ATMOSPHERIC IMPACT REPORT FOR THE MOOV FUEL BULK STORAGE FACILITY

Prepared by:

DDA Environmental Engineers

PO Box 60034
7439 Table View
Tel: (021) 551 1836
Email: demosd@ddaenviro.co.za

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Authors	Amy Xu	Demos Dracoulides
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Details and Declaration of Interest by the Specialist

This report has been professionally independently prepared by DDA Environmental Engineers cc, which is a South African Professional Consulting company, with a team of professionals specialising in air quality and noise pollution.

Company Contact Details:

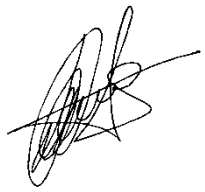
Physical Address: Unit 11, Prosperity Park, Computer Road,

Milnerton, Cape Town

Telephone Number: 021-551 1836

E-mail: demosd@ddaenviro.co.za

The author of this report, Demos Dracoulides, does hereby declare that he is an independent consultant appointed by K&T Consulting Engineers and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are his own.



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Acronyms and Abbreviations

ASTs	Aboveground storage tanks
ATSDR	Agency for Toxic Substances and Disease Registry
DDA	DDA Environmental Engineers
DEA	Department of Environmental Affairs
EMPr	Environmental Management Programme
ESLs	Effects Screening Levels
g/s	Gram per second
LDAR	Leak Detection and Repair
m/s	Meter per second
MRLs	Minimal risk levels
OEHHA	Office of Environmental Health Hazard Assessment
RELs	Reference Exposure Levels
SANS	South African National Standard
TCEQ	Texas Commission on Environmental Quality
µg/m^3	Microgram per cubic meter
US EPA	US Environmental Protection Agency
VOCs	Volatile Organic Compounds

1 INTRODUCTION

MOOV Fuel & Lubricants (Pty) Ltd (MOOV Fuel) proposes the expansion of the bulk fuel storage facility at their Kraaifontein Depot. The depot is located at 13 Kiaat Street in Kraaifontein Industrial, Cape Town.

MOOV Fuel intends to increase its on-site storage capacity of petroleum products by an additional 2,454 m^3 to improve security of supply and to optimise logistics efficiency, as well as allow for ad-hoc/emergency fuel requests. The project will entail the removal of two (2) existing diesel aboveground storage tanks (ASTs) with a combined capacity of 46 m^3 and the installation of three (3) new ASTs with a combined capacity of 2500 m^3, in the following configuration:

➢ 2 x 1000 m^3 aboveground tanks for the storage of 50ppm diesel; and

➢ 1 x 500 m^3 aboveground tanks for the storage of unleaded petroleum (ULP 95).

DDA Environmental Engineers (DDA) was appointed by K&T Consulting Engineers to compile an Atmospheric Impact Report for the proposed expansion.

1.1 Main Aims of the Study and Terms of Reference

The main aims of the atmospheric impact report are to:

- Describe the environment that may be affected by the proposed operations of the facility.
- Identify all legislation and guidelines that have been considered in the preparation of the impact report.
- Establish a detailed emissions inventory for the air pollutants of concern.
- Predict the ground-level concentrations of the relevant air pollutants, utilising air dispersion modelling.
- Compare the resulting concentrations against relevant South African Air Quality Standards and international air quality guidelines.
- Assess the expected impacts due to the proposed operations.
- Identify emission reduction opportunities and cost-effective emission abatement strategies, if necessary.

1.2 Methodology Overview

Air emissions from fuel storage operations primarily consist of volatile organic compound (VOC) emissions during tank loading, along with breathing losses caused by vapour expansion and contraction due to fluctuations in ambient temperature and barometric pressure. Additional VOC emissions also occur during the loading of fuel into road tankers.

The primary pollutants of concern are VOCs such as benzene, toluene, ethylbenzene, and xylene. Emissions from storage tanks were estimated using the US EPA TANKS 5.0 model, while emissions from fuel truck loading were calculated using relevant US EPA emission factors.

To assess the air quality impacts, dispersion modelling was conducted using the AERMOD View model (Version 13.0.0), an air dispersion model approved by the US EPA and recommended in the South African Regulations Regarding Air Dispersion Modelling (DEA, 2014). Three years of hourly meteorological data from Cape Town International Airport were processed to provide the necessary input parameters for the model.

The resulting ground-level concentrations of the identified pollutants were then compared against both South African Air Quality Standards and applicable international guidelines to evaluate the atmospheric impact due to the operation of the facility.

2 ENTERPRISE DETAILS

2.1 Enterprise Details

The details of the facility are shown in Table 2-1.

Table 2-1. Enterprise Details

Enterprise Name	MOOV Fuel (Pty) Ltd
Trading As	MOOV Fuel
Company Registration Number (Registration Numbers if Joint Venture)	Private company
Company/Close Corporation/TrustRegistration Number (RegistrationNumbers if Joint Venture)	2007/024515/07
Registered Address	8 Fabriek Road, Bredasdorp, 7280
Postal Address	PO Box 176, Bredasdorp, 7280
Telephone Number (General)	021 691 4959 / 028 424 2091
Industry Type/Nature of Trade	Petrochemical (supply & deliver fuel, lubricant & LPG products)
Land Use Zoning as per Town Planning Scheme	General Industrial 2

2.2 Location and Extent of Plant

Table 2-2. Location and Extent of Plant

Physical Address of the Plant	13 Kiaat Street, Kraaifontein Industria, Cape Town
Description of Site (Where No Street Address)	N/A
Coordinates of Approximate Centre of Operations	North-south: S33.841497° East-west: E18.728463°
Extent (km²)	0.009747
Elevation Above Mean Sea Level (m)	107
Province	Western Cape
Metropolitan/District Municipality	City of Cape Town
Designated Priority Area	N/A

The bulk fuel storage facility is located at 13 Kiaat Street in Kraaifontein Industria, Cape Town. The location of the facility, as well as the residential areas within a 5-km radius, are shown in Figure 2-1 below. The main land uses within this 5-km radius are residential, light industrial and agricultural. The residential areas include Bloekombos, Walacedene, Scottsdene, Zonnendal, Windsor Park, and Joostenberg Vlakte. The light industrial areas include the Kraaifontein Industrial and the Brackenfell Industrial. The agricultural areas are located to the north, east and south -east of the site.

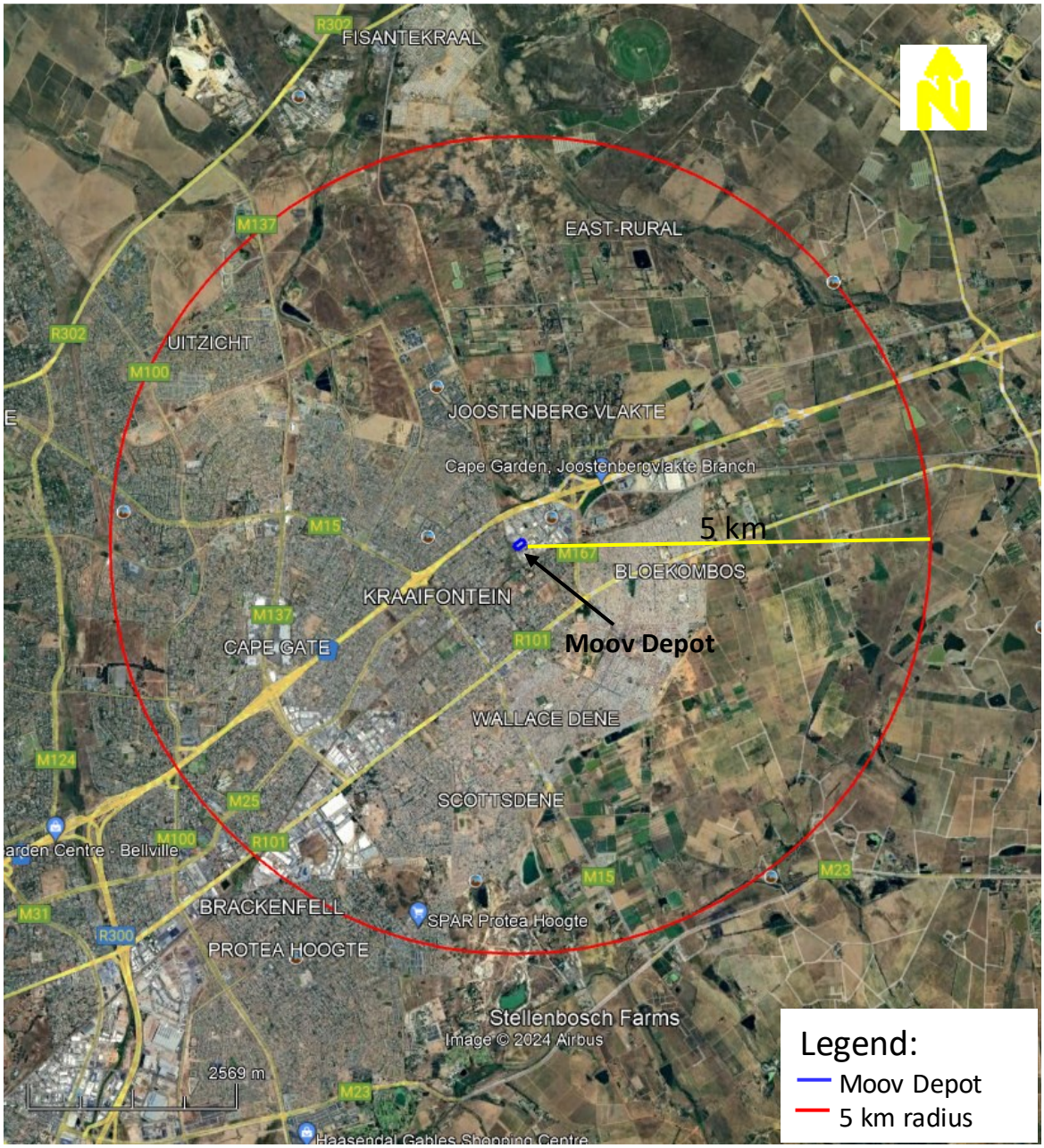

Figure 2-1. Locality Map

3 NATURE OF PROCESS

3.1 Project Description

MOOV Fuel intends to increase its on-site storage capacity of petroleum products by an additional 2,454 m^3. The project will entail the removal of two (2) existing diesel ASTs with a combined capacity of 46 m^3 and the installation of three (3) new ASTs with a combined capacity of 2500 m^3, in the following configuration:

➢ 2 x 1000 m^3 aboveground tanks for the storage of 50ppm diesel; and

➢ 1 x 500 m^3 aboveground tanks for the storage of unleaded petroleum (ULP 95).

The project will include a new wash bay (in a different location on site), which will connect to the existing wash bay separator and then drain to the existing sewer network. It will also include a new oily water separator.

Additionally, the project will require the demolition of two warehouses (one of which contains a wash bay and the other containing oil drums), an out building at the front of the site, the toilet and office area in the middle of the main warehouse and two small storerooms (with firefighting equipment mounted on them) to make way for the proposal.

The products stored in the above-mentioned oil store will be relocated to the main warehouse. These include lubricants/oils, engine cleaner & ethanol (for current operations and the quantities are to remain the same with project in the future). The total storage capacity is 500,000 litres. The proportions of the 500, 000 L products are

- Lubricants/Oils : 99%
- Degrasol Engine Cleaner : 0.5%
- Ethanol Solution : 0.5%

In addition to the planned petrol and diesel storage tanks, MOOV Fuel also stores 1,500 kg of liquefied petroleum gas (LPG) on site, which will be relocated to the southern corner of the site.

Bulk Storage Tanks

A total number of 4 tanks can be accommodated within the available space. Under the current project, only 3 of the 4 tanks will be constructed with space allowance for a future tank.

The specifications of the tanks and the associated fuel types are provided in Table 3-1 below. All tanks will be fixed cone roof designs, with the unleaded petroleum (ULP) tank incorporating an internal floating roof.

Table 3-1. Bulk Storage Tanks

Tank No	Tank Type	Service	Diameter	Height	Gross Volume
#1	Fixed cone roof tank with internal floating roof	ULP 95	11,52m	4.8m	500 m^3
#2	Fixed cone roof tank	Diesel	11,52m	9,6m	1000 m^3
#3	Fixed cone roof tank	Diesel	11,52m	9,6m	1000 m^3
#4	-	Future	11,52m	9,6m	1000 m^3

Product Receipt & Transfer Facilities

All product receipts and transfers will be done via road tankers. The Moov Fuel Bulk Storage facility will comprise the following:

- Product Receipt
  - Decanting hose & dry-break coupling,
  - Suction Strainer,
  - Decanting Pump installed onto a concrete plinth,
  - Vertical Deaerator c/w open-close valve to ensure no air is transmitted through the flow Meter,
  - Mechanical Flow meter with calibration valves.
- Product transfer
  - Loading hose & dry break coupling,
  - Loading Pump installed onto a concrete plinth,
  - Strainer/ Air Eliminator,
  - Mechanical Flow meter with calibration valves,
  - Suction strainer.

