Western Cape Government

Department of Environmental Affairs and Development Planning

Western Cape State of Air Quality Management Report: 2021

State of Air Quality Management Report 2021

Western Cape Government
FOR YOU

Cover Image: Dan Grinwis

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ACRONYMS

ACSA	Airports Company South Africa
AEL	Atmospheric Emission Licence
APPA	Atmospheric Pollution Prevention Act (No. 45 of 1965)
AQMP	Air Quality Management Plan
AQM	Air Quality Management
AQO	Air Quality Officer
AQOF	Air Quality Officers' Forum
CCT	City of Cape Town
CDM	Clean Development Mechanism
CKDM	Central Karoo District Municipality
CH_4	Methane
COP	Conference of the Parties
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CSG	Council for Geoscience
CSIR	Council for Scientific and Industrial Research
CWDM	Cape Winelands District Municipality
D: AQM	Directorate: Air Quality Management
DEROs	Desired Emission Reduction Outcomes
DoE	Department of Energy
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DNA	Designated National Authority
DTI	Department of Trade and Industry
DoT	Department of Transport
GRDM	Garden Route District Municipality
EIA	Environmental Impact Assessment
EMI	Environmental Management Inspector
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbei
GN	Government Notice
GRDM	Garden Route District Municipality
GSB	Greater Saldanha Bay

H_2S	Hydrogen Sulphide
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbon
HHRA	Human Health Risk Assessment
HRA	Health Risk Assessment
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IGTT	Inter-Governmental Task Team
IPCC	Inter-Governmental Panel on Climate Change
IRP	Integrated Resource Plan
LM	Local Municipality
MEC	Member of the Executive Council
MERO	Municipal Economic Report Outlook
NAEIS	National Atmospheric Emissions Inventory System
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM: AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM: AQAA	National Environmental Management: Air Quality Amendment Act
NEM: WA	National Environmental Management: Waste Act, 2008 (No. 59 of 2008)
NERSA	National Energy Regulator of South Africa
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
ODM	Overberg District Municipality
PAEL	Provisional Atmospheric Emission Licence
PERO	Provincial Economic Review and Outlook
PM	Particulate Matter
PM_{10}	Particulate matter with an aerodynamic diameter of 10µm and smaller
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of 2.5µm and smaller
PPP	Public Participation Process
RAC	Refrigeration and Air Conditioning
RPL	Remote Pilot Licences
REIPPP	Renewable Energy Independent Power Producers Procurement Programme
SANBI	South African National Biodiversity Institute
SAAELIP	South Africa Atmospheric Emission Licensing and Inventory Portal
SAAQIS	South Africa Air Quality Information System
SANEDI	South Africa National Energy Development Institute
SBIDZ	Saldanha Bay Industrial Development Zone

SEA	Strategic Environmental Assessment
SEMA	Specific Environmental Management Act
SGD	Shale Gas Development
SNAEL	System for National Atmospheric Emission Licensing
SO_2	Sulphur Dioxide
StatsSA	Statistics South Africa
UNFCCC	United Nations Framework Convention on Climate Change
US EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WCDM	West Coast District Municipality
WCG	Western Cape Government
WG	Working Group

FOREWORD

It is with great pleasure that I share with you the 2021 State of Air Quality Management Report. The year 2021 has been another dynamic year in that the country was faced with many changes and officials had to learn to do things differently, given the restrictions of the Covid-19 Pandemic. Despite these challenges, the Department of Environmental Affairs and Development Planning (DEA&DP) continued to co-ordinate and foster a culture of collaboration and pro-action between Province and all Municipalities in the Western Cape, to successfully implement air quality management in terms of the National Environmental Management: Air Quality Act (No. 39 of 2004; NEM:AQA). During 2021, we adopted the 3rd Generation Western Cape Air Quality Management Plan (AQMP), for implementation over the next 5 years.

It is through the strong partnership between the Provincial Government and the Metropolitan, District, and Local Municipalities of the Western Cape that the Province has reached many milestones in air quality management, including the successful implementation of its AQMP. This is evident during the collaborative sessions held at the quarterly Air Quality Officers' Forums (AQOFs) where matters are raised, discussed and resolutions are formulated to ensure effective and efficient air quality management in the Western Cape. Although the Covid-19 Pandemic made it difficult to travel, authorities in the Province used virtual platforms to ensure that air quality matters are attended to swiftly. The Forum provides air quality officials the opportunity to build, strengthen and refine their interventions towards the implementation of the NEM: AQA and to share experiences, challenges and to plan for the year ahead. Therefore, it was important that even amidst travel restrictions, officials continued deliberating and finding ways to manage the air quality in the Province.

During 2021, Licensing Authorities in the Western Cape continued to implement the Atmospheric Emission Licensing system. To date, authorities have regulated a total of 13 Provisional Atmospheric Emission Licences and 124 final Atmospheric Emission Licences during this reporting year. Further, a total of 17 Municipal By-laws on air quality management have been published in Province. These By-laws enable Municipalities to enforce air quality management within their jurisdictional areas. Moreover, 29 out of 30 Municipalities have adopted their Municipal AQMPs, whilst 29 Air Quality Officers have been designated to ensure that air quality in the regions is managed effectively and efficiently in the Province. Of course, these numbers change as Air Quality Officers resign or retire. Currently, the Beaufort West Municipality has a draft Municipal AQMP, which is envisaged to follow the process to completion during the next reporting year.

I call upon your continued support towards ensuring that together, as Government and the public, we find a balance between air quality management and sustained economic growth and development in the Western Cape, so that we can continue to protect our air quality for all, today and tomorrow!

Anton Bredell
Western Cape MEC: Local Government,
Environmental Affairs and Development Planning

Photograph by: Peter van Noorden

EXECUTIVE SUMMARY

The State of Air Quality Management: Western Cape 2021 is a comprehensive report on the management of air quality in the Western Cape.

The report has been compiled by the Department of Environmental Affairs and Development Planning (DEA&DP), with the support of the Metropolitan, District and Local Municipalities in the Western Cape.

Ambient Air Quality Monitoring

The National Environmental Management: Air Quality Act's (Act No. 39 of 2004; NEM: AQA) Section 8 mandates Provinces and Municipalities to monitor ambient air quality. The City of Cape Town Metropolitan Municipality (CCT), the West Coast District Municipality (WCDM), the Saldanha Bay Municipality (SBM), and the DEA&DP's Directorate: Air Quality Management (D: AQM) monitor ambient air quality within their respective jurisdictions, as a part of the Ambient Air Quality Monitoring Network in the Western Cape Province (**Table EXEC-1**).

Table EXEC-1: AMBIENT AIR QUALITY MONITORING NETWORKS IN THE WESTERN CAPE

MUNICIPAL AREA	LOCATION	DATE COMMENCED
DEA&DP's WESTERN CAPE AMBIENT AIR QUALITY MONITORING NETWORK		
CAPE WINELANDS	Meirings Park, Worcester	July 2009 - present
	Municipal Vehicle Testing Station, Paarl	March 2008 - May 2009* August 2018 - present
	Cape Winelands District Municipality, Stellenbosch	October 2011 - present
WEST COAST	Stompneus Bay, St Helena Bay	April 2011 - April 2021*
	Malmesbury Central, Malmesbury	April 2010 - present
	Saldanha Bay IDZ, Saldanha Bay	April 2021- present
	Vredenburg High School, Vredenburg	April 2008 - March 2010*
CITY OF CAPE TOWN	Sentinel, Hout Bay	March 2014 - present
	Khayelitsha District Hospital, Khayelitsha	May 2017 - present
	Morningstar Small Holdings, Vissershok	September 2011 - March 2019*
	Khayelitsha Training Centre, Khayelitsha	May 2011 - 2017*
	Panther Park, Berkeley Rd, Maitland	August 2010 - March 2011*
	Driftsands Nature Reserve, Blue Downs	April 2019 - November 2020*
	Maitland Crematorium, Maitland	April 2021 - present
GARDEN ROUTE	Bongolethu, Oudtshoorn	April 2011 - present
	Conville, George	July 2010 - present
	Garden Route District Municipality, Mossel Bay	November 2016 - present
	Dana Bay Reservoir, Dana Bay	November 2011 - October 2016*
	Voorbaai, Mossel Bay	August 2008 - February 2010*

OVERBERG	Mount Pleasant, Hermanus	March 2014 - December 2018*
	Abagold, Hermanus	December 2018 - present
MUNICIPAL AREA	**LOCATION**	**DATE COMMENCED**
CITY OF CAPE TOWN's AMBIENT AIR QUALITY MONITORING NETWORK		
CITY OF CAPE TOWN	Molteno	1992
	Goodwood	1993
	Athlone	1993
	City Hall	2020*
	Tableview	1994
	Foreshore	1995
	Bothasig	1995
	Khayelitsha	2002
	Bellville-South	2003
	Wallacedene	2006
	Atlantis	2008
	Somerset-West	2008
	Plattekloof	2013
	Potsdam	2013
SALDANHA BAY MUNICIPALITY's AMBIENT AIR QUALITY MONITORING NETWORK		
SALDANHA BAY	Saldanha Bay Harbour	July 2014
	Louwville, Vredenburg	July 2014
	Saldanha Bay Substation	*Decommissioned 2014
WEST COAST DISTRICT MUNICIPALITY's AMBIENT AIR QUALITY MONITORING NETWORK		
VELDDRIF	Velddrif Municipal vehicle testing station	June 2017

*Decommissioned

DEA&DP, CCT, SBM and WCDM ambient air quality monitoring stations are operated in accordance with the US EPA ambient air quality monitoring methods (Quality Assurance Handbook for Air Pollution Measurement Systems, Vol II), ISO/IEC17025:2005 standards and SANAS TR-07-03 requirements. Air quality monitoring data measured at the stations is recorded on data loggers, after which it is transferred via a modem to a server for storage and further processing. The data undergoes quality control and quality assurance prior to producing daily and monthly reports. Monitoring data in the Western Cape Ambient Air Quality Monitoring Network is reported to the South African Air Quality Information System (SAAQIS) on a monthly or quarterly basis.

The Western Cape Ambient Air Quality Monitoring Network's air quality monitoring measurements were generally below the NAAQS during the 2021 monitoring period. The PM_{10} NAAQS of 75 µg/m³ was exceeded on two (2) occasions during 2021; these exceedances occurred at the Khayelitsha air quality monitoring station. In accordance with the NAAQS, an exceedance frequency of only four (4) exceedances per calendar year is allowed in order to be compliant. The exceedances were likely due to wind-blown dust, as there are no major industries in the area.

The CCT's Ambient Air Quality Monitoring Network reported elevated concentrations of PM_{10} and $PM_{2.5}$ within the Metropolitan area in 2021. The Goodwood and Foreshore monitoring stations reported more than the four (4) for PM_{10} and $PM_{2.5}$ exceedances per calendar year, making the areas' air quality non-compliant with the NAAQS. Moreover, the CCT monitoring stations located in Khayelitsha and Wallacedene suggests that the air quality in these low-income areas is non-compliant with the NAAQS, recording more than the allowable exceedances. These observations are likely attributed to open fires used for heating and cooking, vehicle emissions and poor air dispersion during the cold winter months.

The Saldanha Bay Municipality has two ambient air quality monitoring stations that measure SO_2, O_3, NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations in the area. During 2015-2021, all the air quality parameters measured were generally below the NAAQS.

Air Quality Officers' Forum and Air Quality Management Planning

The Western Cape's Provincial Air Quality Officers' Forum (AQOF) takes place quarterly. In this Forum, Air Quality Officers (AQOs) of the Western Cape Province discuss air quality matters and coordinate progress on the implementation of the NEM: AQA and the National Air Quality Management Framework. The Forum further provides air quality officials from the different spheres of government the opportunity to build, strengthen and/or refine their air quality management interventions towards the implementation of the NEM: AQA and to share experiences, challenges and to plan for the year ahead.

The Provincial Noise Control Forum forms part of the Western Cape Provincial AQOF to ensure an improved co-ordination regarding noise control in the Province. Participants of this Forum are informed of achievements and challenges with regards to noise management in the Western Cape Province.

Prior to March 2020, when the COVID-19 Regulations were put into effect, the Western Cape Air Quality Officers' and Noise Control Forums took place across the five (5) Districts and the Metropolitan Municipality within the Province. Since the AQOF that was held in May 2020, all other subsequent AQOFs were held virtually via Microsoft Teams (MS Teams).

Special forums are arranged to co-ordinate the AQOs to address air quality-related matters in the Province, and to engage on legislative and policy development with the Department of Forestry, Fisheries and the Environment, (DFFE), as and when required. The key discussions and outcomes of the forums for the period 2010 – 2021 are discussed in Chapter 2.

Three (3) Provincial AQMP Working Groups were established to implement and achieve the goals identified in the AQMP. The Working Group meetings were held concurrently with the Western Cape AQOFs and were held during the period 2010 – 2021. The following Working Groups were hosted during these sessions:

- **WORKING GROUP I** – Air Quality Management and Climate Change;
- **WORKING GROUP II** – Air Quality Education and Awareness Raising; and
- **WORKING GROUP III** – Compliance Monitoring and Enforcement.

Each Working Group identified initial priorities for implementation in the Province. A summary of the priorities are outlined below.

WORKING GROUP I: AIR QUALITY MANAGEMENT AND CLIMATE CHANGE

This Working Group emphasized the integral relationship between air quality and climate change. The DEA&DP's Directorate: Climate Change (D: CC) regularly provides updates on climate change matters as it relates to air quality management. Through the Working Group, the D: AQM and D: CC engaged on possible activities for collaboration within the Western Cape's 3rd Generation AQMP (AQMP, 2021).

Engagements and collaborations with other fields of expertise such as the spatial development and transport sectors are still required to ensure that forthcoming proposals from these fields and sectors address any air quality matters that may arise within these sectors and other sectors.

Progress was evaluated with respect to the development of emissions inventories and the status of integrating AQMPs as sector plans into IDPs. The Working Group also facilitates the development of Municipal AQMPs and the designation of AQOs. To date, the Western Cape has 30 approved AQMPs (viz. 1 Provincial and 29 Municipalities and has one (1) draft AQMP (Beaufort West Local Municipality). During 2021, the Provincial AQO made a plea that Municipal AQOs should indicate in advance their intentions to retire or when they have tendered their resignation so that appropriate measures to assist Municipalities to remain compliant with Section 14(3) of the NEM: AQA can be made. During the reporting period, a total of 30 of the 30 AQOs were designated in the Western Cape, with the Overberg District Municipality in the process of designating a new AQO, as the previous AQO had retired (**Table EXEC-2**). See Chapter 1 for more information on the status of AQMPs and AQO designation in the Province.

Table EXEC-2: STATUS OF AQMPs AND DESIGNATED AQO'S IN THE MUNICIPALITIES OF THE WESTERN CAPE DURING 2021

AUTHORITY	YEAR AQMP ADOPTED	SECOND GENERATION AQMP	THIRD GENERATION AQMP	AIR QUALITY OFFICER DESIGNATED
City of Cape Town	2009	in progress		✓
Cape Winelands	2009	2018		✓
DEA&DP	2010	2016	2021	✓
Drakenstein	2011	2020		✓
West Coast	2011	2019		✓
Garden Route	2011	2013	2019	✓
Overberg	2012			×
Bergrivier	2012	2019		✓
Matzikama	2012	2020		✓
Saldanha Bay	2012	2020		✓
Swartland	2012	2019		✓
Central Karoo	2012	2016		✓
Cape Agulhas	2013	2019		✓
Overstrand	2013	2017		✓
Witzenberg	2013	2014		✓
George	2013	2019		✓
Hessequa	2013	2019		✓
Bitou	2013	2019		✓
Knysna	2013	2019		✓
Kannaland	2013	2021		✓
Mossel Bay	2013	2019		✓
Oudtshoorn	2013	2019		✓
Theewaterskloof	2014	2015		✓
Prince Albert	2014			✓
Swellendam	2015			✓
Stellenbosch	2015	2018		✓
Cederberg	2016	2019		✓
Laingsburg	2016			✓
Breede Valley	2017			✓
Langeberg	2017			✓
Beaufort West	Draft			✓

WORKING GROUP II: AIR QUALITY EDUCATION AND AWARENESS RAISING

The implementation of Working Group II has identified the need for all Municipalities to develop awareness raising programmes and to establish various forums. Below is a summary of the awareness raising activities in the various regions.

CAPE WINELANDS DISTRICT MUNICIPALITY (CWDM)

The CWDM interactive theatre production that promotes environmental awareness was suspended due to the COVID-19 pandemic.

Due to the pandemic regulations and restrictions, the launch of the CWDM activity booklet on environmental pollution inclusive of air, water and soil was also postponed to 2022.

CITY OF CAPE TOWN (CCT)

The CCT indicated that the awareness raising activities were hampered by budget cuts and by the amount of work other areas required as a result of the COVID-19 pandemic. Even though the CCT has developed colouring books with stories to promote air quality awareness, officials could not go to schools with their mascot, "Sniffels the Air Pollution Cat", to promote and distribute due to the lockdown restrictions. The CCT noted that it may need to work on making its material available electronically to be circulated for future education and awareness raising programmes.

GARDEN ROUTE DISTRICT MUNICIPALITY (GRDM)

For the last seven (7) years, the GRDM has incorporated air pollution awareness as part of its community awareness raising activities. The GRDM has since 2011 successfully implemented their Eden Clean Fires Campaign (now called the Garden Route Clean Fires Campaign). The project was identified due to poor air quality, especially in the informal settlements, caused by fires that are made and used for household purposes such as cooking and heating.

The Garden Route Clean Fires Campaign has taken great strides in that the Western Cape Education Department approved the Clean Fires campaign for it to be incorporated as part of the Grade 3 curriculum. Schools are identified and approached, and each participating school receives a study pack with study material that is in line with the current primary education Curriculum and Assessment Policy Statements (CAPS). These study packs are printed in English, isiXhosa and Afrikaans, the predominant languages used in the Province.

During 2021, 66 schools in the GRDM participated, totaling 115 teachers and 4 400 children. It is anticipated that four (4) family members are reached per child, with a cumulative impact estimated to be 17 600 community members reached through this project for the year 2021.

WEST COAST DISTRICT MUNICIPALITY (WCDM)

The WCDM's awareness-raising is conducted through the establishment of Working Groups and Environmental Stakeholder's Forums within the District. Industries that potentially impact on the health and wellbeing of people residing in receptor areas are required to establish communication platforms and meet with residents at agreed-upon intervals. During these meetings, the public is informed of industrial processes and the implementation of measures to control emissions. Air Quality Officers from the Local Municipalities within the CWDM also attend these meetings.

Awareness raising in the District was also conducted via site inspections, as well as through emails between the Licensing Authority and the Licence Holders to keep them informed of any concerns or legislative changes.

The Joint Municipal Air Quality Working Group meetings were also held quarterly during 2021 between the local municipal Air Quality Officers, West Coast District Municipal Air Quality Officers and the West Coast District Municipal Environmental Health Practitioners. Air quality matters were discussed at this working group and guidance was provided where needed.

CENTRAL KAROO DISTRICT MUNICIPALITY (CKDM)

The CKDM distributed information on Eco-friendly Workplaces to Category B-Municipalities. The information packs included topics on:

- Contribute your share for cleaner air & Health effects of air pollution;
- Noise pollution and effects of noise pollution; and
- Energy Saving Tips for the District.

WORKING GROUP III: COMPLIANCE MONITORING AND ENFORCEMENT

The Licensing Authorities in the Western Cape have accepted the Atmospheric Emissions Licensing (AEL) function and have successfully carried out their mandate. See Chapter 4 (Table 4 -1) for more detail on the licensing of Section 21 Listed Activities of NEM: AQA in the Western Cape during the period 2010 – 2021.

Capacity building in air quality management has been recognized as a key requirement for Municipalities. During the reporting period, authorities participated in various training sessions, which included NAEIS refresher training, SAAEILP training, NAEIS facility emission report training, as well as noise control training, amongst others.

The Western Cape Province continues to promote the appointment of Environmental Management Inspectors (EMI). Most of the Municipalities have trained and appointed EMIs. To date, there are 205 EMIs who have been officially designated in the Province. In 2021, more prospective EMIs from the D: AQM and the Western Cape Province Municipalities underwent training. They now too await official designation. The number of designated EMIs to date is shown in Table 2-2.

The Working Group encourages Municipalities to develop Municipal By-Laws. Since 2008, a total of 17 Municipal By-laws, in respect of air quality management were gazetted in the Western Cape (See Chapter 2, Table 2-3).

Air Quality Governance

The separation of powers, roles and responsibilities at the local government level between Local and District Municipalities is often not clearly understood by Municipalities, and the lack of clarity continues to hamper the implementation of air quality management functions in the Province. This has resulted in many Municipalities not having adequate financial resources to manage air quality related matters in their jurisdictions.

The DEA&DP continues to work closely with the Municipalities to ensure that not only are the roles and responsibilities understood by all, AQMPs are developed and implemented, while AQOs are designated at all Municipalities in the Province. The aim is to have 31 AQOs designated in the Western Cape. The Western Cape Government, as per the AQPM, aims to have AQOs designated within all its Municipalities. As at December 2021, 30 AQOs (*viz*. 1 Provincial and 29 Municipalities) were designated **(see Table EXEC-2).** The ODM AQM has retired in January 2021; the Municipality is in the process of designating an AQO.

All Provinces and Municipalities are required to have approved AQMPs, as per the NEM: AQA. To date, 30 AQMP's have been adopted (viz. 29 Municipal and 1 Provincial) and are currently being implemetned in the Western Cape. The Beaufort West Local Municipality AQMP is currently in draft form (**Table EXEC-2**).

In terms of the National Framework on Air Quality Management in South Africa, (DFFE, 2018), AQMPs are to be reviewed every five (5) years. Due to budget and human resource constraints, this has proven to be challenging for most Municipalities in the Province. Thus, the focus currently is on ensuring that existing Municipal AQMPs are implemented, as a first premise.

Table EXEC-2: STATUS OF AQMPs AND DESIGNATED AQOs IN THE MUNICIPALITIES OF THE WESTERN CAPE DURING 2021

AUTHORITY	YEAR AQMP ADOPTED	SECOND GENERATION AQMP	THIRD GENERATION AQMP	AIR QUALITY OFFICER DESIGNATED
City of Cape Town	2009	in progress		✓
Cape Winelands	2009	2018		✓
DEA&DP	2010	2016	2021	✓
Drakenstein	2011	2020		✓
West Coast	2011	2019		✓
Garden Route	2011	2013	2019	✓
Overberg	2012			×
Bergrivier	2012	2019		✓
Matzikama	2012	2020		✓
Saldanha Bay	2012	2020		✓
Swartland	2012	2019		✓
Central Karoo	2012	2016		✓
Cape Agulhas	2013	2019		✓
Overstrand	2013	2017		✓
Witzenberg	2013	2014		✓
George	2013	2019		✓
Hessequa	2013	2019		✓
Bitou	2013	2019		✓
Knysna	2013	2019		✓
Kannaland	2013	2021		✓
Mossel Bay	2013	2019		✓
Oudtshoorn	2013	2019		✓
Theewaterskloof	2014	2015		✓
Prince Albert	2014			✓
Swellendam	2015			✓
Stellenbosch	2015	2018		✓
Cederberg	2016	2019		✓
Laingsburg	2016			✓
Breede Valley	2017			✓
Langeberg	2017			✓
Beaufort West	Draft			✓

Atmospheric Emission Licensing

The Licensing Authorities in the Western Cape have embraced the atmospheric emission licensing system. A total of 13 Provisional Atmospheric Emission Licences (PAELs) and 124 AELs were regulated within the Province. **Table EXEC-3** provides a summary of the AELs and PAELs issued annually during the period 2010 – 2021. During this period, a few PAELs have progressed to AELs, as per Section 42(1) of NEM: AQA.

Below is a list of the National Legislation that was gazetted during the reporting period,

- GG41650 GN516: Notice of Intention to amend the List of Activities which result in Atmospheric Emission which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage:
- GG41650 GN517: Draft National Dust Control Regulations:
- GG41650 GN518: Notice of intention to amend the 2012 National Framework for Air Quality Management:
- GG41996 GN1144: 2017 National Framework for Air Quality Management:
- GG42472 GoN 686: National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004) Notice of intention to amend the list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage:
- GG42669 GoN 1115: National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004): Consultation on the intention to repeal the regulations relating to the inspection of premises in a dust control area made in terms of section 33(1) (b) of the Atmospheric Pollution Prevention Act, 1965 and the dust control areas declared in terms of section 27(1) of The Atmospheric Pollution Prevention Act, 1965:
- GG42669 GoN 1113: National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004): Consultation on the intention to repeal the regulations regarding fuel burning appliances in dwelling houses made in terms of section 44(1) (dA) of the Atmospheric Pollution Prevention Act, 1965 1965:
- GG42669 GoN 1114: National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004): Consultation on the intention to repeal the smoke control regulations made in terms of section 18 of the Atmospheric Pollution Prevention Act, 1965 and the smoke control zone orders made in terms of section 20 of the Atmospheric Pollution Prevention Act, 1965:
- GG42684 GoN 1136: National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) Proposed amendment of the National Greenhouse Gas Emission Reporting Regulations.

Table EXEC-3: SUMMARY OF AELs AND PAELs ISSUED BY LICENSING AUTHORITIES IN THE WESTERN CAPE DURING 2010 – 2021

Licensing Authority	REGULATED AS AT 31 DECEMBER																								NUMBER ISSUED IN YEAR	
	2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2021	
	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL
WCDM	0	0	5	1	1	1	6	1	7	9	12	9	12	12	12	13	12	15	11	17	10	18	2	20	1	6
GRDM	5	0	4	0	7	2	2	14	3	6	2	23	0	26	0	27	0	26	0	27	0	30	2	26	0	4
ODM	0	0	0	0	0	0	1	0	2	0	5	0	1	4	0	5	0	5	0	5	0	5	0	5	0	3
CKDM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCT	0	0	2	0	1	3	3	2	14	19	16	31	18	32	26	6	19	42	14	50	15	52	9	56	3	4
CWDM	0	0	1	0	0	0	0	0	4	11	5	10	6	9	6	8	6	8	4	10	1	13	0	14	0	1
DEA&DP	0	0	0	0	0	0	0	0	1	0	3	0	1	3	0	3	0	3	0	3	0	3	0	3	0	1
TOTAL PAEL | AEL	5	0	12	1	9	6	12	17	31	45	43	73	38	86	44	62	37	99	29	112	26	121	13	124	4	19

Compliance and Enforcement

As per the NEM: AQA, the DEA&DP has the responsibility of facilitating compliance monitoring and implementation, with respect to Atmospheric Emission Licensing of facilities with Section 21 Listed Activities. These facilities are regulated through the review of records, inspection, and compliance monitoring.

During the reporting period, AEL compliance inspections were conducted across the Province, focusing on the various activities within the Province such as Sub-Category 8.2: Crematoria and Veterinary Waste Incineration activities and Sub-Category 5.3: Clamp Kilns for brick production and Subcategory 1.2: Liquid Fuel Combustion Installation activities. The compliance monitoring methodology followed, is to assess compliance with conditions in the AEL and with relevant legislative provisions by way of interviews, document review and on-site monitoring activities. To date, 40 compliance inspections have been undertaken as part of the Western Cape AEL Compliance Monitoring Programme (**Table EXEC-4**).

Due to limited human resources available in the DEA&DP Directorate: Air Quality Management, the number of compliance inspections undertaken and completed is limited to four (4) per annum. The compliance monitoring of facilities will continue to be restricted, pending the availability of human resource capacity.

Table EXEC-4: SUMMARY OF THE AEL COMPLIANCE INSPECTION PROGRAMME UNDERTAKEN IN THE WESTERN CAPE SINCE 2013

MUNICIPAL AREA	YEAR	SECTION 21 LISTED ACTIVITY	NO. OF FACILITIES IN-SPECTED
CAPE WINELANDS	2013	Category 10. Animal Matter Processing	1
WEST COAST	2013	Category 10. Animal Matter Processing	2
WEST COAST	2013	Sub-Category 5.4. Cement Production	1
CITY OF CAPE OF TOWN	2013	Category 10. Animal Matter Processing	1
CITY OF CAPE OF TOWN	2014	Sub-Category 2.4. Storage and Handling of Petroleum Products & Sub- Category 2.5. In-stallations Used to Recycle or Recover Oil	1
GARDEN ROUTE	2014	Category 10. Animal Matter Processing	3
OVERBERG	2014	Sub-Category 5.6. Lime Production	1
WEST COAST	2014	Sub-Category 4.7. Electric Arc Furnaces & Sub- Category 5.2. Drying	1
CITY OF CAPE OF TOWN	2015	Sub-Category 8.2. Crematoria and Veteri-nary Waste Incineration	1
GARDEN ROUTE	2015	Sub-category 4.22. Hot Dip Galvanizing	1
WEST COAST	2015	Sub-Category 5.1. Storage and Handling of Ore and Coal	1
WEST COAST	2015	Sub-Category 5.6. Lime Production	1
CAPE WINELANDS	2015	Sub-Category 5.6. Lime Production	1
CAPE WINELANDS	2016	Sub-Category 7.2. Production of Acids & Sub-Category 8.3. Burning Grounds	1
OVERBERG	2016	Category 10. Animal Matter Processing	1
CITY OF CAPE TOWN	2016	Sub-Category 8.1. Thermal treatment of Haz-ardous & General Waste	1
WEST COAST	2016	Sub-Category 5.1. Storage and Handling of Ore and Coal	1
GARDEN ROUTE	2017	Sub-Category 2.4: Petroleum product stor-age tanks and product transfer facilities, ex-cept those used for liquefied petroleum gas.	1
CAPE WINELANDS	2017	Sub-Category 5.3: Clamp Kilns for brick pro-duction	1
OVERBERG	2017	Sub-Category 5.3: Clamp Kilns for brick pro-duction	1

MUNICIPAL AREA	YEAR	SECTION 21 LISTED ACTIVITY	NO. OF FACILITIES IN-SPECTED
CITY OF CAPE TOWN	2017	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CITY OF CAPE TOWN	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CAPE WINELANDS	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
GARDEN ROUTE	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
OVERBERG	2018	Sub-Category 5.3: Clamp Kilns for brick production	1
CITY OF CAPE TOWN	2019	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CITY OF CAPE TOWN	2019	Sub-Category 1.2: Liquid Fuel Combustion Installation	2
OVERBERG	2019	Category 10. Animal Matter Processing	1
CITY OF CAPE TOWN	2020	Sub-Category 1.2: Liquid Fuel Combustion Installation	2
CITY OF CAPE TOWN	2020	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
OVERBERG (BOTRIVIER)	2020	Sub-Category 5.3: Clamp Kilns for Brick Production	1
CITY OF CAPE TOWN	2021	Sub-Category 1.2: Liquid Fuel Combustion Installation	2
CITY OF CAPE TOWN	2021	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CAPE WINELANDS	2021	Sub-Category 5.3: Clamp Kilns for Brick Production	1
TOTAL			**40**

Summary

Overall, much progress has been made in terms of managing the ambient air quality in the Western Cape to ensure that the air that we breathe is of a relatively good quality. This can largely be attributed to the continued support and engagement between the D: AQM and the Municipalities in respect of the designation of AQOs and the effective and efficient implementation of their adopted AQMPs. Municipal Managers have committed to designate AQOs in their jurisdictions therefore, a total of 30 AQOs (viz. 1 Provincial and 29 Municipal) are currently designated, while 30 AQMPs have been adopted in the Western Cape. The only AQMP that is currently in draft is the Beaufort West Municipality AQMP. The D: AQM continues to assist the Beaufort West Municipality to draft their AQMP.

However, there are areas that remain to be of concern that require not only human resource capacity, but also resources at both Provincial and Municipal level. The D: AQM identified "hotspots" in the Province that require urgent attention, such as, for example, the iron ore and manganese handling processes in the Saldanha Bay, as well as in the Central Karoo, where shale gas development poses an emerging air quality risk.

Furthermore, the impact of climate change on air quality management is clearly visible through the elevated trend in PM_{10} levels that were observed in areas across the Province, and which are mostly attributed to windblown dust due to severe drought conditions experienced in the Western Cape.

Over the past few years, the success of the Western Cape Ambient Air Quality Monitoring Network has been severely hampered by aging infrastructure. The economic constraints and hence limited budgets have placed the Network at risk, as the aging infrastructure cannot be replaced, but are repaired, which is unsustainable and not advisable for ongoing operations. This has resulted in data loss at various ambient air quality monitoring stations located across the Province. The DEA&DP has, however, prioritised the replacement of aging infrastructure for the immediate future; long-term budget availability is, however, limited.

To protect the air that we breathe, which is both a national and international asset given that it has no boundaries, the most important next step is for the Province and Municipalities to further prioritise air quality management by investing significantly in human resource capacity and ambient air quality monitoring infrastructure in the Western Cape.

Photograph by Portia Rululu

ORGANISATION OF THE REPORT

CHAPTER 1: Governance: Air Quality Management Planning

This chapter summarises the progress made during the implementation of the Provincial AQMP2016 and those of the Municipal AQMPs, where adopted.

CHAPTER 2: Governance: Air Quality Officers' Forums

This chapter provides a summary of the Western Cape Provincial Air Quality Officers' Forums conducted on a quarterly basis.

CHAPTER 3: Ambient Air Quality Monitoring

This chapter provides an overview of the Western Cape Ambient Air Quality Monitoring Network (DEA&DP), the City of Cape Town's, the Cape Winelands District Municipality, the West Coast District Municipality, the Overberg District Municipality and the Saldanha Bay Local Municipality's Ambient Air Quality Monitoring Network, as well as passive sampling undertaken by the Garden Route District Municipality.

CHAPTER 4: Compliance and Enforcement

This Chapter provides an overview on atmospheric emission licensing, compliance inspections and complaints handling conducted by air quality officials in the Western Cape.

CHAPTER 5: References

This chapter provides the references used in developing this Report.

Photograph by: Thomas Bennie

1. GOVERNANCE: AIR QUALITY MANAGEMENT PLANNING

All three (3) spheres of government have a mandatory obligation to designate Air Quality Officers and adopt Air Quality Management Plans (AQMPs) in their areas of jurisdictions as per Sections 14 and 15 of the National Environmental Management: Air Quality Act (No. 39 of 2004; NEM: AQA).

The Western Cape Province adopted its 1st Generation Air Quality Management Plan in 2010 (AQMP2010). The main purpose of an AQMP is to establish effective and sound planning and management of air quality management. AQMPs ensure that the sources of air pollution that impact the quality of air are identified and managed in the most appropriate and cost-effective manner. The National Framework on Air Quality Management in South Africa requires that an AQMP be reviewed every five (5) years. Thus, the Western Cape Province's AQMP has undergone two (2) revisions, in 2016 and 2021. Currently, the 3rd Generation Western Cape AQMP 2021 is under implementation, as adopted.

A summary of the progress made during the implementation of the Western Cape AQMP is provided below.

1.1 PROVINCIAL AIR QUALITY MANAGEMENT PLANNING

1.1.1 INSTITUTIONAL ARRANGEMENTS

The Western Cape Government's Member of the Executive Council (MEC) of Local Government, Environmental Affairs and Development Planning has designated the Director: Air Quality Management (D: AQM) as the Western Cape's Provincial Air Quality Officer (AQO). The Provincial AQO is responsible for coordinating and overseeing matters pertaining to air quality management in the Province.

The functions, roles and responsibilities of the Provincial AQO are carried out through three (3) Sub-Directorates of the D: AQM, viz. Air Quality Monitoring, Air Quality Regulatory Services, and Air Quality Planning and Information Management. The most important co-ordinating roles for air quality management in the Province includes the development, implementation, and the reviewing of the Western Cape AQMP, as well as providing oversight in terms of the development of Municipal AQMPs, and the designation of Municipal AQOs throughout the Province.

To discuss and advise on recommendations and solutions to effectively manage and regulate air quality in the Province, the Directorate co-ordinates and hosts the quarterly Air Quality Officers' Forums (AQOF). At the Forums, matters pertaining to the licensing of Section 21 Listed Activities, developing Provincial Regulations on Air Quality Management, monitoring of ambient air quality in the Province and the performance of Municipalities in implementing the NEM: AQA are discussed.

During 2021, the quarterly AQOFs were held virtually via the MS Teams platform. This presents contemporary and innovative approach to engage on air quality management in the Province and overcame the limitations imposed by the COVID-19 Pandemic restrictions. The approach ensured that the Western Cape Province is

able to apply innovation, in line with its Core Values of the Provincial Administration which are:

- **Innovation:** To be open to new ideas and develop creative solutions to problems in a resourceful way.
- **Caring:** To care for those we serve and work with.
- **Competence:** The ability and capacity to do the job we were employed to do.
- **Accountability:** We take responsibility.
- **Integrity:** To be honest and do the right thing.
- **Responsiveness:** To serve the needs of our citizens and employees.

1.1.2 PROVINCIAL AIR QUALITY MANAGEMENT PLANNING

The Western Cape AQMP2016 was implemented through engagements with Municipalities, and the progress is monitored via the quarterly AQOFs held to date. In terms of the Provincial-Local Government relationship, capacity building opportunities and active engagements on air quality matters have taken place. Moreover, the Provincial Department of Environmental Affairs and Development Planning (DEA&DP) meets regularly with Local Authorities at amongst others, the Inter-Governmental Task Teams and Municipal AQOFs on various air quality matters, providing advice on air quality matters, when required.

The year 2021 was the final year of the AQMP2016's implementation, and its review also took place internally within the D: AQM, as well as with external stakeholders, including the public via an online survey questionnaire. The AQMP2016 review findings were presented and discussed at the AQOFs.

During the AQOFs, capacity building opportunities and active engagements on air quality matters have also taken place, and this platform strengthens the Provincial-Local Government relationship because over and above routine discussions, task teams are established to deal with urgent and high priority air quality issues in the Province. In July 2021, a sub-group working committee of the Greater Saldanha Bay Inter-Governmental Task Team was established, to discuss recent developments in that area, complaints received by the AQO's, as well as finding possible solutions to resolving the complex matter.

The Action Plan in the Western Cape AQMP is implemented through the three (3) AQMP Working Group meetings.

The Working Groups were each assigned the following areas of work, respectively:

- **AIR QUALITY MANAGEMENT AND CLIMATE CHANGE WORKING GROUP:** Governance, management with respect to air quality, climate change, town and regional planning and transport planning.
- **AIR QUALITY AWARENESS RAISING WORKING GROUP:** Information management on air quality and climate change.
- **COMPLIANCE MONITORING AND ENFORCEMENT WORKING GROUP:** Technical/control and legal matters.

Progress made in respect of implementing the Western Cape AQMP2016 including its final

year of implementation(2021) via the three (3) Working Groups is elaborated in Chapter 2.

1.1.3 MUNICIPAL AIR QUALITY MANAGEMENT PLANNING

Over the years, during the implementation of the AQMP2016, the DEA&DP via the D: AQM, has successfully hosted capacity building workshops with Municipal AQOs, Councillors and Municipal Managers of various Municipalities to develop their Municipal AQMPs. The aim of these workshops was to:

- Ensure that Councillors and Municipal Managers understand and accept the roles and responsibilities of the Air Quality Management function;
- Ensure that Municipalities designate Air Quality Officers (AQOs); and
- Ensure that the Municipalities secure funding to develop, reveiw and implement their AQMPs.

To date, a total of 29 Municipalities have adopted their AQMPs, and a total of 29 Municipalities have designated AQOs in their jurisdictional areas (Table 1-1). A summary of the status of the air quality management planning per Metropolitan and District Municipal area is provided below.

1.1.4 CITY OF CAPE TOWN

The City of Cape Town (CCT) was the first Municipality in the country to adopt its AQMP in 2009; and has also incorporated it as a Sector Plan in its Integrated Development Plan (IDP). During 2011, an internal review of the AQMP was initiated. As of 2021, a further review of the CCT AQMP has been initiated and is expected to be concluded during the 2022/23 financial year.

The CCT's vision is "to be the city with the cleanest air in Africa". This vision is aimed to be met through implementing the following objectives:

- To formulate an air quality management system for the City of Cape Town;
- To specify ambient air quality standards and targets for the City of Cape Town;
- To monitor priority pollutants which cause brown haze and affect human health;
- To improve air quality in informal areas;
- To enforce current and future legislation for air quality management;
- To compile a comprehensive emissions inventory database for the City of Cape Town;
- To control vehicle emissions in the City of Cape Town;
- To consider air quality in land use and transport planning;
- To determine the detrimental health effects of poor air quality on the population of the City of Cape Town;
- To establish a comprehensive education and communication strategy for air quality management; and
- To periodically review the air pollution situation, report on progress and adjust and update strategies and objectives where needed.

Overall, the CCT has been implementing its AQMP, and has rolled out air quality management priorities in all areas of its identified objectives. See Chapters 3 and 4 for an overview of the various aspects of the CCT's AQMP implementation.

TABLE 1-1: STATUS OF AQMP'S AND DESIGNATED AQO'S IN THE MUNICIPALITIES OF THE WESTERN CAPE

AUTHORITY	YEAR AQMP ADOPTED	SECOND GENERATION AQMP	THIRD GENERATION AQMP	AIR QUALITY OFFICER DESIGNATED
City of Cape Town	2009	in progress		✓
Cape Winelands	2009	2018		✓
DEA&DP	2010	2016	2021	✓
Drakenstein	2011	2020		✓
West Coast	2011	2019		✓
Garden Route	2011	2013	2019	✓
Overberg	2012			X
Bergrivier	2012	2019		✓
Matzikama	2012	2020		✓
Saldanha Bay	2012	2020		✓
Swartland	2012	2019		✓
Central Karoo	2012	2016		✓
Cape Agulhas	2013	2019		✓
Overstrand	2013	2017		✓
Witzenberg	2013	2014		✓
George	2013	2019		✓
Hessequa	2013	2019		✓
Bitou	2013	2019		✓
Knysna	2013	2019		✓
Kannaland	2013	2021		✓
Mossel Bay	2013	2019		✓
Oudtshoorn	2013	2019		✓
Theewaterskloof	2014	2015		✓
Prince Albert	2014			✓
Swellendam	2015			✓
Stellenbosch	2015	2018		✓
Cederberg	2016	2019		✓
Laingsburg	2016			✓
Breede Valley	2017			✓
Langeberg	2017			✓
Beaufort West	Draft			✓

1.1.5 CAPE WINELANDS DISTRICT MUNICIPALITY

The 1st Generation AQMP of the Cape Winelands District Municipality (CWDM) was adopted by its Council in 2009 and has been included as a Sector Plan in its IDP since 2011. The 2nd Generation AQMP for the CWDM was approved in May 2018. The CWDM has been implementing interventions in air quality management, as per the NEM: AQA, as well as the goals of the CWDMs AQMP, which are to:

- Have effective air quality management;
- Promote communication in relation to air quality management; and
- Implement compliance monitoring and enforcement.

All Local Municipalities within the CWDM, have developed, adopted and implemented their AQMPs in their jurisdictional areas (Table 1-1). It should be noted that most of the Municipal AQMPs will soon be due for review, with the exception of the Drakenstein Municipality, which recently adopted its reviewed AQMP in 2020. These Municipalities are the Witzenberg Local Municipality, which adopted its 2nd Generation AQMP in 2014, and the Stellenbosch Local Municipality, which adopted its 2nd Generation AQMP in 2018. The Breede Valley Local Municipality adopted its AQMP in 2017, while the Langeberg Local Municipality adopted its AQMP in 2017. All the Municipalities in the CWDM have designated AQOs (Table 1-1).

1.1.6 CENTRAL KAROO DISTRICT MUNICIPALITY

The Central Karoo District Municipality's (CKDM) AQMP was approved in 2012 and incorporated it as a Sector Plan of its IDP in the same year. The AQMP was reviewed and adopted as a 2nd Generation AQMP in 2016. The 2nd Generation AQMP is due for review in 2021. The goals of the current AQMP address different aspects of the vision, and are as follows:

- To ensure effective and consistent air quality management. This goal aims to address the development and maintenance of the varied requirements for systems, skills and capacity for air quality management, and the establishment of the necessary institutional arrangements;
- To ensure effective and consistent compliance monitoring and enforcement. This goal aims to improve compliance monitoring and enforcement in the District, and to ensure that ambient air quality standards for the protection of health are attained and continually met;
- To support climate change protection programmes, including promoting the reduction of Greenhouse Gas emissions.
- To raise awareness with respect to air quality. This goal aims to improve awareness of air pollution issues in the CKDM through awareness raising and education.

The Prince Albert and the Laingsburg Local Municipalities have adopted and implemented their AQMPs in their jurisdictional areas. It is only the Beaufort West Municipality that is yet to adopt an AQMP; however, a draft version exists and is awaiting adoption. All AQOs have been designated in the CKDM area (Table 1-1).

1.1.7 GARDEN ROUTE DISTRICT MUNICIPALITY

The Garden Route District Municipality's (GRDM) 2nd Generation AQMP was reviewed in 2019 along with all the Local Municipalities within it. The Local Municipalities adopted their 2nd Generation AQMPs which were also included as Sector Plans in their respective IDPs. The GRDM also adopted its 3rd Generation AQMP which was adopted by Council in 2019. The 3rd Generation AQMP is included as a Sector Plan in its IDP, and its vision is as follows:

- "To have air quality worthy of the name 'The Garden Route".

This vision has been pursued through a set of objectives, the status of which is provided in Table 1-2.

TABLE 1-2: THE STATUS OF GRDM'S AQMP IMPLEMENTATION

OBJECTIVE	STATUS OF IMPLEMENTATION
Create awareness of AQMP implications	Implementing
Promote cooperation amongst all spheres of municipal government	Implementing
Strengthen and build capacity in AQM, compliance and enforcement	Implemented
Develop institutional mechanisms to improve air quality and climate change response	Not yet implemented
Develop, implement and maintain air quality management systems	Implemented
Ensure adequate funding for the implementation of AQM by Municipalities	Not fully implemented
Improve air quality compliance monitoring and enforcement	Implementing
Promote continuous improvement in respect of industry air quality compliance	Implemented
Develop and implement air quality regulatory processes	Implementing
Develop comprehensive education and communication mechanisms, strategies and programmes with respect to AQM and CCR	Implementing
Reduce ozone depleting substances and Greenhouse gas emissions, in line with National and International requirements	Not yet implemented

The GRDM and all the Local Municipalities have designated AQOs (Table 1-1).

1.1.8 OVERBERG DISTRICT MUNICIPALITY

The Overberg District Municipality (ODM) AQMP was adopted back in 2012 and is now due for review (Table 1-1). The AQMP is also included as a Sector Plan in its IDP. The goals of the AQMP are as follows:

- Effective and consistent air quality management;
- Promote communication in relation to air quality management; effective and consistent compliance monitoring and enforcement;
- Develop and maintain institutional arrangement between the District and the Local Municipalities that support air quality management;
- Achieve and sustain acceptable air quality levels throughout the District; and
- Minimize the negative impact on human health and well-being and on the environment.

All Local Municipalities in the ODM have developed, adopted and implemented their AQMPs (Table 1 -1). The AQMPs of the Overstrand and Cape Agulhas Local Municipalities were reviewed, and the 2nd Generation AQMP's were adopted by its Councils in 2017 and 2019, respectively. The 1st Generation AQMP for the Swellendam Local Municipality was adopted in 2015. The 2nd Generation AQMP of the Theewaterskloof Local Municipality was reviewed and adopted in 2015.

All AQOs have been designated in the District Municipality, as well as the Local Municipalities within the Overberg region (Table 1-1).

1.1.9 WEST COAST DISTRICT MUNICIPALITY

The West Coast District Municipality's (WCDM) Council approved its 2nd Generation AQMP in 2019 (Table 1-1) and included it as a Sector Plan of its IDP. The strategic goals and objectives of the AQMP are:

- Implementing the air quality management plan within the District;
- Assigning clear responsibilities and function for air quality management at both District and Local levels;
- Air quality training of current and future air quality personnel at both District and Local levels;
- Obtaining the necessary resources and funding for air quality management in the District;
- Preliminary monitoring of identified "hotspot" areas in the District to determine air pollutant concentrations;
- Undertake continuous ambient air quality monitoring to obtain a long-term record of air quality in the District. Such information must be available to the public and private sectors; Maintaining good air quality within the boundaries of the West Coast District, with specific emphasis on PM_{10} and SO_2 concentrations in the District;
- Compliance monitoring and enforcement air quality legislation, policies and regulations in the District; and
- Assessing the contribution of agriculture to ambient air quality and establishing measures to control emissions from these sources.

All Local Municipalities have developed their 2nd Generation AQMPs (Table 1-1). The Bergrivier and Cederberg Local Municipalities adopted their 2nd Generation AQMPs in 2019; The Saldanha Bay and Matzikama Local Municipalities' 2nd Generation AQMPs were adopted by their respective councils in 2020.

In order to improve communication and co-operative governance between the WCDM and the five (5) Local Municipalities in the West Coast, a Joint Municipal Air Quality Working Group was established in February 2015. The division of air quality management functions was formalized through a Memorandum of Understanding (MoU). The review of the AQMPs between the District and the Local Municipalities was facilitated through the MoU.

The AQOs have been designated in the District Municipality and in all the Local Municipalities of the West Coast (Table 1-1).

2. GOVERNANCE: AIR QUALITY OFFICERS' FORUM

The Minister of Forestry, Fisheries and the Environment is required to establish a National Framework for Air Quality Management, as per Section 7 of the National Environmental Management: Air Quality Act (NEM: AQA). In 2007, the then National Department of Environmental Affairs (DEA), now the Department of Forestry, Fisheries and the Environment (DFFE), developed the 2007 National Framework for Air Quality Management in South Africa (DEA, 2007). The National Framework was to ensure the efficient and effective implementation of the NEM: AQA, to guide air quality management initiatives in the country.

The 1st Generation National Framework (2007) was reviewed in 2012, five (5) years after its implementation, with major achievements having been made in implementing the NEM: AQA. The improvements included, amongst others, the following:

- Declaration of National Priority Areas;
- Development of AQMPs and designation of Air Quality Officers to:
  - Improve and maintain air quality in Provinces and Municipalities; and
  - Ensure the full implementation of the atmospheric emmission licensing system across the country.

Following a further five (5) years of implementation, the 2nd Generation 2012 National Framework was reviewed, and adopted the 2017 National Framework for Air Quality Management, with a commencement date of 26 October 2018 (DEA, 2018). The 2017 edition of the National Framework for Air Quality Management is due for review in 2022.

Amongst others, the National Framework encourages that each Province establishes a Provincial-Municipal AQOF and convene quarterly meetings. In order to facilitate the effective, efficient and cohesive functioning of the AQOF, the National DFFE provided standardised terms of reference for its implementation in the Provinces.

The overall objective of the AQOFs, as per the National Framework (DEA, 2013), is as follows:

"*An effective governance framework is developed, maintained and implemented in a manner that ensures that the unacceptable current and future impacts of atmospheric emissions are minimised, mitigated or managed in line with government policy, legislation, goals, strategies, norms and standards that are protective of everyone's right to an environment that is not harmful to their health or well-being and protect the environment for the benefit of present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development*. "

2.1 WESTERN CAPE AIR QUALITY OFFICERS' FORUM

The Western Cape Provincial Air Quality Officers Forum is a planned quarterly event aimed at providing a platform for discussing and coordinating air quality matters related to the progress made in the implementation of the NEM: AQA and the National Framework. The Forum also assesses the efficacy of the NEM: AQA's and the National Framework's implementation. Officials get provided with the opportunity to build, strengthen and/or refine their air quality management interventions towards the implementation of the NEM: AQA, and they share experiences as well as challenges, and plans for the year ahead.

The Provincial Noise Control Forum is incorporated into the Western Cape Provincial AQOF to ensure and improve the co-ordination of noise control in the Province. Similarly, the participants are informed of achievements and challenges with regards to noise management in the Province. Noise control in the Province is regulated by the Western Cape Noise Control Regulations (2013; PN 200/2013) under Section 25 of the Environment Conservation Act (Act 73 of 1989).

The location of the Western Cape Air Quality Officers' and Noise Control Forum is rotated between the five (5) Districts and the Metropolitan Municipality within the Province. Special Forums are also arranged to co-ordinate the responses of all AQOs on air quality-related matters in the Province, and to engage on legislative and policy development with National DFFE, as required (See Section 2.1.1.). During 2021, the Forum meetings were held virtually via MS Teams due to the COVID-19 related regulations and restrictions on gatherings.

Table 2-1 provides an inventory of the Western Cape Air Quality Officers' and Noise Control Forums held since 2010.

Photo by: Jean Tresfon

TABLE 2 -1: AIR QUALITY OFFICERS' AND NOISE CONTROL FORUMS HELD SINCE 2010

YEAR	DATE	LOCATION
2010	09 – 11 February 13 – 14 May 05 – 06 August	George, GRDM Beaufort West, CKDM Woodstock, CCT
2011	09 – 11 February 13 May 12 August	George, GRDM Witsand, CWDM Sea Point, CCT
2012	10 February 10 – 11May 23 – 24 August	Langebaan, WCDM Knysna, GRDM Robertson, CWDM
2013	07 – 08 February 09 – 10 May 29 – 30 August	Arniston, ODM Matjiesfontein, CKDM Klapmuts, CWDM
2014	13 – 14 February 15 – 16 May 14 – 15 August 01 – 02 November	Citrusdal, WCDM Cape Town, CCT Calitzdorp, GRDM Cape Town, CCT – Special AQOF
2015	13 – 14 February 14 – 15 May 13 – 14 August 03 – 04 November	Caledon, ODM Beaufort West, CKDM Paarl, CWDM Driftsands, CCT – Special AQOF
2016	10 – 11 February 12 – 13 May 11 – 12 August 21 October	Langebaan, WCDM Driftsands, CCT Mossel Bay, GRDM Tygerberg Nature Reserve, CCT – Special AQOF
2017	02 – 03 February 18 – 19 May 03 – 04 August 28 November	Arniston, ODM Laingsburg, CKDM Worcester, CWDM Driftsands, CCT – Special AQOF
2018	08 – 09 February 31 May – 01 June 14 – 17 August 08 November	Langebaan, WCDM Driftsands, CCT George, GRDM McGregor, CWDM – Special AQOF
2019	07 – 08 February 14 – 17 May 01 – 02 August 27 November	Bredasdorp, ODM Laingsburg, CKDM McGregor, CWDM Brackenfell, CCT – Special AQOF
2020	20 – 21 February 14 May 25 August 04 November	Vredendal, WCDM Virtual via MS TEAMS Virtual via MS TEAMS Virtual via MS TEAMS
2021	17 February 12 May 4 August 13 October	Virtual via MS TEAMS Virtual via MS TEAMS Virtual via MS TEAMS Virtual via MS TEAMS

2.1.1 SPECIAL AIR QUALITY OFFICERS' FORUMS

Special AQOFs are used as an opportunity to further discuss proposed air quality management legislative and policy developments in the country. The 2021 Special AQOF was held on 27 July 2021, and was hosted virtually on MS Teams.

Special AQOFs are convened to discuss, amongst others, policy amendments and reforms in the following:

- NEM: AQA Ambient Air Quality Standards for Particulate Matter ($PM_{2.5}$);
- The Listed Activities and Minimum Emission Standards of the NEM: AQA;
- Notice 309 of 2011 of the NEM: AQA, 2004 (Draft National Dust Control Regulations);
- NEM: AQA Amendments, Provisions and Associated Implications; NEM: AQA Atmospheric Emissions Licencing (AEL) Processing Fee Regulations;
- NEM: AQA Amendments to Section 22A;
- NEM: AQA AEL Appeal Regulations;
- Biogas / Animal Matter Licensing Challenges
- NEM: AQA Section 22A Calculator for determining Administrative Fines;
- NEM: AQA Dust Regulations;
- National Dust Control Regulations, 2013 amendments;
- NEM: AQA Amendments, Section 21 Listed Activities & Amendments;
- Carbon Tax Bill;
- Emission Database and the Development of the 2050 Emissions Pathway;
- Greenhouse Gas Reporting Inventory; and
- Implications of streamlining the National Environmental Management Act (NEMA)/Specific Environmental Management Acts (SEMA).

Other topics discussed at the Special AQOFs include the following:

- Standard Operating Procedure (SOP) between Department Mineral Resources and Energy (DMRE) and Air Quality Authorities
- SOP on AEL's
- NAEIS Capacity Building Traning;
- AEL Postponement Applications;
- Review of the Western Cape AQMPs;
- Introduction to the South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP), which incorporates the National Atmospheric Emission Inventory System (NAEIS), and System for National Atmospheric Emission Licensing (SNAEL);
- Overview of the SMART-air Programme;
- Fire in Fynbos and Alien Vegetation Management;
- Point source emissions monitoring from a Licensing Authority's perspective;
- Agricultural Burning and crop spraying;

- Burning of alien vegetation and green waste recycling;
- Western Cape State of Waste;
- Management of disposable Refrigeration and Air Air Conditioning (RAC) cylinders;
- The National cleaner production centre;
- Municipal Air Quality Management Plans (AQMPs); and
- Radon exposure in the Western Cape

2.1.2 KEY DISCUSSIONS AND OUTCOMES OF THE FORUMS

The scope of the AQOF is to provide clarity on complex air pollution and noise matters, as well as to report air quality challenges and successes, and areas that need further improvement.

PRESENTATIONS AND DISCUSSIONS AT THE FORUMS HAVE INCLUDED THE FOLLOWING:

- **AIR QUALITY PLANNING**
  - Overview of the Provincial Air Quality Projects 2014/2015;
  - Roles and Responsibilities of Air Quality Officers (AQO's): District vs. Local Municipalities;
  - Western Cape Climate Change Response Strategy;
  - Overview of the Western Cape 2nd Generation AQMP; and
  - Roles and Responsibilities of Municipalities in terms of Air Quality Management format of the Provincial Air Quality Officer Forums.
- **AIR QUALITY MONITORING**
  - Emission Reporting Requirements;
  - Interpretation and Analysis of Air Quality Monitoring Data;
  - Ambient Air Quality Monitoring Stations Locations;
  - The CCT's Air Quality Monitoring Network;
  - Ambient Air Quality Data Management;
  - Portable Air Quality Monitoring Instruments; and
  - Introducing Low-Cost Sensor Monitoring.
- **REGULATION / COMPLIANCE AND ENFORCEMENT**
  - Appeal Regulations and Case Studies;
  - An Environmental Case Study: Compliance and Enforcement;
  - The Impact of Crematoriums on Ambient Air Quality;
  - The Dangers of Landfill Sites;
  - Environmental Impact Assessment Authorisations;
  - Handling of Applications that does not trigger an Environmental Impact Assessment (EIA) or AEL;
  - AEL Postponement Process;

- Registration of Controlled Emitters;
- Variation of an AEL and Animal Matter Processing: Section 21;
- Listed Activities – Cape Environmental Assessment Practitioners (Cape EAPrac);
- Review of the AEL for the Saldanha Bay, Transnet Port Terminal;
- Introduction to SAAELIP, registering and approving user accounts on the portal;
- Licensing Authority perspective on stack emission reporting for AEL compliance;
- Noise, dust and odour complaints from a Metropolitan, District and Local municipal perspective;
- By-laws to administer and manage noise, dust and odour complaints from a local municipal perspective;
- Roles and responsibilities of an Environmental Management Inspector;
- Oudtshoorn Municipal By-Law and Air Quality complaints;
- Defensible Air Quality Management decision making;
- AEL Standard Operating Procedures;
- Dealing with Burning Permits;
- EMI designations, roles, and responsibilities; and
- Handling of complaints.

NOISE CONTROL

- Noise Management: A Focus on Compliance and Enforcement Matters;
- Update on Noise Control in the Western Cape Province;
- Noise Management: Monitoring and Legislation;
- Noise Control Regulations and the Handling of Noise-Related Complaints;
- Noise Control in Local Municipalities; and
- Discussion on Noise Compliance Inspections.

LEGISLATION AND POLICY

- Legislative Background on Stack Monitoring;
- Progress with regards to Legislation and Regulations ;
- National Dust Control Regulations;
- Noise Control Regulations;
- Section 30 Emergency Incidences;
- NEM: AQA Amendments and AEL Implications;
- Air Quality Legislative Developments;
- Section 22A of NEM: AQA;
- Interpretation of the Section 22A Administrative Fine Process;
- Environmental Legislation amendments;
- Local Governments Powers regarding Environmental Management; and
- National Management Laws Amendment Bill National Environmental Management

- Laws Amendment (NEMLA) 4.

CAPACITY BUILDING

- The Boiler design, Fuels and Emissions (John Thompson (Pty) Ltd.);
- Introduction to Ecostat;
- Introduction to Hydraulic Fracking;
- Best Practices for Animal Matter Processes;
- Introduction to Stack Monitoring;
- Burning of alien vegetation and green-waste recycling;
- Manganese ore storage and handling;
- Remotely piloted aircraft system (drones);
- Gender mainstreaming;
- Monitoring of Vehicular Emissions;
- Benefits of the Smart Driver Programme;
- Vehicle Emission Modelling & Progress – MOVES;
- Introduction to Transnet National Ports Authority; and
- Saldanha Bay 2010 – 2030.

AWARENESS RAISING

- Air Quality Improvement Programmes;
- Western Cape SMART-air Programme;
- Western Cape Industrial Symbiosis Program and wood waste opportunities;
- Industrial Activities: input into the 2050 Emissions Pathway and Greenhouse Gas (GHG) inventory for the Western Cape; and
- Western Cape 2050 Emissions Pathway.

The AQOs actively participated on the discussions pertaining to the above topics. Air quality matters put forth were also discussed and resolved with the Municipal AQOs and the Provincial AQO. Where required, National officials were also called upon to further provide clarity on issues raised. These were issues concerning the NEM: AQA amendments, Atmospheric Emission Licensing, compliance monitoring and enforcement, as well as streamlining government ambient air quality monitoring initiatives.

OTHER MATTERS OF RELEVANCE, AS DISCUSSED AT THE AQOF'S:

ATMOSPHERIC EMISSION LICENSING

The District Municipalities, as the Licensing Authorities, reported back on Atmospheric Emission Licenses (AELs) related issued, or any issues encountered regarding the issuance, review or renewal of Licenses. The Licensing Authorities in the Western Cape have embraced the AEL process.

The development of various legislation, reform and policy developments pertaining to AELs are presented and discussed at the Forums. A summary of the AELs and PAELs issued in the Western Cape during the period 2010 – 2021 is provided in Chapter 4.

EMISSIONS INVENTORY AND AMBIENT AIR QUALITY MONITORING

Updates on the Western Cape Air Emissions Inventory, as well as the status of the Western Cape Ambient Air Quality Monitoring Network, are reported regularly at the AQOFs. At the AQOFs, the AQOs and the DEA&DP staff expressed concerns regarding vandalism incidents at the monitoring stations. Possible solutions were presented, such as locating the stations at government facilities under 24hr security. Other issues raised were power outages, which affected data recovery, as well as data logging on the SAAELIP system.

More detailed information on the status of the Western Cape Ambient Air Quality Monitoring Network, is provided in Chapter 3.

LEGISLATIVE REFORM AND POLICY DEVELOPMENT

Several legislative reforms and policy developments in terms of the NEM: AQA took place since its promulgation. In 2021, complete reforms and policy developments, proposed and in draft process were tabled for discussion. National DFFE assists in presenting and clarifying these for the Western Cape Province.

The AQOs have discussed proposed legislative reforms and policies at the AQOFs and have provided joint comments to the DFFE. The Special AQOFs provided a platform for authorities to further engage in air quality legislative reforms and policy development.

2.2 WESTERN CAPE AIR QUALITY MANAGEMENT PLAN WORKING GROUPS I – III

The Western Cape AQMP established three (3) Provincial AQMP Working Groups to implement and achieve the goals it identified. The Working Group meetings were held concurrently with the Western Cape AQOFs and have been held during the period 2010 – 2021, as outlined in Table 2 -1. However, due to the virtual nature of the meetings caused by the COVID-19 restrictions, the AQOFs and Working Group meetings were held on the same day. It is also worth noting that Regulations pertaining to the COVID-19 pandemic made it difficult for Municipalities to carry out their functions, especially those which required physical contact and interaction.

The Working Groups discussed and reported on the following matters at the Western Cape AQOFs:

- **WORKING GROUP I** – Air Quality Management and Climate Change;
- **WORKING GROUP II** – Air Quality Education and Awareness Raising; and
- **WORKING GROUP III** – Technical, Compliance Monitoring and Enforcement.

Each Working Group identified priorities for implementation in the Province, and where implementation presented challenges, recommendations were made. A summary of the priorities is outlined below.

WORKING GROUP I: AIR QUALITY MANAGEMENT AND CLIMATE CHANGE

This Working Group is responsible for information management on air quality and climate change, and mainly addresses governance, the management of air quality, climate change, as well as town and regional planning in the Province. The roles and responsibilities of the Working Group are as follows:

- Ensure the development of AQMPs and appointment of AQO's by Municipalities;
- Develop, review, update, finalise and recommend the emissions inventory reporting format and/or tools for publication by DEA&DP;
- Monitor IDP process and ensure the inclusion of AQMPs as Sector Plans of Municipal IDPs;
- Propose and recommend By-laws for municipal consideration and adoption;
- Establish and adopt minimum standards for energy efficiency for all new houses, major renovations and redevelopments; and
- Develop and implement an integrated plan to manage precursors to reduce regional-scale ozone.

This Working Group maintained its emphasis on the integral relationship between air quality and climate change. Presentations on the work done for the Western Cape 2050 Emissions Pathway and GHGs inventory were given by the DEA&DP's Directorate: Climate Change (D: CC), and these projects are undertaken towards the path of the Western Cape's Climate Change Response Strategy review.

A need for collaboration with other fields of expertise such as the spatial development and transport sectors to ensure that forthcoming proposals address air quality matters within these sectors and other sectors is still seen as a gap to be filled, especially as complaints relating to these sectors seem to be on the rise in the Province.

Progress made on the Province's emissions inventory was also evaluated. Further initiatives to source and add data to the emissions inventory were also presented, and this included the estimations of emissions from vehicles via the Motor Vehicle Emission Simulator (MOVES) model. MOVES is an emission modeling system that estimates emissions for mobile sources. The Working Group also focused on the development, review and adoption of Municipal AQMPs, ensuring that they remain included as Sector Plans for the various Municipalities. The designation of AQOs was reviewed to ensure that the Municipalities comply with Section 14(3) of the NEM: AQA. To date, the Western Cape has 30 approved AQMPs (viz. 1 Provincial and 29 Municipalities) and one (1) draft AQMP (Beaufort West Local Municipality). A total of 30 AQOs were designated in the Western Cape during 2021. In the ODM, the AQO retired in 2021; however, a temporary appointment was made to ensure compliance with Section 14(3) of the NEM: AQA.

WORKING GROUP II: AIR QUALITY EDUCATION AND AWARENESS RAISING

This Working Group serves to encourage the District, Metropolitan and Local Municipalities to facilitate various awareness raising events. It is also a platform where the Provincial Government also showcases their education and awareness raising initiatives. The roles and responsibilities of the Working Group are as follows:

- To develop and recommend awareness-raising material for distribution; To facilitate annual awareness-raising events at municipalities;
- Review air quality management activities;
- Recommend content for inclusion in the State of Air Quality Management Report for the Western Cape on an annual basis; and

Activities of this working group this Working Group were severely impacted by the COVID-19 pandemic related restrictions. Nevertheless, the implementation of Working Group II has identified the need for all Municipalities to develop awareness-raising programmes and to establish various forums and to use alternative platforms to engage, some which may be digital. Below is a summary of the awareness-raising activities in the various regions.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING (DEA&DP)

The DEA&DP's D: AQM held two (2) Refrigeration and Air Conditioning (RAC) events during 2021, namely, an event to commemorate World Refrigeration Day (25 June 2021) and a RAC Technical Workshop (held from 16-17 September 2021), to promote the safe handling of natural refrigerants. These events were both held in conjunction with the Bavarian State Ministry.

On 19 August 2021, the DEA&DP officials, together with AQOs in the Western Cape, facilitated and discussed waste-related AEL authorisations with the DEA&DP's Waste Management Directorate.

CAPE WINELANDS DISTRICT MUNICIPALITY (CWDM)

The CWDM interactive theatre production to promote environmental awareness was suspended due to the COVID-19 pandemic.

Due to the pandemic restrictions, the launch of the CWDM activity booklet on environmental pollution inclusive of air, water and soil was also postponed to 2022.

CITY OF CAPE TOWN (CCT)

The CCT indicated that the awareness raising activities were hampered by budget cuts and by the amount of work other areas required as a result of the COVID-19 Pandemic. The CCT officials could not go out to schools with its mascot, "Sniffels the Air Pollution Cat", to promote and dispense awareness raising booklets, due to the restrictions around the pandemic that

were in place. CCT noted that it may need to work on making some of its awareness raising material available electronically to be circulated for future education programmes.

GARDEN ROUTE DISTRICT MUNICIPALITY (GRDM)

For the last seven (7) years, the GRDM has incorporated air pollution awareness as part of its community awareness raising activities. The GRDM has since 2011 successfully implemented their Clean Fires Campaign (now called the Garden Route Clean Fires Campaign). The project was identified due to poor air quality, especially in the informal settlements, caused by fires that are made and used for household purposes such as cooking and heating.

The Garden Route Clean Fires Campaign has taken great strides, in that the Western Cape Education Department approved that the campaign be incorporated as part of the Grade 3 curriculum. Schools were identified and approached, and each participating school received a study pack with study material that is in line with the current primary education Curriculum and Assessment Policy Statements (CAPS). These study packs are printed in English, isiXhosa and Afrikaans, the predominant languages used in the Province.

