



Document number	T4-PP-SHERQ-061	Revision No	V0
Department name	SHERQ		
Document Name	Dust Monitoring Report		

April 2022 Dust Monitoring Report

Report Compiler: Pieter Holtzhausen

Date: 06 May 2022

Reviewed: Gerhard Muller

Date: 10 May 2022

Finalisation Date: 16 May 2022

Compiler Signature

Environmental Manager Signature

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1. Introduction

Tetra4 is currently operating the HDR1 gas production facility with the Phase 1 LNG/He plant development currently still under construction. As per the EMPR, Tetra4 must undertake dust monitoring and as such monthly dust bucket collection and placement at pre-identified sites and report on the results. The buckets are sent to a SANAS accredited laboratory for total dust fallout analysis. This report aims to present the results of the monthly dust fallout monitoring undertaken for the period 10 March 2022 to 4 April 2022, and to evaluate if dust generated from the Tetra4 construction activities fall within acceptable limits.

1.1 Project Setting

The study area is situated near the town of Virginia in the Free State Province, and traverses both the Matjhabeng and Masilonyana Local Municipalities. The rivers and streams running through the study area includes the Sand River, Bosluisspruit and Doring River, with the R30 also traversing the study area. For this monitoring programme, the study area includes eighteen dust monitoring locations, situated around areas of construction where potential sensitive receptors were identified. This includes the gas gathering pipeline and proposed exploration within the Cluster 1 area as well as the phase 1 plant construction activities. Refer to Figure 1 for a layout map of the dust monitoring locations.

1.2 Monitoring Requirements

The requirement for continuous dust fallout monitoring is restricted to the project's construction phase only. The approved Environmental Management Programme (EMPr) has the functional requirement that Tetra4 must conduct dust fallout monitoring at potential sensitive receptors which fall within the defined 200 m zone of impact of construction related activities. This requirement is to ensure compliance to the following Standards:

- ASTM D1739:1998 (Reapproved 2010)
- SANS 1929
- National Dust Control Regulations (GN827 /2013)
- National Ambient Air Quality Standards (GN1210/2009)

Construction work on the gas gathering pipeline was completed by the end of June 2021, therefor monitoring of sites surrounding the pipeline has ceased. However, construction of the plant will continue until June 2022. As such, the April 2022 monitoring event only included monitoring sites around the plant construction activities. Table 1 below indicates dust buckets to be sampled which fall within the 200 m zone of influence from construction activities along with the specific construction activities being conducted.

Table 1: Sample sites within 3 km of construction activities

Property	Construction Activity	Monitoring Sites within 3 km
Mond van Doornrivier 38/ RE	HDR1 Plant	C1_Sch_13, C1_Bla_16, C1_Mon_2



