AIMS

Report

Monthly AirGradient Monitoring

June 2026

Submitted to: Candice Webb / Sandy Camminga

Richards Bay Clean Air Association (RBCAA)

Suite 18 Calypso Centre, 2 Kruger Rand Grove, Richards Bay, KwaZulu-Natal, 3900

P O Box 10299, Meerensee, 3901

Submitted by: Lance Coetzee

Air Impact Measurement Specialists

Suite 18 Calypso Centre, 2 Kruger Rand Grove, Richards Bay, KwaZulu-Natal, 3900

PO Box 10491, Meerensee, KwaZulu-Natal, 3901

Project 2026001 Report 017

July 2026

Document Approval

Action	Designation	Name	Date
Prepared	Assistant Consultant	Alicia Garnica	2026-07-14
Reviewed	Senior Consultant	Lance Coetzee	2027-07-21
Reviewed	Senior Consultant	Lance Coetzee	2026-07-29


Signer ID: ABS1DHBUH7...

Lance Coetzee
Director

Record of Revisions

Revision	Comments	Author	Date
0	Draft	Lance Coetzee	2027-07-21
1	Final	Lance Coetzee	2026-07-29

Note

This report has been finalised with the available information at the time of its compilation.

Disclaimer and Use of Information

The AirGradient screening data contained in this report have undergone the routine quality-control and data-validation procedures applied to the RBCAA secondary screening network. This report, together with the original compilation, presentation and analysis of the data, is the intellectual property of the RBCAA (a non-profit association). It is made available to the public for informational purposes and to relevant authorities for regulatory tracking and compliance. Although this information is accessible, no part of this report or its data compilations may be reproduced, extracted, republished, distributed or incorporated into external works for commercial purposes, private consultancy or financial gain without the prior written consent of the RBCAA. The RBCAA accepts no responsibility or liability for any reliance placed on this information, or for any unauthorised use, misuse, misinterpretation or alteration of the data by third parties.

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

This monthly air quality report, prepared for the Richards Bay Clean Air Association (RBCAA), summarises AirGradient monitoring data for June 2026. It assesses particulate matter (PM), total volatile organic compound (TVOC) index values, nitrogen oxides (NO_x) index values and carbon dioxide (CO_2) concentrations measured by the RBCAA AirGradient screening network. The report highlights notable incidents, elevated short-term events and data-quality issues observed during the month. These monthly summaries support the identification of spatial and temporal patterns and help prioritise follow-up investigation where warranted.

RBCAA also publishes annual air quality reports summarising findings and longer-term trends over a complete calendar year. The annual reports provide stakeholders with an integrated view of regional air quality performance and support informed decision-making, policy development and environmental management: consistent monitoring and reporting support transparency, ongoing environmental assessment and community awareness.

The RBCAA monitoring network comprises eleven (11) primary monitoring stations (Figure 1.1 and Table 1.1). Airport, Felixton Met and Meerensee are meteorological stations and do not operate continuous air-quality analysers. The network also includes a secondary screening network comprising 10 AirGradient monitors (Table 1.2).

Figure 1.1: RBCAA monitoring network.

Table 1.1: Primary monitoring network station coordinates.

Station	Latitude	Longitude	Elevation (m)
Airport	-28.738161	32.093332	33.99
Arboretum	-28.752377	32.062791	25.20
Brackenham	-28.731325	32.039059	56.28
CBD	-28.744693	32.054851	32.26
eSikhaleni	-28.865278	31.911679	14.54
Felixton	-28.829255	31.893636	56.59
Meerensee	-28.772104	32.101308	14.89
Felixton Met	-28.836487	31.892513	27.87
Harbour West	-28.787297	32.027133	7.36
Richardia	-28.762769	32.066068	19.96
Scorpio	-28.769694	32.034282	29.39

Table 1.2: Secondary screening network coordinates (AirGradient monitors).

Site	Latitude (°)	Longitude (°)	Elevation (m)	UTM Zone 36S X (m)	UTM Zone 36S Y (m)
Airport	-28.738161	32.093332	33.99	411467	6820686
Brackenham	-28.731325	32.039059	56.28	406161	6821402
CBD	-28.744693	32.054851	32.26	407715	6819933
Empangeni	-28.734970	31.896245	109.85	392217	6820877
eSikhaleni	-28.865278	31.911679	14.54	393857	6806453
Felixton	-28.829255	31.893636	56.59	392060	6810428
Harbour West	-28.787297	32.027133	7.36	405047	6815191
Meerensee	-28.772104	32.101308	14.89	412274	6816931
Mtunzini	-28.959335	31.743905	84.00	377603	6795870
Richardia	-28.762769	32.066068	19.96	408826	6817939

2. AIRGRADIENT MONITORING NETWORK

The AirGradient network was established in late 2023 as a co-location study to evaluate the comparability of particulate measurements against the primary monitoring network. It was subsequently expanded in support of an RBCAA objective to screen additional air-quality parameters. Initially, the network comprised two sites, Harbour West and Richardia, and monitored only particulates (PM_{10}, $PM_{2.5}$ and PM_1). In July 2024, the network was expanded to include Brackenham, CBD, eSikhaleni and Felixton, and all monitors were upgraded to measure total volatile organic compound (TVOC) index, nitrogen oxides (NO_x) index and carbon dioxide (CO_2). A further expansion initiated in August 2025 added Airport, Empangeni, Meerensee and Mtunzini progressively: Meerensee and Mtunzini produced data during 2025, while Airport and Empangeni commenced reporting in 2026. The network now comprises 10 monitors across multiple sites.

AirGradient monitors are designed as accessible, lower-cost air-quality screening instruments. Their data are useful for identifying spatial patterns, short-term events and locations that may warrant follow-up. Still, they are not equivalent to reference-grade or regulatory-equivalent analysers and should be evaluated against a documented monitoring objective, performance basis and QA/QC process (Clements et al., 2022).

- Accuracy and precision: Regulatory reference or equivalent analysers are subject to method approval, routine calibration and quality-assurance requirements for specific pollutants. AirGradient monitors use compact sensors, including optical particle counters for PM and non-dispersive infrared sensors for CO_2. These sensors are useful for indicative screening but are more sensitive to siting, environmental conditions, sensor drift and calibration uncertainty than reference instruments.
- Calibration and certification: Product certifications such as CE, FCC, RoHS and REACH relate primarily to product conformity and market access; they should not be interpreted as certification of equivalence to regulatory reference methods. Where AirGradient data are used for technical assessment, co-location, calibration checks and documented QA/QC procedures are required to define their uncertainty and fitness for use.
- **Data application:** The AirGradient network is therefore treated as a secondary screening network. The TVOC and NO_x outputs are reported as dimensionless index values (Sensirion, 2022a; Sensirion, 2022b) and are interpreted as relative indicators of short-term changes rather than pollutant-specific regulatory concentrations.
- Cost and accessibility: Because the monitors are lower-cost and easier to deploy than reference analysers, they can improve spatial coverage and help identify potential localised events, provided the limitations above are clearly recognised.

In summary, AirGradient monitors provide useful indicative information for non-regulatory screening. Still, the data should not be used as a substitute for approved reference or equivalent-method analyser data when assessing statutory compliance.

Station abbreviations used in figures and tables are Air = Airport, Brk = Brackenham, CBD = CBD, Emp = Empangeni, eSk = eSikhaleni, Flx = Felixton, HW = Harbour West, MS = Meerensee, Mtz = Mtunzini and Rch = Richardia.

Comparison basis: The comments below compare the AirGradient screening results with the June 2026 Monthly Air Quality report (Project 2026001 Report 016). The comparison is qualitative and event/station-based, not a formal method comparison, because instruments, parameters and co-location coverage differ, and the AirGradient TVOC and NO_x outputs are dimensionless indices. The 3σ and 5σ screening thresholds are fixed from pooled valid hourly observations across operational AirGradient stations for calendar year 2025, calculated as the pooled mean plus three or five population standard deviations. Calculations use unrounded thresholds; figures display rounded values. These are statistical screening thresholds, not regulatory or health limits. June 2026 TVOC, NO_x and CO_2 event counts were recalculated from the source hourly datasets; Tables 4.2, 5.2 and 6.2 have been restated where the previous values did not reproduce from the source data. Unless otherwise stated, data completeness is calculated as the number of valid 10-minute records divided by the number of scheduled 10-minute records for the reporting month.

3. PARTICULATE MONITORING

3.1. Data Completeness

The June 2026 particulate data completeness results are summarised in Table 3.1.

Table 3.1: Particulate data completeness (%) based on valid 10-minute records.

Month	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch
Jan 2026	-	99	***85***	-	97	100	100	100	***90***	100
Feb 2026	***85***	***93***	***85***	***65***	96	98	100	100	98	99
Mar 2026	96	97	99	***90***	***94***	99	99	98	***91***	99
Apr 2026	100	***94***	100	96	96	99	100	100	***90***	100
May 2026	98	99	100	99	***94***	100	100	99	99	100
Jun 2026	99	97	100	99	95	100	100	100	98	99
Jul 2026	-	-	-	-	-	-	-	-	-	-
Aug 2026	-	-	-	-	-	-	-	-	-	-
Sept 2026	-	-	-	-	-	-	-	-	-	-
Oct 2026	-	-	-	-	-	-	-	-	-	-
Nov 2026	-	-	-	-	-	-	-	-	-	-
Dec 2026	-	-	-	-	-	-	-	-	-	-

Missing Data (Particulates)

- *All stations recorded at least 95% monthly particulate data completeness, calculated from valid 10-minute records; only intermittent short gaps occurred.*

3.2. Monthly

PM_{10} and $PM_{2.5}$ monthly average concentrations are shown in Figures 3.1 and 3.2. Comparisons to previous months are provided in Figures 3.3 and 3.4.
Regulatory/health-limit interpretation: for PM_{10} and $PM_{2.5}$, the RSA ambient standards are the applicable regulatory reference values, while the WHO air quality guidelines are used as health-based contextual benchmarks. Because these AirGradient measurements are screening-network data, the comparisons identify potential concern and follow-up priorities only; they do not constitute reference-method compliance findings.

- PM_{10} averages were below the RSA annual standard value, and the WHO annual guideline value is shown for context; annual compliance cannot be assessed from a single monthly average, and AirGradient data remain screening data rather than regulatory-equivalent measurements.
- $PM_{2.5}$ averages were below the RSA annual standard value at all sites. All monitoring stations were above the WHO annual guideline value, shown for context. This is a contextual comparison of screening data only and is not a formal annual exceedance or compliance assessment.
- Station-specific monthly benchmark status: no station exceeded the RSA PM_{10} or $PM_{2.5}$ annual standard values in the June screening comparison. The WHO annual guideline comparison, used as a health-based contextual benchmark only, was exceeded for PM_{10} at all AirGradient stations except CBD, and for $PM_{2.5}$ at all AirGradient stations.

