WIOA Paper Submission – NSW May 2025
Jointly presented by Yarra Valley Water and Envirosuite

Title

UNDERSTANDING SITE ODOUR IN REAL-TIME: A CASE STUDY FROM THE WOLLERT WASTE TO ENERGY FACILITY

Authors: Georgia Brown (YVW), Stephanie Salinas (YVW), Nick Spurrett (EVS), Sabina Todd (EVS)

Abstract

Yarra Valley Water (YVW) operates a Waste to Energy (anaerobic digestor) facility at Wollert in Melbourne's northern suburbs. The facility processes a broad range of commercial food waste, turning it into renewable energy.

Without adequate controls, facilities such as these may carry a risk of odour emissions impacting surrounding communities. The facility is located within the northern growth corridor of Melbourne and since its commissioning, there has been significant residential development in the surrounding area encroaching on the facilities location.

This case study will detail how YVW maintains a real-time understanding on the effectiveness of its odour management controls and maintains a high level of confidence regarding the compliance of the facility.

1. Introduction

Yarra Valley Water Wollert waste to energy plant was commissioned for operations in 2017. Waste producers, such as markets or food manufacturers, deliver the equivalent of 33,000 tonnes of commercial food waste to the Wollert facility each year, diverting thousands of tonnes of waste away from landfill. The facility can produce around 22,000 kilowatt hours of electricity per day, the equivalent power demand of around 1,300 homes.

The facility is located adjacent to Yarra Valley Water's Aurora sewage treatment plant, generating enough energy to power both the facility and the sewage treatment plant. Excess energy is exported to the electricity grid.

Turning waste into energy benefits Victoria by reducing waste sent to landfill, and lowering greenhouse gas emissions. By generating energy on-site, these facilities realise economic benefits via lower operating expenses from reduced electricity consumption costs and increased revenue from sale of excess electricity to the grid.

After five years of operation, YVW were made aware of community members lodging enquiries about elevated odour in the region by the regulator. Other odour producing businesses also operate in the Wollert area including a municipal waste landfill, an organic waste recycling

facilities with open windrow composting as well as general development. Therefore, it was not clear which facility or other local activity was responsible for causing the odour enquiries.

YVW is committed to sustainable development which encompasses best practice environmental management and delivering successful outcomes for the community. The facility is designed with various odour control such as air treatment systems, enclosed waste processing however upon learning of odour impacts being experienced within the community, YVW identified they had a low level of confidence in their ability to measure any potential impact from the waste to energy facility.

2. Discussion

2.1 Solution overview

In May 2023, YVW commenced use of Envirosuite's environmental intelligence software platform called 'Omnis'. The purpose of the solution was to provide:

- Real-time awareness: Gain a real-time understanding of air quality conditions around the plant, including maintaining constant awareness of any potential odour emissions generated from the plant and when the community may be impacted by odour
- Simplified data management: Transform complex environmental data into actionable insights while reducing reliance on manual collection and paper-based reporting
- Rapid operational response: Receive early warning to raising odour levels so that emerging issues can be managed in real-time before they reach regulatory limits
- Proactive risk management: Forecasting weather and high risk operational periods, allowing for scheduling of preventative maintenance and operational planning to optimise odour control measures and prevent impacts occurring
- Impact management and rapid stakeholder response: Fast-track odour enquiry investigation and identify key odour sources to optimise mitigation efforts and build community trust through fast resolution and transparent environmental impact reporting

2.2 Solution design

The environmental management solution consisted of:

- Hardware: Deployment of four low cost air quality monitors and a weather station which stream real-time data to a cloud hosted system. The air quality monitors measure indicative H_2S and NH_3 concentrations.
- Software: Envirosuite's Omnis solution was used. The Omnis software platform ingests the real-time data and displays it in a range of ways that provide easy to understand and actionable insights.

Monitoring hardware was strategically located around the facility to capture upwind and downwind measurements to isolate the site contribution to odour emissions and in the direction of the highest sensitivity communities so that early warning of off-site impacts could be detected.

2.3 Real-time awareness

Omnis's monitoring module provides YVW with a constant awareness of odour and weather conditions in the region. The monitoring page, refer Figure 1, uses an intuitive 'traffic light' colour system to allow YVW to assess site's odour performance at a glance and understand if odour is being emitted from the facility and consequently if additional operational control is warranted.