Mond van Doornrivier 38/ RE	Site Establishment and Balance of Plant	C1_Sch_13, C1_Bla_16, C1_Mon_2
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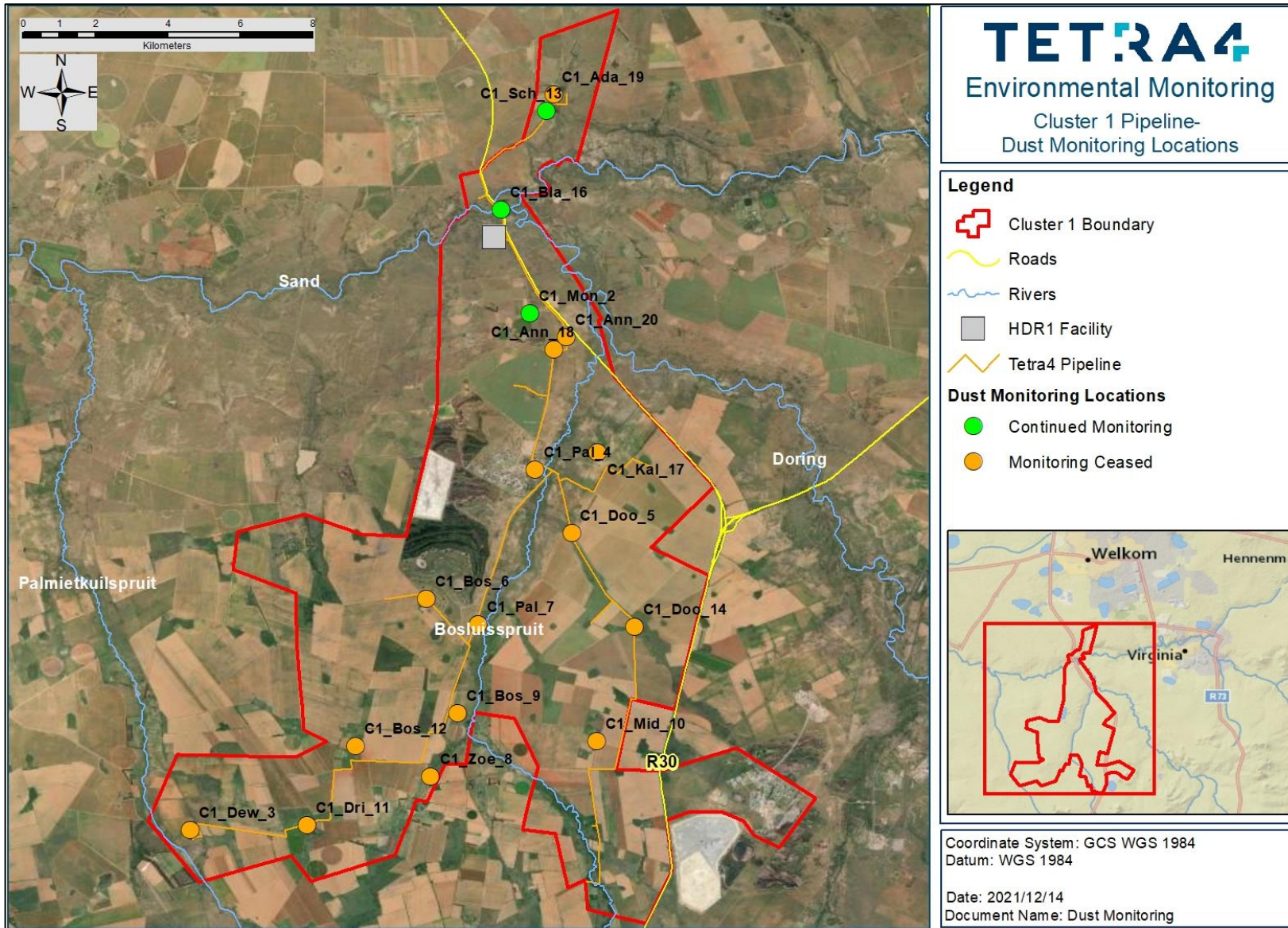


Figure 1: Dust monitoring locations



2. Study Design

2.1 Sample Locations

Sample locations were determined by Environmental Impact Management Services (Pty) Ltd (EIMS) in consultation with Tetra4 as per Figure 1. A total of 18 sampling locations were identified, of which only 3 sites are still being monitored. These sites, their coordinates and area classifications are listed in Table 2 below.

Table 2: Dust monitoring locations

Site ID	Latitude	Longitude	Area Classification
C1_Mon_2	-28,14514	26,72807	Residential
C1_Bla_16	-28,11951	26,72083	Residential
C1_Sch_13	-28,09486	26,73211	Residential (School)

The sample site locations were guided by the requirements of ASTM 1739-98 (2010) as follows:

- Buckets were placed in an open area. The areas must be free of any structures higher than 1 m for at least a 20 m radius surrounding the bucket.
- Dust buckets were placed away from local sources of pollution and objects that can affect the settling of particulate matter (e.g., trees, air exhausts and intakes). Accessibility and security from vandalism were major considerations in the selection of sites.
- Dust buckets were placed away from areas with chimneys. Buckets were also placed more than ten stack-lengths from operating stack and upwind from these stacks where relevant in accordance with the most frequent wind direction.

2.2 Equipment

Sampling for dust fallout was undertaken in accordance with the American Society for Testing and Materials' (ASTM) standard method for the collection and measurement of dust fallout (ASTM D1739-98 (2010)). Dust buckets should consist of the following:

- An open-topped cylinder with a diameter of not less than 150 mm and a height not less than twice the bucket's diameter.
- Buckets should be composed of stainless steel or weatherproof plastic.
- Buckets must be legibly labelled with a weatherproof permanent marker.
- Each dust bucket should have a tightfitting lid.
- A stand with an aerodynamic wind shield should house the bucket at a height of 2 m above the ground (top of the bucket).



