Tronox KZN Sands (Pty) Ltd
Fairbreeze Mine
KwaZulu-Natal

Our Ref: 41104206

21 November 2023

NOISE COMPLIANCE STATEMENT: FAIRBREEZE MINE – HELEZA MOYA PROJECT

INTRODUCTION

Tronox KwaZulu-Natal (KZN) Sands (Pty) Ltd (Tronox) has operated the Fairbreeze mineral sands mine, located immediately southwest of Mtunzini, for nearly ten years. In 2022 Tronox acquired the 118 ha Heleza Moya property, located between the Fairbreeze Primary Wet Plant (PWP) and the Fairbreeze B pit (FBB), and incorporated this property into the Fairbreeze Mining Rights Area. 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 FBB orebody which lies to the immediate north and west of Heleza Moya. The proposed extension of mining activities have the potential to generate noise and as such, the potential impact of noise must be assessed as part of the Environmental Authorisation process.

STUDY RATIONALE

The Department of Forestry, Fisheries and the Environment (DFFE) screening tool does not identify the proposed Project area as being a site sensitive to noise. WSP have evaluated the site area, activities under consideration and surrounding land uses, together with potential noise receptors and are in agreement with this classification. Based on the low sensitivity of the Heleza Moya site from an environmental noise perspective due to limited nearby receptors; no new noise sources associated with the proposed Project; and that the existing noise climate is already mining-dominated, a full Environmental Acoustic Impact Assessment is not considered necessary and a Noise Compliance Statement has consequently been produced.

As per the National Environmental Management Act (NEMA) Government Gazette No.43110 (Republic of South Africa, 2020), this Noise Compliance Statement is issued for the proposed Project as no significant noise impact is expected at any nearby receptors. A detailed discussion regarding noise associated with the proposed Project is included hereafter.

DISCUSSION

Tronox currently operates the heavy mineral sands Fairbreeze Mine, located immediately southwest of the town of Mtunzini, ~33.5 km southwest of Richards Bay in KwaZulu-Natal. Fairbreeze is surrounded by agricultural land, plantations and natural open land. Nearby towns include Mtunzini (immediately northeast of Fairbreeze), Mbizimbelwe (immediately southwest of Fairbreeze), KwaGingindlovu (~3.7 km west-northwest of Fairbreeze), Mabhokweni (~3.9 km northwest of Fairbreeze), Mabangwa (~2.5 km northwest of Fairbreeze), Nguqu (~3.4 km

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northwest of Fairbreeze), Obanjeni (~5.2 km northwest of Fairbreeze) and Izingeni (~4.2 km north-northwest of Fairbreeze). Scattered farmhouses / free-standing receptors are also evident at varying distances from Fairbreeze and are indicated in **Figure 1**. The proposed Heleza Moya site is located within the approved Fairbreeze mining right area.

The Fairbreeze mine, which has been in operation for nearly ten years, comprises four approved mining areas, 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 the Tronox Central Processing Complex (CPC) in Empangeni which includes a Mineral separation plant and smelter where titanium dioxide and pig iron are produced.

At Fairbreeze there are currently four ore bodies present, namely Fairbreeze A (FBA), Fairbreeze B (FBB), Fairbreeze C (FBC) and Fairbreeze C extension (FBCX). The current proposal is to expand the FBB ore body to include economically viable mineralised areas within the Heleza Moya property, as an extension to the FBB ore body which is currently being mined.

Mining at Heleza Moya will follow the same mining methods currently employed at the Fairbreeze Mine (hydraulic mining) and the required mineral beneficiation and infrastructure to support the mining activity and fleet is already in place, with no increase in plant processing capacity required. Sources of noise associated with Heleza Moya will include excavators and front-end-loaders (topsoil stripping and backfilling), hydraulic mining equipment, various pumps and pump stations, screens and trucks. When the mining at Heleza Moya commences, the abovementioned equipment will need to be transferred into the Heleza Moya area (from the current FBB area), with no new noise sources introduced for the Project. With the introduction of no new noise sources, the existing noise climate surrounding the site is anticipated to remain mostly unchanged.

Mining at FBB commenced in 2023 and will continue until 2026. The proposed Heleza Moya reserve will be mined as a direct extension of this orebody with mining commencing in Heleza Moya in 2025 and continuing until 2029, a period of four years. The combined FBB and Heleza Moya Pit will consequently be active for seven years, excluding final rehabilitation activities. There is no defined construction stage. The topsoil pre-strip activities are considered part of the mining process.

The Heleza Moya site is surrounded on three sides by the existing Fairbreeze Mine, with the land use on the coastal side (southeast) over the railway track, being a mix of natural land (conservation) and plantations (forestry). The nearest sensitive receptors to the Heleza Moya site are farmhouses / free-standing receptors, located 2.6 km northeast of the site, within the Fairbreeze boundary (**Figure 1**).

The current noise climate in and around Fairbreeze is predominantly influenced by mining sources, vehicles on the nearby N2 road, natural sources such as insects and birds, and the ocean (NOSA, 2019a; NOSA, 2019b; NOSA, 2020; NOSA, 2021a, NOSA, 2021b; NOSA, 2022b). An initial noise impact assessment (which included monitoring) was conducted in 2010 (Safetech, 2010) to assess the impacts of the Fairbreeze mine before it became operational. Subsequently, annual noise monitoring campaigns have been undertaken since 2019 at various receptor locations and most recently at a permanent noise monitoring station located close to the boundary with Mtunzini (NOSA, 2019a; NOSA, 2019b; NOSA, 2020; NOSA, 2021a, NOSA, 2021b; NOSA, 2022a, NOSA, 2022b; NOSA, 2022c). The location of the noise monitoring points are presented in **Figure 2**.

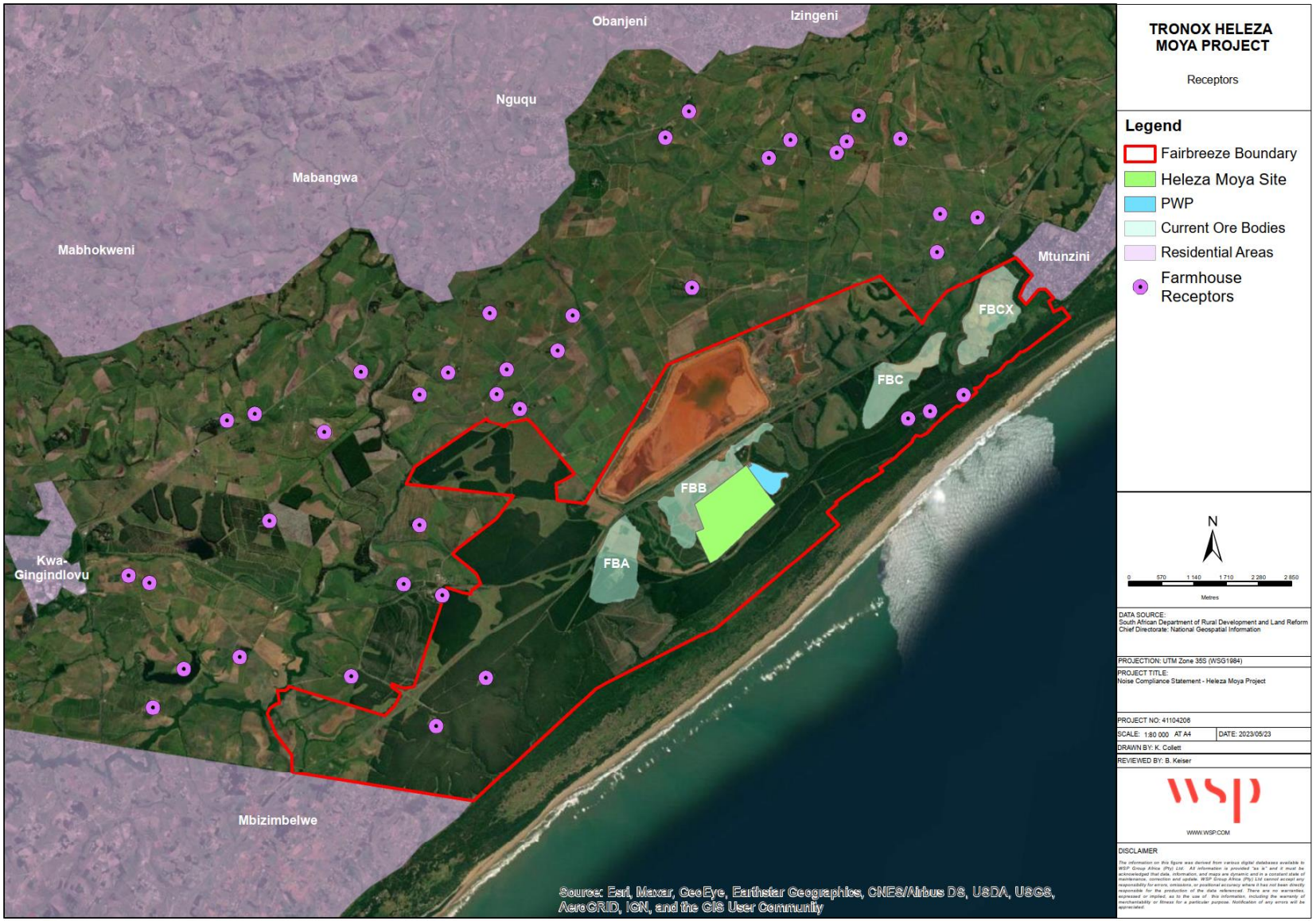

Figure 1: Basic site layout and receptor locations[1]

