



AIR QUALITY IMPACT ASSESSMENT & SOLUTION

3-9 Byron Street, Bulimba QLD 4171



The car park discharge is a low-level grille that blows towards the street. The "receptors" are the noses of people who may be on the nearby balconies.

Prepared for:	3 Byron Street P/L
Prepared by:	SEED
Purpose:	AIR QUALITY IMPACT ASSESSMENT & SOLUTION
Issue No:	A
Date Issued:	30-Oct-25
Author:	R Lord - Brisbane
Checked and Approved:	Rob Lord

This document has been prepared in accordance with the terms and conditions of appointment. It remains the property of SEED until the document has been paid for.

SEED Engineers Pty Ltd (ABN 84 637 479 139) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party without prior approval. The intellectual property herein remains the property of SEED until it has been appropriately purchased.

The success and realisation of the proposed initiatives will be dependent upon the commitment of the design team, the development of the initiatives through the life of the design, and the implementation into the operation of the building. The use of computer simulation is, by its nature, predictive with output based on historic weather data and standard assumptions. The results of any computer simulations within this specification do not guarantee future performance.

Amendment Register

The following register each issue of the document and the amendments associated with each issue. Each issue is organised by revision number, page and section number, details of each amendment and the date of issue. All additional changes after construction issue within the document will be marked in ***bold italics***, and all deletions will be crossed out by ~~strikethrough~~.

Amendment Register						
Revision	Section and Page Number	Issue/Amendment	Author	Project Engineer	Checked	Date
A	ALL	FOR STATUS	R LORD	R LORD	R LORD	30/10/2025

Contents

Introduction	7
Project Description	8
4.3 Receptors	9
Modelled Scenario	15
Appendix A – CV Of Author	19

Executive Summary

SEED was appointed by 3 Byron Street P/L, to undertake an investigation into the Air Quality Impact of pollutants originating from the low level discharge carpark exhaust system, located 3-9 Byron Street, Bulimba QLD 4171.

This report responds to PO20 of the Multiple Dwelling Code (assessment criteria section). This is represented below:

PO20

Development is located, designed and constructed to achieve the:

- a. air quality (planning) criteria in [Table 9.3.14.3.G](#);
- b. odour criteria in [Table 9.3.14.3.H](#).

Note—An air quality impact report prepared in accordance with the [Air quality planning scheme policy](#) can assist in demonstrating achievement of this performance outcome.

This is the performance outcome required where the discharge is not achieving 15m separation to the nearest Point of Interest (POI).

This report uses the air dispersion modelling software CALPUFF for the impact assessment using the worst case year of 2022 meteorological data.

The compliance criteria and results for comparison are tabled below:

Table 1 Summary of pollutant impact assessment and compliance Ground Floor Carpark Discharge

Relevant Air Quality Parameter	Impact Assessment Criteria From P20 (At Receptor)	Achieved Incremental Impact	Compliance status
CO Carbon Monoxide	<9 ppm	0.0000149 ppm	Compliant
CO ₂ Carbon Dioxide	<700 ppm	0.01ppm	Compliant
NO ₂ Nitrous Oxides	<15 ppb	0.00 ppb	Compliant
PM _{2.5}	<8 ug/m ³	<0.001 ug/m ³	Compliant
PM ₁₀	<50 ug/m ³	<0.001ug/m ³	Compliant
Odour	<20U	<0.257 OU total	Compliant

Hence I can state assertively that compliance to P20 has been achieved. This report follows the format sought by the CityPlan document ([Air quality planning scheme policy](#)) and it demonstrates compliance to the air quality (planning) criteria in [Table 9.3.14.3.G](#); and the odour criteria in [Table 9.3.14.3.H](#).

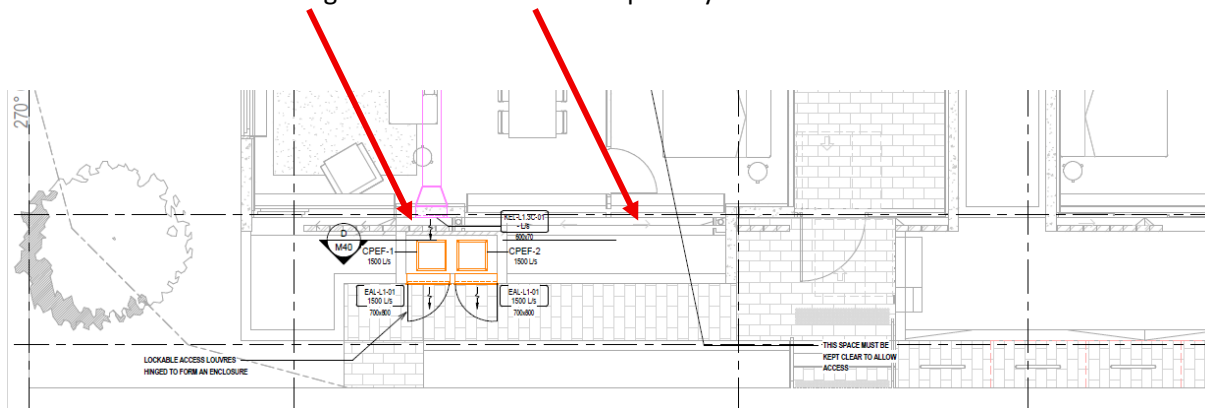
Note that our knowledge manager is unable to find any reliable research or reference to odour units stemming solely from a carpark ventilation system. Hence, we took the view that the odour within the carpark had to be below the EPA QLD's definition of odour nuisance (20U/m³), hence it was modelled as 60U. This is the worst-case odour prediction that could occur in this carpark, otherwise there would be a separate odour nuisance matter unrelated to the carpark.

Note that the report adopts the modelling conventions established in the NSW DEH guidelines for modelling, primarily the 2013 DEH Guideline - *Odour Impact Assessment from Developments*¹, which relies on the document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017)*.

One impact of this is the conservative nature of the assumptions adopted. For example, all species (including odour) were modelled without decay. This is quite conservative as the chemicals listed above have reasonably short "half-lives". (e.g. CO has a 4 hour half life, meaning it's concentration is halved after 4 hours).

The modelling shows that the **dilution factor** of the discharge is in the order of 8 at the nearest POI. That is, the air quality experienced in the carpark is diluted with fresh air 8 times over, before it is experienced by the nearest POI.

The location of the discharge and the nearest POI is portrayed below:



The key reason that this system performs so well is that the airflow is almost constantly moving through this carpark, driving towards a setpoint below 10ppm CO. Code requirements are much higher than this (i.e. they are at 60ppm).

The fans are continuously operating at a very low-level speed, changing the air over. This strategy results in an air quality in discharge that is effectively outside air quality.

For and on behalf of SEED

Rob Lord

Rob Lord MIEAust CPEng Director of SEED
 DOFT, PRE, RPEQ,
 Chartered Professional Engineer (Institute of Engineers Australia)
 Mechanical Licence number: 645749
 Email: rob@seedengineers.com ; Ph: 0484 395 889

¹ This is a NSW State Government document, which we adopt because it is so stringent.

Introduction

Background

The Car Park Exhaust Discharge is proposed to discharge a relatively clean air as a low level discharge. This is on the "site" to operate at 3-9 Byron Street, Bulimba QLD 4171.

The Car Park has been engineered to be flowing nearly constantly ranging as a trickle at night time to full design flow in the mid-morning. This combination of flows and times allows the carpark to be maintained at a very high quality throughout the air, already complying with F6V1 (an air quality standard listed within the BCA 2022 for air inside buildings).

The design exploits this superior discharge result by discharging within 3m of an external balcony.

Due to the discharge proximity to receptors (i.e. people with noses), an AIR QUALITY IMPACT ASSESSMENT & SOLUTION is required.

Scope of Assessment

SEED was appointed by the Client to create an AIR QUALITY IMPACT ASSESSMENT & SOLUTION for the restoration of local air quality on this site.

The assessment has been conducted in accordance with the following documents:

- QLD EPA Act 1994;
- 2013 DEH Guideline - *Odour Impact Assessment from Developments*²;
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017);
- Assessment and management of odour from stationary sources in NSW (2006).

In accordance with the requirements of the above guidelines, computational modelling has been undertaken to verify there will be no adverse amenity as a result of the proposed discharge.

This report summarises the investigation to assess the discharge of carpark exhaust in terms of its air quality. The report is to verify the solution is adequate and outline the modelling methodology, results, and conclusions of the air quality impact assessment.

² This is a NSW State Government document, which we adopt because it is so stringent.

Project Description

SEED has undertaken air dispersion modelling for the prediction of contaminant emissions from 3 Byron Street carpark exhaust discharge. This will compare the risk of air quality nuisance on surrounding receptors.

The scenario modelled is the scenario proposed in the Mechanical Services design for this space.

Location

The site is located at 3-9 Byron Street, Bulimba QLD 4171 on a single Lot.

Figure 4 (later within this report) illustrates the Subject Site and land uses in the general vicinity of the Subject Site.

The Subject Site, along with the lots immediately to the east and west are zoned as Local Centre. Other surrounding land uses are listed below:

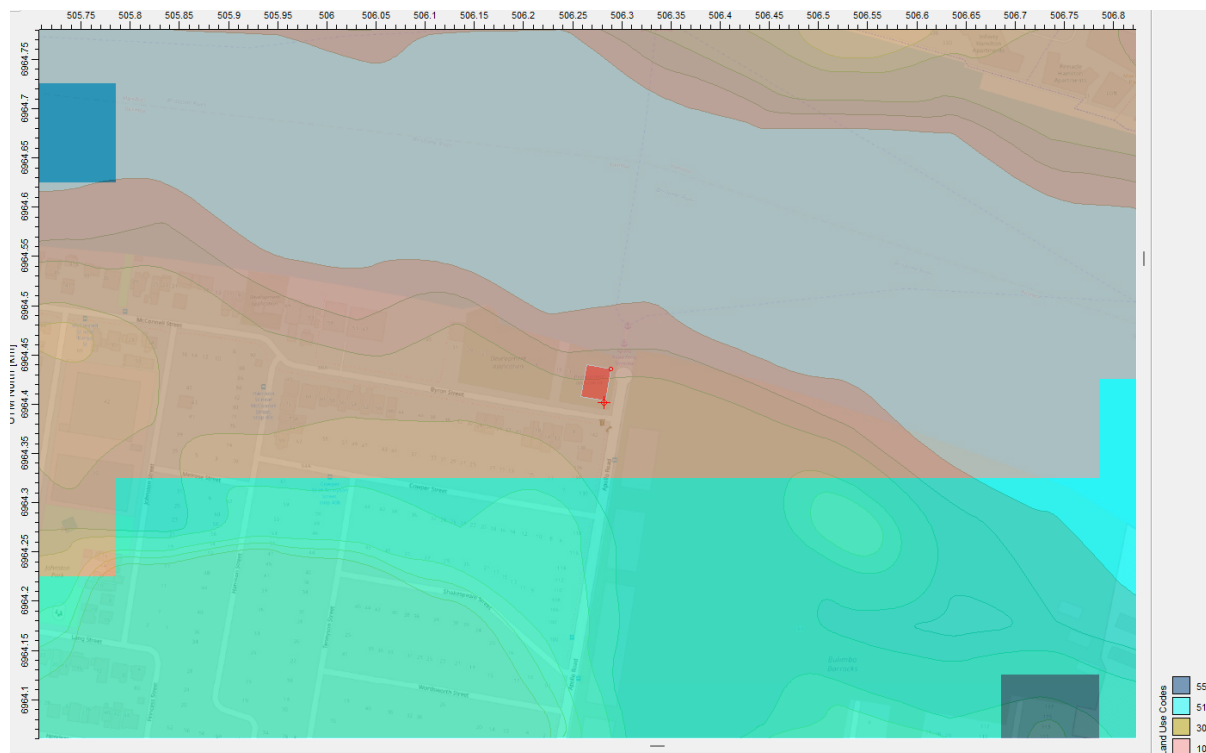


Figure 1 Land use Code of Subject Site

4.3 Receptors

Figure 2, Table 3 and Table 2 present the nearest sensitive receptors to the Subject Site that are relevant as points of interest, including pedestrians on street, adjacent building window openings, balconies, terraces. The receptors form a grid with a radius of 200 metres from the emission sources with a spacing of 10 metres between them. There is one set of receptors placed at a height of 2m above ground level

Table 2 Receptor grid – Ground Level

ID_Receptor	X [m]	Y [m]	Base_Elevation [m]	Flagpole_Height [m]	Description
R_1	505982.00	6964102.00	25.97	2	Nested Grid (NSTD1)
R_2	505992.00	6964102.00	25.85	2	Nested Grid (NSTD1)
This pattern continues until the final receptors are identified below:					
R_3720	506572.00	6964702.00	2.22	2	Nested Grid (NSTD1)
R_3721	506582.00	6964702.00	2.35	2	Nested Grid (NSTD1)

