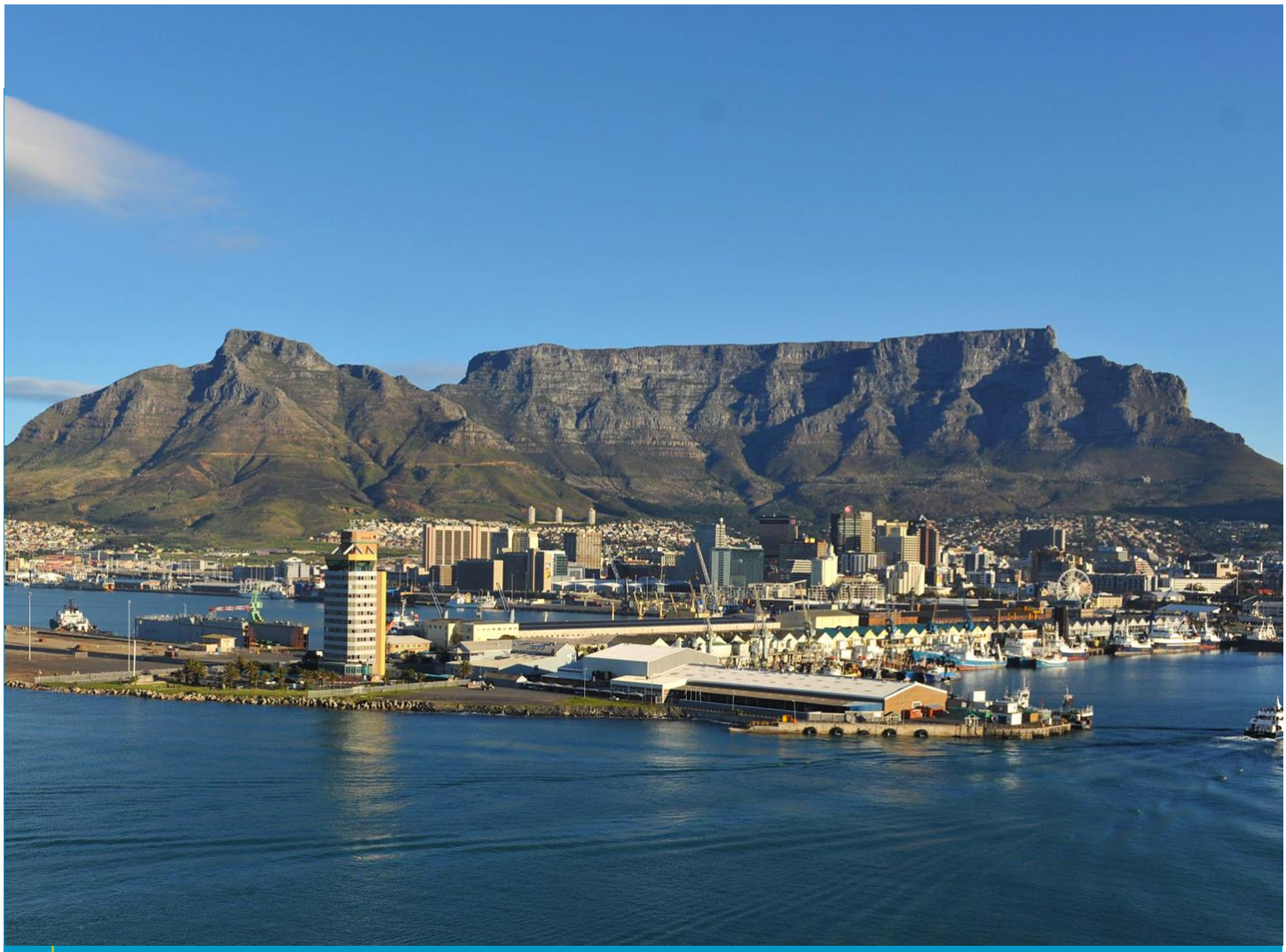
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD



AIR QUALITY MANAGEMENT PLAN 2024

2nd Generation Plan

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ABBREVIATIONS

AEL Atmospheric Emission Licence

AQM Air Quality Management

AQMP Air Quality Management Plan

AQO Air Quality Officer

C_6H_6 Benzene

CCT City of Cape Town

CH_4 Methane

CO Carbon Monoxide

CO_2 Carbon Dioxide

CTBHS Cape Town Brown Haze Study

DEA&DP Department of Environmental Affairs and Development Planning

DFFE National Department of Forestry, Fisheries and the Environment

EMI Environmental Management Inspector

GHG Greenhouse Gas

GN Government Notice

GVA Gross Value Added

H_2S Hydrogen Sulphide

HVAC Heating, Ventilation, and Air Conditioning

IDP Integrated Development Plan

IPC Inter-modal Planning Committees

ISO International Organization for Standardisation

µ Micro or micrograms

MEC Member of the Executive Council

N_2O Nitrous Oxide

NAAQS National Ambient Air Quality Standards

NAEIS National Atmospheric Emissions Inventory System

NCC National Coordination Committee

NEM: AQA National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004)

NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)

NO_2 Nitrogen Dioxide

NO_X Nitric Oxides

O_3 Ozone

PAEL Provisional Atmospheric Emission Licence

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

ppb Parts per billion

ppm Parts per million

PPP Public Participation Process

SAAELIP South African Atmospheric Emission Licensing and Inventory Portal

SAAQIS South African Air Quality Information System

SANAS South African National Accreditation System

SANS South African National Standards

SAQP Senior Air Quality Practitioner

SEA Strategic Environmental Assessment

SEMA Specific Environmental Management Act

SNAEL System National Atmospheric Emission Licensing

SO_2 Sulphur Dioxide

SOP Standard Operating Procedure

StatsSA Statistics South Africa

UNFCCC United Nations Framework Convention on Climate Change

US EPA United States Environmental Protection Agency

VOCs Volatile Organic Compounds

VPUU Violence Prevention through Urban Upgrading

WHO World Health Organisation

DEFINITIONS AND TERMINOLOGY

"Air Quality Act" means the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004);

''adverse effect'' means any actual or potential impact on the environment that impairs or would impair the environment or any aspect of it to an extent that is more than trivial or insignificant;

''air pollutant'' includes any dust, smoke, fumes or gas that causes or may cause air pollution;

''air pollution'' means any change in the environment caused by any substance emitted into the atmosphere from any activity, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future;

"air quality management plan" means the air quality management plan referred to in section 15 of the Air Quality Act;

"air quality officer" means the air quality officer designated as such in terms of section 14(3) of the Air Quality Act;

"ambient air" means **"ambient air"** as defined in section 1 of the Air Quality Act;

''atmosphere'' means air that is not enclosed by a building, machine, chimney or other similar structure;

"atmospheric emission" or **"emission"** means any emission or entrainment process emanating from a point, non-point or mobile source, as defined in the Air Quality Act that results in air pollution;

"best practicable environmental option" means the option that provides the most benefit, or causes the least damage to the environment as a whole, at a cost acceptable in the long term as well as in the short term;

"City" means the City of Cape Town established by Provincial Notice No. 479 of 2000 in terms of section 12 of the Local Government: Municipal Structures Act, 1998 (Act No. 117 of 1998) or any structure or employee of the City acting in terms of delegated authority;

"climate forcings" are different factors that affect the Earth's climate. These "forcings" drive or "force" the climate system to change.

"Council'' means the Municipal Council of the City;

"duty of care" requires that any person who is wholly or partially responsible for causing air pollution or creating a risk of air pollution occurring must take all reasonable measures including the best practicable environmental option–
(a) to prevent any potential significant air pollution from occurring; and
(b) to mitigate and, as far as reasonably possible, remedy the environmental impacts and consequences of any air pollution that has occurred.

''environment'' means the surroundings within which humans exist and that are made up of—
(a) the land, water and atmosphere of the earth;
(b) micro-organisms, plant and animal life;
(c) any part or combination of (a) and (b) and the interrelationships among and between them; and
(d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being;

"frequency of exceedance" means the permissible number of ambient air quality standard pollutant exceedances at a monitoring station allowed by law for a given time period;

''living organism'' means any biological entity capable of transferring or replicating genetic material, including sterile organisms and viruses;

"Municipal Systems Act" means the Local Government: Municipal Systems Act, 2000, (Act No. 32 of 2000);

"Provincial Government" means the Provincial Government of the Western Cape.

EXECUTIVE SUMMARY

Air Quality Management Plan

2nd Generation

The purpose of this plan is to ensure that clean air is achieved and maintained in the City over the next 10 to 20 years. It contains the vision, mission, objectives, and activities that are needed to achieve this.

The City of Cape Town's Air Quality Management Vision

TO BE A CITY THAT ENSURES CLEAN AIR FOR ALL.

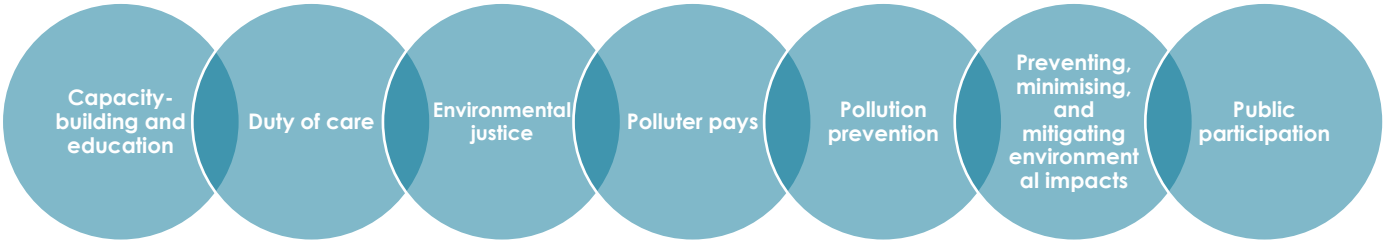
The City of Cape Town's Air Quality Management Mission

TO REDUCE THE HEALTH EFFECTS OF POOR AIR QUALITY FOR ALL IN CAPE TOWN.

The Second Generation Plan has four (4) goals and seventeen (17) enabling objectives which will assist in achieving the vision and mission for air quality management for the City of Cape Town for the short, medium and long term:

- GOAL 1: Reduce harmful greenhouse gas emissions through supporting air quality and climate change response programmes
- GOAL 2: Ensure effective and consistent air quality management, linked to climate change response
- GOAL 3: Raise awareness with respect to air quality management and climate change response
- GOAL 4: Increase compliance through effective and consistent air quality compliance, monitoring and enforcement

PRINCIPLES INFORMING AIR QUALITY MANAGEMENT



CONTENT OF THE PLAN

Clause	Purpose/Overview
1. Background and context	Provides an overview of the impact of air pollution on human health and the current state of air quality in the City of Cape Town and outlines the main challenges that the City currently faces in this regard. This clause can be read in conjunction with the more detailed situational assessment in clause 11.
2. Vision and Mission Statements	The main vision and mission of the Plan as discussed above.
3. Desired Outcomes	Implementing the Plan including related Goals and Objectives in pursuance of the Vision and Mission of the Plan.
4. Principles for Air Quality Management	The Plan and related activities are underpinned by a key set of principles as discussed above.
5. Strategic Intent and Policy Alignment	Discusses the alignment and links with relevant local, provincial, national and international strategies, plans and policies.
6. Regulatory Context	Sets out the legal context of the Plan, including legislative requirements from the Constitution to relevant local by-laws.
7. Plan Parameters	Outlines the application of the Plan (see below).
8. Role Players and Stakeholders	The Plan requires a whole of government and society approach to improve air quality. This section outlines the main role players and stakeholders including the aspects of the Plan that are relevant to them.
9. Plan Directives: Goals and Objectives	In order to achieve the overall goals and objectives of the Plan a list of activities is outlined including responsible City departments, time-line, dependencies and the desired outcomes for each activity.
10. Implementation Programme	Discusses the overarching approach to achieving effective control of air quality. The implementation of the activities contained in the Plan including due consideration being given to the monitoring and evaluation of the outcomes and impacts of the activities.
11. Situational Assessment	Assesses monitored air quality and pollution trends against National Ambient Air Quality Standards.

ROLES AND RESPONSIBILITIES

Local government: City of Cape Town	Transversal action is required to achieve improved air quality including addressing upstream and downstream pollution sources that various City departments regulate or manage.
Provincial and National Government	Provincial government provides oversight as well as support and guidance to local air quality management services. National government provides the overall regulatory framework as well as coordinating and oversight functions.
Business, Industry and the General Public	Business, industry and the general public play a critical role in reducing air pollution and working in partnership with government to improve overall air quality.

PLAN PARAMETERS

This document fulfils the purpose of the City of Cape Town's Air Quality Management Plan as contemplated in Section 15(2) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004). Parameters of the Plan are:

- The Plan applies city-wide.
- The Plan seeks to provide a transversal approach to Air Quality Management related challenges facing the city.
- The Plan is guided and implemented through the Air Quality Act, its regulations and the City of Cape Town Air Quality Management By-law, 2016.
- The Plan has transversal implications and requires various directorates to work collaboratively to realise the vision, mission, goals and objectives of the Plan.

1 BACKGROUND AND CONTEXT

1.1 Impacts of Air Quality

The World Health Organisation (WHO) has recognised that air pollution kills an estimated seven million people worldwide every year. "*WHO data shows that 9 out of 10 people breathe air that exceeds WHO guideline limits containing high levels of pollutants, with low- and middle-income countries suffering from the highest exposures*".

"*From smog hanging over cities to smoke inside the home, air pollution poses a major threat to health and climate. The combined effects of ambient (outdoor) and household air pollution cause about seven million premature deaths every year, largely as a result of increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer and acute respiratory infections*" (*https://www.who.int/health-topics/air-pollution*).

Due to the multiple known risks of air pollution, the National Department of Forestry, Fisheries and the Environment (DFFE) has identified certain pollutants which may have a detrimental effect on the environment and the health of individuals. The pollutants are called criteria air pollutants, as listed below:

i. PM_{10} – suspended particles smaller than 10 microns in diameter, also called inhalable particulate matter;
ii. $PM_{2.5}$ – suspended particles smaller than 2.5 microns in diameter. The ultrafine fraction of particulate matter;
iii. Sulphur Dioxide (SO_2);
iv. Nitrogen Dioxide (NO_2);
v. Ozone (O_3);
vi. Hydrogen Sulphide (H_2S) (odour threshold only);
vii. Carbon Monoxide (CO);
viii. Benzene (C_6H_6); and
ix. Lead (Pb).

Cape Town is not excluded from the impacts of air pollution. The main cause of the Cape Town Brown Haze is fine and ultra-fine particulate matter, Volatile Organic Compounds (VOC) and Nitric Oxides (NO_x) emissions from transport, biomass burning, industrial, and domestic sources. These pollutants are known to cause a health risk if inhaled at high concentrations for long periods. Every year during the period from May to September, Cape Town experiences episodes of visible pollution, which are associated with stable atmospheric conditions and low-level inversions. These conditions give rise to visible brown haze, which has been a cause for concern for many years.

Existing levels of ambient air pollution in Cape Town have the following main impacts:

i. Poor visibility especially during the 'Brown Haze' episodes;
ii. Climate change inducing impacts due to greenhouse gas (GHG) emissions i.e. Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (NO) and short lived climate forcing agents e.g. black carbon;
iii. Risks to human health and well-being and environment – noting that more research is needed to understand the specific impact on vulnerable groups in the City of Cape Town;
iv. Disproportionate health and other impacts on residents in dense low-income areas;
v. Reduced tourism;
vi. Reduced quality of the environment in which to live; and
vii. GHGs contributing to climate change.

Due to the above problem statements, it is essential that the City develops and implements a thorough and evidence based air quality management plan.

1.2 Cape Town socio economic overview

The City of Cape Town is the only metropolitan municipality in the Western Cape and together with twenty three other local municipalities and the five other district municipalities forms part of the Western Cape provincial structure as shown in the locality map in **Figure 1.**

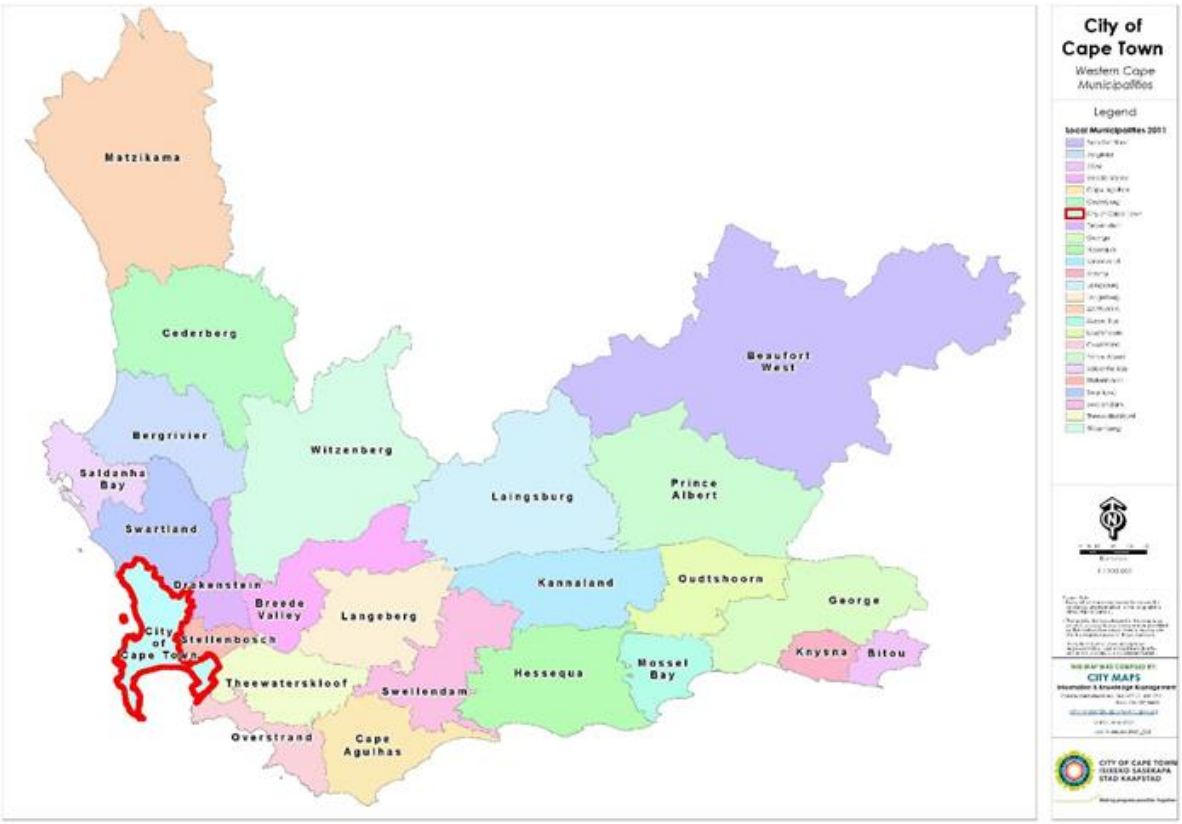


Figure1: Locality map of the City of Cape Town in the Western Cape Province

Cape Town hosts approximately 64.1% of the population of the Western Cape Province. The population of Cape Town was 3 740 026 in 2011 (2011 Census, StatsSA) and has seen steady growth with an estimated population of 4 678 900 in the 2021 mid-year population estimates (StatsSA) which equates to an increase of 25.1% since 2011. It is projected that the population of Cape Town will grow to at least 5.8 million in the year 2040 (according to City of Cape Town, 2017 - Cape Town Population Projections 2016 to 2040).