In addition to the aforementioned fuel storage and associated facilities, the depot will include the following infrastructure:

- Exiting Office and Admin Building,
- Storage of Lubes Products within the main warehouse,
- Relocation of the truck wash bay facilities,
- Truck Workshop building,
- Relocation of LPG storage cage
- Truck staging and car parking facilities,
- Site Works with boundary wall, concreted paved areas, etc.

3.2 Process Description

1) Filling Up Tanks

The fuel will arrive at the facility via road tankers.

2) Fuel Storage

The petrol and diesel fuel will be stored on site. In addition to the fuels stored in the tanks, there will also be pre-loaded tankers (+-4 tankers) with diesel fuel only parked at the facility overnight for deliveries the next day.

3) Fuel Transfer

The fuel will be loaded onto road tankers for dispatch. The fuel loading facility is located adjacent to the tank farm area.

3.3 Listed Activities

A list of activities, which result in atmospheric emissions and their associated minimum emission standards was published in Gazette No. 37054 on 22 November 2013. The proposed facility triggers the listed activity Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass, subcategory 2.4: Storage and handling of petroleum products.

The requirements for the storage tanks based on the products' vapour pressure are shown in Table 3-2 below.

As indicated in Section 3.1, all the proposed tanks will be fixed cone roof tanks and the ULP tank will have an internal floating roof.

In addition to the requirements on the tank types, if the throughput is greater than 50,000 m^3 per year for products with a vapour pressure greater than 14 kPa, a vapour recovery/destruction unit is required to be installed. The details of this requirement are shown further below.

As the expected annual petrol throughput will be much lower than 50,000 m^3 per year, a vapour recovery/destruction unit will not be constructed.

Table 3-2. Storage Tank Requirements

Application	All permanent immobile liquid storage facilities at a single site with a combined storage capacity of greater than 1000 cubic meters.
True vapour pressure of contents at product storage temperature	**Type of tank or vessel**
Type 1: Up to 14 kPa	Fixed-roof tank vented to atmosphere, or as per Type 2 and 3
Type 2: Above 14 kPa and up to 91 kPa with a throughput of less than 50'000 m³ per annum	Fixed-roof tank with Pressure Vacuum Vents fitted as a minimum, to prevent "breathing" losses, or as per Type 3
Type 3: Above 14 kPa and up to 91 kPa with a throughput greater than 50'000 m³ per annum	a) External floating-roof tank with primary rim seal and secondary rim seal for tank with a diameter greater than 20m, or b) fixed-roof tank with internal floating deck / roof fitted with primary seal, or c) fixed-roof tank with vapour recovery system.
Type 4: Above 91 kPa	Pressure vessel

(c) The following special arrangements shall apply for control of TVOCs from the loading and unloading (excluding ships) of raw materials, intermediate and final products with a vapour pressure of greater than 14kPa at handling temperature. Alternative control measures that can achieve the same or better results may be used:

(i) All installations with a throughput of greater than 50'000 m³ per annum of products with a vapour pressure greater than 14 kPa, must be fitted with vapour recovery / destruction units. Emission limits are set out in the table below -

Description:	Vapour Recovery Units		
Application:	All loading/ offloading facilities with a throughput greater than 50 000 m³		
Substance or mixture of substances		**Plant status**	**mg/Nm³ under normal conditions of 273 Kelvin and 101.3 kPa.**
Common name	**Chemical symbol**		
Total volatile organic compounds from vapour recovery/ destruction units using thermal treatment.	N/A	New	150
		Existing	150
Total volatile organic compounds from vapour recovery/ destruction units using non-thermal treatment.	N/A	New	40 000
		Existing	40 000

(ii) For road tanker and rail car loading / offloading facilities where the throughput is less than 50'000 m³ per annum, and where ambient air quality is, or is likely to be impacted, all liquid products shall be loaded using bottom loading, or equivalent, with the venting pipe connected to a vapour balancing system. Where vapour balancing and / or bottom loading is not possible, a recovery system utilizing adsorption, absorption, condensation or incineration of the remaining VOC's, with a collection efficiency of at least 95%, shall be fitted.

3.4 Unit Processes at the Site of Work

Table 3-3. Unit Processes

Unit Process	Unit Process Function	Batch or Continuous Process
Product receipt	Filling up the fuel tanks with road tankers	Batch
Product storage	Storage of petrol and diesel	Continuous
Product transfer	Loading of fuel onto road tankers	Batch

3.5 Hours of Operation

Table 3-4. Operating Hours

Unit Process	Operating Hours	Number of Days Operated per Year
Product receipt	24/7	365
Product storage		
Product transfer		

3.6 Fuel Throughputs

Table 3-5. Fuel Throughputs

Raw material Type	Design Throughput	Actual Throughput	Units (Quantity/Period)
Diesel	16,650,000	14,985,000	Litres per annum
ULP 95	1,850,000	1,665,000	Litres per annum

4 ATMOSPHERIC EMISSIONS

4.1 Area Source Parameters

Three tanks will be constructed for the bulk fuel storage. The fourth tank is planned to be constructed in the future and does not form part of the present study. The area source parameters for these tanks can be seen in Table 4-1 below.

Table 4-1. Area Source Parameters

Source Name	Source Description	Latitude (decimal degrees) of SW corner	Longitude (decimal degrees) of SW corner	Height of Release Above Ground (m) [b]	Length of Area (m) [a]	Width of Area (m) [c]
Tank #1	ULP 95 tank	-33.841524°	18.728702°	6	11,52m	4.8m
Tank #2	Diesel tank	-33.841386°	18.728565°	12	11,52m	9,6m
Tank #3	Diesel tank	-33.841306°	18.728696°	12	11,52m	9,6m
Tank #4	Future tank	-	-	-	-	-

[a] Diameter of the tank.
[b] Height of the breather valves.
[c] Height of the tank.

4.2 Area Source Fugitive Emissions

4.2.1 Fuel Storage Tank Losses

Air emissions from fuel storage tanks originate from several sources, including fuel loading into the tanks, fuel transfer to road tankers, as well as breathing losses resulting from vapour expansion and contraction caused by changes in ambient temperature and barometric pressure.

The emission inventory for the depot was developed using the "Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources" (AP-42), Chapter 7, Section 7.1, Organic Liquid Storage Tanks (US EPA, 2020), along with the US EPA emissions inventory model TANKS 5.0. The emission estimating equations that form the basis of the TANKS software program and the AP-42 Section 7.1 manual are based on methodologies developed by the American Petroleum Institute (API).

4.2.1.1 TANKS Model Setup

The site-specific information regarding the fuel quantities, the storage tanks (dimensions, tank type, paint condition, tank fittings, etc.), the fuel contents (chemical components and liquid temperature), and meteorological data (ambient minimum and maximum temperatures, atmospheric pressure, etc.) were utilised as inputs into the model.

The fuel types that were chosen during the model runs are as follows:

Fuel	TANKS Model
Petrol, ULP 95	Gasoline RVP 10
Diesel (gas oil)	Distillate fuel oil no.2

For the speciation of the various compounds in the fuel, the test results for ULP 95 from Astron Energy (report date: 24/06/2024) were used. For the diesel speciation, the typical diesel composition in the

NPI emission Estimation Technique Manual for Fuel and Organic Liquid Storage (May 2012) was utilised. The percentage compositions of benzene, toluene, ethylbenzene and xylene (BTEX) in petrol and diesel are shown in Table 4-2 below.

Table 4-2. Petrol and Diesel BTEX Speciation

Component	Composition (vol%)	
	Petrol	Diesel
Benzene	2.91	0.03
Toluene	20	0.1
Ethylbenzene	10	0.11
Xylene (-m)	5	0.345

The TANK model input parameters are presented in Table 4-3 and Table 4-4 below for the petrol and diesel tanks respectively.

Table 4-3. Internal Floating Roof Tank Input: Petrol

Input Type	Input
Tank content	Gasoline (RVP 10)
Tank diameter (m)	11.52
Height (m)	4.8
Annual throughput (litres/yr)	1,850,000
Maximum liquid height (m)	4.6
Average liquid height (m)	3.8
Tank Construction and Rim Seal System:	
Tank construction	Welded with self-supporting roof
Primary seal	Mechanical shoe
Secondary seal	Shoe-mounted
Shell/roof external colour	White
Shell/roof external condition	New
Deck type	Bolted
Deck Fittings	
Access hatch	1, bolted cover, gasketed
Slotted Guidepole/Sample Well	2, ungasketed or gasketed sliding cover
Automatic gauge float well	1, unbolted cover, ungasketed
Gauge-hatch/Sample Port:	1, weighted mechanical actuation, gasketed
Vacuum breaker	1, weighted mechanical Actuation, gasketed.
Deck leg	Adjustable
Rim vent	1, weighted mechanical actuation, gasketed

Table 4-4. Vertical Fixed Roof Free Vent Tank Input: Diesel

Input Type	Tank 2	Tank 3
Tank content	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Tank diameter (m)	11.52	11.52
Tank height (m)	9.6	9.6
Annual throughput (litres/yr)	8,325,000	8,325,000
Maximum liquid height (m)	8.64	8.64

Input Type	Tank 2	Tank 3
Average liquid height (m)	7.68	7.68
Shell & roof external colour	White	White
Shell & roof external condition	New	New
Roof type	Cone	Cone
Roof slope	0.0625	0.0625
Breather vent setting (Pressure) (kPa)	0	0
Breather vent setting (Vacuum) (kPa)	0	0

Based on the input data outlined above and the throughput for each tank from further above, the emission quantities for each of the selected compounds were estimated with the use of the TANKS 5.0 model. The estimated annual emission quantities can be seen in Table 4-5 and the speciated emissions in Table 4-6 further below. As expected, most of the VOC emissions originate from the petrol tank, reaching 1,097.4 kilograms per year (kg/year). The emissions from the diesel tanks are expected to be 32.7 kg/year per tank.

Table 4-5. Total VOC Emissions from the Tanks

Tank ID	Annual Emissions - Total VOC (kg/yr)		
	Standing Losses	Working Losses	Total Losses
01	987.1	110.4	1,097.4
02	8.6	24.1	32.7
03	8.6	24.1	32.7

Table 4-6. Petrol and Diesel Tanks BTEX Emissions

Pollutant	Tank Emissions	
	kg/year	g/s *
	Petrol tank	
Total VOC	1,097.45	
Benzene	18.55	5.88E-04
Toluene	58.81	1.86E-03
Ethylbenzene	20.12	6.38E-04
Xylene (m) (1,3-dimethyl benzene)	9.78	3.10E-04
	Diesel tank (each)	
Total VOC	32.72	
Benzene	3.44	1.09E-04
Toluene	2.34	7.43E-05
Ethylbenzene	0.86	2.74E-05
Xylene (m) (1,3-dimethyl benzene)	1.89	5.98E-05
* Emission hours: 24/7		

4.2.2 Road Tanker Loading Losses

In addition to the storage fugitive emissions, the loading of the tanker trucks for fuel dispatch is expected to also generate VOC emissions at the facility.

These fuel loading emissions can be estimated using the following expression (US EPA, 2006):

$$L_L = 12.46 \frac{SPM}{T}$$

where:

L_L = loading loss, pounds per 1000 gallons ($lb/10^3$ gal) of fuel loaded

S = a saturation factor

P = true vapor pressure of fuel loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")

M = molecular weight of vapours, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")

T = temperature of bulk liquid loaded, °R (°F + 460)

It was assumed that loading will take place submerged. The saturation factor (S) for submerged loading operations is given as 0.5. As for the true vapour pressure (P) and molecular weight of the vapours (M), the values at 60 °F were used, by assuming the fuels will be of ambient temperature which is 16.7 °C (=60 °F). The true vapour pressure (P) and molecular weight of the vapours (M) are shown in table below (US EPA, 2020).

Table 4-7. Properties of Selected Petroleum Liquids

Fuel	Vapor Molecular Weight at 60 °F (lb/lb-mole)	True Vapor Pressure, Pva (psi) at 60 °F
Petrol (gasoline RVP 10)	66	0.0065
Diesel (fuel oil No. 2)	130	5.2

Based on the above-mentioned properties, the operational emissions from the loading of the tankers were estimated and can be seen in Table 4-8 below. The petrol loading had the maximum emissions reaching 910.4 kg/ year. The similar emissions from the diesel dispatch were 20.2 kg/year.

Table 4-8. Road Tanker Loading Emissions

Fuel	Loading Losses		
	$lb/10^3$ gal	g/L	kg/year
Petrol (gasoline RVP 10)	4.11	0.49	910.4
Diesel (fuel oil No. 2)	0.01	0.001	20.2

For the speciation of the BTEX emissions, the fractions from Table 4-6 were used. The resulting BTEX emissions from fuel dispatch are shown in Table 4-9 below.