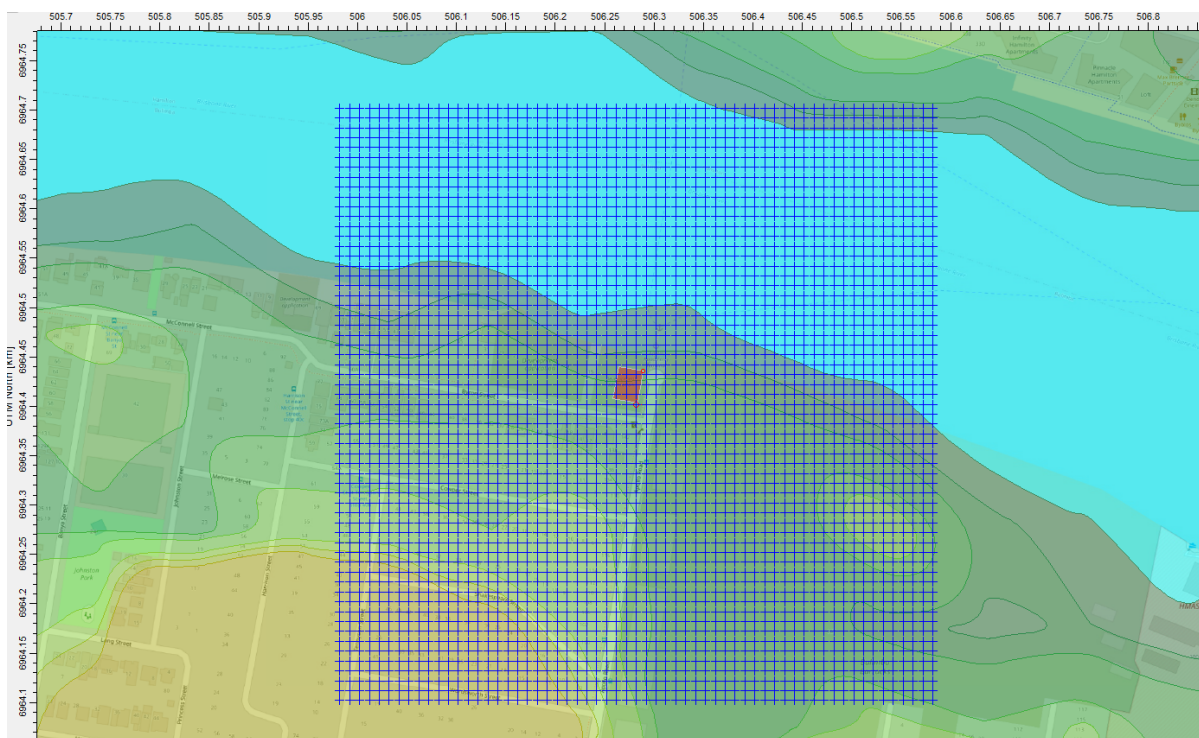


Figure 2 - Map with receptors

Assessment Criteria

Due to the high density of the surrounding land uses, the assessment has considered and adopted the more stringent air quality criteria outlined in NSW's *Environmental Protection (Air) Policy 2008*, in precedent to Queensland's more relaxed criteria, as likely to be more representative of the population.

1. Air Quality criteria relevant to this assessment are also presented in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2016)*. We adopt this criteria as it is more stringent than the guidance published by the QLD EPA.
2. Table 4 presents air contaminant criteria, as specified by the EPA's *Environmental Protection (Air) Policy 2008*.

Relevant Air Quality Parameter	Impact Assessment Criteria (At Receptor)
CO Carbon Monoxide	<9 ppm
CO ₂ Carbon Dioxide	<700 ppm
NO ₂ Nitrous Oxides	<15 ppb
PM2.5	<8 ug/m ³
PM10	<50 ug/m ³
Odour	<2OU/m ³

In assessing compliance of predicted ground level concentrations, it is necessary to estimate the peak-to-mean concentration ratios for the source being considered. These peak-to-mean ratios allow estimation of 1-second average (nose response time) concentrations based on the predicted 1-hour average concentrations generated by the air dispersion model. For this assessment, the criteria for urban areas have been applied.

In the case of the site in question, the sources of emissions are from a horizontal discharge without influence of temperature stratification.

Given this, the Approved Methods recommends the use of a peak-to-mean ratio of 1 be considered.

However, in the interests of being conservative and acknowledging that electric vehicle usage is growing, we have adopted a peak-to-mean ratio of 2.3.

As such, all predicted 1-hour average concentrations have been multiplied by a peak-to-mean ratio of 2.3 to estimate 1-second (nose-response time) average concentrations.

Existing Environment

The main sources of air pollutants in the general area of the Subject Site are emissions from street traffic only. As such, a cumulative impact assessment is not required.

Modelling Methodology

Atmospheric dispersion modelling involves the mathematical simulation of the dispersion of air contaminants in the environment. The modelling utilises a range of information to estimate the dispersion of pollutants released from a source including:

- Meteorological data for surface and upper air winds, temperature, and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions parameters including source location and height, source dimensions and physical parameters along with pollutant mass emission rates;
- Terrain elevations and land use both at the source and throughout the surrounding region;
- The location, height, and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume.

For the purpose of the assessment, meteorological modelling has been undertaken using CALMET to predict localised meteorological conditions. The meteorological data derived from these models have been used as an input for the CALPUFF dispersion modelling.

Prognostic models, such as CALMET, permit the development of localised meteorological datasets, based on synoptic weather conditions. The model predicts the regional flows important to dispersion, such as sea breezes and terrain induced flows, against a background of larger-scale meteorology provided by synoptic analyses.

The output of this model, when used with a diagnostic meteorological model, such as CALMET, provides a meteorological dataset suitable for introduction into the wind field results. This methodology is the recommended approach for the modelling of contaminant concentrations using CALMET³.

Summary of Meteorological Modelling Parameters

Figure 2 presents the annual wind and stability class rose for the Subject Site for 2022.

³ TRC Environmental Corporation (March 2011) 'Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia' prepared on behalf of the NSW Office of Environment and Heritage

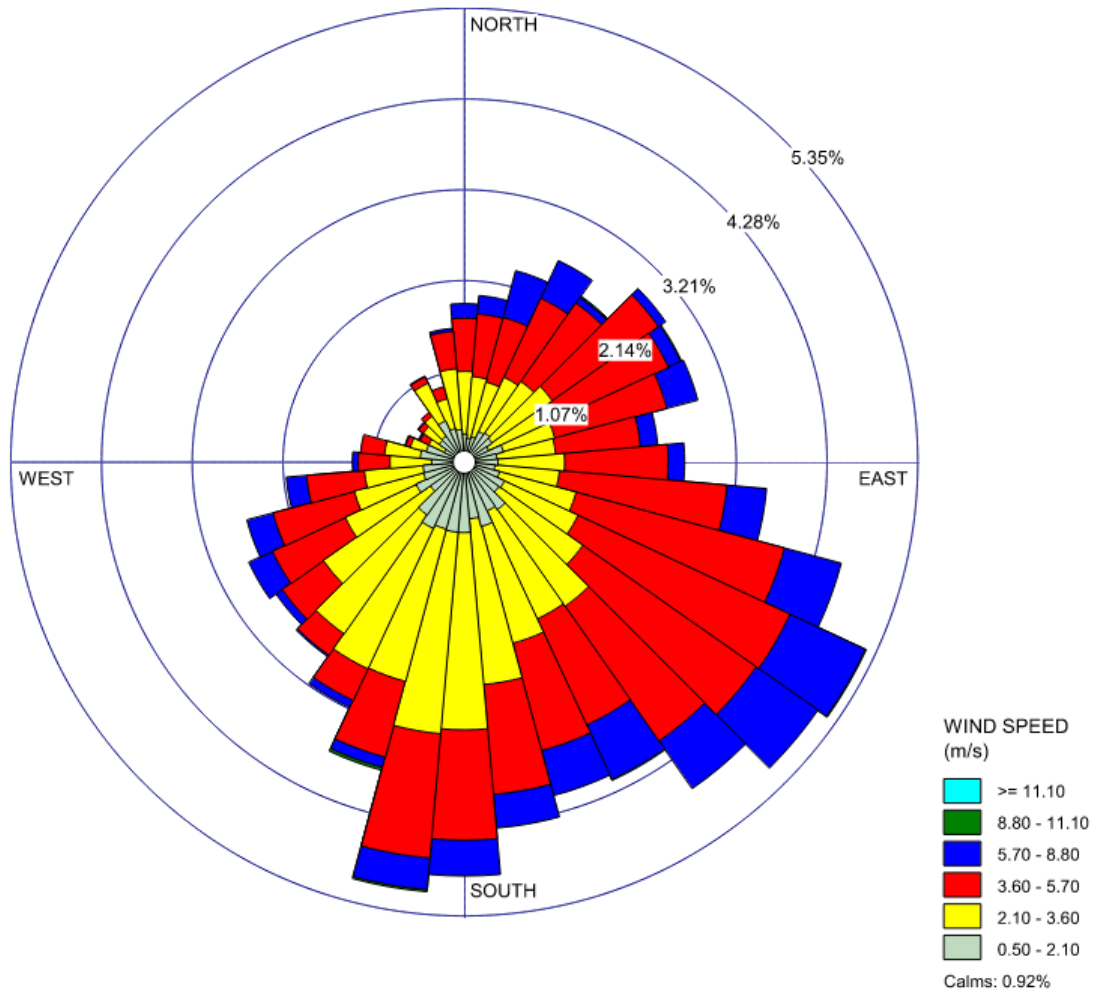


Figure 2 Predicted Annual Wind Rose Stability Class Rose at Subject Site for 2022

CALPUFF Dispersion Modelling

The CALPUFF modelling system treats emissions as a series of puffs. These puffs are then dispersed throughout the modelling area and allowed to grow and bend with spatial variations in meteorology. In doing so, the model can retain a memory of the plume's movement throughout a single hour and from one hour to the next while continuing to better approximate the effects of complex air flows.

CALPUFF utilises the meteorological processing and prediction model CALMET to provide three-dimensional wind field predictions for the area of interest. The final wind field developed by the model (for consideration by CALPUFF) includes an approximation of the effects of local topography, the effects of varying surface temperatures (as is observed in land and sea bodies) and surface roughness (resulting from varied land uses and vegetation cover in an area). The CALPUFF model can resolve complex terrain influences on local wind fields including consideration of katabatic flows and terrain blocking.

Post processing of modelled emissions is undertaken using the CALPOST package. This allows the rigorous analysis of pollutant predictions generated by the CALPUFF system. CALPOST is able to provide an analysis of predicted pollutant concentrations for a range of averaging periods from 1 hour to 1 year.

Receptors

Different grid sizes are used and they may be confusing to a first-time reader. A "computational" grid of 2 km by 2 km at 200 m spacing has been modelled. This covers the whole area of influence.

A "nested" grid (a grid within a grid) centred on the Subject Site was modelled as at 0.2 km from centre at varying spacings:

- 50 m from source – 5 m spacing;
- 100 m from source – 10 m spacing; and
- 200 m from source – 10 m spacing.

The nest grid is where we anticipate the nuances of the discharge or airflow around the buildings will be apparent.

Additionally, the boundaries of the Subject Site have been modelled as discrete receptors at a spacing of 3 m intervals.

Other Settings

For the purposes of the assessment, the air dispersion modelling has utilised the following settings for CALPUFF:

- Three-dimensional mode using meteorological data file from CALMET.
- ISC urban wind speed profile.
- NOX to NO2 chemical transformation is 100%. (This is a conservative measure outlined in the NSW Air Quality Modelling guidelines).
- Transitional plume rise. (albeit our plume is a low flow horizontal discharge)
- Stack tip downwash (albeit our discharge is largely protected from building wash due to it's location).
- Partial plume penetration.
- Turbulence calculated from micro-meteorology.
- No adjustment of dispersion curves for roughness.
- Partial plume path adjustment method for terrain using default coefficients. The PRIME method is used to account for building wake effects.

Odour Emissions

CO and other pollutant emissions from the Subject Site were based on the carpark exhaust discharge calculation done by SEED.

The calculated CO concentrations and pollutant emissions for the source(s) are presented in Table 9 below.

Table 3 Summary of Source Emissions

Description	Height	Dia	Exit Velocity	Exit Temperature	Air Volume
	[m]	[m]	[m/s]	[K]	M3/s
GF carpark discharge	1.5	.38	2.14	318	3
CO	CO2	NOx	PM2.5	PM10	OU
ppm	ppm	ppb	ug/m ³	ug/m ³	Odour Units (OU)
1.1804E-6	7.02E-4	2.38E-07	2.23E-9	3.72E-09	6

For the purposes of the assessment, it has been assumed that the emissions from the Subject Site are emitted continuously during the operational hours for every day across the entire year of meteorological data considered.

Results

This Section provides the results at the most affected sensitive receptor as follows:

- Proposed controls description of operations.

Modelled Scenario

Table 8 presents the maximum predicted peak ground level concentrations from Site with the current operating hours, for the sensitive receptors outlined in Table 2. It can be seen that the maximum predicted concentration for each pollutant, 99th percentile complies with the assessment criteria, 99th percentile.