The population density and the coverage of the ambient air quality monitoring stations in relation to populated areas within the boundaries of the City is shown in the map in **Figure 2.** In 2020, finance, insurance, real estate and business services constituted 40.1% of economic activity in the CCT (*GVA contribution*), followed by community services (19.2%), trade and hospitality (13.1%) and manufacturing (12.7 %) (IHS Markit, 2021).

The socio economic footprint and index of the City and the location of the ambient air quality monitoring stations in relation to the different zoning and economic activities in the City is shown in the map in **Figure 3.**

1.3 Cape Town Climate, Weather Patterns, Meteorological Characteristics and Topography that affect air pollution

Cape Town has a warm Mediterranean climate with mild, moderately wet winters and dry, warm summers. Winter, which lasts from the beginning of June to the end of August, may see large cold fronts entering for limited periods from the Atlantic Ocean with significant precipitation and strong north-westerly winds. Winter months in the city average a maximum of 18 °C and minimum of 8.5 °C. Total annual rainfall in the city averages 515 millimetres although in the southern suburbs, close to the mountains e.g. in the Newlands area rainfall is significantly higher and averages closer to 1 000 millimetres.

Summer, which lasts from December to March, is warm and dry with an average maximum of 26 °C and minimum of 16 °C. The region can get uncomfortably hot when the Berg Wind, meaning "mountain wind", blows from the Karoo interior for a couple of weeks in February or March. Spring and summer generally feature a strong wind from the south-east, known locally as the 'South-Easter' or the 'Cape Doctor', so called because it blows air pollution away. This wind is caused by a high-pressure system, which sits in the South Atlantic to the west of Cape Town, known as the South Atlantic High. Cape Town receives 3 100 hours of sunshine per year, which contributes to ground level ozone formation.

It is well known that meteorological conditions in the Greater Cape Town region follow complicated patterns, due to various topographical influences such as Table Mountain and the two oceans (*Dracoulides, 1994. Air Pollution Modelling for the Greater Cape Town Region. Energy Research Institute, University of Cape Town*) as shown in the topographical map of Cape Town in **Figure 4.**

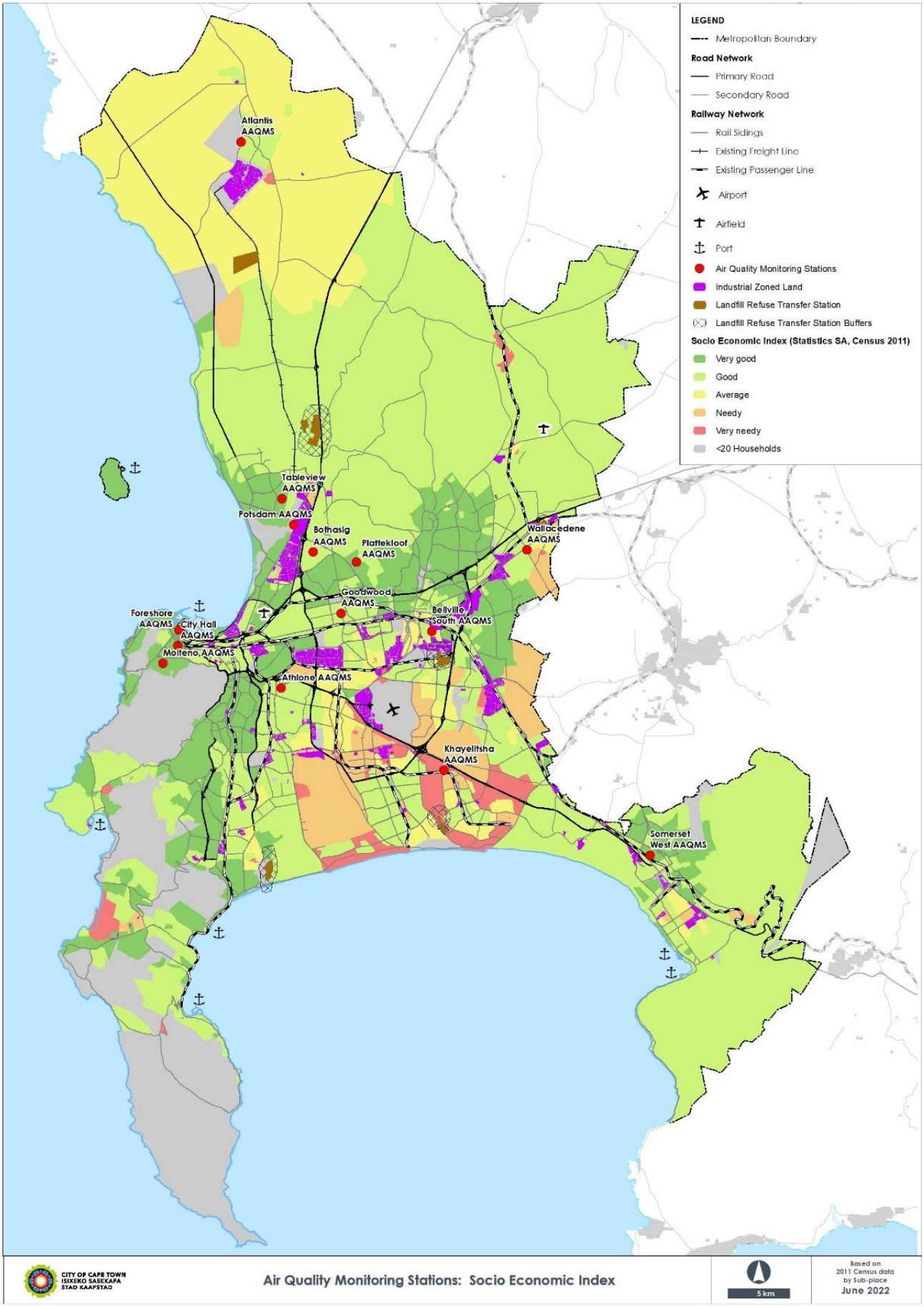


Figure 2: Cape Town Socio Economic Index.

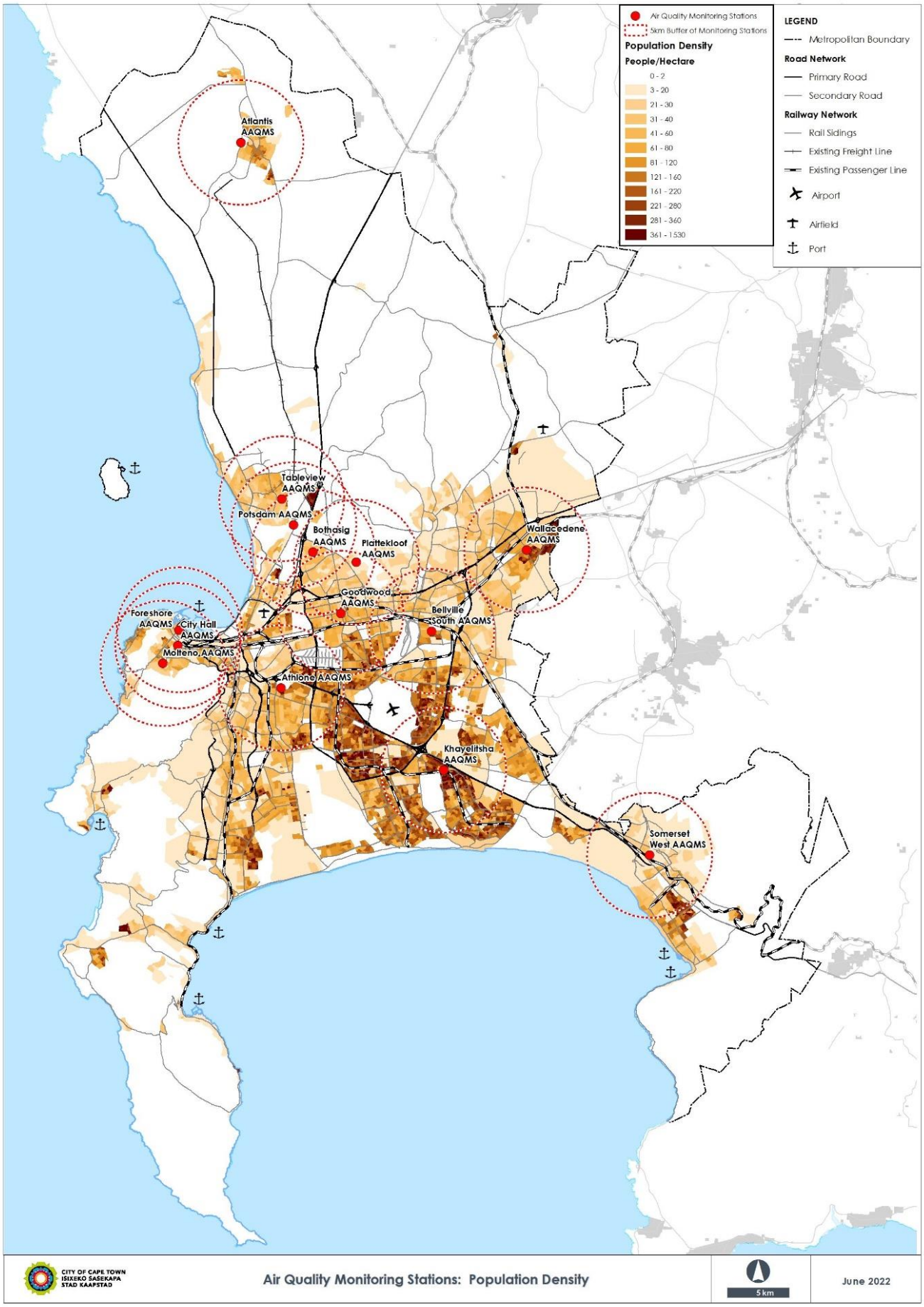


Figure 3: Cape Town Gross Population per square kilometre.

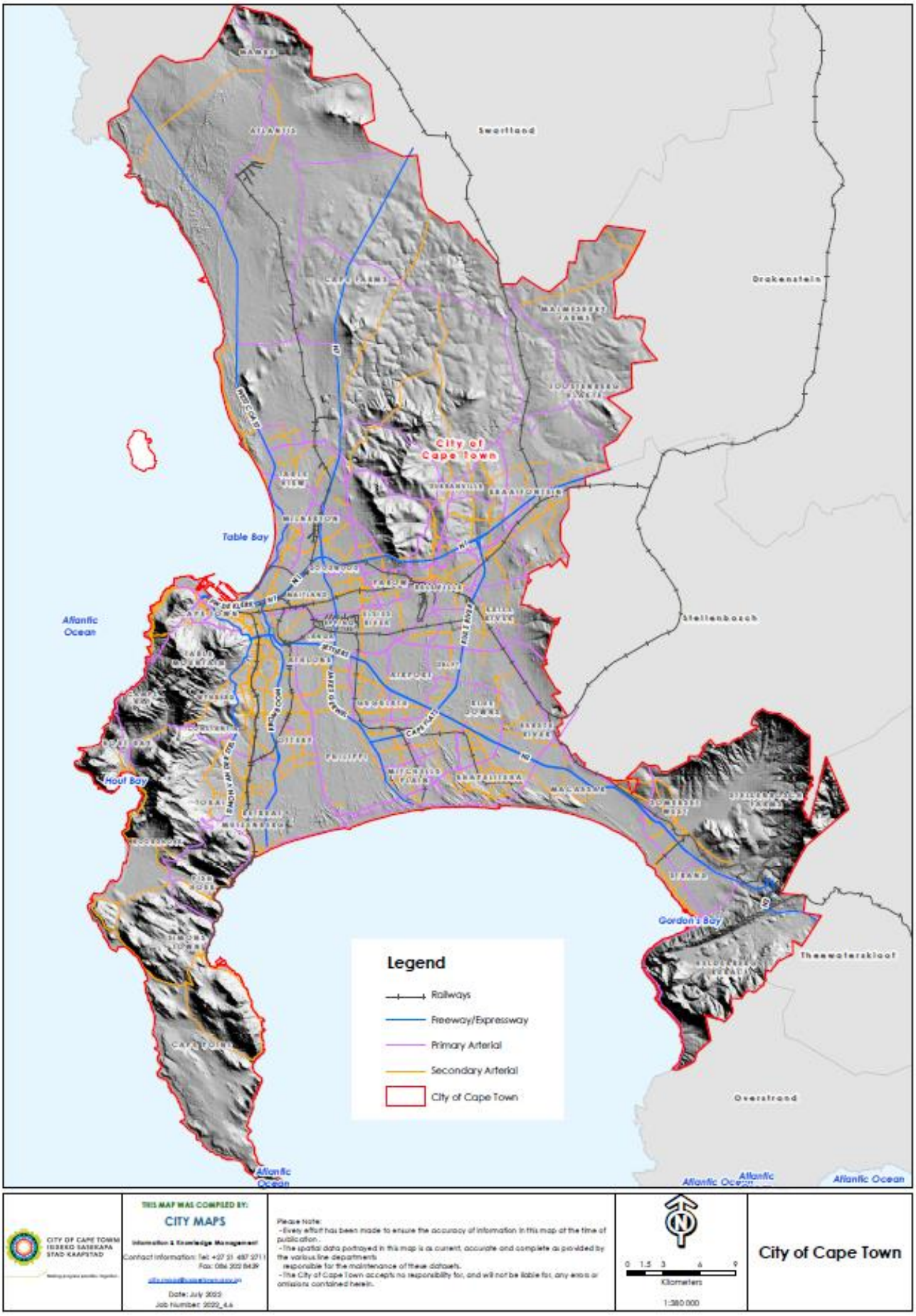


Figure 4: Cape Town Topography and major transport routes and suburbs

According to Dracoulides (1994: 2-18), measured meteorological parameters at one weather station do not represent the entire area under all atmospheric conditions.

The Cape Town Brown Haze Study (*Wicking-Baird, M C, de Villiers, M G & Dutkiewicz, R K 1997. Cape Town Brown Haze study. GEN 182, Energy Research Institute, University of Cape Town, Cape Town*) suggests that ambient pollutant concentrations are strongly dependent on the atmosphere into which they are emitted. The meteorological factors that affect air pollutant concentrations in the lower atmosphere are wind velocity, vertical temperature profile and mechanical turbulence. These factors together with the rate and height of emissions govern the ambient pollutant concentrations.

In general, Cape Town meteorology can be summarised by four typical synoptic patterns for the Southern African subcontinent. The summer months are characterised by a high south-easterly airflow which is caused by a ridging anticyclone over the south Atlantic. This results in high wind velocities and consequently high atmospheric turbulence, which dilutes and disperses pollutants efficiently.

During the winter months, the wind is generally from the north-west. This is caused by a pre-frontal system that also causes low temperatures and overcast conditions. The high wind velocity performs a diluting function on pollutants in the area. During early spring and late winter, Cape Town experiences brown haze episodes in the Cape Town region under conditions of strong overnight temperature inversions usually associated with light berg wind conditions, ahead of migrating coastal lows.

Stagnant atmospheric conditions also exist whereby an anticyclone results in light variable winds and an elevated temperature inversion, which have the potential to result in pollution episodes due to insufficient airflow to dilute pollutants (Wicking-Baird 1997: 15).

Furthermore, climate change risks may increase air pollution through the following mechanisms:

i. Drought and decreased rainfall, leading to increased dust due to dry soil conditions and reduced vegetation cover;
ii. Increased fire risk, leading to additional pollution from fire events (smoke, ash, and other particulate matter);
iii. Increased heat, leading to increased production of ground level ozone; and
iv. Increased wind speeds, causing greater dispersion of pollutants but also leading to more dust and other particulate matter being carried by wind.

It is also important to note that these climate risks may all occur at the same time (i.e. hot, dry, and windy conditions that increase fire risk).

1.4 The air pollution situation in Cape Town

The cleansing effects of the 'South-Easter' or 'Cape Doctor' are well known. Nevertheless, the City periodically experiences visible pollution episodes - the 'Brown Haze' - as well as high levels of other

pollutants, which are known to affect human and ecological health. In order to address air quality matters, the City compiled a detailed Situation Assessment of Air Quality in 2005, which identified the priority pollutants, sources, impact areas of air pollution, as well as a possible future approach to air quality management. The findings, recommendations and action plans of the Situation Assessment have been incorporated into the Air Quality Management Plan.

Air Quality monitoring data for a range of pollutants **(Table 1)** are monitored at 13 Air Quality Monitoring stations located throughout the City **(Figure 5)**.

AQM Station	Parameters
Athlone	SO_2 – This station is currently being upgraded.
Atlantis	SO_2, NO_x, O_3 and full meteorological parameters.
Bellville South	PM_{10}, SO_2, and full meteorological parameters.
Bothasig	SO_2, NO_x, and full meteorological parameters.
Foreshore	PM_{10}, $PM_{2.5}$, SO_2 and VOCs. This station has since been decommissioned.
Goodwood	PM_{10}, SO_2, NO_x, O_3, CO, and full meteorological parameters.
Khayelitsha	PM_{10}, $PM_{2.5}$, SO_2, NO_x, VOC, and full meteorological parameters.
Molteno	NO_x and O_3.
Plattekloof	PM_{10}, SO_2, NO_x and O_3.
Potsdam	VOCs.
Somerset West	SO_2 and full meteorological parameters.
Tableview	PM_{10}, $PM_{2.5}$, SO_2, NO_x, and full meteorological parameters.
Wallacedene	PM_{10}, SO_2, NO_x, O_3, and full meteorological parameters.

Note: Lead is no longer monitored since it has been removed from petroleum products.

Table 1: Pollutants monitored at City of Cape Town Ambient Air Quality Monitoring Station Network

Ambient Air Quality Monitoring stations are located in areas known to be impacted by transport, industrial and domestic activities. **Figure 6** shows that the air pollution 'Hot Spot' areas of Cape Town include:

i. Household fuel burning areas, particularly but not exclusively dense low-income settlements such as Khayelitsha and Wallacedene due to high particulate concentrations associated with fuel burning, transport and windblown dust from unpaved and exposed area sources;
ii. The Central Business Districts and residential areas transected by highways, on-ramps and main feeder roads;
iii. Residential areas close to industrial areas such as Bellville South and Milnerton;
iv. Residential areas close to Cape Town International Airport;
v. The Port of Cape Town; and
vi. Open cast mines and quarries which contribute significantly to ambient dust fallout.

Sustainable long term improvements to air quality require improvement in the areas of industrial pollution, vehicle emissions, fuel quality, integrated transport planning, public transport, community education and participation by all stakeholders. Moreover, the City needs to continue to develop and enhance partnerships through cooperative governance, industry and communities to be successful in each of these spheres.