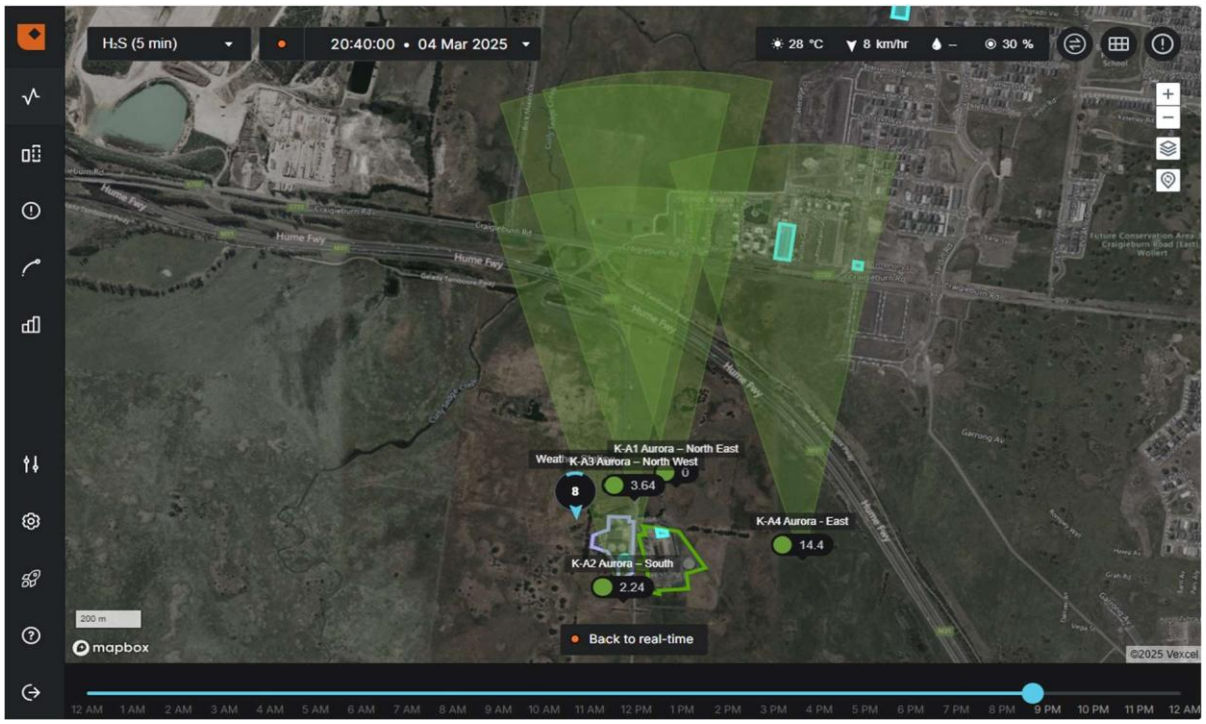

Figure 1 Omnis monitoring module

Figure 1 shows a real-time snapshot of the H_2S concentrations (in ppb) at sensors around the plant. The green wedges indicate the approximate area that is impacting the sensor readings (i.e. the green wedges show where the likely source of emissions is located). In this case the wedges are showing that low H_2S concentrations are blowing from the community to the north over the Wollert plant. Sensors upwind and downwind of the plant show similar H_2S concentrations indicating that no odours are being picked up in the plant, otherwise the sensor on the south side of the plant would be reading an elevated H_2S concentration.

2.4 Simplified data management:

Omnis consolidates and stores all historical data collected through the monitoring network providing YVW with a centralized database of environmental data. It undertakes computations (such as data aggregations) in real-time so that desired environmental data and averaging periods are displayed.

Omnis's reporting module allows YVW to export the data in a variety of methods including tabular and graphical formats so allow for further data analysis and reporting if required.

2.5 Rapid response

Omnis contains a powerful alerting engine enabling alerts to be sent via SMS or by email to operational team members. YVW set up customised alert thresholds so that they are notified if odour levels reach predetermined concentrations and can respond to emerging odour trends as quickly as possible.