Percentile Results Summary					
Byron St CP Discharge					
CO - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	2.0681E-008	2022, 325, 1000	506.282	6964.402
24-HOUR	99.00TH	5.4727E-009	2022, 110, 0000	506.282	6964.402
CO2 - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	1.2312E-005	2022, 325, 1000	506.282	6964.402
24-HOUR	99.00TH	3.2579E-006	2022, 110, 0000	506.282	6964.402
NO2 - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	4.1711E-009	2022, 325, 1000	506.282	6964.402
24-HOUR	99.00TH	1.1038E-009	2022, 110, 0000	506.282	6964.402
PM2.5 - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	3.9199E-011	2022, 325, 1000	506.282	6964.402
24-HOUR	99.00TH	1.0390E-011	2022, 110, 0000	506.282	6964.402
PM10 - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
PM10 - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	6.5332E-011	2022, 325, 1000	506.282	6964.402
24-HOUR	99.00TH	1.7288E-011	2022, 110, 0000	506.282	6964.402
ODOR - Concentration: [g/m ³]					
Average Period	Percentile	Peak	Year, Julian Day, Start Hour	X [km]	Y [km]
1-HOUR	99.00TH	2.5725E-001	2022, 017, 0600	506.282	6964.402
24-HOUR	99.00TH	4.8336E-002	2022, 289, 0000	506.282	6964.402

Figure 3 - Predicted 1-hour 99th Percentile emissions concentrations - at the Carpark Exhaust Discharge Louvre

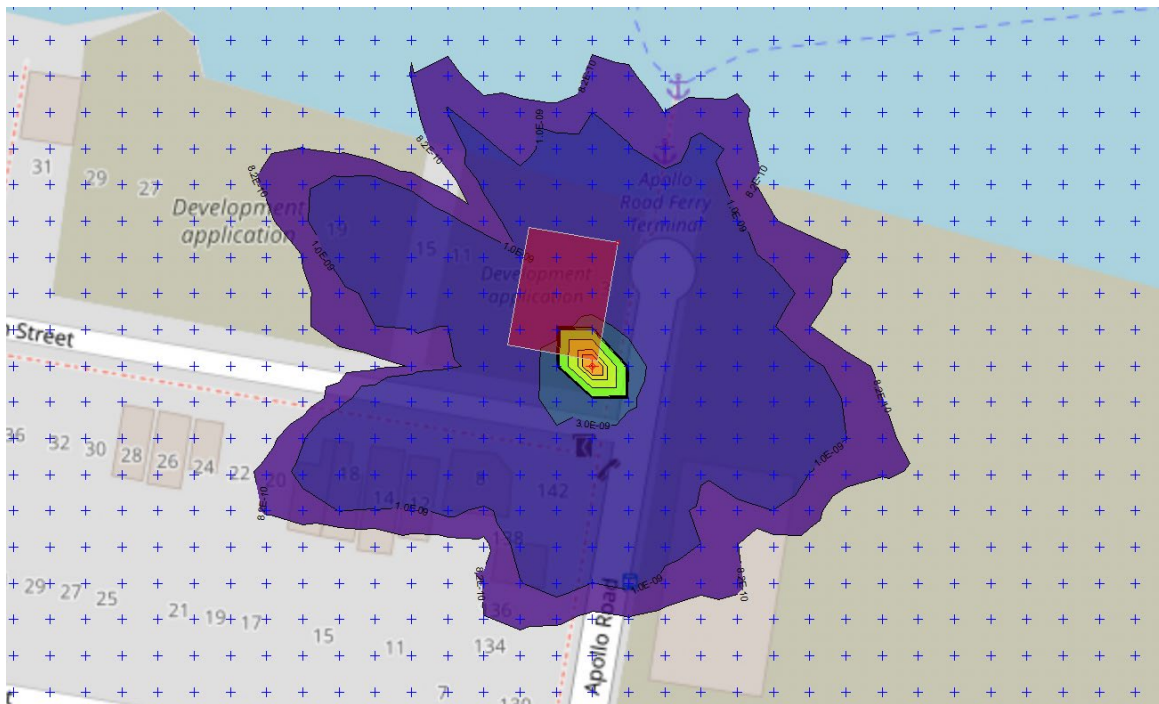


Figure 4 - 1 Hour average concentration of CO – 99th percentile in 2D Perspective. Note that the purple colour indicates concentrations that are 0.1% of the compliance criteria.



Figure 5 - 1 Hour average concentration of CO – 99th percentile in 3D Perspective

Table 4 Summary of pollutant impact assessment and compliance Ground Floor Carpark Discharge

Relevant Air Quality Parameter	Impact Assessment Criteria (At Receptor)	Achieved Incremental Impact	Compliance status
CO Carbon Monoxide	<9 ppm	0.0000149 ppm	Compliant
CO ₂ Carbon Dioxide	<700 ppm	0.01ppm	Compliant
NO ₂ Nitrous Oxides	<15 ppb	0.00 ppb	Compliant
PM2.5	<8 ug/m ³	<0.001 µg/m ³	Compliant
PM10	<50 ug/m ³	<0.001µg/m ³	Compliant
Odour	<2OU	<0.257 OU total	Compliant

Conclusion and Recommendations

SEED Engineering was appointed by the Client to undertake an investigation into what would be the air quality impact of a low level carpark exhaust discharge for 3 Byron Street P/L located in 3-9 Byron Street, Bulimba QLD 4171.

The intent of this investigation was to verify compliance to P20 from the CityPlan.

Using conservative assumptions and the required modelling report format, SEED has demonstrated compliance to P20.

The proposed scenario (with proposed operating hours and control philosophies) was modelled to assess impacts to sensitive receptors because of the measures listed below.

The summary results of the modelling are portrayed in Table 4. They indicated that by adopting the control design measures for the site, the maximum predicted concentrations for pollutants satisfy the air quality criteria at the nearest sensitive receptors.

Not that the key control measures modelled are as follows:-

- Constant flushing of the carpark via the low-level discharge at a rate of approximately 25% design flow.
- Discharge of air away from the nearest local receptor.

Appendix B of the report includes the CALPUFF modelling images showing the dispersion of pollutants across the grid.

Appendix A – CV Of Author



Rob Lord

Director



Profile

I recognise that our clients are always searching for the balance between financial feasibility and environmental performance. I earnestly believe I have the background to assist clients in making these decisions, owing to the extensive amount of experience I have earned either in Australia, South East Asia, or the USA, working as either a consultant, commissioning agent, supplier or sub-contractor.

Professional Education

Bachelor of Engineering (Hons) Mechanical

University of Queensland

Graduate Diploma Business Management

Deakin University

- NABERS Accredited Assessor

- CBD Accredited Assessor

- Certified Energy Efficiency

Specialist

- Greenstar Accredited

Professional

CPENG: 645749, NER, RPEQ:

6986, VBA: EM24597,

Accredited to certify: ESD,

Mech, Fire, Hydraulic

Relevant Project Experience

Specialist

NMFS Laboratory Building, Honolulu, USA

ESD and mechanical services design for this new laboratory building. In 2002, it was selected to represent the USA at the Green Building Challenge, Oslo, as one of the 5 greenest buildings in the USA. It featured radiant cooling, chilled beams, desiccant drying, displacement cooling, and Task Air.

Hinze Dam Visitor Centre, QLD

ESD and mechanical services design for the redeveloped Interpretative Centre.

Main Roads Office and Laboratories, Nundah, QLD

This development incorporates industrial labs and offices, presenting a challenge to incorporate ESD principles. Daylight and thermal modelling, together with heat exchanges for outside air load reduction, allowed for a pleasant working environment without excessive energy use. Detailed rainfall analysis, utilising a century of data, enabled very accurate prediction of rain- and storm-water collection capacity. A unique design service was that of solvent reticulation throughout the laboratories.

Brisbane Entertainment Centre, Brisbane, QLD

Mechanical design and project management for complete cold-room replacement and extension. High efficiency compressors, close analysis of cooks' workflow, BMS integration, and quality panelling minimised energy consumption.

Brisbane City Hall Refurbishment, QLD

ESD and mechanical services design for the redeveloped Brisbane City Hall. This challenging project faced significant cost and environmental issues as well as heritage issues.

PNG ANGAU Hospital – Mechanical Services Re-Brief

ESD & Mechanical Services. Rob worked with the infection control nurses to redevelop culturally-appropriate standards for healthcare for PNG occupants.

This was work using different thermal comfort & ventilation standards to promote a sophisticated adoption of natural ventilation & mechanical ventilation to this historically-significant hospital.

Workplace

Green Square Office Tower, Brisbane, QLD

This 5-Star certified Green Star project required detailed, accurate energy modelling of their HVAC to predict total energy use.

Brisbane 07 3062 4880

Melbourne 03 9005 5099

L9, 316 Adelaide St, Brisbane QLD 4000

L4, 150 Albert Rd, South Melbourne VIC 3205

SEED Engineers P/L

www.seedengineers.com



Workplace (Cont.)

Energex Office Building, QLD

Project Leader for this building, directing all services and managing air-tightness for the builder. Mechanical Design Leader, thermal simulation, and complex controls specification for this 6-Star Green Star rated building.

Submissions for Design & As Built Green Star Ratings

EPA Office Building, Port of Brisbane, Manly, QLD

Project Leader for this innovative 5 Green Star coastal office building designed to house Queensland's EPA. Features designed to achieve Green Star accreditation include seawater cooling, rainwater harvesting, and natural lighting.

RTA Mechanical Refurbishment, Brisbane, QLD

Mechanical Designer during this refurbishment of a three-storey office block. Project management, detailed HVAC design, and client liaison were all important in achieving the improved comfort levels required by the tenants.

Energex Office Building, QLD

Project Leader for this building, directing all services and managing air-tightness for the builder. Mechanical Design Leader, thermal simulation, and complex controls specification for this 6-Star Green Star rated building.

Submissions for Design & As Built Green Star Ratings

Green Square Office Tower, Brisbane, QLD

This 5-Star certified Green Star project required detailed, accurate energy modelling of their HVAC to predict total energy use.

EPA Office Building, Port of Brisbane, Manly, QLD

Project Leader for this innovative 5 Green Star coastal office building designed to house Queensland's EPA. Features designed to achieve Green Star accreditation include seawater cooling, rainwater harvesting, and natural lighting.

RTA Mechanical Refurbishment, Brisbane, QLD

Mechanical Designer during this refurbishment of a three-storey office block. Project management, detailed HVAC design, and client liaison were all important in achieving the improved comfort levels required by the tenants.

Maroochydore Government Office Building, QLD

Detailed daylighting, thermal comfort, and solar access modelling was undertaken to meet low energy consumption targets and Green Star reporting requirements.

New Port Office Building, QLD

Working in an integrated services team; simulation enabled the quantitative value of chilled water storage and night chiller operation to be determined. Energy consumption determination and thermal comfort prediction was also undertaken. This was a 5 Star Green Star As Built Project.

127 Creek Street Fire Services Rectification

The building faced a series of problems in 2011, ranging from non-existence to serious non-compliance in stair pressurisation, smoke exhaust, fire sprinklers, fire hydrants, fire detection and fire water supply. Using fire engineering and extensive QFES negotiation, Rob developed the working prototype of "activated sub-ducts" which enabled the building to have a smoke exhaust riser. Other problems were resolved with fire engineering

339 Coronation Drive Fire Services Rectification

In 2016, the building failed compliance audits for maintenance. The building had a unique passive venting system which appeared to be untested for its lifetime. Rob tested the system and repaired its defects which included developing a decelerating restraint for the passive vent system to make it safe for annual compliance.



Workplace (Cont.)

ABC Headquarters, South Bank, QLD

Green Star and ESD consulting on this important building, with a clear focus on indoor environment quality.

Commissioning

ICA for Synergy Office Development

Independent Commissioning Agent for this commercial office development, including all services and Green Star.

ICA for Amberely Hall Redevelopment

Independent Commissioning Agent for this development comprising Defence offices and Mess Hall, including all services and Green Star.

ICA for Southpoint

Independent Commissioning Agent for this mixed-use development including commercial office, retail, and medical offices, including all services and Green Star. This commission was not completed.

ICA for Ripley Valley Town Centre

Independent Commissioning Agent for this mixed-use development including commercial office, retail, and medical offices, including all services and Green Star.

Commissioning Rectification for Multiple Projects

Direction of mechanical, electrical, hydraulic and fire services commissioning where projects have failed to achieve requirements. This includes 127 Creek Street Rectification (M/H/F/E), Lamb Shop Kitchen Rectification (M/H/E), Sofitel Brisbane Restaurant Rectification (M/E/H), and Arlington Apartments (F/M/H).

Lifestyle

North Sydney Aquatic Centre, NSW

Pool Water Treatment and Mechanical Designer for this facility incorporating pools, office and Creche suites. The brief required an extraordinarily green response and significant renewable energy.

Mangere Aquatic Centre, New Zealand

Pool Water Treatment and Mechanical Designer for this facility incorporating pools, office, and waterslides.

Lloyd Elsmore Pools, Auckland

Pool Water Treatment and Building Services Design Coordinator for this facility incorporating new and refurbished pools, offices, and gym.

Tauronga Aquatic Centre, New Zealand

Building Services Design Coordinator for this facility incorporating pools, waterslides, in-pool movies and office suites. The brief required an extraordinarily green response as well as significant energy and water saving measures.

Mt Isa Cultural Pavilion, Mt Isa Council, QLD

Mechanical and ESD Consultant for this showcase cultural building in the challenging climate of Mt Isa.

New Delhi International Exhibition Centre, India

This large, challenging design required advice on how to improve comfort and reduce energy use. CFD and thermal modelling, together with architectural workshops, enabled an innovative, dual-shaded-skin design to be tested.

Brisbane Entertainment Centre, QLD

Replacement of existing cold rooms servicing commercial kitchen, working within tight time schedules.



Lifestyle (Cont.)

Annette Kellerman Aquatic Centre, Marrickville, Sydney, NSW

Project Leader and Mechanical Designer for this facility incorporating pools, offices, and Creche suites. The brief required an extraordinarily green response and a tri-generation system was required to satisfy these requirements. Automated mixed mode and daylight harvesting were also incorporated.

Retail

Mt Ommaney Shopping Centre, Mt Ommaney, QLD

Offline Green Star Retail Centre assessment for this large shopping centre extension. Energy modelling, daylighting modelling, and risk management were crucial.

Ripley Valley Town Centre, Ipswich QLD

Green Star consultancy for this project including Design & As Built Submissions.