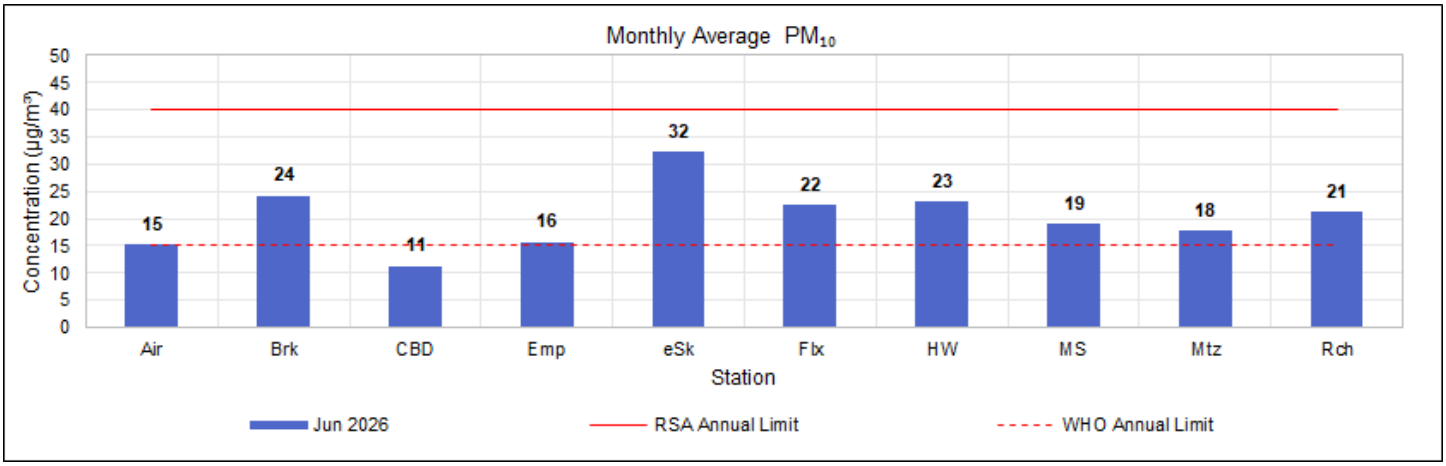

Figure 3.1: PM_{10} monthly concentration.

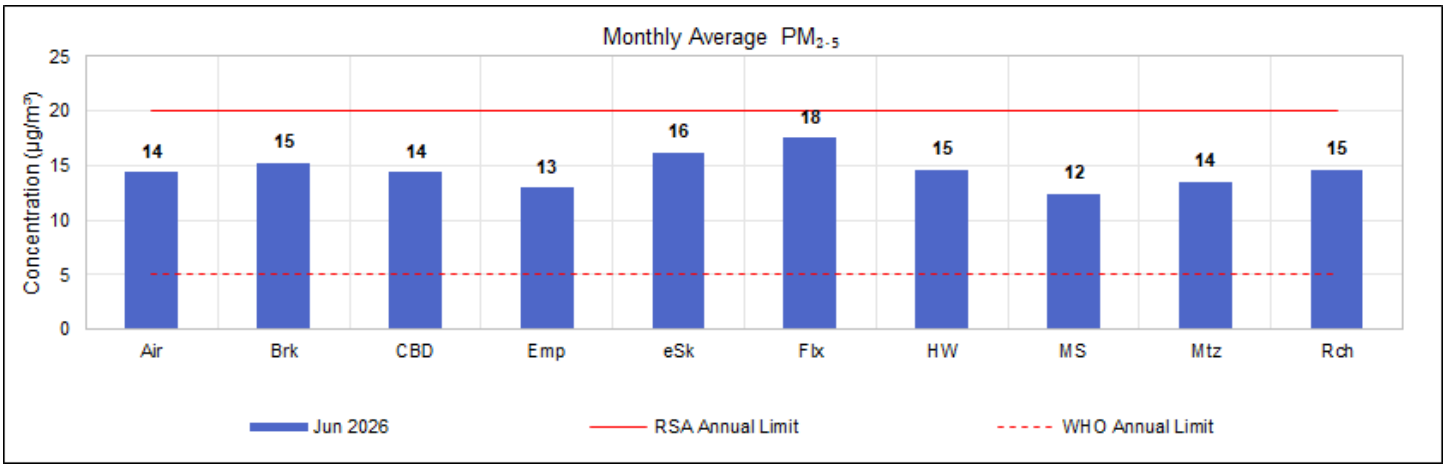

Figure 3.2: $PM_{2.5}$ monthly concentration.

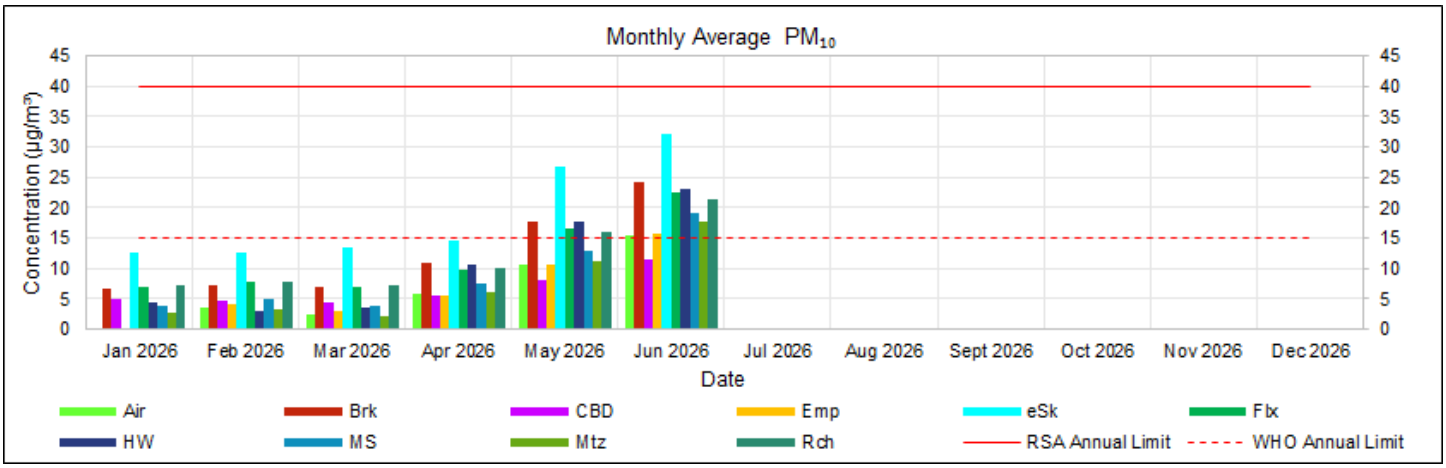

Figure 3.3: PM_{10} monthly comparison.

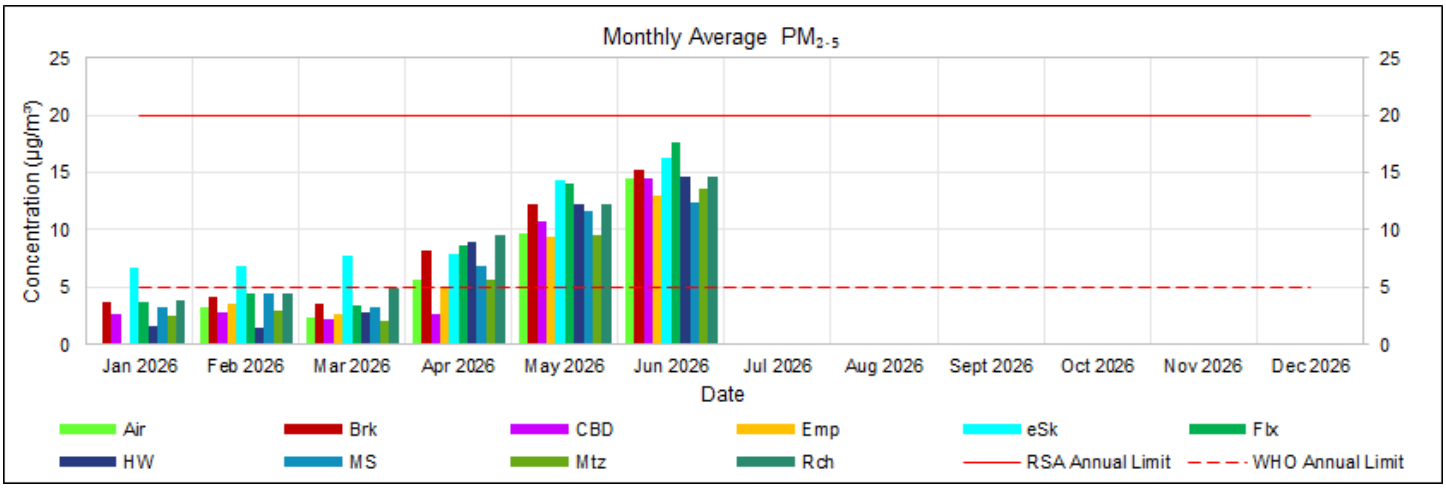

Figure 3.4: $PM_{2.5}$ monthly comparison.

3.3. Diurnal

PM diurnal concentrations are shown in Figures 3.5 and 3.6.

- Diurnal PM_{10} averages are presented for temporal-pattern screening only.
- The RSA and WHO particulate criteria used in this report are calendar-day (24-hour) values and should not be applied to hour-of-day averages.
- Benchmark interpretation is therefore based on the calendar-day results in Section 3.4.

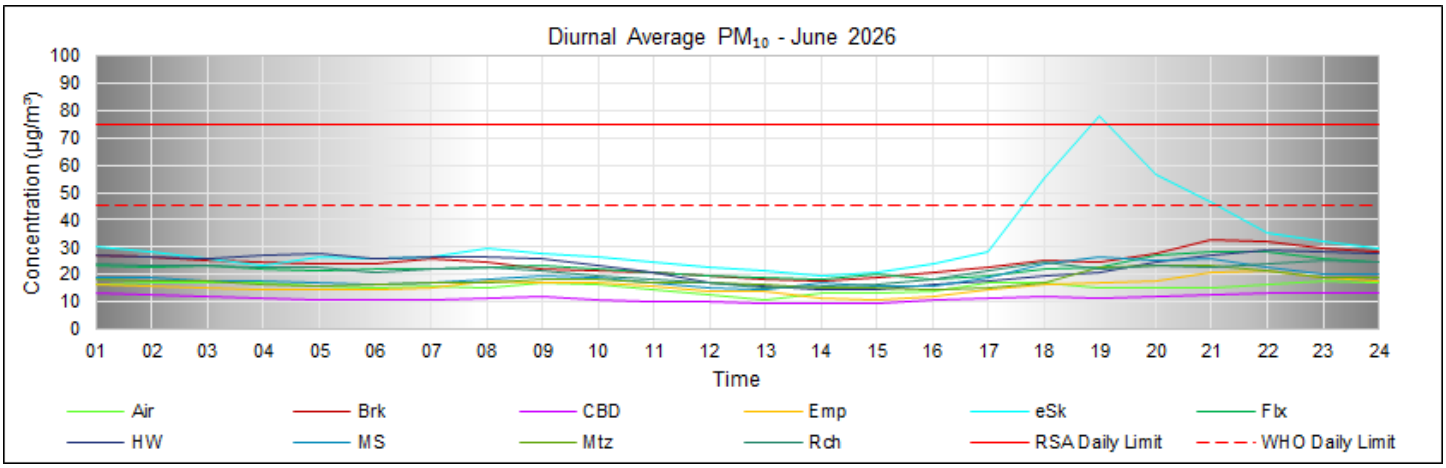

Figure 3.5: PM_{10} diurnal concentrations.