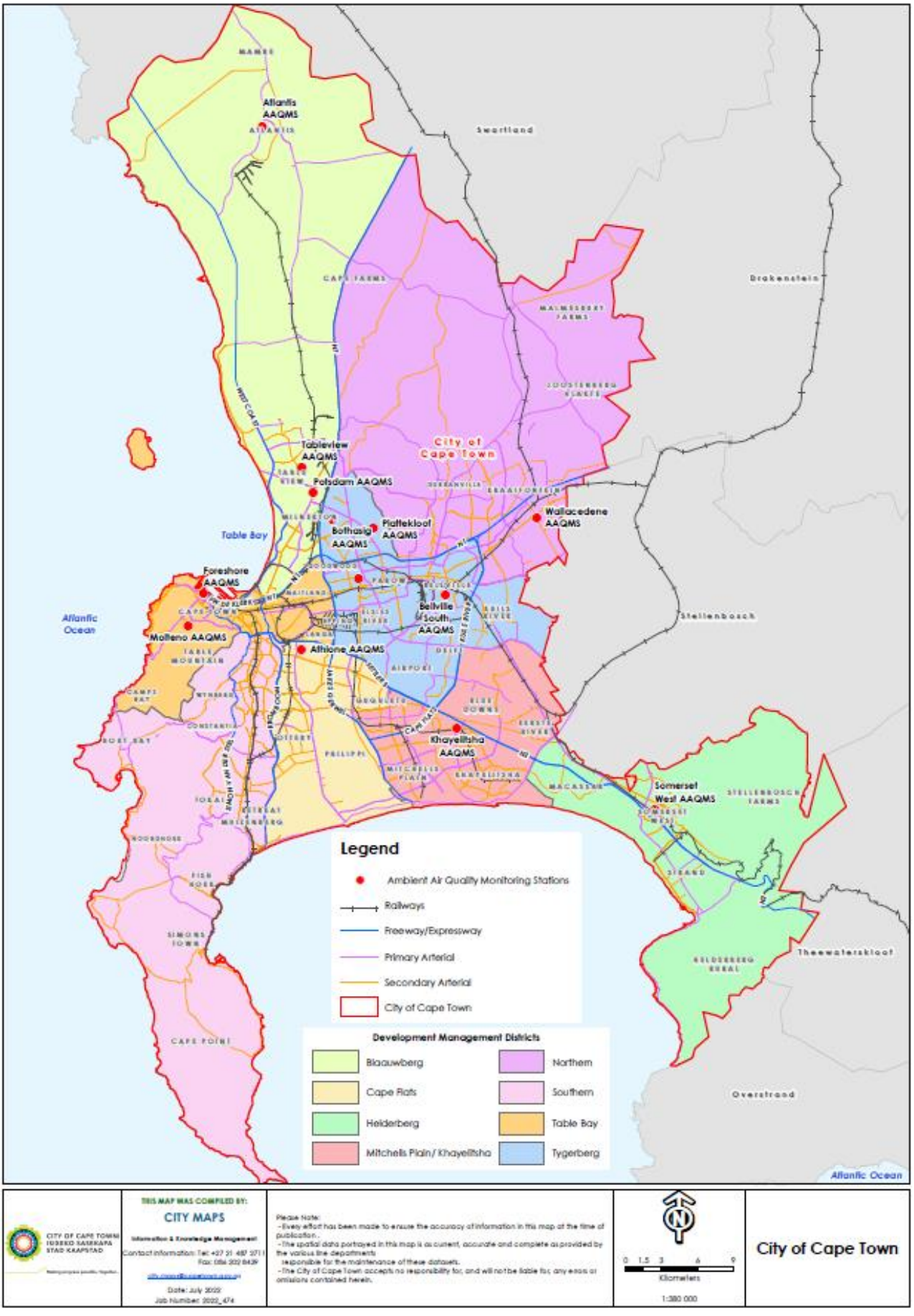


Figure 5: Air Quality Monitoring Station Network

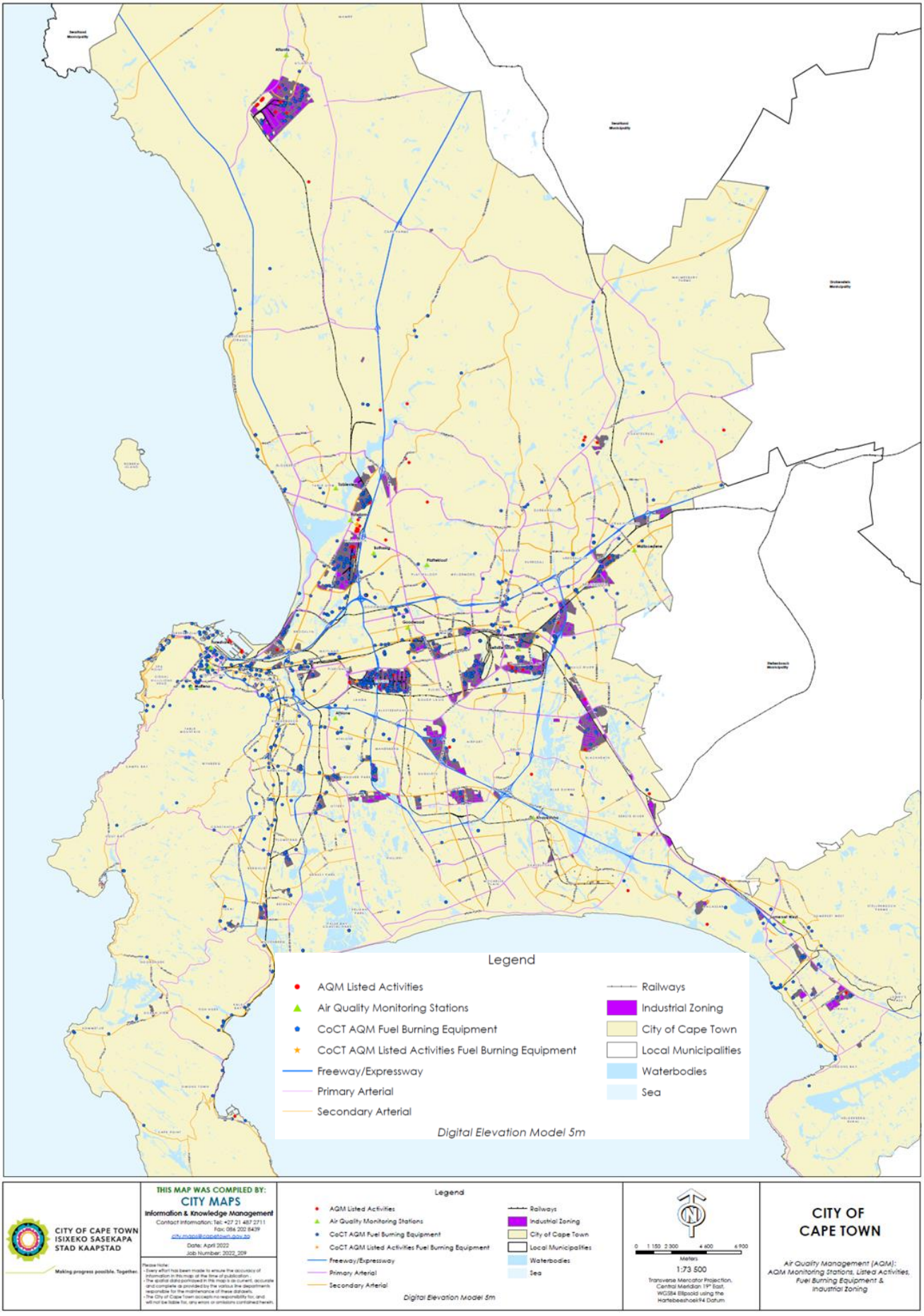


Figure 6: Industrial Zoning and AQM Listed Activities, Monitoring Stations, Fuel Burning Equipment and Listed Activities Fuel Burning Equipment

2 VISION AND MISSION STATEMENTS

2.1 The City of Cape Town's Air Quality Management Vision

TO BE A CITY THAT ENSURES CLEAN AIR FOR ALL.

2.2 The City of Cape Town's Air Quality Management Mission

TO REDUCE THE HEALTH EFFECTS OF POOR AIR QUALITY FOR ALL IN CAPE TOWN.

3 DESIRED OUTCOMES

3.1 The City of Cape Town's AQMP clarifies the vision and mission for air quality management and the principles (see **clause 5**) which will underpin future actions.

3.2 The City will strive for an environment where there is excellent air quality in all areas of Cape Town, and health impacts of air pollution due to poor air quality are mitigated through the set of Goals and Objectives detailed in the AQMP see below summary (detailed linked activities are captured in **clause 6**):

GOAL 1: REDUCE HARMFUL GHG EMISSIONS THROUGH SUPPORTING AIR QUALITY AND CLIMATE CHANGE RESPONSE PROGRAMMES

- Objective 1.1: To improve air quality in dense low-income settlements.
- Objective 1.2: To reduce and manage landfill emissions.
- Objective 1.3: To reduce and manage emissions from waste water infrastructure.
- Objective 1.4: To reduce and control vehicle emissions in the City.
- Objective 1.5: To support sustainable transport planning initiatives.
- Objective 1.6: To support climate friendly procurement in the City.
- Objective 1.7: To support National, Provincial and Local programmes to reduce GHG and the associated carbon footprint.

GOAL 2: ENSURE EFFECTIVE AND CONSISTENT AIR QUALITY MANAGEMENT, LINKED TO CLIMATE CHANGE RESPONSE

- Objective 2.1: To maintain and enhance the Air Quality Management System for the City of Cape Town.
- Objective 2.2: To develop and implement mechanisms and systems to attain compliance with national ambient air quality standards.
- Objective 2.3: To monitor criteria air pollutants which, through ambient concentrations, deposition or in any other way, present a threat to health, well-being or the environment.

GOAL 3: RAISE AWARENESS WITH RESPECT TO AIR QUALITY MANAGEMENT AND CLIMATE CHANGE RESPONSE

- Objective 3.1: To support research efforts to determine the extent of detrimental health effects of poor air quality on the population of Cape Town.
- Objective 3.2: To expand upon existing education and awareness activities and to provide a comprehensive and sustainable awareness and communication programme for Air Quality Management.

GOAL 4: INCREASE COMPLIANCE THROUGH EFFECTIVE AND CONSISTENT AIR QUALITY COMPLIANCE MONITORING AND ENFORCEMENT

- Objective 4.1: To enforce current and future legislation for Air Quality Management.
- Objective 4.2: To strengthen and build capacity in air quality management and compliance and enforcement.
- Objective 4.3: To conduct annual compliance monitoring and enforcement of Listed Activities.
- Objective 4.4: To support City Departments and facilities in maintaining environmental compliance.
- Objective 4.5: To ensure NEMA Section 30 incidents which impact on air quality are investigated and reported.

4 PRINCIPLES FOR AIR QUALITY MANAGEMENT

The City of Cape Town's approach to air quality management is underpinned by the following set of overarching principles:

4.1 Capacity-building and education

All people must have the opportunity to develop their understanding, skills and capacity for effective participation in achieving sustainable development and sustainable use of air as a resource, to maximise the opportunity of communities to maintain a healthy lifestyle.

4.2 Duty-of-care

Any person or institution that generates air pollution is accountable for the management of this pollution and should be penalised appropriately for transgressions committed.

4.3 Environmental justice

The City must integrate environmental considerations, including air quality considerations, with social, political, economic justice and development in addressing the needs and rights of all communities, sectors and individuals. Integrated planning and environmental management provides the incentive for the integration of air quality issues into transportation and land use planning processes. Improved air quality and associated health outcomes is a key part of the discussion around South Africa's just transition to a carbon neutral and climate resilient future.

4.4 Polluter pays

The full cost associated with pollution (including monitoring, management, clean up and supervision) should be met by the organisations or persons responsible for the source of the pollution.

4.5 Pollution prevention

Measures must continue to be taken to reduce emissions at the source (i.e. source-based controls).

4.6 Public participation

Public participation is necessary for the effective integration of the public's views into the AQMP development and impact assessment processes.

4.7 Preventing, minimising, and mitigating environmental impacts

This includes a specific directive that the City will work towards excellent air quality levels in all areas of the city, and significant reductions in ill health attributable to poor air quality.

The City aligns with the environmental governance cycle shown in Figure 7 for continued improvements in environmental quality as legislated in the 2017 National Framework for Air Quality Management in the Republic of South Africa.

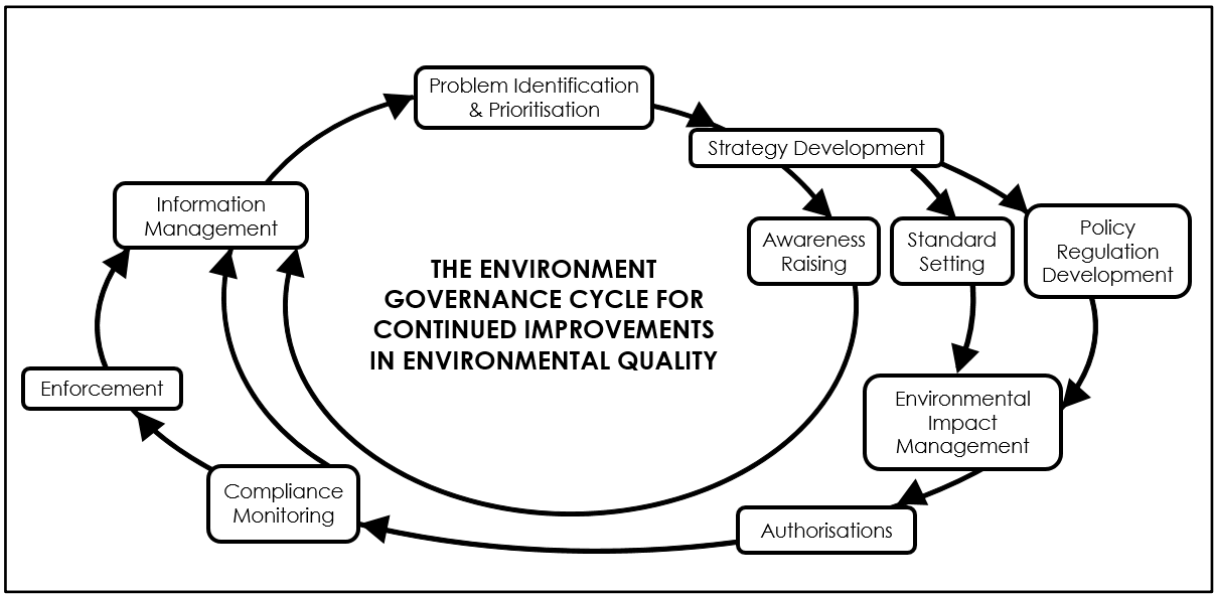


Figure 7: Environmental governance cycle for continued improvements in environmental quality

5 STRATEGIC INTENT AND POLICY ALIGNMENT

5.1 Relevant international and national conventions, strategies, policies and plans:

5.1.1 United Nations Framework Convention on Climate Change (UNFCCC), South Africa's UNFCCC obligations;

5.1.2 Sustainable Development Goals (SDGs) – Relevant SDG targets include: 3.9.1, which calls for a substantial reduction in deaths and illnesses from air pollution; 7.1.2, which aims to ensure access to clean energy in homes and 11.6.2, which aims to reduce the environmental impact of cities by improving air quality;

5.1.3 The Vienna Convention for the Protection of the Ozone Layer;

5.1.4 The Montreal Protocol on Substances that deplete the Ozone Layer;

5.1.5 The Stockholm Convention on Persistent Organic Pollutants (POPs) International concerns around Mercury, Lead and Cadmium;

5.1.6 The 2017 National Framework for Air Quality Management in the Republic of South Africa;

5.1.7 The 2020 National Integrated Waste Management Policy;

5.1.8 The 2018 National Strategy to Address Air Pollution in Dense Low-Income Settlements; and

5.1.9 South Africa's contributions to the global effort to reduce GHG emissions and stratospheric ozone depletion.

5.2 OneCape2040

The City of Cape Town AQMP is aligned to OneCape2040 visions of Living Cape (Settlement Transition) that proposes good health services and a focus on service delivery and Green Cape (Ecological Transition) of which the objectives are sustainable resource use and reduction of carbon footprint (emissions).

5.3 Integrated Development Plan for the City of Cape Town

The AQMP is closely aligned to various priorities, foundations as well as related programmes, projects and initiatives of the Integrated Development Plan. These include:

5.3.1 Vision of a City of Hope: The City aims to create a City of Hope - a prosperous, inclusive and healthy city where people can see their hopes of a better future for themselves, their children and their community become a reality. This Plan especially aims to improve the health and well-being of all residents and the environment.

5.3.2 Public Space, Environment and Amenities Priority: The City is committed to improving the health of the urban environment for residents to live, work and interact in. This Plan specifically relates and aligns to the *City health programme* that outlines the City's approach to Environmental Health as well as Primary Healthcare Services.

Additionally, *Objective 9 – Healthy and sustainable environment of the IDP* includes the City's commitments to protect, restore and manage our natural areas to ensure their long-term sustainability. The City recognises that its green infrastructure is important to Cape Town's resilience to climate change, and for reducing the impact of shock events such as floods and heatwaves. The Corporate Scorecard linked to the IDP's implementation includes Key Performance Indicators linked to Improved Air Quality.

5.3.3 A Resilient City Foundation: The AQMP aligns with *the integrated urban health programme* that aims to improve and support a healthy environment, addressing disparities in health outcomes, as well as the environments that create them. The aim is to reduce vulnerability to future pandemics and improve overall health and well-being. Additionally the Plan aligns and forms part of the *Climate change response planning and monitoring initiative* that is part of the climate change programme. As part of the initiative, the City will continue to analyse and monitor key climate change indicators relevant to climate change mitigation and adaptation. This will include regular updates and reporting of Cape Town's GHG emissions inventory, and conducting hazard, vulnerability and risk assessments. The City will also strengthen its capacity to interpret and integrate climate risk response into infrastructure planning and development processes.

Other relevant strategies, policies and plans include:

5.4 Environmental Strategy for the City of Cape Town

The AQMP supports the vision of the Environmental Strategy, which seeks to enhance, protect and manage Cape Town's natural and cultural resources for long-term prosperity in a way that optimises economic opportunities and promotes access and social well-being. In the long term, the City will strive for an

environment where there is excellent air quality in all areas of Cape Town, and lung irritation, disease, and environmental impacts due to poor air quality are mitigated.

5.5 Comprehensive Integrated Transport Plan for the City of Cape Town

The AQMP aligns with the Comprehensive Integrated Plans vision of "an efficient, integrated transport system for all – implemented sustainably". The plan incorporates elements of emissions management from the transport sector.

5.6 Climate Change Strategy for the City of Cape Town

The AQMP supports the City's Climate Change Strategy vision to become a climate-resilient, resource-efficient, and carbon-neutral city that enables inclusive economic development and healthy, thriving communities and ecosystems. The AQMP aligns with Strategic Focus Area 9: Mobility for Quality of Life and Livelihoods.

5.7 Metropolitan Spatial Development Framework for the City of Cape Town;

The AQMP supports the Municipal Spatial Development Framework's Policy statement (Policy 17) which aims to appropriately protect citizens of Cape Town from risk areas and activities and which states that the development applications should ideally "avoid inappropriate urban growth and development in risk areas (fire, flooding, heat exposure, poor air quality and noise pollution)".

5.8 Air Quality Management Plan for the Western Cape Government

The City of Cape Town's AQMP goals align directly with the goals of the Western Cape Government AQMP.

6 REGULATORY CONTEXT

6.1 Constitution of the Republic of South Africa, 1996

Chapter 2, Section 24 of the Constitution of South Africa specifies:

Environment

24. Everyone has the right -

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Schedule 4 Part B of the Constitution places the onus of addressing air pollution matters on Local Government subject to Section 155(6)(a) and (7).

6.2 National Environmental Management Act, 1998 (Act No. 107 of 1998)

To provide for cooperative, environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

6.3 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.

6.4 The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

6.5 The Carbon Tax Act, 2019 (Act No.15 of 2019)

To provide for the imposition of a tax on the carbon dioxide (CO_2) equivalent of GHG emissions and to provide for matters connected therewith. This includes the "polluter pays" principle.

