



APPENDICES

BUSHFIRE ADVISORY COMMITTEE MEETING

To Be Held

Wednesday, 8th March 2023

Commencing at 7.00pm

At

**Shire of Dardanup
Administration Centre Eaton
1 Council Drive - EATON**

This document is available in alternative formats such as:
~ Large Print
~ Electronic Format [disk or emailed]
Upon request.



Bunbury Geographe Integrated Information Network (BGIRRIN)

Live micro-climate weather, air quality, remote visibility, public safety, early detection and local industry and tourism support, in a single integrated, intelligent network.

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Delivering real needs for local councils

The Bunbury Geographe Integrated Information Network

The construction of the Bunbury Geographe Integrated Information Network (BGIRIN) delivers a new level of continuous real-time, accurate, region-wide information, available for all residents, visitors, local industry and services, providing situational awareness for the entire community. This year-round resource provides micro-climate weather, air quality, fire detection, notification and live information to aid informed decisions regarding personal safety, health and well being as well as support the local agriculture industry.

Access to live information

The BGIRIN interface and App provides 24-hour access to view live local weather, rainfall, visual and thermal images and air quality readings at each location. The network is expandable, so over time the network can be developed into a region wide information hub connecting the entire community in real-time to their region and environment, providing a sense of cohesion, support and confidence.

Instant notification

Registered users can establish threshold alerts to receive instant notification via email or SMS of adverse conditions or ignition information. All notifications enable users to view images and conditions at the location, delivering critical information throughout an event. Ignition notifications and live conditions are provided directly to first responders to enable rapid response, ongoing intelligence and live situational awareness.

An integrated intelligent platform

The BGIRIN intelligent platform allows the connection of existing and future sensing, CCTV, smart technology, automation and systems. Combining data and information from multiple systems allows greater in-depth insight and understanding, allowing for improved future planning (including digital twin creation), fine-scale region-wide management, public health and safety and local industry support.

Monitoring

Attentis monitors all networks 24/7 to ensure all components – sensors, interfaces, applications, connectivity, functionality – operate continuously through the lifecycle of the network. This ‘heartbeat technology’ supports community confidence that the network is monitoring the region for all events, everyday.

“For fire particularly, Attentis sensors can monitor weather conditions leading into the fire season, then detect fire ignition, location, temperature and movement. Multiple fires can be viewed simultaneously so that active conditions affecting fire growth and movement can be better understood”

NSW Independent Bushfire Inquiry Report, sec 2.5.1.7 - August 2020

Hi-resolution visual and thermal imaging

Attentis multi-sensors incorporate thermal and visual imaging to detect hot spots, fire ignitions and changes in equipment temperature that can lead to faults, outages and fire starts.

360° time lapse video and still image recording is included in all multi-sensor units.

Extreme Weather Proof

Attentis multi-sensors are constructed using a composition of fire, shock and UV resistant polymers and include multilayer protection.

This allows continuous operation even in the harshest conditions. Attentis networks have been continuously operating for over 5 years in locations that experience extreme conditions (-40C - +51C) and experienced winds over 148 kph.

Low-maintenance

All materials and components used in multi-sensor construction are selected to minimise maintenance. Attentis administration has 24 hour remote access to diagnosis system operation and analysis. Multi-sensors also feature dual operating systems for extra redundancy. All multi-sensors are solar-powered with internal battery backup to operate in low light conditions without power input.

Made in Australia

Attentis is 100 per cent Australian owned and manufactured.

In 2019 Attentis networks were recognised as the most technologically advanced data transmission networks in Australia, receiving the 2019 Australia Smart Cities Award – Regional.

Engaging and supporting your community

Attentis is changing the way we interact with our environment.

Access to continuous real-time localised environmental data dramatically improves situational awareness, informed decision making and outcomes.

The creation of a region-wide network allows improvements in local emergency management and response, public health and safety, critical infrastructure monitoring and creates new levels of efficiency, productivity and risk mitigation for local industries and the community.

Our intelligent, patented sensors stream fine-scale, wide ranging data through our mission critical high speed networks. Data is analysed, segmented, correlated and presented through our range of easy to understand interactive interfaces and Apps.

We have successfully applied our technology to the mining, demolition and power transmission and distribution industries and in 2019, we constructed the world’s largest environmental monitoring and detection network to provide a community in a heavy industry region, with confidence and awareness through access to region-wide real-time information.

Today, we are connecting LGAs to monitor fine scale changes in environments, share information across boundaries and borders, prevent large scale disasters, warn of impending weather events and produce greater local understanding for all residents and communities

Only information delivers real-time resilience.



Live weather



Bushfire Detection



Asset Protection



Powerline Management



Noise Monitoring



Structural Integrity



Thermal Imaging



Air Quality



Flood Detection



Visual Images



Water Monitoring



Lightning Detection



Soil Moisture



Agriculture



Fire Detection



Early Notification



Pollution Detection



Livestock Monitoring



Wind Monitoring



Dust Detection



An end-to-end solution

We design sensors

Attentis designs and manufactures a vast range of highly robust intelligent, patented multi-sensors that continuously measure a vast array of conditions, capture images, stream video and detect changes, threats and faults, combined into a single stream of ultra-rich data.

We construct networks

Attentis actively works with Councils, Agencies, Industries and Communities to understand the key issues at every location. We work with you to design the network and then construct it, seamlessly. This multi-communication high-speed network then combines data and information from all locations, enabling a complete real-time picture of your region, detailing factors that influence safety, structural integrity, operations, risk, community and financial outcomes.

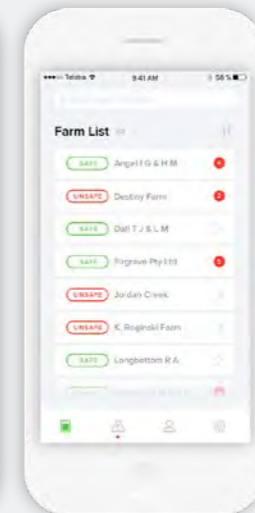
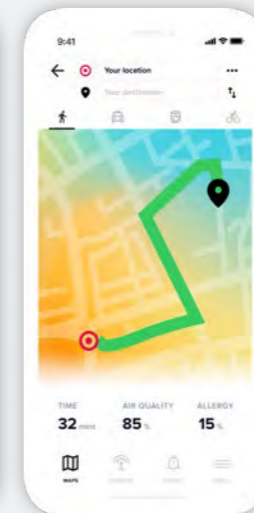
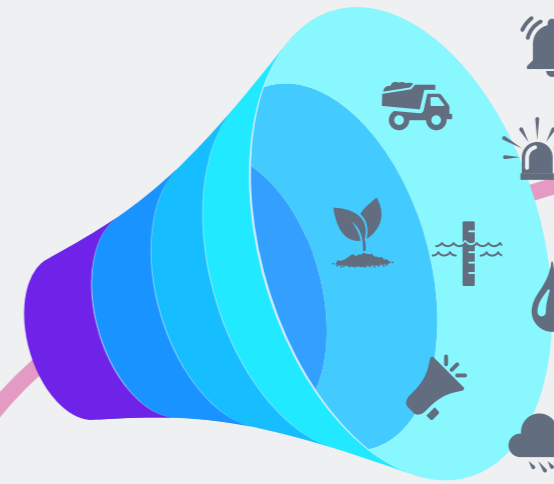
We deliver information

Attentis constructs a range of interactive interfaces and Apps to visualise data and information 24/7.

Every network is accompanied by a bespoke interface and App to provide 24 hour access to view the region and the continuous stream of real-time information from every location.

360 degree images, air quality information, river heights, micro-climate weather, rainfall, soil moisture, bridge and road information, notifications and alerts are all viewable on the interface and App.

Attentis stands alone in its ability to create integrated intelligent networks that deliver continuous real-time information.



Bunbury Geographe Integrated Information Network

Attentis multi-sensors:

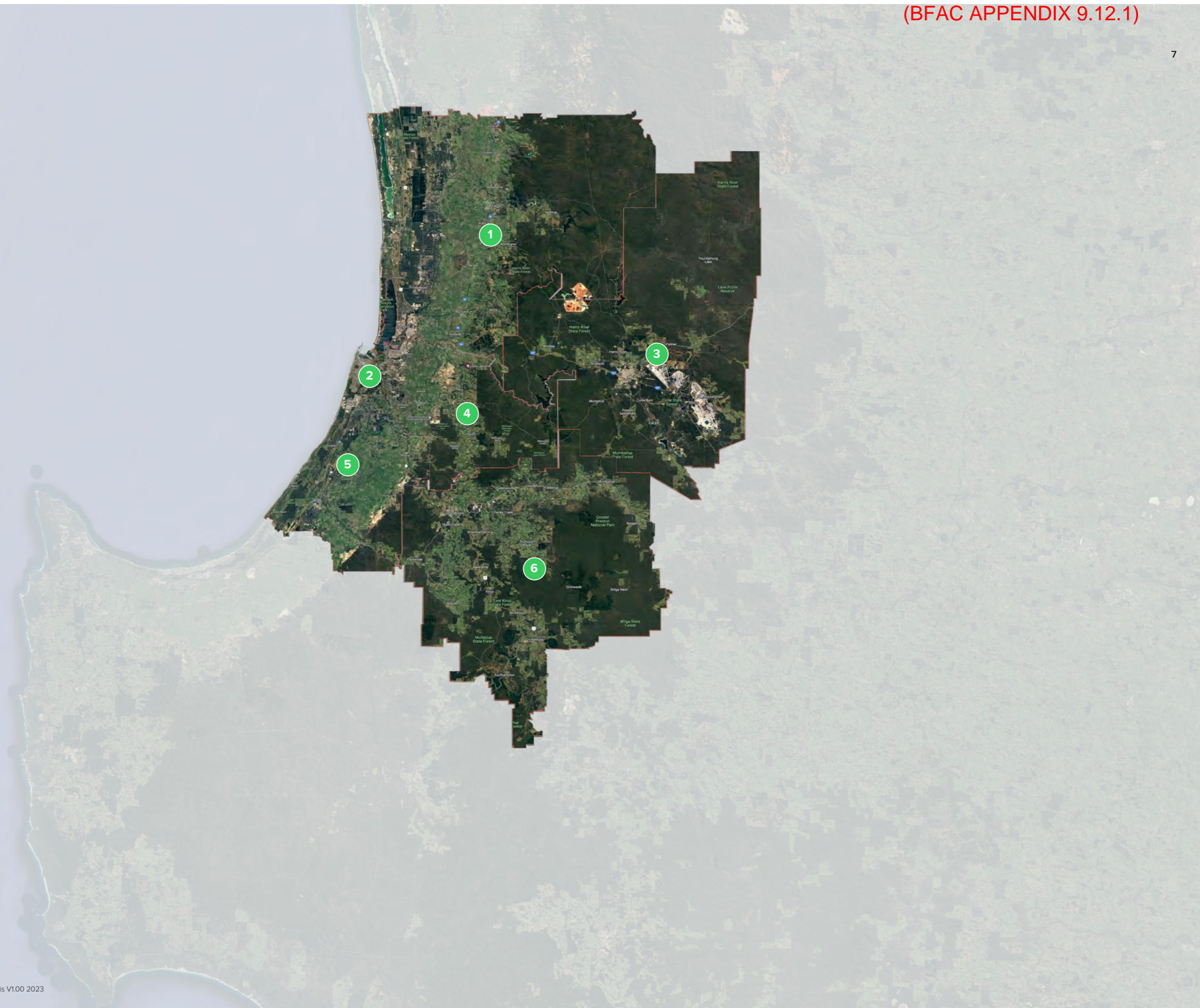
- Air quality
- Micro-climate weather (wind speed, wind direction, wind gust an vectoring, temperature, rainfall, relative humidity, barometric pressure
- River height monitoring
- Local information

Network details

88 x R11 Attentis multi-sensors

City of Bunbury Geographe Integrated Information Network Interface and App included

- 1 Harvey Shire
- 2 Bunbury Shire
- 3 Collie Shire
- 4 Dardanup Shire
- 5 Capel Shire
- 6 Donnybrook-Balingup Shire



1 Shire of Harvey

LGA size 1,729m²

217 heritage-listed sites

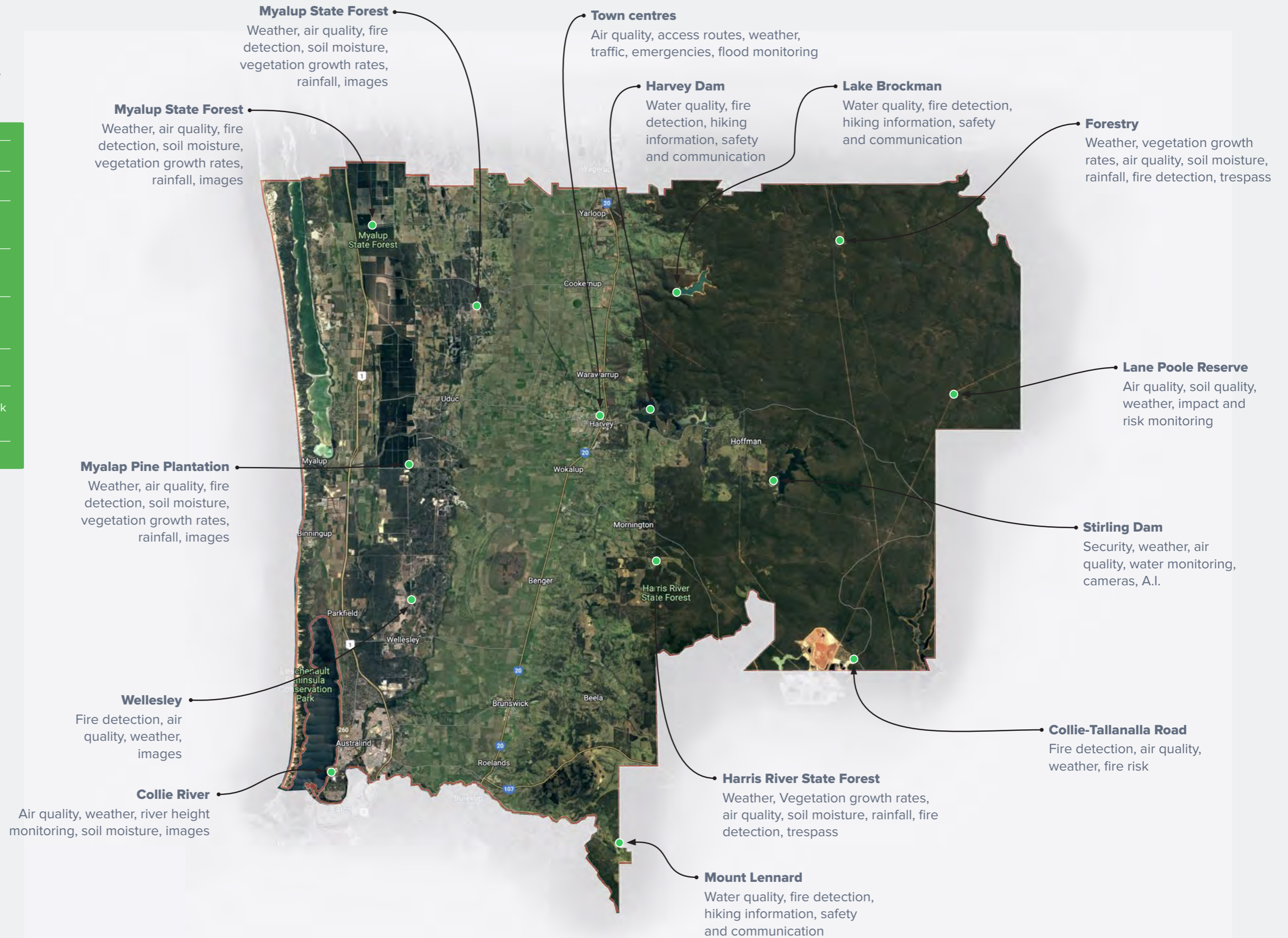
9 on the State Register of Heritage Places

Including the Yarloop Workshops (destroyed by a bushfire in 2016)

Network

14 x R11 Attentis multi-sensors

Shire of Harvey Information Network Interface and App included



2 City of Bunbury

LGA size 65km²

6 Attentis multi-sensors:

- Air quality
- Micro-climate weather
- Local information

Network

6 x R11 Attentis multi-sensors

City of Bunbury Information Network Interface and App included



3 Collie Shire

LGA size 1,711km²

198 heritage-listed places

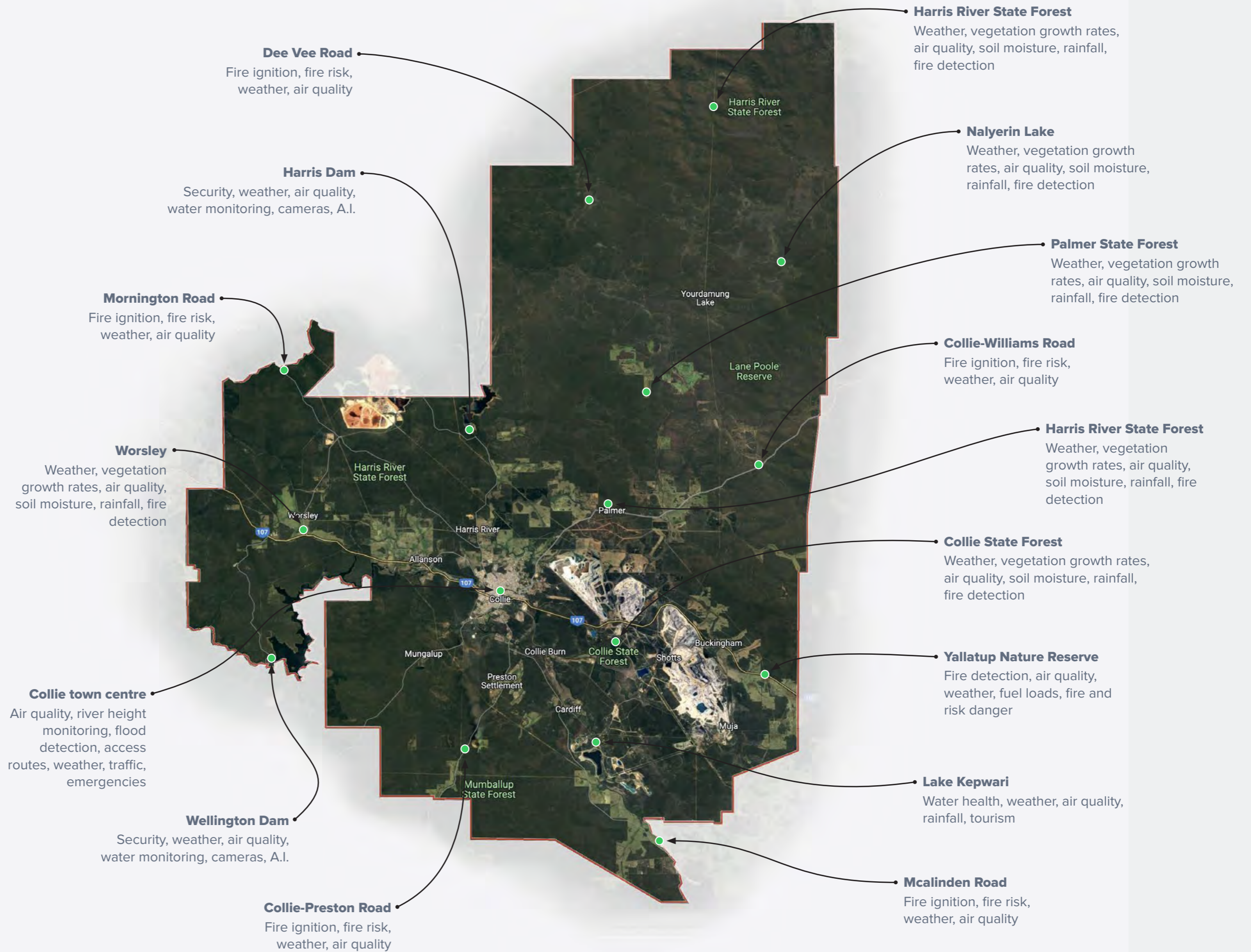
8 on the State Register of Heritage Places

Including Wellington Dam

Network

16 x R11 Attentis multi-sensors

Shire of Collie Information Network Interface and App included



4 Dardanup Shire

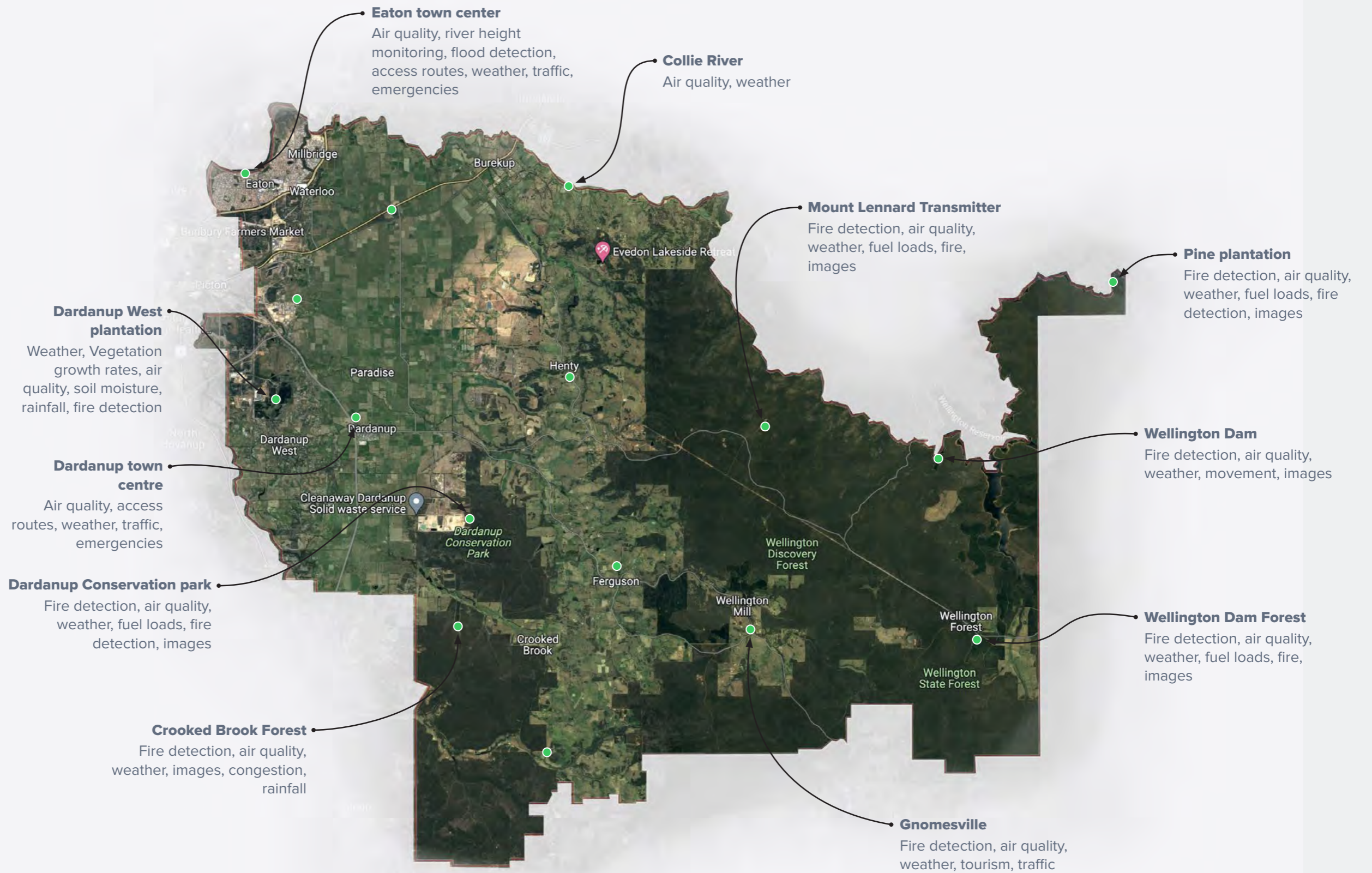
LGA size 526km2

As of 2021, 57 places are heritage-listed in the Shire of Dardanup, of which four are on the State Register of Heritage Places.

Network estimate

11 x R11 Attentis multi-sensors

Dardanup Information Network Interface and App included



5 Capel Shire

LGA size 558km²

Capel is a traditional farming area; incorporating dairy, beef, alpacas, viticulture, aquaculture and forestry (blue gums)

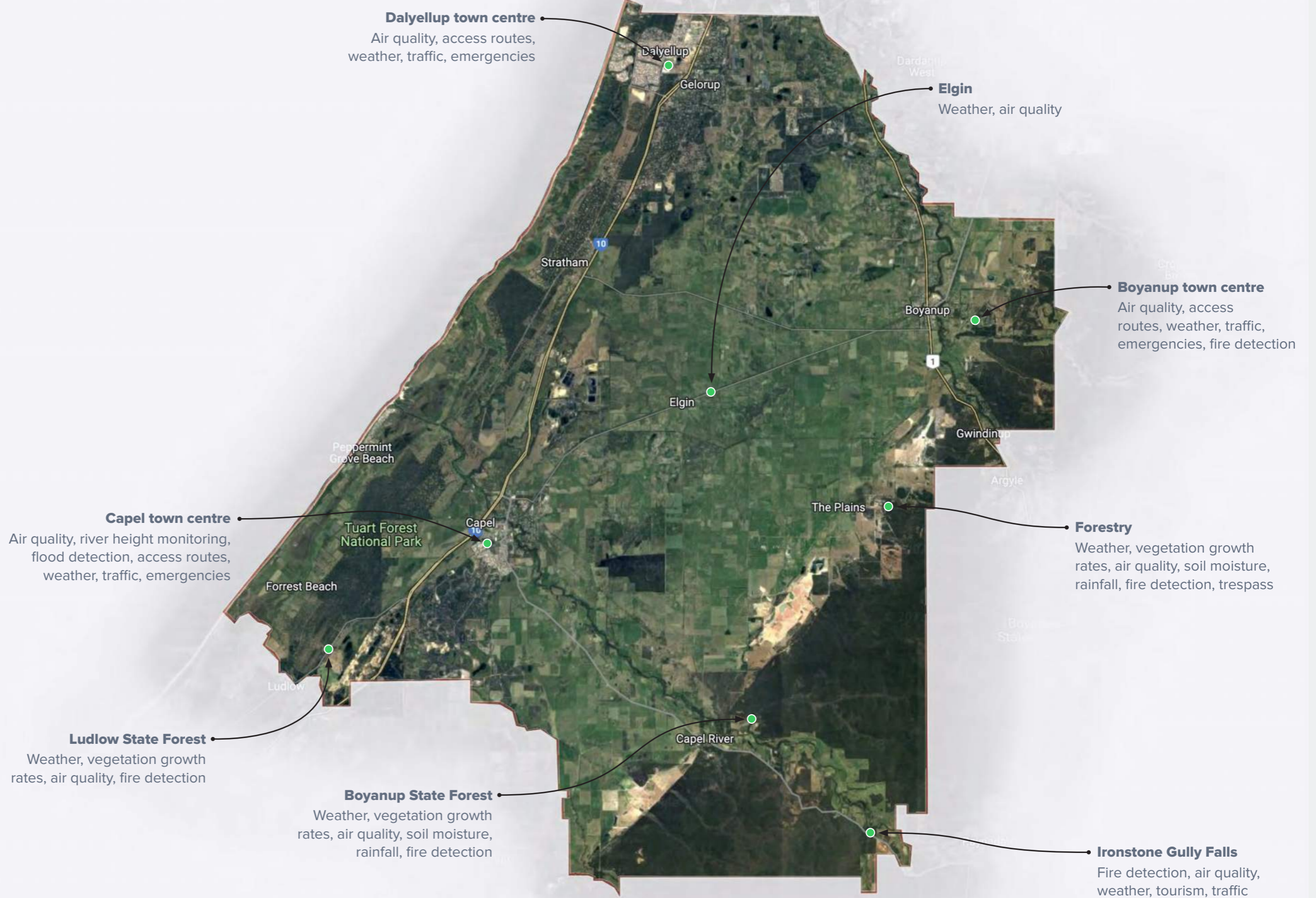
Mineral sands are present in the Shire

Tourism is increasingly important to the Shire's economy

Network

11 x R11 Attentis multi-sensor

Shire of Capel Information Network Interface and App included



6 Donnybrook-Balingup Shire

LGA size 1,561km²

113 heritage-listed places

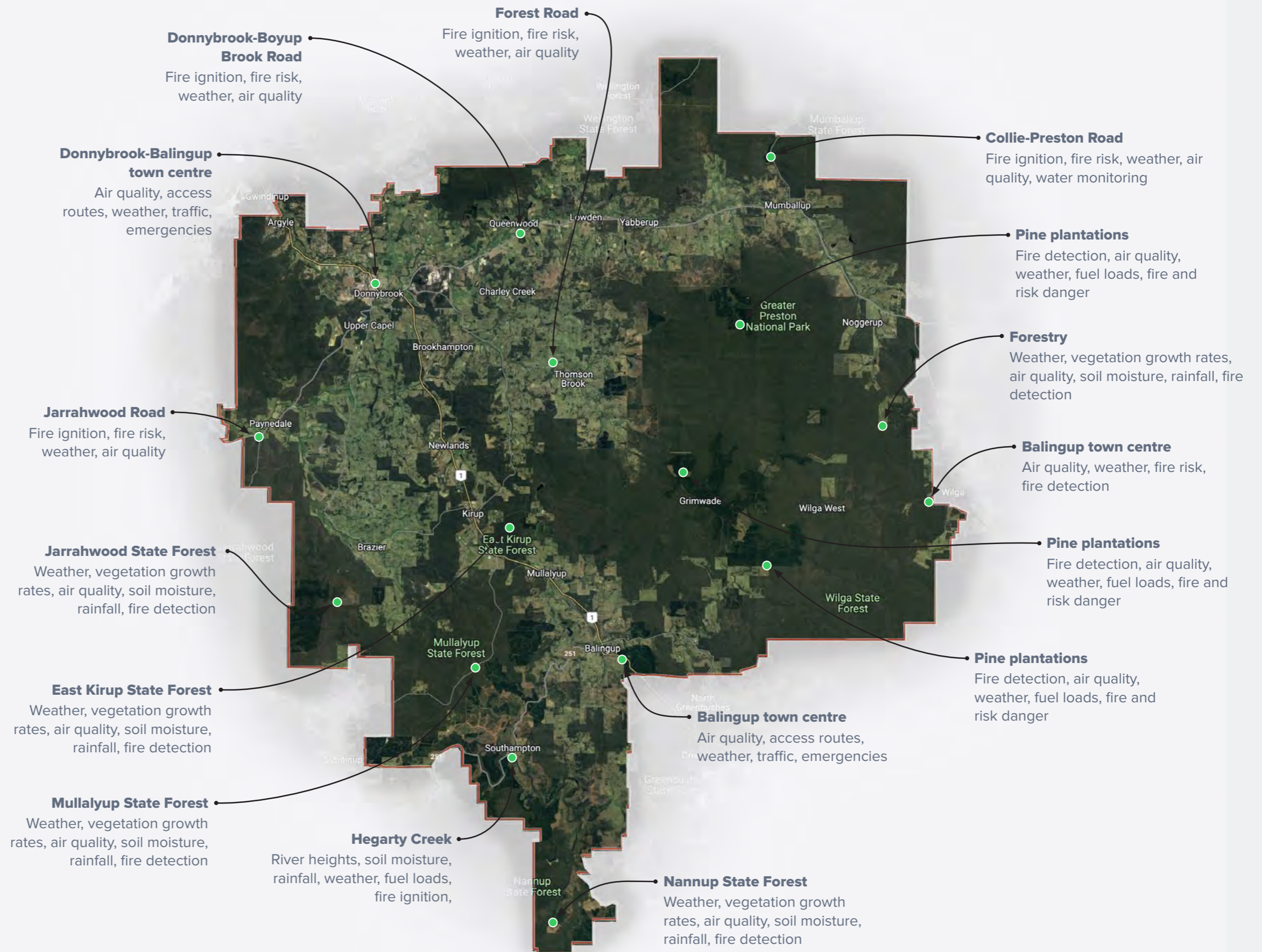
12 on the State Register of Heritage Places

Including the Southampton Homestead

Network

16 x R11 Attentis multi-sensors

Donnybrook-Balingup Information Network Interface and App included



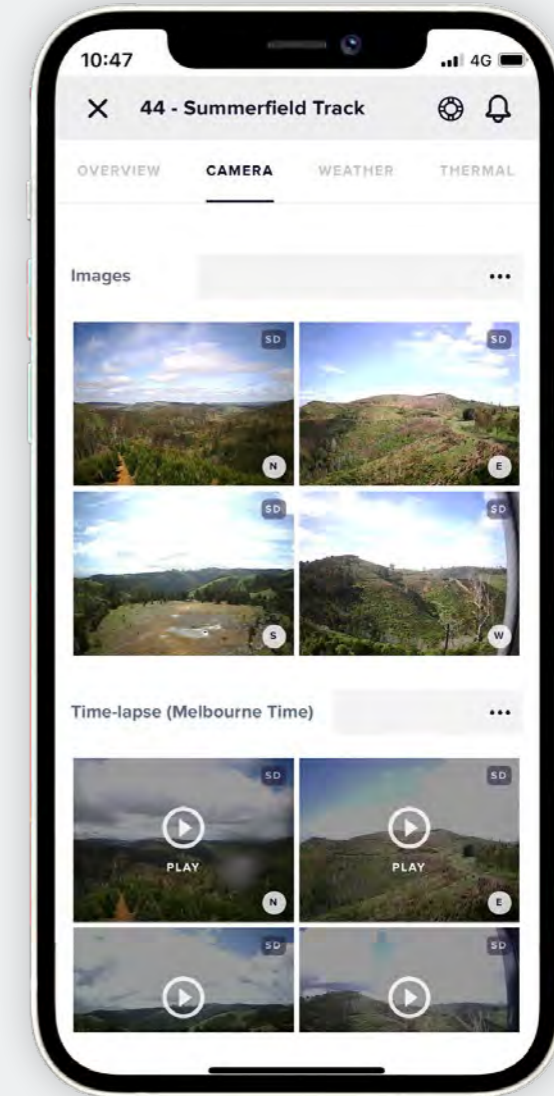
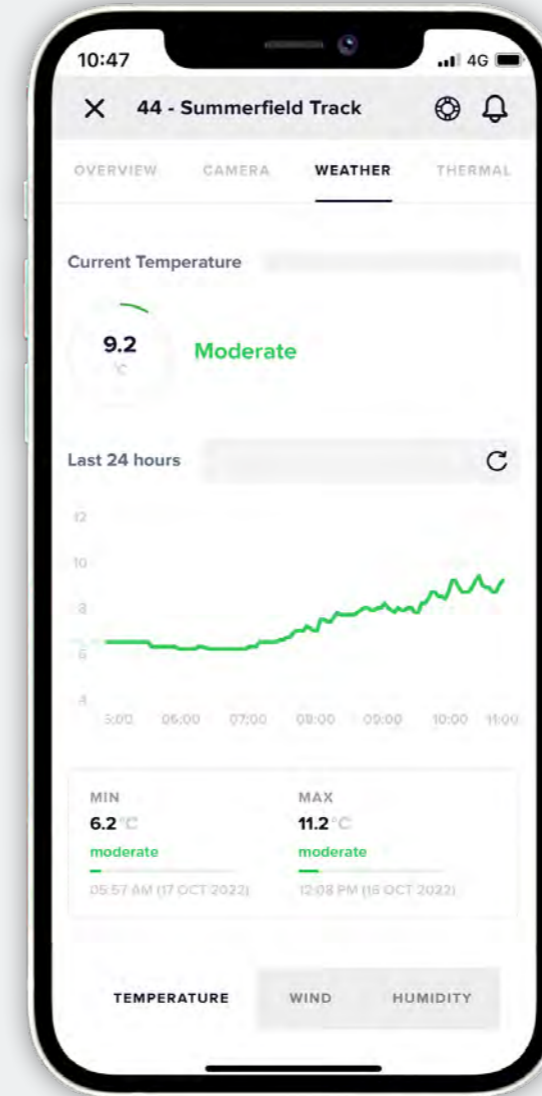
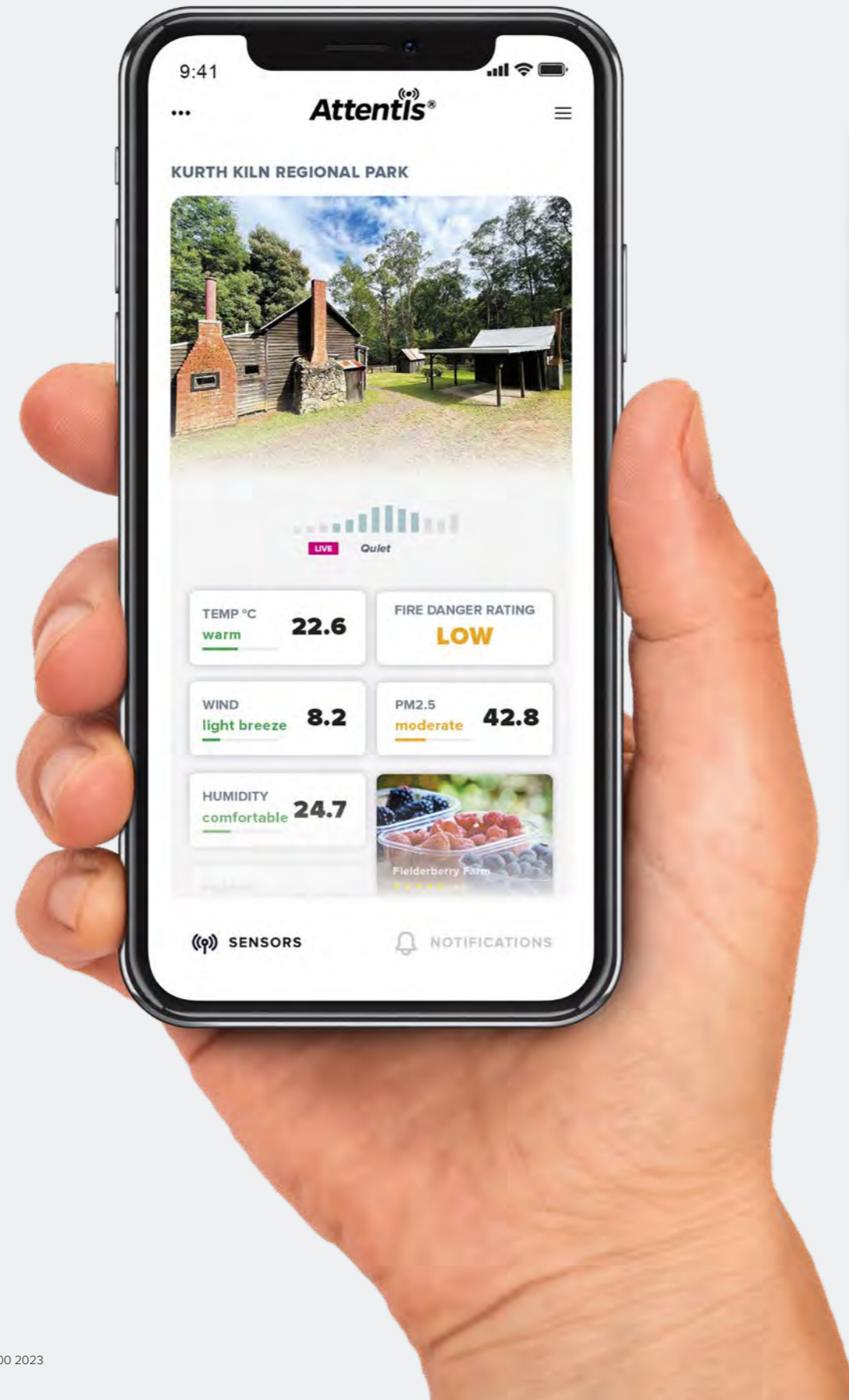


An App for all seasons

The accompanying Bunbury Geographe Integrated Information Network App will connect you to your local council in real-time.

The value of real-time / live local information lies in the ability for people to respond to an event.

Attentis provides a comprehensive interactive App to support local governments, agencies, emergency services, industries and communities - providing access to live local conditions and information to support greater awareness, safety and health.



Technology to deliver unparalleled situational awareness

Our intelligent sensors detect, measure, analyse and transmit detailed information including air quality, weather, noise, fire ignition, water quality, ground and structural movement, noise, asset condition.

Sensing capabilities are supported by live images, hi-definition video streaming, thermal imaging and equipment automation.



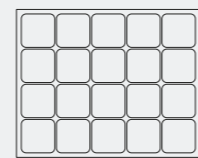
Gases

Multiple air quality sensors detect and disseminate particles based on size and shape – PM 0.3, 1, 2.5, 10, CO, CO2, NO2, SO2 etc.



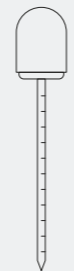
Pollen

Type recognition through laser measurement of size and shape to detect and notify asthma sufferers



Solar powered

Mains powered and 110V/240V. Portable plug pack units are also available



Soil moisture

Self-powered, wireless communication, intelligent



Vibration

Measured in multiple data formats to comply with all Global standards



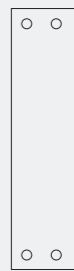
Movement

Ground and structural movement (towers, bridges, buildings, structures, etc) to 0.1 of a degree via remote sensors



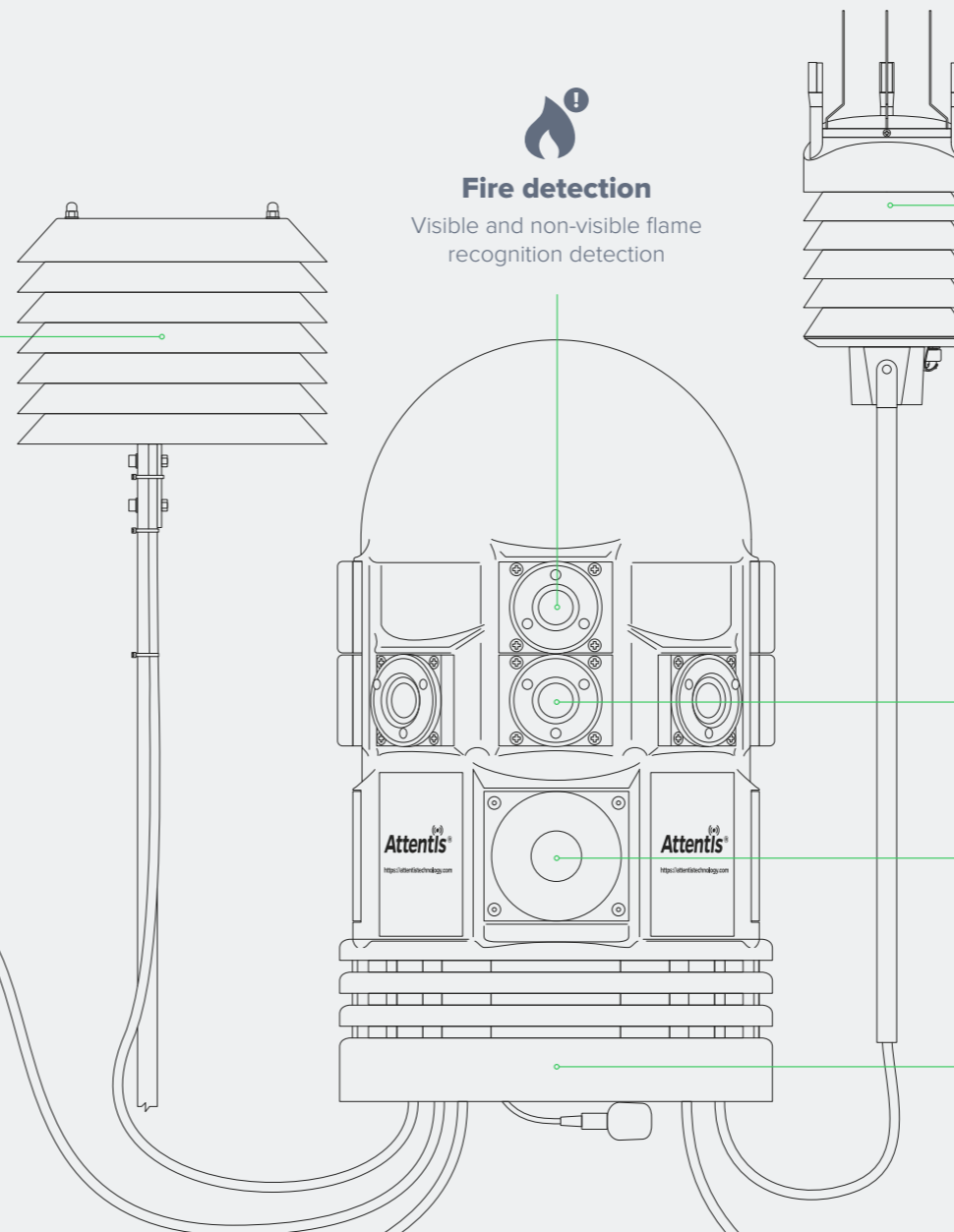
Audio

Fine scale recording and playback via individual MP3 files



Floods

Ultrasonic measurement of river depth and height in real-time



Instant detection and notification

Fire ignition in remote locations can occur at anytime, day or night, from a range of sources. Undetected ignitions coupled with high winds and dry conditions can soon create fires that are difficult and sometimes impossible to contain. Early detection and rapid response are key elements to combat bushfire in the future.

During the Yinnar fires in the Latrobe Valley in March 2019, the Attentis multi-sensor located at HVP Plantations in Jumbuk detected a fire re-ignition after the main fire had been extinguished (this unit was set up post main fire to monitor the location).

The thermal detection capability of the sensors was proven, detecting the re-ignition, returning crews to extinguish the re-ignition. A series of thermal notifications (far left) displaying the detection and the increasing temperature at the ignition source.

Protecting valuable resources

Attentis detected a fire ignition at 5.33pm on Friday 23rd October 2021, at a location opposite the HVP Plantation in Rifle Range Road, Latrobe Valley.

Detecting the presence of PM₁₀ fine particulates and an increase in thermal temperature, an alert was sent to Plantation Management, the local Country Fire Authority and local Council Emergency Management. Investigation by HVP personnel found a small fire adjacent the plantation. The fire was extinguished.

Thermal imaging, combined with temperature and air quality enables remote monitoring of high bushfire risk locations and assets. Protection of forest assets is also vital to support local timber mills, paper, packaging and construction industries.

90° to 360° real-time, live thermal and visual imaging

Still image resolution capabilities

Low bandwidth: 640x480 (480p)

Low resolution: 1280x720 (720p)

Standard resolution: 2592x1944 (1080p)

High resolution: 3280x2464 (8MP - 4K equivalent)

Ultra high resolution: 4912x3684 (18MP)

Video resolution

Standard resolution: 480p at 30fps

High resolution: 1080p at 30fps

Thermal imaging

10,000 points (90°)

80,000 points (360°)



Thermal



Visual

Air quality

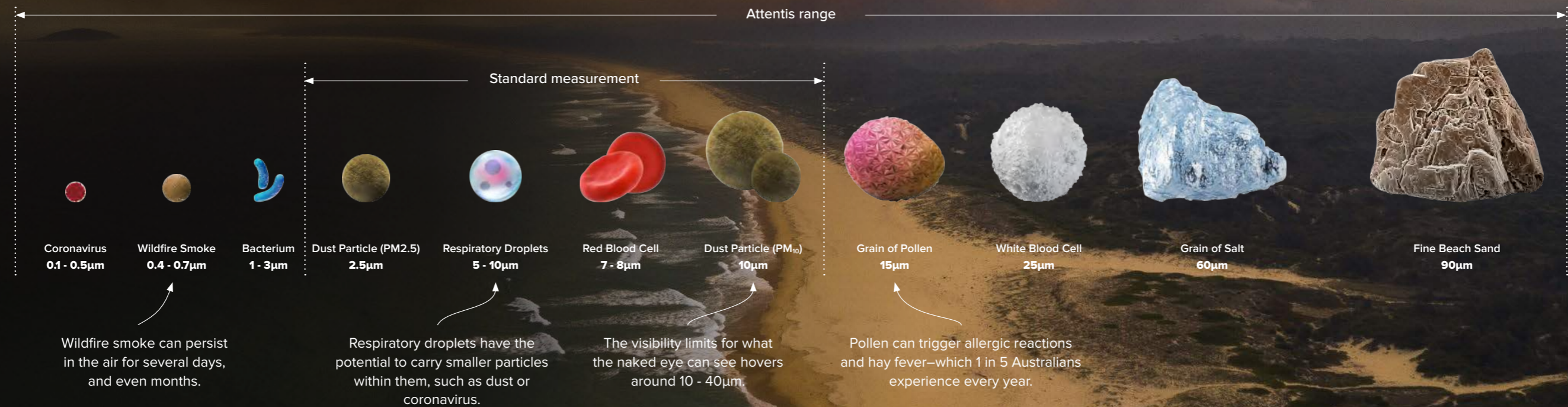
Attentis multi-sensors feature fine-scale continuous real-time air quality measurement of a vast range of particulates, and gases. Standard measurements include PM₁, PM_{2.5}, PM₁₀, carbon dioxide, carbon monoxide, sulphur dioxide and nitrogen dioxide; all representing significant health risks. Additional gas monitoring requirements can also be incorporated.

Our world standard air quality measurement and reporting provides immediate notification of a threat, allowing first responders to engage mitigation measures to reduce exposure.

Combining Attentis multi-sensors to form a network delivers a unique capability to actively track live air movement and composition throughout a location or region providing notification of the threat, its time of impact and concentration level resulting reduced exposure and impact.

During a fire event, live streamed air quality information allows first responders and the general public the ability to view live concentration levels across a region, understand the health risks and seek refuge to reduce exposure.

Particulate Matter (PM) explained



Micro-climate weather

Attentis networks provide continuous live correlated weather intelligence.

Attentis live micro-climate weather information includes wind speed, wind direction, gusts, wind vectoring, temperature, rainfall, relative humidity, barometric pressure and soil moisture sensing. Dew, frost, Delta-T, Fire Danger Index (FDI) and spray drift calculations are also available.

Continuous measurement of river heights, rainfall and soil moisture provides early flood warnings, live water movements, identifies flood zones and details access routes and road impacts in real-time.

During a fire event, live streamed weather (combined with fire movement) allows the deployment of appropriate resources to key locations to minimise impact.

Due to the multi-communication and high speed data transmission capabilities of Attentis multi-sensors, all information is continuously measured and displayed.

Attentis weather sensors deliver world standard weather measure in line with the World Meteorological Organisation.

The application of A.I. learning capabilities to Attentis data provides a new level of insight into changes in the local environment, enabling mitigation, improved planning and risk management.

Provides continuous fine-scale localised weather data

Wind speed

Wind direction

Wind gust and vectoring

Temperature

Rainfall

Relative humidity

Barometric pressure

Soil moisture sensing

Delta-T

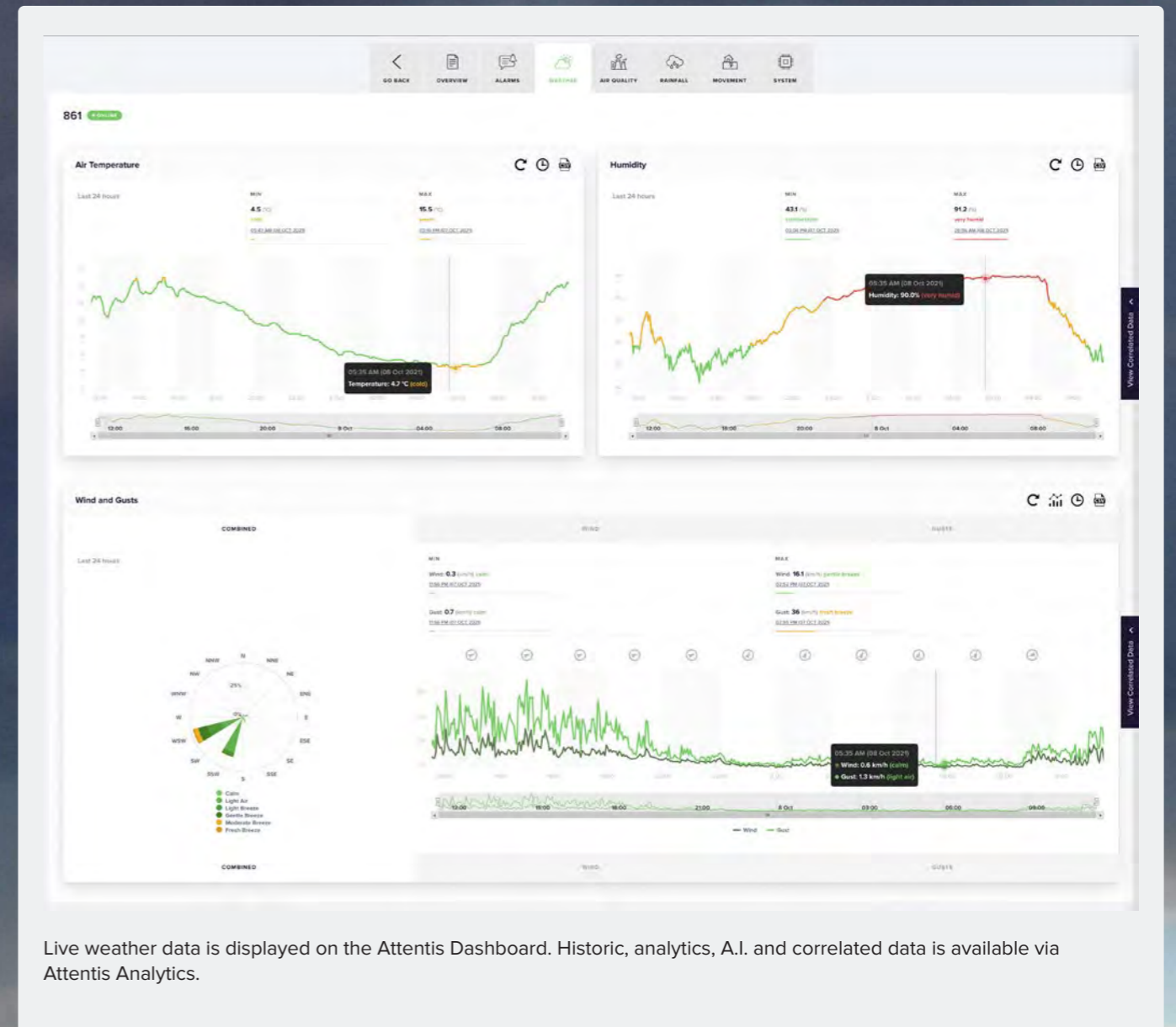
Fire Danger Index

World Standards compliance

WMO (World Meteorological Organisation)

BOM (Bureau of Meteorology)

Attentis is a trusted provider of weather data to the Bureau of Meteorology through the TPAWS (Trusted Private Automated Weather Stations) Partner Alliance.





Sporting facilities

Live weather, air quality security, visibility and awareness.

Sporting grounds serve as hubs for communities, providing cohesion, interaction, activities and evacuation points during a local event or natural disaster.

The installation of an Attentis multi-sensor at sporting facilities enables live access to weather and air quality conditions, on-site images and a range of information to support facility security and maintenance.

During a sporting event, Council can remotely view the location to determine attendance levels, weather, ingress and egress, carpark levels and conditions that could impact patrons.

Attentis multi-sensors can also monitor playing surfaces, on-site vegetation, security and out of hours access to assist site management and maintenance requirements.

When operating as a staging ground for emergency services during a disaster, the facility can act as an information centre providing residents to access to live localised information.



Vegetation

A major management component for Councils.

Vegetation management remains a priority in all LGAs. Programs to reduce fuel build up, vegetation encroachment, proximity to critical infrastructure and access issues are all key elements.

In addition to early fire detection and fuel monitoring components, well placed Attentis multi-sensors can provide a new level of remote vegetation management. Through the artificial intelligence capability contained within each multi-sensor, vegetation growth can be actively mapped, triggering a notification to maintenance crew to attend the location to perform maintenance.

Correlated information from all multi-sensors is tracked to identify risk. Artificial intelligence provides accurate insight into the level of risk present at each location, determined by fuel load, moisture content, changes in conditions and other external factors. This information supports future planning and management strategies.

Artificial Intelligence

Attentis multi-sensors incorporate artificial intelligence to determine variations and changes in images and environmental factors to reveal trends, growth rates and indications of future failures.

Actively tracking minor changes in surfaces, terrain and landscapes can identify early signs of future impact, allowing mitigation measures to be engaged prior to catastrophic failure. Attentis incorporates Artificial Intelligence into every multi-sensor, measuring multiple elements at each location to provide unparalleled insight into environmental factors that influence events, operations, maintenance and management.

Attentis' patented technology delivers fine scale continuous measurement, correlation, analytics and A.I. processed in the device (edge computing) as well as the cloud, maintaining all capabilities when connectivity is interrupted.

Defined preset alert parameters (e.g. growth rates, surface changes, increased equipment operating temperature) trigger an alert once the threshold is reached, delivering notification, mitigation and scheduled maintenance crews to attend.

Applying A.I. vastly improves asset and operations management, is a low cost / high value resource and identifies conditions that would normally go unnoticed and in many cases only becoming apparent through physical attendance or failure.



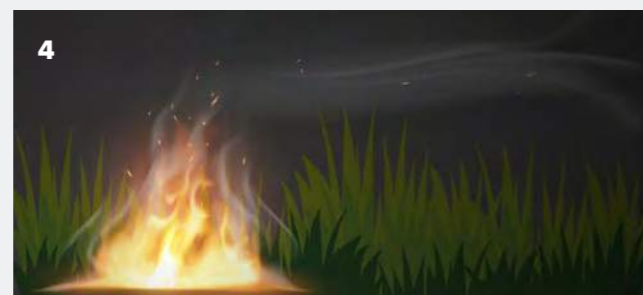
1 Continuous image capture identifies ignition



2 Alert sent detailing changes (presence of flame) and conditions



3 A.I identifies growth rate and direction



4 Continuous imaging reveals movement, intensity and growth



Active processing of images highlights variations, changes, object visualisation and determination

Existing sensors / networks

Incorporating existing sensors and networks into a fully integrated system is easy with Attentis.

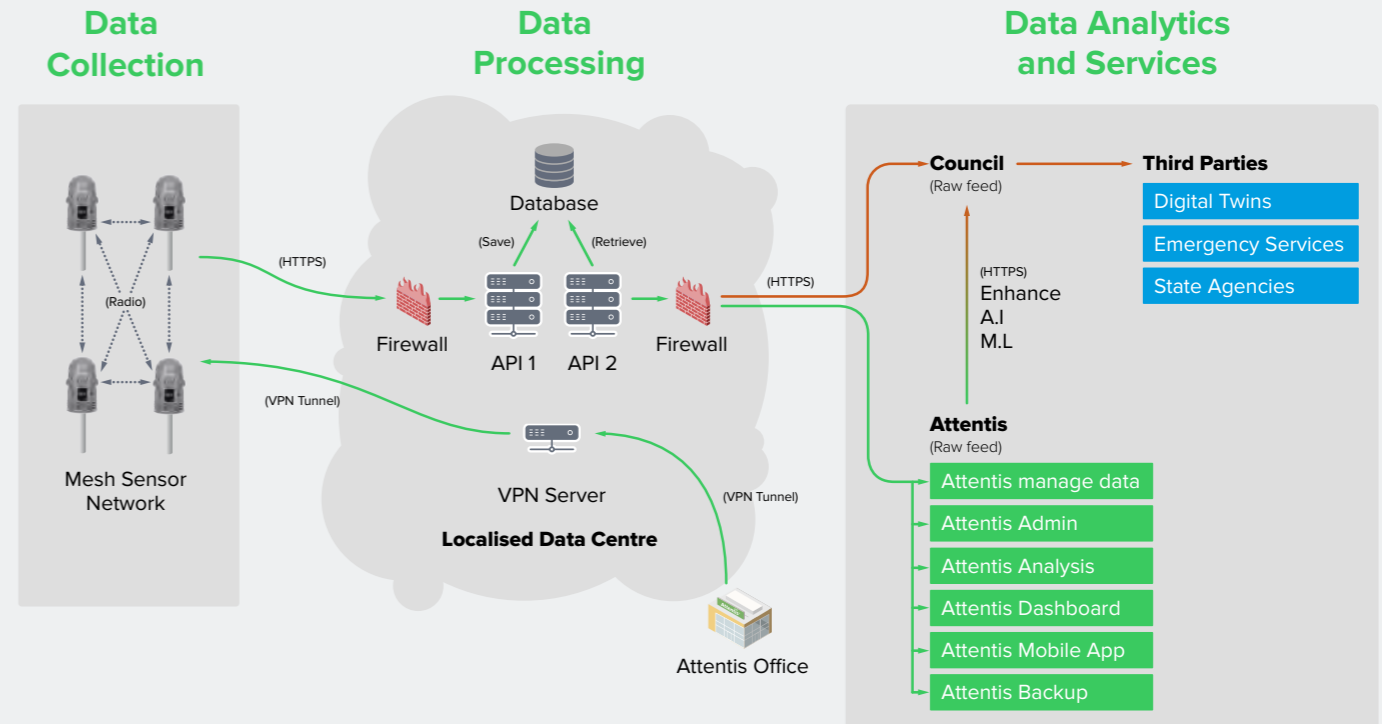
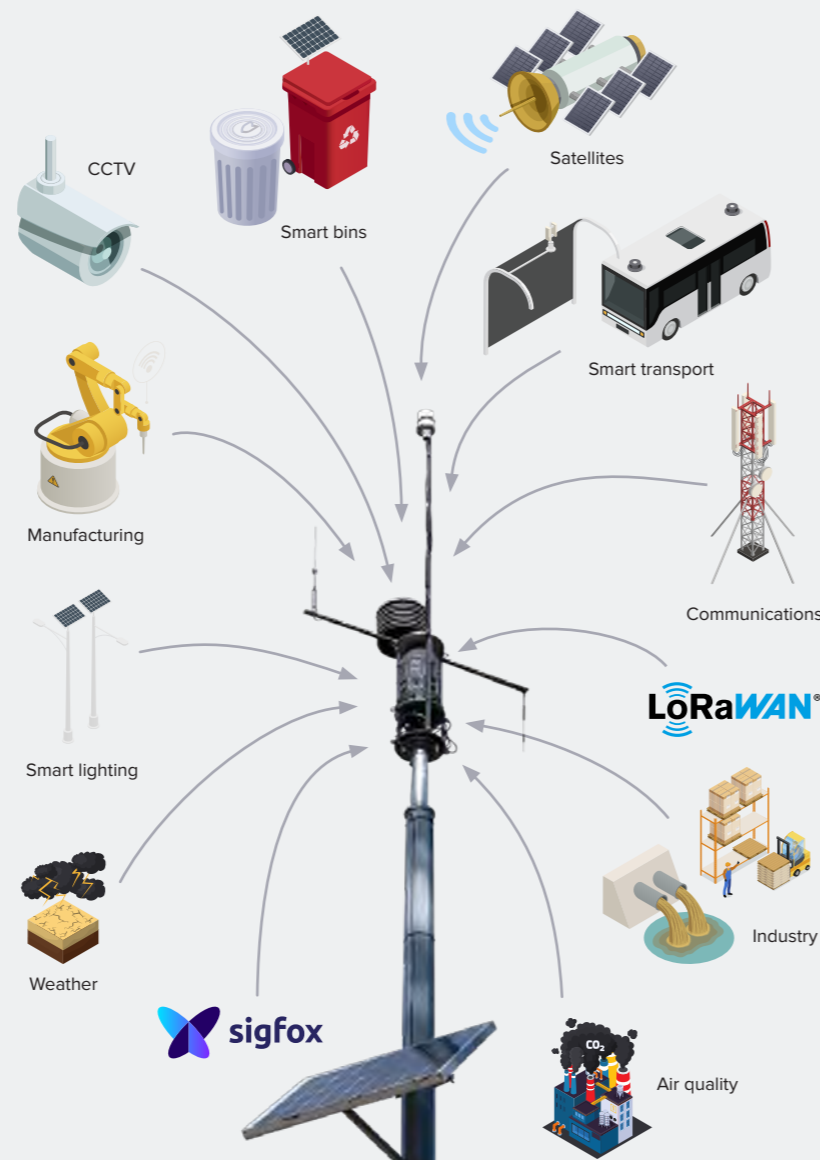
Acknowledging previous Council investment in existing sensing, SCADA and low power, low data networks, Attentis has equipped its multi-sensor range with the ability to collect, collate, process and present data from other systems.

Existing cameras and automation can also be incorporated to streamline images and information into a single system or platform.

This capability reduces the need to replace perfectly functional components, enables improved visualisation, data correlation and system simplification by combining multiple systems into a single source of valuable information.

Attentis raw data and processed information can be injected directly, via an API into existing Council networks and systems.

Flexibility within our technology enables a vast range of options to combine and collate information to ensure that the value of information is available and accessible.



Data Collection

Attentis smart sensors form a local wireless mesh network through radio connections. Data collected on individual sensors is encrypted and sent straight to the Attentis cloud servers via a secure and private API service by a 3G/4G LTE connection. In the event of poor connectivity, the collected data will be relayed by a nearby sensor which has a better signal through the mesh network. If there's no connectivity, data will be saved locally and re-transmitted to the cloud as soon as a 3G/4G LTE connection becomes available.

Data Processing

Attentis has deployed a large number of cloud servers located in the Sydney data centre to host and process data. The API service consists of two main components, API 1 and API 2, as illustrated in the diagram. API 1 is private-only and responsible for data validation, processing and storage. API 2 is publicly-accessible and user-independent, which serves as a data pool gateway for Attentis web/mobile apps or third-party integrations.

Data Analytics

All Attentis web and mobile apps are updated regularly, which provide customers with intuitive data analytics and visualisation tools. Furthermore, customers can apply for an API key to retrieve raw data directly via the public API service in case they wish to integrate it with other systems or build their own user interfaces. User permissions are in place to ensure appropriate access to the data.

Data Security

Security is a high priority for Attentis. We undertake all measures to protect sensor and user data and conform to software security best practices, including the use of encryption, firewalls, VPNs and strict access to production servers. All network traffic is encrypted using SSL/TLS with 256-bit encryption.

Data Sharing

Customers can control data sensitivity under a data share agreement with Attentis. Attentis has developed strict security rules to ensure sensitive data is only accessible by authorised customers only.



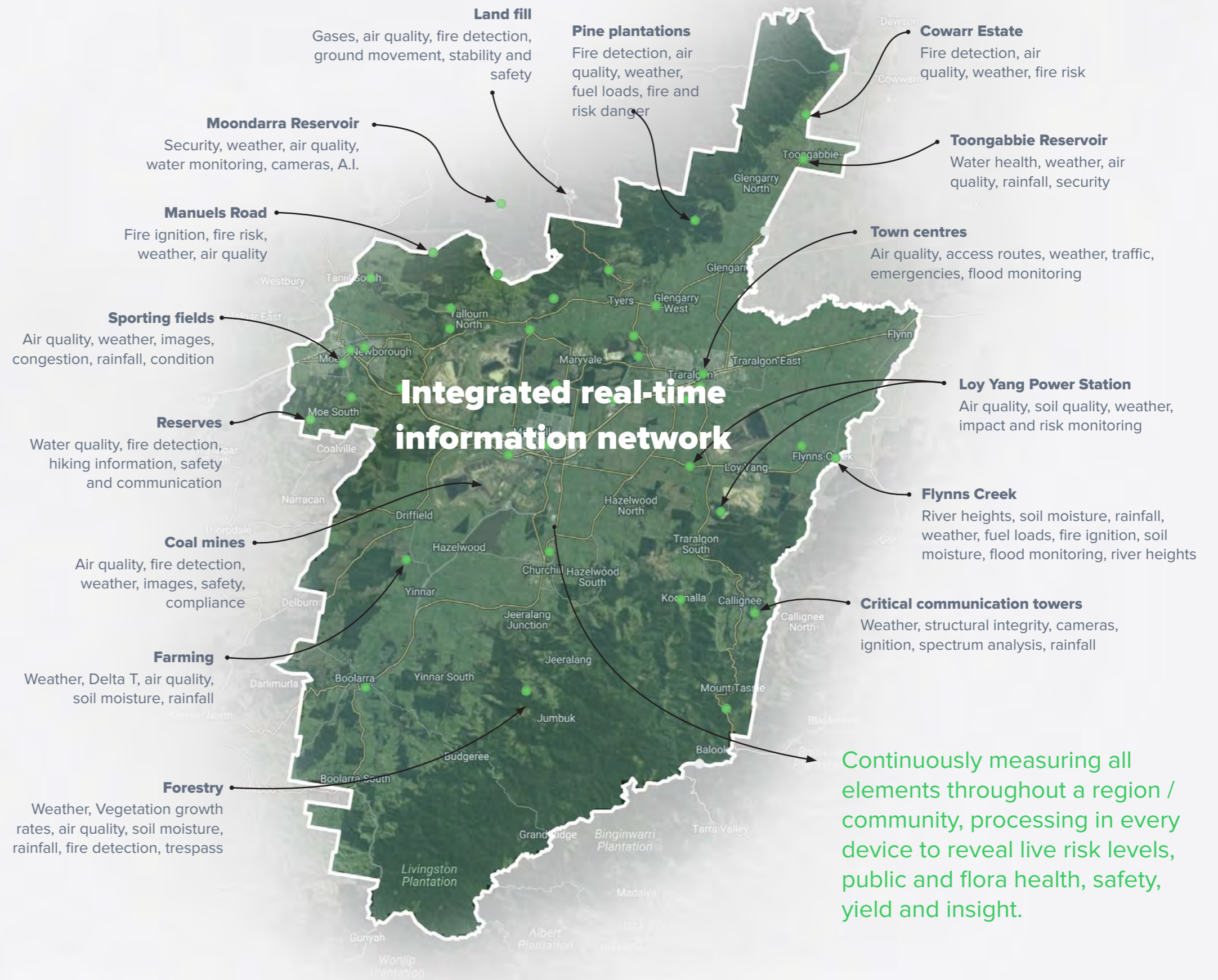
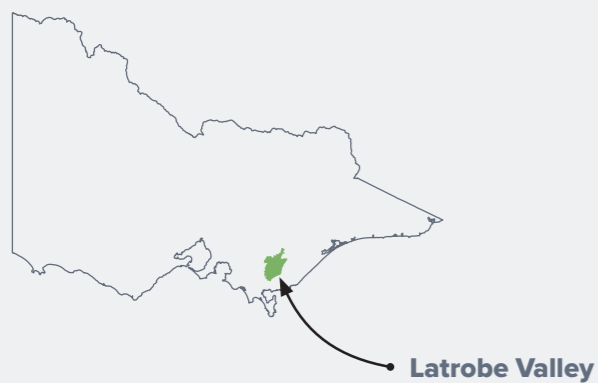
Changing how we interact with our environment

We are connecting council, residents, emergency services and industries - through access to localised, fine scale, real-time information.

Integrating a vast array of sensing capabilities into a single modular multi-sensor, specific to a location, then integrated with other multi-sensors reveals previously unavailable and incomprehensible information, understanding and insight for all local industries, agencies, services, communities and individuals.

The Latrobe Valley Information Network (LVIN.org) provided the proof of concept (POC) for the future of connected communities.

Now we are moving to connect other communities, with their own community and other neighbouring communities - supporting greater awareness, personal and public health and safety and resilience through access to real-time, integrated information.



Continuously measuring all elements throughout a region / community, processing in every device to reveal live risk levels, public and flora health, safety, yield and insight.

SUSTAINABLE DEVELOPMENT GOALS

- 1 Air quality**
 PM₁₀, PM_{2.5}, PM₁₀, CO, CO₂, O₃, SO₂, pollen, pollution, air and gas composition are continuously sampled and tracked across a location, region or state.
- 2 Mining**
 Miners are being required to adhere to increasingly rigid state and federal standards and protocols for environment management. These apply across all phases of mine life – exploration, development, extraction, processing and remediation.
- 3 Agriculture**
 Attentis combines micro-climate weather, delta T, fire index, wind movements and air, water and soil composition to improve efficiency, maximise crop yield and detail factors that impact operations. Intelligent equipment automation, crop health monitoring and diagnosis systems assist in the prevention of spray drift and hazardous practices.
- 4 Livestock**
 Animal health monitoring, stock movement and tracking, and system automation improves efficiency, productivity, traceability and accountability.
- 5 Structural integrity**
 Monitoring of vibration, tilt, sway, movement and material conditions in buildings, bridges, towers and structures.
- 6 Shipping management**
 Foreign water testing (ballast water), smart goods tracking, ship movement and engine room detection systems.
- 7 Water quality**
 Water composition and contaminant concentration levels in real-time and for historic comparative analysis.
- 8 Hazardous conditions**
 Continuous measurement of radiation levels, gases and discharge materials from power stations, chemical plants and hazardous materials factories.
- 9 Public safety**
 Real-time public notification of events, closures, warnings, threats and general public information.
- 10 Restricted area access**
 Controlled access to restricted areas combined with intruder detection in non-authorised locations.
- 11 Bushfire / wildfire detection**
 24 hour ignition detection from powerlines, substations, lightning strikes, accidental ignition and arson. Real-time fire movement tracking to enable effective resource deployment.

- 12 Electromagnetic levels**
 Measurements of radiated energy from cell stations, radio, Wi-Fi and communication equipment and towers. Data speed monitoring to identify black spots for future upgrades.
- 13 Noise monitoring**
 Multi-frequency audio monitoring in high traffic, venue and aviation locations.
- 14 Public health monitoring**
 Localised, microclimate and air quality conditions combined with wearable device data increases public health information in sport centres, parks and fields.
- 15 Item location**
 Search of individual items in big surfaces e.g. warehouses and harbors.
- 16 Waste management**
 Detection of rubbish levels to optimise garbage collection routines and routes.
- 17 Solar irradiation**
 Incoming solar irradiance measurement, monitoring of regional solar network performance.
- 18 Vehicle and asset tracking**
 Real-time notifications of breakdown, theft or hazardous materials transport to enable rapid response to minimise risk, impacts and interruptions.
- 19 Water infrastructure**
 Leak and pressure variation detection of pipelines, tanks, pressure vessels and valves.
- 20 Dam wall monitoring**
 Real-time integrity monitoring of dam walls.
- 21 Wind farm efficiency**
 Active tracking of wind movements throughout a region can be integrated into the operating system of wind farms to enable turbines to operate in accordance with available wind increasing efficiency and power generation capability.
- 22 Swing and sag monitoring**
 Swing and sag of powerlines are monitored in real-time to detect powerline movement for both energized and de-energized powerlines.
- 23 River heights and health monitoring**
 Real-time monitoring of river, stream, estuary, lagoon, water storage and pondage heights.



SUSTAINABLE DEVELOPMENT GOALS



ATTENTIS - BUNBURY GEOPAPHE INTEGRATED INFORMATION NETWORK (BGIRIN) - TIMELINE

ALL NETWORKS			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Attentis team member	Network role	Network Name	Network ID	07/23	08/23	09/23	10/23	11/23	12/23	01/24	02/24	03/24	04/24	05/24	06/24	07/24	08/24	09/24	10/24	11/24	12/24	01/25	02/25	03/25	04/25
Engagement Team	Successful bid & stakeholder alignment	HARVEY SHIRE	HSIN	HSIN	BSIN	CSIN	DSIN	CASIN		BDSIN															
Legal Team	Access agreement executions	BUNBURY SHIRE	BSIN		HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Network Design	Network Design finalisation	COLLIE SHIRE	CSIN		HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Scoping & Compliance	Location scoping & finalisation	DARDANUP SHIRE	DSIN		HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Telemetry Team 1	Telemetry simulation & testing	CAPEL SHIRE	CASIN		HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Telemetry - Team 2	Telemetry simulation & testing	DONNYBROOK-BALLINGUP SHIRE	BDSIN		HSIN	BSIN	CSIN	DSIN																	
Planning Team 1	Compliance & services engagement				HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Planning Team 2	Utilities engagement & mapping				HSIN	BSIN	CSIN	DSIN																	
Administration support	Network finalisation				HSIN	BSIN	CSIN	DSIN		CASIN	BDSIN														
Procurement	Component acquisition			HSIN	BSIN	CSIN	DSIN	CASIN		BDSIN															
Scheduling Team 1	Construction routes & scheduling					HSIN	HSIN	HSIN		DSIN	DSIN	DSIN													
Scheduling Team 1	Construction routes & scheduling					HSIN	HSIN	HSIN		DSIN	DSIN	DSIN													
Scheduling Team 2	Construction routes & scheduling						BSIN	BSIN		BSIN	CASIN	CASIN													
Scheduling Team 2	Construction routes & scheduling						BSIN	BSIN		BSIN	CASIN	CASIN													
Scheduling Team 3	Construction routes & scheduling							CSIN		CSIN	CSIN	BDSIN	BDSIN												
Scheduling Team 3	Construction routes & scheduling							CSIN		CSIN	CSIN	BDSIN	BDSIN												
Infield Operations Team 1	In-field operations & direction						HSIN	HSIN		HSIN	DSIN	DSIN	DSIN												
Infield Operations Team 1	In-field operations & direction						HSIN	HSIN		HSIN	DSIN	DSIN	DSIN												
Infield Operations Team 2	In-field operations & direction							BSIN		BSIN	BSIN	CASIN	CASIN												
Infield Operations Team 2	In-field operations & direction							BSIN		BSIN	BSIN	CASIN	CASIN												
Infield Operations Team 3	In-field operations & direction									CSIN	CSIN	CSIN	BDSIN	BDSIN											
Infield Operations Team 3	In-field operations & direction									CSIN	CSIN	CSIN	BDSIN	BDSIN											
Commissioning	Network commissioning & testing									HSIN	BSIN	CSIN	DSIN	CASIN	BDSIN										
Media & Events Team 1	Events coordination									HSIN	BSIN	CSIN	DSIN	CASIN	BDSIN										
Media & Events Team 2	Events presentations									HSIN	BSIN	CSIN	DSIN	CASIN	BDSIN										
Education & Training Team 1	Education & Training										HSIN	BSIN	CSIN	DSIN	CASIN	BDSIN									
Education & Training Team 2	Education & Training										HSIN	BSIN	CSIN	DSIN	CASIN	BDSIN									
Inhouse Design Team	Promotional materials development							HSIN		BSIN	CSIN	DSIN	CASIN	BDSIN											
Software Team 1	Interface & App design & construction				HSIN	HSIN	BSIN	BSIN		CSIN	CSIN	DSIN	DSIN	CASIN	BDSIN										
Software Team 2	Interface & App design & construction				HSIN	HSIN	BSIN	BSIN		CSIN	CSIN	DSIN	DSIN	CASIN	BDSIN										
Software Team 3	Interface & App design & construction					HSIN	BSIN	HSIN		BSIN	CSIN	DSIN	DSIN	CASIN	BDSIN										



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Creating intelligent sensor networks is a major step in understanding environmental factors that impact our daily lives.

Attentis technology has invested years of research and development, testing our networks in extreme conditions to ensure reliability.

Attentis intelligent networks transform life through improved human understanding of, interaction with and response to, the environment we live in.

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Attentis®



Attentis® Technology

Real-time monitoring solutions
Intelligent sensor networks

March 2021

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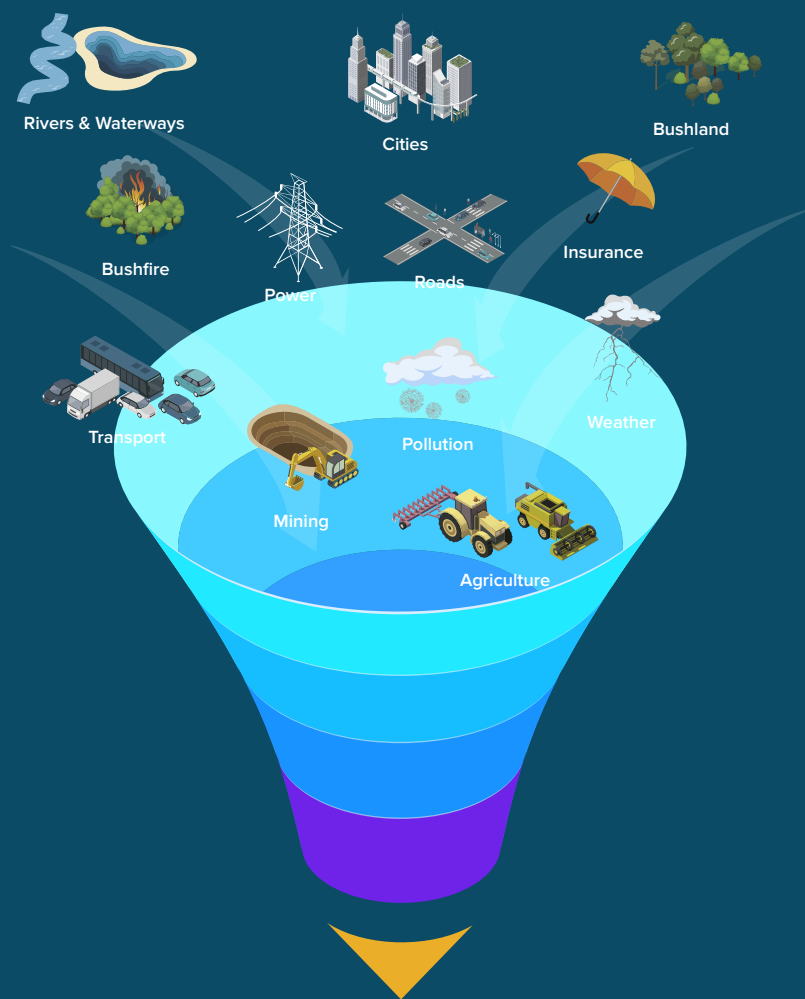
We deliver information

The interfaces and Apps we design and construct present our information in a clear, concise and continuous stream of real-time information, providing users the ability to rapidly react, respond, mitigate, defend, protect and combat, events and impacts as they unfold.

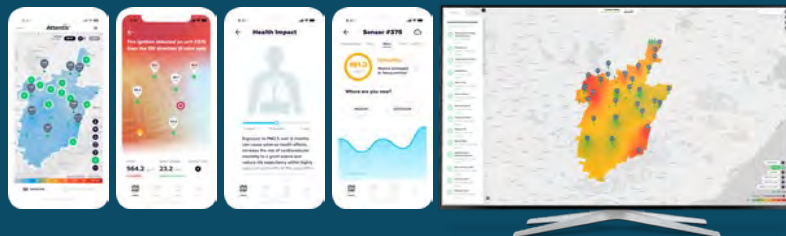
Continuous live relevant information

A single source of ultra-rich, fine scale, local, statewide and nationwide information

Live data is taken from every single element in our environment, processed and returned back to users as real-time, relevant information delivering early detection of events, degradation, and impacts to enable rapid and informed decision making to enact better outcomes.



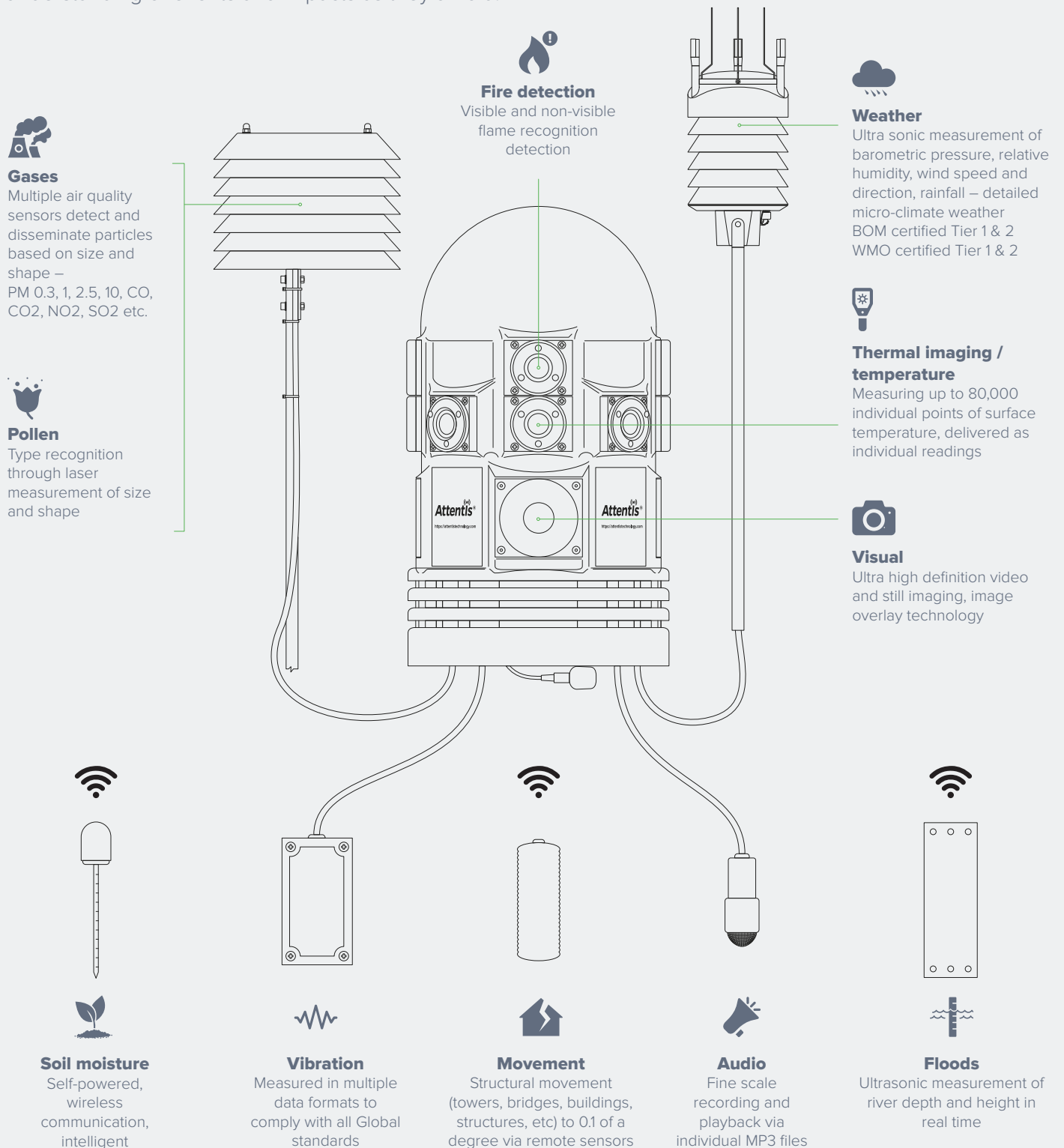
accessible by every industry, agency, organisation, department, community and individual



How the technology works

Intelligent, integrated, intuitive

Technology-intelligent patented sensors; high speed, high power, data streaming networks and integrated interfaces to present real time continuous information, providing users a greater understanding of events and impacts as they unfold.





Public safety

Early identification, notification and response are crucial to public safety.

Attentis[®] provides a range of early detection capabilities, coupled with notification and continuous information systems to improve public safety and situational awareness.

Our systems reduce public exposure, environmental impact and disaster recovery costs.



Public safety

Attentis® technology is critical to the future of fire, flood and natural disaster management.

Early detection, rapid response, and live situational awareness.



Fire Detection



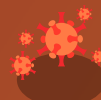
Flood Detection



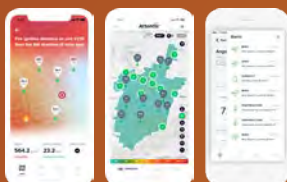
Storm / Asthma



Storm Tracking



Airborne Pathogens



Instant notification to first responders supported by images and live conditions revealed on an Attentis® live map



First responders notified supported by live information to gain a clear understanding of the extent of the ignition and the environmental factors that will impact its growth



Live conditions at all fire fronts reveal fire movement, changes in wind speed and direction



Informed rapid response. Effective deployment of resources to the most effective contact points



Live situational awareness supports fire fighter safety



Attentis® towers continue to deliver information when local communication are no longer available.



Public Information. Live weather conditions / fire front locations, evacuation advice, air quality information, road closures and direct messages from emergency services

Attentis® combines early detection, live information, tracking, notification and communication systems in a single high speed network.



Environment

Attentis® is an Australian company that pioneered real-time integrated intelligent sensor networks.

Our networks provide cutting edge environmental monitoring technology through a range of robust, multi sensory devices, engineered to an unparalleled standard.

The ultra-rich data captured from our sensors travels seamlessly through our high-speed wireless, fully integrated networks, enabling a complete real-time picture of focused surroundings, from anywhere in the world.

Users have the ability to create their own threshold alerts for everything from temperature and wind to security breaches, all through our simple-to-use websites and Apps. From a single farmer checking the health of his animals, to international companies protecting their critical infrastructure from threats and faults, we provide an ability to connect to the environment in way that has never been performed before.

Attentis® has been recognised as the most technological advanced data transmission network in Australia, receiving the 2019 Australian Smart Cities Award- regional, the Best Government IoT Project 2019 as well as the Best Overall IoT Project for the Latrobe Valley Information Network.



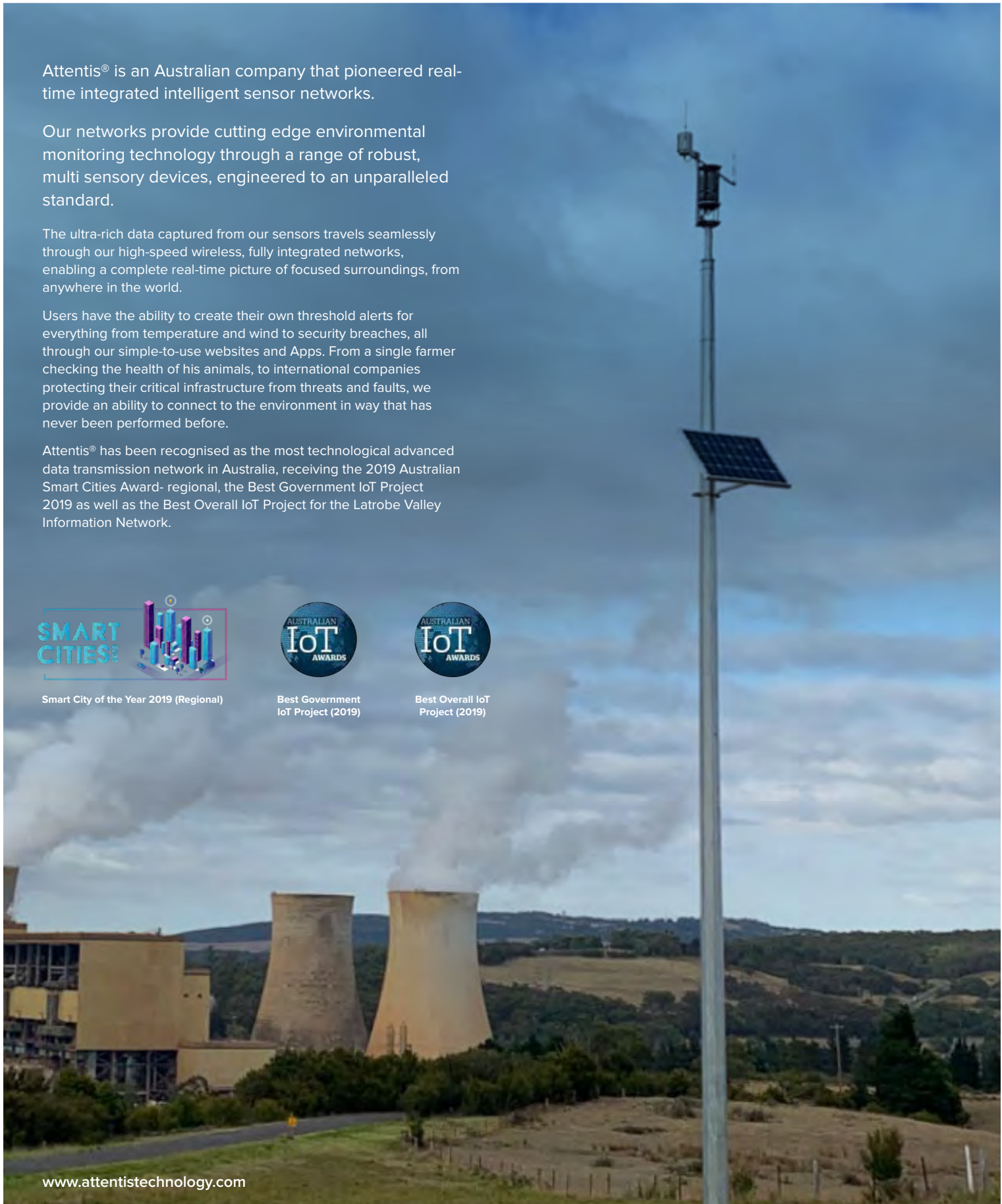
Smart City of the Year 2019 (Regional)



Best Government IoT Project (2019)



Best Overall IoT Project (2019)



Environment

Fully integrated
intelligent solutions.



1 Air Quality

PM₁₀, PM_{2.5}, PM₁₀, CO, CO₂, O₃, SO₂, pollen, pollution, air and gas composition are continuously sampled and tracked across a location, region or state.

2 Traffic Congestion

Vehicle and pedestrian monitoring to reduce traffic congestion, inform public transport systems and provide efficient alternative routes in real-time.

3 Agriculture

Attentis® combines micro-climate weather, delta T, fire index, wind movements and air, water and soil composition to improve efficiency, maximise crop yield and detail factors that impact operations. Intelligent equipment automation, crop health monitoring and diagnosis systems assist in the prevention of spray drift and hazardous practices.

4 Livestock

Animal health monitoring, stock movement and tracking, and system automation improves efficiency, productivity, traceability and accountability.

5 Structural Integrity

Monitoring of vibration, tilt, sway, movement and material conditions in buildings, bridges, towers and structures.

6 Shipping Management

Foreign water testing (ballast water), smart goods tracking, ship movement and engine room detection systems.

7 Water Quality

Water composition and contaminant concentration levels in real-time and for historic comparative analysis.

8 Hazardous Conditions

Continuous measurement of radiation levels, gases and discharge materials from power stations, chemical plants and hazardous materials factories.

9 Public Safety

Real-time public notification of events, closures, warnings, threats and general public information.

10 Restricted Area Access

Controlled access to restricted areas combined with intruder detection in non-authorised locations.

11 Smart Lighting

Intelligent conditions and weather adaptive lighting systems.

12 Bushfire / Wildfire Detection

24 hour ignition detection from powerlines, substations, lightening strikes, accidental ignition and arson. Real-time fire movement tracking to enable effective resource deployment.

13 Electromagnetic Levels

Measurements of radiated energy from cell stations, radio, Wi-Fi and communication equipment and towers. Data speed monitoring to identify black spots for future upgrades.

14 Noise Monitoring

Multi-frequency audio monitoring in high traffic, venue and aviation locations.

15 Public Health Monitoring

Localised, microclimate and air quality conditions combined with wearable device data increases public health information in sport centres, parks and fields.

16 Golf Course & Parks

Selective irrigation in dry zones to reduce water consumption on golf courses and public parks.

17 Item Location

Search of individual items in big surfaces e.g. warehouses and harbours.

18 Waste Management

Detection of rubbish levels to optimise garbage collection routines and routes.

19 Smart Parking

Monitoring of parking space availability in high-traffic locations, coordination of space sharing, cost comparison of parking alternatives, availability in real-time.

20 Solar Irradiation

Incoming solar irradiance measurement, monitoring of regional solar network performance.

21 Vehicle & Asset Tracking

Real-time notifications of breakdown, theft or hazardous materials transport to enable rapid response to minimise risk, impacts and interruptions.

22 Smart Roads

Real-time information, warnings, diversions and notifications including altered climate conditions, unexpected events, accidents and traffic congestion.

23 Water Infrastructure

Leak and pressure variation detection of pipelines, tanks, pressure vessels and valves.

24 Dam Wall Monitoring

Real-time integrity monitoring of dam walls.

25 Wind Farm Efficiency

Active tracking of wind movements throughout a region can be integrated into the operating system of wind farms to enable turbines to operate in accordance with available wind increasing efficiency and power generation capability.

26 Swing & Sag Monitoring

Swing and Sag of powerlines are monitored in real-time to detect powerline movement for both energized and de-energized powerlines.

27 River Heights & Health Monitoring

Real-time monitoring of river, stream, estuary, lagoon, water storage and pondage heights.



Agriculture

Attentis® provides a vast range of agricultural services on farm. Fine-scale information including micro-climate weather, air quality, soil moisture, silo stock levels, frost, dew, fire danger index and delta T aid informed decision making and risk reduction.

Integrated thermal imaging, early detection of airborne, waterborne and soil contaminations elicit immediate response and low impact in relation to biosecurity controls.

Region-wide and state-wide networks introduce finer-scale information and enable inexpensive automation facilitation for all farms regardless of size.

Thermal viewing and tagging monitors cow health and livestock tracking.

Improved information and automation reduces farm engagement time, increases efficiency and production, and allows increased family time and improved mental health.





Mining

Multiple systems, single integrated solution

Integrated 24-hour unmanned monitoring networks

Real-time thermal imaging, visual images, movement, vibration, noise, air composition and weather combine to maintain 24-hour live operational awareness of factors and events that impact operations.

Instant detection of fire ignition, hot spots, increased operating temperatures, gas emissions, excessive vibration or noise, engage an immediate notification, allowing mitigation steps to be engaged prior to catastrophic failure.

Attentis® permits 24-hour unmanned monitoring of all critical infrastructure constructed into a single high speed multi-communication network with all live and historic information viewable via a interactive and intuitive interface and App.

Substation & transformer monitoring - 24-hour real-time thermal imaging, pollution accumulation measurement and micro-climate weather monitoring combined with arc, spark and flash detection and asset life prediction, provides improved maintenance scheduling and reduced outages and shutdowns.

Structural integrity monitoring for tower health - Fine scale structural monitoring for towers and footings measuring movement in 0.1° increments to mitigate against any impact to critical power supply infrastructure.

Air quality monitoring for safety, compliance, and asset degradation - Continuous air quality monitoring including PM₁, PM_{2.5}, PM₁₀, CO, CO₂, NO₂, SO₂, other gases and VOCs on request.

Thermal imaging of refuse sites - 24-hour thermal imaging, fire ignition detection, air quality composition, visual and weather monitoring.

Main power supply hot spot detection - Continuous monitoring of temperature fluctuations in the main power supply and analysis of cable condition, allowing operators to scale back operations during periods when temperatures exceed recommended operation.

Tailings Dam monitoring - Live and comparable ground stability monitoring to ensure structural integrity of Tailings Dam walls.

System automation - Real-time event detection coupled with automation of suppression equipment to reduce overall impact and maintain operations.

Unmanned mining operations - Continuous monitoring of all major operating components to ensure continuous mine operation during unmanned periods. The site can be controlled and viewed remotely. The Attentis® network details any minor change that could impact operations or require immediate shut down if a possible fire or risk is identified.



Mining





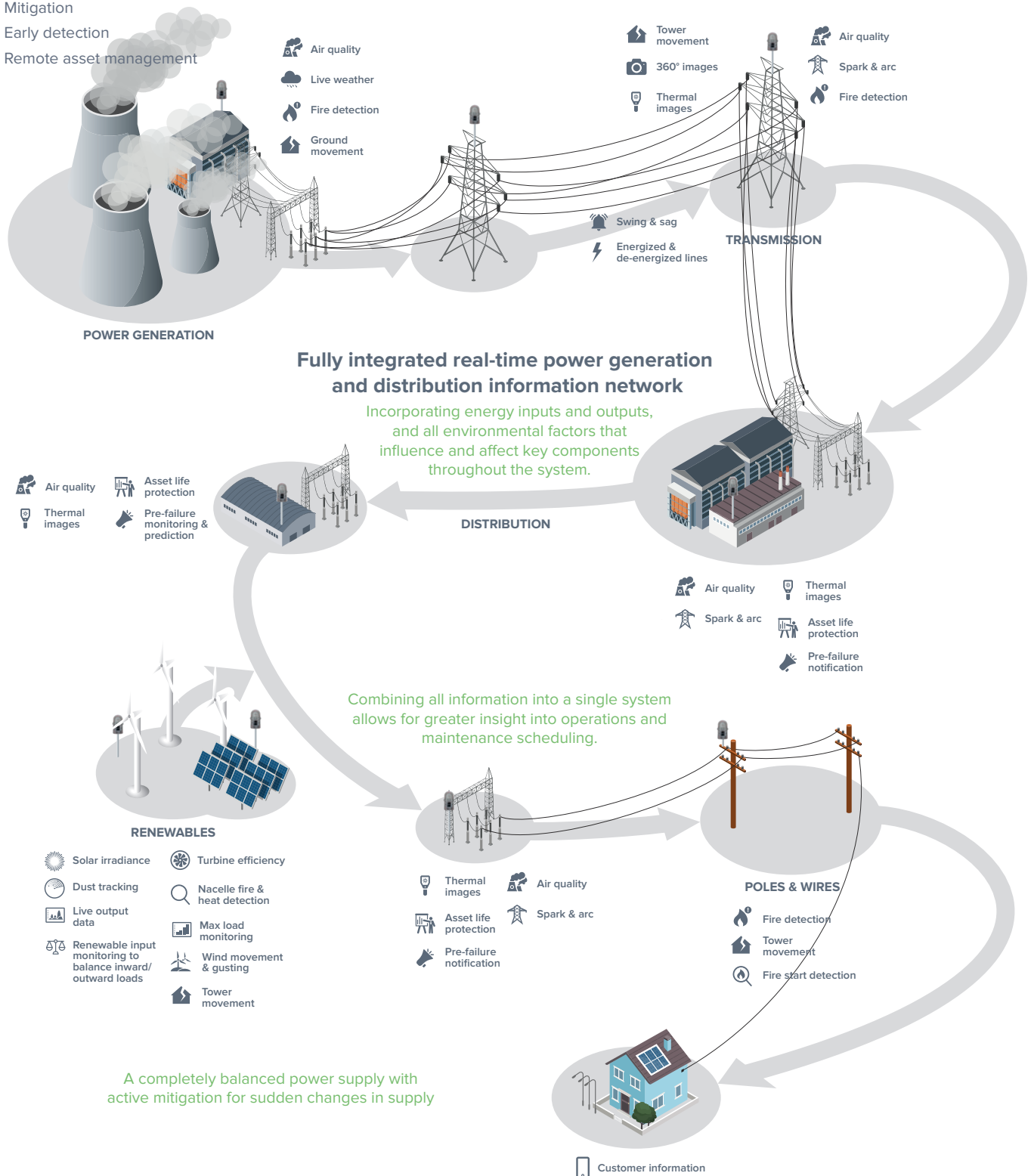
Utilities information

Attentis® provides 24-hour localised situational awareness - delivering live environmental conditions, structural integrity, tower movement, line clashing, fire ignition and asset degradation in substations and towers.

(BFAC APPENDIX 9.12.1)
 Attentis® provides a **continuous real-time stream of environmental information and factors** that can influence or impact operations in the power generation, transmission and distribution sectors.

Attentis® actively works with customers to provide improvements in:

- Visibility
- Mitigation
- Early detection
- Remote asset management



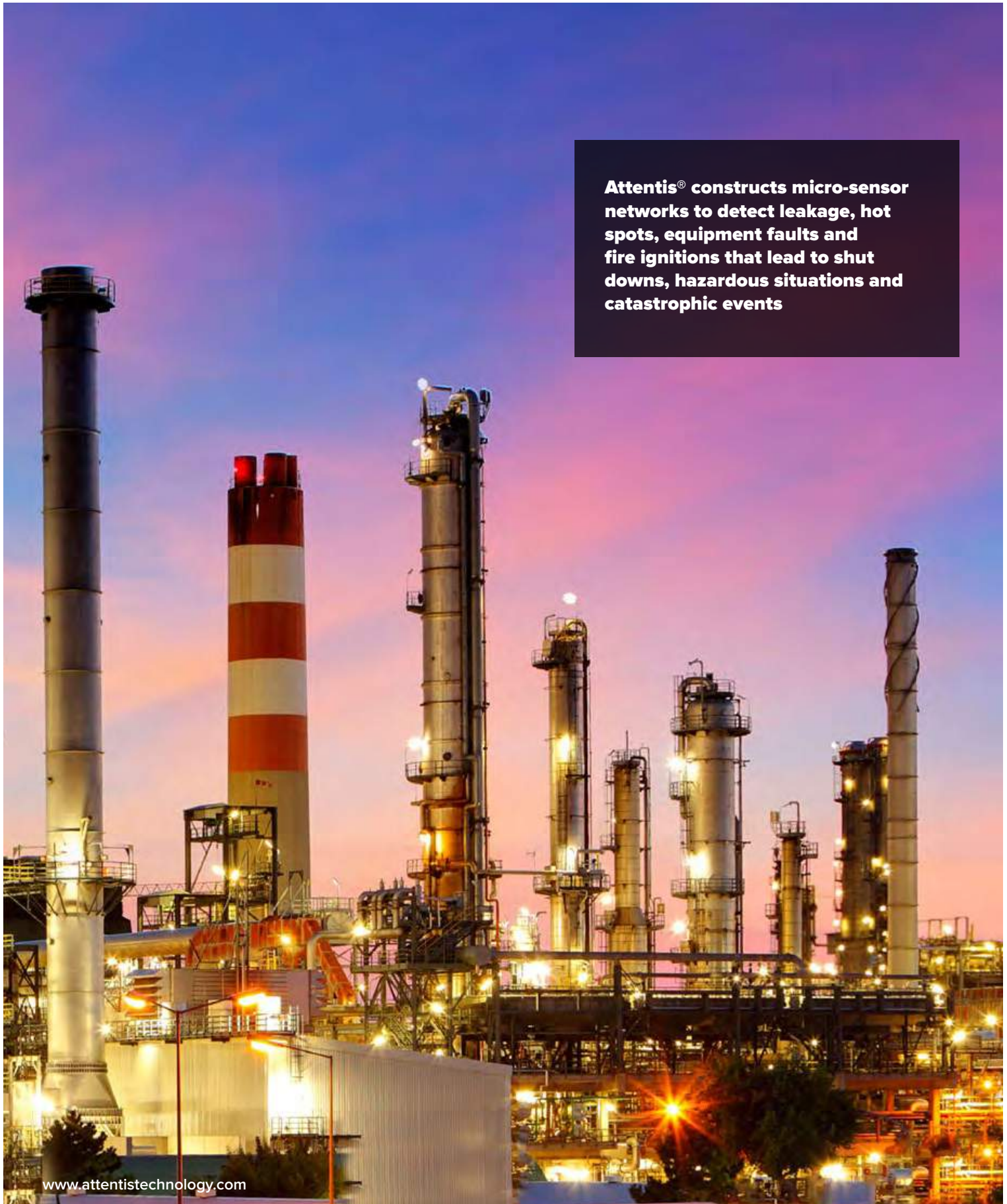
Live, continuous information to ensure rapid decision making
 - less outages, improved customer awareness

Attentis®



Oil & gas

Attentis® constructs micro-sensor networks to detect leakage, hot spots, equipment faults and fire ignitions that lead to shut downs, hazardous situations and catastrophic events





Road & transportation



Bridge movement, vibration, noise and structural integrity monitoring.



Attentis® provides real-time environmental monitoring sensors, networks and systems to provide continuous awareness of environmental factors that contribute to interruption, congestion, safety and degradation.



24-hour real-time tunnel safety: noise, fire ignition, black carbon, CO, CO₂ high PM concentration levels and gases are all continuously monitored to provide an environmental perspective to road management.

//////////
The team



Cameron McKenna – Managing Director

Cameron McKenna has more than 20 years experience in building businesses in finance, consulting, water conservation and product development including designing a range of water-saving products for Nylex Ltd as part of a \$31m manufacturing contract.

In 2005 Cameron designed a scalable hydraulic pumping system, that attracted over 2,300 system installations in two years and a company sale in 2007. Remaining on as COO for a two-year term, Cameron moved to California to consult on water conservation. The 2009 Black Saturday fires and the Station fire in

Los Angeles, was a pivotal moment, leading to the creation of integrated communication networks, edge computing and the development of intelligent sensors that form the basis of Attentis today.

During the course of his career, Cameron has registered three patents, multiple design specifications and developed a range of solutions for customers, spanning multiple industries. A unique skill base incorporating accounting, finance, banking, engineering, software and hardware development, the desire to construct systems that change information and understanding has remained at the forefront of Cameron's career.



Dr Paul Twomey

Dr Paul Twomey is a serial entrepreneur in the legal, cyber-security, talent and bio-security sectors. Paul is a founding figure and former CEO of ICANN, the global coordination body of the Internet, a role in which he was described by the New York Times as "the Chief Operating Officer of the Internet."

Paul was CEO of the Australian Government's National Office for the Information Economy and Deputy at the Australian Trade Commission. Formerly with

McKinsey & Company, he was a special advisor to several Australian Ministers in the Keating and Howard Governments. He is a member of the SAP Artificial Intelligence Ethics Advisory Panel. He serves as a Fellow at several international think tanks. He received his PhD from Cambridge University.



Dr Gregory Ayers – Director of Research

Atmospheric scientist Greg Ayers (BSc(Hons) 1972, PhD 1976) is the former director of Australia's Bureau of Meteorology (BoM). Prior to joining the BoM in 2009 Greg had an impressive career in fundamental and applied research.

Greg joined the CSIRO in 1975 and held numerous roles including Assistant Chief of Atmospheric Research, Chief of Atmospheric Research and Chief of Marine and Atmospheric Research.

Currently on the board of the Antarctic Climate and Ecosystems Cooperative Research Centre, Greg is also on the supervisory committee for the Centre for Australian Weather and Climate Research.

Greg holds various editorial positions and has made significant contributions to higher education in atmospheric sciences. He has authored more than 140 peer-reviewed scientific publications.

During the course of his work Greg has registered two patents and two commercial licences for instruments he developed. In 1995 he was awarded the Australian Meteorological and Oceanographic Society's Priestly Medal for achievements in the science of acid deposition. In 2006 Greg was made a fellow of the Australian Academy of Technological Sciences and Engineering.

Greg is the Director of Research for Attentis, a key role ensuring the quality and consistency of data produced by all Attentis networks remains world standard.

The team



Jeff Perrey – Director of Strategy

With over 20 years ICT industry experience, specialising in connectivity, systems, Internet of Things and system integration, Jeff is responsible for strategy and alliances.

Jeff has extensive experience in leading, managing and motivating multi-disciplinary teams to deliver solutions focused on customer outcomes.

Jeff has been engaged by Telstra and Samsung to deliver long term strategies to integrate solutions involving multiple partners across various business sectors. At Attentis, Jeff is responsible for alliance partnerships, network alignment, customer engagement and program delivery.



Christopher Wilkin – Director of Product Development

A Masters in Engineering (Electronics) from Monash University, Chris has more than 13 years of experience in the IT industry with particular expertise in hardware, systems and source code development, SQL server configuration and data warehousing. Chris served as IT Manager and Systems Developer at Kinetec Technology International, where he successfully

developed a range of distress beacons used in marine and aviation applications. During this period Chris also designed and constructed a flight simulation and training system, still being used to train pilots today.

In 2014, Chris joined Attentis initially working on expanding the capabilities of the V5 series of sensors, then leading the hardware re-design of the V7 series, and now the latest intelligent R-series range.



David Dai – Director of Software Engineering

A Master's Degree in Computer Science from RMIT, David has over 15 years experience in designing and developing interactive websites and mobile apps, focusing on functionality, scalability and high traffic operations. David specialises in user experience (UX) through innovative design and user-interface interaction.

Before joining Attentis, David served as Leading Senior Developer at several prominent digital agencies. He delivered system designs, websites, mobile apps, APIs and branding for BMW Motorcycles, Suzuki, Melbourne University, Australian Unity, Moose Toys and Ceva Logistics.



Wendy Fergie – Director of Corporate Governance and Affairs, HR and Culture

Wendy is a financial analyst with a degree in Economics from Monash University and a proven track record of identifying, managing and growing strategic, high- value, long-term relationships for businesses. Over the last 27 years, Wendy has managed investment portfolios (\$4-14 billion) for investment houses including AXA IM, Alliance Bernstein, ME Bank and IFM, as well as played a key role in supporting managed growth of companies in strategy and alignment.

An active supporter of social impact entrepreneurs in climate change, technology and health, Wendy provides key awareness and connections to aligned parties – government initiatives, funding options and programs, and universities – with an end goal to promote innovation and technology as the forefront of solutions to many problems of today.

The team



Lee Roach – Designer

Lee is a multi-disciplinary designer with a 25-year career in visual communication and brand development, covering a wide selection of industries from government, not-for-profit, corporate and small business, through to start-ups.

His clients have included Holden, Nissan, Department of Education, Department of Justice, PowerCor, Victorian Employers' Chamber of Commerce and Industry (VECCI), Victorian State Emergency Service (VICSES) and the Committee for Melbourne. He has won numerous photography and packaging awards.



Lance King ASFM – Focus areas:
CFA, Local Government, Emergency Management, Utilities and Community Engagement

Lance King started his career as a rigger for the State Electricity Commission (SEC) advancing through a range of electrical engineering positions at Yallourn Power and Loy Yang power stations gaining over 25 years experience in the power generation industry. After a role in emergency management at the Municipal Association of Victoria, Lance returned to the Latrobe Valley as Coordinator of Emergency Management for the Latrobe City Council in 2000.

A life member of the CFA, and President of District 27, Lance has been a key coordinator for State and National emergency response including floods in Western Victoria, Cyclone Yasi in Townsville and the 2009 Victorian Black Saturday fires. Lance is also the Chairman of the Regional Municipal Emergency Management Planning committee. Lance serves the Attentis® advisory board as an advisor in local government, municipal, CFA and Government department relations. Lance was instrumental in the location, coordination and construction of the Latrobe Valley Information Network (LVIN).

Advisory team



Craig Lapsley PSM – Ex Emergency Services Commissioner - State of Victoria

Craig Lapsley was appointed the first and only Fire Services Commissioner in 2010 after 30 years in Australian emergency management, beginning with the Country Fire Authority (CFA) as a volunteer rising to the rank of Deputy Chief Officer. In July 2014 Craig was appointed Victoria's Emergency Management Commissioner, responsible for coordination before,

during and after all major emergencies. Craig has also served as Manager of State Operations for the NSW Fire Brigades, Director Emergency Management - Health and Human Services and was responsible for the restructure of the State Emergency Service from a government department to a statutory body. Craig provides strategy and navigational expertise for agencies and departments and is a key tester of Attentis emergency service related interfaces and Apps.



Rob Gell – Meteorology

Rob Gell is a geographer, former academic and well-known television weather presenter with extensive experience with non-profit, government and private organisations in environmental communications and marketing, sustainable business strategy and project design for the emerging green economy.

Rob is actively engaged in a range of projects and solutions, identifying opportunities for Attentis involvement. Rob has an extensive network that offers business development capacity to grow Attentis's reach with industry.



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Latrobe Valley Information Network

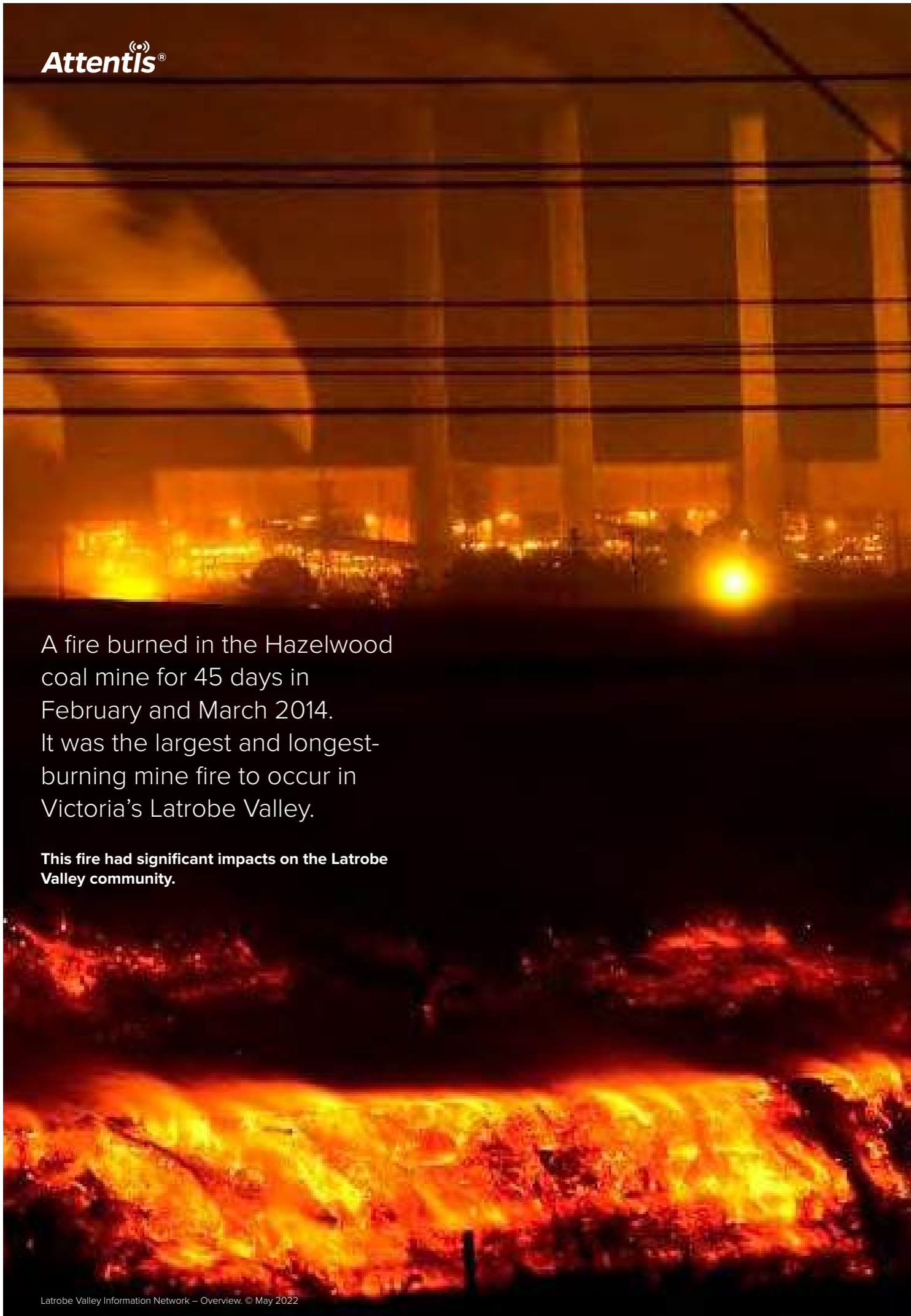
LVIN.org

An award-winning intelligent live sensor network measuring all environmental elements, delivering early detection, proactive disaster mitigation, public health and safety, critical infrastructure protection, industry visibility, resource protection and community resilience.

May 2022

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A fire burned in the Hazelwood coal mine for 45 days in February and March 2014. It was the largest and longest-burning mine fire to occur in Victoria's Latrobe Valley.

This fire had significant impacts on the Latrobe Valley community.

The Latrobe Valley Information Network powered by Attentis®

In 2019, Attentis® constructed the Latrobe Valley Information Network (LVIN.org): 44 key locations featuring our patented, self-powered Attentis® R-series sensors, integrated to form an intelligent network that continuously streams real-time environmental information coupled with unique detection capabilities.

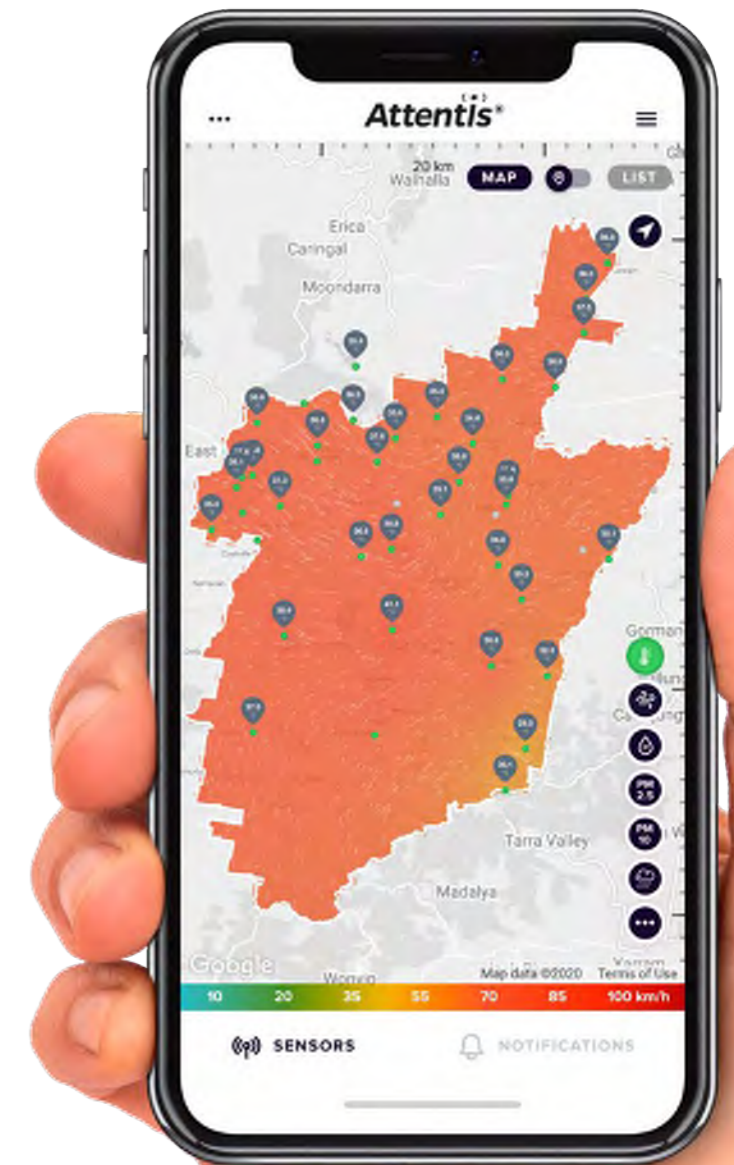
Funded jointly by the Australia Federal Government and Attentis®, the LVIN was constructed to demonstrate the ability of this Australian developed technology to address community, industry, agency and local government need for real-time, integrated, intelligent information throughout the region.

The Latrobe Valley region is home to large scale power generation and distribution, plantations, reservoirs, national parks, coal mines, paper and timber mills and a wide variety of agriculture and farming. The area is also a high fire and flood risk region with previous air quality impacts from several large scale bushfires and a mine fire.

The LVIN was designed to return confidence to the community and local industry through the construction of the world's first integrated real-time environmental monitoring and early detection and notification network.

Today, the LVIN is a live regional support system providing early detection of critical events (fire ignition, floods, contamination, airborne pathogens), live situational awareness and continuous real-time information to support public health and safety, protect resources and strengthen community resilience through access to timely, reliable information.

Access to live and historic information enables local industry and businesses to assess trends, make informed decisions, engage mitigation actions, improve productivity and output contributing to local GDP and employment growth.



“We are excited (about the LVIN) because it actually gives the normal person on the street the ability to see what is happening, live.”

Wendy Farmer – President, Voices of the Valley

The new staple for the region

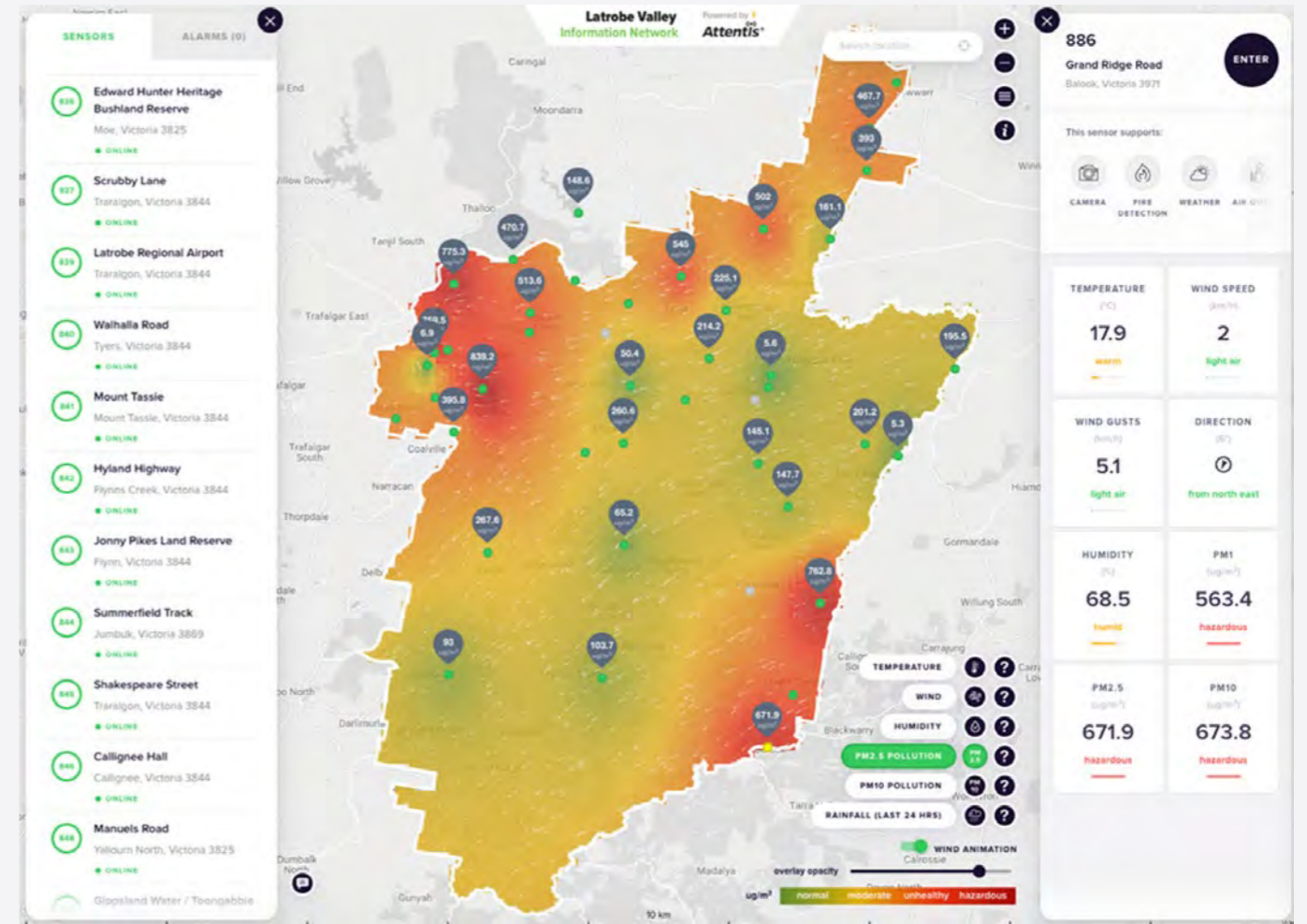
The LVIN has delivered operational improvements for local agriculture, power generation, water utilities, forestry, health services and emergency management, employed local contractors and businesses during construction and restored public confidence in the wake of the Hazelwood mine fire.

This network has become a staple for local industries. Snowy Mountain Hydro, RTL Mining, Thiess, government agencies (CFA, VICSES, VicRoads, Ambulance Vic, DHHS), utilities (AGL, United Energy, AusNet Services, AEMO), local government (Latrobe City Council, Baw Baw Shire) and thousands of local and neighbouring residents, accessing this data on a daily basis.

The network is used for air quality monitoring, localised weather, prediction, mitigation, detection and remote viewing across the region; described by the CFA as invaluable during the Yinnar bushfires in Gippsland.

During the East Gippsland fires over 11,000 daily public users used the LVIN to understand smoke concentration levels throughout the region to make travel route decisions to reduce exposure. Ambulance Victoria also used the site for smoke concentration levels in towns to gain an understanding of the possible future patient numbers attending hospital with respiratory issues and also sent out public warnings.

The Latrobe Valley Information Network is a valuable resource for the region. It provides unparalleled access to a wide variety of live information to aid informed decisions that reduce impact. Real-time community confidence and resilience.



In 2019, Attentis® networks were recognised as the most technologically advanced data transmission networks in Australia, receiving the 2019 Australian Smart Cities Award - Regional, the Best Government IoT Project 2019 in the Australian IoT Awards as well the Best Overall IoT Project for the Latrobe Valley Information Network.



Smart City of the Year 2019 (Regional)



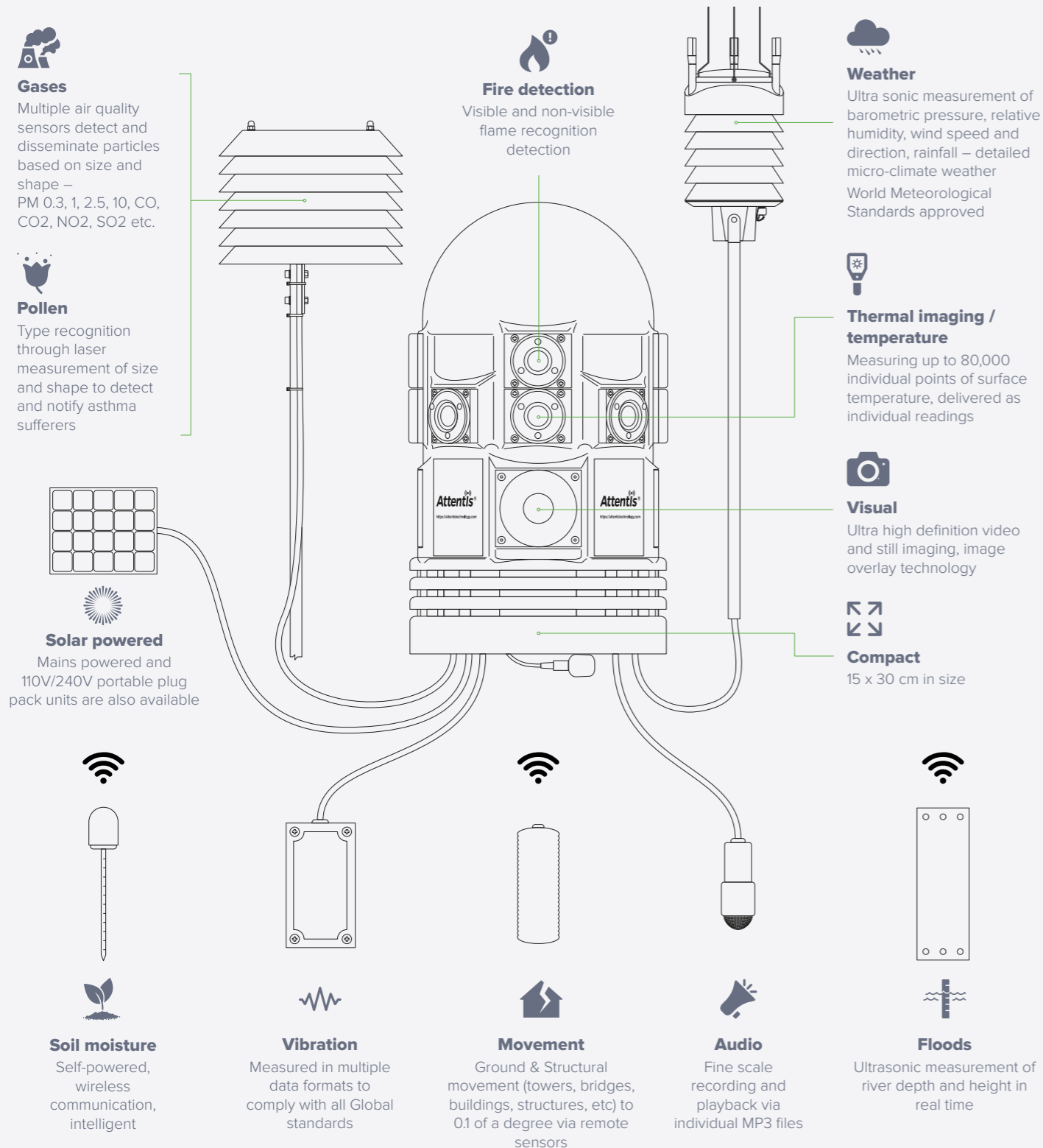
Best Government IoT Project (2019)



Best Overall IoT Project (2019)

Intelligent, integrated, intuitive sensors 44 locations, 1,470 sq klms - real time information

The Latrobe Valley Information Network combines 44 intelligent patented sensors into a high speed, continuous information streaming service for emergency services, agencies, businesses and communities to maintain awareness of live conditions, events and impacts as they unfold - the LVIN.org



Nationally recognised as the technology to support every community

The LVIN featured strongly in the New South Wales Independent Bushfire Inquiry into the 2019 / 2020 fires, stating:

“For fire particularly, the LVIN sensors can monitor weather conditions leading into the fire season, then detect fire ignition, location, temperature and movement. Multiple fires can be viewed simultaneously so that active conditions affecting fire growth and movement can be better understood.”

“Installations such as this in high-fire risk areas of NSW, especially near towns and cities, would be an important, relatively cheap and relatively quick development.”

The LVIN formed the basis for recommendations 4, 34 & 35.

Royal Commission recommendations

Attentis® was subpoenaed to provide technology expertise to the Royal Commission into National Natural Disaster Arrangements presenting the benefits of wide-scale real-time sensor networks to deliver coordinated effective response and secondary communication support for communities.

The technology provides the platform for proactive disaster mitigation, public safety, critical infrastructure protection, agricultural yield improvement and community resilience. It is a key technology for all high risk fire and flood affected regions.

During the 2019 Gippsland fires the CFA accessed LVIN daily, leading to the following quotation from Glenn Pröbstl, Operations Manager, Specialist Response, Fire and Emergency Management, CFA Headquarters:

“Firstly congratulations to the Latrobe City Council for supporting a network of atmospheric monitoring stations throughout the council footprint. I recently had the opportunity to utilise this service during a recent fire in Gippsland.

The ability to monitor weather, for fire operations and pollution for firefighter and community health was a huge advantage over previous campaigns. The advantage of real time information cannot be over emphasised and this was of great benefit to the management of these fires”.

The Royal Commission into National Natural Disasters stated:

“23.48 Australian, state and territory governments should take steps to facilitate **engagement with the private sector to maximise utilisation of ideas and technologies.**

“23.49. “Our hearings highlighted **examples of private sector and individual initiatives which are pursuing innovative research and technology to assist disaster management.** These included:

Attentis, a company designing and manufacturing patented multi-sensors providing a range of capabilities, including: fire ignition and flame detection; 360° cameras; time lapse and high definition video; air quality sampling; flood detection with water heights; lightning detection; and vibration and structural and ground movement.”

p496, Final Report: Royal Commission into National Natural Disaster Arrangements, October 2020

LVIN supports local industry and communities everyday

Agriculture

The LVIN incorporates a range of continuously streamed real-time information that provides the local farming industry with the ability to better understand local conditions, engage accurate automation and drive productivity and yield through awareness, prediction and trends. Continuous fine-scale measurement of micro-climate weather, air quality and composition, rainfall, soil moisture, fog, frost and dew from 44 locations throughout the region delivers this ability.

Farmers can make precise informed decisions about crop investment, type, automation, forecasts and risk mitigation.

Further capabilities including the integration of thermal imaging, early detection of airborne, waterborne and soil contaminations to elicit immediate response to reduce impacts.

The LVIN introduces the ability to incorporate inexpensive automation facilitation for all farms, regardless of size, utilising the network to determine ideal conditions to operate.

The network also allows individual farms to add thermal imaging to monitor cattle health and animal tagging to actively track livestock. All information is accessible through the network.

The LVIN provides the basis for improved information and automation, reducing farm engagement time, increasing efficiency and production, and allowing increased family time for improved mental health.

Viticulture

Attentis® actively worked with the University of Adelaide and E.J Gallo in California, to provide a greater understanding of how smoke taint can impact wine quality. A solution was also developed incorporating smoke detection and automated misting to eliminate smoke absorption.

Micro-climate weather, mildew and frost detection, continuous soil moisture measurement, soil nutrients maintenance and automated mitigation systems are all features contained within the LVIN capability, all designed to protect grape health and support consistent yield objectives of local viticulture.

Resource protection

The LVIN has sensors located at key resources including reservoirs, rivers and streams detailing water heights and movement. Live monitoring provides instant notification around potential flooding, ground movement, dam wall integrity and trespass. Attentis® has sensors throughout timber plantations to detect fire ignition and protect timber resources for the local timber industry.



Community health

A publicly accessible mobile App developed by Attentis® connects the Latrobe Valley community to the local environment 24-hours per day, providing information around air quality, micro-climate weather, flood and fire warnings and local community information.

The App also serves as a secondary communication capability during large scale events to ensure complete situational awareness of the event as it unfolds. Local government agencies and emergency services can send messages directly to local residents to inform them of an event and notifications advising of possible impacts, evacuation routes and how to limit exposure.

This App is particularly valuable for asthmatic individuals and those who experience respiratory ailments by providing a mobile platform for early warning of airborne pollutants that details concentration levels, timeframes and safe routes to avoid exposure.

The App offers a vast range of alerts and notifications that are customisable for individual users. The alerts are also available on the Attentis® website.

Critical infrastructure

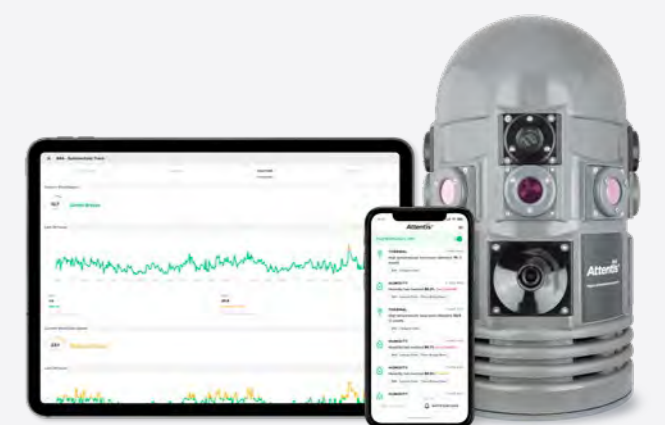
Critical communication infrastructure located in the Latrobe Valley is monitored by Attentis® using thermal and visual imaging, vibration, ground and tower movement and noise monitoring. Protection of communication towers is key to maintaining communications throughout communities and regions during catastrophic events. The LVIN also provides a secondary communication network for emergency communications when cellular and internet communication is impacted.



“Access to real-time information on this scale will assist to build community resilience and confidence, and lead to an informed understanding during events that impact lives throughout the region.”

“Expanding this network will bring greater benefits to all communities and agencies increases the level and breadth of real-time information available.”

Lance King AFSM
Latrobe City Council - Emergency Management



Unmanned fire detection and notification

The Latrobe Valley is a high fire and flood risk location. The region hosts large scale plantations, coal mines, power generation and national parks, increasing the risk of large scale fires. Fire ignition at these remote locations can occur at anytime, day or night, from a range of sources. If undetected, ignitions coupled with high winds and dry conditions can soon create fires that are difficult and sometimes impossible to contain. Early detection and rapid response are key elements to combat bushfire in these high risk locations. The LVIN features strategically located sensor towers in all high fire risk locations; plantation access roads, refuse sites, coal mine plateaus, rivers, reservoirs, national parks, communication platforms and key information gathering sites.

The Attentis® LVIN network delivers 24-hour unmanned detection of fire ignition using our intelligent patented sensors that incorporate 360° real-time thermal imaging, visual imaging, flame detection, noise and environmental changes to detect fire starts, re-ignitions, hot spots and changes in conditions that lead to fire ignitions. Through real-time awareness, multiple detection capabilities and intelligent processing, our sensors provide the most effective detection capabilities available, with no reliance on a single method.



Emergency services

The LVIN is a staple for local emergency services, providing unparalleled level of real-time information and live situational awareness and safety. The LVIN network map details fire location, current conditions, fire movement and personnel location, delivering crucial fire management information.

Live intelligence to inform, improve response, reduce impact and provide better outcomes.

Attentis® technology delivers an invaluable tool to enable first responders to:

- rapidly respond with a clear understanding of the fire, flood or potentially catastrophic event as it unfolds;
- strategically position ground and aerial resources at the most effective combat points;
- maintain real-time awareness of changes in wind speed and direction to remain a step ahead of the event;
- reduce the risk of burn over and health impacts to first responders by continuous tracking of personnel, conditions, the fire front and key assets;
- measure air composition for smoke, particulates and gases to reduce health impact on first responders and the general public.



LVIN: delivering the objective

The Yinnar fires - re-ignition incident

During the Yinnar fires in Gippsland, Victoria on March 2019, the sensor located at HVP Plantations in Jumbuk detected a fire re-ignition after the main fire was extinguished. A slow increase in ground temperature was detected and series of thermal notifications (far left) displaying the increasing temperature at the ignition source was send to first responders to return to the location. The investigation revealed an early-stage re-ignition that was then properly extinguished.

The value of this technology is demonstrated in this capability. If you review the visual images that accompany the thermal images, it clearly reveals the low lying smoke that is not visible above a metre from the ground, making it impossible to detect using solely camera and visual methods. The use of multiple intelligent methods to detect are a feature of our patented technology and proven in real world applications.

Remote ignition detection and response

Site 866 is located along Rifle Range Road in Glengarry North, a dirt access road adjacent to pine plantations owned by Hancock Victoria Plantations (HVP). This particular site was selected due to its propensity as a high fire risk location, in part due to the plantation, the roads use for stolen car fires, its remote accessibility and its frequency of trespassers.

This site features weather, air quality, rainfall, movement and thermal and visual imaging.

At 5.33pm on Friday 23rd October, several alert notifications were received detailing high readings of PM₁ and a higher than normal readings of PM_{2.5}.

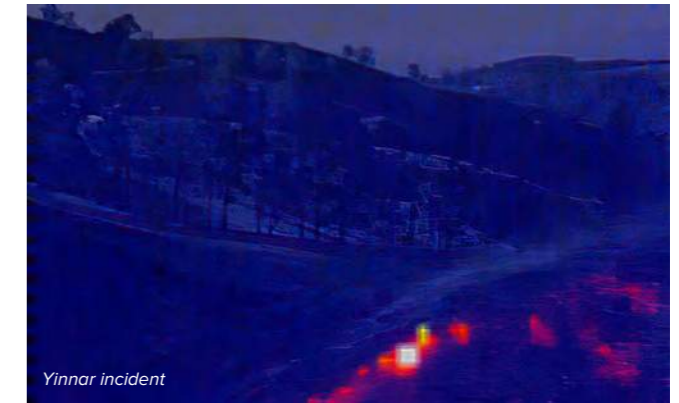
A key feature of Attentis® networks is the ability to rapidly investigate any alert through visual confirmation via the Attentis® interface and App. The investigation confirmed light thermal increases and visual signs of light smoke accentuated by the ability to time-lapse the location.

The alert was also received by Hancock Victoria Plantations and the local emergency services first responder team, whom rapidly investigated the cause.

The investigation revealed a property adjacent to the plantation was undertaking small fuel reduction burning (see image) of a fire approximately 2x2 metres (6 foot x 6 foot). The fire was extinguished.

This event had the hallmarks of a larger scale event. Friday evening, increasing winds, dry conditions and an adjacent fuel load. If this fire failed to be extinguished properly or a re-ignition occurred, embers could have blown into the plantation causing a fire that gains strength throughout the night to reveal an intense fire in the morning that is difficult to extinguish and threatens the local community.

This immediate detection, notification and investigation capability of the LVIN network reveals the value of the technology to provide resilience for the region.



Thermal



Visual



Camera view



On-site visual



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Creating intelligent sensor networks is a major step in understanding environmental factors that impact our daily lives.

Attentis® Technology has invested years of research and development, testing our networks in extreme conditions to ensure reliability.

Attentis® intelligent networks transform life through improved human understanding of, interaction with and response to, the environment we live in.

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Government of **Western Australia**
Department of **Fire & Emergency Services**



Our Ref: BGU/0124-02
Your Ref:

11/04/2022

André Schönfeldt
Chief Executive Officer
Shire of Dardanup
1 Council Drive
EATON WA 6232

Dear André

RE: DARDANUP EMERGENCY INFORMATION NETWORK

I am pleased to provide in-principle support for the Shire of Dardanup's Emergency Information Network (DEIN) project proposal aimed at providing data that can be used to focus on three of the main fundamentals of Emergency Management being Prevention, Preparedness, and Response to an emergency.

I understand that the DEIN proposal is the establishment of a continuous high speed information network and would involve the installation of a range of intelligent sensors supported by 5G technology.

This proposal will provide the Shire of Dardanup and associated agencies access to real-time data, imaging and the identification of high risk locations to make informed decisions for the protection of the community, critical infrastructure and the environment.

If this proposed network proceeds, it represents an opportunity to establish a new benchmark for local governments responsible for public safety and situational awareness that can be replicated in other at-risk regions to provide the tools to combat the increase in natural hazards risks.

Yours sincerely

ANDREW WRIGHT
SUPERINTENDENT – SOUTH WEST



Attentis and the LVIN Recommendations

Delivering proactive bushfire mitigation, public safety, critical infrastructure protection, and community resilience via a single intelligent integrated network.

April 2021

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Royal Commission into National Natural Disaster Arrangements

14.20 Air quality monitoring

The private sector and industry are also involved in air quality monitoring. For example, a private air quality monitoring network operates in the Latrobe Valley, partially funded by the Australian Government – this network is separate to the Victorian Government’s co-designed network. A number of industry-funded monitoring stations also operate in communities with major industries, such as coalmining and lead smelters. (p315)

23.49 Practical application of research

However, our hearings highlighted examples of private sector and individual initiatives which are pursuing innovative research and technology to assist disaster management. These included:

Attentis, a company designing and manufacturing patented multi-sensors providing a range of capabilities, including: fire ignition and flame detection; 360 degrees cameras; time lapse and high definition video; air quality sampling; flood detection with water heights; lightning detection; and vibration and structural and ground movement. (p496)

Final Report of the NSW Bushfire Inquiry

2.5.1.7 A possible early win

While it is unlikely Australian would want to pay for a dedicated geostationary satellite to monitor bush fires, it might consider purchasing one or more high-altitude platforms for this purpose despite the cost, given the fact that these big fires could easily happen again.

However, not all remote sensing technology is as expensive.

An example of an existing installation that demonstrates the advantages of optimising the lifecycle of data retrieved by relatively low-tech remote sensing technology is the Latrobe Valley Information Network (LVIN).

Establish in response to large-scale events that have previously affected the region, including the Hazelwood Coal Fire in 2014 and the Black Saturday fires of 2009, the LVIN began with instrumented towers used to monitor nearby timber plantations, coal mines, power stations, landfill sites and water catchments. Now, the \$1.7 million automated network utilises 45 integrated sensors placed at strategic, high-risk locations around the Latrobe Valley that can operate as a stand-alone unit, but also as part of a network to provide data on environmental parameters including weather, air, soil and water composition, sound, movement, visual and thermal imaging.

For fire particularly, the LVIN sensors can monitor weather conditions leading into the fire season, then detect fire ignition, location, temperature and movement. Multiple fires can be viewed simultaneously so that active conditions affecting fire growth and movement can be better understood.

The LVIN integrates the data and information collected in various ways, and data from other sensors and/or networks can be combined with LVIN data and analytics and transmitted to improve overall understanding of the region, facility or location. The 75,000 residents of the Latrobe Valley have free access to monitor the real-time information via an online portal and notifications from local agencies and emergency services.

Installations such as this in high fire-risk areas of NSW, especially near towns and cities, could be an important, relatively cheap and relatively quick development.

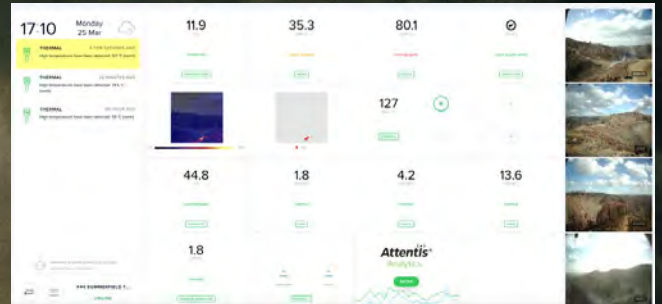


Photo 2-1: Screenshot of LVIN online portal displaying thermal, sensor and visual smoke information relating to a re-ignition adjacent to an at-risk property and home, March 2019. Provided by Latrobe City Council 21 July 2020.



Photo 2-2: Side-by-side thermal and visual image from the LVIN showing the heat sources(s) detected and crews onsite for the same fire shown above in March 2019. This autonomous detection sends an alert to any individual or group who have set up alarm configurations. Provided by Latrobe City Council on 21 July 2020.



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Risk Assessment			
*Risk:	Misinterpretation of Upper Ferguson for Ferguson Bush Fire Brigade.	Date:	21/02/2023
*Measure of Consequence:	Minor	Reported by:	Councillor LILLY
*Context: <i>Radio communication has standard operating procedures.</i> <i>Radio is the primary form of communication on the fire ground.</i> <i>Radios are managed and provided by DFES communications centre.</i>			
		Assessments	
*Causes:		Consequence	Likelihood
<ul style="list-style-type: none"> • Lack of training or knowledge • Casual or negligent radio use • Stress 		Minor	Likely
		Initial/ Inherent	Moderate
Current Controls:		Consequence	Likelihood
<ul style="list-style-type: none"> • Written manual or safe operating procedures handbook issued to each brigade • New members are offered an induction by FCO/Capt. for all fire equipment and vehicles • Radio communication training • None of the brigades currently want to change their name 		Minor	Possible
		*Revised/ Residual/ Current	Moderate
		*Existing Controls Ratings	High

(BFAC APPENDIX 9.13.5)

		Assessments					
		Consequence	Likelihood	Risk Rating			
<p>*Treatment Options:</p> <ul style="list-style-type: none"> • Staff to read handbook • Further or refresher operational radio training to be offered to the brigades • Chief Bush Fire FCO, FCO's and Captains of the two Ferguson Brigades to reiterate the safety significance and importance of effective radio communication during fire events. 							
<p>*Is risk acceptable? If in doubt consult with a higher authority</p>		<input checked="" type="checkbox"/> Yes (Risk is acceptable and the treatment section may be left blank) <input type="checkbox"/> No (Complete treatment section)					
<p>Selected Treatment (Future Controls):</p>		<p>Effectiveness of Treatment:</p>		<p>Future/ Predicted</p>	<p>Minor</p>	<p>Unlikely</p>	<p>Low</p>
<p>Additional education and training</p>		<p>Implemented by:</p>					
		01/ 08 /2023					
Risk Acceptance Criteria							
Risk Reviewed By (OSH Officer):	Date:	Risk Recommended By:	Signature:	Date:	Risk Managed By:	Signature:	Date:
J.Leaver	21-02-2023						