Table 4-9. Road Tanker Loading BTEX Emissions

Pollutant	Emissions - Loading of Tankers		Emissions - Loading of Tankers	
	kg/year	g/s *	kg/year	g/s *
	Petrol		Diesel	
Total VOCs	910.4	-	20.2	-
Benzene	15.39	4.88E-04	2.12	6.73E-05
Toluene	48.79	1.55E-03	1.44	4.58E-05
Ethylbenzene	16.69	5.29E-04	0.53	1.69E-05
Xylene (m) (1,3-dimethyl benzene)	8.12	2.57E-04	1.16	3.69E-05
* Emission hours: 24/7				

5 AMBIENT AIR QUALITY STANDARDS AND GUIDELINES

5.1 National Ambient Air Quality Standards

The South African legislation and guidelines on environmental management and air quality emission standards are:

- The National Environmental Management Act, Air Quality Act (Act No. 39 of 2004);
- The South African National Ambient Air Quality Standards (24 December 2009); and
- The National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter Less Than 2.5 Micron Meters ($PM_{2.5}$) (29 June 2012).

The South African National Ambient Air Quality Standards are presented in Table 5-1 below.

Table 5-1. National Ambient Air Quality Standards

Pollutant	Molecular Formula	Averaging Period	Concentration		Frequency of Exceedance	Compliance Date
			µg/m³	ppb		
Sulphur Dioxide	SO_2	10 minute	500	191	526	Immediate
		1 hour	350	134	88	Immediate
		24 hour	125	48	4	Immediate
		1 year	50	19	0	Immediate
Nitrogen Dioxide	NO_2	1 hour	200	106	88	Immediate
		1 year	40	21	0	Immediate
Carbon Monoxide	CO	1 hour	30,000	26,000	88	Immediate
		8 hour	10,000	8,700	11	Immediate
Particulate Matter	PM_{10}	24 hour	120	-	4	Immediate – 31 Dec 2014
			75	-	4	1 Jan 2015
		1 year	50	-	0	Immediate – 31 Dec 2014
			40	-	0	1 Jan 2015
	$PM_{2.5}$	24 hour	65	-	4	Immediate – 31 Dec 2015
		24 hour	40	-	4	1 Jan 2016 – 31 Dec 2029
		24 hour	25	-	4	1 January 2030
		1 year	25	-	0	Immediate – 31 Dec 2015
		1 year	20	-	0	1 Jan 2016 – 31 Dec 2029
		1 year	15	-	0	1 January 2030
Ozone	O_3	8 hour	120	61	11	Immediate
Lead	Pb	1 year	0.5	-	0	Immediate
Benzene	C_6H_6	1 year	10	3.2	0	Immediate – 31 Dec 2014
			5	1.6	0	1 Jan 2015

5.2 Health Thresholds and Criteria

Internationally, concentration guidelines for toxic and carcinogenic air pollutants are issued by various organisations, such as the:

- Texas Commission on Environmental Quality (TCEQ): acute, sub-acute and chronic effects screening levels (ESLs);
- US Federal Agency for Toxic Substances and Disease Registry (ATSDR): minimal risk levels; and
- Californian Office of Environmental Health Hazard Assessment (OEHHA): reference exposure levels (RELs).

The ESLs, as recommended by the TCEQ, are presented for "short-term" and "long-term" exposures. Long-term ESLs are applicable to annual averaging periods, whereas short-term ESLs are given for hourly to daily periods. It should be noted that these ESLs are not ambient air standards but are used as screening levels. They are based on data related to health effects, vegetation or corrosion effects and odour nuisance potential. If the predicted ambient concentrations do not exceed these levels, no adverse health or welfare effects would be expected to occur. Should ambient concentrations exceed these limits, a more in-depth assessment would be warranted.

The ATSDR Minimal Risk Levels (MRLs) were developed for hazardous substances and utilised the no observed adverse effect level over uncertainty factor (NOAEL/UF) approach. They are set below the levels which, based on current information, might cause adverse health effects in people most sensitive to such substance-induced effects. MRLs are derived for acute (1-14 days), intermediate (>14-364 days), and chronic (365 days and longer) exposure durations. MRLs are based on the most sensitive substance-induced endpoint considered to be of relevance to humans. It should also be noted that exposure to a level above the MRL does not necessarily mean that adverse health effects will occur.

OEHHA has developed short-and long-term Reference Exposure Levels (RELs) for air pollutants of concern. The RELs are provided for acute, 8-hourly and chronic exposures. The exposure averaging time for acute RELs is 1 hour. Chronic RELs are designed to address continuous exposures for up to a lifetime. These guidelines were developed for conducting health risk assessments.

The available ambient concentration limits and guidelines for the selected pollutants from the above-mentioned organisations are presented in Table 5-2 below.

Table 5-2. Health Risk Criteria for Exposures via Inhalation

Substance	US ATSDR MRLs [a] (µg/m³)			TCEQ ESLs [b] (µg/m³)		OEHHA RELs [c] (µg/m³)	
	Acute (1-14 days)	Intermediate (>14-365 days)	Chronic (365+ days)	Short term (1hr)	Long-term (year+)	Short term (1hr)	Long-term (year+)
Benzene	29	19	10	170	5	27	3
Ethylbenzene	21,712	8,685	26	26,000	570		2,000
Toluene	7,540		3,770	4,500	1,200	5,000	420
Xylene	8,684	2,605	217	2,200	180	22,000	700

[a] United States Federal Agency for Toxic Substances and Disease Registry: Maximum Risk Levels (July 2024).

[b] Texas Commission on Environmental Quality: Effects Screening Levels (Nov 2016).

[c] OEHHA Reference Exposure Levels (Nov 2019).

6 BASELINE CHARACTERISTICS

6.1 Current Air Quality

The facility is located in Kraaifontein Industrial, and the current air quality in the study area appears to be good.

The City of Cape Town operate several ambient air quality monitoring stations in the region. The station closest to the facility is the Wallacedene Station in Kraaifontein, which is located approximately 1.8 km south of the site. Air pollutants monitored at the Wallacedene Station include SO_2, NO_2, O_3, $PM_{2.5}$ and PM_{10}. The measured ambient concentrations in 2022 and 2023 are presented in Table 6-1 below.

Based on the measured average concentrations, these concentrations are within their respective annual standards, except for PM_{10} in 2022. However, the data availability was low with an average of 34% only.

Table 6-1. Measured Ambient Concentrations at Wallacedene Station

Year	Pollutant	Ambient Concentration (µg/m³)				Data Availability (%)
		Hourly Maximum	Standard	Annual Average	Standard	
2022	SO_2	614.4	350	24.0	50	48.0
	NO_2	95.8	200	6.8	40	65.8
	PM2.5	79.0	-	13.0	20	10.0
	PM_{10}	579.7	-	91.7	40	56.1
2023	SO_2	391.3	350	10.3	50	31.6
	NO_2	95.7	200	13.3	40	29.2
	PM2.5	153.0	-	11.0	20	14.7
	PM_{10}	579.7	-	24.4	40	14.7

6.2 Area's Meteorology

6.3 Temperature

The historical monthly average maximum and minimum temperature profile of Cape Town is presented in Figure 6-1 below (Meteoblue, 2024). The mean daily maximum temperature in the Cape Town area ranges between 30°C and 18°C and the mean daily minimum temperature is between 15°C and 8°C.

The air temperature is utilised in the dispersion modelling as one of the incorporated parameters for the parametrisation of the atmospheric conditions. Temperature plays an important role in the transportation and dispersion of air pollutants since it affects the plume buoyancy and the atmospheric boundary layer development.

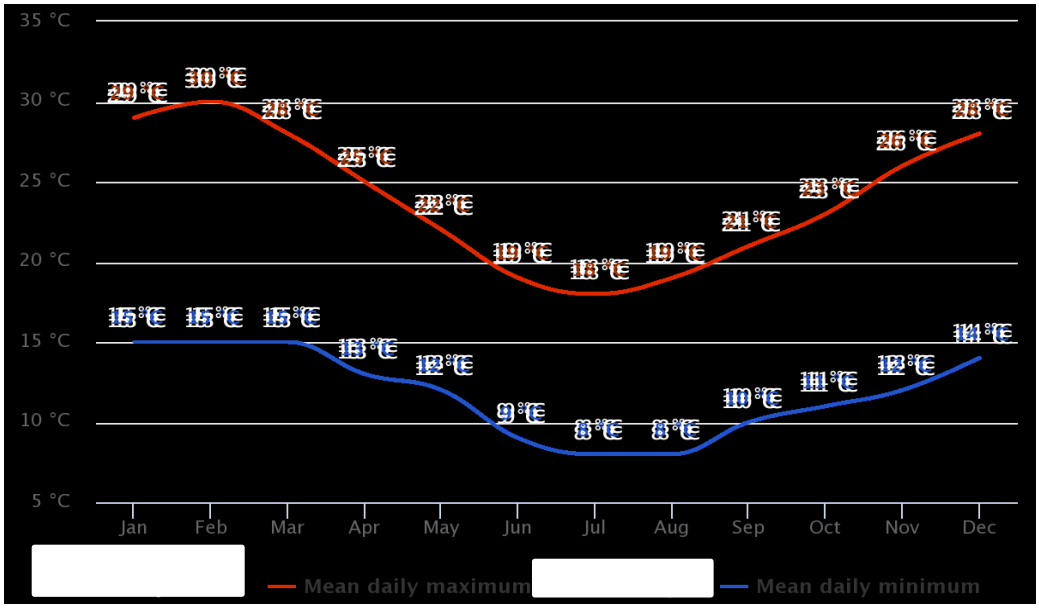

Figure 6-1. Monthly Temperature Profile

6.4 Precipitation and Air Pollution

Precipitation assists in the removal of air pollutants from the atmosphere. Gaseous air pollutants and particulate matter are removed by falling rain droplets through adsorption and deposition.

Rainfall in Cape Town occurs mainly in winter due to its Mediterranean climate. The historical average monthly precipitation profile is shown in Figure 6-2 below (Meteoblue, 2024). As can be seen, the highest monthly maximum precipitation is 95 mm in June, and the lowest is 13 mm in February.

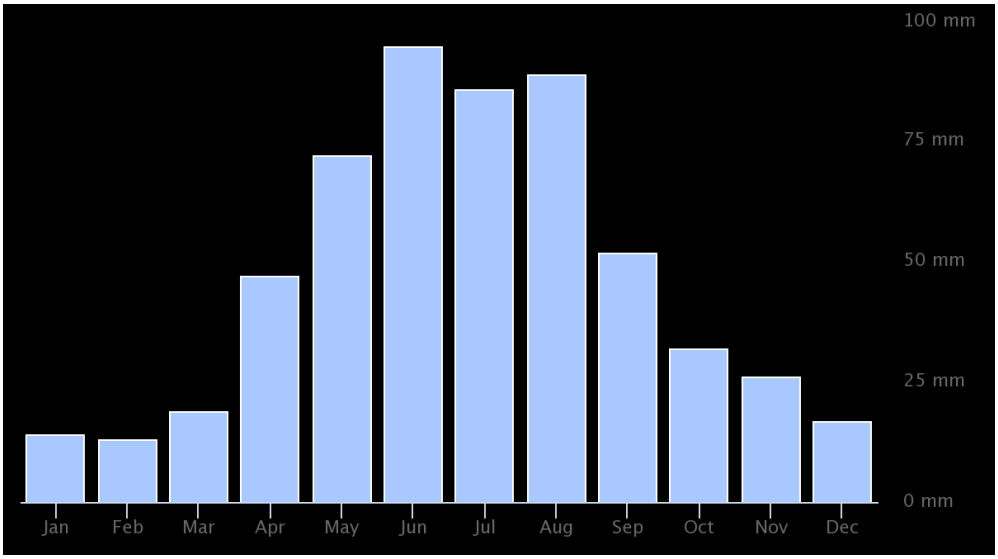

Figure 6-2. Monthly Precipitation Profile

6.5 Local Wind Field

Four-year (2020-2023) hourly meteorological data from the Cape Town International Airport weather station was used for the establishment of the local wind field as wind roses. The wind roses were generated for all hours, daytime, night-time, as well as for the winter and summer periods and are illustrated in the figures below. These wind roses depict the frequency of the wind speeds for each of the 16 cardinal wind directions. The wind directions in the figures show from where the wind blows. The wind classes are indicated by coloured bars, and the frequencies of occurrence for each wind direction are specified by the dashed circles.

Figure 6-3 shows the wind roses and wind speed frequency distributions of all hours, daytime and night-time. As can be seen, the predominant winds are from the southerly direction, for both daytime and night-time. Moderate winds dominate during the daytime, and light to moderate winds prevail at night-time. The average wind speeds are 6.37 m/s and 4.57 m/s for daytime and night-time respectively.