[1] Note that the mining rights boundary has recently been extended to the north of the Mega Sebeka RSF to include the Everglades RSF expansion. Updated mining rights boundaries are indicated in the Basic Assessment Report

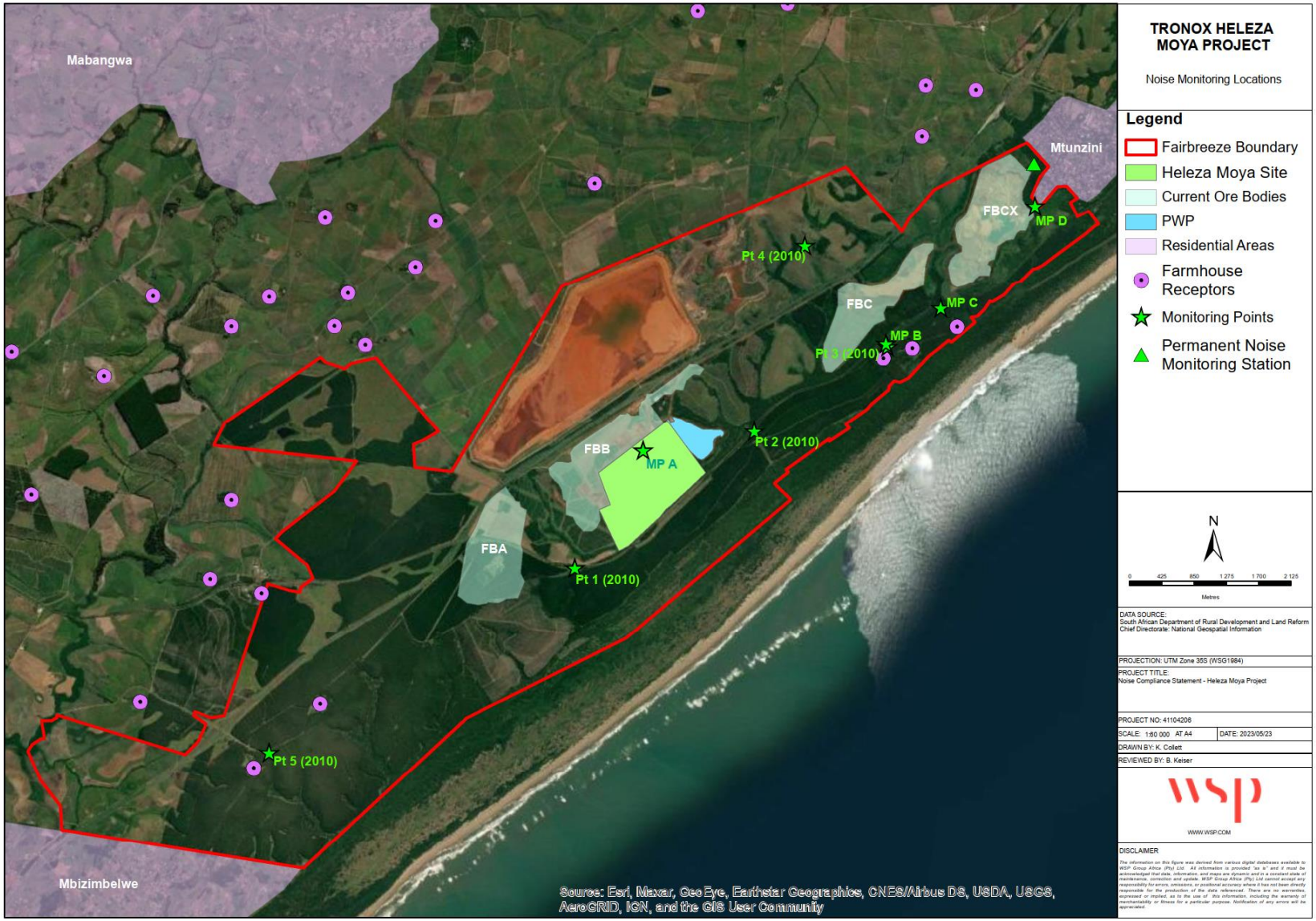

Figure 2: Noise monitoring locations

Model predictions from the 2010 study at the relevant current-day sensitive receptors are presented in **Table 1**. The sites at which noise was predicted in the 2010 noise study have subsequently been refined into the specific noise monitoring locations which form part of the mine's ongoing noise monitoring programme. A summary of noise levels that have been recorded at the relevant monitoring points during monitoring campaigns over time are presented in **Table 2**, while a summary of results from the permanent monitoring station are presented in **Table 3**. It is noted, a short raw data set from the permanent monitoring station was made available to the noise assessment team. The period reviewed was April to May 2022. During this time. It must be noted that mining was actively taking place at the Fairbreeze Pit C extension immediately adjacent to Mtunzini.

Mining is currently occurring at the FBB orebody and mining at the Heleza Moya site will be an extension to this FBB orebody. The 2010 model predictions confirm that noise levels at all nearby receptors were predicted to be compliant with the relevant South African National Standards (SANS) 10103:2008 guideline rating levels during mining at FBB.

From the 2022 monitoring data, all receptors with the exception of McMurray's farm (which is now owned by Tronox and is the subject of the current mining application) indicate daytime results that are below the guideline level. McMurray's Farm (the farmhouse location itself) now forms part of the Heleza Moya site and is no longer considered a receptor as this area falls within the proposed future mining area. During 2022, mining was only occurring at the FBCX ore body, which is in close proximity to Mtunzini, while the PWP and associated access roads are adjacent to the McMurray's site.

Table 1: Noise level predictions from the initial Noise Impact Assessment (Safetech, 2010)

Location	Noise levels associated with different sources (dB(A))					
	PWP + FBA	PWP + FBB	PWP + FBC West	PWP + FBC East	PWP + FBCX South	PWP + FBCX North
McMurray's Farm	25.4	25.7	25.3	25.3	25.3	25.3
Mtunzini	0.0	0.0	12.0	10.8	22.2	42.1
Twin Streams Educational Centre	3.4	3.8	21.5	27.6	17.4	14.3
Twin Streams Nursery	8.1	8.4	19.9	25.6	12.8	11.0

Notes:
- Only receptors applicable to the current-day situation are presented here
- PWP = Primary Wet Plant
- Values highlighted in red exceed the SANS Rural Guideline Rating Level (45 dB(A) – day and 35 dB(A) – night)

Table 2: Historical noise monitoring data (NOSA, 2019a; NOSA, 2019b; NOSA, 2020; NOSA, 2021a; NOSA, 2021b; NOSA, 2022)

Location	June 2019		October 2019		June 2020		Dec 2020/Jan 2021		December 2021		June 2022	
	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))
MP A (McMurray's Farm)	46.5 36.2	47.2 43.2	45.4	39.6	45.3	40.9	47.7	45.9	47.4	44.7	45.3	39.7
MP B (Twin Streams Nursery)	44.3 40.8	44.1 44.1	42.1	41.5	53.9	40.5	42.5	50.7	50.4	46.4	39.0	49.0
MP C (Twin Streams Educational Centre)	40.2 37.4	44.6 42.6	39.7	44.4	50.5	39.7	46.8	46.2	53.4	44.2	39.3	42.0
MP D (XaXaZa Caravan Park)	38.2 37.4	38.0 41.2	39.3	36.3	41.7	38.6	38.2	44.3	54.4	51.6	37.9	43.0

Notes:
- Values highlighted in red exceed the SANS Rural Guideline Rating Level (45 dB(A) – day and 35 dB(A) – night)
- June 2019 has results for two consecutive days of monitoring

Table 3: Results from the permanent noise monitoring station for April and May 2022 (NOSA, 2022a; NOSA 2022b)

April 2022		May 2022	
Time	**Average Noise Level (dB(A))**	**Time**	**Average Noise Level (dB(A))**
06:00	47.4	06:00	49.4
07:00	49.4	07:00	50.1
08:00	48.1	08:00	49.1
09:00	48.5	09:00	48.7
10:00	48.8	10:00	49.3
11:00	48.0	11:00	61.0
12:00	63.6	12:00	48.8
13:00	48.6	13:00	48.5
14:00	48.7	14:00	48.7
15:00	48.6	15:00	47.9
16:00	47.9	16:00	48.0
17:00	48.3	17:00	48.9
18:00	50.6	18:00	49.8
19:00	50.3	19:00	49.3
20:00	50.2	20:00	52.1
21:00	48.2	21:00	50.3
22:00	47.7	22:00	48.4
23:00	49.0	23:00	48.3
00:00	49.5	00:00	49.3
01:00	49.1	01:00	48.9
02:00	49.4	02:00	48.6
03:00	49.7	03:00	48.4
04:00	48.4	04:00	48.3
05:00	47.7	05:00	49.3

Note:
- Values highlighted in red exceed the SANS Suburban Guideline Rating Level (50 dB(A) – day and 40 dB(A) – night)

For context, and notwithstanding that mining at FBCX is nearing completion, the approximate distances between key noise receptors and existing infrastructure, as well as the proposed Heleza Moya mining area are summarised in **Table 4**.