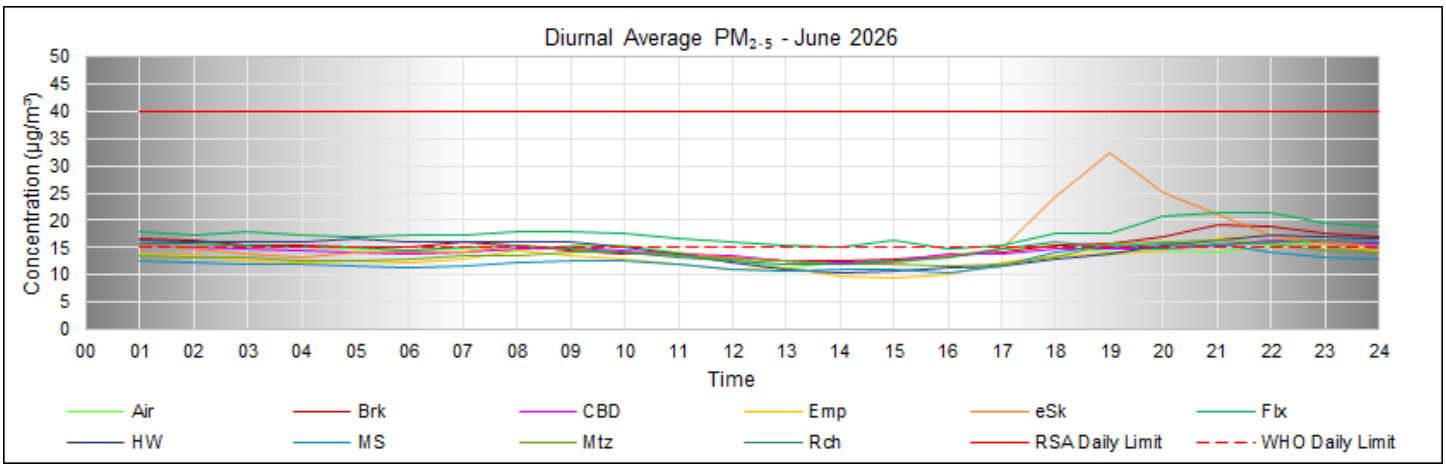

Figure 3.6: $PM_{2.5}$ diurnal concentrations.

3.4. Daily

PM daily concentrations are shown in Figures 3.7 and 3.8.

- Daily average PM_{10} concentrations remained below the RSA 24-hour standard value at all stations. The WHO 24-hour guideline value, shown for context, was exceeded at all stations except CBD.
- Daily average $PM_{2.5}$ remained below the RSA 24-hour standard value at all stations except Empangeni, where the daily average of 45.9 µg/m³ on 3 June 2026 exceeded the 40 µg/m³ standard value. The WHO 24-hour guideline value (shown for context) was exceeded at all stations. These are screening-network results and should not be interpreted as reference-method compliance findings.
- Station-specific daily benchmark status: no station exceeded the RSA PM_{10} 24-hour standard value; the RSA $PM_{2.5}$ 24-hour standard value was exceeded at Empangeni (one day, 3 June 2026). The WHO 24-hour guideline comparison, used as a health-based contextual benchmark only, was exceeded for PM_{10} at all stations except CBD, and for $PM_{2.5}$ at all stations.

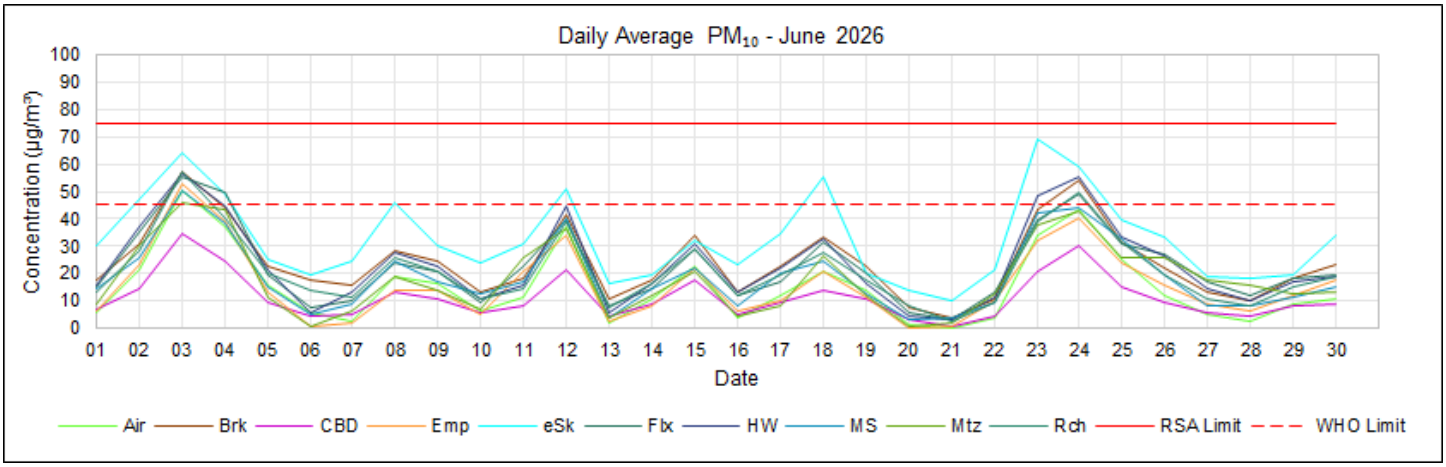

Figure 3.7: PM_{10} daily concentrations.

Missing Data (Particulates): Intermittent short communication gaps only; June data capture was 95% or above at all stations.

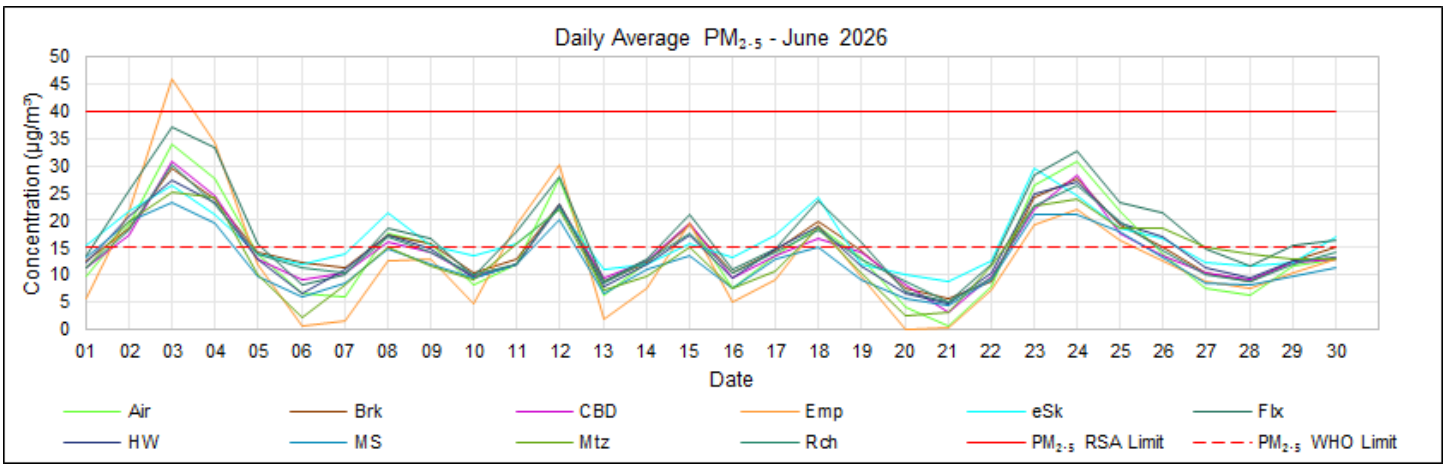

Figure 3.8: $PM_{2.5}$ daily concentrations.

3.5. Conclusion

Particulate concentrations in June 2026 were generally low to moderate across the AirGradient network.

Monthly PM_{10} averages ranged from approximately 11 to 32 µg/m³, with the highest value at eSikhaleni (32 µg/m³) and the lowest at CBD (11 µg/m³). Monthly $PM_{2.5}$ averages ranged from approximately 12 to 18 µg/m³, with the highest values at Felixton (18 µg/m³) and eSikhaleni (16 µg/m³) and the lowest at Meerensee (12 µg/m³). Monthly PM_{10} averages were below the RSA annual standard value at all sites; the WHO annual guideline value (shown for context) was exceeded at all stations except CBD.

Monthly $PM_{2.5}$ averages were below the RSA annual standard value at all sites, while all sites were above the WHO annual guideline value shown for context. These are contextual comparisons of screening data only; annual compliance cannot be concluded from one month of screening data. Daily average PM_{10} remained below the RSA 24-hour standard value at all sites; the WHO 24-hour guideline value (shown for context) was exceeded at all stations except CBD. Daily average $PM_{2.5}$ remained below the RSA 24-hour standard value at all sites except Empangeni, which recorded one exceedance (45.9 µg/m³, 3 June 2026), and exceeded the WHO 24-hour guideline value at all stations.

Regulatory-limit comment: no PM_{10} AirGradient daily average exceeded the RSA 24-hour standard value during June; one $PM_{2.5}$ daily average, at Empangeni on 3 June 2026, exceeded the RSA 24-hour standard value; annual regulatory status cannot be concluded from a single month of screening data. Health-limit comment: the WHO guideline comparisons are more conservative and indicate health-relevant particulate levels at several sites, particularly for $PM_{2.5}$, despite the absence of RSA 24-hour standard exceedances.

Station-specific conclusion: the June 2026 AirGradient particulate results indicate one RSA regulatory daily standard exceedance ($PM_{2.5}$ at Empangeni); no other station exceeded an RSA daily standard value. The health-based WHO daily guideline comparison identified PM_{10} exceedances at all stations except CBD, and $PM_{2.5}$ exceedances at all stations.