6.6 National Health Act, 2003 (Act No. 61 of 2003)

To provide a framework for a structured uniform health system within the Republic, taking into account the obligations imposed by the Constitution and other laws on the national, provincial and local governments with regard to health services; and to provide for matters connected therewith.

6.7 National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977)

To provide for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities; for the prescribing of building standards; and for matters connected therewith.

6.8 Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000)

Chapter 2, Section 4 (2) (i) of the Municipal Systems Act states: The council of a municipality, within the municipality's financial and administrative capacity and having regard to practical considerations, has the duty to promote a safe and healthy environment in the municipality.

6.9 Local Government: Municipal Financial Management Act, 2003 (Act No. 56 of 2003)

The General financial management functions of the Municipal Finance Management Act states that the accounting officer of a municipality is responsible for managing the financial administration of the municipality and must for this purpose take all reasonable steps to ensure that the resources of the municipality are used effectively, efficiently and economically.

6.10 City of Cape Town: Air Quality Management By-Law, 2016

To provide for air quality management and reasonable measures to prevent air pollution; to provide for the designation of the air quality officer; to provide for the establishment of local emissions norms and standards, and the promulgation of smoke control zones; to prohibit smoke emissions from dwellings and other premises; to provide for installation and operation of fuel burning equipment and obscuration measuring equipment, monitoring and sampling; to prohibit the emissions caused by dust, open burning and the burning of material; to prohibit dark smoke from compression ignition powered vehicles and provide for stopping, inspection and testing procedures; to prohibit emissions that cause a nuisance.

6.11 City of Cape Town: Municipal Planning By-law, 2015

The general purpose of this By-law is to determine use rights and to provide for control over use rights and over the utilisation of land in the area of jurisdiction of the City of Cape Town.

7 PLAN PARAMETERS

This document fulfils the purpose of the City of Cape Town's Air Quality Management Plan as contemplated in Section 15(2) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).

7.1. The Plan applies city-wide.

7.2. The Plan seeks to provide a transversal approach to Air Quality Management related challenges facing the city.

7.3. The Plan is guided and implemented through the City's Air Quality Management By-law, 2016.

7.4. The Plan has transversal implications and requires various directorates to work collaboratively to realise the vision, mission and goals and objectives of the plan.

8 ROLE PLAYERS AND STAKEHOLDERS[1]

The following role players and stakeholders are identified for the purpose of implementing the provisions of this strategic plan:

8.1 Community Services and Health Directorate

8.1.1 City Health Department

8.1.1.1 Air Quality Management

The unit is responsible for the implementation of air quality related legislation. The Unit also collaborates with the Area and sub-district Environmental Health units to identify sources of air pollution. The Air Quality Management unit has entered into inter-departmental Service Level Agreements with the City's Scientific Services regarding ambient air quality monitoring and the City's Traffic Services for the implementation of the diesel vehicle emissions testing programme.

8.1.1.2 Personal Primary Health Care

Facilitating the understanding in the state of health and well-being and treatment for the impacts of poor air quality on the community within the context of the state of ambient air quality. Epidemiological monitoring of the burden of disease due to poor air quality.

8.1.2 Recreation and Parks Department

City Parks plays an important role in greening open spaces i.e. through the planting of trees and shrubs which act as barriers between pollution sources and receptors and helps mitigate wind-blown dust.

8.2 Urban Mobility Directorate

Due to the impact the transport sector has on ambient air quality, the Urban Mobility Directorate is a key stakeholder in the successful improvement in the state of ambient air quality through the implementation of the City's Comprehensive Integrated Transport Plan. Infrastructure planning and transport related programmes such as public transport, rail transport and taxi associations all contribute in this regard.

8.3 Corporate Services Directorate

The directorate has an extensive vehicle fleet and good quality fuel procurement, driver behaviour and regular vehicle maintenance and repair are key factors to ensure low vehicle emission release.

8.4 Safety and Security Directorate

8.4.1 Fire and Emergency Services

Assesses facilities for their compliance with the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977) and issues Fire Safety Certificates during application for approval of

[1] Note that while directorate or departmental names may change in the future, the functional requirements and alignment remain in place.

open burning applications, fuel-burning equipment and to provide comments during the Atmospheric Emission Licensing process. Disaster Management and Fire Safety undertake education and awareness activities in fire prevention in informal settlements as well as wild fire prevention.

8.4.2 Law enforcement

Assistance by City Law Enforcement in the execution of Air Quality Management legislation in particular, the Metals Theft unit.

8.4.3 Traffic Enforcement

Assistance by Traffic Department during diesel vehicle emissions testing.

8.5 Water and Sanitation Directorate

8.5.1 The Water and Sanitation Services

The unit is responsible for maintenance and effective operational management of wastewater treatment plants to minimise atmospheric emission releases.

8.5.2 The Scientific Services Department

The Department manages the air quality monitoring network and associated laboratory services and provides statistical data and scientific interpretation and advice relating to air quality matters.

8.6 Urban Waste Management Directorate

The Directorate has the delegated authority and mandate to construct and maintain landfill sites in order to minimise the release of landfill gas emissions. Solid Waste Management is responsible for the development of landfill gas management systems as well as promoting waste to energy and alternate waste disposal methods in order to reduce waste. Solid Waste Collection Services facilitate the effective removal of refuse to prevent the open burning of refuse.

8.7 Future Planning and Resilience Directorate

8.7.1 Resilience and Risk Department

This department is responsible for coordinating the implementation of the City's transversal Climate Change Strategy and Climate Change Action Plans.

Energy Directorate

8.8.1 Electricity Generation and Distribution

Maintaining a continuous electricity supply plays an important role in Air Quality Management through the electrification of previously un-serviced areas and the subsequent reduction of biomass burning for cooking and space heating. When supply interruptions occur, industry relies on standby generation capacity (such as diesel generators), which affects the local airshed. The maintenance of electricity generating installations is critical to minimise emission release from facilities such as Eskom's Ankerlig and Acacia peaking generation turbines.

8.8.2 Sustainable Energy Markets

The development of sustainable and renewable energy markets and the promotion of sustainable energy utilisation have the potential to make a significant positive contribution to ambient air quality.

8.9 Spatial Planning and Environment Directorate

The implementation of the Metropolitan Spatial Development Framework, District Spatial Development Frameworks and the City's Municipal Planning By-law, 2015 should regulate developments within the City in such a manner that air quality impacts are considered when industrial and residential development applications are submitted. The Planning and Building Development Management Department is responsible for the approval of building plans and for the authorisation of land use.

Air quality is also a sub-component of 'Strategic Focus Area 3: Environmental Quality Management and Monitoring' of the City's Environmental Strategy, and the AQMP is included as an implementation tool in the Implementation Framework of the Environmental Strategy. There is thus a need for collaboration in relation to monitoring, evaluation and reporting on air quality as part of the Environmental Strategy.

The biennial City of Cape Town's State of the Environment Report is an essential monitoring and evaluation tool used to identify and report on changes to the city's natural environment, and supports informed environmental decision making. The State of the Environment Report includes a chapter on air quality; a description and analysis of the state of air quality; key management responses and trends in air quality.

8.10 Human Settlements Directorate

The Human Settlements Directorate ensures improvements in service delivery to informal settlements and backyarders, which could result in an improvement in ambient air quality.

8.10.1 The Housing Development Department

The Department plays an important role in terms of the National Strategy to address air pollution in dense low-income settlements through the implementation of energy saving initiatives in the design of new and retro-fitment of existing housing.

8.11 Provincial Government

The Western Cape Government through its Department of Environmental Affairs and Development Planning play an oversight role and provide support and guidance to Air Quality Management services at a municipal level in the Province. The Provincial Department of Health and Wellness is involved in the monitoring and treatment of the health effects of poor air quality on the community.

The activities and objectives of the City's AQMP support the aims and objectives of the Western Cape Government's AQMP.

Together with the district and local municipalities of the rest of the Western Cape, the City's Air Quality Officer represents the City at the Provincial Air Quality Officers Forum. Through cooperative governance, the forum strives to coordinate and streamline air quality management activities in the Province.

8.12 National Government

The Chief Directorate Air Quality Management of the National Department of Forestry Fisheries and Environmental Affairs plays an important role in the formulation and promulgation of National legislation, policy and strategy development. The City is represented by the Air Quality Officer on the Ministerial Technical Advisory Committee Work Group II – Air Quality Management and its various sub-committees. These committees plan work activities, assist with commenting on legislation formulation, National policy and strategy development and coordinate work activities between the National Department, Provinces and Metropolitan Councils on air quality management matters.

8.13 Industry and Business

Businesses and industry need to adhere to environmental regulations and standards set by the government. This includes obtaining necessary permits, monitoring emissions, and implementing measures to reduce pollution. Where possible, industries should actively work towards minimising their emissions by adopting cleaner technologies, using energy-efficient processes, and implementing emission control measures. This can involve upgrading equipment, optimising production processes, and investing in renewable energy sources.

Businesses can play a crucial role in educating their employees, customers, and the wider community about the importance of air quality and the actions individuals can take to contribute to improvement. This can involve organising awareness campaigns, providing educational materials, and promoting sustainable practices or encouraging sustainable transportation practices among employees and customers which can significantly contribute to improving air quality. Businesses can promote carpooling, provide incentives for using public transportation, and support the use of electric vehicles. Businesses can collaborate with the City, community organisations, and other stakeholders to develop and implement air quality improvement initiatives. They can participate in public consultations, share best practices, and support advocacy efforts from government and interest groups.

8.14 General public

The general public plays a crucial role in improving air quality within the City of Cape Town. Individuals have the power to contribute to a cleaner environment through various actions and responsibilities:

Firstly, adopting sustainable transportation practices is important. Where possible choosing public transportation, carpooling, biking, or walking reduces the number of vehicles on the road, thus reducing air pollution from exhaust emissions. Responsible burning practices are essential to prevent air pollution. Avoiding the open burning of garden waste and opting for proper waste disposal methods such as recycling, composting, or using designated waste collection services helps minimise harmful emissions. Reporting polluters to relevant authorities is an active way to combat air pollution.

Raising awareness about air quality issues is crucial as well. Engaging in educational campaigns, sharing information with others can encourage sustainable practices and urge authorities and businesses to prioritise air quality improvement.

Furthermore, planting trees and supporting green spaces contribute significantly to improving air quality. Trees absorb air pollutants, and individuals can plant trees in their homes, neighbourhoods, or participate in community tree-planting initiatives. Supporting the creation of green spaces within the city also helps mitigate air pollution.

Finally, participating in public initiatives is crucial. Engaging in public consultations, attending community meetings, and providing input on air quality-related policies and programmes allows residents to voice concerns, share ideas, and contribute to decision making processes.

Through sustainable practices, awareness raising, and active participation, the general public can make a substantial difference in improving air quality in Cape Town.

9 PLAN DIRECTIVES: GOALS AND OBJECTIVES

The Goals and Objectives as discussed above for the AQMP are captured in the set of tables on the following pages.

How to read the tables below:

i. **Key activities:** Crucial activity to achieve the relevant objective and overall goal
ii. **Responsible Department:** Relevant City department – noting that these may shift in the future
iii. **Term:** Ongoing means current; Short term – less than 1 year; Medium term – 1 to 5 years; Long term – more than 5 years
iv. **Dependencies:** The resources/aspects that are required/must be in place to achieve the activity
v. **Desired outcomes:** This is what we are seeking to achieve from the activity

9.1 GOAL 1: REDUCE HARMFUL GREENHOUSE GAS EMISSIONS THROUGH SUPPORTING AIR QUALITY AND CLIMATE CHANGE RESPONSE PROGRAMMES

The relationship between air quality and climate change is clear: activities that lead to the emission of carbon dioxide and other GHGs also promote the emission of other air pollutants. Additionally, poor health associated with exposure to poor air quality lowers general health and wellbeing. Increased temperatures may also lead to the increased formation of ground level ozone, impacting on the health of those exposed to this pollutant. It is critical that air quality is improved for all specifically for vulnerable residents and those that live in dense low-income settlements who are disproportionately affected by low air quality.

Objective 1.1: To improve air quality in dense low-income settlements:

The Draft Strategy to Address Air Pollution in Dense Low-Income Settlements (Department of Environmental Affairs -2016) recognises that "*air pollution monitoring data has shown that there are some geographic areas within the country where ambient air quality standards are being exceeded and this is posing a threat to human health and the environment in those areas*". Ambient air quality monitoring in the Khayelitsha and Wallacedene areas shows that the NAAQS for PM_{10} are often exceeded during winter months when inversion conditions prevail.

The Khayelitsha Air Pollution Strategy (KAPS) project was implemented to provide an understanding of the factors behind the high levels of PM_{10} observed. The project identified the factors that contribute to high PM_{10} levels in Khayelitsha as household waste burning, informal meat traders who burn wood for cooking fuel, waste tyre burning, vehicular emissions, and dust blown by wind from the unpaved roads and surfaces (KAPS 2008).

Where poor air quality impacts on human health and the environment, the City has undertaken to improve air quality in affected areas in the following ways:

1. Collaborate with National Government in the implementation of the Khayelitsha Air Pollution Strategy, a community based project to try and reduce PM_{10} levels in the area through education and targeted interventions. The City will strive to implement similar approaches across similar contexts across the Metropolitan area.
2. Appoint a representative to attend meetings of "National Coordination Committee (NCC) on Residential Air Pollution" when required.
3. Implement activities aimed specifically at improving air quality in dense low-income settlements, or implementing activities that have known positive air quality impacts and actively provide up to date information on such activities to the NCC.

4. Be involved in the development and facilitation of identified possible interventions to improve air quality in low-income settlements.
5. Support the provision of affordable or subsidised clean energy alternatives where feasible e.g. Solar tech alternatives, Clean stoves, free basic electricity with efficient appliances, subsidised Liquid Petroleum Gas. Ensure that low-income houses are energy efficient as per the National Building Regulations and specifically SANS 10400 XA – Environmental Sustainability – Energy Usage in Buildings, influence development-planning initiatives to take into account air quality issues.
6. In order to improve air quality in dense low-income settlements , air quality officers should be part of development planning and should be in constant liaison with development sections to ensure that the following services are prioritised during development planning in dense low-income settlements:
    a. Road surfacing;
    b. Regular refuse removal;
    c. Electrification; and
    d. Supporting housing development that is energy efficient.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Appoint a dedicated Senior Air Quality Practitioner (SAQP) to champion air quality improvement projects in dense low-income settlements.	City Health	Short	Staff Capacity	SAQP appointed to position.
2. Internal Departments to undertake projects that address identified sources of pollution e.g. Solid Waste removal; Alternative clean energy sources (the provision of free basic energy subsidy policy), Paving of roads and greening of open spaces/parks.	Roads; City Parks; Solid Waste; Informal Settlements; Sustainable Energy Markets	Ongoing	Departmental Budgets	Reduction in air pollution levels recorded at Wallacedene and Khayelitsha air quality monitoring stations.

3. Engage with Violence Prevention through Urban Upgrading (VPUU) and Economic Development to implement social upliftment projects with air quality co-benefits e.g. improvements to informal trading braai areas.	AQM / VPUU	Short	Cooperative Governance	Reduction in air pollution levels recorded at Wallacedene and Khayelitsha air quality monitoring stations.
4. Engage with relevant political stakeholders to support air pollution interventions in informal settlements.	City Health	Short	Political support from Sub-Councils	Reports on air pollution to sub-councils submitted.
5. Support and ensure that newly built government subsidised housing or alike units are designed and constructed in accordance with energy efficiency guidelines.	Housing	Ongoing	Budget and political support	% of new RDP housing designed and constructed in accordance with energy efficiency guidelines.
6. Influence Development Planning Initiatives for new housing developments to consider air quality impacts from localised industrial emission sources.	Housing, Development Management, City Health AQM and Safety and Security	Ongoing	Cooperative Governance	New housing developments are developed taking the impacts of existing localised air pollution sources into consideration.

OBJECTIVE 1.2: To reduce and manage landfill emissions:

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Formulate and implement a Dust Management Plan for all City landfill sites.	Solid Waste	Medium term	Capacity	Dust management plans formulated and implemented for all City landfill sites.
2. Solid Waste to reduce the impact of daily dust fall for residential and non-residential areas adjacent to landfill sites.	Solid waste	Medium term	Budget	Reduction in community dust complaints for land fill sites.
3. Support the City's Solid Waste Department in the monitoring of landfill gas emissions.	Scientific Services	Ongoing	Staff Capacity	Technical support provided in monitoring landfill gas emissions.
4. Participate in landfill monitoring committees that have been established at various sites across the City.	City Health	Ongoing	Cooperative Governance	Landfill monitoring committee meetings attended and technical support provided.
5. Solid Waste to reduce GHG emissions to atmosphere through the roll out of GHG emissions reduction systems.	Solid waste	Medium term	Budget	GHG emission reduction technologies installed at landfill sites.

OBJECTIVE 1.3: To reduce and manage emissions from waste water infrastructure

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Support the City's Water and Sanitation Department in the management of gaseous emissions from Waste Water Treatment Works.	Scientific Services and Water and Sanitation	Short term and ongoing	Capex and Opex Budget	Technical support and assistance provided in response to complaints received.
2. Manage odorous hydrogen sulphide and other emissions generated by waste water treatment process to below nuisance levels for adjacent communities.	Water and Sanitation	Ongoing	Capex and Opex Budget	Technical support and assistance provided in response to complaints received.
3. Manage and maintain sewerage pump stations and distribution infrastructure to prevent the emission of odorous emissions to atmosphere to below nuisance levels.	Water and Sanitation	Ongoing	Capex and Opex Budget	Technical support and assistance provided in response to complaints received.
4. Manage and reduce GHG emissions from Waste Water Treatment infrastructure.	Water and Sanitation	Medium	Capex and Opex Budget	Reduction in GHG emissions inventory.
5. Undertake routine air quality monitoring of hydrogen sulphide at Waste Water Treatment Works where complaints are received.	Scientific Services and Water and Sanitation	Ongoing	Capex and Opex Budget	Technical support and assistance provided in response to complaints received.

OBJECTIVE 1.4: To reduce and control vehicle emissions in the City

An effective vehicle emissions reduction and control programme has direct ambient air quality benefits through the reduction of particulate matter and brown haze episode intensity and occurrence. The programme also has a number of climate change co-benefits, these include black carbon emissions reduction through regular diesel vehicle emissions testing, compliance and enforcement.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Re-establish the Vehicle Emissions Working Group for the implementation of inter-departmental cross-cutting local air quality response activities.	Urban Mobility (Lead) / City Health, Scientific Services and Energy as well as Future Planning and Resilience (Support)	On-going	Transversal cooperation and capacity	Improved transversal governance of vehicle emissions.
2. Undertake research to support and encourage best practice with regards to vehicle emission reduction interventions.	Urban Mobility / AQM / Sustainable Energy Markets	On-going	Capacity and budget	Emission reduction research undertaken; reduction interventions identified and implemented.
3. Participate in and collaborate in and support other forums and organisations undertaking initiatives that relate to vehicle emission reductions in order to share lessons learned and transfer knowledge (examples include WC Elective Vehicle (EV) Task Team; C40 National EV Working Group).	Urban Mobility / Air Quality Management / Sustainable Energy Markets	On-going	Transversal cooperation and capacity	Improved transversal governance and shared learning on vehicle emissions reduction activities.