Table 4: Proximity of receptors to activities at the Fairbreeze Mine

Fairbreeze Mine Activity	**Distance to Receptors (m)**		
	Mtunzini	**Twin Streams Nursery**	**Twin Streams Educational Centre**
Fairbreeze C Ext.	150	1,200	400
PWP	5,100	2,500	3,700
Fairbreeze B	5,700	3,100	4,300
Heleza Moya	5,700	2,600	4,000

While the FBCX pit, where active mining is currently taking place at Fairbreeze, extends to ~150 m of the edge of Mtunzini town, ~400 m from the Twin Streams Educational Centre and 1.2 km from the Twin Streams Nursery, the subsequent mining areas are considerably further from these receptors. The PWP is ~2.5 km from the Twin Streams Nursery and 5.1 km from Mtunzini town

itself. Similarly, FBB where mining has commenced in 2023, lies 3 km from Twin Streams Nursery and 5.7 km from Mtunzini at its closest point. The proposed Heleza Moya mining extension to FBB will be approximately 5.4 km from Mtunzini and 2.6 km from the Twin Streams Nursery at its closest point.

Thus, should monitored noise levels be compliant at receptors in close proximity to existing mining activities, then it is reasonable that noise levels at these receptors will reduce as mining moves to more distant localities. Noise levels at sensitive receptors are not expected to fall out of compliance when mining progresses to FBB (as previously predicted and authorised) and Heleza Moya (subject of the current application).

It is understood that mining at FBCX is nearing completion, whereafter mining will move to FBB (and subsequently Heleza Moya), with the progression of mining moving even further south after that to the approved FBA orebody. During that time, noise levels at the Twin Streams receptors and Mtunzini will decrease further.

Additionally, noise levels recorded at the permanent monitoring station are mostly compliant during the day except for peaks above the guideline level around midday and late evening. Night-time monitoring results throughout all monitoring campaigns exceed the SANS rural guideline level consistently. It is noted that these results are assessed against the most stringent guideline level (rural) even though the station is located within the mining rights boundary. These elevated levels at night are predominantly influenced by existing background sources that are constantly present (traffic on the N2, ocean noise and wind), with some influences from the mining operations (NOSA, 2022a; NOSA, 2022b).

The above provides further support that when mining at Heleza Moya occurs, no additional impact over that already inherent in the area and associated with the approved mining operation are likely to be experienced because Heleza Moya will be mined as an extension of the FBB orebody and will be more than 2.6 km from the closest receptor.

From the preceding discussions, additional noise impacts attributable to the Heleza Moya Project are not anticipated for the following reasons:

- There are no new noise sources associated with the Heleza Moya site, which will be mined as an extension of the approved FBB orebody.
- Historical model predictions and monitoring results indicate that when mining occurs at the FBB orebody, no impacts at nearby receptors (Twin Streams receptors and Mtunzini) will be perceived, hence no impact is anticipated to result from the extension of mining into the proposed mineable area at Heleza Moya.
- Receptors are located at considerable distances from the Heleza Moya site (closest receptor is over 2.6 km away) and from previous experience with other mining sites, noise impacts are usually perceived within 1 to 2 km from the source.

ASSUMPTIONS AND LIMITATIONS

The identification of sensitive receptors was based on a desktop assessment using the most recent satellite imagery available on Google Earth Pro™. Additionally, this was cross-correlated with receptors identified in previous monitoring campaigns. Some of those receptors are no longer in place and hence not included in this report. All reasonably identifiable key receptors have been considered.

The scope of this report does not include the acoustic impacts on avifauna or any other animals. It is assumed that these impacts will be addressed in a separate biodiversity specialist study. Nonetheless, based on the fact that Fairbreeze has been a mining site for close to ten years (Tronox, 2018), the immediate noise climate has been dominated by anthropogenic mining activities and animal receptors are likely used to this, so no additional impacts as a result of Heleza Moya are anticipated.

Additionally, based on the findings of this compliance statement, no changes in the noise climate are anticipated as a result of Heleza Moya and impacts on the natural environment are not envisaged to change.

Lastly, the Department of Forestry, Fisheries and the Environment (DFFE) screening tool does not identify noise as having any significant impacts for this proposed Project and does not list a site sensitivity rating for noise. The tool does, however, have some inherent deficiencies in terms of noise impacts as it only identifies noise as a significant theme for Wind Energy Facilities and does not provide impacts for any other industries / sectors. As such, the impact assessment of the Heleza Moya site cannot be fully reliant upon the opinion expressed via the screening tool. For this reason, notwithstanding that this is a compliance statement, the noise specialist team have applied their mind critically to the activities proposed, within the context of the noise impact assessment and predictions conducted to inform primary permitting of the mining operation. (*Please Note: the required map for a compliance statement, indicating the proposed development footprint overlaid with the noise sensitivity map generated by the screening tool is not presented here, as the screening tool does not list a site sensitivity for noise or a resultant map*).

RECOMMENDATIONS

The Fairbreeze mining operation has an established Environmental Management Program (EMPr) which addresses the mitigation of operational noise and defines the ongoing noise monitoring programme. As part of ongoing improvement at the mining operation Tronox has made a number of improvements to further reduce noise including the replacement of reverse alarms with “white noise reverse alarms” (quackers), daily vehicle inspections, third-party noise monitoring of vehicles and ensuring that all vehicles operate under mandatory codes of practice. These measures are considered adequate and no changes in relation to noise management/mitigation contained in the approved EMPr are deemed necessary. Similarly, no changes to the approved monitoring program are deemed necessary. WSP do highlight, however, the importance of maintaining the continuous monitoring station and continuing with the annual monitoring campaigns. Consideration of the following is also encouraged (some of which measures are already implemented at the site):

- Maintenance of an active complaints register in which both complaints pertaining to noise and the follow-up actions undertaken are recorded in order to ensure transparent records related to noise incidents are retained.
- The following mitigation options are put forward for Tronox’s consideration for ongoing improvement at the site (IFC, 2007):
    - Selecting equipment with lower sound power levels when the equipment requires replacement.
    - Ensuring equipment is well-maintained to avoid unnecessary noise generation.
    - Ensure to the extent possible 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.

CONCLUSION

With reference to environmental acoustic impacts, based on the low sensitivity of the Heleza Moya site (due to limited surrounding receptors, the site being bordered on three sides by existing Fairbreeze operations, and no new noise sources being introduced with the operation of Heleza Moya), the proposed Project can be authorised with the existing noise management procedures in place, with no new special conditions / measures applicable.

However, should monitoring data indicate any increases in noise levels showing scenes in excess of 7 dB(A) as stipulated in the EMPr, potentially impacting on receptors, a more comprehensive assessment should be undertaken in response to the identification of such noise exceedances through routine monitoring in order to best identify additional mitigation measures to avoid recurrence of such exceedances.

NOISE SPECIALIST - DECLARATION OF INDEPENDENCE

This Noise Compliance Statement was compiled by Kirsten Collett, an air quality and acoustic consultant with a Master of Science (Atmospheric Sciences) degree obtained from the University of the Witwatersrand. She is currently employed by WSP and has worked on environmental acoustic impact assessments, monitoring and modelling for a variety of clients over the past eleven years. She has provided acoustic consulting support to various client industries including petrochemical, mining and production industries among others. She is also a registered Professional Natural Scientist (Pr. Nat. Sci.) with the South African Council for Natural Scientific Professions (SACNASP). Please see **Appendix A** for a CV detailing project experience.

I hereby declare that I am fully aware of my responsibilities in terms of the National Environmental Management Act: Environmental Impact Assessment Regulations of 2014 and that I have no financial or other interest in the undertaking of the proposed activity other than the imbursement of consultant's fees.

