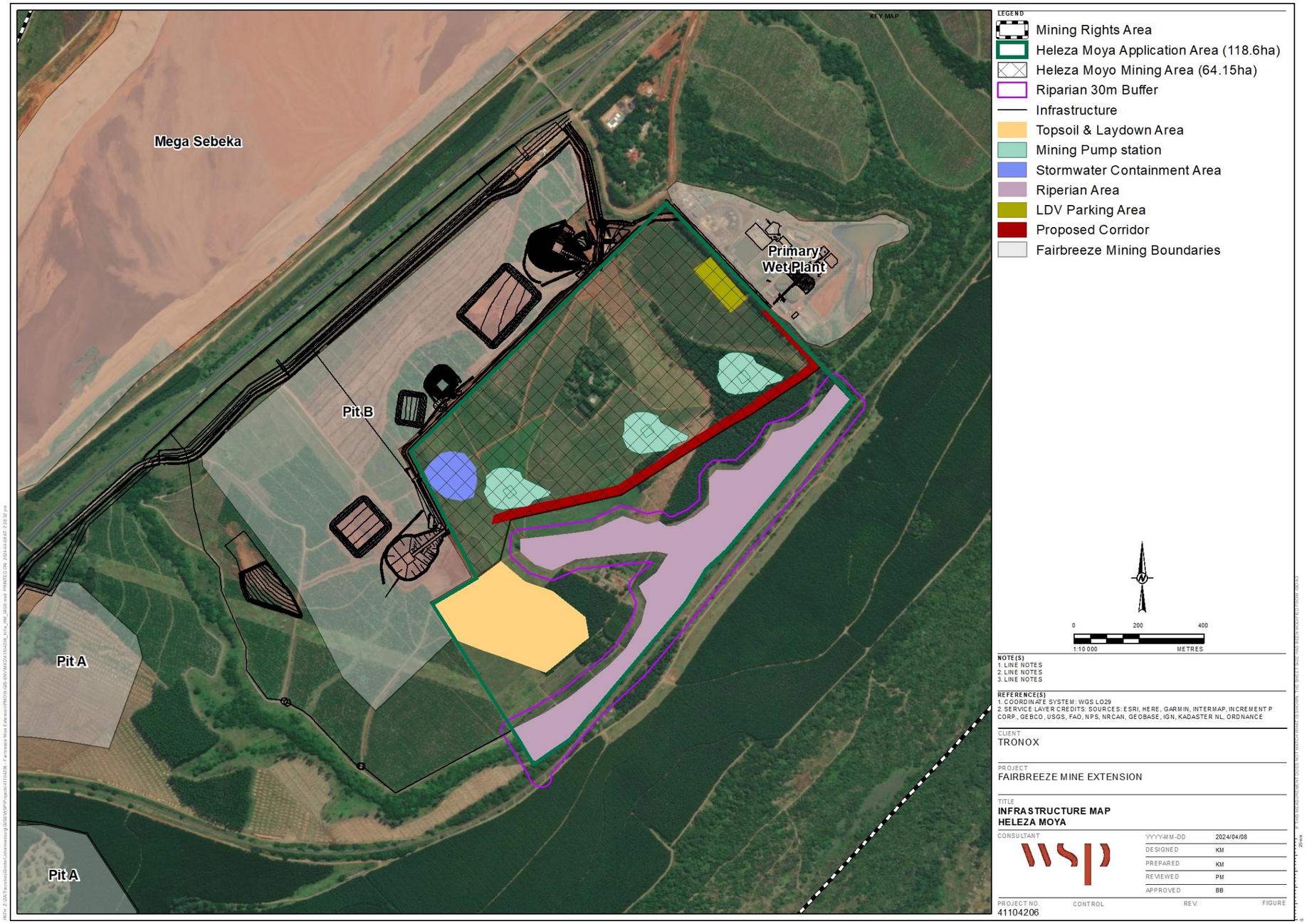


Figure 2-5 - Deliniated wetland in relation to the proposed infrastructure

2.2 IMPACT ASSESSMENT OUTCOMES

In assessing the environmental feasibility of the proposed construction of the proposed Project, the requirements of all relevant legislation have been considered. The identification and development of appropriate mitigation measures that should be implemented to minimise potentially significant impacts associated with the project, has been informed by best practice principles, past experience, and the relevant legislation (where applicable).

Potential impacts associated with the proposed extension have been assessed and the significance of these evaluated with consideration of proposed mitigation measures. Potential overall negative impacts were considered to be of low significance. The low significance of potential impacts was substantiated on the premise that EMPr measures would be implemented. It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

A summary of the identified impacts and corresponding significance ratings for the proposed extension into Heleza Moya is provided in Table 2-2 below.

Table 2-2 – Impact Assessment Summary Table

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
Construction Phase																			
Heritage and Palaeontology																			
Excavations	Unearthing of graves	4	2	1	2	14	Low	2	2	1	2	10	Low	▪ It is recommended that the identified site (29°0'8.20"S; 31°42'22.20"E) be fenced-in properly and that a Buffer Zone of at least 15 m be placed around the outer perimeter of the burial ground/graves in which no development and mine related activities should be allowed. ▪ The site should also be b signposted indicating it as a burial area. Access to the burial ground/graves for potential descendants/family should be provided unhindered.	Control through impact management	At commencement of project	Disturbance of burial grounds/ graves avoided	National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	Environmental Manager
Air Quality																			
Site establishment, bulk earthworks, development, relocation of required service infrastructure on the site	Generation of dust, PM_{10} and PM2.5 on sensitive receptors	6	2	2	3	30	Moderate	4	2	1	2	14	Low	Planning construction activities in consultation with nearby residences. Information regarding construction activities should be provided to all nearby residences of the proposed site. Such information includes: ▪ Contact details of a responsible person on site should complaints arise to reduce emissions in a timely manner. ▪ Avoid dust generating works during the windiest conditions. ▪ When working near a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible. ▪ Ensure construction fleet vehicles are kept at speed limits within 20-40 km/h at the construction site. ▪ Wet suppression and wind speed reduction are common methods used to control open dust sources at construction sites as a source of water and material for wind barriers tend to be readily available.	Control through impact management	▪ At commencement of project ▪ Monthly and annual reporting should be ongoing and used to identify problem areas/activities to target mitigation. ▪ Particulate matter monitoring stations are maintained, and monitoring is ongoing.	No exceedances recorded	National dust fallout standards	Environmental Manager
Noise																			
Site clearance	Noise increase at the boundary of the mine footprint and at the abutting residential areas	2	3	1	1	6	Low	2	3	1	0	0	Low	The following mitigation options are recommended (IFC, 2007): ▪ Selecting equipment with lower sound power levels. ▪ Ensuring equipment is well-maintained to avoid additional noise generation. ▪ Ensure that heavy mobile equipment operations, especially those near sensitive receptors, are scheduled for daytime hours. ▪ Installing suitable mufflers on engine exhausts. ▪ Installing acoustic enclosures for equipment that causes radiating noise. ▪ Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas. ▪ Re-locating noise sources to less-sensitive areas to take advantage of distance and shielding.	Control through impact management	At commencement of noisy construction activities. Quarterly noise monitoring.	To remain within the recommendations provided in the Fairbreeze EMPr	SANS 10103 AND Occupational Health and Safety Act (Act No. 85 of 1993)	Environmental Manager
Civil construction and construction activities at the footprint	Noise increase at the boundary of the mine footprint	2	3	1	1	6	Low	2	3	1	0	0	Low						
Assembly of conveyor sections and the belt	Noise increase at the boundary of the mine footprint	2	3	1	1	6	Low	2	3	1	0	0	Low						
Constructions of the haul road	Noise increase at the boundary of the mine footprint	2	3	1	1	6	Low	2	3	1	0	0	Low						
Social																			

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
Continuation of the Fairbreeze Mine	Continued economic revenue	2	3	3	3	24	Low	4	4	4	4	48	Moderate	The EMP (2012) contains adequate mitigation commitments that expand on implementing the SLP and prioritising local employment. These include: ■ The policy is to employ at least 60% of the people from the Region. ■ Tronox will only hire people outside this area if the necessary skills are unavailable locally. ■ Per the Social and Labour Plan, the company will introduce training programmes focused on raising the skill levels of the residents. ■ The SLP further echoes this by stating that economic development projects will prioritise the local municipality, followed by the communities within the district municipality.	Control through impact management	At commencement of project	To remain within the recommendations provided in the Fairbreeze EMPr and SLP	N/A	Stakeholder Engagement Manager, HR
Continuation of the Fairbreeze Mine	Extension of training programs	4	3	4	4	44	Moderate	4	4	4	4	48	Moderate	The Fairbreeze EMP contains adequate mitigation that expands on how training programmes should prioritise local communities.	Control through impact management	At commencement of project		N/A	Stakeholder Engagement Manager, HR
Continuation of the Fairbreeze Mine	Extension to the employment of staff at the mine	4	3	4	4	44	Moderate	4	4	4	4	48	Moderate	The EMP suggests that labour should be sourced locally, and the SLP mentions that 100% of the employment is from the district municipality. No additional employment opportunities are associated with the proposed mine extension into the Heleza Moya land parcel. Consequently, no further mitigation needs to be added to the existing EMP.	Control through impact management	At commencement of project		N/A	Stakeholder Engagement Manager, HR
Terrestrial Fauna																			
Vegetation clearing and bulk earth works	Loss and disturbance of fauna habitat	3	1	4	4	32	Moderate	2	1	1	2	8	Low	■ Vegetation clearing should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas. ■ The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. ■ No heavy vehicles should travel beyond the marked works zone.	Avoidance and minimisation	At commencement of project	Retention of indigenous grasses species	Compliance with EMPr	Environmental Manager
Vegetation clearing and bulk earth works	Injury, mortality and disturbance of fauna	3	1	4	4	32	Moderate	2	1	1	2	8	Low	■ An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions. The ECO should be trained in inter alia, snake handling and basic fauna identification. ■ Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat. ■ As appropriate, barriers should be erected around construction trenches and excavations to prevent fauna being trapped in these features. ■ A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions. ■ The handling, poisoning and killing of on-site fauna by workers and contractors must be strictly prohibited. ■ The rules and regulations concerning all wildlife should be communicated to workers and contractors through on-site signage and awareness training (induction).	Avoidance and minimisation	At commencement of project	Retention of indigenous grasses species	Compliance with EMPr	Environmental Manager

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
Vegetation clearing and bulk earth works	Establishment and spread of alien invasive species resulting in degradation of fauna habitat.	4	2	4	4	40	Moderate	2	1	2	2	10	Low	An Alien Invasive Species (AIS) Control and Eradication Plan must be developed for the Project. It is recommended that the plan include: ▪ A combined approach using both chemical and mechanical control methods. ▪ Periodic follow-up treatments, informed by regular monitoring. ▪ ▪ A specific focus on: ▪ All sites disturbed by construction. ▪ Areas of wetland/stream vegetation.	Minimisation	Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on: ▪ All sites disturbed during the construction phase. ▪ Riparian/wetland areas adjacent to construction sites. ▪ Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control.	Retention of indigenous grasses species	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Environmental Manager
Terrestrial Flora																			
Vegetation clearing and earth works	Loss and Disturbance of Flora Habitat	5	2	5	5	60	Moderate	4	1	4	4	36	Moderate	Areas of undisturbed natural habitat should be avoided: ▪ All temporary construction footprints, including, but not limited to, laydown areas, portable toilets, cement batching plants, etc., should only be located in areas of modified habitat. ▪ Proposed Project access roads should be aligned with existing farm roads and tracks. ▪ Vegetation clearing should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas. ▪ The footprints to be cleared should be clearly demarcated according to the mine plan prior to construction to prevent unnecessary clearing outside of these areas. ▪ No heavy vehicles should travel outside of dedicated / disturbed areas.	Avoidance and minimisation	At commencement of project	Retention of indigenous grasses species	Compliance with EMPr AND Flora Species of Conservation Concern (SCC) Rescue and Relocation	Environmental Manager
Habitat fragmentation and soil compaction	Disruption of Ecosystem Processes due to Project Infrastructure	3	2	4	3	27	Low	2	2	2	2	12	Low	To prevent wetland desiccation, the wetland management and protection measures outlined in the wetland impact assessment for the proposed Project should be strictly implemented on-site.	Control through impact management	Annual Monitoring Report	Retention of ecosystem function	Compliance with EMPr AND Flora SCC Rescue and Relocation	Environmental Manager
Vegetation clearing and earth works	Establishment and Spread of Alien Invasive Species	5	2	4	4	44	Moderate	2	1	2	2	10	Low	An AIS Control and Eradication Plan include this Project area. It is recommended that the plan include: ▪ A combined approach using both chemical and mechanical control methods. ▪ Periodic follow-up treatments, informed by regular monitoring. ▪ A specific focus on: ▪ All sites disturbed by construction. ▪ Areas of wetland/stream vegetation.	Control through impact management	Annual Monitoring Report	Retention of indigenous grasses species AND no colonization by alien invasive species	Compliance with EMPr AND Flora SCC Rescue and Relocation	Environmental Manager

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
Vegetation clearing and earth works	Loss of Flora Species of Conservation Concern	5	2	5	4	48	Moderate	3	1	4	3	24	Low	▪ Prior to any vegetation clearing, the proposed construction footprints should be clearly marked in the field. ▪ A wet/growing season field survey for flora SCC should then be conducted within the planned development footprints to determine the identify and number of potentially impacted flora SCC. ▪ Informed by the findings of the survey. ▪ Wherever possible, infrastructure footprints should be re-aligned/re-positioned to avoid SCC locations. ▪ Where re-alignment/re-positioning is not possible, permits should be obtained from the relevant authority to rescue and relocate impacted plants. ▪ A Flora SCC Rescue and Relocation as per the 2012 EMPr should be implemented for the proposed Project to provide guidance on all aspects of SCC rescue and relocation.	Avoidance and minimisation	Annual Monitoring Report	Retention of Species of Conservation Concern	Compliance with EMPr AND Flora SCC Rescue and Relocation	Environmental Manager
Surface water																			
Clearing of vegetation for construction	Erosion and sedimentation due to clearing of vegetation and construction activities	6	2	3	4	44	Moderate	3	2	2	4	28	Low	Continue with current management of sediment using silt fences and keeping the cleared footprint to a minimum	Avoidance and minimisation	Annual Monitoring Report	Observed Department of Water and Sanitation (DWS) and manually measured flows in the Amanzimnyama and Siyaya catchments	Compliance with EMPr	Environmental Manager
Visual																			
Earthworks and site establishment	Visibility and visual exposure	1	1	1	1	3	Low	1	1	1	1	3	Low	The Fairbreeze EMP contains adequate mitigation that expands on how training programmes should prioritise local communities.	Avoidance and minimisation	As per Fairbreeze EMPr	No new visual exposure points	Compliance with EMPr	Environmental Manager
Operational Phase																			
Air Quality																			
Mining, progressive backfilling and rehabilitation and ongoing support activities	Generation of dust, PM10 and PM2.5 on sensitive receptors	4	4	1	2	18	Low	2	4	1	1	7	Low	Emissions during the operational phase from the proposed Heleza Moya operations are minimal and no further mitigation measures are deemed necessary for the proposed site.	Minimisation	As per Fairbreeze EMPr	No exceedances recorded	National dust fallout standards	Environmental Manager
Terrestrial Fauna																			
▪ Vehicle collisions along access roads during day-to-day maintenance activities. ▪ Increased hunting and snaring as a result of improved accessibility associated with the proposed access road network	Injury, mortality disturbance of fauna	5	2	5	3	36	Moderate	3	1	2	2	12	Low	▪ No off-road driving is permitted for vehicles and mobile machinery used during operations and for maintenance purposes. ▪ A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions. ▪ The handling, poisoning and killing of on-site fauna by maintenance personnel must be strictly prohibited. ▪ The rules and regulations concerning fauna should be communicated to maintenance personnel through on-site signage and awareness training.	Avoidance and minimisation	As per Fairbreeze EMPr	No injury, mortality disturbance of fauna	Compliance with EMPr	Environmental Manager

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
▪ Vehicle collisions along access roads during day-to-day maintenance activities. ▪ Increased hunting and snaring as a result of improved accessibility associated with the proposed access road network.	Establishment and spread of alien invasive species	4	2	4	3	30	Moderate	2	1	2	2	10	Low	Active alien invasive species control should continue throughout the operational phase, as per the Project's AIS Control and Eradication Plan.	Avoidance and minimisation	Alien invasive species monitoring should be conducted on an annual basis.	Retention of animal species AND no records of animal carcasses related to mine operation	Compliance with EMPr	Environmental Manager
Terrestrial Flora																			
Operational earthworks and soil management activities, resulting in disturbance of terrestrial ecosystems and species	Establishment and spread of alien invasive species	4	2	4	3	30	Moderate	2	1	2	2	10	Low	Control through impact management	Minimisation	Annual Monitoring Report	Retention of indigenous grasses species AND no colonization by alien invasive species	Compliance with EMPr	Environmental Manager
Social																			
Skills development program	Skill transfer and development	2	3	3	3	24	Low	4	4	4	4	48	Moderate	The EMP emphasised that skill development programmes should benefit local surrounding communities, especially disadvantaged communities in the uMlalazi Local Municipality. This mitigation is sufficient and implemented fully. The SLP shows figures on the people who benefit from the local community's skill development programmes.	Control through impact management	At commencement of project	To remain within the recommendations provided in the Fairbreeze EMPr and SLP	To remain within the recommendations provided in the Fairbreeze EMPr and SLP	Stakeholder Engagement Manager, HR
Continuation of the Fairbreeze Mine	Impacts of dust and noise	2	3	3	2	16	Low	2	1	1	2	8	Low	All environmental mitigation strategies in the EMP that are in place are sufficient to reduce social impacts. These include measures for managing and mitigating potential dust, noise and air quality impacts.	Control through impact management	At commencement of project		To remain within the recommendations provided in the Fairbreeze EMPr and SLP	Stakeholder Engagement Manager, HR
Surface Water																			
Change of flow regime in Amanzimnyama and Siyaya Rivers	Reduction in baseflows impacting on water users and ecology	1	2	2	5	25	Low	1	2	2	5	25	Low	Control through implementation of stormwater management systems and footprint minimisation. Continued monitoring and annual updates of modelling and flow assessment	Minimisation, infrastructure and monitoring	Implemented at planning stage and during mining. Audit report on management systems and annual review of monitoring data and model updates	Minimum change in flow regime	Compliance with EMPr	Environmental Manager
Impact on water quality of streams draining and flowing adjacent to the mine	Deterioration of water quality in receiving streams due to mining activities.	1	2	2	4	20	Low	1	2	2	4	20	Low	Continued stormwater and in pit water management. Continued monitoring and annual review	Management practises and monitoring	Continue with monitoring program as per current EMPr and annual data reviews	No deterioration in water quality. Water quality suitable for all users including environment.	Compliance with EMPr	Environmental Manager
Surface Water – Estuary																			

ACTIVITY	POTENTIAL IMPACT	Magnitude	Duration	Scale	Probability	Significance	Before Mitigation	Magnitude	Duration	Scale	Probability	Significance	After Mitigation	Detailed Mitigation Measures	Mitigation Type	Time period for implementation	Std. to be Achieved	Compliance with Standards	Responsible person
Earthworks, site establishment and the use of plant vehicles & machinery	Hazardous substance spills during mining operations	8	3	1	2	24	Low	4	1	1	1	6	Low	▪ Intentional disposal of any substance into the environment is strictly prohibited, while accidental spillage must be prevented, contained and reported immediately. ▪ A rigorous environmental management and control plan (as outlined in the EMPr) must be followed (including procedures for remediation). ▪ No fuel and oil must be stored on site, and should instead be stored at existing offsite storage areas ▪ Vehicle maintenance must occur offsite, and no leaking equipment or vehicles are permitted on site. ▪ Spill kits must be available on site at all times, and staff must be trained in their proposed use.	Avoidance and minimisation	At commencement of project	▪ No trails of spilt material on the roads/parking area/storage areas, etc. ▪ No visible spillages on site.	▪ Compliance with EMPr ▪ Good record or documentation of spillage incidents ▪ Correct disposal of hazardous substances	Environmental Manager
Transportation of exposed sediment into the estuary and wetland areas	Water Quality Impacts Associated with Sedimentation	1	1	1	3	9	Low	1	1	1	1	3	Low	▪ Rehabilitate the mining area with indigenous vegetation post-mining to prevent future erosion. ▪ Increase berm height at long-term sediment stockpiles to reduce the impacts of wind. ▪ Cover small temporary stockpiles with textiles such as Hessian to avoid erosion. ▪ Minimise the duration in time between the removal of topsoil and the mining activities. ▪ Try to avoid exposing new ground on extremely windy days. ▪ Work to initiate the implementation of the 'Siyaya Plantations Offset Area' offsets and rehabilitation methods as soon as possible to reduce overall/cumulative mining impacts.	Management practises and monitoring	At commencement of project	Retention of ecosystem function	Compliance with EMPr	Environmental Manager
Removal of vegetation and the clearing of land Reduction in Baseflows into the Estuary		1	1	1	4	12	Low	1	1	1	3	9	Low	▪ Ensure the continuation of surface water monitoring during and post mining. ▪ Ensuring continued and accurate flow data is recorded (fix faulty flow monitors at weirs). ▪ Rehabilitate wetland post mining.	Management practises and monitoring	Continue with monitoring program as per current EMPr and annual data reviews	▪ Minimum change in flow regime ▪ No deterioration in water quality. Water quality suitable for all users including environment.	Compliance with EMPr	Environmental Manager
Habitat change within the catchments of the Siyaya Estuary includes forestry and agriculture (specifically Eucalyptus plantations and sugar cane plantations), minerals mining and a small portion of low-density urban area	Cumulative Impact of Heleza Moya Extension on the Siyaya Estuary	1	4	1	3	18	Low	1	2	1	2	8	Low	▪ Continue Monitoring of invasive plants. ▪ Plant Indigenous species in rehabilitated land. ▪ Active alien invasive species control (as described in the EMPr and BAR) should be implemented during the decommissioning phase and follow up control continued for five years.	Management practises and monitoring	Continue with monitoring program as per current EMPr and annual data reviews	Retention of indigenous vegetation AND no colonization by alien invasive species	Compliance with EMPr AND Flora SCC Rescue and Relocation	Environmental Manager
Decommissioning and Closure Phase																			
Terrestrial Flora																			
Dismantling and clearing away of infrastructure	Establishment and spread of alien invasive species	4	2	4	4	40	Moderate	2	1	2	2	10	Low	Active alien invasive species control, as per the AIS Control and Eradication Plan, should continue during the decommissioning phase and follow up control should be carried out for a five- year period following decommissioning	Minimisation	Annual Monitoring Report	Retention of indigenous grasses species AND no colonization by alien invasive species	Compliance with EMPr	Environmental Manager
Surface Water																			
Change in flow regime in Amanzimnyama and Siyaya	Reduced flow impacting the water users and ecology. Potentially impacting the Siyaya Estuary	1	5	3	4	36	Moderate	1	5	3	3	27	Low	Rehabilitation of the mining area through pit backfilling and re-establishing vegetation. Recreating surface drainage lines across the rehabilitated area and monitoring of flows at the weirs.	Management practises and monitoring	Continue with monitoring program as per current EMPr and annual data reviews	No change in flow regime and potentially an improvement in the flow regime in the Amanzimnyama and Siyaya Rivers	Compliance with EMPr	Environmental Manager

3 ENVIRONMENTAL MANAGEMENT OBJECTIVES

An 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 reduced, and positive effects are enhanced through a process of continual improvement, during both the construction and operational phases of the Fairbreeze extension project.

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.

3.1 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 with regard to 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.

3.2 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 impact of added traffic into 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 with regard to their environmental obligations.

3.2.1 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. Environmental management commitments made previously in the Fairbreeze Mine EMPr, 2012 (Appendix 2), have been included in this document to ensure that environmental management of all components of the Fairbreeze Mine and extension into Heleza Moya are undertaken to the same standards. Additional measures, from specialist studies undertaken for Heleza Moya, have been added or the detail of the commitments increased to ensure sound environmental management.

Furthermore, management and mitigation measures that were recommended for the Everglades Expansion of the Residue Storage Facility and the iSiyaya Plantations Biodiversity Offset at Fairbreeze Mine, have also been included in the EMP table in order to have a consolidated document.

- Aspect: Describes the aspect to be impacted upon. 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 2.
- Detailed description of the aspect of the activity: This is in requirement of 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),
    - Construction (C),

- Operation (O),
- 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. A formal complaint procedure at Tronox is currently in place and will be extended to include Heleza Moya. This will be done by developing a code of responsible environmental practise that will be included in tender documents and contracts. This section also includes commitments relating to handling of emergencies, environmental awareness, and performance assessment.

4 MANAGEMENT PROCEDURES AND ADMINISTRATIVE REQUIREMENTS

4.1 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

Formal responsibilities are necessary to ensure that key management measures/procedures are executed. The Proponent via the appointed contractor 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 4-1 provides a high-level outline of the various roles and responsibilities of the project. The specific responsibilities as per the various time periods within which the measures contemplated in the EMP must be implemented, have been included in Table 6-2.

Table 4-1 – Roles and Responsibilities

Designation	Roles and Responsibility
Proponent / Holder of the EA (Tronox)	▪ The owner of the Fairbreeze Mine and associated infrastructure and will be the holder of environmental approvals. Tronox is ultimately responsible for the implementation of the EMP 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 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 (EA) to monitor and audit compliance with the EMP on a regular basis. ▪ The EA must be independent to Tronox and the details of the appointment to be submitted to the competent authorities. Tronox to ensure that all appointed Contractors are bound to implement the EMP as it applies to the Contractors' line of work. ▪ Should any activity be planned on the site that requires an environmental authorisation, permit or license approval, which is not covered by existing authorisations or approvals, appropriate applications for authorisations and approvals must be lodged with the competent authorities. These includes listed activities in terms of the NEMA, NEMWA, NWA and MPRDA as well any other environmental acts and regulations. ▪ Tronox senior management to report major environmental incidents and major EMP 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 incident reporting system.
Environmental Auditor (EA)	▪ The EA to conduct regular audits of the project site and surroundings to verify EMP and general environmental legal compliance.

Designation	Roles and Responsibility
	▪ The EA to act as guide and advisor to the PM, ECO and Tronox in matters related to EMP implementation and environmental legal compliance. ▪ The EA to compile and submit annual environmental compliance audit reports to Tronox and competent authorities during all project phases. ▪ The EA (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 authorization 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 the adherence to statutory safety, health and environment (SHE) standards and ensuring the construction activities comply with the EMP. ▪ Monitoring the site and services corridor on a daily basis 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 EMP, BAR and all relevant environmental permits and authorisations.
Contractors	▪ Managing and operating their activities with due care and diligence. ▪ Contractors to familiarise themselves with the EMP 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 EMP and environmental authorisations and permits. ▪ Contractors to implement EMP amendments, EMP procedures and written EMP instructions issued to them by the ECO, within the timeframe specified by the ECO in the EMP 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 implementation of the EMP as it applies to the nature of the contract with Tronox.

Designation	Roles and Responsibility
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. ▪ Monitoring implementation of the EMPr and all authorisations by the contractor. ▪ Advising the project manager on actions or issues impacting on the environment and provide 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, EA, 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). The above CHSO/CHSM and EO appointments cannot be dual roles as appointed by the Contractor. Above appointments must be approved by Applicant
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.

4.2 ENVIRONMENTAL AWARENESS PLAN

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 which 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, it is important that employees, contractors (including subcontractors) are aware of the responsibilities in terms of the relevant environmental legislation and the contents of the EMPr, conditions of the environmental authorisation.

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 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 sub-contractors, will also need to demonstrate compliance to 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.

4.2.1 PROCEDURES FOR ENVIRONMENTAL EMERGENCIES

Tronox Fairbreeze operations has an existing Emergency Procedure which will be applied during all phases of activities of the Fairbreeze 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;
- Hydrocarbon spillages

4.2.2 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.

4.2.3 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 monthly by the Senior Management;

- 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;
- Communication between all personnel and Senior Management will be facilitated through the appropriate reporting lines, or by using complaint and incident forms.

4.2.4 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).

4.2.5 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:

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

4.2.6 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.
- 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 does it comprise of and how do we interact with it;
  - A description on the components and phases of the Heleza Moya extension;
  - 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 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.

4.3 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 will 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.

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.

4.4 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.

4.4.1 COMPLIANCE WITH THE EMPR AND CONDITIONS OF THE ENVIRONMENTAL AUTHORISATION

- 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;
- All persons employed by a contractor or their sub-contractors will abide by the requirements of the EMPr and conditions of the environmental authorisation;
- 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 will 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 environmental authorisation;
- 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
- Departmental officials will 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 environmental authorisation, at all reasonable times.

4.4.2 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.

4.5 DOCUMENTATION AND REPORTING

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

- 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 Project Engineer 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 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 on-site 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 to show before, during and post rehabilitation evidence of the project. The photographic record can also be used in cases of damages 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.

5 ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr contains guidelines, operating procedures, rehabilitation and pollution control requirements which 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 Project Engineer, 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.

Table 5-1 outlines the Environmental management programme commitments for Fairbreeze Mine operations. Additional requirements for Heleza Moya have been highlighted.

Table 5-2 - Environmental management programme commitments for Fairbreeze Mine operations. Additional commitments for Heleza Moya are highlighted.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Topography							
Detail description of aspect: The height and rolling topography of the dunes will be altered down to the mining floor, with regular shapes and benches. Backfilling of the mined-out areas will result in the replacement of much of the sands and the topography will be largely restored. Due to the removal of the heavy minerals, slimes and some of the sand, the backfilled area will be lower than the original ground elevation. The final wall height of the VRSF is expected to be approximately 30 m at its highest point and about 1 m at its lowest. Although the total height of the wall at MSRSF would be less, it will still alter the topography. The walls of the RSFs are built at a 1:3 slope on the outside and a 1:2 slope on the inside (1m vertical 3m horizontal). Slimes deposition in the basins of the RSFs will gradually fill the facilities until they comprise extensive flat areas with a level topography.							
Minimise change in topography due to mining	1	The pre-mining landscape will be surveyed to record topography. All dunes mined will be rehabilitated to the original shaping of natural topography (slope, landform and orientation) on the basis of the pre-mining survey.	P/C/O/D	TRONOX	Landscape after mining similar	Review monthly during rehabilitation phase	Consult with surveyor and mine manager
	2	Existing farm roads will be used where possible.	C/O	TRONOX	No erosion due to roads	Daily, and after heavy storm events	Incident register will be kept to up to date and necessary actions executed based on incident
Heleza Moya - Topography							
Minimise change in topography due to mining	-	The shaping of backfilled mining areas must be done to mimic the pre-mining topography and ensure a free training landscape once rehabilitated	C/O/D	TRONOX	Landscape after mining similar	Review monthly during rehabilitation phase	Consult with surveyor and mine manager
Aspect: Soil							
Detail description of aspect: During the mining phase the soil profile down to a depth of 0.5 m (in the ore body areas) and 0.3 m (in the waste facility areas) will be removed and stockpiled or used immediately for rehabilitation. Any soil structure below this depth will be lost, while the organic carbon content and population of micro-organisms within the removed soil will be diluted during the period of storage, where required. Increased erosion and sedimentation can have a negative impact on the aquatic and terrestrial ecology downstream. Sedimentation and erosion are existing problems due to disturbance from the current land uses. This is expected to be the same throughout the site.							
Minimise the loss of a soil resource	B1	A road network will be established that conforms to the newly shaped landscape and designed with a view to minimising erosion potential by utilising retained topsoil and shaping the roads according to accepted engineering standards	C/O/D	TRONOX ECO	Road network causing minimal erosion.	Daily, and after heavy storm events	Incident register will be kept to up to date and necessary actions executed based on incident.
	B2	Topsoil storage will only be carried out for the first ore body excavation and for soil removed from the RSF. After that removed topsoil and Eucalyptus harvesting residues will be moved onto backfilled areas from areas due to be mined in a sequential manner.	C	TRONOX ECO	Successful topsoil management	Ongoing inspection of topsoil stockpiles and rehabilitated areas	
	3	Topsoil conservation to be practised in accordance with rehabilitation specifications contained in **Section 10.6 of BAR, 2012, attached as Appendix 2** (Rehabilitation). Emphasis will be placed on preserving the topsoil for future use. Topsoil storage will be undertaken according to scientific principles and actively managed by re-vegetating and periodical tillage (ripping/ploughing) to ensure its beneficial properties are retained. The specific	C/O	TRONOX	▪ No erosion at topsoil stockpiles ▪ Successful implementation of Rehabilitation Research Programme		

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		guidelines for this process are currently being developed by the Rehabilitation Research Programme					
	4	Only areas within the ore bodies, servitudes and infrastructure footprints will be disturbed. The areas to be disturbed will be kept as small as possible. Buffer zones and no-go areas will be demarcated to prevent disturbances (see Section 6.2)	P/C/O	TRONOX	Minimum area of disturbances throughout mining phase, as well as for construction areas, e.g., PWP, pipeline	Ongoing inspection of disturbed areas and rehabilitating areas	
	5	Vegetation will be removed from an area no longer than 45 days prior to scheduled mining or disturbance of the area.	C/O	TRONOX	Minimum area cleared, as per 45d planned mining schedule		
	7	Replacement of reconstituted soil and addition of topsoil will be undertaken with a view to restoring soil fertility and structure appropriate for the intended land-use. Specific guidelines for the management of this medium, including the principles of re-vegetation, reforestation and regeneration of soil fertility and structure will be guided by the Rehabilitation Research Programme and consideration of the latest mine rehabilitation technology.	C/O/D	TRONOX ECO	▪ Successful implementation of topsoil management guidelines ▪ Successful implementation of Rehabilitation Research Programme recommendations	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with rehabilitation specialist where required
	B3	A protocol for monitoring and measuring soil fertility and soil quality will be developed during the Rehabilitation Research Programme. These will provide soil chemical and physical measures and norms as indicators of the success of the rehabilitation process.		TRONOX ECO	Successful implementation of Rehabilitation Research Programme recommendations		
Prevent or minimise erosion of soils	8	Topsoil stockpiles will be placed in suitable locations and away from within the 1:100 year flood line of any watercourse. Topsoil stockpiles will be protected from surface water flows by diversion berms.	C/O	TRONOX ECO	Successful implementation of topsoil management guidelines		
	B4	Since layering takes place during the replacement of the reconstituted soil, deep tillage behind a grader of bulldozer on the contour will be carried out to homogenize the soil and break up compacted layers when the soil is at a suitable water content	C/O	TRONOX ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations		
	9	Seek to minimise the unrehabilitated mined-out area of the pit to keep the rehabilitation backlog as small as possible through rehabilitation keeping pace with mining. Ideally, the unrehabilitated area should not exceed 0.65 km^2 at any one time.	C/O	TRONOX ECO			
	10	Revegetation of disturbed areas will commence within 60 days of removal of the disturbing factor. Intermediate revegetation will aim to establish at least 30% basal cover within 60 days of planting. Revegetation of backfilled and shaped areas, per area, will commence within 60 days of completion of the placement of soil medium. Revegetation will aim to establish at least 30% basal cover within 90	C/O/D	TRONOX ECO			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		days of planting. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).					
	11	Ensure road construction (including culverts, run-off channels, etc.) using accepted engineering methods, as well as regular maintenance of roads.	C/O/D	TRONOX ECO			
	12	The RSFs starter wall will be vegetated with stoloniferous grasses and legumes to prevent surface erosion. Vegetation must achieve 80% dust control efficiency. (Rehabilitation will be done based on information derived from the Rehabilitation Research Programme).	C	TRONOX ECO			
	13	All disturbed areas, areas undergoing rehabilitation, the RSF walls and all water management structures will be inspected after every major storm event and repaired as necessary.	C/O/D	TRONOX ECO			
	14	Toe (or catchment) paddocks will be constructed below the RSF walls and maintained.	_C/O	TRONOX ECO			
	15	Linear infrastructure (roads and pipelines) will be inspected monthly to check that the associated water management infrastructure is effective in controlling erosion.	C/O	TRONOX ECO	Repairs to incidents within 7 days	Monthly inspections Bi-weekly inspections during periods of high rainfall and after major rainfall events	Incident register will be kept to up to date and necessary actions executed based on incident
	16	Construction of surface water management infrastructure from soil (berms, canals and bunds) and advised by engineer.	C/O	ECO	Repairs to incidents within 7 days		
	17	Energy dissipaters will be constructed at points where there are concentrated discharges of water to the environment that can cause significant erosion. Where necessary, energy dissipaters will also be placed within water channels to slow the speed of water (for example in the clean water diversions).	C/O	TRONOX	The effectiveness of these dissipaters will be checked monthly. Repairs to incidents within 7 days		
	18	Energy dissipaters will be placed in footpaths where there are signs of erosion.	C/O	TRONOX	No erosion, and if erosion occurs, repairs to incidents within 7 days		
Heleza Moya - Soil							
Minimise the loss of a soil resource	-	To the extent possible the stockpiling of topsoil should be avoided. Where this is unavoidable the maximum height of the topsoil stockpile should be limited, preferably to below 2 m.	C/O	TRONOX ECO	▪ Successful implementation of topsoil management guidelines ▪ Successful implementation of Rehabilitation Research Programme recommendations	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	▪ Incident register will be kept to up to date and necessary actions executed based on incident. ▪ Consult with rehabilitation specialist where required

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Live placement of topsoil on the areas available for rehabilitation is preferable to creating soil stockpiles.	C/O	TRONOX ECO	▪ Successful implementation of topsoil management guidelines ▪ Successful implementation of Rehabilitation Research Programme recommendations		
Aspect: Land capability							
Detail description of aspect: For the duration of the Fairbreeze Mine project, the area affected by mining, pipelines corridors, soil stockpiling, PWP and RSFs will not be available for agricultural production or any other land use. After rehabilitation, the area could be used once again for commercial agricultural production. The removal of the heavy mineral fraction is not expected to affect the land capability of the soil. It is anticipated that a similar land capability can be achieved in the post-mining environment. It is anticipated that the ESKOM powerline servitude will permanently remain in the re-aligned position. The re-aligned powerline will replace an existing powerline and the difference in the area of land lost to their servitudes is negligible.							
Minimise loss of land with arable capability/agricultural potential		See ref 3, 4 and 5.					
	B5	Management will focus efforts on creating a well-aerated rooting environment free of excessive compaction and layering in the reconstituted soil by employing suitable land preparation methods. These methods will be guided the Rehabilitation Research Programme.	O	ECO	Successful implementation of topsoil management guidelines	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist where required
	B6	Existing topsoil will be utilised as far as possible as a means for restoring soil fertility and soil structure. Emphasis will be placed on utilising the existing topsoil in combination with the forest floor and harvesting residues (bark, branches, leaves, tree tops and chipped stumps) that will be available after clear-felling of the Eucalyptus.	O	ECO	Successful implementation of topsoil management guidelines		
	B7	Management of the reconstituted soil (i.e. depth of application and specific clay: sand ratio), topsoil/harvesting residue mix, incorporation of the latter within the reconstituted soil and further amelioration will be determined by the Rehabilitation Research Programme and consideration of the latest mine rehabilitation technology	O	ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations		
	B8	Topsoil storage will only be carried out for the first ore body excavation. After that removed topsoil and Eucalyptus harvesting residues will be moved onto backfilled areas from areas due to be mined in a sequential manner.	O	TRONOX	Successful implementation of topsoil management guidelines		
	B9	Once reforested, growth of the re-established forest plantation will be monitored and compared to growth expectations from Mondi's growth and yield models for the species/clone/hybrid in question	O	TRONOX	Successful rehabilitation and Rehabilitation Research Programme recommendations		

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	B10	Since the establishment of forest plantations will contribute to improving the fertility and structure of soils, the time taken between re-vegetation and establishment of tree crops will be minimized	O	TRONOX			
	19	As per the rehabilitation/closure procedure (**Section 10.6 of BAR, 2012, attached as Appendix 2**), the soil structure will be restored during the final stages of residue deposition. The restoration will be appropriate to the agreed post-mining land capability (sugarcane, plantations, and natural areas). (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	O/D	TRONOX			
	20	The method of soil structure restoration will be defined by the Rehabilitation Research Programme in accordance with appropriate specialists and take cognisance of the work currently being undertaken at Hillendale. Ref B3	O				
	21	Following backfilling, the landform will be shaped to the extent where it will be possible to practise the agreed land use on the area. The post mining topography will be modelled on the pre-mining landscape survey.	O/D	TRONOX	Landscape after mining similar to original topography	Review monthly during rehabilitation phase	Consult with surveyor and mine manager
	22	Ensure that the topsoil coverage is as even as possible, with no compaction, and that natural drainage has been re-established (no wet spots or obstructed drainage ways)	O/D	TRONOX	.Successful implementation of topsoil management guidelines	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with rehabilitation specialist where required
	23	Lessons learnt from Hillendale mine will be implemented at Fairbreeze Mine to ensure most effective sugar cane farming and forestry growing conditions. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	O		.		
	24	An appropriate indigenous vegetation seed mixture, as determined by the Rehabilitation Research Programme/Biodiversity Forum, will be used over areas to be returned to a natural land cover. The revegetation will aim to ensure at least 30% vegetative cover is established with 3 months. Vegetation establishment will be monitored quarterly for 3 years after planting, or until monitoring indicates that a suitable, self-sustaining natural land cover has been achieved.	C/O	TRONOX ECO	Disturbed areas rehabilitated and vegetative cover achieved	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	25	Ensure that the vegetation coverage is as even as possible, and if uneven coverage occurs, soil conditions will be checked and rectified.	O/D	TRONOX ECO			
	26	Mondi will be compensated as per conditions of the lease agreement. Compensation has been paid for the ESKOM servitude.	P	TRONOX	.Fulfilment of lease agreement		

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Heleza Moya - Land Capability							
No additional mitigation is required.							
Everglades – Land Capability							
Minimise agricultural impacts	C1	Consideration should be given to supporting emerging sugarcane growers as part of Tronox's community development projects.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr	Consult with specialist where required
Aspect: Land use							
Detail description of aspect: The impact on land use will include the removal of the forestry plantations, sugar cane fields and some homesteads. The removal for mining will be gradual, proceeding slightly ahead of the mining schedule, whereas the clearing for PWP and offramp infrastructure will be immediate and for the period during life of mine. Due to safety reasons, the proposed power line will require the registration of a servitude in which, no other land use will be allowed.							
Prevent long term changes in land use		See Ref 4					
	27	The post-mining land use will be agriculture, specifically sugar cane and Eucalyptus sp. Plantations or natural vegetation.	O/D	TRONOX	Successful rehabilitation to facilitate post-land use	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
Minimise loss of land currently used for wilderness/wetlands	A1	Buffer zone management will be conducted as specified as per of biodiversity monitoring programme (Section 6.2)	C/O/D	ECO	Limited impact on buffer zones	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	
	28	The soil structure will be restored during the final stages of residue deposition. The restoration will be appropriate to the agreed end land use. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research panel). See Ref B3-B6.					
		See ref 20					
	29	Details of the post closure land use for each ore body will be agreed with stakeholders, in particular the landowner (Mondi) and relevant regulatory authorities (DME, DWAF, DAEARD).	O/D	TRONOX	Successful rehabilitation to facilitate post-land use.	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating area	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with rehabilitation specialist/Biodiversity Forum where required
	30	Following initial soil restoration, a geohydrology and soil assessment of the top surface of the RSF will be undertaken in accordance with TRONOX's Rehabilitation Strategy (**Section 10.6 of BAR, 2012, attached as Appendix 2**). On-going rehabilitation of the RSF will be adapted to suit the specific situation at each RSF and incorporate recommendations of the specialist reports.	D	TRONOX	Successful rehabilitation to facilitate post-land use		
Heleza Moya - Land Use							
No additional mitigation is required.							
Aspect: Fauna, flora, wetlands and aquatic ecology							
Detail description of aspect: All areas currently vegetated by Eucalyptus will be cleared prior to establishment of required infrastructure or prior to mining. Syzygium/ Cassipourea dominated swamp forests vegetation community will be impacted by the position of the VSRF and alternative RWD. Construction of the 88 kVA ESKOM powerline will require clearing a servitude of 50m wide of trees. Vibration, light and							