4. Support relevant national initiatives and activities that relate to vehicle emissions reduction and control.	City Health AQM and Urban Mobility	On-going	Transversal cooperation and capacity	Improved transversal governance and shared learning on vehicle emissions reduction activities.
5. Develop or provide input into development of relevant policy frameworks/ activities in support of cleaner fuel, vehicle technologies and renewable energy sources for fuel use as well as associated infrastructure.	Urban Mobility, AQM and Sustainable Energy Markets	On-going	Transversal cooperation and capacity	Improved transversal governance of vehicle emissions reduction activities.
6. Initiate necessary activities/ policies to reduce vehicle emissions.	Urban Mobility	On-going	Transversal cooperation and capacity	Improved transversal governance, activities and policies for vehicle emissions reduction.
7. Continue diesel vehicle emissions testing and ensure enforcement of emission requirements.	City Health, and Safety and Security – Traffic Services	On-going	Transversal cooperation and capacity	Diesel vehicle emission testing targets met as per Service Delivery and Budget Implementation Plan (SDBIP).
8. Support the City's Fleet Greening Strategy and consider feasible interventions in order to: a) Improve vehicle efficiency; b) Improve operational efficiency; c) Promote an alternative technology programme that assesses costs and benefits transparently and pilots viable options; and d) Integrate e-fuelling and other City fleet emissions data into a generally accessible reporting	Urban Mobility, and City Health	Short to medium	Transversal cooperation, capacity and resources	City's Fleet Greening Strategy successfully implemented.

database and platform like EPCAM[2], Smart Facility or other.				
9. Improve the use of predictive air quality modelling tools to inform land use and transport planning and ensure better alignment between Transport and AQM.	Urban Mobility, AQM and Scientific Services Department	Medium to Long	Transversal cooperation, capacity and resources	Air quality and transport modelling tools and information used to inform land use and transport planning and ensure better alignment between Transport and AQM.
10. Promote and expand the City's SMART Driver Training Programme to improve fuel consumption through driver behaviour change.	ERM and Fleet Management	On-going	Staff capacity	City fleet driver behaviour improved to reduce fuel consumption.
11. Integrate GHG emissions and air quality metrics into the Urban Development Index by: a) Developing a credible, spatially disaggregated transport GHG and local air pollutants inventory for the city; and b) Ensuring that the data outputs are configured in such a way that it is compatible with and can be integrated into the UDI dataset.	Sustainable Energy Markets and AQM Urban Mobility to support	On-going	Section 21.1 of City of Cape Town Climate Change Action Plan (CCAP)	GHG emissions and air quality metrics updated and integrated into the UDI.
12. Support Transport in the development of a communications/ behavioural change strategy.	Urban Mobility, Environmental	On-going	Resources and capacity	Transport communications and behavioural change

[2] EPCAM™ is a Carbon disclosure reporting system – read more here: https://www.brundtland.co.za/brundtland-epcam/

	Management, and City Health			strategy developed and implemented.

OBJECTIVE 1.5: To support sustainable transport planning initiatives

It should be noted that while the sustainable transport initiatives below are essential to the success of the AQMP; these activities below have been prioritised in the City's Climate Change Strategy and its associated Climate Change Action Plan; the City's Comprehensive Integrated Transport Plan (CITP); the City's Travel Demand Management Plan (TDMP). Many of these priority areas are already being addressed in various other forums such as the Inter-modal Planning Committees (IPC) and their respective working groups, which report directly to the high level Land Transport Advisory Board (LTAB). While still included here for reference sake, please note the focus of the re-established Vehicle Emissions Working Group referred to above will remain on the items listed in objective 1.4.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Support densification through integrated transport and land use planning.	Spatial Planning and Urban Mobility	Medium to long	Transversal governance, budget and capacity	Densification achieved through integrated transport and land use planning.
2. Support and encourage a safe and more reliable public transport system.	Urban Mobility	Medium to long	Transversal governance, budget and capacity	Safe and more reliable public transport system in place.
3. Support modal shift to public transport and non-motorised transport.	Urban Mobility	Medium to long	Transversal governance, budget and capacity	Modal shift to public transport and non-motorised transport achieved.

4. Support Travel Demand Management measures with overall aim of influencing travel behavioural change and reducing the number of vehicle kilometres travelled.	Urban Mobility	Medium to long	Transversal governance, budget, capacity and public buy-in	Travel behavioural change and reduction in the number of vehicle kilometres travelled.
5. Support electrification of the My-Citi bus fleet and other public transport (C40 Green and Healthy Streets Declaration).	Urban Mobility	Medium to long	Transversal governance, budget and capacity	My-Citi bus fleet and other public transport electrified.
6. Support the initiatives to develop Zero Emissions Areas (ZEA) in a major part of the city (C40 Green and Healthy Streets Declaration).	Urban Mobility	Medium to long	Transversal governance, budget and capacity	Develop Zero Emissions Areas (ZEA) in parts of the city (C40 Green and Healthy Streets Declaration).
7. Support measures aimed at the widespread adoption of Electric Vehicles roll out of supportive infrastructure such as charging stations.	Sustainable Energy Markets	Medium to long	Budget and capacity	Charging station infrastructure provided.

OBJECTIVE 1.6: To support Climate friendly procurement in the City

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Facilities and Supply Chain Management need to adopt a more climate friendly policy on refrigeration and Heating, Ventilation, and Air Conditioning (HVAC) procurement that have a	Facilities Management and Supply Chain Management	On-going	Departmental cooperation	Green procurement of HVAC systems implemented by facilities management.

lower energy consumption with reduced impact on GHG emissions.				

OBJECTIVE 1.7: To support National; Provincial and Local programmes to reduce greenhouse gases and its associated carbon footprint.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Support National, Provincial and local programmes and initiatives to reduce GHG emissions and the associated carbon footprint.	City Health; Environmental Management; Energy and Climate change; and Transport: support role	On-going	Cooperative governance	Programmes and initiatives supported to reduce GHG emissions and the associated carbon footprint.

9.2 GOAL 2: ENSURE EFFECTIVE AND CONSISTENT AIR QUALITY MANAGEMENT, LINKED TO CLIMATE CHANGE RESPONSE

Objective 2.1: To maintain and enhance the Air Quality Management System for the City of Cape Town.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Continuously update the City's emission inventories with current available information on sources of air pollution. This information is used to inform other city activities.	Air Quality Management	On-going	Staff capacity	Emissions Inventory updated annually.
2. Verification of the actual fuel consumption of larger fuel burning entities on the Air Quality Management database.	Air Quality Management	On-going	Staff capacity	Annual update of fuel consumption of large users.
3. Develop regulatory dispersion modelling capacity within the City that aligns with national and international norms and standards.	Air Quality Management	Medium to long	Ongoing Training of staff on applicable air dispersion models	Number of staff trained in air dispersion modelling.
4. Improve the ambient air quality monitoring network infrastructure of the City to enable accurate reporting of air quality information i.e. one additional monitoring station will be added to the Mitchells Plain area.	Scientific Services	On-going	Budget for replacement analysers and staff capacity	Improved data recovery rates and number of analysers recapitalised.

5. Extend the ISO 17025[3] quality system to include remote air quality stations.	Scientific Services	Short	Budget for application and staff capacity	Number of remote stations South African National Accreditation System (SANAS) accredited
6. Expand the meteorological monitoring capabilities of the ambient air quality network.	Scientific Services	Short	Budget	Number of stations with meteorological capability.
7. Re-instate SANAS TR07/03[4] certification to the Athlone reference laboratory and roll out accreditation to the ambient air quality monitoring network.	Scientific Services	Short to Medium	Budget	SANAS accreditation achieved.
8. Engage with other ambient air quality monitoring station owners to supply their data to the SAAQIS and City e.g. National Ports Authority; Airport Company South Africa; Eskom.	City Health AQM	Short	Cooperative governance	Private monitoring networks added to SAAQIS.
9. Conduct an internal annual review of progress towards implementing objectives.	City Health	Annually	Internal review	Internal review conducted annually.
10. Conduct a full AQMP review every five years.	City Health	Every 5 years	Internal review	Internal review conducted every 5 years.

[3] ISO 17025 enables laboratories to demonstrate that they operate competently and generate valid results, thereby promoting confidence in their work both nationally and around the world.

[4] Supplementary Requirements for the Accreditation of Continuous Ambient. Air Quality Monitoring Stations

11. Investigate options for utilising sensor-based pollution monitoring technology of transport related emissions and the impacts on ambient air quality, and implement the technology if deemed feasible.	Scientific Services (Lead) with City Health and Transport (Support)	Ongoing	Budget and staff capacity	Feasibility study conducted.

Objective 2.2: To develop and implement mechanisms and systems to attain compliance with national ambient air quality standards.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Implement ambient air quality screening with portable ambient air quality analysers in problem areas currently not covered by the network.	Scientific Services and City Health	Ongoing	Budget	Screening of identified problem areas conducted.
2. Maintain the ambient air quality monitoring network to achieve a minimum of 75% data recovery rates for all measured pollutants across the network and develop a turnaround strategy to achieve this.	Scientific Services	Short	Capital expenditure & Operating expenditure Budget/ SCM for rapid procurement of Repairs and Maintenance	75% data recovery rates achieved.
3. To accredit the ambient air quality monitoring network in terms of ISO 17025.	Scientific Services	Medium to long	Budget	Number of remote stations

				SANAS accredited.
4. Replace ambient air quality monitoring equipment that has reached the end of their useful lifecycle (usually 7 - 10 years).	Scientific Services and City Health	Ongoing	Budget	The number of analysers recapitalised.

Objective 2.3: To monitor criteria air pollutants which, through ambient concentrations, deposition or in any other way, present a threat to health, well-being or the environment.

Waste as well as water and sanitation services are known to impact on air quality and climate change through the emissions of criteria and non-criteria air pollutants[5] and GHGs from waste water treatment works and landfill sites. The table below outlines approaches to reduce the health and environmental impacts.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Continuously monitor, analyse and report on ambient air quality and point, non-point and mobile source emissions.	Scientific Services and City Health AQM	On-going	Budget	Ambient air quality monitoring reporting to the SAAQIS.
2. Monitor the health outcomes secondary to air pollution in partnership with City Health epidemiology/ Urban Health programme.	City Health (Epidemiology)	On-going	Budget	Review conducted every 5 years.

[5] Includes all other pollutants that are not listed pollutants (see section 1.1 of the Plan)

3. In partnership with the Head: Climate Change, initiate investigations on the relationship between climate change and ambient air quality and implement measures to counteract these impacts such as: a) Focussing on mitigation which will cover the aspect of emissions and reducing its impact on climate change and air quality; and b) Researching the climate change impact on air quality in the City.	City Health and Sustainable Energy Markets (Transport – Support Directorate) and Resilience Department, Future Planning and Resilience Directorate	Medium/Long	Budget	Investigations initiated to counteract climate change impacts.
4. Maintain and expand the ambient air quality monitoring network to measure priority pollutants.	Scientific Services Department	Short/Medium	Budget and Staff Capacity	Number of new priority pollutant analysers added.
5. Develop activities to monitor, manage and reduce atmospheric emissions from waste water treatment works, gas flaring and energy generation projects and landfill sites.	Solid Waste and Water and Sanitation	Short/Medium	Budget and Staff Capacity	Strategy developed to monitor, manage and reduce atmospheric emissions.

9.3 GOAL 3: RAISE AWARENESS WITH RESPECT TO AIR QUALITY MANAGEMENT AND CLIMATE CHANGE RESPONSE

Objective 3.1: To support research efforts to determine the extent of detrimental health effects of poor air quality on the population of Cape Town

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Support the Western Cape Government Health Risk Assessment's (linked to air pollution) phased rollout of the study and implement any applicable recommendations for the City of Cape Town study area.	City Health	Medium	Western Cape Government continued funding of their research studies. Sufficient budget to implement recommendations arising from the studies.	Recommendations implemented.
2. Promote, assist and support academic research initiatives with respect to health effects and climate change aspects linked to air pollution through the provision of the City's ambient air quality monitoring and emissions inventory data and support.	City Health, Future Planning, Resilience (Corporate Research Branch) and Scientific Services Department (Air Quality Labs)	Short/ Ongoing	Transversal cooperative governance within City Departments.	Academic research initiatives supported and approved in terms of the City research Protocols.
3. Support the Environmental Management Department on reporting on air quality within the biennial State of the Environment Report.	City Health and Scientific Services	Ongoing	Transversal cooperative governance within City Departments.	Data and inputs provided for the biennial State of the Environment Report.

Objective 3.2: To expand upon existing education and awareness activities and to provide a comprehensive and sustainable awareness and communication programme for Air Quality Management.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Establish a dedicated Education and Awareness component within the Air Quality Management unit to implement programmes.	City Health	Medium	Adequate staff, budget capacity, and resources needed to implement educational and awareness programmes.	A dedicated Education and Awareness component within the Air Quality Management unit is established and resourced.
2. Expand on existing primary schools education programmes.	City Health	Short/Medium	Adequate staff, budget capacity, and resources needed to undertake educational, and awareness programmes.	Number of air quality related education and awareness programmes undertaken in primary schools annually.
3. Support and encourage best practice and reduction at source activities by developing education material for industry.	City Health, Resilience Department, Environmental Management Department and Enterprise and Investment	Medium/Long	Adequate staff, budget capacity, and resources needed to develop educational and awareness programmes.	Number of air quality related education and awareness programmes undertaken at industries annually.
4. Develop linkages to Cities "Let's ACT campaign".	City Health / Resilience Department	Short/Medium	Transversal cooperative governance and capacity.	Formalised linkages developed in support of the "Let's ACT" campaign.

5. Collaborate transversely with other internal and external role players in promoting clean air initiatives e.g. The City's Smart Living Programme and Handbook and the Energy and Sustainable Markets Climate Change communications.	City Health; Environmental Management Department and Energy and Future Resilience Department	Short / Medium / Ongoing	Transversal cooperative governance, budget and capacity	Initiatives undertaken in support of the "Let's ACT" campaign, City's Smart Living Programme and Handbook and the Energy and Sustainable Markets Climate Change communications.

9.4 GOAL 4: INCREASE COMPLIANCE THROUGH EFFECTIVE AND CONSISTENT AIR QUALITY COMPLIANCE MONITORING AND ENFORCEMENT

Objective 4.1: To enforce current and future legislation for Air Quality Management

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Enforce the City of Cape Town: Air Quality Management By-law, 2016.	City Health AQM and Law Enforcement	Short	Adequate human resource capacity	Compliance and enforcement inspections undertaken, fines issued and legal actions taken for non-compliance.
2. Enforce National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA) provisions.	City Health AQM	Short	Adequate human resource capacity	Compliance and enforcement inspections undertaken, fines issued and legal actions taken for non-compliance.
3. Ensure compliance of listed activities with Atmospheric Emission Licence conditions and minimum emission standards through compliance audits.	City Health AQM	Short/medium	Adequate human resource capacity	Compliance and enforcement inspections undertaken, fines issued and legal actions taken for non-compliance.
4. Initiate, lead and participate in joint compliance and enforcement actions with Environmental Management Inspectors (EMIs) from Provincial and National departments.	City Health AQM	Ongoing	Cooperative governance.	Joint compliance inspections undertaken when required.

5. Ensure all Licensed Listed activities and Section 23 Controlled Emitters report their annual emissions to the National Atmospheric Emission Inventory System (NAEIS) within the prescribed reporting timeframes.	City Health AQM	Annually	Industry cooperation, compliance and enforcement	90% of Listed Activities and Section 23 Controlled Emitters report emissions to the NAEIS.
6. The AQM Unit processes all Atmospheric Emission Licence (AEL) applications submitted on the South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP) within the timeframes prescribed in the National Framework for Air Quality Management in the Republic of South Africa.	City Health AQM	Annually and ongoing	Cooperative governance	100% of AEL applications processed and issued within prescribed timeframes.
7. Develop and implement a Standard Operating Procedure (SOP) with Safety and Security Metals Theft Unit on the enforcement of illegal open burning for metal recovery.	City Health AQM & Safety and Security	Short /Ongoing	Cooperative governance	SOP developed and implemented.

OBJECTIVE 4.2: To strengthen and build capacity in air quality management and compliance and enforcement

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. All newly appointed Air Quality Practitioners to be trained and appointed as EMIs.	City Health AQM	Short	Budget and course availability in Western Cape	All Air Quality Practitioners trained and appointed as EMIs.
2. Participate in and collaborate and support the Western Cape/City of Cape Town EMI forum and Provincial Air Quality Officers Forum Work Group.	City Health AQM	Short	Cooperative governance	Participation in and input into DEA&DP AQM and EMI forum.

OBJECTIVE 4.3: To conduct annual compliance monitoring and enforcement of Listed Activities

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Conduct annual compliance and enforcement inspection audits of Listed Activities.	City Health AQM	Short	Staff Capacity	Conduct annual compliance inspections at all Listed Activities with PAELs and at least twice in the 5-year AEL life cycle.
2. Ensure compliance by Listed Activities with AEL conditions and minimum emissions standards through compliance audits; issuing of compliance notices; and calling for pollution abatement plans where required.	City Health AQM	Short/medium	Staff Capacity	Pre-compliance/Compliance notices served on 100% of non-compliant Listed Activities annually.

OBJECTIVE 4.4: To support City Departments and facilities in maintaining environmental compliance

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Provide City Departments and facilities with technical guidance on air quality matters and legislation in order to assist them in maintaining environmental compliance e.g. City Parks (Crematoria) and Solid Waste Management (Landfill site management) when requested.	City Health	On-going	Cooperative governance	Line departments assisted with maintaining compliance with air quality legislation.

OBJECTIVE 4.5: To ensure NEMA Section 30 incidents[6] which impact on air quality are investigated and reported on.

Key Activity	Responsible Department	Term	Dependency	Desired Outcomes/Indicators for Success
1. Investigate and report on air quality related NEMA Section 30 incidents notified to the City of Cape Town where the AQM unit is identified as the lead authority.	City Health	On-going	Industry and cooperative governance	NEMA Section 30 investigations undertaken and reported on.
2. Where incidents reported are due to negligence, ensure that the appropriate compliance and enforcement actions are initiated.	City Health; Environmental Management Department; DEA&DP Environmental Compliance and Enforcement unit.	On-going	Cooperative governance	Compliance and enforcement actions initiated against negligent facilities.

[6] In terms of section 30(1)(a) of NEMA, an "incident" means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

10 IMPLEMENTATION PROGRAMME

Achieving effective control of air quality will be an ongoing long-term multi-disciplinary process involving the following:

10.1 Execution of the activities discussed and outlined in **clause 6** of the plan. This includes the identified and responsible department, whether it is short, medium or long term and what resources and dependencies are relevant.

10.2 Compile and periodically review the AQMP to guide the process, every five years or when required.

10.3 Capacity building and public participation to finalise the AQMP for the City.

10.4 Compile and publish the final AQMP, detailing the institutional and scientific approach to air quality management in Cape Town.

10.5 Develop a Monitoring and Evaluation approach to track the implementation and outcomes and impacts of each of the activities identified in the AQMP.