The wind roses and wind speed frequency distributions were also generated for the winter and summer periods and are shown in Figure 6-4. It can be seen that northerly and westerly winds predominate in winter. In summer, southerly winds are the most frequent. The wind speeds in summer are higher than those during winter. The averaged wind speeds are 6.37 m/s and 4.57 m/s for summer and winter respectively.

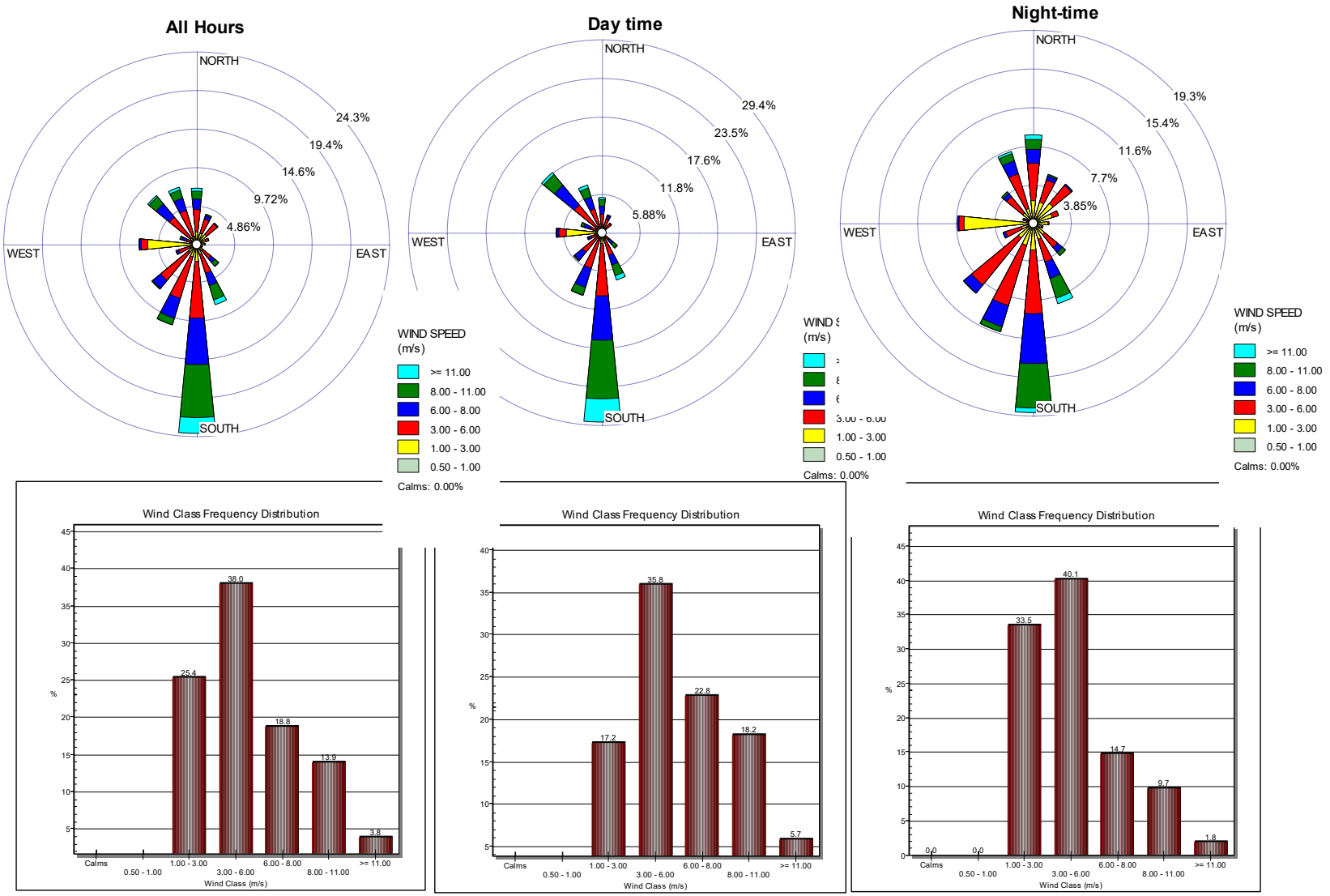

Figure 6-3. Wind Roses and Wind Speed Frequency Distribution: All-hours, Daytime and Night-time

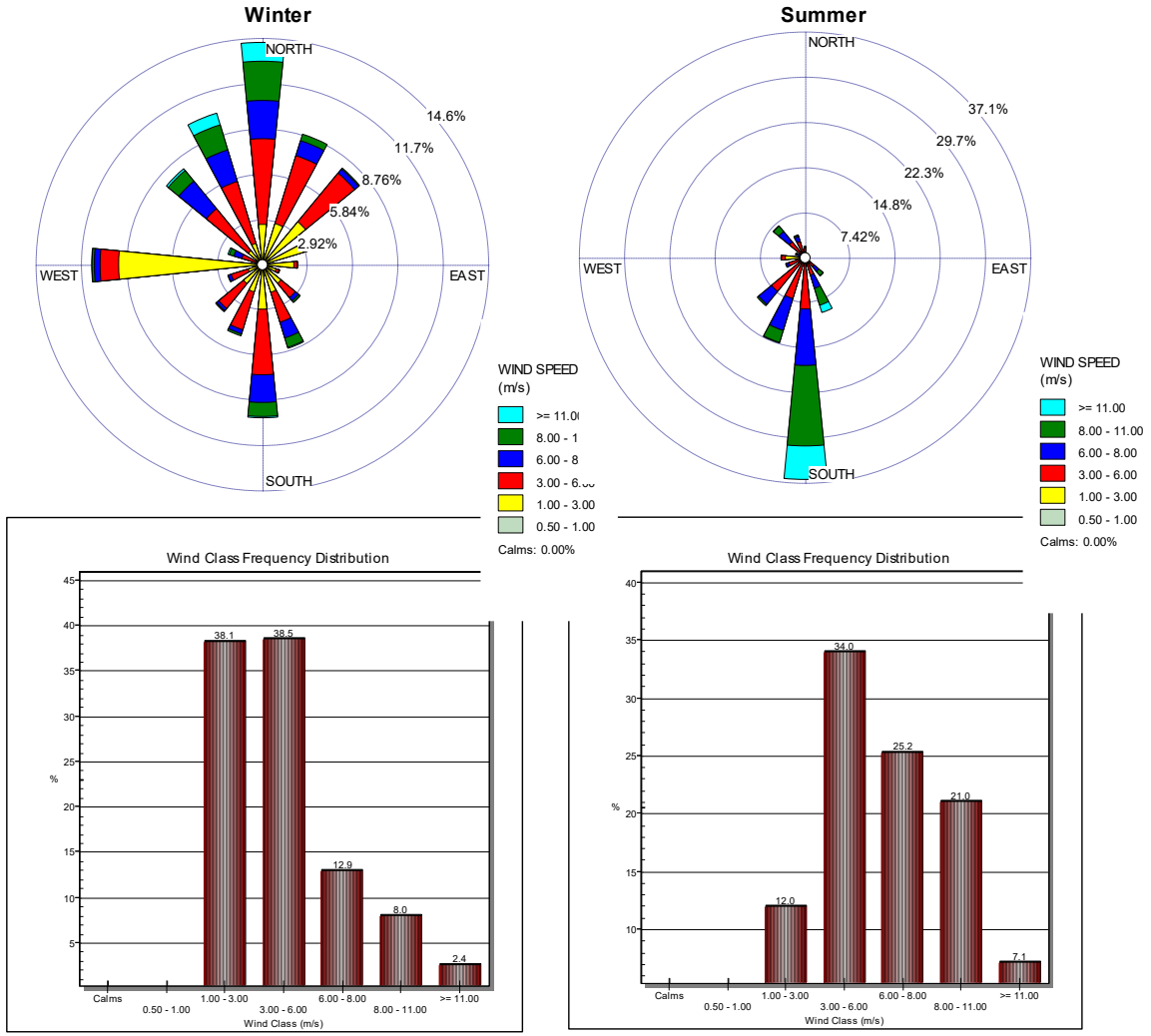

Figure 6-4. Wind Roses and Wind Speed Frequency Distribution: Winter and Summer

7 DISPERSION SIMULATION

7.1 Atmospheric Dispersion Model

A tiered approach in air dispersion modelling is recommended according to the Regulations Regarding Air Dispersion Modelling (DEA, 2014). There are 3 levels of assessment, where Level 1 provides an estimate of the worst-case air quality impacts, utilising screening models. Level 1 assessment is used for:

- Licence/approval decisions for typically single sources.
- Preliminary identification of air quality issues associated with proposed new sources or modifications to existing sources.
- Identification of the need for more detailed modelling, using Level 2 or 3 assessment approaches (if exceedances of short-term objectives are predicted) and;
- Confirmation of refined model results that might appear unusually high or low.

Level 2 is a more detailed assessment and is suitable for determining the air quality impacts as part of a license application or amendment process, where the impacts are expected to occur within a few kilometres downwind (less than 50 km) from the emission source.

The dispersion modelling for the proposed MOOV Fuel storage facility was conducted according to the Level 2 assessment. The source configuration and emission quantities from all the sources identified were utilised as input into the dispersion modelling. The AERMOD View Model (V.13.0.0) was used for the dispersion modelling calculations and the contributions of the various sources of pollution to the ambient air pollutant concentrations.

7.1.1 Model Set-up and Data Input

Emission source configuration:

Source	Source Type
Tank 01	area source
Tank 02	area source
Tank 03	area source
Fuel tanker loading	volume source

Emission Hours

Emissions were assumed to occur continuously, 24 hours per day, 7 days a week, throughout the year.

Model Set-up:

The settings utilised within the model included:

- Regulatory options: Default,
- Terrain height option: Elevated,
- Dispersion coefficient: Urban,
- Output type: Concentration.

Meteorological Data Input:

Three years (2021-2023) of hourly meteorological data from the weather station at the Cape Town International Airport was used as input to the AERMOD model.

This data was combined and analysed in one data pool to determine the resulting worst-case concentrations from all the potential atmospheric condition combinations and their related dispersion characteristics in the area.

The dispersion modelling was carried out in accordance with the Regulations Regarding Air Dispersion Modelling. In line with these regulations, for the short-term concentrations (i.e. 1-hr and 24-hr), the 99th percentiles were calculated for comparison against the National Ambient Air Quality Standards and the relevant guidelines.

The modelling domain was set to be a 10 km x 10 km grid, with the facility at the centre. For the modelling of the ground-level concentrations, a Cartesian grid with a spacing of 100 m was utilised.

In addition to the grid calculations, the ambient concentrations were also determined at several discrete receptors around the facility. The locations of these receptors are shown in Figure 7-1, and the coordinates can be found in Table 7-1.

The resulting maximum ground-level concentrations at each grid point were used to generate the concentration isopleths for each pollutant and averaging time. These results are presented in the sections below.