During 2021 alone, 66 schools, 115 teachers and 4 400 children participated in the Garden Route Clean Fires Campaign. It is anticipated that four (4) family members are reached per child, with a cumulative impact estimated to be 17 600 community members reached through this project for the year.

WEST COAST DISTRICT MUNICIPALITY (WCDM)

The WCDM's awareness-raising is conducted through the establishment of Working Groups and Environmental Stakeholders Forums. Industries that potentially impact on the health and wellbeing of people residing in receptor areas are required to establish communication platforms and meet with residents at agreed-upon intervals. During these meetings, the public is informed of industrial processes and the implementation of measures to control emissions. Air Quality Officers from the Local Municipalities within the CWDM also attend these meetings.

Awareness-raising was also conducted via site inspections, as well as through emails between the Licensing Authority and the Licence Holders, to keep them informed of any concerns or legislative changes.

The Joint Municipal Air Quality Working Group meetings were also held quarterly during 2021 between the Local Municipal Air Quality Officers, West Coast District Municipal Air Quality Officers, and the West Coast District Municipal Environmental Health Practitioners. Air quality matters were discussed at this working group and guidance was provided, where needed.

CENTRAL KAROO DISTRICT MUNICIPALITY (CKDM)

The CKDM distributed information on Eco-friendly Workplaces to Category B-Municipalities. The information packs included topics on:

- Contribute your share for cleaner air and health effects of air pollution;

- Noise pollution and effects of noise pollution; and
- Energy saving tips.

WORKING GROUP III: COMPLIANCE MONITORING AND ENFORCEMENT

This Working Group is responsible for all coordinating of activities regarding the implementation of the Atmospheric Emission Licensing system. The roles and responsibilities of the Working Group are as follows:

- Develop and recommend a plan of action to identify and manage illegal listed activities and participation in crime prevention forums;
- Establish air quality management Working Groups between industries and the various Licensing Authorities to facilitate report back from Section 21 Listed Activities on compliance and enforcement activities;
- Update officials on any amendments to air quality management legislation from national to the local level;
- Assist and capacitate officials with the administration of atmospheric emission licences in respect of Section 21 Listed Activities; and
- Establish training needs and available training programmes in respect of atmospheric emission licensing.

The Western Cape Licensing Authorities have accepted the AEL function and have successfully carried out their mandate in this regard. Chapter 4 (Table 4 -1) provides more detail on the licensing of Section 21 Listed Activities of the NEM: AQA in the Western Cape during the period 2010 – 2021.

Municipalities in the Western Cape have also matured in their roles pertaining to air quality management, exercising powers granted by the NEM: AQA. Capacity building has played a significant role in ensuring that Municipal AQOs are well capacitated, and it has assisted authorities who had very little to no training in air quality management. During the reporting period, authorities received NAEIS refresher training (23 July 2021), SAAEILP training (14 September 2021, NAEIS facility emissions management and reporting training (23 – 26 August 2021) as well as noise control training (30 November 2021) amongst others.

The Western Cape Province continues to promote the appointment of Environmental Management Inspectors (EMI). Most of the Municipalities have trained and appointed EMIs. To date, there are 205 EMIs who have been officially designated in the Province. In 2021, more prospective EMIs from D: AQM and the Western Cape Province Municipalities underwent training. The number of designated EMIs in the Province to date is shown in Table 2-3. The EMIs cover a wide range of compliance and enforcement matters in the Province.

TABLE 2 - 3: THE NUMBER OF DESIGNATED EMIs IN THE WESTERN CAPE PROVINCE

ORGANISATION	NO. OF DESIGNATED EMIs
DEA&DP	84
Cape Nature	42
District and Local Municipalities	79
Total	205

The Working Group encourages Municipalities to develop Municipal By-Laws. Since 2008, a total of 17 Municipal By-laws, in respect of air quality management, were gazetted in the Western Cape (Table 2-3).

TABLE 2 - 3: LIST OF MUNICIPAL BY-LAWS PROMULGATED, IN RESPECT OF AIR QUALITY MANAGEMENT IN THE WESTERN CAPE

MUNICIPALITY	BY-LAW	GAZETTE NO.	DATE
HESSEQUA	Air Pollution Control By-Law	6588	19 December 2008
GEORGE	Air Pollution Control By-Law	6816	30 November 2010
GARDEN ROUTE	Air Quality Management By-Law	7043	12 October 2012
SALDANHA BAY	Air Pollution Control By-Law	7077	09 April 2018
WEST COAST	Air Quality Management By-Law	7170	06 September 2013
MOSSEL BAY	Air Quality Control By-Law	7184	04 October 2013
SWELLENDAM	Air Quality Control By-Law	7338	05 December 2014
OVERBERG	Air Quality Management By-Law	7389	15 May 2014
SWARTLAND	Air Quality By-Law	7394	22 May 2014
THEEWATERSKLOOF	Air Quality Management By-Law	7488	11 September 2015
CENTRAL KAROO	Air Quality Management By-Law	8023	14 December 2018
STELLENBOSCH	Air Quality By-Law	8038	08 February 2019
LANGEBERG	Air Quality By-Law	8261	24 January 2020
CEDERBERG	Air Quality By-Law	8237	13 May 2020
BERGRIVIER	Air Quality By-Law	8261	03 July 2020
DRANKENSTEIN	Air Quality Management By-Law	8425	07 May 2021
CITY OF CAPE TOWN	Air Quality Management By-Law	8508	22 October 2021

CITY OF CAPE TOWN

The CCT's 2010 Air Quality Management By-Law was replaced by the 2016 CCT Air Quality Management By-Law. The 2016 By-Law was approved by Council on 31 March 2016 and was gazetted on 17 August 2016. In 2021, the CCT gazetted a new By-law that was improved to strengthen the CCT's compliance and enforcement tools to combat air pollution. Specific improvements made related to the sections dealing with dust and air pollution nuisances, amongst others.

GARDEN ROUTE DISTRICT MUNICIPALITY

The GRDM Air Quality By-law was gazetted in November 2012. This By-law makes provision for Offences and Penalties, as well as the issuing of spot fines, as implemented.

OVERBERG DISTRICT MUNICIPALITY

The ODM developed its Air Quality Management By-Law, which was adopted by Council and gazetted on 15 May 2014.

WEST COAST DISTRICT MUNICIPALITY

The WCDM Air Quality Management By-law was gazetted on 06 September 2013. The storage and handling of ore in quantities below the threshold where licensing in terms of the NEM: AQA is required, has been identified as a source of pollution, especially within the Saldanha Bay area. The WCDM, with assistance from the DEA&DP and Saldanha Bay Municipality, has drafted a guideline which was communicated with other stakeholders and accepted at the Greater Saldanha Bay (GSB) Intergovernmental Task Team (IGTT) meeting in July 2017.

CAPE WINELANDS DISTRICT MUNICIPALITY

The CWDM has a draft Air Quality By-law specific to its District. The By-law will be promulgated once its AQO has been designated as an EMI. The AQO underwent EMI training in 2021 and awaits official designation.

CENTRAL KAROO DISTRICT MUNICIPALITY

The CKDM developed an Air Quality Management By-law, which was gazetted on 14 December 2018.

2.3 MUNICIPAL AIR QUALITY OFFICERS' / INDUSTRY FORUMS

As a means of managing air quality whilst guarding the economic viability in line with compliance to the NEM: AQA of the Western Cape Province towns, four (4) District Municipalities, viz. WCDM, GRDM, CWDM and ODM have established Municipal AQOFs, within their respective areas. The Municipal Forums are conducted quarterly and attended by industries that operate under the NEM: AQA Section 21 Listed Activities, the Local Municipal AQOs, as well as some Provincial Air Quality Officials. The Forums serve as a platform to communicate air quality matters with stakeholders. The WCDM also has civil society bodies incorporated into its forums.

Activities at the Municipal forums include, amongst others:

- Presentation of quarterly reports by industries to the competent authorities to establish compliance, as well as non-compliance to air quality minimum emission standards and other conditions of the AELs;
- The District Municipalities share information with industries on air quality notices/amendments and promulgation of regulations, legislation and standards; and
- Local Municipal AQOs attend the forums to gain information on the performance of the industries in their areas.

2.4 PROJECTS AND PROGRAMMES TO MANAGE AIR QUALITY IN THE PROVINCE

2.4.1 HUMAN HEALTH RISK ASSESSMENT

To determine the human health risk associated with exposure to air pollutants, the DEA&DP completed a comprehensive Human Health Risk Assessment Study (HHRA) in selected areas of the Western Cape, inclusive of epidemiological studies and the impacts of air pollution.

Even though the measured criteria pollutants were below the National Ambient Air Quality Standard thresholds, from a cost-benefit analysis perspective, the HHRA Study suggested that air pollution could potentially have a larger impact on human health and the economy of the Western Cape. The Total Economic Cost was estimated at approximately R8.7 billion per annum, using particulate matter with a diameter less than 10µm (PM_{10}) as a proxy indicator for air pollution in the study areas. This provided an indication of the potential economic impact, which amongst other, include the cost of treatment, loss of income and the loss in the wider economy, linked to mortality, respiratory and cardiac hospital admissions due to possible air pollutant exposure in the study areas.

During 2021, the DEA&DP continued to implement the following two (2) remaining key HHRA Study recommendations and associated air quality measures/ actions that were identified:

- Officials continued to maintain the ambient air quality monitoring station that was commissioned in Paarl (See Chapter 3.2.3.3); and

- Officials continued updating the Western Cape Emission Inventory. An emissions inventory is required for the integration of air quality monitoring and dispersion modelling.

2.4.2 WESTERN CAPE SMART-air PROGRAMME

The Western Cape Government, through the AQMP2016, introduced a recognition programme for reducing air pollution, viz. the SMART-air Programme. The AQMP2021 further reaffirmed its support for the SMART-air Programme as it continues to serve as the key factor through which emission reduction best practices in industry, commerce and communities are to be recognised, while also raising awareness on air quality matters linked to climate change international commitments.

At its inception, the SMART-air Programme was rolled-out over three (3) phases as outlined in Figure 2-1, with the following timelines: short term (1 to 3 years), medium-term (3 to 5 years) and long term (greater than 5 years).

Phase 1 and Phase 2 of the SMART-air Programme have been completed and were funded as part of the Green Economy Programme of the Province. Currently, the Programme is in Phase 3, Implementation Phase, where the long-term goals (greater than 5 years) are to be realised. A step towards the longer-term achievements have been undertaken and will be further unpacked in the **RAC Project** section.

SMART-air Programme Phases

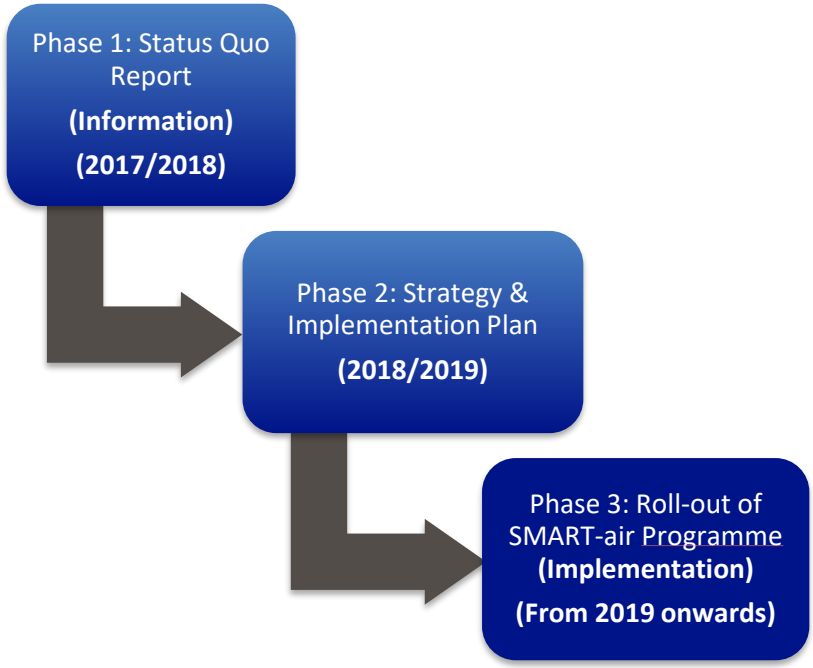


Figure 2 - 1: Phases of the SMART-air programme

The responsibility for the implementation of the SMART-air Programme continues to rest on the Western Cape DEA&DP; District and Local AQOs and the AQMP Working Groups. Table 2-4 shows the summary of the SMART-air Strategy and Implantation plan.

TABLE 2 - 4: SUMMARY OF THE SMART-air STRATEGY & IMPLEMENTATION PLAN

Thematic Area	Vision	Objectives
SMART-air Emission Abatement and Mitigation Technologies	Accelerated uptake of emission abatement and mitigation technologies across the Province.	– Identify industries/facilities to target for air emissions abatement and mitigation, as well as the abatement technologies relevant to those industries/facilities. – Identify industries/facilities to target for GHG mitigation, as well as the mitigation technologies relevant to those sectors and sub-sectors. – Facilitate engagements between AQOs and facilities on mitigation. – Facilitate engagements between technology service providers and AQOs. – Monitor and support the uptake of mitigation technologies.
SMART-air Training, Skills Development and Mentorship	Highly trained and engaged AQOs; micro, small and medium-size operators; and graduates.	– Continuous AQO training on emissions sources and the types of emission abatement and mitigation technologies and alternatives relevant to emitters in their jurisdictions, as well as the requirements for implementation. – Increase the focus on air emissions abatement and mitigation considerations in courses at tertiary institutions and technical colleges. – Skills development on implementing measures for reducing emissions from micro and small facilities.
SMART-air 2Precious2Pollute Recognition	An established recognition programme for leaders in emissions mitigation and abatement.	– Establish platforms and learning networks for peer-to-peer and expert mentorship and lessons sharing. – Establish and maintain a high profile, well-respected recognition programme for leaders in the field of emissions mitigation and abatement. – Establish a system of 2Precious2Pollute champions to drive the programme and keep it relevant. – Establish and maintain collaboration with NACA and the associated recognition programme for leaders in the field of emissions mitigation and abatement.
SMART-air Emissions Inventory	A complete and detailed emissions inventory at the Municipal, District and Provincial level, covering both air pollutants and greenhouse gas emissions, to enhance emissions management and tracking.	– Obtain a comprehensive list of point, non-point and mobile sources in each Local Municipality. – Establish and implement a data collection, management and analysis system to supplement the data collected in NAEIS, towards the preparation of a comprehensive emissions inventory. – Establish a systematic approach to monitoring, reporting and verification (MRV) of emissions outside of NAEIS. – Establish a comprehensive education, awareness and communication strategy surrounding the inventory.

SMART-air Awareness Raising	Increased awareness of the needs and opportunities formitigating emissions across the Province	Establish an awareness-raising strategy that focuses on different target groups.
		Roll out the strategy on a continuous basis, continually updating it as appropriate.
		Disseminate DEA&DP publications on air quality.
		Develop and disseminate communication materials aimed at emitters to increase their knowledge about emission abatement and mitigation technologies.

REFRIGERATION AND AIR CONDITIONING (RAC) PROJECT

This RAC project is the Western Cape Province's response intervention that aims to reduce ozone-depleting substances and GHG emissions. The project is one of the SMART-air Programme's initiatives that the Province has committed to in its AQMP, and it aims to undertake the project in line with national and international standards.

The target sector, as the name RAC suggests, is the refrigeration and air conditioning sector which includes ozone-depleting substances such as fluorinated gases, i.e. hydrochlorofluorocarbons (HCFCs) or hydrofluorocarbons (HFCs). These substances have a high global warming potential (GWP) and are up to several thousand times more potent than CO_2. Therefore, if no interventions are undertaken to their handling, storage and use, the sector risks to be one of the more significant contributors to GHG emissions, as it has been estimated to be 13 % of global GHG emissions by 2030.

In line with national and international requirements, there has been a radical move from using the high GWP HFCs to natural refrigerants such as CO_2, ammonia or propane, which have low GWP is recommended for the RAC sector. In this way, there would be significant savings in terms of waste and energy, when combining energy efficient appliances with natural refrigerant systems.

The RAC project, in its inception, had a budget of 360,000 EUR (approximately 4,725,734 ZAR), funded by the Free State of Bavaria. The RAC Project Concept outlined the various activities that were to take place during the project's lifespan. The Western Cape Government and the Free State of Bavaria, Germany, signed a Memorandum of Agreement Action Plan (2016 - 2018; 2019 - 2021) entailing collaborative work on Climate-Friendly Refrigeration and Air Conditioning (RAC) in the Western Cape, South Africa.

The following activities formed part of achieving the objectives of the RAC Partnership Project, and were completed during the duration of the project:

- A special session on South Africa was hosted at the IFAT Trade Fair on 16 May 2018, which was chaired by Professor Rupel of Stellenbosch University. The special session focused on South Africa and Trade, and a special presentation on the RAC Programme was made during this special session on South Africa.

- Multiple "train-the-trainer cool-training events", which targeted teachers, instructors and experts of refrigeration and air conditioning technologies from the Western Cape were held in Bavaria. The aim was to have RAC experts trained to act as "multipliers for information" on climate-friendly natural refrigerant technologies in the Western Cape. Nine (9) RAC specialists were trained in Bavaria during 2018 and 2019 of whom two female specialists were trained. An exchange visit to Bavaria took place during

- May 2018, with Bavarian officials visiting Cape Town, South Africa, during June 2019.

- The first phase of the RAC Project included a Technical Workshop on "Green Cooling Solutions –Unlocking the South African market uptake" took place on 20 – 21 June 2019 at Elsenburg, Stellenbosch. Workshop delegates were tasked to identify and discuss the initial concept for a RAC pilot project to be undertaken in the Western Cape during Phase 2. A second Technical Workshop took place during September 2021, where the safety aspects of hydrocarbon technologies were discussed. The workshop's objective was for international experts on natural refrigerants to do presentations and undertake practical exercises and share success stories on natural refrigeration. Ventilation, leak detection, and calculating the flammability limits for a closed room were also discussed at the technical workshop.

- Following a request for proposals to identify a RAC Pilot Project in the Western Cape, the West Coast College Atlantis Campus was identified as the implementing institution for the RAC Pilot Project. Therefore, in December 2021. A Hydrocarbons Training Laboratory was officially opened on 6 December 2021 by MEC Anton Bredell of the Provincial Department of Environmental Affairs and Development Planning, along with the Deputy Minister of Higher Education and Training, as well as other guests and stakeholders. The first cohort of students were trained at the laboratory, were awarded training certificates in the use of natural refrigerants, endorsed by the South African Refrigeration & Air Conditioning contractors (SARACCA), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and South African Institute of refrigeration and Air Conditioning (SAIRAC).

Implementation of the RAC Project will continue to be monitored by the founding partners.

2.4.3 Gender Mainstreaming within Air Quality Management

"*Gender mainstreaming includes a process of assessing the implications of any planned action, legislation, policies, budgets and programmes, in all areas and at all levels, for women, men, boys and girls. It involves the integration of gender considerations into all structures; systems and processes; organisational decisions and activities; implementation of corrective measures for prevention and alleviation of prejudice, removal of barriers, and reduction of disparities between women and men, boys and girls, and ultimately achieving gender equality, not just in equity, but in lived experience*," (DoW, 2015)

The National Framework for Women Empowerment and Gender Equality (2000) is a tool that has been identified to be necessary for the creation of an enabling environment for the development of policies and strategies to ensure equality of opportunities and treatment for men and women in terms of access to and share of employment opportunities, services and resources. As such, the DEA&DP Gender Mainstreaming Forum was established in 2017 with the following purpose:

- To instill genuine gender mainstreaming;
- To fulfil relevant policy requirements;
- To deal with issues in which gender and gender stereotypes play a key role; and
- To encourage inclusivity.

Such an environment is created because as per to the Policy Framework, women are the most affected by environmental consequences, and also that relatively few women are involved in decision-making for the development of programmes that will promote sustainable and safe settings for economic growth, particularly in rural areas. The Policy Framework also recognizes that women are the most reliant on a clean and healthy environment for daily nutrition and survival, particularly in impoverished areas (DEA, 2016).

In line with DFFE's stance to comply with the provisions of the National Framework for Women Empowerment and Gender Equality (2000), the Constitution (Act No. 108 of 1996), the Sector Gender Framework for the Environment Sector, the Women's Charter for Effective Equality (1994), and the Strategic Framework for Gender Equality within the Public Service (2006), the D: AQM has made a concerted effort to actively incorporate gender mainstreaming within the Departments' commitments.

According to general socio-economic statistics, women and children bear the brunt of poor air quality in many areas, but especially informal settlements, as fires are used for household purposes such as cooking and heating. For this reason, the D: AQM is considering the facilitation of garnering more support and strengthening the rolling out of campaigns like that of the Garden Route Clean Fires Campaign, to other districts.

The Garden Route Clean Fires Programme is a GRDM initiative (see section 2.2), where Peer Educators are trained to teach the community on the dangers of air pollution. Training also includes using dry wood, chopped small, as opposed to larger wet logs that smolder and produce smoke. The use of "Rocket Stoves" for cooking are demonstrated, as it requires small quantities of wood, while generating heat. The Clean Fires Programme will specifically focus on women, as women often are negatively exposed to harmful indoor air pollution and suffer the consequences of their exposure. The World Health Organization (WHO) indicates that around 2.6 billion people globally still use solid fuels such as biomass (wood, animal dung and crop waste), coal and kerosene for cooking and heating. The fuels are typically used indoors by means of open fires and/ or inefficient stoves where ventilation is often not adequate. Indoor air pollution may lead to stroke, chronic obstructive pulmonary disease, lung cancer, ischemic heart disease and pneumonia (WHO, 2021).

An internal assessment of the 2nd Generation AQMP was undertaken, with a specific gender focus. The assessment revealed the gender specific shortcomings of the 2nd Generation AQMP. In response, a commitment was made to actively incorporate gender mainstreaming and human rights matters in all air quality management policies (e.g. 3rd Generation AQMP) and projects in the Department. In 2021, the Western Cape had 10 female AQOs, which includes the Provincial AQO and the WCDM AQO. In 2021, there were 11 female AQOs. The RAC project also promotes the participation of women in the programme. During 2019, two (2) female candidates were selected and completed the RAC Cool Training Programme in Bavaria while, a female RAC Technician was trained at the West Coast College on the safe use and handling of natural refrigerant gases. A further assessment of women in the air quality sector is also planned.

3. AMBIENT AIR QUALITY MONITORING

3.1 AMBIENT AIR QUALITY MONITORING IN THE WESTERN CAPE

The National Environmental Management: Air Quality Act's (Act No. 39 of 2004; NEM: AQA) Section 8 mandates Provinces and Municipalities to monitor ambient air quality. The City of Cape Town Metropolitan Municipality (CCT), the West Coast District Municipality (WCDM), the Saldanha Bay Municipality (SBM), and the Department of Environmental Affairs and Development Planning's (DEA&DP) Directorate: Air Quality Management (D: AQM) have all installed ambient air quality monitoring equipment within their respective jurisdictions as a part of the Ambient Air Quality Monitoring Network in the Western Cape Province (Table 3-1).

TABLE 3-1: THE WESTERN CAPE AMBIENT AIR QUALITY MONITORING NETWORK

MUNICIPAL AREA	LOCATION	DATE COMMENCED
DEA&DP's WESTERN CAPE AMBIENT AIR QUALITY MONITORING NETWORK		
CAPE WINELANDS	Meirings Park, Worcester	July 2009 - present
	Municipal Vehicle Testing Station, Paarl	March 2008 - May 2009* August 2018 - present
	Cape Winelands District Municipality, Stellenbosch	October 2011 - present
WEST COAST	Stompneus Bay, St Helena Bay	April 2011 - April 2021*
	Malmesbury Central, Malmesbury	April 2010 - present
	Vredenburg High School, Vredenburg	April 2008 - March 2010*
	Saldanha Bay Industrial Development Zone (IDZ)	December 2021
CITY OF CAPE TOWN	Sentinel, Hout Bay	March 2014 - present
	Khayelitsha District Hospital, Khayelitsha	May 2017 - present
	Morningstar Small Holdings, Vissershok	September 2011 - March 2019*
	Khayelitsha Training Centre, Khayelitsha	May 2011 - 2017*
	Panther Park, Berkeley Rd, Maitland	August 2010 - March 2011*
	Driftsands Nature Reserve, Blue Downs	April 2019 - November 2020*
	Maitland Crematorium, Maitland	April 2021 - present
GARDEN ROUTE	Bongolethu, Oudtshoorn	April 2011 - present
	Conville, George	July 2010 - present
	Garden Route District Municipality, Mossel Bay	November 2016 - present
	Dana Bay Reservoir, Dana Bay	November 2011 - October 2016*
	Voorbaai, Mossel Bay	August 2008 - February 2010*
OVERBERG	Mount Pleasant, Hermanus	March 2014 - December 2018*
	Abagold, Hermanus	December 2018 - present

MUNICIPAL AREA	LOCATION	DATE COMMENCED
CITY OF CAPE TOWN's AMBIENT AIR QUALITY MONITORING NETWORK		
CITY OF CAPE TOWN	Molteno	1992
	Goodwood	1993
	Athlone	1993
	City Hall	2020*
	Tableview	1994
	Foreshore	1995
	Bothasig	1995
	Khayelitsha	2002
	Bellville-South	2003
	Wallacedene	2006
	Atlantis	2008
	Somerset-West	2008
	Plattekloof	2013
	Potsdam	2013
SALDANHA BAY MUNICIPALITY's AMBIENT AIR QUALITY MONITORING NETWORK		
SALDANHA BAY	Saldanha Bay Harbour	July 2014
	Louwville, Vredenburg	July 2014
	Saldanha Bay Substation	*Decommissioned 2014
WEST COAST DISTRICT MUNICIPALITY's AMBIENT AIR QUALITY MONITORING NETWORK		
VELDDRIF	Velddrif Municipal vehicle testing station	June 2017

*Decommissioned

The ambient air quality monitoring stations of the DEA&DP, CCT, SBM and WCDM are operated in accordance with the US EPA ambient air quality monitoring methods (Quality Assurance Handbook for Air Pollution Measurement Systems, Vol II), ISO/IEC17025:2005 standards and SANAS TR-07-03 requirements. Air quality monitoring data measured at the stations are recorded on data loggers, after which it is transferred via a modem to a server for storage and further processing. The data is quality controlled, and quality assured prior to producing daily and monthly reports. All data in the Western Cape Ambient Air Quality Monitoring Network is reported to the South African Air Quality Information System (SAAQIS) on a monthly or quarterly basis, https://saaqis.environment.gov.za.

3.1.1 The National Air Quality Index (NAQI)

The National Air Quality Index (NAQI) is a unit of measure that was developed provide an indication of the state and trend of ambient air quality in South Africa. The NAQI was

developed by the Department of Forestry, Fisheries and the Environment (DFFE) to provide a valid and reportable measure of air quality at a national scale that can be used by various stakeholders, ranging from air quality managers to the general public. The NAQI is based on an annual measure of PM_{10} and SO_2 concentrations at selected locations of the Ambient Air Quality Monitoring Network within South Africa, as operated by various spheres of government. The criteria pollutants are selected because of the increasing trends reported at a national scale. They are also measured at the majority of the ambient air quality monitoring stations, and hence have established historical datasets (DEA, 2017).

Within the Western Cape Province, nine (9) ambient air quality monitoring stations form part of the NAQI Ambient Air Quality Monitoring Network (Table 3-2).

TABLE 3-2: LIST OF WESTERN CAPE PROVINCE LOCATIONS OF THE NAQI AMBIENT AIR QUALITY MONITORING NETWORK

STATION NAME	STATION OWNER/ NETWORK
Foreshore	City of Cape Town
Bellville-South	City of Cape Town
Khayelitsha (CCT Metro)	City of Cape Town
Goodwood	City of Cape Town
Table View	City of Cape Town
Wallacedene	City of Cape Town
George	DEA&DP
Worcester	DEA&DP
Cape GAW Station Cape Point	South African Weather Services (SAWS)

3.2 THE DEA&DP's WESTERN CAPE AMBIENT AIR QUALITY MONITORING NETWORK

The DEA&DP commissioned its first ambient air quality monitoring station in 2008, as part of the Western Cape Ambient Air Quality Monitoring Network. To date, 18 locations have been monitored, with 12 currently in operation and reporting on various air quality parameters (Figure 3-1 and Table 3-3) during 2021.

The set of air quality parameters measured at each monitoring station was primarily determined by the historical air quality conditions at the location. Each set of parameters measured may include complimentary sets of parameters, i.e. SO_2, O_3 and NO_2 (vehicle emissions and combustion), PM_{10} and CO (combustion), and H_2S and CO_2 (odour and combustion), which often provides an indication of the possible causes of air pollution in an area. Meteorological parameters (wind speed and direction, ambient temperature, pressure, relative humidity) are also measured to provide the context within which the air quality is measured. The information recorded also assists in reporting on air quality that impact on the larger area, which is being monitored (Table 3-3).

A synopsis of the ambient air quality, as currently monitored at each location of the DEA&DP's Ambient Air Quality Monitoring Network, is provided.

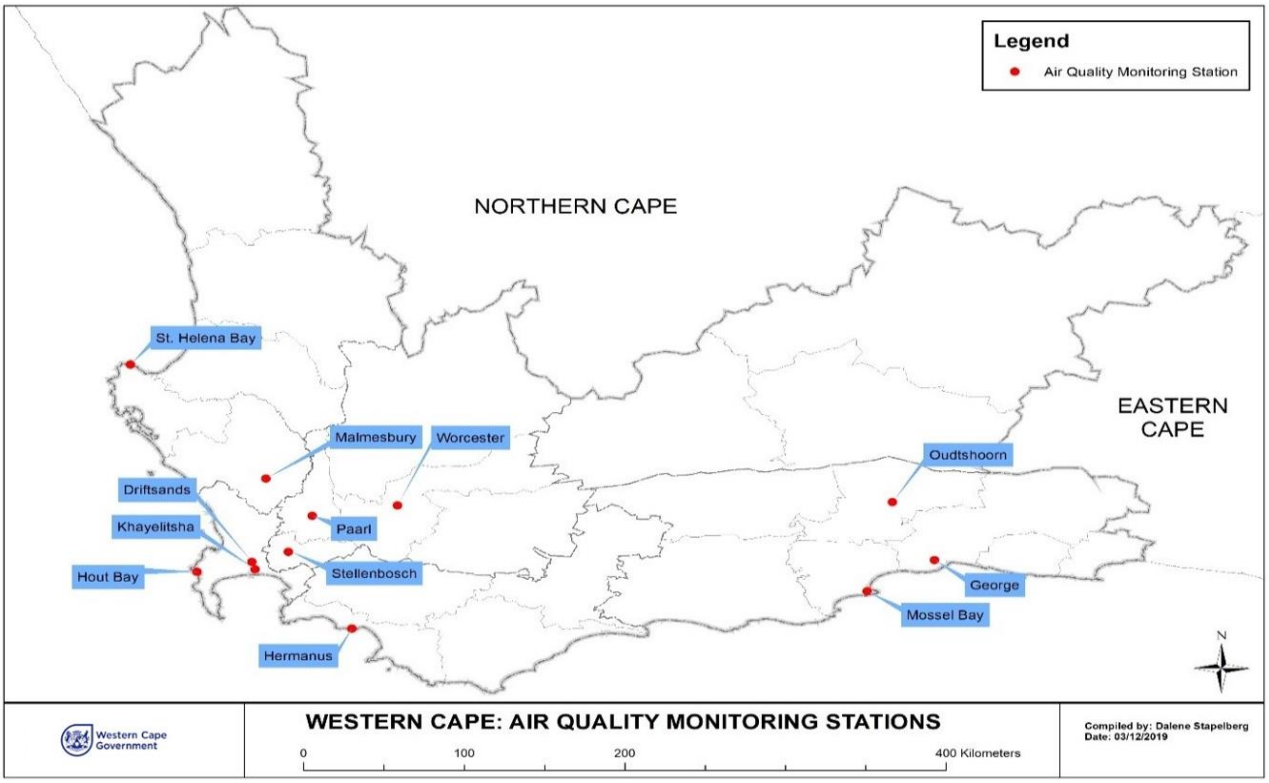


Figure 3-1: Locations of the ambient air quality monitoring stations operated in the DEA&DP's ambient air quality monitoring network

TABLE 3-3: LIST OF PARAMETERS MONITORED AT THE DEA&DP AIR QUALITY MONITORING STATIONS

LOCATION OF STATIONS	AIR QUALITY PARAMETERS MEASURED
WORCESTER	SO_2, O_3, NO_2, CO, PM_{10}, meteorological parameters
PAARL	SO_2, O_3, NO_2, CO, meteorological parameters
STELLENBOSCH	SO_2, O_3, NO_2, CO, CO_2, PM_{10} & $PM_{2.5}$, meteorological parameters
ST HELENA BAY	H_2S, CO_2, meteorological parameters
MALMESBURY	SO_2, O_3, NO_2, CO, PM_{10}, meteorological parameters
HOUT BAY	H_2S and meteorological parameters
KHAYELITSHA	SO_2, O_3, NO_2, CO, CO_2, PM_{10}, & $PM_{2.5}$, meteorological parameters
OUDTSHOORN	H_2S, CO_2, meteorological parameters
GEORGE	SO_2, O_3, NO_2, CO, PM_{10}, meteorological parameters
MOSSEL BAY	H_2S, VOC's (BTEX), meteorological parameters
HERMANUS	SO_2, O_3, NO_2, CO, CO_2, PM_{10} & $PM_{2,5}$, meteorological parameters
MAITLAND	SO_2, NO_2, CO, PM_{10}, meteorological parameters

3.2.1 West Coast District Municipality

The WCDM consists of five (5) Local Municipalities; namely Saldanha Bay, Swartland, Bergrivier, Matzikama, and Cederberg Local Municipalities. Activities with possible air quality impacts include mining, fishing, ore export facilities, agriculture and small-scale industrial activities. The Municipality of Saldanha Bay includes the largest natural port in the southern hemisphere from which ore is exported. The Saldanha Bay Municipality and the West Coast District Municipality have their own air quality monitoring networks, respectively (see section 3.3 and 3.4), while the DEA&DP monitors ambient air quality in St Helena Bay and Malmesbury, as reported below.

3.2.1.1 St Helena Bay (Saldanha Bay Municipality)

The St Helena Bay ambient air quality monitoring station was commissioned during April 2011 and decommissioned in December 2021 due to security concerns following a vandalism incident during the reporting period. The monitoring station was located in a residential area in Stompneus Bay, adjacent to HP Williams Primary School and downwind of nearby fishing industries (Figure 3-2).

Table 3-4 shows the percentage data capture for each air pollutant monitored at the St Helena Bay air quality monitoring station during 2021. The monitoring station was not operational after April 2021; therefore, H_2S and CO_2 data for 2021 are not presented in this report. The data capture for the meteorological parameters was also below 60% during 2021, following the suspension of operations of the monitoring station. The wind speed and direction for 2016 – 2020 is shown in Figure 3-5.

Figure 3-2: Aerial image of St Helena Bay ambient air quality monitoring location

TABLE 3-4: ST HELENA BAY DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Hydrogen Sulphide (H_2S)	<60
Carbon Dioxide (CO_2)	<60

- **Long term air quality trends for St Helena Bay**

The long term H_2S concentration measured at the St Helena Bay ambient air quality monitoring station from April 2011 to December 2021 is shown in Figure 3-3. There is a discernible trend of H_2S peaks during the autumn/winter season since the inception of St Helena Bay monitoring station.

The long term CO_2 concentrations monitored at St Helena Bay ambient air quality monitoring station from January 2012 to December 2021 shows an upward trend, with the highest concentration of all time recorded at 466 ppm on 18 July 2018 (Figure 3-4).

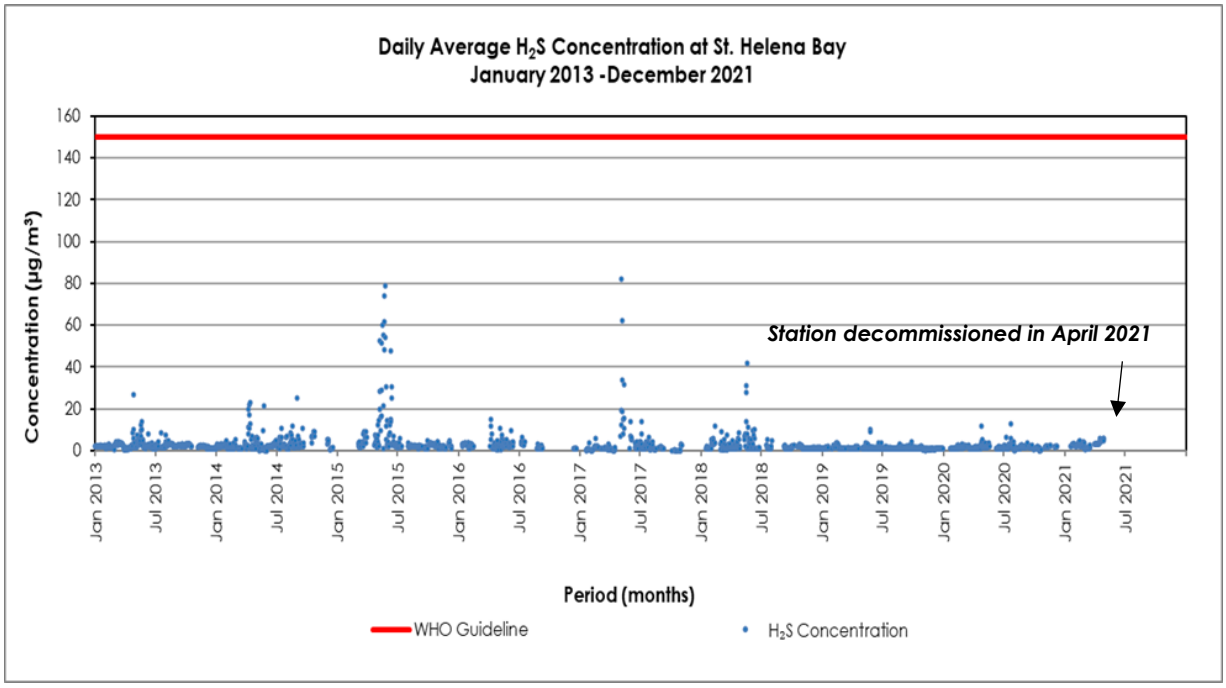


Figure 3-3: Long term H_2S trend at St Helena Bay (Apr 2011 – Dec 2021)

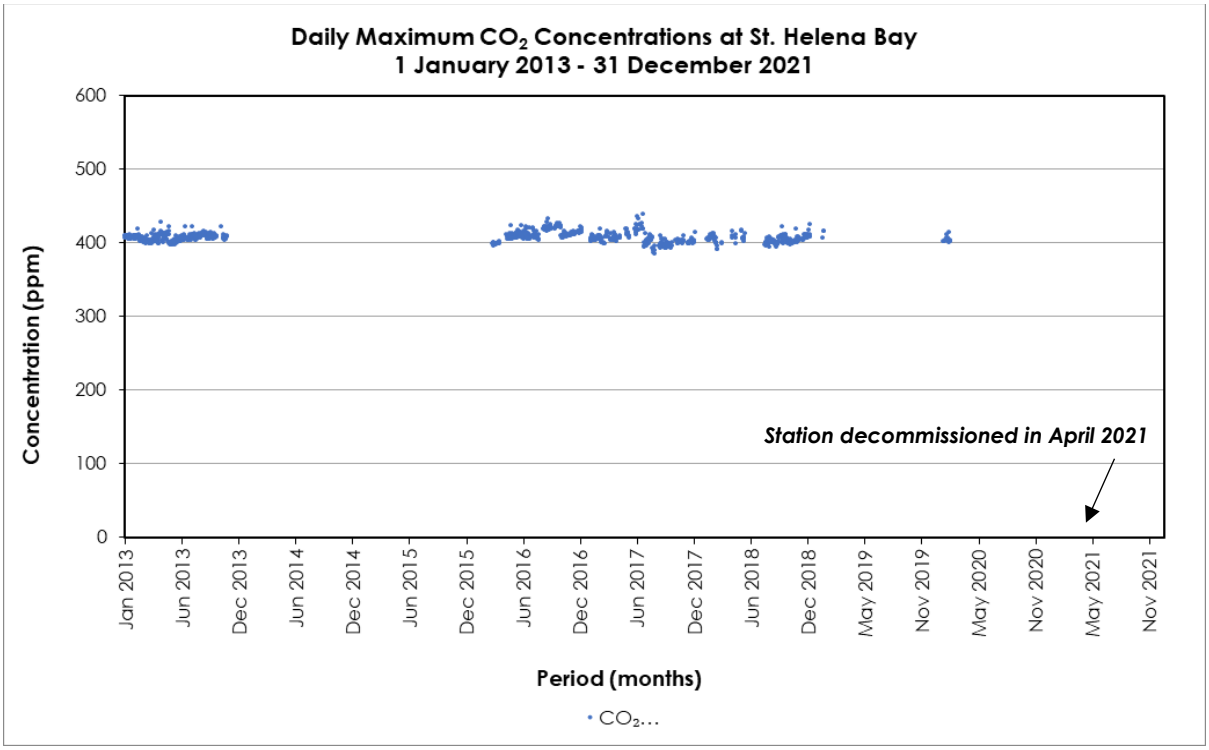
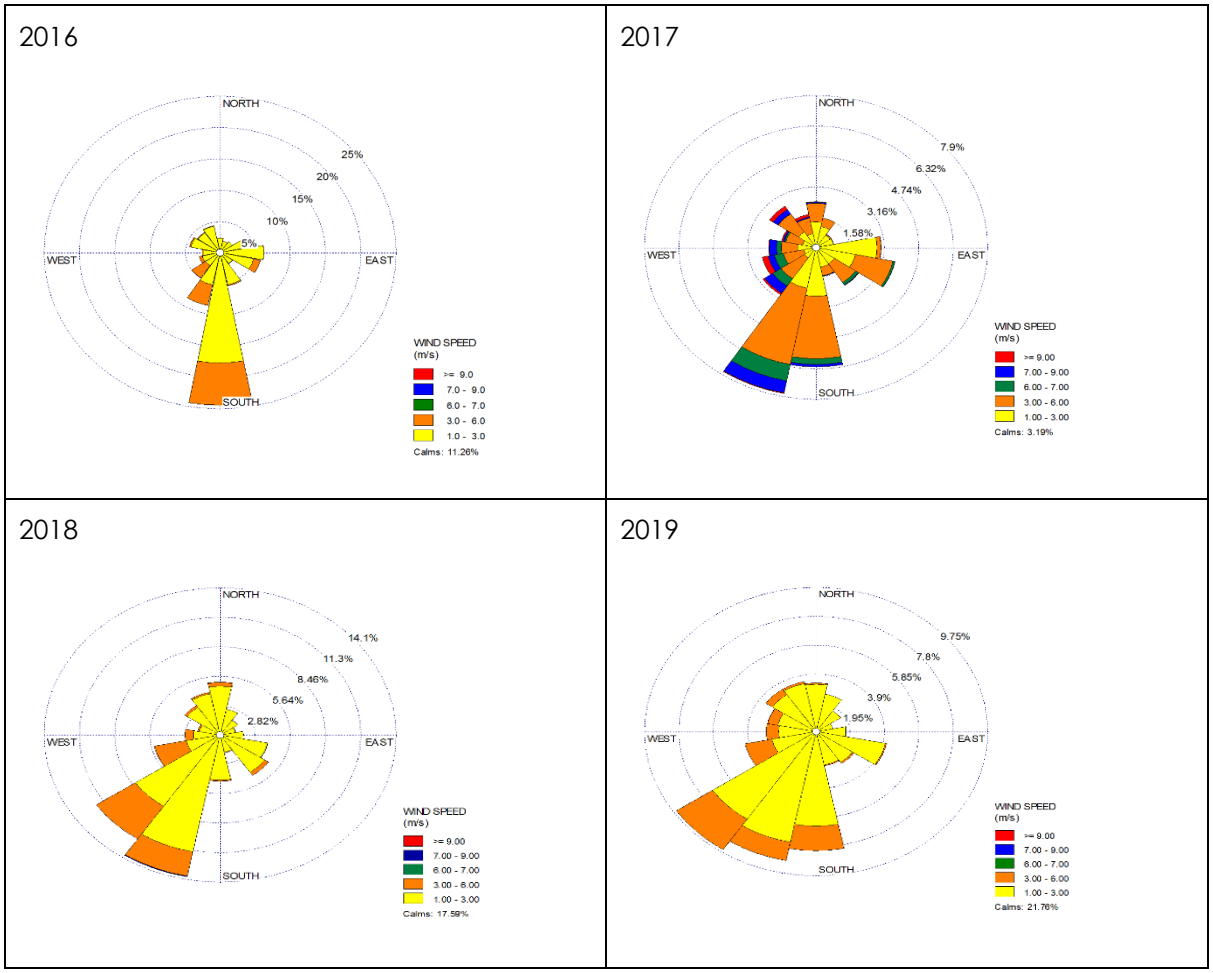


Figure 3-4: Long term CO_2 trend at St Helena Bay (Jan 2013 – Dec 2021)



2020

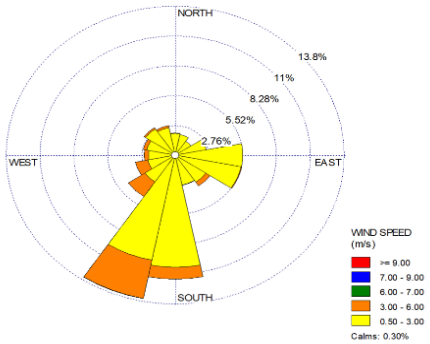


Figure 3-5: Annual wind roses for St Helena Bay (2020)

3.2.1.2 Malmesbury (Swartland Municipality)

The Malmesbury ambient air quality monitoring station was commissioned in April 2010 at the Swartland High School in Malmesbury (Figure 3-6). The monitoring station is located in a residential area downwind of industries, it is also close to the central business district and the national road (N7).

The percentage data capture for each air pollutant measured at the Malmesbury monitoring station is shown in Table 3-5. The respective data capture rates for SO_2 and PM_{10} were below 60 % as both analysers were reinstalled later during the monitoring period after repair. Therefore, the data for these pollutants is not presented in this report. The intermittent gaps in the data are due to power outages and instrument failure. The data capture rate for meteorological parameters was below 60 % for 2021 due to faulty sensors; therefore, the meteorological data are not presented in this report.

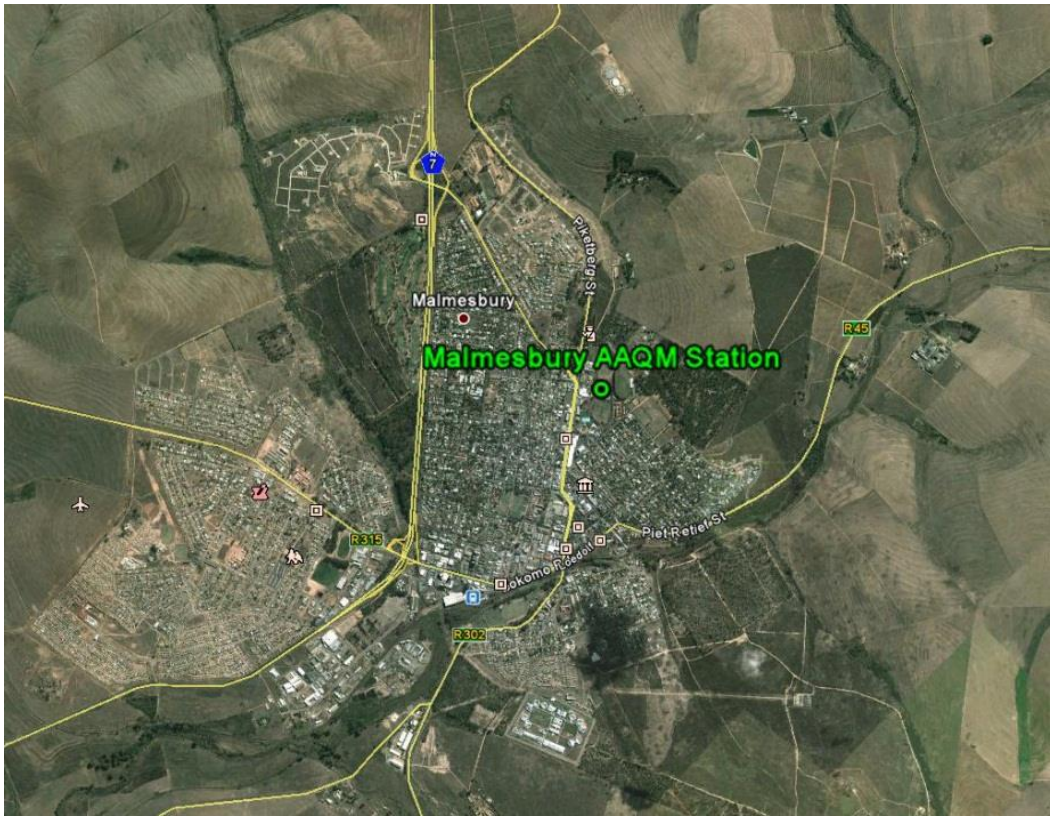


Figure 3-6: Aerial image of Malmesbury ambient air quality monitoring location

TABLE 3-5: MALMESBURY DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	68
Ozone (O_3)	88
Nitrogen Dioxide (NO_2)	67
Sulphur Dioxide (SO_2)	<60
Particulates (PM_{10})	<60

- **Carbon Monoxide (CO)**

Daily maximum 8-hour mean CO concentrations measured at the Malmesbury ambient air quality monitoring station is shown in Figure 3-7. The CO (8–hour mean) National Ambient Air Quality Standards (NAAQS) of 10 mg/m^3 (Worcester) calculated from hourly averages was not exceeded during the 2021 monitoring period. The 2021 annual average CO concentration was 0.48 mg/m^3. The intermittent gaps in the data were as a result of power outages and instrument failure.

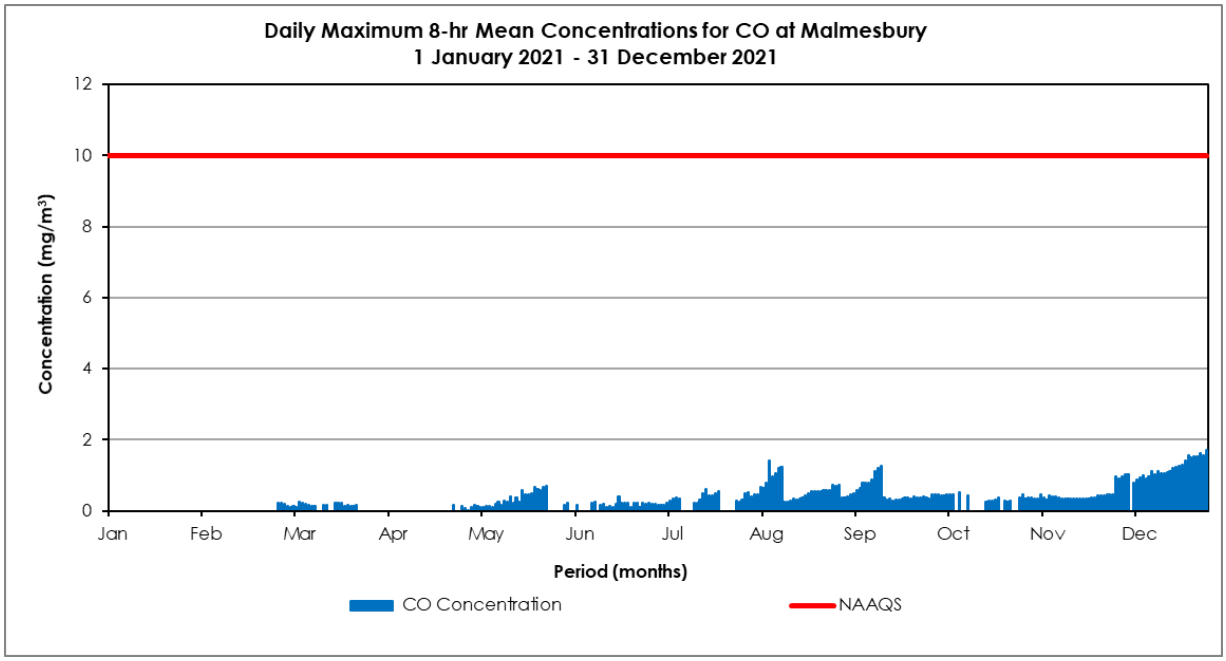


Figure 3-7: Daily maximum (8–hour mean) for CO at Malmesbury (2021)

- **Ozone (O_3)**

Daily maximum 8-hour mean concentrations for O_3 measured at the Malmesbury ambient air quality monitoring station is shown in Figure 3-8. The maximum running 8-hour average O_3 concentration was recorded at 86.23 µg/m³ on 23 October 2021, while the annual average O_3 concentration was 50.69 µg/m³. There were no exceedances of the O_3 (8–hours, running) NAAQS of 120 µg/m³ during the 2021 monitoring period. The intermittent gaps in the data occurred due to power outages and instrument failure.

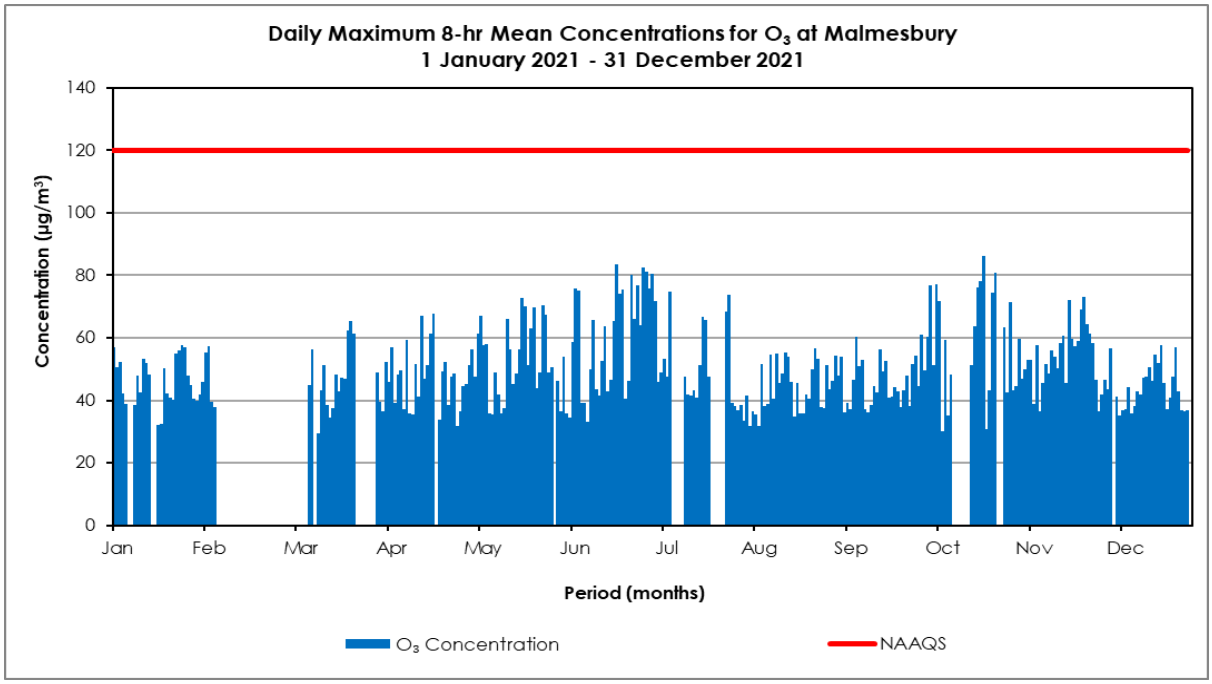


Figure 3-8: Daily maximum O_3 (8–hour mean) at Malmesbury (2021)

Nitrogen Dioxide (NO_2)

Daily average concentrations for NO_2 measured at the Malmesbury ambient air quality monitoring station is shown in Figure 3-9. The maximum daily average NO_2 concentration was recorded at approximately 63 µg/m³ on 04 June 2021, while the annual average NO_2 concentration was 4.87 µg/m³. There were no exceedances of the NO_2 NAAQS of 200 µg/m³ during the 2021 monitoring period. The intermittent gaps in the data occurred due to power outages and instrument failure.

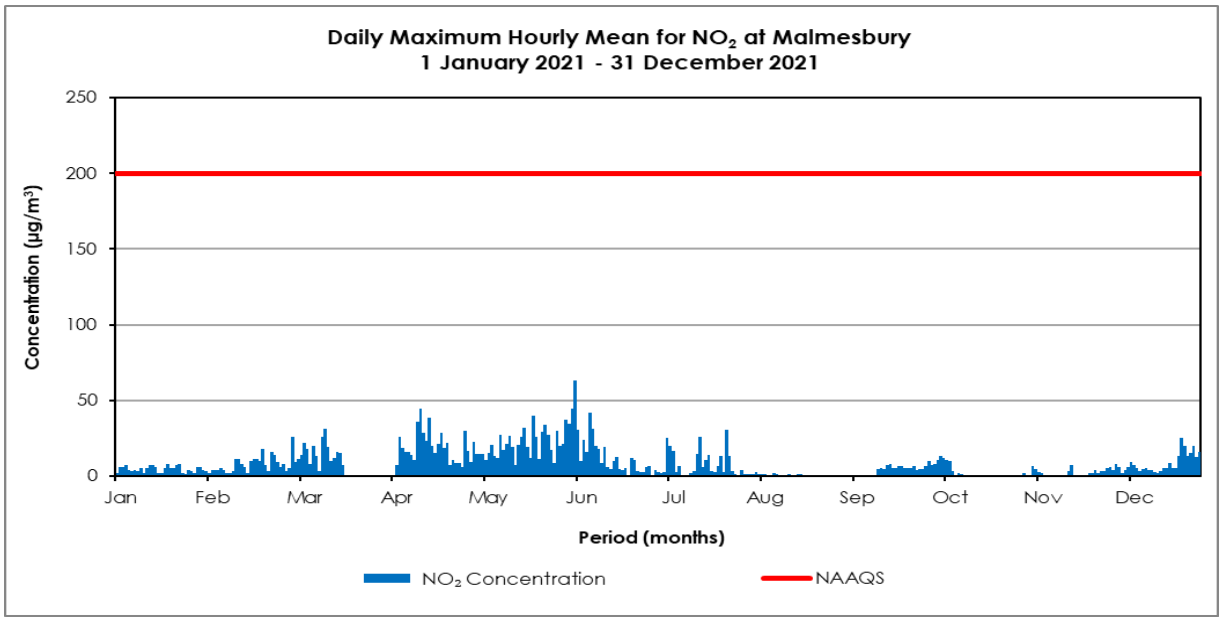


Figure 3-9: Daily maximum NO_2 hourly mean at Malmesbury (2021)

Long term air quality data for Malmesbury

The long term Malmesbury CO time series shows a steady average concentration below 2 mg/m³ over the past 11 years of air quality monitoring at the Malmesbury station (Figure 3-10).

The long term Malmesbury NO_2 time series shows a steady average concentration of less than 10 µg/m³ over the past 11 years of air quality monitoring at the Malmesbury station Figure 3-11).

The long term Malmesbury O_3 time series shows a steady decline from an average concentration of approximately 45 µg/m³ to below 30 µg/m³ over the past 11 years of air quality monitoring at the Malmesbury station (Figure 3-12). There is a discernible seasonal cycle for O_3 concentrations with a downward trend at the Malmesbury monitoring station.

The long term Malmesbury SO_2 time series shows a steady average concentration of approximately 5 µg/m³ over the past 11 years of air quality monitoring at the Malmesbury station (Figure 3-13).

The long term PM_{10} concentrations measured at the Malmesbury ambient air quality monitoring station, as shown in Figure 3-14 shows a steady upward trend until recently. As of 1 January 2015, the NAAQS for PM_{10} was reduced from a daily average concentration of 120 µg/m³ to a daily average concentration of 75 µg/m³.

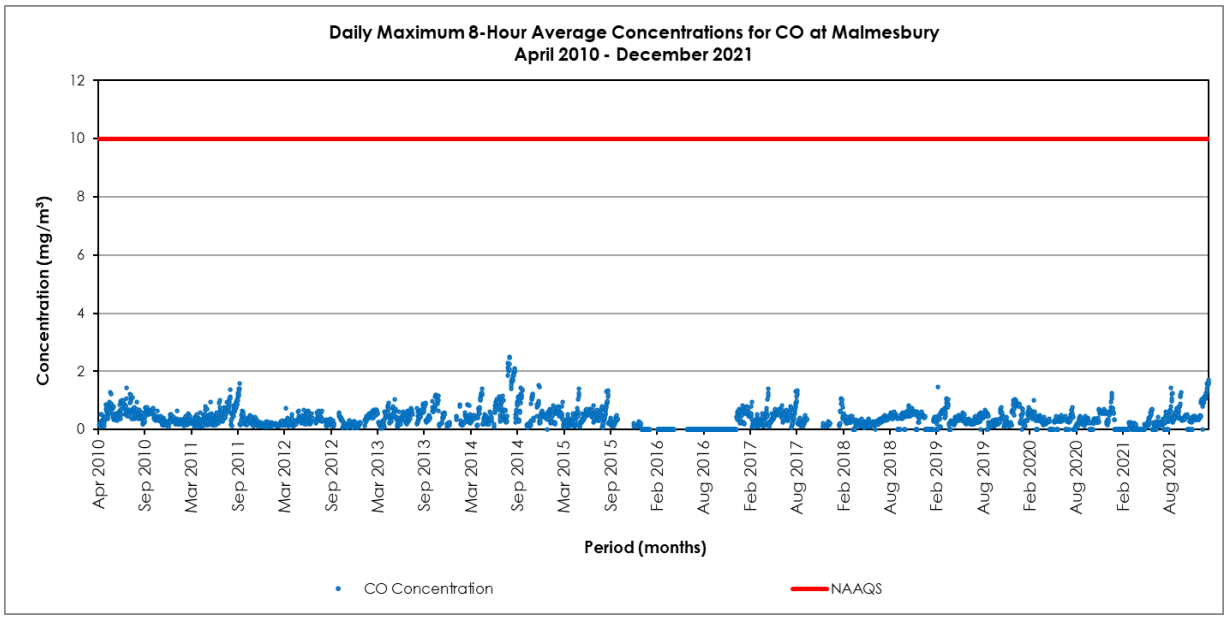


Figure 3-10: Long term CO trend at Malmesbury (Apr 2010 – Dec 2021)

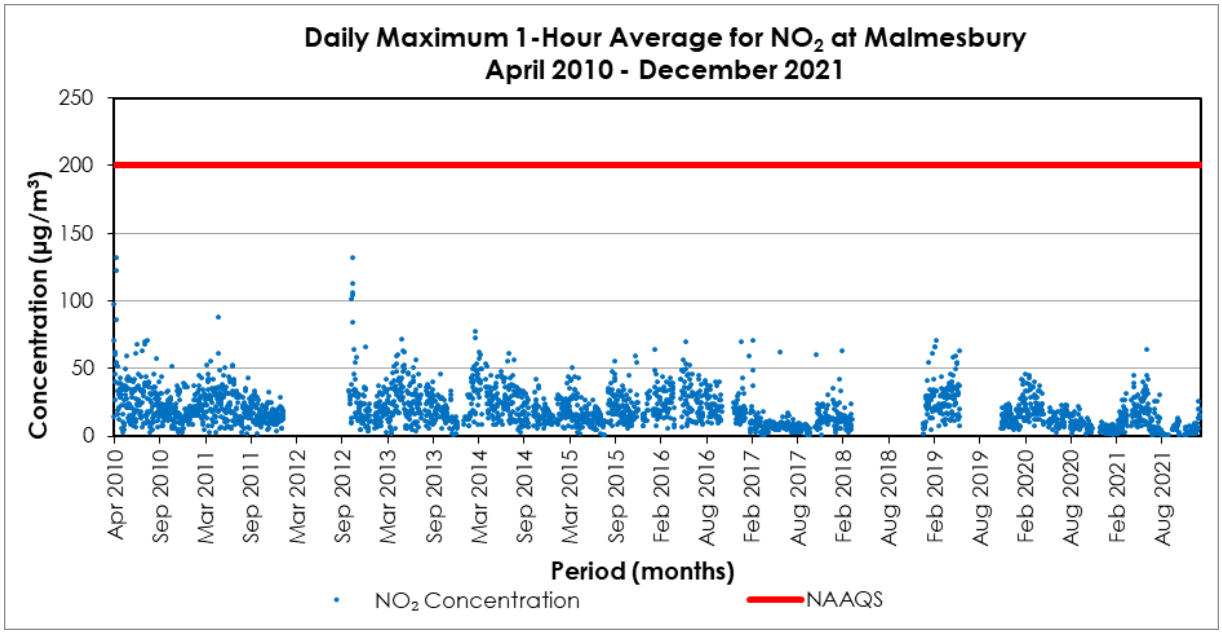


Figure 3-11: Long term NO_2 trend at Malmesbury (Apr 2010 – Dec 2021)

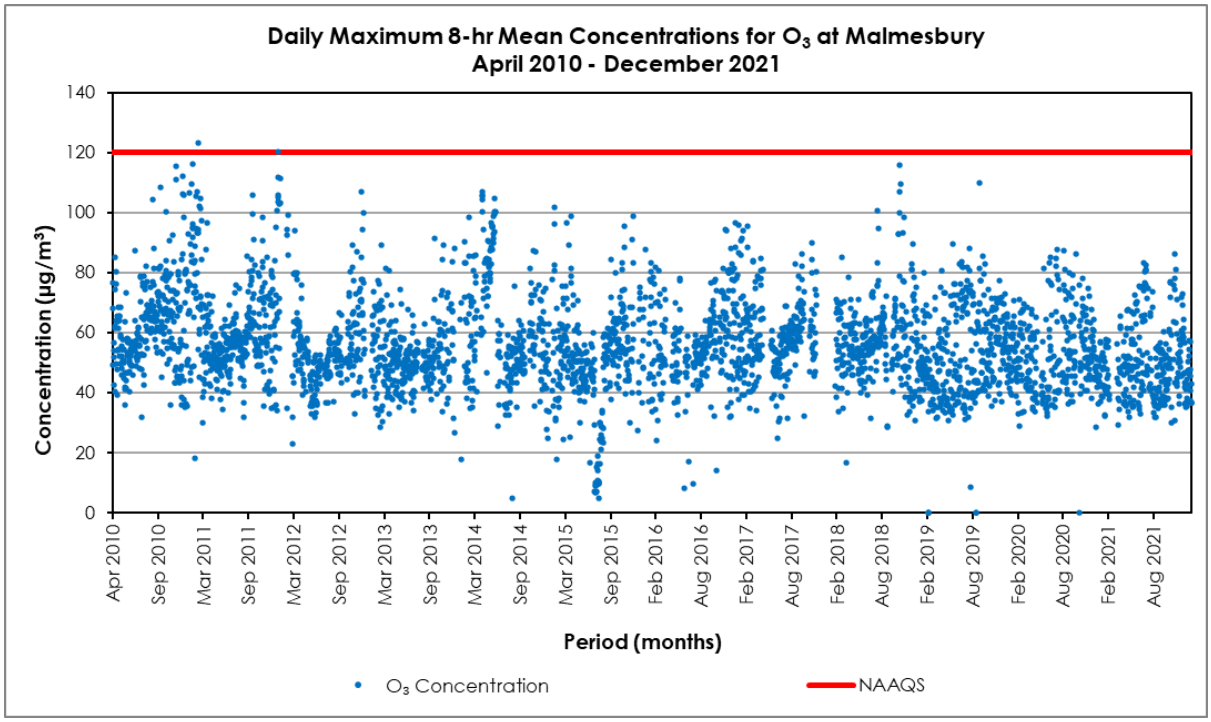


Figure 3-12: Long term O_3 trend at Malmesbury (Apr 2010 – Dec 2021)

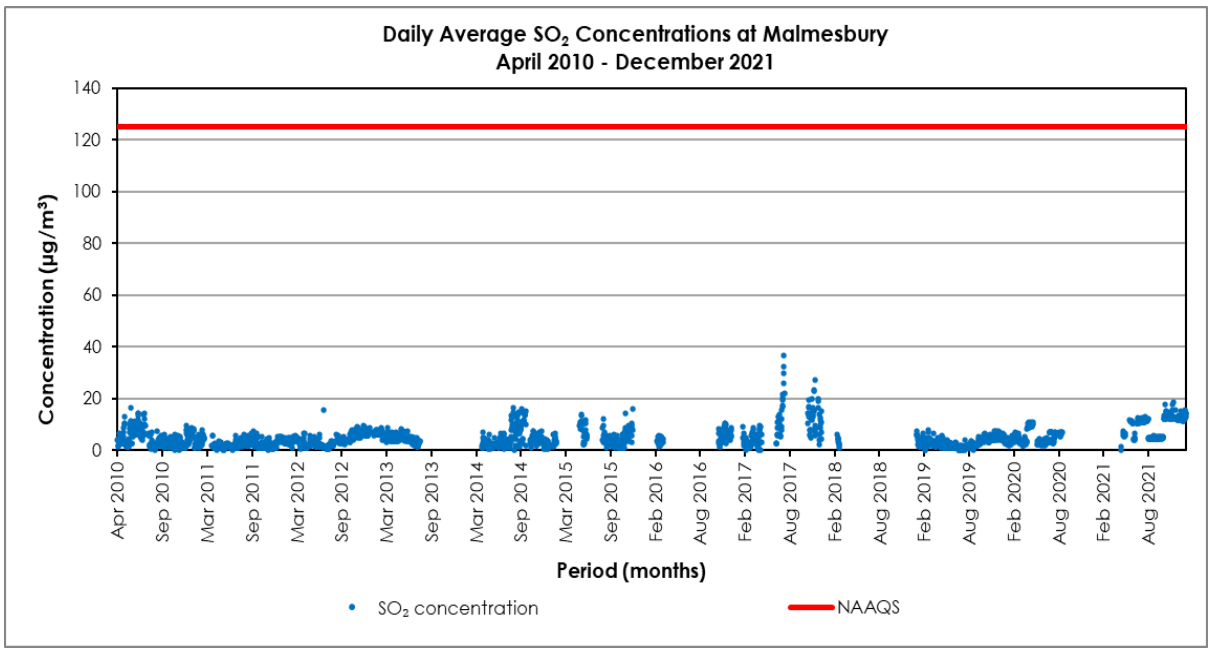


Figure 3-13: Long term SO_2 trend at Malmesbury (Apr 2010 – Dec 2021)

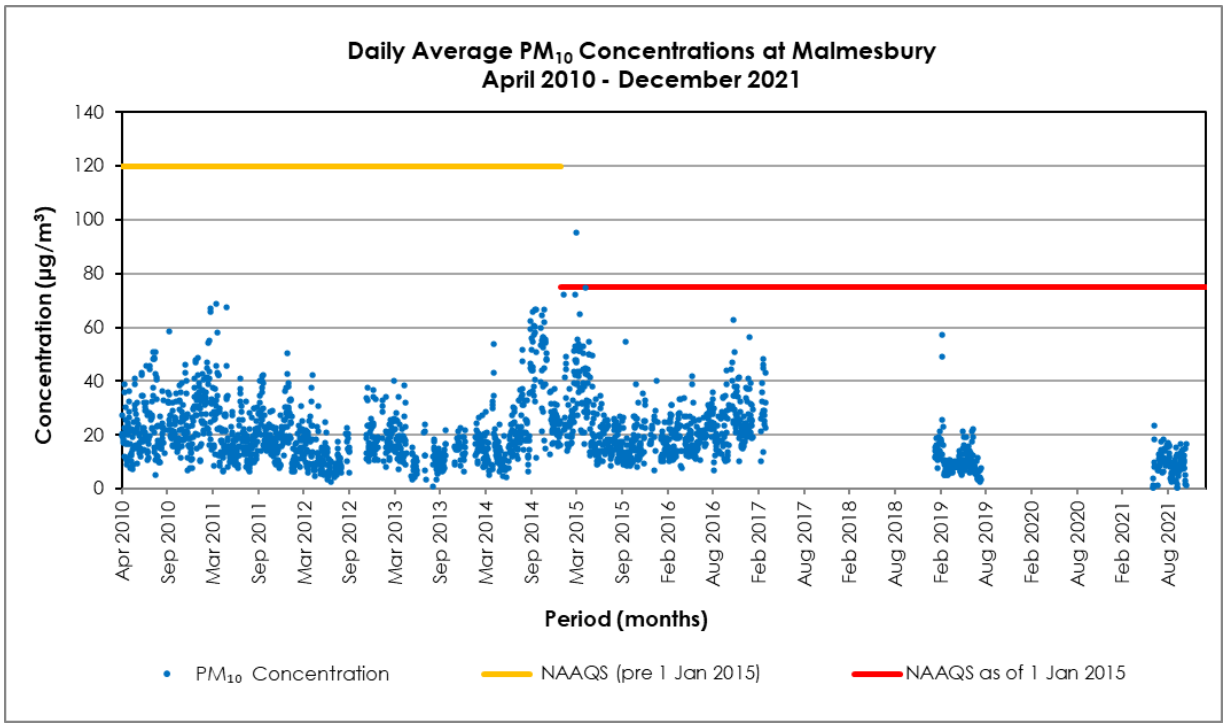


Figure 3-14: Long term PM_{10} trend at Malmesbury (Apr 2010 – Dec 2021)

3.2.2 Garden Route District Municipality

3.2.2.1 George (George Municipality)

The George ambient air quality monitoring station was commissioned at Conville Municipal swimming pool in July 2010. The monitoring station is located in a residential area and surrounded by industries in the west, central business district at about 1.5 km north-west, an adjacent congested main road, the national roads N2 and N9 located in the south and north, respectively, of the monitoring station (Figure 3-15).

