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DUST IMPACT ASSESSMENT OF SPH KUNDALILA (PTY) LTD: BARRAGE BULK SAND MINE

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1. Site Description

The SPH Kundalila (Pty) Ltd: Barrage Bulk Sand Mine operational area is situated closest to the towns of Sasolburg, Parys and Van Der Bijl Park in the Northern Free State Province. The operation is situated at 1458 m above sea level at reference point A, Figure 1. The site (from reference point A, Figure 1) is situated 21.50 km WNW of Sasolburg, 22.47 km NE of Parys and 22.65 km WSW of Van Der Bijl Park. The Barrage Bulk Sand Mine is surrounded by agricultural land used mostly for commercial farming of live-stock and dry land maize production (EMPR, 2015). The Vaalriver borders the operational area directly to the East and another sand quarry borders the operational area to the North-West. The boundary of the complete SPH Kundalila (Pty) Ltd: Barrage Bulk Sand Mine lease area is represented in Figure 1 (black line).

Figure 1: *The SPH: Barrage Bulk Sand Mine lease area*

2. Project description

To determine and access the potential impact of the mining and screening activities of SPH: Barrage Bulk Sand Mine on the surrounding environment.

3. Pollutant of concern

The only real pollutant of concern which may impact on the air quality of the region as well as the health and well-being of the surrounding environment associated within the entire mining operation is the emission of particulate matter or dust. The dust emitted during the excavation and mining process of the SPH: Barrage Bulk Sand Mine will be of main pollutant concern. These particulates will consist out of a range of sizes and emitted during the activities of loading, transport, screening and off-loading of sand.

4. Potential sources

No other sources of particulate or gaseous emissions other than the dust generated from mining are expected to have an impact on the air quality status and environment of this region. The main sources of dust emission contributions will be wind-blown dust from vehicles travelling on gravel roads and the mining (excavating and screening) of Parys Borrow Pit. From the wind-blown dust sources, the stockpiles and screening will be the main source of emissions and mitigating concerns. Wind-blown dust typically impacts down-wind from the direction where the highest velocity winds occur.

The trucks involved in the transport would potentially be an insignificant source of re-suspension of soil on the gravel roads and the vehicle entrained dust will be bounded near the road where it is generated from.

5. Projected modelling of impact and receptors

No expansive modelling was needed to make the necessary dust deposition predictions due to factors including: the small size of operation; nature of the pollutant (mainly coarse dust particulates); mainly one source; impact and location of site; availability of data of similar operations. After a comprehensive literature study into the specific nature of these activities dust (tailings and gravel), the possible impacts related to the dust deposition levels of this activity was assessed and determine. The level of control that would be required in order to mitigate it was also included in the study. The impact of dust as pollutant of this mining activity can be assessed as follows:

The potential significance and overall effect of dust as pollutant responsible for degradation of the surrounding environment and air quality is determined mainly by the size of the dust particles and the climatology of the region. In general, large dust particles (greater than 30 microns- TSP) make up the greatest proportion of dust and largely deposit within 100 metres of the source. Intermediate sized particles (10 to 30 microns) are likely to travel 200 to 500 metres (Goodquarry.com, 2005). For this impact study the travel distances of dust particles as calculated by G.E. Blight under South African conditions were used. Blight determined travel distances using a wind speed of 13.9 $m.s^{-1}$ and calculated distribution distance for the re-suspension of different size dust particles at a height of 1 meter (G.E. Blight, 2007). According to his calculations the travel distance through re-suspension of dust particles will be 38 metres for a 60-micron particle (G.E. Blight, 2007). This is also more or less in line with real distances of dust particles travelled internationally as described by goodquarrry.com.

Grading analysis of the silica sand mined at the Parys Borrow Pit by Stata labs (SANAS accredited, Appendix 1) indicates from several samples that only 2 to 5 % of the silica sand within each sample tested had particle sizes smaller than 75 micron meters. The wind speeds of Sasolburg never exceed 50 km/h (see figure 2). It is thus the prediction of this assessment that no particle ≥ 75 microns which will include 95-98 % of the Parys Borrow Pit as tested will travel further than 100 metres from the source if released at a height of 1 meters or below.