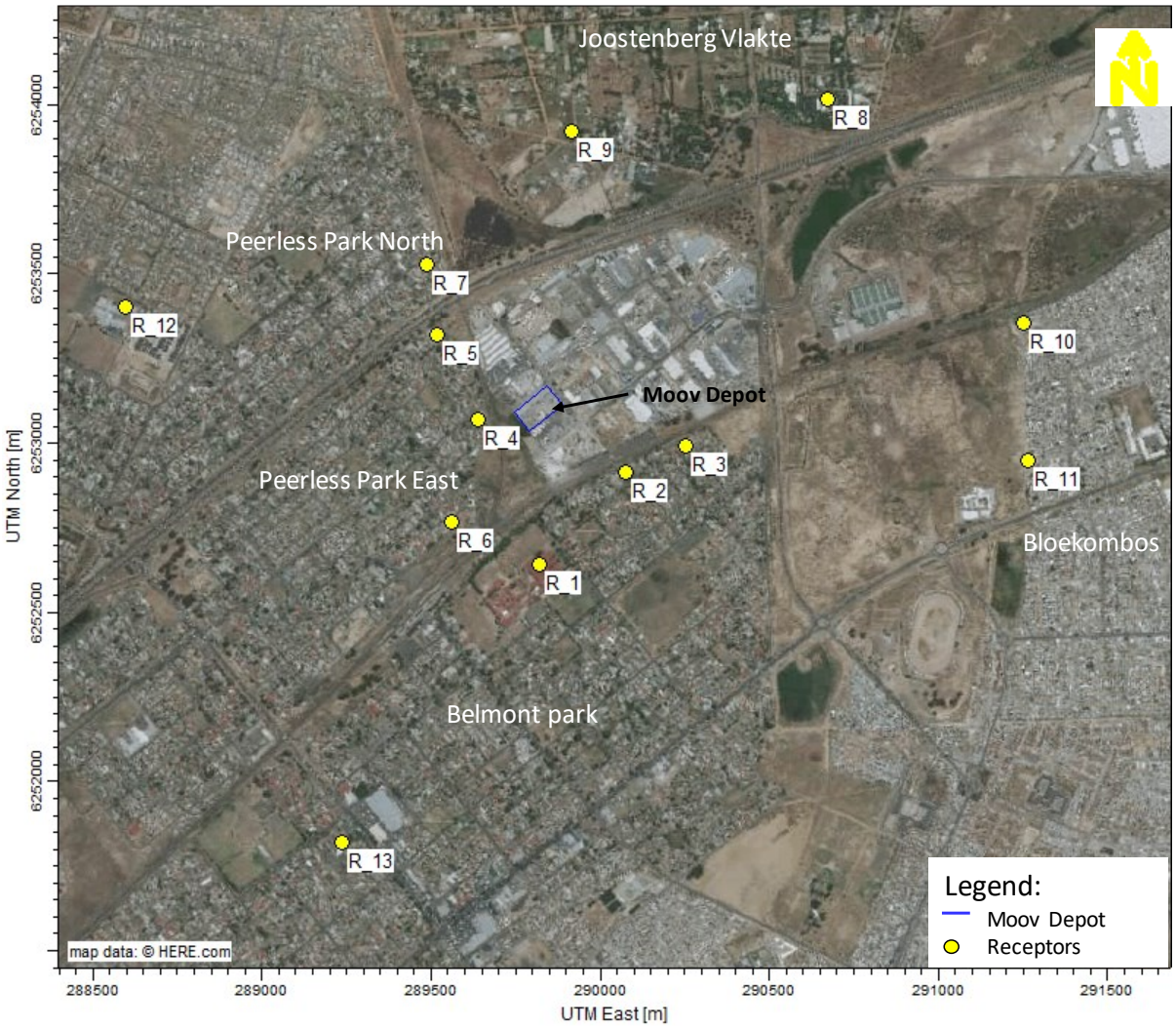

Figure 7-1. Sensitive Receptor Locations

Table 7-1. Identified Sensitive Receptors

Receptor	UTM Coordinates		Description
	X	Y	
R01	289820.3	6252643	Simonsberg Primary School, south of the site
R02	290076.8	6252913	Residence in Belmont Park south of the site
R03	290254.2	6252994	Residence in Belmont Park south of the site
R04	289639.3	6253071	Residence in Peerless Park East
R05	289518.2	6253320	Residence in Peerless Park East
R06	289559.7	6252766	Residence in Peerless Park East
R07	289488.9	6253529	Residence in Peerless Park North
R08	290673.6	6254018	Residence in Joostenberg Vlakte north of the site
R09	289917.3	6253923	Residence in Joostenberg Vlakte north of the site
R10	291251.5	6253355	Residence in Bloekombos east of the site
R11	291265.5	6252949	Residence in Bloekombos east of the site
R12	288596.8	6253401	Monument Park High School
R13	289235.8	6251818	Kraaifontein Day Hospital

7.2 Dispersion Simulation Results

Based on the methodology described in the sections above, the detailed dispersion modelling calculations were carried out for benzene, toluene, ethylbenzene and xylene. The resulting modelled ground-level concentration contours were generated and can be found in the relevant figures for each averaging period and air pollutants in the sections below.

7.2.1 Benzene Concentrations

The modelled maximum 1-hr (99th percentile) and annual benzene concentrations are shown in Figure 7-2 and Figure 7-3 respectively.

The maximum 1-hr (99th percentile) benzene concentrations reached 2.0 µg/m^3 at the facility. The 1-hr benzene concentrations were reduced to be less than 0.5 µg/m^3 at the communities to the south and west. The 1-hr benzene concentrations were well below the TCEQ short-term guideline of 170 µg/m^3.

The maximum annual benzene concentrations reached 0.10 µg/m^3. At the communities, the benzene concentrations were less than 0.03 µg/m^3. The annual benzene concentrations were well below the South African Air Quality Standard and the TCEQ long-term guideline of 5 µg/m^3.

As such, the air quality impacts due to the emissions of benzene in the immediate vicinity of the facility are very low, and in the nearby residential areas, negligible.

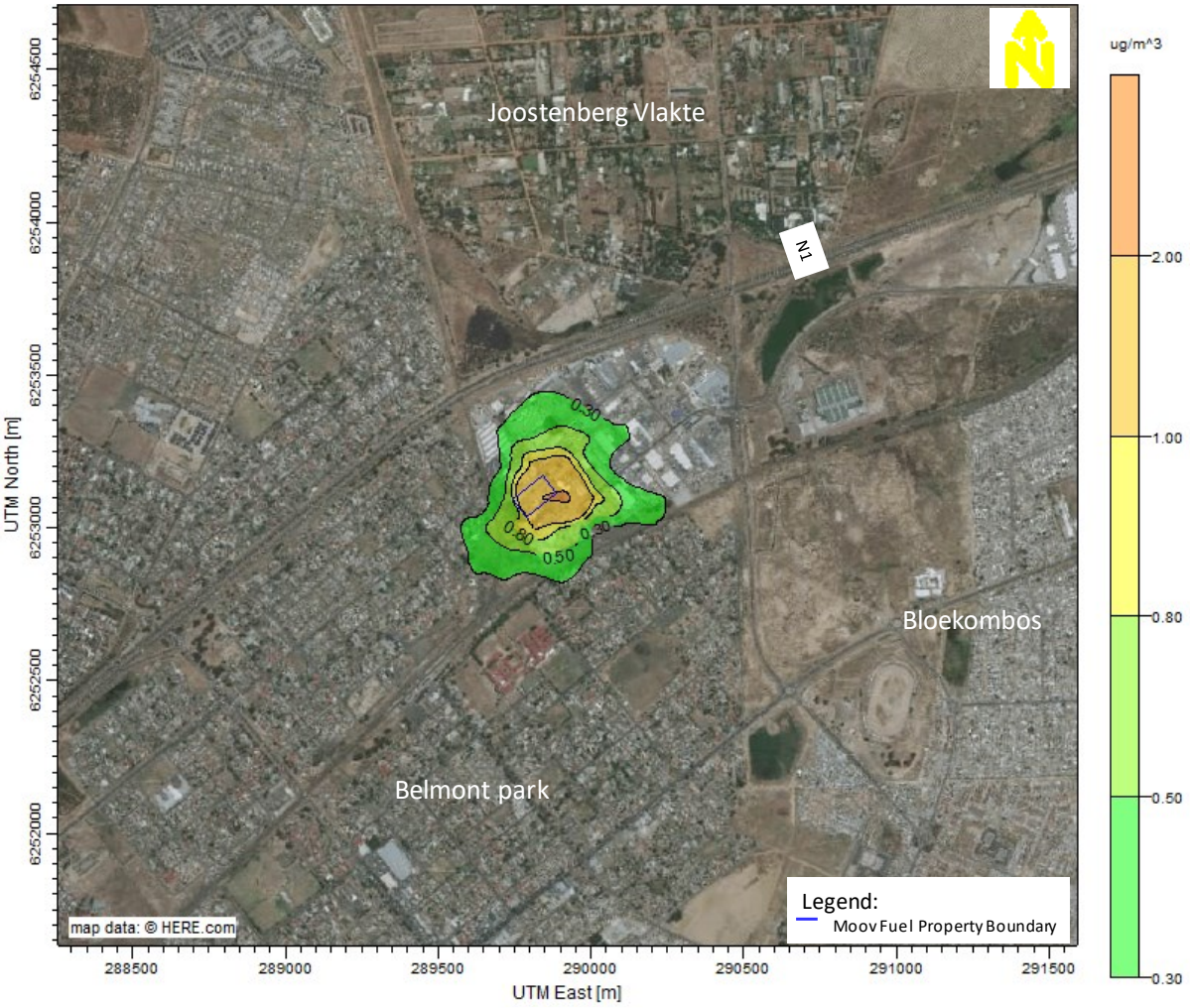

Figure 7-2. Maximum 1-hr Benzene Concentrations 99th Percentile (TCEQ ESL: 170 µg/m^3)

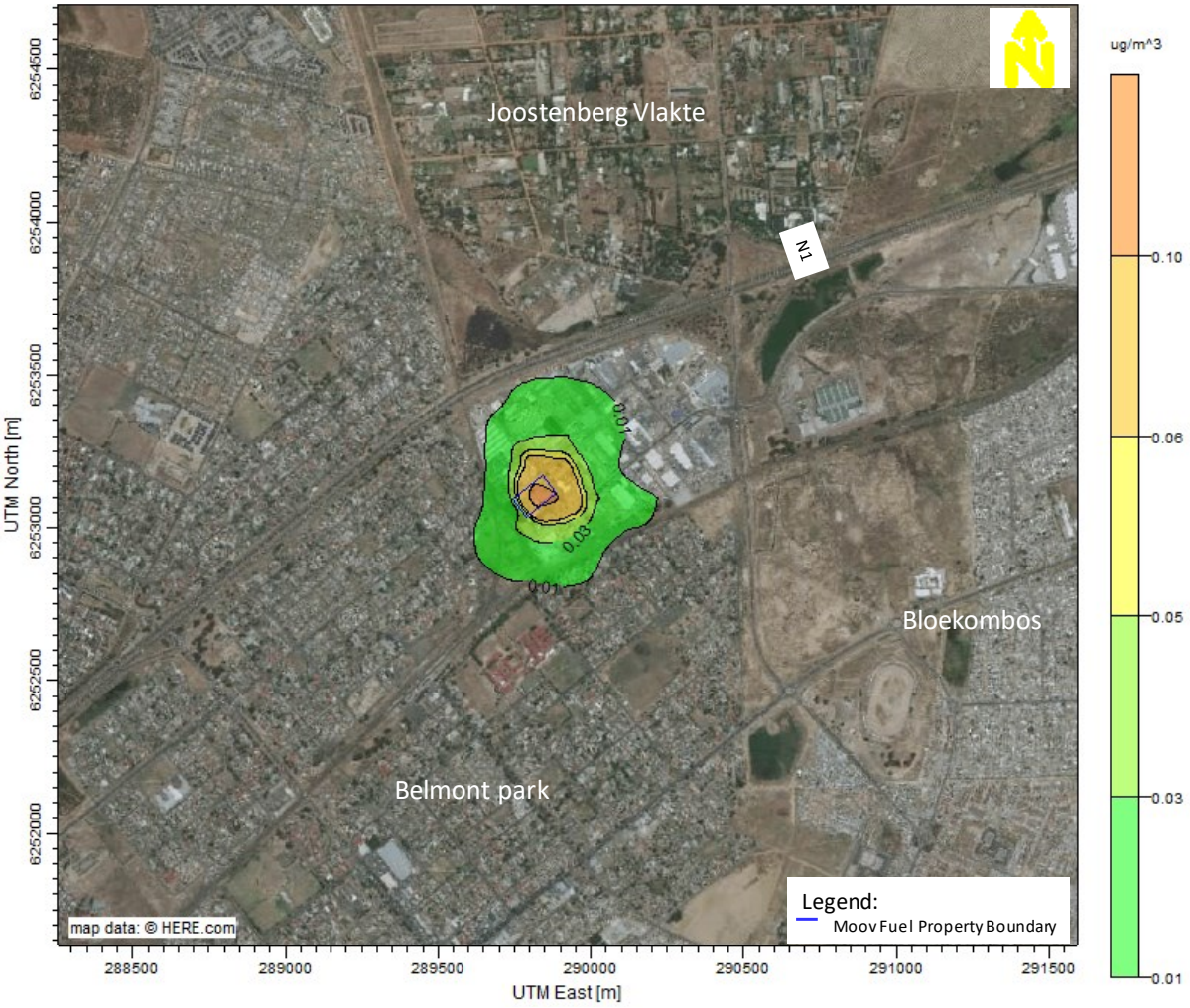

Figure 7-3. Maximum Annual Benzene Concentrations (Standard: 5 µg/m³)

7.2.2 Ethylbenzene Concentrations

The modelled maximum 1-hr (99th percentile) and annual ethylbenzene concentrations are shown in Figure 7-4 and Figure 7-5 respectively.

The maximum 1-hour ethylbenzene concentrations (99th percentile) reached 2 µg/m^3 at the facility. The maximum 1-hour ethylbenzene concentrations (99th percentile) were very low and well below the TCEQ short-term guideline of 26,000 µg/m^3.

The maximum annual ethylbenzene concentrations were very low and well below the TCEQ long-term guideline of 570 µg/m^3.

The modelled ethylbenzene concentrations were also well within their respective ATSDR and OEHHA guidelines. The maximum 1-hour and annual concentrations of ethylbenzene at the communities nearby were very low.