11 SITUATIONAL ASSESSMENT

11.1 AMBIENT AIR QUALITY STANDARDS

The NEM: AQA defines air quality that is not harmful to health and well-being through the promulgation of the National Ambient Air Quality Standards (DEA, 2009) and provides the regulatory tools and mandates for government to deliver the desired outcome. **Table 2** below details the South African National Ambient Air Quality Standards (NAAQS):

Pollutant	NAAQS Guideline Concentration	Frequency of exceedance
Sulphur dioxide (SO_2) 10-minute averaged data	500 µg/m³ (191 ppb)	526
Sulphur dioxide (SO_2) Hourly averaged data	350 µg/m³ (134 ppb)	88
Sulphur dioxide (SO_2) Daily averaged data	125 µg/m³ (48 ppb)	4
Sulphur dioxide (SO_2) Annual average	50 µg/m³ (19 ppb)	0
Nitrogen dioxide (NO_2) Hourly averaged data	200 µg/m³ (106 ppb)	88
Nitrogen dioxide (NO_2) Annual average	40 µg/m³ (21 ppb)	0
Carbon monoxide (CO) Hourly averaged data	30 mg/m³ (28 ppm)	88
Carbon monoxide (CO) 8-Hour running average	10 mg/m³ (8.7 ppm)	11
Ozone (O_3) 8-hour running average	120 µg/m³ (61 ppb)	11
Particulate matter (PM_{10}) Daily averaged data	75 µg/m³	4
Particulate matter (PM_{10}) Annual average	40 µg/m³	0
Particulate matter ($PM_{2.5}$) Daily averaged data	40 µg/m³	4
Particulate matter ($PM_{2.5}$) Annual average	20 µg/m³	0
Benzene (C_6H_6) Annual average	5 µg/m³ (1.6 ppb)	0

Table 2: The South African National Ambient Air Quality Standards (NAAQS)

11.2 AIR QUALITY TRENDS

Air Quality is affected by seasonal variability, as well as regional, trans-boundary, and localised emission sources and fluctuates significantly at each site. **Figures 8 to 11** highlight the PM_{10}, SO_2 and NO_2 air quality trends between 2010 and 2021. Over the past 12 years, air quality in most areas has met the National Ambient Air Quality Standards (annual averages) apart from PM_{10} in Khayelitsha and Wallacedene in 2021, due to extenuating circumstances, such as sporadic localised pollution events, urban and wildfires, traffic

congestion, associated with calm climatic conditions with temperature inversion events. It should be noted that low data recovery rates at some stations can affect the certainty of trend analysis.

11.2.1 Particulate Matter 10 microns in size (PM_{10})

Annual average PM_{10} levels in Cape Town have generally been lower than that required by the 2015 standard (see **Figure 8: Annual PM_{10} averages, 2010-2021).**

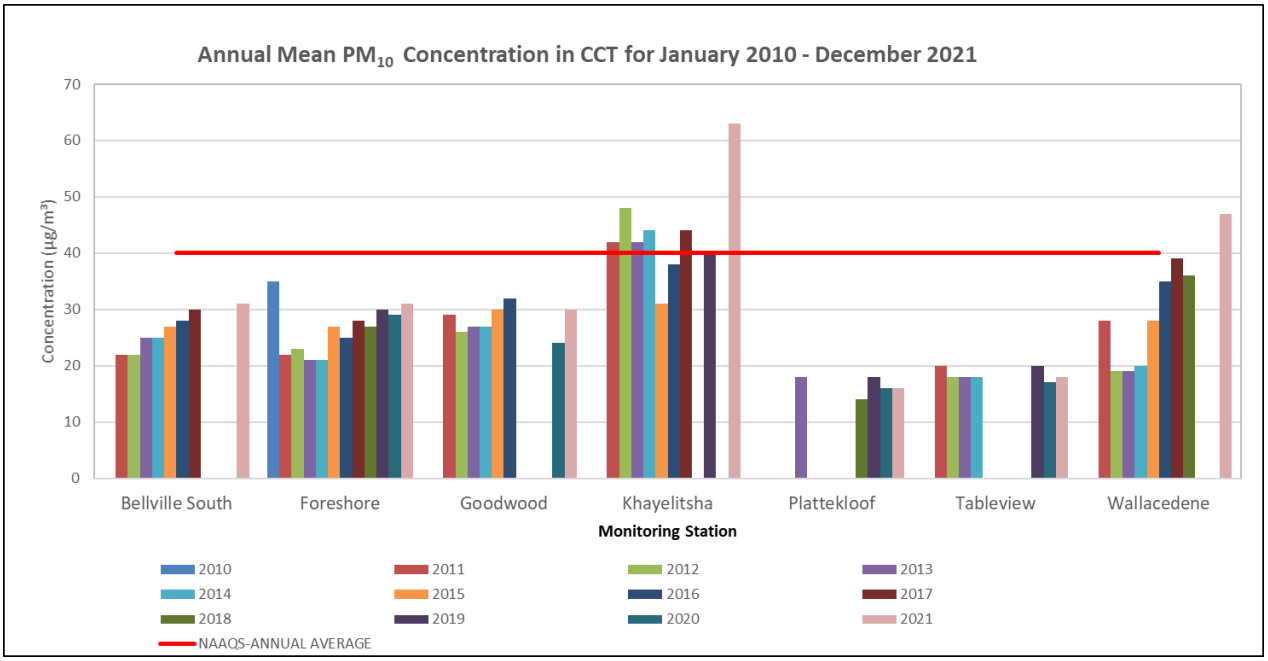


Figure 8: Annual PM_{10} averages, 2010-2021.

Wallacedene and Khayelitsha experienced significant increases in PM_{10} pollution since 2016. However, PM_{10} in Khayelitsha and Wallacedene are the only ambient air quality monitoring sites unable to meet the Annual Average of 40µg/m³ for the 2021 calendar year. The PM_{10} exceedances have been attributed to the extensive burning of wood by informal food traders operating in very close proximity to the Khayelitsha Air Quality Monitoring Station. Smoke emissions from these open braai fires negatively skew the data. Similar activities are associated with the Wallacedene Air Quality Monitoring Station. Both these stations are close to major roadways and are therefore impacted by vehicular emissions.

The Foreshore ambient air quality monitoring site has recorded a considerable decrease in PM_{10} between 2011 and 2014, with increases only experienced again since 2015. The UCT/Table Mountain fire of April 2021, significantly contributed to the increase in PM_{10} in 2021. There are multiple reasons for isolated incidents of poor air quality around Cape Town. These are generally context specific and may be attributed to many social, economic and environmental factors.

Generally, the PM_{10} monitoring stations that were operational during 2020-2021 showed a marginal decrease in pollutant levels, which could be attributed to a reduction in traffic volumes and economic activities brought about by the COVID-19 hard lock down.

Data gaps are attributed to ageing equipment in the monitoring network that required constant and continuous maintenance. A recapitalisation programme has been embarked upon to replace this ageing equipment.

The City recognises that ongoing urban infrastructure improvements, including road works, and property development, will have a beneficial impact on ambient air quality in the long-term thus also benefitting human health. Unpaved and unsurfaced roads and areas contribute to high concentrations of particulate matter in windy conditions.

Industry and traffic also play significant roles in contributing to air pollution. Furthermore, energy costs, energy supply disruptions (in the form of "load-shedding") and the presence of un-electrified households further exacerbate localised exceedances, as households are forced to burn wood or paraffin for heating and cooking. The burning of tyres and other waste material, as well as veld fires and bio-mass burning, also contribute to air quality exceedances **(**see **Figure 8: Annual PM_{10} averages, 2010-2021).**

11.2.2 Sulphur Dioxide (SO_2)

SO_2 levels in the city are generally low and considerably below the legislated South African air quality standards (see **Figure 9: Annual SO_2 averages, 2010-2021)**.

Most ambient monitoring sites have shown a downward trend throughout the past 12 years, with discrepancies occurring every few years e.g. at Wallacedene and Khayelitsha stations. These could have been attributed to instrument malfunction.

The introduction of mandatory lower sulphur content in diesel fuels, which decreased from 5000ppm to 500ppm with 50ppm being readily available for consumers to use may have contributed to lower ambient SO_2 concentrations being measured.

There was a marked reduction in SO_2 levels at the Bellville South station when a large industrial fuel user switched to a lower sulphur fuel in 2017. The introduction of even tighter fuel specifications known as Clean Fuels 2 was scheduled to come into effect in September 2023 but this has been postponed to July 2027. Further benefits to ambient air quality are anticipated as a result of these changes.

The operation of Eskom's Ankerlig Open Cycle Gas Turbines in Atlantis during periods of load shedding from 2020 to 2021 have likely contributed to the increased SO_2 levels monitored at the Atlantis Air Quality Monitoring station.

SO_2 levels at the Tableview monitoring station have shown a decrease likely due to the suspension of refining operations at the Astron Milnerton Refinery during 2020-2021. New technologies to further reduce SO_2 emissions have been implemented at the refinery, which will be re-commencing operations towards the end of 2022.

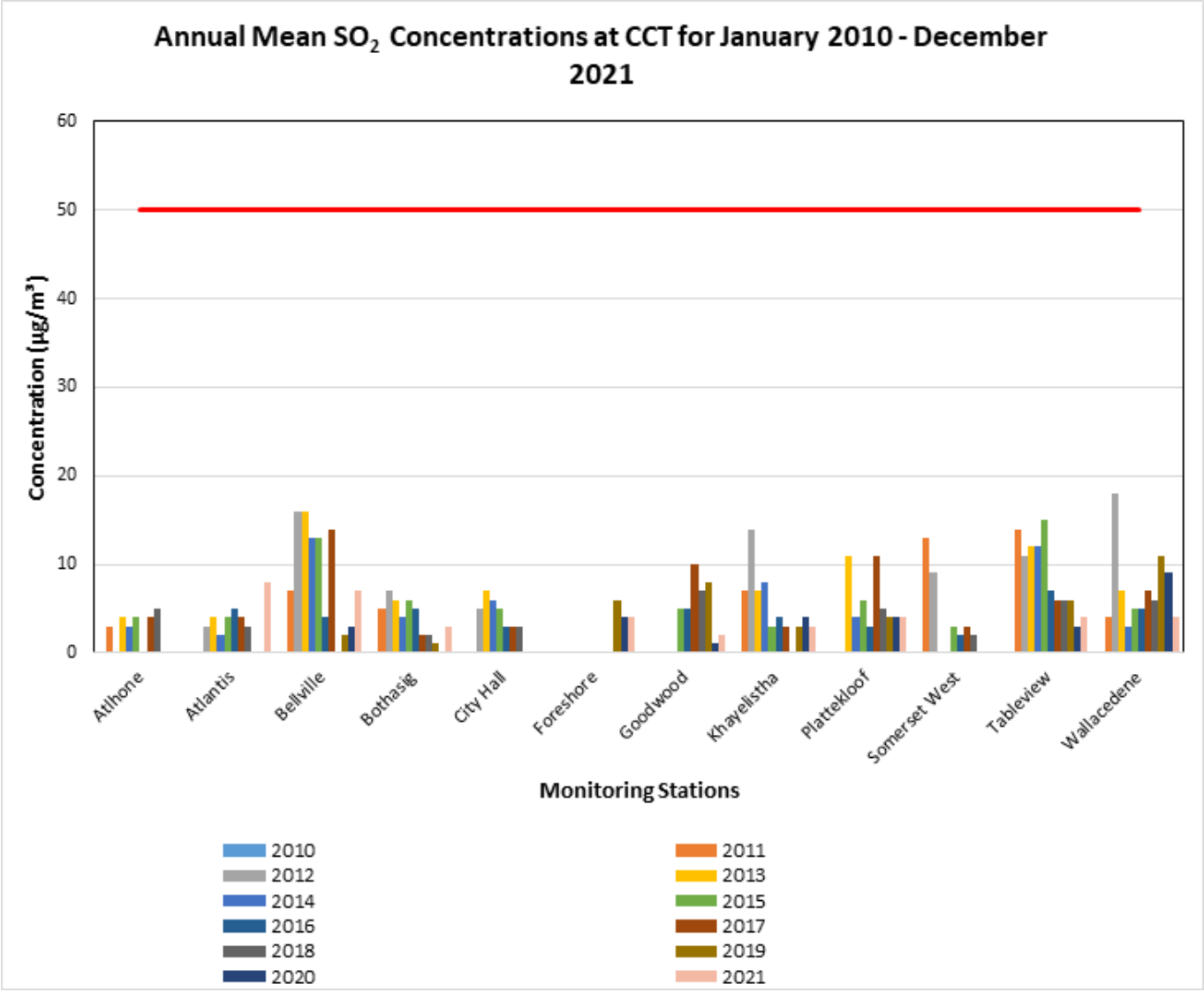


Figure 9: Annual SO_2 averages, 2010-2021

11.2.3 Nitrogen Dioxide (NO_2)

The lack of NO_2 data recovery and data gaps for the period under review affect the reliability of trend analysis however, year on year fluctuations of NO_2 pollution has occurred over the years (see **Figure 10: Annual NO_2 averages, 2010-2021).** This is most likely attributed to climate variability. Significantly, all sites have measured NO_2 levels below the South African Standards over the past 12 years.

The most significant decreasing trends in NO_2 averages were experienced at Khayelitsha and Goodwood in 2021. Bothasig, and Plattekloof have shown a marginal increase in recorded levels which could be attributed to the increase in traffic volumes in these areas.

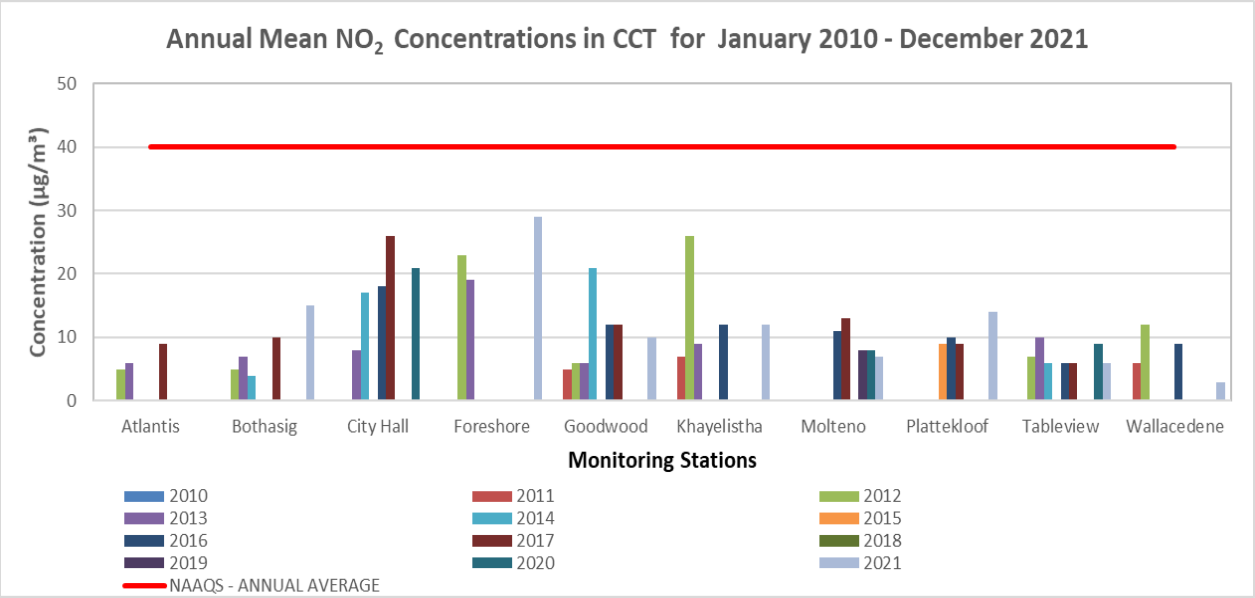


Figure 10: Annual NO_2 averages, 2010-2021

The Foreshore station recorded the highest NO_2 levels in 2021, that could be attributed to high concentrations of vehicle traffic entering the city bowl, port activities as well as weather conditions in this area that cause pollutants to become trapped and recirculated within the dense, built-up areas of the city.

Figure 11 shows the "time varying profile of hourly traffic counts for roads". The profile is based on the readily available permanent Comprehensive Traffic Observation station data over the period of a full year between March 2021 and February 2022. Only stations within an urban setting as identified in the data source were selected. These include a few stations along the provincial arterials in a semi-rural environment. The figure clearly depicts the morning and afternoon weekday peaks that correlate with the diurnal pollution trends (see the diurnal trend graphs for the various air pollutants monitored at the ambient air quality monitoring stations in **Annexure C: Diurnal Trend Graphs**).

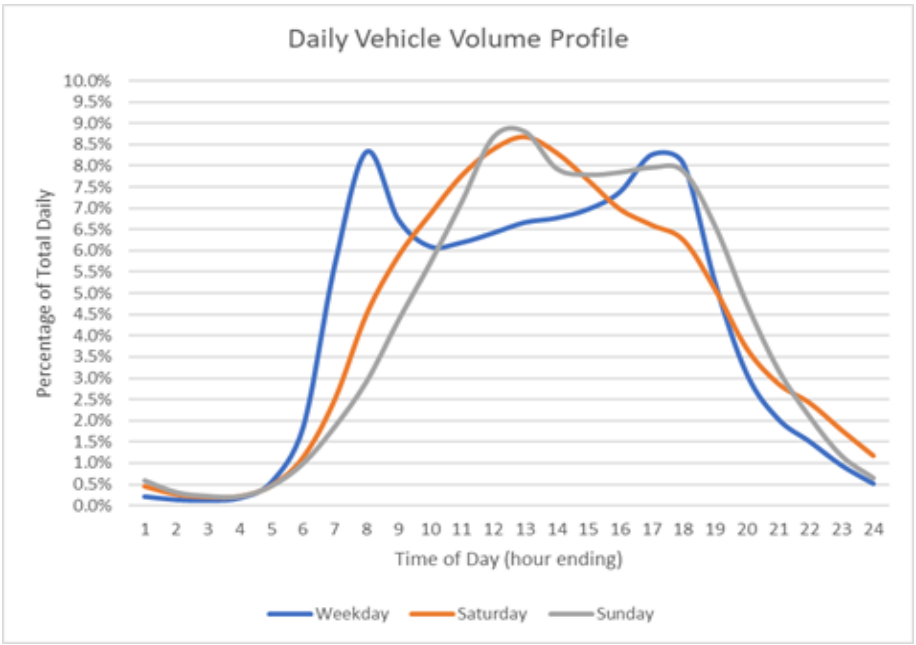
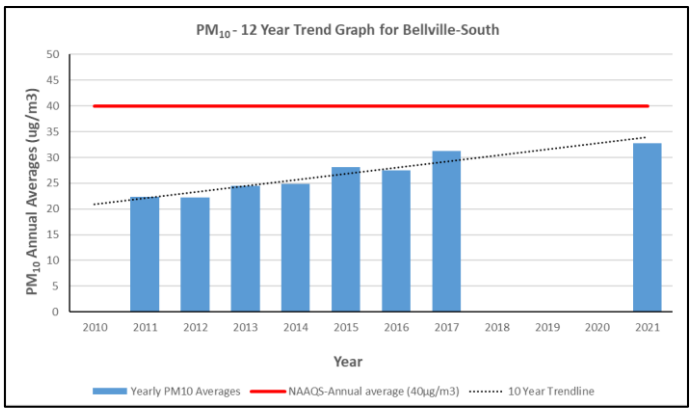
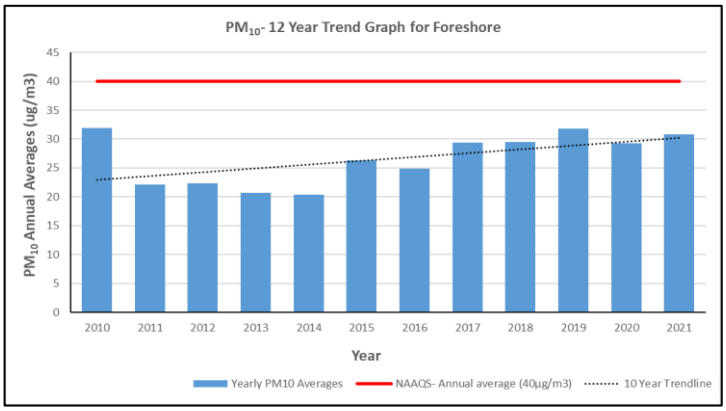
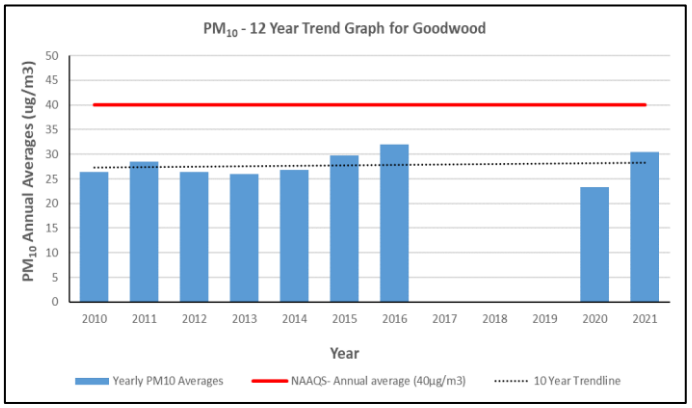