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Signature:

REFERENCES

- International Finance Corporation (IFC) (2007): Environmental, Health and Safety Guidelines: 1.7 Noise, 52 – 53.
- NOSA Occupational Hygiene Services (2019a): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 04 & 05 June 2019. Report no: 19047EM01.F.Q1.Amended.v01.
- NOSA Occupational Hygiene Services (2019b): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 24 October 2019. Report no: 19047KM03.F.Q3.Amended.v01.
- NOSA Occupational Hygiene Services (2020): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 18 June 2020. Report no: 20120LB.Q1.
- NOSA Occupational Hygiene Services (2021a): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 14 January 2021. Report no: 20197LB08.Amended.v01.
- NOSA Occupational Hygiene Services (2021b): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 06 December 2021. Report no: 21231LB02.Q4.
- NOSA Occupational Hygiene Services (2022a): Evaluation of Environmental Noise Levels measured by the Permanent Monitoring Station – 01 to 30 April 2022. Report no: 22048MP.ENV.04.
- NOSA Occupational Hygiene Services (2022b): Evaluation of Environmental Noise Levels measured by the Permanent Monitoring Station – 01 to 31 May 2022. Report no: 22048MP.ENV.05.
- NOSA Occupational Hygiene Services (2022c): An Environmental Noise Survey at Selected areas of the Fairbreeze Mine – 29 June 2022. Report no: 22048MP04.Q2.
- Republic of South Africa (2020): National Environmental Management Act, 1998 (Act No. 107 of 1998) Procedures for the Assessment and Minimum criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation (Government Notice 320 of 2020, Government Gazette 43110).
- Safetech (2010): Specialist Study on Noise Impacts – Exxaro KZN Sands Fairbreeze A,B,C,Cext & D Mining Project. Report no: 26/1248.
- South African National Standards (2008): SANS – Code of Practice 10103:2008, The measurement and rating of environmental noise with respect to annoyance and to speech communication, Standards South Africa, 6th Edition (ISBN 978-0-626-20832-5).
- Tronox (2018): Social and Labour Plan 2018 – 2022. Available online at: https://www.tronox.com/download.php?path=14507.

APPENDIX

A CURRICULUM VITAE

Kirsten Collett

Earth & Environment, Air Quality & Acoustics – Environment & Energy, Principal Consultant

CAREER SUMMARY

Kirsten is a Principal Air Quality and Acoustic Consultant with a Master of Science (Atmospheric Sciences) degree obtained from the University of the Witwatersrand. She is currently employed at the Johannesburg branch of WSP and has worked on various air quality and acoustic impact assessments; air quality management plans; air quality and acoustic monitoring projects; and air quality and acoustic modelling projects for a variety of clients over the past eleven years. She has provided consulting support to various client industries including petrochemical, mining, metallurgical, manufacturing and local government bodies among others. She is also a registered Professional Natural Scientist (Pr.Nat.Sci.) with the South African Council for Natural Scientific Professions (SACNASP).

Countries of work experience gained include South Africa, Botswana, Mozambique, Madagascar, Somalia, Ethiopia, Serbia, Qatar and Kuwait.

11 years with WSP

13 years of experience

Area of Expertise

Air Quality Impact Assessments

Air Quality Management

Ambient Air Quality and Acoustic Monitoring

Environmental Acoustic Impact Assessments

Language

English - Fluent

EDUCATION

Master of Science, Atmospheric Sciences, University of Witwatersrand, Johannesburg, South Africa	2009
Bachelor of Science (Honours) Geography and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa	2006
Bachelor of Science, Geography and Environmental Studies, University of Witwatersrand, Johannesburg, South Africa	2005

ADDITIONAL TRAINING

CadnaA - Acoustics Training	2022
Snake Awareness Training	2016
Business-focussed Project Management	2013

PROFESSIONAL MEMBERSHIPS

SACNASP – South African Council for Natural Scientific Professions	2016
NACA – National Association for Clean Air	2016

Kirsten Collett

Earth & Environment, Air Quality & Acoustics – Environment & Energy, Principal Consultant

SASAS – South African Society for Atmospheric Sciences 2022

PROFESSIONAL HISTORY

WSP Group Africa (Pty) Ltd 2011 – present

Climatology Research Group (University of the Witwatersrand) 2009 – 2011

PROFESSIONAL EXPERIENCE

Air Quality Impact Assessments (AQIAs)

Transnet Port Terminals - Saldanha, AQIA for a Proposed Expansion to an Iron Ore Loading Terminal, Saldanha, Western Cape, South Africa
2020 – 2022
Project Manager and Lead Consultant
WSP was contracted to undertake an air quality impact assessment in the form of an atmospheric impact report (AIR) to determine the impacts of a proposed increase in iron ore storage and handling capacity at the Saldanha Port. The project was part of an Atmospheric Emission Licence (AEL) variation application, with an AIR specifically requested by the authorities. The project included a baseline assessment, compilation of a comprehensive emissions inventory and dispersion modelling using the CALPUFF dispersion model to assess the impacts of emissions on the surrounding communities. The project also included the AEL component, with authority liaison, advertisement placement and submission of the AEL variation application on the South African Atmospheric Emission Licencing and Inventory Portal (SAAELIP).

Cast Products South Africa, AQIA for a Section 22A AEL Renewal for a Foundry, Boksburg, Gauteng, South Africa
2022
Project Manager and Lead Consultant
WSP was contracted to undertake an air quality impact assessment in the form of an atmospheric impact report (AIR) for the Boksburg Foundry. The Client failed to renew their current AEL timeously and as such a Section 22A rectification process was triggered. As part of the Section 22A process, an AIR was specifically requested by the authorities. The project included a baseline assessment, compilation of a comprehensive emissions inventory and dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on the surrounding communities. The project also included the AEL component, with authority liaison, advertisement placement and submission of the AEL renewal application on the South African Atmospheric Emission Licencing and Inventory Portal (SAAELIP).

Orion Engineered Carbons, AQIA for a Bulk Liquid Cargo Facility, Port of Gqeberha, Eastern Cape, South Africa
2020 – 2021
Project Manager and Lead Consultant
WSP was appointed to conduct an AQIA in the form of an Atmospheric Impact Report as part of the licencing of the operational tanks at the port. This formed part of a Noxious Use Permit application, as per the Port Elizabeth Zoning Scheme. The assessment consisted of quantification of emissions from the tanks using the US EPA's Tanks 4.0.9 model as well as dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on any surrounding receptors.

Platinum Cement Industries, AQIA for a Proposed Cement Grinding Processing Facility, Umbogintwini, KwaZulu-Natal, South Africa
2020 – 2021
Project Manager and Lead Consultant
WSP was appointed to conduct an AQIA in the form of an Atmospheric Impact Report as part of an Atmospheric Emission Licence (AEL) application for a proposed cement grinding processing facility. The

assessment consisted of the compilation of a comprehensive emissions inventory to account for emissions from the facility as well as dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on any surrounding receptors.

Protea Chemicals, AQIA for a Revised Production Rate for a Chemical Producer, Cape Town, Western Cape, South Africa
2020
Project Manager and Lead Consultant
WSP was appointed to conduct an AQIA in the form of an Atmospheric Impact Report as part of an Atmospheric Emission Licence (AEL) amendment application for a production rate change at the facility. The assessment consisted of the compilation of a comprehensive emissions inventory to account for emissions from the facility as well as dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on any surrounding receptors.

WSP Middle East, AQIA for a Proposed Independent Power Project, Qatar
2020
Project Manager and Lead Consultant
WSP was contracted to undertake a screening-level air quality impact assessment to determine the suitability of the proposed stack heights in dispersing emission away from sensitive receptors. The project included a baseline assessment, emissions inventory, dispersion modelling using SCREEN3 and comparison of the predicted concentrations against the Qatar ambient air quality standards.

Transnet Port Terminals - Saldanha, AQIA for a Proposed Expansion to an Iron Ore Loading Port, Saldanha, Western Cape, South Africa
2019
Project Manager and Lead Consultant
WSP was contracted to undertake an air quality impact assessment to determine the impacts of a proposed increase in iron ore storage and handling capacity at the Saldanha Port. The project included a baseline assessment, compilation of a comprehensive emissions inventory and dispersion modelling using the CALPUFF dispersion model to assess the impacts of emissions on the surrounding communities.

Anglo American Coal SA, AQIA for a proposed coal stockpile at an underground mine, Ogies, Mpumalanga, South Africa
2018
Project Manager and Lead Consultant
WSP was appointed to conduct an Air Pollution Assessment in the form of an Atmospheric Impact Report for a proposed coal stockpile at the underground section of the Zibulo Colliery. The assessment consisted of the compilation of a comprehensive emissions inventory to account for emissions from the proposed stockpile as well as dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on any surrounding receptors.

WSP Middle East, AQIA for a Proposed Waste to Energy Facility, Kuwait
2017 – 2018
Project Manager and Lead Consultant
WSP was contracted to undertake an air quality impact assessment to determine the impacts of a proposed waste to energy facility in Kuwait. The project included assessment of baseline monitoring data (conducted by a local partner), a baseline assessment, emissions inventory, dispersion modelling using CALPUFF and comparison of the predicted concentrations against the Kuwait and International ambient air quality guidelines/standards. A preliminary screening assessment was undertaken using SCREEN3 to determine the monitoring locations for the baseline monitoring campaign.

The Dow Chemical Company (Rohm and Haas) - Advanced Materials, AQIA for a Chemical Manufacturer, New Germany, KwaZulu-Natal, South Africa
2015
Project Manager and Lead Consultant
WSP was appointed to conduct an Air Pollution Assessment in the form of an Atmospheric Impact Report for the proposed Polyol Blending Plant at the Dow Advanced Materials site in New Germany. The assessment consisted of the compilation of a comprehensive emissions inventory to account for emissions from both the existing and proposed operations as well as dispersion modelling using the AERMOD dispersion model to assess the impacts of emissions on the surrounding communities.

South32 Aluminium SA Limited, AQIA for Remediation of a Smelter, Richards Bay, KwaZulu-Natal, South Africa
2015 – 2016
Lead Consultant
WSP was contracted to undertake an air quality impact assessment to determine the impacts of remediating the legacy landfill sites at the Bayside Aluminium Smelter in Richards Bay. Kirsten was responsible for the development of a comprehensive emissions inventory; and determination of the impact of the proposed project on the surrounding communities using the AERMOD dispersion modelling software.

South32 Aluminium SA Limited, AQIA for a Smelter Decommissioning, Richards Bay, KwaZulu-Natal, South Africa
2014 – 2015
Lead Consultant
WSP was contracted to undertake a screening-level air quality impact assessment for the decommissioning of the Bayside Aluminium Smelter in Richards Bay. Kirsten was responsible for the development of a comprehensive emissions inventory; and determination of the impact of the proposed project on the surrounding communities using the AERSCREEN Tier 1 dispersion modelling software.

First in Spec Biofuels Ltd, AQIA for a Biodiesel Plant, Coega IDZ, Eastern Cape, South Africa
2011 – 2015
Lead Consultant
As part of a larger Environmental Impact Assessment for a proposed biodiesel production plant in Coega, WSP was commissioned to conduct a specialist air quality impact assessment for the facility. Kirsten was responsible for compiling the air quality impact assessment which was initially a screening-level assessment and later upgraded to a Tier 2 full air quality impact assessment. The project involved a baseline review of the area; baseline meteorological and pollutant data analysis; emission inventory compilation; dispersion modelling; reporting; and atmospheric emission licence (AEL) compilation.

Atha-Africa Ventures (Pty) Ltd, AQIA for a Proposed Mine, Wakkerstroom, Mpumalanga, South Africa
2012 – 2014
Lead Consultant
WSP was commissioned to undertake an air quality impact assessment for a proposed underground coal mine near Wakkerstroom, Mpumalanga as part of a comprehensive environmental and social impact assessment for the mine. Kirsten was responsible for conducting the air quality assessment. The assessment comprised on-site ambient air quality monitoring in order to assess the existing air quality in the region as well as dispersion modelling (using the ADMS (v5) software) to determine the predicted impacts that the proposed mine will have on the existing air quality.

Apollo Tyres South Africa (Pty) Ltd, AQIA for a Tyre Manufacturer, Durban, KwaZulu-Natal, South Africa
2012 – 2013
Consultant
WSP was commissioned to perform an air quality impact assessment for a tyre manufacturer to determine the changes in emissions should they replace their existing heavy fuel oil fired boiler with two coal fired boiler equipped with bag filters. Kirsten was responsible for conducting this screening-level air quality assessment through a baseline review of the site; emissions inventory compilation; and determination of the impact of the boiler emissions on the surrounding communities using the SCREEN3 screening-level dispersion modelling software.

Ferrochrome Furnaces (Pty) Ltd, AQIA for Ferrochrome Production Facility, Rustenburg, North West, South Africa
2012

Lead Consultant
WSP was commissioned to perform an air quality impact assessment of a proposed ferrochrome production facility in Zinniaville, Rustenburg as part of a larger environmental impact assessment. Kirsten was responsible for conducting the air quality assessment through a baseline review of the site; compilation of a detailed site-specific emissions inventory; determination of the impact of the proposed facility on the surrounding communities using the ADMS dispersion modelling software; and compilation of the atmospheric emission licence (AEL) application.

SIVEST SA (Pty) Ltd, AQIA for a Fuel Depot Recommissioning, Western Cape, South Africa
2012
Consultant
WSP was commissioned as part of a broader environmental impact assessment, to conduct an air quality impact assessment of the recommissioning of the Total Paarden Island fuel storage and distribution terminal near Cape Town. The air quality impact assessment investigated emissions generated as a result of both the construction phase and operational phase of the facility. Kirsten was responsible for the assessment which comprised a baseline review of the site; compilation of a detailed site-specific emissions inventory; estimation of emissions generated from each of the onsite storage tanks through the use of the TANKS 4.0.9 model; and determination of the impact of the proposed facility on the surrounding communities using the SCREEN3 dispersion modelling software.

Noble Resources Ltd, AQIA for a Proposed Oilseeds Processing Plant, Standerton, Mpumalanga, South Africa
2011-2012
Consultant
Noble Resources proposed to construct an oilseeds processing plant in Standerton and required an air quality assessment to determine what impacts the activity would have in the region. Kirsten performed this assessment through a baseline assessment of the site; development of a comprehensive emissions inventory; and determination of the proposed impacts through the use of a Tier 2 atmospheric dispersion model (ADMS)

City of Johannesburg, Ambient Air Quality Assessment during Car Free Day, Johannesburg, South Africa
2007 – 2008
Consultant
This project monitored vehicular emissions from a mobile monitoring station placed alongside the M1 highway in Johannesburg. This was done to evaluate the effectiveness of car free day and to assess whether there was a reduction in emissions on the day. Kirsten was involved in the assessment, analysis and reporting in this specific project.

Air Quality Management

Weir Minerals, Atmospheric Emission Licence (AEL) Audit, Annual Reporting and NAEIS submission for a Foundry, Isando, Gauteng
2021
Project Manager and Lead Consultant
WSP was appointed to undertake an audit of the facility's current AEL to assess the accuracy of what was represented in the AEL as well as to evaluate compliance with the conditions stipulated in the AEL. Additionally, the scope of work included compilation of their Annual Report as well as reporting of emissions onto the National Atmospheric Emissions Inventory System (NAEIS). Kirsten was responsible for conducting the audit, compiling the audit report and annual report and submitting all information onto NAEIS.

Sasol Satellite Operations Ekandustria, Atmospheric Emission Licence (AEL) Audit for an Explosives Manufacturer, Ekandustria, Mpumalanga, South Africa
2020
Project Manager and Lead Consultant

WSP was appointed to undertake an audit of the facility's current AEL to assess the accuracy of what was represented in the AEL as well as to evaluate compliance with the conditions stipulated in the AEL. Kirsten was responsible for conducting the audit and compiling the audit report.

Anglo American Coal SA, Isibonelo Colliery Air Quality Management Plan, Mpumalanga, South Africa
2019 – 2020
Project Manager and Lead Consultant
Anglo American Coal SA requested the compilation of an Air Quality Management Plan (AQMP) for the Isibonelo Colliery in the Mpumalanga province. The AQMP was aimed at improving air quality at the colliery through the identification of main sources of emissions and recommendations to reduce emissions from these sources. Kirsten was responsible for the compilation of the AQMP which was performed through a baseline assessment of activities at the colliery; identification of key emission sources; compilation of a detailed site specific emissions inventory; determination of the impact of emissions from the colliery on surrounding communities using the AERMOD dispersion modelling software; review of current management and mitigation techniques at the colliery; and development of strategies to minimise any impacts of emissions from the colliery going forward.

Transnet Port Terminals Saldanha Bay, Atmospheric Emission Licence (AEL) Audit for a Manganese Multipurpose Terminal, Saldanha, Western Cape, South Africa
2019
Lead Consultant
WSP was contracted to undertake an audit of the current provisional AEL (PAEL) for the terminal and assist with conversion of the PAEL to a final AEL. The project included a site visit and audit, Client and Authority liaison and assistance with submission of the AEL on the South African Atmospheric Emission Licencing and Inventory Portal (SAAELIP).

Anglo American Coal SA, Mafube Colliery Integrated Air Quality Management Plan, Mpumalanga, South Africa
2015 – 2016
Project Manager and Lead Consultant
WSP was appointed for the compilation of an integrated Air Quality Management Plan (AQMP) for the Mafube Colliery in the Mpumalanga province. The AQMP was aimed at improving air quality at the colliery through the identification of main sources of emissions and recommendations to reduce emissions from these sources. Kirsten was responsible for the compilation of the AQMP which was performed through a baseline assessment of activities at the colliery; identification of key emission sources; compilation of a detailed site specific emissions inventory; determination of the impact of emissions from the colliery on surrounding communities using the AERMOD dispersion modelling software; review of current management and mitigation techniques at the colliery; and development of strategies to minimise any impacts of emissions from the colliery going forward.

Sonae Novobord (Pty) Ltd, Air Quality Management Reports, White River, Mpumalanga, South Africa
2011 – 2015
Consultant
WSP has been continuously monitoring formaldehyde, suspended particulate matter (PM_{10}) and dust deposition (fallout) concentrations in and around the Sonae Novobord White River plant since 2008. Kirsten was responsible for analysing and assessing the ambient monitoring data and drafting the air quality management reports.