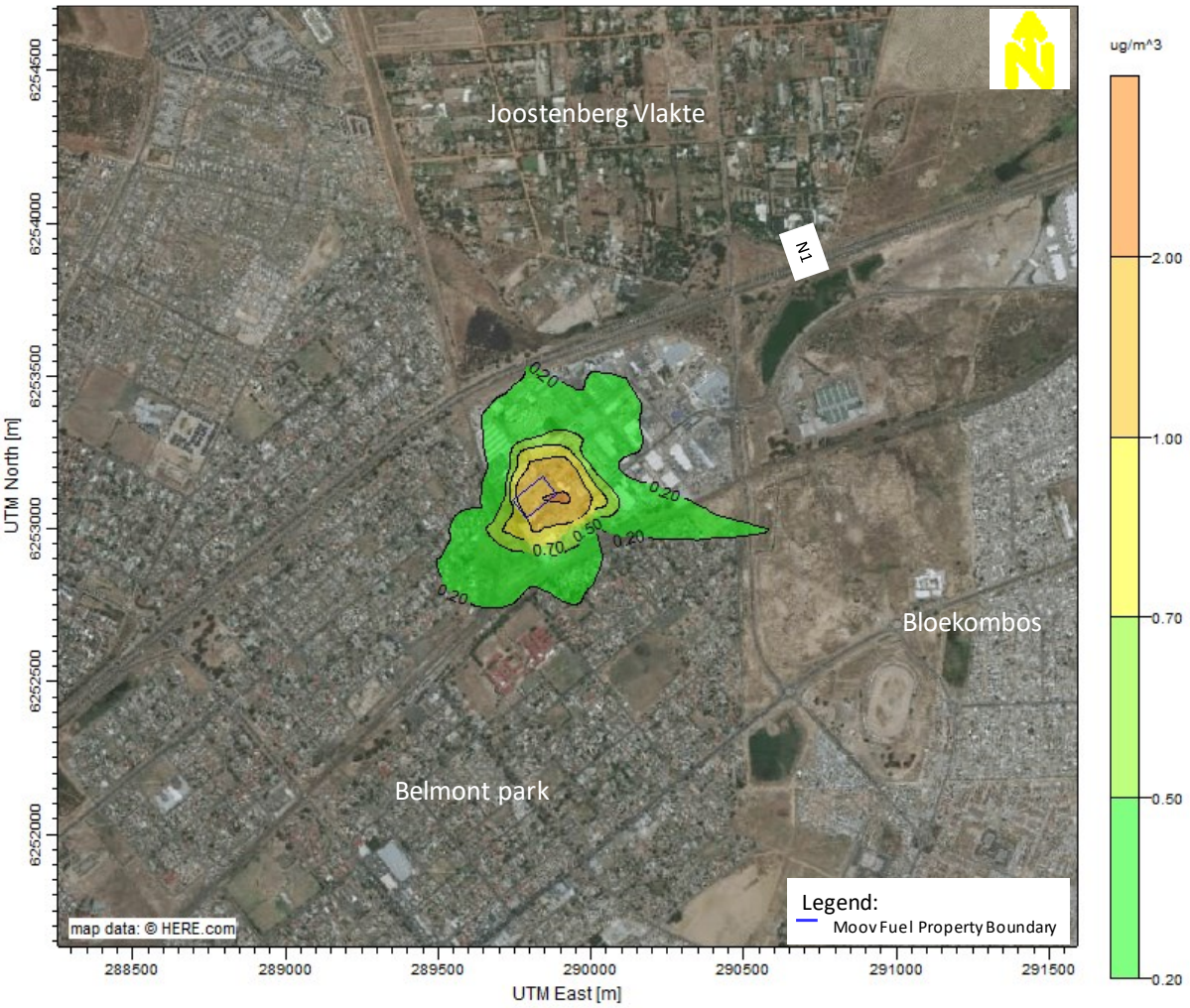

Figure 7-4. Maximum 1-hr Ethylbenzene Concentrations 99th Percentile (TCEQ guideline: 26,000 µg/m^3)

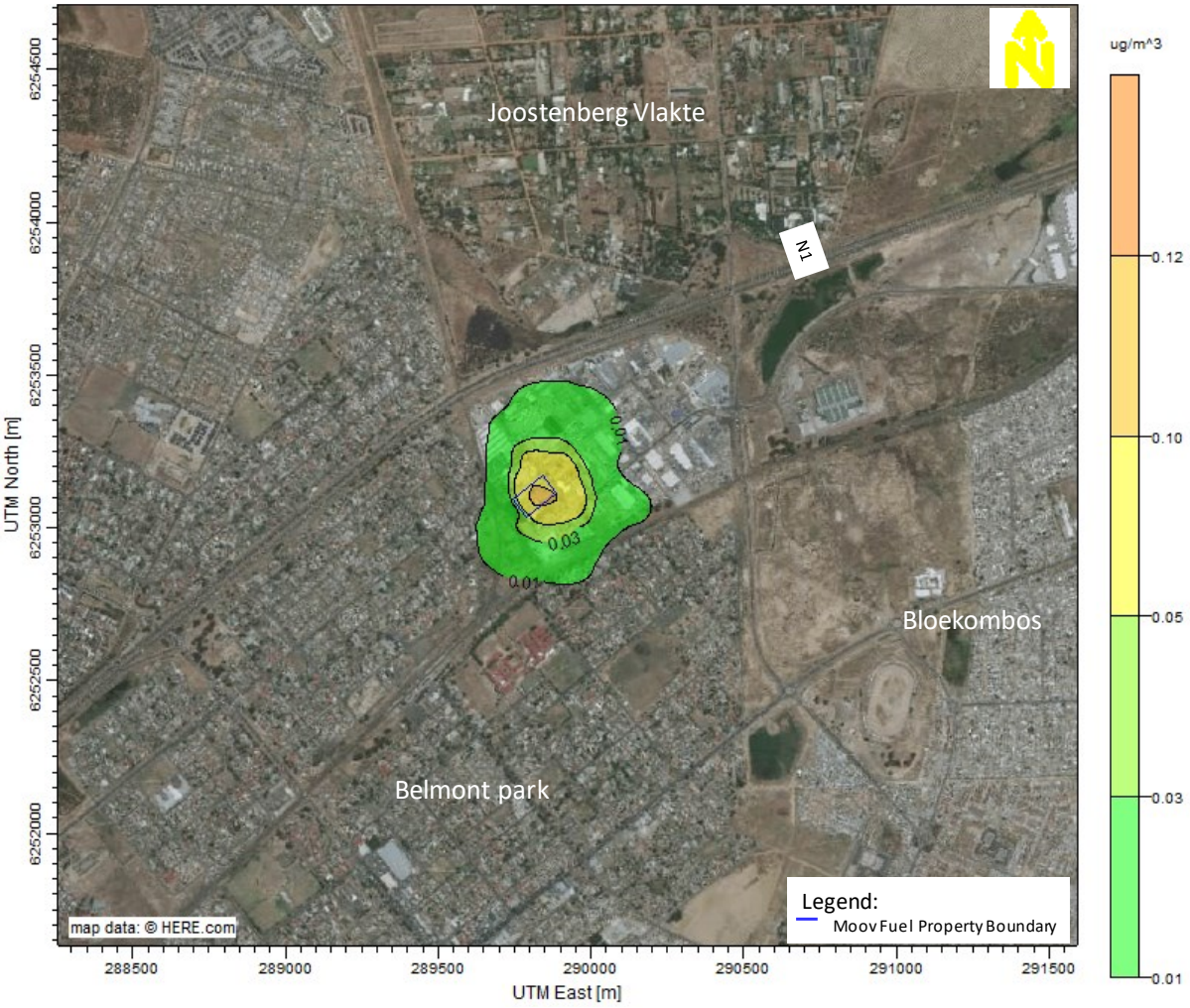

Figure 7-5. Maximum Annual Ethylbenzene Concentrations (TCEQ guideline: 570 µg/m³)

7.2.3 Toluene Concentrations

The modelled maximum 1-hour (99th percentile) and annual toluene concentration contours can be seen in Figure 7-6 and Figure 7-7 below.

The maximum 1-hour toluene concentrations (99th percentile) were 6 µg/m^3 at the facility and dropped to 1 µg/m^3 at the communities to the southwest. The toluene concentrations are well below the TCEQ short-term screening level of 4,500 µg/m^3.

The maximum annual toluene concentrations were less than 1 µg/m^3, which is well below the TCEQ long-term screening level of 1,200 µg/m^3.

The modelled toluene concentrations were also well within their respective ATSDR and OEHHA guidelines. The maximum 1-hour and annual concentrations of toluene at the communities nearby were very low.

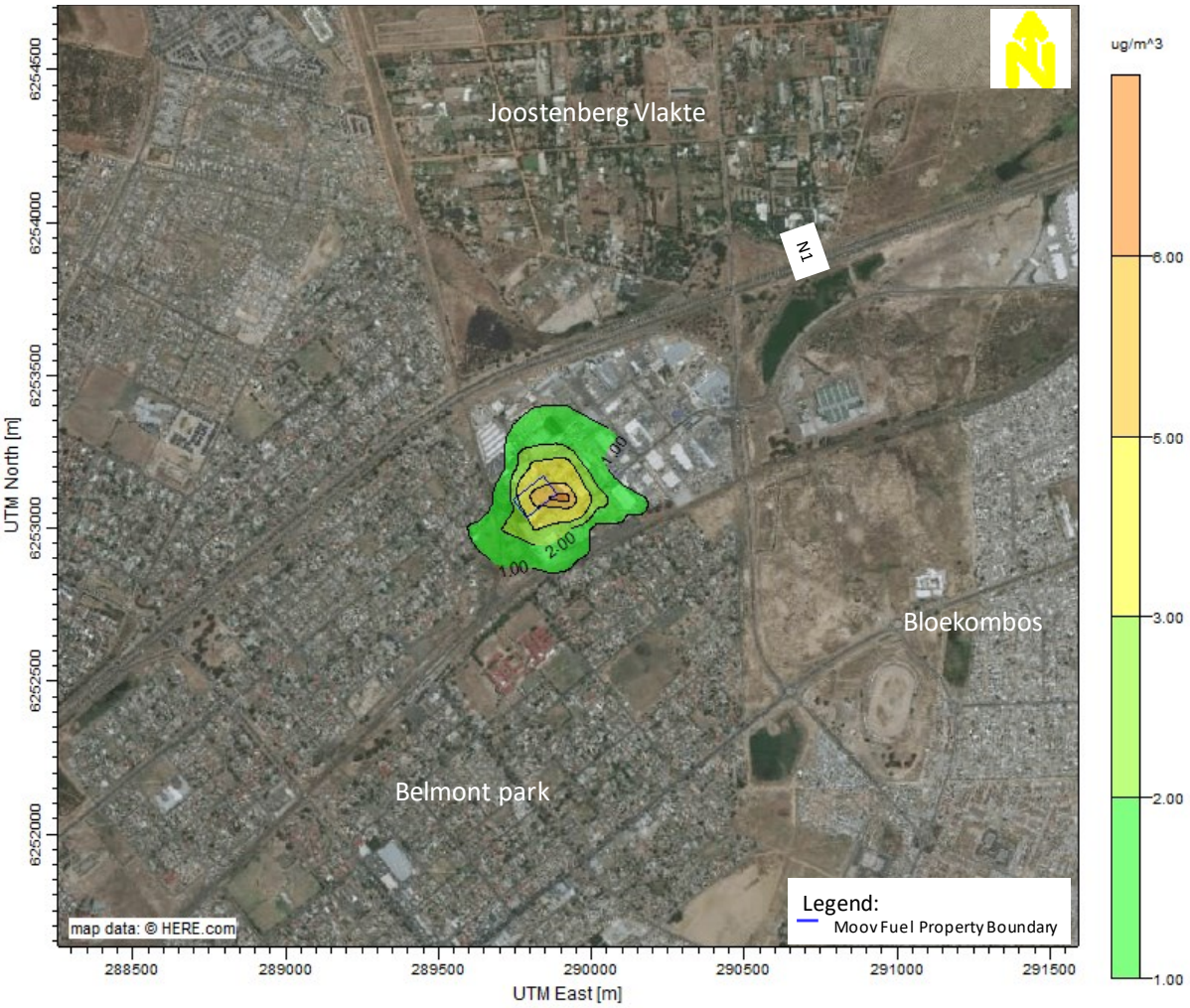

Figure 7-6. Maximum 1-Hour Toluene Concentrations 99th Percentile (TCEQ guideline: 4,500 µg/m^3)