Table 3-6 shows data capture percentage of air pollutants monitored at the George air quality monitoring station during 2021. The George monitoring station forms part of the National DFFE NAQI project from October 2018.

Figure 3-15: Aerial image of George ambient air quality monitoring location

TABLE 3-6: GEORGE DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	98
Ozone (O_3)	98
Nitrogen Dioxide (NO_2)	92
Sulphur Dioxide (SO_2)	96
Particulates (PM_{10})	98

- **Carbon Monoxide (CO)**

Daily maximum 8-hour mean CO concentrations measured at the George ambient air quality monitoring station are shown in Figure 3-16**.** The CO concentrations were generally low during the 2021 monitoring period; however, elevated CO concentrations were observed during winter from May to July 2021. The CO (8–hour mean) NAAQS of 10 mg/m^3 calculated from hourly averages was not exceeded during the 2021 monitoring period. The 2021 annual average for CO concentrations was 0.88 mg/m^3.

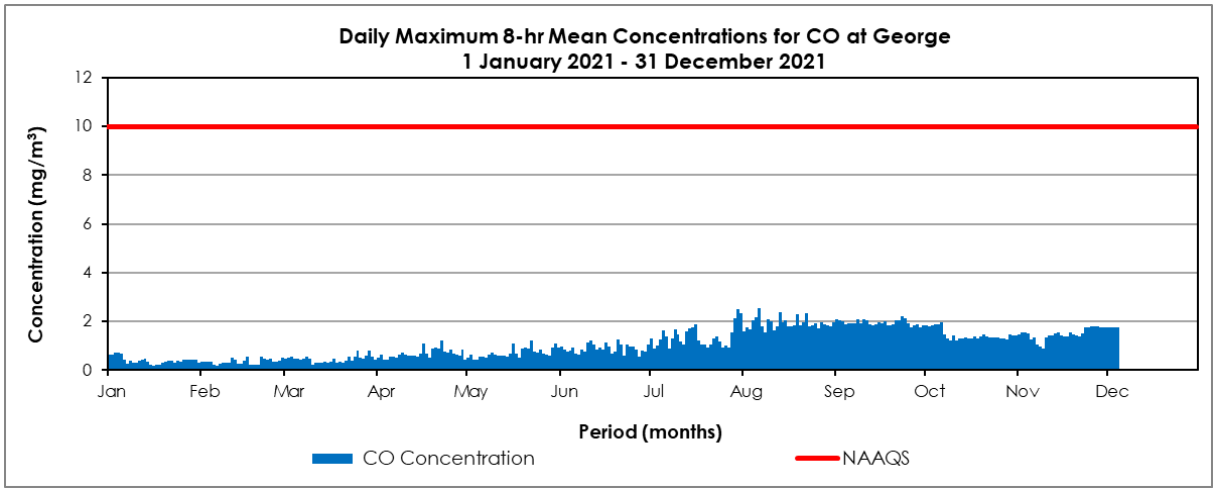


Figure 3-16: Daily maximum (8–hour mean) for CO at George (2021)

- **Ozone (O_3)**

Daily maximum 8-hour mean concentrations for O_3 measured at the George ambient air quality monitoring station are shown in Figure 3-17. The maximum rolling 8-hour average peak for O_3 concentrations recorded during this monitoring period was 102 µg/m³ during June 2021. The O_3 (8–hours, running) NAAQS of 120 µg/m³ was not exceeded and the annual average for O_3 concentrations was 38 µg/m³ during the 2021 monitoring period.

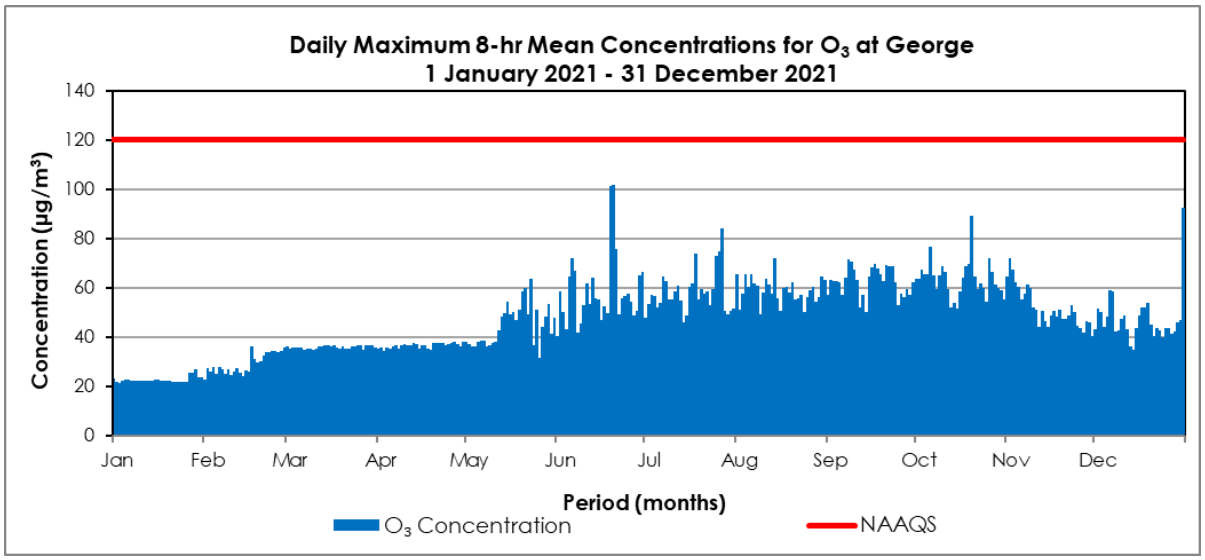


Figure 3-17: Daily maximum O_3 (8–hour mean) at George (2021)

- **Nitrogen Dioxide (NO_2)**

Daily maximum hourly averages for NO_2 concentrations measured at the George ambient air quality monitoring station are shown in Figure 3-18. The NO_2 (1-hour) NAAQS of 200 µg/m³ was not exceeded during the monitoring period. A discernible seasonal pattern of NO_2 concentrations was observed during the monitoring period, with NO_2 concentrations peaking in winter and dropping in summer. The seasonal cycle is probably a result of the reduced winter daylight hours and intensity, with sunlight being the primary driver which converts nitrogen dioxide to the secondary pollutant, ozone. The annual average for NO_2 was 8 µg/m³ during the 2021 monitoring period.

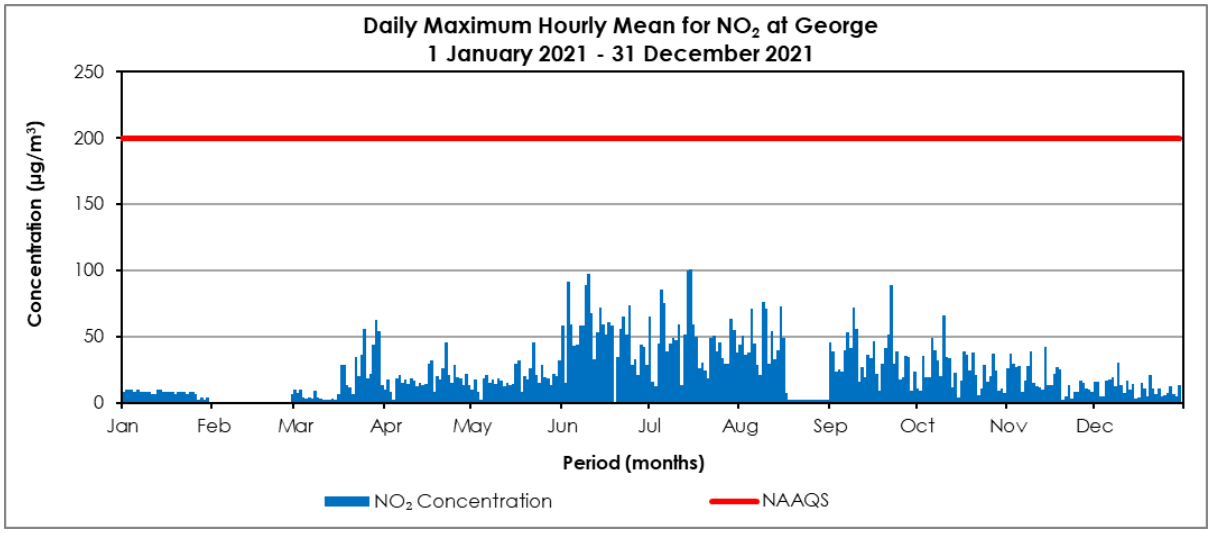


Figure 3-18: Daily maximum (1–hour mean) for NO_2 at George (2021)

- **Particulate Matter (PM_{10})**

Daily mean PM_{10} concentrations measured at the George ambient air quality monitoring station are shown in Figure 3-19. The maximum daily mean for PM_{10} concentrations recorded during the 2021 monitoring period was 74 µg/m³ during October 2021. The annual average was 25.7 µg/m³ during the 2021 monitoring period. No exceedance of both the PM_{10} 24-hourly and annual NAAQS reported from the George monitoring station for 2021.

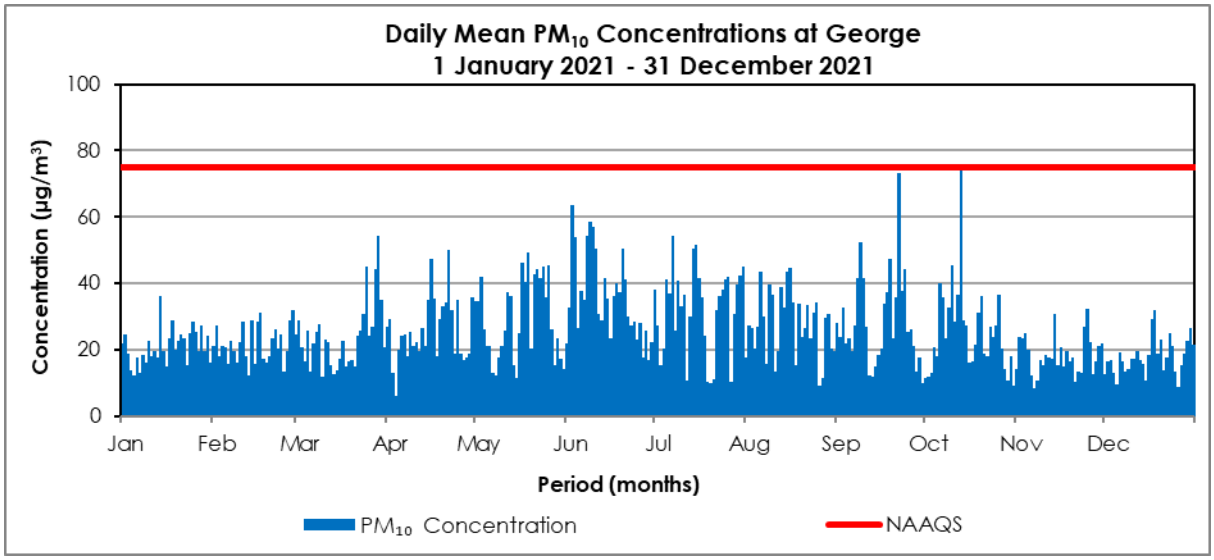


Figure 3-19: Daily mean PM_{10} concentrations at George (2021)

- **Sulphur Dioxide (SO_2)**

The SO_2 concentrations measured at the George ambient air quality monitoring station are presented in Figure 3-20. The SO_2 NAAQS of 125 µg/m³ was not exceeded during the monitoring period and remained well below the NAAQS. The highest recorded value of 90 µg/m³ was recorded during January 2021.

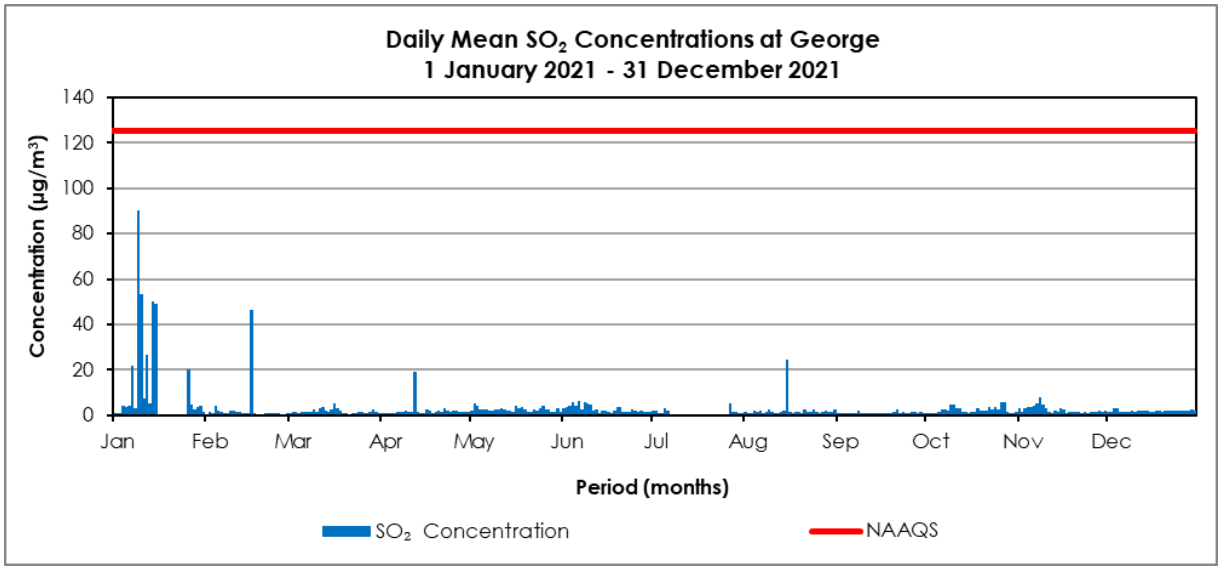


Figure 3-20: Daily mean SO_2 concentrations at George (2021)

- **Long Term Air Quality Trends for George**

Overall, all air pollutants measured at the George ambient air quality monitoring station were below the NAAQS, except for the daily mean PM_{10} NAAQS of 75 µg/m³ exceedance, as shown in Figure 3-25.

The long-term CO concentrations measured at the George monitoring station shows a seasonal pattern with CO concentrations peaking in winter and dropping in summer. Nevertheless, CO concentrations are below the NAAQS of 10 mg/m³.

The long term O_3 concentrations measured at the George monitoring station shows a downward trend, with the highest annual average of 41 µg/m³ observed in 2017. During the 2021 monitoring period, the observed O_3 levels were lower, with an annual average of 38 µg/m³ and the highest recorded value of 102 µg/m³. There is a discernible annual cycle for O_3 concentrations at the George monitoring station, with the highest O_3 concentrations in September and lowest in December. It is usually expected for O_3 concentration levels to be lower in colder months due to lower solar radiation levels. However, in this scenario, the O_3 levels peak in May, June, and July, which are colder months. This phenomenon is likely induced by meteorological conditions associated with anticyclones and the presence of temperature inversions during the winter season.

The long term NO_2 concentrations measured at the George ambient air quality monitoring station shows a downward trend, as opposed to the O_3 long term trend. It appears that during the winter season, NO_2 concentrations tend to increase and decrease in the summer season. This seasonal pattern concurs that meteorological conditions influence the dispersion of air pollutants in the atmosphere. During the winter season, the George area is characterised by a persistent high-pressure system, which brings temperature inversions; hence, there is likely less dispersion of air pollutants in the atmosphere which results in elevated NO_2 concentrations.

The George ambient air quality monitoring station is classified as a roadside or traffic monitoring station with ground-level ozone being measured at this location. The comparison of O_3

levels and NO_2 levels shows a converse pattern due to photochemical reactions between the Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NOx) in the presence of sunlight.

The annual average SO_2 concentrations during 2021 was 2.4 µg/m^3 and as a result the long term SO_2 concentrations measured at the George ambient air quality monitoring station are significantly below the NAAQS.

The long term PM_{10} concentrations measured at the George ambient air quality monitoring station, as shown in Figure 3-25 shows a steady upward trend. As of 1 January 2015, the NAAQS for PM_{10} has become more stringent from daily average of 120 µg/m^3 to daily average of 75 µg/m^3. However, there were no exceedances of PM_{10} in 2021.

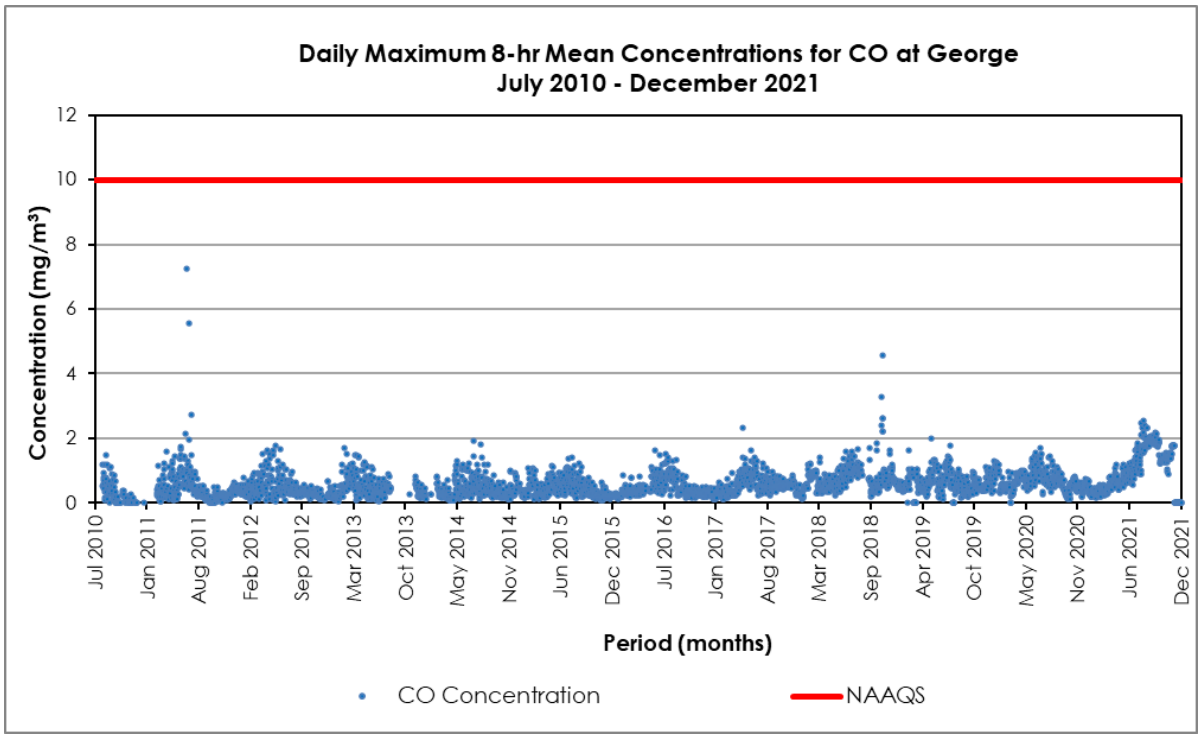


Figure 3-21: Long term CO trend at George (Jul 2010 – Dec 2021)

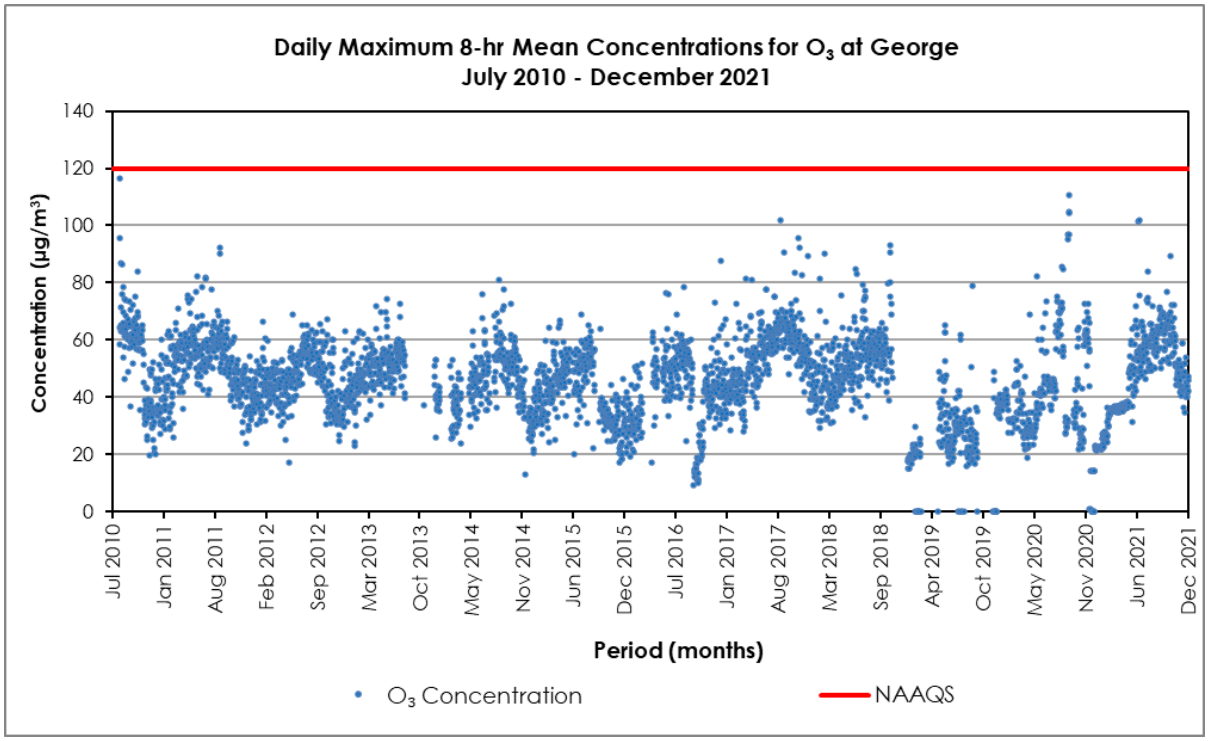


Figure 3-22: Long term O_3 trend at George (Jul 2010 – Dec 2021)

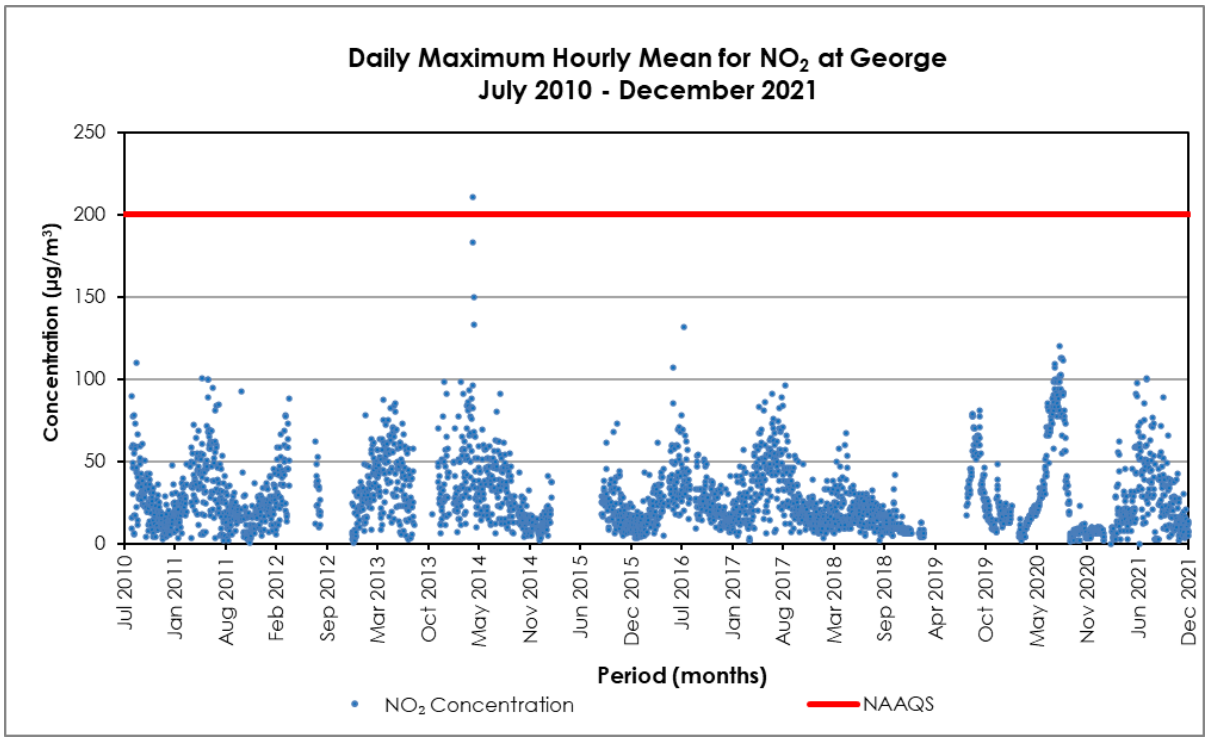


Figure 3-23: Long term NO_2 trend at George (Jul 2010 – Dec 2021)

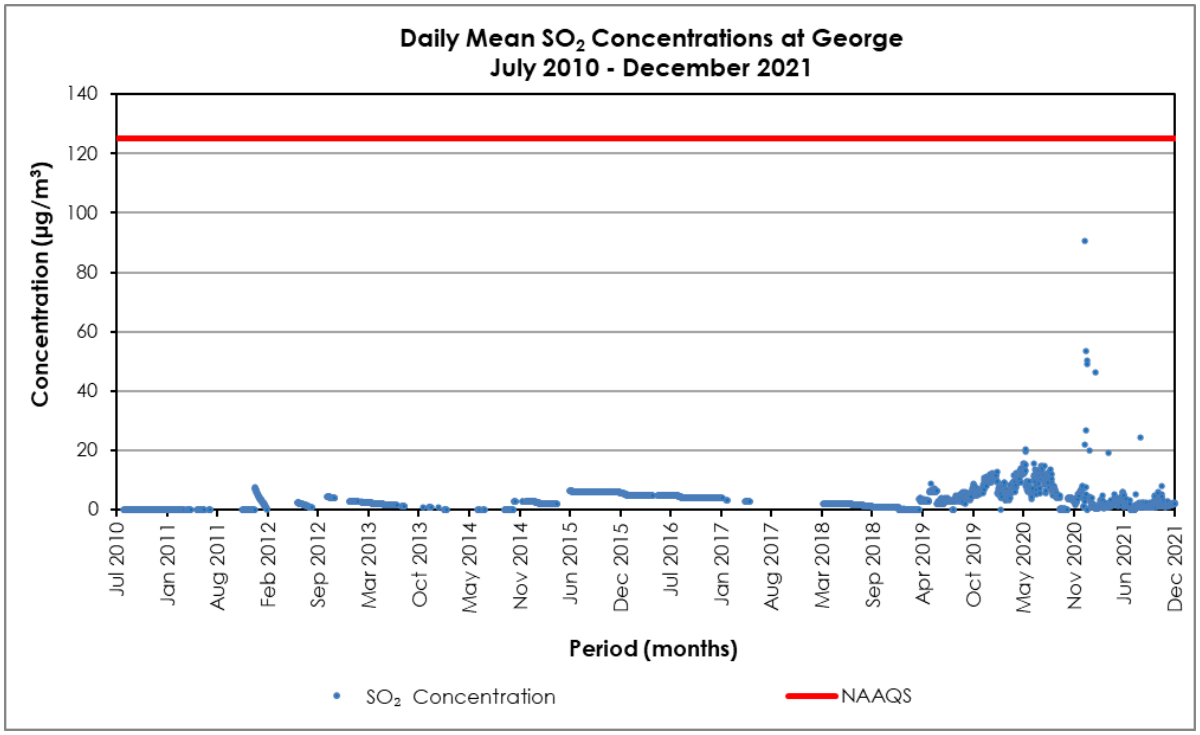


Figure 3-24: Long term SO_2 trend at George (Jul 2010 – Dec 2021)

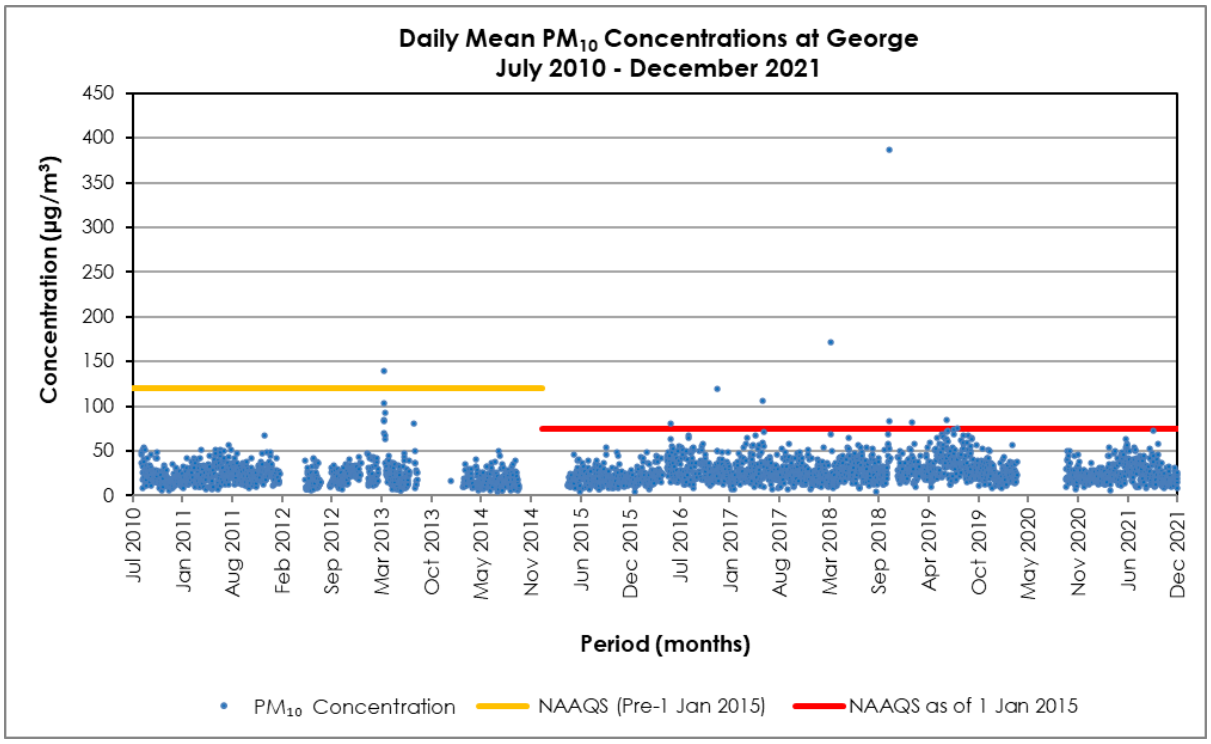
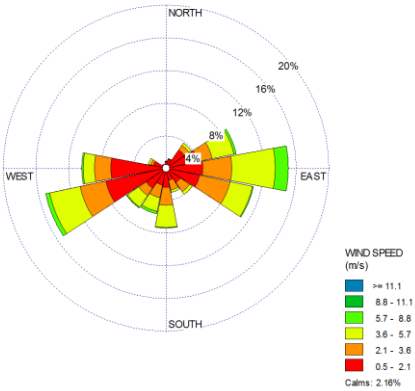


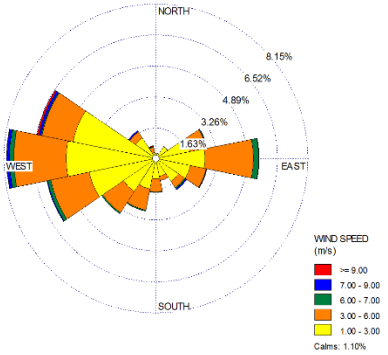
Figure 3-25: Long term PM_{10} trend at George (Jul 2010 – Dec 2021)

During 2021 the wind blew from the west at approximately 8 % of the time at the George ambient air quality monitoring station. The prevailing winds are predominantly westerly and southerly from light to moderate breeze blowing at an average speed of 1 m/s to above 6 m/s. Wind were generally calm at approximately 36 %. Overall, the meteorological conditions for the 2016 – 2021 period were characterised by light to moderate westerly winds.

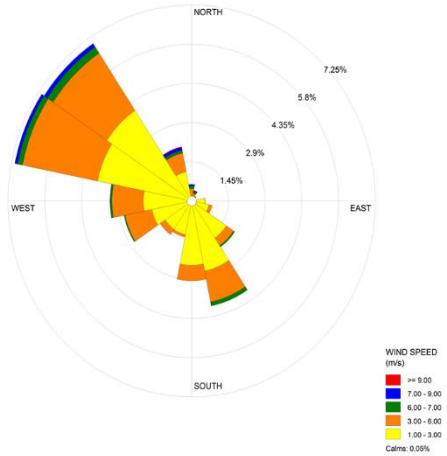
2016



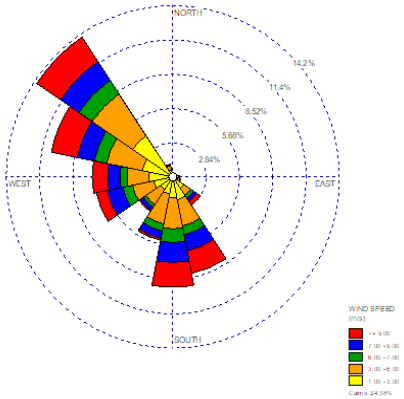
2017



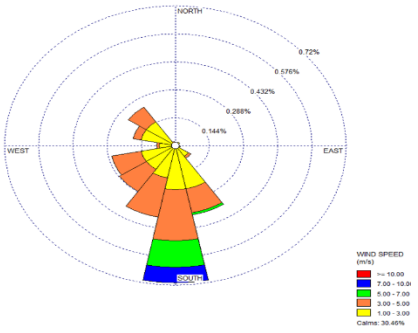
2018



2019



2020



2021

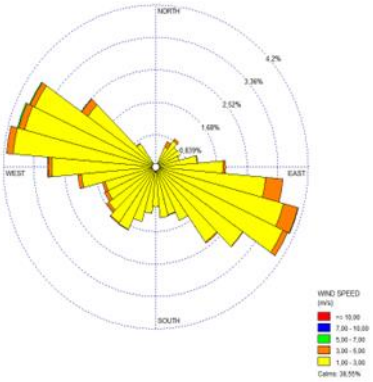


Figure 3-26: Annual wind rose for George (2016 - 2021)

3.2.2.2 Mossel Bay (Mossel Bay Municipality)

The Mossel Bay ambient air quality monitoring station was commissioned in November 2011 at the Dana Bay Reservoir. Due to recurrent theft and vandalism incidents the monitoring station was relocated to the Garden Route District Municipality offices at Boplaas in Mossel Bay during November 2016. The relocation of the monitoring station was within a 5 kilometer radius and was considered to effectively be measuring from the same air pollution sources. The present location of the ambient air quality monitoring station is in a residential area, 5 km east of the major refinery plant and adjacent to the N2 and R102 roads (Figure 3-27). Table 3-7 shows the data capture percentage at the Mossel Bay ambient air quality monitoring station during 2021. The location of this station is being reviewed.

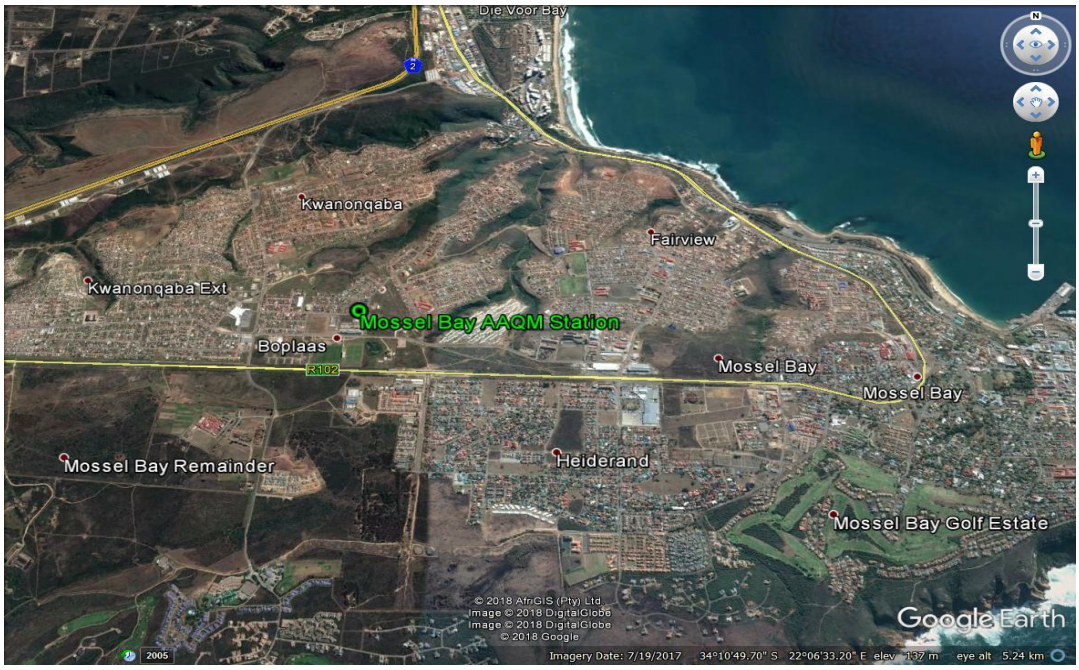


Figure 3-27: Aerial image of Mossel Bay Ambient Air Quality Monitoring location

TABLE 3-7: MOSSEL BAY DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Hydrogen Sulphide (H_2S)	90

- **Hydrogen Sulphide (H_2S)**

Daily maximum hourly mean H_2S concentrations measured at the Mossel Bay ambient air quality monitoring station is shown in Figure 3-28. This report uses the World Health Organization (WHO) Guideline for H_2S (24-hour average) health threshold of 150 µg/m^3. The calculated annual average for H_2S was 0.9 µg/m^3 during the 2021 monitoring period, and therefore well below the WHO Guideline of 150 µg/m^3.

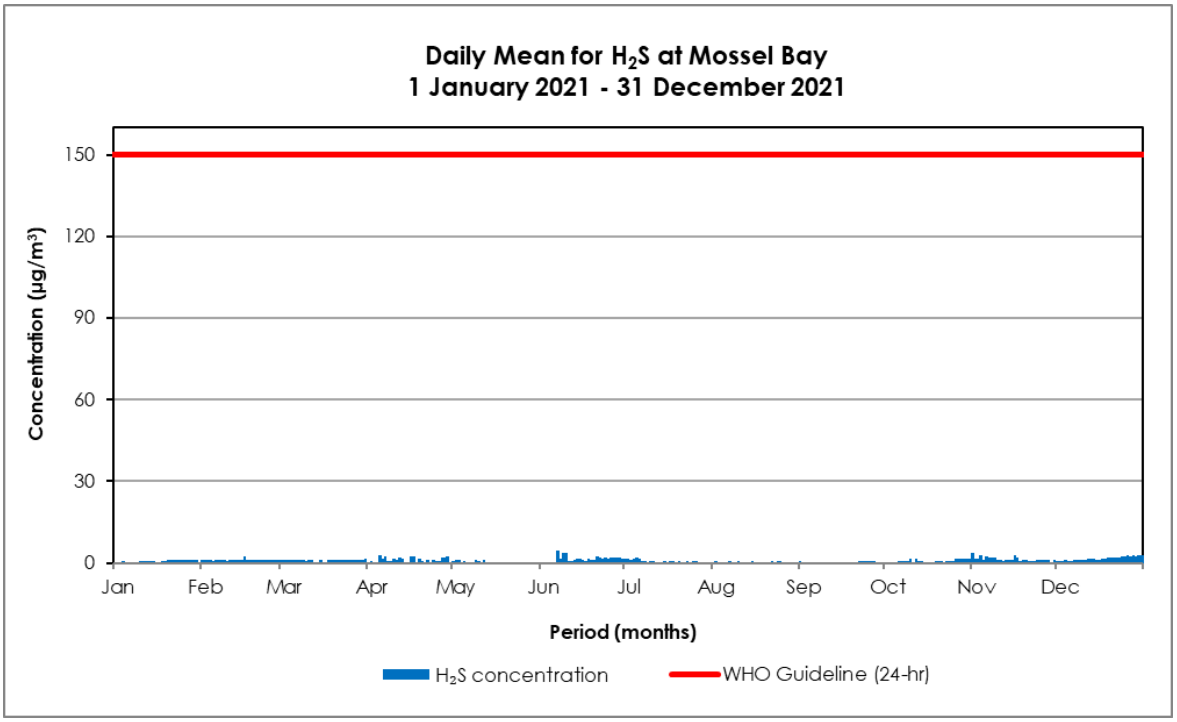


Figure 3-28: Daily maximum (1–hour mean) for H_2S at Mossel Bay (2021)

- **Long Term Air Quality Trends for Mossel Bay**

The long term H_2S concentrations measured at the Mossel Bay ambient air quality monitoring station is shown in Figure 3-29. There is little inference to be drawn with the interpretation of the long term H_2S trend since the monitoring station experienced vandalism resulting in less data recovery in the previous location at Dana Bay Reservoir (2011 – 2016). However, in 2018 at the new location in Mossel Bay, the monitoring station data capture percentage improved significantly. A seasonal pattern may be observed whereby H_2S concentrations increased in winter and decreased in summer. In 2021, the calculated annual average for H_2S was 0.9 µg/m^3, and therefore well below the WHO Guideline of 150 µg/m^3.

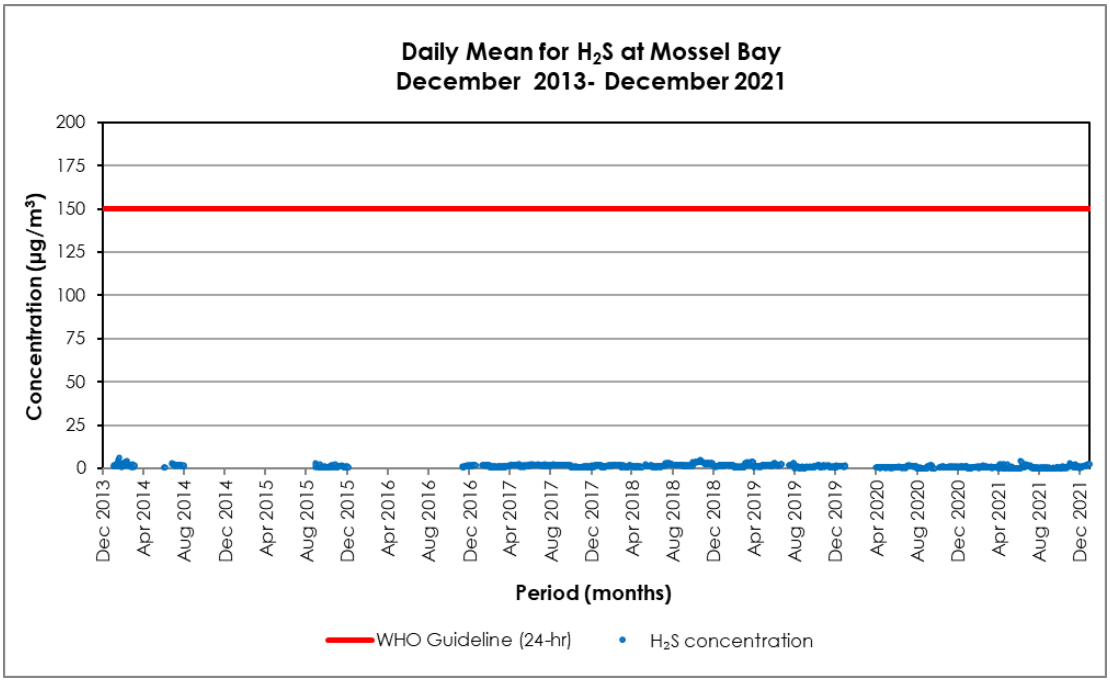
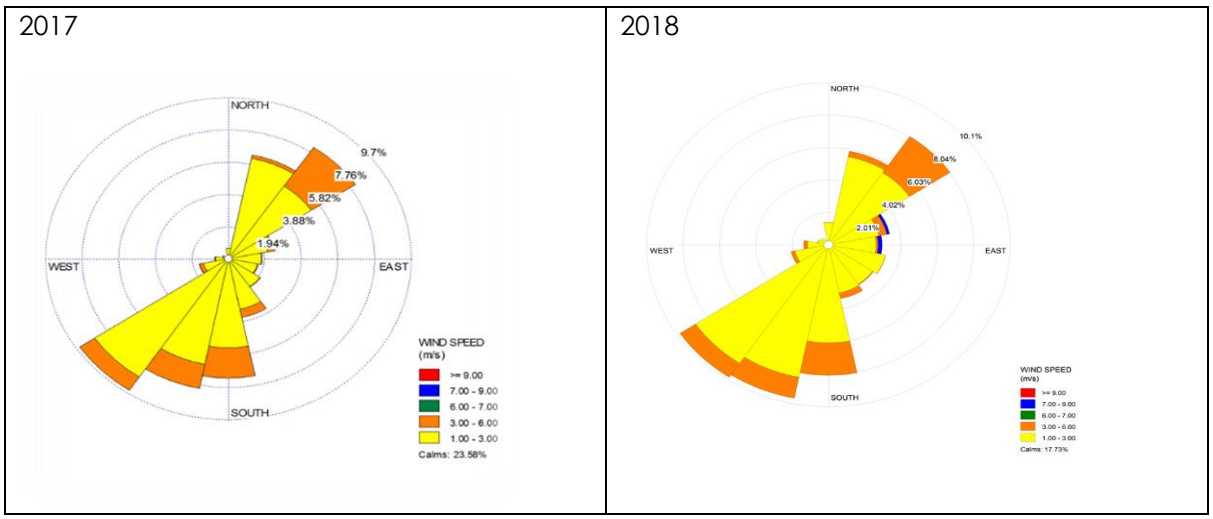


Figure 3-29: Mossel Bay long term H_2S trend (Dec 2013 – Dec 2021)

On average, winds were predominantly from the south-westerly and north-easterly directions approximately 9.7 % of the time at Mossel Bay ambient air quality monitoring station. Fresh onshore breeze from calm to moderate are predominantly from the south-westerly and north-easterly directions, blowing at an average wind speed of 1 m/s to 6 m/s and winds are generally calm at approximately 17.73 % of the time (Figure 3-30). There is no wind rose for 2016 due to vandalism that occurred at the station during that period. There is no wind rose available for 2021.



2019 2020

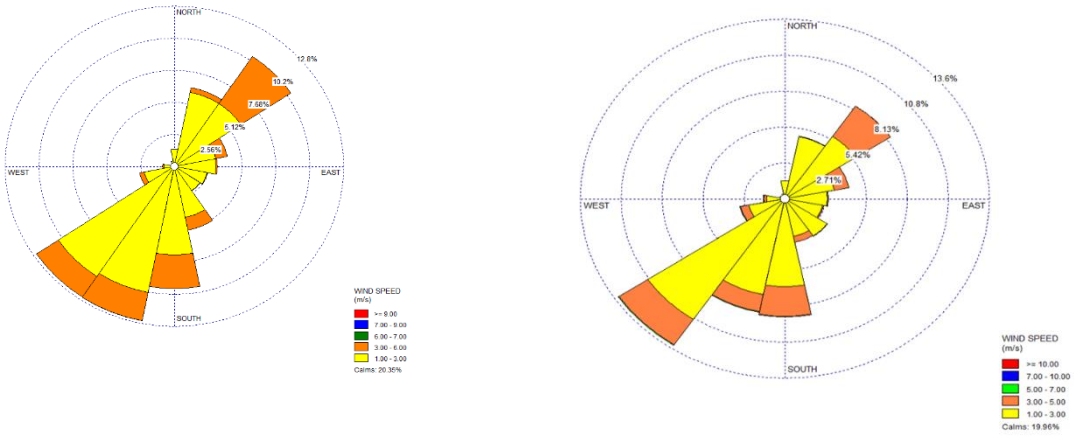


Figure 3-30: Annual wind rose for Mossel Bay (2017 – 2020)

3.2.2.3 Oudtshoorn (Oudtshoorn Municipality)

The Oudtshoorn ambient air monitoring station was commissioned at the Bongolethu Clinic in April 2011. It is located in the heart of a residential area, within a close proximity of an abattoir, tannery and municipal sewerage treatment facility (Figure 3-31).

Table 3-8 shows the 2021 data capture for air pollutants measured at the Oudtshoorn monitoring station. In South Africa there are no specific NAAQS for H_2S. This report uses the WHO Guideline for H_2S analysis at the Oudtshoorn monitoring station. The WHO suggests H_2S 24-hour average health threshold of 150 µg/m^3 as published in the WHO Air Quality Guidelines for Europe – 2nd edition (WHO, 2000).

Figure 3-31: Aerial image of Oudtshoorn ambient air quality monitoring location

TABLE 3-8: OUDTSHOORN DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Hydrogen Sulphide (H_2S)	90
Carbon Dioxide (CO_2)	88

- **Hydrogen Sulphide (H_2S)**

Daily maximum hourly averages of H_2S concentrations measured at the Oudtshoorn ambient air quality monitoring station is characterised by seasonal trends. The maximum daily mean for H_2S with a value of 15 µg/m^3 was recorded in October 2021 (Figure 3-32). The WHO Guideline of 150 µg/m^3 was not exceeded during the monitoring period. The annual average for H_2S was 2.7 µg/m^3 during the 2021 monitoring period.

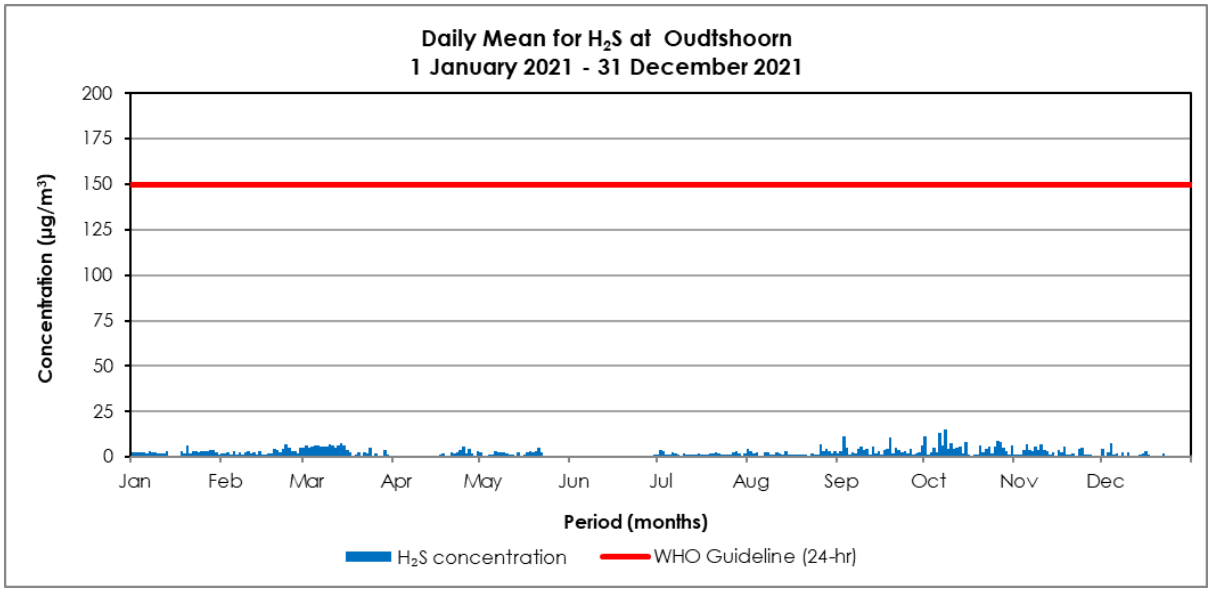


Figure 3-32: Daily maximum (1–hour mean) for H_2S at Oudtshoorn (2021)

- **Long term air quality trends for Oudtshoorn**

The long term H_2S concentrations measured at the Oudtshoorn ambient air quality monitoring station is shown in Figure 3-33. From the results observed, it can be inferred that there is no discernible seasonable pattern of a H_2S long term trend at the Oudtshoorn ambient air quality monitoring station.

The long-term CO_2 concentrations measured at the Oudtshoorn ambient air quality monitoring station is shown in Figure 3-34. The CO_2 long term trend measured at the Oudtshoorn monitoring station is characterised by intermittent data gaps, making it difficult to make inferences on CO_2 long term trends. However, from November 2019 an upward trend can be observed.

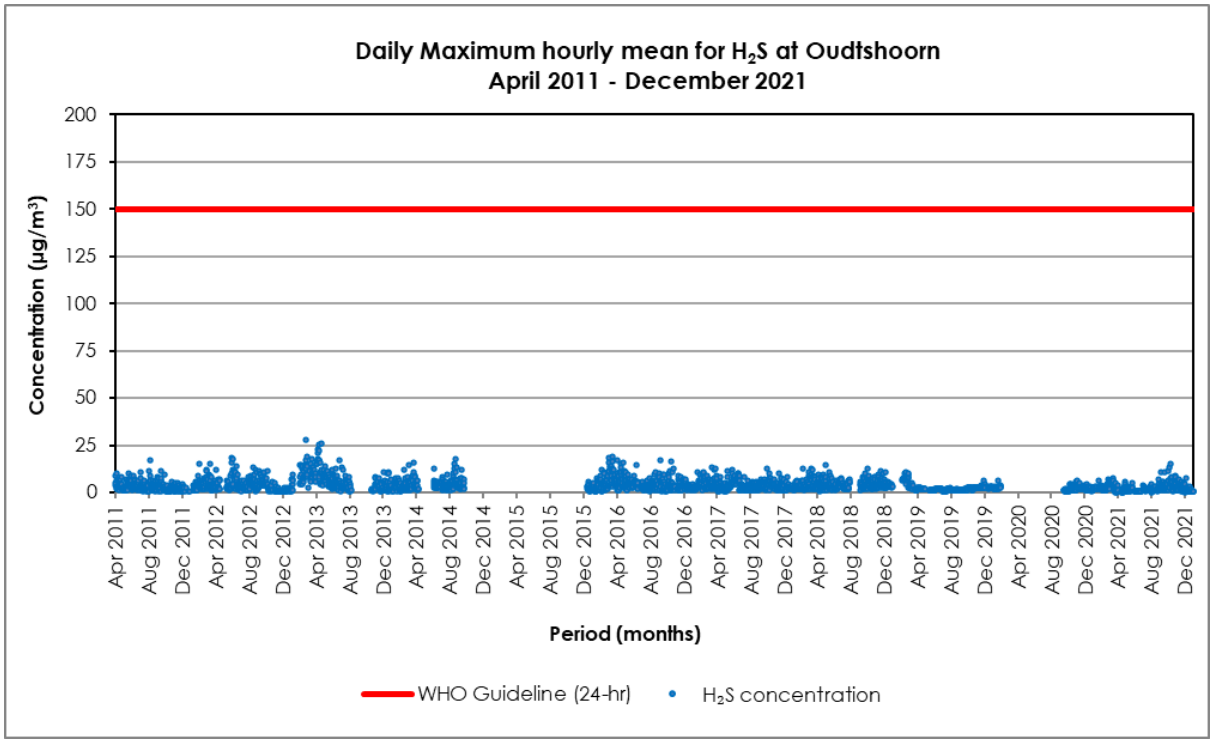


Figure 3-33: Long term H_2S trend at Oudtshoorn (Apr 2011 – Dec 2021)

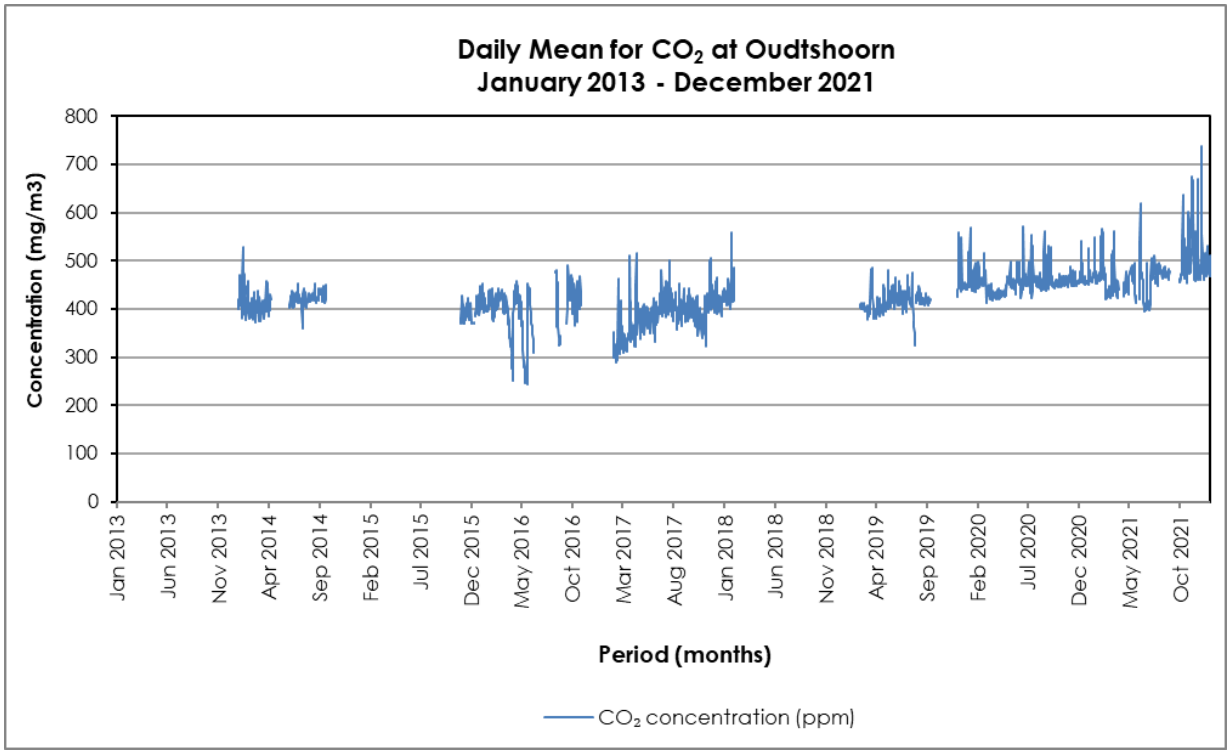


Figure 3-34: Long term CO_2 trend at Oudtshoorn (Jan 2013 – Dec 2021)

The wind blows from the south-east at approximately 7.25 % of the time at the Oudtshoorn ambient air quality monitoring station during 2017 – 2021 (Figure 3-35). The prevailing winds are predominantly from the south-west, north-west and south-east and blows at average wind

speeds of 1 m/s to 6 m/s. The meteorological data for 2016 and 2021 is not reported due to low data capture induced by faulty meteorological sensors at the Oudtshoorn monitoring station during this monitoring period.

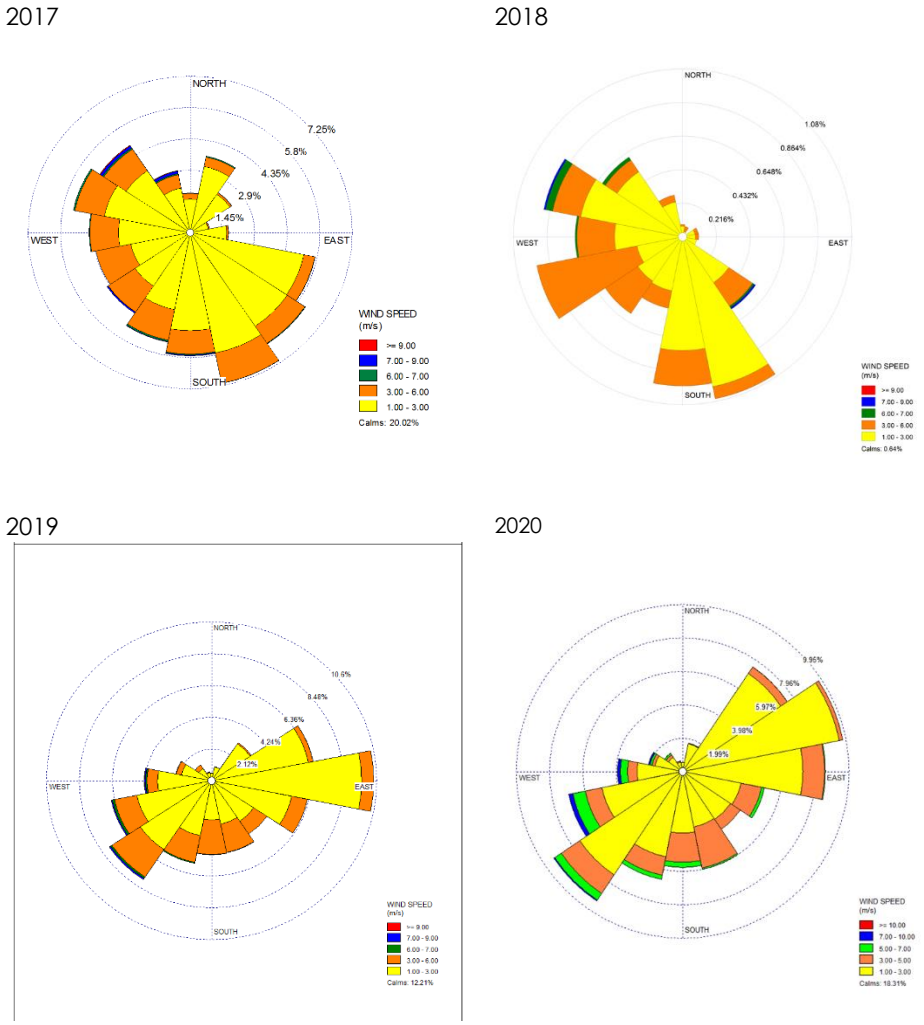


Figure 3-35: Annual wind rose for Oudtshoorn (2017 – 2020)

3.2.3 Cape Winelands District Municipality

3.2.3.1 Stellenbosch (Stellenbosch Municipality)

The Stellenbosch monitoring station, commissioned August 2011, is located at the Cape Winelands District Municipality (CWDM) offices on the corner of Bird and Langenhoven Street in Stellenbosch (Figure 3-36). Although located close to residential areas, the station is impacted by vehicle emissions due to it being located next to a major traffic artery into and out of Stellenbosch. The monitoring station is equipped to continuously monitor CO, O_3, NO_2, SO_2, PM_{10} and CO_2. Table 3-9 shows the percentage data capture for the air pollutants monitored at the Stellenbosch monitoring station during 2021. The loss in data capture is as a result of power and instrument failure.

Figure 3-36: Aerial image of Stellenbosch air quality monitoring station location

TABLE 3-9: STELLENBOSCH DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	<60
Ozone (O_3)	<60
Nitrogen Dioxide (NO_2)	62
Sulphur Dioxide (SO_2)	60
Particulates (PM_{10})	<60
Carbon Dioxide (CO_2)	<60

- **Sulphur Dioxide (SO_2)**

The SO_2 concentrations measured at the Stellenbosch ambient air quality monitoring station are presented in Figure 3-37. The highest recorded daily SO_2 mean of 15 µg/m^3 was recorded 26 May 2021. The SO_2 NAAQS of 125 µg/m^3 was not exceeded during the monitoring period and remained well below the NAAQS. Loss of data were due to power, instrument, and logger failures.

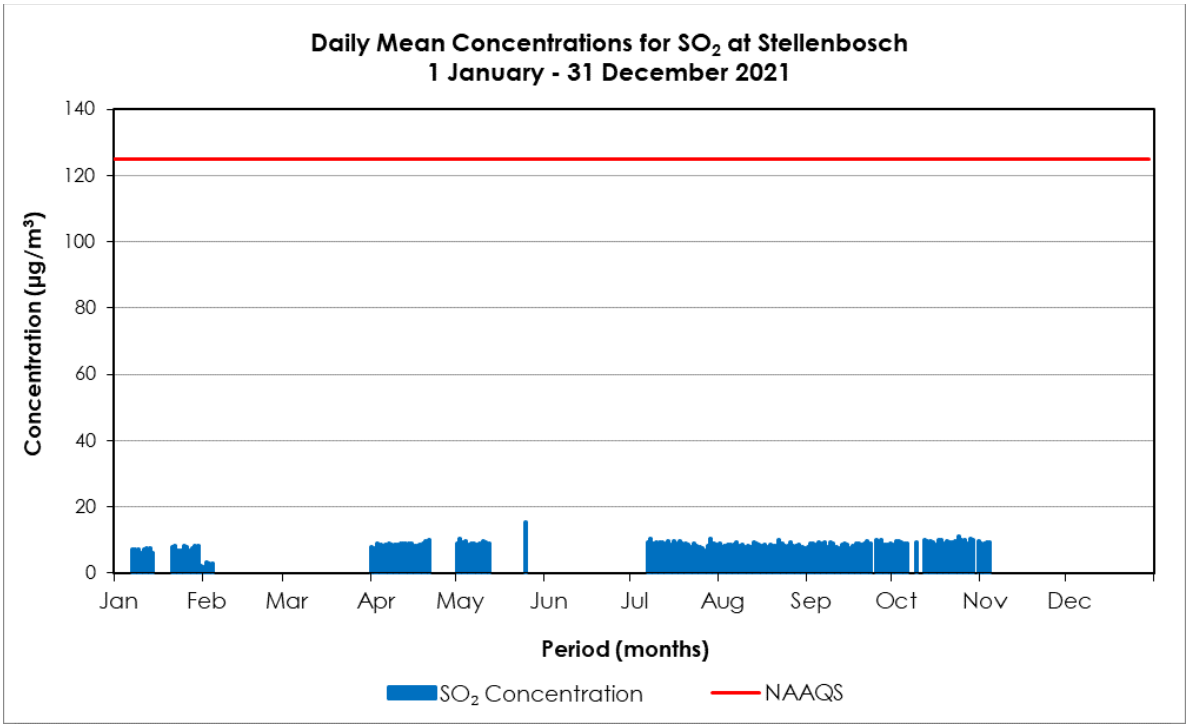


Figure 3-37: Daily mean SO_2 concentrations at Stellenbosch (2021)

- **Nitrogen Dioxide (NO_2)**

The NO_2 concentrations measured at Stellenbosch monitoring station are presented in Figure 3-38. The highest NO_2 level recorded during this period was 173 µg/m³ on 15 July 2021. There were no exceedances of the NO_2 (24 – hours) NAAQS of 200 µg/m³. Loss of data were due to power, instrument failures and logger failures.