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
noise pollution will have a significant impact on fauna species in the immediate vicinity of the mine and transport of the ore and the need for sufficient lighting during the night. The addition of sufficient lighting to facilitate 24-hour operations in close proximity to areas of natural vegetation may attract large numbers of insects which will in turn attract faunal elements such as amphibians, bats and nocturnal birds. It is expected that the majority of faunal species will move away from areas with increased noise, light and dust pollution leading to changes in the faunal composition and ecological function of adjacent habitats. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment. The plant communities that are traversed by the powerlines provide habitat for several Red Data bird species including larger bird species. The mining activities will result in the influx of people into the project area. This will result in increased anthropogenic pressure on the ecosystems in the project area in terms of increased access and therefore harvesting of natural resources such as firewood, medicinal plants for use in the muti trade, hunting, and fishing. Construction of the proposed VRSF will result in the loss of wetland system WS06. Loss of this wetland system will result in changes in flow patterns, inundation and functionality in downstream wetland units including those in Umlalazi Nature Reserve and will be significant on a regional basis. The significance of this impact is rated as high due to the sensitive nature and threatened status of wetland habitats. The wetlands associated with VRSF provide habitat for several Red Data species, some of which have been confirmed and others that are considered to be highly likely to occur in the project area. Although the vegetation will be removed during the construction and operational phase the surface flow from the ore body areas will be contained, resulting in a decrease in surface run-off. This however will be short term as the estimated maximum open area is 0,65km2 and the remainder of the mined ore body will be rehabilitated, and the ground sloped to drain back to original catchments. During the first five years of mining there will be an increase of approximately 5-10% in the MAR and close to 0% for the last 6 years. With rehabilitated intermediate forestry in place the MAR will increase close to current conditions and decrease slightly for mature forestry.							
Minimise loss of vegetation due to the Fairbreeze Mine		See Ref 4.					
		See Ref 34-39					
	30	The identified natural vegetation areas will be declared no-go areas with respect to mining equipment and protected against disturbances. Buffer zones will be adhered to as stipulated in section 6.2).	C/O	ECO	Adherence to no-go and buffer areas Limited impact on buffer zones	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with rehabilitation specialist/Biodiversity Forum where required
	31	Revegetation of disturbed areas will be undertaken as soon as possible and will commence within 60 days of removal of the disturbing factor. This will be measured against the commitment of maximum open areas ($0.65km^2$) at any time as well as rehabilitation/closure procedures.	C/O/D	TRONOX ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations	Ongoing inspection of rehabilitation/closure procedures	
	48	All Eskom pylons to be constructed outside the delineated wetland area.	C	TRONOX	No pylons within delineated wetlands	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	
	49	Routes for vehicles transporting heavy machinery during the construction phase must be restricted to approved roads, turning sites and stockpile areas to minimize soil compacting and vegetation destruction. If soil is compacted, it must be loosened again by ripping or ploughing of these compacted areas during rehabilitation process (as per Specifications in Ref B4).	C/O/D	ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations	Ongoing inspection of rehabilitation/closure procedures	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with rehabilitation specialist/Biodiversity Forum where required
	50	Rehabilitation, to the pre-disturbance conditions, needs to be initiated as soon as each section of the pipeline construction has been completed.	C/O/D	ECO TRONOX	Successful rehabilitation		
Ensure management of staff in terms of	32	Strict management of access control to the site, control of movement of the labour force within the mine property and	C/O/D	ECO		Ongoing training	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
environmental aspects sensitive to the Fairbreeze Mine project		prevention of disturbance to vegetation or animals will be practised.			No incidents into unforeseen disturbances to biodiversity		
	33	All mine personnel will be provided with annual environmental awareness and job specific training. This will include specific aspects of Red data species, connectivity of natural habitats, species recognition, migration corridors, stipulated buffer zones, etc. This training will also be supplemented via posters on site.	C/O/D	ECO			
Minimise effects of habitat fragmentation	34	Disturbances to identified areas of natural vegetation or corridors between these areas will be prevented. Where disturbances are approved, the restoration of the connectivity will be prioritised. Infrastructure through or between areas of natural vegetation or corridors will be implemented with provision for the passage of fauna. Buffer zones will be adhered to as stipulated in relevant map included in report (see **Figure 6-1**).	C/O	ECO	Successful rehabilitation	Ongoing biodiversity	
Minimise impact on terrestrial and aquatic fauna and flora due to dust, light, erosion and sedimentation		See Ref 8 to 18 (erosion and sedimentation)					
		See Ref 81 to 91 (dust control)					
	44	Mining-associated traffic will be restricted on the roads to the west of the swamp forest at FBCX, and any other areas as identified by the ECO.	C/O/D	TRONOX ECO			
	45	The tree barrier adjacent to Mtunzini (see Ref 87) will be maintained to provide a faunal corridor. This barrier will remain in place until such time as the property is finally declared a conservation area, as per the offset agreement, after which it will be managed as part of the offset management contract.	C/O/D	ECO			
		See Ref 17 to 26 (water quality)					
	51	Water quality and flow monitoring (see Ref 53 and 54) will be used to calculate sediment loads within each water course/ estuary.	C/O/D	ECO	Sediment loads will be maintained within 10% of current/generally accepted levels.	Implementation of biomonitoring programme	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum where required
	52	A biomonitoring programme will be implemented on the estuarine and freshwater parts of the aquatic system. This will cover: Fish (freshwater and estuarine); Water Quality (estuarine and freshwater); Sediment composition (estuarine and freshwater); Macro-invertebrates (freshwater); and Macrocrustacea (estuarine and freshwater). Section 6.1 specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist study.	C/O/D	ECO	Adherence to biomonitoring specialist specifications or conditions in project authorisations		
		See Ref 8 to 18 (erosion) and 34					
		See Ref 4					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise loss of species with conservation importance	35	Harvesting of medicinal species as well as Red Data rescue and relocation missions for all species as specified by KZN Wildlife will occur prior to the start of any construction activities in an area. Permits to relocate the TOPS protected species will be obtained from KZN Wildlife. Specimens will be removed as per TOPS permit conditions.	P/C/O	ECO	No unauthorised activities to medicinal species as well as RD Species Adherence to permit conditions.	Ongoing monitoring of permit conditions	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum were required
	36	Long term mitigation measures include establishment of off-set areas where required. A biodiversity offset-agreement has beenin conjunction with the offset advisory committee inclusive of (representatives from the following organisations DMRE, EDTEA, DWS, Department of Agriculture, Land Reform and Rural Development (DALRD) (formerly Department of Agriculture, Forestry and Fisheries (DAFF)), EKZNW and Tronox (formerly Exxaro). Management and monitoring of these offset areas are critical for the success thereof and will be measured as per the conditions and monitoring requirements of the offset agreement. The offset plan provides alternative and sustainable land use strategies to enhance the future health of the biodiversity of this important area. It is proposed that a Siyaya monitoring forum be established with a key focus on sustainable land use and management within the Siyaya catchment. Relevant key stakeholders, e.g., TRONOX, Mondi, DWA, WESSA, KZN Wildlife, and Mtunzini Conservancy will be involved in Forum.	P/C/O/D	ECO	As per offset management	Monitoring as per offset management plan	
	A2	Disturbances to habitat known to protected species will be prevented through access control, training of personnel and management of mine activities.	C/O/D	ECO	No unnecessary disturbances to indigenous areas	Ongoing monitoring as per permit conditions, no go areas and buffer zones	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum were required
	38	TRONOX will implement an alien and invasive vegetation programme to remove alien and invasive plants in all the identified natural vegetation areas within the mining area	C/O/D	ECO	Revegetated areas will also be inspected every 6 months and alien and invasive plants removed		
	39	Firebreaks will be maintained as agreed with the landowners, neighbours and in terms of the Veld and Forests Fire Act (101 of 1998). TRONOX will join and participate with the local Fire Protection Association.	C/O/D/P	ECO	Adequate fire breaks	Ongoing monitoring of firebreaks	
Minimise risk of avian collision due to re-aligned ESKOM powerlines	40	To ensure visibility of new aligned Eskom powerlines, bird “flappers” will be installed. This will be done in consultation with ESKOM.	C	TRONOX ECO	Adherence to ESKOM EMP (Appendix F) and any other ESKOM requirements.	Ongoing monitoring of bird flappers	
	41	The bird flappers will be installed, monitored and maintained as per ESKOM standards, by ESKOM.	C/O	TRONOX ECO			
Manage the direct (in the mining area) loss of herpetofauna	42	An on-site herpetofauna monitoring program in the initial year of operations at FB will be undertaken to quantify the	C/O	ECO	Implementation of herpetofauna monitoring program	Ongoing monitoring as per permit conditions, no go areas and buffer zones	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		numbers and species of herpetofauna impacted on by mining operations.					
	43	Where necessary a herpetofauna search and rescue operation will be undertaken within the identified wetlands prior to their destruction by mine development. Rescued specimens will be released in the offset or other suitable areas. A herpetologist will provide the necessary expertise for release.	C/O	ECO	Implementation of herpetofauna monitoring program	Ongoing monitoring as per permit conditions, no go areas and buffer zones	
Catchment loss (FBA, FBB, FBC, FBD, MSRSF, VRSF) feeding wetland systems		See Ref 4.	C/O				
		See Ref 30	C/O				
		See Ref 31.	C/O/D				
	46	Restore surface water runoff from rehabilitated areas to the original catchments on the basis of the survey of the original landform	O/D	EXARRO	Implementation of surface and ground water monitoring programme	Monitoring as per monitoring plans	Obtain input from hydrologists
	47	Rehabilitation of the proposed wetland areas within the offset sites will commence as soon as feasible (as identified in **Appendix G16.6 of BAR, 2012, attached as Appendix 2**), Revised offset plan).	D	ECO	As per offset management plan	Monitoring as per offset management plan	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist/Biodiversity Forum where required
		See Ref 36.					
Minimise change in inundation patterns		Ref 36 for offset plan					
		Ref 46, 69-72 to deal with management of erosion due to increased base flow or mining operations					
		Ref 77 to deal with flow within Siyaya River					
		Ref 79 to deal with the MRSF impacts on water flow patters					
		Ref 80 to deal with groundwater impacts					
Minimise loss in sensitive habitat (RWD, VRSF, pipeline corridor)		Ref 36 for offset plan					
Minimise indirect impacts on wetlands (FBD)	B12	As per recommendation in Final BAR, FBD should not be authorized based on existing data	P				
Minimise impact on wetlands due to contaminated surface and groundwater/change in water quality		See management in surface (Ref 59-79) and groundwater section (Ref 80).	C/O/D				
	53	Rigorous and regular monitoring of stream flow will be undertaken in alignment with the biomonitoring programme requirements. This will inform any adaptive management measures if deemed necessary by aquatic	C/O/D	ECO	Adherence to biomonitoring specialist specifications or	Implementation of biomonitoring programme	▪ Incident register will be kept to up to date and necessary actions

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		specialists. 6.1 of the BAR specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist			conditions in project authorisations		executed based on incident ■ Consult with specialist/Biodiversity Forum where required
	54	Monitoring of the Siyaya estuary will be undertaken in alignment with the biomonitoring programme requirements. Section 6.1 specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist study.	C/O/D	ECO			
Minimise changes to riverine habitat due to altered base flow		See Ref 4					
		Ref 46, 69-72 to deal with management of erosion due to increased base flow or mining operations					
		See ref 51, 53 and 54 (flow monitoring)					
		See ref 52 (biomonitoring)					
		Ref 77 to deal with flow within Siyaya River					
		Ref 80 to deal with groundwater impacts					
Minimise impact of infrastructure on the aquatic ecosystem	55	Designs for new roads or infrastructure which needs to bridge or move across water courses will ensure that flows of the water course are obstructed or impeded to the minimum. Design of the crossings will also allow for river connectivity and ensure that the path of migratory organisms is not blocked.	C	TRONOX Contractor	Limited impact on water flow	Ongoing monitoring of water flow at selected areas	Clearing of obstruction Consult with engineer
Sustainable management of the impacted catchments	56	The biodiversity offset includes the rehabilitation and/or conservation of areas of wetlands, and riparian zones as agreed in the offset plan. Ref 36 for offset plan	D	TRONOX	As per offset management plan	Monitoring as per offset management plan	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist/Biodiversity Forum where required
	57	Rehabilitation of VRSF site will take cognisance of the current land use, and as specified in RSF closure, will ensure rehabilitation of land to wetland areas.	D	TRONOX	Successful rehabilitation to facilitate post-land use	Ongoing inspection of rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
Heleza Moya - Fauna, Flora, wetlands and aquatic ecology							
Avoid loss and disturbance of fauna and flora habitat		All temporary construction footprints, including, but not limited to, laydown areas, portable toilets, cement batching plants, wind tower factory etc., should only be	P	TRONOX	Limited impact on fauna and flora	Monitoring as per biomonitoring programme	■ Incident register will be kept to up to date and

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		located in areas of modified habitat (e.g., cultivated fields and alien tree plantations); and					necessary actions executed based on incident ■ Consult with specialist/Biodiversity Forum where required
		Where feasible, permanent proposed Project infrastructure should be located on land that is already modified; and					
		Proposed Project access roads should be aligned with existing district and farm roads and tracks.					
		Vegetation clearing should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas;	C	TRONOX	Limited impact on fauna and flora	Monitoring as per biomonitoring programme	■ Incident register will be kept to up to date and necessary actions executed based on incident ■ Consult with specialist/Biodiversity Forum where required
		The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas;					
		No heavy vehicles should travel beyond the marked works zone.					
		A rehabilitation/landscaping protocol should be developed and implemented on-site. The protocol should include, inter alia, the following provisions:					
		■ Stockpiling of topsoil from development footprints during site preparation;					
		■ Post-construction, the land form should be correctly contoured to limit potential erosion and compacted soils should be ripped and loosened to facilitate vegetation establishment					
		■ Topsoil removed during construction should be applied to all non-operational sites that were disturbed during construction and require revegetation; and					
Avoid loss and disturbance of fauna and flora habitat		■ Locally occurring indigenous grasses species should be used to revegetate all areas disturbed during construction.					
Avoid injury, mortality and disturbance of fauna	-	An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions. The ECO should be trained in inter alia, snake handling and basic fauna identification;	C	TRONOX ECO	Limited impact on fauna	Monitoring as per biomonitoring programme	■ Incident register will be kept to up to date and necessary actions executed based on incident
		Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat;					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		As appropriate, barriers should be erected around construction trenches and excavations to prevent fauna being trapped in these features;					▪ Consult with specialist/Biodiversity Forum where required
		A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions;					
		The handling, poisoning and killing of on-site fauna by workers and contractors must be strictly prohibited; and					
		The rules and regulations concerning all wildlife should be communicated to workers and contractors through on-site signage and awareness training (induction).					
Avoid the establishment and spread of alien invasive species	-	An Alien Invasive Species (AIS) Control and Eradication Plan must be expanded to include the Project. It is recommended that the plan include:	C	TRONOX	Limited impact on fauna and flora	Monitoring as per biomonitoring programme	▪ Incident register will be kept to up to date and necessary actions executed based on incident ▪ Consult with specialist/Biodiversity Forum where required
		▪ A combined approach using both chemical and mechanical control methods;					
		▪ Periodic follow-up treatments, informed by regular monitoring;					
		▪ A specific focus on: • All sites disturbed by construction; and • Areas of wetland/stream vegetation.					
Avoid injury, mortality and disturbance of fauna	-	No off-road driving is permitted for vehicles and mobile machinery used during operations and for maintenance purposes.	O	TRONOX	Limited impact on fauna	Monitoring as per biomonitoring programme	▪ Incident register will be kept to up to date and necessary actions executed based on incident ▪ Consult with specialist/Biodiversity Forum where required
		The handling, poisoning and killing of on-site fauna by maintenance personnel must be strictly prohibited;					
		The rules and regulations concerning fauna should be communicated to maintenance personnel through on-site signage and awareness training					
Avoid the establishment and spread of alien invasive species	-	Active alien invasive species control should continue throughout the operational phase, as per the Project's AIS Control and Eradication Plan.	O	TRONOX	Limited impact on fauna and flora	Monitoring as per biomonitoring programme	▪ Incident register will be kept to up to date and necessary actions executed based on incident ▪ Consult with specialist/Biodiversity Forum where required
		Active alien invasive species control, as per the AIS Control and Eradication Plan, should continue during the	D	TRONOX	Limited impact on fauna	Monitoring as per biomonitoring programme	▪ Incident register will be kept to up to date and

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		decommissioning phase and follow up control should be carried out for a five- year period following decommissioning.					necessary actions executed based on incident ■ Consult with specialist/Biodiversity Forum where required
Avoid disruption of ecosystem processes due to Project infrastructure		To prevent wetland desiccation, the wetland management and protection measures outlined in the wetland impact assessment for the proposed Project should be strictly implemented on-site.	C	TRONOX	Limited impact on flora	Monitoring as per biomonitoring programme	■ Incident register will be kept to up to date and necessary actions executed based on incident ■ Consult with specialist/Biodiversity Forum where required
Avoid loss of flora of conservation concern	-	Prior to any vegetation clearing, the proposed construction footprints should be clearly marked in the field; A wet/growing season field survey for flora SCC should then be conducted within the planned development footprints to determine the identify and number of potentially impacted flora SCC; ■ Informed by the findings of the survey: • Wherever possible, infrastructure footprints should be re-aligned/re-positioned to avoid SCC locations; • Where re-alignment/re-positioning is not possible, permits should be obtained from the relevant authority to rescue and relocate impacted plants; and A Flora SCC Rescue and Relocation should be developed for the proposed Project to provide guidance on all aspects of SCC rescue and relocation as per Fairbreeze 2012 EMPr (**Appendix 2**)	C	TRONOX	Limited impact on flora	Monitoring as per biomonitoring programme	■ Incident register will be kept to up to date and necessary actions executed based on incident ■ Consult with specialist/Biodiversity Forum where required
Enhancing wetland health		Investigate the potential for rehabilitation of the South Eastern portion of the Heleza Moya property.	C/O/D	TRONOX	Improved health and functioning of the wetland	Update existing rehabilitation plan to include this portion.	Consult with specialist where required
		Implement the 'Biodiversity Offset Plan for the iSiyaya Plantations Offset Area'.	O/D	TRONOX	■ Monitoring and auditing results ■ As per offset management plan	Implementation of the 'Biodiversity Offset Plan for the iSiyaya Plantations Offset Area'' plan	Consult with specialist where required
Everglades - Fauna, flora, wetlands and aquatic ecology							

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise impacts on wetlands and biodiversity	C2	Remaining wetland areas fringing the VRWD (seepage arms) that are not to be transformed as a result of the dam expansion will need to be rehabilitated in order to reduce any secondary degradation impacts associated with the return water discharge (clean and dirty), particularly to wetland W2a.	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		Demarcate access roads, construction zones and no-go zones'					
		Control pollution as per the IWWMP and SWMP.					
		Minimise duration of bare soils on site.					
		Maintain adequate through flows to downstream aquatic ecosystems.					
		Implement erosion control measures.					
		Protect wildlife and manage natural resources effectively.					
		Ensure adequate fire management.					
		Control alien invasive weeds.					
		No water abstraction from natural sources.					
		Implement EMPr for Eskom powerline realignment.					
		Implement Rehabilitation Plan for Siyaya Plantations Offset					
Minimise impacts on aquatic, riverine and estuarine environments	C3	Management and enforcement of the recommended buffer zones from the riparian edges.	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		Implement soil erosion control, spill prevention and dirty water containment measures during all phases of the project in line with the other specialist reports in particular the wetland, stormwater and waste management reports.					
		Onsite measures to control potential pollution from mining operations must be strictly implemented in line with the management actions contained in the Integrated Water and Waste Management Plan (IWWMP) and Storm Water Management Plan for Fairbreeze Mine.					
		This includes the following focused monitoring of in-situ physicochemical parameters in all rivers surrounding the residue storage facility and the return water dam ensuring turbidity, suspended solids, pH and in-situ dissolved oxygen are included in the suite of parameters.					
		Monitoring of both the Siyaya and aMatigulu Estuaries using national estuarine health index protocols.					
		Design will ensure that seepage or runoff is prevented from entering ground water or reaching the surface water resources.					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Invasive Alien Plant Control must be implemented according to the requirements of the NEM:BA.					
		Implement erosion control measures.					
		Protect wildlife and manage natural resources effectively.					
		Ensure adequate fire management.					
		Control alien invasive weeds.					
		No water abstraction from natural sources.					
Aspect: Water management (surface and groundwater)							
Detail description of aspect: Sediment in any runoff will potentially come from exposed areas during most phases of the mining operation (e.g. topsoil stripping). Higher sediment loads may naturally be introduced into the estuary due to increased frequency and intensity of flooding, large-scale erosion and sediment movement. The mining of heavy minerals is not impact adversely on surface or groundwater quality, as the dunes have been extensively leached by percolation of rainwater, hence all remaining constituents can be considered to be stable. No point source discharges are planned from the proposed operations. Therefore, potential impacts will arise from accidental point sources and diffuse sources. Diffuse pollution, which is often more difficult to manage, can arise from: Seepage from the open pits (directly to surface waters and indirectly via groundwater) affected by geochemical changes and process reagents; Unconfined storm water runoff from contaminated surfaces; and Run-off from exposed areas carrying increased sediment load. Although the vegetation will be removed during the construction and operational phase the surface flow from the ore body areas will be contained, resulting in a decrease in surface run-off. This however will be short term as the estimated maximum open area is 0,65km^2 and the remainder of the mined ore body will be rehabilitated, and the ground sloped to drain back to original catchments. For the MSRSF, VRSF and RWD catchments the surface water would remain trapped for the duration of the mining operation. The rehabilitation and ground sloping back to original condition at closure would ensure surface water flows back to current conditions. Due to the exposure of unvegetated areas and presence of water in pits due to monitoring and backfilling could increase infiltration rates, and thereby increase the base flow in the Siyaya (and Amanzimnyama), leading to increased quantities of water in the estuary. The rate of deposition of sediment behind the gauging weirs suggests that erosion is already occurring in the catchments and sediments are being moved down the river channels under the present flow regimes. The degree of bank or bed erosion is based on the storm flows (short term) rather than stream flows (long term) and are predominantly rainfall dependent. Other factors, such as vegetation and soil, play an important role in determining potential for erosion. In the Amanzimnyama, indications are that the banks are relatively stable and well vegetated, so bed erosion may dominate in this system. Erosion may also be caused by uncontrolled runoff from mining areas or flow exiting from drainage structures, such as clean water diversions. The mining activities fall outside the 1:100 year floodlines except for MSRSF, VRSF and the RWD. Where pipes or road crossings are required to cross any of the rivers, the design of the infrastructure must not negatively impact the surrounding area (increased flood levels etc.). The change in the flow patterns caused by the physical obstruction of flow in the system at road and pipeline crossings can impact on sedimentation. Water losses from the mining operations will result in a zone of groundwater mounding. The mounding after six years of mining is related to the losses of water during mining and backfilling at FBCX. The backfilling is likely to occur over a short period of seven months whilst in other areas the losses either occurs over a smaller area or longer time period attenuating the effect of the losses to the groundwater. The mound slowly dissipates and spreads with time and is still present at year 12 of mining. The mounding is unlikely to result in seep zones forming. Once mining at FBC ext. is complete the baseflow improves but remains below the estimated pre-mining level. The only plausible reason for the baseflow remaining at a lower level is that the leakage from the Valley RSF is lower than the pre- mining recharge over the footprint. At present groundwater quality is generally good for the identified uses. Most of the identified impacts will be constrained to the operational phase, with the exception of spills. Results from the comprehensive eco-toxicological assessment performed on the flocculant used in the primary beneficiation process at Hillendale indicated that no adverse effects were detected at the residual flocculant concentration of 0.06 mg/l found to be present in the RWD. The probability of exceeding these levels in the mining operation is exceedingly low.							
Minimise or prevent deterioration in surface water quality due to mining activities	59	Water quality and flow monitoring within the freshwater and the estuarine parts of the catchments will be undertaken in accordance with TRONOX's monitoring programme (Section 6). The results will be used in the development of the closure plan remediation and monitoring programme. Also see ref 51, 53 and 54.	C/O/D	ECO	Adherence to environmental authorization conditions into water quality and quantity. No reduction on water quality prior to start of mine	As per surface and groundwater monitoring programmes in section 6.7 and 6.6.	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required
	60	Clean water diversions and dirty water collection facilities will be established at all mining areas as well as at the	C/O	TRONOX		Ongoing monitoring of functioning of diversion	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		RSFs, PWP and RWD to prevent clean surface runoff becoming contaminated by construction or operational activities. Diversion measures will be established before land clearing and mining commences. The measures envisioned are simple soil berms and trenches to prevent clean runoff entering dirty areas and others to divert dirty water to settlement paddocks.			Functional water management facilities and pipelines	measures as well as need for additional measures	
	61	Dirty water drains will be sized to manage the „dirty" water generated by a 1:50 year storm arising on contaminated areas. Dirty water will be directed to retention ponds, from where it can be returned to the mine or process water circuit. The storage facilities will have a minimum freeboard of 0.8m above full supply level. The width and height of the drains will be determined to ensure compatibility with identified hydraulic requirements of the drain.	C/O	TRONOX			
	62	The water levels in the dirty water storage facilities will be kept low by recycling into process water circuit. This ensures that the facility has enough capacity in the event of another severe rainfall event. All dirty water storage facilities will be managed with the required freeboard	C/O	TRONOX			
	63	TRONOX will keep water systems clear of obstructions. Drains will be inspected regularly for erosion and obstructions. Unless problems are encountered during these inspections, the drains will be cleaned and maintained as necessary.	C/O	TRONOX			
	64	Spillages from pipelines near to watercourses will be contained by soil bunds. These will contain spillages or direct the material to areas where it may be cleaned up and returned to the process. A contingency plan will be implemented to enable early detection of burst pipelines.	C/O	TRONOX			
	65	Prevention of spillages by quarterly inspection and maintenance of pipelines. All pipe bursts and spillages will be recorded as incidents and measures implemented to contain, clean-up and prevent further spillages. The mine will use its incident reporting system to ensure appropriate measures are taken in the event of incidents	C/O	TRONOX			
	66	Ensure that temporary toilet facilities do not cause any water pollution or a health hazard.	C/O	TRONOX ECO			
	67	The flocculants used will be such that both the flocculants and its decay products will not be to the detriment of downstream water users. The dosage of excessive amounts of flocculants will be avoided	O	TRONOX	No excessive dosage of flocculants	Regular checking of dosage equipment for malfunction	
	68	Should contamination or excessive surface water flow be detected, the mine will immediately notify relevant authorities. The mine will then: identify the source of the	C/O/D	EXARRO ECO	Visual contamination of surface water. Reduction in water quality as per	As per section 6.7 and 6.6.	Identification of source, implement prevention of contamination.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		contamination; identify, and if necessary, implement, measures for the prevention of this contamination (short and long term); determine, and if necessary implement, any remediation measures.			results of monitoring programmes		Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
Minimise risk of erosion from either increased base flow or mining operations	69	Changes in base flow in the affected rivers will be determined as part of the monitoring programme (ref 17).	C/O/D/P	ECO	Change in base flow		Consult with specialist where required
	70	A log will be kept of breaching events of the Siyaya Estuary, including, where possible, duration of the breach, rainfall and flow in the Siyaya and Amanzimnyama Rivers	C/O/D/P	ECO	Breach of Siyaya Estuary	Ongoing monitoring of estuary	
		See Ref 4 (minimise disturbance)					
		See Ref 10 (rehabilitate promptly)					
	71	To minimise impact on the receiving water bodies, TRONOX will optimise the removal of return water from backfilling operations.	O	TRONOX	Optimal removal of water from backfilling	As per surface and groundwater monitoring programmes section 6.7 and 6.6.	Consult with specialist where required
	72	Water systems, such as drains and canals will be designed to prevent pollution and minimise erosion or sedimentation	C/O	ECO	Functional water management facilities	Ongoing monitoring of functioning of diversion measures as well as need for additional measures If any of the inspections identify eroded areas, these will be repaired within 7 days.	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required.
	73	Linear infrastructure (roads and pipelines) will be inspected on a quarterly basis to check that the associated water management infrastructure is effective in controlling erosion.	C/O/D	ECO	Limited erosion		
	74	See Ref 16	C/O/D				
		See Ref 17	C/O/D				
	B12	Rise in water levels at the Siyayi Borehole (located at FBCX) to within 10m of the surface will trigger additional mitigation measure such as pumping or a cut-off trench.	C/O/D	ECO	Rise in water level to within 10m from surface	Ongoing monitoring of functioning of diversion measures as well as need for additional measures	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required
		See Ref 18					
Minimise changes in flow patterns caused by blockages in the rivers	75	River and riparian crossings will be designed and maintained such that stream flow will not be impaired	C	ECO	Functional water management facilities	Ongoing monitoring of functioning of diversion measures as well as need for additional measures	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	76	Pipelines that cross any watercourse and / or drainage line will allow flows to safely pass without any risk of flooding or damming. Embankments at watercourse crossings, within the flooding zone, will be protected against erosion. Where culverts are used at crossings, the culverts will have downstream erosion protection and energy dissipaters to reduce flow rates to their original velocities. Except for watercourse crossings, roads and	C/O	ECO			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		pipelines will be positioned outside the 1:50 year flood line.					
Manage changes in mean annual runoff	77	The flow measurement facilities at the two weirs are to be re-established by DWA with assistance provided by TRONOX. The flow in the Siyaya and Amanzimnyama will then be recorded on a continuous basis by DWA. TRONOX will use this information as part of its water quality monitoring (Ref. 59- 68) and assessment to determine sediment loads, erosion potential, alterations to natural flow regimes and risk of estuarine breaching	C/O/D	TRONOX ECO	▪ Functional water management facilities ▪ Water quality within guidelines limits	As per surface monitoring programmes section 6.6.	Consult with specialist where required
	78	The closed systems and water capture measures will reduce the water requirements for the mining operations, thus reducing the impact on other users.	O	ECO	Water requirements in comparison to Mhlathuze water contract.	Water quality monitored on a monthly basis	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	A5	Restoration of landform during backfilling must ensure that catchment divides are restored in terms of the pre-mining survey	C/O/D	ECO	Successful rehabilitation leads to restoring of hydrological regime in dunes	As per surface and groundwater monitoring programmes section 6.7 and 6.6.	Consult with specialist where required
Minimise change in ground water quantity and quality		See Surface Water (ref 59 to 79) for monitoring, water use optimisation and pollution control requirements.					
	80	A groundwater monitoring programme consisting of the following will be conducted,: the use of soil moisture probes or other relevant instrumentation to determine unsaturated zone conditions; as many of the future exploration boreholes as possible will be drilled to bedrock; piezometers will be installed across the FB deposit and monitored to establish the shape of the current groundwater mound more accurately; piezometers will be installed in the coastal strip between the rivers and the sea to include areas such as the Twin Streams Educational Center and the Umlalazi Nature reserve; Geohydrological data, abstraction rates and water level measurements will be obtained for the water supply boreholes and the data analysed	C/O	ECO	Reduction in water quality due to mining Reduction in water quantity	As per surface and groundwater monitoring programmes section 6.7 and 6.6.	Consult with specialist where required
	B13	Model simulations will be re-run as monitoring data becomes available in order to ensure predictions are continuously updated in terms of estimated losses.	C/O/D	TRONOX	Hydrological models with up to date input	Model predictions updating	Consult with specialist where required
	B14	Installation of lysimeters at Hillendale (rehabilitated areas) and Fairbreeze in relevant areas in order to quantify the change in recharge pre-mining, during rehabilitation and post mining. After installation, monitoring data will be used to update the model simulations on an annual basis	P/C/O/D	TRONOX			
		See ref 67.					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Heleza Moya - Water management (surface and groundwater)							
Note: The mining of FBB and Heleza Moya has a very minor effect on the streamflow of the Amanzimnyama and negligible effect at the Siyaya estuary. No additional mitigation measures recommended.							
	-	See ref 59 and 77					
Minimise change in ground water quantity and quality		Monitoring of the Shepley borehole should continue as it is located close to the simulated zone of drawdown.	C/O/D	TRONOX	▪ Functional water management facilities ▪ Water quality within guidelines limits	As per surface monitoring programmes section 6.6.	Consult with specialist where required
		Review the monitoring program to considering changes in mining, infrastructure, and observed groundwater changes.	C/O/D	TRONOX	Water quality within guidelines limits	As per surface monitoring programmes section 6.6.	Consult with specialist where required
Minimise change of flow regime in Amanzimnyama and Siyaya Rivers		Implement stormwater management systems and footprint minimisation. Continued monitoring and annual updates of modelling and flow assessment	C/O	TRONOX	▪ Functional water management facilities ▪ Water quality within guidelines limits	As per surface monitoring programmes section 6.6.	Consult with specialist where required
Everglades - Water management (surface and groundwater)							
Minimise impacts to surface and groundwater	C4	Construct in dry season if possible.	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		Maintain separation of clean/dirty water.					
		Clean water cut-off drains and diversions to downstream catchment.					
		Rehabilitation of wetlands and buffer strips.					
		Most of the seepage will be through the sand wall which will not receive the poor water quality and will have under drains installed in them.					
		There are few users of groundwater that can be affected by the RSFs and RWDs.					
		Wetland water use is primarily fed by elevated lateral flow and will not be significantly impacted from groundwater contributions. Groundwater and surface monitoring is in place as an early warning system.					
		If the water quality of users in the vicinity of the RSF is impacted then an alternative supply will need to be provided.					
		The water quality monitoring plan must be updated to include monitoring of the ERSF facilities					
Aspect: Air Quality							
Detail description of aspect: Major sources of particulate emissions at for the proposed Fairbreeze project are the RSFs walls, the backfilled area, the topsoil stockpile and roads, mitigation will be used to reduce emissions from these sources. Mitigation such as vegetation, wind breaks are effective at source, these measures apart from binding the surface reduce surface wind speeds and as a consequence energy required for particulate suspension, once however particulates are airborne these measure may increase dust fallout by the same principle. Proposed mining operations will increase the dust levels from dust levels experienced currently, however it							

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
will not exceed current or future PM-10 air quality guidelines. The use of mitigation measures further reduces concentrations. Similarly, TSP concentrations will not exceed current or future PM-10 air quality guidelines. By far the biggest contributor to maximum concentrations is wind erosion, contributions by roads although significant to total emissions was small, actual emission for them were low in comparison to other sources. Significant emission rates were calculated for material transfer points, these will receive mitigation such as wind breaks (e.g. slatted fences).							
Air emissions will be managed to minimise nuisance effects and prevent health effects	81	The mine will develop an Air Pollution Control System (APCS) for FB prior to commencing with operations. This APCS must include detailed management plans, mitigation measures and monitoring and operational procedures developed for each significant source to ensure reductions in emissions. The APCS will be implemented and revised on an on-going basis. Air quality must be compared to pre-mining ambient levels and maintained with maximum allowable limits.	C	TRONOX	Mine with limited dust impacts Successful implementation of APCS	Monitoring as specified in air quality monitoring plan (Section 6.5) and any additional monitoring identified in environmental authorizations	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required
	82	The dirt road entering the Siyaya property will be upgraded and surfaced. A maximum speed limit of 40km/h will be observed. Dedicated entry and exit routes will be established to access each active mining area and infrastructure	C/O	TRONOX	Mine with limited dust impacts		
	83	The establishment of intermediate revegetation on the mined-out area will take place within 60 days of the removal of the mining disturbance. Intermediate revegetation will aim to establish at least 80% dust control efficiency	O/D	TRONOX			
	84	The rehabilitation (vegetation) or dust suppression measures of the backfilled area will take place as soon as the previously mined void has been filled. Dust from backfilled areas will be minimised by the establishment of vegetation, or dune coating (which can achieve higher efficiencies than vegetation in the short term). Vegetation cover, where relevant, will be maintained to a minimum dust control efficiency of 80%.	C/O/D	TRONOX			
	A6	Shade netting must be used on rehabilitated areas at FBCX to limit dust impacts.	C/O/D	TRONOX ECO			
	85	The routine monitoring of vegetation cover will be undertaken to determine the effectiveness of the rehabilitation protocols that have been employed. The establishment of vegetation will be monitored on a quarterly basis for 3 years or until monitoring indicates that a suitable, self- sustaining vegetation cover has been achieved.	O/D	ECO			
	86	The 100 m wide tree barrier between FB and Mtunzini (85-90 m of indigenous trees, and 10- 15 m of Eucalyptus, 5 m firebreak) will be maintained and supplemented to ensure its development and effectiveness. Where	C/O/D	ECO			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		necessary, powerlines and services will be re-routed so that the barrier remains intact					
	87	Additional windbreaks/visual barriers will be implemented as per the recommendations indicated in Figure 10-2 in previous BAR, 2012 (DC28/0036/2010). The tree barriers (85-90 m of indigenous trees, and 10-15 m of Eucalyptus, 5 m firebreak) will be planted within 6 months of mining approval. These barriers will be maintained and supplemented to ensure their development and effectiveness.	C/O	ECO			
	88	Dust suppression will be applied on unpaved roads to achieve a minimum control efficiency of 85% (using either water sprays or chemical suppressants).	C/O/D	ECO			
	89	Source based performance indicators for the mining operations will include the following: visible reductions in fugitive dust resulting from mining activities; dust fall immediately downwind over the N2 Highway to be <1200 mg/m²/day; and dust fall within the residential development of Mtunzini to be <600 mg/m2/day.	C/O/D	ECO			
	90	Source based performance indicators for sources of wind erosion will include vegetation cover up to 1m from the source (applicable to the RSFs and topsoil pile); vegetation density to be at least 80% on backfilled areas; and dust fall immediately downwind from the source to be < 1 200 mg/m²/day.	C/O/D	ECO	Mine with limited dust impacts Successful implementation of APCS	Monitoring as specified in air quality monitoring plan (Section 6.5) and any additional monitoring identified in environmental authorizations	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required.
	91	Compliance with the performance indicators will be assessed as part of an on-going monitoring programme.	C/O/D	ECO			
Heleza Moya – Air Quality							
Air emissions will be managed to minimise nuisance effects and prevent health effects	-	Plan construction activities in consultation with nearby residences. Information regarding construction activities should be provided to all nearby residences of the proposed site. Such information includes: Contact details of a responsible person on site should complaints arise to reduce emissions in a timely manner	P/C	TRONOX ECO	No complaints from surrounding residents/ landowners	An issues register must be kept on site to record any complaints lodged.	Complaints to be investigated and necessary actions executed. Air quality specialist to be consulted where necessary.
		Avoid dust generating works during the windiest conditions.	O	TRONOX ECO	Mine with limited dust impacts.	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident. Air quality specialist to be consulted where necessary.
		When working near a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible.	O	TRONOX ECO	▪ Mine with limited dust impacts	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
					▪ Successful implementation of APCS.		Air quality specialist to be consulted where necessary.
		Windbreaks in the form of shade cloth screens may be erected at exposed areas.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident. Air quality specialist to be consulted where necessary.
Minimise emissions from unpaved roads		Vehicles carrying loose aggregate should be covered with tarpaulins or sheets at all times.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident. Air quality specialist to be consulted where necessary.
		Prevention of material deposition onto haul roads through avoiding the overloading of truck loads resulting in spillages on the roads; preventing wind erosion from adjacent open areas; and ensure adequate storm water drainage to prevent water erosion of the roads.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
		Prioritising source reduction measures through the use of the most direct travel routes on site; undertaking backhauling; using conveyors instead of haul roads where possible; and using larger capacity trucks to minimise the number of trips.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
		Water bowser routes should align with the daily/weekly mine plan schedule and a maintenance programme should be in place to ensure continuous availability of the water bowsers.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
Minimise emissions from material handling activities		Modify or cease loading activities during dry and windy conditions.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident. Air quality specialist to be consulted where necessary.
		Avoid double handling of material where possible.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Minimise the drop height of the material from truck loads.	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
Minimise the erosion potential of stockpiles		Increase the height of existing berms at stockpiles, reducing the impact of winds on the stockpile	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.	Monitoring as specified in air quality monitoring plan and any additional monitoring identified in environmental authorizations.	Incident register will be kept to up to date and necessary actions executed based on incident. Air quality specialist to be consulted where necessary.
		Enclose temporary stockpiles with porous walls	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
		Small, temporary stockpiles can be covered with a porous sheet (preferably hessian).	O	TRONOX ECO	▪ Mine with limited dust impacts ▪ Successful implementation of APCS.		
Everglades - Air Quality							
Minimise dust impacts	C5	Adhere to the management measures regarding dust provided by the air quality specialist.	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		Continuation of air quality monitoring during the construction, operational and rehabilitation phase of the mine to determine the cumulative impact of the current and proposed operations. The current PM10 monitoring network should be serviced and regularly maintained to improve data recovery.					
		In addition to monitoring PM10, it is recommended that PM2.5 also be monitored as it is a priority pollutant in South Africa.					
		Maintain the existing dust management/mitigation measures on-site, as per the air quality management plan (AQ211). Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards.					
		An air emissions specialist should be appointed to monitor the impact of dust pollution on impacted properties. The contact details of such a specialist to be made available to the owners of impacted properties.					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		▪ The following key management measures will need to be implemented to manage concentrations of dust emissions within and around the project area: • Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust. Particular attention should be given to roads in close proximity to sensitive receptors. • Speed limits within the mine should be adhered to, for both treated haul roads and unpaved roads. For example, restriction of transport speed on roads without special covering up to 30 km/h. • Ensure that the moisture content of 5% is maintained at the RSF walls to lower dust emissions. • Portions of the RSFs and backfilled areas should be rehabilitated with vegetation as soon as possible to reduce windblown dust. • The re-vegetation of the site during the operational phase, as part of progressive rehabilitation should be monitored and action taken to address any areas where re-vegetation is ineffective • On windy days, or when fugitive dust can be observed leaving the site, additional application of water to the affected areas should be applied. • Soil disturbance activities should be stopped when wind speeds exceed 40 km/hr. • Wet suppression where feasible on materials handling activities.					

Aspect: Noise

Detail description of aspect: The results indicate that the SANS 10103 rural guideline of 35dB(A) at night and 45dB(A) during the day will not be exceeded at any of the identified noise sensitive areas except for the southernmost portion of Mtunzini, approximately 42dB(A). This will only occur when the mining operations are within 100m of the nearest residents. The ambient noise measurements taken in this vicinity by Acusolv vary from 39 to 47dB(A) at night. The SANS 10103 night time limit is 35 dB(A). If a tree line is erected around the mine property in this area and the mining operations utilize a “bottom–up bench technique”, where the water jet noise is screened by the bench, the night limit will not be exceeded. Furthermore, the combination day/night limit in SANS 10103 of 45dB(A) will not be exceeded. The worst case results indicate that the 45 dB(A) guideline limit is exceeded approximately 70m from the noise source. This can be used a general indication as the noise sources are constantly moving as the mining activities progress through the ore body.
The operation of the PWP will in all likelihood not affect the McMurray property as the SANS 10103 guideline is not predicted to be exceeded.
The noise from the PWP will have an impact within 640m as it will be higher than the ambient noise. Beyond this distance, the noise level will be below the ambient noise and will therefore have little impact. A similar assumption can be made regarding the McMurray home. If the ambient noise is at 40dB(A), the combined noise sources (worst case) during the construction phase would be at 47dB(A) and thus audible as the McMurray home is within 640m from the PWP. The noise duration would be transient at high levels during the construction period which will last 18 months. Mitigation measures have been proposed, and it is highly unlikely that all the construction noises will be operational at the same time.
Results have indicated that an expected 6.1% increase in the truck traffic compared to all other vehicles will occur on the N2 Highway. Calculations indicate that there will be an increase in operational traffic noise from 62.90 dB(A) to 63.04 dB(A). In the context of the existing noise and general scarcity of receptors along the N2 Highway, there will only be a slight increase in the road traffic noise.