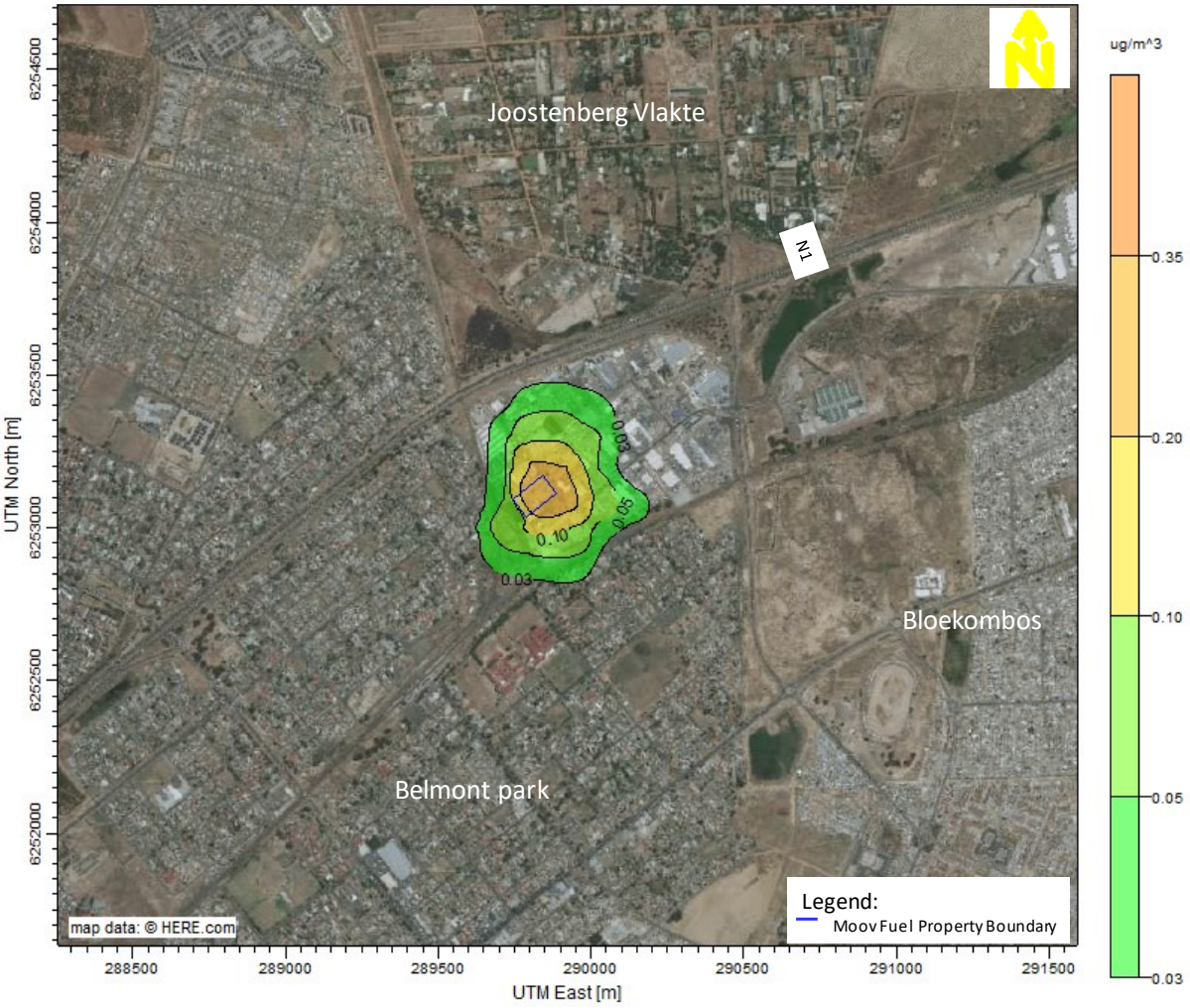

Figure 7-7. Maximum Annual Toluene Concentrations (TCEQ guideline: 1,200 µg/m³)

7.2.4 Xylene Concentrations

The modelled maximum 1-hr (99th percentile) and annual xylene concentrations are shown in Figure 7-8 and Figure 7-9 respectively.

The 1-hr and annual xylene concentrations were very low and well below the TCEQ short-term guideline of 2,200 µg/m^3 and the long-term guideline of 180 µg/m^3.

The modelled xylene concentrations were also well within their respective ATSDR and OEHHA guidelines. The modelled xylene concentrations at the communities nearby were very low.

Figure 7-8. Maximum 1-hr Xylene Concentrations 99th Percentile (TCEQ guideline: 2,200 µg/m^3)

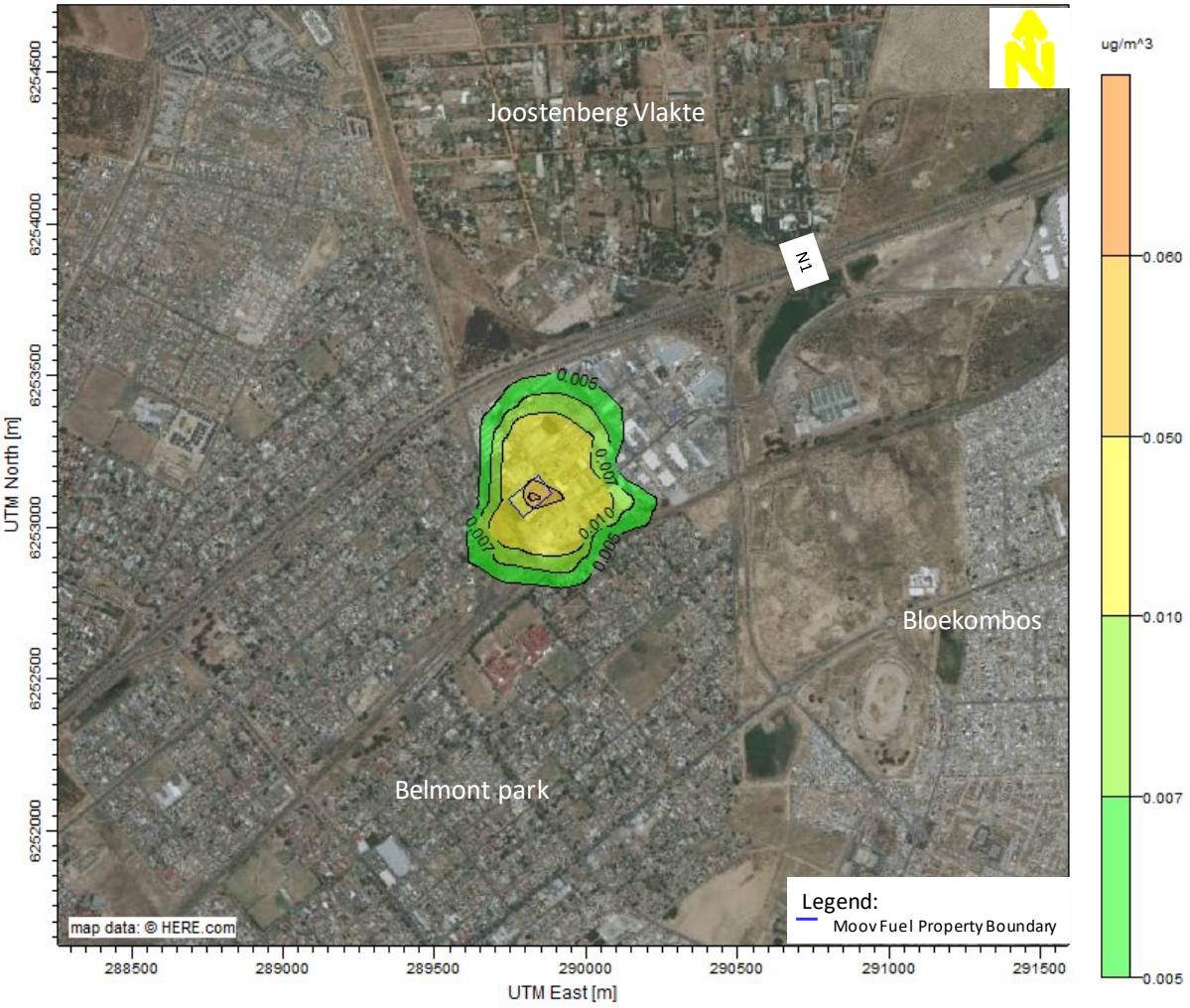

Figure 7-9. Maximum Annual Xylene Concentrations (TCEQ guideline: 180 µg/m^3)

7.2.5 Concentrations at Discrete Receptors

The ground-level concentrations at the discrete receptors are presented in Table 7-2. As can be seen from these concentrations the resulting levels at the residential areas around the facility were very low for both averaging periods and are considered negligible.

Table 7-2. Concentrations at Discrete Receptors Around the Facility

Receptor	Modelled Concentrations (µg/m³)							
	Benzene		Toluene		Ethylbenzene		Xylene	
	1hr (99th percentile)	Annual	1hr (99th percentile)	Annual	1hr (99th percentile)	Annual	1hr (99th percentile)	Annual
R01	0.09	0.00	0.24	0.01	0.08	0.00	0.05	0.00
R02	0.12	0.01	0.33	0.02	0.11	0.01	0.06	0.00
R03	0.28	0.01	0.77	0.02	0.26	0.01	0.15	0.00
R04	0.19	0.01	0.56	0.02	0.19	0.01	0.10	0.00
R05	0.05	0.00	0.14	0.01	0.05	0.00	0.03	0.00
R06	0.18	0.01	0.47	0.02	0.16	0.01	0.09	0.00
R07	0.08	0.00	0.22	0.01	0.08	0.00	0.04	0.00
R08	0.06	0.00	0.16	0.00	0.05	0.00	0.03	0.00
R09	0.09	0.00	0.23	0.01	0.08	0.00	0.05	0.00
R10	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
R11	0.08	0.00	0.21	0.01	0.07	0.00	0.04	0.00
R12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
R13	0.04	0.00	0.10	0.00	0.03	0.00	0.02	0.00
Guideline/Standard	170 [a]	5 [a,b]	4,500 [a]	1,200 [a]	26,000 [a]	570 [a]	2,200 [a]	180 [a]

[a.] TCEQ short-term and long-term ESLs.

[b.] National Ambient Air Quality Standard.

8 CONCLUSIONS AND RECOMMENDATIONS

MOOV Fuel proposes to construct three new bulk fuel storage tanks at its Kraaifontein Depot, comprising two 1,000 m³ diesel tanks and one 500 m³ petrol (ULP 95) tank.

Air emissions from these storage tanks are primarily composed of volatile organic compounds (VOCs) released during tank filling, along with breathing losses caused by vapour expansion and contraction in response to fluctuations in ambient temperature and barometric pressure. Additional VOC emissions are expected during the loading of fuel into road tankers.

The primary pollutants of concern in this assessment are benzene, toluene, ethylbenzene, and xylene. VOC emissions were estimated using the US EPA TANKS 5.0 model, along with applicable US EPA emission factors for fuel truck loading.

The air pollution dispersion modelling was carried out with the use of the AERMOD View model. The modelled ground-level concentrations were then compared against the National Ambient Air Quality Standards and international guidelines, and the air quality impacts due to the operations of the Depot were assessed.

8.1 Conclusions

Based on the modelled ground-level concentrations, the following can be concluded:

- The annual benzene concentrations were low and well below the ambient air quality standard of 5 µg/m^3. The maximum annual benzene concentrations reached 0.10 µg/m^3 at the site.
- The 1-hour and annual concentrations of benzene, toluene, ethylbenzene and xylene were within the relevant air quality guidelines provided by the ATSDR, TCEQ and OEHHA.
- The resulting ground-level concentrations at the discrete receptors within the residential areas around the facility were found to be very low and are expected to have a very low impact on the ambient air quality in the extended area.
- Due to the low modelled concentrations, the increase of the ambient VOCs concentrations due to the operations of the facility is expected to be insignificant, and the cumulative effect due to these emissions on the ambient concentrations in the extended area is expected to be very low.

Based on the dispersion modelling results, the air quality impacts are considered **LOW** in the industrial area close to the site and **VERY LOW** to **NEGLIGIBLE** in the nearest residential areas further away**.**

Based on these modelled concentrations and the resulting impacts, the proposed expansion should be authorised.

8.2 Recommendations

Based on the study findings and conclusions, the main recommendations are:

- Before the depot is in operation, perform two rounds of ambient VOCs monitoring via passive samplers at four locations along the site boundaries, in order to establish the background air quality levels in the area. Thereafter, once the plant is in operation, perform annual ambient VOCs monitoring via passive samplers at these same locations.

- Develop a site-specific Leak Detection and Repair (LDAR) programme and submit it to the appropriate authorities for approval.
- Perform annual leak detection monitoring following the above-mentioned LDAR programme.

9 ASSUMPTIONS AND LIMITATIONS

The main assumptions and uncertainties in the air quality impact assessment study are:

- For the speciation of the BTEX compounds in diesel, the typical composition for diesel from the NPI emission Estimation Technique Manual for Fuel and Organic Liquid Storage (May 2012) was used.
- The emissions were assumed to occur continuously, 24 hours per day, 7 days a week, throughout the year.