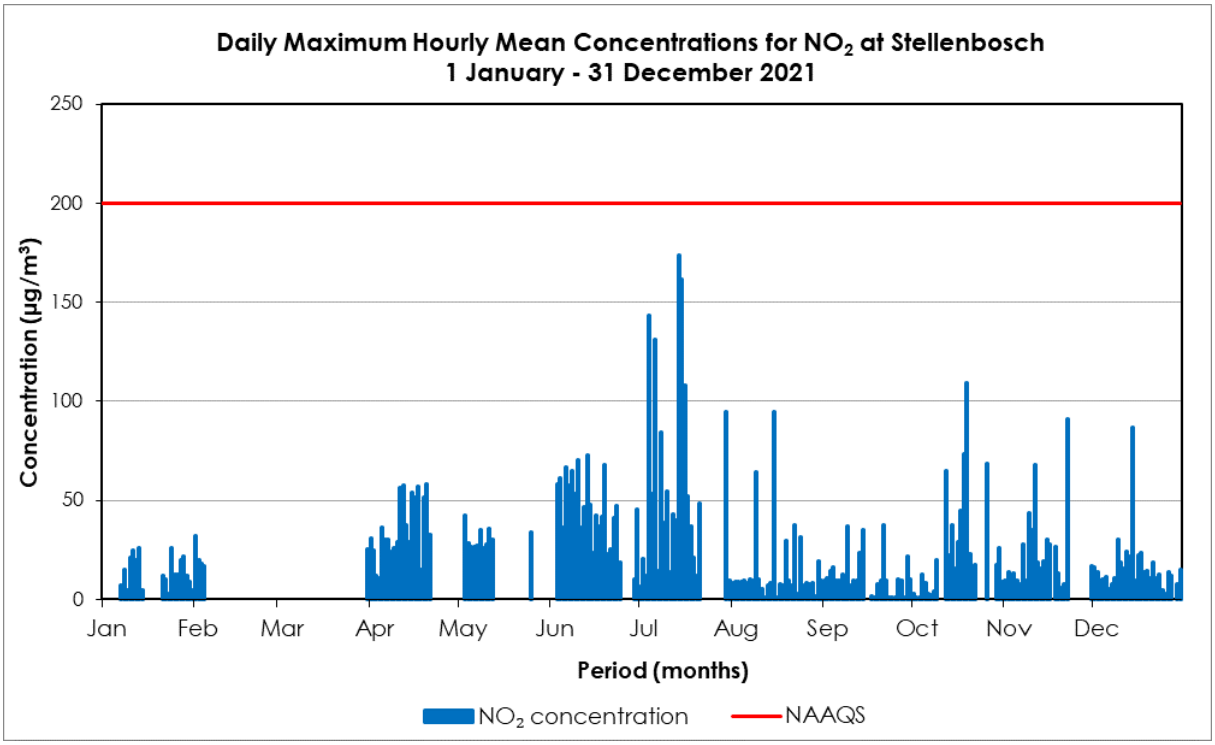


Figure 3-38: Daily mean NO_2 concentrations at Stellenbosch (2021)

Long Term Air Quality Trend for Stellenbosch

The long-term CO concentrations (Figure 3-39) (November 2011 – December 2021) shows an average concentration of approximate 0.5 mg/m^3 and remained below the 10 mg/m^3 NAAQS standard. There appears to be a seasonal cycle for CO, with lower values in the December – January period, and higher in the June – July period.

The long-term O_3 concentrations (Figure 3-40) (November 2011 – December 2021) shows an average concentration of approximate 47 µg/m^3 and remained below the 120 µg/m^3 NAAQS standard. Ozone is a secondary pollutant that is produced when VOC's and NOx gases react with each other in the presence of sunlight. It is evident that O_3 peaks are predominantly higher during the summer months and are primarily associated with the increased sunlight and warmer temperatures that result in the secondary pollutant production.

There appears to be a seasonal cycle for NO_2 (Figure 3-41), with lower values in the summer period (December - January), and higher in the winter period (June – July). For the period November 2011 – December 2021, NO_2 shows an average concentration of 9 µg/m^3 and remained below the 200 µg/m^3 NAAQS.

The long-term PM_{10} concentrations (Figure 3-42) (November 2011 – December 2021) shows an average concentration of approximate 19 µg/m^3 and remained below the 120 µg/m^3 NAAQS.

The long term SO_2 concentrations (Figure 3-43) (November 2011 – December 2021) shows and average concentration of 15.73 µg/m^3 and remained below the 125 µg/m^3 NAAQS.

The long-term CO_2 concentrations (Figure 3-44) (January 2019 – December 2021) shows an average concentration of approximate 450 µg/m^3.

Overall, the air pollutants monitored at the Stellenbosch ambient air quality monitoring station remained below the respective NAAQS, except on a few occasions as reported in the long-term trends.

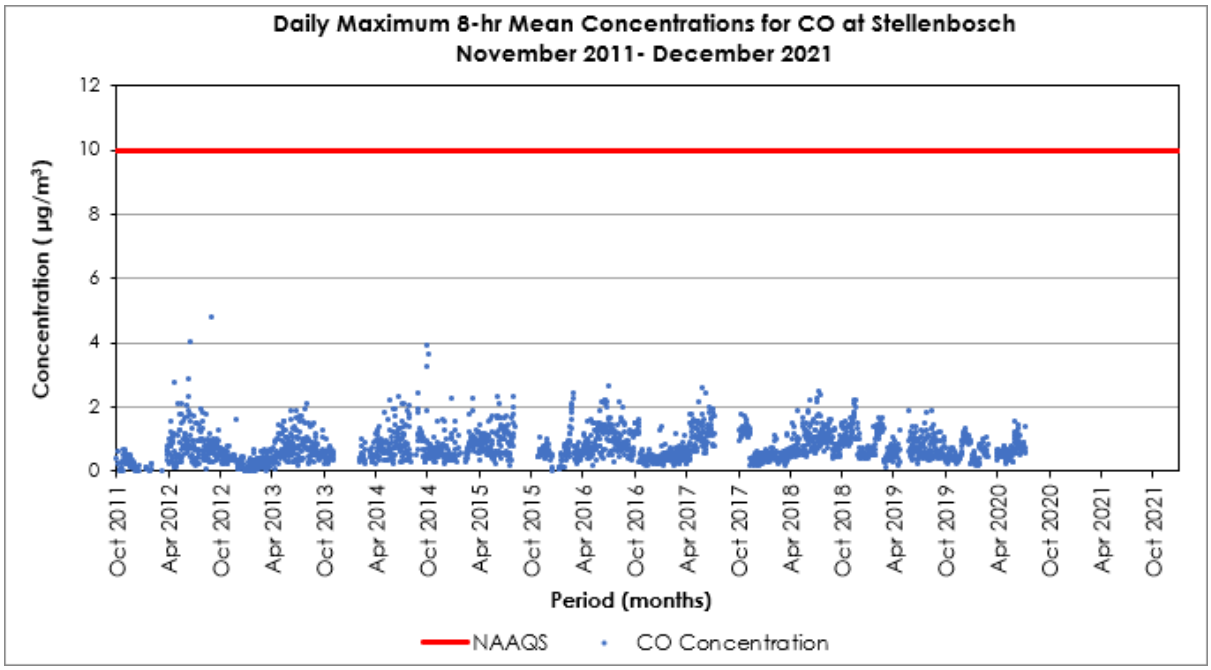


Figure 3-39: Long term CO trend at Stellenbosch (Nov 2011 – Dec 2021)

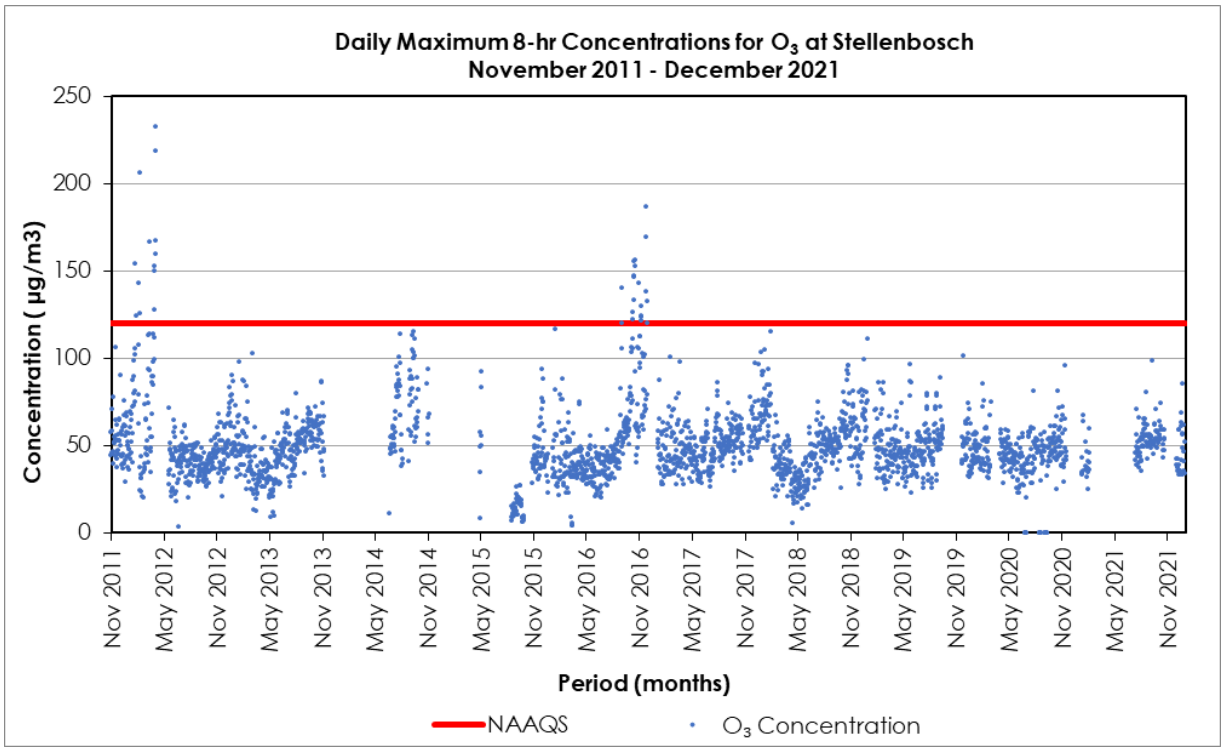


Figure 3-40: Long term O_3 trend at Stellenbosch (Nov 2011 – Dec 2021)

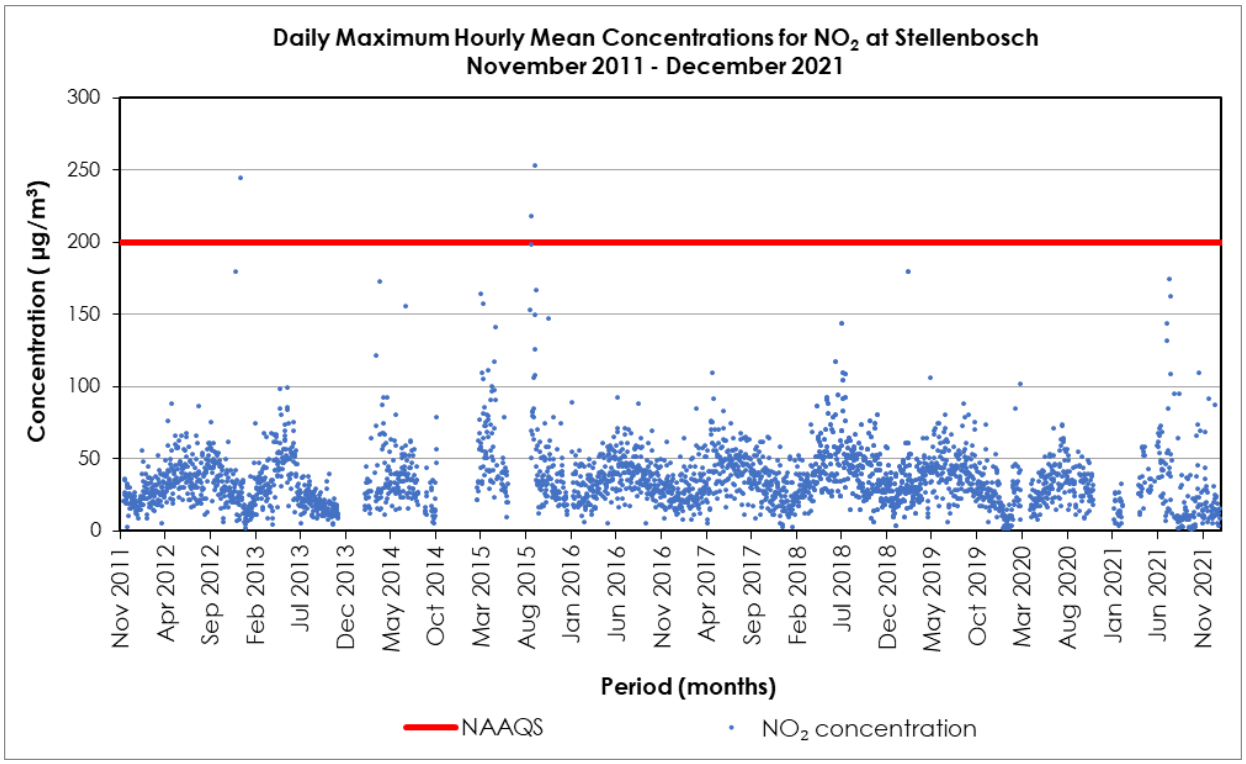


Figure 3-41: Long term NO_2 trend at Stellenbosch (Nov 2011 – Dec 2021)

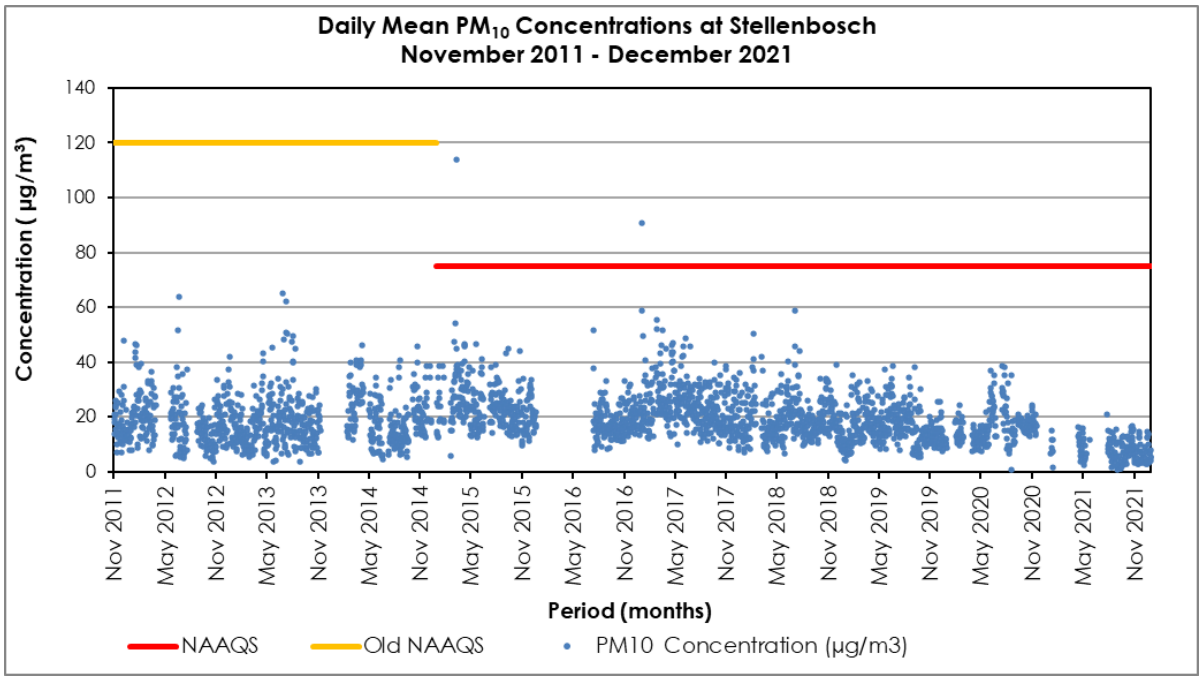


Figure 3-42: Long term PM_{10} trend at Stellenbosch (Nov 2011 – Dec 2021)

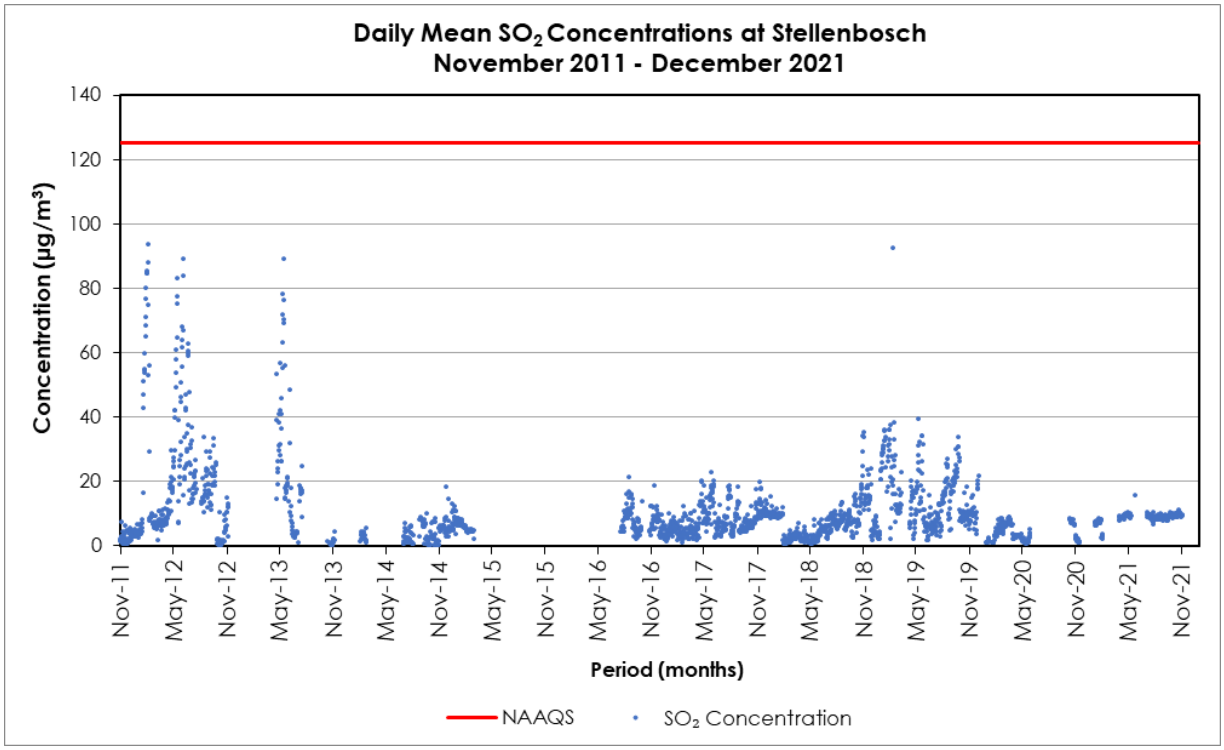


Figure 3-43: Long term SO_2 trend at Stellenbosch (Nov 2011 – Dec 2021)

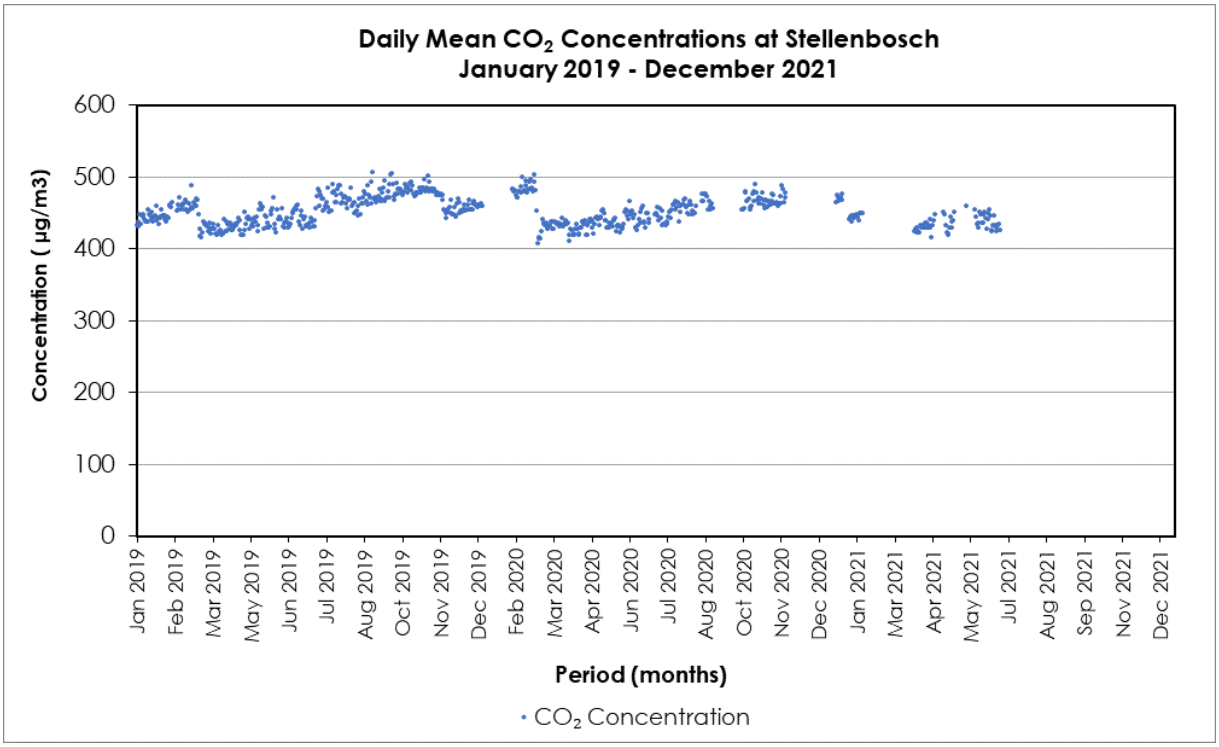
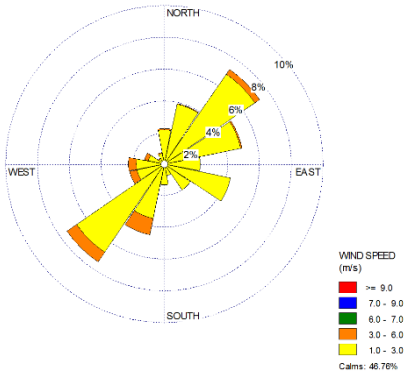


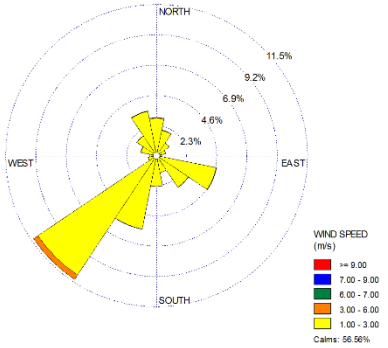
Figure 3-44: Long term CO_2 trend at Stellenbosch (Jan 2019 – Dec 2021)

During 2016 and 2017 the meteorological conditions were characterized by variable light to moderate winds, with south-westerly and north easterly components. While in 2018, 2019 and 2020 it was characterized by variable light winds, with a predominant south-westerly and south-easterly component (Figure 3-45).

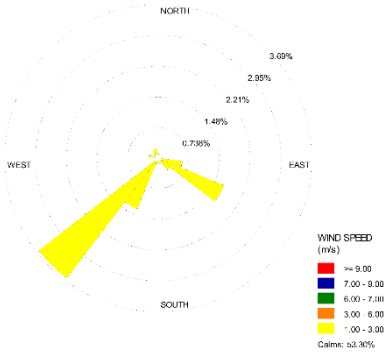
2016



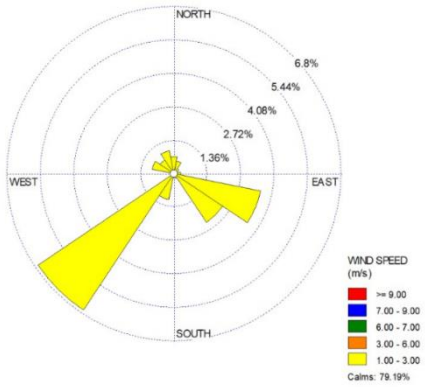
2017



2018



2019



2020

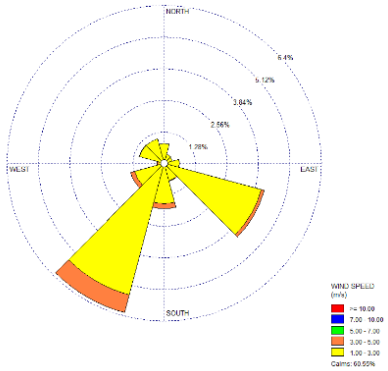


Figure 3-45: Annual wind rose for Stellenbosch (2016 – 2020)

3.2.3.2 Worcester (Breede Valley Municipality)

The Worcester monitoring station was commissioned at the Meirings Park Electric Sub-station during August 2009 (Figure 3-46). The monitoring station is located in a residential area, downwind from industry and is adjacent to the N1 National Road. Data recovery for all parameters measured during 2021 were above 70 % for all parameters (Table 3-10). The Worcester monitoring station forms part of the National DFFE NAQI project since October 2018. Long term trends in air quality parameters measured at Worcester, are presented in Figure 3-52 to Figure 3-56.

Figure 3-46: Aerial image of the Worcester ambient air quality monitoring location

TABLE 3-10: WORCESTER DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	97
Ozone (O_3)	88
Nitrogen Dioxide (NO_2)	98
Sulphur Dioxide (SO_2)	95
Particulates (PM_{10})	80

- **Ozone (O_3)**

The O_3 concentrations measured at the Worcester monitoring station were not exceeded during this period (Figure 3-47). Vehicle emissions, coupled with high ambient temperatures, contributed to the elevated levels recorded during this period. The highest recorded 8-hourly O_3 mean of 26.2 µg/m^3 was recorded during September 2021

.

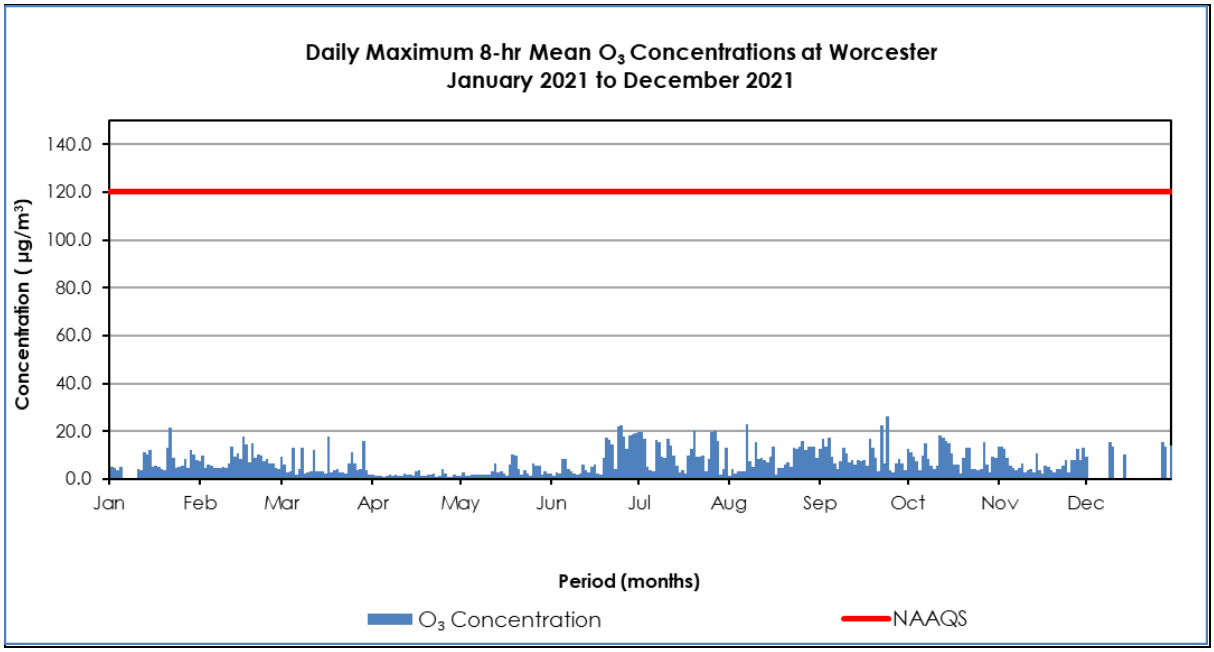


Figure 3-47: Daily maximum 8-hour mean O_3 concentrations Worcester (2021)

Sulphur Dioxide (SO_2)

The SO_2 concentrations measured at Worcester are presented in Figure 3-48. The SO_2 NAAQS of 125µg/m³ was not exceeded during the monitoring period and remained well below the NAAQS. The highest recorded value of 26 µg/m³ was recorded during July 2021.

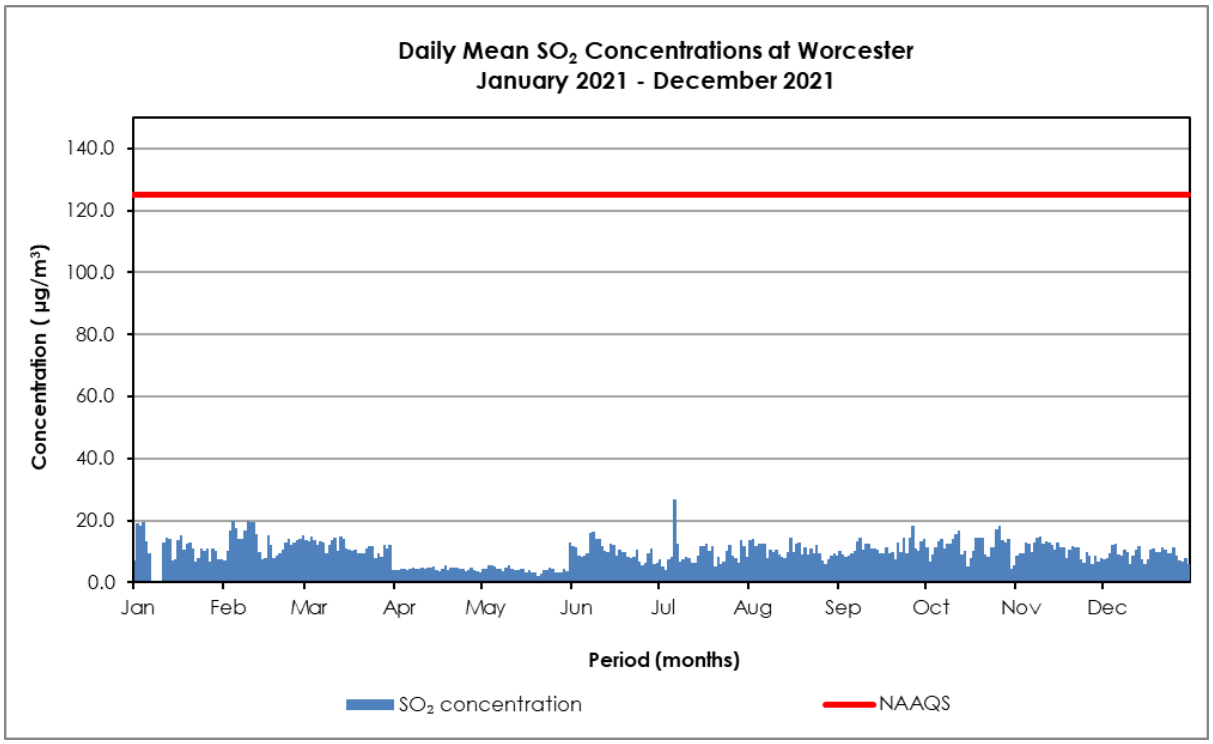


Figure 3-48: Daily mean 1-hour SO_2 concentrations Worcester (2021)

Carbon Monoxide (CO)

The CO concentrations measured at the Worcester monitoring station are presented in Figure 3-49. Overall, the CO levels remained well below the NAAQS of 10 mg/m^3 during 1 January to 31 December 2021. The CO (8 – hour) NAAQS of 10 mg/m^3 was not exceeded during the monitoring period. The gaps in the data were as a result of instrument failure.

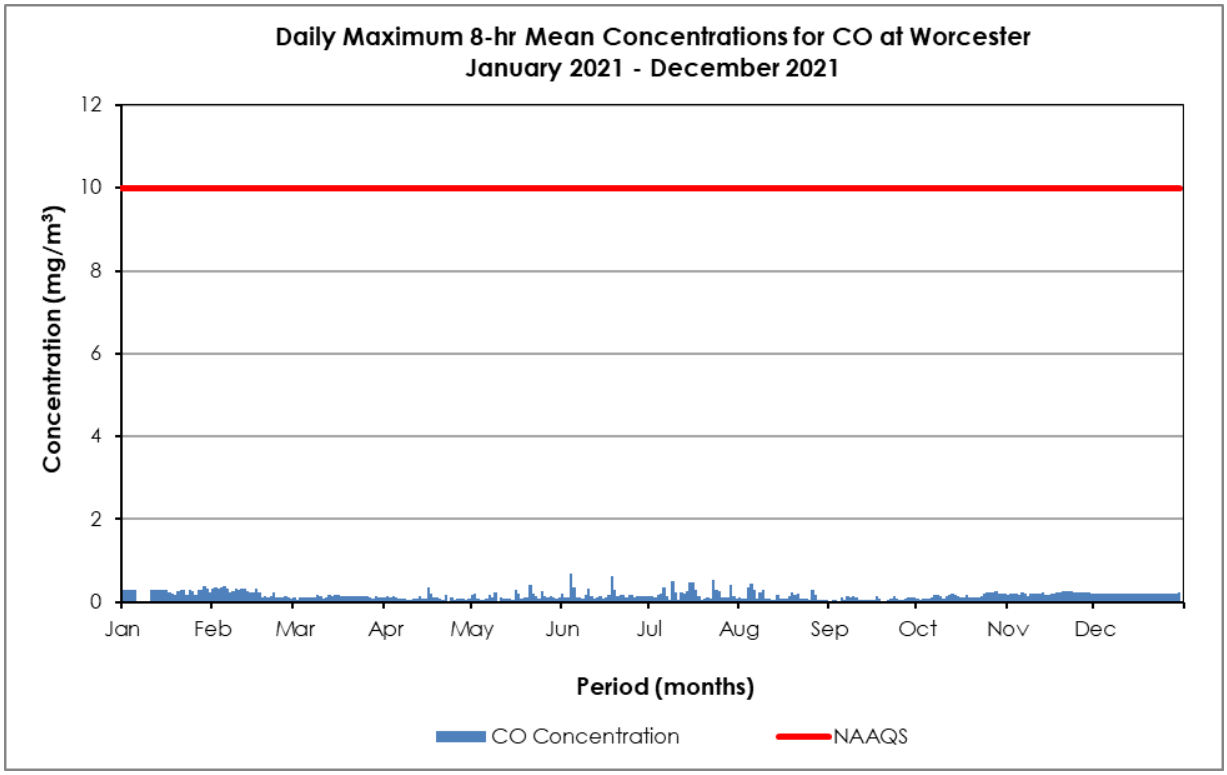


Figure 3-49: Daily maximum 8-hour mean CO concentrations Worcester (2021)

Particulate Matter (PM_{10})

The PM_{10} concentrations measured at the Worcester ambient air quality monitoring station are presented in Figure 3-50. There were no exceedances of the NAAQS. The maximum daily mean peak for PM_{10} concentrations recorded during this monitoring period was 59 µg/m^3 during 2021, which was below the daily mean NAAQS of 75 µg/m^3 for PM_{10}. The annual average was 23 µg/m^3 during the 2021 monitoring period.

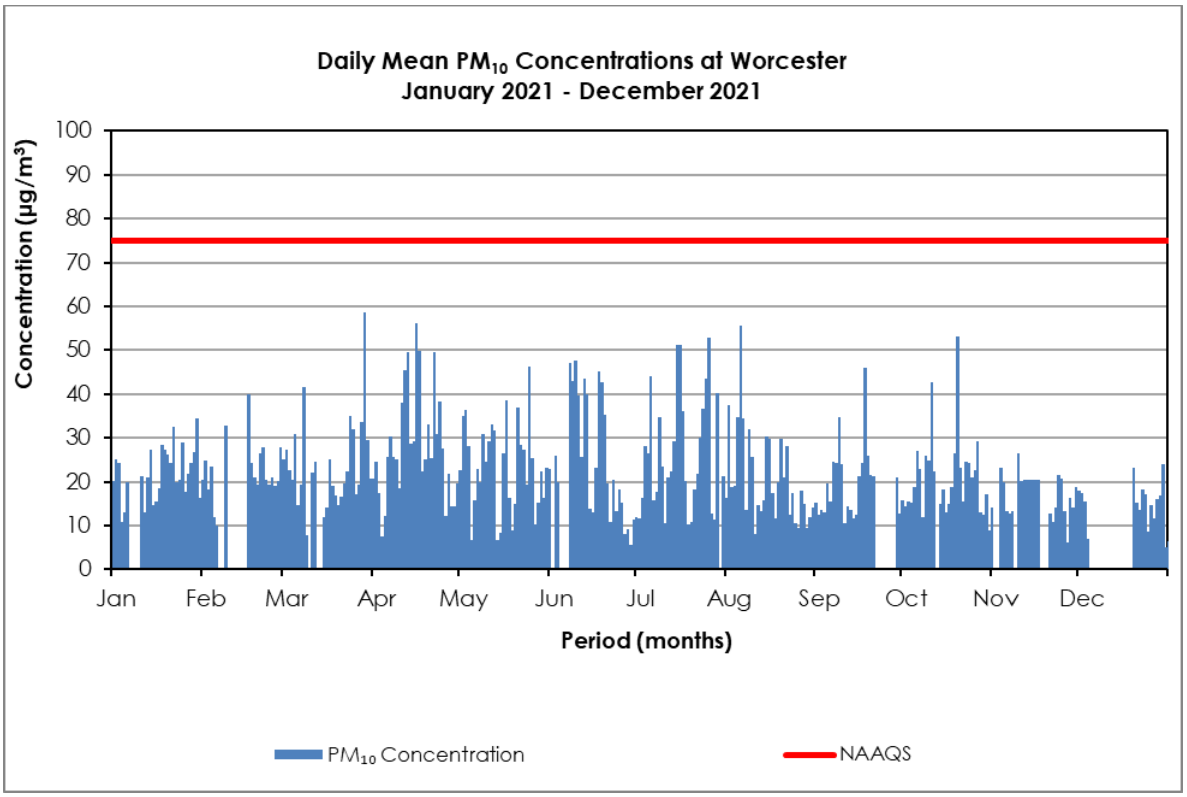


Figure 3-50: Daily mean PM_{10} concentrations Worcester (2021)

Nitrogen Dioxide (NO_2)

Daily maximum hourly averages for NO_2 concentrations measured at the Worcester ambient air quality monitoring station are shown in Figure 3-51. The NO_2 (1-hour) NAAQS of 200 µg/m³ was not exceeded during the monitoring period. A discernible seasonal pattern of NO_2 concentrations was observed during the monitoring period with NO_2 concentrations peaking in winter and dropping in summer. The seasonal cycle is due to the shorter sunlight hours and lower atmospheric temperatures which result in reduced conversion of NO_2 to secondary compounds. The annual average for NO_2 was 13 µg/m³ during the 2021 monitoring period.

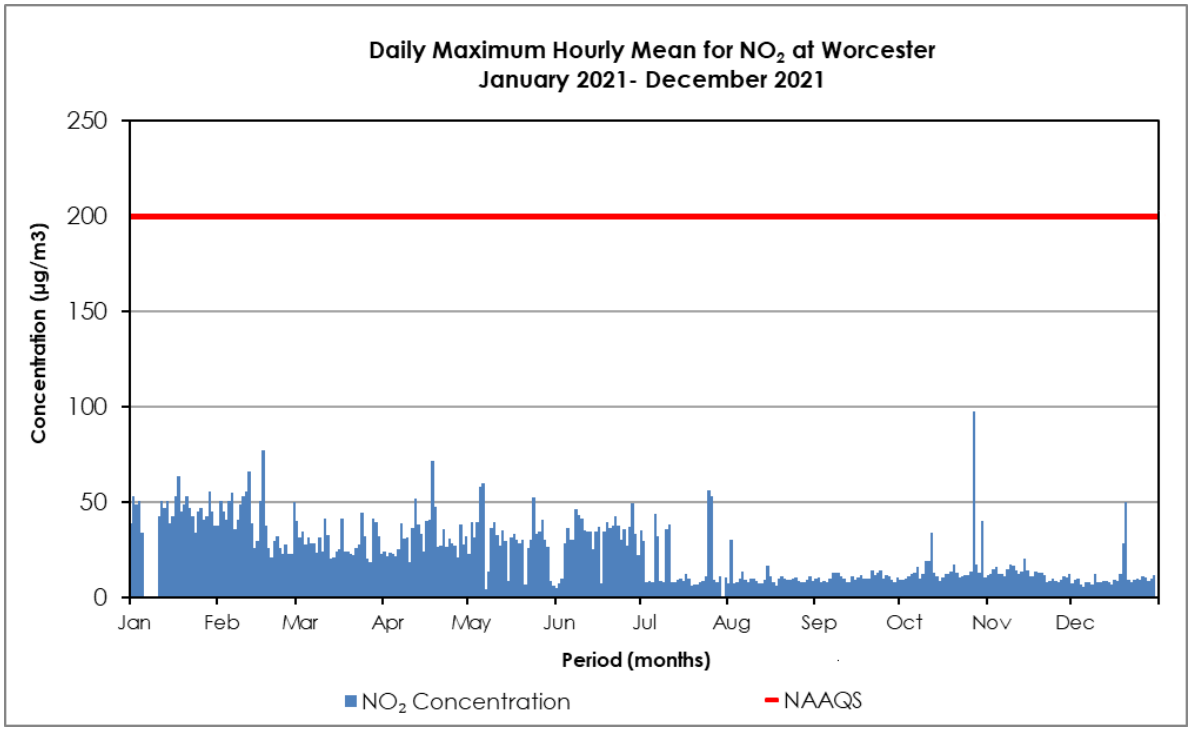


Figure 3-51: Daily maximum 8-hour mean NO_2 concentrations Worcester (2021)

- **Long term air quality data for Worcester**

Overall, air quality parameters monitored in Worcester were below the NAAQS as shown in Figure 3-52 to Figure 3-56.

The long-term CO concentrations (Figure 3-52) at Worcester (July 2009 – December 2021) shows a seasonal pattern with CO concentrations peaking in winter and dropping in summer. Nevertheless, CO concentrations are below the NAAQS of 10 mg/m^3.

The long term O_3 concentration (Figure 3-53) shows a steady decline from approximately 60 µg/m^3 to 40 µg/m^3 (July 2009 – December 2021). There is a discernible annual cycle for O_3 concentrations at the Worcester monitoring station, with the highest O_3 concentrations in September and lowest in December. It is usually expected for O_3 concentration levels to be lower in colder months due to lower solar radiation levels. However, in this scenario, the O_3 levels peak in May, June, and July, which are colder months. This phenomenon is likely induced by meteorological conditions associated with anticyclones and the presence of temperature inversions during the winter season. The calculated annual average for 2021 is 23 µg/m^3, well below the 120 µg/m^3 Annual average NAAQS.

The long term PM_{10} concentration values at Worcester (July 2009 – December 2021) are below the NAAQS, for the period prior to (120 µg/m^3), as well as after (75 µg/m^3) 1 January 2015 (Figure 3-54). The calculated annual average during the 2021 monitoring period is 23 µg/m^3 well below the 120 µg/m^3 Annual average NAAQS.

The long term NO_2 concentrations at Worcester is presented in Figure 3-55. There is a discernible annual cycle for NO_2 concentrations at the Worcester monitoring station, with the highest NO_2 concentrations in March and lowest in December. The concentration levels peak in winter and drop in summer. The calculated annual average for NO_2 at Worcester during the 2021 monitoring period is, 25 µg/m^3 and therefore well below the NAAQS.

The long term SO_2 concentrations at Worcester are presented Figure 3-56. There is a discernible annual cycle for SO_2 concentrations at the Worcester monitoring station, with the highest SO_2 concentrations observed in winter and dropping in summer. The calculated annual average for SO_2 concentrations at Worcester for 2021 is 9.6 µg/m^3 and therefore well below the NAAQS.

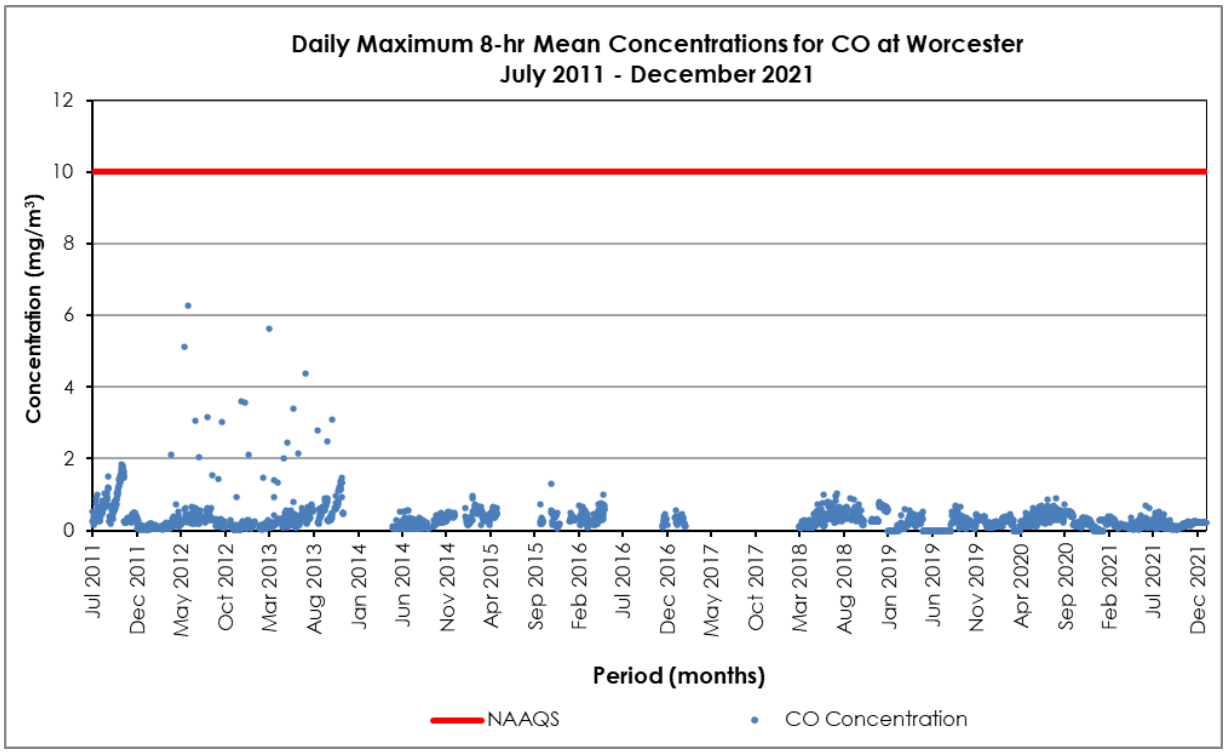


Figure 3-52: Long term CO trend at Worcester (July 2011 – Dec 2021)

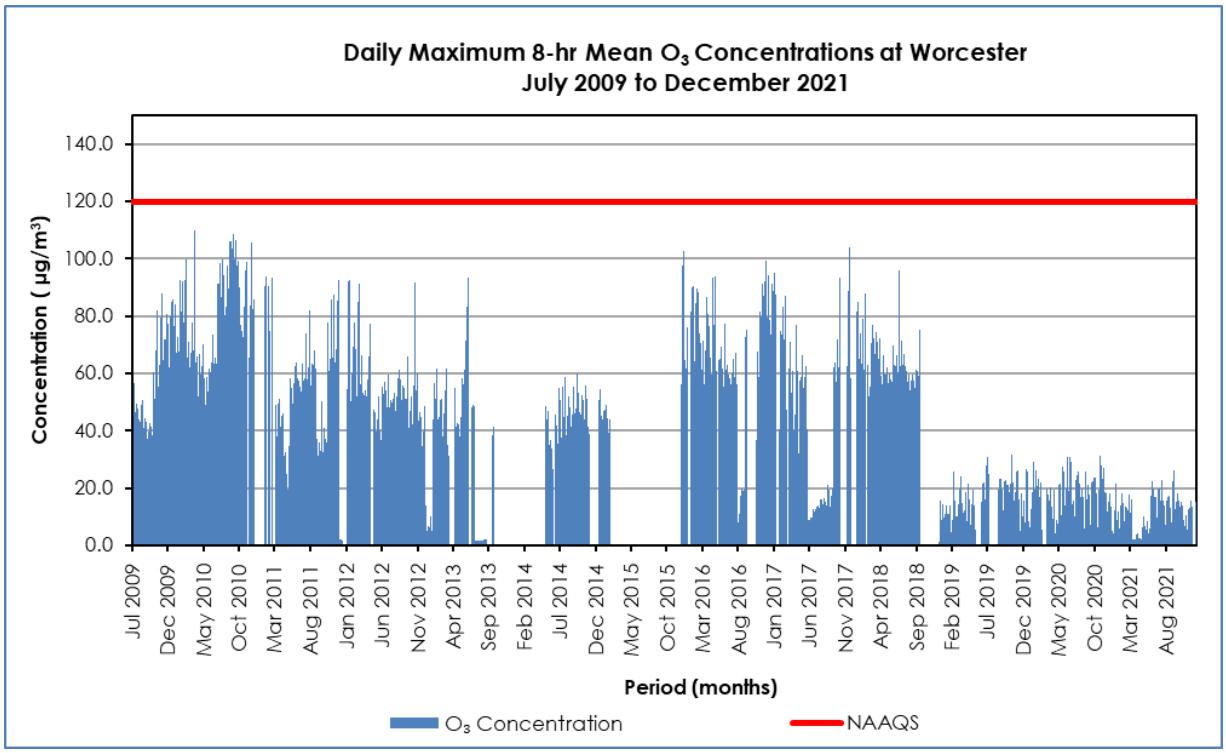


Figure 3-53: Long term O_3 trend at Worcester (Jul 2009 – Dec 2021)

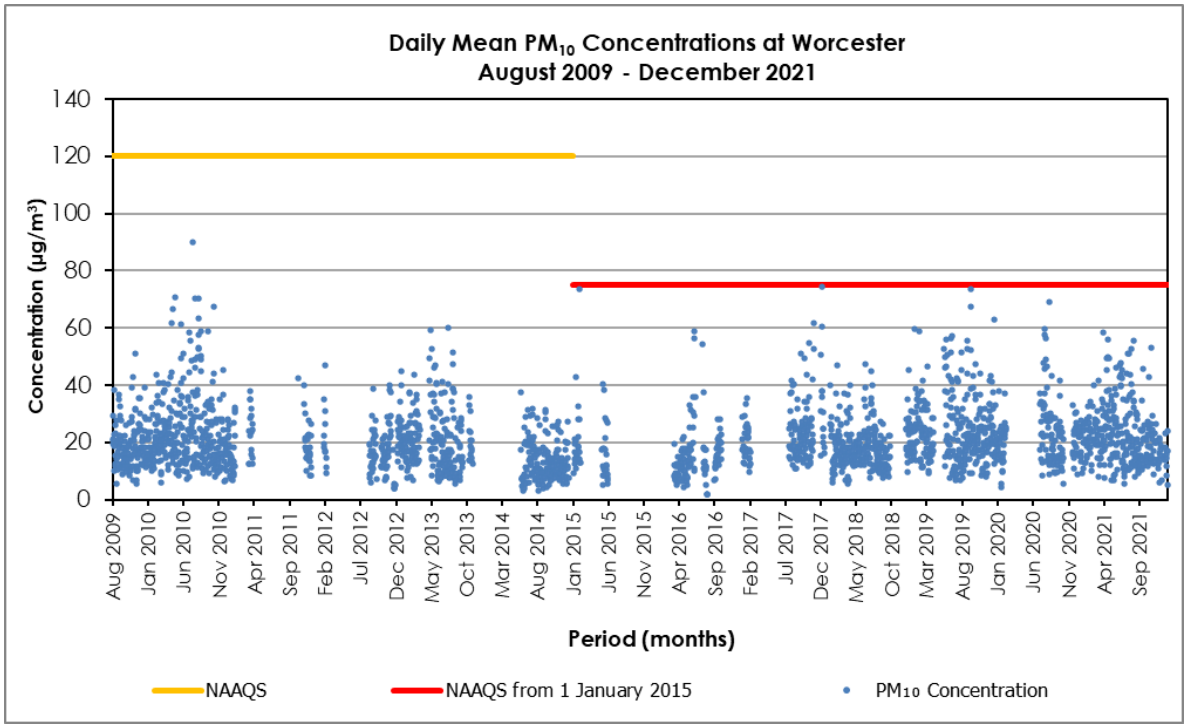


Figure 3-54: Long term PM_{10} trend at Worcester (Jul 2009 – Dec 2021)

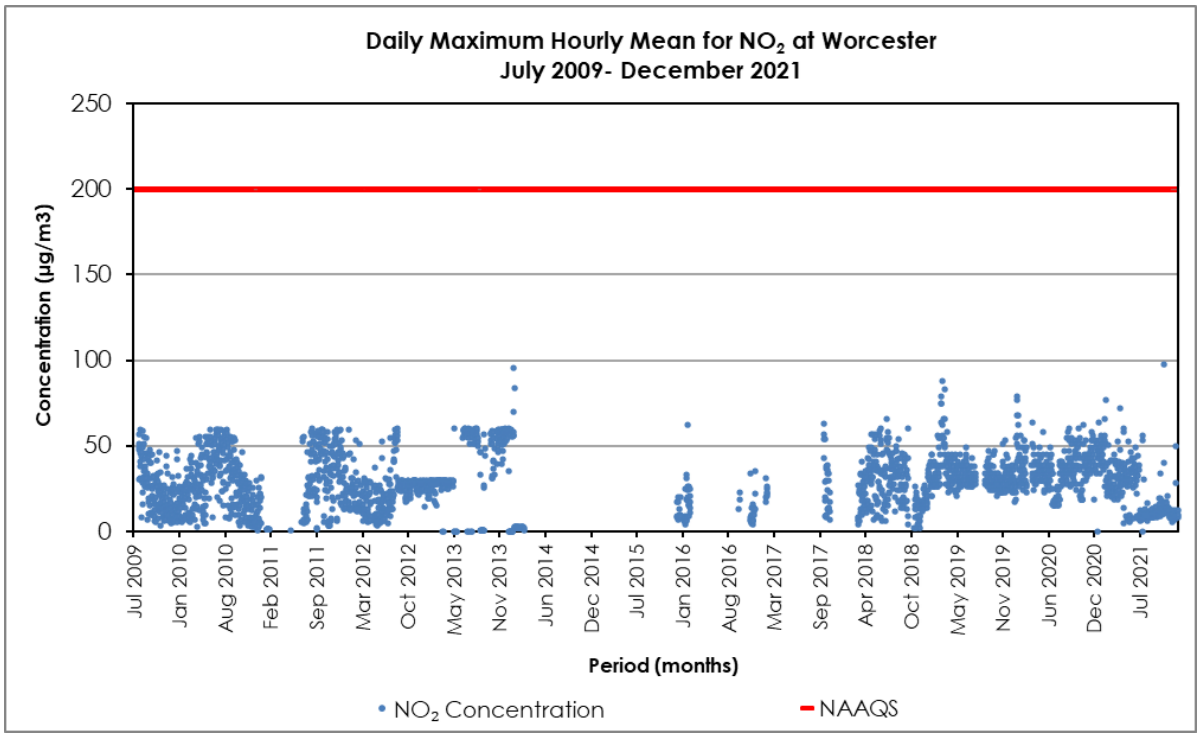


Figure 3-55: Long term NO_2 trend at Worcester (Jul 2009- Dec 2021)

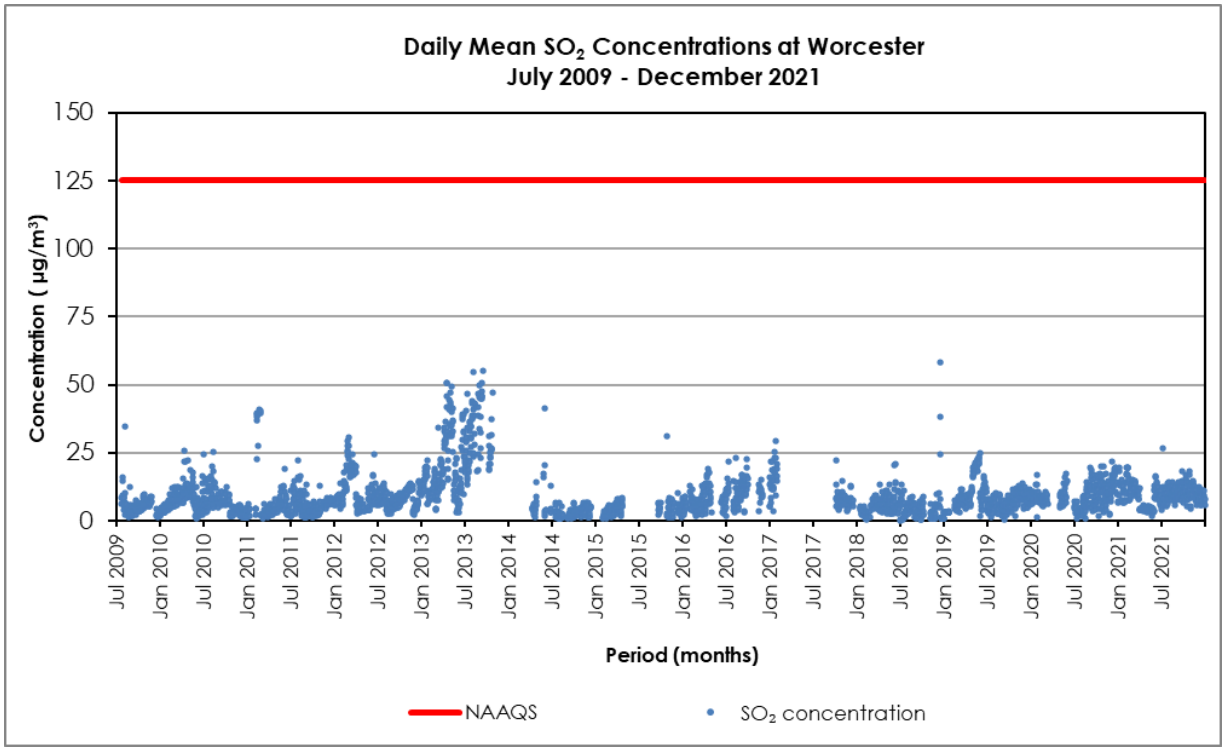
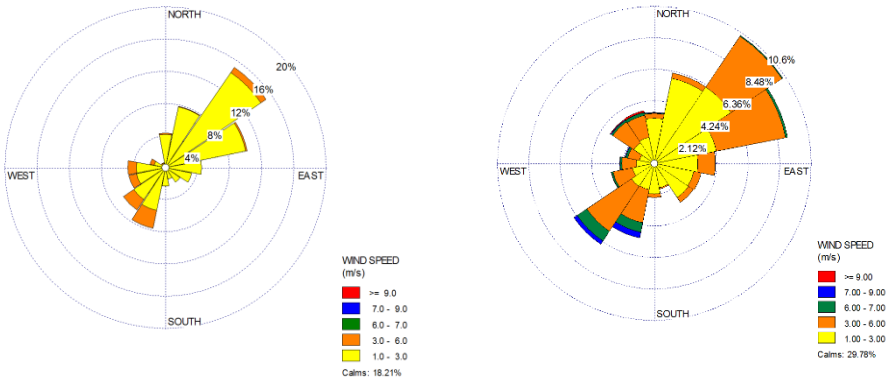


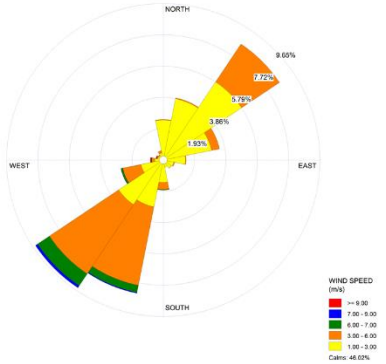
Figure 3-56: Long term SO_2 trend at Worcester (Jul 2009- Dec 2021)

The meteorological conditions for Worcester during the period under review were characterized by light to moderate winds, with predominant north-easterly and south-westerly winds. (Figure 3-57).

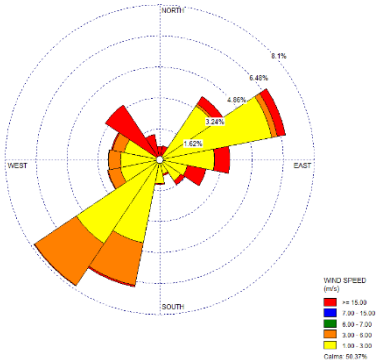
2016 2017



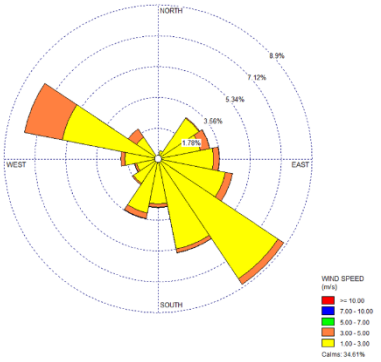
2018



2019



2020



2021

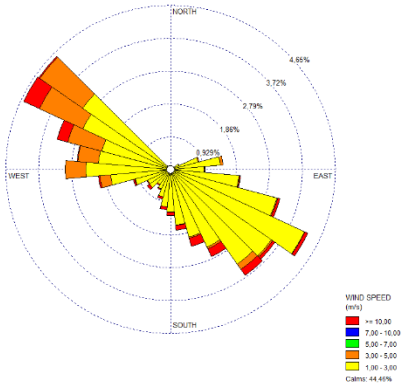


Figure 3-57: Annual wind rose for Worcester (2016 – 2021)

3.2.3.3 Paarl (Drakenstein Municipality)

The Paarl monitoring station, commissioned during August 2018, is located on the grounds of the Paarl Traffic Testing Station near Mbekweni, to the north of the town. The monitoring station is located on the corner of Jan van Riebeeck Drive and Bartolomeu Street, Paarl (Figure 3-58). The monitoring station is situated downwind from industrial activities, construction activities and is adjacent to a major traffic artery.

The monitoring station is equipped to continuously monitor CO, O_3 NO_2 and SO_2. Table 3-11 shows the data capture percentage for each air pollutant monitored for this period. Data capture for all pollutants was less than 60 % and is therefore not reported. The loss in data capture was as a result of power, instrument failure and data logger failure. During this period a new data logging system was successfully installed at the station.

Figure 3-58: Aerial image of Paarl air quality monitoring station location

TABLE 3-11: PAARL DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	<60
Ozone (O_3)	<60
Nitrogen Dioxide (NO_2)	<60
Sulphur Dioxide (SO_2)	<60

- **Long Term Air Quality Trend for Paarl**

Overall, the parameters measured were below the NAAQS, as shown in Figure 3-59 to Figure 3-61.

The long-term O_3 concentrations (Figure 3-59) (August 2018 – December 2021) shows an average concentration of approximate 25 µg/m^3 and remained below the 120 µg/m^3 NAAQS.

There appears to be a seasonal cycle for NO_2 (Figure 3-60), with lower values in the summer period (December – January), and higher in the winter period (June – July). The NO_2 average concentration of approximate 10 µg/m^3 and remained below the 200 µg/m^3 NAAQS.

The SO_2 analyser was commissioned in April 2019. The long term SO_2 concentrations (Figure 3-61) (April 2019 – December 2020) shows an average concentration of approximate 43 µg/m^3 and remained below the 125 µg/m^3 NAAQS.