2.3 Sampling Methodology

Dust buckets are exposed to the environment for a period of between 27 and 33 days. **Note:** during the April 2022 event the dust buckets were only placed for a duration of 25 days and are considered under-exposed (outside of the required 30 ± 3 days exposure period). The bucket is then collected and replaced with an empty dust bucket which is cleaned with a detergent solution and rinsed with reagent water at least twice prior to placement. The collected buckets are stored in a secure location for transportation to a SANAS accredited laboratory within 1 week of collection for analysis. All buckets are clearly labelled with a permanent marker on both the bucket and bucket lid.

Prior to the first sampling event the following information is recorded for each site:

- Co-ordinates.
- Altitude.
- Panoramic photos.

The following information is recorded during every site visit:

- Description of activities surrounding the site, specifically activities that could influence the dust fallout concentrations.
- Dust bucket content
- Wind direction and speed recorded for the sampling period.
- Bucket collection and replacement dates.

Laboratory results are recorded in a consolidated database after laboratory analysis.

3. Results

The National Dust Control Regulations (NDCR, 2013) set out standards for acceptable dust fallout rates as in Table 3 below.

Table 3: Standards for acceptable dust fallout rates

Area Classification	Acceptable Dust fallout rate (mg/m ² /day, 30 days average)	Permitted Annual Exceedances
Residential	< 600	Two non-sequential months
Non-residential	< 1200	Two non-sequential months

The South African National Standards (SANS1929, 2005) defined a four-band scale of criteria for dust deposition as in Table 4 below.

Table 4: Four band scale dust deposition criteria (SANS 1929, 2005)

Band Number	Description	Dust Fallout Rate (mg/m ² /day)	Comment
1	Residential	< 600	Permissible for residential and light commercial.



2	Industrial	600 < 1200	Permissible for heavy commercial and industrial.
3	Action	1200 < 2400	Requires investigation and remediation if two sequential months lie in this band, or more than three occur in a year.
4	Alert	2400 <	Immediate action and remediation required following first incidence of the dust fall rate being exceeded. Incident report to be submitted to the relevant authority.

The above criteria will be evaluated against the monthly laboratory results for each site. Additionally, the results will be categorised in accordance with the nuisance categories as specified in Table 5 below.

Table 5: Dust fallout nuisance categories

Nuisance Category	Thresholds (mg/m ² /day)
Slight	< 250
Moderate	250 < 500
Heavy	500 < 1200
Very Heavy	> 1200



3.2 Dust Fallout Results

The dust fallout results for the April 2022 monitoring event were compared to the SANS1925 (2005) four band scale for dust deposition and were also evaluated for the number of NDCR exceedances within the last year (see Table 6 below). The nuisance category was noted at each site for the month and depicted on a map, see Figure 2.

Table 6: March 2022 dust fallout results

Site ID	Start Date	End Date	Number of Days	Total Dust Fallout (mg)	Total Dust Fallout (mg/m ² /day)	SANS Band	Number of NDCR Exceedances within a Year	Nuisance Category
C1_Bla_16	2022/03/10	2022/04/04	25	13.69538047	31	Residential	0	Slight
C1_Mon_2	2022/03/10	2022/04/04	25	13.69538047	31	Residential	0	Slight
C1_Sch_13	2022/03/10	2022/04/04	25	7.510369937	17	Residential	0	Slight