These are screening-network results and should not be interpreted as reference-method compliance findings. June data completeness ranged from 95% to 100%; all sites met the RBCAA 95% operational target, the 90% SANAS-related reporting expectation and the 80% statistical-robustness threshold.

Correlation with the June 2026 technical report: Both datasets indicate a regional particulate episode on 3 June 2026, but the station-level results do not reproduce quantitatively. The reference-network appendix reported no

PM_{10} RSA or WHO 24-hour exceedance at eSikhaleni, whereas the AirGradient network identified eSikhaleni as a WHO daily-guideline screening location. Reference-network $PM_{2.5}$ RSA daily exceedances occurred at Brackenham and Felixton, while the AirGradient RSA screening exceedance occurred at Empangeni. The limited agreement at co-located sites confirms that the correlation is event-level only and that AirGradient measurements are not regulatory-equivalent data.

4. TOTAL VOLATILE ORGANIC COMPOUNDS MONITORING

Volatile organic compounds (VOCs) are organic chemicals that can evaporate at ambient temperatures. Outdoor VOCs may originate from industrial activities, combustion sources, vehicle exhaust and the use or storage of solvents and other chemical products. Health and environmental relevance depend strongly on the individual compound, concentration and exposure duration; therefore, a total VOC index should not be interpreted as a compound-specific health-risk metric. The AirGradient TVOC sensor does not identify individual compounds and reports a relative, dimensionless index rather than an absolute concentration (Sensirion, 2022b). In this report, TVOC index data are used only as screening information to identify temporal changes and potential short-term events requiring follow-up.

4.1. Data Completeness

The June 2026 TVOC data completeness results are summarised in Table 4.1.

Table 4.1: TVOC data completeness (%) based on valid 10-minute records.

Month	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch
Jan 2026	-	99	***84***	-	97	100	100	100	***90***	100
Feb 2026	***85***	***93***	***83***	***65***	96	98	100	100	98	99
Mar 2026	96	97	99	***90***	***94***	***92***	99	98	***91***	99
Apr 2026	100	***91***	97	96	96	99	100	100	***90***	100
May 2026	98	99	99	99	***94***	100	100	99	99	100
Jun 2026	99	97	100	99	***76***	100	100	100	98	99
Jul 2026	-	-	-	-	-	-	-	-	-	-
Aug 2026	-	-	-	-	-	-	-	-	-	-
Sept 2026	-	-	-	-	-	-	-	-	-	-
Oct 2026	-	-	-	-	-	-	-	-	-	-
Nov 2026	-	-	-	-	-	-	-	-	-	-
Dec 2026	-	-	-	-	-	-	-	-	-	-

Missing Data (TVOC)

- *eSikhaleni – TVOC/NO_x sensor data were unavailable from 23 to 29 June 2026 (June monthly TVOC data completeness: 76%, based on valid 10-minute records).*

4.2. Monthly

TVOC monthly average index values are shown in Figure 4.1. Comparisons to previous months are also provided in Figure 4.2.

Regulatory/health-limit applicability: No South African ambient regulatory limit or generally applicable health-based limit is applied to the AirGradient TVOC index because it is a dimensionless relative index rather than a compound-specific concentration. Elevated TVOC index values are therefore evaluated only as screening indicators using temporal patterns and the 3σ/5σ event flags in Table 4.2.

Station-specific limit/standard status: No AirGradient TVOC station is recorded as exceeding a regulatory or health-based limit or standard in June 2026. All stations recorded one or more 3σ screening flags; eSikhaleni (73) and CBD (22) recorded the most. No station recorded a 5σ flag. These are screening-event flags only.

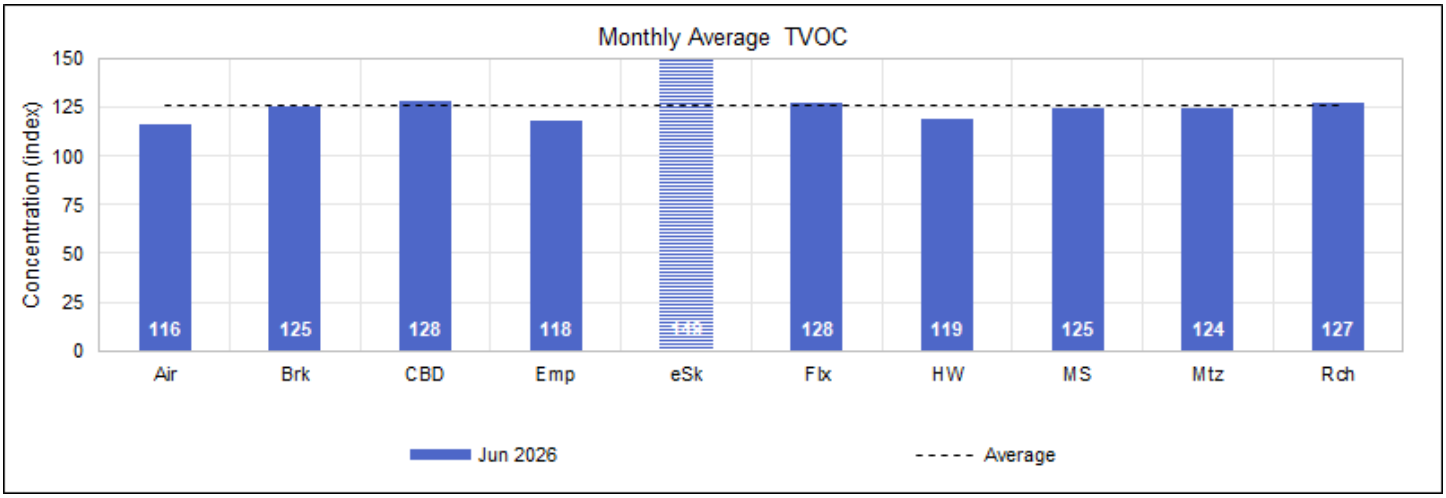

Figure 4.1: TVOC monthly index values.

eSk < 80% data capture for June.

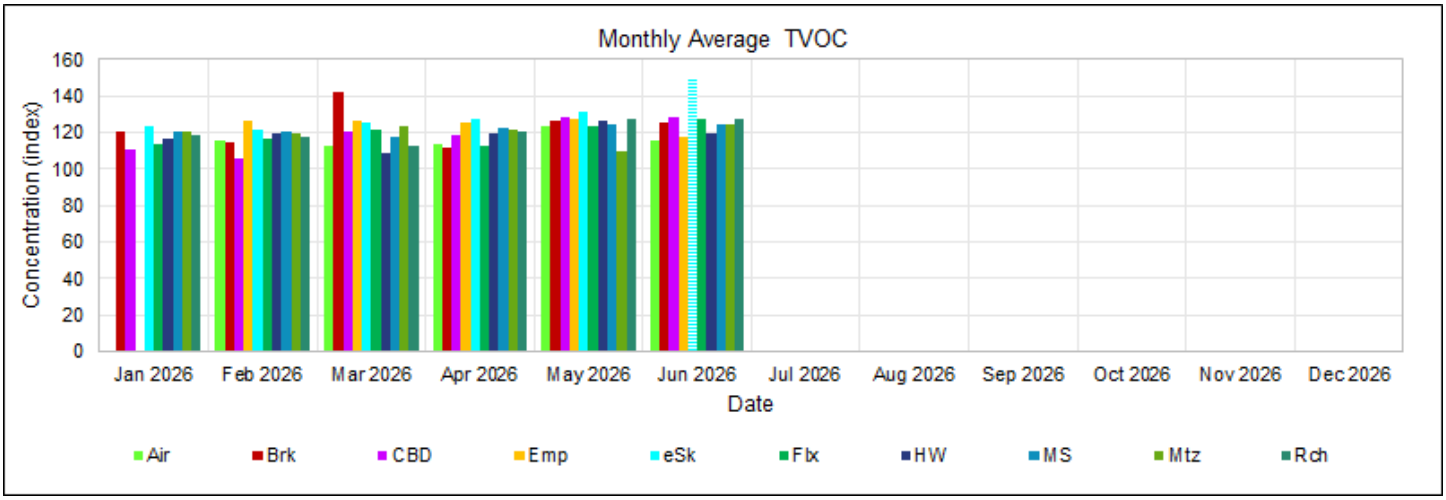

Figure 4.2: TVOC monthly index comparison.

eSk < 80% data capture for June.

4.3. Diurnal

TVOC diurnal index values are shown below (Figure 4.3).

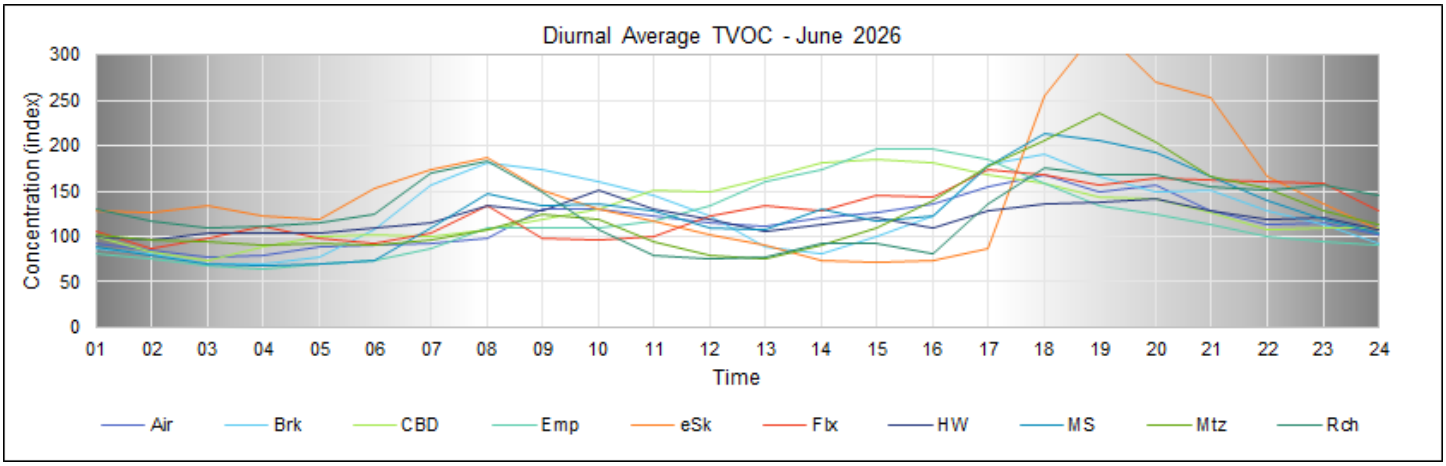

Figure 4.3: TVOC diurnal index values.

4.4. Daily

TVOC daily index values are shown below (Figure 4.4).

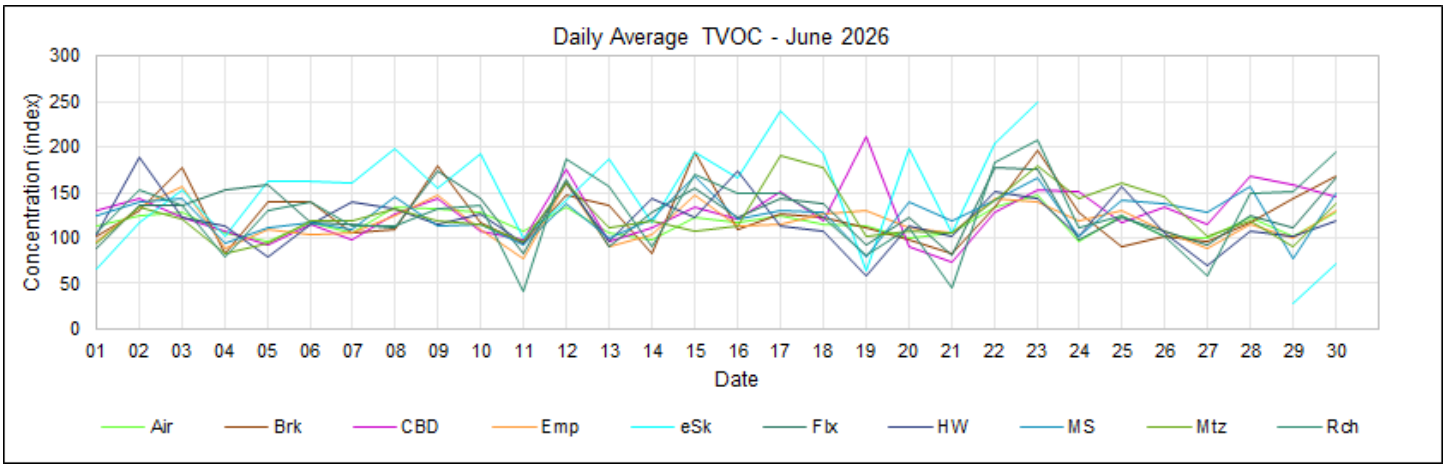

Figure 4.4: TVOC daily index values.

Missing Data (TVOC): eSikhaleni – TVOC sensor data were unavailable from 23 to 29 June 2026; other stations recorded only intermittent short gaps.

4.5. Hourly

TVOC hourly index values are shown below (Figure 4.5).

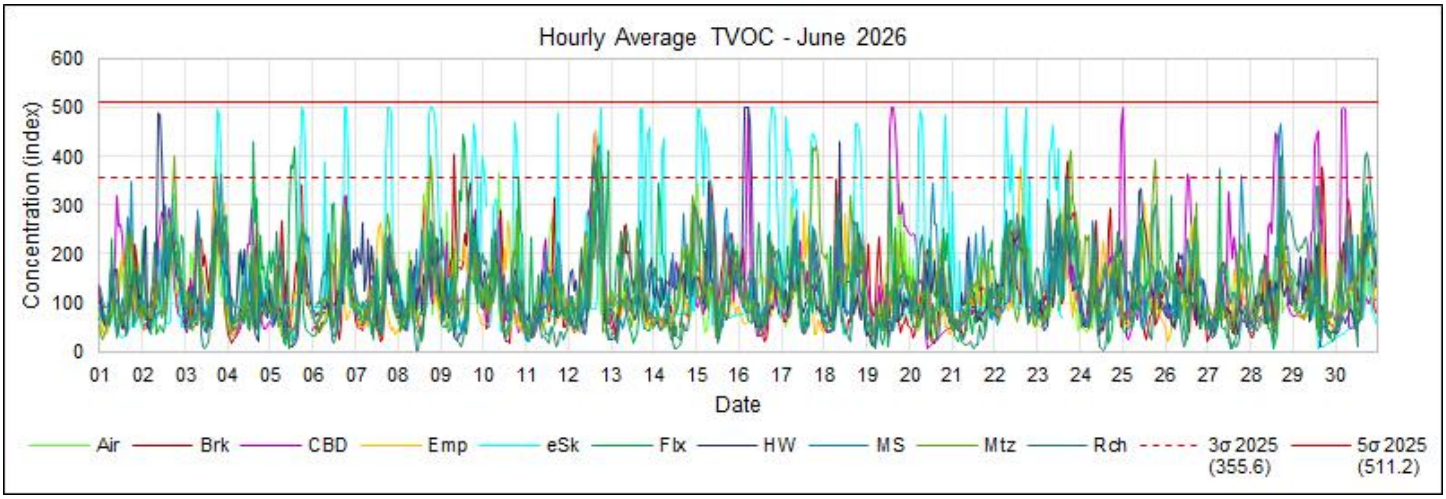

Figure 4.5: TVOC hourly index values.

TVOC hourly observations above the 3σ and 5σ screening thresholds are summarised in Table 4.2.

Table 4.2: TVOC hourly observations above the 3σ and 5σ screening thresholds.

Limit	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch	Total
3σ	2	4	**22**	6	**73**	**11**	**11**	6	**10**	8	153
5σ	0	0	0	0	0	0	0	0	0	0	0

4.6. Conclusion

June 2026 TVOC monthly average index values ranged from approximately 116 to 128. CBD recorded the highest monthly average index value, followed by Felixton, Richardia and Brackenham, while Airport recorded the lowest; the eSikhaleni monthly value was withheld because June data completeness (76%) was below the 80% completeness threshold. Diurnal and hourly data indicate intermittent short-term elevated index events rather than persistently elevated conditions. Using the exact unrounded hourly thresholds (3σ = 355.6; 5σ = 511.2), 153 observations were above 3σ, and none were above 5σ. eSikhaleni (73) and CBD (22) recorded the most 3σ flags. The eSikhaleni event count is retained as screening information, but should be interpreted cautiously because completeness was below 80%. Overall, the results indicate a relatively consistent baseline with isolated short-term events that warrant local-source follow-up only where they coincide with odour observations, complaints or relevant meteorological conditions. All other sites met the RBCAA 95% operational target.

Regulatory and health-limit conclusion: the TVOC findings cannot be assessed against an ambient compliance limit or a health-based concentration threshold in this report. The reported events should be treated as screening triggers for source-pattern review, targeted field observations or compound-specific monitoring where persistent or recurrent elevations are observed.

Station-specific conclusion: no TVOC station exceeded an applicable regulatory or health limit or standard; all named TVOC stations with 3σ flags should therefore be described as screening-event locations rather than exceedance locations.

Correlation with the June 2026 technical report: There is no direct TVOC comparator. The only overlap is contextual: widespread TVOC 3σ flags coincide with a complaint-heavy month and TRS short-term exceedances at Brackenham, eSikhaleni, Felixton and Richardia; this is a follow-up trigger only, not attribution.

5. NITROGEN OXIDES MONITORING

Nitrogen oxides (NO_x) are a group of reactive gases that primarily include nitric oxide (NO) and nitrogen dioxide (NO_2), generated mainly by high-temperature combustion from vehicles, power generation and industrial activities. NO_x contributes to the formation of ozone and secondary particulate matter and can affect respiratory health, particularly in susceptible populations. The AirGradient NO_x sensor reports a relative, dimensionless index rather than pollutant-specific NO or NO_2 concentrations (Sensirion, 2022a). In this report, NO_x index data are used as screening information to identify short-term changes and potential events, not to assess compliance with ambient NO_2 standards.

5.1. Data Completeness

The June 2026 NO_x data completeness results are summarised in Table 5.1.

Table 5.1: NO_x data completeness (%) based on valid 10-minute records.

Month	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch
Jan 2026	-	99	***84***	-	97	100	100	100	***90***	100
Feb 2026	***85***	***93***	***83***	***65***	96	98	100	100	98	99
Mar 2026	96	97	99	***90***	***94***	***92***	99	98	***91***	99
Apr 2026	100	***91***	97	96	96	99	100	100	***90***	100
May 2026	98	99	99	99	***94***	100	100	99	99	100
Jun 2026	99	97	100	99	***76***	100	100	100	98	99
Jul 2026	-	-	-	-	-	-	-	-	-	-
Aug 2026	-	-	-	-	-	-	-	-	-	-
Sept 2026	-	-	-	-	-	-	-	-	-	-
Oct 2026	-	-	-	-	-	-	-	-	-	-
Nov 2026	-	-	-	-	-	-	-	-	-	-
Dec 2026	-	-	-	-	-	-	-	-	-	-

Missing Data (NO_x)

- *eSikhaleni – TVOC/NO_x sensor data were unavailable from 23 to 29 June 2026 (June monthly NO_x data completeness: 76%, based on valid 10-minute records).*

5.2. Monthly

NO_x monthly average index values are shown in Figure 5.1; comparisons to previous months are also provided in Figure 5.2.

Regulatory/health-limit applicability: the AirGradient NO_x output is reported as a dimensionless index and is not equivalent to an NO_2 or NO_x concentration in µg/m³. South African NO_2 ambient standards and WHO NO_2 health-based guidelines are therefore not applied to these index data; interpretation is limited to relative screening and 3σ/5σ event identification.

Station-specific limit/standard status: No AirGradient NO_x station is recorded as exceeding a regulatory or health-based limit or standard in June 2026 because the NO_x output is an index, not an NO_2 concentration. eSikhaleni was the only station with 3σ or 5σ screening flags, with 57 and 37 hourly observations above the respective thresholds. These are screening flags only and not regulatory or health-standard exceedances.

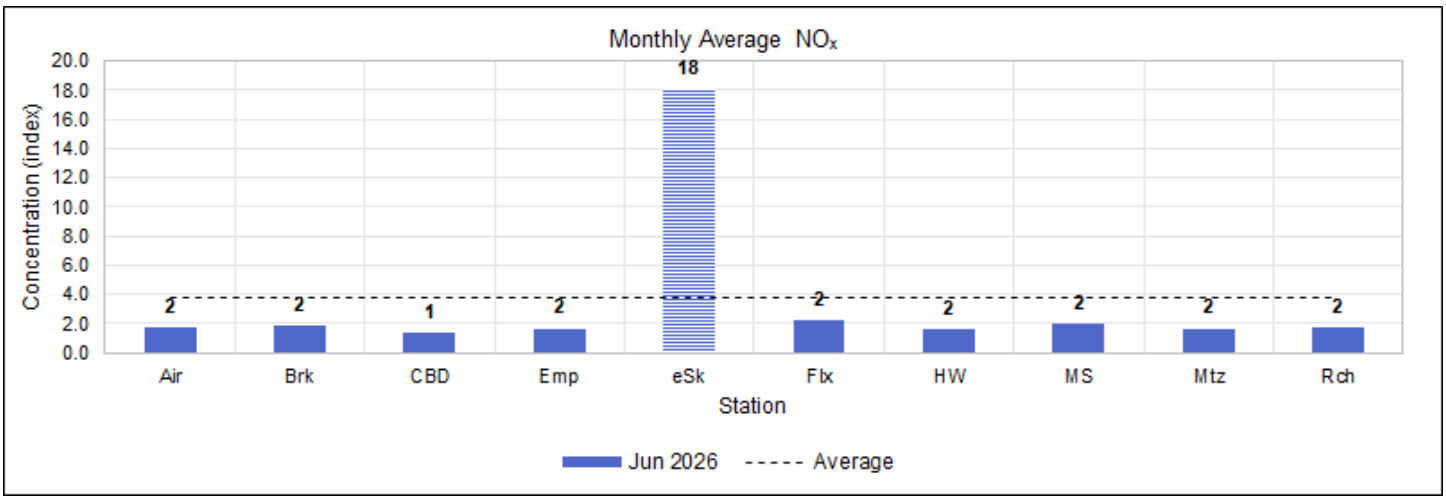

Figure 5.1: NO_x monthly index values.

eSk < 80% data capture for June.

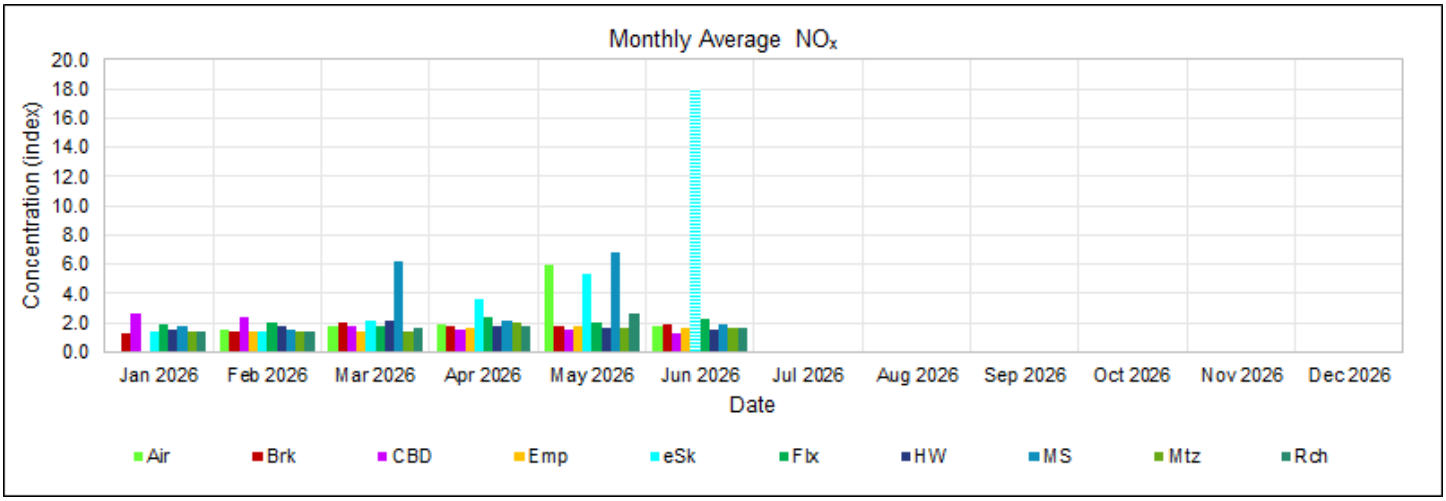

Figure 5.2: NO_x monthly comparison.

eSk < 80% data capture for June.

5.3. Diurnal

NO_x diurnal index values are shown below (Figure 5.3).

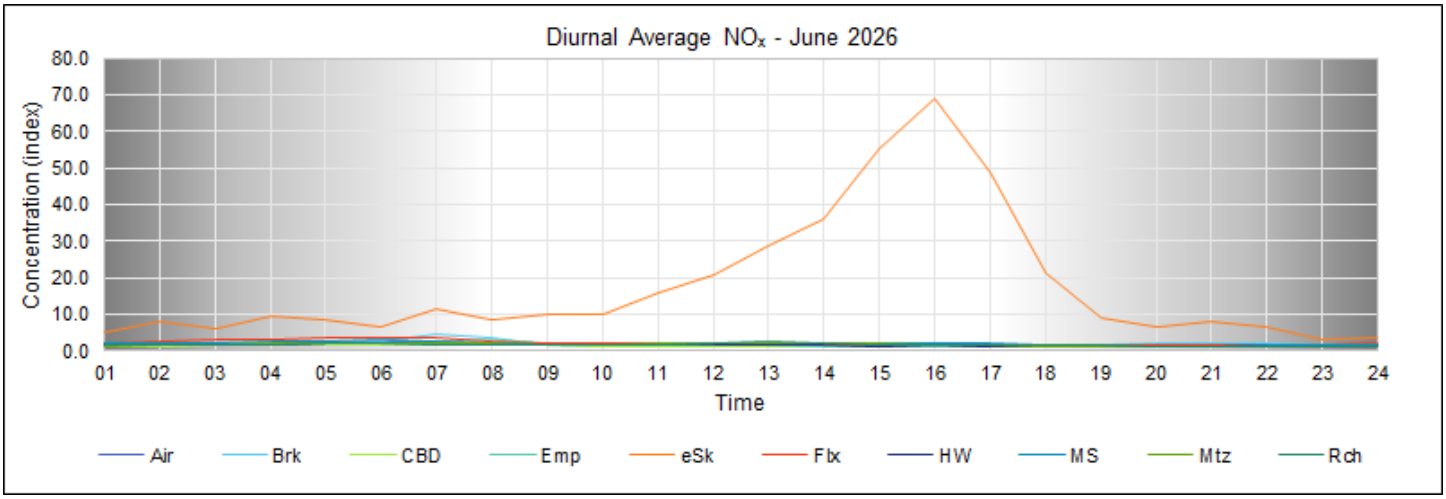

Figure 5.3: NO_x diurnal index values.

5.4. Daily

NO_x daily index values are shown below (Figure 5.4).

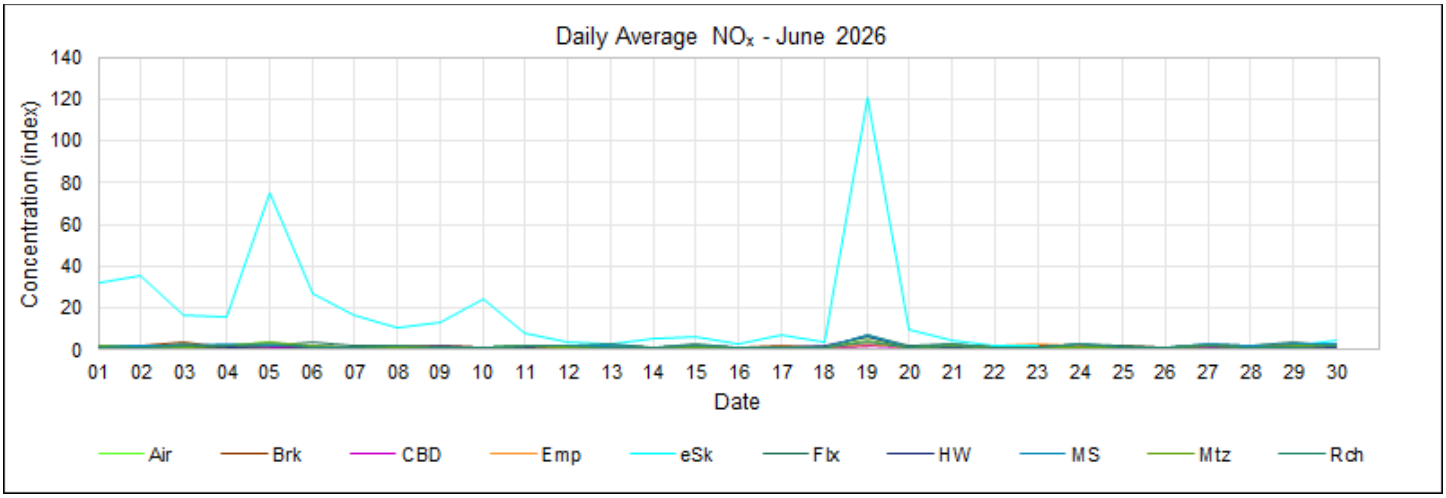

Figure 5.4: NO_x daily index values.

Missing Data (NO_x): eSikhaleni – NO_x sensor data were unavailable from 23 to 29 June 2026; other stations recorded only intermittent short gaps.

5.5. Hourly

NO_x hourly index values are shown below (Figure 5.5).

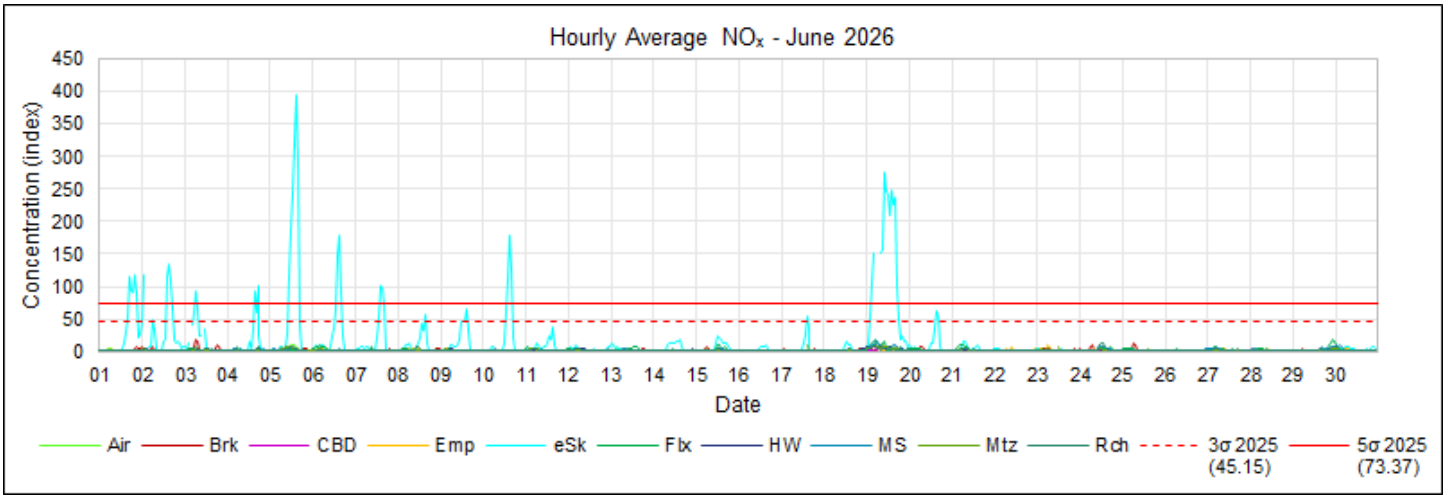

Figure 5.5: NO_x hourly index values.

NO_x hourly observations above the 3σ and 5σ screening thresholds are summarised in Table 5.2.