Anglo American Coal SA, Combined Integrated Air Quality Management Plan for the Greenside, Kleinkoppje and Landau Collieries, Mpumalanga, South Africa
2013 – 2014
Lead Consultant
Anglo American Coal SA requested the compilation of a combined integrated Air Quality Management Plan (AQMP) for the Greenside, Kleinkoppje and Landau Collieries in the Mpumalanga province. The AQMP was

aimed at becoming a management tool for the collieries going forward Kirsten was responsible for the compilation of the combined AQMP which was performed through a baseline assessment of activities at each colliery; identification of key emission sources; compilation of a detailed site specific emissions inventory for each colliery; determination of the impact of emissions from each colliery (as well as the combined impact) on surrounding communities using the CALPUFF dispersion modelling software; review of current management and mitigation techniques at each colliery; and development of strategies to minimise any impacts of emissions going forward.

Columbus Stainless (Pty) Ltd, Fugitive Dust Suppression Plan for a Steel Producer, Middelburg, Mpumalanga, South Africa
2013
Lead Consultant
WSP was commissioned to compile a fugitive dust suppression plan in order to assess the fugitive dust emanating from a stainless-steel plant in Middelburg. Kirsten was responsible for compiling the fugitive dust suppression plan through on-site dust fallout monitoring; analysis of all historical particulate matter, dust fallout and meteorological data for the site; identification of key emission sources; and provision of mitigation and management measures to limit the impact of fugitive dust going forward.

Anglo American Coal SA, Greenside Colliery Integrated Air Quality Management Plan, Mpumalanga, South Africa
2012 – 2013
Lead Consultant
Anglo American Coal SA requested the compilation of an integrated Air Quality Management Plan (AQMP) for the Greenside Colliery in the Mpumalanga province. The AQMP was aimed at improving air quality at the colliery through the identification of main sources of emissions and recommendations to reduce emissions from these sources. Kirsten was responsible for the compilation of the AQMP which was performed through a baseline assessment of activities at the colliery; identification of key emission sources; compilation of a detailed site specific emissions inventory; determination of the impact of emissions from the colliery on surrounding communities using the ADMS dispersion modelling software; review of current management and mitigation techniques at the colliery; and development of strategies to minimise any impacts of emissions from the colliery going forward.

Anglo American Coal SA, Landau Colliery Integrated Air Quality Management Plan, Mpumalanga, South Africa
2012
Lead Consultant
Anglo American Coal SA requested the compilation of an integrated Air Quality Management Plan (AQMP) for the Landau Colliery in the Mpumalanga province. The AQMP was aimed at improving air quality at the colliery through the identification of main sources of emissions and recommendations to reduce emissions from these sources. Kirsten was responsible for the compilation of the AQMP which was performed through a baseline assessment of activities at the colliery; identification of key emission sources; compilation of a detailed site specific emissions inventory; determination of the impact of emissions from the colliery on surrounding communities using the ADMS dispersion modelling software; review of current management and mitigation techniques at the colliery; and development of strategies to minimise any impacts of emissions from the colliery going forward.

Sonae Novobord (Pty) Ltd, Strategic Overview of Air Quality Conditions at the Sonae Novobord Plant, White River, Mpumalanga, South Africa
2008 – 2011
Consultant
WSP has been monitoring various air quality aspects in and around the Sonae Novobord White River plant since 2008. Concentrations of formaldehyde, suspended particulate matter (PM_{10}) and dust deposition (fallout) have been continually monitored in terms of the requirements of the NEMA Section 24G Environmental Management Plan. Kirsten was involved in performing a strategic assessment of conditions at the plant, to

ascertain whether the air quality has improved over time and whether the conditions set out in the Record of Decision and the Air Quality Management Plan are being met.

Ambient Monitoring

Anglo American Coal SA, Dust Fallout and Particulate Matter Monitoring for nine Collieries, Mpumalanga, South Africa
2016 – 2022
Project Manager
WSP was appointed to manage Anglo American Coal SA's air quality monitoring requirements at nine of their collieries. The contract includes dust fallout monitoring at all nine collieries, while continuous particulate matter (PM_{10} and $PM_{2.5}$) monitoring is conducted at seven collieries using mobile custom-designed solar system trailers. Kirsten was responsible for project management and quality control for the project.

Foskor (Pty) Ltd, Dust Fallout and Particulate Matter Monitoring for a Phosphate Mine, Phalaborwa, Limpopo, South Africa
2016 – 2019
Project Manager
WSP was commissioned to manage and maintain a dust monitoring network for Foskor Phalaborwa's phosphate rock operations in the Limpopo Province. The monitoring network comprises 37 dust fallout samplers, and a real-time particulate matter (PM_{10}) monitor. Kirsten was responsible for project management and quality control for the project.

Total South Africa (Pty) Ltd, Leak Detection and Repair Programs for Ten Fuel Depots, South Africa
2016 – 2017
Project Manager
WSP was appointed to conduct leak detection and repair programs at ten of Total South Africa's bulk fuel storage depots as part of their atmospheric emission licence conditions. Kirsten was responsible for project management, data analysis and reporting for the project.

Eskom Holdings SOC Limited, Dust Fallout Monitoring for Kendal Power Station, Kendal, Mpumalanga, South Africa
2016
Project Manager
WSP was commissioned to monitor dust fallout at the Kendal Power Station in Mpumalanga for a six month period. Kirsten was responsible for project management, data analysis and reporting for the project.

Evraz Highveld Steel and Vanadium Corporation Ltd, Dust Fallout Monitoring for a Steel Facility, Mpumalanga, South Africa
2012 – 2015
Project Manager
As part of Evraz Highveld Steel's on-going monitoring program for the assessment of dust generated by the steelworks and associated activities, WSP was commissioned to conduct dust fallout monitoring both on and off site. Monitoring has been performed over time at the site on a monthly basis in accordance with the ASTM D1739 reference method. Kirsten was responsible for data analysis, interpretation and reporting during the 2012 monitoring period. Most recently, Kirsten was responsible for project management during the 2014 and 2015 campaign.

Evraz Highveld Steel & Vanadium Corporation Ltd, Particulate Matter Monitoring for a Steel Facility, Mpumalanga, South Africa
2014 – 2015
Project Manager
WSP was commissioned to monitor particulate matter concentrations at three locations in and around the Evraz Highveld Steel facility using E-sampler monitoring equipment. Kirsten was responsible for project management and reporting for the project.

Eskom Holdings SOC Limited, Dust Fallout Monitoring for Majuba Power Station, Volksrust, Mpumalanga, South Africa
2013 – 2015
Project Manager
WSP was commissioned to monitor dust fallout at the Majuba Power Station in Mpumalanga for a two-year period. Kirsten was responsible for project management, data analysis and reporting for the project.

Tubular Holdings (Pty) Ltd, Dust Fallout Monitoring, Kendal, Mpumalanga, South Africa
2013 – 2014
Project Manager
WSP was commissioned to monitor dust fallout and meteorological conditions at the Tubular Holdings workers' living quarters near Kendal, Mpumalanga. The project was initiated to determine the source of dust at this location. Kirsten was responsible for project management; data analysis; and reporting for the project.

Atlantis Foundries (Pty) Ltd, Dust Monitoring Program for a Foundry, Atlantis, Western Cape, South Africa
2011
Data Analyst
WSP was commissioned to provide specialist air quality support and monitoring services to Atlantis Foundries (Pty) Ltd, situated within Atlantis near Cape Town. The project included: dust deposition monitoring, the compilation of an Atmospheric Emission Licence (AEL) for the facility and the development of site-specific dust mitigation and management strategies. Kirsten was involved in assisting with data analysis and interpretation of the results obtained from the monthly monitoring campaigns at the site.

Sasol New Energy Holding (Pty) Ltd, Air Quality Monitoring for a Proposed Power Plant, Ressano Garcia, Mozambique
2011
Field Consultant
WSP was commissioned by Sasol New Energy Holding (Pty) Ltd to undertake an integrated environmental and social impact assessment (ESIA) and bankable environmental, social and health impact assessment (ESHIA) for the proposed gas engine power plant that is to be constructed in Ressano Garcia, Mozambique. As part of this assessment, a specialist air quality study was conducted to assess what impacts the proposed plant may have on air quality in the region. Kirsten was responsible in assisting with the set-up of passive monitoring equipment, dust buckets and a meteorological station at the site.

Eskom Holdings SOC Limited, European Integrated Project on Aerosol, Cloud, Climate and Air Quality Interactions, Mpumalanga, South Africa
2007 – 2010
Technical Consultant
This was an international aerosol project focusing on four developing countries, namely South Africa, India, Brazil and China. It was initiated to provide a comparative set of aerosol emission data between the four countries. Kirsten was involved in the setup and maintenance of the monitoring instrumentation at the South African site. For this, Kirsten was also involved in an aerosol training course in Hyytiälä, Finland as well as technical training in Leipzig, Germany for the SMPS (Scanning Mobility Particle Sizer) instrument.

Eskom Holdings SOC Limited, Ambient Air Monitoring at the Point of Highest Impact Resulting from Kriel and Matla Power Stations, Mpumalanga, South Africa
2009
Consultant
This study was conducted on the Mpumalanga Highveld in order to increase our understanding of the sources and diurnal variations of various atmospheric species as well as the effects of local meteorology on the concentration of these species. The study included ambient monitoring using a mobile monitoring station. Kirsten was involved in the data analysis, statistical manipulation and reporting.

Acoustics

ENERTRAG South Africa, Environmental Acoustic Screening Assessment for two Proposed Wind Energy Facilities, Camden, Mpumalanga, South Africa
2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic screening assessment for two proposed wind energy facilities near Camden in Mpumalanga. Kirsten was responsible for conducting the assessments which

determined the potential acoustic impacts of the proposed projects based on the methodology prescribed by the International Finance Corporation Environmental Health and Safety (IFC EHS) Guidelines.

ENERTRAG South Africa, Environmental Acoustic Impact Assessment for a Proposed Green Hydrogen and Ammonia Facility, Camden, Mpumalanga, South Africa
2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic Impact assessment for the proposed Camden I Green Hydrogen and Ammonia Facility. Kirsten was responsible for conducting the assessment which included a baseline assessment; development of a comprehensive acoustic inventory; and determination of the impact of the proposed project on the surrounding sensitive receptors using attenuation-over-distance acoustic calculations.

Crossboundary Energy, Environmental Acoustic Screening Assessment for a Proposed Wind Energy Facility, Port Dauphine, Madagascar
2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic screening assessment for a proposed wind energy facility in Madagascar. Kirsten was responsible for conducting the assessment which determined the potential acoustic impacts of the proposed project based on the methodology prescribed by the International Finance Corporation Environmental Health and Safety (IFC EHS) Guidelines.

DP World, Environmental Acoustic Impact Assessment for the Port of Berbera Phase 2 Expansion, Somaliland, Somalia
2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the proposed Phase 2 expansion to the Port of Berbera. An acoustic inventory was developed to identify all potential sources of noise associated with the construction and operational phases of the Phase 2 expansion project. The construction phase impacts were assessed through attenuation-over-distance acoustic calculations, whilst acoustic impacts of the proposed port operations were assessed using the Computer Aided Noise Abatement (CadnaA) acoustic model.

Loci Environmental, Environmental Acoustic Impact Assessment for a Proposed Manganese Mine, Kanye, Botswana
2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for a proposed manganese mine in Botswana. Kirsten was responsible for conducting the assessment which included a baseline assessment; development of a comprehensive acoustic inventory; and determination of the impact of the proposed project on the surrounding sensitive receptors using the Computer Aided Noise Abatement (CadnaA) acoustic modelling software.

Die Oesterreichische Entwicklungsbank Ag And Metito Utilities Ltd, Environmental Acoustic Impact Assessment for a Proposed Wastewater Treatment Plant, Zrenjanin, Serbia
2021
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the development of a proposed wastewater treatment plant (WWTP). To assess the existing noise climate in the area surrounding the proposed site, ambient noise monitoring was conducted at four receptor locations. An acoustic inventory was developed to identify all potential sources of noise associated with the construction and operational phases of the WWTP. The acoustic impacts of the operation of the proposed WWTP were then assessed using the Computer Aided Noise Abatement (CadnaA) acoustic model, while construction phase impacts were assessed through attenuation-over-distance acoustic calculations.

DNG Energy Ltd, Environmental Acoustic Impact Assessment for a Proposed Gas to Power Project, Komatipoort, Mpumalanga, South Africa
2021
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the development of the proposed Khensani Gas to Power Project. To assess the existing noise climate in the area surrounding the proposed site, ambient noise monitoring was conducted at five receptor locations. An acoustic inventory was developed to identify all potential sources of noise associated with the operational phase of the project. The acoustic impacts of the operation of the proposed facility during both an unmitigated and mitigated scenario were then assessed using the Computer Aided Noise Abatement (CadnaA) acoustic model.

Platinum Cement Industries, Environmental Acoustic Impact Assessment for a Proposed Cement Grinding Processing Facility, Umbogintwini, KwaZulu-Natal, South Africa
2020 – 2021
Project Manager and Lead Consultant
WSP was appointed to conduct a screening-level environmental acoustic impact assessment for a proposed cement grinding processing facility. Kirsten was responsible for conducting the assessment which included a baseline assessment; development of a comprehensive acoustic inventory; and determination of the impact of the proposed project on the surrounding sensitive receptors using attenuation-over-distance acoustic calculations.

AngloGold Ashanti, Environmental Acoustic Impact Assessment for the expansion to a tailings storage facility, Northwest, South Africa
2017 – 2020
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the proposed extension of the Kareerand Tailings Storage Facility. Kirsten was responsible for conducting the assessment which included baseline acoustic monitoring; development of a comprehensive acoustic inventory for both the construction and operational phases of the project; and determination of the impact of the proposed project on the surrounding sensitive receptors using the Computer Aided Noise Abatement (CadnaA) acoustic modelling software.

BioTherm Energy, Environmental Acoustic Impact Assessment for three wind energy facilities, Northern and Western Cape, South Africa
2016 – 2019 and 2021 – 2022
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for three proposed wind energy facilities located between Sutherland and Matjiesfontein in the Northern and Western Cape provinces. Kirsten was responsible for conducting the assessments which included baseline acoustic monitoring; development of a comprehensive acoustic inventory for both the construction and operational phases of the project; and determination of the impact of the proposed wind energy facilities on the surrounding sensitive receptors (farmhouses) using the Computer Aided Noise Abatement (CadnaA) acoustic modelling software. Various updates and expansions to the above-mentioned projects were then further assessed during 2021/2022.

Sappi Southern Africa Limited, Environmental Acoustic Impact Assessment for the proposed expansion to a paper mill, KwaZulu-Natal, South Africa
2018
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the proposed expansion to the Sappi Saiccor Mill, near Umkomaas. Kirsten was responsible for conducting the assessment which included baseline acoustic monitoring; development of a comprehensive acoustic inventory for the proposed expansion activities; and determination of the impact of the proposed expansion on the surrounding sensitive receptors through the use of attenuation-over-distance acoustic calculations.

Sappi Southern Africa Limited, Environmental Acoustic Impact Assessment for a proposed timber handling facility, Umkomaas, KwaZulu-Natal, South Africa
2017
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for a proposed timber handling facility near Umkomaas. Kirsten was responsible for conducting the assessment which included

baseline acoustic monitoring; development of a comprehensive acoustic inventory; and determination of the impact of the proposed facility on the surrounding sensitive receptors (specifically, a newly proposed retirement village) using the Computer Aided Noise Abatement (CadnaA) acoustic modelling software.

Loci Environmental, Environmental Acoustic Impact Assessment for the proposed rehabilitation of the Sekoma-Morwamosu road section, Botswana
2017
Project Manager and Lead Consultant
WSP was appointed to undertake an environmental acoustic impact assessment for the proposed rehabilitation of a section of road within the southern part of Botswana. Kirsten was responsible for conducting the assessment. Current operational noise levels in the vicinity of the road section where determined using an acoustic modelling platform, with current (2017) traffic count data as input. The acoustic impacts of the proposed rehabilitation were determined using attenuation-over-distance calculations (construction phase) and acoustic modelling (operational phase). Changes in noise levels at specific receptor locations were then assessed for each phase and the resultant community responses were evaluated.

City of Cape Town, Environmental Acoustic Impact Assessment for the Redevelopment of the Athlone Power Station, Cape Town, Western Cape, South Africa
2016 – 2017
Lead Consultant
WSP was contracted to undertake an environmental acoustic impact assessment for redevelopment of the Athlone Power Station site to determine the noise impacts of a) the surrounding activities on the redevelopment site; and b) the proposed site activities on the surrounding communities. Kirsten was responsible for conducting the assessment which included baseline acoustic monitoring; development of a comprehensive noise source inventory; and determination of the impact of the current noise climate on the Athlone site as well as the impact of the proposed redevelopment activities on the surrounding communities.

Central Termica Da Ressano Garcia, Environmental Acoustic Monitoring for a Gas Engine Power Plant, Ressano Garcia, Mozambique
2016
Project Manager
WSP was commissioned to undertake acoustic monitoring at the Central Termica De Ressano Garcia gas engine power plant site in order to assess the noise associated with the operation of the plant. Kirsten was responsible for project management, technical input and reporting for this project.

Anglo American Coal SA, Community Environmental Acoustic Monitoring Survey, Vereeniging, Gauteng, South Africa
2016
Project Manager
WSP was appointed to conduct community-based noise monitoring in a region adjacent to the New Vaal Colliery in order to assess the acoustic impacts of the colliery on the surrounding communities. Kirsten was responsible for project management, data analysis and reporting for the project.

Anglo American Platinum Limited, Screening Level Environmental Acoustic Impact Assessment for a New Ventilation Shaft, Rustenburg, Northwest, South Africa
2016
Lead Consultant
WSP was appointed to investigate the acoustic impacts associated with the construction and operation of an additional ventilation shaft at the Siphumelele 1 Mine near Rustenburg. Kirsten was responsible for conducting the assessment through baseline acoustic monitoring and acoustic propagation calculations.