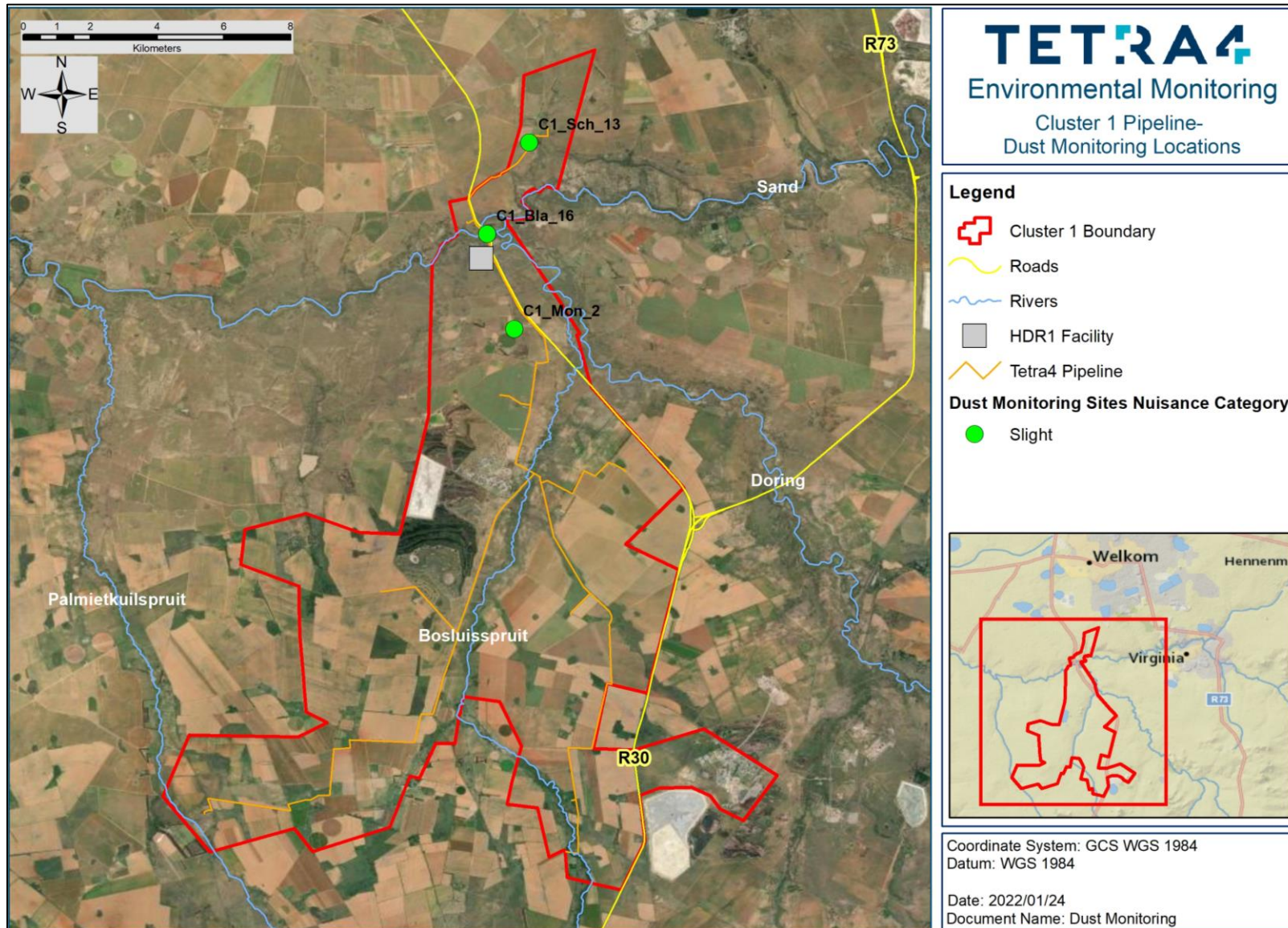


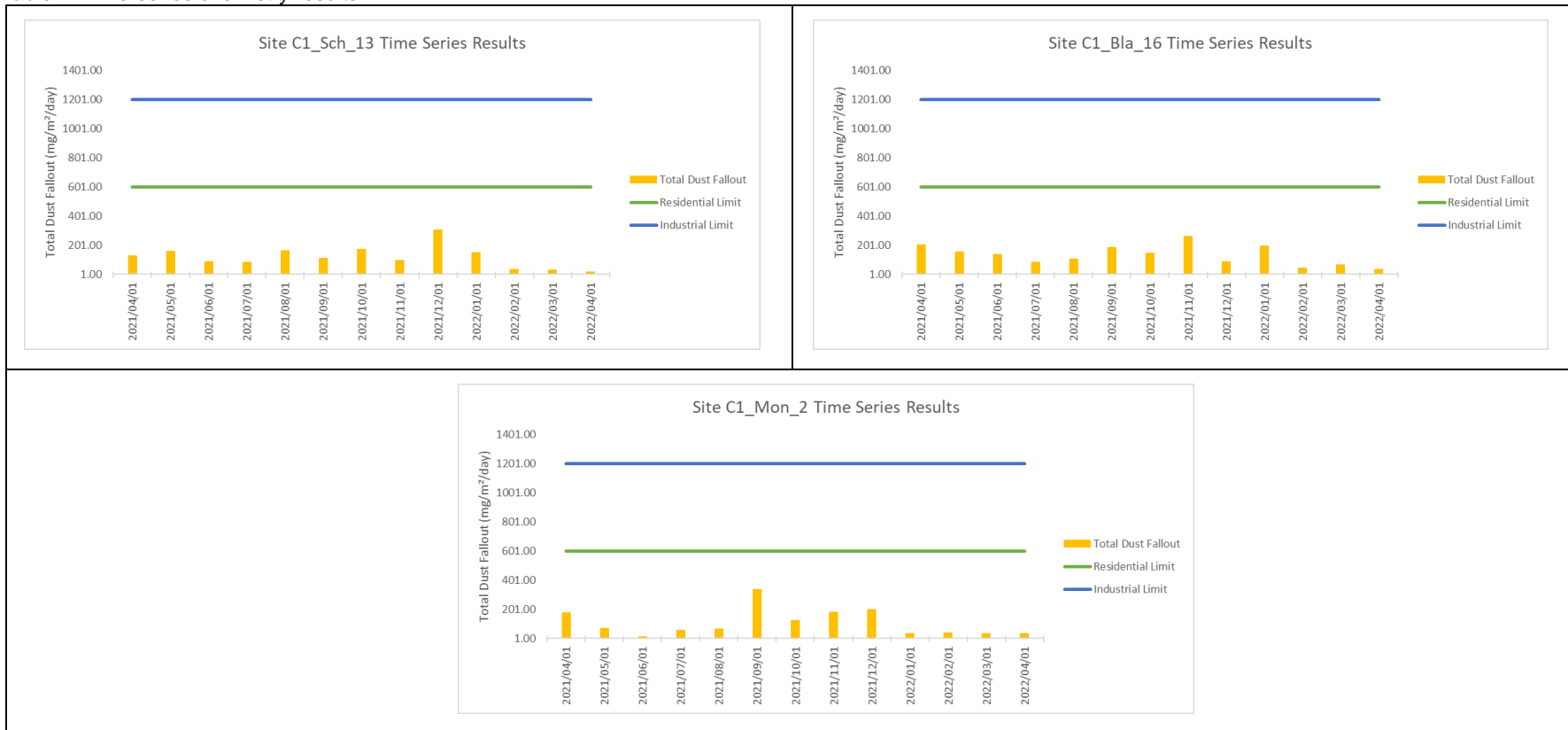
Figure 2: Dust nuisance categories for sampled sites



3.3 Time-Series Data

This section aims to analyse the current dust fallout results and compare them to previous results for each site sampled. See the table of figures, Table 7, for the time-series chemistry results for each site as taken over the life of the monitoring programme.

Table 7: Time-series chemistry results



3.4 Weather Results

Meteorological records were extracted from the Tetra4 weather monitoring station located at the HDR1 plant for the period 10 March 2022 to 4 April 2022. The wind speed, direction and frequency of occurrence were used to create a wind rose as depicted in Figure 3 below.

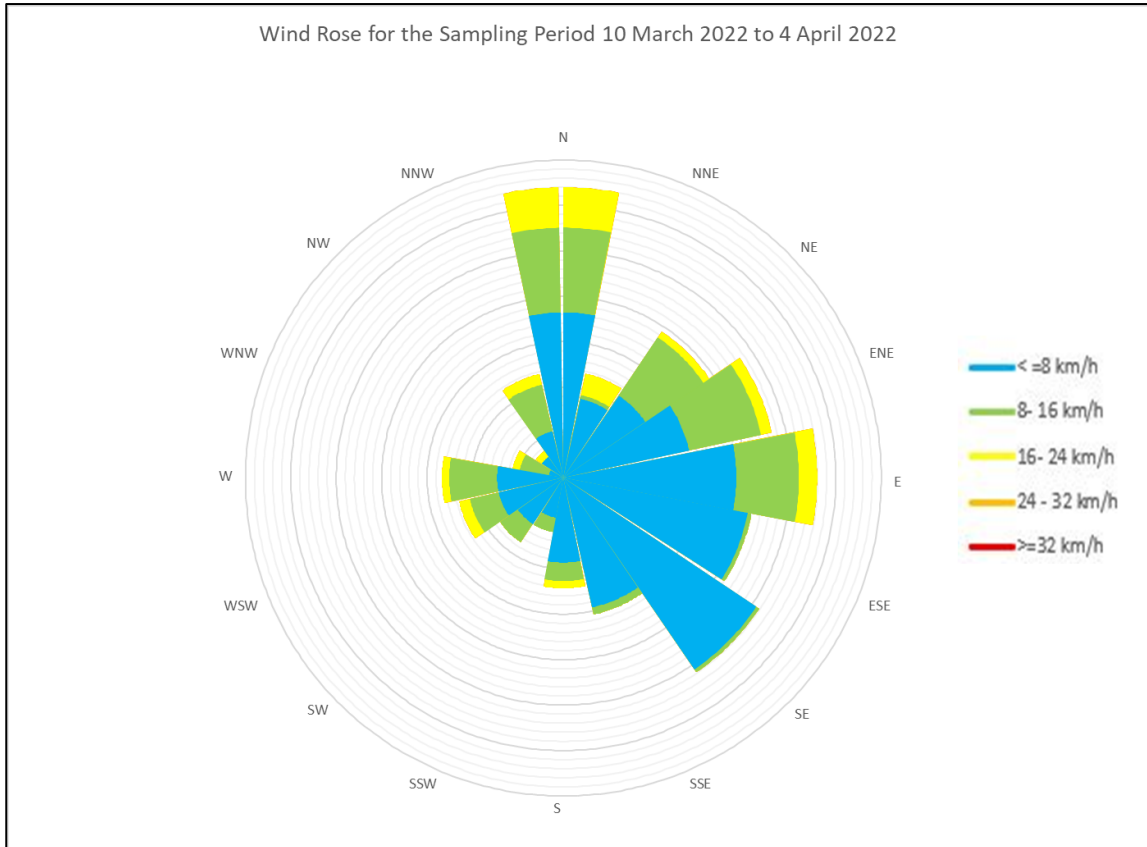


Figure 3: Wind rose for the period 10 March 2022 to 4 April 2022

4. Discussion

Dust fallout rates at all sites fell within the slight nuisance category during the April 2022 dust fallout monitoring event. The dust fallout for this event at all sites sampled is considered permissible for residential and light commercial areas as per the four-band scale provided in SANS 1929 (2005). The small scale of construction activities undertaken at the Tetra4 HDR1 plant is unlikely to produce dust fallout levels above the permissible levels at any of the sites being monitored. No occurrence of unusual events that may have contributed to the current reporting period's dust fallout concentrations were noted.

When analysing the time-series dust fallout results, all sites had a slight decrease when compared to the previous month. There were no exceedances of the National Dust Control Regulations at any of these sites for the past year. **Note:** during the April 2022 event the dust buckets were only placed for a duration of 25 days and are considered under-exposed (outside of the required 30 ±3 days exposure period). However, the measured dust concentration at all sites were extremely low, and it is unlikely that more exposure would have led to significant higher dust results.



Meteorological records are important in determining possible sources of total dust fallout at the monitoring sites. The weather monitoring station located at the HDR1 plant is used to extract wind speed and direction data monthly to assist in evaluating any possible sources of dust fallout. The wind rose plot provided in Figure 3 indicate that the dominant wind direction during this reporting period was in a northerly direction with an average wind speed of 8.81 km/h.

Based on the findings of this report, no further mitigation or management measures with regards to total dust fallout are required at this time.

5. 5. Recommendations

The following recommendations apply to this report:

- Unusual events or activities that may contribute significantly to the dust fallout results (i.e., veld fires, clearing and tilling of the agricultural fields) in the areas surrounding dust monitoring locations should be noted during dust bucket collection.

6. 6. References

American Society for Testing and Materials; D1739 -98 (2010): Standard Test Method for the Collection and Measurement of Dustfall (settleable particulate matter). ASTM International, USA.

Department of Environmental Affairs; 2009: National Environmental Management: Air Quality Act, 2004 National Ambient Air Quality Standards. Government Notice No 1210, 24 December 2009. Government Printer, Pretoria.

Department of Environmental Affairs; 2013: National Environmental Management: Air Quality Act, 2004 National Dust Control Regulations. Government Notice No 827, 1 November 2013. Government Printer, Pretoria.