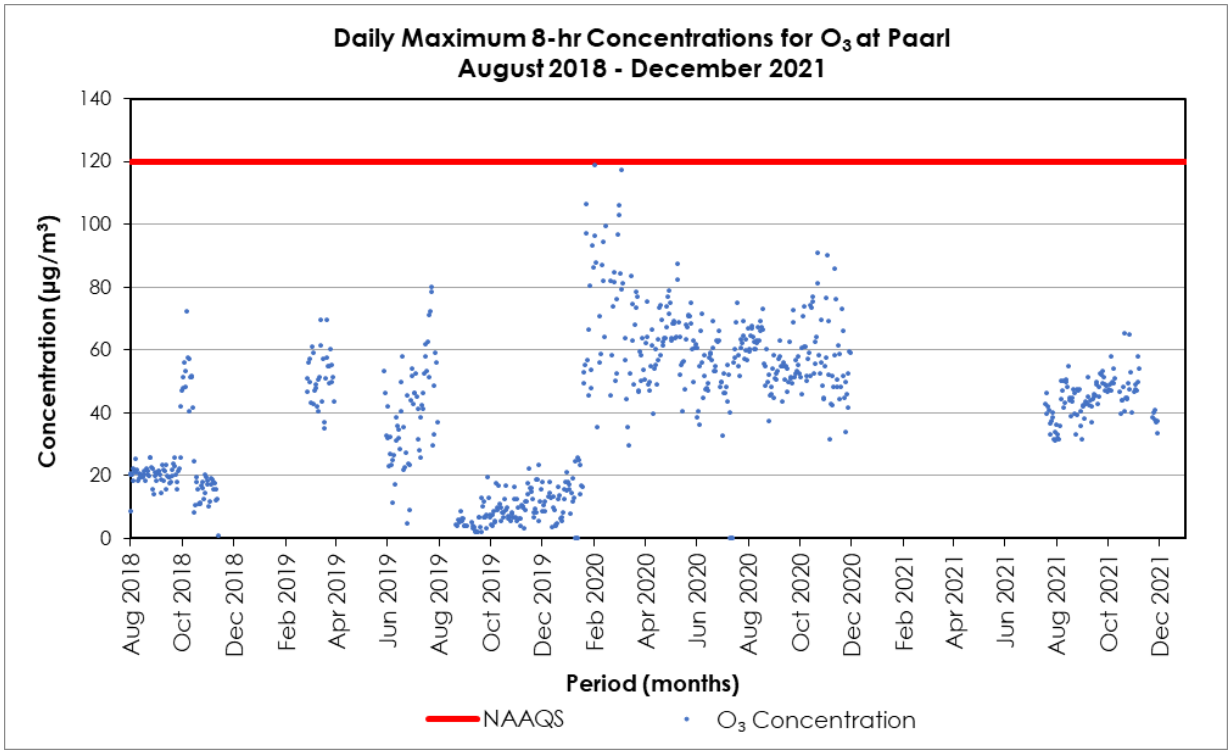


Figure 3-59: Long term O_3 trend at Paarl (Aug 2018 – Dec 2021)

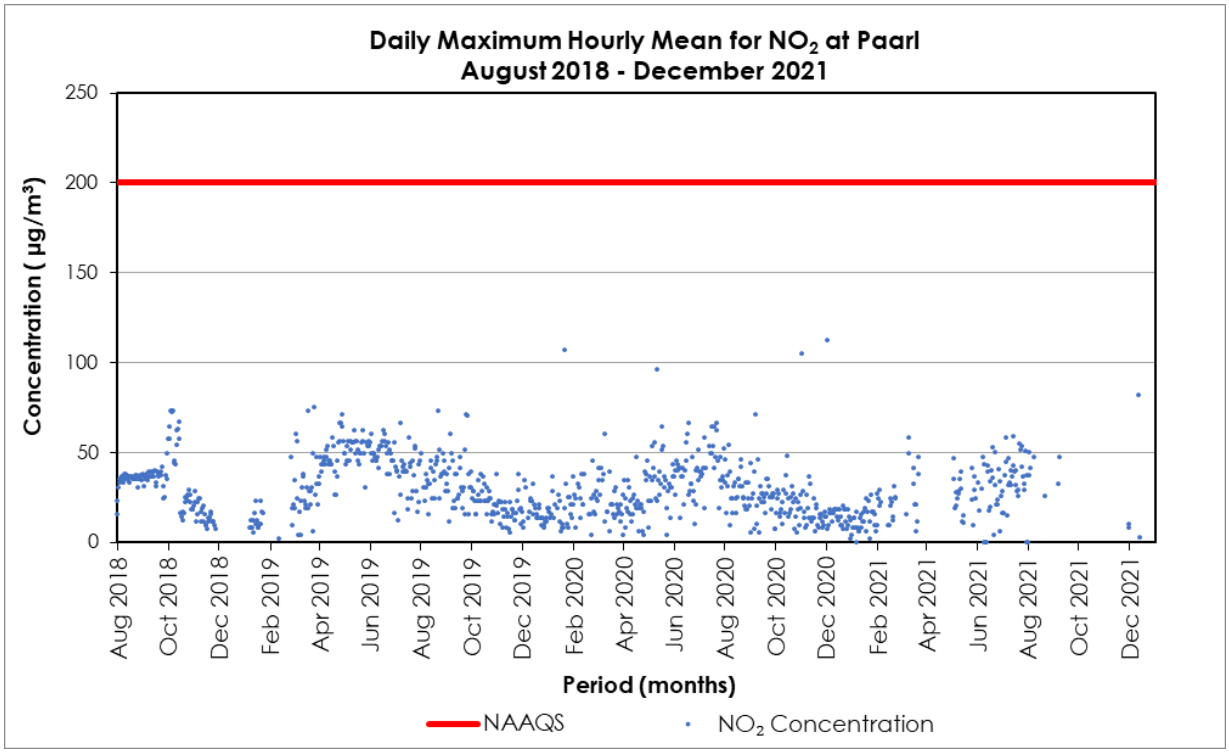


Figure 3-60: Long term NO_2 trend at Paarl (Aug 2018 – Dec 2021)

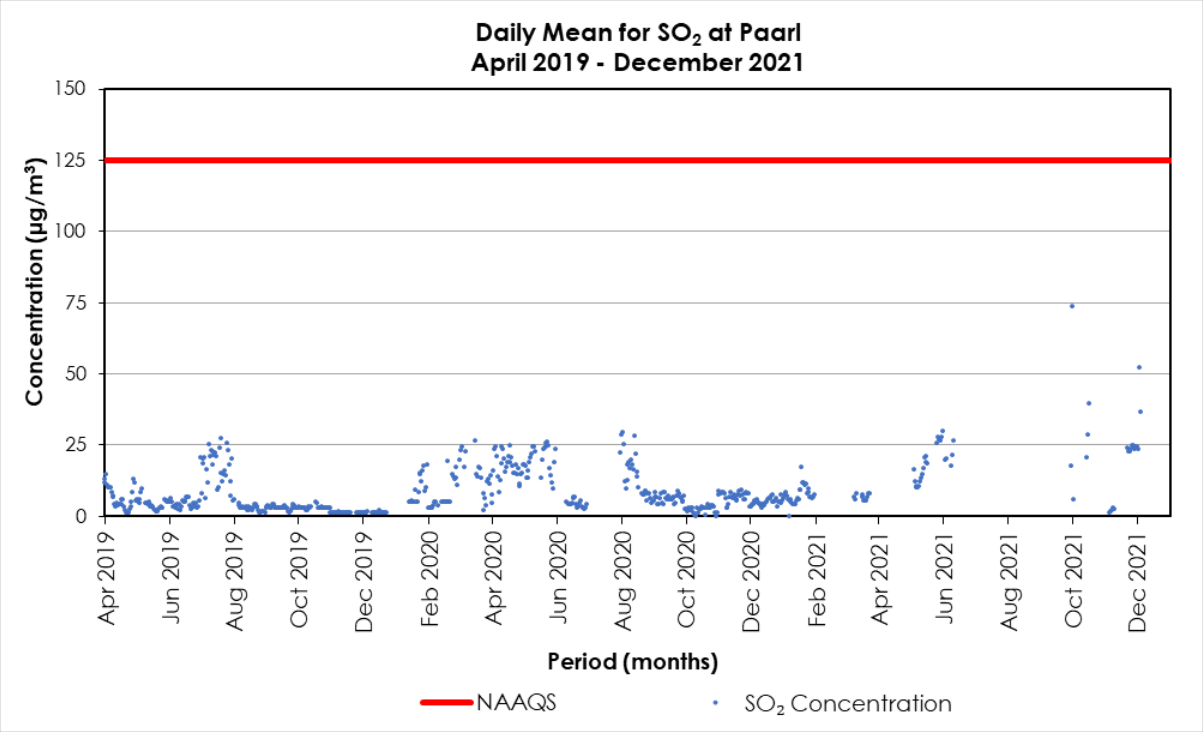


Figure 3-61: Long term SO_2 trend at Paarl (Apr 2019 – Dec 2021)

Due to low data capture for the meteorological parameters, no wind speed and wind direction is shown for 2018 and 2019. However, the meteorological conditions for 2020 and 2021 were characterized by variable light to moderate winds, with a predominant southerly, south easterly and south westerly component. A 39.1 % occurrence of calm conditions, below 1 m/s, were recorded for the 2021 period (Figure 3-62).

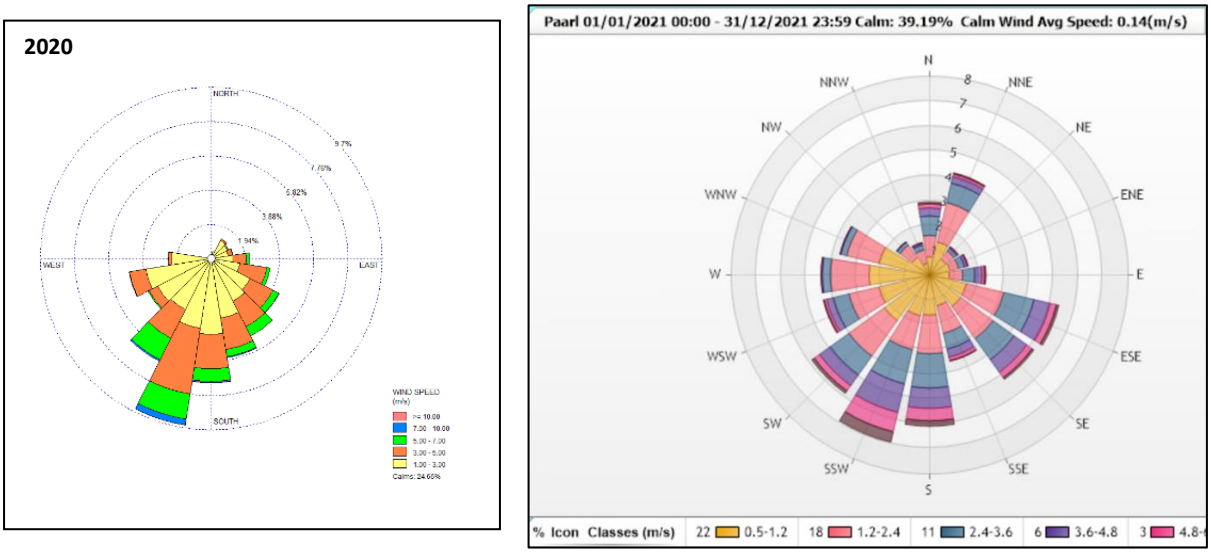


Figure 3-62: Annual wind rose for Paarl (2020 and 2021)

3.2.4 Overberg District Municipality

3.2.4.1 Hermanus (Overstrand Municipality)

The Hermanus ambient monitoring station was initially commissioned in March 2014 at Mount Pleasant Primary School. It was relocated to a new site in December 2018 (less than 5km away). The new site is at the Abogold facility in Church Street, New Harbour Westcliff. The monitoring station is located to the west of the town, between the major road (R43) and the coastline which is to the south. Hermanus is situated on the southern coastline of the Western Cape Province (Figure 3-63).

The monitoring station is equipped to continuously monitor CO, O_3 NO_2, SO_2 and PM_{10}. Table 3-12 shows the data capture percentage for each air pollutant monitored at the Hermanus monitoring station during the 2021 monitoring period. Data capture for CO, O_3, NO_2, SO_2 and PM_{10} was less than 60 %; and is therefore not reported for the 2021 period. The loss of data was due to power failure, data logger failures and instrument failure. During this period, a new data logging system was successfully installed at the station.

Figure 3-63: Aerial image of Hermanus ambient air quality monitoring location

TABLE 3-12: HERMANUS DATA CAPTURE (2021)

MEASUREMENT	% DATA RECOVERY
Carbon Monoxide (CO)	<60
Ozone (O_3)	<60
Nitrogen Dioxide (NO_2)	<60
Sulphur Dioxide (SO_2)	<60
Particulates (PM_{10})	<60

- **Long term air quality data for Hermanus**

Overall, air quality parameters monitored in Hermanus were below the NAAQS, as shown in Figure 3-64 to Figure 3-67.

The long-term CO concentration (Figure 3-64) (March 2014 – December 2021) shows an average concentration of approximate 2 mg/m^3 remained well below the 10 mg/m^3 NAAQS.

The long term O_3 concentration concentrations (Figure 3-65) (March 2014 – December 2021) shows an average concentration of approximate 30 µg/m^3 and remained below the 120 µg/m^3 NAAQS.

For NO_2 (Figure 3-66), there appears to be a seasonal cycle, with lower values in the summer period (December – January), and higher in the winter period (June – July). For the period, March 2014 – December 2021, NO_2 shows an average concentration of approximate 5 µg/m^3 and remained below the 200 µg/m^3 NAAQS.

The long term SO_2 concentrations (Figure 3-67) (March 2014 – December 2021) shows an average concentration of approximate 7 µg/m^3 and remained below the 125 µg/m^3 NAAQS.

Overall, all pollutants monitored at the Hermanus ambient air quality monitoring station were below the respective NAAQS.

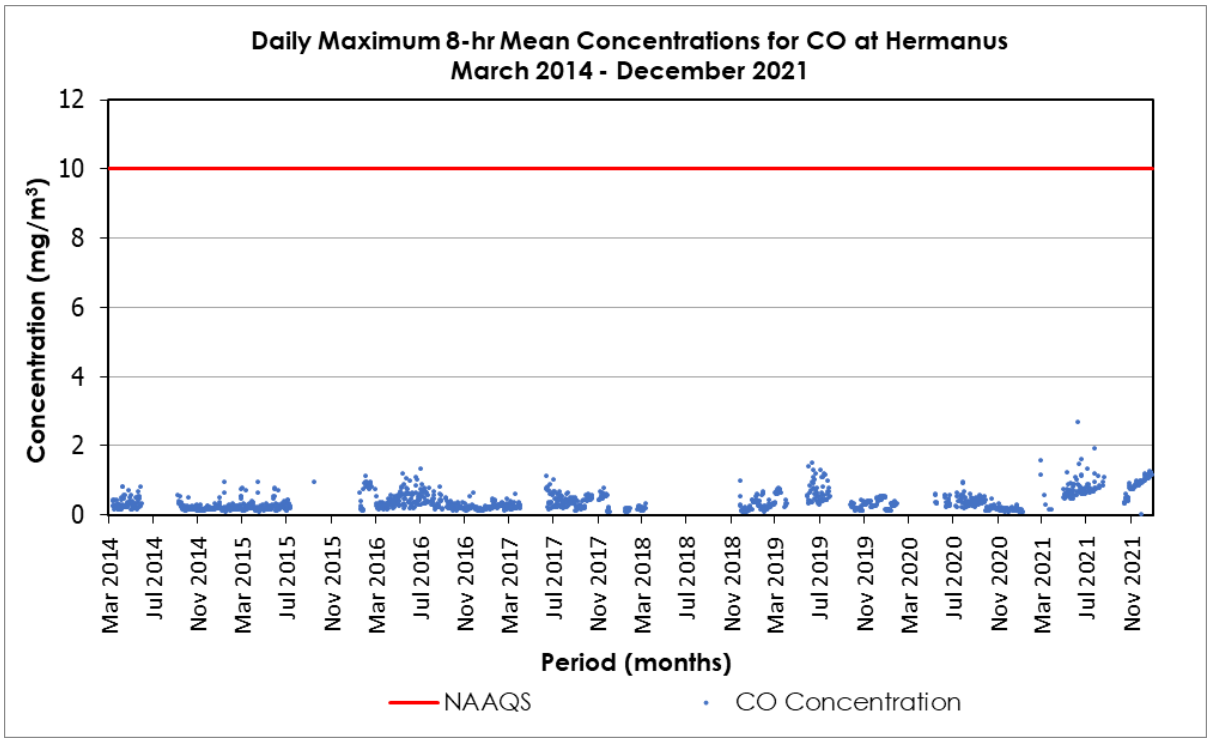


Figure 3-64: Long term trend CO concentrations at Hermanus (Mar 2014 - Dec 2021)

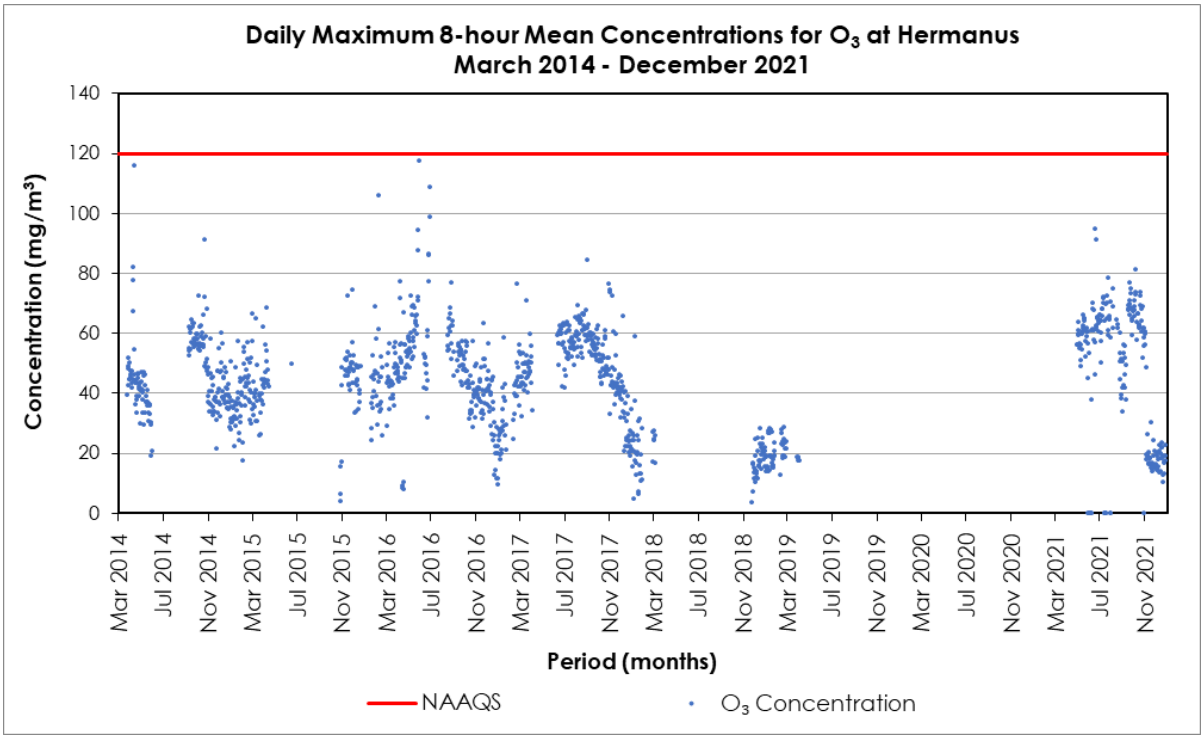


Figure 3-65: Long term trend O_3 concentrations at Hermanus (Mar 2014 - Dec 2021)

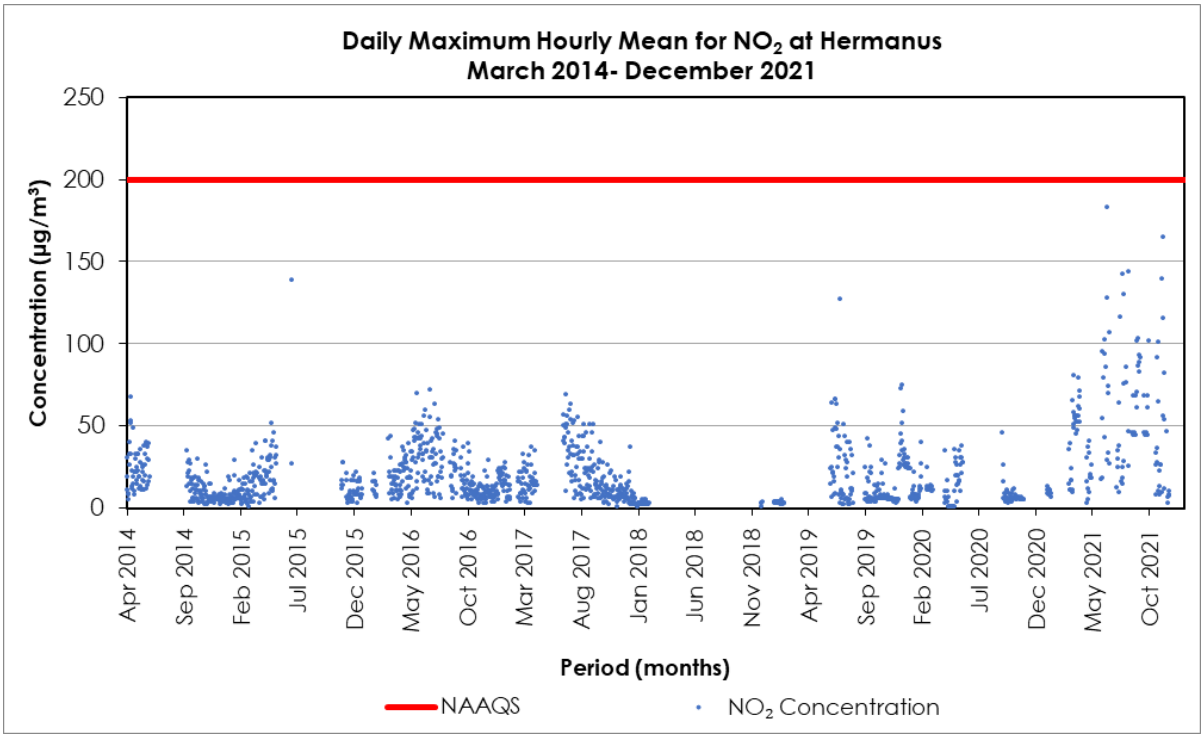


Figure 3-66: Long term trend NO_2 concentrations at Hermanus (Mar 2014 - Dec 2021)

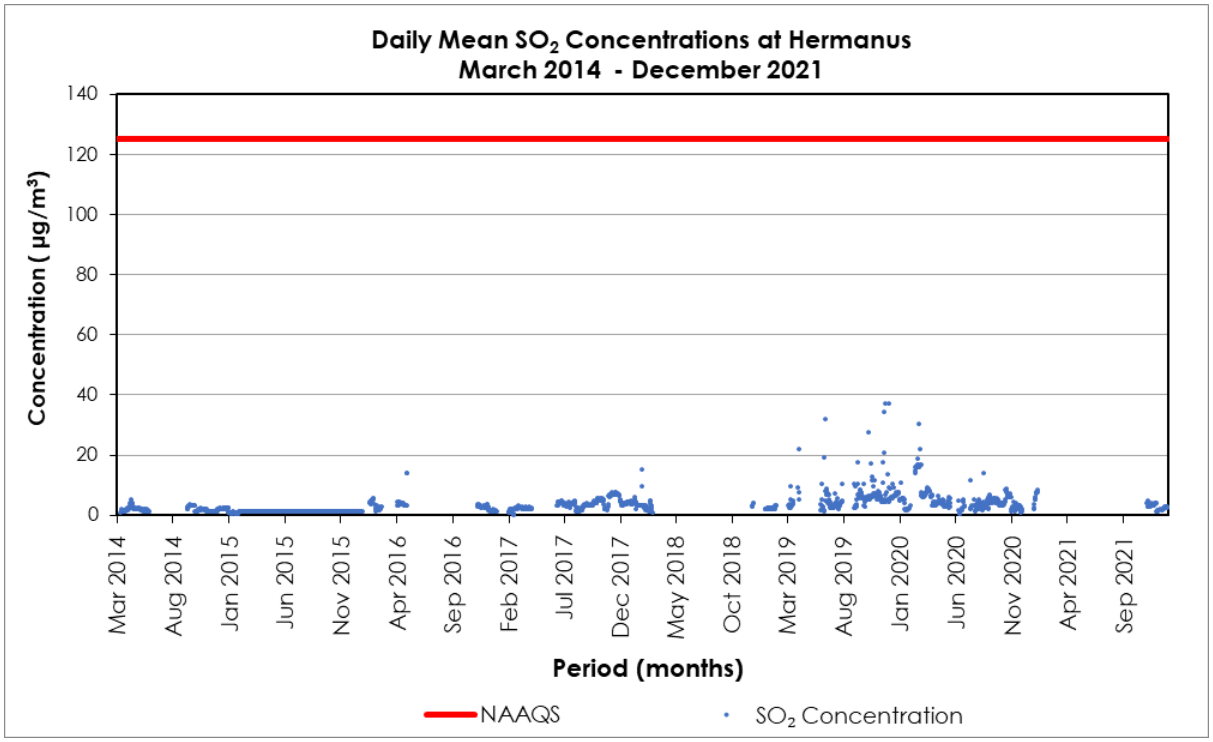


Figure 3-67: Long term trend SO_2 concentrations at Hermanus (Mar 2014 - Dec 2021)

The wind rose for 2016 is shown in Figure 3-68. There are no wind roses presented for 2017 – 2020 due to low data recovery as a result of data logging and meteorological instrument failures. Due to a faulty anemometer, no wind data is presented for 2021.

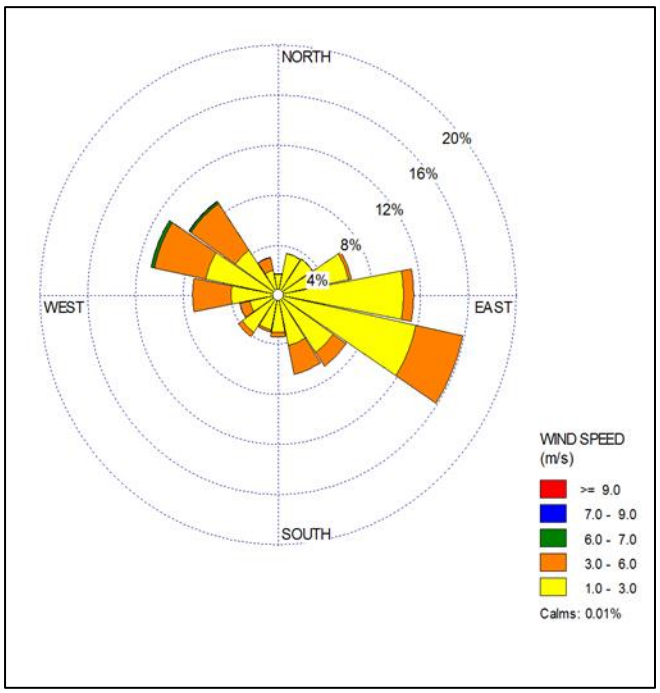


Figure 3-68: Annual wind rose (2016)

3.2.5 City of Cape Town Metropolitan Municipality

3.2.5.1 Khayelitsha (City of Cape Town)

Khayelitsha is situated south-east of Cape Town. The Khayelitsha monitoring station, initially commissioned in May 2011 at the Khayelitsha Municipal Training Centre, was relocated in December 2014 to a new site at the Khayelitsha District Hospital (less than 5km from its original location) (Figure 3-69). The data recovery is indicated in Table 3-13. Long-term trends in air quality are reported for all parameters measured from 2012 to 2021.

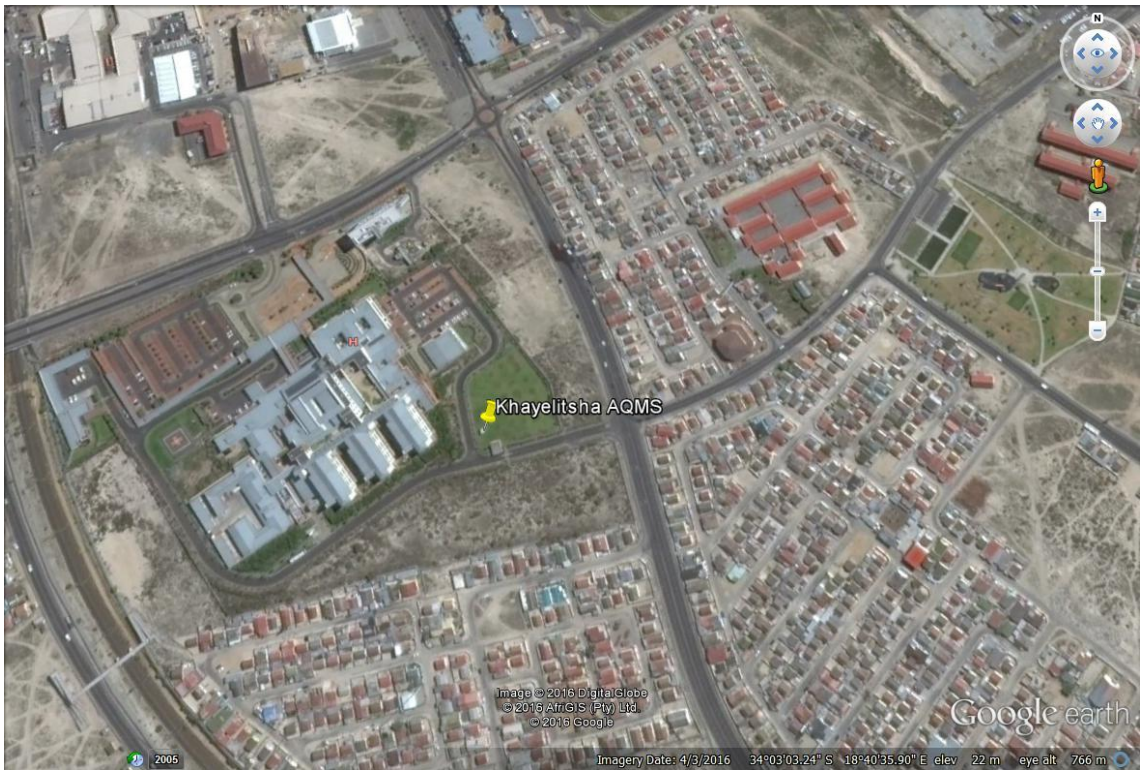


Figure 3-69: Aerial image of Khayelitsha air quality monitoring station location

TABLE 3-13: KHAYELITSHA DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Carbon Monoxide (CO)	71
Ozone (O_3)	63
Nitrogen Dioxide (NO_2)	62
Sulphur Dioxide (SO_2)	71
Particulates (PM_{10})	90
Carbon Dioxide (CO_2)	62

Carbon Monoxide (CO)

The CO concentrations measured at the Khayelitsha monitoring station are presented in Figure 3-70. Overall, the CO levels remained well below the CO (8 – hour) NAAQS of 10 mg/m³ during 1 January – 31 December 2021.

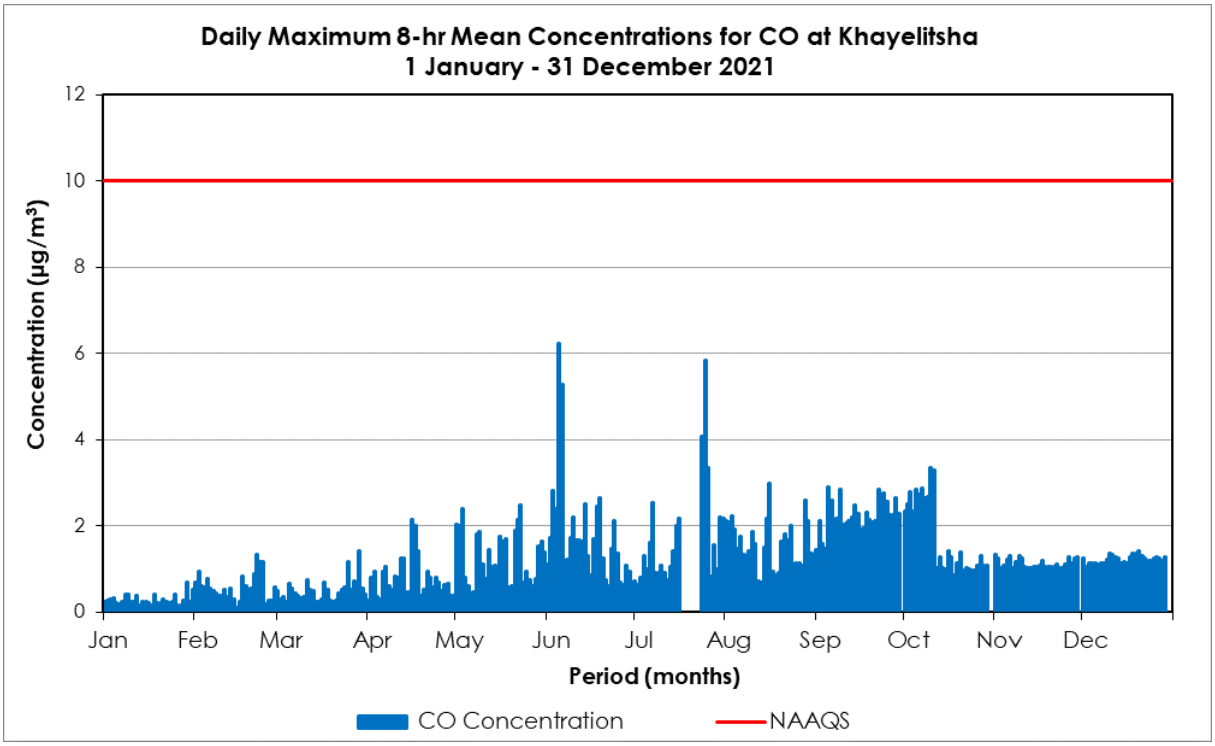


Figure 3-70: Daily maximum CO (8 – hour mean) at Khayelitsha (2021)

Ozone (O_3)

The O_3 concentrations measured at the Khayelitsha monitoring station are presented in Figure 7-71. Overall, the O_3 levels remained well below the O_3 (8 – hour) NAAQS of 120 µg /m³ during 1 January – 31 December 2021.

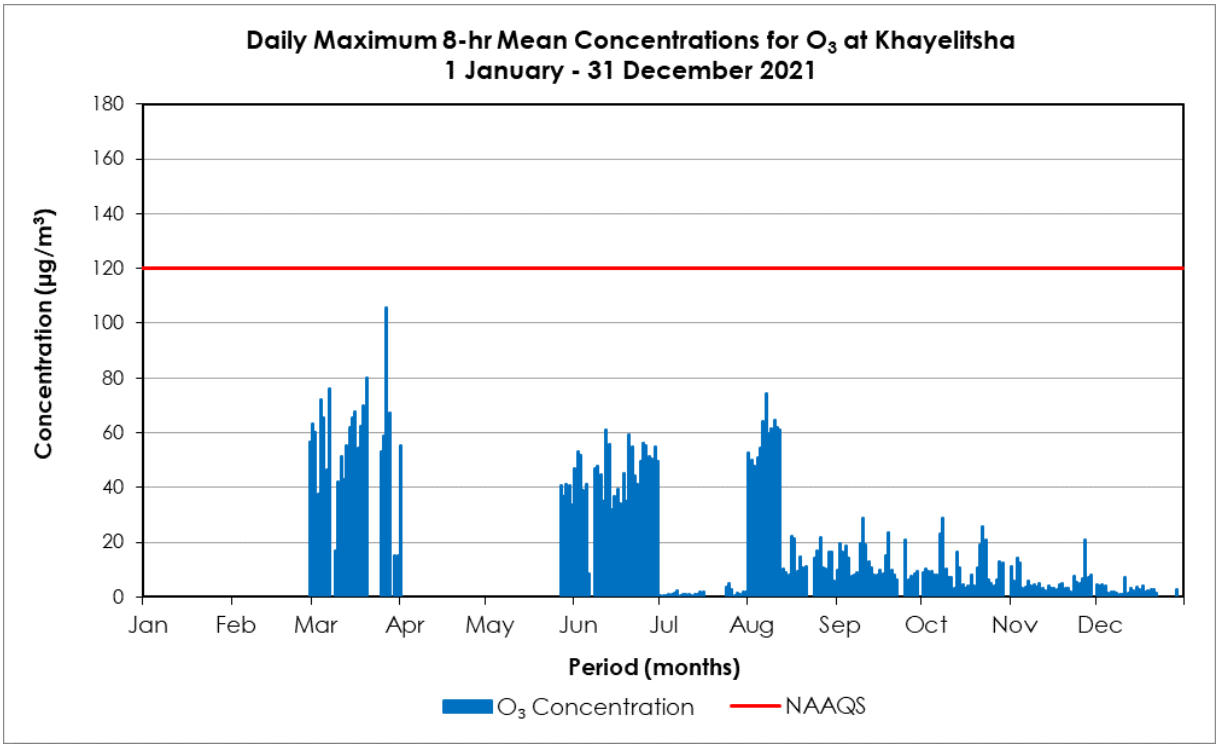


Figure 7-71: Daily maximum O_3 (8 – hour mean) at Khayelitsha (2021)

- **Nitrogen Dioxide (NO_2)**

The NO_2 concentrations measured at the Khayelitsha monitoring station are presented in Figure 7-72. The highest NO_2 level recorded during this period was 146 µg/m³ on 3 May 2021. There were no exceedances of the NO_2 (1 – hour) NAAQS of 200 µg/m³.

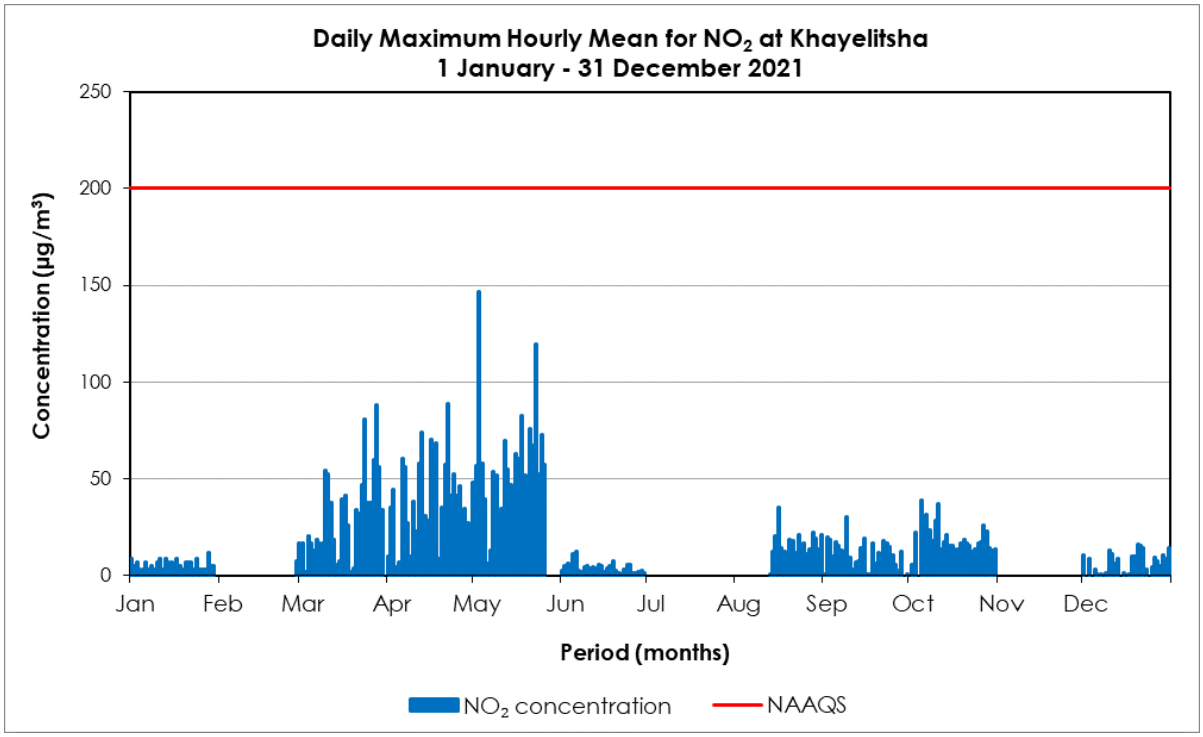


Figure 7-72: Daily maximum hourly NO_2 concentrations at Khayelitsha (2021)

Sulphur Dioxide (SO_2)

The SO_2 concentrations measured at the Khayelitsha monitoring station during this period are shown in Figure 7-73. The SO_2 (24 - hours) NAAQS of 125 µg/m³ was not exceeded during the monitoring period. The data gaps were mainly attributed to instrument failure.

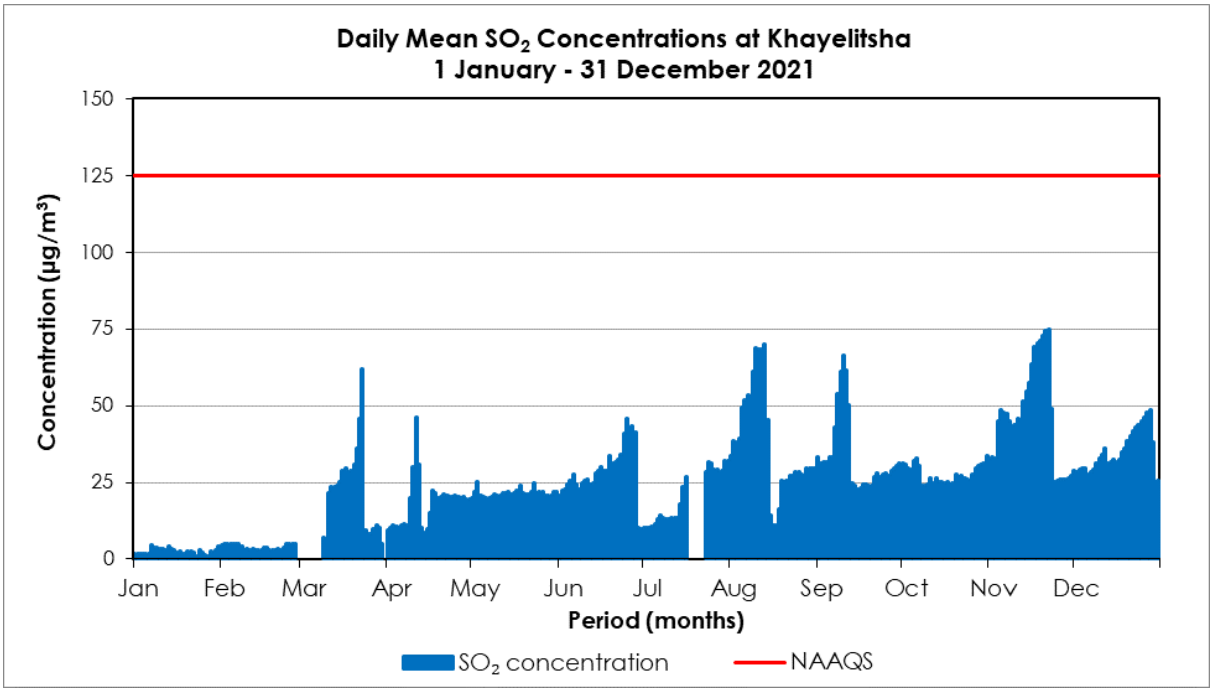


Figure 7-73: Daily mean SO_2 concentrations at Khayelitsha (2021)

Particulate Matter (PM_{10})

The PM_{10} concentrations measured at Khayelitsha are presented in Figure 7-74. The PM_{10} (24 – hours) NAAQS of 75 µg/m³ was exceeded on two (2) occasions in June 2021. During this period elevated CO levels correlates with elevated PM_{10} levels recorded, with the highest levels recorded between 18:00 and 06:00. Elevated PM_{10} levels in the area may be attributed to open fires used for heating and cooking, vehicle emissions and poor air dispersion conditions during the cold winter months.

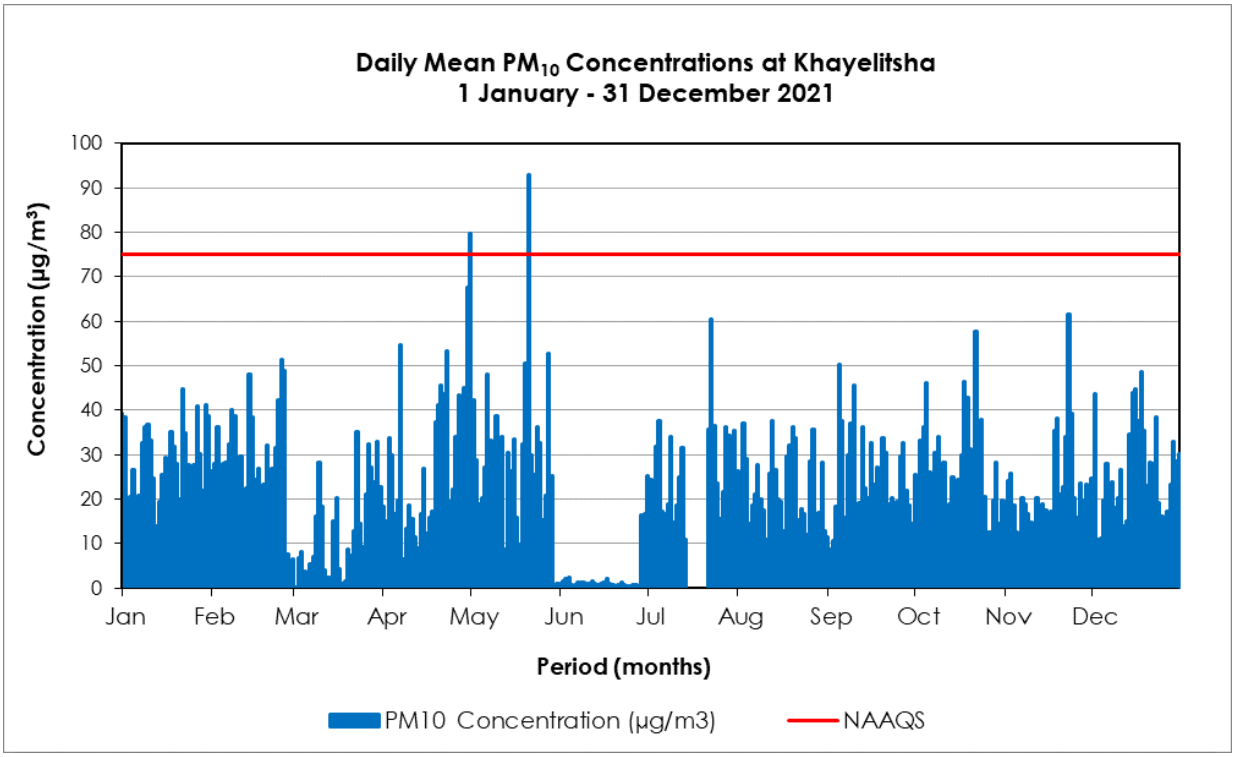


Figure 7-74: Daily mean PM_{10} concentrations at Khayelitsha (2021)

Carbon Dioxide (CO_2)

The CO_2 concentrations measured at the Khayelitsha monitoring station during this period are shown in Figure 7-75.

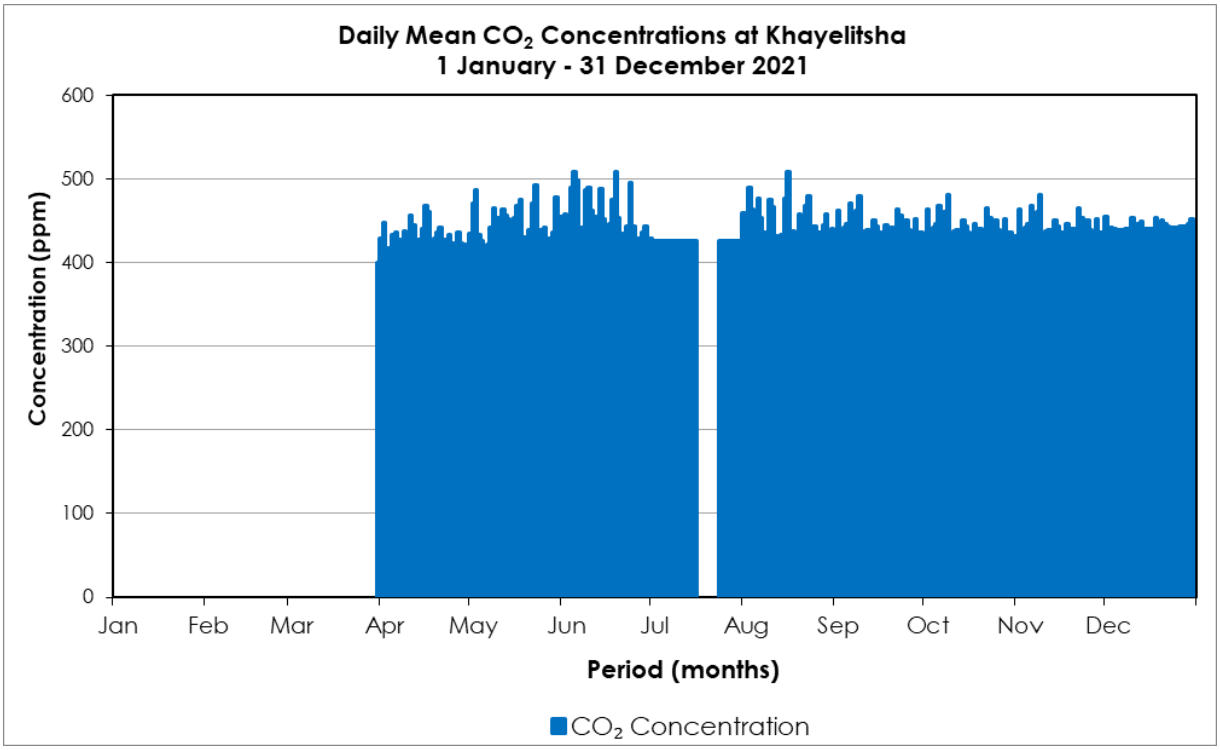


Figure 7-75: Daily mean CO_2 concentrations at Khayelitsha (2021)

Long term air quality trends for Khayelitsha

The long-term trends for the parameters measured at Khayelitsha, from January 2012 to December 2021, are shown in Figure 7-76 to Figure 7-79. Overall, all parameters measured were below the NAAQS.

The PM_{10} analyser at Khayelitsha was replaced during May 2019 and therefore there are no long-term trend graphs to present in this report.

The long-term CO concentrations (Figure 7-76) (January 2012 – December 2021) shows an average concentration of 2.8 mg/m^3 and remained below the 10 mg/m^3 NAAQS.

Ozone is a secondary pollutant that is produced when VOC and NO_x gases react with each other in the presence of sunlight. The long term O_3 concentrations (Figure 7-77) (January 2012 – December 2021) shows an average concentration of 11 µg/m^3 and remained below the 120 µg/m^3 NAAQS. The graph shows that O_3 peaks are predominantly higher in the summer months, primarily associated with the increased sunlight and warmer temperatures for the secondary pollutant production.

The long-term NO_2 concentrations (Figure 7-78) (November 2012 – December 2021) shows an average concentration of 8.7 µg/m^3 and remained below the 200 µg/m^3 NAAQS. The NO_2 data trend shows higher levels during the winter months with no exceedances of the NAAQS.

The long-term SO_2 concentrations (Figure 7-79) (January 2012 – December 2020) shows an average concentration of 41 µg/m^3 and remained below the 125 µg/m^3 NAAQS.

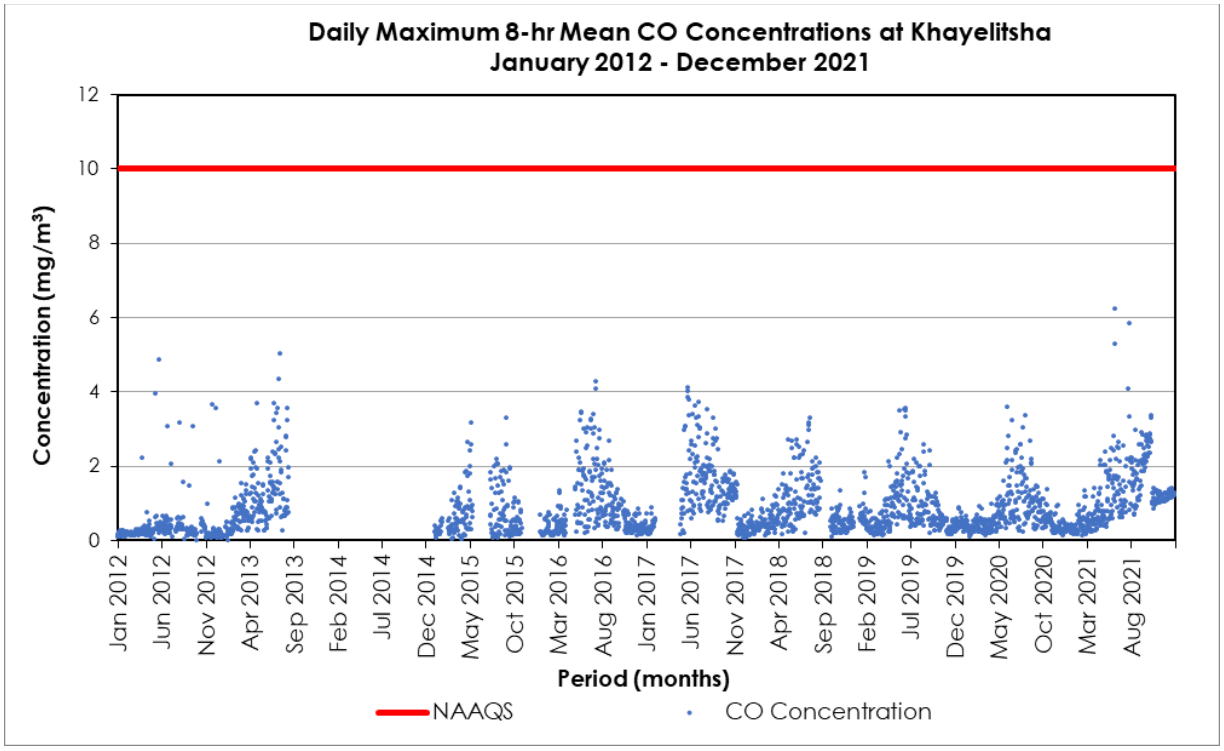


Figure 7-76: Long term trend daily maximum 8-hour mean CO at Khayelitsha (Jan 2012 – Dec 2021)

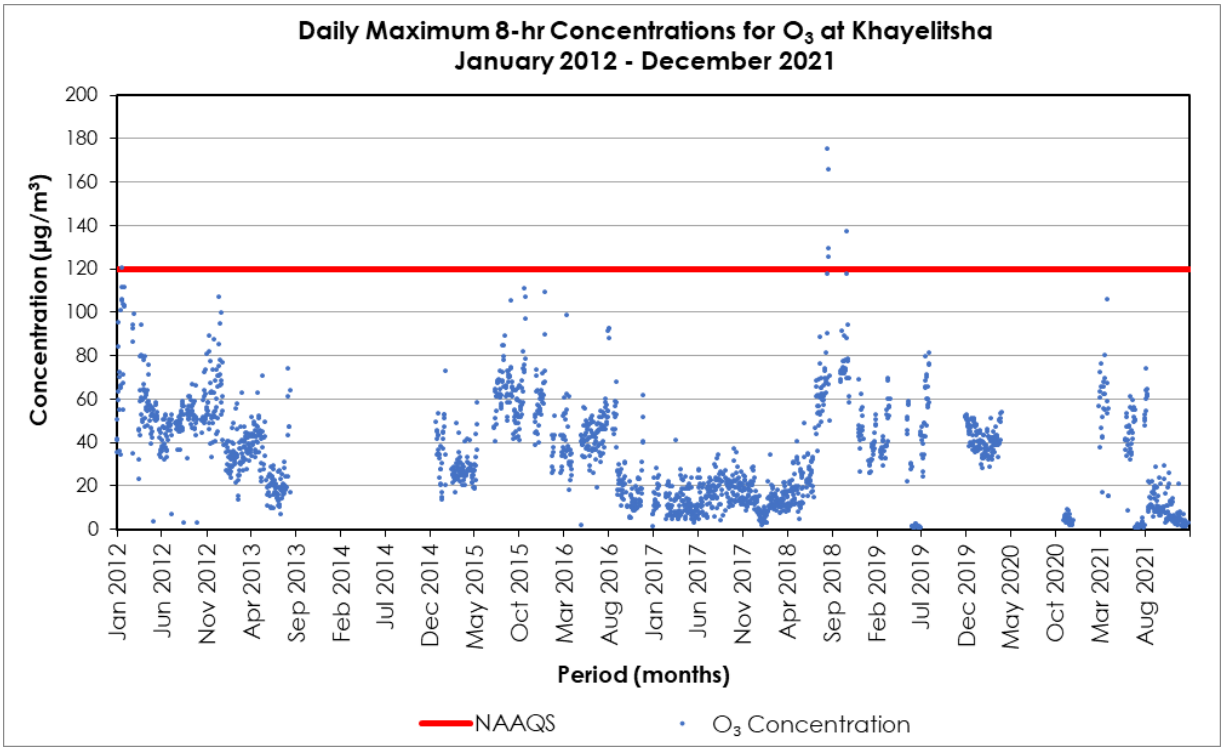


Figure 7-77: Long term trend of daily maximum 8-hour mean O_3 at Khayelitsha (Jan 2012 – Dec 2021)

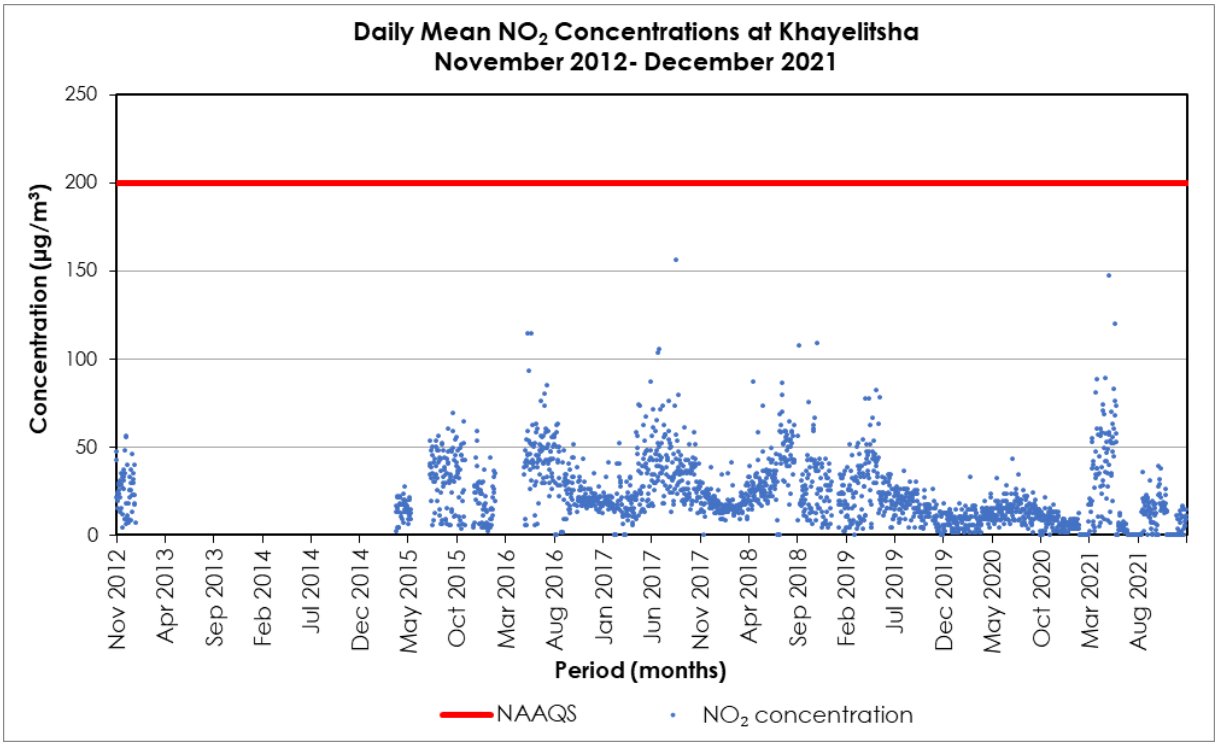


Figure 7-78: Long term trend of daily mean NO_2 at Khayelitsha (Nov 2012 – Dec 2021)

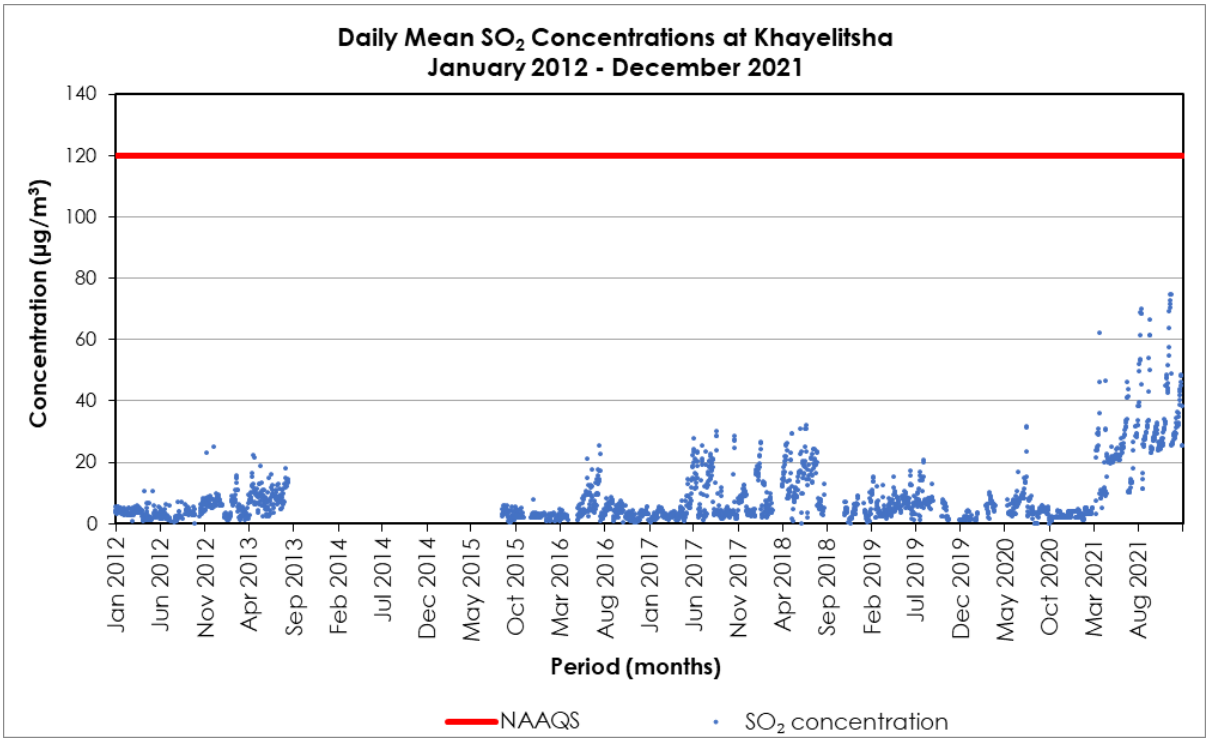
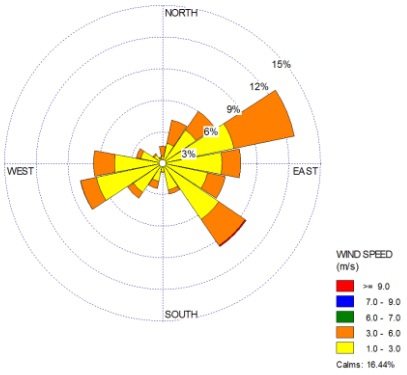


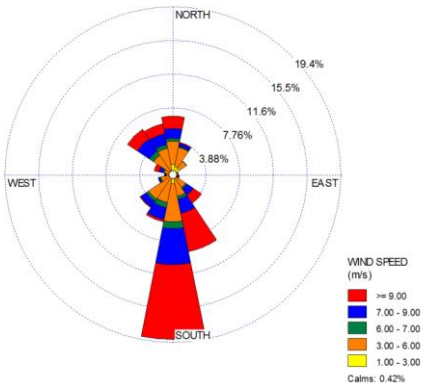
Figure 7-79: Long term trend of daily mean SO_2 at Khayelitsha (Jan 2012 – Dec 2021)

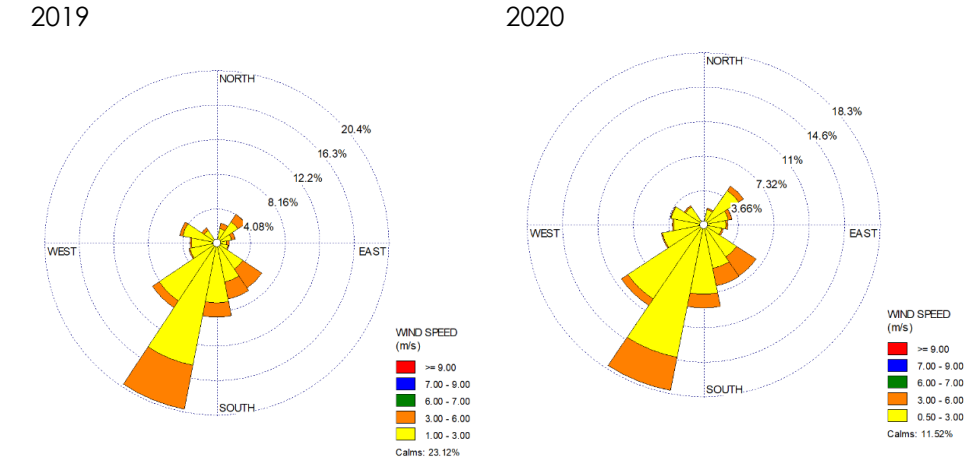
Overall, the meteorological conditions for the period under review were characterized by variable light to moderate winds. In 2016, predominant south easterly, north easterly and westerly winds occurred. In 2017, 2019 and 2020 predominant southerly, south easterly and south westerly winds were prevalent (Figure 7-80). Due to faulty instrumentation the data capture for wind speed and wind direction was low in 2018.

2016



2017





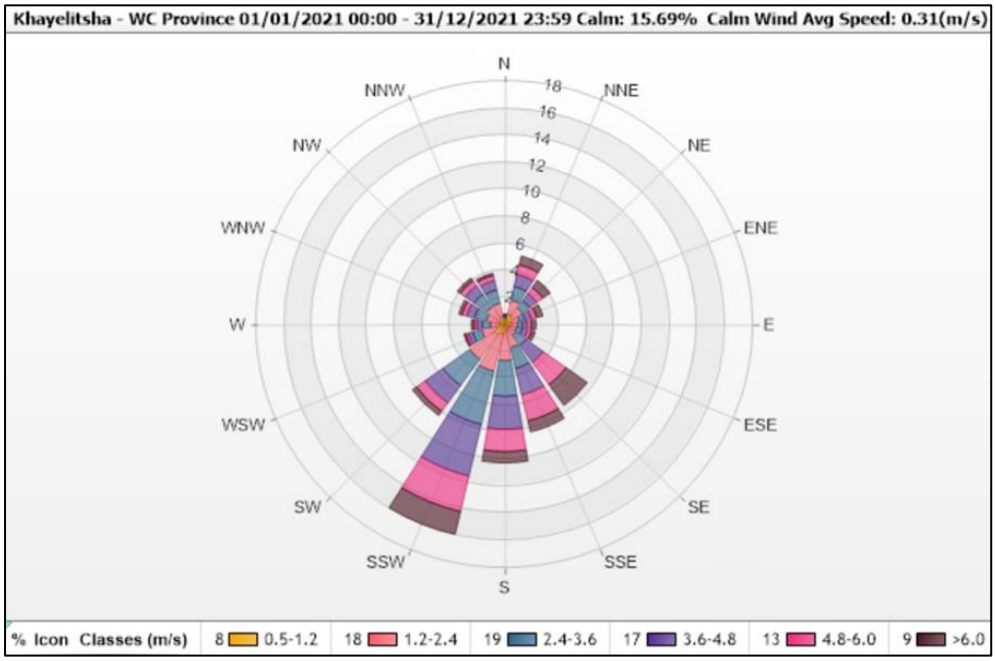


Figure 7-80: Annual wind rose for Khayelitsha (2016, 2017,2019, 2020 and 2021)

3.2.5.2 Hout Bay (City of Cape Town)

The Hout Bay ambient air quality monitoring station was commissioned in January 2014 and is located at the Sentinel Primary School in Hout Bay (Figure 3-81). The monitoring station is located in a residential area in close proximity of industrial activities and a working harbour. Table 3-14 shows the data capture percentage for each air pollutant monitored at the Hout Bay air quality monitoring station during 2021. The data capture rate for meteorological parameters was below 60% for 2021 due to faulty sensors; therefore, the meteorological data is not presented in this report.

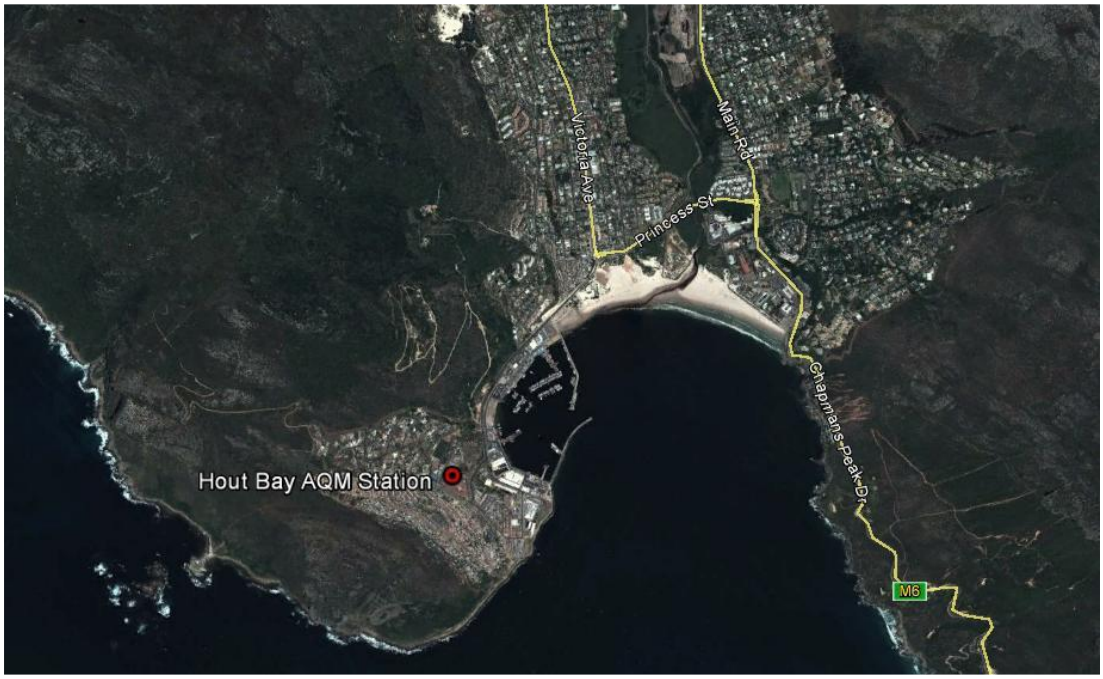


Figure 3-81: Aerial image of Hout Bay ambient air quality monitoring location

TABLE 3-14 HOUT BAY DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Hydrogen Sulphide (H_2S)	76

Hydrogen Sulphide (H_2S)

Daily maximum hourly H_2S concentrations measured at the Hout Bay ambient air quality monitoring station are shown in Figure 3-82. A daily maximum hourly H_2S peak of 10.53 µg/m³ was observed on 29 August 2021. There were no exceedances of the WHO guideline of 150 µg/m³ daily average in 2021. The annual average H_2S concentration was approximately 5.2 µg/m³ for the 2021 monitoring period.

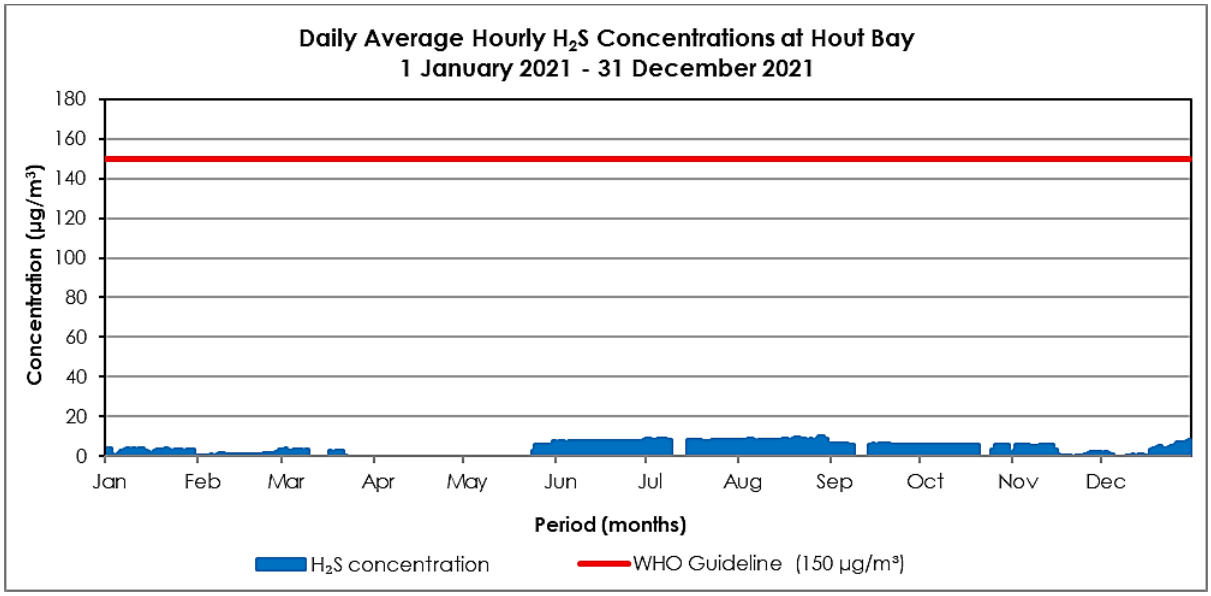


Figure 3-81: Daily average (1–hour mean) for H_2S at Hout Bay (2021)

Long term air quality trends for Hout Bay

The long term H_2S concentrations measured at the Hout Bay ambient air quality monitoring station from January 2014 to December 2021 are shown in Figure 3-82. While there have been no exceedances of the WHO 1-hour guideline of 150 µg/m^3, there is a discernible trend of H_2S peaks during the autumn/winter season since the inception of the Hout Bay monitoring station.

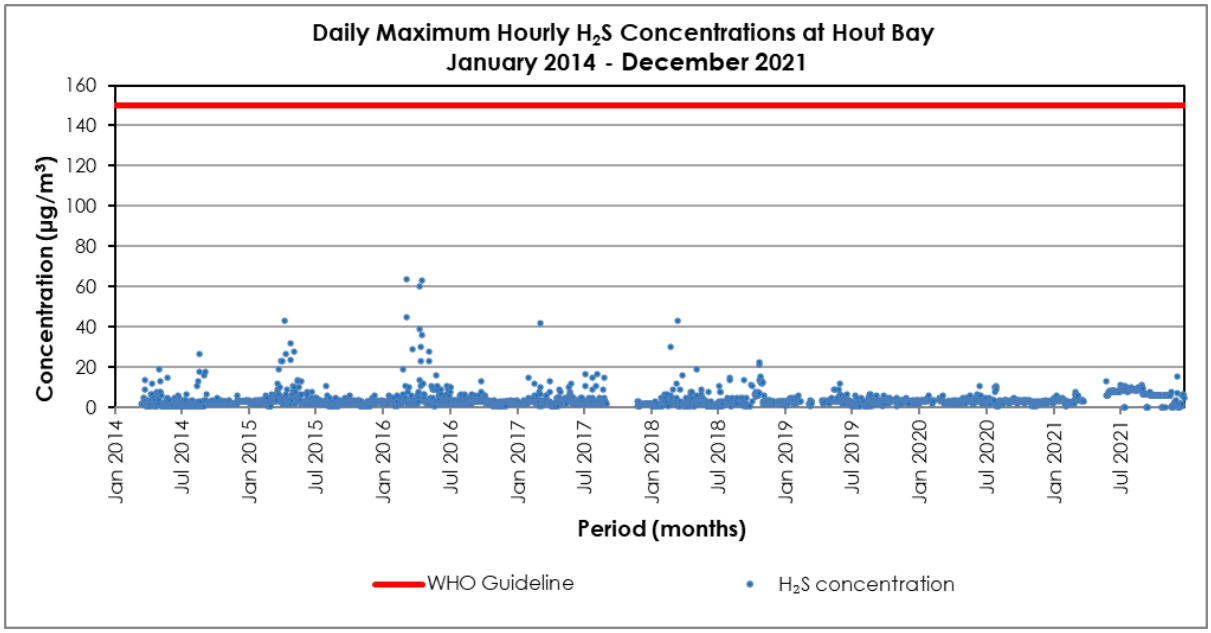
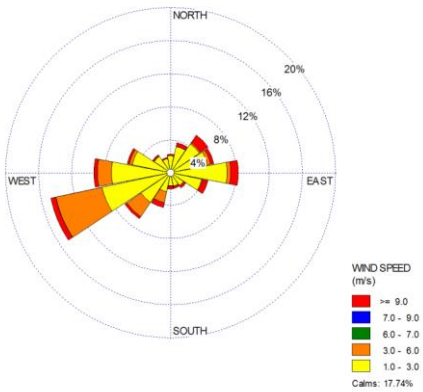


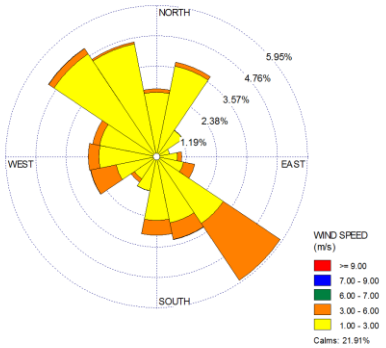
Figure 3-82: Long term H_2S trend at Hout Bay (Apr 2011 – Dec 2021)

Overall, the meteorological conditions for the period under review were characterized by variable winds throughout (Figure 3-83). During 2016, the wind speed and direction was predominantly light to moderate winds, with strong south-westerly, westerly and easterly components. During 2017, the wind speed and direction was predominantly light to moderate winds, with dominant south-easterly and north-westerly components. During 2018, the wind speed and direction was predominantly moderate to strong winds, with dominant north-westerly and south-easterly components. The wind data capture rate was below 60 % for 2019, therefore wind data is presented for 2018.

2016



2017



2018

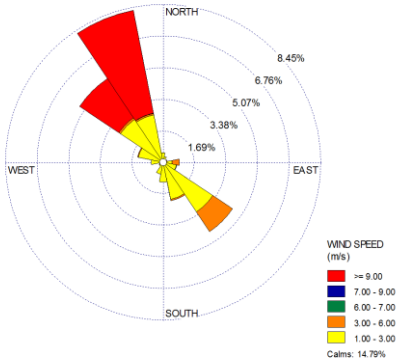


Figure 3-83: Annual wind rose for Hout Bay (2016 – 2018)

3.2.5.3 Maitland (City of Cape Town)

The Maitland Air Quality Monitoring Station was commissioned in March 2021 and is located on the premises of the Maitland Crematorium (Figure 3-84), Maitland, Cape Town. This station is situated between the suburbs of Kensington to the north, Pinelands to the south and Thornton to the southeast. There are light industrial areas to the north, as well as to the west.

Figure 3-84: Location of the Maitland Air Quality Monitoring Station in Maitland, Cape Town

Data is analysed for completeness against required standards and is presented in Table 3-14 as the data capture percentage for each air pollutant monitored at the Maitland air quality monitoring station during 2021. The data is presented from 1 April 2021 as the CO and PM_{10} analysers were commissioned after 15 March 2021.

TABLE 3-14: MAITLAND DATA CAPTURE (2021)

MEASUREMENT	% DATA CAPTURE
Sulphur Dioxide (SO_2)	95
Nitrogen Dioxide (NO_2)	95
Carbon Monoxide (CO)	95
Particulates (PM_{10})	95

Sulphur Dioxide (SO_2)

The SO_2 concentrations measured at Maitland are presented In Figure 3-85. The SO_2 NAAQS of 125 µg/m³ was not exceeded during the monitoring period. The average SO_2 concentration at Maitland was 3.7 µg/m³ for the measurement period during 2021. The highest recorded value of 9 µg/m³ was recorded during July 2021.

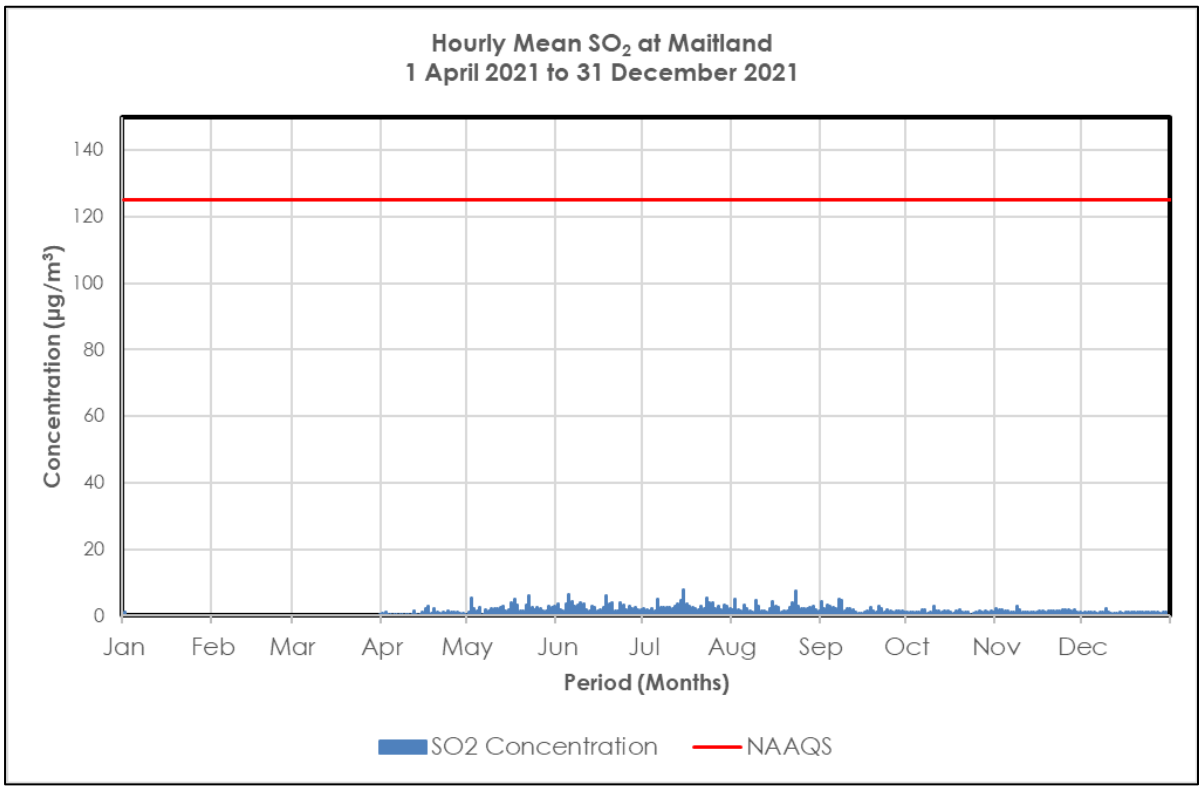


Figure 3-85: Mean SO_2 concentrations at Maitland (2021)

Nitrogen Dioxide (NO_2)

Hourly averages for NO_2 concentrations measured at the Maitland ambient air quality monitoring station are shown in Figure 3-86. The NO_2 (1-hour) NAAQS of 200 µg/m³ was not exceeded during the monitoring period. There appears to be higher winter season values of NO_2 concentrations observed during the monitoring period. This may be due to the shorter sunlight hours and lower atmospheric temperatures in winter which result in reduced conversion of NO_2 to secondary compounds. The annual average for NO_2 was 14.7 µg/m³ during the 2021 monitoring period below the annual NAAQS standard.

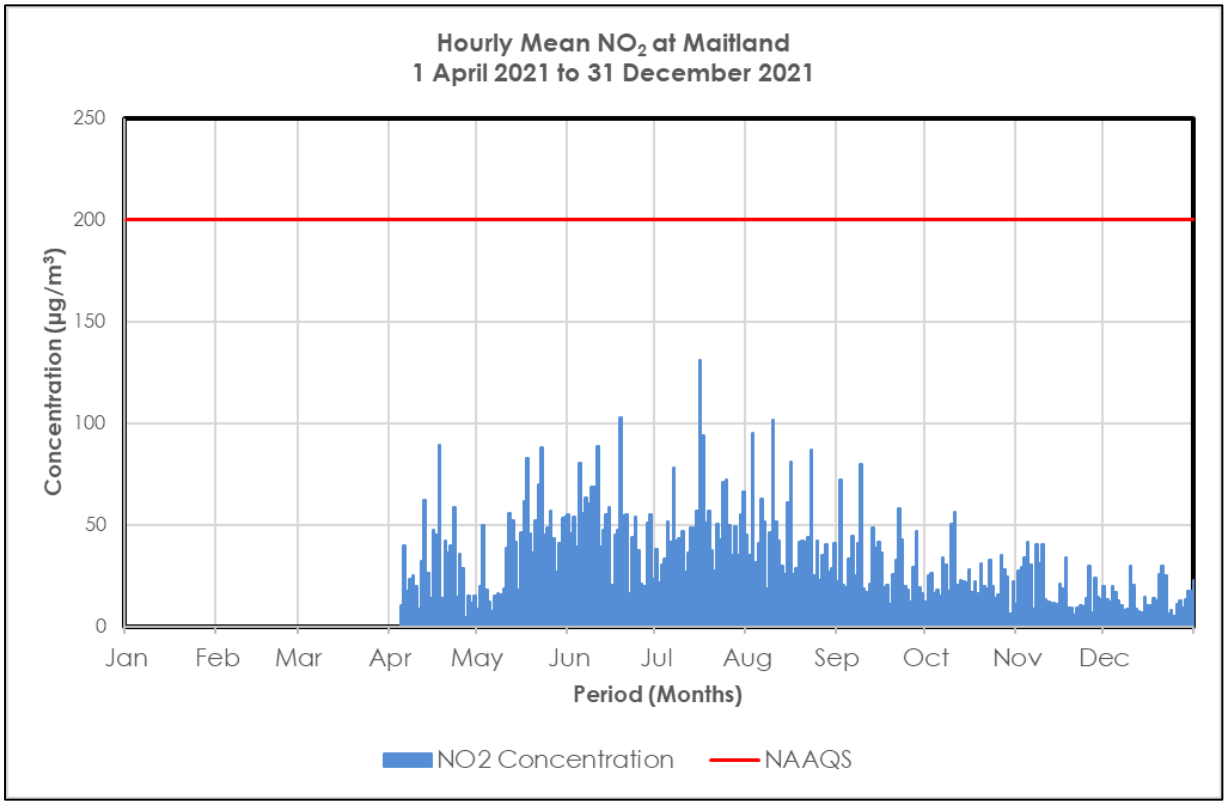


Figure 3-86: Maximum (1-hour mean) for NO_2 at Maitland (2021)

- **Carbon Monoxide (CO)**

Daily 8-hour CO concentrations measured at the Maitland ambient air quality monitoring station for the period 1 January to 31 December 2021 is shown in Figure 3-87. The CO concentrations were generally low during the 2021 monitoring period; however, elevated CO concentrations were observed during winter from June to August. The CO (8-hour) NAAQS of 10 mg/m^3 calculated from hourly averages was not exceeded during 2021 monitoring period. The 2021 annual average for CO concentrations was 0.5 mg/m^3.

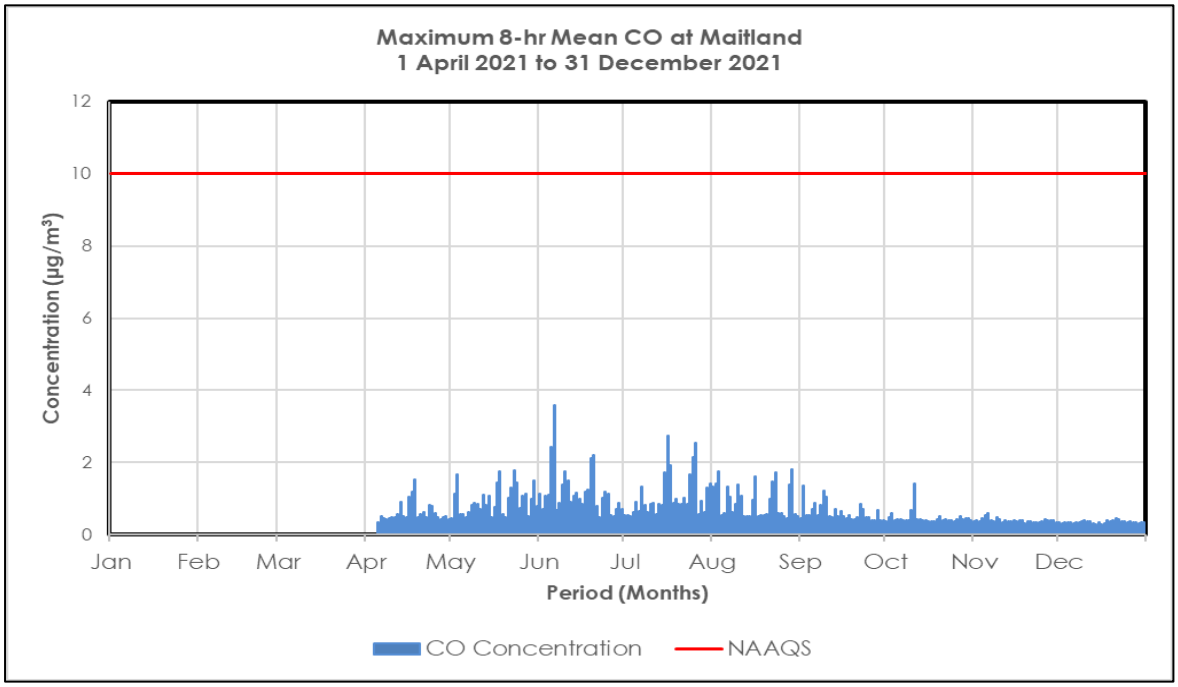


Figure 3-87: Maximum (8-hour mean) for CO at Maitland (2021)

- **Particulate Matter (PM_{10})**

Daily mean PM_{10} concentrations measured at the Maitland ambient air quality monitoring station are shown in Figure 3-88. Two (2) similar maximum daily mean peak for PM_{10} concentrations were recorded in June and July 2021 of just over 50 µg/m³ during the 2021 monitoring period. The daily mean PM_{10} concentrations did not exceeded the NAAQS standard during the monitoring period.

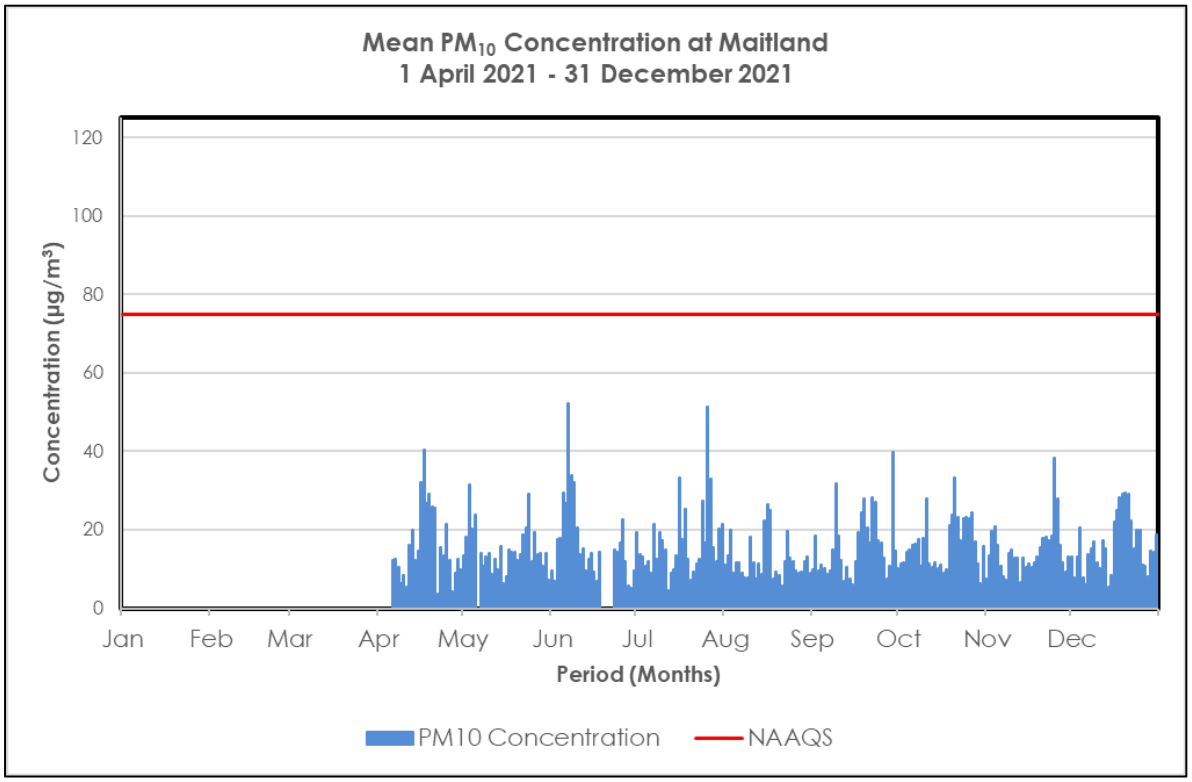


Figure 3-88: Mean PM_{10} Concentrations at Maitland (2021)

Overall, the meteorological conditions for the 2016 – 2021 period were characterised by light to moderate westerly winds. The wind was shown to come from the south and west most of the time at the Maitland ambient air quality monitoring station in 2021. The prevailing winds are predominantly light to moderate at an average wind speed of 1 m/s to 4 m/s. Winds were generally calm at approximately 34 %.

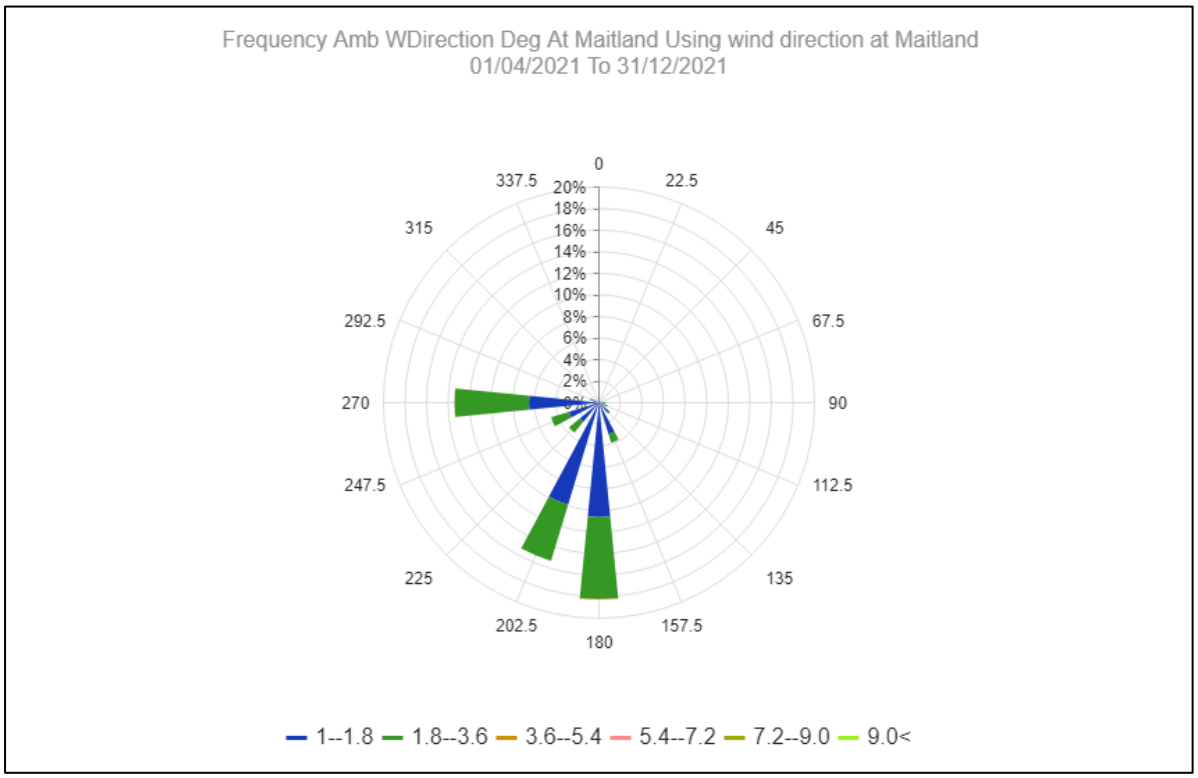


Figure 3-89: Annual Wind Rose for Maitland (2021)

3.3 MUNICIPAL AMBIENT AIR QUALITY MONITORING: WEST COAST DISTRICT MUNICIPALITY

The West Coast District Municipality commissioned an ambient air quality monitoring station in Velddrif in June 2017. The station is located at the Velddrif Municipal Vehicle Testing Station in the Main Road, Velddrift (Figure 3-90). The only parameter measured at this station is H_2S and was established due to odour-related complaints received from residents in living Port Owen and next to the fishmeal plant. Other possible sources of H_2S that were identified include the estuary, the salt works, guano from the birds, the red tide, rotting seaweed, and the sewerage plant. A meteorological station was commissioned on-site in April 2018.

Figure 3-90: Location of the WCDM air quality monitoring station in Velddrif

- **Hydrogen Sulphide (H_2S)**

There were no exceedances of the H_2S WHO Health Guideline of 150 µg/m³ during 2021 (Figure 3-91).

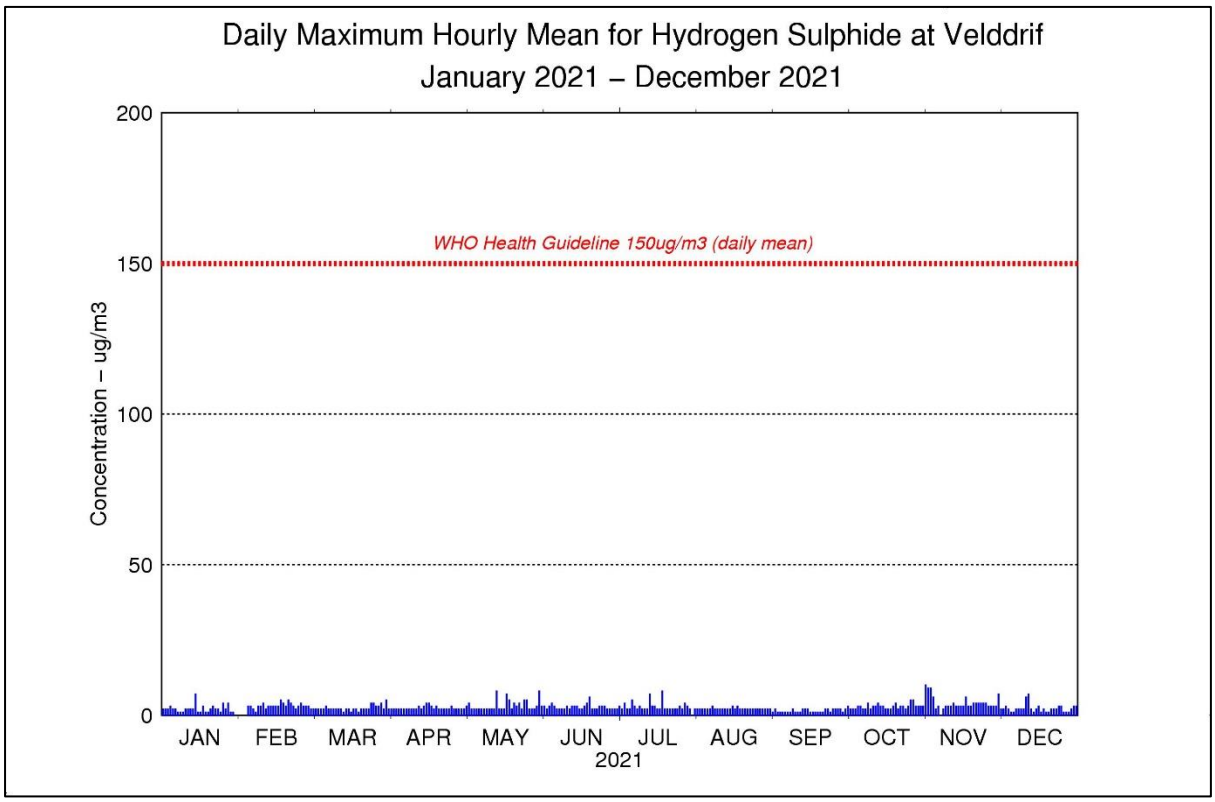


Figure 3-91: Daily maximum hourly mean for H_2S at Velddrif (Jan-Dec 2021)

- **Long term air quality trends for Velddrif**

The long term H_2S concentrations measured at the Velddrif ambient air quality monitoring station from June 2017 to December 2021 are shown in Figure 3-92. There have been no exceedances of the WHO Guideline of 150 µg/m^3.

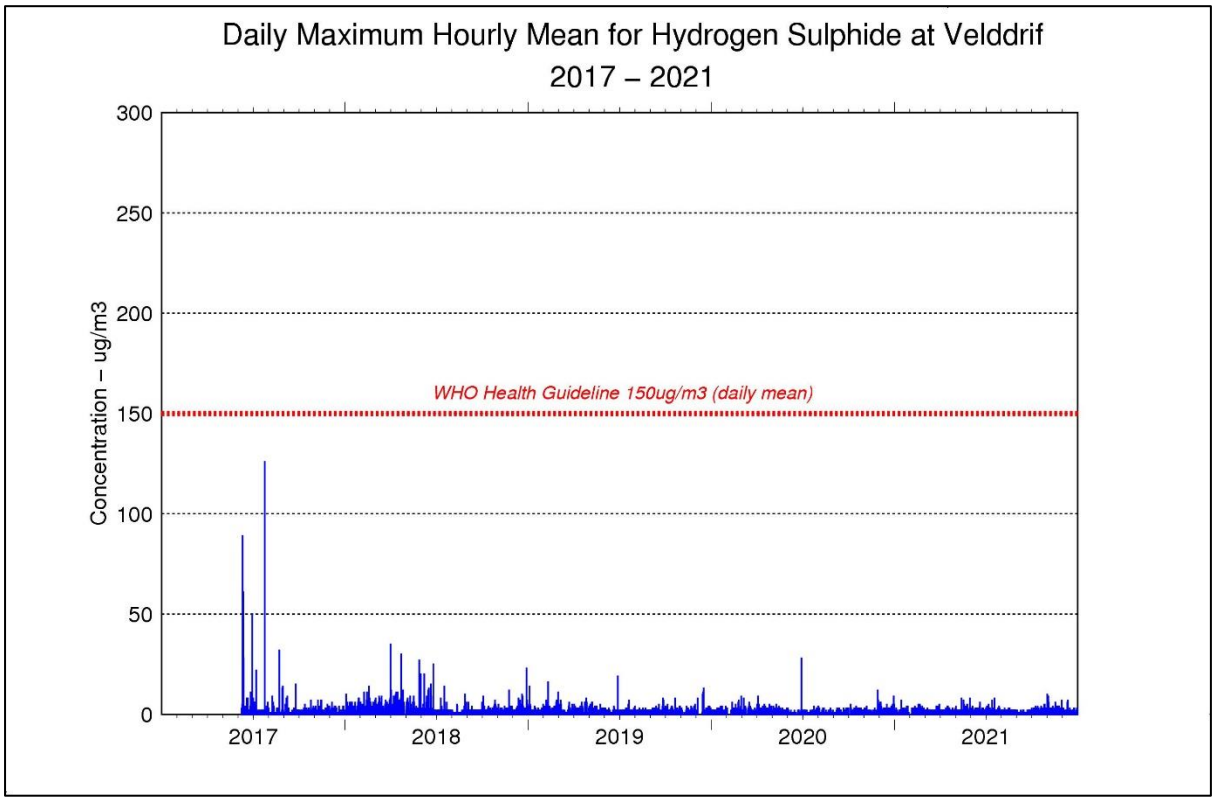


Figure 3-92: Daily maximum hourly mean for H_2S at Velddrif (June 2017 – December 2021)

3.4 MUNICIPAL AMBIENT AIR QUALITY MONITORING: SALDANHA BAY MUNICIPALITY

The Saldanha Bay Municipality (SBM) commissioned two ambient air quality monitoring stations in 2014, located in Saldanha Bay and Vredenburg. The site selected at Vredenburg is ideally located on the prevailing wind vector to detect the impact of industrial emission in Saldanha Bay on the residential areas in Vredenburg. The Saldanha Bay monitoring site is removed from the primary impact zone of Saldanha Bay industries, and ideally located to monitor changes in ambient air quality as a result of development at the Port of Saldanha. The location of the monitoring stations is illustrated in Figure 3-93.

The SBM Ambient Air Monitoring Network comprises two (2) fully automated ambient air quality monitoring stations and seven (7) dust fallout monitoring sites. These sites are designed to measure SO_2, NO, NO_2, NO_x, O_3, PM_{10} and $PM_{2.5}$, and meteorological parameters.

Further monitoring in the Saldanha Bay district is conducted by Transnet Port Terminals (PM_{10} and dust fallout monitoring) and Saldanha Steel (dust fallout monitoring), but it is not reported in this report.

Figure 3-94 to Figure 3-96 depict the results for the Saldanha Bay municipality stations.

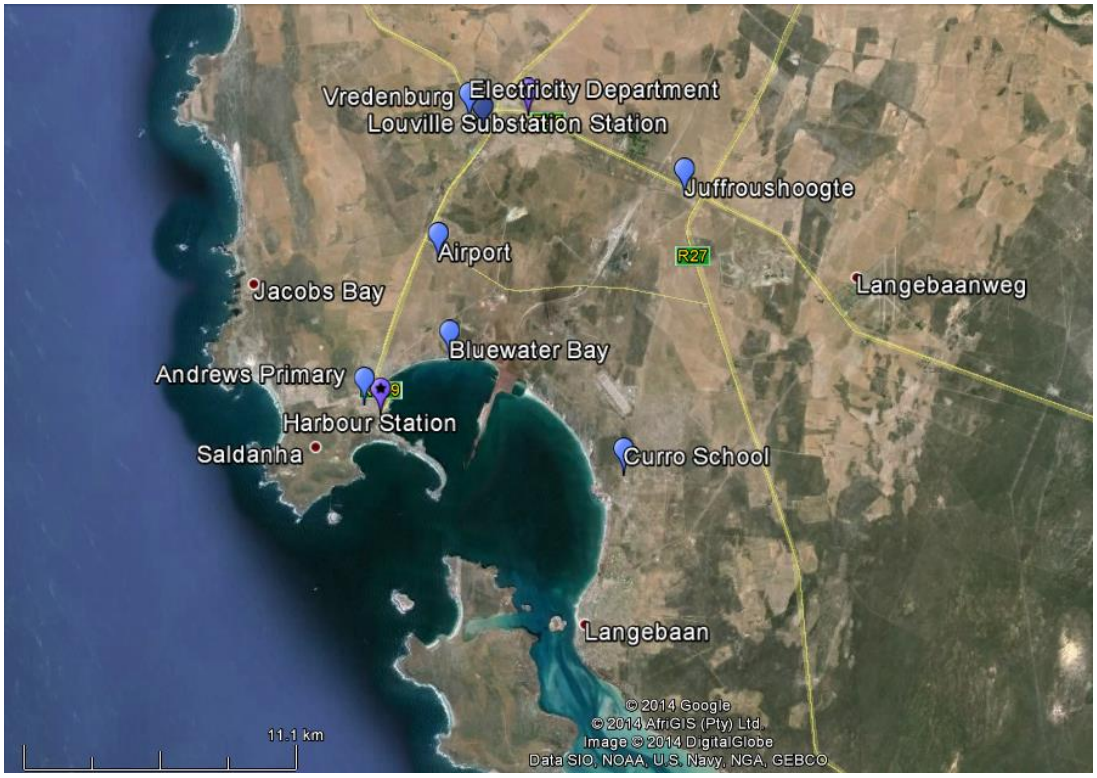


Figure 3-93: Aerial map showing location of monitoring stations - SBM

Particulate Matter ($PM_{2.5}$)

There is insufficient data for $PM_{2.5}$ to report for this period due to equipment failure, vandalism and the service provider's contract ending mid-2021.

Particulate Matter (PM_{10})

There is insufficient data for PM_{10} to report for this period due to vandalism, air conditioner failure and load-shedding.

Nitrogen Dioxide (NO_2)

There is limited data for NO_2 during 2021 due to COVID-19 restrictions, vandalism and the contract ending in mid-2021. The NO_2 NAAQS of 106 µg/m^3 (ppb) was not exceeded during the monitoring period (Figure 3-94).

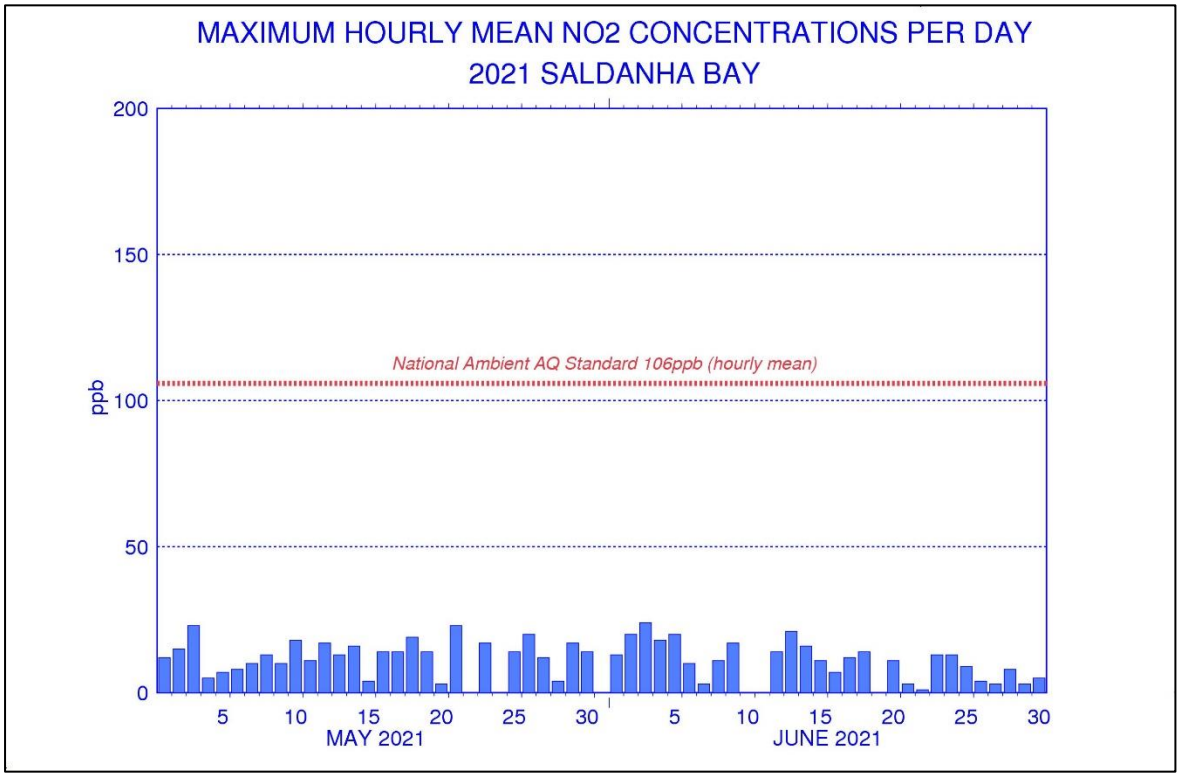


Figure 3-94: Saldanha Bay NO_2 hourly mean concentrations (2021)

- **Ozone (O_3)**

The O_3 NAAQS were not exceeded during the monitoring period (Figure 3-95). The data gaps for O_3 recorded during 2021 were as a result of COVID-19 restrictions, vandalism and the contract ending in mid-2021.

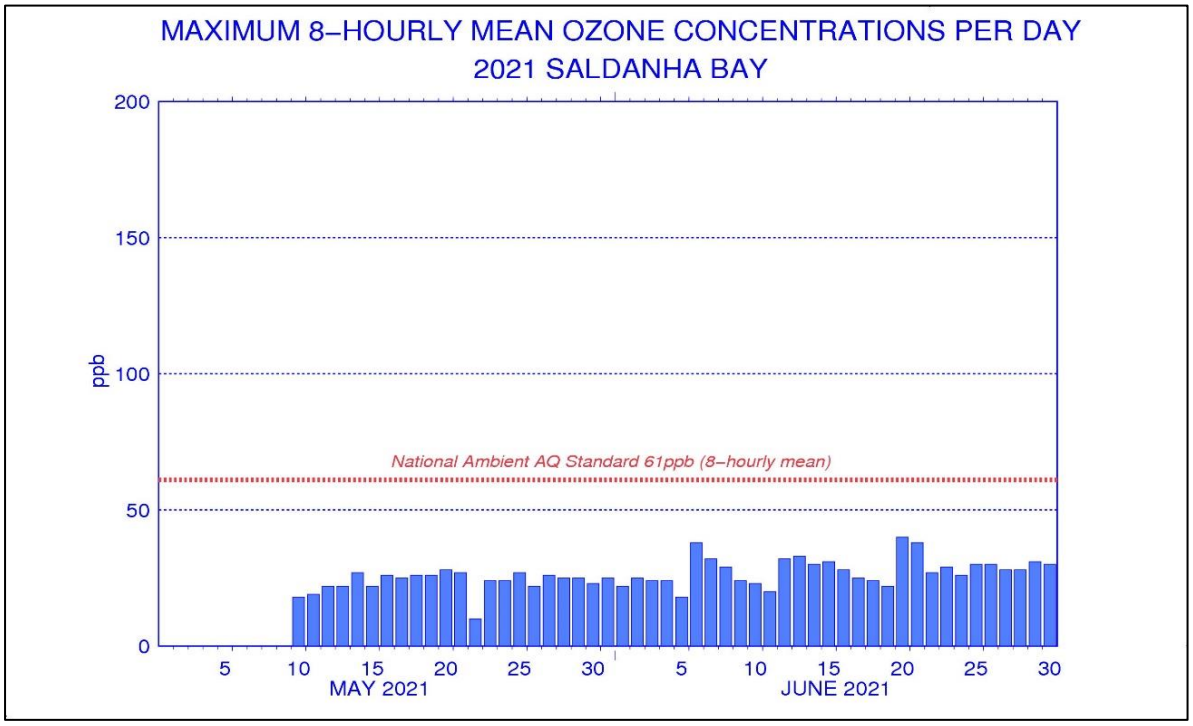


Figure 3-95: Saldanha Bay O_3 8-hour mean concentrations (2021)

Sulphur Dioxide (SO_2)

The SO_2 NAAQS of 48 µg/m³ (ppb) (daily mean) were not exceeded during 2021 (Figure 3-96). The data gaps for O_3 recorded during 2021 were a result of COVID-19 restrictions, vandalism and the service providers' contract ending in mid-2021.

Due to low data recovery, reliable average SO_2 concentrations were not obtainable to compare to annual SO_2 NAAQS standards.

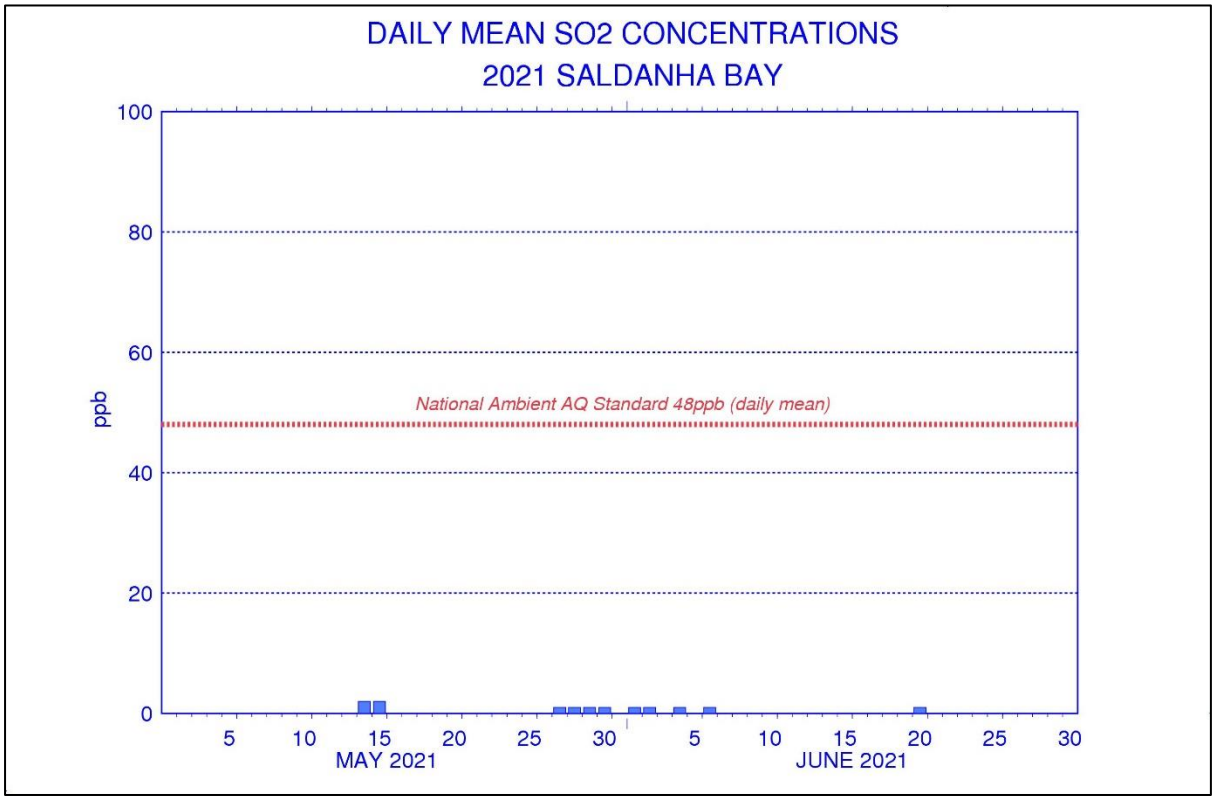


Figure 3-96: Saldanha Bay SO2 hourly mean concentrations (2021)

Long term air quality data for Saldanha Bay

The long term $PM_{2.5}$, NO_2, O_3, SO_2, and PM_{10} concentrations measured at the Saldanha Bay ambient air quality monitoring stations from 2015 to 2021 are shown in Figure 3-97 to Figure 3-101.

Overall, all pollutants monitored were below the respective NAAQS, except for a few exceedances of the daily mean PM_{10} NAAQS during 2016.

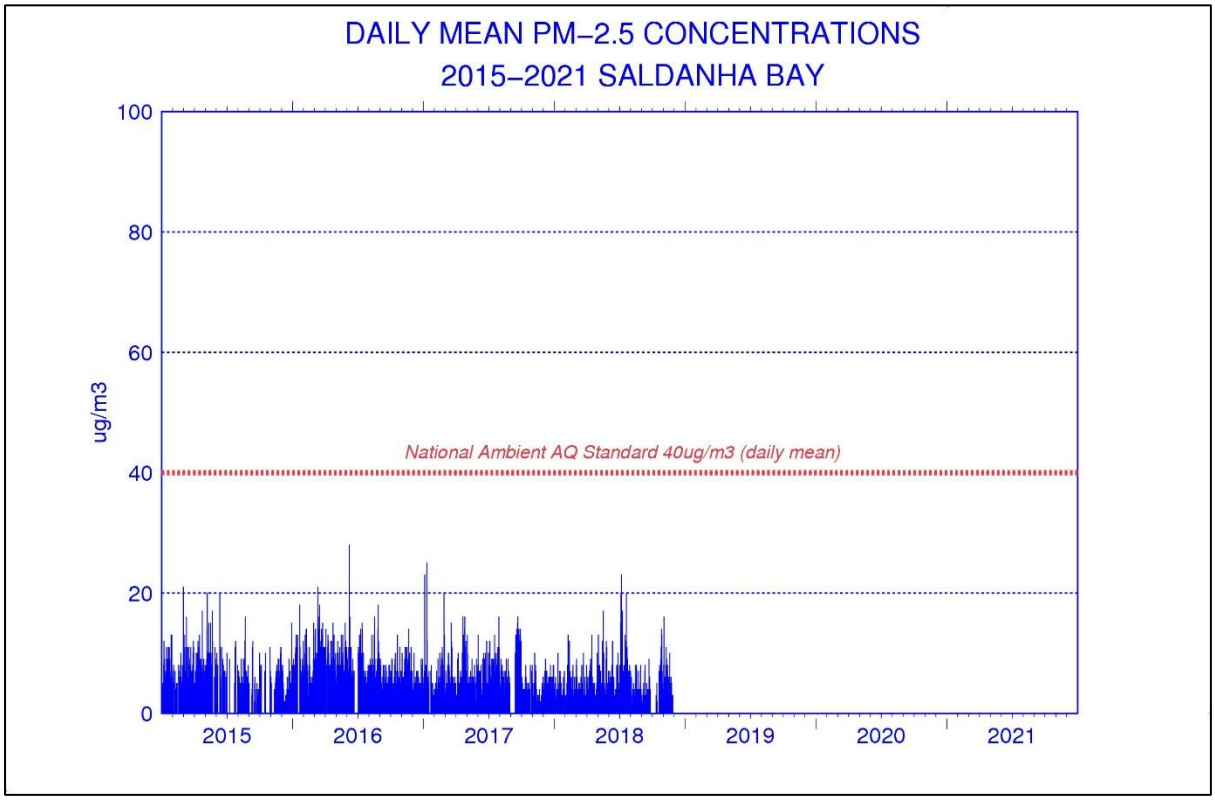


Figure 3-97: Long term trend Saldanha Bay $PM_{2.5}$ daily mean concentrations (2015-2021)

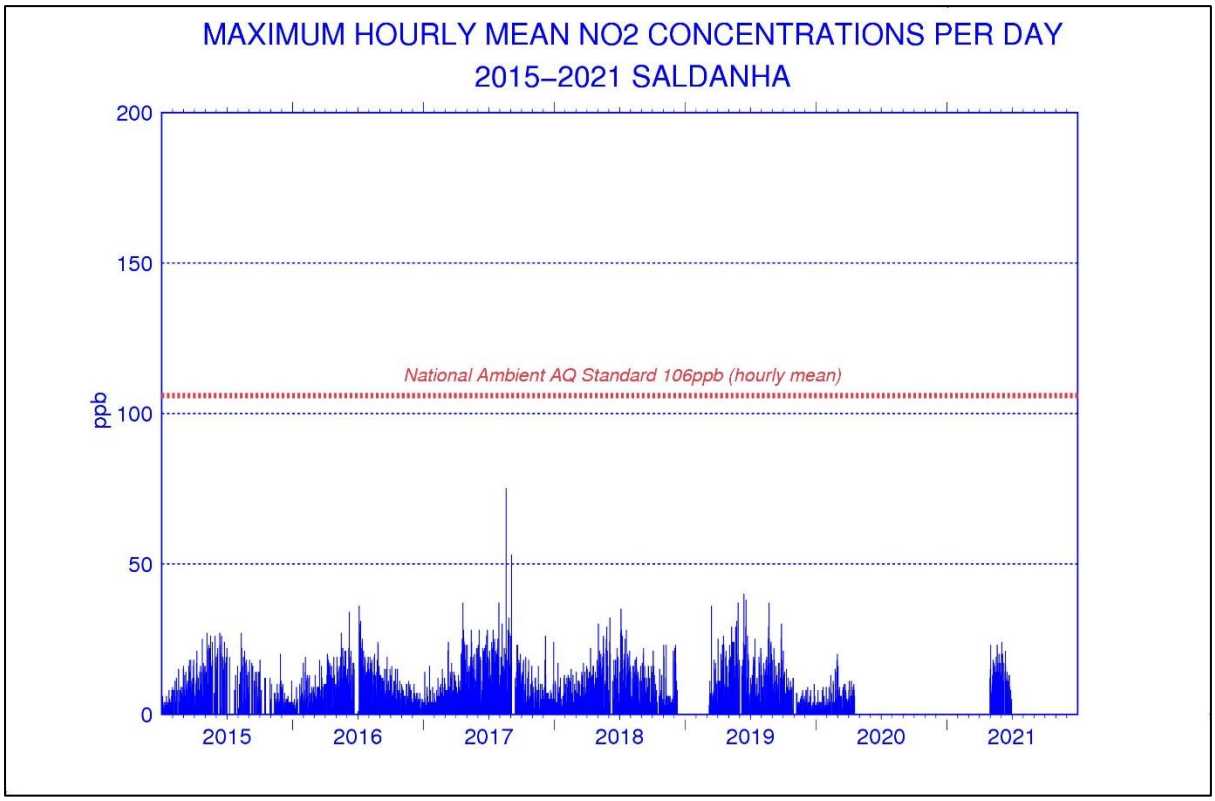


Figure 3-98: Long term trend Saldanha Bay NO_2 daily mean concentrations (2015-2021)

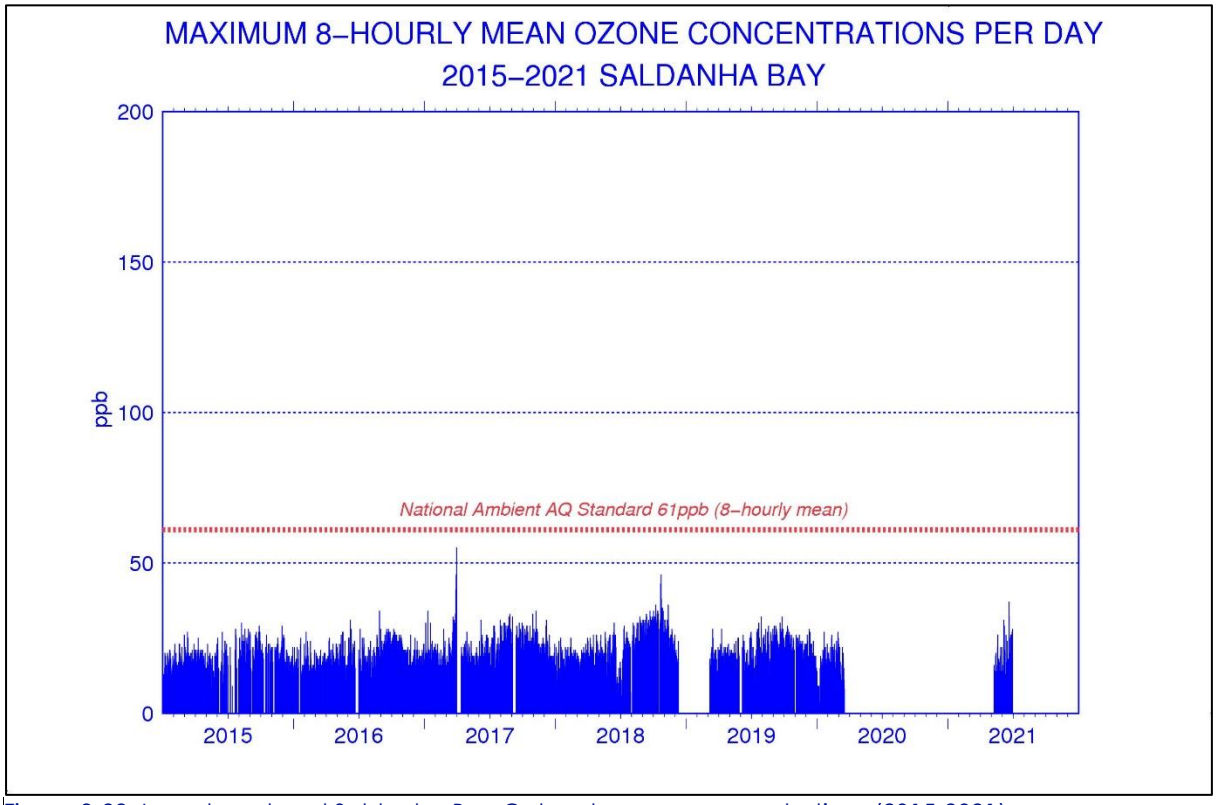


Figure 3-99: Long term trend Saldanha Bay O_3 hourly mean concentrations (2015-2021)

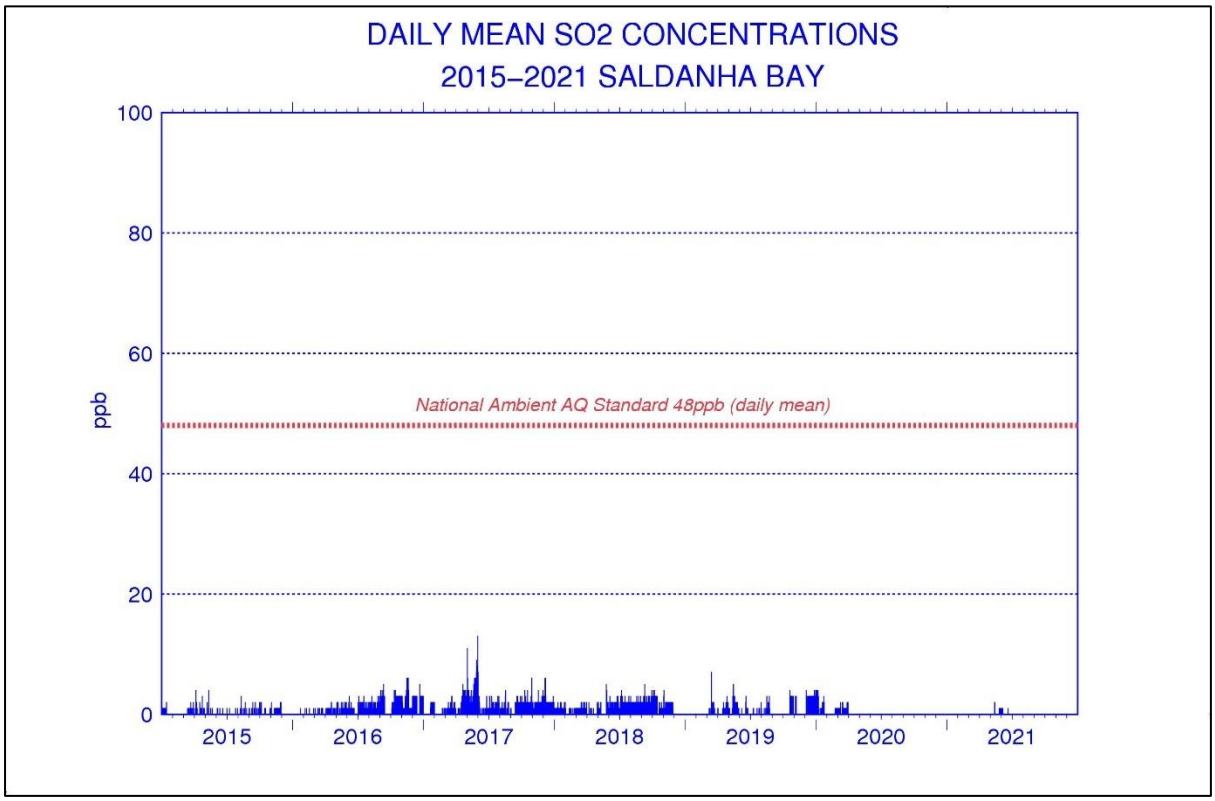


Figure 3-100: Long term trend Saldanha Bay SO_2 hourly mean concentrations (2015-2021)

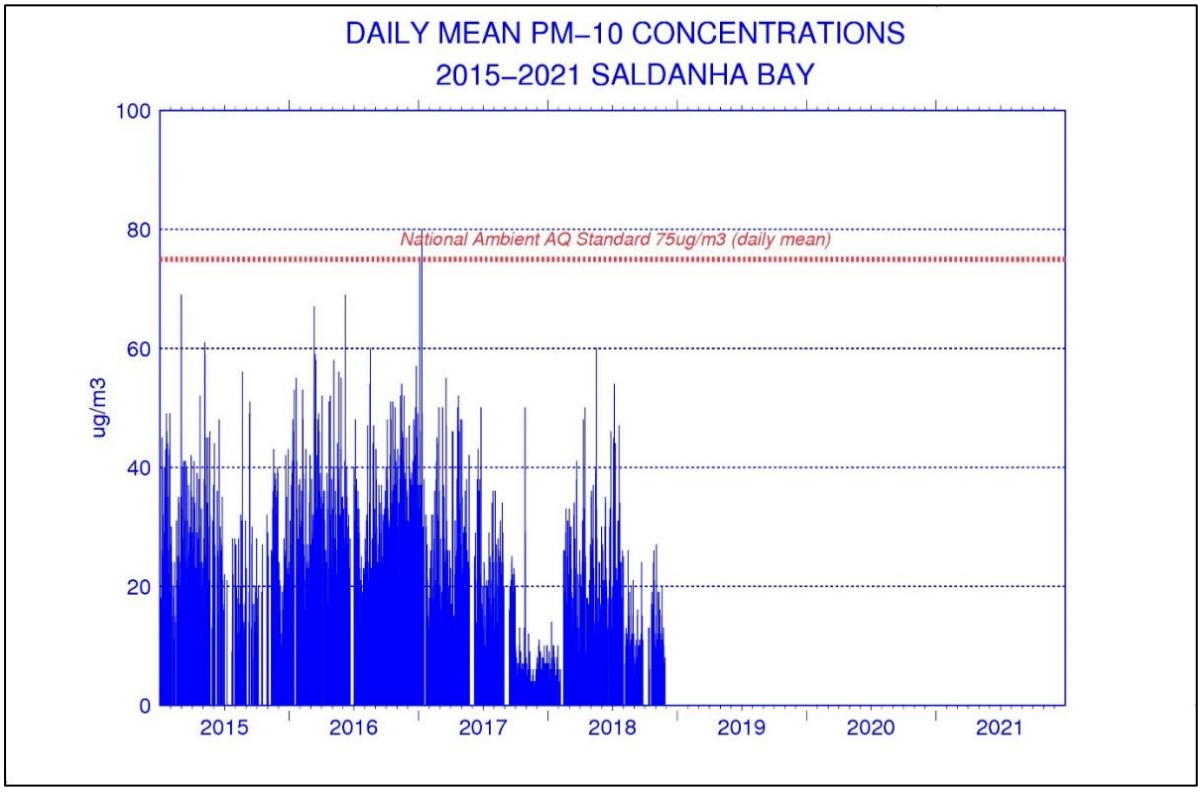


Figure 3-101: Long term trend Saldanha Bay PM_{10} daily mean concentrations (2015-2021)

The long-term dust fallout concentrations measured at the seven Saldanha Bay Municipality's dust fallout sites are shown in Figure 3-104. There was no exceedance of the National Dust Control Regulations, Residential and Non-Residential limit of 600 < D < 1200 (dust fallout rate in $mg/m^2/day$, 30 days average) during 2021. Data gaps are due to the service providers' contract that ended in May 2021.

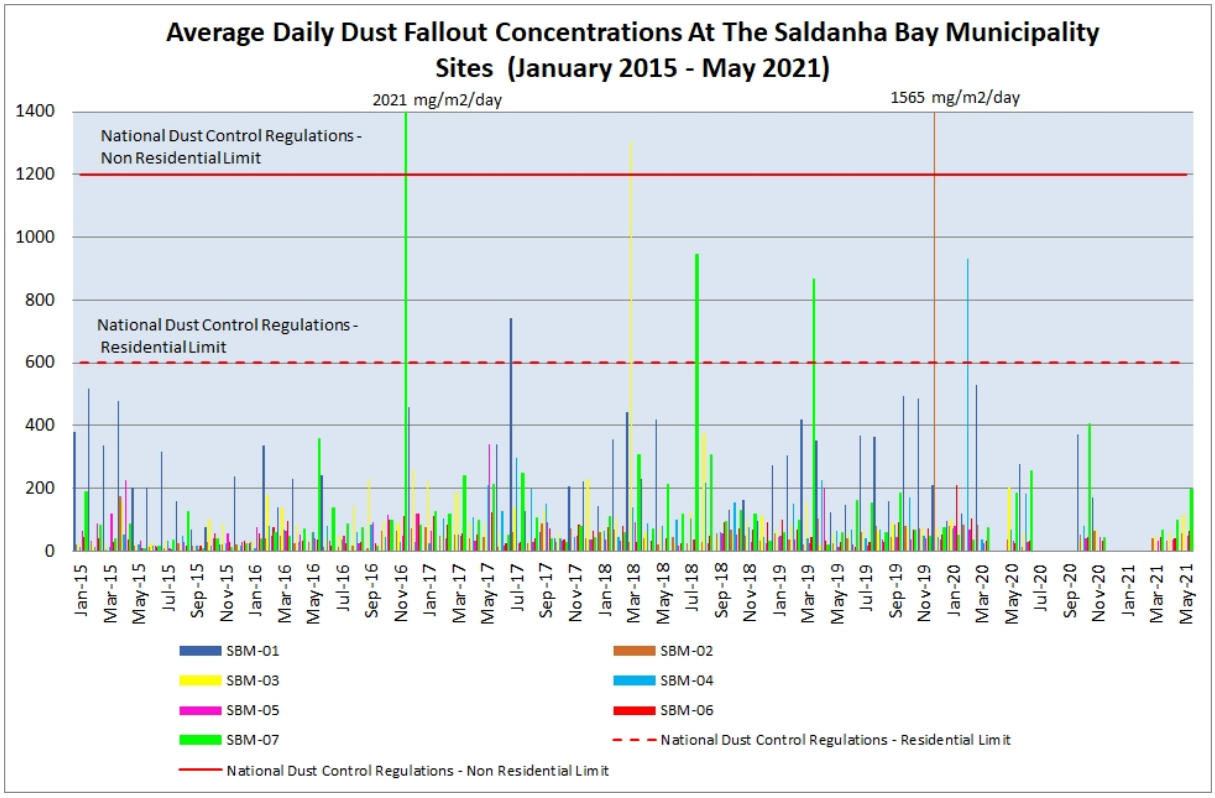


Figure 3-102: Saldanha Bay average daily dust fallout concentrations (2015-2021)

3.5 MUNICIPAL AMBIENT AIR QUALITY MONITORING: CITY OF CAPE TOWN (CCT)

The City of Cape Town's Air Quality Monitoring Network consists of 14 ambient air quality monitoring stations, as indicated in Figure 3-103. The Network is complemented by three (3) additional continuous ambient air quality monitoring stations, which are operated by the DEA&DP at Maitland (since April 2021) Hout Bay and Khayelitsha (Section 3.2).

Air pollution in Cape Town is caused by a variety of sources, including industry, vehicle traffic, energy production, and the domestic fuel usage. The summertime south-easterly wind, sometimes known as the "Cape Doctor," is responsible for the dispersion of pollutants throughout the region but it also contributes to raising summertime dust levels.

The ambient air is measured on a continuous basis every 10 seconds and all data are collected on a central server at the CCT's Scientific Services Department. The data is processed daily to 1-minute, 10-minute, 15-minute, 1-hour, 8-hour and daily averages. These averages are compared against guidelines and guideline exceedances are reported daily on the CCT's Air Quality Website, (www.capetown.gov.za/airqual), as well as monthly reports.

The CCT continues to implement its AQMP as a tool for the management of the air quality in order to protect human health and the environment as part of their constitutional responsibility as Local Authority to comply with the NEM: AQA.

"*To specify ambient air quality standards and targets for Cape Town*" is one of the key objectives presented in the CCT's AQMP. Ambient air quality guideline levels indicate safe daily exposure levels for the majority of the population. In order to link pollution levels and non-compliance episodes with the potential for health risk, the CCT has adopted the internationally acceptable UK Guidelines for ambient air quality in its State of the Environment Report.

The Athlone, Somerset West and Potsdam ambient air quality monitoring stations were not operational during 2021 and therefore are not presented in this report.

Figure 3-103: The City of Cape Town Municipal Ambient Air Quality Monitoring Network

3.5.1 Bothasig

The Bothasig monitoring station forms part of the Milnerton area that is monitored. The primary aim of this location is to monitor the impact of a refinery and other emitters on ambient air quality in the area. Ambient monitoring at the Bothasig monitoring station commenced in 1995. The pollutants measured are SO_2 and NO_2.

The SO_2 concentrations measured at the Bothasig monitoring station are shown in Figure 3-104. The SO_2 24 – hour average of 125 µg/m³ was not exceeded during the monitoring period. The annual average for SO_2 was 3 µg/m³ during the 2021 monitoring period.

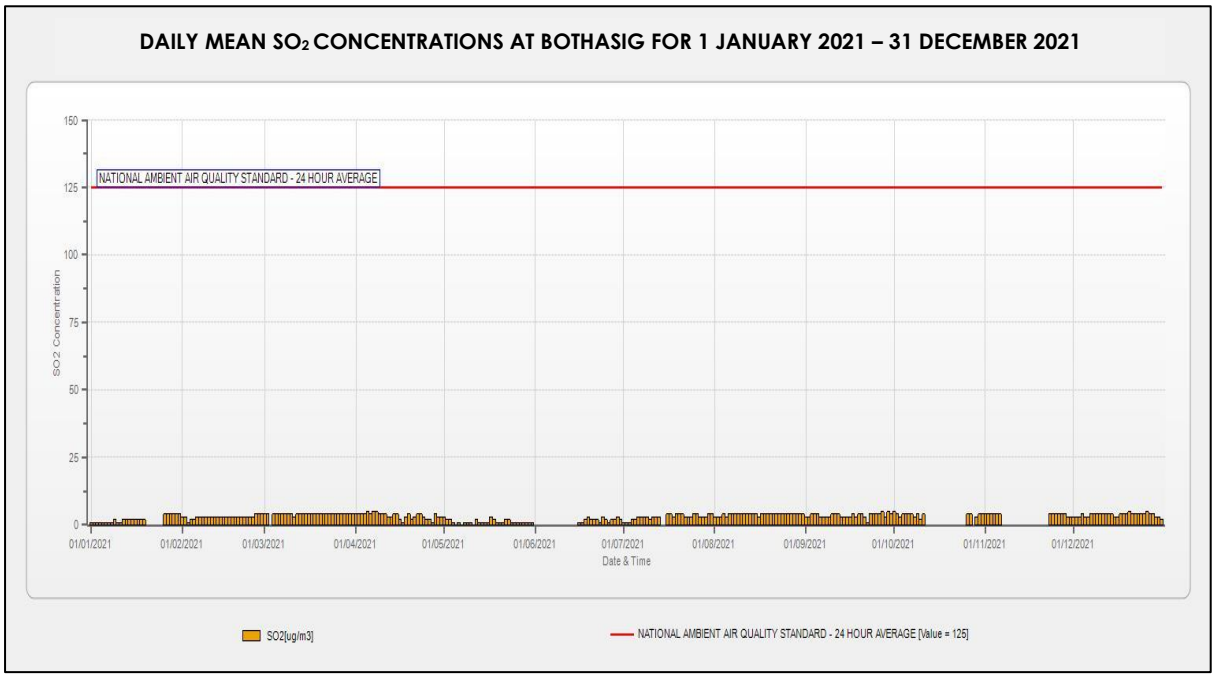


Figure 3-104: Daily mean SO_2 concentrations at Bothasig for 2021

The NO_2 concentrations measured at the Bothasig monitoring station are shown in Figure 3-105. The NO_2 1-hour average of 200 µg/m³ was exceeded on one (1) occasion during the 2021 monitoring period, with an hourly average of 273 µg/m³ recorded on 3 May 2021. The observation is established that the exceedance could be attributed to traffic congestion in the Bothasig area. The annual average for NO_2 was 15 µg/m³ during the 2021 monitoring period.

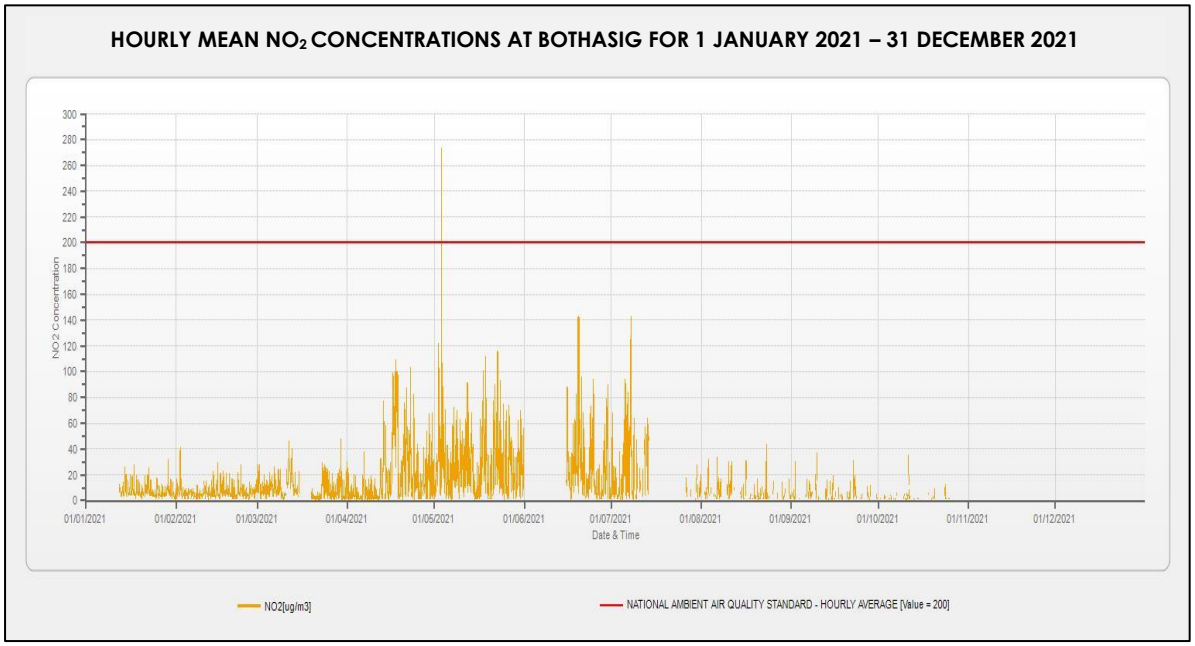


Figure 3-105: Hourly mean NO2 concentrations at Bothasig for 2021

The overall meteorological conditions were characterised by moderate winds, with a strong southerly component (Figure 3-106).

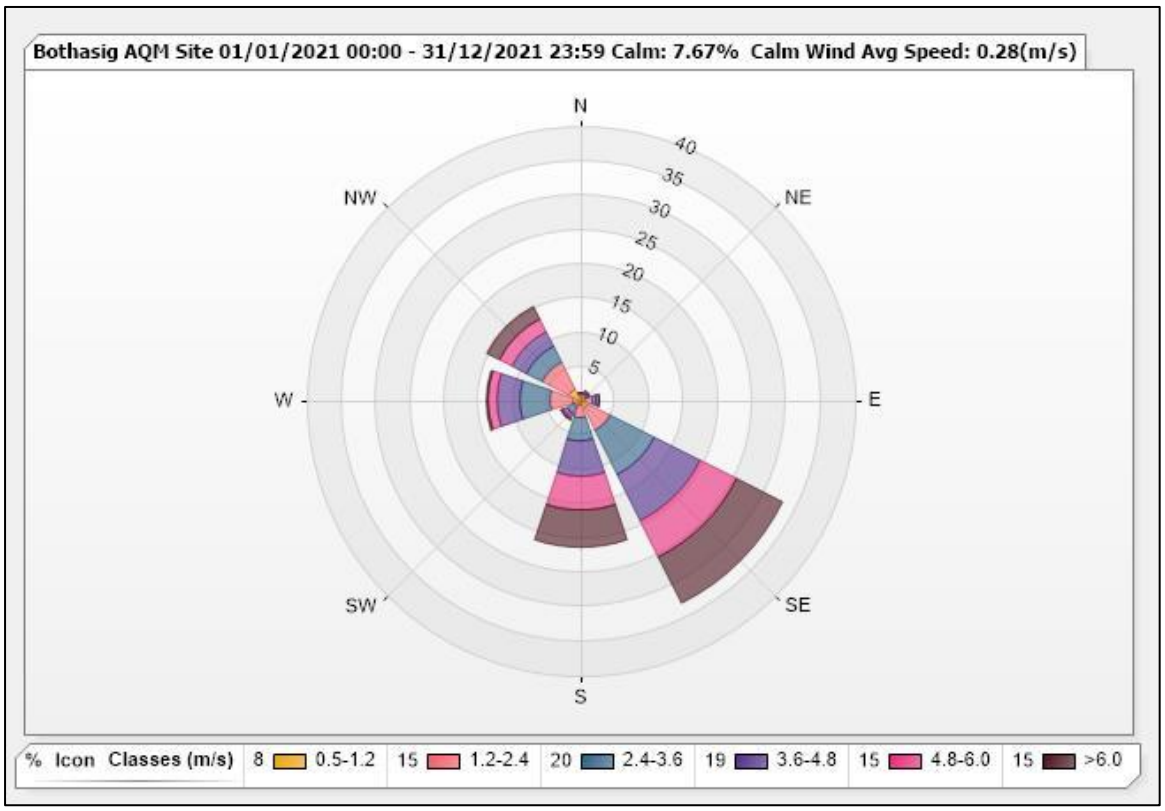


Figure 3-106: Bothasig annual wind rose (2021)

3.5.2 Foreshore

The Foreshore monitoring station was sited to assess vehicular emissions and to characterise emissions from other nearby sources such as the Port activities in the area. Monitoring commenced during 1995.

The PM_{10} 24-hour average of 75 µg/m³ was exceeded on five (5) occasions during the 2021 monitoring period, with 171 µg/m³ being the highest concentration measured on 19 August 2021. The exceedances are attributed to the Table Mountain fire that started on 18 April 2021. The annual average for PM_{10} was 29 µg/m³ during the 2021 monitoring period.

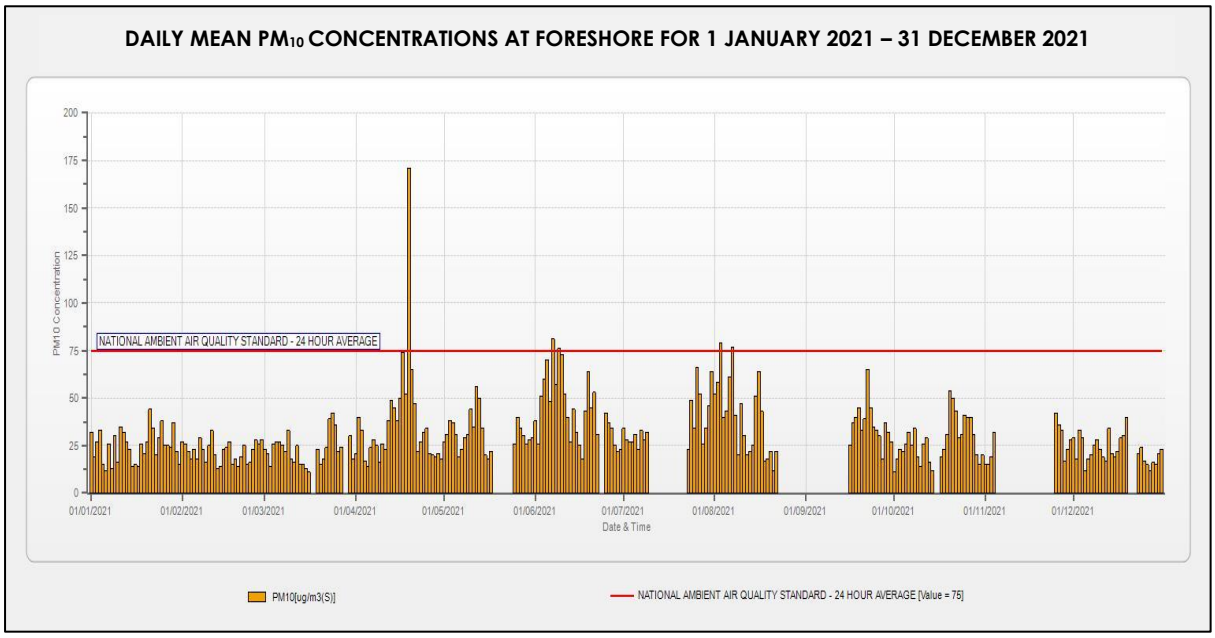


Figure 3-107: Daily mean PM_{10} concentrations at Foreshore for 2021

The $PM_{2.5}$ concentration measured at the Foreshore monitoring station are shown in Figure 3-108. The $PM_{2.5}$ 24-hour average of 40 µg/m³ was exceeded on two (2) occasions during the monitoring period, with the highest 24-hour average of 106 µg/m³ recorded om 19 April 2021, attributed to the Table Mountain Fire. The annual average for $PM_{2.5}$ was 12 µg/m³ during the 2021 monitoring period.

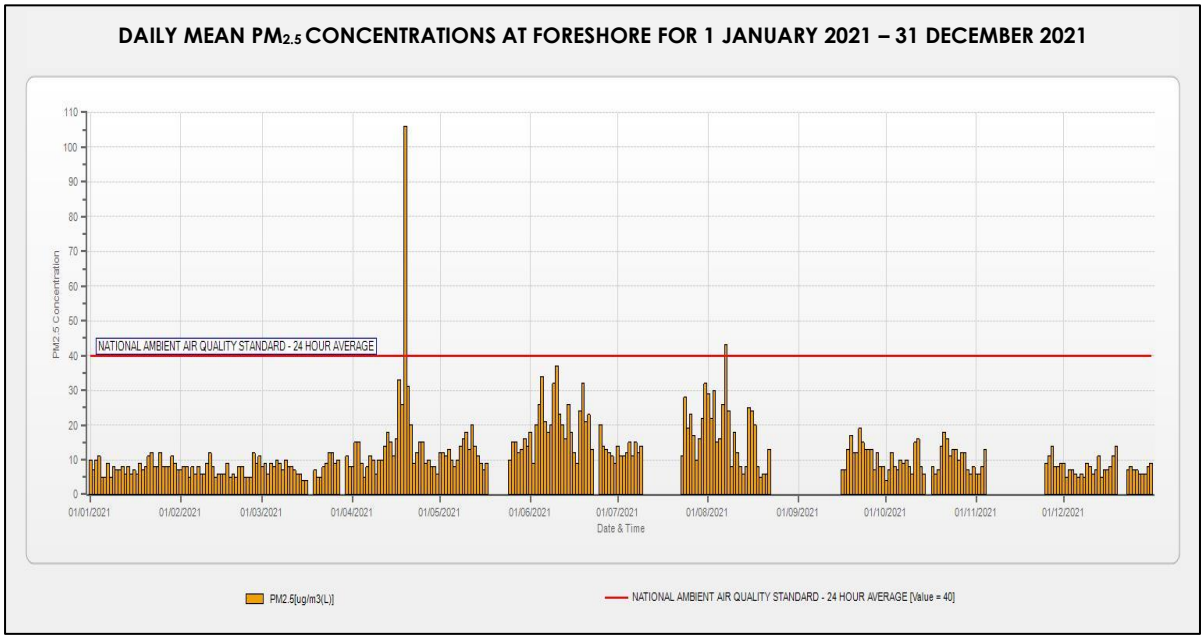


Figure 3-108: Annual mean PM2.5 concentrations at Foreshore for 2021

The SO_2 24-hour average of 125 µg/m³ was not exceeded during the monitoring period. The annual average for SO2 was 4 µg/m³ during the 2021 monitoring period.

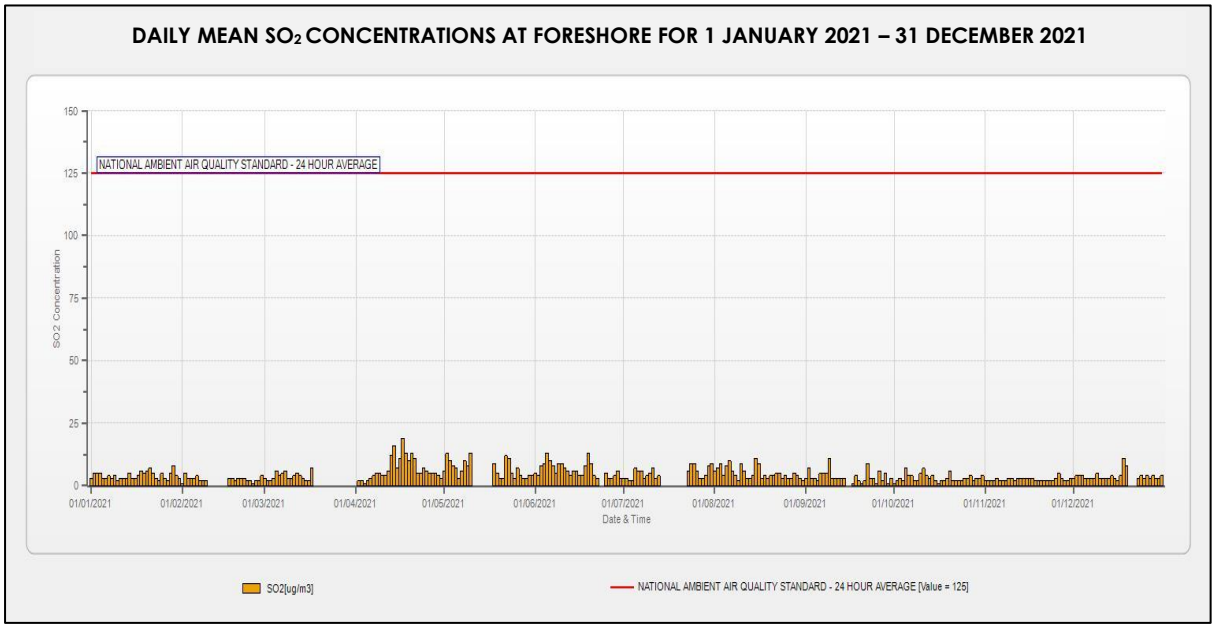


Figure 3-109: Annual mean SO2 concentrations at Foreshore for 2021

The NO2 concentration measured at the Foreshore monitoring station are shown in Figure 3-110. The NO2 1-hour average of 200 µg/m³ was not exceeded during the monitoring period. The annual average for NO2 was 29 µg/m³ during the 2021 monitoring period.

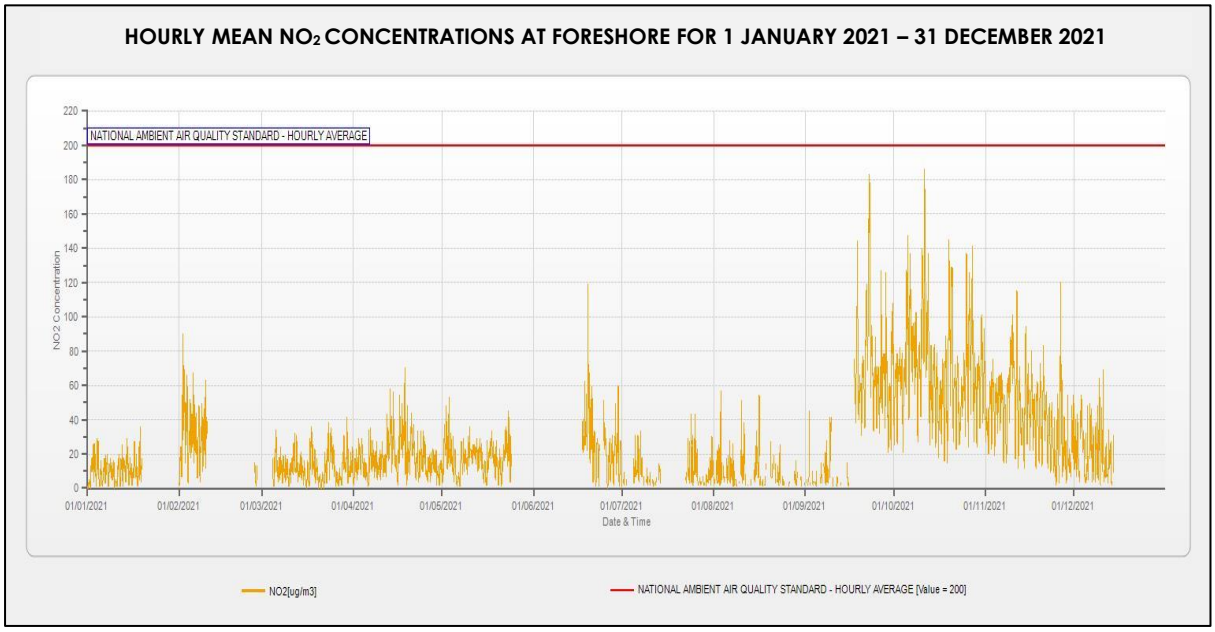


Figure 3-110: Annual mean NO2 concentrations at Foreshore for 2021

3.5.3 Goodwood

The Goodwood monitoring station serves as a regional station to monitor background air pollution levels. Ambient air quality monitoring at the Goodwood monitoring station commenced in 1993; the pollutants measured during 2021 are SO_2, NO_2, PM_{10}, and $PM_{2.5}$. The analysis of the results is shown in Figure 3-111 to Figure 3-114.

The SO_2 concentrations measured at the Goodwood monitoring station are shown in Figure 3-111. The SO_2 24-hour average of 125 µg/m³ was not exceeded during the monitoring period. The annual average for SO_2 was 2 µg/m³ during the 2021 monitoring period. The data gaps were due to the SO_2 analyser being removed due to mechanical issues.

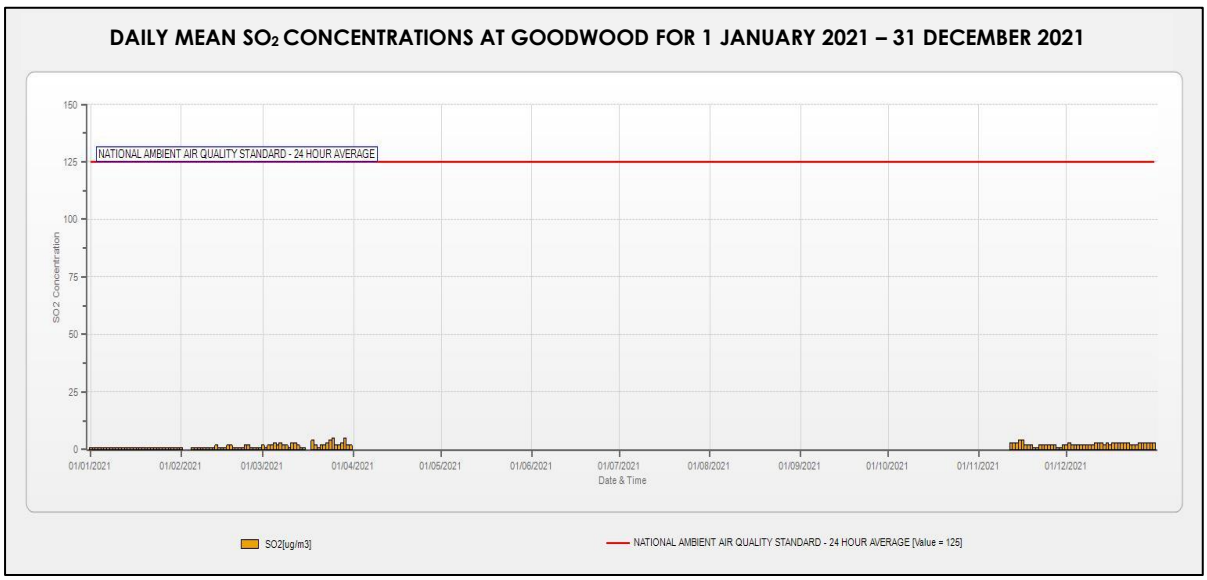


Figure 3-111: Daily mean SO_2 concentrations at Goodwood for 2021

The NO_2 concentrations measured at the Goodwood monitoring station are shown in Figure 3-112. The NO_2 1-hour average of 200 µg/m³ was not exceeded during the monitoring period. The annual average for NO_2 was 8 µg/m³ during the 2021 monitoring period.

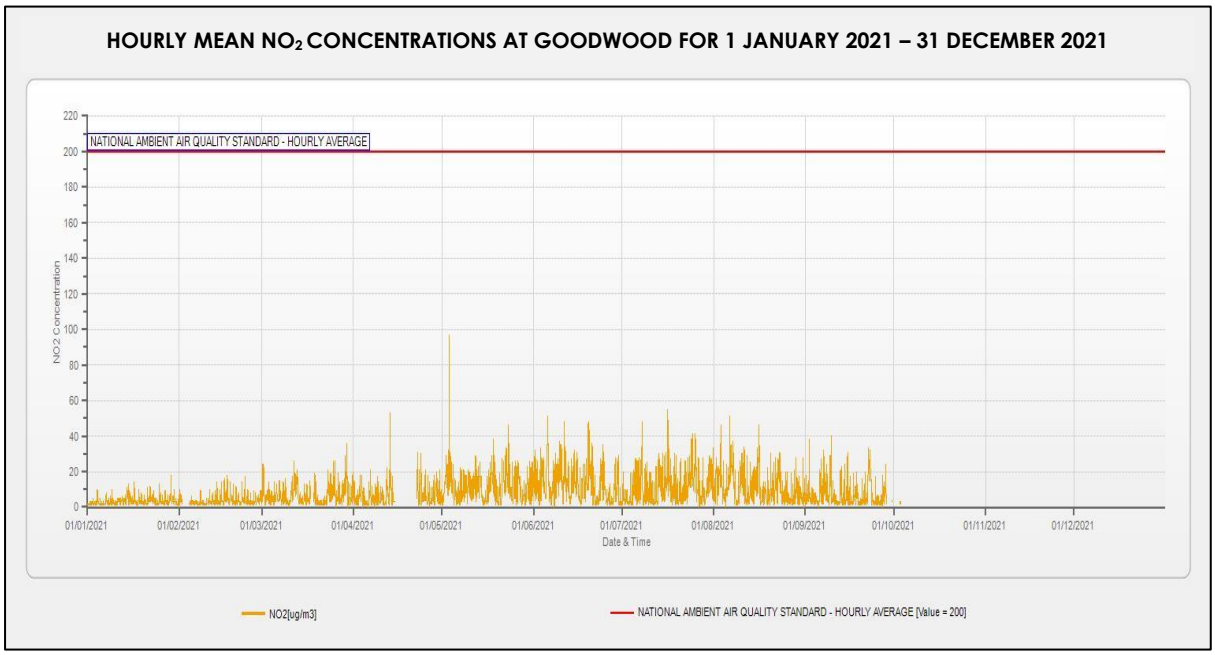


Figure 3-112: Hourly mean NO_2 concentrations at Goodwood for 2021

The PM_{10} concentrations measured at the Goodwood monitoring station are shown in Figure 3-113. The PM_{10} 24-hour average of 75 µg/m³ was exceeded on six (6) occasions during the monitoring period, with the highest 24-hour average of 119 µg/m³ recorded on 19 June 2021. The annual average for PM_{10} was 30 µg/m³ during the 2021 monitoring period.

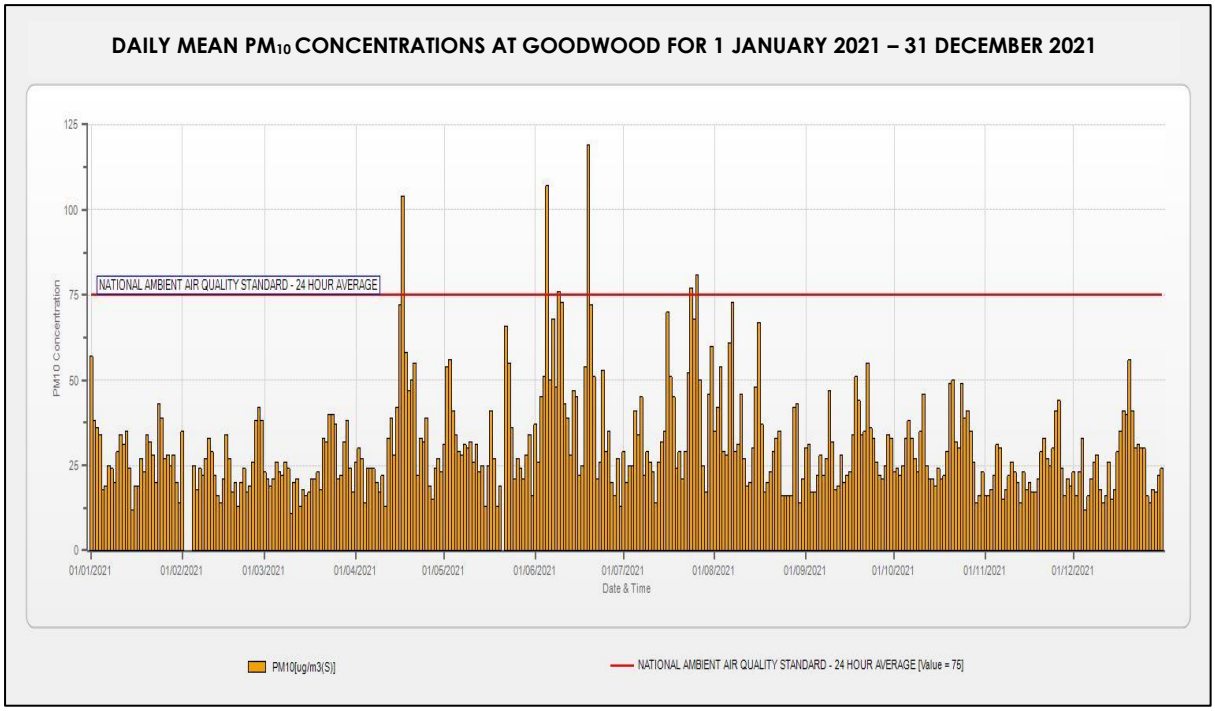


Figure 3-113: Daily mean PM_{10} concentrations at Goodwood for 2021

The **PM2.5** 24-hour average of 40 µg/m³ NAAQS was exceeded on 11 occasions during the 2021 monitoring period, with the highest 24-hour average of 82 µg/m³ recorded on 19 June 2021. The annual average for $PM_{2.5}$ was 13 µg/m³ during 2021.

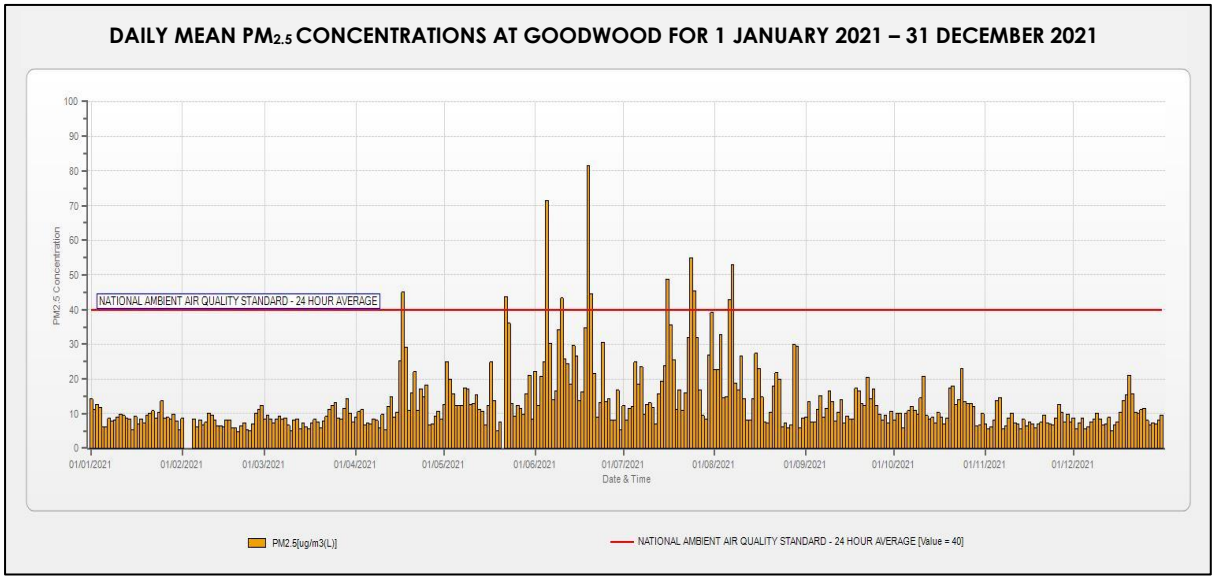


Figure 3-114: Daily mean PM2.5 concentrations at Goodwood for 2021

3.5.4 Table View

The Table View monitoring station forms part of the Milnerton Air Quality monitoring. The primary aim of this location is to monitor the impact of a refinery and other emitters from the area, on ambient air quality. Ambient air quality monitoring at Tableview monitoring station commenced in 1994. The pollutants measured are SO_2, NO_2, PM_{10} and $PM_{2.5}$.

The SO_2 concentrations measured at the Table View monitoring station are shown in Figure 3-115. The SO_2 24 – hour average of 125 µg/m³ was not exceeded during the monitoring period. The annual average for SO2 was 3 µg/m³ during the 2021 monitoring period.

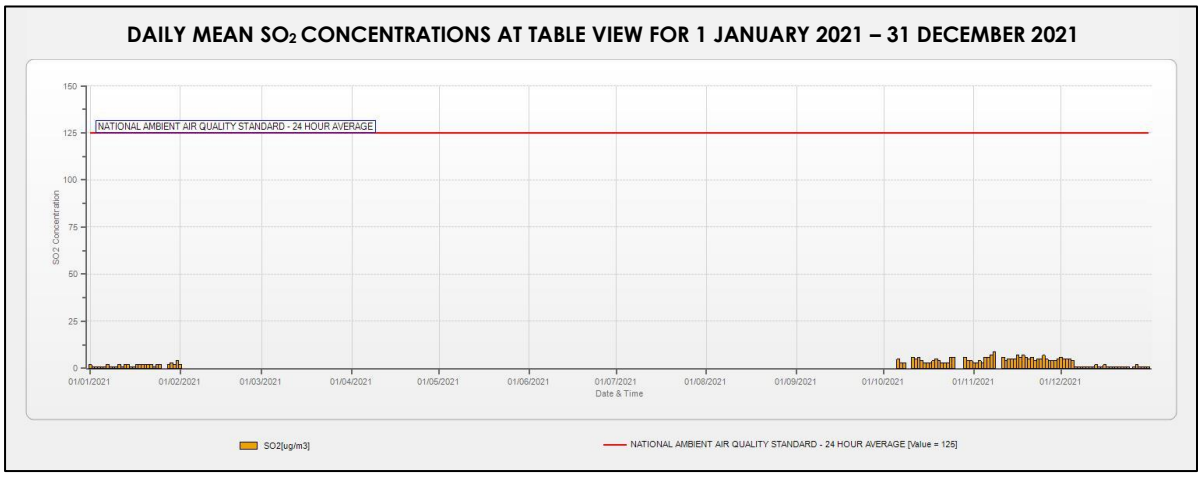


Figure 3-115: Daily mean SO_2 concentrations at Table View for 2021

The NO_2 concentrations measured at the Table View monitoring station are shown in Figure 3-116. The NO_2 hourly average of 200 µg/m³ was not exceeded during the monitoring period. The annual average for NO_2 was 6 µg/m³ during 2021 monitoring period.

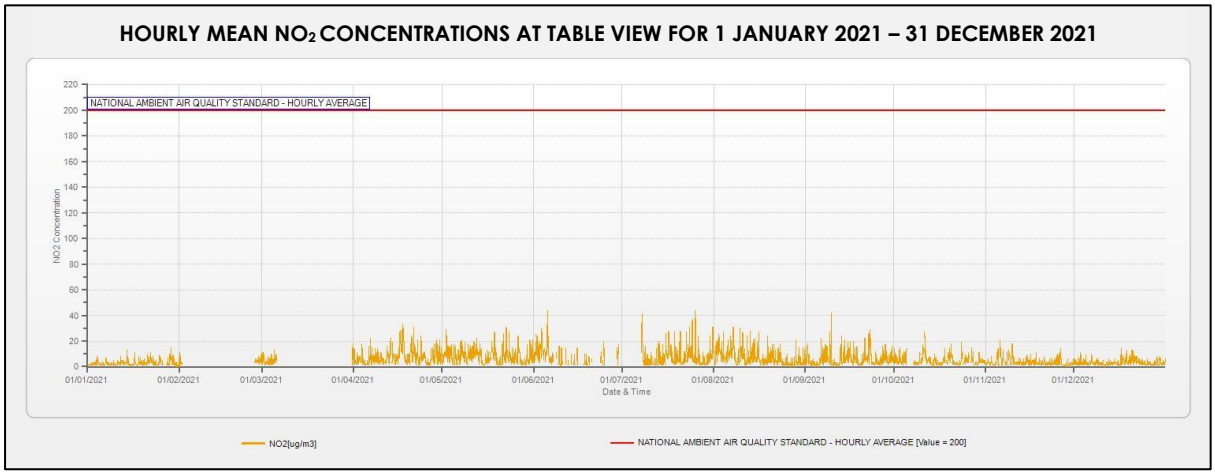


Figure 3-116: Hourly mean NO_2 concentrations at Table View for 2021

The PM_{10} 24-hour average of 75 µg/m³ was not exceeded during the monitoring period. The annual average for PM_{10} was 18 µg/m³ during 2021 monitoring period.

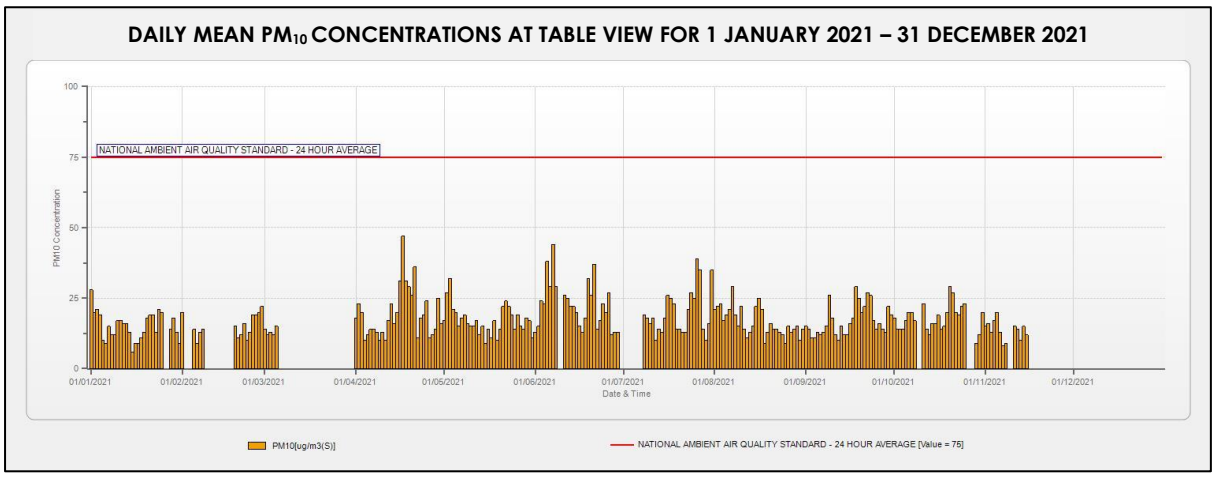


Figure 3-117: Daily mean PM_{10} concentrations at Table View for 2021

The $PM_{2.5}$ concentration measured at Table View Monitoring Station are shown in Figure 3-118. The $PM_{2.5}$ 24-hour avearge of 40 µg/m³ was not exceeded during the monitoring period. The annual average for $PM_{2.5}$ was 8 µg/m³ during 2021 monitoring period.

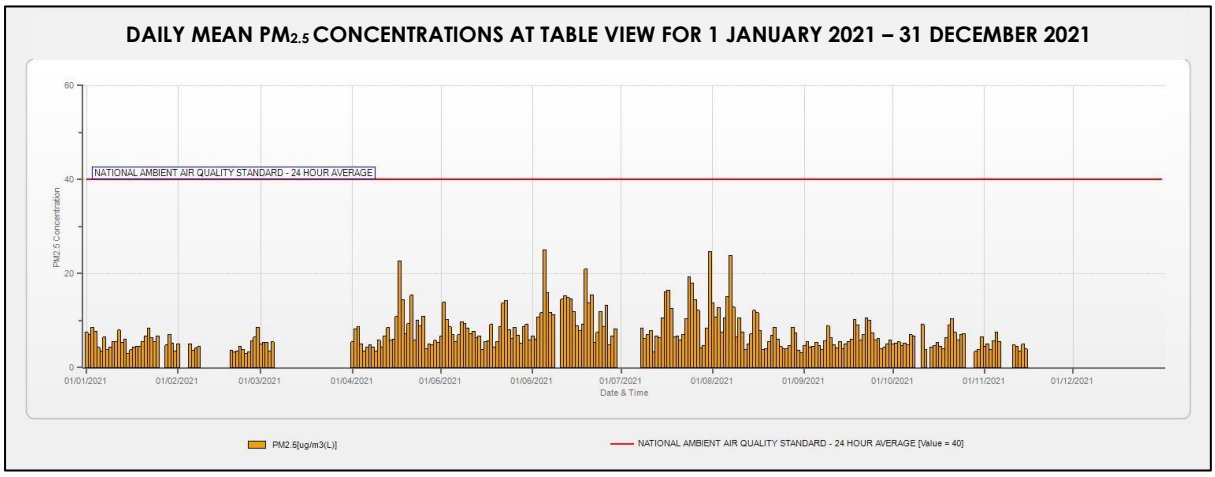


Figure 3-118: Daily mean $PM_{2.5}$ concentrations at Table View for 2021

The overall meteorological conditions were characterised by moderate winds, with a strong southerly component (Figure 3-119).

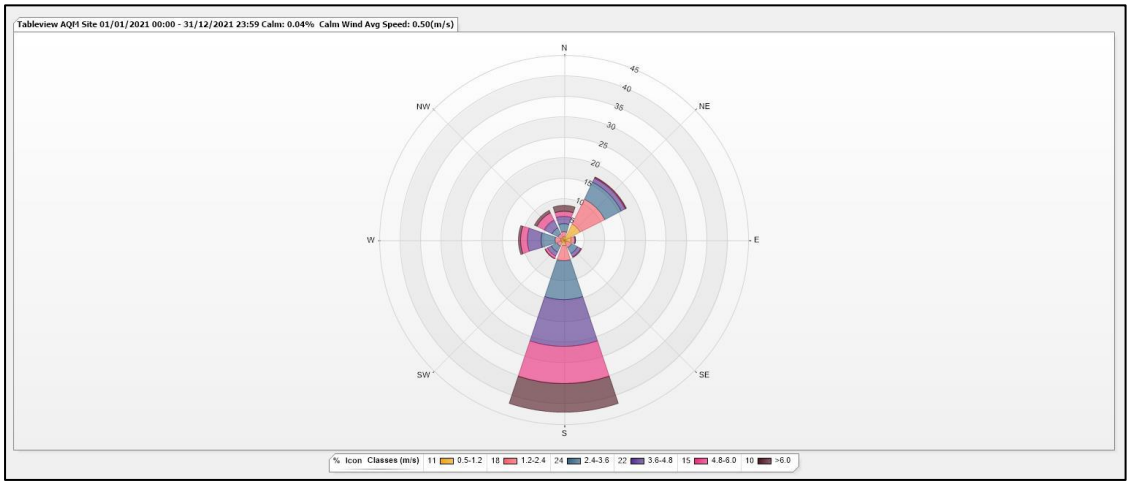


Figure 3-119: Table View wind rose for 2021

3.5.5 Wallacedene

Ambient monitoring at Wallacedene monitoring station commenced during 2006. The primary aim of the Wallacedene monitoring station is to monitor the impact emissions from the Wallacedene informal settlement on ambient air quality.

The pollutants measured for the 2021 monitoring period are SO_2, PM_{10} and $PM_{2.5}$. The analysis of the results is shown Figure 3-120 to Figure 3-122.

The SO_2 24 – hour average of 125 µg/m³ was not exceeded during the monitoring period. The annual average for SO_2 was 4 µg/m³ during 2021 monitoring period.

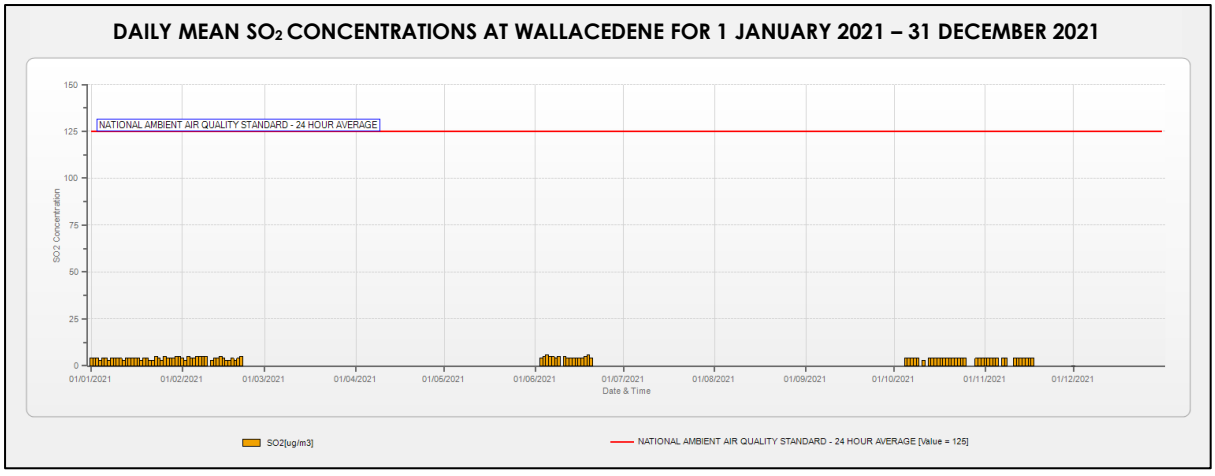


Figure 3-120: Daily mean SO_2 concentrations at Wallacedene for 2021

The PM_{10} concentration measured at Wallacedene monitoring station are shown in Figure 3-120. The PM_{10} 24-hour avearge of 75 µg/m³ was exceeded on 28 occasions during the monitoring period, with the highest 24-hour average of 228 µg/m³ recorded on 5 June 2021. The PM_{10} annual average of 40 ug/m³ was exceeded during 2021 monitoring period. These exceedences are attributed to the burning of wood for cooking and heating in the Wallacedene informal residential area, in close proximity to the monitoring station.

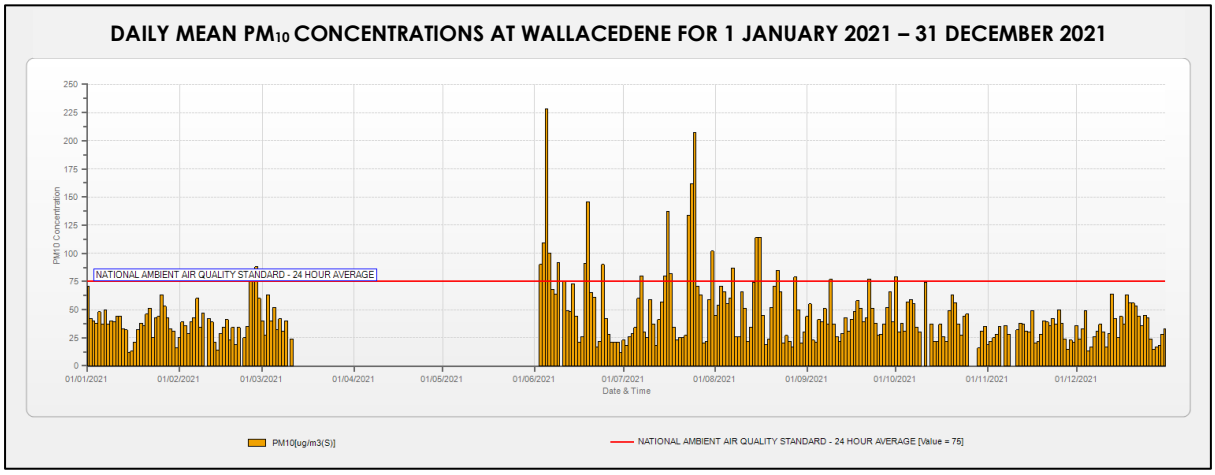


Figure 3-121: Daily mean PM_{10} concentrations at Wallacedene for 2021

The $PM_{2.5}$ concentration measured at Wallacedene monitoring station are shown in Figure 3-122. The $PM_{2.5}$ 24-hour avearge of 40 µg/m³ was exceeded on 25 occasions during the monitoring period, with the highest 24-hour average of 160 µg/m³ recorded on 5 June 2021. The $PM_{2.5}$ annual average of 20 µg/m³ was exceeded during 2021 monitoring period. These exceedences are attributed to the burning of wood for cooking and heating in the Wallacedene informal residential area in close proximity to the monitoring station.

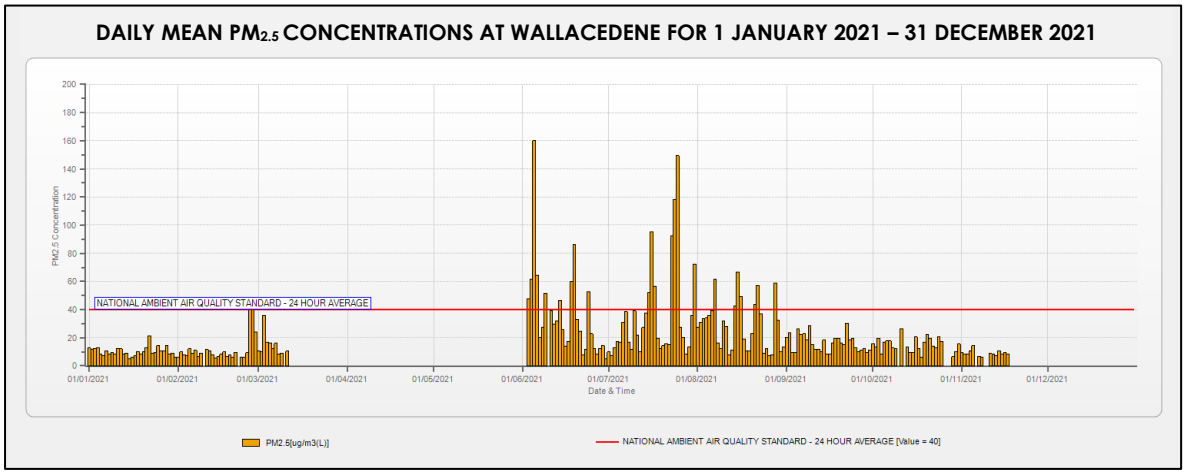


Figure 3-122: Daily mean $PM_{2.5}$ concentrations at Wallacedene for 2021

3.5.6 Plattekloof

The Plattekloof monitoring station is positioned to monitor the refinery's impact on ambient air quality. Ambient air quality monitoring at Plattekloof monitoring station commenced during late 2013. The pollutants measured are SO_2, NO and O_3. The analysis of the results is shown in Figure 3-123 to Figure 3-125.

The SO_2 concentrations measured at the Plattekloof monitoring station are shown in Figure 3-123. The SO_2 24-hour average of 125 µg /m³ was not exceeded during the monitoring period. The annual average for SO_2 was 4 µg /m³ during the 2021 monitoring period.

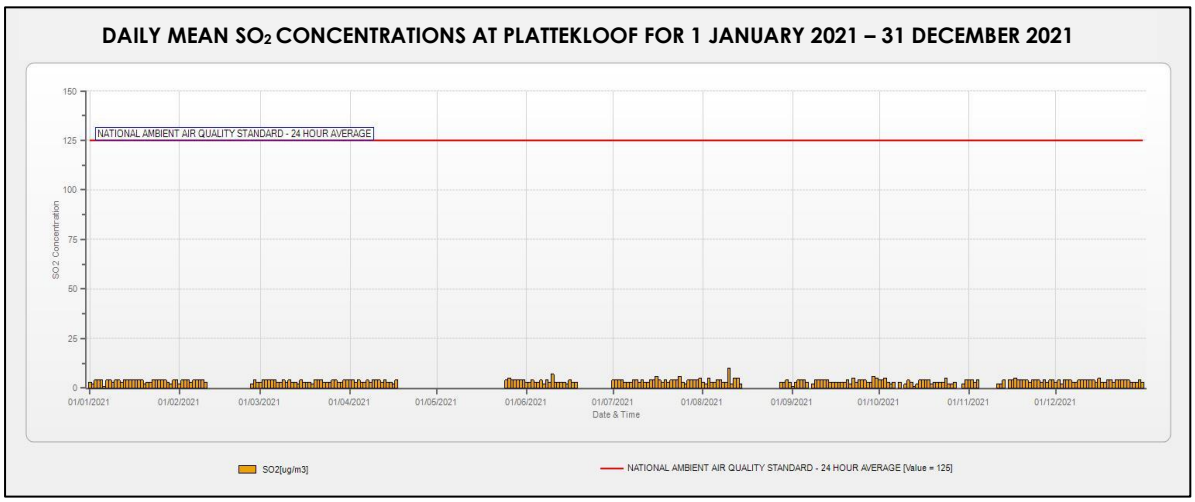


Figure 3-123: Daily mean SO_2 concentrations at Plattekloof for 2021

The NO_2 concentrations measured at the Plattekloof monitoring station are shown in Figure 3-124. The NO_2 hourly average of 200 µg/m³ was not exceeded during the monitoring period. The annual average for NO_2 was 13 µg/m³ during 2021.

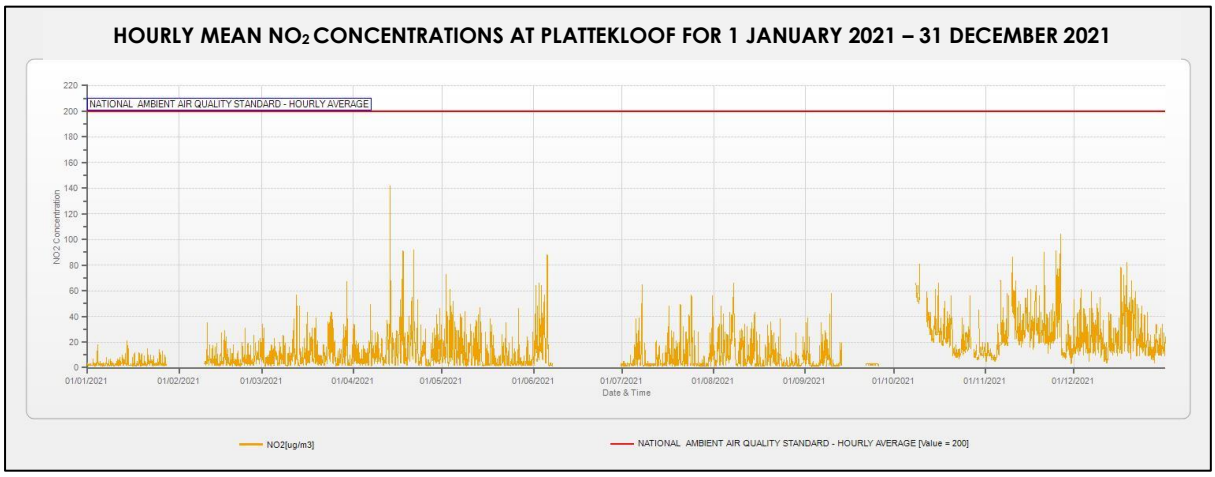


Figure 3-124: Hourly mean NO_2 concentrations at Plattekloof for 2021

The O_3 concentration measured at Plattekloof Monitoring Station are shown in Figure 3-125. The O_3 8- hour running avearge of 120 µg/m³ was not exceeded during the monitoring period.

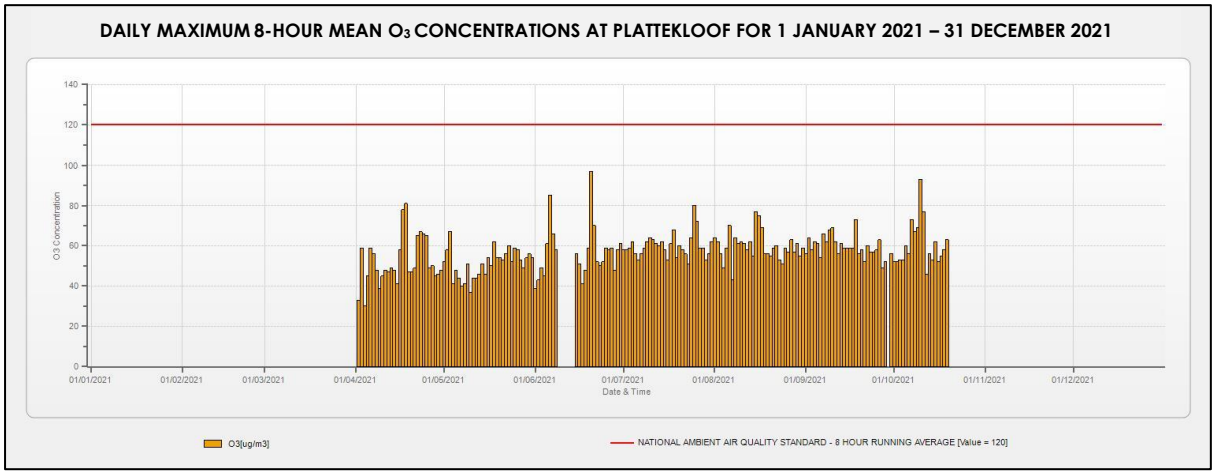


Figure 3-125: Daily maximum O_3 8 – hour running mean at Plattekloof for 2021

3.5.7 Bellville-South

Ambient air quality monitoring at the Bellville-South monitoring station commenced in 2003. The pollutants measured are SO_2 NO_2, PM_{10} and $PM_{2.5}$ (Figure 3-126 and Figure 3-129).

The SO_2 concentrations measured at the Bellville-South monitoring station are shown in Figure 3-126. The SO_2 24-hour average of 125 µg/m³ was 7 µg/m³ during the 2021 monitoring period.

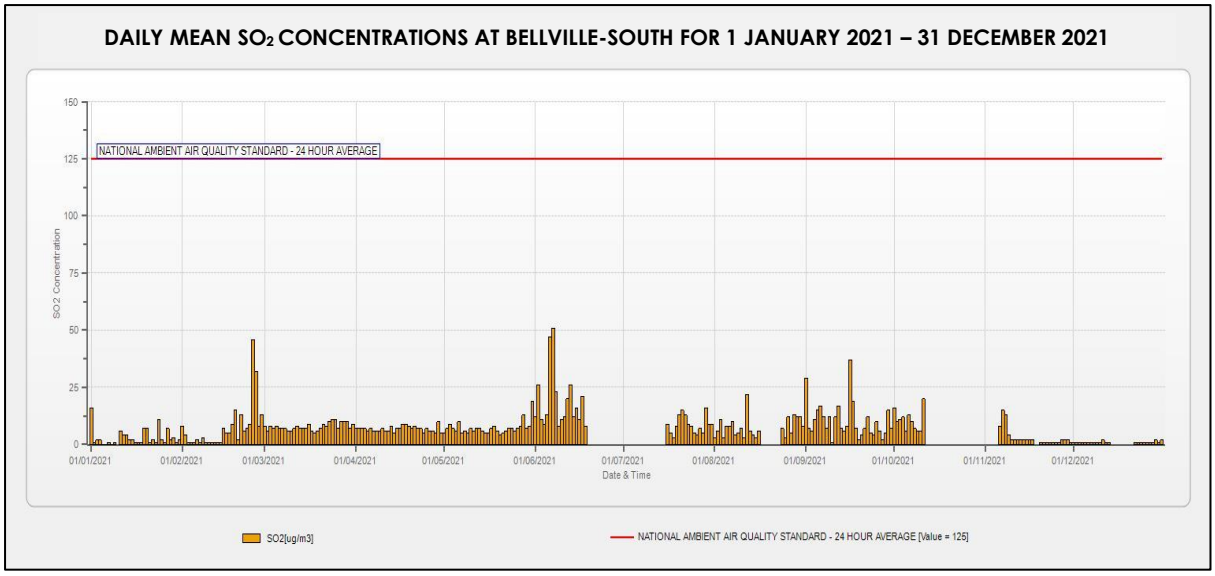


Figure 3-126: Daily mean SO_2 concentrations at Bellville-South for 2021

The Bellville monitoring station started to monitor NO_2 in November 2020, due to the introduction of new analysers to the network. The NO_2 hourly average of 200 µg/m³ was not exceeded during the 2021 monitoring period. The annual average for NO_2 was 14 µg/m³ during 2021.

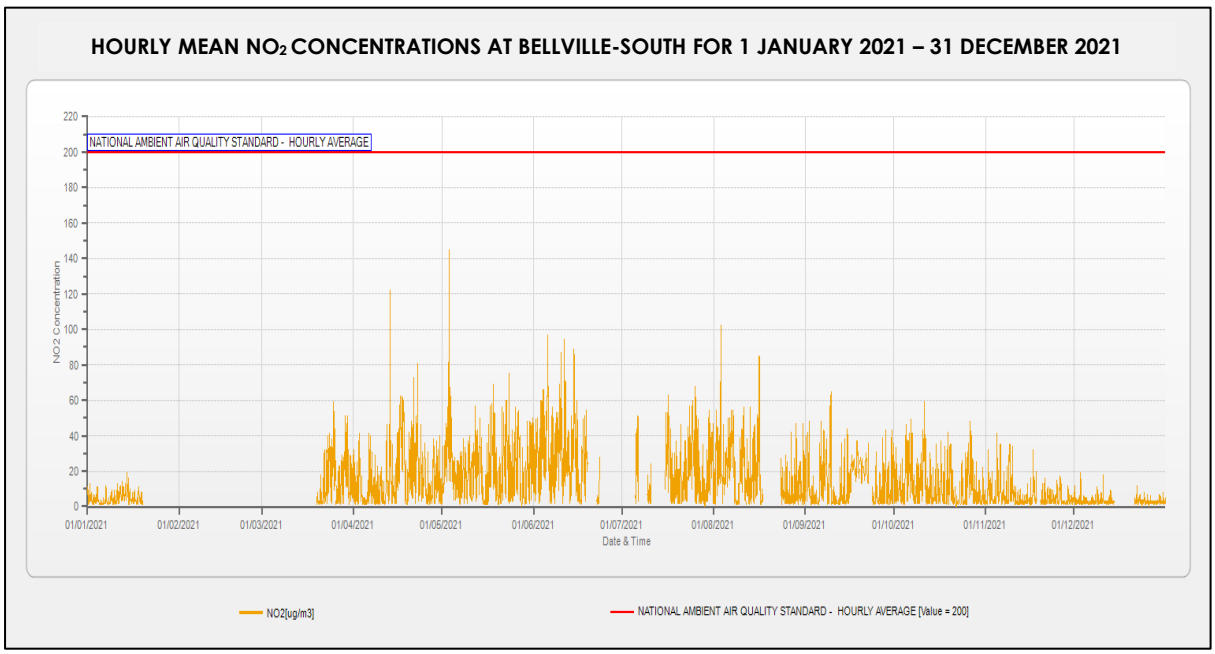


Figure 3-127: Hourly mean NO_2 concentrations at Bellville-South for 2021

The PM_{10} concentrations measured at the Bellville-South monitoring station are shown in Figure 3-128. The PM_{10} 24-hour average of 75 µg/m³ was exceeded on three (3) occasions during the 2021 monitoring period. The annual average for PM_{10} was 32 µg/m³ during 2021.

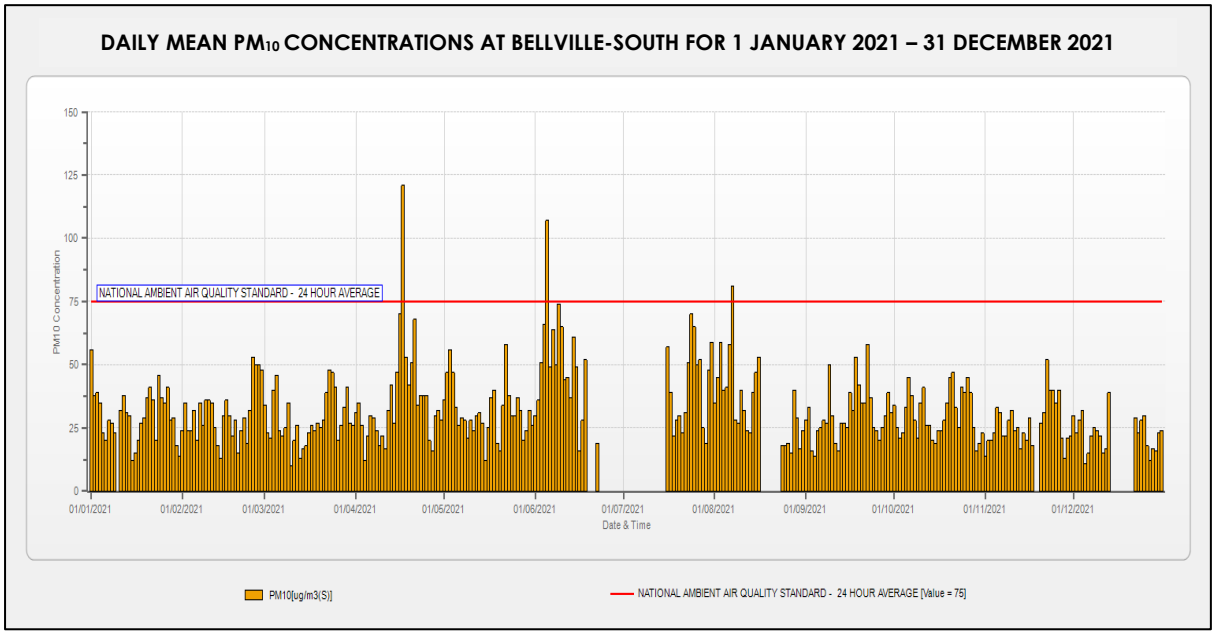


Figure 3-128: Daily mean PM_{10} concentrations at Bellville-South for 2021

The $PM_{2.5}$ 24-hour average of 40 µg/m³ was exceeded on five (5) occasions during 2021. The highest $PM_{2.5}$ concentration of 70 µg/m³ was exceeded on 5 June 2021. The annual average for $PM_{2.5}$ was 13 µg/m³ during the 2021 monitoring period.

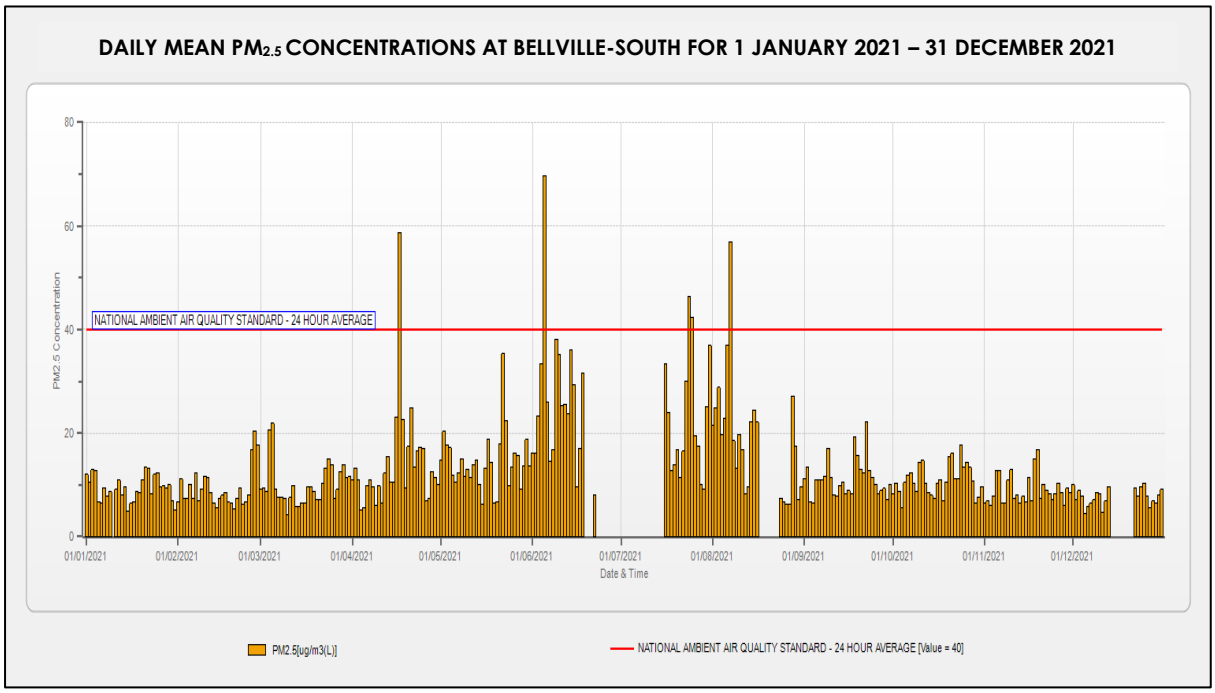


Figure 3-129: Daily mean $PM_{2.5}$ concentrations at Bellville-South for 2021

The overall meteorological conditions were characterised by moderate winds, with a strong southerly component (Figure 3-130).

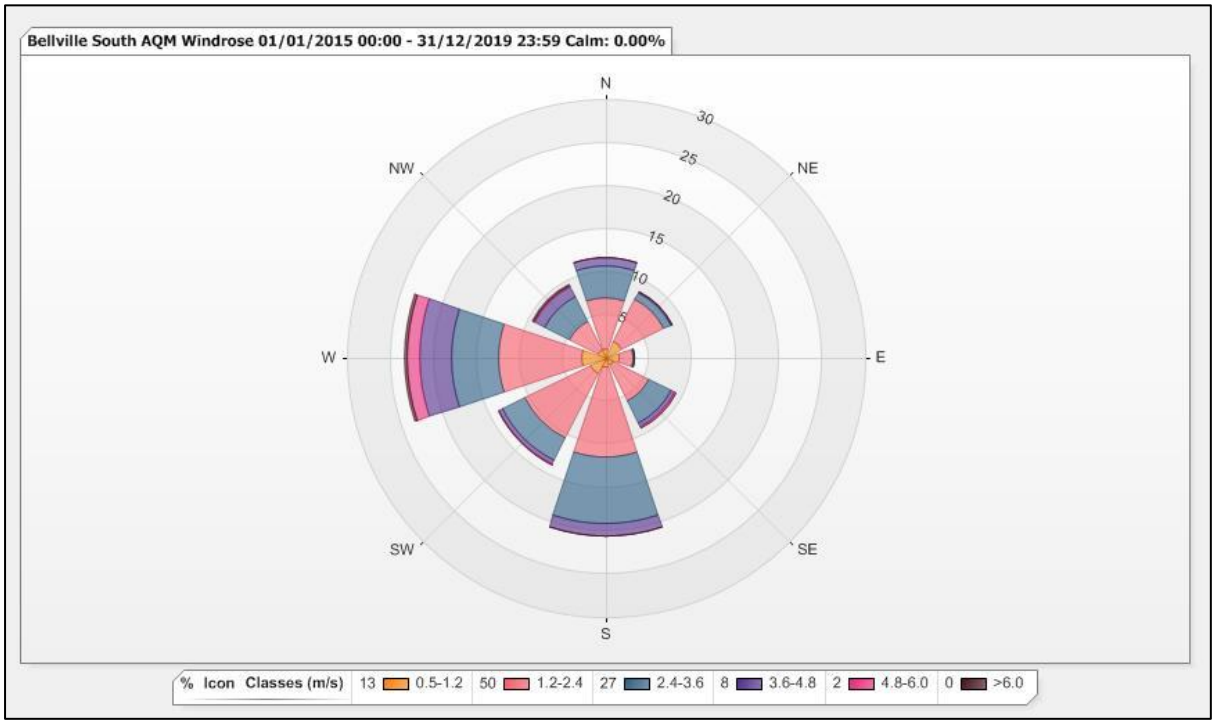


Figure 3-130: Bellville-South wind rose for 2021

3.5.8 Atlantis

Ambient monitoring at Atlantis monitoring station commenced in 2008. The pollutants measured during 2021 were SO2 and O3. The analysis of the results is shown in Figure 3-131 to Figure 3-132.

