Air Quality Assessment for the Beeshoek Mine Optimisation Projects

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Optimisation projects

Projects with potential air quality impacts

- Project 1: Consolidation of Run of Mine (ROM) Stockpiles on South Mine
- Project 2: Amendments to the design of existing Waste Rock Dumps (WRDs) in terms of the increase in heights, and allowance for final slope, which will result in extension of footprints
- Project 3: Increase of Opencast Footprint Areas, as well as the undertaking of detrital mining for shallow iron ore reserves, including transportation routes (Haul roads)
- Project 4: Development of the Beneficiation Project which will comprise of a WHIMS Plant and Jig Plant at Beeshoek

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Methodology

- Estimate missions from the current operational activities and from the optimization projects
- Use dispersion modelling to predict ambient concentrations from the current emissions, the four projects individually, and optimization as a whole
- Assessment of potential impacts, comparing modelled concentrations with National Ambient Air Quality Standards

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Emissions

Mining activity	TSP	PM_{10}	$PM_{2.5}$
Current operation emissions	5 224	1 545	172
Emissions post optimisation projects	7 039	2 118	230

- Approximately 90% of all TSP and PM_{10} emissions are attributed to the entrainment of dust by vehicles, and 80% of the $PM_{2.5}$ emission.
- Crushing and screening is the second largest source of particulate emissions at Beeshoek, but it is relatively small with 5.4% of the total TSP and PM_{10} emission.
- The total emission of particulates increases with the implementation of the optimisation projects

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Maximum predicted concentrations

- The predicted annual PM_{10} and $PM_{2.5}$ concentrations and dustfall from Project 1 (ROM consolidation), Project 2 (WRD amendments) and Project 4 (beneficiation plants) are low and below the NAAQS.
- The predicted annual PM_{10} and $PM_{2.5}$ concentrations and dustfall from Project 3 exceeded the NAAQS. PM_{10} exceedance occur over Beeshoek and beyond the mine to the west.
- Project 3 activities contribute to the mine exceeding the NAAQS post optimisation. PM_{10} exceedance occur over Beeshoek and beyond the mine property to the west.

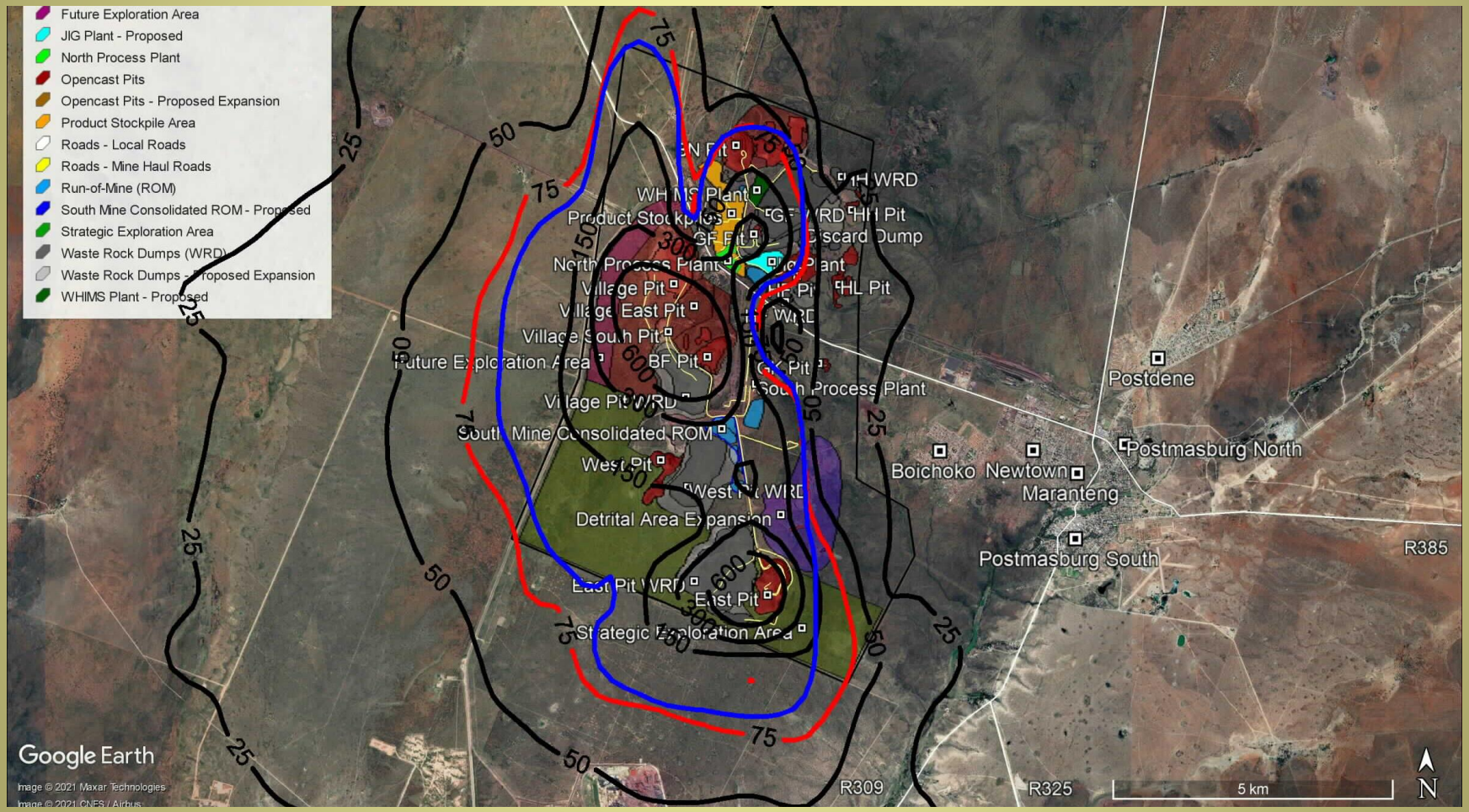
	Annual PM_{10}	24-hour PM_{10}	Annual $PM_{2.5}$	24-hour $PM_{2.5}$	Dust fallout
Project 1: Consolidation of ROM stockpiles	7.2	30	2.8	11.6	16.3
Project 2: Amendments to WRDs	1.4	4.4	0.2	0.7	2.8
Project 3: Opencast footprints	**439**	**1 239**	**45**	**127**	1 175
Project 4: Beneficiation plant upgrade	33	271	6.5	21	509
Beeshoek Mine post improvements	**793**	**2 617**	**80**	**263**	**2 457**
NAAQS	40	75	20	40	600

Sensitive receptors

- These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants
- Sensitive receptors include, but are not limited to, hospitals, schools, day care facilities, elderly housing and convalescent facilities
- Predicted ambient PM_{10} and $PM_{2.5}$ concentrations and dust fallout are well below the NAAQS at all sensitive receptors

Receptor	Annual PM_{10}	24-hour PM_{10}	Annual $PM_{2.5}$	24-hour $PM_{2.5}$	Dust fallout
Aukampsrus	8.0	65.0	0.8	7.0	75
Boichoco	2.1	21.1	0.2	2.0	22
Maranteng	1.1	12.3	0.1	1.3	12
Newtown	1.4	14.7	0.2	1.5	15
Postdene	0.9	10.1	0.1	0.9	12
Postmasburg-North	1.1	13.0	0.1	1.3	13
Postmasburg-South	1.2	13.2	0.1	1.4	14
NAAQS	40	75	20	40	600

Predicted PM_{10} concentrations post optimisation



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Impact assessment

- The impact significance for Project 1 (ROM consolidation), Project 2 (WRD amendments), and Project 4 (beneficiation plant) is considered **low**.
- The impact significance for Project 3 (pit expansion) is considered **medium**.
- The impact significance for all activities at the Beeshoek Mine following the implementation of the optimisation projects is considered **medium**.

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