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise noise impact during construction of the PWP	92	It is recommended that if pile operations are needed, noise attenuation measures such as an earth berm will be constructed. If impact piling is conducted, an additional survey will be conducted at night to determine the zone of influence as well as the actual efficacy of the attenuation measures. Mitigation measures from survey must be adhered to.	C	Contractor	No complaints from surrounding residents/ landowners	An issues register must be kept on site to record any complaints lodged.	Complaints to be investigated and necessary actions executed. Noise specialist to be consulted where necessary
	93	Construction staff will receive noise sensitivity training to ensure that the construction noise is kept at a minimum.	C	Contractor			
	94	During construction of the PWP, a noise specialist will be on site weekly during piling and other noisy activities. The noise specialist will conduct monitoring to ensure the portable noise attenuation screens are applied effectively. These can be placed as close as possible to the noise source such as mobile compressors, drilling rigs etc	C	Contractor ECO			
	95	Night-time activities will be limited to use of minimum required equipment.	C	Contractor			
	96	Monthly noise surveys will be conducted at sensitive receptors to determine the efficacy of noise attenuation measures. Noise levels will be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			
	97	The tree barriers at the PWP will be kept in place, and all additional noise barriers as advised by the noise specialist will be adhered to. See Also Ref 86 and 87 on tree barriers.	C	ECO			
	A7	Noise monitoring will be conducted bi-weekly at the PWP site during construction. Noise levels to be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			
Minimise noise disturbance during mining	A8	Noise monitoring will be conducted quarterly during the first year. Noise levels will be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			
	99	Mining of FBCX will advance northwards towards Mtunzini to ensure that the hydraulic monitors are normally not visible from the town (acoustically screened behind the bench) (as per FMCX ROD).	C	ECO EXARRO			
	100	Bulldozing operations at FBCX will be limited to daytime hours (as per FMCX ROD).	C/O/D	ECO	No complaints from surrounding residents/ landowners	An issues register must be kept on site to record any complaints lodged.	Complaints to be investigated and necessary actions executed. Noise specialist to be consulted where necessary
	101	The mine will avoid clustering of the hydraulic monitors when mining in the zone nearest to Mtunzini (as per FMCX ROD)	O	TRONOX			
		See ref 86 and 87 (tree barriers)	C/O	ECO			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Heleza Moya - Noise							
No additional mitigation measures are required.							
Everglades - Noise							
Minimise noise impacts	C6	If piling is required, it should only occur during the day to take advantage of unstable atmospheric conditions.	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		All operators should receive adequate training on equipment use.					
		All earth moving equipment to be regularly serviced					
		No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions.					
		Ambient noise monitoring to be conducted at least once at NSA 5 (**Refer to Everglades BAR, attached as Appendix 3**) when operations commence to verify the noise emissions meet the noise rating limit.					
		Build an acoustic enclosure around all pumps to contain noise emissions.					
		All vehicles to have silencers fitted and serviced regularly.					
Aspect: Archaeology							
Detail description of aspect: Many of the older buildings have historical middens and these would need to be monitored and sampled, if not partially excavated. Several buildings were surveyed but only one building, Highfields House, is of high significance and will not be damaged. Demolition is not recommended as the property is substantial; the house and associated building form a tight complex; the property has close proximity to the road and has been operating as a guest house for many years; the buildings are little altered and are in excellent condition and there is a strong topophilia suggested by the site, the house and its associated garden. It has been identified as an excellent example of Union Period architecture in Zululand. Studies have been undertaken to identify sites of archaeological or heritage significance. Where possible disturbance of these sites will be avoided, however if disturbance is unavoidable then the appropriate assessments and management measures will be applied at these sites. All earthworks for pipelines, roads and PWP pose potential risks to archaeological sites that may occur, but have not been identified						
Manage the loss of archaeological or cultural sites	102	A monthly monitoring program to record and assess potential sites/artefacts that were missed due to the current vegetation or that were below the surface at the time of the survey will be undertaken.	C/O	ECO	Successful implementation of monitoring programme	As per monitoring programme (Section 6.9)	Consult with archaeologist/ AMAFA KZN with regards to appropriate actions
	103	A destruction permit will be obtained for any identified sites and any other unrecorded sites that may be recorded during the monitoring program, in terms of the KwaZulu Natal Heritage Act of 1997.	C/O	TRONOX	Obtain all required permits	Annual review of permit conditions and expiry dates	
	104	All identified graves overlying planned mining areas will be relocated prior to the start of mining in that area. The appropriate social process will be followed	P/C	TRONOX ECO			
	104	Should any graves or heritage artefacts be unearthed during construction or mining then operations in that location all activities in that area will be suspended in order to allow investigation and appropriate action to be completed	C/O	ECO	All sites identified and reported to AMAFA	As per monitoring programme (Section 6.9)	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Manage changes in mean annual runoff	105	All buildings will be adequately recorded before demolition, in the form photographs and basic measurements, indicating the various additions. Middens would need sampling, and some compounds would need photographing and mapping, if no drawings available	C/O	TRONOX	Correct procedures followed into management of impact on historical buildings		
	106	A demolition permit will be obtained for any identified historical buildings from AMAFA KZN.	C/O	TRONOX			
	107	The Highfields House will be retained and not demolished, as per recommendation of historian.	C/O	TRONOX			
Heleza Moya - Archaeology							
The heritage resources found within Heleza Moya include old compounds, labourers houses and burial ground/graves.							
Manage the loss of archaeological or cultural sites	-	A permit in terms of section 37 of the KZN Amafa and Research Institute Act (5/2018) for the demolition of the structures. CM9 and CFS1 must be obtained from the Amafa Institute (Refer to Heritage Screening Report, Appendix C9 of BAR, 2023).	P/C	TRONOX ECO	All sites identified and reported to AMAFA	Implement Chance Find Procedure (Refer to Heritage Screening Report, Appendix C9 of BAR, 2023). As per monitoring programme (Section **6.9**)	Consult with archaeologist/ AMAFA KZN with regards to appropriate actions
		Prior to demolition of CM9, photograph remains and sample middens and CFS1	P/C	TRONOX ECO			
		Prior to demolition undertake the following: appoint specialist to undertake detailed investigation of the buildings detailed mapping of buildings take photographs	P/C	TRONOX ECO			
		Place 15m buffer around the outer perimeter of graves where no development and mine related activities should be allowed.	P/C	TRONOX ECO	Successful implementation of monitoring programme	As per monitoring programme (Section **6.9**)	Consult with archaeologist/ AMAFA KZN with regards to appropriate actions
Everglades - Archaeology							
Manage the loss of archaeological, cultural or palaeontological sites	C7	Review the chance find encounter in the previous Fairbreeze EMPr (**Ref 104**) to ensure it is sufficient in terms of Amafa's latest requirements	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
Aspect: Visual							
Detail description of aspect: The proposed Fairbreeze project would have a major negative impact on the aesthetics of the landscape and would add a new and foreign dimension (man-made disturbance) to the existing character of the landscape. The cause of this relates primarily to the removal of vegetation (plantations and cane fields) and the exposure of large areas of red soil that will contrast dramatically with the existing green hues and textures of the landscape. The construction of the RSFs, built from soil excavated from the dunes will also cause a major disturbance to the aesthetic environment and impact negatively on the sense of place of the area. The Murray property would be severely affected by the PWP, however due to the large trees at the homestead and the rows of mature blue gum trees along the western boundary of the PWP, these views would mostly be screened. To the west of the site, visibility and exposure are severe as the full extent of the MSRSF, the re-aligned power lines (although they already occur in the area so they do not constitute a new intervention) and portions of VSRSF, the ore bodies and the PWP would be visible in this general area. Project activities would be visible from the higher elevated sections of Mtunzini, primarily from south and						

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
west facing properties. The most southern, lower laying sections of the town would not be able to see the mining operations, due to topographic relief and the assumption that the proposed tree screen grows rapidly to maturity. However, even without the tree screen, the potential impact on views from the southern low laying areas of the town, is moderate, which show that the upper level of the PWP and the very early stages of mining at FBC (when the initial clearing of the land takes place) would be visible above the horizon line. However, if the mining occurs from south to north (i.e. the operation would always occur behind an earth embankment, the effect on views from Mtunzini would be of a lowering horizon line and the full mining operation would not be seen from these vantage points. Sections of the Umlalazi Nature Reserve will be impacted upon by the plant and when the higher dune elevations of ore bodies B, C and D are mined. From this perspective the view would be of a reducing horizon line as the mine is proposed to be excavated from the south to north, i.e. mining activities would take place behind a soil embankment. The viewshed analyses and visual intrusion simulations indicate that for the most part project activities will not have a great effect on views from within this sector. Only the top sections of the PWP, the MSRSF and the mining operation at the highest dune elevations would be visible. However, as stated before, the mining will occur behind an earth embankment and exposed red earth would not be visible. Also, when the view is from the beach areas, the existing topography and vegetation would block most views to project activities. Visual intrusion from this sector is predicted to be low as there would be a minor change in landscape characteristics over localized area resulting in a minor change to a few key views. The potential visual impact of the Fairbreeze project at night could be significant as the mining operation will take place over the full 24-hour period and due to the high elevation of the mineral deposits in the dunes, these lights (located at the edge of the excavation) would be visible from far off at night in the areas discussed above. Light sources at night, particularly poorly directed security flood lighting, influence the visual impact of proposed project by causing a general glow in the area and would be visible from significantly longer distances than any structural features during daylight hours. Exacerbating this situation is that the study area, for the most part, is devoid of major light sources (other than Mtunzini and Gingindlovu) and therefore, lights would stand out against the dark background.							
Minimise visual disturbance		See Ref 86 and 87 (tree barriers)	C/O/D	ECO	Effective screening of mining activities	Monitoring of condition and effectiveness of rehabilitation and visual screening	Enhance visual screening by consulting specialist/ landscape architect.
		See Ref 99 (mine northwards)	C/O/D	TRONOX			
		See Ref 9 and 10 (rehabilitate promptly)	C/O/D	TRONOX	Effective minimising visual impact		
		See Ref 4 (minimise disturbance)	C/O/D	TRONOX			
	108	Existing indigenous and plantation vegetation will be retained wherever possible (especially along the N2 and the western and eastern extremities of the site and along the western boundary of the plant site). This forms part of the tree barrier recommendations (See Also Ref 86 and 87 on tree barriers.)	C/O/D	TRONOX	Effective screening of mining activities		
	109	An ecological approach to rehabilitation measures, as opposed to a horticultural approach to landscaping will be adopted wherever possible. For example, communities of indigenous, preferable endemic, plants enhance biodiversity and blend well with existing vegetation. A registered landscape architect (SACLAP) will be consulted for this purpose. This approach could be considered along the N2 in areas where plantations will not necessarily be grown. If this is not possible then Eucalyptus will be planted in dense rows to create an effective tree screen along the N2.	C/O/D	ECO			
	110	All existing vegetation between the mining site and all public roads must be retained where possible. See Also Ref 86 and 87 on tree barriers	C/O	ECO			
	111	The worked-out area behind the mining face will be screened using shrub planting, where effective.	O	ECO			
	112	The RSF walls will have slopes no steeper than 1:2 and will be vegetated. The walls will be vegetated within 60 days after shaping and removal of disturbing factors. This will be a continuous process as the wall raising advances.	C/O/D	TRONOX	Revegetation within timeframes	Monitoring of the growth on slopes	Consult with specialist to assist with optimising growth

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	113	Light pollution will be kept to a minimum. Security and flood lighting to only be used where necessary and will be directed downwards so as to avoid illuminating the sky. i.e., away from Mtunzini and residences west of the site and also away from the Murray property	C/O	TRONOX ECO	The effective containment of light from facility fixtures	Monitoring of the condition and effectiveness of light fixtures	Realignment of light fixtures to reduce lighting impact
	114	Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the complex – this is especially relevant where the edge of the proposed mining is exposed to residential properties.	C/O	ECO			
	115	Avoid high pole top security lighting along the periphery of the site or at elevated locations.	C/O	ECO			
	116	Use security lighting at the periphery of the site that is activated by movement and are not permanently kept on.	C/O/D	ECO			
Heleza Moya - Visual							
Note: The existing topography and existing tree screens (evergreen eucalyptus, 15 m high and 8 m wide) creates an effective screen which will block views to Heleza Moya. Therefore, no additional mitigation measures are recommended.							
Everglades - Visual							
Minimise visual impacts	C8	Dam walls are to be planted with suitable groundcover to stabilise soil as soon as is practical	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
		Storm water and resulting soil erosion risk to be designed out of the proposed development option.					
		Tronox undertakes to work with farmers to plant tree screens wherever this is deemed desirable, either to screen views or to help mitigate possible wind and dust damage to crops, as has been done to date.					
		Reverse hooters on all vehicles operating on site to be replaced with bird calls.					
		Night operations to be minimised.					
		Dam land and mined land will be rehabilitated for conservation.					
		When mining operations cease, gum trees will initially be planted to stabilise soils and then harvested, destroyed and replaced with locally indigenous coastal grassland vegetation.					
		Mine vehicles are to avoid traversing private farmland – if there is a need, permission is to be sought from the landowner.					
		Undertake gradual clearing of land/vegetation.					
		Undertake progressive rehabilitation and planting of suitable vegetation of the side walls of the structures.					

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Plant vegetation such as trees and shrubs on periphery of the households and villages to the south west and west of the ERSF and RWDs to provide a screen/buffer of direct views towards these structures.					
		Point lighting inwards and not to villages to avoid nocturnal impacts.					
		Point lighting away from nearest households and villages.					
		Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine.					
		Where possible, harvest plants from the VRWD area and preserve in the nursery for rehabilitation purposes, where practical.					
		Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan.					
		Where possible, rehabilitate with plants harvested from the area or similar.					
		Remove sources of nocturnal lighting where possible.					
Aspect: Social and Socio-economic **Detail description of aspect:** The major impact of the construction and operational activities of the proposed mining at the Fairbreeze mining sites on the tourism industry in Mtunzini is to negatively affect the sense of place of the tourism destination. Local residents and the uMlalazi Tourism Association fear that the mining operations at Fairbreeze will discourage tourists from visiting and staying in the town. The socio-economic specialist study has specifically assessed the potential impacts relating to the mechanisms through which these possible impacts on the local tourism industry can be transmitted and assesses the significance of these impacts. The Fairbreeze operations will employ a contractor for the construction phase of the project that will be responsible for the recruitment and management of temporary construction workers. It is expected that approximately 1000 temporary employment opportunities will be generated during this phase. In addition, a substantial number of indirect employment opportunities will be created in the broader economy during the construction phase.							
Minimise changes in the demographics of the area	117	Where possible TRONOX will employ people from district 28 (uThungulu District Municipality). The TRONOX policy is to employ at least 60% of the people from the Region 28 and the remainder of the workforce from anywhere. This was approved by the HR&R Board Committee and agreed to with the current Community Forum, which represents Region 28. The Community Forum consists of representatives from Amakhosi and Councillors. People from outside this area will only be employed if the necessary skills required are not available in the local area.	C/O/D	TRONOX	Employ as far as possible people from local district. A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities. Mine with limited dust impacts	The number of people employed from local communities versus other areas	Consultation with Community Forum in order to improve employment from local district
	118	If suitably trained employees are not available from within the surrounding communities, TRONOX will, in accordance with the TRONOX Social and Labour Plan, introduce training programmes focused on raising the skill levels of the local residents.	C/O/D	TRONOX			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	119	TRONOX will not allow establishment of informal settlements on its land and leased land (in consultation with Mondi)	C/O/D	TRONOX		No informal settlements on mining area	
Minimise increase in crime arising from mining construction activities	120	The northern boundary of the mine will be fenced, and the fence regularly checked and maintained	C/O/D	TRONOX		Fence in good condition	Fixing of the fence
	121	To discourage theft, loitering and public disturbances due to the influence of the mine, there will be no direct accessible link between FBCX and Mtunzini	C/O/D	TRONOX		Number of people loitering on site	Improve security access to mining area
	122	It is recommended that there be increased security assigned to the mining areas with controlled access and maintained fences around the proposed mine construction areas.	C/O/D	TRONOX		Number of security issues	
Maximise possible contributions to the economy	123	The mine procurement policy will encourage the establishment of sustainable businesses from which goods are obtained, in accordance with the targets as set out in the TRONOX Social and Labour Plan.	C/O/D	TRONOX		Number of sustainable businesses established	Consultation with Community Forum to improve opportunities for local district
	124	Every attempt will be made to ensure that the mine is operated in a responsible manner (see all the commitments above) to ensure that tourism and eco-tourism will not suffer.	C/O/D	TRONOX		Implementation of grievance procedure Regular review of complaints lodged	Review grievances lodged to limit occurrence
	125	TRONOX will, where possible, support local accommodation establishments when hosting visitors from out of town.	C/O/D	TRONOX		Monitoring of local accommodation used	Review of accommodation booking principles
Ensuring the continuation of the Twinstreams Environmental Education Centre	126	Tree buffers between Twinstreams and FBC-ore body will be retained. See Also Ref 86 and 87 on tree barriers.	C/O/D	TRONOX		Monitoring as specified in air quality monitoring plan (**Air Quality monitoring programme**) and any additional monitoring identified in environmental authorisations	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist where required
	127	Pre-mining occupancy statistics for Twinstreams must be obtained and compared to occupancy statistics during mining operations. Significant declines in these figures may necessitate that TRONOX provide compensation.	P	TRONOX		Obtain pre-mining statistics of Twinstreams and Umlalazi Nature Reserve, Xaxaza Implementation of grievance procedure Regular review of complaints lodged	Review statistics and enter into discussions with affected party Consult with Local Municipality and groups to review needs at existing eco-tourism facilities
	128	As a proactive measure, to limit decline at the Centre, TRONOX should financially assist with investigating alternatives e.g., identify other suitable alternate sites which could be developed for Twinstreams and linked with the current site.	P/C/O	TRONOX			
Supporting eco-tourism development in Mtunzini as a way of offsetting any losses due to changes in „sense of place	129	TRONOX will contribute financially to enhance the existing eco-tourism facilities in order to offset any loss of sense of place, e.g., the upgrade of the deteriorating Raphia Palm boardwalk, the extension of the Mtunzini beach boardwalk, upgrade of the dirt roads in the uMlalazi Nature Reserve, development of bird hides at suitable sites within Mtunzini	P/C	TRONOX	Employ as far as possible people from local district A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict		

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Encouraging educational tourism at the Fairbreeze site	130	TRONOX will offer regular educational tours to school and other interest groups to describe the mining process	C/O/D	TRONOX	Minimise potential for conflict with surrounding communities. Mine with limited dust impacts Equal opportunities for service providers	Statistics of number of educational groups	Provide additional opportunities for educational groups to attend educational tour
Changes in physical infrastructure, e g. roads	131	Heavy goods vehicles related to TRONOX FB mine will not be allowed to pass through Mtunzini. TRONOX have proposed to construct an off-ramp onto Bridge 4; which would mean that the mine will not have use the Ring Road unless special circumstances and adjacent landowners and existing road users informed.	C/O/D	TRONOX		Implementation of grievance procedure Regular review of complaints lodged	Review grievances lodged in order to limit occurrence
	132	During construction of this off-ramp, temporary usage of existing internal roads will be communicated to adjacent landowners and existing road users.	C	TRONOX			
Minimise risk of an increase in social pathologies and diseases	133	To combat a rise in the incidence of social diseases, education and awareness campaigns will be held with all mine employees stressing the precautionary measures that will be taken to avoid such diseases.	C/O/D	TRONOX		Statistics of incidence of social diseases	Increase awareness campaigns on required topics
Minimise impact on adjacent farmers and landowners	134	Drainage streams on neighbouring farms and boreholes used for irrigation will be monitored to ensure that water quality is maintained. If farm drainage streams require additional filtering or maintenance due to mining impacts the landowners will be compensated	C/O	TRONOX		Implementation of water quality monitoring programmes	Review grievances lodged in order to limit occurrence
	135	Communicate rehabilitation process and plans for Fairbreeze Mine to the general public, and provide regular updates on this matter	P/C/O/D	TRONOX		Implementation of grievance procedure Regular review of complaints lodged	
	136	Twin Streams Nursery or other initiatives with local participation will be given an opportunity to provide the services and plants required for rehabilitation or landscaping.	C/O	TRONOX		Review of service providers for various services	Review appointment processes for provision of various services
Devaluation of property adjacent to the FB site	137	The study area's current economic success is linked to the natural environment. Every attempt will be made by TRONOX to ensure that the mine is operated in a responsible manner to ensure that tourism and eco-tourism will not suffer. This will ensure the economic sustainability of the study area once the mine has closed. It will also yield benefits such as a smooth and conflict free relationship with the residents of the study area	C/O/D	TRONOX		Successful rehabilitation and Rehabilitation Research Programme recommendations	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	138	The mining method and mine rehabilitation have the power to influence the area long after the mine has closed. Rehabilitation will thus be conducted in such a manner that it will have a positive impact upon land value and hence upon sustainable post-mining land use. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	C/O	TRONOX	Rehabilitation successful to enable specified post land use	Ongoing inspection of rehabilitation/closure procedures	

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	139	Gerrard Wessel's (Grant McMurray or John Murray) and Jim Parker's farm property prices will be affected by the mining at sites A, B, D and / or the construction of the RSF. A non- compulsory pre-mining market related offer should be made for the purchase of these two properties. These properties should be included as a buffer between the mining operations and other neighbouring properties	P/C	TRONOX	A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities	Ongoing evaluation of monitoring data to evaluate impact of mine Implementation of grievance procedure Regular review of complaints lodged. Implementation of all required monitoring programmes	Discussions with adjacent owners Review of adequacy of monitoring programmes Review of adequacy of complaints procedure
	140	If Jim Parker does not accept the market related offer for his property made by TRONOX and continues to farm geraniums for essential oils and subsequently loses his organic accreditation due to mining activities, he must be compensated for the loss in value of his harvested crop, until organic accreditation is regained.	P/C	TRONOX			
	141	If Jim Parker accepts the market related offer for his property made by TRONOX, the essential oils processing plant (distillery) on his property needs to continue to operate throughout the lifespan of the mining activities to preserve the livelihoods of the 50 farmers who currently supply product to the plant for processing. It will be the responsibility of Jim Parker to have a succession and operational plan in place for the future on-going running of the essential oils processing plant.	P/C	TRONOX			
Maintain positive and transparent relationships with TRONOX"s stakeholders	142	It is proposed that a Siyaya monitoring forum be established with a key focus on sustainable land use and management within the Siyaya catchment. The forum will meet quarterly to discuss progress, monitoring and issues.	P/C/O/D	TRONOX	Successful implementation of the Rehabilitation programme and offset plan		
	143	TRONOX will maintain communication channels with I&APs through the community forums, e.g. Greater Mhlathuze Environmental Forum (quarterly); Community Forum (quarterly); Employee Forum (quarterly); Mtunzini Environmental Oversite Comittee represented by the Mtunzini Residents' Association (quarterly); Regulatory authority meeting (quarterly); Amakhosi information meeting (quarterly); and Councillors information meeting (quarterly).	C/O/D	TRONOX	A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities		
	144	The forum information sessions will initially be aimed at construction activities, and as mining commences, will gradually change over to reflect the status of operations. Forums will be maintained until mine closure.	C/O/D	TRONOX			
	145	Communicate rehabilitation process and plans for Hillendale Mine and Fairbreeze Mine to the general public.	C/O/D	TRONOX			
	146	Inform the general public of the TRONOX comments and complaints procedure and contact details. Ensure annual notification of the facility.	C/O/D	TRONOX			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	B16	After lodging a compliant, the ECO must inform interested and affected parties that they are allowed to contact the EA to discuss their complaints should they feel their complaint is not being resolved through the normal complaints management procedures followed by the ECO.		TRONOX			
Provide stakeholders with relevant information	147	All information as described in the relevant sections will be made available to interested and affected parties via the communication channels outlined in Ref 143.	C/O/D	TRONOX			
	148	Authorities will be provided with information as specified in the relevant legislation and authorisations.	C/O/D/P	TRONOX			
Put in place a fair and transparent process with regards to recruitment and management of labour.	B17	As committed to communities, TRONOX will without compromising job-specific skills requirements, safety, quality and meeting of construction timeframes, define a recruitment strategy based on principles, such as including a fair and accessible process of advertising employment opportunities, skills development and training opportunities, creation of opportunities for local entrepreneurs.	P/O/D	TRONOX	No community discontentment and unrest due to perceived unfair recruitment procedures	The number of people employed from local communities versus other areas	Consultation with Community Forum in order to improve employment from local district
Provide information to relevant authorities as required	161	Applications for registration of dams with a safety risk will be submitted to DWA.	C	TRONOX	Dam registered with DWA	Legal review of all conditions and permits	Register dam with DWA
	162	The water use license applications will be amended or applied for as required.	C	TRONOX	DWA approval where required		Conduct necessary actions to obtain required approvals. Conduct rectifying actions based on outcome of the audit/legal review
	156	Performance assessments relating to the contents of Section 6 of BAR (**Appendix 2**) will be conducted annually by an Independent Environmental Auditor	C/O	TRONOX	Adhere to conditions of permits	Annual Independent Auditing Legal review of all conditions and permits	
	B18	All conditions of all applicable licenses, permits and authorisations related to the Fairbreeze Project will be adhered to.	C/O/D	TRONOX			
Limit nuisance impacts due to mining and related activities on site	165	Good „housekeeping" (keeping the site tidy and neat) is essential throughout all phases of the project. Adequate toilet and proper sanitation facilities shall be provided at all work areas, approximately one toilet per 15 staff members. Sewerage sludge removed from chemical toilets and conservancy tanks (by a „honey sucker") will be disposed of at a licensed facility for such waste.	C/O/D	TRONOX	Provision of all appropriate waste manifests for all waste streams Internal site audits ensuring that waste segregation, recycling and reuse is applied appropriately	▪ Regular review of complaints lodged ▪ Observation and execution of waste management practices throughout all phases ▪ Waste collection to be monitored on regular basis ▪ Relevant waste documentation completed	Discussions with adjacent owners Review of adequacy of monitoring programmes Review of adequacy of complaints procedure
Heleza Moya – Social and socio-economic							
Note: The extension of the Fairbreeze Mine will have minimal impacts on the surrounding communities and environment because the proposed portion of land is already within an existing mining area, and the nearest sensitive receptor is 5.5 km away. Therefore, no additional mitigation measures are recommended.							
Everglades – Social and socio-economic							

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise negative socio-economic impacts	C9	Any staff retrenched at Everglades Farm as a result of cessation of agricultural activity at the farm should be invited to apply for jobs for which they are qualified or trainable, as suitable vacancies arise at Fairbreeze Mine	P/C/O/D	TRONOX	Monitoring and auditing results	▪ Update existing EMPr and monitoring plans to include Everglades. ▪ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
Aspect: Engineering design recommendations							
Maintain the RSFs to minimise the risk of failure	149	The RSFs will be regularly inspected by suitably qualified consultant engineers who will devise a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits	C/O/D/P	TRONOX	Implement a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits.	Conduct audit as per management principles	Review outcome of management principles and audits on stability of the dam
	150	The RSFs will be constructed and maintained in accordance with the design criteria specified by the detailed design engineers and in accordance with the Code of Practice required in terms of the Mine Health and Safety Act.	C/O	TRONOX			
	151	Good housekeeping will be maintained to minimise the risk of pollution. The mine will operate in such a way as to prevent uncontrolled releases of potentially polluting material.	C/O/D	TRONOX	Development and implementation of contamination clean-up plan to ensure that any spills are cleared as soon as possible and to ensure disposal of spilt material in an appropriate way.	Ongoing monitoring of clean up actions Annual Independent Auditing Legal review of all conditions and permits	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	152	The mine will ensure that relevant equipment is well maintained and fully operational. Development and implementation of equipment maintenance schedule.	C/O/D	TRONOX	All equipment to be maintained in good working order No complaints from adjacent communities	As identified in maintenance schedule	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	153	Non-mining waste materials will be classified according to the Minimum Requirements for the handling and disposal of waste as published by DWA. Classified waste materials will be placed in containers specifically identified for this purpose, and disposed in appropriate disposal sites. Hydrocarbons in particular will be disposed in a licensed H:h disposal site. All spills will be treated as per the approved TRONOX spills procedure	C/O	TRONOX	No complaints from adjacent communities	As per minimum requirements of waste disposal. As per spills procedure Internal site audits	
	154	The approved TRONOX Emergency Procedure will be applied during all phases of mining	C/O/D	TRONOX			
	155	All employees and contractors will receive basic training in environmental awareness as well as the applicable sections of the Emergency Procedure. The environmental awareness training will include reference to the following: identified environmental risks in the workplace;	C/O	TRONOX	Fast and affective remediation of conflict. Minimise potential for conflict with surrounding communities. Mine with	Statistics of incidence reports	Increase awareness campaigns on required topics

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		Environmental Management Plans related to the specific risks; provisions and commitments contained in Section 5; incident identification and reporting.			limited impacts on surrounding communities		
	157	The mine will carry out regular risk assessments to ensure that potentially hazardous materials are appropriately stored, labelled and handled.	C/O	TRONOX	All equipment to be maintained in good working order No complaints from adjacent communities	As per minimum requirements of waste disposal As per spills procedure	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	158	To minimise the risk of pollution arising from the use of mobile equipment, drivers (both mine and contractors) will be trained on how to deal with accidents involving hydrocarbons and other potential contaminants. Emergency action plans will be drawn up to deal with serious spills on the road in order to minimise the impact on water resources.	C/O/D	TRONOX			
Maintain the RWD to minimise the risk of failure and maintain operating standards	159	The RWD will be constructed and maintained in accordance with the design criteria specified by the detailed design engineers and in accordance with the Code of Practice required in terms of the Mine Health and Safety Act.	C/O	TRONOX	Implement a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits. No water discharged below required water quality levels from the RWD	Conduct audit as per management principles Annual Independent Auditing Legal review of all conditions and permits Monitoring of the discharge from the RWD and clean water diversion trenches will be conducted on a monthly basis.	Review outcome of management principles and audits of the RWD Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	160	The RWD will be regularly inspected by suitably qualified consultant engineers who will devise a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits	C/O/D/P	TRONOX			
SANRAL management principles for road construction and related issues	163	SANRAL has a generic EMP which will be adhered to at all times by the Contractor undertaking the on and off ramp construction. The on-off ramp construction is considered part of the Fairbreeze project and will thus adhere to all other TRONOX requirements, as well as all mitigation measures contained in the BAR.	P/C/O/D	TRONOX	Conformance to all EMP conditions	As per EMP conditions	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
ESKOM management principles of power lines and related issues, e.g. maintenance of servitude area	164	ESKOM has a generic EMP and protocol document, e.g., AMAFA requirements, vegetation removal procedure, which will need to be adhered to at all times by the Contractor undertaking the powerline deviation. The ESKOM powerline re-alignment is considered part of the Fairbreeze project and will thus adhere to all other TRONOX requirements, as well as all mitigation measures contained in the BAR.	C/O/D	TRONOX	Conformance to all EMP conditions	As per EMP conditions	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
Heleza Moya - Engineering design recommendations							
No additional mitigation measures recommended							
Everglades - Engineering design recommendations / Further investigation / Monitoring							
All requirements in terms of R632 must be complied with.	C10	The design of the ERSF must be followed implicitly throughout the construction and operation thereof, and any deviations from the design must be approved by the delegated official within DMRE and the EMPr amended accordingly.	P/C/O/D	TRONOX	Monitoring and auditing results for Everglades	▪ Update existing EMPr and monitoring plans to include Everglades.	Consult with engineer / specialist where required

<table>
<tr><th>Impact Management Outcome</th><th>Ref</th><th>Mitigation action</th><th>Time period for impacts</th><th>Responsible party</th><th>Performance indicator</th><th>Monitoring</th><th>Remedying action</th></tr>
<tr><td></td><td></td><td>As part of the monitoring system, measurements of all residues transported to the site and of all surplus water removed from the site are to be recorded.
■ In the design of a monitoring system for the ERSF, consideration must be given to-
• baseline and background conditions with regard to air, surface and groundwater quality.
• the air, surface and groundwater quality objectives.
• residue characteristics.
• the degree and nature of residue containment.
• the receiving environment and specifically the climatic, local geological, hydrogeological and geochemical conditions.
• potential migration pathways and potential impacts of leachate.
• the location of monitoring points and the monitoring protocols.
• the reporting frequency and procedures.</td><td></td><td></td><td></td><td>■ Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset</td><td></td></tr>
<tr><td colspan="8">Further Investigation</td></tr>
<tr><td colspan="8">Detail description: These items require further monitoring and then updating of the applicable models and databases</td></tr>
<tr><td rowspan="3">Undertake further investigations/actions prior to the commencement of mining to confirm predictions made in this report</td><td>166</td><td>Detailed engineering design for the final mitigation plans for the impacts identified during the environmental impact assessment process.</td><td>P/C/O</td><td>TRONOX</td><td rowspan="3">Monitoring as per specialist study recommendations and monitoring programmes
Monitoring as per environmental authorisations and permits
Relevant forums and government departments up to date with monitoring data</td><td rowspan="3">As per schedules and scope of monitoring programmes</td><td rowspan="3">Consult with applicable specialist/government department if non-compliant</td></tr>
<tr><td>A9</td><td>Groundwater and surface water models to be updated with additional DWA and TRONOX monitoring data on an annual basis, or as specified by DWA.</td><td>P/C/O/D</td><td>TRONOX</td></tr>
<tr><td>167</td><td>Adhere to all specialist study recommendations and monitoring programmes as per Section 6 of the EMP or conditions contanined in the project authrosations. Below is included a summary table.
<table>
<tr><th>Item</th><th>Points</th><th>Frequency & Duration</th></tr>
<tr><td>Surface water quality</td><td>Watercourses in all affected catchments</td><td>Quarterly for life of mine</td></tr>
<tr><td>Water course flow</td><td>At weirs in Siyaya and Amanzimnyama Rivers</td><td>Monthly for life of mine</td></tr>
</table></td><td>P/C/O/D</td><td>ECO</td></tr>
</table>

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
		<table><tr><td>Ground water quality and levels</td><td>Boreholes. See **Figure 6-4**</td><td>Quarterly for life of mine</td></tr><tr><td>Water management structures</td><td>Drains, berms, dams, channels, sumps</td><td>Quarterly and after heavy rainfall events</td></tr><tr><td>Aquatic Biomonitoring</td><td>Proposed monitoring localities</td><td>Quarterly for life of mine</td></tr><tr><td>Dust buckets</td><td>Dust fallout network compromising of two twin directional dust buckets and installed single buckets</td><td>Monthly for life of mine</td></tr><tr><td>Noise monitoring</td><td>At sensitive receptors</td><td>Weekly during PWP construction Quarterly during mining</td></tr><tr><td>Tree barriers</td><td>All planted tree barriers</td><td>Quarterly for 3 years after planting, thereafter bi-annually until closure</td></tr><tr><td>Vegetation establishment</td><td>All revegetated sites</td><td>Quarterly for 3 years after planting, thereafter bi-annually until closure</td></tr></table>					
Undertake further investigations/actions during mining to confirm/improve predictions made in this report.	A10	The groundwater model will be updated prior to mining in order to ensure that the conservative estimates are refined, and correct management applied. The groundwater model must be updated when significant new information is derived from any of the monitoring programmes, or at least every year. Information derived from the model must be incorporated into future management and monitoring	P/C/O/D	TRONOX			

Impact Management Outcome	Ref	Mitigation action	Time period for impacts	Responsible party	Performance indicator	Monitoring	Remedying action
	A11	The surface water model will be updated when significant new information is derived from any of the monitoring programmes, or at least every year. Information derived from the model must be incorporated into future management and monitoring.	P/C/O/D	TRONOX			
	A12	Tronox will establish, drive and fund a Rehabilitation Research Programme. The Rehabilitation Research Programme will investigate all aspects concerning the rehabilitation of, and vegetation growth on, areas disturbed during mining at the Fairbreeze Mine. The programme must be multi-disciplinary, with the objective of producing objective and scientific information to guide and continuously improve the rehabilitation of areas affected by mining	P/C/O/D	TRONOX			
	A13	Tronox will establish, drive and fund the Siyaya Biodiversity Forum. The Siyaya Biodiversity Forum will be responsible for the development, implementation and management of the biodiversity offset area until the area is formally transferred to a conservation agency	P/C/O/D	TRONOX			
	A14	The mining of FBD may not be undertaken until such time as TRONOX has concluded monitoring and studies necessary to demonstrate to the competent authority the low significance of mining on the dune cordon wetlands. Such studies must also present the management, mitigation and rehabilitation requirements of mined areas which potentially impact on the dune cordon wetlands.	P/C/O/D	TRONOX	No mining of FBD orebody	Performance assessments as per legal requirements	Discussions with relevant government authorities
	168	Update TRONOX complaints procedure to include Fairbreeze Mine. Complaints procedure details provided to IA&PS prior to start of construction, and updated as required	P/C/O/D	TRONOX ECO	Complaints captured in time, and necessary response actioned. Feedback provided to complainant within timeframe specified in procedure	Ongoing evaluation of monitoring data to evaluate impact of mine Implementation of grievance procedure Regular review of complaints lodged. Implementation of all required monitoring programmes	Review of adequacy of monitoring programmes Review of adequacy of complaints procedure Consult with specialists

6 ENVIRONMENTAL MONITORING PROGRAMME

The monitoring programmes detailed below, and referred to in Table 5-2, are part of the commitments made previously under the Basic Assessment Report and EMPr that was compiled for Fairbreeze Mine in 2012 (DC28/0036/2020). These were compiled by specialists during the impact assessment phase of the Fairbreeze Mine project and are deemed adequate to mitigate impacts associated with the extension into Heleza Moya.

6.1 BIODIVERSITY MONITORING PROGRAMME

- A biodiversity monitoring programme within the natural areas. This must include flora, all assessed faunal taxa within this study as well as wetland functionality. The data and summary of the results must be submitted to KZNW, DAEARD and DWA on a bi-annual basis to ensure they are kept informed.
- An alien invasive plant monitoring programme must be established and must coincide with the monitoring of indigenous forests and riparian zones to establish whether mining activities are contributing to the spread of alien invasive species;
- Surface water runoff into riparian zones must be monitored and moderated in order not to increase or decrease the flow to such an extent that it will affect the vegetation of these riparian zones.
- Siltation in the riparian zones must be monitored at various points within each of the riparian zones;
- The monitoring of the indigenous forests and wetlands must be used in order to determine proactive management strategies designed to maintain the biodiversity and biological integrity of these areas.

Prior to closure, the following will be conducted:

- A post-mining monitoring plan will be included to evaluate the rehabilitation success based on avifaunal successional patterns and trends.

6.2 MANAGEMENT OF BIODIVERSITY BUFFER ZONES

Mining of the ore bodies will remain outside the wetlands and sensitive areas. Buffer zones have been specified around all sensitive areas (see Figure 6-1) and no disturbances will be permitted inside of these areas. The management of buffer zones will be undertaken as follows:

- Buffer zones needs to be clearly demarcated in the field prior to construction activities commencing so that there can be dispute or uncertainty of buffer location;
- Compliance with the buffers needs to be managed and enforced by environmental management on the mine;
- Any infringement into buffer zones needs to be strictly evaluated, approved and monitored by environmental management on the mine;
- In cases where temporary impacts within the buffer zone are unavoidable immediate remediation needs to be implemented upon completion of activities;

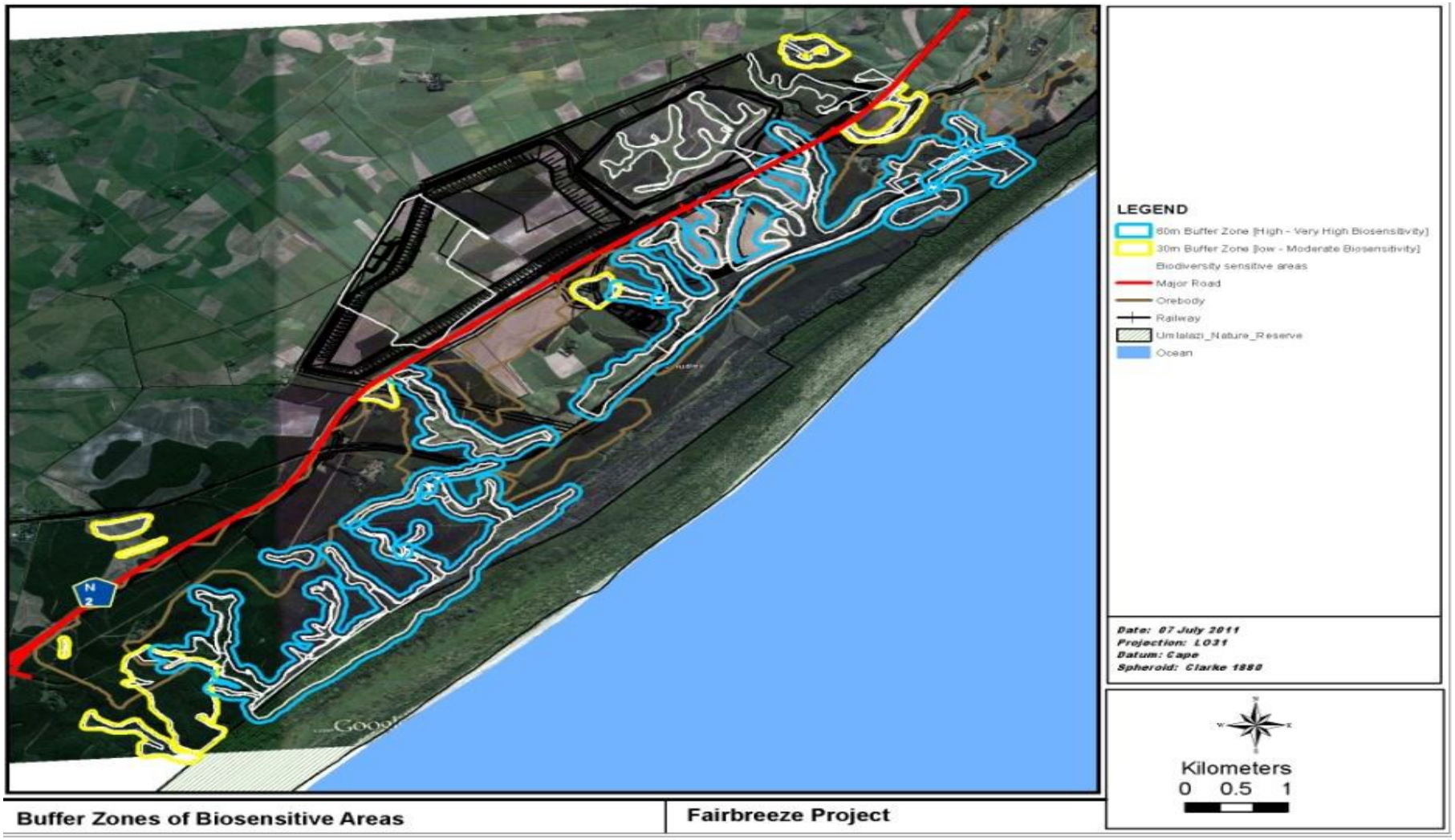


Figure 6-1 - Buffer zones around sensitive biodiversity areas (Adam, 2012)

- Effectiveness of buffers needs to be monitored throughout the life of the mine. This will allow remedial actions to be taken if recommended buffer zones are found to be inadequate;
- Any non-compliance with the above conditions will be regarded as a non-compliance in terms of mining license conditions.

6.2.1 HELEZA MOYA

The area where flora SCC were recorded in or immediately adjacent to the study area during the field survey (February 2023), including *Raphia australis* and *Cassipourea gummiflua var. verticillata*, which are both listed as Vulnerable on South Africa's regional Red List should be protected to ensure that no further negative impact will be sustained on the extent and condition of habitats supporting this species as a result of mining at Heleza Moya.

Most of the study area is transformed and classified as modified habitat, with a limited patch of Swamp Forest in the eastern corner as well as small patches of semi-natural and regenerating Secondary Grassland and Secondary Bush-clumps and Thickets are also present.

It is therefore recommended that the Swamp Forest is demarcated as a no-go area.

6.3 AQUATIC ECOLOGY MONITORING PROGRAMME

The application of a selection of the recommended biomonitoring indices (SA River Health Programme) in this regard is recommended as follows;

- Monthly flow measurements on the Siyaya, Amanzimnyama, Sabeka and Nyezane rivers
- Water quality – monthly (surface and groundwater monitoring)
- Freshwater macro invertebrates (SASS) – 4 times a year (quarterly) with habitat assessment
- Fish sampling for calculation of the Fish Assemblage Integrity Index (FAII) – once every 6 months
- Index of Habitat Integrity – comprehensive survey once a year
- Estuarine physico-chemical conditions and macro benthic invertebrates surveys (quarterly) to assess the response of the downstream Siyaya estuary to flow changes, activities or potential polluting industries
- Develop a spill response and clean up protocol.
- Monitor water quality and levels of down gradient groundwater users.
- The classification and determination of water resources (currently being undertaken by the Department of Water and Sanitation, due to be complete in May 2024) must be taken into account in the updates of both the hydrology assessment and estuarine assessment.
- Assessment of the impacts of the flow regime perturbations against the Reserve Determination, when this becomes available.
- Adoption of stable isotopes analysis to enhance the simulation of surface water and groundwater interaction.
- Updating the current numerical groundwater model with the current geological model.
- Review the monitoring program to considering changes in mining, infrastructure, and observed groundwater changes.

6.4 NOISE MONITORING PROGRAMME

- During construction of the PWP, the noise specialist will be on site on a bi-weekly basis to assess the noise impacts and ensure moveable noise screen is being applied optimally.
- During operations noise measurements will be undertaken at sensitive receptors on a monthly basis.

6.5 AIR QUALITY MONITORING PROGRAMME

An AQMP for the proposed Fairbreeze mine was established. The mine proposed the following intervention strategies.

- Monthly monitoring of Dust fallout network comprising of two twin directional dust buckets and single buckets (Table 6-1 and Figure 6-2).
- Quarterly assessment and maintenance of all planted windbreaks.

Figure 6-2 - Tree screens required for visual, noise and dust barriers (Adam, 2012)

The following proposed monitoring program would address the shortfalls of current situation. Table 6-1. Monitoring program for sensitive receptors

Table 6-1 - Monitoring program for sensitive receptors

Receptor	PM-10		Dust fallout	
	Method	Frequency	Method	Frequency
Mtunzini	E-sampler	Continuous	Dust buckets	Continuous
Brig Parker Homestead	E-sampler	Continuous	Dust buckets	Continuous
McMurray Organic Farm	E-sampler	Continuous	Dust buckets	Continuous
Twinstreams nursery and educational centre	E-sampler	Continuous	Dust buckets	Continuous

6.6 SURFACE WATER MONITORING PROGRAMME

- 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. A long term monitoring schedule needs to be designed and strictly adhered to;
- Monitoring points will be rationalised to avoid duplication at certain points and the nomenclature standardised. There are not many monitoring points in the south and more must be included into the surface water monitoring program. The points will be logged with a GPS and the naming convention agreed with Tronox so that samples can be taken from similar points; and
- The proposed surface water monitoring points which include some of the existing and additional surface water monitoring points are to be implemented into the surface water monitoring program (Figure 6-3).

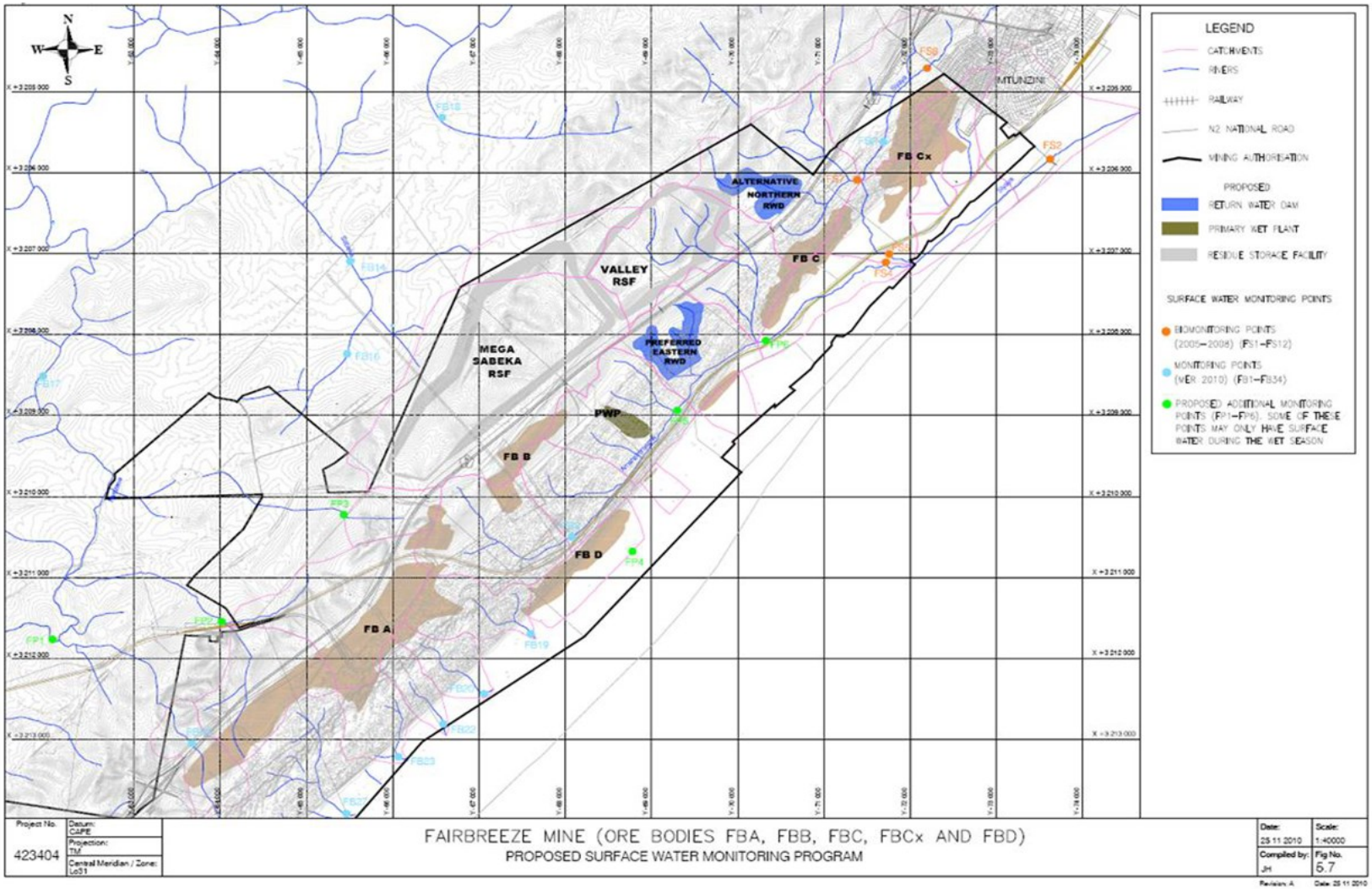


Figure 6-3 - Proposed surface water monitoring points (Adam, 2012)

6.7 GROUND WATER MONITORING PROGRAMME

A database will form the central information store accessible to all responsible for water control. The following information will be included:

- Water levels for all monitoring points
- Precipitation
- Quality data
- Flow measurements along Amanzimnyama and Sabeka rivers
- Conduct hydraulic testing on selected new monitoring boreholes proposed.
- Numerical groundwater flow model will be re-run if the mining schedule is altered or improved.
- Estimates of losses during mining and pit backfilling is made.
- Develop a spill response and clean up protocol.
- Monitor water quality and levels of down gradient groundwater users.

The groundwater monitoring network will consist of existing water supply boreholes, piezometers installed by Tronox, monitoring boreholes drilled around the RSFs and six additional new monitoring wells are proposed to augment the current network (Figure 6-4). Some nineteen boreholes are recommended to be sampled and water levels recorded. These boreholes will be sampled on a quarterly basis for at least the first two years, with at least a year's monitoring prior to mining. Thereafter the monitoring schedule could be revised based on the trends observed. The parameters monitored will be the same as those targeted for during this study, namely:

Table 6-2 – Monitored Parameters

Rest Water Levels	Sulphate SO4,
pH	Magnesium Mg
Electrical Conductivity EC	Iron Fe
Sodium Na	Manganese Mn
Calcium Ca	Aluminium Al
Potassium K	Copper Cu
Alkalinity as CaCO3	Titanium Ti
Ammonia NH4	Zircon Zr
Nitrate NO3	Nickel Ni
Chloride Cl	Radiation (appropriate analysis to be advice by relevant

Once trends have been established the list of parameters could be revised. The sampling must be undertaken according to accepted protocols. Water levels must be collected from the remaining boreholes on a monthly basis.

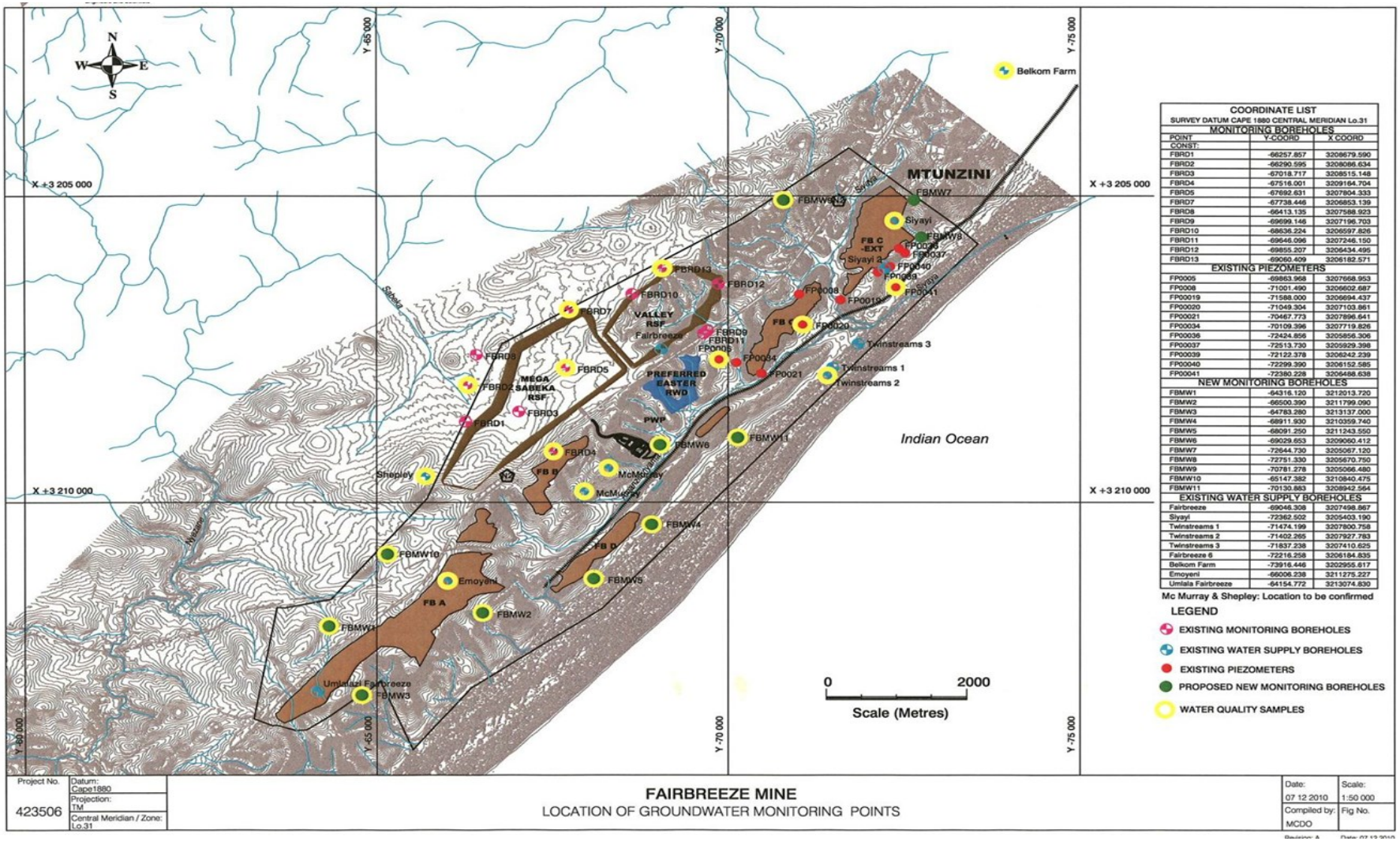


Figure 6-4 - Proposed ground water monitoring sampling points (Adam, 2012)

6.8 ALIEN PLANTS MONITORING PROGRAMME

An alien plant removal programme will be compiled and adhered to. This plan will include a detailed map of areas and surveying schedule. This programme will be approved by DWA.

6.9 HERITAGE MONITORING PROGRAMME

The mining lease consists of many heritage features dating to several periods. There will be a general monitoring program whereby an area is surveyed during or after earthmoving activity. A site-specific management plan is also required where sensitive areas are either monitored, sampled or excavated and mapped. All sites mentioned in the text will be considered as being sensitive and require monitoring. Table 2 of the Heritage Impact Assessment (Appendix D8) summarises the management issues. Figure 13 of the Heritage Impact Assessment (Appendix D8) summarises the significance of the sites.

6.9.1 BUILDINGS

Several buildings were surveyed, but only one building is of high significance and will not be damaged.

All buildings will be adequately recorded before demolition, in the form photographs and basic measurements, indicating the various additions. The buildings may have historical middens and these need to be sampled and partially excavated, where required.

6.9.2 ARCHAEOLOGICAL SITES

The area is of low archaeological significance, mostly due to afforestation. The entire area needs to be monitored on a regular basis during mining activity. This would occur after vegetation clearance and before actual mining. Any earthmoving activity will be monitored for archaeological sites.

6.9.3 GRAVES

Several known graves exist in the mining lease. A social impact assessment will be undertaken dealing specifically with the graves for the entire mining lease. This process will involve distribution of a general letter to all landowners requesting information regarding potential graves known to them in the mining lease. It is likely that more graves will be found in the mining lease during the operational phase, and thus social impact assessment would already be in place to deal with these remains.

6.9.4 PALAEONTOLOGY

The mining lease is unlikely to yield palaeontological remains unless the mining operations reach the original seabed levels (Dr. Gideon Groenewald pers. comm.).

7 CONCLUSION

Tronox now plans to extend its Fairbreeze mining operations to include a surface right known as Heleza Moya. The Heleza Moya tenement falls within the approved Fairbreeze.

It is the opinion of the EAP that provided this project is mitigated, as per the mitigation and management measures outlined in this EMPr, the project will result in impacts that should not negatively affect the environment. It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by including the EMPr in the contract documentation. The contractor must thoroughly familiarise himself with the requirements of the EMPr and appoint an Environmental Officer to oversee the implementation of the EMPr on a day-to-day basis. In addition, the applicant must appoint an external ECO to undertake regular compliance audits during construction against the requirements of the EMPr as well as the EA.

Parties responsible for transgression of this EMPr must be held responsible for any corrective actions that may need to be undertaken. Parties responsible for environmental degradation through irresponsible behaviour/negligence must receive penalties.

WSP is of the opinion that the project can proceed, provided that the outlined mitigation measures of the BA process and this EMPr are implemented effectively.

In terms of NEMA, everyone (i.e., all persons engaging in any component of this project) is required to take reasonable measures to ensure that they do not pollute the environment. 'Reasonable measures' includes informing and educating employees about the environmental risks associated with their work and training them to operate in an environmentally responsible manner.

The Proponent also recognises that, in terms of NEMA, the cost to repair any environmental damage will be borne by the person responsible for the damage. Should the above-mentioned environmental guidelines and mitigation measures be adopted, it is anticipated that the negative environmental impacts of the proposed Project will be mitigated adequately.

8 REFERENCES

Adam, J. (2012). *Amended Final Basic Assessment Report: Construction of the Fairbreeze Mine and Related Activities.* Exigent Engineering Consultants.

Mottram and Associates cc. (2023). *ASSESSMENT OF AGRICULTURAL POTENTIAL OF HELEZA MOYA FARM PTN 3 OF LOT 88 OF EMOYENI 9105 .*

Appendix A

EAP CURRICULUM VITAE

Phindile Mashau

Planning & Advisory, Environmental Assessment Practitioner

CAREER SUMMARY

Phindile has been working in the environmental management field from 2014 where she has been involved in alternative energy applications and selected energy permitting projects as well as health and environmental compliance. Her experience within the Environmental Management field is focused on Impact Assessment, Permitting, Environmental Health and Safety (EHS) Auditing and Public Participation.
Selected project experience includes undertaking permitting processes for Hydro-Power Plants, Offshore Exploration Drilling, Power Lines, Data Centres and various Infrastructure Projects.
Her countries of experience include South Africa, Namibia, Nigeria, Lesotho, Kingdom of Saudi Arabia, Zambia and Mozambique with local legislation as well as World Bank Framework, IFC Principles, Equator Principles and KfW Development Bank Guidelines.

1 year with WSP

8 years of experience

Area of expertise

Impact Assessment

Permitting

Environmental Health & Safety Auditing

Public Participation

Language

English – Fluent

Tsonga – Fluent

Afrikaans – Advanced

Zulu – Advanced

Sotho – Advanced

Venda – Fluent

EDUCATION

Bachelor of Science (Honours) Environmental Management, University of South Africa, Pretoria	2016
Bachelor of Science Environmental Management, Chemistry Stream, University of South Africa	2014

PROFESSIONAL MEMBERSHIPS

IAIASA (Professional Member) – 5154	2016
SACNASP (Pr.Nat.Sci.) – 115915	2017
EAPASA (Registered EAP) – 2019/1731	2022

Phindile Mashau

Planning & Advisory, Environmental Assessment Practitioner

PROFESSIONAL HISTORY

WSP Group Africa (Pty) Ltd	July 2022 – current
Golder Associates Africa (Pty) Ltd	July 2021 – June 2022
AECOM SA (Pty) Ltd – Centurion	2016 – June 2021
Sandown Motors Limited – Centurion	2015 – 2016
Department of Science and Technology, South Africa – Pretoria	2015

PROFESSIONAL EXPERIENCE

INFRASTRUCTURE

Shell Downstream South Africa (Pty) Ltd, Section 24G application for 96 service stations, across South Africa, South Africa
2021 – current
Project Manager and EAP.
The client took an internal decision to undertake the Section 24G regularisation process to regularise unlawful commencement for their service stations (existing and legacy sites). Duties include stakeholder engagement, legal reviews/assessments and extended authority consultation.

New Largo Coal Mine, Environmental Authorisation; Environmental Management Programme; Bankable Feasibility Study; and Application for Water Use Licence, Mpumalanga, South Africa
2021 – 2022
Assistant EAP
To give effect to proposed changes on the previously approved mining plan the client must apply for amendments to its approved EA and prepare an updated EMPr.

Richards Bay Coal Terminal (RBCT), Operational EMPr, Richards Bay, South Africa
2022 – 2022
EAP
The project included consolidating various permitting licences/ authorisations and internal policies polices to a single EMPr similar to an Environmental Management System to assist in the environmental performance of the terminal.

Grindrod Terminals Richards Bay (Pty) Ltd, Section 24G and Air Emissions Licence Application for the Sea Munye Terminals, Richards Bay, South Africa
EAP
2022 – 2022
The client had to submit an application for the regularisation of a listed activity which commenced without an environmental authorisation in terms of Section 24G of the NEMA.

Société de Péage du Lualaba (SOPEL), Environmental and Social Impact Assessment and Environmental and Social Management Plan for the By-Pass Toll Road in Kolwezi, Democratic Republic of Congo (DRC)
Environmental Consultant
2021 – 2022

The client is currently constructing a By-pass Toll Road, which will divert heavy truck traffic (mining, general freight, agriculture) of over 220 000 trucks per year around the Kolwezi City center. This ESIA was compiled during construction to in terms of the IFC principles.

Eskom Holdings SOC Limited, Basic Assessment (BA) for the proposed Eskom Battery Energy Storage Systems (BESS) in Preiska, Northern Cape, Environmental Scientist and Project Manager
2021 – 2021
The client is undertaking BA) process is required for the proposed ESKOM 70 Mega Watt, 280 Mega Watt hour BESS and associated infrastructure in Copperton, near Prieska in the Northern Cape.

Amazon Data Services, Basic Assessment for the Proposed Installation of Back-up Generators and Diesel Storage for Data Centres in the Western Cape, South Africa
Environmental Scientist and Project Manager
2020 – 2021
The client undertaking planning and infrastructure provision for the installation of diesel storage facilities and generators associated with one of their data storage facilities with the intention establishing an independent uninterrupted power supply (UPS) system to provide energy relief in the event when there is a loss or interruption of the municipal power supply.

Confidential Client, Subsea Cable Project, Maputo and Nacala, Mozambique
Environmental Scientist tasked to compile the Permit Feasibly Study (PFS) and Permit Matrices (PM) in the landing country
2020 – 2021
The project entails a proposed private marine subsea cable system that will connect different continents. Responsibilities included conducting PFSs to determine country-specific permitting requirements for the project. The project also includes the implementation of marine, terrestrial, environmental and land use permitting processes. The project area of influence includes territorial waters and the exclusive economic zone (EEZ). The purpose of the project is to significantly increase the capacity, quality and availability of internet connectivity between continents.

CEC GETFiT Hydropower Projects, ESIA and Environmental and Social Management Plan (ESMP) for hydro power stations in Changa and Kabompo, Zambia
Environmental Scientist
2019 – 2021
The client is undertaking two ESIA processes in terms of IFC to obtain the necessary permits to construct Hydropower dams in support of grid connection in the near future. Responsibilities included responsible for the compilation of the screening reports and providing technical support for the Peer Review of the ESIA process.

Stellenbosch Local Municipality, Basic Assessment and General Authorisation for the Proposed Kayamandi Northern Extension Water Supply Project, Western Cape, South Africa
Environmental Scientist and Project Manager
2019 – 2021
Stellenbosch Municipality is undertaking planning and infrastructure provision for the establishment of the Kayamandi Bulk Water Supply Pipe and Reservoir (the Project). The proposed project is aligned to the Stellenbosch Municipality's Integrated Development Plan (IDP) and is in support of housing and development schemes over the next couple of years.

Airports Company South Africa SOC Ltd (ACSA), Legal Review and Water use Licence Application for the redevelopment of the Terminal 2 area at Cape Town International Airport (CTIA), Western Cape, South Africa
2018 – 2019

Environmental Scientist and Assistant Project Manager
ACSA
ACSA intended to demolish the existing Terminal 2 building and to construct a new building in line with the form, structure and aesthetic. This included the need to abstract groundwater for potable and non-potable uses in support of the redevelopment activities.

Xylem Water Solutions, Environmental Health and Safety (EHS) Audits, Northwest, Gauteng and Western Cape, South Africa
EHS Auditor
2019 – 2019
The client was undertaking triennial evaluation of the environmental compliance and management system implementation within the faculty in terms with local regulatory requirements at three of their South African facilities. The role included a review previous year's audit finding, review client specific checklists & audit requirements (protocols), prepare a presentation for the opening meetings & chair the opening meeting, undertake site inspections, undertake interviews with relevant staff, undertake a review of the relevant company documentation, prepare audit findings, prepare & chair the closing meeting and submission of audit report to client.

Smiths Group, Annual EHS Audits, Gauteng, South Africa
Environmental Auditor
2019 -2019
Client was undertaking an annual audit to evaluate their environmental compliance and management system implementation within the faculty. Duties included a review previous year's audit finding, review client specific checklists & audit requirements (protocols), prepare a presentation for the opening meetings & chair the opening meeting, undertake site inspections, undertake interviews with relevant staff, undertake a review of the relevant company documentation, prepare audit findings, prepare & chair the closing meeting and submission of audit report to client.

Eskom Holdings SOC Limited, Water Use Licence (WUL) Audits, Mpumalanga, South Africa
Environmental Auditor
2019 – 2019
The appointment was to conduct an audit at Eskom's Kusile Power Station to assess compliance with the WUL Compliance – including compliance based on water quality requirements for the particular catchment area Tasks included a review previous year's audit findings, review client specific checklists & audit requirements (protocols), prepare a presentation for the opening meetings & chair the opening meeting, undertake site inspections, undertake interviews with relevant staff, undertake a review of the relevant company documentation, prepare audit findings, prepare & chair the closing meeting and submission of audit report to client.

Anglo American, Environmental Compliance Audit Reports –Chromium Railway Extension, Limpopo, South Africa
Environmental Scientist and Project Manager
2018 – 2020
Anglo was in the process of extending their railway line at the Amandebult Chromium Plant within their Amandebult complex in Thabazimbi. Technical review of Environmental Compliance Audit Reports and Deputy Project Manager.

Anglo American, Environmental Compliance Audit Reports in terms of Regulation 34 of The EIA Regulations (2014) as amended, Amandebult complex in Thabazimbi, Limpopo, South Africa
Environmental Scientist and Project Manager
Regulation 34 of the EIA Regulations (2014) require that an EA (including similar authorisations in terms of specific environmental management acts), EMPr and closure plan (where applicable) must be audited by an

independent party with the relevant environmental auditing expertise and the environmental audit report must be submitted to the Competent Authority.

Shell South Africa (Pty) Ltd, Construction of Kroondal N4 Service Stations, Northwest, South Africa
Environmental Compliance Officer
2017 – 2018
Compilation of the EMPr, Compilation of environmental monitoring checklist, ECO
Compliance auditing of construction activities associated with the Shell Kroondal Service Stations, near Rustenburg against the approved Environmental Monitoring and Auditing Plan (EMAP).

City of Mbombela Local Municipality, Widening of Friedenheim Road, Mpumalanga, South Africa
Environmental Compliance Officer and Environmental Scients
2017 – 2018
The client undertook a feasibility study to upgrade the existing Friedenheim Road within the city of Nelspruit. Prior to construction, environmental authorisation was required for the upgrading activities.

TotalEnergies Namibia, Environmental and Social Impact Assessment for the Offshore Drilling on Block 2913B, Namibia
Environmental Scientist and Project Manager
2018 – 2019
ESIA for the proposed Offshore Exploration Drilling – Namibia Block 2913B. The ESIA is conducted in compliance with local Namibian legislative requirements as well with Total's International Standards.

The Red Sea Development Company, Environmental and Social Impact Assessment for the for an exclusive luxury hospitality accommodation on the Red Sea, Amaala, Kingdom of Saudi Arabia,
Environmental Scientist
ESIA for the development of a luxury hospitality resort on the Red Sea. Project components include: an airport, all infrastructure (Wastewater Water Treatment, Energy provision, primary networks, Water Treatment, Roads, etc.), Residential, Worker accommodation, Island development and the Main land resort. Duties included the compilation of three (3) Early Earthworks Preliminary Environmental Review (PER) and Construction EMPrs.

The Red Sea Development Company, Exclusive luxury hospitality accommodation on the Red Sea, **Kingdom of Saudi Arabia**
Environmental Scientist
2019 – 2019
Tasks included the compilation of the Early Construction Environmental Management Programmes consisting of mitigation measures for construction (generic construction activities), mitigation measures for operation (asset specific), design guidelines (asset specific) and Sustainability Guidelines for Red Sea- as part of the Environmental and Social Impact Assessment for the development of a luxury hospitality resort on the Red Sea. Project components include: an airport, all infrastructure (Wastewater Water Treatment, Energy provision, primary networks, Water Treatment, Roads, etc.), Residential, Worker accommodation, Island development and the Main land resort.

Lesotho Highlands Development Agency (LHDA), Environmental Management Plan for the repair and upgrade of the Northern Access Road (NAR), Pitseng, Ha Lejone and Ha Seshote, Lesotho
Environmental Scientist and Stakeholder Engagement Facilitator
2018 – 2018
The overall objective of the project is to repair and reseal this section of the NAR with minor safety upgrades. This will include the access road and surfacing at the Mafika Lisiu View Site. The upgrade of the NAR will allow access for the transportation of plant, equipment and materials to construct the PWAR and eventually the Polihali Dam.

Eskom Holdings SOC Limited, Basic Assessment for the proposed Eskom Grid-Scale Battery Storage at Gansbaai, Kleinmond, Stanford, Arniston, Bredasdorp, Struisbaai and Vryheid sub-stations, Western Cape, South Africa
Environmental Scientist, Assistant Project Manager and Stakeholder Engagement Facilitator. Responsible for reviewing the BARs and EMPrs for 2018 – 2019
Eskom intended to install BESSs to provide ancillary support in terms of enhanced frequency control of the network, reactive power support and improved quality of supply performance in close proximity to existing Distributed Generation Renewable Energy plants.

Transnet SOC Limited, Basic Assessment for the Sishen Railway Link, Western Cape, South Africa
Environmental Scientist
2018 – 2019
Transnet Rail intends to link two existing railway lines in the Sishen area. It is thus assumed that the railway line is not located in an industrial zone and the new railway line section will be outside of the existing rail reserve. Further, the route alignment of the new railway line section seems to cross a watercourse.

Western Cape Provincial Department of Transport and Public Works (DTPW), Basic Assessment for the Reseal works for the Trunk Road 23 Section 2 from Hermon (KM 0.00) to Gouda (KM 17.63), Western Cape,
Environmental Scientist and Public Participation Administrator
2018 – 2019
The client wants to undertake a Basic Assessment process and a Water Use Licence Application (WULA) process in support of environmental authorisation (EA) and WUL required for the proposed reseal and routine road maintenance of Trunk Road Section 2.

South African National Roads Agency Limited (SANRAL), Moloto Road Upgrade (Phase 1 A), City of Tshwane, Gauteng,
Environmental Scientist assisting with the BA process and responsible for the PPP
2018 – 2018
The client wanted to undertake a BA process in support of obtaining EA required for the proposed routine road maintenance and upgrade. The infrastructure associated with the proposed project which requires EA consists of road widening as well as the expansion of culverts and bridges.

Eskom Holdings SOC Limited, Erica LILO 400 kV Power Line, Western Cape, South Africa
Environmental Scientist, Public Participation Administrator, Stakeholder Engagement Facilitator and Assistant Project Manager
2017 – 2019
Eskom planned to conduct a Basic Assessment process associated with the construction of a double 400 kV power line. Project included the compilation of baseline information, an impact assessment which incorporated various specialists, EMPr, BA Report and PPP.

Confidential Client, Phase I Environment & Infrastructure Assessments, Itori and Jebba, Nigeria
Environmental scientist
2017 – 2017
Client in the transportation sector was undertaking a feasibility study at their proposed site, this included site and infrastructure inspections, interviews, compliance review, reporting, document reviews and mapping.

City of Cape Town (CoCT), Muldersvlei WULA - WULA forms, Section 27 Motivation Report, WULA Technical Report, Western Cape, South Africa
Environmental Scientist, Public Participation Administrator, Stakeholder Engagement Facilitator
2017 – 2020

The CoCT requested services to facilitate the WULA process in support of the Northern Area Bulk Water Augmentation Scheme (NABWAS) for the Muldersvlei component.

Netcare Property Holdings (Pty) Ltd, WULA for the Netcare Femina Dewatering, Gauteng, South Africa
Environmental Scientist
Netcare requested services to facilitate baseline information compilation, Impact Assessment, Motivational report, EMPr, Licensing forms, Submission to the Department of Water Affairs (DWS), The purpose was to obtain registration in the form of a General Authorisation (GA) for the abstraction of water from an existing borehole at the Netcare Femina Hospital within the City of Tshwane.

City of Mbombela Local Municipality, Basic Assessment for the upgrade of the Bosch Street - R40 (Madiba Drive) Interchange and Road 2296 (Ka Nyamazane Road), Mpumalanga, South Africa
Environmental Scientist
2017 – 2017
The client proposed to undertake a feasibility study to upgrade the existing Bosch Road within the city of Nelspruit. Prior to construction, environmental authorisation was required for the upgrading activities. Associated tasks included compiling a BA Report, EMPr, PPP and a WULA

Department of Public Works - KwaZulu-Natal, Water and Sanitation Programme, KwaZulu-Natal, South Africa
Assistant project administrator with the responsibility of liaison between the schools and the technical personnel
Environmental scientist in collating, interpreting and compiling comprehensive geotechnical reports inclusive of results of the site investigations conducted
2017 – 2017
The Department of Public Works (DoPW) commenced with the implementation of a Schools Water and Sanitation Programme for 367 schools in the Kwa-Zulu Natal province in an effort to provide healthy and hygienic ablution facilities for learners and teachers.

Confidential Client, Construction of a Data Centre, Gauteng, Western Cape, South Africa
Assistant Scinetist
2016 – 2016
Permitting framework for the construct and operation a new Data Centre. The appointment included compiling a comprehensive assessment of the planning and environmental regulatory requirement that will apply to the construction and future operation of such a facility within three coastal ports

South African National Roads Agency Limited (SANRAL), Moloto Road Upgrade, Gauteng, Mpumalanga and Limpopo, South Africa
Project Administrator
2016 – 2017
Basic Assessment process in support of environmental authorisation required for the proposed routine road maintenance and upgrade. The infrastructure associated with the proposed project which requires environmental authorisation consists of road widening as well as the expansion of culverts and bridges. WULAs were also required as part of the project.

Attacq Waterfall Investment Company (Pty) Ltd, Upgrade of the K101 Road, Gauteng, South Africa
Candidate Scientist
2016 – 2016
Upgrade of the K101 road between Maxwell Drive and Bridal Vale Road including the realignment of existing Provincial Road (P1/2).

Phindile Mashau

Planning & Advisory, Environmental Assessment Practitioner

Attacq Waterfall Investment Company (Pty) Ltd, Basic Assessment for the K60 Road Detail Design Section 3, , Gauteng- South Africa,
Assistant Public Consultation Administrator
2016 – 2016
Amendment to an existing environmental authorisation.

Permanent Water Commission (PWC), Noordoewer / Vioolsdrift Dam Feasibility Study ESIA, Namibia / South Africa,
Environmental scientist and Public Participation Consultant
2016 – 2019
Environmental screening and ESIA study for the proposed Vioolsdrift Dam on Orange River, on the border of South Africa and Namibia. In support of the feasibility study, an environmental fatal flaw assessment, environmental site selection and ESIA had to be conducted.

Interwaste, Multisand Regional Landfill Environmental Impact Assessment (EIA), Gauteng, South Africa
Candidate Scientist
2017 – 2017
EIA in support of environmental authorization and a waste management license, for the new Multisand regional landfill in Tshwane. Waste Management Licence permit Interwaste proposed to construct a new Regional Class B Regional Landfill within the City of Tshwane. In support of a waste management license and environmental authorisation, an EIA was conducted.

Department of Environmental Affairs (DEA), Licensing of Unlicensed Landfill Sites 2015, Eastern Cape, Northern Cape and KwaZulu-Natal, South Africa.
Assistant Scientist
2016 – 2016
The DEA commissioned a study to license all the existing unlicensed landfills within South Africa. As part of the 2015 roll-out, an environmental authorisation process required for the licensing of 17 landfills.

Confidential Client, Development of Gas to Power Plants, KwaZulu-Natal, Western Cape and Eastern Cape, South Africa
Candidate Scientist
2016 – 2016
Company endeavours to establish an energy generation facility (power plant), this included the identification of potentially suitable sites according to set criteria provided by the client. In addition to two sites identified and screened by client.

Royal HaskoningDHV South Africa / City of Tshwane, Belle Ombre Bus Depot, Gauteng, South Africa
Assistant Scientist
2016 -2016
The construction of underground CNG and fuel storage tanks at the existing Belle Ombre Bus Depot required environmental authorisation. An EIA and stakeholder engagement process towards environmental authorisation was undertaken

Appendix B

EXISTING BA AND EMP FOR FAIRBREEZE

April 2012

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

Construction of the Fairbreeze Mine and Related Activities

Compiled For

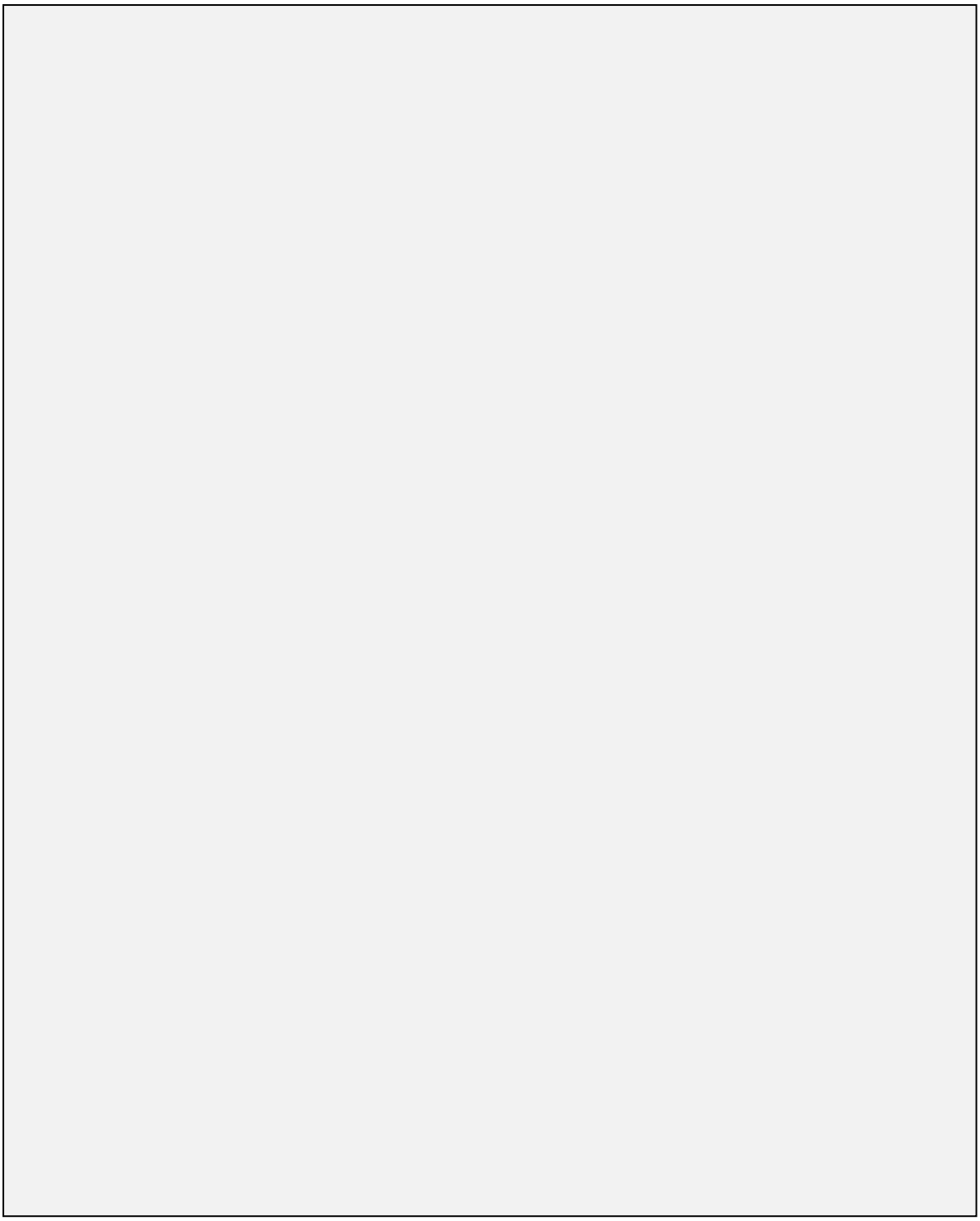
exxaro
KZN | SANDS

UPDATE

Compiled By

EXIGENT

10 ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)



10.1 INTRODUCTION

The objectives of the EMP are to:

- ensure compliance with environmental legislation;
- manage identified impacts;
- provide a reference by which future audits can be assessed.

The EMP represents the mitigation and management commitments of EXXARO and once approved by the DAEARD and DMR will be legally binding. The commitments have been derived from the recommendations of the specialist reports and commitments that have previously been made in the relevant EMPRs for the Fairbreeze Mine. The strategy for the development of management commitments includes:

- meeting legislative requirements;
- adopting principles of sustainability;
- avoidance of impact as far as possible;
- where not possible, reducing the impact;
- accepting responsibility for those impacts.

10.2 DETAILS AND EXPERTISE OF PERSON WHO COMPILED THE EMP

Jacolette Adam has been practising as an Environmental Assessment Practitioner since 2000, and has thus 11 years of project experience in environmental management. During this time she has compiled and given input to EMPs. Matthew has environmental management experience of 5 years, therefore the drafters therefore possess the core competence required to prepare the EMP for the project.

10.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The environmental impacts identified and proposed mitigation measures are listed in Table 10.1. Construction activities will comprise clearance of land, construction of the PWP, construction of the RSFs and RWD, development of access roads, relocation of powerlines, topsoil stockpiling and installation of pipeline/pumping systems. Operational activities will involve on-going mining, residue disposal, backfilling, rehabilitation and collection of storm water runoff. As the impacts associated with these various activities are integrally linked and construction activities will continue throughout the operation (as the mining face progresses), the construction and operational impacts have thus been

considered together. Where there are differences between construction and operational impacts, these have been clearly indicated. Rehabilitation and closure will occur progressively during the decommission phases, and has thus been grouped together as D in terms of the time period of the impact assessment.

The impacts have been assessed in terms of proposed activity. All activities are assessed, however if a specific activity/phase of activity has a different impact than the overall impact, it has been assessed separately underneath the specific project component.

10.3.1 Identification of aspects and proposed management measures

The environmental impacts identified and proposed mitigation measures are listed in Table 10.1. Construction activities will comprise clearance of land, construction of the PWP, construction of the RSFs and RWD, development of access roads, relocation of powerlines, topsoil stockpiling and installation of pipeline/pumping systems. Operational activities will involve on-going mining, residue disposal, backfilling, rehabilitation and collection of storm water runoff. As the impacts associated with these various activities are integrally linked and construction activities will continue throughout the operation (as the mining face progresses), the construction and operational impacts have thus been considered together. Where there are differences between construction and operational impacts, these have been clearly indicated.

The impacts have been assessed in terms of proposed activity. All activities are assessed, however if a specific activity/phase of activity has a different impact than the overall impact, it has been assessed separately underneath the specific project component.

10.3.2 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. Environmental management commitments made previously in the FBC EMPr and EMPr amendments as well as FBCX EMPr have been included in this document to ensure that environmental management of all components of the Fairbreeze Mine (mining, processing etc.) are undertaken to the same standards. Where necessary, additional management measures have been added or the detail of the commitments increased to ensure sound environmental management.

Aspect: this corresponds to the environmental component headings used in Section 9 of the report. If no impacts were identified for a particular environmental aspect e.g. geology, then these have not been included.

- Aspect: Describes the aspect to be impacted upon
- Objective: the objective needed to protect the environmental component in terms of the impacts identified in Section9.
- Detailed description of the aspect of the activity: This is in requirement of NEMA EIA Regulations 33 c.
- Reference number: a unique reference number for a specific commitment used to facilitate cross referencing.
- 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), construction (C), operation (O), decommissioning (D) or closure (C).

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 EXXARO, and contractors will be required to meet EXXARO's requirements in this regard. A formal complaint procedure at EXXARO is currently is in place and will be extended to include Fairbreeze Mine. This will be done by developing a code of responsible environmental practise that will be included in tender documents and contracts. This section also includes commitments relating to handling of emergencies, environmental awareness and performance assessment.

Table 10.1. Environmental management programme commitments for Fairbreeze Mine operations. Additional commitments underlined and referenced with B numbers.