The SO2 24- hour average of 125 µg/m3 was not exceeded during the monitoring period. The annual average for SO2 was 8 µg/m3 during 2021.

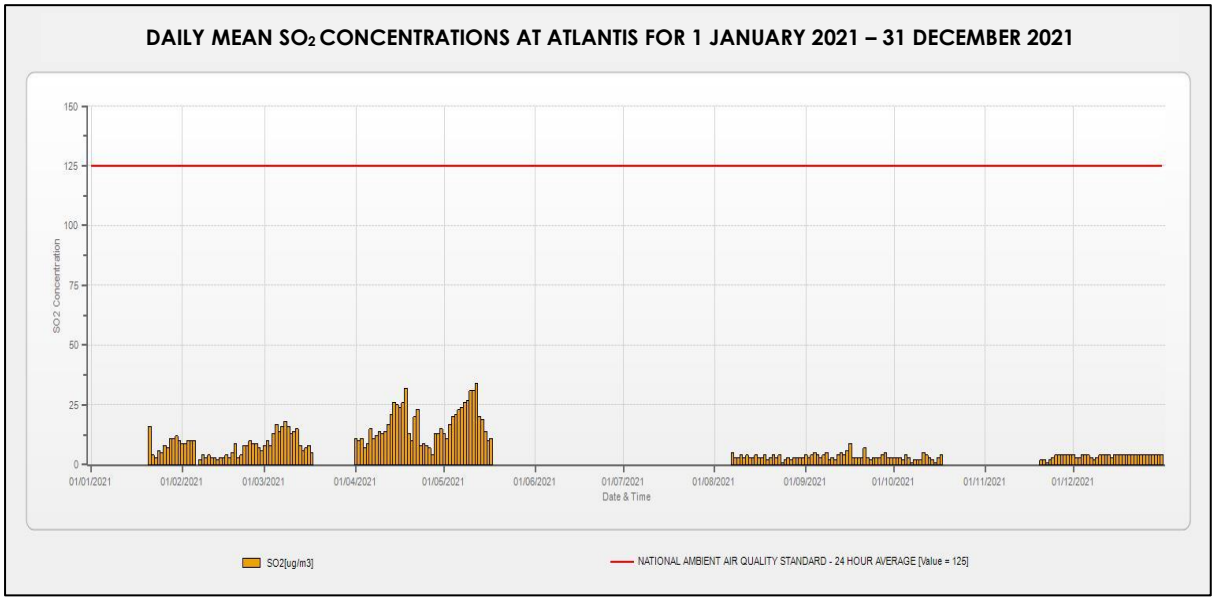


Figure 3-131: Daily mean SO_2 concentrations at Atlantis for 2021

The O_3 concentrations measured at the Atlantis monitoring station are shown in Figure 3-132. The O_3 8- hour running average of 120 µg/m³ was not exceeded during the 2021 monitoring period.

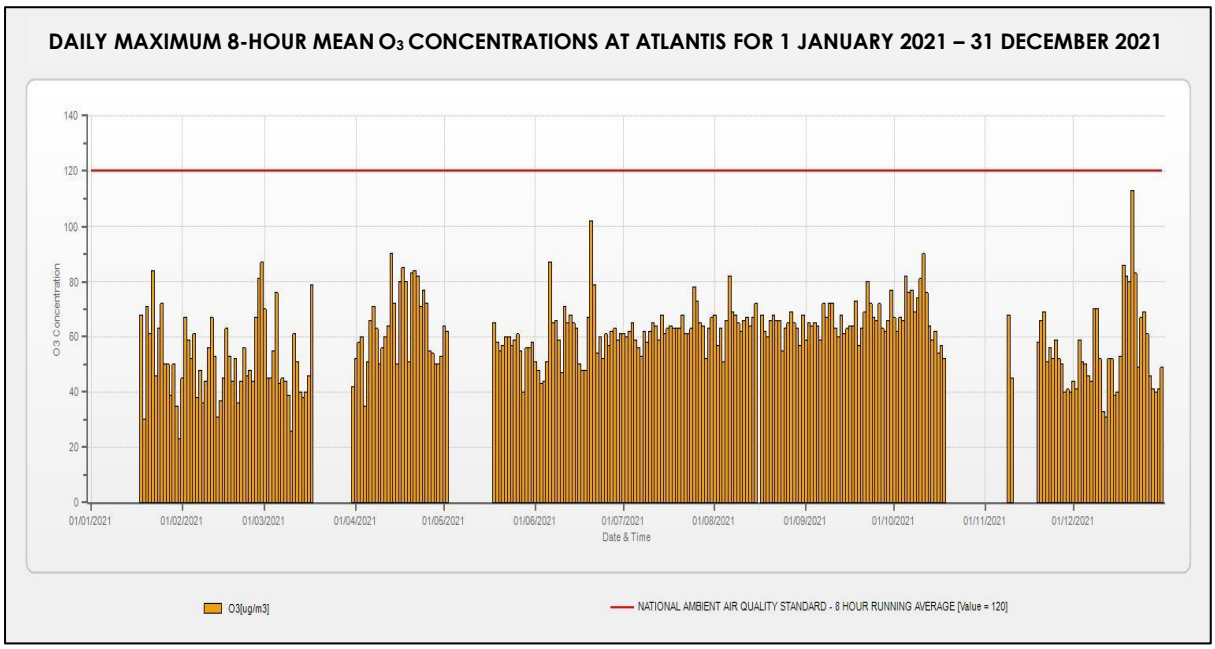


Figure 3-132: Daily maximum O_3 8-hour running mean at Atlantis for 2021

The overall meteorological conditions were characterised by moderate winds, with a strong southerly component (Figure 3-133).

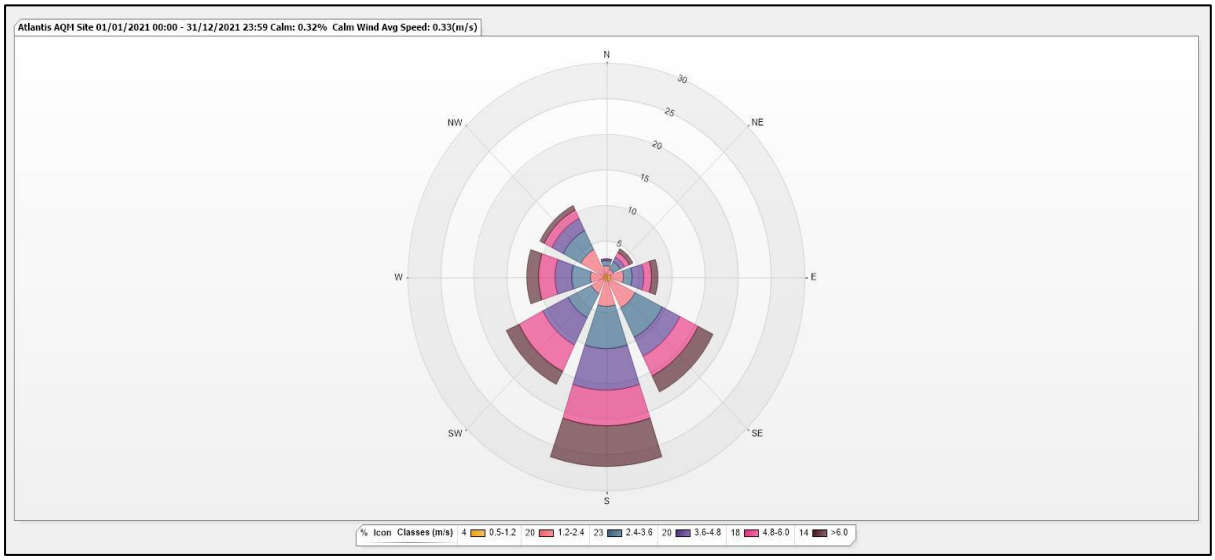


Figure 3-133: Annual wind rose at Atlantis for 2021

3.5.9 Molteno

Ambient monitoring at Molteno monitoring station commenced in 2014. The NO_2 concentrations measured at the Molteno monitoring station are shown in Figure 3-134. The NO_2 hourly average of 200 µg/m³ was not exceeded during the monitoring period. The annual average for NO_2 was 10 µg/m³ during the 2021 monitoring period.

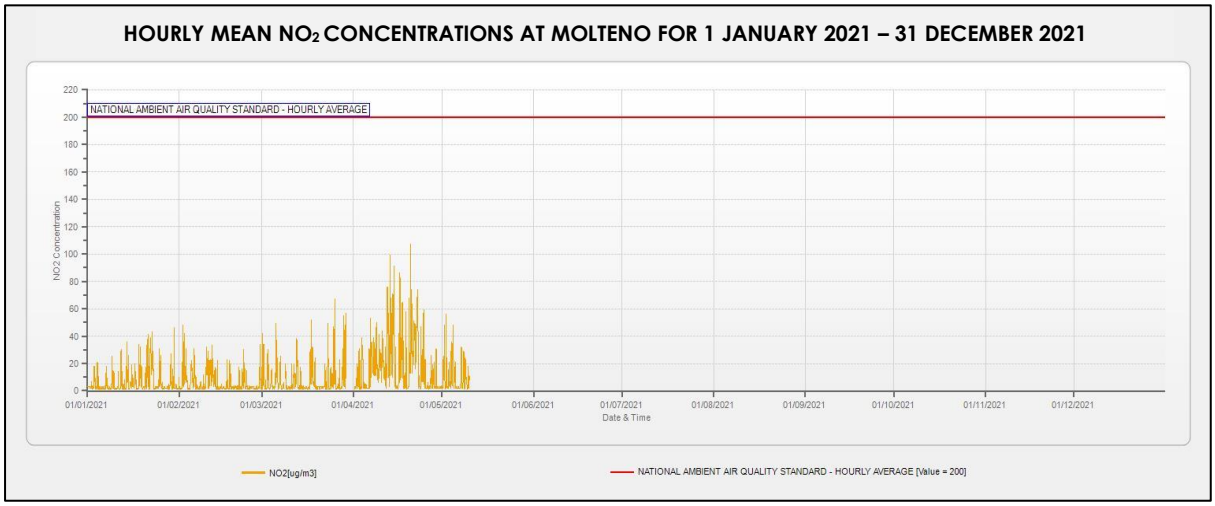


Figure 3-134: Hourly mean NO_2 concentrations at Molteno for 2021

3.5.10 Khayelitsha

The Khayelitsha monitoring station was established to assess the impact of emissions from informal settlement related activities on ambient air quality in the area. Ambient air quality monitoring at the Khayelitsha monitoring station commenced in 2002.

The SO_2 concentration measured at the Khayelitsha monitoring station are shown in Figure 3-135. The SO_2 24-hour average of 125 µg/m^3 was not exceeded during the 2021 monitoring period. The annual average for SO_2 was 3 µg/m^3 during 2021.

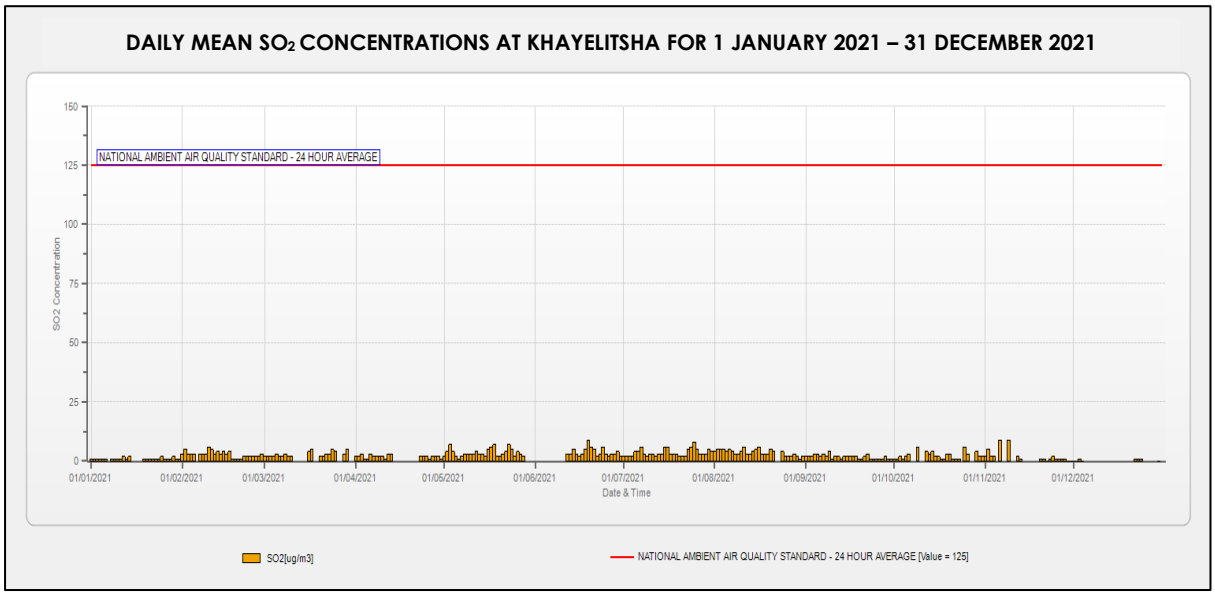


Figure 3-135: Daily mean SO_2 concentrations at Khayelitsha for 2021

The NO_2 hourly average of 200 µg/m^3 was not exceeded during the 2021 monitoring period. The annual average for NO_2 was 12 µg/m^3 during 2021.

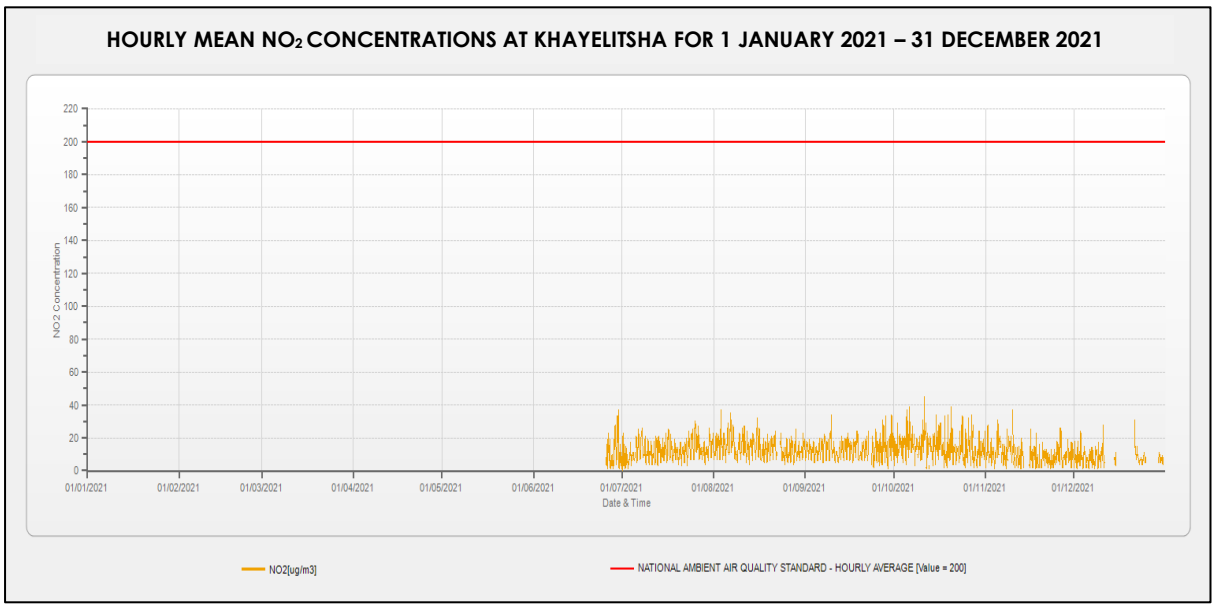


Figure 3-136: Hourly mean NO_2 concentrations at Khayelitsha for 2021

The PM_{10} concentrations measured at the Khayelitsha monitoring station are shown in Figure 3-137. The PM_{10} 24-hour average of 75 µg/m³ was exceeded on 84 occasions during the monitoring period, with the highest 24-hour average of 222 µg/m³ recorded on 25 July 2021. The annual average of 40 µg/m³ for PM_{10} was exceeded during the 2021 monitoring period, the annual average for 2021 was 63 µg/m³. The exceedances are attributed to local food vendors using wood for cooking and heating and an informal taxi rank is in close proximity to the Khayelitsha monitoring station.

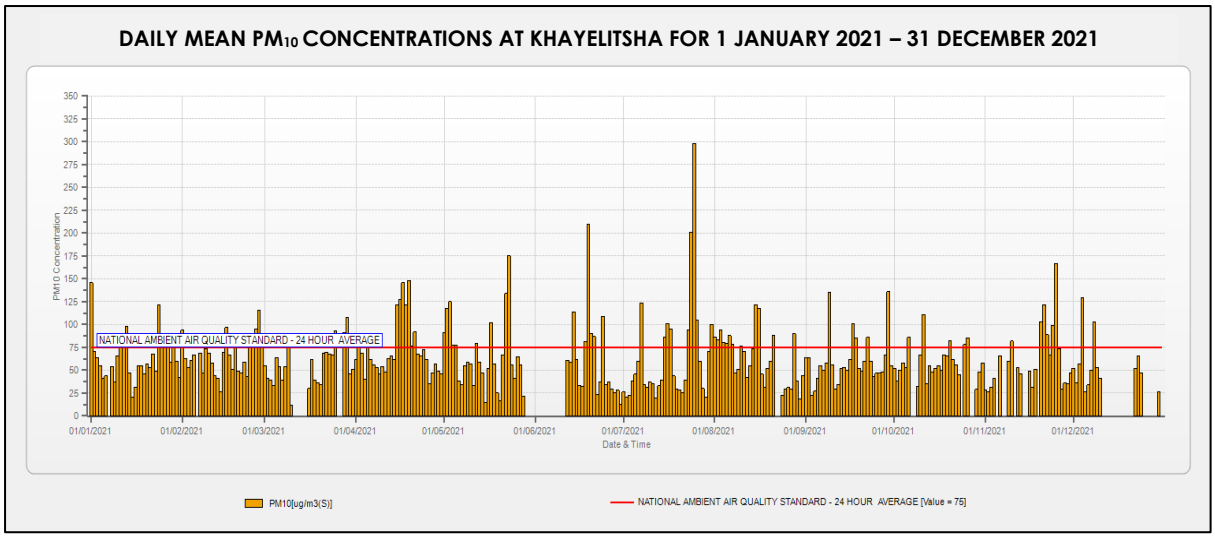


Figure 3-137: Daily mean PM_{10} concentrations at Khayelitsha for 2021

The $PM_{2.5}$ 24-hour average of 40 µg/m³ was exceeded 28 times during the monitoring period, with the highest 24-hour average of 298 µg/m³ recorded on 25 July 2021. The annual average of 20 µg/m³ for $PM_{2.5}$ was exceeded during the 2021 monitoring period. The annual average for $PM_{2.5}$ was 21 µg/m³ during the 2021. The exceedances are attributed to local food vendors using wood for cooking and heating and an informal taxi rank is in close proximity to the Khayelitsha monitoring station.

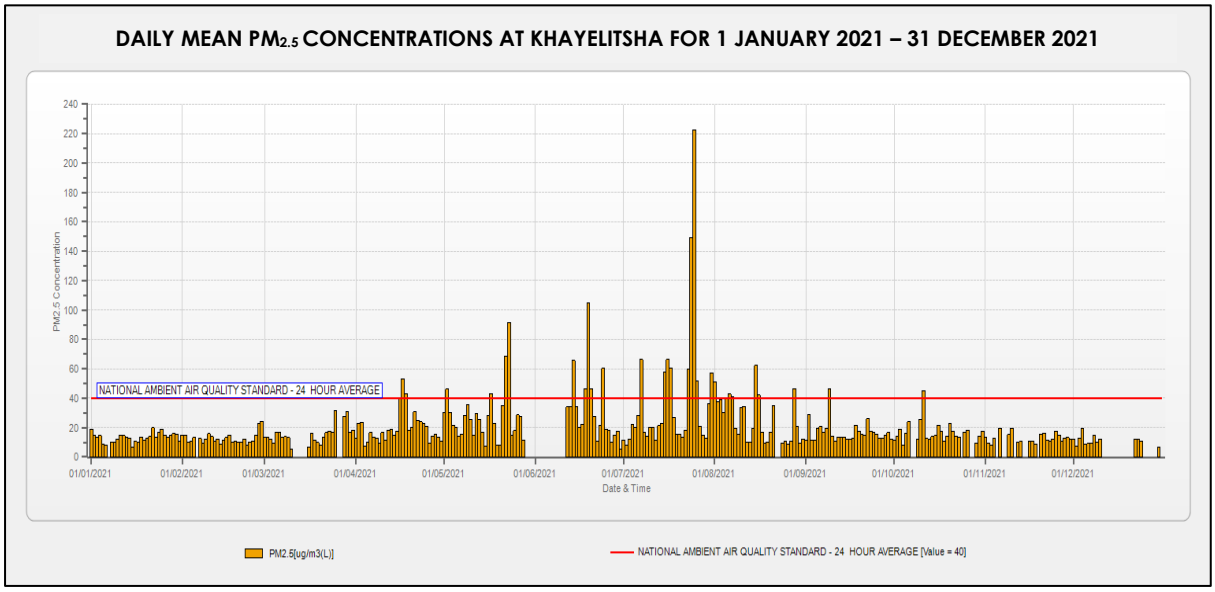


Figure 3-138: Daily mean $PM_{2.5}$ concentrations at Khayelitsha for 2021

- **Long term air quality trends for CCT**

The long-term trends for SO_2, NO_2, and PM_{10} in the CCT are presented in Figures 3-139 to 3-141.

- **Sulphur Dioxide (SO_2)**

The SO_2 concentrations measured in the City of Cape Town are shown in Figure 3-139. The SO_2 annual average of 50 µg/m³ was not exceeded during the period 2010 to 2021.

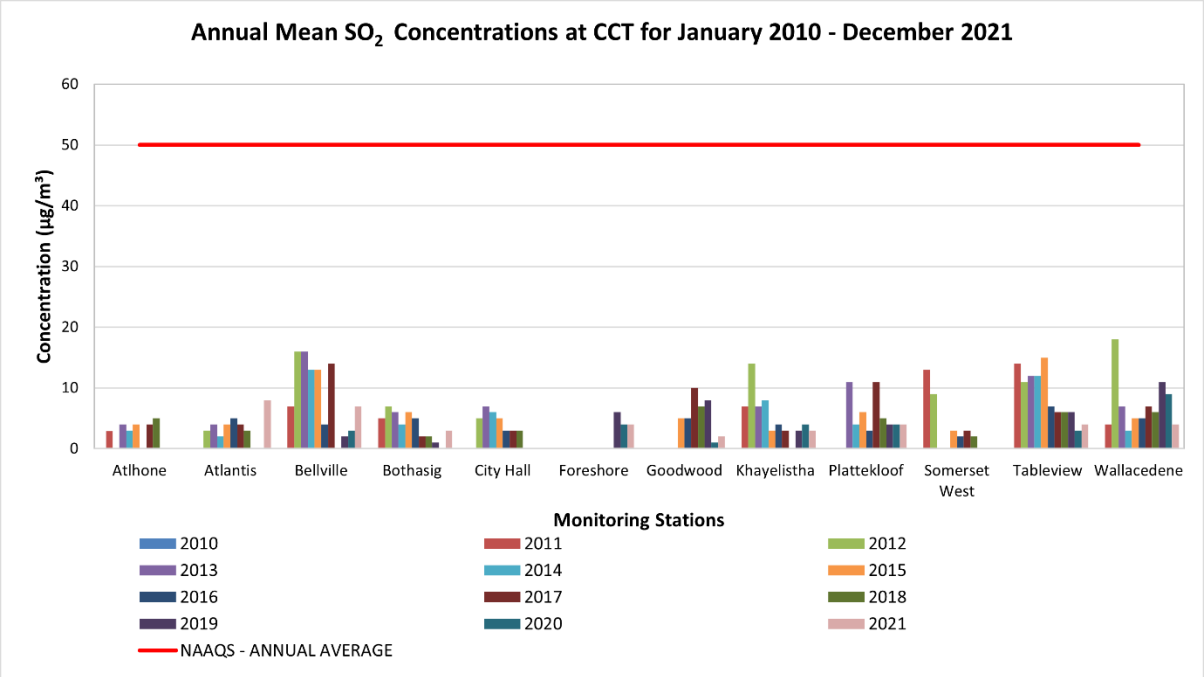


Figure 3-139: Annual mean SO_2 concentrations in City of Cape Town during 2010 -2021

Nitrogen Oxide (NO_2)

The NO_2 concentrations measured in the City of Cape Town are shown in Figure 3-141. The NO_2 annual average of 40 µg/m³ was not exceeded during the period under review.

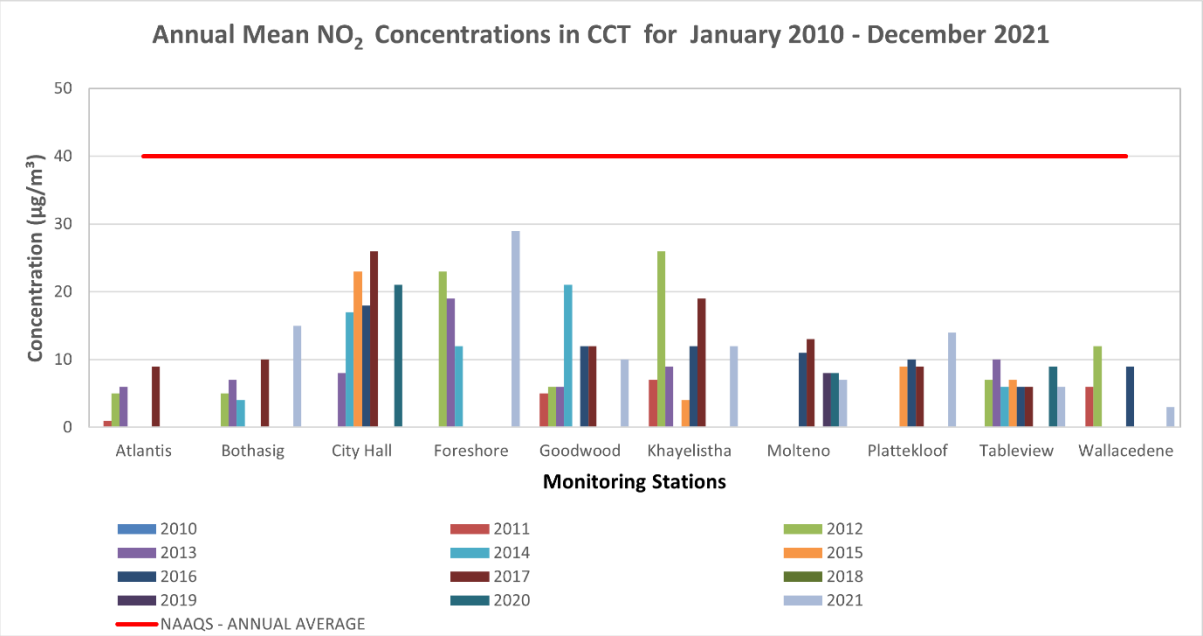


Figure 3-140: Annual mean NO_2 concentrations in City of Cape Town during 2010 -2021

Particulate Matter 10 (PM_{10})

The PM_{10} concentrations measured in the City of Cape Town are shown in Figure 3-141. The PM_{10} annual average of 40 µg/m³, which was effective from 1 January 2015 was exceeded in 2017, 2019 and 2021 at Khayelitsha and in 2021 at Wallacedene.

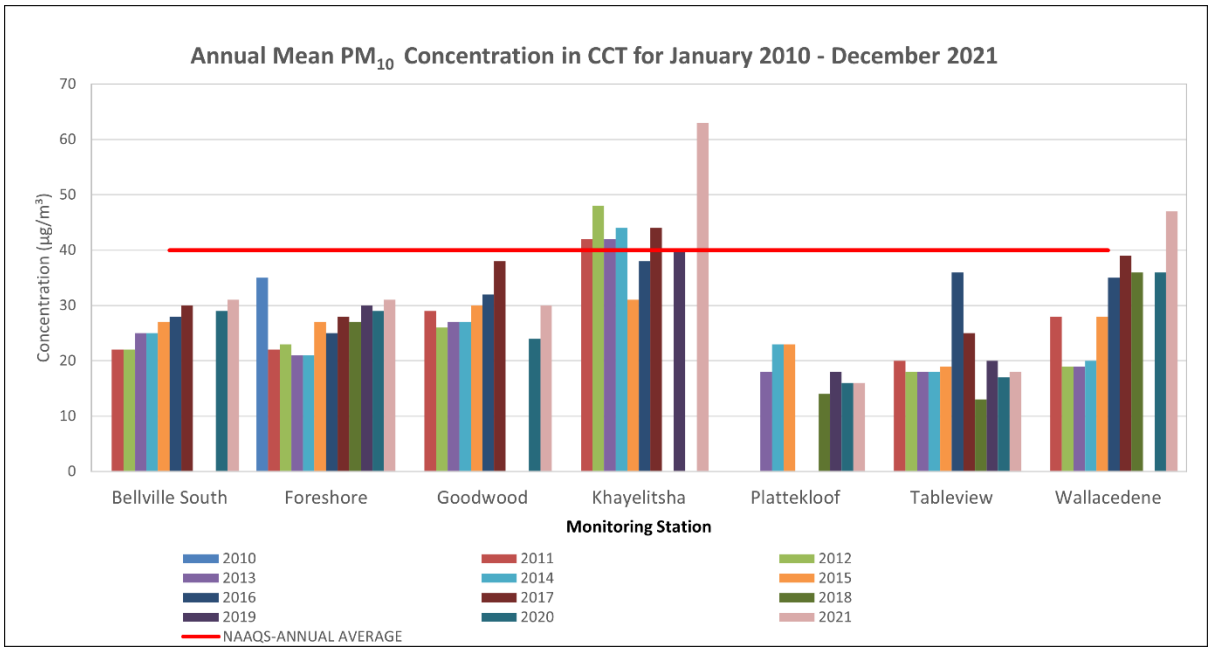


Figure 3-141: Annual mean PM_{10} concentrations in City of Cape Town during 2010 -2021

3.6 SUMMARY OF AMBIENT AIR QUALITY MONITORING IN THE WESTERN CAPE

With the exception of PM_{10} and $PM_{2.5}$ exceedances, the Western Cape Province's air quality measurements were generally below the NAAQS during the monitoring period, as summarised below.

The Western Cape's DEAD&DP Ambient Air Quality Monitoring Network reported that the PM_{10} NAAQS of 75 µg/m³ was exceeded on two (2) occasions during 2021. The two (2) exceedances occurred at the Khayelitsha air quality monitoring station, with the highest daily mean measured in June 2021. The exceedances were attributed to open fires used for heating and cooking, vehicle emissions and poor air dispersion.

A total of 126 exceedances of PM_{10} and 43 $PM_{2.5}$ were reported by the CCT's Ambient Air Quality Monitoring Network during 2021. Five (5) PM_{10} and two (2) $PM_{2.5}$ exceedances occurred at the Foreshore air quality monitoring station on 19 April 2021. The exceedances were attributed to the Table Mountain Fire on 18 April 2021. The Goodwood air quality monitoring station recorded six (6) PM_{10} and a total of 11 $PM_{2.5}$ exceedances from 19 June 2021, while the Wallacedene air quality monitoring station accounted for 28 PM_{10} and 25 $PM_{2.5}$ exceedances. The exceedances were attributed to the burning of wood for cooking and heating in the Wallacedene informal residential area in close proximity to the air quality monitoring station. Three (3) PM_{10} and five (5) $PM_{2.5}$ exceedances occurred at the Bellville-South air quality monitoring station during the 2021 monitoring period, while the Khayelitsha air quality monitoring station accounted for 84 PM_{10} and 28 $PM_{2.5}$ exceedances during 2021. The exceedances are as a result of local food vendors using wood for cooking and heating, and an informal taxi rank located in close proximity to the air quality monitoring station.

The Saldanha Bay Municipality has two (2) ambient air quality monitoring stations that measure SO_2, O_3, NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations in the area. During 2021, all the air quality parameters measured were generally below the NAAQS.

Table 3-15 summarises the percentage data capture, as recorded in the Western Cape Ambient Air Quality Monitoring Network. The ambient air quality monitoring stations experienced reduced data capture due to power supply, instrument failure, as well as the aging infrastructure, at stations.

The Western Cape Ambient Air Quality Monitoring Network's planned infrastructure enhancements have been impeded by the current economic climate and the resulting budgetary restrictions. Moreover, the lack of an adequately equipped workspace to perform in-house repairs on air quality monitoring analysers, as well as the lack of a suitable test environment for analyser maintenance and calibration, further impacted on data capture at the monitoring stations. Prioritizing this workspace is essential if it is to be properly prepared for carrying out the aforementioned tasks successfully and effectively. A fully furnished workstation will help to ensure accurate data collection in the Network, which will improve service delivery for managing air quality in the Province.

Although the Western Cape Province has made great achievements in terms of air quality monitoring, the Province's air quality monitoring coverage is still quite small, with the majority of the stations for continuous ambient air quality monitoring located in the CCT Metropolitan Municipal area. In terms of NEM: AQA, all Municipalities have a responsibility to monitor air quality in their jurisdictional areas. Ambient air quality monitoring provides invaluable information that can be used towards air quality planning, airshed planning and resolving complex air quality complaints in an area.

Therefore, Municipalities in the Western Cape are urged to advocate for funding for passive or continuous sampling in their respective jurisdictional areas, while funding and resources at the provincial level must be prioritized to replace the Western Cape Ambient Air Quality Monitoring Network's aging infrastructure, as well as additional human resource capacity to manage the Network.

TABLE 3-15: PERCENTAGE DATA CAPTURE AT THE AMBIENT AIR QUALITY MONITORING STATIONS OF THE WESTERN CAPE AMBIENT AIR QUALITY MONITORING NETWORK FOR 2021

STATION	SO_2	NO_2	PM_{10}	O_3	CO	H_2S	CO_2
ST HELENA BAY	N/A	N/A	N/A	N/A	N/A	<60	<60
MALMESBURY	<60	67	<60	88	68	N/A	N/A
GEORGE	96	92	98	98	98	N/A	N/A
MOSSEL BAY	N/A	N/A	N/A	N/A	N/A	90	N/A
OUDTSHOORN	N/A	N/A	N/A	N/A	N/A	90	88
STELLENBOSCH	60	62	<60	<60	<60	N/A	<60
WORCESTER	95	98	80	88	97	N/A	N/A
PAARL	<60	<60	N/A	<60	<60	N/A	N/A
HERMANUS	<60	<60	<60	<60	<60	N/A	N/A
KHAYELITSHA	71	62	90	63	71	N/A	62
HOUT BAY	N/A	N/A	N/A	N/A	N/A	76	N/A
MAITLAND	95	95	95	N/A	95	N/A	N/A

Note: N/A = Not Applicable, indicating that the air pollutant is not measured at the ambient air quality monitoring station.

4. AIR QUALITY COMPLIANCE AND ENFORCEMENT

The National Environmental Management: Air Quality Act (Act No. 39 of 2004; NEM: AQA) sets out the legal requirements for Air Quality Officers (AQOs) and Licensing Authorities to regulate air quality management and implement the Atmospheric Emission Licensing system in the Province. It further provides for access to information on air quality matters via the Promotion of Access to Information Act (Act No. 2 of 2000), as well as for administrative justice's legal requirements on air quality matters via the Promotion of Administrative Justice Act (Act No. 3 of 2000).

When the NEM: AQA came into full effect on 1 April 2010, it brought about a shift in the responsibility of authorities to administer the receipt, processing and issuing of Atmospheric Emission Licenses (AELs) from the National Government to the Provincial and Local spheres of government. Through further amendments of the NEM: AQA on 19 May 2014, the National Department of Forestry, Fisheries and the Environment (DFFE) was mandated to be the Licensing Authority for certain Section 21 Listed Activities.

Chapter 5 of the NEM: AQA sets out the procedures for the licensing of Listed Activities, with Section 36 assigning the function to the Metropolitan and District Municipalities, Provinces and the National DFFE, as the Licensing Authorities for Section 21 Listed Activities. The procedures for AELs are outlined, as well as the factors to be taken into account by Licensing Authorities to make a decision to grant or refuse an application, in terms of Section 40 of the NEM: AQA.

The NEM: AQA makes provision for the following applications in terms of atmospheric emission licensing:

- Section 42 - 43: Provisional AELs and AELs;
- Section 44: Transfer of
- Provisional AELs or AELs;

  Section 45: Review of Pro-

  visional AELs or AELs;
- Section 46: Variation of Provisional AELs or AELs; and
- Section 47: Renewal / extension of Provisional AELs or AELs.

The implementation of the atmospheric emission licensing regime has proven to be complex, and therefore, the National DFFE looked at an on-line system whereby AEL's could be tracked from when the application was received to when the license was issued.

4.1 ATMOSPHERIC EMISSION LICENSING IN THE WESTERN CAPE

The Licensing Authorities in the Western Cape have embraced the atmospheric emission licensing process. The introduction of the on-line reporting system called the System for National Atmospheric Emission Licensing (SNAEL) introduced a level of complexity to the application process. In spite of the many improvements made to the system over the years, the system still presents some challenges. These challenges often result in delays in the processing and issuing of AELs.

As at 31 December 2021, a total of 13 PAELs and 124 AELs were being regulated within the Province. Table 4-1 provides a summary of the AELs and PAELs issued annually during the period 2010 – 2021.

The City of Cape Town (CCT) has received training to be up to date with the changes in the system, the Garden Route District Municipality (GRDM), the Cape Winelands District Municipality (CWDM) and West Coast District Municipality (WCDM) have embraced the atmospheric emission licensing mandate and have actively engaged with industries in their respective areas.

TABLE 4 -1: SUMMARY OF THE AELS AND PAELS ISSUED BY LICENSING AUTHORITIES IN THE WESTERN CAPE DURING 2010 – 2021

Licensing Authority	REGULATED AS AT 31 DECEMBER																								NUMBER ISSUED IN YEAR	
	2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2021	
	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL	PAEL	AEL
WCDM	0	0	5	1	1	1	6	1	7	9	12	9	12	12	12	13	12	15	11	17	10	18	2	20	1	6
GRDM	5	0	4	0	7	2	2	14	3	6	2	23	0	26	0	27	0	26	0	27	0	30	2	26	0	4
ODM	0	0	0	0	0	0	1	0	2	0	5	0	1	4	0	5	0	5	0	5	0	5	0	5	0	3
CKDM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCT	0	0	2	0	1	3	3	2	14	19	16	31	18	32	26	6	19	42	14	50	15	52	9	56	3	4
CWDM	0	0	1	0	0	0	0	0	4	11	5	10	6	9	6	8	6	8	4	10	1	13	0	14	0	1
DEA&DP	0	0	0	0	0	0	0	0	1	0	3	0	1	3	0	3	0	3	0	3	0	3	0	3	0	1
TOTAL PAEL | AEL	5	0	12	1	9	6	12	17	31	45	43	73	38	86	44	62	37	99	29	112	26	121	13	124	4	19

4.1.1 South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP)

The National DFFE launched the South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP) at the 10th Air Quality Governance Lekgotla held in Bloemfontein on 30 September 2015.

The SAAELIP **serves as a central platform for the facility to manage license applications, licenses, reporting requirements, and compliance reports. It** provides a singular platform to monitor AEL emission reporting and atmospheric emission inventory reporting via the System for National Atmospheric Emission Licensing (SNAEL) and the National Atmospheric Emission Inventory System (NAEIS), respectively. The portal aims to improve service delivery and ensure transparent governance as it relates to air quality management in South Africa. A brief explanation of the NAEIS and SNAEL is provided in Sections 4.1.1.1 and 4.1.1.2.

The portal can be accessed by the authorities, industry and the general public, and provides information on AELs issued, as well as emissions inventory reports for specific geographic areas. More importantly, the SAAELIP allows the user to:

- Create and manage user accounts;
- Submit and manage AEL applications online;
- Track the status of an application;
- Submit emission inventory data & compliance reports;
- Receive e-mail notifications on licensing results;
- Receive e-mail alerts of upcoming reporting obligations;
- Track historical versions of all applications.

The portal can be accessed: https://saaelip.environment.gov.za/SAAELIP/home/

4.1.1.1 National Atmospheric Emission Inventory System – NAEIS

The main objectives of the NAEIS are to manage online reporting of emission inventories as mandated under the National Atmospheric Emission Reporting Regulations (G.N. 38633 of 2015). The system requires facilities who have been issued AELs or PAELs to submit and manage their emission inventory reports online.

To date, a total of 174 facilities in the Western Cape have registered on the NAEIS. Table 4-2 provides a summary of the number of facilities registered on the NAEIS, as per the different Licensing Authorities in the Western Cape.

TABLE 4 -2: NUMBER OF FACILITIES IN THE WESTERN CAPE, AS REGISTERED ON THE NAEIS

LICENSING AUTHORITY	NUMBER OF REGISTERED FACILITIES
CCT	87
CWDM	19
GRDM	31
ODM	6
WCDM	28
DEA&DP	3
TOTAL	174*

*Total number includes mines and quarries

4.1.1.2 System for National Atmospheric Emission Licensing – SNAEL

The main objectives of the SNAEL are to standardize the processing and issuing of AELs and reduce the associated administrative burden.

The system provides for industries that trigger Section 21 Listed Activities, to apply for an AEL online, as well as track the status of their AEL applications online. The system further provides for Licensing Authorities to schedule licensing related inspections and track inspection results, as well as manage online compliance reporting. The general public can access information about air pollutants permitted in AELs for specific industries.

4.2 COMPLIANCE MONITORING AND ENFORCEMENT

4.2.1 AEL Compliance Inspections Programme

The Department of Environmental Affairs and Development Planning (DEA&DP) has the responsibility of facilitating compliance monitoring and enforcement, with respect to Atmospheric Emission Licensing of controlled establishments in the Western Cape. These facilities, also known as Section 21 Listed Activities, as per the NEM: AQA, are regulated through the review of records, inspection, and compliance monitoring.

The DEA&DP's Directorate: Air Quality Management initiated an AEL Compliance Inspection Programme in 2013 and applied strategic enforcement action on targeted sectors that are likely to have a significant environmental burden in the Province. The DEA&DPs Directorate: Air Quality Management (D: AQM) officials and Environmental

Management Inspectors (EMIs), together with the Metropolitan, District and Local Municipalities' officials responsible for air quality management, undertook compliance inspections of facilities that have Section 21 Listed Activities throughout the Western Cape.

The compliance inspection methodology followed was the assessment of compliance with the conditions of the AEL and relevant legislative provisions by way of interviews, documents and facility records review, on-site walkthrough to gather photographic evidence and visual observations and inspection of site activities.

The Department implemented the due diligence enforcement compliance inspections program to help assist industries comply with all environmental legislation, reduce long-term costs and improve the industry's public image. To date, a total of 40 facilities have been formally inspected within the Western Cape. Table 4-3 provides a summary of the type of Section 21 Listed Activities that were formally inspected for compliance to their AEL conditions.

Due to the limited human resources in the DEA&DP D: AQM, the number of compliance inspections undertaken and completed has been limited to four (4) per annum.

TABLE 4 - 3: SUMMARY OF THE AEL COMPLIANCE INSPECTION PROGRAMME UNDERTAKEN IN THE WESTERN CAPE SINCE 2013

MUNICIPAL AREA	YEAR	SECTION 21 LISTED ACTIVITY	NO. OF FACILITIES INSPECTED
CAPE WINELANDS	2013	Category 10. Animal Matter Processing	1
WEST COAST	2013	Category 10. Animal Matter Processing	2
WEST COAST	2013	Sub-Category 5.4. Cement Production	1
CITY OF CAPE OF TOWN	2013	Category 10. Animal Matter Processing	1
CITY OF CAPE OF TOWN	2014	Sub-Category 2.4. Storage and Handling of Petroleum Products & Sub- Category 2.5. Installations Used to Recycle or Recover Oil from Waste Oils	1
GARDEN ROUTE	2014	Category 10. Animal Matter Processing	3
OVERBERG	2014	Sub-Category 5.6. Lime Production	1
WEST COAST	2014	Sub-Category 4.7. Electric Arc Furnaces & Sub-Category 5.2. Drying	1
CITY OF CAPE OF TOWN	2015	Sub-Category 8.2. Crematoria and Veterinary Waste Incineration	1
GARDEN ROUTE	2015	Sub-category 4.22. Hot Dip Galvanizing	1
WEST COAST	2015	Sub-Category 5.1. Storage and Handling of Ore and Coal	1
WEST COAST	2015	Sub-Category 5.6. Lime Production	1
CAPE WINELANDS	2015	Sub-Category 5.6. Lime Production	1
CAPE WINELANDS	2016	Sub-Category 7.2. Production of Acids & Sub-	1
OVERBERG	2016	Category 10. Animal Matter Processing	1

MUNICIPAL AREA	YEAR	SECTION 21 LISTED ACTIVITY	NO. OF FACILITIES IN-SPECTED
CITY OF CAPE TOWN	2016	Sub-Category 8.1. Thermal treatment of Hazard-ous & General Waste	1
WEST COAST	2016	Sub-Category 5.1. Storage and Handling of Ore and Coal	1
GARDEN ROUTE	2017	Subcategory 2.4: Petroleum product storage tanks and product transfer facilities, except those used for liquefied petroleum gas	1
CAPE WINELANDS	2017	Sub-Category 5.3: Clamp Kilns for brick production	1
OVERBERG	2017	Sub-Category 5.3: Clamp Kilns for brick production	1
CITY OF CAPE TOWN	2017	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CITY OF CAPE TOWN	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CAPE WINELANDS	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
GARDEN ROUTE	2018	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
OVERBERG	2018	Sub-Category 5.3: Clamp Kilns for brick production	1
CITY OF CAPE TOWN	2019	Sub-Category 8.2: Crematoria and Veterinary Waste Incineration	1
CITY OF CAPE TOWN	2019	Subcategory 1.2: Liquid Fuel Combustion Installa-tion	2
OVERBERG	2019	Category 10. Animal Matter Processing	1
CITY OF CAPE TOWN	2020	Subcategory 1.2: Liquid Fuel Combustion Installa-tion	2
CITY OF CAPE TOWN	2020	Subcategory 8.2: Crematoria and Veterinary Waste Incineration	1
OVERBERG (BOTRIVIER)	2020	Subcategory 5.3: Clamp Kilns for Brick Production	1
CITY OF CAPE TOWN	2021	Subcategory 1.2: Liquid Fuel Combustion Installa-tion	2
CITY OF CAPE TOWN	2021	Subcategory 8.2: Crematoria and Veterinary Waste Incineration	1
CAPE WINELANDS	2021	Subcategory 5.3: Clamp Kilns for Brick Production	1
TOTAL			40

4.2.2 Section 22A – Unlawful conduct of Listed Activities

The amendments to the NEM: AQA, as promulgated in the National Environmental Management: Air Quality Amendment Act (Act No. 20 of 2014; NEM: AQAA) on 19 May 2014, introduced amendments to Section 22 Consequences of Listing. Section 22A empowers Licensing
Authorities to address the unlawful conduct of listed activities resulting in atmospheric emissions in the following instances, applicable to:

- Operating without a Provisional Registration or Registration Certificate of a scheduled process in terms of the APPA, at any time prior to the commencement of the NEM: AQA; or
- Operating without a PAEL or an AEL, of any activity listed in terms of Section 21 of the NEM: AQA, which results in atmospheric emission.

- Regulations informing the Section 22A administrative fine fee structure were promulgated on 18 March 2016, and provide for the determination of an administrative fine, as well as for an applicant to pay the applicable AEL processing fee as stipulated. No Section 22A administrative fines have been issued in the Western Cape to date.

4.3 AIR POLLUTION COMPLAINTS HANDLING DURING 2016 – 2021

4.3.1 Inter-Governmental Task Teams (IGTT)

Air Quality Officers also investigated complaints and applied the NEM: AQA, as well as Municipal Air Quality Management By-laws to regulate air quality within their jurisdictional areas.

During the period 2010 – 2021, the DEA&DP convened various Inter-Governmental Task Teams (IGTTs) in order to investigate and resolve complaints related to complex air quality matters. Generally, the IGTTs comprised of all three (3) spheres of government, industry and the community. Following initial meetings, the convening of the IGTTs were transferred to the Metropolitan or District Municipality in their respective jurisdictional areas. This approach has proven to be advantageous with regards to the handling and resolving of air pollution complaints and activities.

Table 4-4 provides a summary of an IGTTs in Saldanha Bay, to address concerns regarding iron-ore and manganese handling in the area.

TABLE 4-4: Current INTER- GOVERNMENTAL TASK TEAMS FORMED IN THE WESTERN CAPE

AREA	NATURE OF COMPLAINT
SALDANHA BAY	No unlawful iron ore activities are currently conducted. Complaints received are mostly regarding staining of property. Industry emissions were found to be compliant with AEL conditions. The GSB IGTT headed by DEA&DP, discusses various topics inclusive of dust emanating from manganese ore handling. Through the Greater Saldanha Bay IGTT meeting, the DEA&DP and an appointed service provider completed a Strategic Environmental Assessment. A draft report detailing the current status quo and the future desired state of the greater Saldanha Bay area was distributed for comment. Due to the COVID-19 restrictions in terms of meetings and travelling, the Greater Saldanha Bay IGTT meetings were held virtually, via MS Teams.

4.3.2 Complaints Handling: Garden Route District Municipality

The Garden Route District Municipality (GRDM) actively assisted Local Municipalities to address air pollution related complaints in their areas. All complaints are captured on an electronic database and dealt with timeously. Most complaints relate to Listed Activities and Controlled Emitters to a lesser degree.

During the period 2010-2021, complaints included smoke and odour, with the former having reduced over this reporting period (Figure 4 -1). Odour-related complaints in Oudtshoorn and Mossel Bay have been resolved, hence the overall decrease during this reporting period.

During 2016-2021, offensive odour was the predominant complaint as per the trend (Table 4-1); this was followed by smoke complaints and dust. The agglomeration of animal matter processing facilities remained a challenge as it is difficult to measure and attribute offensive odour to a specific facility or process. There was a definite decline in complaints in 2019, following the closure of an animal matter processing facility in Mossel Bay.

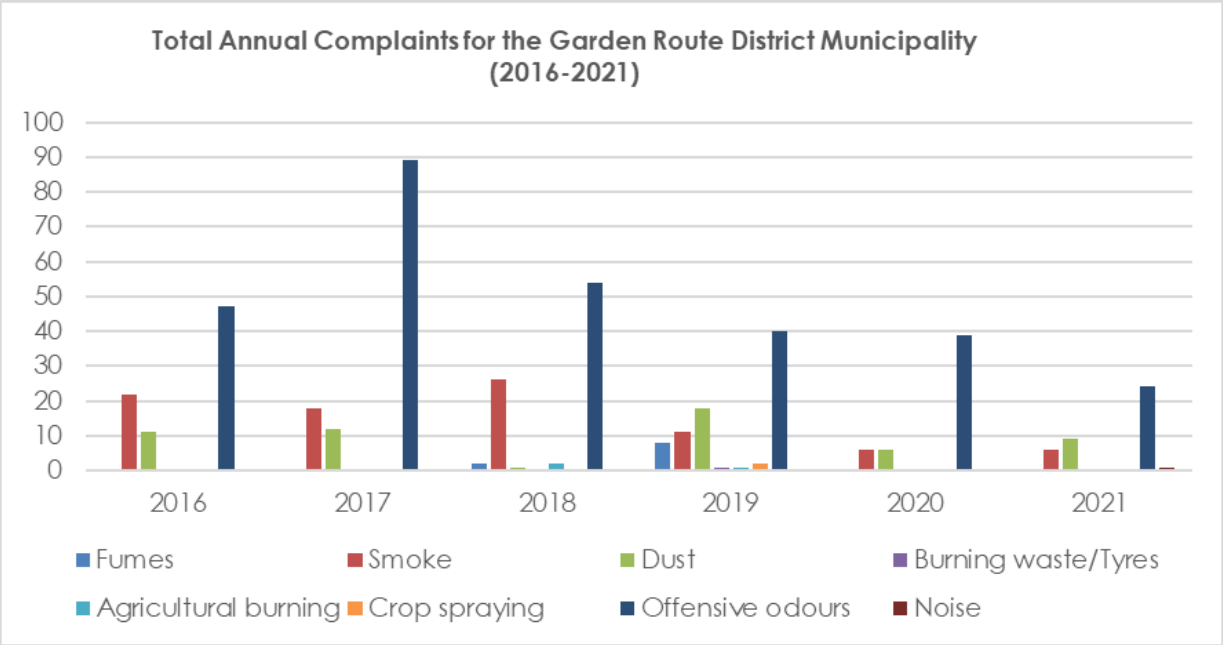


Figure 4 -1: Total complaints received by the Garden Route District (2010 – 2021)

4.3.3 Complaints Handling: West Coast District Municipality

Odour from fishmeal processing remains a challenge. Currently, there is no legislation in South Africa to address the nuisance factor in respect of odour. The World Health Organisation (WHO) Guidelines for hydrogen sulphide (H_2S) is applied through the atmospheric emission licensing process and industry monitoring results have indicated that industries are well within the emission limits of the Section 21 Listed Activities. Despite industries operating within the WHO Guideline limit for odour, best practices and equipment are implemented to ensure that the plant runs optimally to further reduce odour emissions; however, due to the associated nuisance factor, complaints are still lodged by the public.

Dust has also remained a challenge in the area. The main sources of dust in the area include iron ore and manganese storage and handling facilities, gravel (unpaved) roads and mining operations. Although listed activities are managed via the atmospheric emission licensing process and individually comply with their relevant Minimum Emission Standards (MES) and monitoring in the area show compliance to the National Ambient Air Quality Standards (NAAQS), it is evident that industry and residential communities need to engage on this matter. The National Dust Control Regulations (GN. 827 of 2013) will assist with enforcing better control measures where dust emissions are challenging. It is recommended that legislation regarding fugitive dust be reviewed to further regulate and control dust emissions from industrial and / or mining processes.

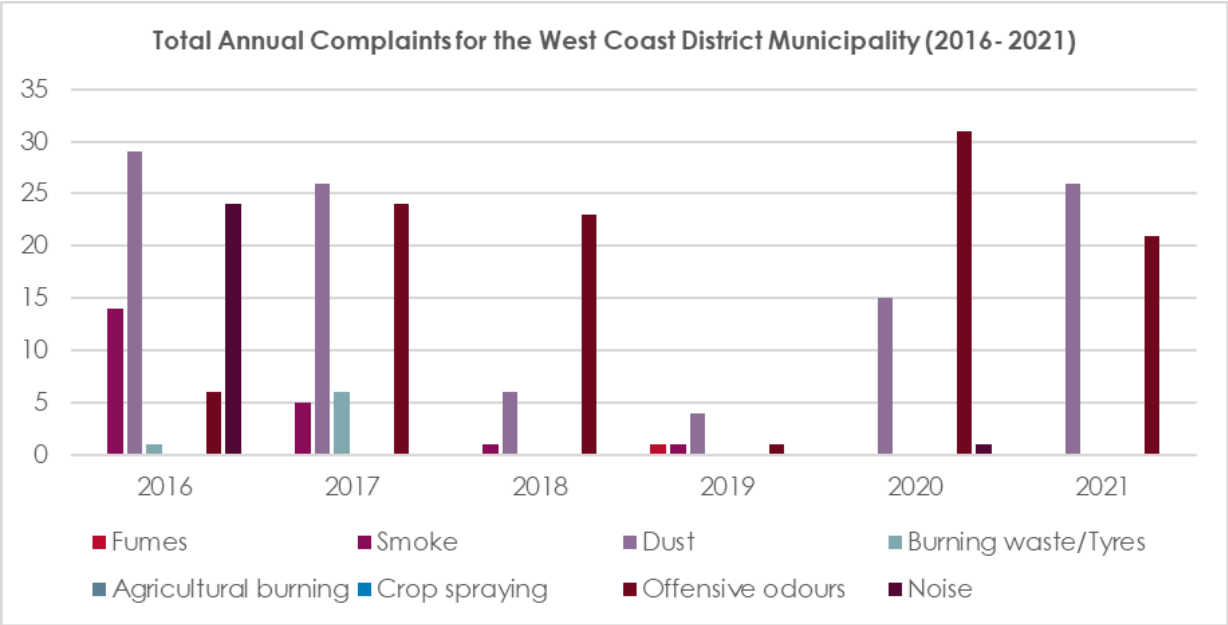


Figure 4 -2: Total complaints received by the West Coast District Municipality (2010-2021)

4.3.4 Complaints Handling: Cape Winelands District Municipality

During 2010-2021, air quality complaints in the Cape Winelands District Municipality (CWDM) were mostly related to odour, noise and agricultural (dust, crop spraying, farmland / waste burning) (Figure 4-3). Due to the nature of the complaints, particularly with regards to crop spraying and agricultural burning, the CWDM expressed the need for a harmonized legislative approach between the different Directorates in DFFE at National level.

The CWDM established an Industrial Air Quality Forum in May 2011 to ensure appropriate discussion on air quality compliance and the relevant legislative requirements in terms of air quality management in the region. Odour related complaints, particularly in the Breede Valley Municipal region required that the CWDM and DEA&DP set up an IGTT to investigate the conditions of authorisation for a Category 10: Animal Matter Processing listed activity; which has since been resolved.

Odour related complaints, with regards to the operation of a Category 10: Animal Matter Processing Section 21 Listed Activities were drastically reduced with the commissioning of a new odour mitigation plant in 2017 to minimise and mitigate possible odour releases that were considered offensive by the receptor community within the Breede Valley Municipality. Other recurring odour complaints included odours emanating from industrial wastewater disposal on open land with an approved Water Use License, non-listed industrial processes and agricultural activities.

The increase in dust related complaints, as received on farming activities and listed activities such as clay brick manufactures during 2017 to 2019, is likely attributed to the Western Cape drought. As per the NEM: AQA, odour, noise and dust are a Local Municipality responsibility. There is a notable decrease in the number of noise complaints.

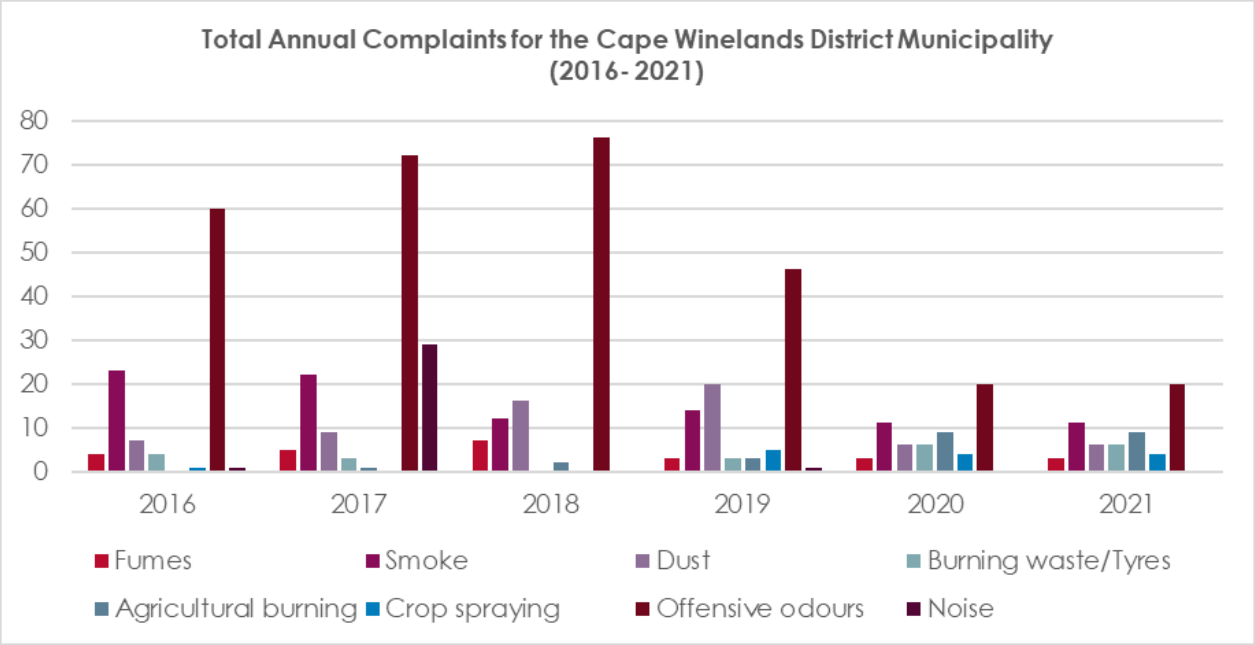


Figure 4 - 3: Total complaints received by the Cape Winelands District Municipality (2010 – 2021)

4.3.5 Complaints Handling: Central Karoo District Municipality

The Central Karoo District Municipality (CKDM) did not receive complaints during the reporting period. Figure 4-4 is representative of past complaints received in the area, during 2017 and 2019. These complaints have long been resolved.

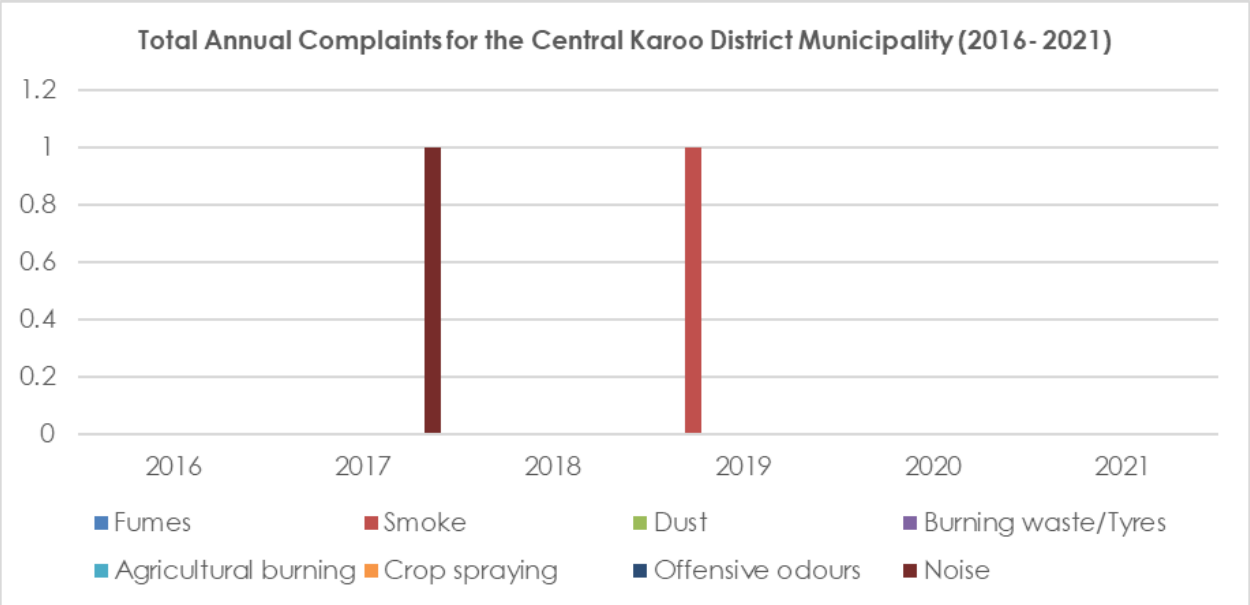


Figure 4 - 4: Total complaints received by the Central Karoo District Municipality (2010 – 2021)

4.3.6 Complaints Handling: Overberg District Municipality

During 2010-2016, the Overberg District Municipality (ODM) received complaints comprising mostly of offensive odour, followed by dust, smoke from waste and land burning, as well as noise (Figure 4-5). These matters were investigated and resolved by the ODM. During 2017- 2021, the ODM did not receive any complaints.

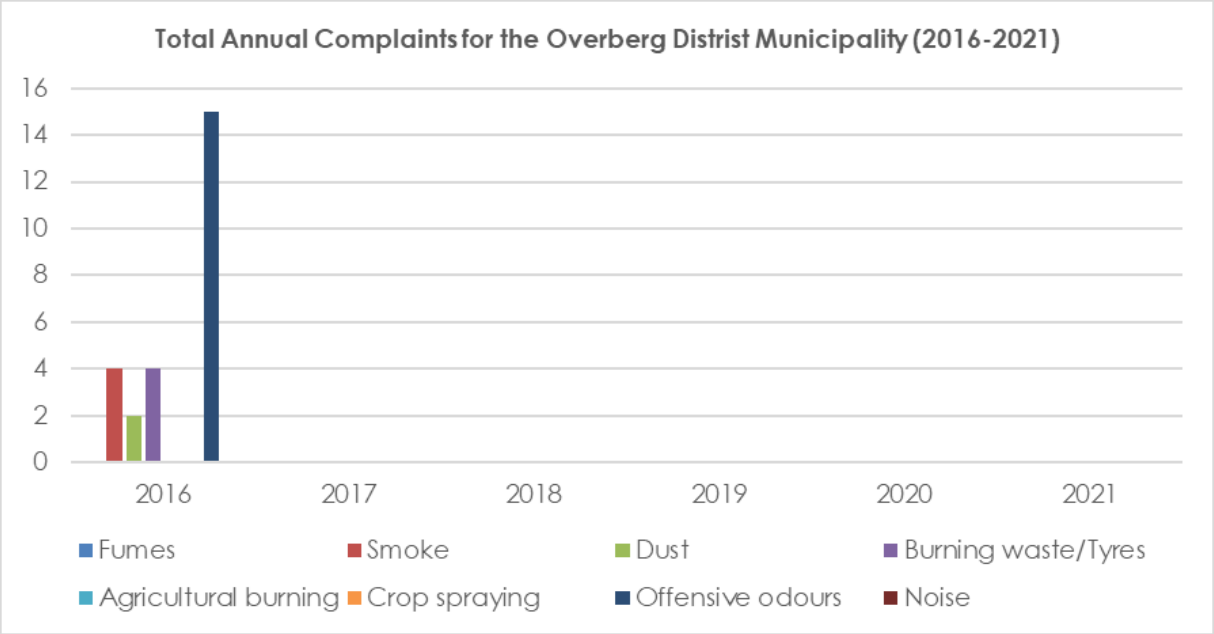


Figure 4 - 5: Total complaints received by the Overberg District Municipality (2010 – 2021)

4.3.7 Complaints Handling: City of Cape Town

During 2010-2021, air quality complaints in the City of Cape Town (CCT) comprised mostly of noise, fumes, odour and farmland / tyre / waste burning (Figure 4-6). The CCT conducted compliance and enforcement investigations on galvanizing facilities, illegal foundry operators, metal spray operators and hazardous waste incinerators. These complaints cases were referred to the Director: Public Prosecutions for consideration for prosecution. Numerous By-law enforcement actions were also undertaken.

During 2016-2021, most complaints comprised of noise, fumes and smoke. There has been a decrease in the number of offensive odour complaints since 2016.

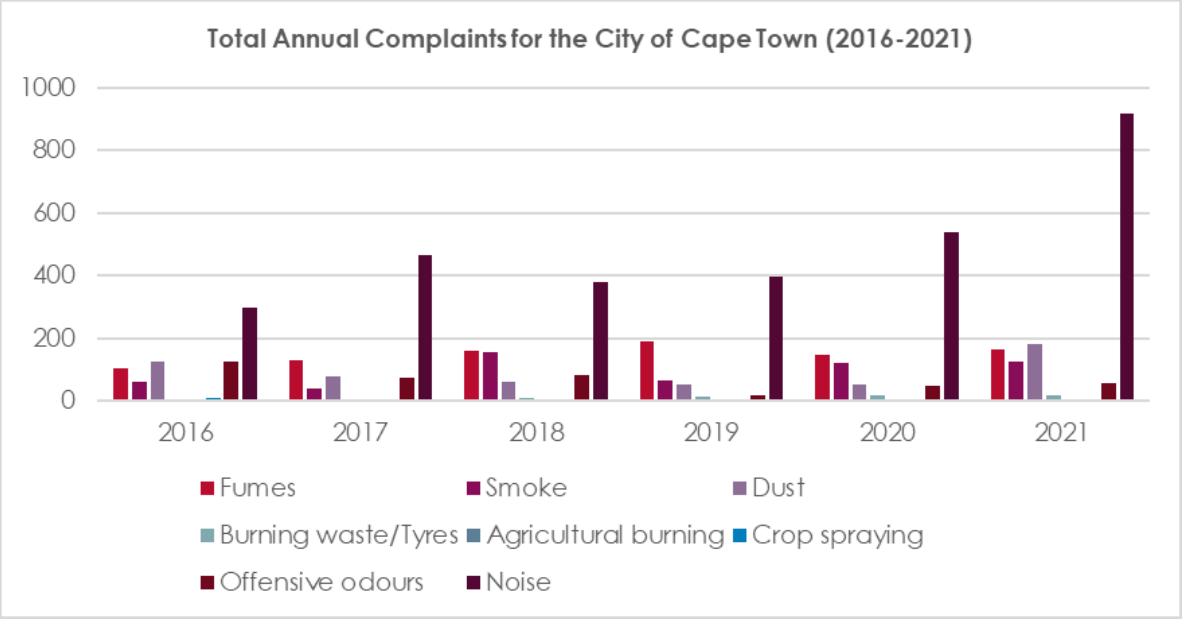


Figure 4 - 6: Total annual complaints received by the City of Cape Town (2010 – 2021)

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