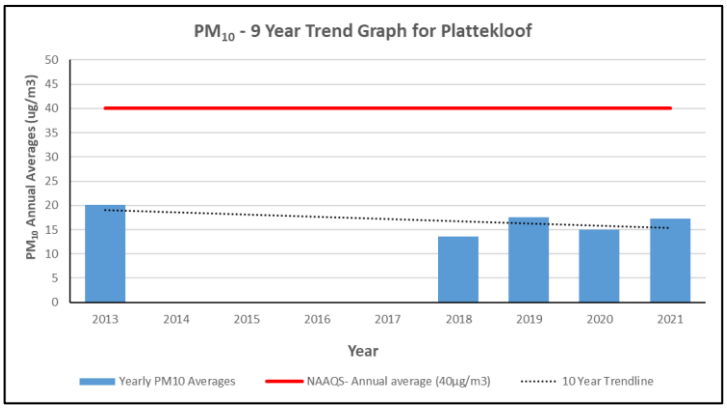
Figure 11: Time varying profile of hourly traffic counts for roads

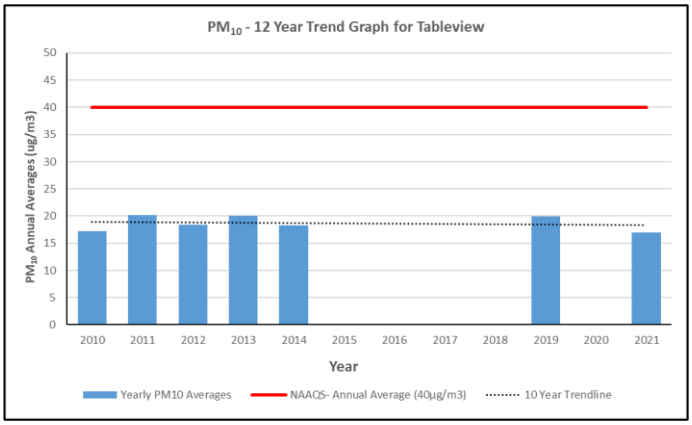
ANNEXURE A: PARTICULATE MATTER ≤10 (PM_{10}) MICRONS TREND GRAPHS

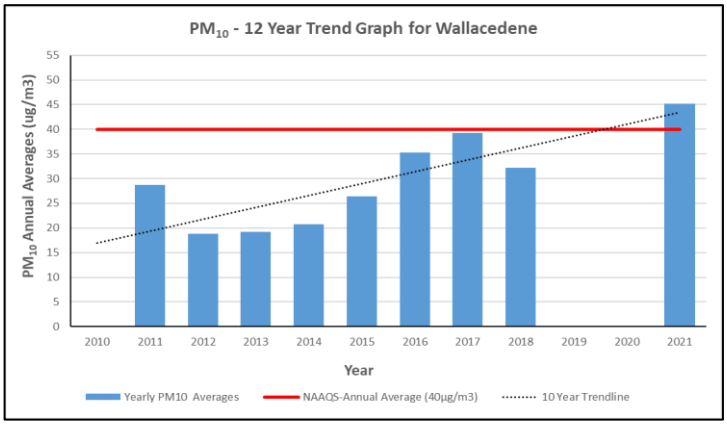


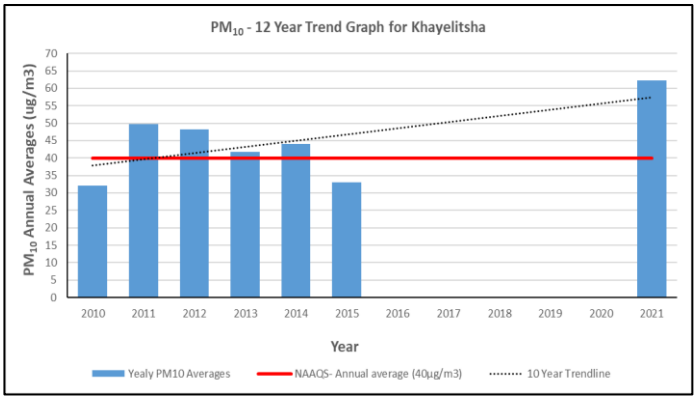




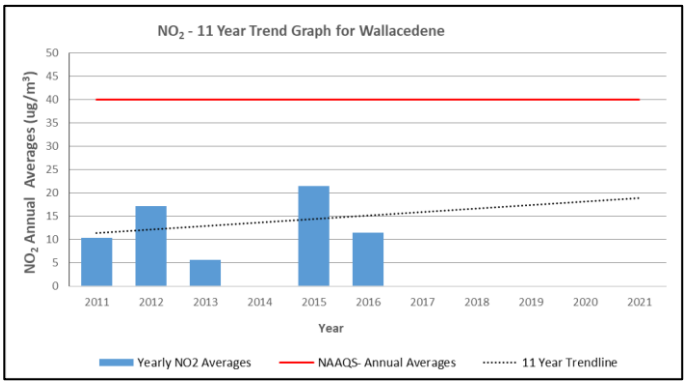


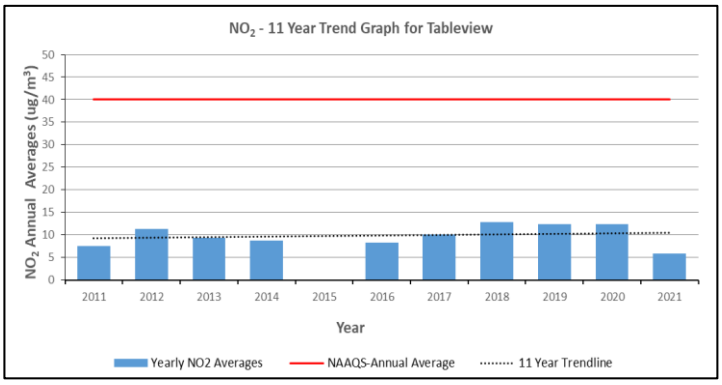


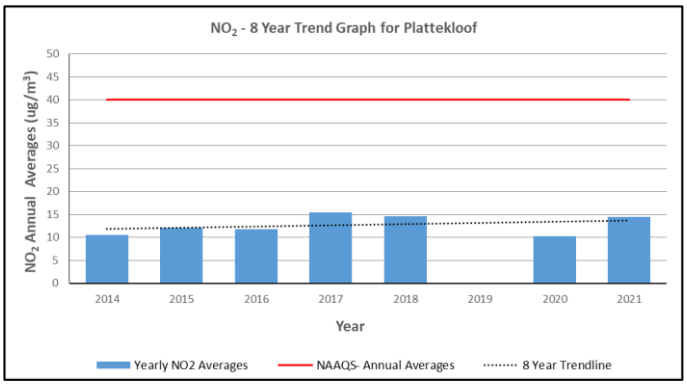


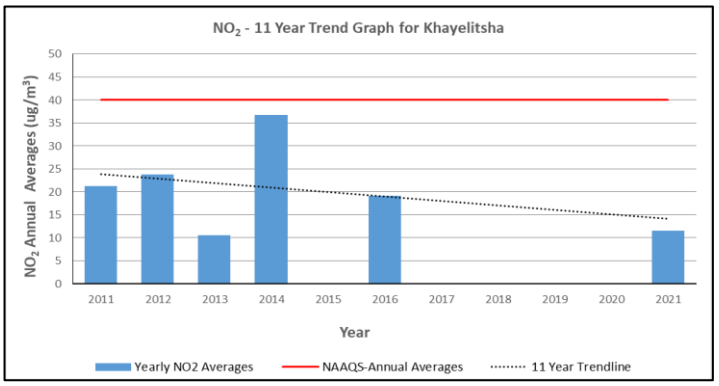


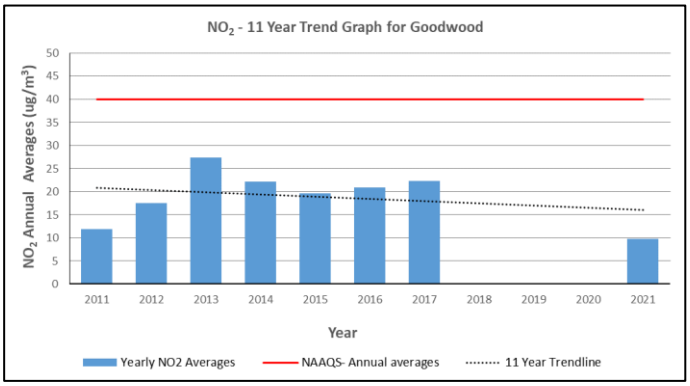
ANNEXURE B: NITROGEN DIOXIDE (NO_2) TREND GRAPHS

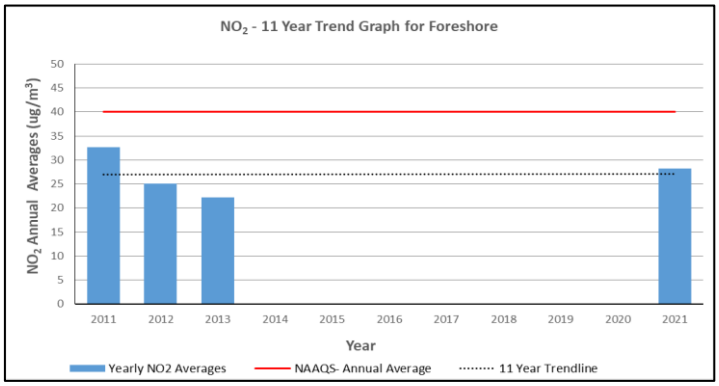


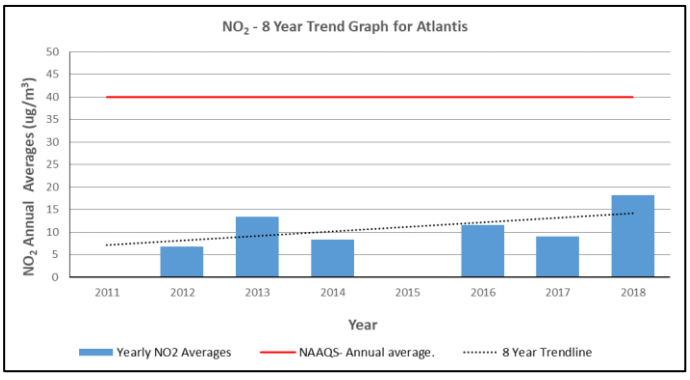


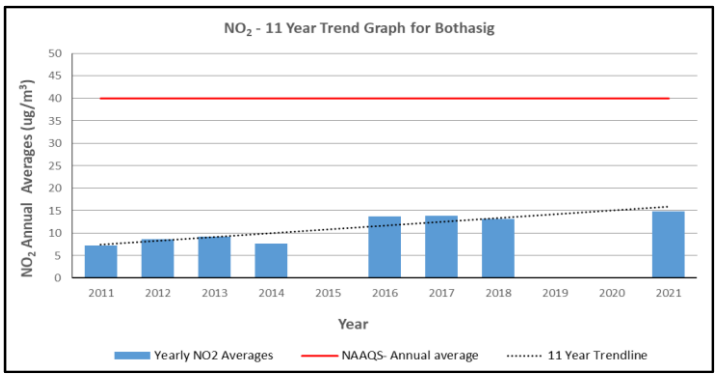


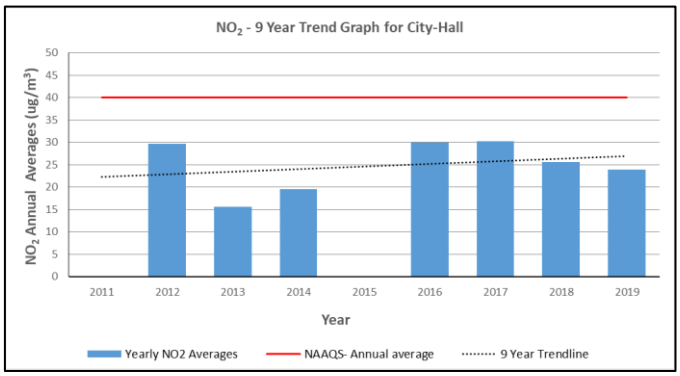






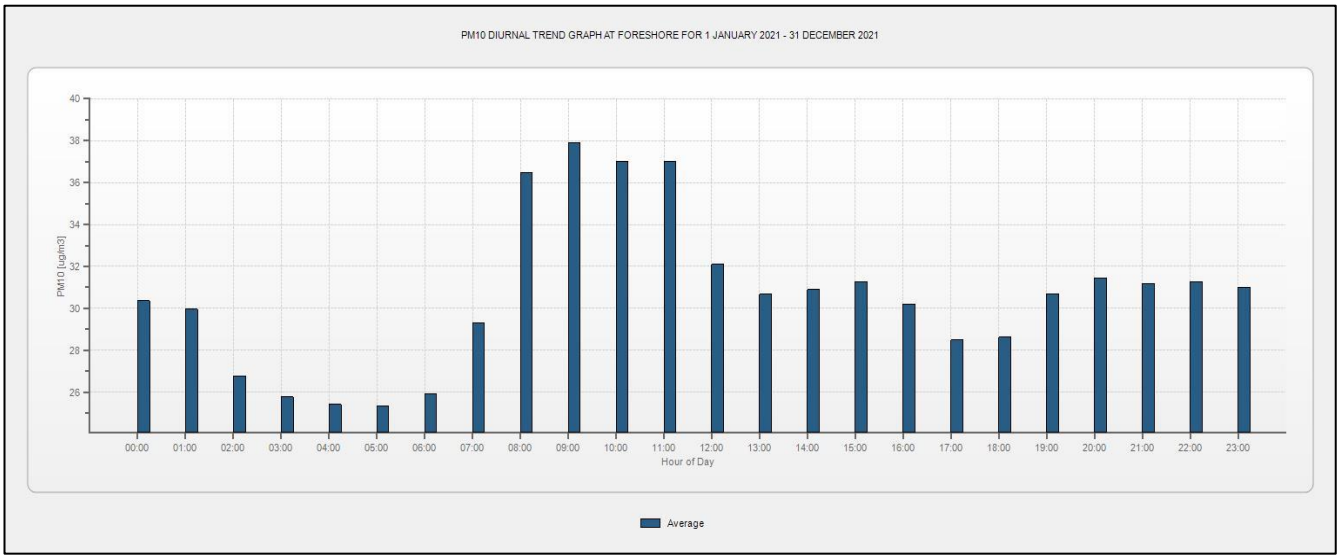


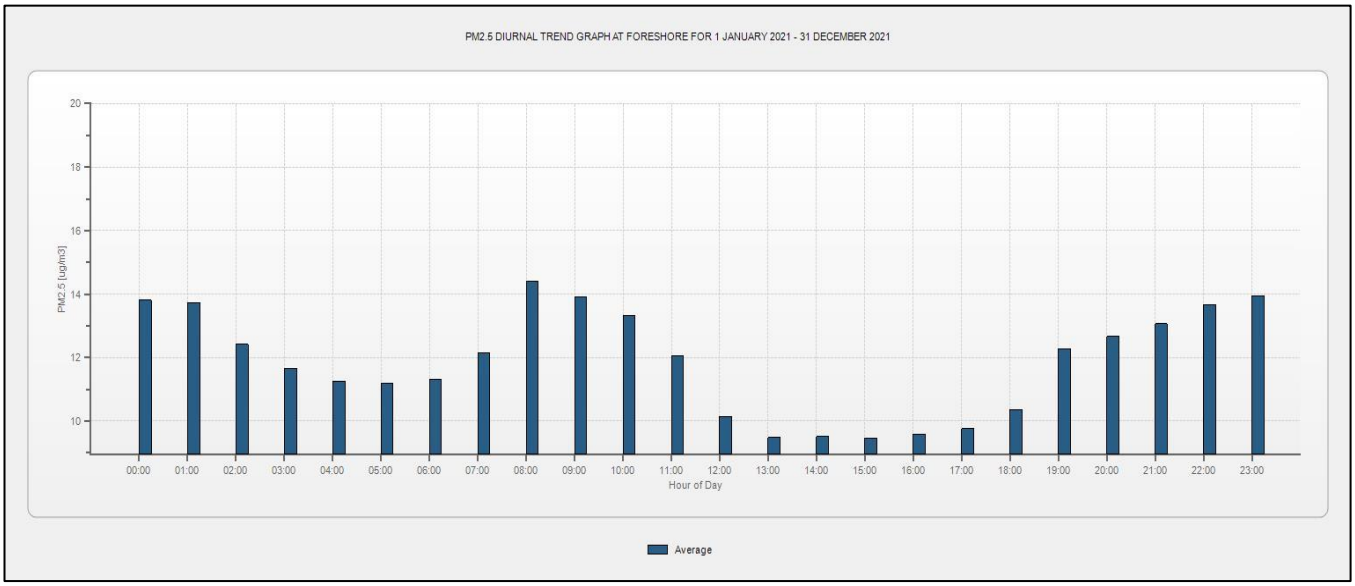


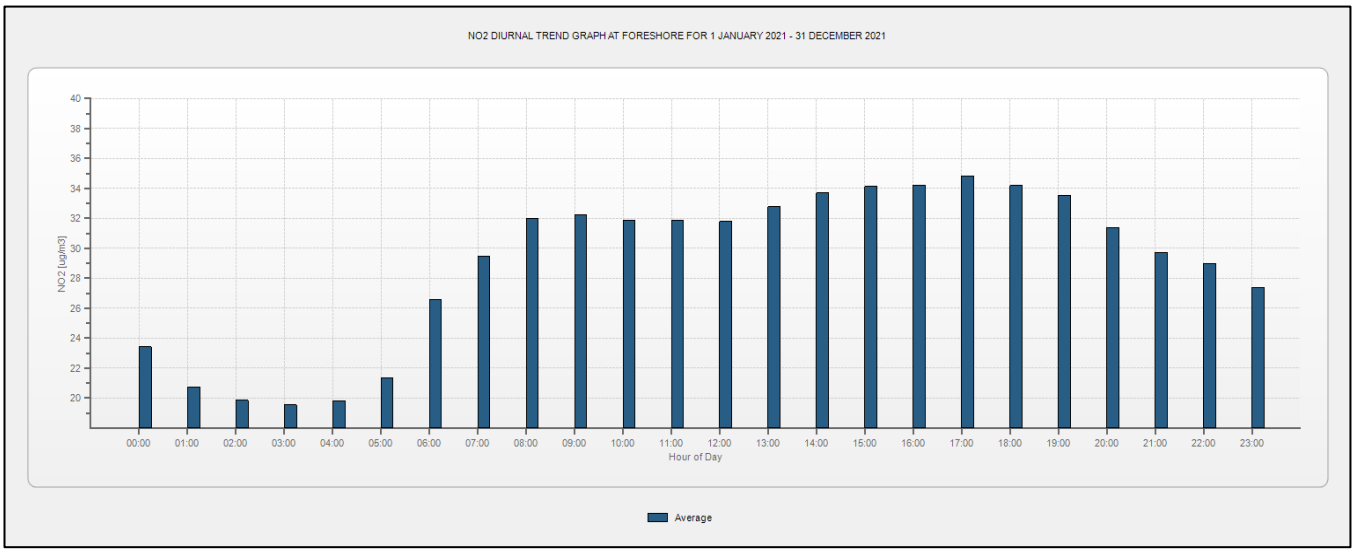

NO2 - 9 Year Trend Graph for City-Hall
NO2 Annual Averages (ug/m3)
50
45
40
35
30
25
20
15
10
5
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
Yearly NO2 Averages
NAAQS- Annual average
9 Year Trendline