Industrial Development Corporation of SA (Pty) Ltd, Environmental Acoustic Impact Assessment for a Proposed Paper Mill, Frankfort, Free State, South Africa
2013 – 2015
Lead Consultant
WSP was contracted to undertake an environmental acoustic impact assessment for a proposed paper mill in Frankfort in the Free State Province. Kirsten was responsible for conducting the assessment which included baseline acoustic monitoring; development of a comprehensive noise source inventory; and determination of the impact of the proposed project on the surrounding communities using the Computer Aided Noise Abatement (CadnaA) acoustic model.

South32 Aluminium SA Limited, Environmental Acoustic Impact Assessment for the Decommissioning of a Smelter, Richards Bay, KwaZulu-Natal, South Africa
2014 – 2015
Lead Consultant
WSP was contracted to undertake a screening-level environmental acoustic impact assessment for the decommissioning of the Bayside Aluminium Smelter in Richards Bay. Kirsten was responsible for conducting the assessment which included the development of a comprehensive noise source inventory; and determination of the impact of the proposed project on the surrounding communities using noise propagation calculations.

Sasol New Energy Holding (Pty) Ltd, Environmental Acoustic Monitoring for a Gas Engine Power Plant, Ressano Garcia, Mozambique, Africa
2014 – 2015
Project Manager and Lead Consultant
WSP was commissioned by Sasol New Energy Holding (Pty) Ltd to undertake acoustic monitoring at the Central Termica De Ressano Garcia gas engine power plant site in order to assess the noise associated with the construction and operational phases of the plant. Kirsten was responsible for technical input, acoustic data analysis and reporting for this project.

Sonae Novobord (Pty) Ltd, Environmental Noise Survey for a Wood Producer, White River, Mpumalanga, South Africa
2012 – 2015
Consultant
WSP has been conducting environmental noise monitoring at the Sonae Novobord White River plant since 2009. The project includes day and night-time monitoring in accordance with the SANS 10103:2008 methodology, data analysis, compliance assessment and reporting. Kirsten was involved in the data analysis, interpretation and reporting for the project.

Atha-Africa Ventures (Pty) Ltd, Environmental Acoustic Impact Assessment for a Proposed Mine, Wakkerstroom, Mpumalanga, South Africa
2012 – 2014
Lead Consultant
WSP Environmental was commissioned to undertake an environmental acoustic impact assessment for a proposed underground coal mine near Wakkerstroom, Mpumalanga as part of a comprehensive environmental and social impact assessment for the mine. Kirsten was responsible for conducting the environmental acoustic assessment. The assessment comprised on-site environmental noise monitoring in order to obtain a baseline noise climate for the region as well as acoustic modelling to determine the predicted impacts that the proposed mine will have on the existing noise climate. An inventory of all noise sources during the construction and operational phases was compiled with associated sound power levels for each source. These sources were then input into the Computer Aided Noise Abatement (CadnaA) acoustic model. Results were compared with the monitored (existing) noise levels as well as the SANS day and night-time guidelines to assess compliance.

Sonae Novobord (Pty) Ltd, Environmental Noise Survey for a Wood Producer, Panbult, Mpumalanga, South Africa
2013
Project Manager
WSP was commissioned to do a once-off environmental acoustic compliance monitoring survey at the Sonae Novobord Panbult site in Mpumalanga. Kirsten was responsible for project management and reporting for the project.

Kirsten Collett

Earth & Environment, Air Quality & Acoustics – Environment & Energy, Principal Consultant

Rustenburg Platinum Mines Limited, Environmental Noise Impact Assessment for the Amandelbult Mine, Limpopo, South Africa
2013
Lead Consultant
As part of an environmental impact assessment, WSP was commissioned to conduct an environmental noise assessment for the sinking of a new shaft at the Tumela mine in the Limpopo Province. Kirsten conducted this environmental noise impact assessment through a baseline review of the site; compilation of a detailed site-specific noise inventory; determination of the impact of the proposed project on the surrounding communities using the CadnaA acoustic model; interpretation of modelled results; compliance assessment; and reporting.

Shell and BP South Africa Petroleum Refineries (SAPREF), Environmental Noise Impact Assessment for SAPREF Cleaner Fuels Phase Two, Durban, KwaZulu-Natal, South Africa
2013
Lead Consultant
WSP was contracted to perform the environmental noise impact assessment of the Cleaner Fuels Phase Two Project for the SAPREF Refinery in South Durban. The project investigated the noise associated with undertaking the required modifications to the refinery in order to meet the pending fuel specifications published by the South African Department of Energy. Kirsten was responsible for analysis and interpretation of on-site acoustic monitoring; compilation of a detailed site-specific noise inventory; determination of the impact of the proposed project on the surrounding communities through the use of the CadnaA acoustic model; interpretation of modelled results; compliance assessment; and reporting.

Assmang Black Rock Mine Operations, Environmental Monitoring Assessment for a Manganese Mine, Hotazel, Northern Cape, South Africa
2012 – 2013
Consultant
WSP was commissioned to conduct environmental monitoring for their underground manganese mining venture at Black Rock in the Northern Cape Province. The environmental monitoring consisted of both environmental noise monitoring and particulate monitoring. Vehicle noise and emissions testing was also performed on various Assmang owned vehicles onsite. Kirsten was responsible for analysis of all monitored data, interpretation, compliance assessment and reporting.

AngloGold Ashanti (Pty) Ltd, Environmental Noise Surveys, Vaal River and West Wits Operations, Northwest, South Africa
2012
Consultant
WSP was commissioned by Anglo Gold Ashanti to perform environmental noise surveys of their Vaal River and West Wits mining operations in the Northwest Province, as part of their commitment to minimise negative impacts on the environment. The project included day and night-time monitoring in accordance with the SANS 10103:2008 methodology, data analysis, compliance assessment and reporting. Kirsten was responsible for assisting with data analysis, interpretation and reporting.

Sasol New Energy Holding (Pty) Ltd, Environmental Acoustic Impact Assessment for a proposed Power Plant, Ressano Garcia, Mozambique
2011
Field Consultant
WSP was commissioned by Sasol New Energy Holding (Pty) Ltd to undertake an integrated environmental and social impact assessment (ESIA) and bankable environmental, social and health impact assessment (ESHIA) for the proposed gas engine power plant that is to be constructed in Ressano Garcia, Mozambique. As part of this assessment, a specialist environmental acoustic study was conducted to assess what impacts the proposed plant may have on the noise climate of the region. Kirsten was responsible in assisting with on-site acoustic monitoring for the project.

Kirsten Collett

Earth & Environment, Air Quality & Acoustics – Environment & Energy, Principal Consultant

MSC Thesis

The Atmospheric Nitrogen Budget over the South African Highveld, Mpumalanga, South Africa 2007 – 2009
This project was Kirsten's MSc thesis and was performed in collaboration with Eskom. The project aimed to assess the atmospheric nitrogen cycle in the industrialised Highveld region. The project investigated the various atmospheric nitrogen compounds on the South African Highveld and looked at the dominant sources, the transport and conversion of the species in the atmosphere and in what form they are deposited to the ground. From this it was confirmed that the majority of emitted nitrogen remains in the atmosphere, confirming the trends depicted by satellite technology. Client: Eskom Holdings SOC Limited.

Honours Project

NOx or Not: Nitrogen Oxide Levels over the South African Highveld, Mpumalanga, South Africa 2006
This was Kirsten's honours project and was performed in collaboration with Eskom. This project aimed to validate the nitrogen dioxide hotspot over the South African Highveld as identified by satellite technology. The prevalent sources of nitrogen dioxide were investigated as well as the diurnal and seasonal distributions. Client: Eskom Holdings SOC Limited.

AWARDS

2009 - MSc Distinction

2008 - Best presentation for paper entitled "The Atmospheric Nitrogen Budget over the South African Highveld".
National Association for Clean Air (NACA) conference

PUBLICATIONS AND PRESENTATIONS

Publications

Collett, K.S., Piketh, S.J. and Ross, K.E. "An assessment of the atmospheric nitrogen budget on the South African Highveld." South African Journal of Science, 2010, pp. #106, 5/6, Article# 220.

Laakso, L., Vakkari, V., Laakso, H., Virkkula, A., Kulmala, M., Beukes, J.P., van Zyl, P.G., Pienaar, J.J., Chiloane, K., Gilardoni, S., Vignati, E., Wiedensohler, A., Tuch, T., Birmili, W., Piketh, S., Collett, K., Fourie, G.D., Komppula, M., Lihavainen, H., de Leeuw, G. and Kerminen, V.-M. "South African EUCAARI – measurements: a site with high atmospheric variability, "Atmospheric Chemistry and Physics Discussion. Month 2010, 10, 30691 – 30729.

Ross, K., Broccardo, S., Heue, K-P., Collett (nee Ferguson), K. and Piketh, S. "Nitrogen oxides on the South African Highveld." Clean Air Journal, Month 2007. 16, 2, 6 – 15.

Presentations

Collett, Kirsten. "The Atmospheric Nitrogen Budget over the South African Highveld." National Association for Clean Air Conference, Nelspruit, Mpumalanga, 2009.