As the air quality sensors are located on the boundary of the Wollert facility, this ensures that YVW operators are notified as an event is unfolding and, in most cases, before there is time for the emission to travel offsite and be detected by the community. This facilitates timely review of site operations and implementation of additional mitigation measures to minimize and prevent potential odour impacts if required.

2.6 Proactive risk management

Omnis provides advanced capabilities to assist facilities proactively manage operations to prevent potential impacts from occurring. These tools include:

- Weather forecasting
- Odour dispersion modelling using forecast meteorology
- Risk forecast reports

YVW successfully used these tools to assist with the planning of major maintenance works, like the overhaul of the anerobic digester tankss. The odour modelling tool assisted YVW to understand windows in time when additional control measures may need to be implemented to mitigate the risk of offsite odour impact. Doing this proactively, instead of reactively, as the works are taking place increased confidence in the works taking place but also minimized the need for last minute corrective actions. Visualisation of the forecast odour plume is shown in Figure 2.

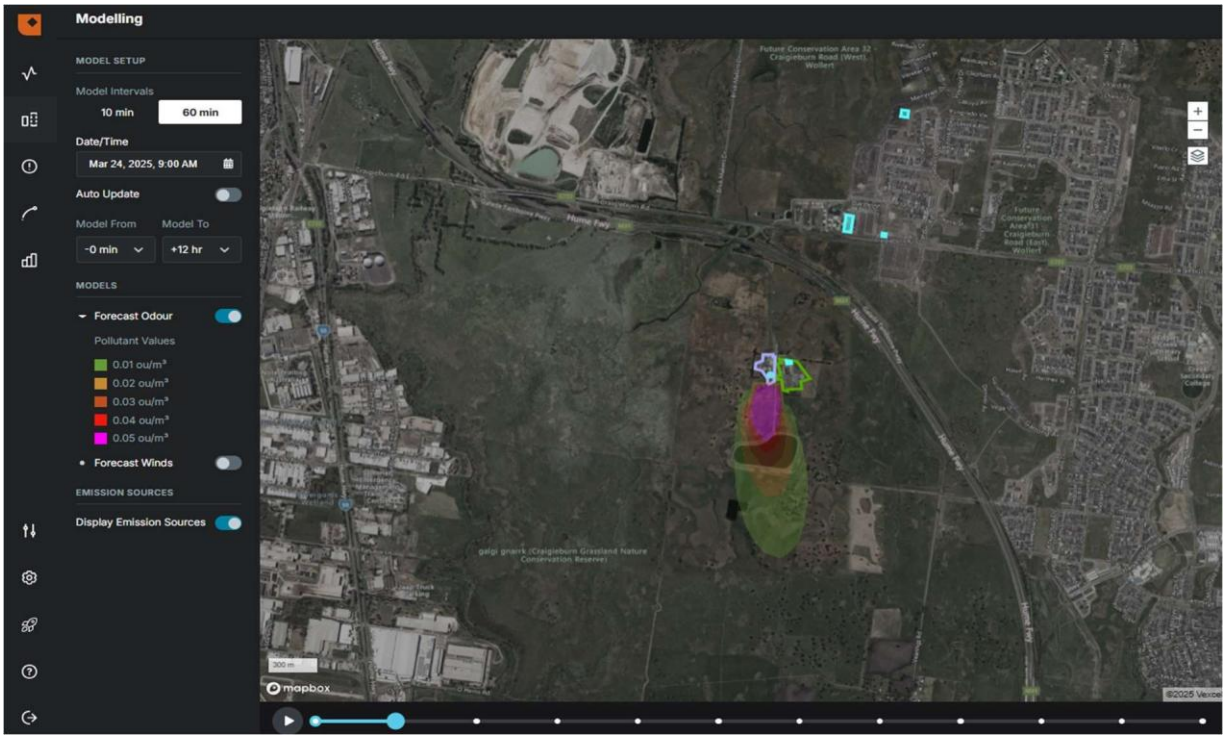

Figure 2 Forecast odour plume modelling

Odour risk forecast reports provide YVW with an understanding of future meteorological conditions and identifies upcoming periods of higher risk where odour impact to surrounding communities is more likely based on the prevailing weather conditions.