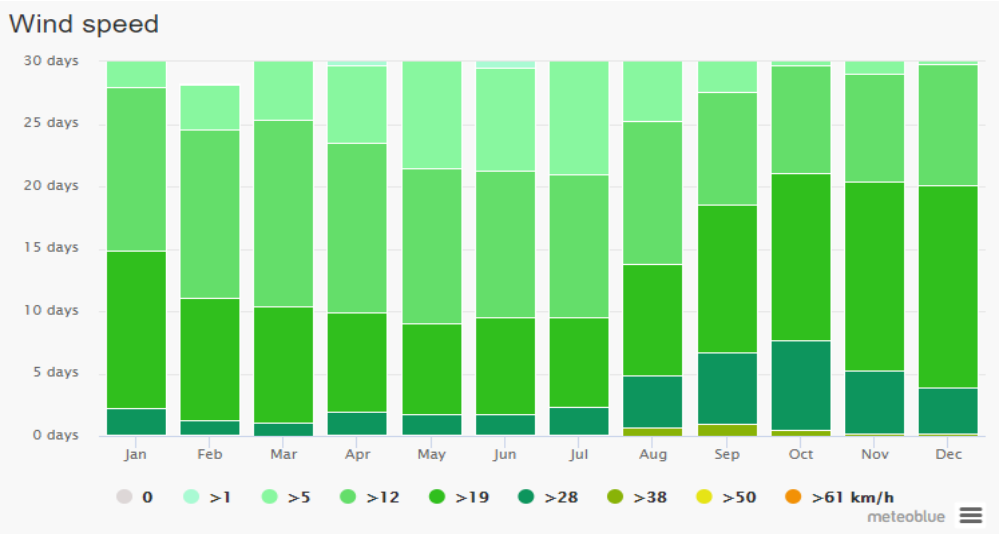

Figure 2: Wind speeds for Sasolburg

The predicted impact of the generated dust (TSP) emitted during all mining activities including screening at SPH: Barrage Bulk Sand Mine can be assessed as follows:

- The closest sensitive receptors are:
  -Vaal Oewer located 1.6 km NNW of the closest point of the site
  - farm house located 600 meters east of the site boundary
  - the Vaalriver itself located directly to the eastern of the operational boundary
- Almost all emitted dust will be 60 microns and larger
- 60 micron dust particles will travel 38 m with a wind speed of 13.9 $m.s^{-1}$
- The wind direction for this region is northerly directions 80% of the time (Figure 3)
- The wind speed for this region never exceeds 50,4 km/h = 13,9 $m.s^{-1}$ (Figure 2)
- The only sensitive receptors downwind of the site will be the Vaal river to the east
- All sensitive receptors except the Vaal river is located more than 100 meters from operational boundary.

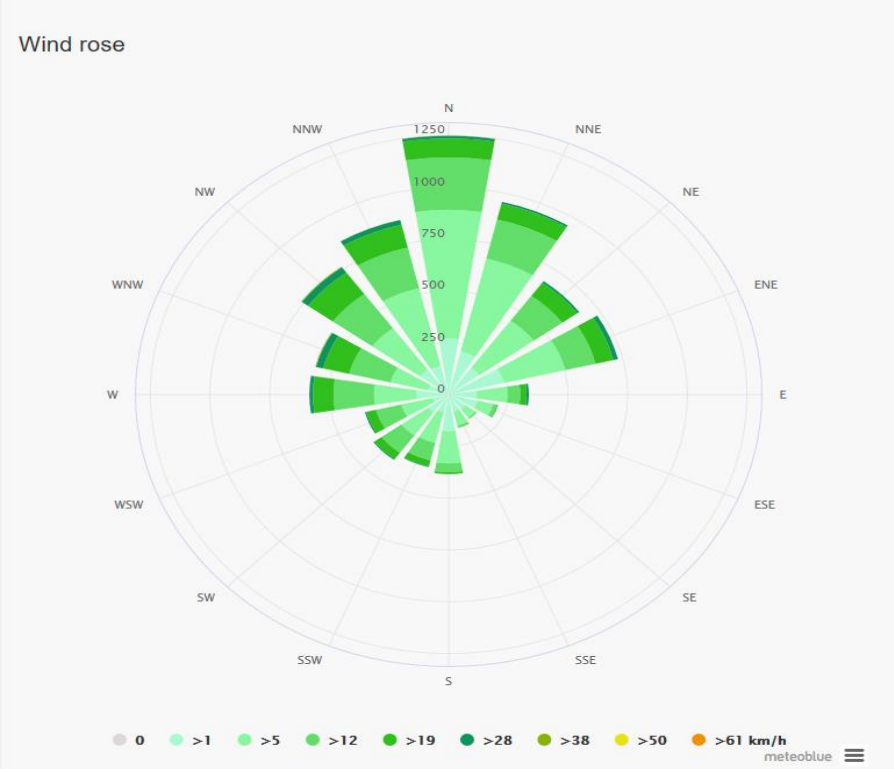

Figure 3: Wind rose *for Sasolburg*

It can therefore be presumed that the proposed project will have no impact on any of the nearby receptors including the river as long as mining does not take place within 300 m of the operational boundary line.