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: *Topography*							
Detail description of aspect: The height and rolling topography of the dunes will be altered down to the mining floor, with regular shapes and benches. Backfilling of the mined out areas will result in the replacement of much of the sands and the topography will be largely restored. Due to the removal of the heavy minerals, slimes and some of the sand, the backfilled area will be lower than the original ground elevation. The final wall height of the VRSF is expected to be approximately 30 m at its highest point and about 1 m at its lowest. Although the total height of the wall at MSRSF would be less, it will still alter the topography. The walls of the RSFs are built at a 1:3 slope on the outside and a 1:2 slope on the inside (1m vertical 3m horizontal). Slimes deposition in the basins of the RSFs will gradually fill the facilities until they comprise extensive flat areas with a level topography.							
Minimise change in topography due to mining	1	The pre-mining landscape will be surveyed to record topography. All dunes mined will be rehabilitated to the original shaping of natural topography (slope, landform and orientation) on the basis of the pre-mining survey.	P/C/O/D	EXXARO	Landscape after mining similar to original topography	Review monthly during rehabilitation phase	Consult with surveyor and mine manager
	2	Existing farm roads will be used where possible.	C/O	EXXARO	No erosion due to roads	Daily, and after heavy storm events	Incident register will be kept to up to date and necessary actions executed based on incident
Aspect: Soil							
Detail description of aspect: During the mining phase the soil profile down to a depth of 0.5 m (in the ore body areas) and 0.3 m (in the waste facility areas) will be removed and stockpiled or used immediately for rehabilitation. Any soil structure below this depth will be lost, while the organic carbon content and population of micro-organisms within the removed soil will be diluted during the period of storage, where required. Increased erosion and sedimentation can have a negative impact on the aquatic and terrestrial ecology downstream. Sedimentation and erosion are existing problems due to disturbance from the current land uses. This is expected to be the same throughout the site.							
Minimise the loss of a soil resource	B1	A road network will be established that conforms to the newly shaped landscape and designed with a view to minimising erosion potential by utilising retained topsoil and shaping the roads according to accepted engineering standards	C/O/D	EXXARO ECO	Road network causing minimal erosion	Daily, and after heavy storm events	Incident register will be kept to up to date and necessary actions executed based on incident
	B2	Topsoil storage will only be carried out for the first ore body excavation and for soil removed from the RSF. After that removed topsoil and *Eucalyptus* harvesting residues will be moved onto backfilled areas from areas due to be mined in a sequential manner.	C	EXXARO ECO	Successful topsoil management	Ongoing inspection of topsoil stockpiles and rehabilitated areas	
	3	~~Topsoil conservation to be practised in accordance with rehabilitation specifications contained in Section 10.6 (Rehabilitation).~~ Emphasis will be placed on preserving the topsoil for future use. Topsoil storage will be undertaken according to scientific principles and actively managed by re-vegetating and periodical tillage (ripping/ploughing) to ensure its beneficial properties are retained. The specific guidelines for this process are currently being developed by the Rehabilitation Research Programme	C/O	EXXARO	No erosion at topsoil stockpiles Successful implementation of Rehabilitation Research Programme		
	4	Only areas within the ore bodies, servitudes and infrastructure footprints will be disturbed. The areas to be disturbed will be kept as small as possible. Buffer zones and no-go areas will be demarcated to prevent disturbances (see 10.3.3.2).	P/C/O	EXXARO	Minimum area of disturbances throughout mining phase, as well as for construction areas, e.g. PWP, pipeline	Ongoing inspection of disturbed areas and rehabilitating areas	
	5	Vegetation will be removed from an area no longer than 45 days prior to scheduled mining or disturbance of the area.	C/O	EXXARO	Minimum area cleared, as per 45d planned mining schedule		
	~~6~~	~~The rehabilitation of the soil moisture retention characteristics will take place so that the original or current land use can be supported. This will reduce long-term recharge to ground water, as the vegetation is re-established. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme, 10.6.2).~~	~~O~~				

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	7	~~When soil is replaced, loosen full depth of topsoil before re-seeding.~~ Replacement of reconstituted soil and addition of topsoil will be undertaken with a view to restoring soil fertility and structure appropriate for the intended land-use. Specific guidelines for the management of this medium, including the principles of re-vegetation, reforestation and regeneration of soil fertility and structure will be guided by the Rehabilitation Research Programme and consideration of the latest mine rehabilitation technology.	C/O/D	ECO EXXARO	Successful implementation of topsoil management guidelines Successful implementation of Rehabilitation Research Programme recommendations	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas Inspections of affected areas will occur before the Major storm event is reached. Inspections of infrastructure will occur after 30mm in 24 hours. A rainfall event of >1:5 years (157mm in 24 hours at Fairbreeze) will trigger a mandatory inspection from the geotechnical section and will raise specific action lists.	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist where required
	B3	A protocol for monitoring and measuring soil fertility and soil quality will be developed during the Rehabilitation Research Programme. These will provide soil chemical and physical measures and norms as indicators of the success of the rehabilitation process.		ECO EXXARO	Successful implementation of Rehabilitation Research Programme recommendations		
Prevent or minimise erosion of soils	8	Topsoil stockpiles will be placed in suitable locations and away from within the 1:100 year floodline of any watercourse. Topsoil stockpiles will be protected from surface water flows by diversion berms. ~~Topsoil stockpiles will be vegetated.~~	C/O	ECO EXXARO	Successful implementation of topsoil management guidelines		
	B4	Since layering takes place during the replacement of the reconstituted soil, deep tillage behind a grader of bulldozer on the contour will be carried out to homogenize the soil and break up compacted layers when the soil is at a suitable water content	C/O	ECO EXXARO	Successful rehabilitation and Rehabilitation Research Programme recommendations		
	9	The maximum open, active mining area will not exceed 0.65 km^2 at any one time. Intermediate revegetation will be undertaken at a pace similar to mining such that the area requiring revegetation also does not exceed 0.65 km^2.	C/O	ECO EXXARO			
	10	Revegetation of disturbed areas will commence within 60 days of removal of the disturbing factor. Intermediate revegetation will aim to establish at least 30% basal cover within 60 days of planting. Revegetation of backfilled and shaped areas, per area, will commence within 60 days of completion of the placement of soil medium. Revegetation will aim to establish at least 30% basal cover within 90 days of planting. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	C/O/D	ECO EXXARO			
	11	Ensure road construction (including culverts, run-off channels, etc.) using accepted engineering methods, as well as regular maintenance of roads.	C/O/D	ECO EXXARO			
	12	The RSFs starter wall will be vegetated with stoloniferous grasses and legumes to prevent surface erosion. Vegetation must achieve 80% dust control efficiency. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	C	ECO EXXARO			
	13	All disturbed areas, areas undergoing rehabilitation, the RSF walls and all water management structures will be inspected after every major storm event and repaired as necessary.	C/O/D	ECO EXXARO			
	14	Toe (or catchment) paddocks will be constructed below the RSF walls and maintained.	C/O	ECO EXXARO			
	15	Linear infrastructure (roads and pipelines) will be inspected on a monthly basis to check that the associated water management infrastructure is effective in controlling erosion.	C/O	ECO EXXARO	Repairs to incidents within 7 days	Monthly inspections Bi-weekly inspections during periods of high rainfall and after	Incident register will be kept to up to date and necessary actions executed based on incident
	16	Construction of surface water management infrastructure from soil (berms, canals and bunds) and advised by engineer.	C/O	ECO	Repairs to incidents within 7 days		

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	17	Energy dissipaters will be constructed at points where there are concentrated discharges of water to the environment that can cause significant erosion. Where necessary, energy dissipaters will also be placed within water channels to slow the speed of water (for example in the clean water diversions).	C/O	EXXARO	The effectiveness of these dissipaters will be checked on a monthly basis.Repairs to incidents within 7 days	major rainfall events	
	18	Energy dissipaters will be placed in footpaths where there are signs of erosion.	C/O		No erosion, and if erosion occurs, repairs to incidents within 7 days		
Aspect: Land capability							
Detail description of aspect: For the duration of the Fairbreeze Mine project, the area affected by mining, pipelines corridors, soil stockpiling, PWP and RSFs will not be available for agricultural production or any other land use. After rehabilitation, the area could be used once again for commercial agricultural production. The removal of the heavy mineral fraction is not expected to affect the land capability of the soil. It is anticipated, that a similar land capability can be achieved in the post-mining environment. It is anticipated that the ESKOM powerline servitude will permanently remain in the re-aligned position. The re-aligned powerline will replace an existing powerline and the difference in the area of land lost to their servitudes is negligible.							
Minimise loss of land with arable capability/agricultural potential		See ref 3, 4 and 5.					
	B5	Management will focus efforts on creating a well-aerated rooting environment free of excessive compaction and layering in the reconstituted soil by employing suitable land preparation methods. These methods will be guided the Rehabilitation Research Programme.	O	ECO	Successful implementation of topsoil management guidelines	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist where required
	B6	Existing topsoil will be utilised as far as possible as a means for restoring soil fertility and soil structure. Emphasis will be placed on utilising the existing topsoil in combination with the forest floor and harvesting residues (bark, branches, leaves, tree tops and chipped stumps) that will be available after clearfelling of the *Eucalyptus*.	O	ECO	Successful implementation of topsoil management guidelines		
	B7	Management of the reconstituted soil (i.e. depth of application and specific clay:sand ratio), topsoil/harvesting residue mix, incorporation of the latter within the reconstituted soil and further amelioration will be determined by the Rehabilitation Research Programme and consideration of the latest mine rehabilitation technology	O	ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations		
	B8	Topsoil storage will only be carried out for the first ore body excavation. After that removed topsoil and *Eucalyptus* harvesting residues will be moved onto backfilled areas from areas due to be mined in a sequential manner.	O	EXXARO	Successful implementation of topsoil management guidelines		
	B9	Once reforested, growth of the re-established forest plantation will be monitored and compared to growth expectations from Mondi's growth and yield models for the species/clone/hybrid in question	O	EXXARO	Successful rehabilitation and Rehabilitation Research Programme recommendations		
	B10	Since the establishment of forest plantations will contribute to improving the fertility and structure of soils, the time taken between re-vegetation and establishment of tree crops will be minimized	O	EXXARO			
	19	As per the rehabilitation/closure procedure (Section 10.6, the soil structure will be restored during the final stages of residue deposition. The restoration will be appropriate to the agreed post-mining land capability (sugarcane, plantations, and natural areas). (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	O/D	EXXARO			
	~~20~~	~~The method of soil structure restoration will be defined by the Rehabilitation Research Programme in accordance with appropriate specialists and take cognisance of the work currently being undertaken at Hillendale.~~ Ref B3	~~O~~				
	21	Following backfilling, the landform will be shaped to the extent where it will be possible to practise the agreed land use on the area. The post mining topography will be modelled on the pre-mining landscape survey.	O/D	EXXARO	Landscape after mining similar to original topography	Review monthly during rehabilitation phase	Consult with surveyor and mine manager

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	22	Ensure that the topsoil coverage is as even as possible, with no compaction, and that natural drainage has been re-established (no wet spots or obstructed drainage ways)	O/D	EXXARO	Successful implementation of topsoil management guidelines	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist where required
	~~23~~	~~Lessons learnt from Hillendale mine will be implemented at Fairbreeze Mine to ensure most effective sugar cane farming and forestry growing conditions. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).~~	O				
	24	An appropriate indigenous vegetation seed mixture, as determined by the Rehabilitation Research Programme/Biodiversity Forum, will be used over areas to be returned to a natural land cover. The revegetation will aim to ensure at least 30% vegetative cover is established with 3 months. Vegetation establishment will be monitored quarterly for 3 years after planting, or until monitoring indicates that a suitable, self-sustaining natural land cover has been achieved.	C/O	EXXARO ECO	Disturbed areas rehabilitated and vegetative cover achieved	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	25	Ensure that the vegetation coverage is as even as possible, and if uneven coverage occurs, soil conditions will be checked and rectified.	O/D	EXXARO ECO			
	26	Mondi will be compensated as per conditions of the lease agreement. Compensation has been paid for the ESKOM servitude.	P	EXXARO	Fulfilment of lease agreement		
Aspect: Land use							
Detail description of aspect: The impact on land use will include the removal of the forestry plantations, sugar cane fields and some homesteads. The removal for mining will be gradual, proceeding slightly ahead of the mining schedule, whereas the clearing for PWP and offramp infrastructure will be immediate and for the period during life of mine. Due to safety reasons, the proposed power line will require the registration of a servitude in which, no other land use will be allowed.							
Prevent long term changes in land use		See Ref 4.	C/O				
	27	The post-mining land use will be agriculture, specifically sugar cane and *Eucalyptus* sp. Plantations or natural vegetation.	O/D	EXXARO	Successful rehabilitation to facilitate post-land use	Ongoing inspection of disturbed areas, topsoil stockpiles and rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
Minimise loss of land currently used for wilderness/wetlands	A1	Buffer zone management will be conducted as specified as per of biodiversity monitoring programme (Section 10.3.3.2).	C/O/D	ECO	Limited impact on buffer zones	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	
	~~28~~	~~The soil structure will be restored during the final stages of residue deposition. The restoration will be appropriate to the agreed end land use. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research panel).~~ See Ref B3-B6.					
		See ref 20.	O				
	29	Details of the post closure land use for each ore body will be agreed with stakeholders, in particular the land owner (Mondi) and relevant regulatory authorities (DME, DWAF, DAEARD).	O/D	EXXARO	Successful rehabilitation to facilitate post-land use	Ongoing inspection of disturbed areas,	Incident register will be kept to up to date and necessary actions

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	30	Following initial soil restoration, a geohydrology and soil assessment of the top surface of the RSF will be undertaken in accordance with EXXARO's Rehabilitation Strategy (Section 10.6). On-going rehabilitation of the RSF will be adapted to suit the specific situation at each RSF and incorporate recommendations of the specialist reports.	D	EXXARO	Successful rehabilitation to facilitate post-land use	topsoil stockpiles and rehabilitating areas Annual assessments after initial soil restoration.	executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
Aspect: Fauna, flora, wetlands and aquatic ecology							
Detail description of aspect: All areas currently vegetated by *Eucalyptus* will be cleared prior to establishment of required infrastructure or prior to mining. *Syzygium/ Cassipourea* dominated swamp forests vegetation community will be impacted by the position of the VSRF and alternative RWD. Construction of the 88 kVA ESKOM powerline will require clearing a servitude of 50m wide of trees. Vibration, light and noise pollution will have a significant impact on fauna species in the immediate vicinity of the mine and transport of the ore and the need for sufficient lighting during the night. The addition of sufficient lighting to facilitate 24-hour operations in close proximity to areas of natural vegetation may attract large numbers of insects which will in turn attract faunal elements such as amphibians, bats and nocturnal birds. It is expected that the majority of faunal species will move away from areas with increased noise, light and dust pollution leading to changes in the faunal composition and ecological function of adjacent habitats. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment. The plant communities that are traversed by the powerlines provide habitat for several Red Data bird species including larger bird species. The mining activities will result in the influx of people into the project area. This will result in increased anthropogenic pressure on the ecosystems in the project area in terms of increased access and therefore harvesting of natural resources such as firewood, medicinal plants for use in the muti trade, hunting and fishing. Construction of the proposed VRSF will result in the loss of wetland system WS06. Loss of this wetland system will result in changes in flow patterns, inundation and functionality in downstream wetland units including those in Umlalazi Nature Reserve and will be significant on a regional basis. The significance of this impact is rated as high due to the sensitive nature and threatened status of wetland habitats. The wetlands associated with VRSF provide habitat for several Red Data species, some of which have been confirmed and others that are considered to be highly likely to occur in the project area. Although the vegetation will be removed during the construction and operational phase the surface flow from the ore body areas will be contained, resulting in a decrease in surface run-off. This however will be short term as the estimated maximum open area is 0,65km^2 and the remainder of the mined ore body will be rehabilitated and the ground sloped to drain back to original catchments. During the first five years of mining there will be an increase of approximately 5-10% in the MAR and close to 0% for the last 6 years. With rehabilitated intermediate forestry in place the MAR will increase close to current conditions and decrease slightly for mature forestry.							
Minimise loss of vegetation due to the Fairbreeze Mine		See Ref 4.					
		See Ref 34-39					
	30	The identified natural vegetation areas will be declared no-go areas with respect to mining equipment and protected against disturbances. Buffer zones will be adhered to as stipulated in 10.3.3.2.	C/O	ECO	Adherence to no-go and buffer areas Limited impact on buffer zones	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	31	Revegetation of disturbed areas will be undertaken as soon as possible and will commence within 60 days of removal of the disturbing factor. This will be measured against the commitment of maximum open areas (0.65km^2) at any time as well as rehabilitation/closure procedures	C/O/D	EXXARO ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations	Ongoing inspection of rehabilitation/closure procedures	
	48	All Eskom pylons to be constructed outside the delineated wetland area.	C	EXXARO	No pylons within delineated wetlands	Implementation of biodiversity monitoring programme Ongoing inspection of buffer zones	

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	49	Routes for vehicles transporting heavy machinery during the construction phase must be restricted to approved roads, turning sites and stockpile areas to minimize soil compacting and vegetation destruction. If soil is compacted, it must be loosened again by ripping or ploughing of these compacted areas during rehabilitation process (as per Specifications in Ref B4.	C/O/D	ECO	Successful rehabilitation and Rehabilitation Research Programme recommendations	Ongoing inspection of rehabilitation/closure procedures	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	50	Rehabilitation, to the pre-disturbance conditions, needs to be initiated as soon as each section of the pipeline construction has been completed.	C/O/D	ECO EXXARO	Successful rehabilitation		
Ensure management of staff in terms of environmental aspects sensitive to the Fairbreeze Mine project	32	Strict management of access control to the site, control of movement of the labour force within the mine property and prevention of disturbance to vegetation or animals will be practised.	C/O/D	ECO	No incidents ito unforeseen disturbances to biodiversity	Ongoing training	
	33	All mine personnel will be provided with annual environmental awareness and job specific training. This will include specific aspects of Red data species, connectivity of natural habitats, species recognition, migration corridors, stipulated buffer zones, etc. This training will also be supplemented via posters on site.	C/O/D	ECO			
Minimise effects of habitat fragmentation	34	Disturbances to identified areas of natural vegetation or corridors between these areas will be prevented. Where disturbances are approved, the restoration of the connectivity will be prioritised. Infrastructure through or between areas of natural vegetation or corridors will be implemented with provision for the passage of fauna. Buffer zones will be adhered to as stipulated in relevant map included in report (see Figure 10.1).	C/O	ECO	Successful rehabilitation	Ongoing biodiversity monitoring Ongoing inspection of buffer zones	
Minimise impact on terrestrial and aquatic fauna and flora due to dust, light, erosion and sedimentation		See Ref 8 to 18 (erosion and sedimentation)					
		See Ref 81 to 91 (dust control)					
	44	Mining-associated traffic will be restricted on the roads to the west of the swamp forest at FBCX, and any other areas as identified by the ECO.	C/O/D	ECO EXXARO	No incidents ito unforeseen disturbances to biodiversity	Ongoing monitoring of roads.	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required
	45	The tree barrier adjacent to Mtunzini (see Ref 87) will be maintained to provide a faunal corridor. This barrier will remain in place until such time as the property is finally handed over to KZN Wildlife, as per the offset agreement, after which it will be managed as per the offset contract	C/O/D	ECO	No incidents ito unforeseen disturbances to biodiversity Successful rehabilitation	Ongoing biodiversity monitoring Ongoing inspection of buffer zones	
		See Ref 17 to 26 (water quality)					
	51	Water quality and flow monitoring (see Ref 53 and 54) will be used to calculate sediment loads within each water course/ estuary.	C/O/D	ECO	Sediment loads will be maintained within 10% of current/generally accepted levels.	Implementation of biomonitoring programme	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum where required
	52	A biomonitoring programme will be implemented on the estuarine and freshwater parts of the aquatic system. This will cover: Fish (freshwater and estuarine); Water Quality (estuarine and freshwater); Sediment composition (estuarine and freshwater); Macro-invertebrates (freshwater); and Macrocrustacea (estuarine and freshwater). Sec 10.3.3.1 of the BAR specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist study.	C/O/D	ECO	Adherence to biomonitoring specialist specifications or conditions in project authorisations		
		See Ref 8 to 18 (erosion) and 34.					
\Minimise loss of		See Ref 4.					

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
species with conservation importance	35	Harvesting of medicinal species as well as Red Data rescue and relocation missions for all species as specified by KZN Wildlife will occur prior to the start of any construction activities in an area. Permits to relocate the TOPS protected species will be obtained from KZN Wildlife. Specimens will be removed as per TOPS permit conditions.	P/C/O	ECO	No unauthorised activities ito medicinal species as well as RD Species Adherence to permit conditions	Ongoing monitoring of permit conditions	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum where required
	36	Long term mitigation measures include establishment of off-set areas where required. A biodiversity offset-agreement has been compiled in conjunction with KZN Wildlife and DWA. Management and monitoring of these offset areas are critical for the success thereof and will be measured as per the conditions and monitoring requirements of the offset agreement. The offset plan provides alternative and sustainable land use strategies to enhance the future health of the biodiversity of this important area. It is proposed that a Siyaya monitoring forum be established with a key focus on sustainable land use and management within the Siyaya catchment. Relevant key stakeholders, e.g. EXXARO, Mondi, DWA, WESSA, KZN Wildlife, and Mtunzini Conservancy will be involved in Forum.	P/C/O/D	ECO	As per offset management plan	Monitoring as per offset management plan	
	A2	Disturbances to habitat known to protected species will be prevented through access control, training of personnel and management of mine activities.	C/O/D	ECO	No unnecessary disturbances to indigenous areas	Ongoing monitoring as per permit conditions, no go areas and buffer zones	
	38	EXXARO will implement an alien and invasive vegetation programme to remove alien and invasive plants in all the identified natural vegetation areas within the mining area.	C/O/D	ECO	Revegetated areas will also be inspected every 6 months and alien and invasive plants removed.		
	39	Firebreaks will be maintained as agreed with the land owners, neighbours and in terms of the Veld and Forests Fire Act (101 of 1998). EXXARO will join and participate with the local Fire Protection Association.	C/O/D/P	ECO	Adequate fire breaks	Ongoing monitoring of firebreaks	
Minimise risk of avian collision due to re-aligned ESKOM powerlines	40	To ensure visibility of new aligned Eskom powerlines, bird “flappers” will be installed. This will be done in consultation with ESKOM.	C	EXXARO ECO	Adherence to ESKOM EMP (Appendix F) and any other ESKOM requirements.	Ongoing monitoring of bird flappers	
	41	The bird flappers will be installed, monitored and maintained as per ESKOM standards, by ESKOM.	C/O	EXXARO ECO			
Manage the direct (in the mining area) loss of herpetofauna	42	An on-site herpetofauna monitoring program in the initial year of operations at FB will be undertaken to quantify the numbers and species of herpetofauna impacted on by mining operations.	C/O	ECO	Implementation of herpetofauna monitoring program	Ongoing monitoring as per permit conditions, no go areas and buffer zones	
	43	Where necessary a herpetofauna search and rescue operation will be undertaken within the identified wetlands prior to their destruction by mine development. Rescued specimens will be released in the offset or other suitable areas. A herpetologist will provide the necessary expertise for release.	C/O	ECO			
Catchment loss (FBA, FBB, FBC, FBD, MSRSF, VRSF) feeding wetland systems		See Ref 4.	C/O				
		See Ref 30	C/O				
		See Ref 31.	C/O/D				
	46	Restore surface water runoff from rehabilitated areas to the original catchments on the basis of the survey of the original landform.	O/D	EXXARO	Implementation of surface and ground water monitoring programme	Monitoring as per monitoring plans	Obtain input from hydrologists

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	47	Rehabilitation of the proposed wetland areas within the offset sites will commence as soon as feasible (as identified in Appendix G16.6, Revised offset plan).	D	ECO	As per offset management plan	Monitoring as per offset management plan	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum where required
		See Ref 36.					
Minimise change in inundation patterns		Ref 36 for offset plan					
		Ref 46, 69-72 to deal with management of erosion due to increased base flow or mining operations					
		Ref 77 to deal with flow within Siyaya River					
		Ref 79 to deal with the MRSF impacts on water flow patters					
		Ref 80 to deal with groundwater impacts					
Minimise loss in sensitive habitat (RWD, VRSF, pipeline corridor)		Ref 36 for offset plan					
Minimise indirect impacts on wetlands (FBD)	B12	As per recommendation in Final BAR/EMPR, FBD should not be authorized based on existing data	P				
Minimise impact on wetlands due to contaminated surface and groundwater/change in water quality		See management in surface (Ref 59-79) and groundwater section (Ref 80).	C/O/D				
	53	Rigorous and regular monitoring of stream flow will be undertaken in alignment with the biomonitoring programme requirements. This will inform any adaptive management measures if deemed necessary by aquatic specialists. Section 10.3.3 of the BAR specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist study.	C/O/D	ECO	Adherence to biomonitoring specialist specifications or conditions in project authorisations	Implementation of biomonitoring programme	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist/Biodiversity Forum where required
	54	Monitoring of the Siyaya estuary will be undertaken in alignment with the biomonitoring programme requirements. Section 10.3.3 of the BAR specifies the frequency of the monitoring. Locations for sampling will be based on results of biomonitoring specialist study.	C/O/D	ECO			
Minimise changes to riverine habitat due to altered base flow		See Ref 4					
		Ref 46, 69-72 to deal with management of erosion due to increased base flow or mining operations					
		See ref 51, 53 and 54 (flow monitoring)					
		See ref 52 (biomonitoring)					
		Ref 77 to deal with flow within Siyaya River					
		Ref 80 to deal with groundwater impacts					

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise impact of infrastructure on the aquatic ecosystem	55	Designs for new roads or infrastructure which needs to bridge or move across water courses will ensure that flows of the water course are obstructed or impeded to the minimum. Design of the crossings will also allow for river connectivity and ensure that the path of migratory organisms is not blocked.	C	EXXARO Contractor	Limited impact on water flow	Ongoing monitoring of water flow at selected areas	Clearing of obstruction Consult with engineer
Sustainable management of the impacted catchments	56	The biodiversity offset includes the rehabilitation and/or conservation of areas of wetlands, and riparian zones as agreed in the offset plan. Ref 36 for offset plan	D	EXXARO	As per offset management plan	Monitoring as per offset management plan	Incident register will be kept to up to date and necessary actions executed based on incident. Consult with specialist/Biodiversity Forum where required
	57	Rehabilitation of VRSF site will take cognisance of the current land use, and as specified in RSF closure, will ensure rehabilitation of land to wetland areas.	D	EXXARO	Successful rehabilitation to facilitate post-land use	Ongoing inspection of rehabilitating areas	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation specialist/Biodiversity Forum where required

Aspect: Water management (surface and groundwater)

Detail description of aspect: Sediment in any runoff will potentially come from exposed areas during most phases of the mining operation (e.g. topsoil stripping). Higher sediment loads may naturally be introduced into the estuary due to increased frequency and intensity of flooding, large-scale erosion and sediment movement.

The mining of heavy minerals is not impact adversely on surface or groundwater quality, as the dunes have been extensively leached by percolation of rainwater, hence all remaining constituents can be considered to be stable.

No point source discharges are planned from the proposed operations. Therefore potential impacts will arise from accidental point sources and diffuse sources. Diffuse pollution, which is often more difficult to manage, can arise from: Seepage from the open pits (directly to surface waters and indirectly via groundwater) affected by geochemical changes and process reagents; Unconfined storm water runoff from contaminated surfaces; and Run-off from exposed areas carrying increased sediment load.

Although the vegetation will be removed during the construction and operational phase the surface flow from the ore body areas will be contained, resulting in a decrease in surface run-off. This however will be short term as the estimated maximum open area is 0,65km^2 and the remainder of the mined ore body will be rehabilitated and the ground sloped to drain back to original catchments. For the MSRSF, VRSF and RWD catchments the surface water would remain trapped for the duration of the mining operation. The rehabilitation and ground sloping back to original condition at closure would ensure surface water flows back to current conditions.

Due to the exposure of unvegetated areas and presence of water in pits due to monitoring and backfilling could increase infiltration rates, and thereby increase the base flow in the Siyaya (and Amanzimnyama), leading to increased quantities of water in the estuary.

The rate of deposition of sediment behind the gauging weirs suggests that erosion is already occurring in the catchments and sediments are being moved down the river channels under the present flow regimes. The degree of bank or bed erosion is based on the storm flows (short term) rather than stream flows (long term) and are predominantly rainfall dependent. Other factors, such as vegetation and soil, play an important role in determining potential for erosion. In the Amanzimnyama, indications are that the banks are relatively stable and well vegetated, so bed erosion may dominate in this system. Erosion may also be caused by uncontrolled runoff from mining areas or flow exiting from drainage structures, such as clean water diversions.

The mining activities fall outside the 1:100 year floodlines except for MSRSF, VRSF and the RWD. Where pipes or road crossings are required to cross any of the rivers, the design of the infrastructure must not negatively impact the surrounding area (increased flood levels etc.). The change in the flow patterns caused by the physical obstruction of flow in the system at road and pipeline crossings can impact on sedimentation.

Water losses from the mining operations will result in a zone of groundwater mounding. The mounding after six years of mining is related to the losses of water during mining and backfilling at FBCX. The backfilling is likely to occur over a short period of seven months whilst in other areas the losses either occurs over a smaller area or longer time period attenuating the effect of the losses to the groundwater. The mound slowly dissipates and spreads with time and is still present at year 12 of mining. The mounding is unlikely to result in seep zones forming. Once mining at FBC ext is complete the baseflow improves but remains below the estimated pre-mining level. The only plausible reason for the baseflow remaining at a lower level is that the leakage from the Valley RSF is lower than the pre-mining recharge over the footprint.

At present groundwater quality is generally good for the identified uses. Most of the identified impacts will be constrained to the operational phase, with the exception of spills. Results from the comprehensive eco-toxicological assessment performed on the flocculant used in the primary beneficiation process at Hillendale indicated that no adverse effects were detected at the residual flocculant concentration of 0.06 mg/l found to be present in the RWD. The probability of exceeding these levels in the mining operation is exceedingly low.

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Minimise or prevent deterioration in surface water quality due to mining activities	59	Water quality and flow monitoring within the freshwater and the estuarine parts of the catchments will be undertaken in accordance with EXXARO's monitoring programme (Section 10.3.3). The results will be used in the development of the closure plan remediation and monitoring programme. Also see ref 51, 53 and 54.	C/O/D	ECO	Adherence to environmental authorization conditions ito water quality and quantity No reduction on water quality prior to start of mine	As per surface and groundwater monitoring programmes10.3.3.7 and 10.3.3.6.	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	60	Clean water diversions and dirty water collection facilities will be established at all mining areas as well as at the RSFs, PWP and RWD to prevent clean surface runoff becoming contaminated by construction or operational activities. Diversion measures will be established before land clearing and mining commences. The measures envisioned are simple soil berms and trenches to prevent clean runoff entering dirty areas and others to divert dirty water to settlement paddocks.	C/O	EXXARO	Functional water management facilities and pipelines	Ongoing monitoring of functioning of diversion measures as well as need for additional measures	
	61	Dirty water drains will be sized to manage the 'dirty' water generated by a 1:50 year storm arising on contaminated areas. Dirty water will be directed to retention ponds, from where it can be returned to the mine or process water circuit. The storage facilities will have a minimum freeboard of 0.8m above full supply level. The width and height of the drains will be determined to ensure compatibility with identified hydraulic requirements of the drain.	C/O	EXXARO			
	62	The water levels in the dirty water storage facilities will be kept low by recycling into process water circuit. This ensures that the facility has enough capacity in the event of another severe rainfall event. All dirty water storage facilities will be managed with the required freeboard	C/O	EXXARO			
	63	EXXARO will keep water systems clear of obstructions. Drains will be inspected regularly for erosion and obstructions. Unless problems are encountered during these inspections, the drains will be cleaned and maintained as necessary.	C/O	EXXARO			
	64	Spillages from pipelines near to watercourses will be contained by soil bunds. These will contain spillages or direct the material to areas where it may be cleaned up and returned to the process. A contingency plan will be implemented to enable early detection of burst pipelines.	C/O	EXXARO			
	65	Prevention of spillages by quarterly inspection and maintenance of pipelines. All pipe bursts and spillages will be recorded as incidents and measures implemented to contain, clean-up and prevent further spillages. The mine will use its incident reporting system to ensure appropriate measures are taken in the event of incidents.	C/O	EXXARO			
	66	Ensure that temporary toilet facilities do not cause any water pollution or a health hazard.	C/O	EXXARO ECO			
	67	The flocculants used will be such that both the flocculants and its decay products will not be to the detriment of downstream water users. The dosage of excessive amounts of flocculants will be avoided.	O	EXXARO	No excessive dosage of flocculants	Regular checking of dosage equipment for malfunction	

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	68	Should contamination or excessive surface water flow be detected, the mine will immediately notify relevant authorities. The mine will then: identify the source of the contamination; identify, and if necessary implement, measures for the prevention of this contamination (short and long term); determine, and if necessary implement, any remediation measures.	C/O/D	EXXARO ECO	Visual contamination of surface water Reduction in water quality as per results of monitoring programmes	As per surface and groundwater monitoring programmes10.3.3.7 and 10.3.3.6.	Identification of source, implement prevention of contamination Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
Minimise risk of erosion from either increased base flow or mining operations	69	Changes in base flow in the affected rivers will be determined as part of the monitoring programme (ref 17).	C/O/D/P	ECO	Change in base flow		Consult with specialist where required
	70	A log will be kept of breaching events of the Siyaya Estuary, including, where possible, duration of the breach, rainfall and flow in the Siyaya and Amanzimnyama Rivers	C/O/D/P	ECO	Breach of Siyaya Estuary	Ongoing monitoring of estuary	
		See Ref 4 (minimise disturbance)					
		See Ref 10 (rehabilitate promptly)					
	71	To minimise impact on the receiving water bodies, EXXARO will optimise the removal of return water from backfilling operations.	O	EXXARO	Optimal removal of water from backfilling	As per surface and groundwater monitoring programmes10.3.3.7 and 10.3.3.6.	Consult with specialist where required
	72	Water systems, such as drains and canals will be designed to prevent pollution and minimise erosion or sedimentation.	C/O	ECO	Functional water management facilities Limited erosion	Ongoing monitoring of functioning of diversion measures as well as need for additional measures If any of the inspections identify eroded areas, these will be repaired within 7 days.	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	73	Linear infrastructure (roads and pipelines) will be inspected on a quarterly basis to check that the associated water management infrastructure is effective in controlling erosion.	C/O/D	ECO			
	74	See Ref 16.	C/O/D				
		See ref 17	C/O/D				
	B12	Rise in water levels at the Siyayi Borehole (located at FBCX) to within 10m of the surface will trigger additional mitigation measure such as pumping or a cut-off trench.	C/O/D	ECO	Rise in water level to within 10m from surface	Ongoing monitoring of functioning of diversion measures as well as need for additional measures	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
		See ref 18					
Minimise changes in flow patterns caused	75	River and riparian crossings will be designed and maintained such that stream flow will not be impaired.	C	ECO	Functional water management facilities	Ongoing monitoring of functioning of	Incident register will be kept to up to date and necessary actions

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
by blockages in the rivers	76	Pipelines that cross any watercourse and / or drainage line will allow flows to safely pass without any risk of flooding or damming. Embankments at watercourse crossings, within the flooding zone, will be protected against erosion. Where culverts are used at crossings, the culverts will have downstream erosion protection and energy dissipaters to reduce flow rates to their original velocities. Except for watercourse crossings, roads and pipelines will be positioned outside the 1:50 year floodline.	C/O	ECO		diversion measures as well as need for additional measures	executed based on incident Consult with specialist where required
Manage changes in mean annual runoff	77	The flow measurement facilities at the two weirs are to be re-established by DWA with assistance provided by EXXARO. The flow in the Siyaya and Amanzimnyama will then be recorded on a continuous basis by DWA. EXXARO will use this information as part of its water quality monitoring (Ref. 59- 68) and assessment to determine sediment loads, erosion potential, alterations to natural flow regimes and risk of estuarine breaching.	C/O/D	EXXARO ECO	Functional water management facilities Water quality within guidelines limits	As per surface monitoring programmes 10.3.3.6.	Consult with specialist where required
	78	The closed systems and water capture measures will reduce the water requirements for the mining operations, thus reducing the impact on other users.	O	ECO	Water requirements in comparison to Mhlathuze water contract.	Water quality monitored on a monthly basis	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	A5	Restoration of landform during backfilling must ensure that catchment divides are restored in terms of the pre-mining survey.	C/O/D	ECO	Successful rehabilitation leads to restoring of hydrological regime in dunes	As per surface and groundwater monitoring programmes10.3.3.7 and 10.3.3.6.	Consult with specialist where required
Minimise change in ground water quantity and quality		See Surface Water (ref 59 to 79) for monitoring, water use optimisation and pollution control requirements.					
	80	A groundwater monitoring programme consisting of the following will be conducted,: the use of soil moisture probes or other relevant instrumentation to determine unsaturated zone conditions; as many of the future exploration boreholes as possible will be drilled to bedrock; piezometers will be installed across the FB deposit and monitored to establish the shape of the current groundwater mound more accurately; piezometers will be installed in the coastal strip between the rivers and the sea to include areas such as the Twin Streams Educational Center and the Umlalazi Nature reserve; Geohydrological data, abstraction rates and water level measurements will be obtained for the water supply boreholes and the data analysed.	C/O	ECO	Reduction in water quality due to mining Reduction in water quantity	As per surface and groundwater monitoring programmes10.3.3.7 and 10.3.3.6.	Consult with specialist where required
	B13	Model simulations will be re-run as monitoring data becomes available in order to ensure predictions are continuously updated in terms of estimated losses.	C/O/D	EXXARO	Hydrological models with up to date input	Model predictions updating	Consult with specialist where required
	B14	Installation of lysimeters at Hillendale (rehabilitated areas) and Fairbreeze in relevant areas in order to quantify the change in recharge pre-mining, during rehabilitation and post mining. After installation, monitoring data will be used to update the model simulations on an annual basis.	P/C/O/D	EXXARO			
		See ref 67.	O				

Aspect: Air quality

Detail description of aspect: Major sources of particulate emissions at for the proposed Fairbreeze project are the RSFs walls, the backfilled area, the topsoil stockpile and roads, mitigation will be used to reduce emissions from these sources.

Mitigation such as vegetation, wind breaks are effective at source, these measures apart from binding the surface reduce surface wind speeds and as a consequence energies required for particulate suspension, once however particulates are airborne these measure may increase dust fallout by the same principle. Proposed mining operations will increase the dust levels from dust levels experienced currently, however it will not exceed current or future PM-10 air quality guidelines. The use of mitigation measures further reduces concentrations. Similarly TSP concentrations will not exceed current or future PM-10 air quality guidelines.

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
By far the biggest contributor to maximum concentrations is wind erosion, contributions by roads although significant to total emissions was small, actual emission for them were low in comparison to other sources. Significant emission rates were calculated for material transfer points, these will receive mitigation such as wind breaks (e.g. slatted fences).							
Air emissions will be managed to minimise nuisance effects and prevent health effects.	81	The mine will develop an Air Pollution Control System (APCS) for FB prior to commencing with operations. This APCS must include detailed management plans, mitigation measures and monitoring and operational procedures developed for each significant source to ensure reductions in emissions. The APCS will be implemented and revised on an on-going basis. Air quality must be compared to pre-mining ambient levels and maintained with maximum allowable limits.	C	EXXARO	Mine with limited dust impacts Successful implementation of APCS	Monitoring as specified in air quality monitoring plan (10.3.3.5) and any additional monitoring identified in environmental authorizations	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	82	The dirt road entering the Siyaya property will be upgraded and surfaced. A maximum speed limit of 40km/h will be observed. Dedicated entry and exit routes will be established to access each active mining area and infrastructure.	C/O	EXXARO	Mine with limited dust impacts		
	83	The establishment of intermediate revegetation on the mined out area will take place within 60 days of the removal of the mining disturbance. Intermediate revegetation will aim to establish at least 80% dust control efficiency.	O/D	EXXARO			
	84	The rehabilitation (vegetation) or dust suppression measures of the backfilled area will take place as soon as the previously mined void has been filled. Dust from backfilled areas will be minimised by the establishment of vegetation, or dune coating (which can achieve higher efficiencies than vegetation in the short term). Vegetation cover, where relevant, will be maintained to a minimum dust control efficiency of 80%.	C/O/D	EXXARO			
	A6	Shade netting must be used on rehabilitated areas at FBCX to limit dust impacts.	C/O/D	EXXARO ECO			
	85	The routine monitoring of vegetation cover will be undertaken to determine the effectiveness of the rehabilitation protocols that have been employed. The establishment of vegetation will be monitored on a quarterly basis for 3 years or until monitoring indicates that a suitable, self-sustaining vegetation cover has been achieved.	O/D	ECO			
	86	The 100 m wide tree barrier between FB and Mtunzini (85-90 m of indigenous trees, and 10-15 m of *Eucalyptus*, 5 m firebreak) will be maintained and supplemented to ensure its development and effectiveness. Where necessary, powerlines and services will be re-routed so that the barrier remains intact.	C/O/D	ECO			
	87	Additional windbreaks/visual barriers will be implemented as per the recommendations indicated in Figure 10.2. The tree barriers (85-90 m of indigenous trees, and 10-15 m of *Eucalyptus*, 5 m firebreak) will be planted within 6 months of mining approval. These barriers will be maintained and supplemented to ensure their development and effectiveness.	C/O	ECO			
	88	Dust suppression will be applied on unpaved roads to achieve a minimum control efficiency of 85% (using either water sprays or chemical suppressants).	C/O/D	ECO			
	89	Source based performance indicators for the mining operations will include the following: visible reductions in fugitive dust resulting from mining activities; dustfall immediately downwind over the N2 Highway to be <1200 mg/m²/day; and dustfall within the residential development of Mtunzini to be <600 mg/m²/day.	C/O/D	ECO			

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	90	Source based performance indicators for sources of wind erosion will include: vegetation cover up to 1m from the source (applicable to the RSFs and topsoil pile); vegetation density to be at least 80% on backfilled areas; and dustfall immediately downwind from the source to be < 1 200 mg/m²/day.	C/O/D	ECO	Mine with limited dust impacts Successful implementation of APCS	Monitoring as specified in air quality monitoring plan (10.3.3.5) and any additional monitoring identified in environmental authorizations	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	91	Compliance with the performance indicators will be assessed as part of an on-going monitoring programme.	C/O/D	ECO			
Aspect: Noise							
Detail description of aspect: The results indicate that the SANS 10103 rural guideline of 35dB(A) at night and 45dB(A) during the day will not be exceeded at any of the identified noise sensitive areas except for the southernmost portion of Mtunzini, approximately 42dB(A). This will only occur when the mining operations are within 100m of the nearest residents. The ambient noise measurements taken in this vicinity by Acusolv vary from 39 to 47dB(A) at night. The SANS 10103 night time limit is 35 dB(A). If a tree line is erected around the mine property in this area and the mining operations utilize a "bottom–up bench technique", where the water jet noise is screened by the bench, the night limit will not be exceeded. Furthermore the combination day/night limit in SANS 10103 of 45dB(A) will not be exceeded. The worst case results indicate that the 45 dB(A) guideline limit is exceeded approximately 70m from the noise source. This can be used a general indication as the noise sources are constantly moving as the mining activities progress through the ore body. The operation of the PWP will in all likelihood not affect the McMurray property as the SANS 10103 guideline is not predicted to be exceeded. The noise from the PWP will have an impact within 640m as it will be higher than the ambient noise. Beyond this distance, the noise level will be below the ambient noise and will therefore have little impact. A similar assumption can be made regarding the McMurray home. If the ambient noise is at 40dB(A), the combined noise sources (worst case) during the construction phase would be at 47dB(A) and thus audible as the McMurray home is within 640m from the PWP. The noise duration would be transient at high levels during the construction period which will last 18 months. Mitigation measures have been proposed, and it is highly unlikely that all the construction noises will be operational at the same time. Results have indicated that an expected 6.1% increase in the truck traffic compared to all other vehicles will occur on the N2 Highway. Calculations indicate that there will be an increase in operational traffic noise from 62.90 dB(A) to 63.04 dB(A). In the context of the existing noise and general scarcity of receptors along the N2 Highway, there will only be a slight increase in the road traffic noise.							
Minimise noise impact during construction of the PWP	92	It is recommended that if pile operations are needed, noise attenuation measures such as an earth berm will be constructed. If impact piling is conducted, an additional survey will be conducted at night to determine the zone of influence as well as the actual efficacy of the attenuation measures. Mitigation measures from survey must be adhered to.	C	Contractor	No complaints from surrounding residents/ landowners	An issues register must be kept on site to record any complaints lodged.	Complaints to be investigated and necessary actions executed. Noise specialist to be consulted where necessary.
	93	Construction staff will receive noise sensitivity training to ensure that the construction noise is kept at a minimum.	C	Contractor			
	94	During construction of the PWP, a noise specialist will be on site weekly during piling and other noisy activities. The noise specialist will conduct monitoring to ensure the portable noise attenuation screens are applied effectively. These can be placed as close as possible to the noise source such as mobile compressors, drilling rigs etc.	C	Contractor ECO			
	95	Night time activities will be limited to use of minimum required equipment.	C	Contractor			
	96	Monthly noise surveys will be conducted at sensitive receptors to determine the efficacy of noise attenuation measures. Noise levels will be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			
	97	The tree barriers at the PWP will be kept in place, and all additional noise barriers as advised by the noise specialist will be adhered to. See Also Ref 86 and 87 on tree barriers.	C	ECO			
	A7	Noise monitoring will be conducted bi-weekly at the PWP site during construction. Noise levels to be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			
Minimise noise disturbance during	A8	Noise monitoring will be conducted quarterly during the first year. Noise levels will be compared to pre-mining ambient levels and maintained within maximum allowable limits.	C	ECO			

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
mining	99	Mining of FBCX will advance northwards towards Mtunzini to ensure that the hydraulic monitors are normally not visible from the town (acoustically screened behind the bench) (as per FMCX ROD).	O	ECO EXXARO			
	100	Bulldozing operations at FBCX will be limited to daytime hours (as per FMCX ROD).	C/O/D	ECO	No complaints from surrounding residents/ landowners	An issues register must be kept on site to record any complaints lodged.	Complaints to be investigated and necessary actions executed. Noise specialist to be consulted where necessary.
	101	The mine will avoid clustering of the hydraulic monitors when mining in the zone nearest to Mtunzini (as per FMCX ROD)	O	EXXARO			
		See ref 86 and 87 (tree barriers)	C/O	ECO			
Aspect: Archaeology							
Detail description of aspect: Many of the older buildings have historical middens and these would need to be monitored and sampled, if not partially excavated. Several buildings were surveyed but only one building, Highfields House, is of high significance and will not be damaged. Demolition is not recommended as the property is substantial; the house and associated building form a tight complex; the property has close proximity to the road and has been operating as a guest house for many years; the buildings are little altered and are in excellent condition and there is a strong topophilia suggested by the site, the house and its associated garden. It has been identified as an excellent example of Union Period architecture in Zululand. Studies have been undertaken to identify sites of archaeological or heritage significance. Where possible disturbance of these sites will be avoided, however if disturbance is unavoidable then the appropriate assessments and management measures will be applied at these sites. All earthworks for pipelines, roads and PWP pose potential risks to archaeological sites that may occur, but have not been identified.						
Manage the loss of archaeological or cultural sites	102	A monthly monitoring program to record and assess potential sites/artefacts that were missed due to the current vegetation or that were below the surface at the time of the survey will be undertaken.	C/O	ECO	Successful implementation of monitoring programme	As per monitoring programme (Section 10.3.3.9)	Consult with archaeologist/ AMAFA KZN with regards to appropriate actions
	103	A destruction permit will be obtained for any identified sites and any other unrecorded sites that may be recorded during the monitoring program, in terms of the KwaZulu Natal Heritage Act of 1997.	C/O	EXXARO	Obtain all required permits	Annual review of permit conditions and expiry dates	
	104	All identified graves overlying planned mining areas will be relocated prior to the start of mining in that area. The appropriate social process will be followed.	P/C	EXXARO ECO			
	104	Should any graves or heritage artefacts be unearthed during construction or mining then operations in that location all activities in that area will be suspended in order to allow investigation and appropriate action to be completed.	C/O	ECO	All sites identified and reported to AMAFA	As per monitoring programme (Section 10.3.3.9)	
Manage the loss of buildings with historical value	105	All buildings will be adequately recorded before demolition, in the form photographs and basic measurements, indicating the various additions. Middens would need sampling, and some compounds would need photographing and mapping, if no drawings available.	C/O	EXXARO	Correct procedures followed ito management of impact on historical buildings		
	106	A demolition permit will be obtained for any identified historical buildings from AMAFA KZN.	C/O	EXXARO			
	107	The Highfields House will be retained and not demolished, as per recommendation of historian.	C/O	EXXARO			
Aspect: Visual							
Detail description of aspect: The proposed Fairbreeze project would have a major negative impact on the aesthetics of the landscape and would add a new and foreign dimension (man-made disturbance) to the existing character of the landscape. The cause of this relates primarily to the removal of vegetation (plantations and cane fields) and the exposure of large areas of red soil that will contrast dramatically with the existing green hues and textures of the landscape. The construction of the RSFs, built from soil excavated from the dunes will also cause a major disturbance to the aesthetic environment and impact negatively on the sense of place of the area. The Murray property would be severely affected by the PWP, however due to the large trees at the homestead and the rows of mature blue gum trees along the western boundary of the PWP, these views would mostly be screened. To the west of the site, visibility and exposure are severe as the full extent of the MSRSF, the re-aligned power lines (although they already occur in the area so they do not constitute a new intervention) and portions of VSRSF, the ore bodies and the PWP would be visible in this general area. Project activities would be visible from the higher elevated sections of Mtunzini, primarily from south and west facing properties. The most southern, lower laying sections of the town would not be able to see the mining operations, due to topographic relief and the assumption that the proposed tree screen grows rapidly to maturity. However, even without the tree screen, the potential impact on views from the southern low laying areas of the town, is moderate, which show that the upper level of the PWP and the very early stages of mining at FBC (when the initial clearing of the land takes place) would be visible above the horizon line. However, if the mining occurs from south to north (i.e. the operation would always occur behind an earth embankment, the effect on views from Mtunzini would be of a lowering horizon line and the full mining operation would not be seen from these vantage points.						

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Sections of the Umlalazi Nature Reserve will be impacted upon by the plant and when the higher dune elevations of ore bodies B, C and D are mined. From this perspective the view would be of a reducing horizon line as the mine is proposed to be excavated from the south to north, i.e. mining activities would take place behind a soil embankment. The viewshed analyses and visual intrusion simulations indicate that for the most part project activities will not have a great effect on views from within this sector. Only the top sections of the PWP, the MSRSF and the mining operation at the highest dune elevations would be visible. However, as stated before, the mining will occur behind an earth embankment and exposed red earth would not be visible. Also, when the view is from the beach areas, the existing topography and vegetation would block most views to project activities. Visual intrusion from this sector is predicted to be *low* as there would be a minor change in landscape characteristics over localized area resulting in a minor change to a few key views. The potential visual impact of the Fairbreeze project at night could be significant as the mining operation will take place over the full 24-hour period and due to the high elevation of the mineral deposits in the dunes, these lights (located at the edge of the excavation) would be visible from far off at night in the areas discussed above. Light sources at night, particularly poorly directed security flood lighting, influence the visual impact of proposed project by causing a general glow in the area and would be visible from significantly longer distances than any structural features during daylight hours. Exacerbating this situation is that the study area, for the most part, is devoid of major light sources (other than Mtunzini and Gingindlovu) and therefore, lights would stand out against the dark background.							
Minimise visual disturbance		See Ref 86 and 87 (tree barriers)	C/O/D	ECO	Effective screening of mining activities	Monitoring of condition and effectiveness of rehabilitation and visual screening	Enhance visual screening by consulting specialist/ landscape architect
		See Ref 99 (mine northwards)	C/O/D	EXXARO			
		See Ref 9 and 10 (rehabilitate promptly)	C/O/D	EXXARO	Effectively minimising visual impact		
		See Ref 4 (minimise disturbance)	C/O/D	EXXARO			
	108	Existing indigenous and plantation vegetation will be retained wherever possible (especially along the N2 and the western and eastern extremities of the site and along the western boundary of the plant site). This forms part of the tree barrier recommendations (See Also Ref 86 and 87 on tree barriers.)	C/O/D	EXXARO	Effective screening of mining activities		
	109	An ecological approach to rehabilitation measures, as opposed to a horticultural approach to landscaping will be adopted wherever possible. For example communities of indigenous, preferable endemic, plants enhance biodiversity and blend well with existing vegetation. A registered landscape architect (SACLAP) will be consulted for this purpose. This approach could be considered along the N2 in areas where plantations will not necessarily be grown. If this is not possible then *Eucalyptus* will be planted in dense rows to create an effective tree screen along the N2.	C/O/D	ECO			
	110	All existing vegetation between the mining site and all public roads must be retained where possible. See Also Ref 86 and 87 on tree barriers.	C/O	ECO			
	111	The worked out area behind the mining face will be screened using shrub planting, where effective.	O	ECO			
	112	The RSF walls will have slopes no steeper than 1:2 and will be vegetated. The walls will be vegetated within 60 days after shaping and removal of disturbing factors. This will be a continuous process as the wall raising advances.	C/O/D	EXXARO	Revegetation within timeframes	Monitoring of the growth on slopes	Consult with specialist to assist with optimising growth
	113	Light pollution will be kept to a minimum. Security and flood lighting to only be used where absolutely necessary and will be directed downwards so as to avoid illuminating the sky. i.e. away from Mtunzini and residences west of the site and also away from the Murray property.	C/O	EXXARO ECO	The effective containment of light from facility fixtures	Monitoring of the condition and effectiveness of light fixtures	Realignment of light fixtures to reduce lighting impact
	114	Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the complex – this is especially relevant where the edge of the proposed mining is exposed to residential properties.	C/O	ECO			
	115	Avoid high pole top security lighting along the periphery of the site or at elevated locations.	C/O	ECO			
	116	Use security lighting at the periphery of the site that is activated by movement and are not permanently kept on.	C/O/D	ECO			

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Social and Socio-economic							
Detail description of aspect: The major impact of the construction and operational activities of the proposed mining at the Fairbreeze mining sites on the tourism industry in Mtunzini is to negatively affect the sense of place of the tourism destination. Local residents and the uMlalazi Tourism Association fear that the mining operations at Fairbreeze will discourage tourists from visiting and staying in the town. The socio-economic specialist study has specifically assessed the potential impacts relating to the mechanisms through which these possible impacts on the local tourism industry can be transmitted and assesses the significance of these impacts. The Fairbreeze operations will employ a contractor for the construction phase of the project that will be responsible for the recruitment and management of temporary construction workers. It is expected that approximately 1000 temporary employment opportunities will be generated during this phase. In addition, a substantial number of indirect employment opportunities will be created in the broader economy during the construction phase.							
Minimise changes in the demographics of the area	117	Where possible EXXARO will employ people from district 28 (uThungulu District Municipality). The EXXARO policy is to employ at least 60% of the people from the Region 28 and the remainder of the workforce from anywhere. This was approved by the HR&R Board Committee and agreed to with the current Community Forum, which represents Region 28. The Community Forum consists of representatives from Amakhosi and Councillors. People from outside this area will only be employed if the necessary skills required are not available in the local area.	C/O/D	EXXARO	Employ as far as possible people from local district A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities Mine with limited dust impacts	The number of people employed from local communities versus other areas	Consultation with Community Forum in order to improve employment from local district
	118	If suitably trained employees are not available from within the surrounding communities, EXXARO will, in accordance with the EXXARO Social and Labour Plan, introduce training programmes focused on raising the skill levels of the local residents.	C/O/D	EXXARO		The number of people trained by EXXARO	
	119	EXXARO will not allow establishment of informal settlements on its land and leased land (in consultation with Mondi)	C/O/D	EXXARO		No informal settlements on mining area	
Minimise increase in crime arising from mining construction activities	120	The northern boundary of the mine will be fenced and the fence regularly checked and maintained.	C/O/D	EXXARO		Fence in good condition	Fixing of the fence
	121	To discourage theft, loitering and public disturbances due to the influence of the mine, there will be no direct accessible link between FBCX and Mtunzini.	C/O/D	EXXARO		Number of people loitering on site	Improve security access to mining area
	122	It is recommended that there be increased security assigned to the mining areas with controlled access and maintained fences around the proposed mine construction areas.	C/O/D	EXXARO		Number of security issues	
Maximise possible contributions to the economy	123	The mine procurement policy will encourage the establishment of sustainable businesses from which goods are obtained, in accordance with the targets as set out in the EXXARO Social and Labour Plan.	C/O/D	EXXARO		Number of sustainable business established	Consultation with Community Forum in order to improve opportunities for local district
	124	Every attempt will be made to ensure that the mine is operated in a responsible manner (see all the commitments above) to ensure that tourism and eco-tourism will not suffer.	C/O/D	EXXARO		Implementation of grievance procedure Regular review of complaints lodged	Review grievances lodged in order to limit occurrence
	125	EXXARO will, where possible, support local accommodation establishments when hosting visitors from out of town.	C/O/D	EXXARO		Monitoring of local accommodation used	Review of accommodation booking principles
Ensuring the continuation of the Twinstreams Environmental Education Centre	126	Tree buffers between Twinstreams and FBC-ore body will be retained. See Also Ref 86 and 87 on tree barriers.	C/O/D	EXXARO		Monitoring as specified in air quality monitoring plan (10.3.3.5) and any additional monitoring identified in environmental	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
						authorizations	
	127	Pre-mining occupancy statistics for Twinstreams must be obtained and compared to occupancy statistics during mining operations. Significant declines in these figures may necessitate that EXXARO provide compensation.	P	EXXARO		Obtain pre-mining statistics of Twinstreams and Umlalazi Nature Reserve, Xaxaza	Review statistics and enter into discussions with affected party
	128	As a proactive measure, to limit decline at the Centre, EXXARO should financially assist with investigating alternatives e.g., identify other suitable alternate sites which could be developed for Twinstreams and linked with the current site.	P/C/O	EXXARO		Implementation of grievance procedure	Consult with Local Municipality and groups to review needs at existing eco-tourism facilities
Supporting eco-tourism development in Mtunzini as a way of offsetting any losses due to changes in 'sense of place'	129	EXXARO will contribute financially to enhance the existing eco-tourism facilities in order to offset any loss of sense of place, e.g. the upgrade of the deteriorating Raphia Palm boardwalk, the extension of the Mtunzini beach boardwalk, upgrade of the dirt roads in the uMlalazi Nature Reserve, development of bird hides at suitable sites within Mtunzini.	P/C	EXXARO	Employ as far as possible people from local district A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities Mine with limited dust impacts Equal opportunities for service providers	Regular review of complaints lodged	
Encouraging educational tourism at the Fairbreeze site	130	EXXARO will offer regular educational tours to school and other interest groups to describe the mining process.	C/O/D	EXXARO		Statistics of number of educational groups	Provide additional opportunities for educational groups to attend educational tour
Changes in physical infrastructure, e g. roads	131	Heavy goods vehicles related to EXXARO FB mine will not be allowed to pass through Mtunzini. EXXARO have proposed to construct an off-ramp onto Bridge 4; which would mean that the mine will not have use the Ring Road unless special circumstances and adjacent landowners and existing road users informed.	C/O/D	EXXARO		Implementation of grievance procedure Regular review of complaints lodged	Review grievances lodged in order to limit occurrence
	132	During construction of this off-ramp, temporary usage of existing internal roads will be communicated to adjacent landowners and existing road users.	C	EXXARO			
Minimise risk of an increase in social pathologies and diseases	133	To combat a rise in the incidence of social diseases, education and awareness campaigns will be held with all mine employees stressing the precautionary measures that will be taken to avoid such diseases.	C/O/D	EXXARO		Statistics of incidence of social diseases	Increase awareness campaigns on required topics
Minimise impact on adjacent farmers and landowners	134	Drainage streams on neighbouring farms and boreholes used for irrigation will be monitored to ensure that water quality is maintained. If farm drainage streams require additional filtering or maintenance due to mining impacts the landowners will be compensated.	C/O	EXXARO		Implementation of water quality monitoring programmes	Review grievances lodged in order to limit occurrence
	135	Communicate rehabilitation process and plans for Fairbreeze Mine to the general public, and provide regular updates on this matter.	P/C/O/D	EXXARO		Implementation of grievance procedure Regular review of complaints lodged	
	136	Twin Streams Nursery or other initiatives with local participation will be given an opportunity to provide the services and plants required for rehabilitation or landscaping.	C/O	EXXARO		Review of service providers for various services	Review appointment processes for provision of various services
Devaluation of property adjacent to the FB site	137	The study area's current economic success is linked to the natural environment. Every attempt will be made by EXXARO to ensure that the mine is operated in a responsible manner to ensure that tourism and eco-tourism will not suffer. This will ensure the economic sustainability of the study area once the mine has closed. It will also yield benefits such as a smooth and conflict free relationship with the residents of the study area.	C/O/D	EXXARO		Successful rehabilitation and Rehabilitation Research Programme recommendations	Incident register will be kept to up to date and necessary actions executed based on incident Consult with rehabilitation

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	138	The mining method and mine rehabilitation have the power to influence the area long after the mine has closed. Rehabilitation will thus be conducted in such a manner that it will have a positive impact upon land value and hence upon sustainable post-mining land use. (Rehabilitation will be done on the basis of information derived from the Rehabilitation Research Programme).	C/O/D	EXXARO	Rehabilitation successful to enable specified post land use	Ongoing inspection of rehabilitation/closure procedures	specialist/Biodiversity Forum where required
	139	Gerrard Wessel's (Grant McMurray or John Murray) and Jim Parker's farm property prices will be affected by the mining at sites A, B, D and / or the construction of the RSF. A non-compulsory pre-mining market related offer should be made for the purchase of these two properties. These properties should be included as a buffer between the mining operations and other neighbouring properties.	P/C	EXXARO	A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities	Ongoing evaluation of monitoring data to evaluate impact of mine Implementation of grievance procedure Regular review of complaints lodged Implementation of all required monitoring programmes	Discussions with adjacent owners Review of adequacy of monitoring programmes Review of adequacy of complaints procedure
	140	If Jim Parker does not accept the market related offer for his property made by EXXARO, and continues to farm geraniums for essential oils and subsequently loses his organic accreditation due to mining activities, he must be compensated for the loss in value of his harvested crop, until organic accreditation is regained.	P/C	EXXARO			
	141	If Jim Parker accepts the market related offer for his property made by EXXARO, the essential oils processing plant (distillery) on his property needs to continue to operate throughout the lifespan of the mining activities to preserve the livelihoods of the 50 farmers who currently supply product to the plant for processing. It will be the responsibility of Jim Parker to have a succession and operational plan in place for the future on-going running of the essential oils processing plant.	P/C	EXXARO			
Maintain positive and transparent relationships with EXXARO's stakeholders	142	It is proposed that a Siyaya monitoring forum be established with a key focus on sustainable land use and management within the Siyaya catchment. The forum will meet quarterly to discuss progress, monitoring and issues.	P/C/O/D	EXXARO	Successful implementation of the Rehabilitation programme and offset plan		
	143	EXXARO will maintain communication channels with I&APs through the community forums, e.g. Greater Mhlathuze Environmental Forum (quarterly); Community Forum (quarterly); Employee Forum (quarterly); Greater Mtunzini Communications Forum (quarterly); Regulatory authority meeting (quarterly); Amakhosi information meeting (quarterly); and Councillors information meeting (quarterly).	C/O/D	EXXARO	A mine with minimal conflict with adjacent communities Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities		
	144	The forum information sessions will initially be aimed at construction activities, and as mining commences, will gradually change over to reflect the status of operations. Forums will be maintained until mine closure.	C/O/D	EXXARO			
	145	Communicate rehabilitation process and plans for Hillendale Mine and Fairbreeze Mine to the general public.	C/O/D	EXXARO			
	146	Inform the general public of the EXXARO comments and complaints procedure and contact details. Ensure annual notification of the facility.	C/O/D	EXXARO			
	B16	After lodging a compliant, the ECO must inform interested and affected parties that they are allowed to contact the EA to discuss their complaints should they feel their complaint is not being resolved through the normal complaints management procedures followed by the ECO.		EXXARO			
Provide stakeholders with relevant information	147	All information as described in the relevant sections will be made available to interested and affected parties via the communication channels outlined in Ref 143.	C/O/D	EXXARO			
	148	Authorities will be provided with information as specified in the relevant legislation and authorisations.	C/O/D/P	EXXARO			

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Put in place a fair and transparent process with regards to recruitment and management of labour.	B17	As committed to communities, EXXARO will without compromising job-specific skills requirements, safety, quality and meeting of construction timeframes, define a recruitment strategy based on principles, such as including a fair and accessible process of advertising employment opportunities, skills development and training opportunities, creation of opportunities for local entrepreneurs.	P/O/D	EXXARO	No community discontentment and unrest due to perceived unfair recruitment procedures.	The number of people employed from local communities versus other areas	Consultation with Community Forum in order to improve employment from local district
Provide information to relevant authorities as required	161	Applications for registration of dams with a safety risk will be submitted to DWA.	C	EXXARO	Dam registered with DWA	Legal review of all conditions and permits	Register dam with DWA
	162	The water use license applications will be amended or applied for as required.	C	EXXARO	DWA approval where required		Conduct necessary actions to obtain required approvals
	156	Performance assessments relating to the contents of Section 10 will be conducted annually by an Independent Environmental Auditor (See Section 10.4.1).	C/O	EXXARO	Adhere to conditions of permits	Annual Independent Auditing	Conduct rectifying actions based on outcome of the audit/legal review
	B18	All conditions of all applicable licenses, permits and authorisations related to the Fairbreeze Project will be adhered to.	C/O/D	EXXARO		Legal review of all conditions and permits	
Limit nuisance impacts due to mining and related activities on site	165	Good 'housekeeping' (keeping the site tidy and neat) is essential throughout all phases of the project. Adequate toilet and proper sanitation facilities shall be provided at all work areas, approximately one toilet per 15 staff members. Sewerage sludge removed from chemical toilets and conservancy tanks (by a 'honey sucker') will be disposed of at a licensed facility for such waste.	C/O/D	EXXARO	Provision of all appropriate waste manifests for all waste streams Internal site audits ensuring that waste segregation, recycling and reuse is applied appropriately	Regular review of complaints lodged Observation and execution of waste management practices throughout all phases Waste collection to be monitored on regular basis Relevant waste documentation completed	Discussions with adjacent owners Review of adequacy of monitoring programmes Review of adequacy of complaints procedure
Aspect: Engineering design recommendations							
Maintain the RSFs to minimise the risk of failure	149	The RSFs will be regularly inspected by suitably qualified consultant engineers who will devise a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits.	C/O/D/P	EXXARO	Implement a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits.	Conduct audit as per management principles	Review outcome of management principles and audits on stability of the dam
	150	The RSFs will be constructed and maintained in accordance with the design criteria specified by the detailed design engineers and in accordance with the Code of Practice required in terms of the Mine Health and Safety Act.	C/O	EXXARO			
	151	Good housekeeping will be maintained to minimise the risk of pollution. The mine will operate in such a way as to prevent uncontrolled releases of potentially polluting material.	C/O/D	EXXARO	Development and implementation of contamination clean-up plan to ensure that any spills are cleared as soon as possible and to ensure disposal of spilt material in an appropriate way.	Ongoing monitoring of clean up actions Annual Independent Auditing Legal review of all conditions and permits	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
	152	The mine will ensure that relevant equipment is well maintained and fully operational. Development and implementation of equipment maintenance schedule.	C/O/D	EXXARO	All equipment to be maintained in good working order No complaints from adjacent communities	As identified in maintenance schedule	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	153	Non-mining waste materials will be classified according to the Minimum Requirements for the handling and disposal of waste as published by DWA. Classified waste materials will be placed in containers specifically identified for this purpose, and disposed in appropriate disposal sites. Hydrocarbons in particular will be disposed in a licensed H:h disposal site. All spills will be treated as per the approved EXXARO spills procedure.	C/O	EXXARO	No complaints from adjacent communities	As per minimum requirements of waste disposal As per spills procedure Internal site audits	
	154	The approved EXXARO Emergency Procedure will be applied during all phases of mining.	C/O/D	EXXARO			
	155	All employees and contractors will receive basic training in environmental awareness as well as the applicable sections of the Emergency Procedure. The environmental awareness training will include reference to the following: identified environmental risks in the workplace; Environmental Management Plans related to the specific risks; provisions and commitments contained in Section 10; incident identification and reporting.	C/O	EXXARO	Fast and affective remediation of conflict Minimise potential for conflict with surrounding communities Mine with limited impacts on surrounding communities	Statistics of incidence reports	Increase awareness campaigns on required topics
	157	The mine will carry out regular risk assessments to ensure that potentially hazardous materials are appropriately stored, labelled and handled.	C/O	EXXARO	All equipment to be maintained in good working order No complaints from adjacent communities	As per minimum requirements of waste disposal As per spills procedure	Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	158	To minimise the risk of pollution arising from the use of mobile equipment, drivers (both mine and contractors) will be trained on how to deal with accidents involving hydrocarbons and other potential contaminants. Emergency action plans will be drawn up to deal with serious spills on the road in order to minimise the impact on water resources.	C/O/D	EXXARO			
Maintain the RWD to minimise the risk of failure and maintain operating standards	159	The RWD will be constructed and maintained in accordance with the design criteria specified by the detailed design engineers and in accordance with the Code of Practice required in terms of the Mine Health and Safety Act.	C/O	EXXARO	Implement a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits. No water discharged below required water quality levels from the RWD	Conduct audit as per management principles Annual Independent Auditing Legal review of all conditions and permits Monitoring of the discharge from the RWD and clean water diversion trenches will be conducted on a monthly basis.	Review outcome of management principles and audits of the RWD Incident register will be kept to up to date and necessary actions executed based on incident Consult with specialist where required
	160	The RWD will be regularly inspected by suitably qualified consultant engineers who will devise a system of checks and management principles to ensure that the stability of the dam remains within acceptable limits.	C/O/D/P	EXXARO			

<table>
<tr><th>Objectives to manage potential impacts</th><th>Ref.</th><th>Mitigation action</th><th>Time period for impact</th><th>Responsible party</th><th>Performance indicator</th><th>Monitoring</th><th>Remedying action</th></tr>
<tr><td>SANRAL management principles for road construction and related issues</td><td>163</td><td>SANRAL has a generic EMP which will be adhered to at all times by the Contractor undertaking the on and off ramp construction. The on-off ramp construction is considered part of the Fairbreeze project and will thus adhere to all other EXXARO requirements, as well as all mitigation measures contained in the BAR.</td><td>P/C/O/D</td><td>EXXARO</td><td>Conformance to all EMP conditions</td><td>As per EMP conditions</td><td>Incident register will be kept to up to date and necessary actions executed based on incident
Consult with specialist where required</td></tr>
<tr><td>ESKOM management principles of power lines and related issues, e.g. maintenance of servitude area</td><td>164</td><td>ESKOM has a generic EMP and protocol document, e.g. AMAFA requirements, vegetation removal procedure, which will need to be adhered to at all times by the Contractor undertaking the powerline deviation. The ESKOM powerline re-alignment is considered part of the Fairbreeze project and will thus adhere to all other EXXARO requirements, as well as all mitigation measures contained in the BAR.</td><td>C/O/D</td><td>EXXARO</td><td>Conformance to all EMP conditions</td><td>As per EMP conditions</td><td>Incident register will be kept to up to date and necessary actions executed based on incident
Consult with specialist where required</td></tr>
<tr><th colspan="8">Further investigation</th></tr>
<tr><td colspan="8">Detail description: These items require further monitoring and then updating of the applicable models and databases</td></tr>
<tr><td rowspan="3">Undertake further investigations/actions prior to the commencement of mining to confirm predictions made in this report</td><td>166</td><td>Detailed engineering design for the final mitigation plans for the impacts identified during the environmental impact assessment process.</td><td>P/C/O</td><td>EXXARO</td><td rowspan="3">Monitoring as per specialist study recommendations and monitoring programmes
Monitoring as per environmental authorisations and permits
Relevant forums and government departments up to date with monitoring data</td><td rowspan="2">As per schedules and scope of monitoring programmes</td><td rowspan="2">Consult with applicable specialist/government department if non-compliant</td></tr>
<tr><td>A9</td><td>Groundwater and surface water models to be updated with additional DWA and EXXARO monitoring data on an annual basis, or as specified by DWA.</td><td>P/C/O/D</td><td>EXXARO</td></tr>
<tr><td>167</td><td>Adhere to all specialist study recommendations and monitoring programmes as per Section 10.3.3 of the EMP. Below is included a summary table.
<table>
<tr><th>Item</th><th>Points</th><th>Frequency and Duration</th></tr>
<tr><td>Surface water quality</td><td>Watercourses in all affected catchments</td><td>Quarterly for life of mine</td></tr>
<tr><td>Water course flow</td><td>At weirs in Siyaya and Amanzimnyama Rivers</td><td>Monthly for life of mine</td></tr>
<tr><td>Ground water quality and levels.</td><td>Boreholes. See Figure 10.4</td><td>Quarterly for life of mine</td></tr>
<tr><td>Water management structures</td><td>Drains, berms, dams, channels, sumps</td><td>Quarterly and after heavy events.</td></tr>
<tr><td>Aquatic Biomonitoring</td><td>Proposed monitoring localities.</td><td>Quarterly for life of mine</td></tr>
<tr><td>Dust buckets</td><td>Dust fallout network comprising of two twin directional dust buckets and installed single buckets.</td><td>Monthly for life of mine</td></tr>
<tr><td>Noise monitoring</td><td>At sensitive receptors</td><td>Weekly during PWP construct
Quarterly during mining</td></tr>
<tr><td>Tree barriers</td><td>All planted tree barriers</td><td>Quarterly for 3 years after thereafter bi-annually until clo</td></tr>
<tr><td>Vegetation establishment</td><td>All revegetated sites</td><td>Quarterly for 3 years after thereafter bi-annually until clo</td></tr>
</table></td><td>P/C/O/D</td><td>ECO</td><td>As per schedules and scope of monitoring programmes</td><td>Consult with applicable specialist/government department if non-compliant</td></tr>
</table>

Objectives to manage potential impacts	Ref.	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Undertake further investigations/actions during mining to confirm/improve predictions made in this report.	A10	The groundwater model will be updated prior to mining in order to ensure that the conservative estimates are refined and correct management applied. The groundwater model must be updated when significant new information is derived from any of the monitoring programmes, or at least every year. Information derived from the model must be incorporated into future management and monitoring.	P/C/O/D	EXXARO			
	A11	The surface water model will be updated when significant new information is derived from any of the monitoring programmes, or at least every year. Information derived from the model must be incorporated into future management and monitoring.	P/C/O/D	EXXARO			
	A12	Exxaro will establish, drive and fund a Rehabilitation Research Programme. The Rehabilitation Research Programme will investigate all aspects concerning the rehabilitation of, and vegetation growth on, areas disturbed during mining at the Fairbreeze Mine. The programme must be multi-disciplinary, with the objective of producing objective and scientific information to guide and continuously improve the rehabilitation of areas affected by mining.	P/C/O/D	EXXARO			
	A13	Exxaro will establish, drive and fund the Siyaya Biodiversity Forum. The Siyaya Biodiversity Forum will be responsible for the development, implementation and management of the biodiversity offset area until the area is formally transferred to a conservation agency.	P/C/O/D	EXXARO			
	A14	The mining of FBD may not be undertaken until such time as EXXARO has concluded monitoring and studies necessary to demonstrate to the competent authority the low significance of mining on the dune cordon wetlands. Such studies must also present the management, mitigation and rehabilitation requirements of mined areas which potentially impact on the dune cordon wetlands.	P/C/O/D	EXXARO	No mining of FBD orebody	Performance assessments as per legal requirements	Discussions with relevant government authorities
	168	Update EXXARO complaints procedure to include Fairbreeze Mine. Complaints procedure details provided to IA&PS prior to start of construction, and updated as required.	P/C/O/D	EXXARO ECO	Complaints captured in time, and necessary response actioned. Feedback provided to complainant within timeframe specified in procedure.	Ongoing evaluation of monitoring data to evaluate impact of mine Implementation of grievance procedure Regular review of complaints lodged Implementation of all required monitoring programmes	Review of adequacy of monitoring programmes Review of adequacy of complaints procedure Consult with specialists

10.3.3 Planned monitoring and environmental management programme performance assessment

The following monitoring programmes have been compiled by specialists during assessment of the impacts, and must be adhered to during all phases of the project.

10.3.3.1 Biodiversity monitoring programme

- A biodiversity monitoring programme within the natural areas. This must include flora, all assessed faunal taxa within this study as well as wetland functionality. The data and summary of the results must be submitted to KZNW, DAEARD and DWA on a bi-annual basis to ensure they are kept informed.
- An alien invasive plant monitoring programme must be established and must coincide with the monitoring of indigenous forests and riparian zones to establish whether mining activities are contributing to the spread of alien invasive species;
- Surface water runoff into riparian zones must be monitored and moderated in order not to increase or decrease the flow to such an extent that it will affect the vegetation of these riparian zones.
- Siltation in the riparian zones must be monitored at various points within each of the riparian zones;
- The monitoring of the indigenous forests and wetlands must be used in order to determine proactive management strategies designed to maintain the biodiversity and biological integrity of these areas.

Prior to closure, the following will be conducted:

- A post-mining monitoring plan will be included to evaluate the rehabilitation success based on avifaunal successional patterns and trends.

10.3.3.2 Management of biodiversity buffer zones

Mining of the ore bodies will remain outside the wetlands and sensitive areas. Buffer zones have been specified around all sensitive areas (see Figure 10.1) and no disturbances will be permitted inside of these areas. The management of buffer zones will be undertaken as follows:

- Buffer zones needs to be clearly demarcated in the field prior to construction activities commencing so that there can be dispute or uncertainty of buffer location;
- Compliance with the buffers needs to be managed and enforced by environmental management on the mine;
- Any infringement into buffer zones needs to be strictly evaluated, approved and monitored by environmental management on the mine;
- In cases where temporary impacts within the buffer zone are unavoidable immediate remediation needs to be implemented upon completion of activities;

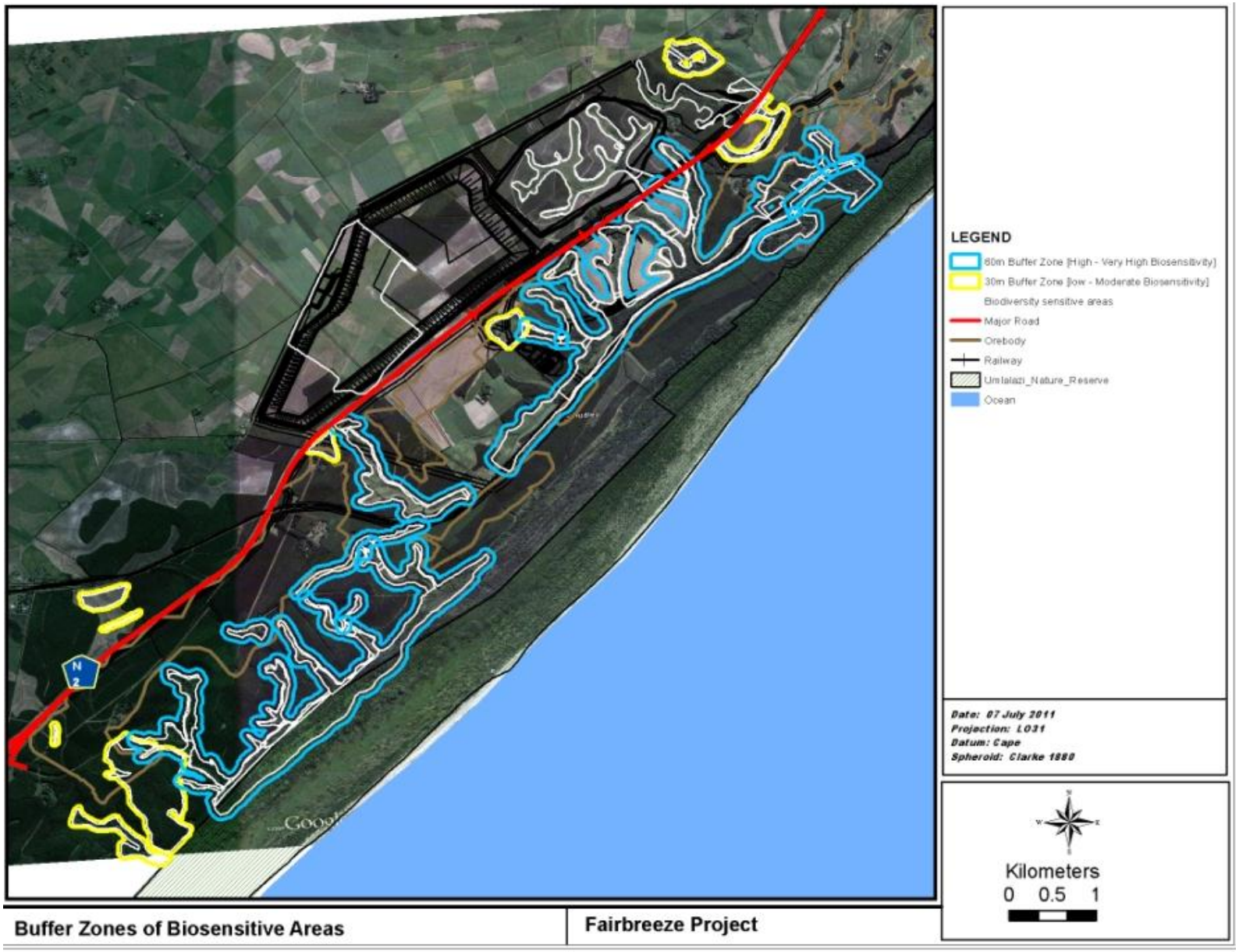


Figure 10.1. Buffer zones around sensitive biodiversity areas

- Effectiveness of buffers needs to be monitored throughout the life of the mine. This will allow remedial actions to be taken if recommended buffer zones are found to be inadequate;
- Any non-compliance with the above conditions will be regarded as a non-compliance in terms of mining license conditions.

10.3.3.3 Aquatic ecology monitoring programme

The application of a selection of the recommended biomonitoring indices (SA River Health Programme) in this regard is recommended as follows;

- Monthly flow measurements on the Siyaya, Amanzimnyama, Sabeka and Nyezane rivers
- Water quality – monthly (surface and groundwater monitoring)
- Freshwater macro invertebrates (SASS) – 4 times a year (quarterly) with habitat assessment
- Fish sampling for calculation of the Fish Assemblage Integrity Index (FAII) – once every 6 months
- Index of Habitat Integrity – comprehensive survey once a year
- Estuarine physico-chemical conditions and macro benthic invertebrates surveys (quarterly) to assess the response of the downstream Siyaya estuary to flow changes, activities or potential polluting industries
- Develop a spill response and clean up protocol.
- Monitor water quality and levels of down gradient groundwater users.

10.3.3.4 Noise monitoring programme

- During construction of the PWP, the noise specialist will be on site on a bi-weekly basis to assess the noise impacts and ensure moveable noise screen is being applied optimally.
- During operations noise measurements will be undertaken at sensitive receptors on a monthly basis.

10.3.3.5 Air Quality monitoring programme

An AQMP for the proposed Fairbreeze mine was established. The mine proposed the following intervention strategies.

- Monthly monitoring of Dust fallout network comprising of two twin directional dust buckets and single buckets (Table 10.2 and Figure 10.2).
- Quarterly assessment and maintenance of all planted windbreaks.

Figure 10.2. Tree screens required for visual, noise and dust barriers (source NLA 2011)

The following proposed monitoring program would address the shortfalls of current situation.

Table 10.2. Monitoring program for sensitive receptors

Receptor	Monitoring			
	PM-10		Dust fallout	
	Method	Frequency	Method	Frequency
Mtunzini	E-sampler	Continuous	Dust buckets	Continuous
Brig Parker Homestead	E-sampler	Continuous	Dust buckets	Continuous
McMurray Organic Farm	E-sampler	Continuous	Dust buckets	Continuous
Twinstreams nursery and educational centre	E-sampler	Continuous	Dust buckets	Continuous

10.3.3.6 Surface Water monitoring programme

- 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. A long term monitoring schedule needs to be designed and strictly adhered to;
- Monitoring points will be rationalised to avoid duplication at certain points and the nomenclature standardised. There are not many monitoring points in the south and more must be included into the surface water monitoring program. The points will be logged with a GPS and the naming convention agreed with EXXARO so that samples can be taken from similar points; and
- The proposed surface water monitoring points which include some of the existing and additional surface water monitoring points are to be implemented into the surface water monitoring program (Figure 10.3).

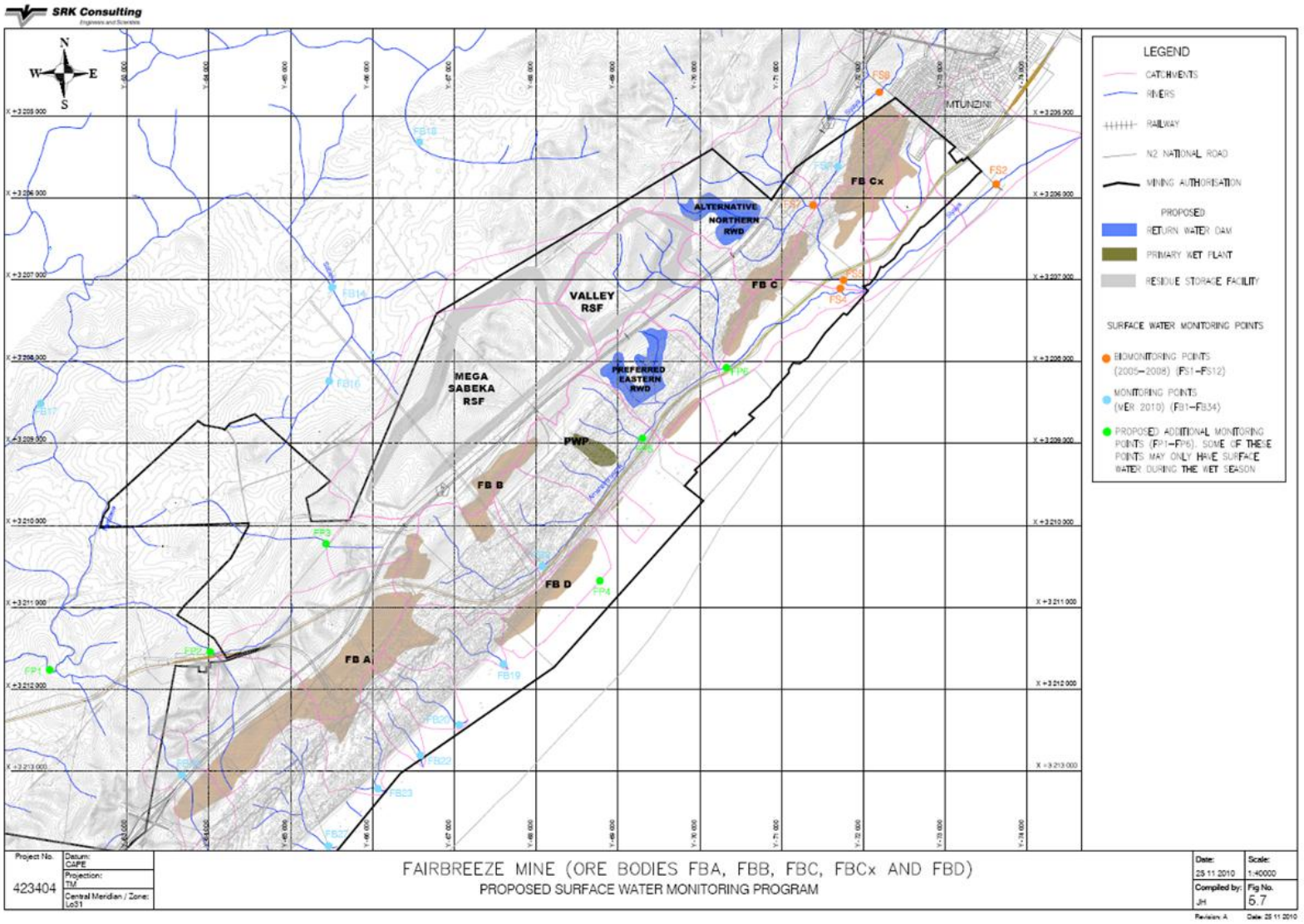


Figure 10.3. Proposed surface water monitoring points

10.3.3.7 Ground Water monitoring programme

A database will form the central information store accessible to all responsible for water control. The following information will be included:

- Water levels for all monitoring points
- Precipitation
- Quality data
- Flow measurements along Amanzimnyama and Sabeka rivers
- Conduct hydraulic testing on selected new monitoring boreholes proposed.
- Numerical groundwater flow model will be re-run if the mining schedule is altered or improved estimates of losses during mining and pit backfilling is made.
- Develop a spill response and clean up protocol.
- Monitor water quality and levels of down gradient groundwater users.

The groundwater monitoring network will consist of existing water supply boreholes, piezometers installed by Exxaro, monitoring boreholes drilled around the RSFs and six additional new monitoring wells are proposed to augment the current network (Figure 10.4). Some nineteen boreholes are recommended to be sampled and water levels recorded. These boreholes will be sampled on a quarterly basis for at least the first two years, with at least a year's monitoring prior to mining. Thereafter the monitoring schedule could be revised based on the trends observed. The parameters monitored will be the same as those targeted for during this study, namely:

Rest Water Levels	Sulphate SO_4,
pH	Magnesium Mg
Electrical Conductivity EC	Iron Fe
Sodium Na	Manganese Mn
Calcium Ca	Aluminium Al
Potassium K	Copper Cu
Alkalinity as $CaCO_3$	Titanium Ti
Ammonia NH_4	Zircon Zr
Nitrate NO_3	Nickel Ni
Chloride Cl	Radiation(appropriate analysis to be advice by relevant specialist)

Once trends have been established the list of parameters could be revised. The sampling must be undertaken according to accepted protocols. Water levels must be collected from the remaining boreholes on a monthly basis.

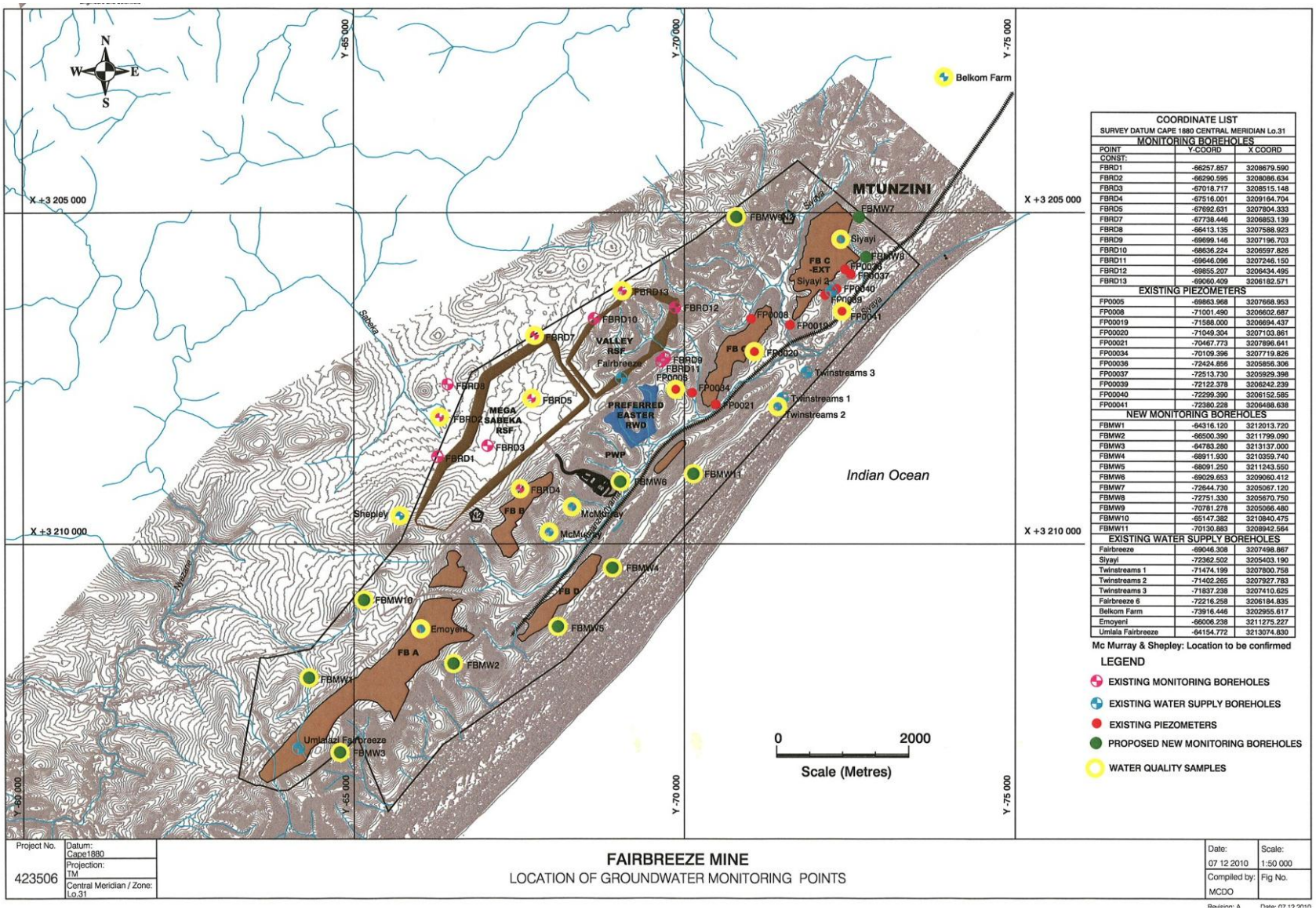


Figure 10.4. Proposed ground water monitoring sampling points

10.3.3.8 Alien Plants monitoring programme

An alien plant removal programme will be compiled and adhered to. This plan will include a detailed map of areas and surveying schedule. This programme will be approved by DWA.

10.3.3.9 Heritage monitoring programme

The mining lease consists of many heritage features dating to several periods. There will be a general monitoring program whereby an area is surveyed during or after earthmoving activity. A site-specific management plan is also required where sensitive areas are either monitored, sampled or excavated and mapped. All sites mentioned in the text will be considered as being sensitive and require monitoring. Table 2 of the Heritage Impact Assessment (Appendix D8) summarises the management issues. Figure 13 of the Heritage Impact Assessment (Appendix D8) summarises the significance of the sites.

10.3.3.9.1 Buildings:

Several buildings were surveyed, but only one building is of high significance and will not be damaged. All buildings will be adequately recorded before demolition, in the form photographs and basic measurements, indicating the various additions. The buildings may have historical middens and these need to be sampled and partially excavated, where required.

10.3.3.9.2 Archaeological sites:

The area is of low archaeological significance, mostly due to afforestation. The entire area needs to be monitored on a regular basis during mining activity. This would occur after vegetation clearance and before actual mining. Any earthmoving activity will be monitored for archaeological sites.

10.3.3.9.3 Graves:

Several known graves exist in the mining lease. A social impact assessment will be undertaken dealing specifically with the graves for the entire mining lease. This process will involve distribution of a general letter to all landowners requesting information regarding potential graves known to them in the mining lease. It is likely that more graves will be found in the mining lease during the operational phase, and thus social impact assessment would already be in place to deal with these remains.

10.3.3.9.4 Palaeontology:

The mining lease is unlikely to yield palaeontological remains unless the mining operations reach the original seabed levels (Dr. Gideon Groenewald pers. comm.).

10.3.3.10 Social Action Plan

Exxaro KZN has a Corporate Social Investment strategy that aims to add value to the quality of life of local communities in which it operates and is aligned with local municipality local economic development plans.

Focus areas for Exxaro KZN Sands' socio-economic development programme are:

- Education, focusing on the development of maths and science in high schools, and management in schools;
- Health, focusing on AIDS and cholera education at the grass roots level in the surrounding communities;
- Business development, focusing on establishing new sustainable SMMEs and supporting existing SMMEs, and skills development in HDSA communities;

- Skills development through training internally in the company (learnerships, internships, etc) as well as skills development in the communities; and
- Environmental stewardship programmes.

The investigations of this study have highlighted potential areas where social investment opportunities may be further investigated. These are discussed in the categories below and are based on meetings held with the Tribal authorities in the area, Mtunzini town residents' discussions, the Social and Labour Plan for Exxaro KZN Sands, and existing local economic development plans.

Educational: Support from Exxaro could take a form similar to the Science Academy established at Hillendale operations. Integrating activities with local municipality efforts will ensure maximum, sustainable benefits to local communities. Furthermore, experience from the Science Academy project at Hillendale will allow the project to be effectively tailored to meet local communities' needs and provide appropriate support systems.

Training and development: Please note that it was mentioned in the Tribal Authorities meeting that to bring labour from areas outside Mtunzini and its communities would cause conflicts and tension. The result would be the same as the conflict that ensued in Madlankala area, where labour was sourced from other communities. It was proposed that there will be at least one person per tribal authority employed by Exxaro in the proposed mine.

It was also mentioned in the Tribal Authorities meeting that due to unemployment of the local people, crime is common in these communities. If Exxaro can employ local people, crime levels in the area would be likely to decrease.

Housing: Assistance from Exxaro with community housing projects, specifically to Rural Housing Projects in affected tribal areas, would significantly aide in reducing housing and service backlogs and relieves pressure from local municipalities. A project would form part of the overall municipal housing plan, ensuring the sustainability of the project, and improve the quality of life of local people.

Health facilities: Exxaro have trained peer counsellors and have AIDS educators and a counselling service on site at its Hillendale operations. Exxaro also support an AIDS education programme in partnership with King Goodwill Zwelithini focusing on educating communities at grassroots level through cultural awareness. It is recommended that peer counsellors, AIDS educations and counselling services are extended to Fairbreeze operations and education programmes are given continual support.

Distances and availability of health care centres are also a local concern for local communities. As an extension of their training and development initiatives, Exxaro could look at training primary health care practitioners in order to run mobile Primary Health Care Facilities in these communities.

Conservation initiatives: Both ULM and uMhlathuze LM have identified tourism as a sector to development, with a strong emphasis on the natural environment, biodiversity and eco-tourism opportunities, Local residents of Mtunzini and surrounding landowners have similarly dedicated time and money to the preservation of the natural environment through the rehabilitation of the UNR, and have strong feelings of attachment to the area.

In light of this, and the considerable potential for recreational activities in the UNR, it is recommended that Exxaro investigate possibilities to support on-going conservation efforts, developing a community forum to discuss potential projects such as contributing to conservation and education efforts at the Twinstreams centre, supporting the maintenance of local cycling and hiking trails and interacting with local conservation organisations. This will build community relations, develop resources for tourism potential, and assist in protecting the natural environment.

10.4 ROLES AND RESPONSIBILITIES

The key roles for this project has been described below, and the specific responsibilities as per the various time periods within which the measures contemplated in the EMP must be implemented, have been included in Table 10.1.

10.4.1 Applicant (EXXARO)

- EXXARO will be the owner of the Fairbreeze Mine and associated infrastructure and will be the holder of environmental approvals. EXXARO corporate management is ultimately responsible for the implementation of the EMP during all phases of the project. EXXARO is a certified ISO14001 company which includes fulfilling the approved environmental policy.
- EXXARO must ensure adherence to all conditions within the EA.
- EXXARO must appoint the 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.
- EXXARO will appoint a capable and suitably qualified and independent external Environmental Auditor (EA) to monitor and audit compliance with the EMP on a regular basis.
- The EA must be independent to EXXARO and the details of the appointment to be submitted to the competent authorities. EXXARO to ensure that all appointed Contractors are bound to implement the EMP as it applies to the Contractors' line of work.
- Should any activity be planned on the site that requires an environmental authorisation, permit or license approval, which is not covered by existing authorisations or approvals, appropriate applications for authorisations and approvals must be lodged with the competent authorities. These includes listed activities in terms of the NEMA, NEMWA, NWA and MPRDA as well any other environmental acts and regulations.
- EXXARO senior management to report major environmental incidents and major EMP 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 EXXARO incident reporting system.

10.4.2 Environmental Auditor (EA)

- The EA to conduct regular audits of the project site and surroundings to verify EMP and general environmental legal compliance.
- The EA to act as guide and advisor to the PM, ECO and EXXARO in matters related to EMP implementation and environmental legal compliance.
- The EA to compile and submit annual environmental compliance audit reports to EXXARO and competent authorities during all project phases.
- The EA (or alternative independent consultant) to attend environmental monitoring committee meetings (as arranged by the PE).

10.4.3 Project Engineer (PE)

- Appointing the appropriately qualified contractor to co-ordinate, supervise and expedite different action plans.

- Ensuring adherence to the DAEARD conditions of authorization 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 the adherence to statutory safety, health and environment (SHE) standards and ensuring the construction activities comply with the EMP.
- Monitoring the site and services corridor on a daily basis 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 contractors compliance and ensure documentation management.
- Ensuring that the contractor has a copy of the EMP, BAR and all relevant environmental permits and authorisations.
- The operational management of the new Eskom infrastructure must be done in accordance with Eskom environmental management procedures.
- The operational management of the new SANRAL infrastructure must be done in accordance with SANRAL environmental management procedures.

10.4.4 Contractors

- Managing and operating their activities with due care and diligence.
- Contractors to familiarise themselves with the EMP 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 EMP and environmental authorisations and permits.
- Contractors to implement EMP amendments, EMP procedures and written EMP instructions issued to them by the ECO, within the timeframe specified by the ECO in the EMP 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 implementation of the EMP as it applies to the nature of the contract with EXXARO.

10.4.5 Environmental Control Officer (ECO)

- Identification of possible areas of improvement during construction.
- 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.
- Monitoring implementation of the EMPr and all authorisations by the contractor.
- Advising the project manager on actions or issues impacting on the environment and provide 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, EA, 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).

10.4.6 Public relations officer (PRO)

- Design and implement a public and stakeholder communication strategy.
- The EXXARO environmental monitoring committee meetings will be held regularly in order to maintain open lines of communication between EXXARO 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.

10.5 COMPLIANCE MONITORING, PERFORMANCE ASSESSMENT AND REPORTING

A copy of this updated Final EMPR, the Amended Final BAR and other environmental authorisations and permits must be available on site at all times. Compliance with all elements of the EMP (Section 10 within this report) and other environmental authorisations and permits must be reviewed as indicated within Table 10.1 by the site engineer and all responsible parties must sign an acceptance letter. In addition it must be noted as per the NEMA No 107 of 1998 (Section 28) offending parties will be held financially accountable for any pollution or environmental damage.

ESKOM has provided a generic EMP, according to their requirements and standards, for the powerline deviation. This has been included as an Appendix to this report, and work on the powerline will require adherence to this EMP all times (Appendix F). The standard EMP from SANRAL for management of construction impacts during off-ramp construction has been included in Appendix F.

Best environmental management practises must be implemented as per the DWA Integrated Environmental Management Series (2005) for Environmental Best Practise Management Construction.

10.5.1 Compliance monitoring

The Environmental Manager, with assistance from the ECO, will monitor the environmental compliance with the Environmental Authorisation and the EMP by all parties concerned.

10.5.1.1 Design compliance monitoring

During the design phase, the Environmental Manager will meet with the Project Engineer to highlight design needs as specified in the EMP. On completion of the design, relevant information will be reviewed by the ECO to ensure that the design demonstrates compliance with environmental requirements. The PE will also provide preliminary construction site layout plans to the ECO and EA for review.

10.5.2 Site compliance monitoring

10.5.2.1 Construction site layout plan

Prior to construction, the PE, with input from the EA and ECO, must approve the construction site layout plan prepared by the Contractor showing the positions and extent of all permanent and temporary site structures and infrastructure. The PE is responsible for the co-ordination of construction site layout plans should there be overlap between multiple Contractors on site.

10.5.2.2 Method statements

Before a construction activity commences, the RE and ECO will agree which activities require a written method statement. Where relevant, the Contractor must submit a written method statement, which will include the following:

- The type of construction activity.
- Locality where the activity will take place.
- Identification of impacts that might result from the activity.
- Identification of activities or aspects that may cause an impact.
- Methodology and/or specifications for impact prevention for each activity or aspect.
- Methodology and/or specifications for impact containment for each activity or aspect.
- Emergency/disaster incident and reaction procedures.
- Treatment and continued maintenance of impacted environment.

The ECO must review the construction method statements to ensure that the environmental specifications contained within this EMP are adhered to.

10.5.2.3 Site handover

The ECO will attend the site handover meeting, where the EMP will form part of the agenda. The construction site layout plan is a key component of site handover and must be finalised before site handover can be completed. The approved plan must be attached to the site handover meeting minutes. Amendments to this plan must be discussed and approved at subsequent site meetings.

10.5.2.4 Site inspections and meetings

The ECO will attend monthly site inspections and meetings to establish how well the Contractor is complying with the Environmental Authorisation and the EMP. The ECO will compile a site

inspection checklist, to be attached to the minutes of the site meeting. The checklist will serve as the monthly audit report to be submitted to DAEARD.

Anything of an environmental nature that arises in between the monthly site meetings must be recorded in the site diary and recorded in written correspondence to the ECO. If required, the ECO must conduct a site visit to address the matter and must report the matter in an addendum to the site inspection checklist.

10.5.2.5 Practical completion

The ECO must attend the practical completion inspections. Outstanding environmental matters requiring attention must be provided to the RE for inclusion in the snag list, which is attached to the practical completion certificate.

10.5.2.6 Final completion and environmental performance certificate

Once the environmental items on the snag list have been addressed to the satisfaction of the ECO, the Environmental Manager will provide an environmental performance certificate confirming that the environmental specifications applicable to the Contractor(s) have been met. This certificate will be submitted to the Project Engineer prior to the final Certificate of Completion being issued.

10.5.3 Non-compliance and remedial action

Matters of non-compliance by any parties must be reported to DAEARD within a reasonable period (or within the period specified within the Environmental Authorisation).

The Contractor(s) and their Sub-contractors are deemed not to have complied with the EMP if:

- There is evidence of contravention of the EMP specifications within the boundaries of the construction-site, site extensions and haul/access roads.
- There is contravention of the EMP specifications that relate to activities outside the boundaries of the construction site.
- Construction activities take place outside demarcated areas.
- Environmental damage ensues due to negligence or intent.
- Failure to comply with corrective or other instructions issued by the Project Engineer within a specific time period.

Where the ECO identifies non-compliance by the Contractors and Sub-contractors, it will be discussed at the monthly site meetings (or when identified) and remedial actions and timeframes specified. The ECO must record these incidents of non-compliance, the remedial actions and timeframes in the site inspection checklist. The RE must also record the relevant instructions for the Contractor(s) in the site diary.

If the specified remedial action has not been carried out by the Contractor(s) within the period stipulated, the non-compliance must be dealt with as follows:

- Where non-compliance has resulted in environmental damage to the site which cannot be rectified by the remedial action specified by the ECO, or the Contractor(s) has failed to carry out the remedial work within the prescribed time limit (or permitted extension thereof), the ECO shall convene a meeting between the RE and the Contractor to discuss the appropriate fine. Appropriate remedial work shall also be discussed and agreed.
- In determining appropriate remedial action, the Environmental Manager and Project Engineer shall consult with the relevant authority and where necessary, obtain specialist input.

- The Project Engineer shall issue an instruction to the Contractor to procure execution of the remedial work as agreed between the parties, and the Contractor shall be obliged to procure such remedial work within the prescribed period to the satisfaction of the Project Engineer.
- Failure by the Contractor to comply with an instruction from the Engineer to procure the carrying out of the required remedial work shall constitute a material breach of the Contract.
- Where Exxaro has taken action to procure the remediation of such consequences it shall be entitled to recover from the Contractor the full cost of remediation.

Incidents of non-compliance, the remedial actions and timeframes must be recorded in the site inspection checklist and the site diary. Fines, applied at the discretion of the Engineer (with input from the Environmental Manager), must be applied in addition to any remedial costs incurred as a result of non-compliance. The Engineer will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

10.5.4 Regulatory authorities site inspections

DAEARD, and other relevant authorities, e.g. DWA may conduct site inspections as desired.

10.5.5 Record keeping

The Environmental Manager and ECO must ensure that all documentation related to the EMP is filed. The following documents may be relevant:

- Environmental Authorisation.
- Basic Assessment Report.
- Environmental Management Programme. Report
- Site inspection checklists.
- Design documents and drawings.
- Construction site layout plans.
- Method statements.
- Communication and correspondence.
- Environmental awareness training programme.
- Environmental incident and accident reports.
- Emergency preparedness and response plans.
- Monthly site meeting minutes during construction.
- Complaints register.
- Environmental performance certificates.

10.6 REHABILITATION

10.6.1 Rehabilitation during Operations

Mining will be hydraulic monitoring of the exposed dunes. Grade control as well as the varying slimes content of the dunes, requires the mining to be done from different areas concurrently. Typically from 3 to 5 areas will be mined during a shift. These areas can stretch over an area of up to 700 metres wide. Once a sufficient area has been mined, the +45 µm sand tailings from the PWP will be used to backfill and rebuild the dune. This will be done as per principles of dune coating, which is placement of layers of wet soil: slimes mixture to limit dust.

During operations at the Fairbreeze Mine the rehabilitation of disturbed areas will be undertaken to the maximum extent possible and with the shortest time delay after removal of the disturbing factor.

Rehabilitation will aim to restore landform and soil function to a point where the pre-mining land use (or such land use as approved) can be sustainably and successfully undertaken. Under certain conditions short-term rehabilitation measures will be applied initially to stabilise the disturbed areas and limit potential visual, dust and erosion impacts.

The rehabilitation plan set out in this document is based on the best, practicable options known to EXXARO. New information derived from the Rehabilitation Research Programme will be used to improve the rehabilitation methods employed at Fairbreeze and the rehabilitation plan will be regularly updated to reflect the improved knowledge.

10.6.2 Rehabilitation Research Programme

Exxaro will establish, drive and fund a Rehabilitation Research Programme to investigate all aspects concerning the rehabilitation of, and vegetation growth on, areas disturbed during mining at the Fairbreeze Mine. A protocol for monitoring and measuring soil fertility and soil quality will be developed, which will provide soil chemical and physical measures and norms as indicators of the success of the rehabilitation process. The programme will be multi-disciplinary, with the on-going goal of producing objective and scientific information to guide and continuously improve the rehabilitation of areas affected by mining.

It is recommended that participants include representatives from:

- An appropriate University Research Programme;
- Institute for Commercial Forestry Research (UKZN, Pietermaritzburg);
- South African Sugar Research Institute, Mount Edgecombe;
- Agricultural Research Council;
- Mondi, and
- Exxaro.

The Rehabilitation Research Programme will make use of the lessons learnt at the Hillendale Mine and the on-going research opportunities at that mine to develop methods and guidelines for the rehabilitation of all types of disturbances at the Fairbreeze Mine. Research on rehabilitation has been conducted at Hillendale by EXXARO, the University of Zululand and other independent parties, and is on-going.

10.6.3 Topsoil management

Topsoil storage will only be carried out for the first ore body excavation and for soil removed from the RSF. After that removed topsoil and *Eucalyptus* harvesting residues will be moved onto backfilled areas from areas due to be mined in a sequential manner.

Topsoil stockpiles will be placed in suitable locations and away from the 1:100 year floodline of any watercourse. They will be protected from surface water flows by diversion berms.

Existing topsoil will be utilised as far as possible as a means for restoring soil fertility and soil structure. Emphasis will be placed on utilising the existing topsoil in combination with the forest floor and harvesting residues (bark, branches, leaves, tree tops and chipped stumps) that will be available after clearfelling of the *Eucalyptus*.

10.6.3.1 Ore-bearing sand dune areas

Removal of approximately 200 mm of topsoil prior to mineral extraction for stockpiling, so that this original material could later be replaced on top of the back-filled sand and/or slimes mixture once mining has been completed.

Topsoil storage will be undertaken according to scientific principles and actively managed by re-vegetating and periodical tillage (ripping/ploughing) to ensure its beneficial properties are retained. The specific guidelines for this process are currently being developed by the Rehabilitation Research Programme.

10.6.3.2 RSF and dams

Remove approximately 300-500 mm of topsoil prior to mineral extraction for stockpiling, so that this original material could later be replaced on top of the outer slopes of the storage facility as deposition progresses. Rehabilitation of the side slopes will occur as quickly as possible to minimise any erosion hazard.

Topsoil will be stripped and pushed to the outside of the RSF and used to build the paddock walls (low walls used to manage the water flowing from the under drains and in the area between the RSF walls and the solution trenches. At completion, the paddocks and solution trenches will no longer be required and the soil will be pushed up the RSF wall to enhance the topsoil there.

10.6.4 Slopes of Residue Storage Facilities

EXXARO will commence with vegetation of the slopes of the RSF within 60 days of construction reaching a point where the disturbance of the walls has ceased. The outer slopes of the wall will be covered with topsoil recovered from the footprint of the RSF. If required the topsoil will be subjected to additional treatments to improve fertility and structure. Once topsoil has been placed the slopes will be vegetated to achieve at least 30% vegetation cover within 3 months. The soil treatment methods and vegetation cover established on the RSF slopes will be informed by the Rehabilitation Research Programme. The slopes of the RSF will include measures to drain surface water runoff from the slopes without erosion or loss of vegetation cover.

10.6.5 Excavated Ore Bodies

The rehabilitation method that will be applied to the excavated ore bodies at Fairbreeze is based on research and lessons learnt at the Hillendale Mine operation. The basic sequence of mining and rehabilitation is shown in Figure 10.5 and is outlined in the text below. New information derived from the Rehabilitation Research Programme will be used to improve the rehabilitation methods employed at Fairbreeze and the rehabilitation plan will be regularly updated to reflect the improved knowledge.

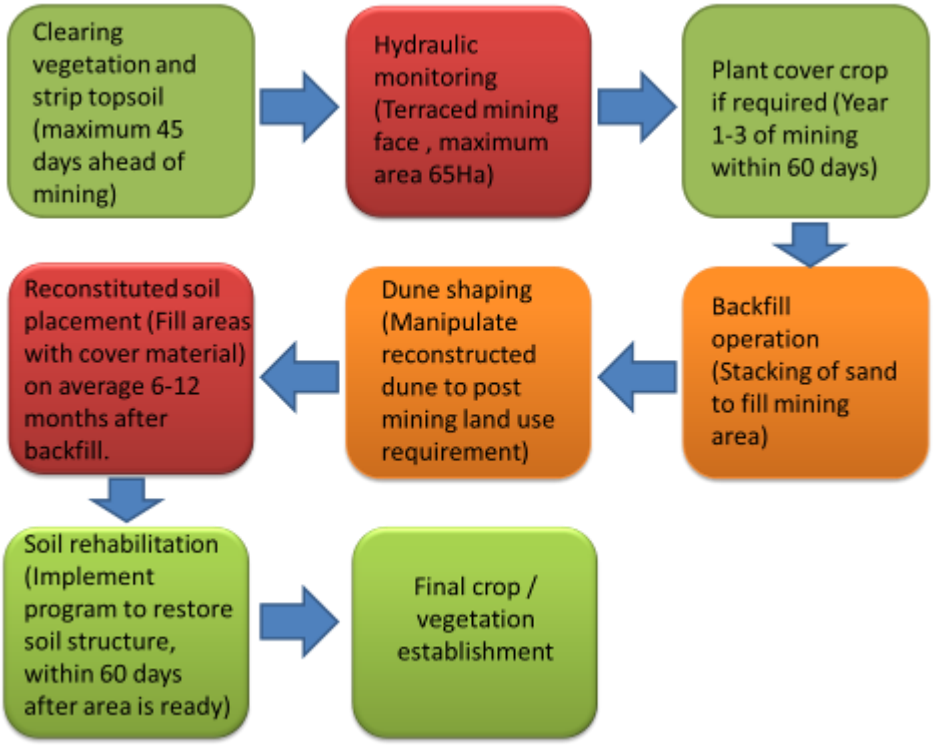


Figure 10.5. Sequence of Mining and Rehabilitation at Fairbreeze Mine

EXXARO will commence with the rehabilitation of the mined out areas at Fairbreeze within 60 days of the mining disturbance having been removed. Rehabilitation is aimed at restoring the pre-mining land form and land capability (or such land capability as approved). Depending on the overall mining development stage at the time of mining of a specific area one of two rehabilitation sequences may be followed. These include short-term rehabilitation or the commencement of the full rehabilitation sequence.

10.6.6 Short-term Rehabilitation with a Cover Crop

Short-term rehabilitation is aimed at stabilising disturbed areas which cannot be immediately backfilled with sand or shaped to a final landform. The short-term rehabilitation will aim to establish vegetation cover as quickly as possible after the removal of the disturbing factor so as to limit the occurrence of dust generation and soil erosion. The short-term rehabilitation will also provide a green cover and thus improve the aesthetics of the site.

During short-term rehabilitation a cover crop will be established on the mined out areas within 60 days of the removal of the disturbing factor. The vegetation cover established during the short-term rehabilitation will depend on the season during which it is established and will be informed by the Rehabilitation Research Programme. The success of the cover crop will be managed and monitored to ensure that adequate basal cover is obtained. If dust generation is potentially problematic then shade netting will be applied across the exposed areas during short-term rehabilitation.

The short-term rehabilitation step will be required during the first three years of mining at FBC and FBCX as the large majority of the sand material from these ore bodies will be used for construction of the RSF walls. There will therefore not be sufficient sand available for backfilling of the mine pits during this period. Backfilling of the FBC and FBCX areas subject to short-term rehabilitation will commence once the RSF walls are completed. Once these areas are backfilled they will be subject to the final rehabilitation sequence.

10.6.7 Final Rehabilitation Sequence

Final rehabilitation is aimed at restoring the pre-mining land form and land capability (or such land use as approved). The rehabilitation sequence will include the following:

- Backfill operations;
- Dune shaping;
- Placement of reconstituted soils;
- Soil Rehabilitation measures; and
- Establishment of final land cover

Since the establishment of forest plantations will contribute to improving the fertility and structure of soils, the time taken between re-vegetation and establishment of tree crops will be minimized.

10.6.7.1 Backfill operations

EXXARO will undertake backfilling of the mined out areas once mining in an ore body (or part thereof) is completed and the backfilling infrastructure is in place. Backfilling will be undertaken with coarse dewatered sand that will be returned from the PWP and distributed with cyclones. Backfilling will to be undertaken so that no mining void remains, but the post-mining surface will be lower than the original surface due to the removal of the slimes component from the sand.

10.6.7.2 Dune Shaping

EXXARO will undertake dune shaping to recreate a landform that is modelled on the pre-mining land survey. Shaping of the post-mining landform will give cognisance to the pre-mining land aspect, slopes, and drainage lines. Dune shaping will be undertaken with earth moving machinery and will be undertaken immediately once the backfilled areas are trafficable.

10.6.7.3 Placement of reconstituted soils

Once the basic landform has been created EXXARO will undertake the placement of reconstituted soil. The reconstituted soil layer comprises a mixture of coarse dewatered sand and slimes material (thickener underflow). The reconstituted soil will be mixed in a bulk mixing plant at a ratio of between 70:30 and 80:20, also referred to as the co-disposal system (4.4.5.5). The sand to slimes ratio will depend on the soil properties and requirements of the post-mining land use. The reconstituted soil will be pumped to the area of use. The reconstituted soil will be deposited within paddocks created over the rehabilitation area. Since layering takes place during the replacement of the reconstituted soil, deep tillage behind a grader or bulldozer on the contour will be carried out to homogenize the soil and break up compacted layers when the soil is at a suitable water content. Detail management of the reconstituted soil (i.e. depth of application and specific clay:sand ratio), topsoil/harvesting residue mix, incorporation of the latter within the reconstituted soil and further amelioration will be determined by the Rehabilitation Research Programme and consideration of the latest mine rehabilitation technology.

The reconstituted soil material will be deposited in layers to a minimum depth of 1.5 m.

10.6.7.4 Soil Rehabilitation measures

EXXARO will undertake amelioration of the physical and chemical properties of the reconstituted soil in order to enable the sustainable and successful undertaking of the pre-mining land use (or such land use as approved). Such measures will be applied once the reconstituted soil layer has dried and stabilised sufficiently to be trafficable. The soil amelioration measures will include:

- Fertilisers and organic materials will be added;
- An intermediate vegetation cover will be planted and managed; and
- The intermediate vegetation cover will be incorporated into the soil.

These steps may be repeated to improve the soil properties to a point where they are suitable for the post-mining land use. The exact soil amelioration measures, fertiliser application rates and planting techniques will be the main focus of the Rehabilitation Research Programme and will be improved as new information becomes available from the research programme. If dust generation is potentially problematic then shade netting will be applied across the exposed areas during rehabilitation.

Management will focus efforts on creating a well-aerated rooting environment free of excessive compaction and layering in the reconstituted soil by employing suitable land preparation methods. These methods will be guided the Rehabilitation Research Programme.

10.6.7.5 Establishment of final land cover

The final steps of rehabilitation will depend on the agreed end land use and will include the establishment of *Eucalyptus* plantations or natural vegetation. The land use agreement with Mondi requires the establishment of *Eucalyptus* plantations on the rehabilitated ore bodies. The appropriate soil conditions and method of establishing vegetation will be based on research conducted in consultation with Mondi. EXXARO have committed to rehabilitating the ore bodies on EXXARO owned land to natural vegetation. The appropriate soil conditions and method of establishing natural vegetation will be based on information prepared by the committee established to oversee the Siyaya Biodiversity Conservation Initiative.

10.6.8 Management and monitoring after establishment of final land cover

Once reforested, growth of the re-established forest plantation will be monitored and compared to growth expectations from Mondi's growth and yield models for the species/clone/hybrid in question.

A road network will be established that conforms to the newly shaped landscape and designed with a view to minimising erosion potential by utilising retained topsoil and shaping the roads according to accepted engineering standards.

10.6.9 Rehabilitation for Decommissioning and Closure

10.6.9.1 Residue storage facilities

The closure objective is to ensure that the RSF's surface is stable and conditioned to create the highest agricultural potential at closure.

Once the RSF walls are constructed to final height these will be covered with topsoil and vegetated. This will occur during the operational phase of the mining.

Dirty water containment and other required structures will be maintained until such time as the vegetative cover has been successfully re-established, after which they will be rehabilitated to the requirement of the farming activities.

The following will thus remain in place:

- the toe paddocks
- the penstock
- upstream storm water diversion channels

These facilities will devolve to the landowner, the maintenance becoming his responsibility. Any unnecessary pipes will be removed.

After closure of facilities, the principle is to allow the free drainage of the rehabilitated surface, although some impoundments could be incorporated in the design which will then function as a dam with an outlet to discharge freely once full. Such an impoundment is however not foreseen at this stage.

After closure the surface of the RSF will be shaped to ensure drainage to the original drainage paths. This will be done in a manner to prevent erosion using contour walls where necessary. The design will also be driven by the final land use, for instance sugar cane or Eucalyptus plantations. Since the RSF will now be on a higher level, it will be provided with engineered outlets designed to prevent any erosion of the soils.

The specific MSRSF and VDRSF closure activities will include the following:

- Placement of a thick layer of sand, into which slimes will be mixed (this may be the approved co-disposal mixture), in order to achieve a similar soil constituent mix when compared with the natural materials. It is assumed that the co-disposal plant (4.4.5.5) will form an integral part in the preparation and deposition of the 1 - 2m layer of closure material;
- placement of topsoil, where necessary and in accordance with the topsoil recommendations (Section 10.6.3), to the top surface of the RSF;
- filling of the permanent penstock towers with gravel. This vertical drainage area will facilitate attenuation of flows back to the natural drainage system at end of life of mine.
- Removal of the jet-float and pump barges for the pool/s of the RSFs;
- backfill and shaping the solution trenches and outer catchment paddocks;
- Sealing of the pipe jacking to the N2 National highway and the Spoornet railway line;
- Leveling off and shaping the dirty water containment dam;
- Leveling off and shaping the silt trap;
- Construction of dedicated adequately sized and lined spillway/s, down chutes and energy dissipaters to safely remove the excess storm-water from the top surface of the RSF. Alternatively, if there is sufficient freeboard on the RSFs at closure, consideration could be given to forming wetlands in the pool area/s of the facilities. However, this would be subject to the approval of the owners/custodians of the land and their long-term end use plan and needs to be investigated during the detailed design phase;
- Leveling off and shaping the RWD and associated silt trap once sufficient vegetation has re-established on the top surface of the RSF;
- Handover of the dirty water dam to land owner, if so agreed, or alternatively it will be treated in a similar manner to the RWD.
- It is expected that the plantation areas will be re-established but that two areas will be preserved as wetland/drainage areas. These areas will be required to attenuate storm water flows from the top of the RSF (see further points below) but provide an opportunity to continue with the rehabilitation measures initiated previously. The composition and structure of these areas will be determined in liaison with relevant specialists.

- The most critical decommissioning and closure aspect will be ensuring the re-establishment of drainage lines to the natural watercourses in such a way that the stability of the VRSF Wall can be assured. The potential consequences of poor drainage include:
    - uncontrolled erosion and weakening of the wall;
    - damage to stabilizing vegetation;
    - buildup of the phreatic surface within the residue deposit resulting in potential instability and possible failure of the dam wall;
    - contribution of significant pollution loads (sediment) to the downstream rivers and estuary.
- Rehabilitation of the topsoil stockpile area adjacent to the N2 National Highway and/or north of the VDRSF - subject to these being the preferred top-soil stockpile area/s;
- Levelling off and shaping of the RWD once sufficient vegetation has been re-established on the top surface of the RSFs;
- Reinstatement/repairs to the perimeter fencing and the installation of danger warning signage to prevent unauthorised entry onto the top surfaces of the RSF.
- A small area (1 ha proposed) will be used to plant *Eucalyptus* sp. This will be used to evaluate which farming methods are the most effective for returning the larger parts of the RSF back to optimum sugar cane and *Eucalyptus* sp. carrying capacity. The Rehabilitation Research Programme will include details of this research.

On-going seepage and control of rain water will be managed by maintaining the structures described above.

Re-vegetation and maintenance of the drainage structure will provide long term stability of the deposit. The side walls will be "battered off" to a slope of 1:7 and contoured. However, stability analyses must be carried out by suitably qualified personnel on a long term basis and any necessary remedial measures undertaken on a long term maintenance basis. It must be ensured that the surface of the RSF can carry farming machinery. If not, then more sand may have to be mixed into surface of the RSF.

10.6.9.2 Primary Wet Plant

The PWP will embody a number of structures, including steel structures to house cyclones and spirals and conveyor system to the HMC stockpile. Buildings such as change rooms, offices and workshops could be useful for agricultural purposes. Some of the piping systems could be similarly used. On completion of mining and processing of the recoverable ores the PWP and all supporting infrastructure will be decommissioned and dismantled. The areas utilised for the plant will be rehabilitated and returned to the pre-mining land use. The steps contemplated for the decommissioning and dismantling of the PWP include:

- Demolition or dismantling of buildings and foundations to below ground level;
- Removal of all supporting infrastructure to below ground level;
- A contamination assessment to identify contaminants, chemicals and wastes;
- Removal and disposal of all wastes to licensed disposal facility;
- Ripping of all compacted areas;

- Restoration of natural landform;
- Replacement of topsoil material;
- Amelioration of soil
- Vegetate to pre-mining land use.

10.6.9.3 Final rehabilitation - haul ramps, road

Haul ramps will be demolished, contoured, top-soiled and rehabilitated. Should the roads not be required for farming operations then they will be demolished, contoured, top-soiled and rehabilitated.

10.6.9.4 Infrastructure

The other mine infrastructure consists of pipelines, pump stations and power lines. Pipelines and power lines will be salvaged for re-used for other potential ore bodies, or if underground, abandoned. Roads will be left as is, for the use of the landowner after mining. After mining, the bulk water supply pipeline will be offered to the district municipality for use for their water supply needs, alternately for possible irrigation uses.

The debris removed will be buried in the sand dunes, prior to final rehabilitation.

10.6.9.5 Final voids

In order to minimise the visual as well as nuisance impact of the mining operation, continuous rehabilitation will occur during mining. This procedure will involve the following steps after mining:

- Planting of a quick growing grass species;
- Backfill the grassed mining void with sand and contour to the required shape;
- Cover the backfilled area with a sand: slimes mix (RSF and sugarcane areas), or soil in *Eucalyptus* areas;
- Establish intermediate vegetation;
- Rehabilitation with required long term commercial crop, i.e. sugar cane or *Eucalyptus* sp.

No final voids will remain as they will be backfilled as per the procedure set out above.

10.6.10 Maintenance

A period of 3 years has been indicated for maintenance after decommissioning to closure, however this would be amended during decommissioning, should it be required.

10.6.10.1 Rehabilitated land

The rehabilitated area will have to be maintained in terms of the following for a period of 3 years following decommissioning to closure:

- successful re-establishment of land use i.e. *Eucalyptus* or natural vegetation;
- provision of fire breaks;
- removal of alien and invasive plants and weeds;
- prevention of poaching;
- stability of the rehabilitated land, including slope stability and prevention of water erosion and dust emission.
    - prevention of water erosion;
    - prevention of dust emissions;

- maintenance of infrastructure such as fencing (where relevant).

10.6.10.2 Rehabilitated Residue Storage Facilities

Maintenance of the RSF will include:

- successful re-establishment of a commercial crop
- removal of alien and invasive plants and weeds
- ensuring stability of the structure including slope stability and
- prevention of water erosion and dust emission.

10.6.10.3 Water pollution control structure

This will entail maintenance of site drains and in the case of the RSF, the toe paddocks, penstocks and RWD.

10.6.11 Proposed timetable, duration and sequence

The dates provided in Table 10.3 below are estimates and are dependent on the economic conditions pertaining during the life of the project.

Table 10.3. Proposed timetable, duration and sequence

No	Action	Indicative time frame
1	Construction of infrastructure for Fairbreeze Phase 1	2011 to 2013
2	Construction of infrastructure for Fairbreeze Phase 2	2018 to 2019
3	Mining of Fairbreeze C	2013 to 2015
4	Mining of Fairbreeze CX	2015 to 2019
5	Mining of Fairbreeze B	2019 to 2020
6	Mining of Fairbreeze D	2020
7	Mining of Fairbreeze A	2021 to 2025
8	Final rehabilitation	2025 to 2030
9	Decommissioning	2025 to 2026
10	Proposed date for closure application	2030

10.7 ENVIRONMENTAL AWARENESS TRAINING

Environmental awareness is addressed on three different levels at EXXARO:

- general induction
- environmental awareness training
- training on Environmental Hazards and Risks

At each of these levels there is an increase in the detail addressed in the training material and the material also becomes more job specific.
The general induction serves to introduce an employee to the company. Part of this induction programme covers environment and radiation related training, involving the introduction of personnel to the Safety Health and Environment (SHE) policy and its implications, relevant legislation, areas where radioactivity is encountered and the basic rules when entering contaminated areas, incident reporting,

the roles of the environment/radiation department as well as the environmental management system. The environmental management system is covered in more detail as part of the ISO system. This training is used to provide all employees with insight into the functioning of the system and the role that each employee plays in the management and maintenance of this system.

The environmental awareness training will include reference to the following:

- identified environmental risks in the workplace;
- Environmental Management Plans related to the specific risks;

provisions and commitments contained in this section of the

- BAR;
- Incident identification and reporting.

From the environmental management system more focused and specific training is provided on the hazards and risks identified in each work area. Training material for significant hazards in an area provides information on what and why an operation or task could pose a risk to the environment. This training also addresses how these hazards are managed and what actions can be taken to prevent them from becoming a risk to the company.

A general induction programme has also been developed and implemented for contractors. This training covers relevant legislation, control of pollution and/ or contamination, incident reporting, dealing with dangerous animals, e.g. venomous snakes and waste disposal.

Attendance registers must be kept of all awareness training sessions.

10.7.1 Procedures for environmental emergencies

EXXARO has an existing Emergency Procedure which will be applied during all phases of activities of the Fairbreeze 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;
- Hydrocarbon spillages

10.8 CLOSURE PLAN

The financial provision for the environmental rehabilitation and closure of any mine and its associated mining operations forms an integral part of the MPRDA, 2002 (Act 28 of 2002). Section 41 of the MPRDA and Regulations 53 and 54, promulgated in terms of the MPRDA, deal with financial provision for mine rehabilitation and closure. The holder of a right as described in the relevant sections of the MPRDA must provide the DMR (with sufficient financial provision for the total quantum for the rehabilitation, management and remediation of negative environmental impacts.

The MPRD Regulations define the suitable methods for the financial provision and the quantum of the required financial provision. Actual costs need to be provided for:

- Premature closure;
- Decommissioning and final closure of the operation; and.
- Post closure management of residual and latent environmental impacts.

In 2005 the DMR prepared an official guideline to financial provision as contemplated in MPRD Regulation 54 (1). The Guideline document for the evaluation of the quantum of closure-related financial provision provided by a mine was consulted during the evaluation of the closure related financial provision for the Fairbreeze Mine. The guideline advocates the determination of the level of information available and on the basis of this recommends a method for the evaluation of the quantum of the financial provision. In the case of Fairbreeze the mine has a detailed EMPr that is in the process of being approved and has a detailed closure plan which covers all aspects of rehabilitation and closure of the mining operation. This constitutes extensive information and thus option 2 was selected for the method for the evaluation of the quantum of the financial provision. This entails an independent review of the quantum of the financial provision for Fairbreeze Mine.

It is anticipated that the quantum of the environmental liability at Fairbreeze Mine will be relatively low during implementation and then increase rapidly in the early stages of mining as large areas are disturbed. Thereafter it should remain more or less static as the maximum extent of active mining is reached and on-going rehabilitation is implemented. Since the natural environment, geology and topography is fairly similar throughout FB, this quantum is not anticipated to vary significantly over time. Mining of the FB mine includes concurrent and continuous rehabilitation as an operational cost.

The estimation of the financial provision has been structured to include the rehabilitation of various mine components as recommended in the DMR guideline. A number of the DMR components have been separated into additional components to better reflect the situation at the Fairbreeze Mine and ensure that all aspects of mine are included in the cost estimate. The costs are based on rates derived from EXXARO whom are currently finalising similar work for the imminent closure of the Hillendale Mine. The closure actions will be undertaken in accordance with the mine's closure objectives stated in the EMPR.

The premature closure cost is an estimation of current environmental liabilities. This has been assumed to represent the as-built situation at the Fairbreeze Mine as at the end of the first year of implementation. The information for the as-built situation was provided by the EXXARO project team. The final closure cost is an estimation of anticipated environmental liabilities at the planned decommissioning of the Fairbreeze Mine. Also included here is a provision for aftercare and maintenance which will be required as the closure components are gradually addressed.

Details of the mine plan, infrastructure layout and the bill of quantities at year one and at closure were obtained from EXXARO and the Fairbreeze project team. Exigent assumes that the mine took all reasonable steps necessary to provide accurate and up to date information. The available information has been reviewed by Exigent and we have every reason to believe that the information is accurate and reliable. No serious gaps have been identified in the available information, due to the available costs for Hillendale, but wherever an assumption has been made or further work is required, this has been indicated in the report.

10.8.1 Key objectives

The key closure objectives are as follows:

- To rehabilitate the mine site to the extent where the previous land use is not compromised in terms of value unlocked.
- To minimise any residual environmental impacts resulting from the mining operations
- To minimise the social impacts following mine closure through sustainable development with education, vocational training and the establishment of local businesses.

10.8.2 Fairbreeze mine at premature closure

In the context of this report premature closure is assumed to take place within the first year of implementation of the Fairbreeze project. The description below presents the anticipated as-built situation at the Fairbreeze Mine as at the end of one year of implementation.

10.8.2.1 Mining Area

No mining will take place in year one and there will not have been any disturbances to the mining areas.

10.8.2.2 Primary Wet Plant and Office Block

The PWP currently at Hillendale Mine will be dismantled, transported by road and erected at Fairbreeze mine. During the relocation the plant will be refurbished with new equipment and upgraded where required. The PWP complex will cover an area of 16 ha and include the plant structure, civil infrastructure, product stockpiles, access roads, water management dams. This area will also include the main mine offices and administration block.

During the first year the PWP site will be prepared, bulk earthworks undertaken and some civil infrastructure installed. Erection of the plant will be in the early phases. It is anticipated the installation of civil infrastructure would be 80 % complete at year 1.

10.8.2.3 Residue Storage Facilities

The Fairbreeze Mine will require two RSFs for the deposition of fine materials extracted in the PWP, together with gypsum returned from the MSP. These include the MSRSF and the VRSF. Both the RSFs will be used during the life of mine, but initially only the MSRSF will be used for slimes deposition. The VRSF will however be constructed and will be utilised as a return water dam.

In year one construction will have commenced on both the Valley RWD and the MSRSF. The construction of the RSFs will include site preparations, topsoil stripping, some drains, base preparations for the walls, borrow pits and the starter wall. It is anticipated that the construction of the VRWD will be 50% complete and will have disturbed an area of 30 ha. Construction of the MSRSF will be less advanced (20%), but will have disturbed an area of 100 ha.

10.8.2.4 Return Water Dam

The Fairbreeze Mine will require a RWD for the containment of process and run-off water recovered from the two RSFs. During the initial years of mining the Valley RSF will function as a return water dam for the MSRSF. The dedicated RWD will only be developed a number of years into the life of mine.

In year one development of the RWD would not have commenced and there will not have been any significant disturbances to the RWD area.

10.8.2.5 Services Corridor and Infrastructure

The Fairbreeze Mine will require a number of corridors for the placement of services. These corridors will provide dedicated routes for pipelines, power lines and access roads. The main service within the corridors will be pipelines which include bulk water supply pipelines, run of mine pipelines, backfill pipelines and tailings pipelines.

In year one construction will be underway along the main bulk water pipeline corridor from Hillendale to Fairbreeze which will cover an area of 6 ha. This is anticipated to be 30% complete. Preparation will have commenced on some of the other pipeline corridors but no infrastructure will have been laid. Construction of most electrical infrastructure would not have commenced.

10.8.2.6 N2 on and off-ramps and Access Roads

The Fairbreeze Mine requires dedicated access to the N2 Highway. An on- and off-ramp complex will be constructed at Bridge 4. Access to the PWP site will be via a 700m long access road. Access to the infrastructure sites within the mining right area will largely be via existing roads.

In year one development of the on and off-ramp complex and the main access road will be 100% complete. A number of short access roads will have been laid to provide access to specific construction areas such as the RSFs and pipeline sites.

10.8.3 Description of Fairbreeze mine at final closure

10.8.3.1 Mining Area

The mining area consists of ~640 ha of ore bodies that will be mined within the 4140 ha mining right property area. Mining will be done hydraulically and the run-of-mine is pumped to the plant for primary beneficiation. The mine plan requires that the active mining area not be larger than 0.65 km^2. Additional areas will be being stripped prior to mining and previously mined areas will be being backfilled and rehabilitated. Coarse sand from the PWP is used to backfill and shape the mined out areas. Backfilling will take place at each mined out area as soon as possible, but this may not always be immediately as it is dependent on the volume of sand available (sand is also required for construction of the RSF walls). Sand and fine materials are then blended and spread across the backfilled areas to create a soil medium suitable for plant growth. Suitable vegetative cover will be established. It is anticipated to take two years from the completion of mining and backfilling in an area to rehabilitate that area to a condition suitable for post mining use. EXXARO and Mondi own the properties in the mine area and agreements are in place on the post mining land condition.

The mining programme will commence at FBC and continue to FBCX. Backfilling and rehabilitation of these areas will be undertaken on an on-going basis as mining proceeds to the other ore bodies. In the last two years of life, mining is planned for the last portion of the mining area. These areas cover an extent of 40ha and will require various levels of backfilling and rehabilitation at final closure. The balance of the mined areas will have been rehabilitated as part of mining operations and will only require after care and maintenance at closure. Closure and decommissioning will occur from 2024 to 2025.

It is estimated that the total void will only be 40ha at closure as rehabilitation will be performed on an on-going basis during the mine operation. The only outstanding pit rehabilitation work that needs to be funded from the mine closure fund will be for the final void at FBD and additional areas which have been backfilled and shaped, but not rehabilitated.

All mined out areas must be rehabilitated to ensure a stable and sustainable post mining landscape and land capability. This will involve:

- Backfilling and shaping of the mined area with coarse sand;
- Placement of a soil mix to appropriate depth;
- Preparation of the soil layer;
- Re-establishment of intermediate vegetation cover (if necessary);
- Re-establishment of the post mining land cover.