Figure 3 shows an example odour risk report, which indicates a ‘low’ risk of odour impacts in the next 7 days. The risk level is calculated based on future meteorological conditions, therefore a ‘high’ risk level indicates that poor odour dispersing weather conditions (i.e. low winds blowing towards sensitive receptors) are predicted in occur in the future. This enabled YVW to proactively plan operations accordingly, so that odorous activities are minimized or rescheduled to avoid higher risk periods.

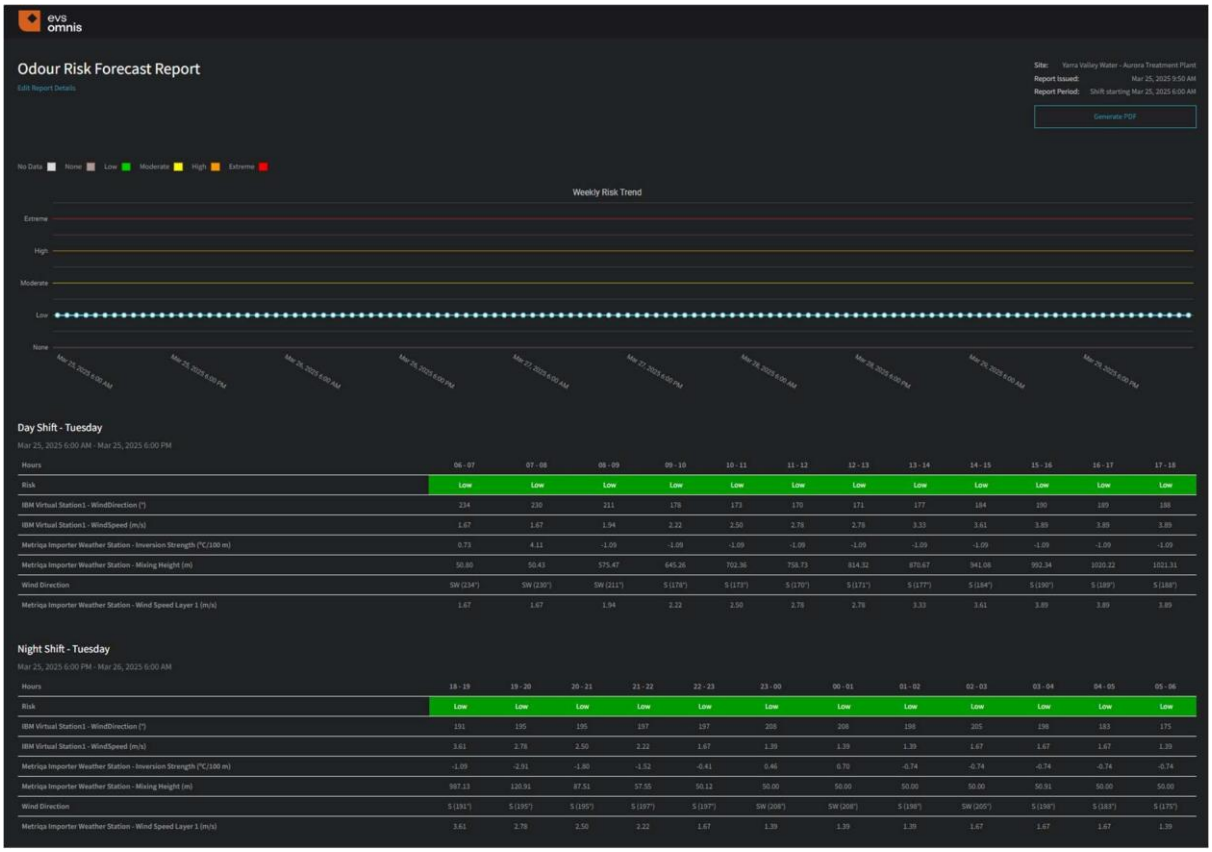

Figure 3 Odour risk forecast report

2.7 Impact management and rapid stakeholder response

The Envirosuite platform has the ability to assess whether a complaint coming from offsite can be attributable to YVW operations or if the emissions are likely from elsewhere. This is done through a backwards trajectory model which simulates the pathway for the parcel of air every minute for up to 60 minutes prior to when the complaint was noted.

This is useful to determine the likelihood of the YVW contributing to odour detected in the community as opposed to the potential that another odour source in the region could have contributed to, or been the cause of the odour.

An example enquiry investigation backwards trajectory is shown in Figure 4, which can build community trust through fast enquiry investigation and resolution based on a scientific and transparent analysis.

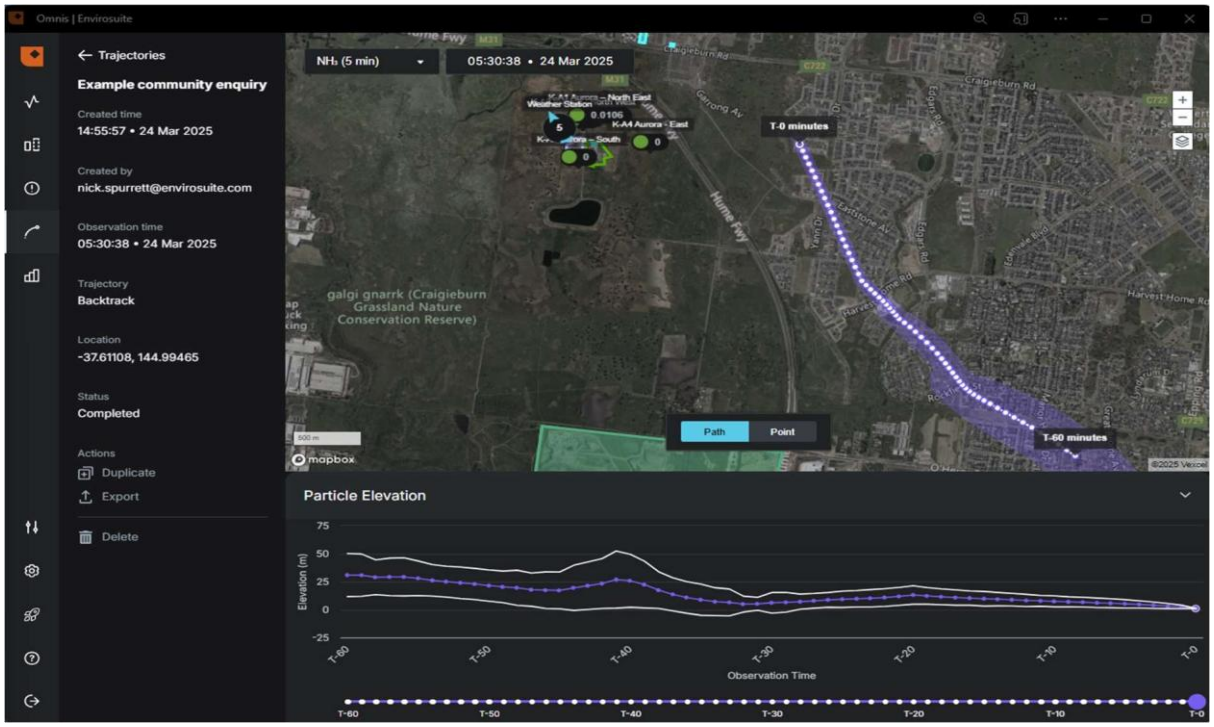

Figure 4 Community enquiry investigation backwards trajectory

Conclusion

Waste to Energy (anaerobic digestor) facilities if not well designed or managed can have the potential to cause odour impact to surrounding communities. This risk is increased if residential developments are closely located or encroaching on existing buffer zones surround the facility.

The Envirosuite Omnis platform provides a range of tools that assist YVW to gain a real-time understanding of air quality around the Wollert waste to energy site, particularly what is attributable to YVW operations through an easy to digest visual display, powerful alerting capability and air dispersion forecast modelling.

The tool has allowed YVW to gain a better understanding of local climate and environment around community when it comes to odour risk.

Where YVW are approached in relation to odour enquiries in the region, they now have data to respond to regulatory and community queries relating to potential impact.

YVW now have a high level of confidence in the controls they undertake and can validate actions through real-time data.

YVW will be implementing a similar solution at the Lilydale waste to energy facility once it becomes operational later this year.