6. Mitigation Strategies

No other sources of particulate or gaseous emissions other than the dust generated from mining, screening and gravel roads are expected to have impact on air quality and environmental surrounding of this region. The main sources of dust emission contributions will be wind-blown dust from vehicles travelling on gravel roads and the mining (excavating) and screening of silica sand. From the wind-blown dust sources, the stockpiles and screening will be the main source of emissions and mitigating concerns. Wind-blown dust typically impacts down-wind from the direction where the highest velocity winds occur.

Fall-out dust buckets are currently placed on the operational boundaries (see figure1). These buckets are used to assess the dust fall-out from the trucks travelling along the gravel roads (source) as well as mining activities to ensure mitigating strategies would be implemented if guideline values for the dust fall-out monitoring program require so. To this date no mitigation strategies was needed as the legal limits of the non-residential dust fall-out rate of 1200 mg/m^2/day or the residential limit of 600 mg/m^2/day of the acceptable dust-fall-out limits as set in the National Dust Control Regulations was ever exceeded (see figure 4).

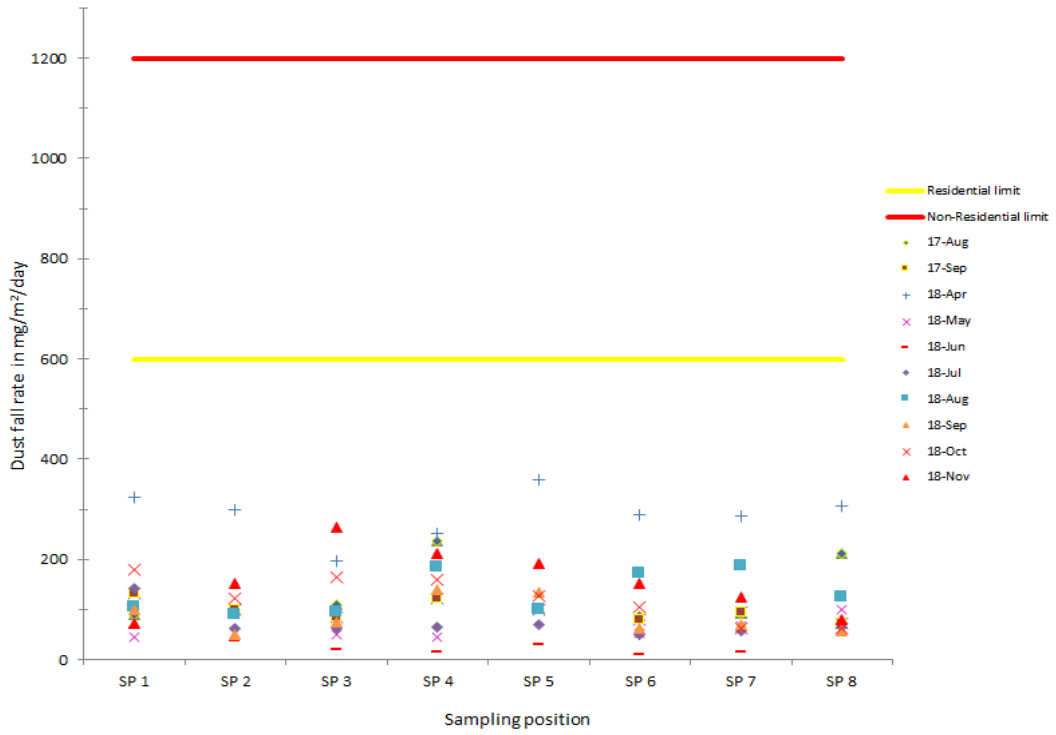

Figure 4: Dust fall-out data of current dust monitoring network

No impact of dust is anticipated beyond the 300-meter guideline as described in Paragraph 5 and therefore all new activities including screening plant and stockpiles would be placed 300 metres from the closest receptor of the Vaal river to the east. Extensive dust monitoring would be done at selected sites with potential significant environmental and health impacts and mitigation of mining methods and activities pertaining to silica sand source would be managed accordingly.

7. References

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