It is assumed that the reshaping of the land will be planned in consultation with Mondi to be acceptable for forestry operations and the land capability will be restored to be suitable for the growing of *Eucalyptus* or sugar cane as was previously undertaken.

10.8.3.2 Primary Wet Plant and Office Block

The PWP complex at Fairbreeze covers an area of 16 ha and includes the plant structure, civil infrastructure, product stockpiles, access roads, water management dams. The plant will have been in operation for 12 years at the site. The area is controlled in terms of an approved Certificate of Registration (CoR) issued by the National Nuclear Regulator.

At closure the plant structure and all associated civil infrastructure will be demolished, disposed and the site rehabilitated to a pre-mining land use. The rehabilitation will include the removal of radiological contamination in terms of the provisions of the CoR. The balance of materials (such as foundations) will be buried under at least 1m of soil. The site will be rehabilitated through the restoration of natural topography, the replacement of topsoil and revegetation.

The main mine offices and administration block will most likely not be retained, however after negotiations with landowner, it could be agreed.

10.8.3.3 Residue Storage Facilities

The Fairbreeze Mine has two RSFs that were used for the deposition of fine materials extracted in the PWP, together with gypsum returned from the MSP. These include the 373 ha MSRSF and the 166 ha VRSF. Toward closure these facilities will approach capacity and will comprise extensive flat surfaces with steep outer walls. The walls surface area of 49 and 8.5 ha respectively will be vegetated throughout the operational phase. The wet pools areas on each of the RSF will be reduced at this point.

Closure of these facilities will involve the removal of all non-essential equipment such as pipes and pumps. The facility will be covered with topsoil and vegetated to enable an agreed post mining land use. Surface drainage measures and erosion control structures will be implemented to remove water from the dam surface. Appropriate land use infrastructure such as access roads will be formalized. Due to the fact that the radioactivity levels of the RSFs will be below the National Nuclear Reactor (NNR) clearance levels, institutional control measures are considered to be unlikely to be applied to the RSFs.

10.8.3.4 Return Water Dam

All infrastructures relating to the RWD will be removed from site, and the site rehabilitated in consultation with Siyaya Biodiversity Forum.

10.8.3.5 Services Corridor and Infrastructure

The Fairbreeze Mine includes a number of services corridors. These corridors provided dedicated routes for pipelines, power lines and access roads. The main service within the corridors were the bulk water supply pipelines, run of mine pipelines, backfill pipelines and tailings pipelines. Mining power supply will also routed with the corridors.

At closure the majority of the service corridors will be decommissioned. This will involve the removal and sale or disposal of the infrastructure and the rehabilitation of the corridor land to a pre-mining condition. The bulk water supply line will not be removed and will most likely be handed to the local municipality depending on alterations at the supply intake at Hillendale.

10.8.3.6 N2 on and off-ramps and Access Roads

The Fairbreeze Mine constructed a dedicated on and off-ramp complex at the N2 Highway. Access to the PWP site was via a 700m long, private access road. Access to the infrastructure sites within the mining right area was via a road network which comprised mostly pre-existing roads.

The N2 on and off-ramp complex may be useful to local agriculture and future land use, but closure has anticipated its removal. The mining specific or non-required roads within the mining area will be removed and the sites rehabilitated to a pre-mining condition.

10.8.4 FB EMPR Closure Objectives

According to this EMPR (Section 9.8), the key objectives of closure and surface rehabilitation at the FB are to:

- To rehabilitate the mine site to the extent where the previous land use is not compromised in terms of value unlocked;
- To minimise any residual environmental impacts resulting from the mining operations; and
- To minimise the social impacts following mine closure through sustainable development with education, vocational training and the establishment of local businesses.

While most of the mining infrastructure will be removed at closure, it must be noted that not every aspect of built infrastructure can or will be removed. Some facilities will be required for safety or pollution control. It is proposed that the following infrastructure can be beneficially used by the surface owners and the need to remove these will be negotiated towards the end of the mine life. The costs to remove and rehabilitate these areas will however be provided for in the closure costing:

- RSFs;
- RWD;
- the Eskom substation and electrical connections; and
- the bulk water supply pipeline.

After mining, the pipeline will be offered to the district municipality for use for their water supply needs, alternately for possible irrigation uses.

10.8.5 Methodology

It was assumed for the calculation of the environmental liabilities that the entire area disturbed by the development of the FB would be rehabilitated to a condition as close to the pre-mining condition as possible. All infrastructure and introduced material must be demolished and removed. The entire area disturbed by mining and related activities will be contoured and re-vegetated.

In order to complete the estimation of the closure-related environmental liabilities it is necessary to make certain assumptions with regards the actions required to effect rehabilitation, the quantities of materials involved, the costs of particular services and the management required to implement rehabilitation. Wherever possible, defined plans and known or measured information is used, but where an assumption has been made to complete the closure costing this has been documented. Further work will be required to accurately determine these estimated quantities or eliminate the use of such assumptions.

In order to ensure that the current estimates of the environmental liabilities are not materially understated, conservative estimates and parameters were used in calculating these costs. The estimate of the environmental liabilities at FB will continue to be refined and updated annually.

10.8.6 Assumptions and limitations

The general assumptions used as a basis for estimating the environmental liabilities at premature and final closure for the Fairbreeze Mine are outlined below:

- The estimation of environmental liabilities is based on achieving compliance with the specific closure objectives outlined in the mine's EMPR.
- The estimate of environmental liabilities also considered the requirements of the DWA and the DMR, as reflected in their guideline document (DME, 2005).
- The cost estimation for premature closure has been determined for the anticipated as-built situation at the Fairbreeze Mine as at the end of year 1 of implementation.
- The quantities and areas used in the assessment of the environmental liabilities were obtained from EXXARO. Where actual quantities and areas were not available, best estimates have been made from the available information. Whenever estimates have been made, these and the associated assumptions are outlined in the relevant report sections.
- The sale or scrap value of infrastructure and materials has not been considered with this cost estimate, as this is a specific DMR requirement.
- All rates and quotations exclude Value Added Tax (VAT). However, VAT has been added to the total as per the DMR requirements.
- The estimate of the environmental liabilities at FB will be refined and updated annually.

10.8.7 Methodology for the Estimation of Rehabilitation Costs

At each project component a series of actions are defined in order to effect rehabilitation, e.g. 1) remove introduced material, 2) replace topsoil and 3) revegetate the area. Each of these actions is undertaken at a certain monetary cost or rate. For each project component there is a particular quantity (area or volume) that must be subject to that action. The sum of these costs provides an estimation of the environmental liability to complete rehabilitation.

10.8.7.1 Actions

The actions or services required to rehabilitate each component of the mining operation at the Fairbreeze Mine were identified from rehabilitation experience at Hillendale, the DMR guidelines and discussions with mining personnel. Each rehabilitation action was broken down into a detailed list of actions required in order to facilitate accurate costing.

10.8.7.2 Quantities

The quantity of each component at the Fairbreeze Mine requiring rehabilitation has been estimated based on engineering information and maps supplied by EXXARO. Surveyed or measured values and volumes from Fairbreeze planning were used as well as information from similar aspects at Hillendale requiring rehabilitation. This is particularly appropriate for the PWP which will be relocated from Hillendale to Fairbreeze and will therefore comprise the same values. Areas of the current construction and mining, disturbed sites and the volume of stockpiles were estimated from the mines development plan. Volumes of material used in buildings or roads were obtained from the projects civil engineers, although many are estimates.

10.8.7.3 Rates

The rates used for each rehabilitation action have been derived from EXXARO. These are the rates that EXXARO are using in their current planning for the decommissioning and closure of Hillendale, which is in the detailed planning phase. Rates have also been derived from other mining contractors, specialist rehabilitation contractors, civil engineering contractors and relevant service providers for similar work. Rates are in 2011 costs and were estimated with fuel and diesel at approximately R9.50 per litre.

10.8.8 Definition of Closure Actions

10.8.8.1 Backfill and shaping of mined areas

- The mined out area will be backfilled with coarse sand from the PWP. The sand is returned to the mining areas as slurry from where the water is extracted with cyclones and returned into the process. .
- Backfilling and shaping of the site will aim to create a surface landscape that mimics natural topography and matches the landform of adjoining areas.
- Natural drainage flow must be reinstated and slopes must be suitable for traversing and not pose an erosion risk.

10.8.8.2 Surface rehabilitation of RSFs

- 476 ha of Flat areas
- 57.5 of slopes

10.8.8.3 Place bulk topsoil mix

- In the mining areas the replaced soil layer will include a composite mixture of coarse sand, slimes from the PWP and original topsoil.
- The composite soil mix will be placed to a depth of a depth determined by the land use requirements of the relevant area.
- It is further anticipated that there is sufficient topsoil on site to ensure adequate replacement of topsoil to a depth of 250 mm.
- The topsoil cost includes the additional soil preparation methods such as deep tilling.
- It was assumed that topsoil has been stripped from all disturbed areas at FB.
- For the non-mining areas the topsoil cost includes distribution from the nearest stockpile and the spreading of the topsoil to the correct depth at the receiving site. It was assumed that the stockpile footprint would be shaped during the removal of the material.

10.8.8.4 Revegetation

- Re-vegetation will take place with an appropriate mix of indigenous, pioneer and climax grass species that are appropriate for the region. Seeding costs include the cost of soil amelioration, organic material, the seed as well as soil tillage and mechanical seeding.
- Soil fertilisation is likely to require the application and incorporation of a 2-3-2 fertiliser immediately prior to planting, followed by six monthly top-ups for the first year and annual dressings for the next two years. Precise fertiliser requirements across the area to be rehabilitated must be determined through soil analysis.
- The addition of organic material, and its incorporation into the soil, is key to the success of revegetation efforts and results in cost savings on follow-up seeding and fertilisation.
- Re-vegetation costs include the addition of 15-20 kg of mixed grass seed per ha and the planting of at least 30 tree seedlings per ha.
- Grass seeds will be planted using mechanical dispersal techniques, unless stated otherwise.

- Soil sampling and analysis must be conducted prior to the commencement of any re-vegetation programme in order to determine exact fertiliser requirements. Sampling must occur at a minimum density of one sample in every hectare. Soil samples will be analysed in a laboratory for pH, K, Na, Mg, Ca and P. Fertiliser application must be based on the results of these analyses.

10.8.8.5 Spread material with a bulldozer

- Material that must be relocated within 100 m of its source will be pushed by a bulldozer.
- Bulldozing is a fixed cost per cubic metre based on the wet working rate of a large bulldozer.
- Bulldozing includes basic shaping of both the working area and final stockpile footprint.
- If material must be moved more than 100 m then the Load and Haul cost will apply.

10.8.8.6 Excavate and full voids or cut to fill

- The excavate rate must be used where buried infrastructure is excavated, removed and the site backfilled.
- It implies some double handling of material and is only applicable if the material is used within 100 m of its source.
- Excavation is a fixed cost per cubic metre based on the wet working rate of a large excavator.
- Excavation includes the basic shaping of the working area.

10.8.8.7 Load and haul material

- Load and haul is a fixed cost per cubic metre within a free haul distance of 1000 m and is required when material must be moved over a distance of more than 100 m.
- Load and haul includes basic shaping of both the excavation and deposition sites.
- The load and haul cost estimates are based on the fuel prices as at March 2011.

10.8.8.8 Per km transport cost

- The transport of material beyond the Load and haul distance of 1000m will incur a surcharge.
- The transport cost is a fixed cost per cubic metre per kilometre.
- The load and haul cost estimates are based on the fuel prices as at March 2011.

10.8.8.9 Waste disposal

- All wastes from the FB which is not suitable for disposal into a mine pit will be removed from the site and disposed at an appropriately licensed site. General waste will be disposed to a local municipal landfill. Hazardous waste will be directed to a suitable hazardous waste facility.

10.8.8.10 Road construction or maintenance

- All roads that have been used by the mine and which must remain post mining will be serviced and upgraded to a suitable standard.
- The final maintenance of roads will include the replacement of the running course (if required) and surface grading to ensure a stable, cambered surface with adequate drainage.

10.8.8.11 Demolition

- All structures that are to be demolished will be pushed over or knocked down with explosives. No building will be dismantled.
- The demolition of all structures will include the removal of the floor slab. Foundations and sub-surface structures must be demolished to at least 500 mm below ground level, or if more cost effective, removed to ground level and then covered to a depth of 500 mm.
- It is assumed that hazardous materials will be removed from all the structures.
- All material from the demolished structures must be removed to the pit or buried on site.
- Certain structures and materials have intrinsic value as scrap or otherwise, and in selling these structures/materials, certain costs will be recovered by the mine. However, as per the DMR requirements, no discounts or cost recoveries were accounted for in the environmental closure costing. It is recommended that the mine account for any cost recoveries in their financial plan rather than in their environmental closure costing.

10.8.8.12 Fencing

- The security fence around the PWP and mine perimeter will be removed.
- Standard farm fencing must be restored across the entire mine area.
- Any areas that are unsafe for humans or domestic stock will be fenced-off.

10.8.9 Post Closure Maintenance and After Care

- Maintenance and after care will continue for a minimum period of 3 years after closure, or for the period dictated by the rehabilitation requirements of a specific component.
- Corrective action must be taken for all areas where uneven settlement occurs. An assumption was made that 10% of all the areas that have been backfilled will require further attention.
- Subsided areas shall be filled with soil material, contoured to emulate the surrounding natural topography and re-vegetated. It is assumed that an average of 200 mm of material will be required to adequately fill these areas. These areas will also require additional topsoil and re-vegetation.
- Corrective action must be taken for all areas where erosion occurs. This will require more expensive corrective on slopes then on flat areas.
- Monitoring for soil erosion and surface subsidence will be done every 6 months. Remedial action must be taken where necessary. This may include the repair and or addition of diversion berms and drains.
- Road maintenance will be required on all un-surfaced access roads used by mining operations. Maintenance will require some replacement of the running course but largely just annual grading of the surface and restoration of camber and drainage.
- Monitoring of vegetation establishment shall take place every 2 months and remedial action must be taken where necessary.
- Follow up fertilisation and seeding may be required to ensure the development of a sustainable sub-climax vegetation community. Fertiliser will be applied annually, before the summer rains,

for a period of 3 years, at a rate dependant on the soil requirements. Such requirements shall be determined by annual soil sampling and analysis.

- It was assumed that 25% of the re-vegetated areas would require follow-up planting.
- Monitoring of alien plant establishment will also take place every 6 months and alien plants must be controlled while they are young. Control of alien plant species must be done as per the requirements of the Conservation of Agricultural Resources Act 43 of 1983.
- Alien and invasive plant species must be controlled through appropriate means while at young age preferably before seeds are set. It was assumed that 20% of the rehabilitated areas would require alien plant control.

10.8.9.1 Monitoring post closure

- Water quality at the RSF, RWD and adjacent water courses must be monitored quarterly for at least 3 years.
- Water quality in all boreholes must continue to be monitored quarterly for at least 3 years.
- The dust bucket network must be maintained and monitored monthly for at least 3 years.
- Aquatic bio-monitoring of all water courses impacted by mining must continue on a bi-annual basis for at least 3 years.
- No requirement for long-term water management is currently anticipated.
- Radiation monitoring at the PWP site must be undertaken annually for at least 3 years.

10.8.9.2 Salaries of professionals in post closure period

- Provision has been made for the following the services of the following personnel:
    - Radiation personnel
    - Environmental personnel
    - Safety Officers
    - Geotechnical and survey staff
    - Consultant for mine closure application.

10.8.9.3 Social Responsibility

- Update of SLP based on post mining social impact assessment
- Implementation of SLP.

10.8.9.4 Biodiversity Offset

- Adherence to the biodiversity offset plan (Appendix G16.6).
- Annual contribution to management of biodiversity offset for 33 years post closure.

10.8.9.5 Additional Allowances

- Fixed ratios for preliminary and general costs (P&G's) and contingencies as stipulated in the DMR guidelines have been applied to the consolidated/summary spread sheets.
- P&G costs for contractors were estimated at 12% of the total rehabilitation costs.

- A contingency for unforeseen expenses was estimated at 10% of direct and indirect costs, as per DMR requirements.
- Engineering and project management costs were estimated at 2% of the rehabilitation costs.
- Additional provision was made for management and staff costs including senior foremen, machinery operators and general workers.
- Provision was also allowed for an operational expenditure budget.

10.8.10 Environmental Liability for Premature Closure

Current environmental liabilities for premature closure of the Fairbreeze Mine, one year into implementation were estimated at R 87,303,335 – ex VAT (Table 10.4). The cost includes the decommissioning, demolition and disposal of most mine infrastructure and the rehabilitation of all disturbed areas to a condition as described in the mine's EMPR. Contingencies, preliminary and general costs as well as administration and management input are included.

10.8.11 Environmental Liability for Final Closure

Future environmental liabilities for end of life mine closure and decommissioning of the Fairbreeze Mine were estimated at R 228 867 814 million – ex VAT (Table 10.5). The cost includes the decommissioning, demolition and disposal of most mine infrastructure and the rehabilitation of all disturbed areas to a condition as described in the mine's EMPr. Contingencies, preliminary and general costs as well as administration and management input are included. Costs for the post closure management and monitoring of the FB area over a 3 year period were estimated at R 56 903 485 million.

10.8.12 Method for Financial Provision

The methods for financial provision are set out in MPRDA regulation 36 which stipulates that the financial provision required in terms of MPRDA section 41 to achieve the total quantum for rehabilitation and remediation of environmental impacts, damage as well as final closure must be provided for by one or more of the following methods:

- an approved contribution as required in terms of section 10(1)(c) of the Income Tax Act, 1962 (which must be in the format of Form S of Annexure II to the MPRDA regulations); and / or
- a financial guarantee from a South African registered bank or any other bank or financial institution approved by the Minister guaranteeing the financial provision relating to the environmental management programme or plan (in the format of Form T of Annexure II to the regulations); and/or
- a cash deposit to be deposited at the office of the Regional Manager in who's region the application was lodged (in the format of Form U of Annexure II to the MPRDA regulations); and/or
- any other manner the Minister may determine.

EXXARO will make monthly contributions to the Exxaro Environmental Rehabilitation Trust in terms of the quantum identified above. The trust fund contribution for Fairbreeze Mine will be defined, and a monthly contribution will be paid once mining commences. As stated earlier, this amount will not make provision for continuous rehabilitation during the operational phase of the project, which will be funded from operational cost. This will be amended annually as per requirements of the MPRDA.

Table 10.4. Premature closure costs at Fairbreeze

KZN SANDS COST ESTIMATE: Premature Closure Fairbreeze					
Closure costing component		**Calculations**			
	Unit	**Rate (2012)**	**Area/volume**	**Source/Assumptions**	
Mine					
No actions required at end of year 1				no mining would have taken place at this point	R0
Sub-total for Mining Area					R0
Primary Wet Plant & Offices					
Remove continerised waste treatment works	unit	R 79 500.00	1		R 79 500
Remove 100kl water reservoir	unit	R 106 000.00	1		R 106 000
Remove 300kw water pumps	unit	R 5 300.00	4		R 21 200
Excavate, remove and backfill water, sewer and stormwater trenches	m^3	R 47.70	1050		R 50 085
Dispose of water, sewer, stormwater pipe	m^3	R 365.70	760		R 277 932
Break down and fill in septic tanks	m^3	R 47.70	30		R 1 431
Remove security fencing	m	R 10.24	8000		R 81 917
Remove standard fencing	m	R 7.42	12000		R 89 040
Demolish steel and brick buildings	m^3	R 292.16	2000		R 584 325
Demolish reinforced concrete	m^3	R 595.46	6000		R 3 572 730
Dispose of construction rubble	m^3	R 365.70	8000		R 2 925 600
Remove and dispose road layerworks	m^3	R 365.70	3900		R 1 426 230
Reshape cut and fill areas to natural topography	m^3	R 31.80	350000		R 11 130 000
Replace topsoil from stockpile	m^3	R 15.90	100000		R 1 590 000
Revegetate all disturbed surfaces	ha	R 13 674.00	16		R 218 784
Sub-total for PWP & Offices					**R22 154 774**

KZN SANDS COST ESTIMATE: Premature Closure Fairbreeze					
Closure costing component		**Calculations**			
	Unit	**Rate (2012)**	**Area/volume**	**Source/Assumptions**	
Residue Storage Facilities					
Valley RSF- Reshape cut and fill areas to natural topography	m^3	R 31.80	100000		R 3 180 000
Replace topsoil from stockpile	m^3	R 15.90	6000		R 95 400
Revegetate all disturbed surfaces	ha	R 13 674.00	30		R 410 220
Mega Sabeka RSF - Reshape cut and fill areas to natural topography	m^3	R 31.80	400000		R 12 720 000
Replace topsoil from stockpile	m^3	R 15.90	150000		R 2 385 000
Revegetate all disturbed surfaces	ha	R 13 674.00	100		R 1 367 400
Sub-total for RSF					**R20 158 020**
Return Water Dam					
No actions required at end of year 1				construction would not have commenced	R0
Sub-total for RWD					R0
Services and Servitudes					
N2 on and off ramp					
Demolish balustraudes and railings	m^3	R 595.46	50		R 29 773
Remove and dispose tarred road and layerworks	m^3	R 365.70	7 500		R 2 742 750
Remove and dispose earth embankments to PWP	m^3	R 31.80	160 000		R 5 088 000
Replace topsoil from stockpile	m^3	R 15.90	4 500		R 71 550
Revegetate all disturbed surfaces	ha	R 13 674.00	1		R 13 674
Eskom Powerlines					
No actions required at end of year 1				construction would not have commenced	R0
Pipelines (Bulk Water, ROM, Slimes, Backfill)					
Bulk Water - excavate, lift pipe and backfill	m^3	R 47.70	40000		R 1 908 000

KZN SANDS COST ESTIMATE: Premature Closure Fairbreeze					
Closure costing component		**Calculations**			
	Unit	**Rate (2012)**	**Area/volume**	**Source/Assumptions**	
Dispose steel pipe	m^3	R 365.70	4500		R 1 645 650
Replace topsoil from stockpile	m^3	R 15.90	6000		R 95 400
Revegetate all disturbed surfaces	ha	R 13 674.00	6		R 82 044
Other pipe corridors - Replace topsoil from stockpile	m^3	R 15.90	15000		R 238 500
Revegetate all disturbed surfaces	ha	R 13 674.00	8		R 109 392
Access Roads					
Remove and dispose tarred road and layerworks	m^3	R 365.70	3 000		R 1 097 100
Remove and dispose culverts	m^3	R 349.80	83		R 28 893
Reshape cut and fill areas to natural topography	m^3	R 31.80	60 000		R 1 908 000
Replace topsoil from stockpile	m^3	R 15.90	1 313		R 20 869
Revegetate all disturbed surfaces	ha	R 13 674.00	1		R 7 179
grade and shape farm roads used by mine vehicles	km	R 74 200.00	5		R 371 000
Sub-total for Services and Servitudes					**R15 457 774**
Post Closure Aspects					
Erosion maintenance - flat areas	ha	R 2 279.00	155		R 353 245
Monitoring - air	pa	R 127 200.00	3		R 381 600
Monitoring - surface water	pa	R 127 200.00	3		R 381 600
Monitoring - aquatic biomonitoring	bi-annual	R 106 000.00	6		R 636 000
Soil Erosion Monitoring	bi-annual	R 26 500.00	6		R 159 000
Vegetation monitoring	bi-mnth	R 12 720.00	18		R 228 960
Alien vegetation removal	ha	R 779.10	465		R 362 282
Surveyor	quart	R 26 500.00	4		R 106 000
Mine closure application/process - DMR & others	pa	R 212 000.00	3		R 636 000

KZN SANDS COST ESTIMATE: Premature Closure Fairbreeze					
Closure costing component		**Calculations**			
	Unit	**Rate (2012)**	**Area/volume**	**Source/Assumptions**	
Salaries of environmental personnel	pa	R 508 800.00	3		R 1 526 400
Salaries of Safety Officer	pa	R 508 800.00	3		R 1 526 400
Sub-total for Post Closure					R 6 297 487
TOTAL					**R64 068 054**
ADDITIONAL ALLOWANCES					
Contractor Provisional and General	%	12			R7 688 166
Contingencies	%	10			R6 406 805
Engineering & project management	%	2			R1 281 361
Management/staff cost	yrs	R 2 261 616.00	3		R 6 784 848
General Opex	yrs	R 2 104 100.00	3		R 6 312 300
Sub Total Additional Allowances					R 28 473 481
SUB-TOTAL					**R 92 541 535**
VAT	%	14			R 12 955 815
GRAND TOTAL					**R 105 497 350**

Table 10.5. Final closure costs at Fairbreeze mine

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
1	**RESIDUE STORAGE FACILITY**				
1.2	Place top soil in fill (Top area 300mm)	m^3	39.22	404250.00	R 15 854 685.00
1.3	Place top soil (RSF walls infill - 300mm)	m^4	39.22	81000.00	R 3 176 820.00
1.4	Grass	ha	14357.70	576.00	R 8 270 035.20
1.5	Sugar cane / Forestry establishment	ha	15219.48	539.00	R 8 203 299.72
1.6	Land use plan implementation	ha	11725.72	576.00	R 6 754 014.72
1.7	Road Construction	m^2	77910.00	16.00	R 1 246 560.00
1.8	Storm water Pipes for Road Crossings	No	10017.00	96.00	R 961 632.00
1.9	Construction of Surface Drainage Canals	m^3	11.66	84000.00	R 979 440.00
1.11	Cover surface area of gully with gabions	m^3	1335.60	2000.00	R 2 671 200.00
1.13	Remove slimes pipe around slimes dam	m	46.64	21600.00	R 1 007 424.00
1.14	Remove twin pipelines from RWD to PWP	m	68.90	5000.00	R 344 500.00
1.15	Remove Header tanks Gray fiberglass pipe	m	58.30	2800.00	R 163 240.00
1.16	Remove RWD HDPE pipe line	m	33.92	6000.00	R 203 520.00
1.17	Remove walkways with pipes	m	222.60	2400.00	R 534 240.00
1.18	Remove floating pump barges and floating distribution barges.	barges	16695.00	22.00	R 367 290.00
1.19	Remove concrete plinths supporting pipes	m^3	537.42	300.00	R 161 226.00
1.2	Remove transformers	transformers	11130.00	6.00	R 66 780.00
1.21	Remove RWD, effluent pumps	pumps	11130.00	14.00	R 155 820.00

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
1.22	Shape RWD shed and laydown area	ha	55038.38	6.00	R 330 230.28
1.23	Remove shed, containers, mcc, stores	sum	556500.00	2.00	R 1 113 000.00
1.24	Scarify area below removed slimes dam pipelines	ha	3584.92	6.00	R 21 509.52
1.25	Scarify area below removed twin return water dam pipelines	ha	3584.92	2.00	R 7 169.84
1.26	Vegetate scarified areas	ha	15219.48	9.00	R 136 975.32
1.27	Maintain dam flat area for 7 years	ha	2390.30	539.00	R 1 288 371.70
1.28	Maintain dam wall slopes for 7 years	ha	6900.60	120.00	R 828 072.00
1.29	Dumping of hazardous waste at landfill site	8t skip	1.06	6200.00	R 6 572.00
1.3	Remove & dispose RWD liner	m^2	5.30	75000.00	R 397 500.00
1.31	Residue dam bypass channel - erosion fixing	R	389550.00	2.00	R 779 100.00
1.32	Clean slime out of RWD	t	3.18	75000.00	R 238 500.00
1.34	Doze material to shape residue drainage	ha	163611.00	162.00	R 26 504 982.00
	Sub-total for Residue storage facilities				**R 82 773 709.30**
2	**MINE**				
2.3	Road construction	m2	77910.00	10.00	R 779 100.00
2.4	Loading station	m^3	39.22	50000.00	R 1 961 000.00
2.11	Fill storm water dam mining area	t	3.18	1700000.00	R 5 406 000.00
2.12	Shape storm water dam mining area	ha	55038.38	13.00	R 715 498.94
2.13	Doze placed mix over storm water dam mining area	ha	163611.00	13.00	R 2 126 943.00
2.14	Remove mixing plant	R	556500.00	2.00	R 1 113 000.00
2.15	Remove mixing plant distribution systems	m	33.92	40000.00	R 1 356 800.00
2.16	Shape Mix plant area	ha	55038.38	10.00	R 550 383.80

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
2.17	Doze placed mix over mix plant area	ha	163611.00	10.00	R 1 636 110.00
2.18	Shape final void	ha	55038.38	10.00	R 550 383.80
2.2	Shape & level no backfilled area	ha	71548.94	10.00	R 715 489.40
2.21	Shape stockpile areas	ha	55038.38	12.00	R 660 460.56
2.22	Doze placed mix over stockpile areas	ha	163611.00	12.00	R 1 963 332.00
2.23	Load and Haul fill material	ha	16.96	489953.00	R 8 309 602.88
2.24	Remove ROM piping	m	41.34	12000.00	R 496 080.00
2.25	Remove mine feed water pipes	m	46.64	12000.00	R 559 680.00
2.26	Remove cyclone return water pipes	m	41.34	6000.00	R 248 040.00
2.27	Remove pump stations	per unit	38955.00	6.00	R 233 730.00
2.28	Remove booster pumps	per unit	5565.00	12.00	R 66 780.00
2.29	Remove cyclones	per unit	1113.00	16.00	R 17 808.00
2.3	Remove electrical skids	per unit	1113.00	8.00	R 8 904.00
2.31	Remove transformers	per unit	11130.00	8.00	R 89 040.00
2.32	Remove overhead cable	m	78.44	6000.00	R 470 640.00
2.33	Remove bundle cable	m	33.92	2000.00	R 67 840.00
2.36	Grass	ha	14357.70	105.00	R 1 507 558.50
2.37	Forestry establishment	ha	15219.48	170.00	R 2 587 311.60
2.38	Land use plan	ha	11725.72	170.00	R 1 993 372.40
2.39	Allowance for storm water routing	sum	1113000.00	2.00	R 2 226 000.00
2.4	Construction of runoff channels	m	2226.00	1600.00	R 3 561 600.00
	Sub Total Mining Area				**R 41 978 488.88**

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
3	**PWP Area**				
3.1	Lift paving blocks	m^2	39.22	1345.00	R 52 750.90
3.2	Decontaminate blocks	day	556.50	20.00	R 11 130.00
3.3	Dispose of paving blocks to void	tons	13.78	1000.00	R 13 780.00
3.4	Remove concrete piling	m^3	537.42	2062.00	R 1 108 160.04
3.6	Lift foundations and floor slabs Plant	m^2	612.68	8600.00	R 5 269 048.00
3.7	Plinths removal	ea	946.58	457.00	R 432 587.06
3.8	Remove concrete to void	m^3	39.22	3965.00	R 155 507.30
3.9	Decontaminate steel structures	day	1 113.00	25.00	R 27 825.00
3.1	Demolish office buildings	m^2	306.34	1815.00	R 556 007.10
3.11	Soil clean up to 250mm	ha	89 040.00	14.00	R 1 246 560.00
3.12	Move contaminated soil to void	m^3	39.22	35000.00	R 1 372 700.00
3.13	Undertake radiological site survey	Occurrence	44 812.56	1.00	R 44 812.56
3.14	Replace topsoil over cleaned area	m^3	42.40	140000.00	R 5 936 000.00
3.15	Vegetate topsoiled area	ha	15 219.48	14.00	R 213 072.72
3.16	Rehabilitation of access roads	km	77 910.00	7.00	R 545 370.00
3.17	Dumping of hazardous waste at landfill site	8t skip	6 900.60	10.00	R 69 006.00
3.18	Demolish drain, soaking pit system, backfill & level	lump	200 340.00	1.00	R 200 340.00
3.22	Dismantle & remove structural steel	sum	3 339 000.00	1.00	R 3 339 000.00
3.23	Dismantle & remove heavy equipment	sum	2 226 000.00	1.00	R 2 226 000.00
	Sub Total PWP area				**R 22 819 656.68**

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
4	**POST-CLOSURE ASPECTS**				
4.1	Erosion maintenance - slopes	ha	7 169.84	100.00	R 716 984.00
4.2	Erosion maintenance - flat areas	ha	1 792.46	200.00	R 358 492.00
4.3	Maintenance of roads	R	15 582.00	10.00	R 155 820.00
4.4	Monitoring - air	pa	250 425.00	5.00	R 1 252 125.00
4.5	Monitoring - surface water	pa	1 089 849.60	5.00	R 5 449 248.00
4.6	Monitoring - radiation (year 0ne)	pa	1 794 172.96	1.00	R 1 794 172.96
4.7	Monitoring - radiation (year 2 & 3)	pa	2 691 267.92	1.00	R 2 691 267.92
4.8	Monitoring - ground water	pa	142 464.00	1.00	R 142 464.00
4.9	Soil Erosion Monitoring	bi-annual	139 125.00	10.00	R 1 391 250.00
4.11	Wetland/alien vegetation removal	pa	489 720.00	5.00	R 2 448 600.00
4.12	Geotechnical work	month	53 424.00	18.00	R 961 632.00
4.13	Surveyor	quart	77 910.00	6.00	R 467 460.00
4.14	Mine closure application/process - DME & others	pa	556 500.00	1.00	R 556 500.00
4.15	Civil engineer dam safety	pa	133 560.00	2.00	R 267 120.00
4.16	Rehabilitation trial monitoring	pa	395 435.12	3.00	R 1 186 305.36
4.17	Removal of fences	m	11.66	20000.00	R 233 200.00
4.18	Social responsibility	unit	4 452 000.00	2.00	R 8 904 000.00
4.21	Salaries of radiation personnel	pa	723 450.00	3.00	R 2 170 350.00
4.22	Salaries of environmental personnel	pa	723 450.00	5.00	R 3 617 250.00
4.22	Salaries of Safety Officer	pa	389 550.00	2.00	R 779 100.00
	Sub Total Post Closure Aspects				**R 35 543 341.24**

KZN SANDS COST ESTIMATE: Final Closure Fairbreeze					
Closure Costing Component		Calculations			
		Unit	Unit rate (2012)	Quantity	Total cost
	TOTAL				**R 183 115 196.10**
5	**ADDITIONAL ALLOWANCES**				
5.1	Contractor Provisional and General	sum			R 9 114 108.96
5.2	Contingencies	sum			R 18 228 218.98
5.3	Engineering & project management	sum			R 3 645 644.22
5.4	Management/staff cost	sum			R 18 877 675.68
5.5	General Opex	sum			R 10 452 046.26
	Sub Total Additional Allowances				**R 60 317 694.10**
	GRAND TOTAL				**R 243 432 890.20**

10.9 SOCIAL AND LABOUR PLAN

A Social and Labour Plan (SLP) has been developed for the combined Hillendale/Fairbreeze operations and has been approved by DMR as part of the mining licence conversion process. This SLP will be updated as required, to incorporate all proposed projects and activities at the FB mine.

11 UNDERTAKING TO COMPLY WITH THE PROVISIONS OF THE ACT

MPRDA *Regulations 51:*
51. An environmental management programme contemplated in section 39(1) of the Act must include the following:

(viii) an undertaking by the applicant to comply with the provisions of the Act and regulations thereto.

Page xi in the front of the report addresses this aspect.

Appendix C

EXISTING BA AND EMP FOR EVERGLADES

e) Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity

Tronox has a detailed approved EMP for the Fairbreeze Mine that already includes the Phase 2 RSF (VRSF and NNRWD) and realignment of an Eskom powerline (refer to **Appendix Q**). The existing management and mitigation measures in the approved EMP have been reviewed and are applicable to the proposed project. There is a separate EMPr for the Eskom powerline realignment (refer to **Appendix M**) and a detailed Rehabilitation Plan, Construction EMPr and Monitoring Plan for the iSiyaya Plantations Offset (refer to **Appendix C**).

All of the general requirements in terms of appointment of an Environmental Control Officer (ECO) and environmental auditing as stipulated in the approved EMP (Section 10.4 and 10.5) are applicable for the proposed project. The rehabilitation plan in Section 10.6 is also applicable to ERSF. The various monitoring plans are to be updated as required to include the proposed project (dust monitoring plan and water quality monitoring plan – refer to **Appendix O**).

The additional environmental management and mitigation measures that must be implemented for the project, as well as responsibilities and timelines for the implementation of these measures, are laid out in Table 2 below. The approved EMP is to be updated to include these measures. Table 2 has been structured as per the approved EMP for ease of updating.

Table 2: Additional environmental management and mitigation measures

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Land capability							
Minimise agricultural impacts	C1	• Consideration should be given to supporting emerging sugarcane growers as part of Tronox's community development projects.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr	Consult with specialist where required
Aspect: Fauna, flora, wetlands and aquatic ecology							
Minimise impacts on wetlands and biodiversity	C2	• Remaining wetland areas fringing the VRWD (seepage arms) that are not to be transformed as a result of the dam expansion will need to be rehabilitated in order to reduce any secondary degradation impacts associated with the return water discharge (clean and dirty), particularly to wetland W2a. • Demarcate access roads, construction zones and no-go zones' • Control pollution as per the IWWMP and SWMP. • Minimise duration of bare soils on site. • Maintain adequate through flows to downstream aquatic ecosystems.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom	Consult with specialist where required

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
		• Implement erosion control measures. • Protect wildlife and manage natural resources effectively. • Ensure adequate fire management. • Control alien invasive weeds. • No water abstraction from natural sources. • Implement EMPr for Eskom powerline realignment. • Implement Rehabilitation Plan for Siaya Plantations Offset.				powerline and Rehabilitation Plan for iSiyaya Plantations Offset	
Minimise impacts on aquatic, riverine and estuarine environments	C3	• Management and enforcement of the recommended buffer zones from the riparian edges. • Implement soil erosion control, spill prevention and dirty water containment measures during all phases of the project in line with the other specialist reports in particular the wetland, stormwater and waste management reports. • Onsite measures to control potential pollution from mining operations must be strictly implemented in line with the management actions contained in the Integrated Water and Waste Management Plan (IWWMP) and Storm Water Management Plan for Fairbreeze Mine. • This includes the following focused monitoring of in-situ physicochemical parameters in all rivers surrounding the residue storage facility and the return water dam ensuring turbidity, suspended solids, pH and in-situ dissolved oxygen are included in the suite of parameters. • Monitoring of both the iSiyaya and aMatigulu Estuaries using national estuarine health index protocols. • Design will ensure that seepage or runoff is prevented from entering ground water or reaching the surface water resources. • Invasive Alien Plant Control must be implemented according to the requirements of the NEM:BA. • Implement erosion control measures. • Protect wildlife and manage natural resources effectively. • Ensure adequate fire management. • Control alien invasive weeds. • No water abstraction from natural sources.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
Aspect: Water management (surface and groundwater)							
Minimise impacts to surface and groundwater	C4	• Construct in dry season if possible. • Maintain separation of clean/dirty water. • Clean water cut-off drains and diversions to downstream catchment. • Rehabilitation of wetlands and buffer strips. • Most of the seepage will be through the sand wall which will not receive the poor water quality and will have under drains installed in them. • There are few users of groundwater that can be affected by the RSFs and RWDs. Wetland water use is primarily fed by elevated lateral flow and will not be significantly impacted from groundwater contributions. Groundwater and surface monitoring is in place as an early warning system. • If the water quality of users in the vicinity of the RSF is impacted then an alternative supply will need to be provided. • The water quality monitoring plan must be updated to include monitoring of the ERSF facilities.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
Aspect: Air quality							
Minimise dust impacts	C5	• Continuation of air quality monitoring during the construction, operational and rehabilitation phase of the mine to determine the cumulative impact of the current and proposed operations. The current PM10 monitoring network should be serviced and regularly maintained to improve data recovery. • In addition to monitoring PM10, it is recommended that PM2.5 also be monitored as it is a priority pollutant in South Africa. • Maintain the existing dust management/mitigation measures on-site, as per the air quality management plan (AQ211). Should dust levels increase the management/mitigation measures should be reviewed to ensure dust levels remain below the respective standards. • The following key management measures will need to be implemented to manage concentrations of dust emissions within and around the project area: – Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust. Particular attention should be given to roads in close proximity to sensitive receptors. – Speed limits within the mine should be adhered to, for both treated haul roads and unpaved roads. For example, restriction of transport speed on roads without special covering up to 30 km/h.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
		– Ensure that the moisture content of 5% is maintained at the RSF walls to lower dust emissions. – Portions of the RSFs and backfilled areas should be rehabilitated with vegetation as soon as possible to reduce windblown dust. – The re-vegetation of the site during the operational phase, as part of progressive rehabilitation should be monitored and action taken to address any areas where re-vegetation is ineffective – On windy days, or when fugitive dust can be observed leaving the site, additional application of water to the affected areas should be applied. – Soil disturbance activities should be stopped when wind speeds exceed 40 km/hr. – Wet suppression where feasible on materials handling activities.					
Aspect: Noise							
Minimise noise impacts	C6	• If piling is required, it should only occur during the day to take advantage of unstable atmospheric conditions. • All operators should receive adequate training on equipment use. • All earth moving equipment to be regularly serviced • No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions. • Ambient noise monitoring to be conducted at least once at NSA 5 when operations commence to verify the noise emissions meet the noise rating limit. • Build an acoustic enclosure around all pumps to contain noise emissions. • All vehicles to have silencers fitted and serviced regularly.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
Aspect: Archaeology							
Manage the loss of archaeological, cultural or palaeontological sites	C7	• Review the chance find encounter in the current approved EMPr (Ref 104) to ensure it is sufficient in terms of Amafa's latest requirements.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for	Consult with specialist where required

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
						Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	
Aspect: Visual							
Minimise visual impacts	C8	• Any staff retrenched at Everglades Farm as a result of cessation of agricultural activity at the farm should be invited to apply for jobs for which they are qualified or trainable, as suitable vacancies arise at Fairbreeze Mine • An air emissions specialist should be appointed to monitor the impact of dust pollution on impacted properties. The contact details of such a specialist to be made available to the owners of impacted properties. • Dam walls are to be planted with suitable groundcover to stabilise soil as soon as is practical • Storm water and resulting soil erosion risk to be designed out of the proposed development option. • Tronox undertakes to work with farmers to plant tree screens wherever this is deemed desirable, either to screen views or to help mitigate possible wind and dust damage to crops, as has been done to date. • Reverse hooters on all vehicles operating on site to be replaced with bird calls. • Night operations to be minimised. • Dam land and mined land will be rehabilitated for conservation. • When mining operations cease, gum trees will initially be planted to stabilise soils and then harvested, destroyed and replaced with locally indigenous coastal grassland vegetation. • Mine vehicles are to avoid traversing private farmland – if there is a need, permission is to be sought from the landowner.	P/C/O/D	TRONOX	Monitoring and auditing results	Update existing EMPr and monitoring plans to include Everglades. Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	Consult with specialist where required
Aspect: Social and socio-economic							
Minimise negative socio-economic impacts	C9	• Undertake gradual clearing of land/vegetation. • Adhere to the management measures regarding dust provided by the air quality specialist. • Undertake progressive rehabilitation and planting of suitable vegetation of the side walls of the structures. • Plant vegetation such as trees and shrubs on periphery of the households and	P/C/O/D	TRONOX	Monitoring and auditing results for Everglades	Update existing EMPr and monitoring plans to include Everglades.	Consult with specialist where required

Objectives to manage potential impacts	Ref	Mitigation action	Time period for impact	Responsible party	Performance indicator	Monitoring	Remedying action
		villages to the south west and west of the ERSF and RWDs to provide a screen/buffer of direct views towards these structures. • Point lighting inwards and not to villages to avoid nocturnal impacts. • Point lighting away from nearest households and villages. • Natural vegetation, wherever possible, should be retained on and around the mine property as well as along the boundary of the mine. • Where possible, harvest plants from the VRWD area and preserve in the nursery for rehabilitation purposes, where practical. • Appoint a rehabilitation specialist to implement the requirements of the Closure and Rehabilitation Plan. • Where possible, rehabilitate with plants harvested from the area or similar. • Remove sources of nocturnal lighting where possible. • Adhere to the management measures regarding dust provided by the air quality specialist. • Undertake further screening based on complaints, if received and if feasible.				Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset	
Aspect: Engineering design recommendations / Further investigation / Monitoring							
All requirements in terms of R632 must be complied with.	*C10*	• *The design of the ERSF must be followed implicitly throughout the construction and operation thereof, and any deviations from the design must be approved by the delegated official within DMRE and the EMPr amended accordingly.* • *As part of the monitoring system, measurements of all residues transported to the site and of all surplus water removed from the site are to be recorded.* • *In the design of a monitoring system for the ERSF, consideration must be given to-* – *baseline and background conditions with regard to air, surface and groundwater quality.* – *the air, surface and groundwater quality objectives.* – *residue characteristics.* – *the degree and nature of residue containment.* – *the receiving environment and specifically the climatic, local geological, hydrogeological and geochemical conditions.* – *potential migration pathways and potential impacts of leachate.* – *the location of monitoring points and the monitoring protocols.* – *the reporting frequency and procedures.*	*P/C/O/D*	*TRONOX*	*Monitoring and auditing results for Everglades*	*Update existing EMPr and monitoring plans to include Everglades.* *Implement EMPr for Eskom powerline and Rehabilitation Plan for iSiyaya Plantations Offset*	*Consult with engineer / specialist where required*

Building 1, Maxwell Office Park
Magwa Crescent West, Waterfall City
Midrand, 1685
South Africa

wsp.com