Table 5.2: NO_x hourly observations above the 3σ and 5σ screening thresholds.

Limit	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch	Total
3σ	0	0	0	0	**57**	0	0	0	0	0	57
5σ	0	0	0	0	**37**	0	0	0	0	0	37

5.6. Conclusion

June 2026 NO_x monthly average index values remained low at sites meeting the completeness criterion, ranging from approximately 1.3 to 2.2. Felixton recorded the highest monthly average index value, followed by Meerensee and Brackenham; CBD recorded the lowest. The eSikhaleni monthly value was withheld because the June data completeness (76%) was below the 80% completeness threshold. Using the exact unrounded hourly thresholds (3σ = 45.1; 5σ = 73.4), eSikhaleni was the only station with screening flags: 57 observations above 3σ and 37 above 5σ. These counts should be interpreted cautiously and corroborated because eSikhaleni completeness was below 80%. Because the AirGradient NO_x output is a dimensionless index rather than a pollutant-specific NO or NO_2 concentration, the results are screening indicators only and do not demonstrate compliance or non-compliance with ambient NO_2 standards. All other sites met the RBCAA 95% operational target.

Regulatory and health-limit conclusion: no regulatory or health-limit exceedance is concluded from the NO_x index results. Recurrent elevated index events should be treated as screening evidence requiring corroboration with reference/equivalent NO_2 or NO_x measurements before any compliance or health-risk interpretation is made.

Station-specific conclusion: No NO_x station exceeded an applicable regulatory or health limit or standard; eSikhaleni should be flagged only as a recurrent NO_x index screening-event location.

Correlation with the June 2026 technical report: There is no direct NO_2/NO_x comparator. Elevated NO_x index flags occurred only at eSikhaleni, which also appears in the technical report's TRS and data-completeness records. This

overlap is contextual only and cannot establish pollutant equivalence, compliance status or source attribution without reference/equivalent NO_2 or NO_x measurements.

6. CARBON DIOXIDE MONITORING

Carbon dioxide (CO_2) is reported in parts per million (ppm). In this report, CO_2 data are used as indicative local concentration measurements to identify relative build-up events and spatial differences across the AirGradient network. Because outdoor CO_2 varies with local sources, vegetation, atmospheric mixing, and sensor accuracy, small differences around the background reference line should not be over-interpreted.

6.1. Data Completeness

The June 2026 CO_2 data completeness results are summarised in Table 6.1.

Table 6.1: CO_2 data completeness (%) based on valid 10-minute records.

Month	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch
Jan 2026	-	99	***85***	-	97	100	-	100	***90***	100
Feb 2026	***85***	***93***	***85***	***65***	96	98	100	100	98	99
Mar 2026	96	97	99	***90***	***94***	99	99	98	***91***	99
Apr 2026	100	***94***	100	96	96	99	100	100	***90***	100
May 2026	98	99	100	99	***94***	100	100	99	99	100
Jun 2026	99	97	100	99	95	100	100	100	98	99
Jul 2026	-	-	-	-	-	-	-	-	-	-
Aug 2026	-	-	-	-	-	-	-	-	-	-
Sept 2026	-	-	-	-	-	-	-	-	-	-
Oct 2026	-	-	-	-	-	-	-	-	-	-
Nov 2026	-	-	-	-	-	-	-	-	-	-
Dec 2026	-	-	-	-	-	-	-	-	-	-

Missing Data (CO_2)

- *All stations recorded at least 95% monthly CO_2 data completeness, calculated from valid 10-minute records; only intermittent short gaps occurred.*

6.2. Monthly

CO_2 monthly average concentrations are shown in Figure 6.1; comparisons to previous months are also provided (Figure 6.2).

Regulatory/health-limit applicability: no South African ambient regulatory limit or WHO ambient health-based guideline is applied to outdoor CO_2 in this report. Occupational exposure limits and indoor ventilation thresholds are not appropriate ambient-air compliance criteria; CO_2 is used here only as an indicative tracer for local accumulation, mixing and possible combustion or respiration influences.

Station-specific limit/standard status: No AirGradient CO_2 station is recorded as exceeding an ambient regulatory or health-based limit or standard in June 2026. CBD, Empangeni, eSikhaleni and Felixton recorded 3σ screening flags. Felixton was the only station with 5σ flags (11). These are local accumulation indicators only.

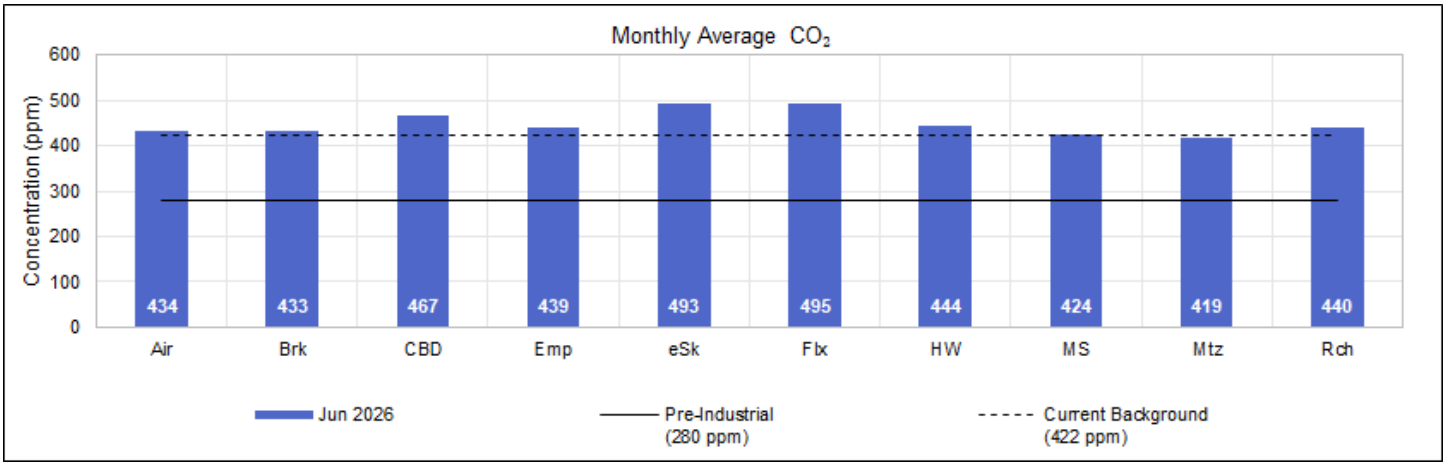

Figure 6.1: CO_2 monthly concentration.

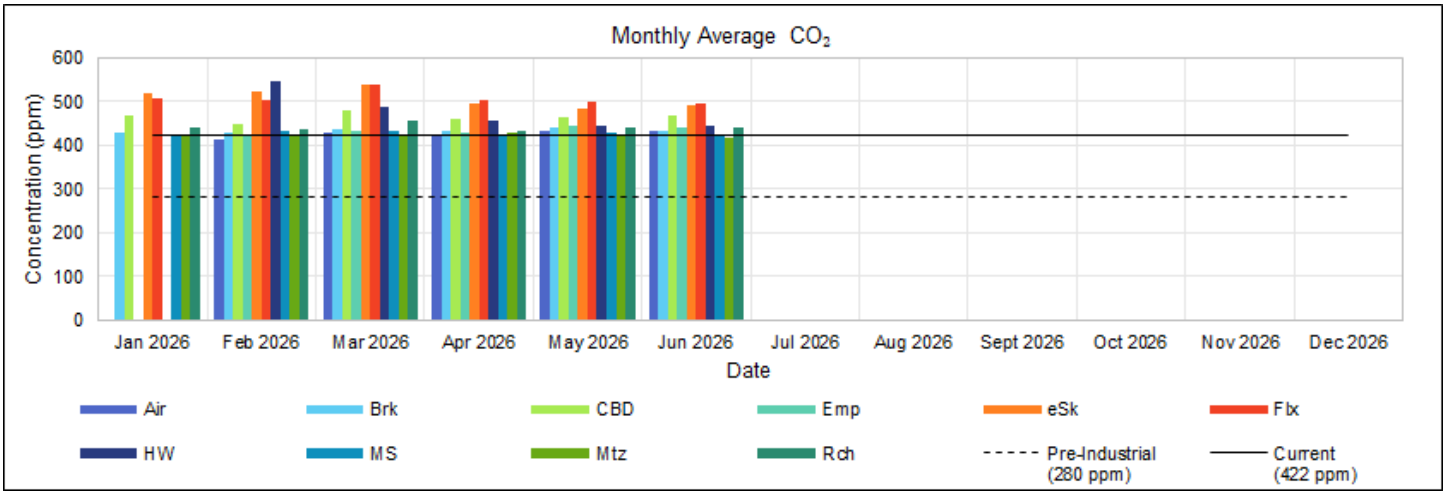

Figure 6.2: CO_2 monthly comparison.

6.3. Diurnal

CO_2 diurnal concentrations are shown below (Figure 6.3).

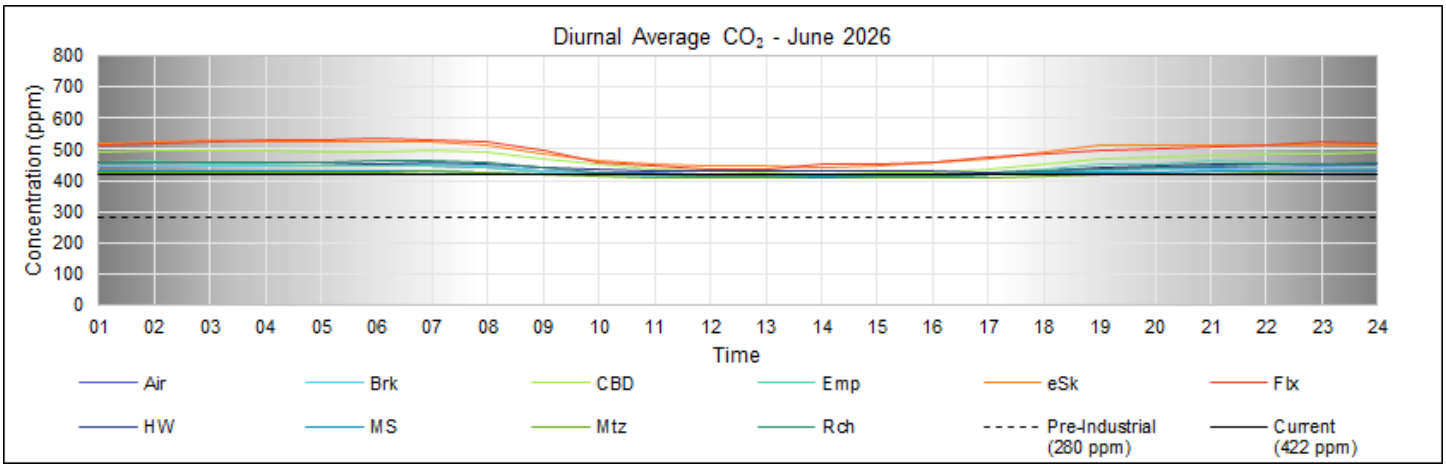

Figure 6.3: CO_2 diurnal concentrations.