10 FORMAL DECLARATION

Declaration of the accuracy of the information-Applicant

Name of Enterprise: ____ MOOV Fuel (Pty) Ltd_____

Declaration of the accuracy of the information provided:

Atmospheric Impact Report in terms of section 30 of the Act.

I, _____DC Maneveld_____[duly authorised], declare that the information provided in this atmospheric impact report is, to the best of my knowledge, in all respects factually true and correct. I am aware that the supply of false or misleading information to an air quality officer is a criminal offence in terms of section 21(1)(g) of this Act.

Signed at _Bredasdorp_____ on this _26th___ day of _June 2025_____

_____

SIGNATURE

General Manager Logistics & Operations

CAPACITY OF SIGNATORY

11 REFERENCES

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US EPA. (2020). AP42, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Chapter 7, Section 7.1: Organic Liquid Storage Tanks. Available at: https://www.epa.gov/sites/default/files/2020-10/documents/ch07s01.pdf

APPENDIX A Checklist of Specialist Report

Requirements as per the 2014 EIA Regulations

Table A-1. Checklist of Specialist Report

EIA REGULATIONS 2014 GNR 982 Appendix 6 **CONTENT OF THE SPECIALIST REPORTS**	**Required at Scoping/Desk-top Phase**	**Required at BA/EIA Phase**	**Cross-reference in this report**
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	X	X	Cover page, Introduction, Appendix B for CV
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	X	X	Page ii
(c) an indication of the scope of, and the purpose for which, the report was prepared	X	X	Introduction
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	X	X	The specialist is familiar with the study area. The seasons are not relevant to the plant emissions. The seasons were taken into consideration in the dispersion modelling, via the hourly meteorological input.
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	X	X	Section 1.2
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	X	X	Section 2.2
(g) an identification of any areas to be avoided, including buffers;	X	X	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	X	X	N/A
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	X	X	Section 9
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	X	X	Section 8
(k) any mitigation measures for inclusion in the EMPr		X	None

EIA REGULATIONS 2014 GNR 982 Appendix 6 **CONTENT OF THE SPECIALIST REPORTS**	**Required at Scoping/Desk-top Phase**	**Required at BA/EIA Phase**	**Cross-reference in this report**
(l) any conditions for inclusion in the environmental authorisation;		X	None
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;		X	Section 8.2
(n) a reasoned opinion— i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;		X	Section 8.1
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	X	X	In a separate report
(p) any other information requested by the competent authority	X	X	N/A

APPENDIX B CV of the Specialist

Demos A. Dracoulides

Office Tel: +2721 551 1836 Cell Phone: +2782 684 8082
E-mail: DemosD@DDAenviro.co.za
S.A. ID No: 660719 5763 186, Issued: 1995-12-27

EDUCATION

M.Sc. in Engineering, Energy Studies, **12/1994**
University of Cape Town, SA

- Energy, Environmental Engineering. Thesis: "Air Pollution Modelling of the Greater Cape Town Region"

Mechanical Engineering (B.Sc.), **11/1991**
Polytechnical School of Engineering, University of Patras, Greece

CONSULTING EXPERIENCE

Present Position: Director of DDA Environmental Engineers: Noise and Air Pollution Consultant
Years with organisation: Consulting work for 25 years

Demos Dracoulides is the Director of DDA Environmental Engineers. Over the past years, Demos Dracoulides has been involved in the development of industry-specific emission inventories, establishing the impacts on air quality in a great number and variety of projects, including AEL applications, emissions testing reporting to NAEIS system, etc. These include projects for petrochemical and chemical industries, minerals processing and mining, the ceramic industry, power generation, landfill facilities, incineration operations, wastewater treatment plants, airport facilities, etc.

He has also been active in the noise and vibration fields. He has been involved in the development of industry-specific noise and vibration models, including power stations and transformer stations. He has participated in teams for the design, technical specifications and noise minimisation for projects such as the Gautrain, the Ankerlig and the Gourikwa CCGT Power Stations, as well as the proposed Pebble Bed Modular Reactor Demonstration Power Plant in South Africa.

Air Pollution Modelling and Monitoring Studies

- Cape Winenalds Airport Air Quality Impact Assessment (In progress).
- Milnerton Lagoon Dredging Odour Impact Assessment, (In progress).
- Stellenbosch Landfill Air Quality Monitoring and Impact Assessment, 2023-2025.
- Highlands Landfill Air Quality Impact Assessment Study, 2022.
- Karwyderskraal Landfill Air Quality Impact Assessment Study, 2022.
- Gansbaai Landfill Air Quality Impact Assessment Study, 2022.
- Wellington Landfill Air Quality Impact Assessment Study, 2022.
- Vitafoam Air Pollution Dispersion Modelling Study and AEL, 2022.
- Solethu Manganese Warehouse Air Quality Impact Assessment, 2022.
- Claytile, Cape Town, Air Quality Impact Assessment Study and AEL Application, 2022.
- Richards Bay Minerals Air Quality Impact Assessment Study, 2022.
- Elandsfontein Phosphate Mine. Dust Deposition Monitoring, (Ongoing).
- City of Cape Town, Landfill Sites Emissions Monitoring and Landfill Gas Migration Monitoring, for Vissershok, Coastal Park and Bellville Landfill Sites, 2021.
- Richards Bay Minerals Air Quality Impact Assessment Study, 2020.
- Wellington Landfill Site Height Increase Air Quality Impact Assessment Study, 2019.
- Worcester Landfill Site Air Quality Impact and Buffer Zone Determination, 2019.

- Masiphumelele Waste Water Treatment Expansion Air Quality and Odour Impact Study, 2019.
- Apollo Bricks Air Quality Impact Assessment Study, 2019.
- Winelands Pork Plant Air Quality Impact Assessment study, 2019.
- Marie Louise Landfill Site Air Quality and Odour Impact Study, 2019.
- Bellville Park Landfill Site, Landfill Gas Generation Estimation, Impact Assessment and Buffer Zone Determination, 2018.
- Germiston Waste Tyre Pyrolysis Plant Air Quality Impact Assessment, 2017.
- City of Cape Town, Landfill Sites Emissions Monitoring and Landfill Gas Migration Monitoring, 2017.
- Frankendale, Vissershok Risk Industry Development Air Quality Impact Assessment and Environmental Management Plan, 2015.
- Stanford Wastewater Treatment Works Air Quality Assessment and Buffer Zone Determination, 2015.
- Gansbaai Wastewater Treatment Works Air Quality Assessment and Buffer Zone Determination, 2015.
- Gansbaai Landfill Site Buffer Zone Determination, 2015.
- Elandsfontein Mine. Air Quality Impact Assessment, 2015.
- Kleinmond Landfill Site Buffer Zone Determination, 2015.
- City of Cape Town Kraaifontein Pyrolysis Plant. Air Quality Impact Assessment, 2014.
- ACSA, Cape Town International Airport Air Emissions and Air Quality Impact Assessment Study. 2015.
- Gamsberg Zink Mine. Air Quality Impact Assessment, 2013.
- Maputo Power Station. Air Quality Baseline Study, 2013.
- Biosolids Beneficiation Facility, Cape Town. Air Quality and Odour Impact Assessment, 2013.
- Matola Coal Terminal Expansion, Mozambique. Air Quality Impact Assessment, 2012.
- City of Cape Town, Landfill Site Gaseous Emission Monitoring: Vissershok, Bellville and Coastal Park. 2010-2013.
- Oceana Brands, St Helena Fish Meal Plant Stack Emissions and Ambient Air Pollution Monitoring, 2012.
- Oceana Brands, Hout Bay Fish Meal Plant Stack Emissions and Ambient Air Pollution Monitoring, 2012.
- Zandrivierspoort Mine Air Pollution Dispersion Modelling and Impact Assessment Study, 2011.
- Kalplats Mining Right Application Air Pollution Dispersion Modelling and Impact Assessment Study, 2010.
- Odour and Air Pollution Emissions Determination for the Oceana Fish Processing Group and Assessment of the Resulting Concentrations via Dispersion Modelling. 2010.
- Conversion of the Gourikwa Power Station Open Cycle Gas Turbine (OCGT) Units to Combined Cycle Gas Turbine (CCGT). Air Pollution Dispersion Modelling and Impact Assessment Study, 2009.
- Conversion of the Ankerlig Power Station Open Cycle Gas Turbine (OCGT) Units to Combined Cycle Gas Turbine (CCGT) Units. Air Pollution Dispersion Modelling and Impact Assessment Study, 2008.
- Acacia Power Station Relocation Air Pollution Dispersion Modelling and Impact Assessment Study, 2008.
- Langkloof Coal Mining Right Application Air Pollution Dispersion Modelling and Impact Assessment Study, 2008.
- Pretoria North Modal Interchange Air Pollution Dispersion Modelling and Impact Assessment Study, 2008.
- Air Pollution Impact Assessment of The Cisco Iron & Steel Works Plant On The Zevenview Residential Estate, 2007.

- Eskom Hendrina-Prearie-Marathon Power Line - Air Quality Impact, 2007.
- Polmaise Coal Mining Right Application Air Pollution Dispersion Modelling and Impact Assessment Study, 2007.
- Durban Roodepoort Deep Uranium Recovery Plant Air Pollution Impact Assessment, 2007.
- Mooihoek Mine Air Pollution Dispersion Modelling and Impact Assessment Study, 2007.
- Air Pollution Dispersion Modelling for the Engen Petroleum Expansion in Montague Gardens, 2007.
- Caltex Episode and Assessment of Emission Parameter Effects and Emission Reduction Scenarios, 2007.
- Elitheni Coal Mine Air Pollution Dispersion Modelling Study, 2007.
- Klipfontein Corridor Project: Noise and Air Pollution Impact Determination. 2005.
- Coastal Park Landfill Site Air Pollution Buffer Zone Determination, 2006.
- Caltex Refinery, Cape Town: Air Pollution Dispersion Model Set-up and Emission Scenarios Determination, 2006.
- Vaal River Eastern Sub-System Augmentation Project (VRESAP): Air Quality Impact Assessment, 2005.
- Helderberg Galvanizing Plant Emission and Air Pollution Impact Study, 2001.
- Air Pollution Emission and Dispersion Modelling Study for the Cape Town International Airport. 2002.
- Helderberg Galvanizing Plant Emission and Air Pollution Impact Study, 2001.
- KRANZKOP Factory Acid Storage Accidental Release Study. Wellington. 2001.
- Hout Bay Main Road: Constantia Nek to Chapman's Peak Drive. Air Pollution and Noise Assessment Study. South Peninsula Municipality, 2000.
- NGK Kiln Installation Air Emissions Project: Technical Report on Atmospheric Emissions and Dispersion Modelling for NGK Shuttle Kiln Project at Airport Industria. 2000.
- Atmospheric Dispersion of Gaseous Emissions from a Simulated Accident at a Propellant Storage Facility at SOMCHEM Factory, Somerset West. 1999.
- Technical Report on the Environmental Impact of the Concrete Production Unit Valmas Ltd. in Andros Island, Greece. 1999.
- Environmental Impact Assessment Study of the "City of Volos Bypass". Ministry of Environment, City Planning and Public Works (MECPPW). PG Ltd. 1998.
- Environmental Impact Study on improvement of Schimatari-Chalkida road, Ministry of Environment, Physical Planning and Public Works. PG Ltd. 1998.
- Environmental Impact Assessment Study for the Concrete Production Unit Blaxopoulos SA in Karpenisi, Greece. PG Ltd. 1998.
- Environmental Impact Assessment Study of "The Aleurada-Tatarna Bridge road section". Ministry of Environment, City Planning and Public Works (MECPPW). PG Ltd. 1998.
- Environmental Impact Assessment Study of project: "Completion of Motorway Larisa-Thessaloniki, Section: Rapsani IC-Platamonas". (MECPPW). K.Mihalopoulos-M.Vlahogiannis Ltd. 1997.
- EIS for the runway extensions of the National Airport of Araxos, Greece. M. Zarkadoula and Partners. 1998
- Kenilworth Race Course Development: Technical report on the Effect on Noise and Air Pollution Levels. Western Province Race Club. 1998.
- Air Pollution and Noise Impact Study for the Construction of Athens International Airport, in Spata. AIA. TRADEMCO. 1997.
- South Africa Energy Policy. A comparison of the Environmental Management Systems from Utilities World-wide. Energy Research Institute. 1995.
- Compilation of an air pollution emissions inventory for the Greater Cape Town area, part of the Brown Haze study for Cape Town. Energy Research Institute. 1995.

AFFILIATIONS

National Association for Clean Air (NACA)
Air & Waste Management Association (A&WMA)
Technical Chamber of Greece
Mechanical Engineers Society of Greece

HONOURS

Greek Special Postgraduate Scholarship (Univ. of Patras)

MEMBERSHIP CERTIFICATE

This certifies that

DEMOS DRACOULIDES

is an Individual Member of the

National Association for Clean Air

for the period 1 January 2025 to 30 January 2026

DD001

Certificate no.: