



South Africa Air Quality Information System Upgrade Project

Air Quality Lekgotla, Cedar Woods of Sandton Hotel

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environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



**South African
Weather Service**

ISO 9001 Certified Organisation



Presentation Outline

SAAQIS Background

- Background to SAAQIS Development

SAAQIS Upgrade Project Development

- New SAAQIS Infrastructure & Website
- Monitoring Network Data Flow to SAAQIS
- SAAQIS Document Management Module

SAAQIS Upgrade Project Implementation

- Migrating Archived SAAQIS Data
- Rolling out new SAAQIS & Other Monitoring Networks
- Demonstration of New SAAQIS and APP

SAAQIS Background

- **SAAQIS first developed in 2007**
- **Implemented from 2009-2011**
- **Then challenges with the quality of the data management system (limited capacity for QA/QC, accommodating growing users etc.) were identified**
- **With time, technology advancements were needed with website and information dissemination systems – website, mobile etc.**
- **In 2011 realisation that system was no longer meeting user requirements.**
- **Many attempts since 2013 to upgrade SAAQIS.**

SAAQIS Background

- **Appointed EnviTech in May 2017**
- **This is the Envidas/Envista suite of air quality information systems providing SA with an off-the-shelf solution, modified to suit SA conditions**
- **SAAQIS Upgrade will ensure:**
 - “LIVE” reporting of all operational government owned ambient stations by 2017.
 - The dissemination of air quality information to the public via all possible communication platforms including websites, billboards, mobile devices (IOS and Android).
 - Effective online Asset Management of the national ambient air quality monitoring network.
 - Effective dissemination of all AQ information.

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New SAAQIS Infrastructure

- **SAAQIS new solution consists of several modules:**
 - 1) **NAAQMN Station Ultimate** – Station Management Module (optional)
 - 2) **NAAQMN Asset Maintain** – Asset Management Module (part of SAAQIS)
 - Will be accessed online through the SAAQIS website
 - 3) **NAAQMN Data Management** – Data Management and Reporting Module
 - For data verification, management and generating reports
 - Provides data to the SAAQIS website for the general public
 - 4) **SAAQIS Web** – website that allows NAAQMN Data Management to be published on the web

4b. Mobile APP

4a. SAAQIS Website

2. NAAQMN
Data
Management
and
Reporting
Module

3. NAAQMN
Asset
maintain
(Asset
Management
Module)

Document Cataloguing
Module

Events/Conferences/
Links

Learners Corner

Complaints Register

AQMP Information

SAAELIP

1. NAAQMN Station
Management Module

NAAQMN – ambient
monitoring stations

NAAQMN



New SAAQIS Website Content

- New SAAQIS website with:
 - **LIVE reporting at the core of the webpage, INDEX, POLLUTANTS, METEOROLOGY**
- Improved document cataloguing system (legislation, AQMP, etc.)
- **Interactive Learners Corner with information for school children and the public**
- SAAELIP landing page (AEL and NAEIS)
- AQMP Information
- Complaints registration centre that will send communication to jurisdiction personnel
- AQ Officers Contact Information

SAAQIS New Website



South African Air Quality Information System - SAAQIS



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Dynamic Tables Menu

[Monitoring Site Summary](#)

[Current levels](#)

[Air Quality Lekgolta](#)

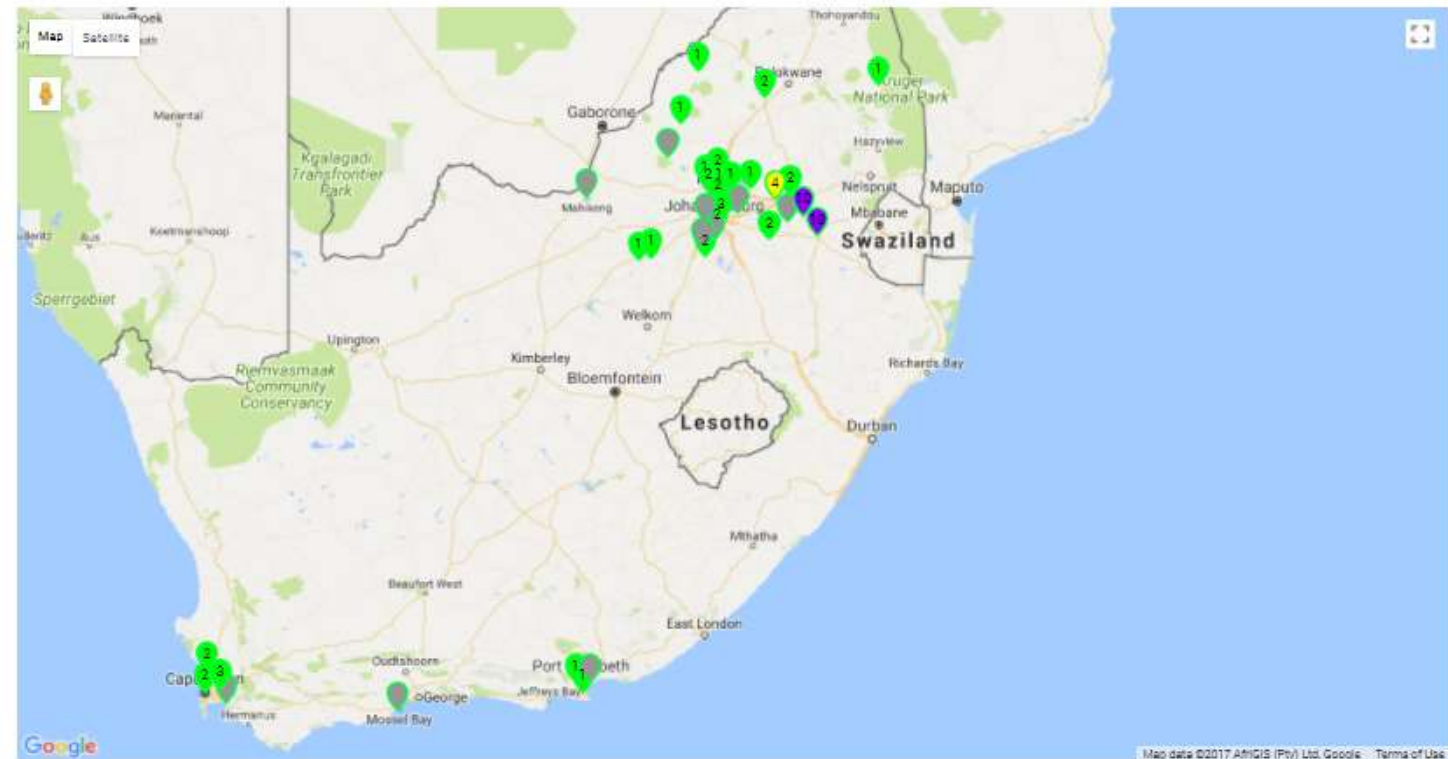


ANDROID APP ON
Google Play



Available on the
App Store

Latest News



Air Quality Index:

1 - 3 Good 4 - 5 Moderate 6 - 7 Unhealthy 8 - 9 Very Unhealthy 10 Hazardous No Data



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Ambient Monitoring Data Flow (NAAQMN Station Ultimate)



COMMUNICATION MODULE

SAAQIS DATA ASSURANCE

SAAQIS DATA MANAGEMENT

DYNAMIC
DISPLAY& GIS

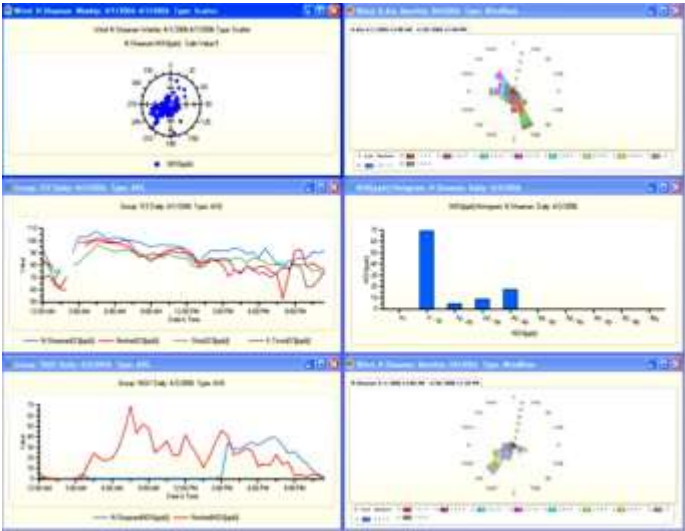
ANALYSE

REPORTS

EDIT DATA
VALIDATE

PUBLIC
DISTR.(MOBILE,
WEBSITE ETC

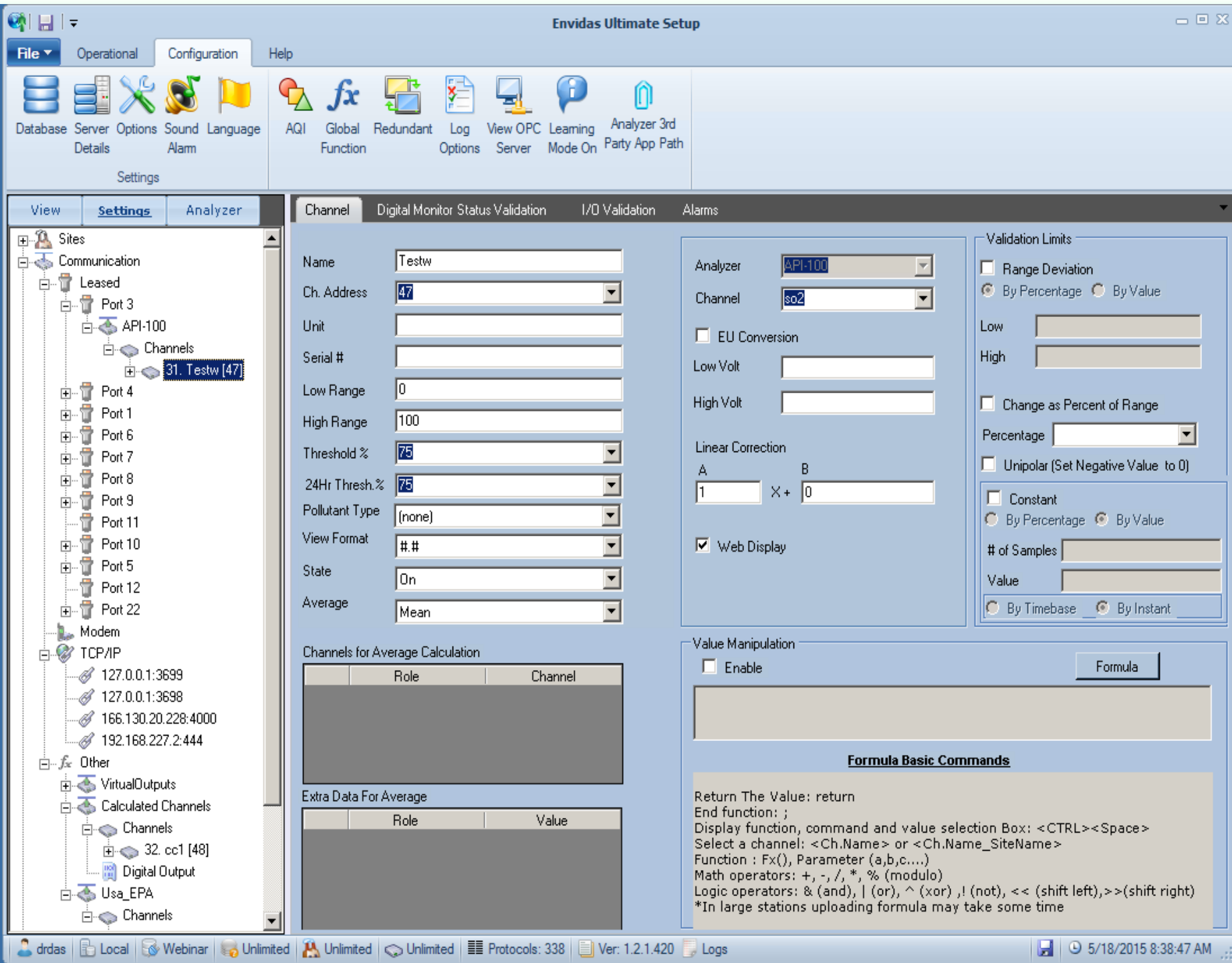
ASSET MAN.



| | | |
|--------------------------|----------------|----------|
| Submit Maintain Request | Maintain Diary | Calendar |
| Submit Audit Calibration | Tools | Reports |

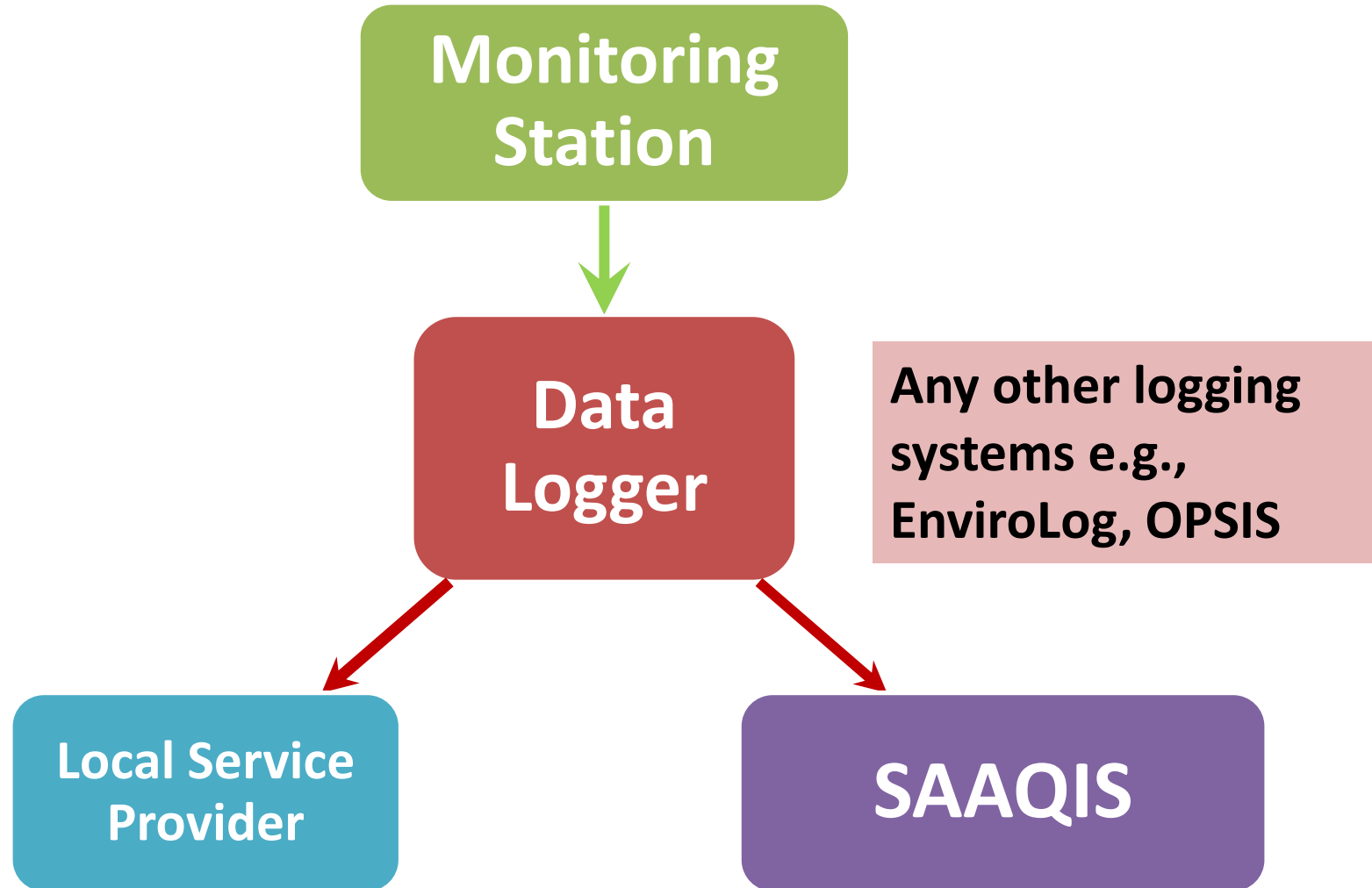
NAAQMN Station Ultimate

- **NAAQMN Station Management Module will allow:**
 - Data acquisition system setup for communication of instruments with SAAQIS server.
 - Control for environmental and process monitoring applications.
 - Setting up and configuring of station (all instruments).
 - Providing remote access to site and instrumentation.
 - First level of data QA\QC (optional for SAAQIS).
 - Local reporting, graphical representation, dynamic charts, dynamic displays, data export features at station level.



NAAQMN Station Ultimate

Networks Using Different Logging Systems



Ambient Monitoring Data Flow



COMMUNICATION MODULE

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DYNAMIC
DISPLAY& GIS

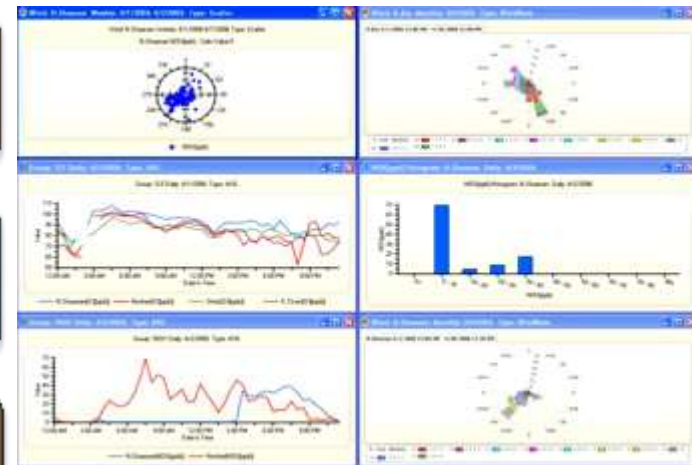
ANALYSE

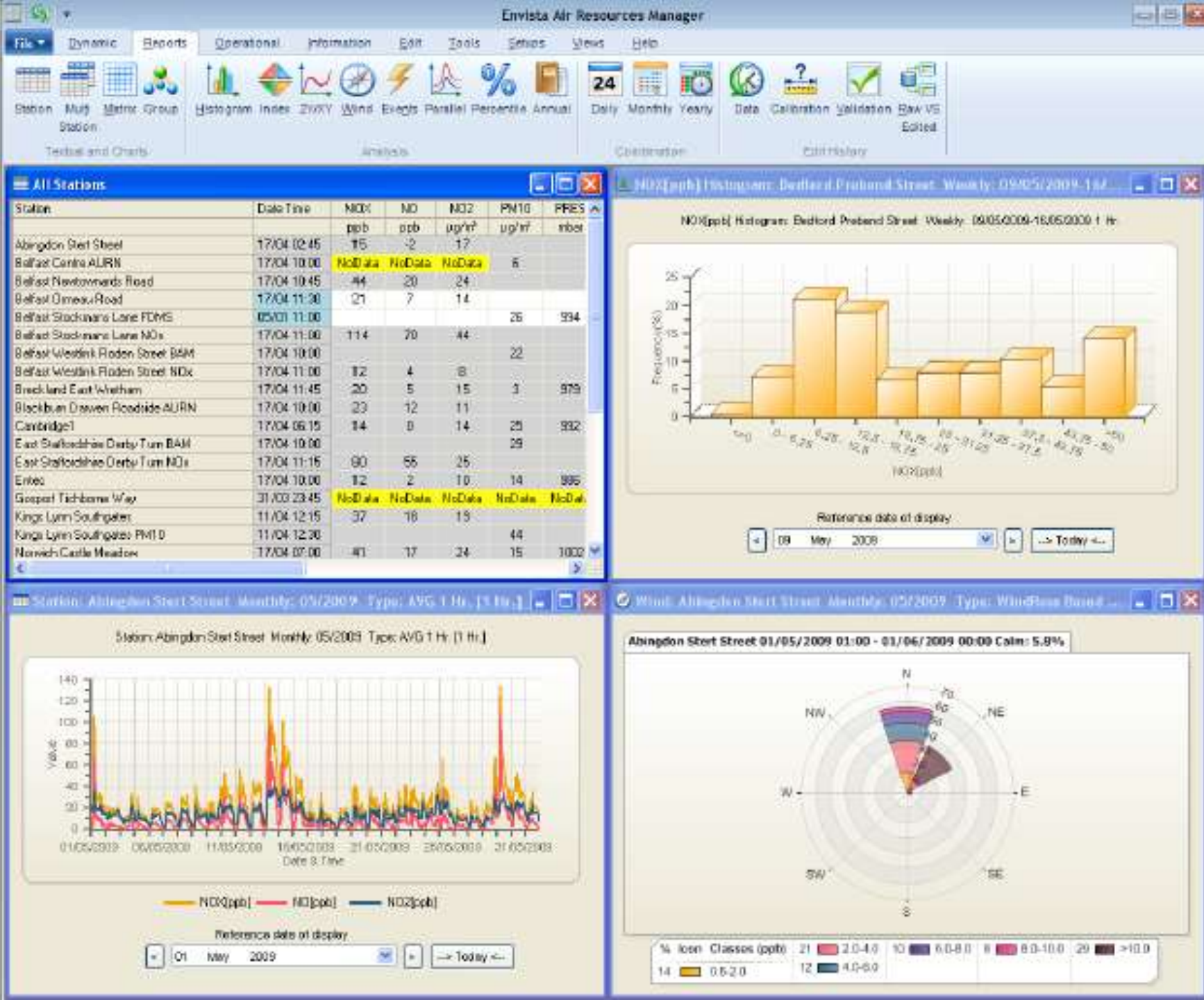
REPORTS

EDIT DATA
VALIDATE

PUBLIC
DISTR.(MOBILE,
WEBSITE ETC

ASSET MAN.





NAAQMN Data Management Module

NAAQMN Data Management Module

Ambient Monitoring Station Owners

- Data verification and evaluation
- View dynamic data plots (time series, wind roses, pollution roses, scatter plots etc.)
- Manage station data
- Generate AQ Monitoring Reports, daily, weekly, monthly, annual or custom
- Distribute data across the full range of media - website, mobile, smart platforms etc.
- **Access data via SAAQIS website or installed on personal computers with secure access**

Public

- **View dynamic data plots (time series, wind roses, pollution roses, scatter plots etc.)**
- **Analyses of all NAAQMN data**
- **Access monitoring data via SAAQIS website**
- **Downloading data will be confirmed with SAAQIS Data Policy**

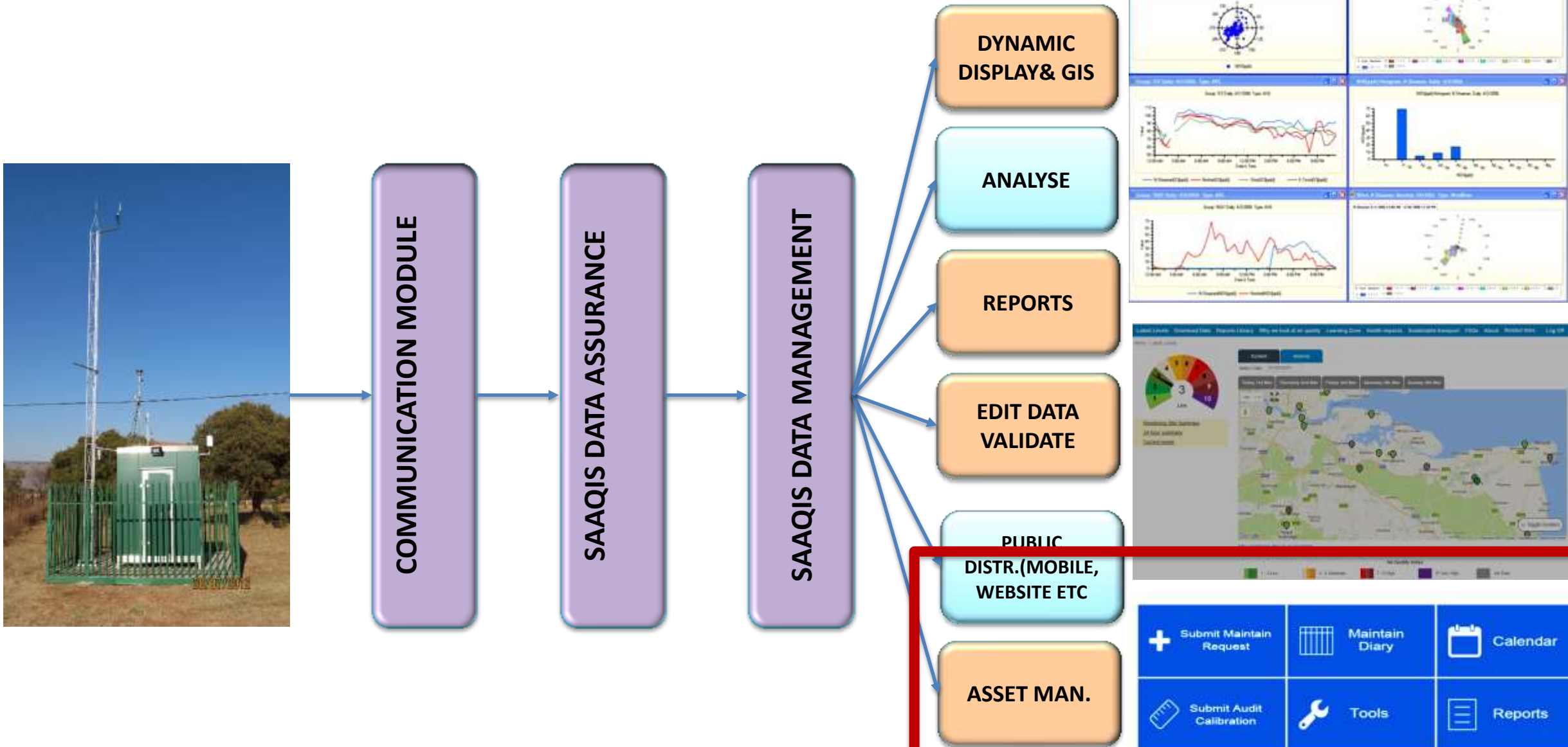
Protocols on Data Management: Levels of Data

| Description | Data Level | Remarks |
|---|------------|---|
| Raw data | Level 1 | <ul style="list-style-type: none">• Dataset that cannot be altered in any way in the database. |
| Automatically adjusted data – Provisional | Level 2 | <ul style="list-style-type: none">• Data is evaluate using default data management system algorithms e.g., to remove suspicious data spikes before display.• This is the LIVE data reported to the public in the form of an Air Quality Index.• All changes are flagged in the database. |
| Verified final data | Level 3 | <ul style="list-style-type: none">• Data validated based on acceptable quality control procedures e.g., adjusting for instrument drift/zero shifts.• Data quality takes into account all necessary data quality requirements.• This is the level of data used for reporting air quality to all stakeholders e.g., monthly, annual reports.• All changes to data between levels justified and documented as part of the quality system.• Data changes are flagged in the database. |

Minimum data requirements for averaging

| Parameter Time Resolution | Required Proportion of Valid Data (until 31 December 2020) | Required Proportion of Valid Data (from 01 January 2021) |
|--------------------------------|---|---|
| 1 hour values | 75 % of values (i.e. 45 minutes) | 80 % of values (i.e. 48 minutes) |
| 8 hours values | 75 % of values (i.e. 6 hours) | 75 % of values (i.e. 6 hours) |
| 24 hour average value | 75% of values (i.e. 18 hours) | 83% of values (i.e. 20 hours) |
| Annual mean | 75 % of the 1 hour values over winter (April to September)* | 80 % of the 1 hour values over winter (April to September)* |
| Number of exceedances per year | Five out of six months over the winter season (April to September)* | Five out of six months over the winter season (April to September)* |

Ambient Monitoring Data Flow



General

Diagnostics

Files

Edit Device Model

Category

GasAnalyzer

Manufacturer

Teledyne API

Supplier

Envitech LTD

Model

T200

Method Code

001

Original Cost

Minimum Detect Limit

%

Uncertainty

%

Resolution

%

Description

Chemiluminescence NO/NO2/NOX Analyzer

Select for View/Edit

Add

Teledyne API

T200

5/6

<<

>>

Save

Clear all

Delete

Cancel

NAAQMN

Asset Maintain

NAAQMN Asset Maintain - Management Module

- **Ability to manage all assets at the station (analysers, zero air generators, calibrators, pumps, met instruments, spares, etc.**
- **Add and management of devices of each station by its supplier, manufacturer including images, user's manual and datasheet**
- **Add and management of spare parts for each device.**
- **Management of Maintain Dairy – displaying fault events that were inserted to the system.**
- **Producing maintain, calibration and inventory reports.**
- **Displaying interactive calendar, activities, and status.**
- **Adding calibration events.**
- **ISO 17025 Accreditation System.**

NAAQMN Asset Maintain

Draft Norms and Standards Chapter 5

- **Operational Documentation**
 - Quality Manual
 - ☺ Administration Manual
 - ☺ Standard Operating Procedures Manuals
- ✓ **Calibrations**
 - Standards And Traceability
 - Zero And Span Checks
 - Multipoint Calibrations
- ✓ **Frequency of Maintenance and Calibration Activities**
 - Daily Checks
 - Routine Station Visits
 - Non-routine Station Visits
- ✓ Performance Acceptance Criteria
- ✓ System Audits

SAAQIS NAAQMN Asset Maintain

- Administration Manual (Station Visit Reports, Visit Logs)
- Instrument Files
 - Instrument data sheets
 - Calibration certificates
 - Servicing records
 - Reparative maintenance records
 - Performance check logs
 - Movement register (history of where instrument was located)
 - Manufacturer Manuals and Brochures
- Frequency of Maintenance and Calibration Activities – linking activities to reporting and data management

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SAAQIS Document Management Module

- **Ambient Monitoring Reports**
 - Monthly, Annual Reports from all networks
- **Legislation**
 - Acts, AQMPs
 - Regulations, Policies
 - Strategies, Guidelines, SOPs, Bylaws etc.
- **Publications**
 - NAQO reports
 - SoA reports
 - Special Projects reports

Air Quality Information and Links

- **AQ Leaners Corner – interactive learning material for students/public on air quality and climate change**
- **Databases of AQ Officers (contact details etc.)**
- **Complaints Registers – linked to AQO per jurisdiction**
- **Events Announcements and Useful Links**

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Archived Ambient Monitoring Data Migration

- **Historical data – NAAQMN Ambient Monitoring Module**
 - Have provided the service provider with the SAAQIS archive.
 - Configured SAAQIS archive to fit the new system – channels, station types, names.
 - All historical data has been migrated – currently performing QA\QC check to ensure all data is migrated properly.
 - **Once data migration is done, further engagements with authorities to ensure that all data has been migrated.**
 - **Migration of data from those stations currently not reporting to SAAQIS.**

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Rolling out the new SAAQIS

- **ALL Priority Area Networks using the NAAQMN Station Ultimate – hence “LIVE” reporting to SAAQIS**
- **Also working on stations currently using NAAQMN Station Ultimate software to report LIVE to SAAQIS**
 - eThekweni Metro (14 stations depending on conditions of operation and availability of logging systems)
 - City of Cape Town (14 stations)
 - Western Cape Province (9 stations)
 - Mangaung Municipality (3 stations)
 - Saldanha Bay Municipality (2 stations)

LIVE Reporting of Other Stations

- **Reconfigured logging systems from those stations currently being managed by other service providers:**
 - GDARD – 10 stations (2 x Sedibeng, 4 x CoJ, 4 x CoT)
 - Ekurhuleni – 10 stations
 - Rustenburg Municipality – 3 stations
 - **LEDET – 1 station**
 - NWPG – 7 stations
 - COEGA Development Corporation (3 stations) and Nelson Mandela Municipality (5 stations)
- **Service providers working to make data transfer possible.**
- **DEA to engage with networks to enable this (with further discussions on data management).**

SAAQIS Roll-Out

- **Continue engaging with other logging system distributors (and respective network owners) to enable all government owned stations under their management to report LIVE to SAAQIS.**
- **Station owners to notify DEA of any other loggers they are utilising so that protocols can be developed for LIVE reporting.**
- **Industries reporting to SAAQIS – more engagements with station owners.**

Training and Support

- **NAAQMN Station Ultimate SOPs under development.**
- **NAAQMN Data Management SOPs under development.**
- **40 government officials trained in July for a week.**
- **SAWS updating priority area asset registers.**
- **To assist municipalities with the asset updates – first step in finalising network configurations.**
- **Further training once system is completed.**

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Hourly Monitoring Data

< Oct 2, 2017 >

Search Here

Zamdela

SO2 [ppb]



| Current | Min | Daily Avg | Max |
|---------|-----|-----------|------|
| 18.0 | 1.0 | 4.0 | 12.0 |

NO2 [ppb]



| Current | Min | Daily Avg | Max |
|---------|------|-----------|-----|
| 4.0 | -1.0 | 2.3 | 7.0 |



NO [ppb]



| Current | Min | Daily Avg | Max |
|---------|-----|-----------|-----|
| 2.0 | 1.0 | 1.6 | 3.0 |



Hourly Monitoring Data



AQI Current Hour Reports



Ozone 8-hr Rolling Average



PM2.5 24-hr Rolling Average



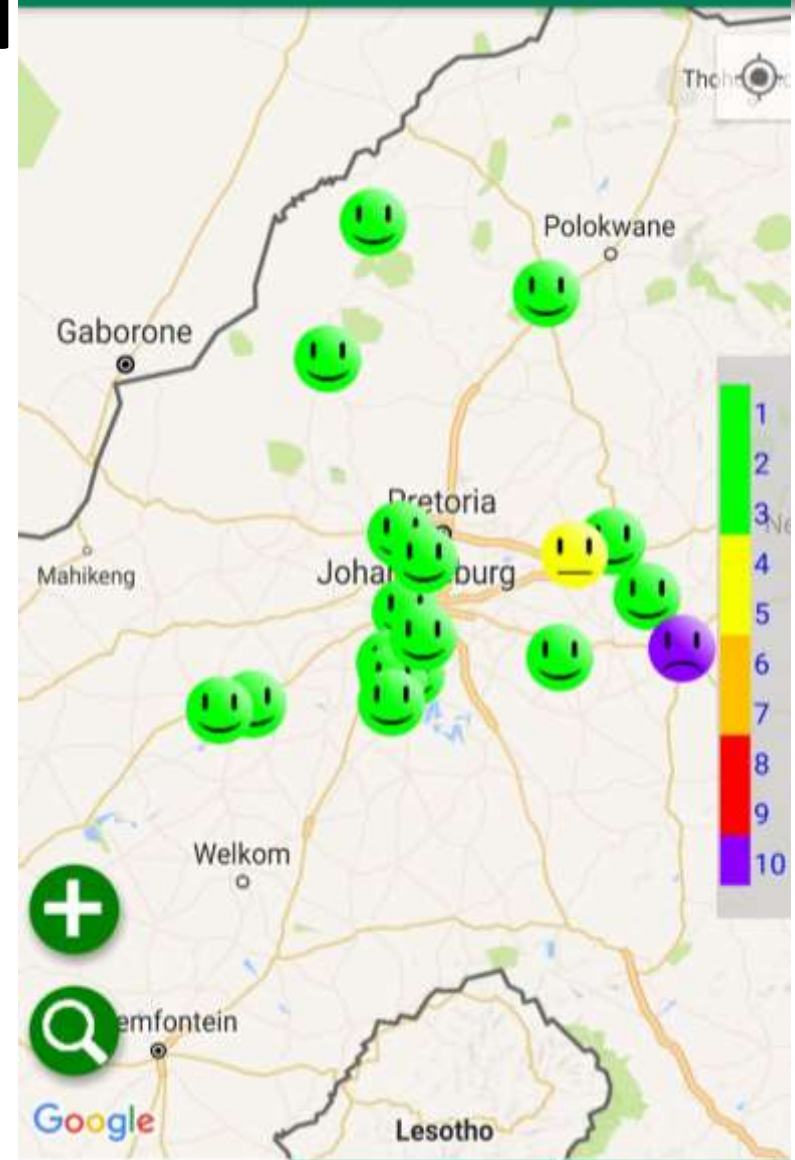
Highest AQI



Highest PM2.5



Highest Ozone



Demonstration

- www.saaqis.online
(to be www.saaqis.environment.gov.za).
- SAAQIS APP – search your App store for SAAQIS.
- Visit SAAQIS demonstration at stand outside main hall.

Acknowledgements

- **SAAQIS PSC Team from DEA and SAWS.**
- **Service provider – EnviTech.**
- **Local service provider C&M with the configuration of OPSIS data logging systems.**
- **Network owners whose stations are already reporting LIVE on SAAQIS.**

Thank You!