ANNEXURE C: DIURNAL TREND GRAPHS

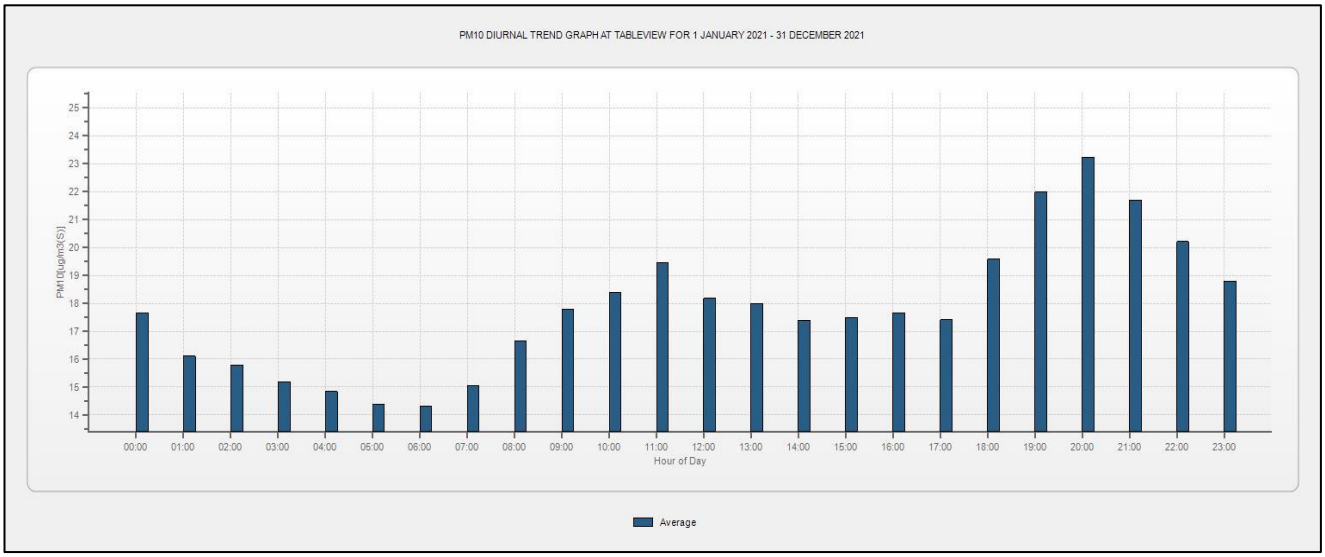
Foreshore

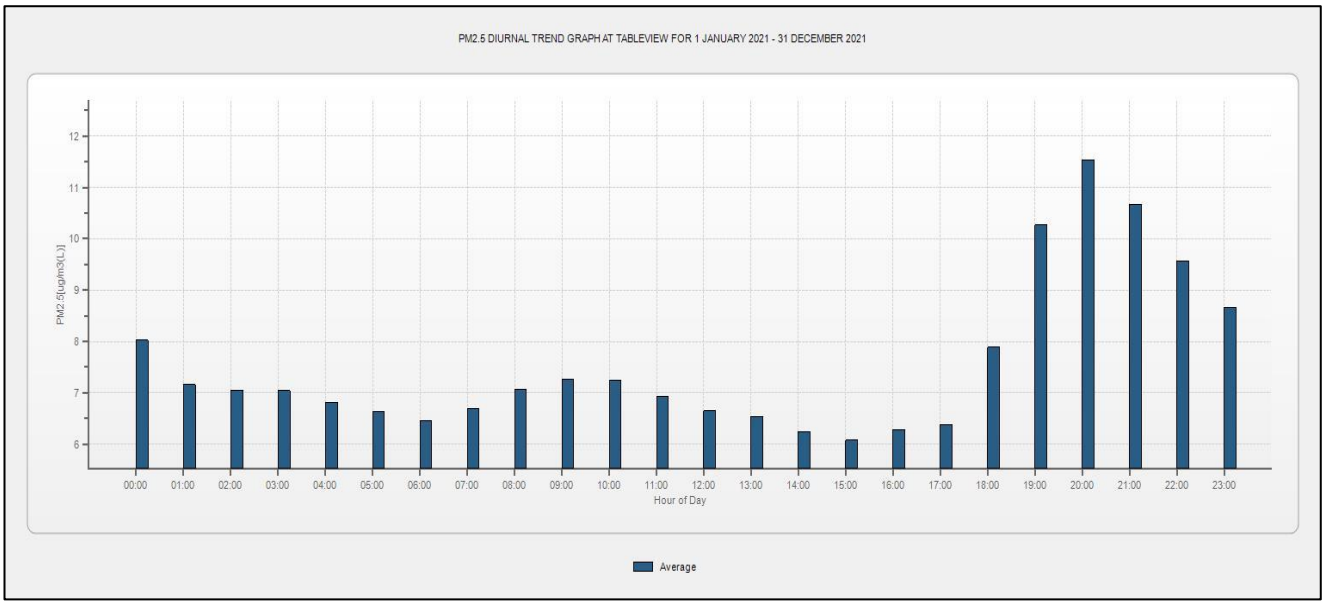


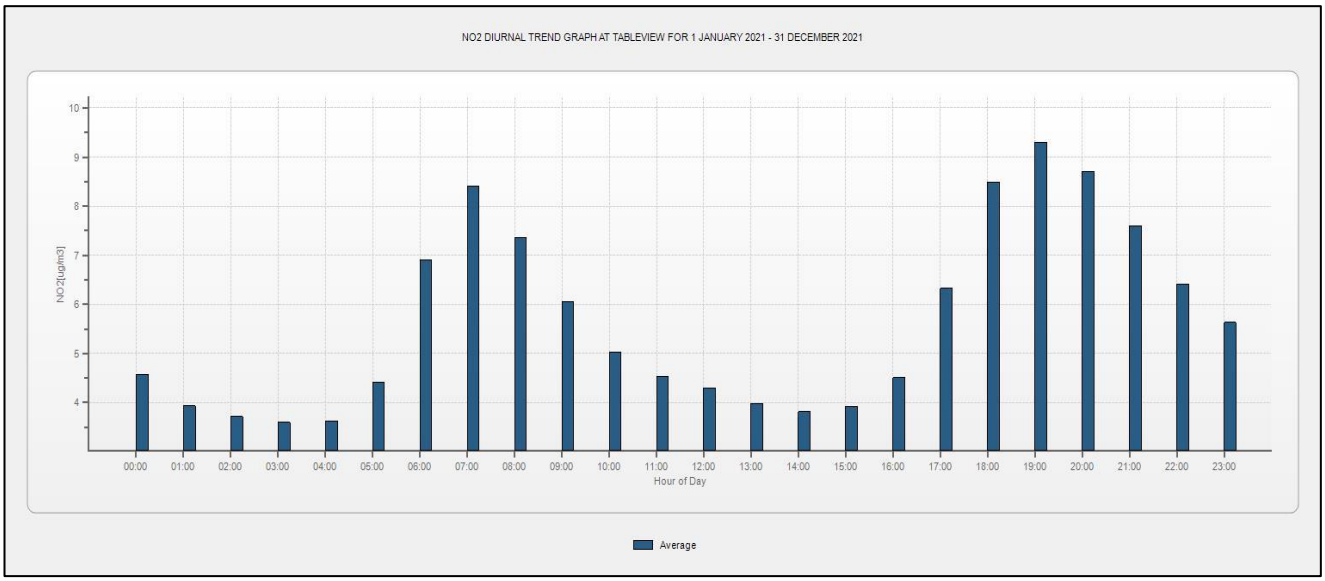




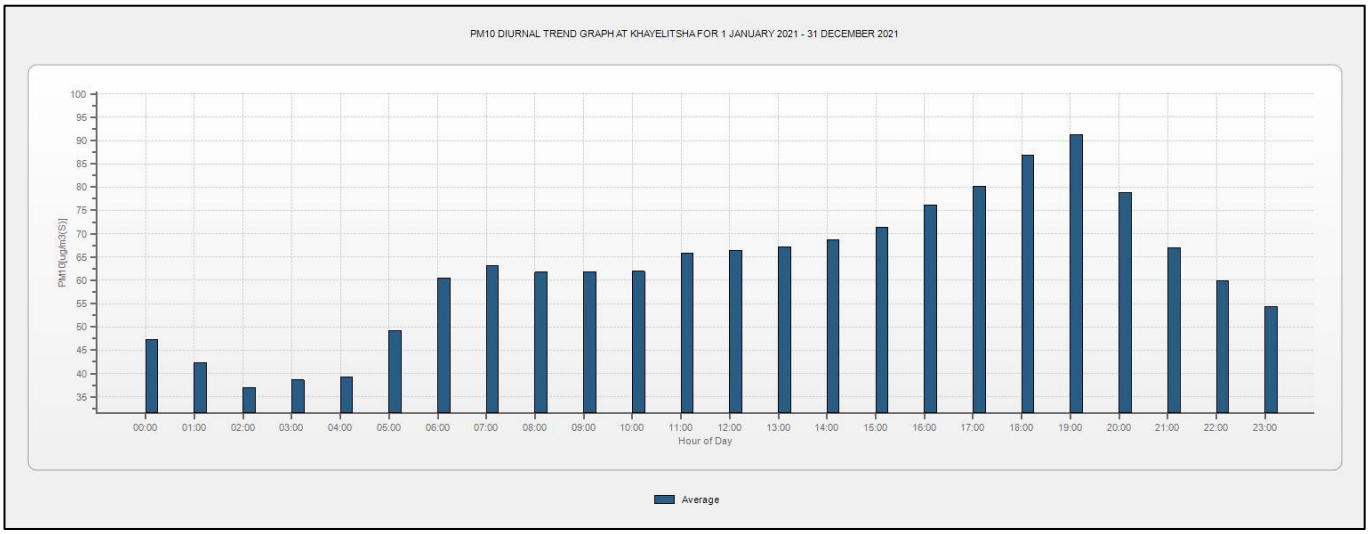
Tableview

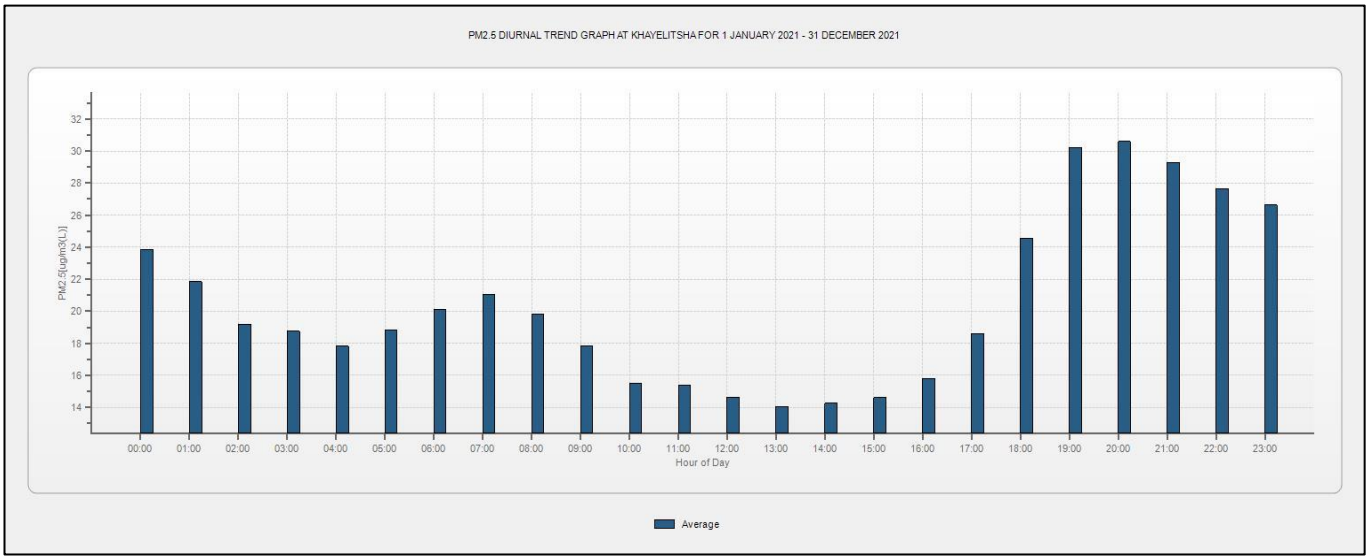

PM10 DIURNAL TREND GRAPH AT TABLEVIEW FOR 1 JANUARY 2021 - 31 DECEMBER 2021
PM10[ug/m3(S)]
Hour of Day
Average


PM2.5 DIURNAL TREND GRAPH AT TABLEVIEW FOR 1 JANUARY 2021 - 31 DECEMBER 2021
PM2.5[ug/m3(L)]
Hour of Day
Average

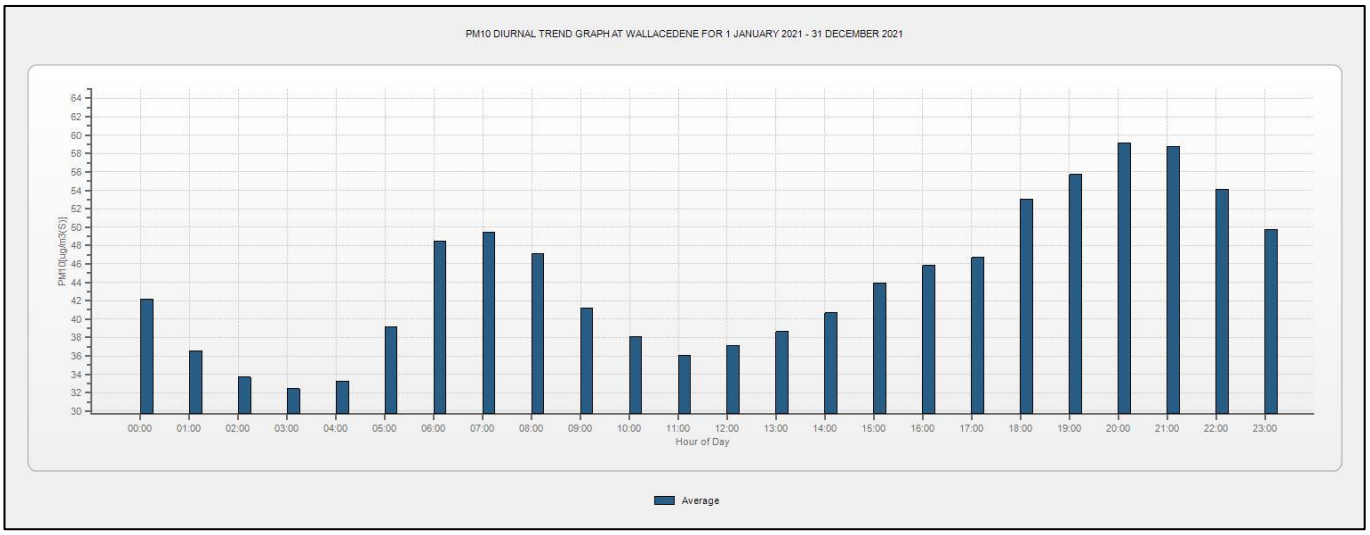

NO2 DIURNAL TREND GRAPH AT TABLEVIEW FOR 1 JANUARY 2021 - 31 DECEMBER 2021
NO2[ug/m3]
Hour of Day
Average

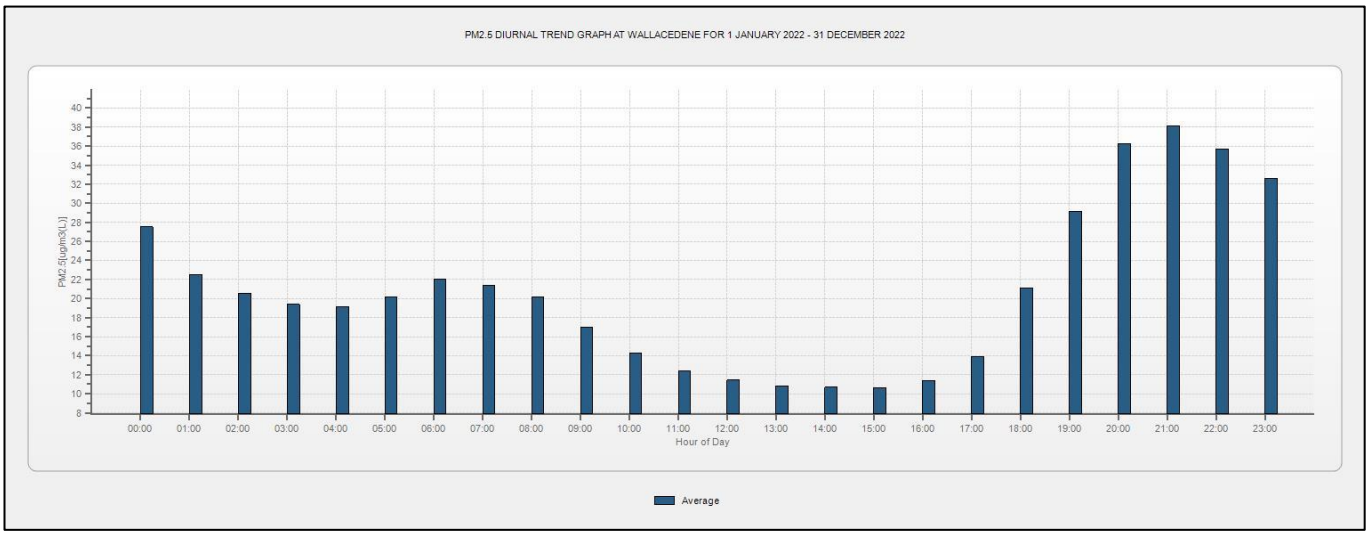
Khayelitsha





Wallacedene




PM2.5 DIURNAL TREND GRAPH AT WALLACEDENE FOR 1 JANUARY 2022 - 31 DECEMBER 2022
PM2.5[ug/m3(L)]
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour of Day
Average