6.4. Daily

CO_2 daily concentrations are shown below (Figure 6.4).

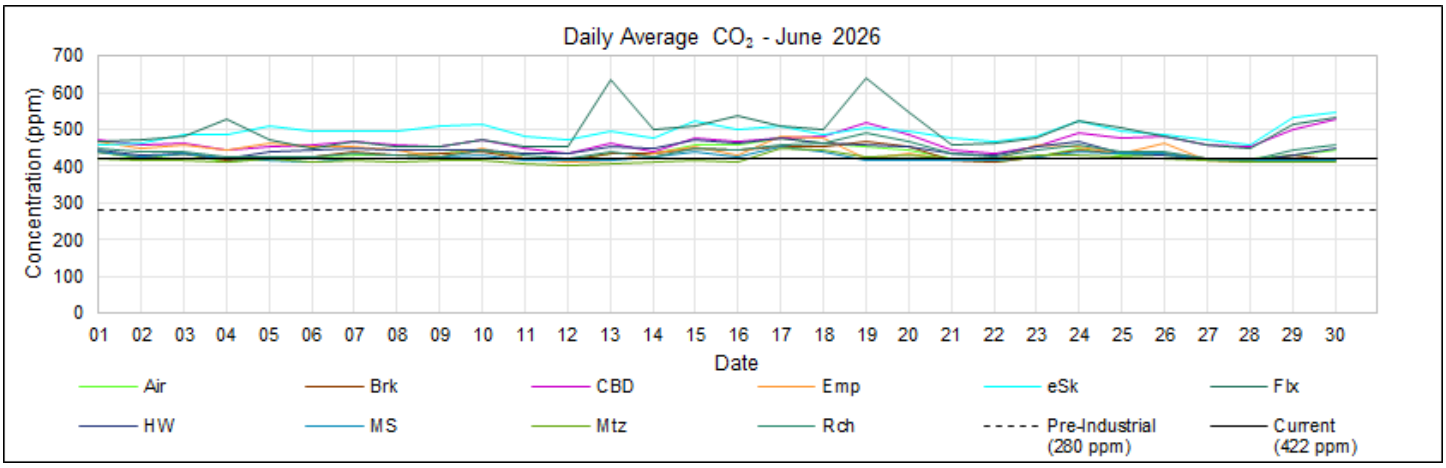

Figure 6.4: CO_2 daily concentrations.

Missing Data (CO_2): Intermittent short communication gaps only; June data capture was 95% or above at all stations.

6.5. Hourly

CO_2 hourly concentrations are shown below (Figure 6.5).

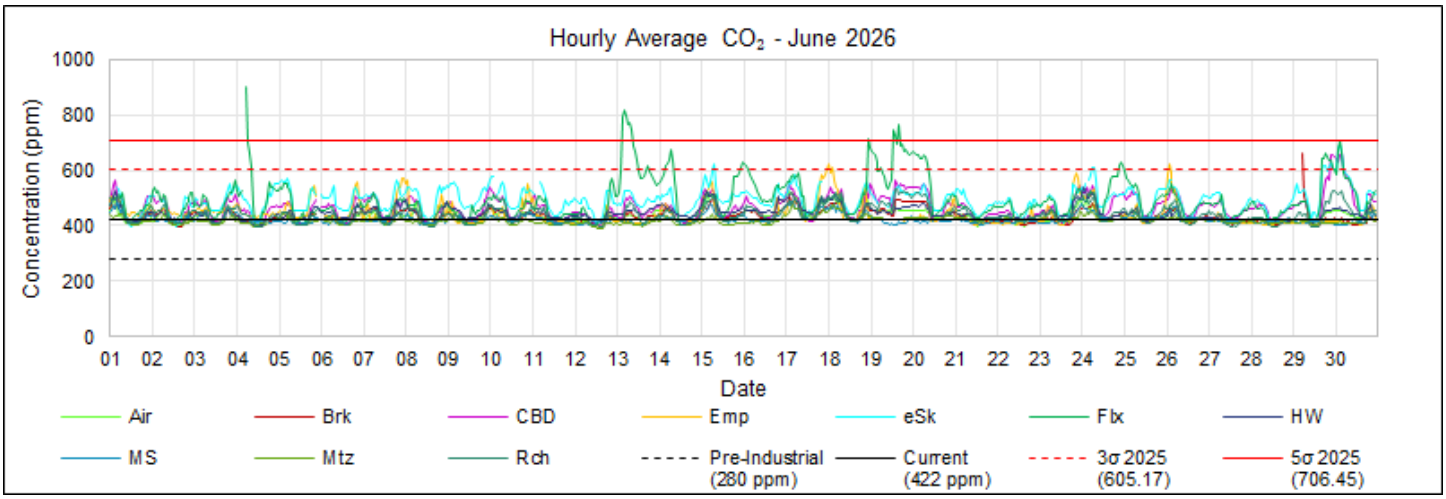

Figure 6.5: CO_2 hourly concentrations.

CO_2 hourly observations above the 3σ and 5σ screening thresholds are summarised in Table 6.2.

Table 6.2: CO_2 hourly observations above the 3σ and 5σ screening thresholds.

Limit	Air	Brk	CBD	Emp	eSk	Flx	HW	MS	Mtz	Rch	Total
3σ	0	0	7	3	12	63	0	0	0	0	85
5σ	0	0	0	0	0	11	0	0	0	0	11

6.6. Conclusion

June 2026 CO_2 monthly average concentrations ranged from approximately 419 to 495 ppm. Felixton recorded the highest monthly average, followed by eSikhaleni, CBD and Harbour West. Airport, Empangeni, Meerensee, Mtunzini, Brackenham and Richardia were closer to the illustrative 422 ppm background reference line shown in the monthly plot, with Mtunzini (419 ppm) marginally below it; small differences around this line should be interpreted in the context of sensor uncertainty. Using the exact unrounded hourly thresholds (3σ = 605.2 ppm; 5σ = 706.5 ppm), 85 observations were above 3σ, and 11 were above 5σ. Felixton dominated the events (63 above 3σ and all 11 above 5σ), followed by eSikhaleni (12 above 3σ), CBD (seven) and Empangeni (three); no other station recorded a flag. The results are indicative screening information for local accumulation and mixing conditions, not a regulatory compliance metric. June data completeness ranged from 95% to 100%; all sites met the RBCAA 95% operational target, the 90% SANAS-related reporting expectation and the 80% statistical-robustness threshold.

Regulatory and health-limit conclusion: the CO_2 results do not represent regulatory or health-limit exceedances. The elevated short-term flags, particularly at Felixton, identify local accumulation events for follow-up but should not be interpreted as ambient health-limit breaches.

Station-specific conclusion: no CO_2 station exceeded an applicable ambient regulatory or health limit or standard; Felixton should be highlighted only as the dominant short-term CO_2 accumulation location, not as a health-standard exceedance location.

Correlation with the June 2026 technical report: Felixton is a relevant overlap within the monthly reporting period: it recorded the strongest AirGradient CO_2 screening activity, while the reference network recorded Felixton $PM_{2.5}$/TRS events, and the complaints log included a Felixton Village odour complaint. This month-level comparison demonstrates no temporal correlation or source attribution.

7. CONSOLIDATED AIRGRADIENT MONITORING CONCLUSION

Overall, the June 2026 AirGradient monitoring results indicate that the secondary screening network provided useful spatial and short-term event context. Still, the data remain indicative and are not equivalent to reference or regulatory-equivalent analyser data. No AirGradient result should be interpreted as a statutory compliance finding. The only parameter for which regulatory and health-based benchmark comparisons were applied was particulate matter. Across the AirGradient particulate dataset, no PM_{10} daily average exceeded the RSA 24-hour standard, one $PM_{2.5}$ daily average (Empangeni, 3 June 2026) exceeded the RSA 24-hour standard, and monthly averages were below the applicable RSA annual standard values; annual compliance cannot be concluded from one month of screening data. The WHO health-based guideline comparisons were more conservative. They flagged PM_{10} at all stations except CBD, and $PM_{2.5}$ at all stations, indicating health-relevant particulate levels for follow-up despite the absence of RSA daily standard exceedances.

TVOC and NO_x outputs are dimensionless index values, and CO_2 is used as an ambient screening/tracer parameter; no applicable ambient regulatory or health-based exceedance is concluded for these parameters. TVOC recorded 153 hourly observations above 3σ and none above 5σ. NO_x screening flags occurred only at eSikhaleni (57 above 3σ and 37 above 5σ), but completeness at this site was 76%, so its event counts require cautious interpretation and corroboration. CO_2 recorded 85 observations above 3σ and 11 above 5σ; all 5σ flags occurred at Felixton. These findings are local screening triggers, not compliance or health-limit breaches.

Correlation with the June 2026 technical report is event-based rather than quantitative. Notable overlaps within the reporting month include the regional particulate episode on 3 June 2026 and the Felixton combination of CO_2 screening activity, reference-network $PM_{2.5}$/TRS events and complaints. Other overlaps at eSikhaleni, Brackenham, Harbour West and Richardia indicate follow-up priorities only. These are month-level associations; co-location, reference/equivalent measurements and meteorological/source analysis are required before concluding equivalence or attribution.

Data completeness was acceptable for PM and CO_2 (95%–100% at all sites). TVOC/NO_x completeness ranged from 76% to 100%; eSikhaleni was below the 80% statistical-robustness threshold because data were unavailable from 23 to 29 June 2026. The June monthly TVOC and NO_x statistics for eSikhaleni were therefore withheld.

8. ACKNOWLEDGEMENT

Air Impact Measurement Specialists compiled this report for the Richards Bay Clean Air Association; contributors include Alicia Garnica and François Nel.

9. REFERENCES

Clements, A., Duvall, R., Greene, D., & Dye, T. (2022). *The Enhanced Air Sensor Guidebook*. Retrieved from https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=356426

Republic of South Africa. (2009). *National Ambient Air Quality Standards.* Government Gazette No. 32816.

Republic of South Africa. (2012). *National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter Less Than 2.5 Micrometres ($PM_{2.5}$).* Government Gazette No. 35463.

Sensirion AG. (2022). *What is Sensirion's NOx Index?* Retrieved from https://sensirion.com/media/documents/9F289B95/6294DFFC/Info_Note_NOx_Index.pdf

Sensirion AG. (2022). *What is Sensirion's VOC Index?* Retrieved from https://sensirion.com/media/documents/02232963/6294E043/Info_Note_VOC_Index.pdf

World Health Organization. (2021). *WHO global air quality guidelines: particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.* World Health Organization. Retrieved from https://www.who.int/publications/i/item/9789240034228