Olsen Rd Shopping Centre, Bundaberg, QLD

ESD advice and mechanical design for this shopping strip. Using insulated tilt panel and wind turbines, shops can operate without air-conditioning for the majority of operating hours.

Matahariland Shopping centres, Indonesia

Mechanical Designer for this series of large shopping centres. Using rooftop units, these units were configured to suit local conditions and assist in fire safety ventilation.

Accommodation

Sofitel Upgrade, Brisbane QLD

All building services consultancy for this hotel in Brisbane CBD. I provided mechanical services design and specifications & oversight on remaining services for the 2013 upgrade of this hotel.

Sheraton Nusa, Bali Indonesia

Mechanical Services consultancy for this international hotel in Bali. As part of a team, I provided design and specifications & construction guidance for the services installed in the Hotel complex.

Sheraton Bandara, Jakarta, Indonesia

Mechanical Services consultancy for this international airport hotel in Jakarta. I provided design and specifications & construction guidance on the use of fresh air preconditioning and the prevention of mould.

Sheraton Waikiki, Honolulu, USA

Mechanical Services consultancy for this famous development in Honolulu. I provided guidance on chilled water energy use and the prevention of mould. This was immediately following the mould incidents at this hotel.

CIVIC Hotel, Sydney NSW

Mechanical Services technical work for this large city hotel in Sydney. I oversaw the design of the VRF systems, which were considered novel at the time. Key design drivers were management simplicity and prevention of mould

Somerville House Boarding School Extension, Brisbane, QLD

Mechanical Services technical work for this large multi-level student accommodation development in Brisbane. I oversaw the design of an innovative VRF system complete with trickle ventilators. Key design drivers were energy use and prevention of mould

Scape, Lincoln Square South, Carlton, VIC

Mechanical Services technical work for this large multi-level student accommodation development in Carlton. I oversaw the design of an innovative VRF system complete with air heat recovery. Key design drivers were energy use and prevention of mould.

Menso at Southbank, West End, QLD

Ventilation design for the student accommodation centre, using performance approaches.



Accommodation (Cont.)

163 Abbott Street, Cairns, QLD

Review and proposed modifications for Chilled Water plant in a student accommodation centre. The plant was originally over-sized, leading to control problems and difficulties with authorities.

Dukuh Golf Hotel & Residences, Jakarta Indonesia.

I participated in a team that provided mechanical services design & documentation for this series of high rise hotels and residences around the Dukuh Golf Course.

Aged Care Accommodation

AVEO DURACK, QLD

Mechanical Services technical work for this large multi-level aged care development in Durack. I oversaw the design of an innovative VRF system complete air heat recovery. Key design drivers were energy use and plant behaviour, so thermal modelling and computational fluid dynamics were used to optimise the design of facades and natural ventilation.

AVEO Robertson QLD

Mechanical Services technical work for this aged care development in Robertson. I oversaw the design of VRF systems complete with air heat recovery. There was also an indoor pool hall to be considered. Key design drivers were energy use and condensation risk. Thermal modelling was extensively used to optimise the design of facades and ventilation.

AVEO Springfield, QLD

Mechanical Services technical work for this aged care development in Springfield. I oversaw the design of VRF systems complete with air heat recovery. Key design drivers were energy use and management simplicity.

Residential

Chevron Island, Gold Coast, QLD

ESD Development Application advice to reduce energy and water consumption. The apartment design was modified to improve thermal comfort, improve natural ventilation, and reduce solar gain.

Main Place, Broadbeach, QLD

ESD technical work for this large multi-use development on the Gold Coast. Key design drivers were energy use and wind behaviour, so thermal modelling and computational fluid dynamics were used to optimise the design of facades and natural ventilation.

Albert Avenue, Southport, QLD

ESD and Building Services technical work for this large multi-use development on the Gold Coast. Key design drivers were energy use and wind behaviour, so thermal modelling and computational fluid dynamics were used to optimise the design of facades and natural ventilation. A 6-Star Green Star rating was proposed for this development.

Many High Rise Residential Projects throughout the Gold Coast QLD

ESD and Building Services technical work for many (20+) large multi-use development on the Gold Coast. Key design drivers are usually energy use and wind behaviour, so thermal modelling and computational fluid dynamics were used to optimise the design of facades and natural ventilation. Often Green Star ratings are proposed for these developments to achieve plot ratio bonuses.

Education

Prince of Peace School and Church, QLD

Mechanical design, integrating ESD into office areas. For the church area, optimal natural ventilation was designed using Computational Fluid Dynamics and thermal simulation.



Education (Cont.)

Collaborative Learning Centre, NT

Glare and daylight control were essential for this school in Alice Springs. Initial advice was followed with Green Star reporting and simulation to tune facade elements.

Loreto College, Brisbane, QLD

Heat transfer and mechanical design detail for this innovative naturally ventilated, radiantly-cooled school.

Learning Innovation Building, University of Queensland, QLD

ESD project leadership from the project's inception enabled integrated and innovate features to be incorporated at reasonable cost. An intelligent natural ventilation system and operable external shading greatly reduces energy consumption and improves occupant satisfaction.

Advanced Engineering Building, University of Queensland, QLD

ESD project leadership from the project's inception enabled integrated and innovate features to be incorporated at reasonable cost. An intelligent natural ventilation system and operable external shading greatly reduces energy consumption and improves occupant satisfaction. Labyrinth cooling is enhanced through the use of Phase Change Materials to supply Task Air cooling to workstations.

Marist Brothers College Science Centre, QLD

Mechanical leadership and ESD detail for this secondary school's 10 rooms science and computing centre. Ample daylighting required clever use of shading to limit solar gain. In turn, this enabled natural ventilation to be used for most of the year. Electrical sub-metering and exposed services enabled the building to be used as a live experiment in resource use, PV electricity, and climate for the students.

Defense

Lavarack Barracks, QLD (Stages 3 & 4)

This long-term project required ESD advice from climate analysis through to detailed daylight and facade studies.

Enoggera Barracks, QLD (Multiple stages)

This long-term project required ESD advice from climate analysis through to detailed daylight and facade studies.

Amberley Barracks, QLD

This long-term project required ESD advice from climate analysis through to detailed daylight and facade studies.

Infrastructure

Sippy Downs Regional Centre, Sippy Downs, QLD

ESD advice on appropriate energy consumption targets. The myriad of ESD documents – federal, state, local, and international mean that selecting and using the appropriate tool at DA stage is vital.

Healthcare

Caboolture Mental Health Project, QLD

Thermal modelling and energy simulation to determine effectiveness of proposed mechanical system. Revised zoning and openable, secure windows allowed for a reduction in energy consumption and improved occupant amenity.

Logan Mental Health Project, QLD

Thermal modelling and energy simulation to determine effectiveness of proposed mechanical system. Revised zoning and openable, secure windows allowed for a reduction in energy consumption and improved occupant amenity.



Healthcare (Cont.)

Townsville Mental Health Project, QLD

Mechanical design, thermal modelling and energy simulation to design effectiveness of proposed mechanical system.

Industrial

Green Star Industrial Tool, QLD

Participation in Technical Working Group for the new Green Star tool. This group provides technical guidance on various ESD and engineering factors involved in industrial building construction.

Additional

Task Air Technical Director

Rob was instrumental in developing Task Air as a concept and assisting in technical promotions. Rob has created design manuals, testing procedures and developed systems for Task Air to promote their product throughout the world. Rob is responsible for international distribution.

Green Star Assessor for Design & As Built & Performance

Rob has been a Green Star Assessor since 2009 and has contributed to GBCA working groups, peer reviews and was a Silver Sponsor for the Performance Rating Tool.

University Lecturer on Integrated Design

From 2000 to 2016, Rob was a regular lecturer in University of Queensland, Queensland University of Technology and Griffith University on the subjects of Mechanical Services, Sustainability & Integrated Design.

Odour Nuisance Consultancy

Rob developed the use of olfactory science to predict odour nuisance. Using CFD and olfactory research, Rob is able to predict the frequency and likelihood of odour detection and odour nuisance, and design the extent of remediation.

Kitchen Ventilation Equipment Testing & Certification

Rob developed the process of using the US Standard UL710B and also VDI 2052 to certify the performance of specific ventilation equipment can match the current Australian Standard AS1668.2.

This has included reviewing and certifying ventilated ceiling projects throughout Australia, most famously including Australian Parliament House. This has also included testing and certification of 50+ models of recirculating hoods or low flow hoods throughout Australia. Council officers and approval authorities have access to the list of equipment SEED has certified through the Kitchen Equipment Portal on the SEED website.

VRF INDUCT

Rob patented a method of using VRV technology in “chilled beam” air-conditioning such that the best of both systems could provide superior environments for hotel and aged care facilities. The patent has been purchased by KRANTZ and is now in production development. The VRF INDUCT allows draft-free air conditioning with low energy and noise levels. It is specifically designed so that any staff can easily wipe clean the internal surface of the air conditioner maintaining a healthy odour-free environment

CURVED FACE KITCHEN HOODS

Rob has developed and patented the use of curved face surfaces on kitchen exhaust hoods so as to improve fume capture. This technique allows the installer to provide more cooking equipment for a specific kitchen exhaust air allowance.

Appendix B – CALPUFF Images

PROJECT TITLE:

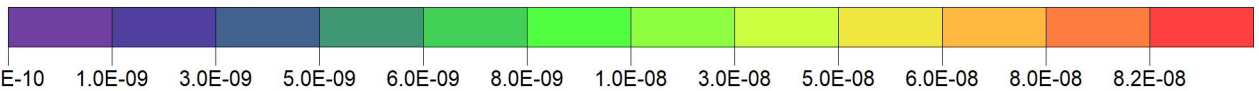
3-9 Byron St, Bulimba, QLD 4171
CO - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (CO)

g/m**3

Max = 8.2E-08 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0  0.05 km

DATE:

30/10/2025

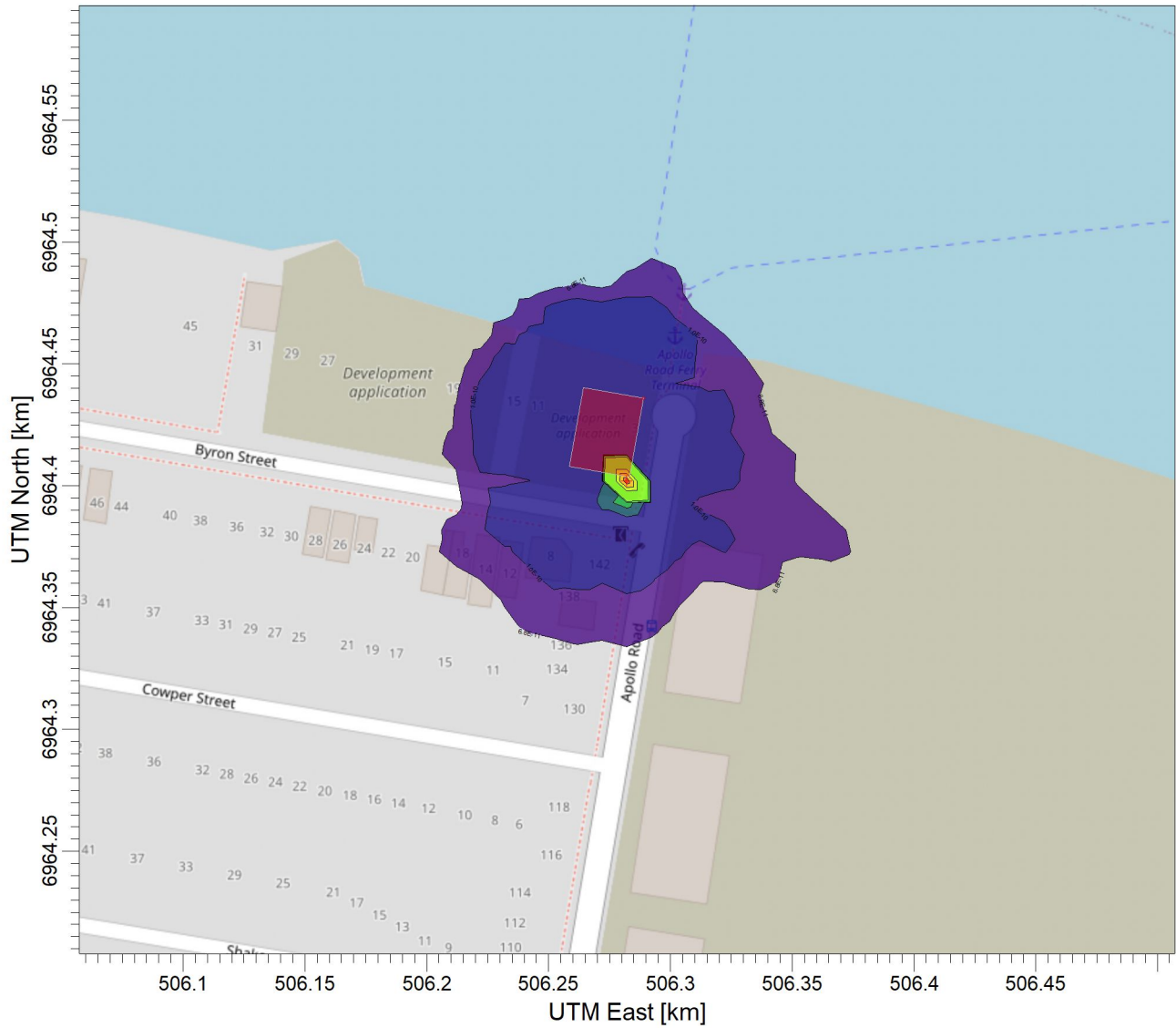


PROJECT NO.:

25364

PROJECT TITLE:

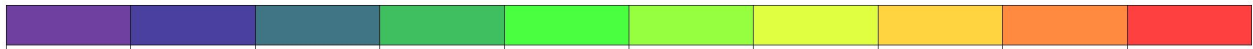
3-9 Byron St, Bulimba, QLD 4171
CO - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (CO)

g/m**3

Max = 6.8E-09 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0 0.05 km

DATE:

30/10/2025

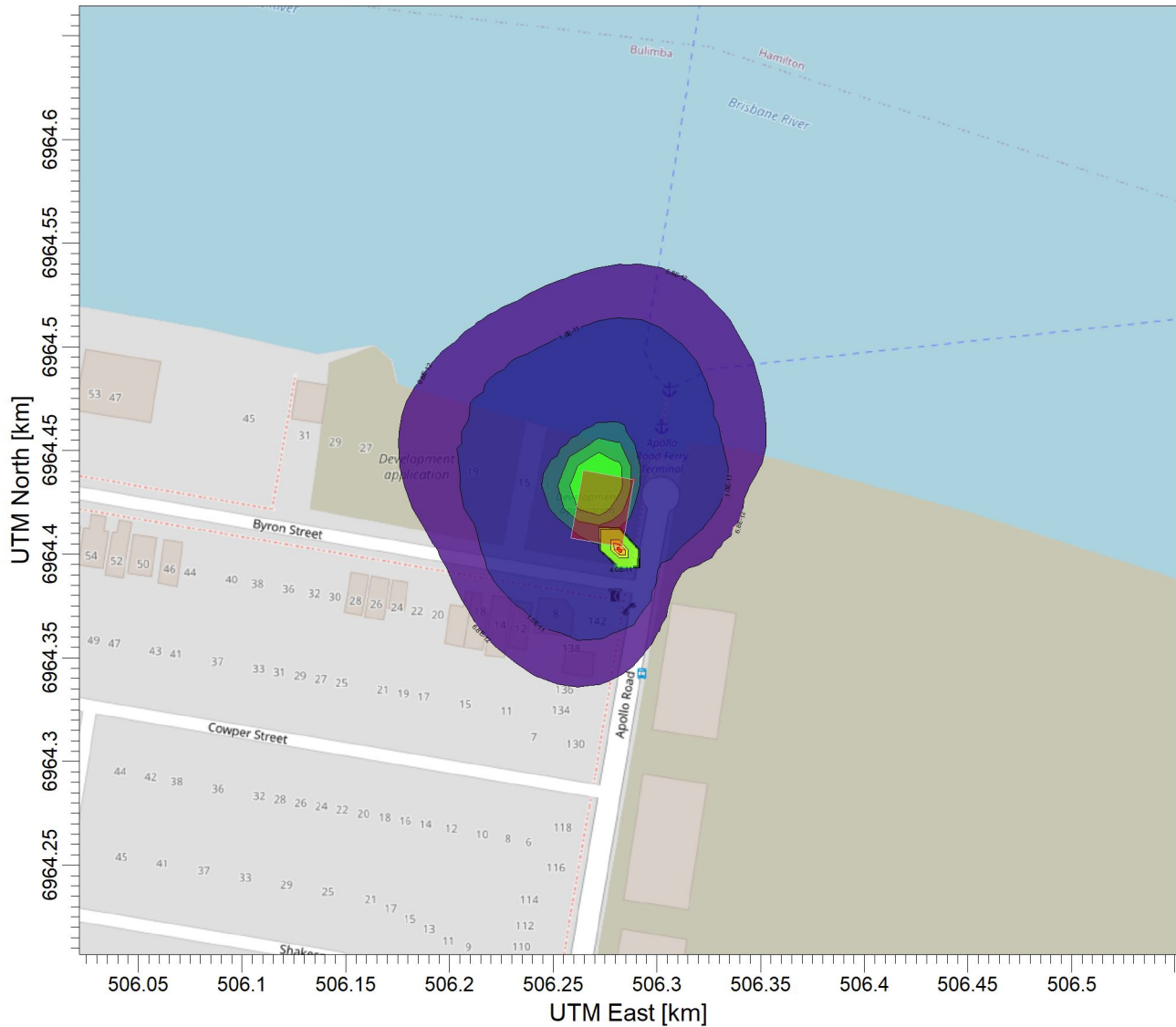
PROJECT NO.:

25364



PROJECT TITLE:

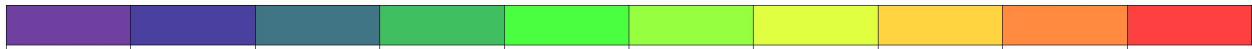
3-9 Byron St, Bulimba, QLD 4171
CO - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (CO)

g/m**3

Max = 6.8E-10 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:3,328

0

0.1 km

DATE:

30/10/2025

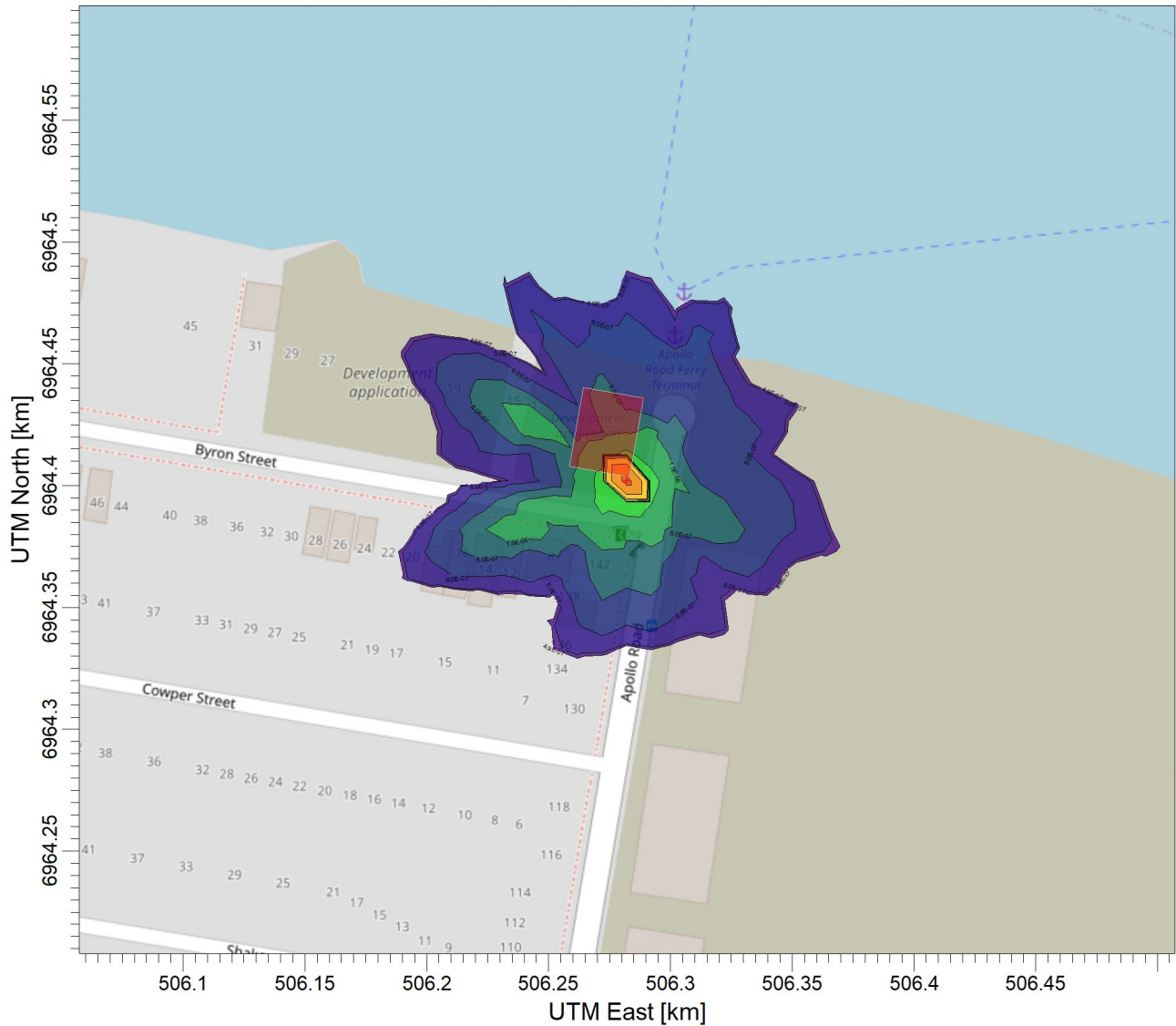


PROJECT NO.:

25364

PROJECT TITLE:

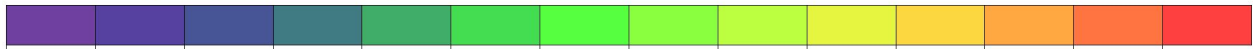
3-9 Byron St, Bulimba, QLD 4171
CO2 - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (CO2)

g/m**3

Max = 4.9E-05 [g/m**3] at (X = 506282.00, Y = 6964402.00)



4.9E-07 5.0E-07 6.0E-07 8.0E-07 1.0E-06 2.0E-06 4.0E-06 5.0E-06 6.0E-06 8.0E-06 1.0E-05 2.0E-05 4.0E-05 4.9E-05

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0 0.05 km

DATE:

30/10/2025

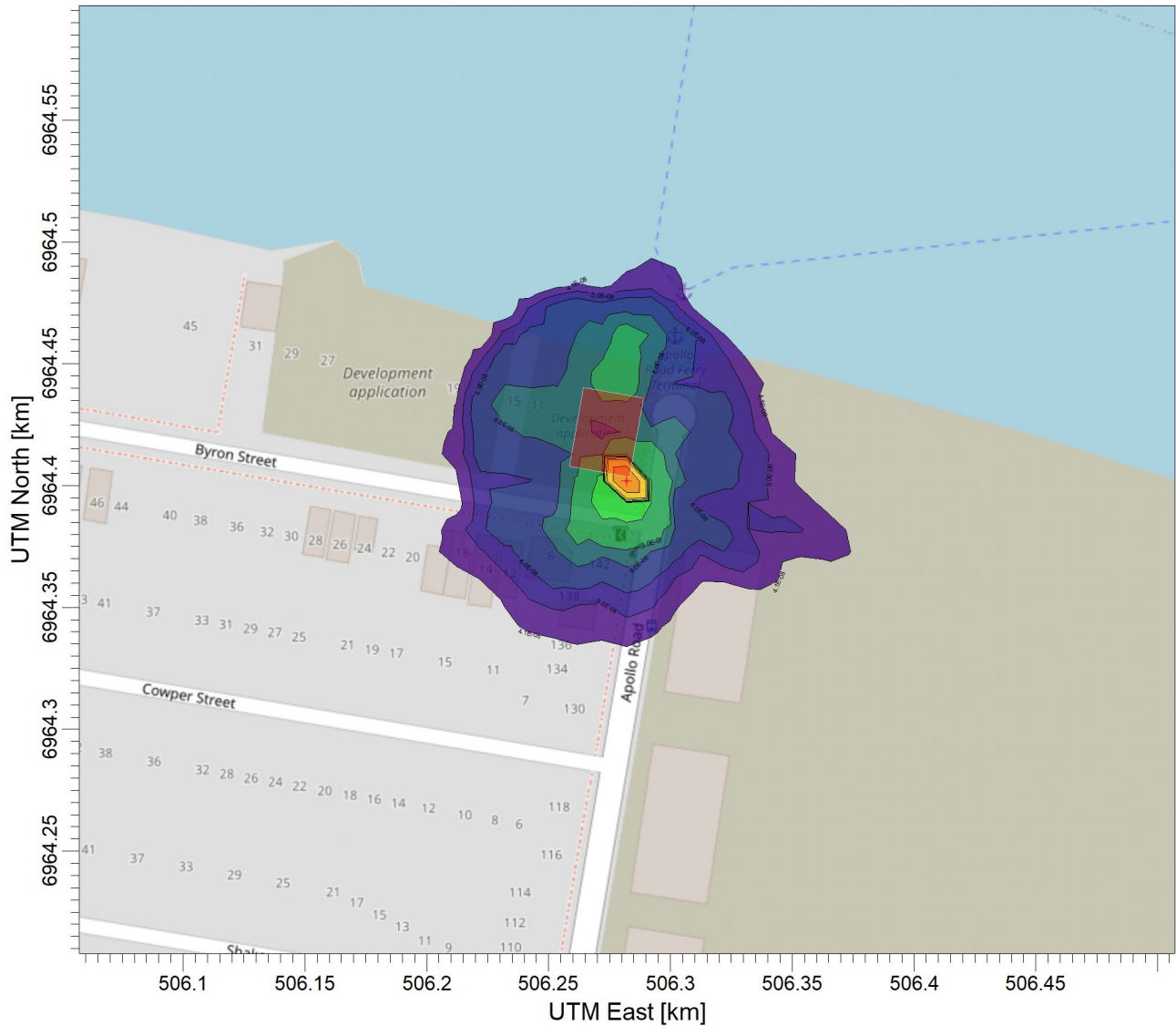


PROJECT NO.:

25364

PROJECT TITLE:

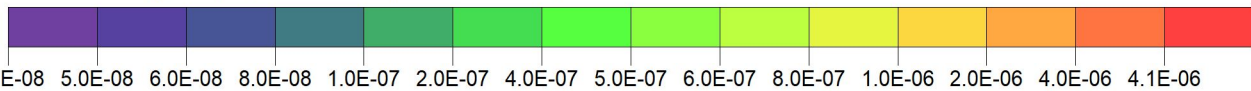
3-9 Byron St, Bulimba, QLD 4171
CO2 - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (CO2)

g/m**3

Max = 4.1E-06 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0 0.05 km

DATE:

30/10/2025

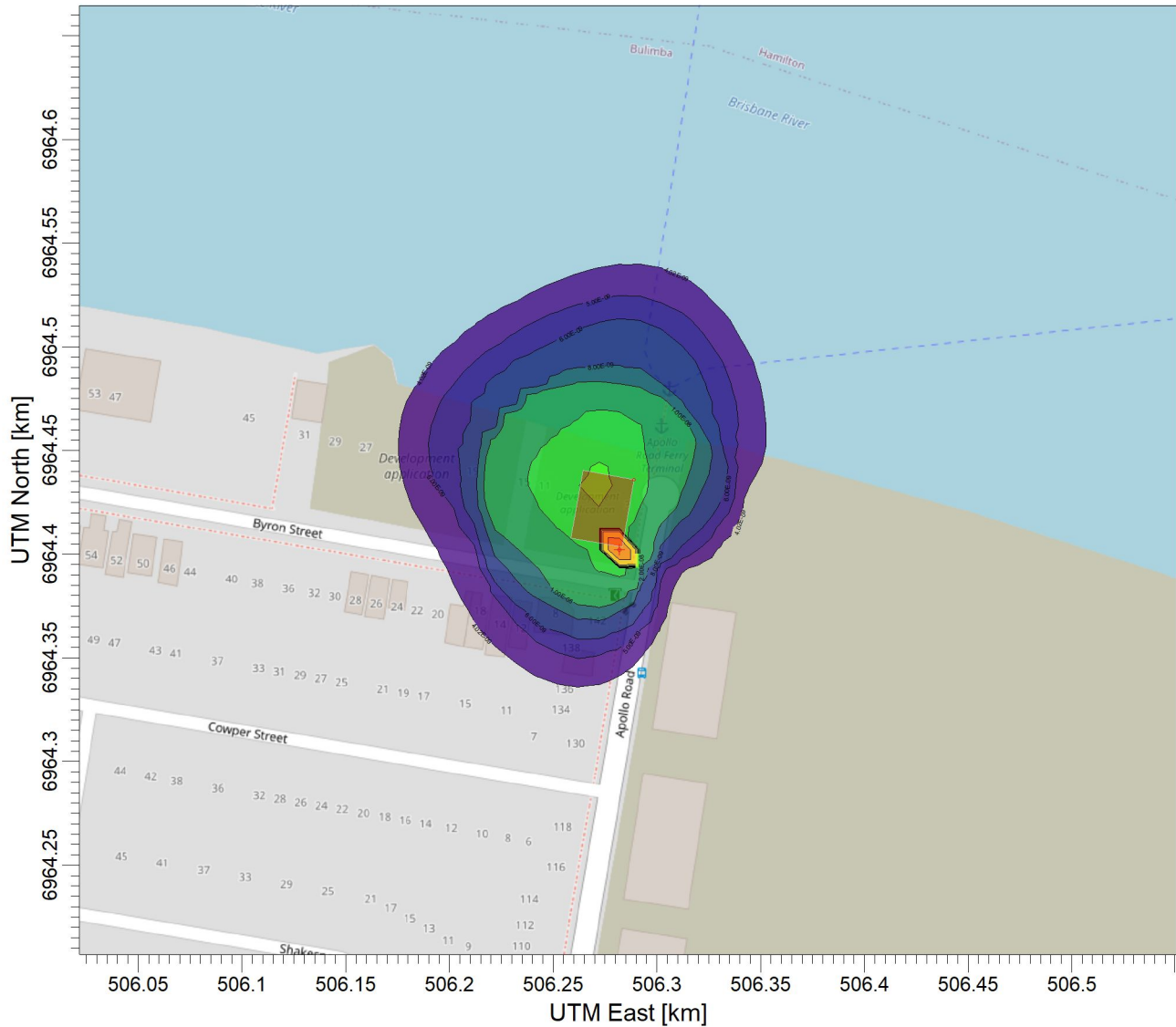


PROJECT NO.:

25364

PROJECT TITLE:

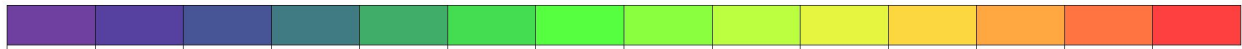
3-9 Byron St, Bulimba, QLD 4171
CO2 - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (CO2)

g/m**3

Max = 4.02E-07 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:3,328

0

0.1 km

DATE:

30/10/2025

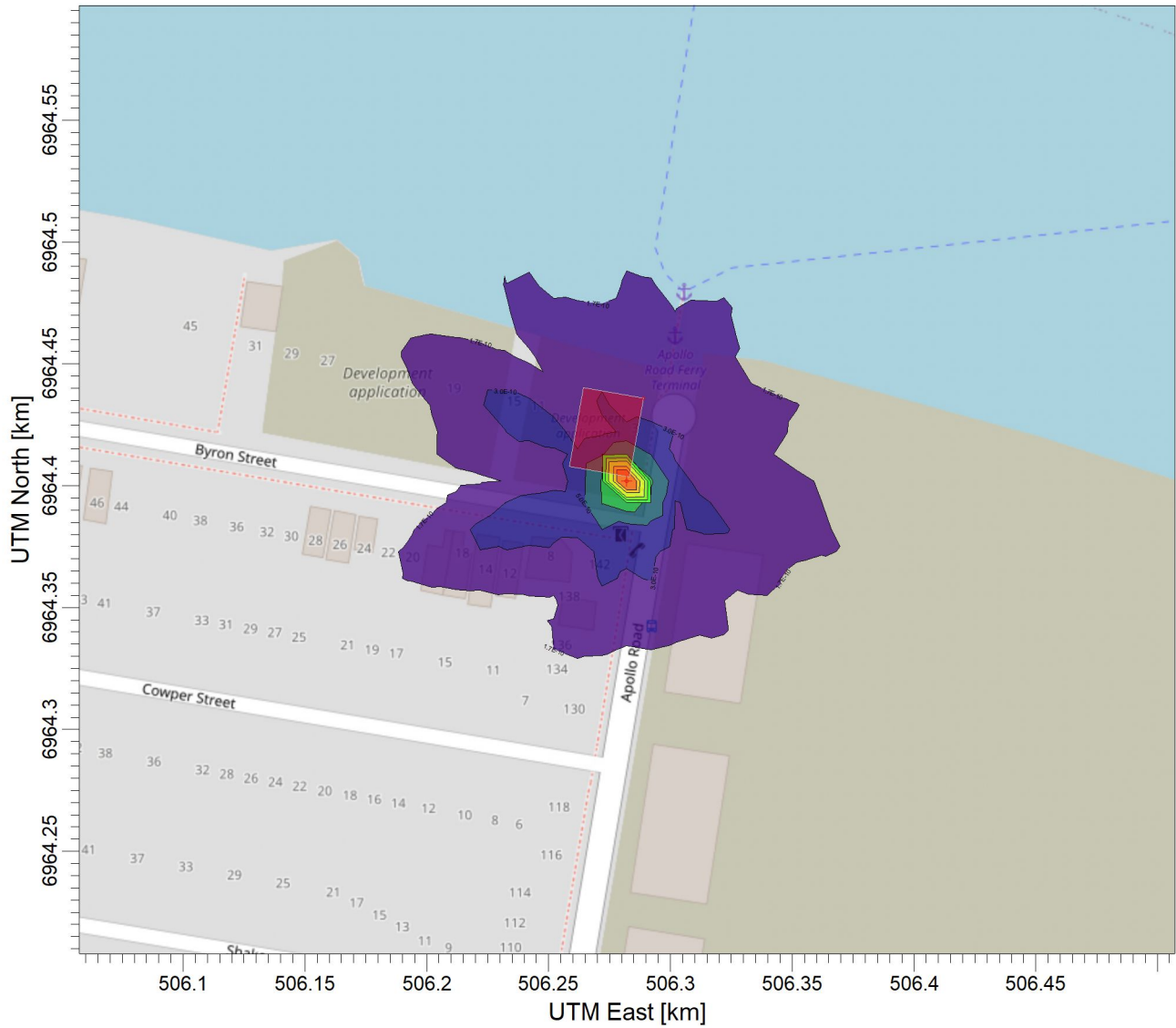


PROJECT NO.:

25364

PROJECT TITLE:

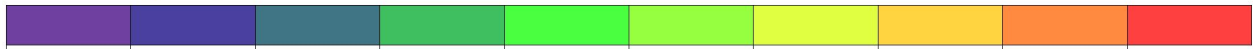
3-9 Byron St, Bulimba, QLD 4171
NO2 - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (NO2)

g/m**3

Max = 1.7E-08 [g/m**3] at (X = 506282.00, Y = 6964402.00)



1.7E-10 3.0E-10 5.0E-10 8.0E-10 1.0E-09 3.0E-09 5.0E-09 8.0E-09 1.0E-08 1.7E-08

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0 0.05 km

DATE:

30/10/2025

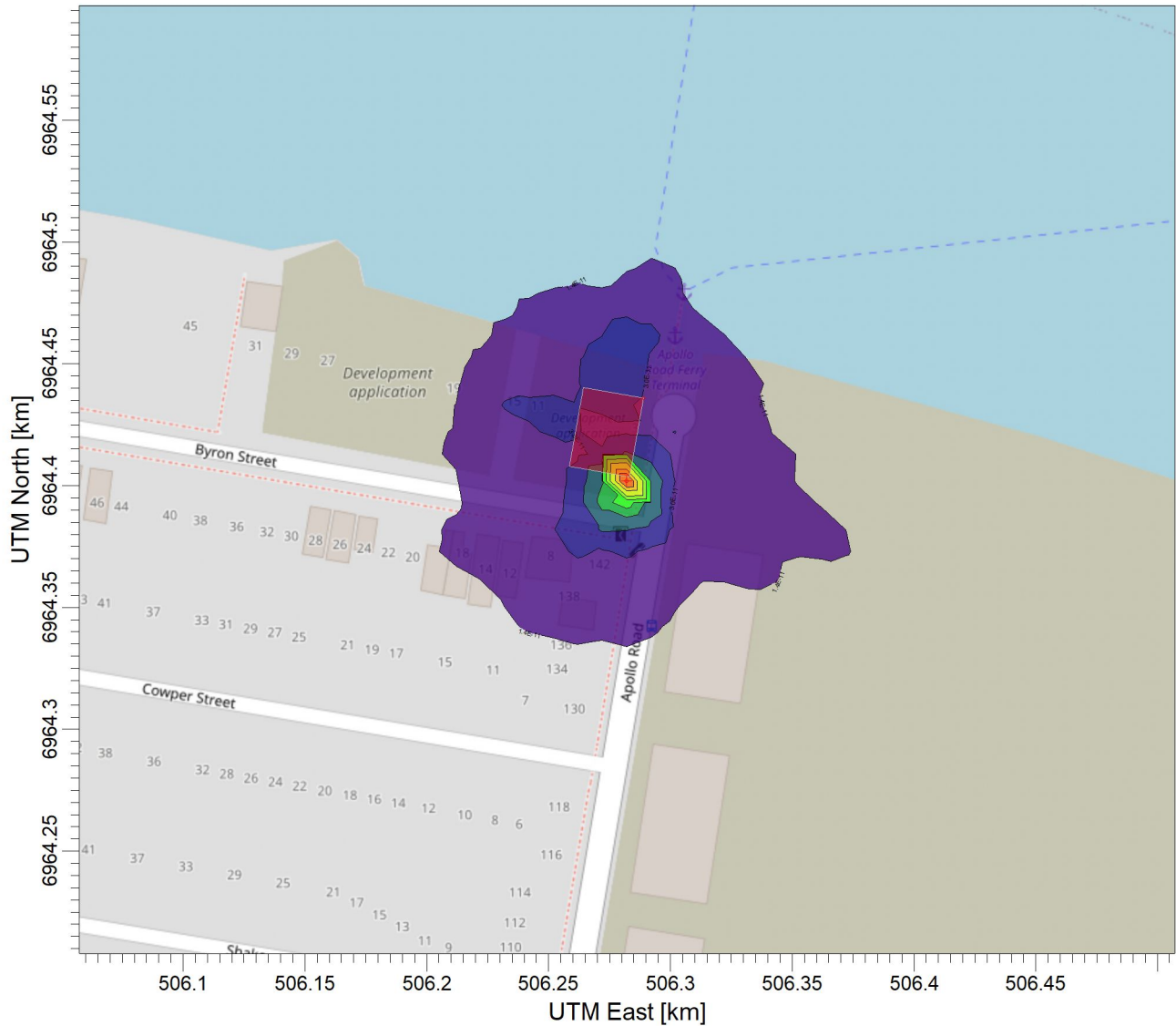


PROJECT NO.:

25364

PROJECT TITLE:

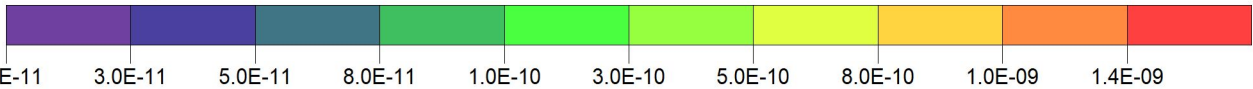
3-9 Byron St, Bulimba, QLD 4171
NO2 - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (NO2)

g/m**3

Max = 1.4E-09 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0 0.05 km

DATE:

30/10/2025

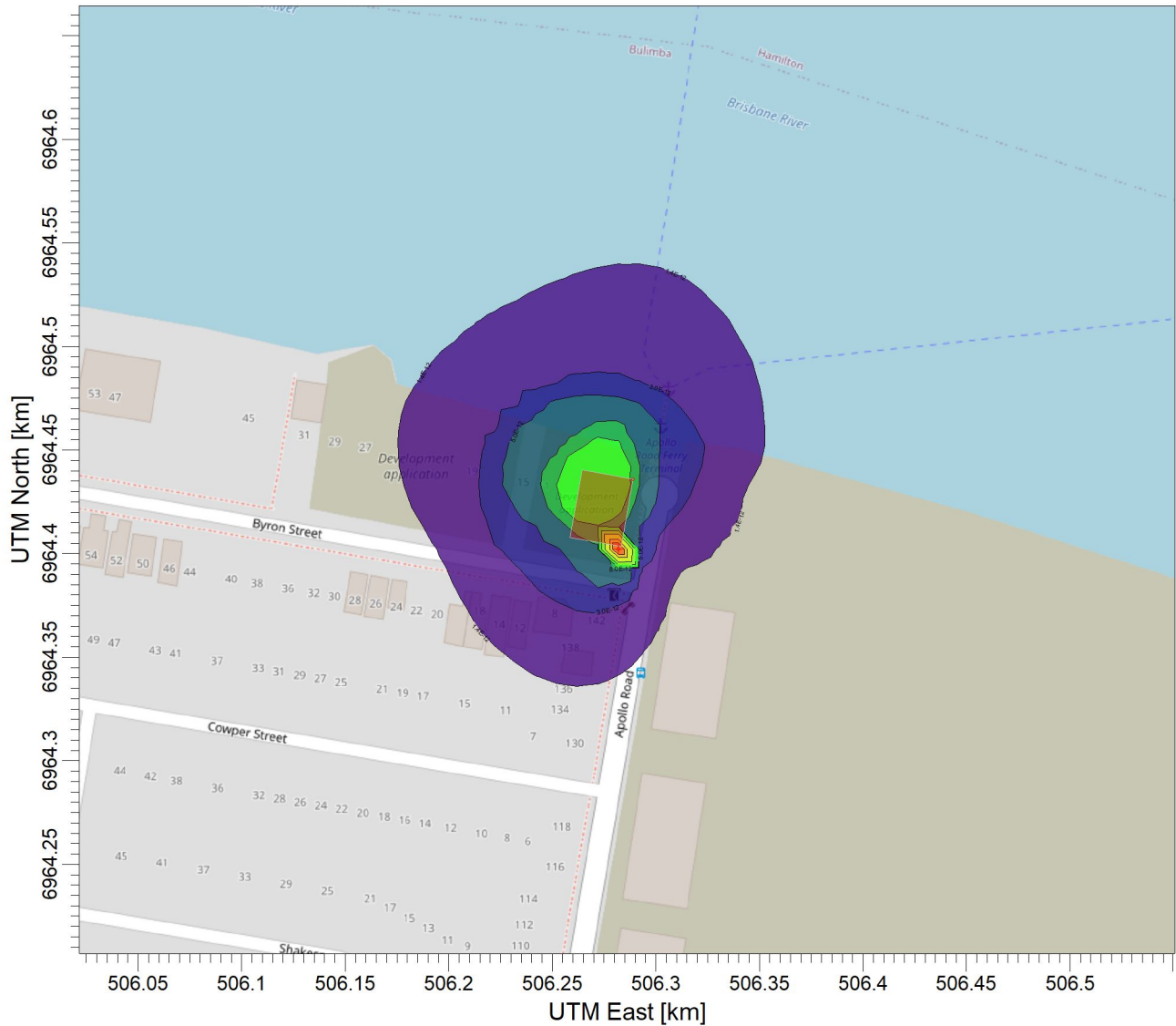


PROJECT NO.:

25364

PROJECT TITLE:

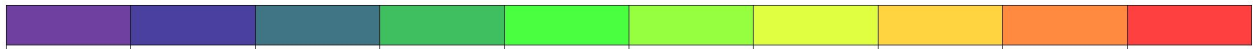
3-9 Byron St, Bulimba, QLD 4171
NO2 - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (NO2)

g/m**3

Max = 1.4E-10 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:3,328

0

0.1 km

DATE:

30/10/2025

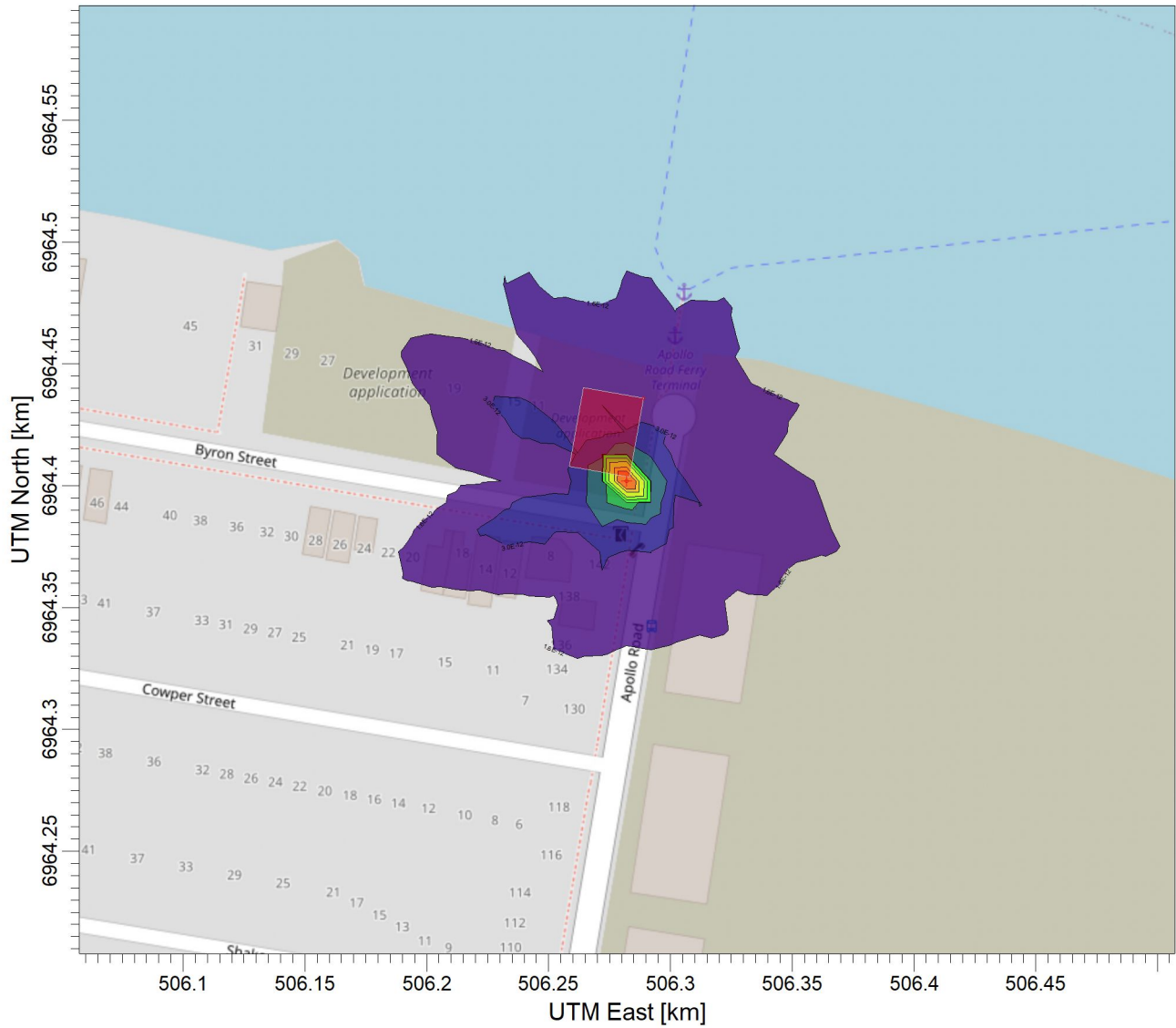
PROJECT NO.:

25364



PROJECT TITLE:

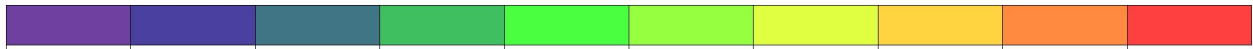
3-9 Byron St, Bulimba, QLD 4171
PM2.5 - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (PM2.5)

g/m**3

Max = 1.6E-10 [g/m**3] at (X = 506282.00, Y = 6964402.00)



1.6E-12 3.0E-12 5.0E-12 8.0E-12 1.0E-11 3.0E-11 5.0E-11 8.0E-11 1.0E-10 1.6E-10

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0  0.05 km

DATE:

30/10/2025

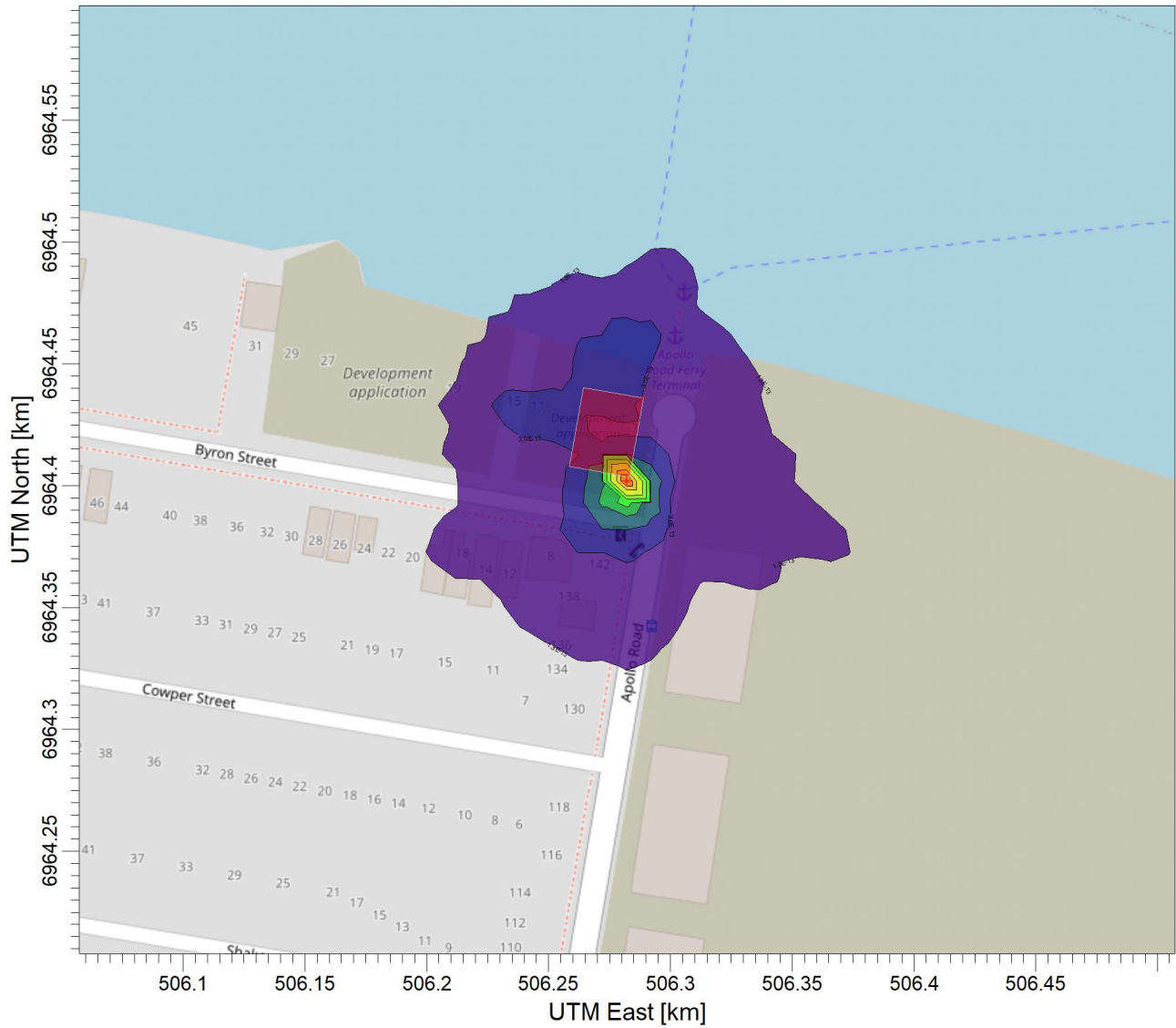
PROJECT NO.:

25364



PROJECT TITLE:

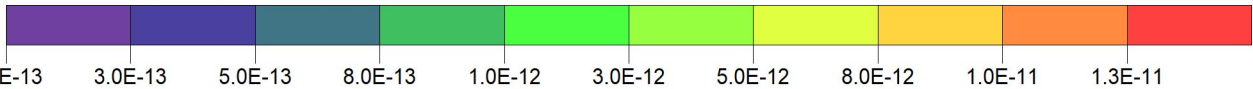
3-9 Byron St, Bulimba, QLD 4171
PM2.5 - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (PM2.5)

g/m**3

Max = 1.3E-11 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0  0.05 km

DATE:

30/10/2025

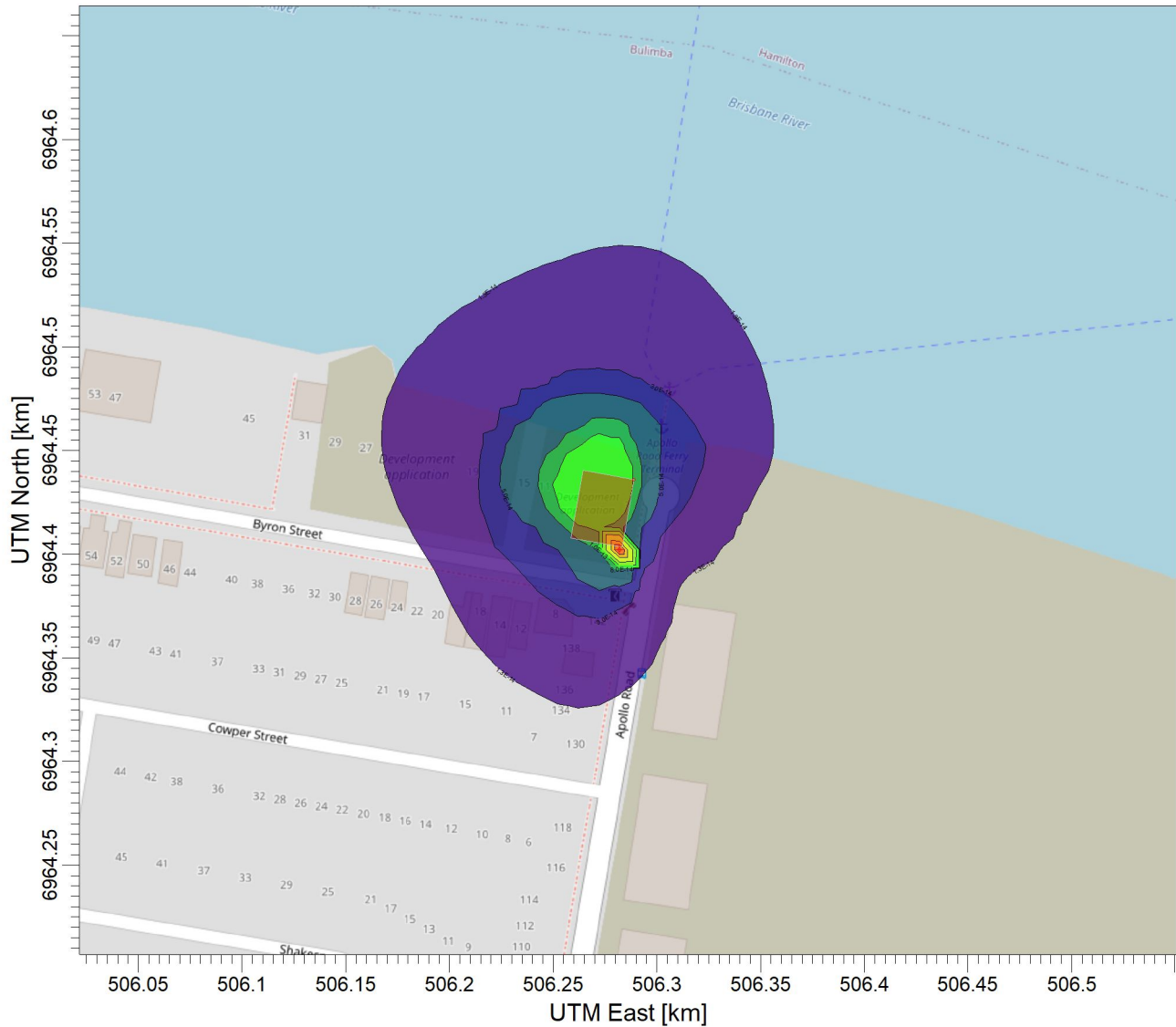
PROJECT NO.:

25364



PROJECT TITLE:

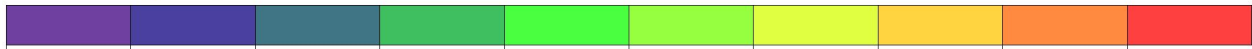
3-9 Byron St, Bulimba, QLD 4171
PM2.5 - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (PM2.5)

g/m**3

Max = 1.3E-12 [g/m**3] at (X = 506282.00, Y = 6964402.00)



1.3E-14 3.0E-14 5.0E-14 8.0E-14 1.0E-13 3.0E-13 5.0E-13 8.0E-13 1.0E-12 1.3E-12

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:3,328

0



DATE:

30/10/2025

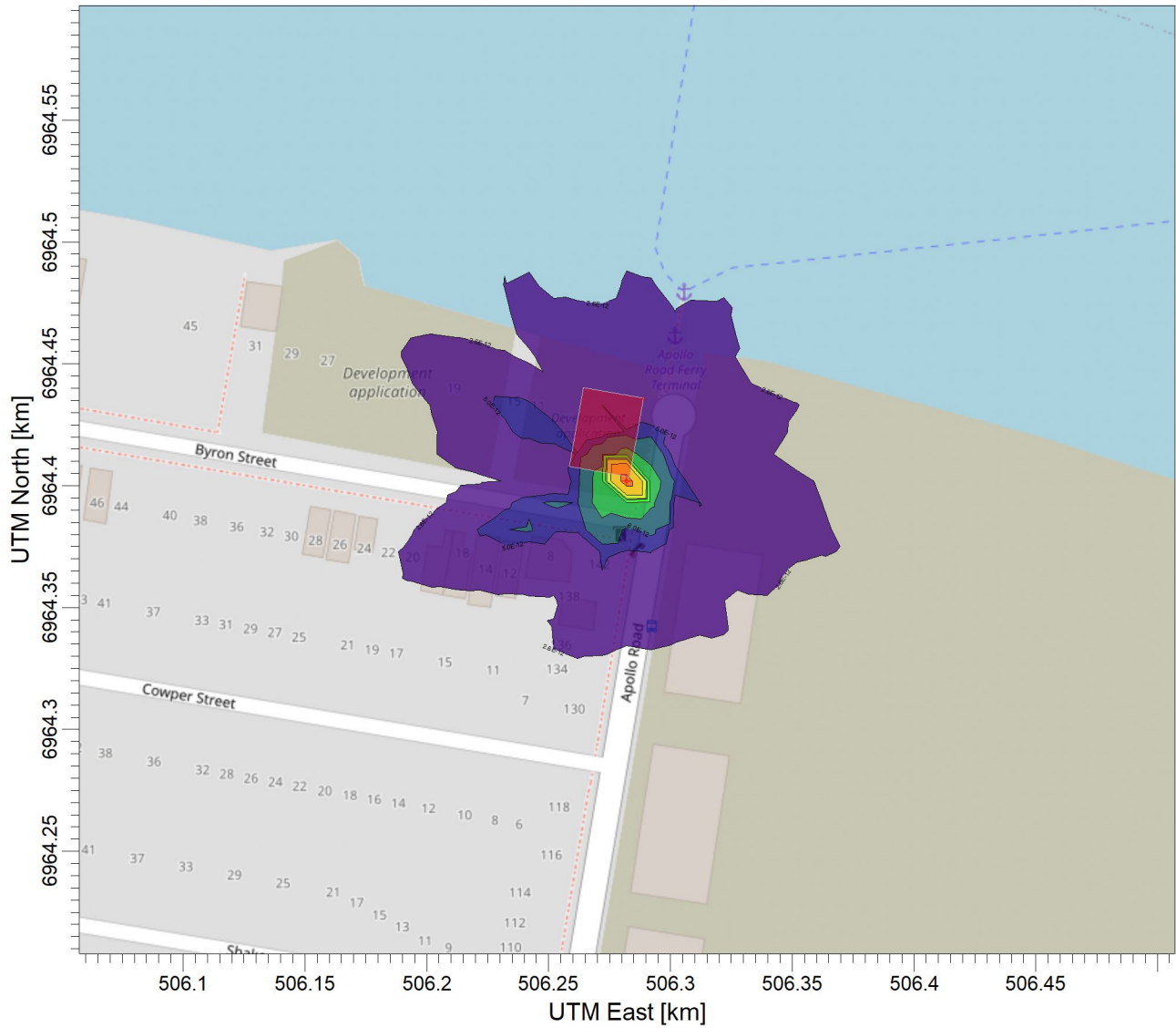


PROJECT NO.:

25364

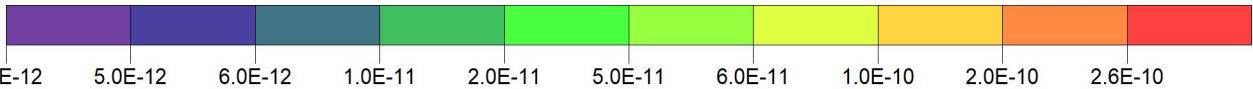
PROJECT TITLE:

3-9 Byron St, Bulimba, QLD 4171
PM10 - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (PM10)
Max = 2.6E-10 [g/m**3] at (X = 506282.00, Y = 6964402.00)

g/m**3



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0  0.05 km

DATE:

30/10/2025

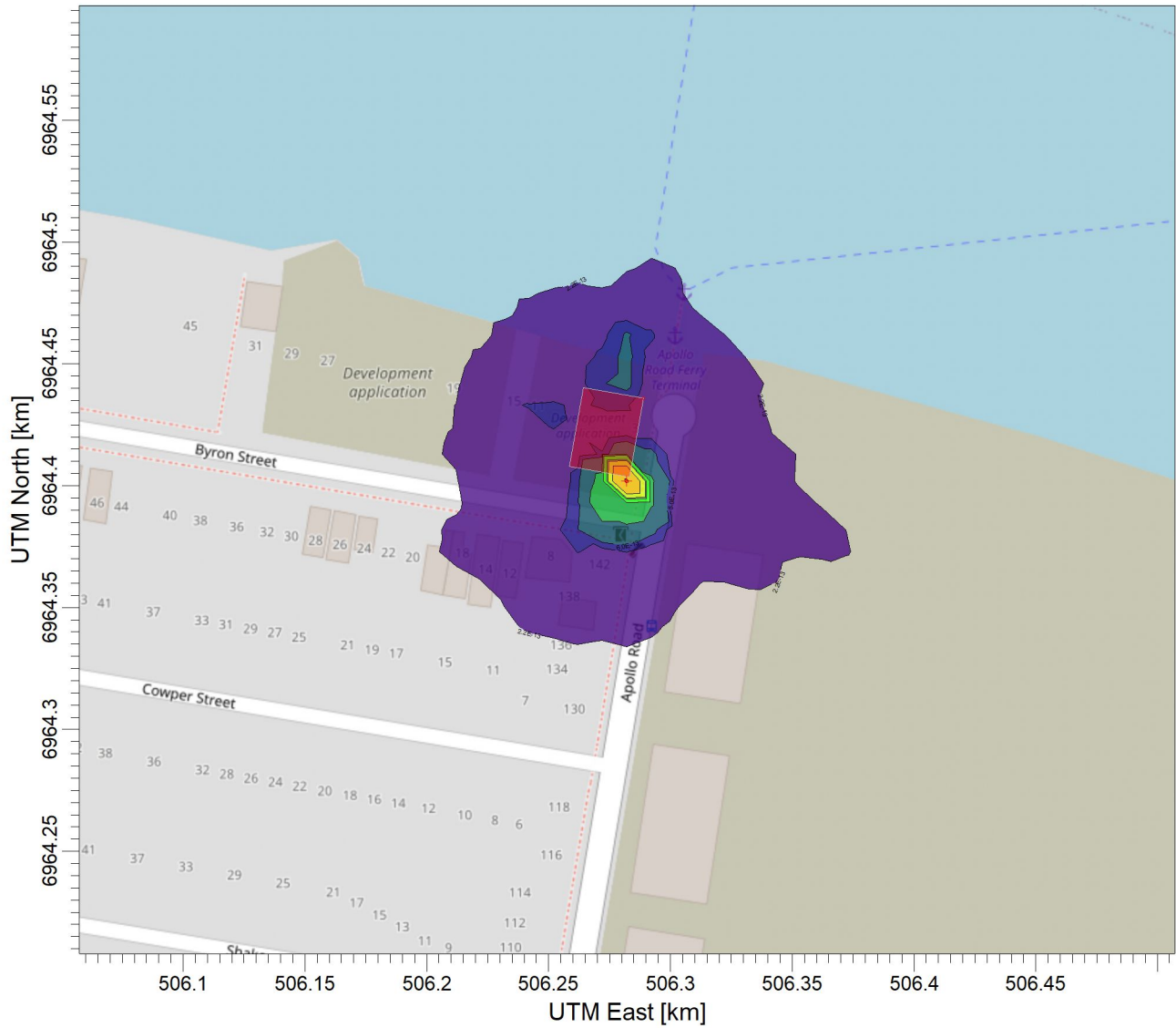
PROJECT NO.:

25364



PROJECT TITLE:

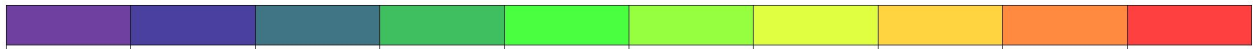
3-9 Byron St, Bulimba, QLD 4171
PM10 - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (PM10)

g/m**3

Max = 2.2E-11 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,829

0  0.05 km

DATE:

30/10/2025

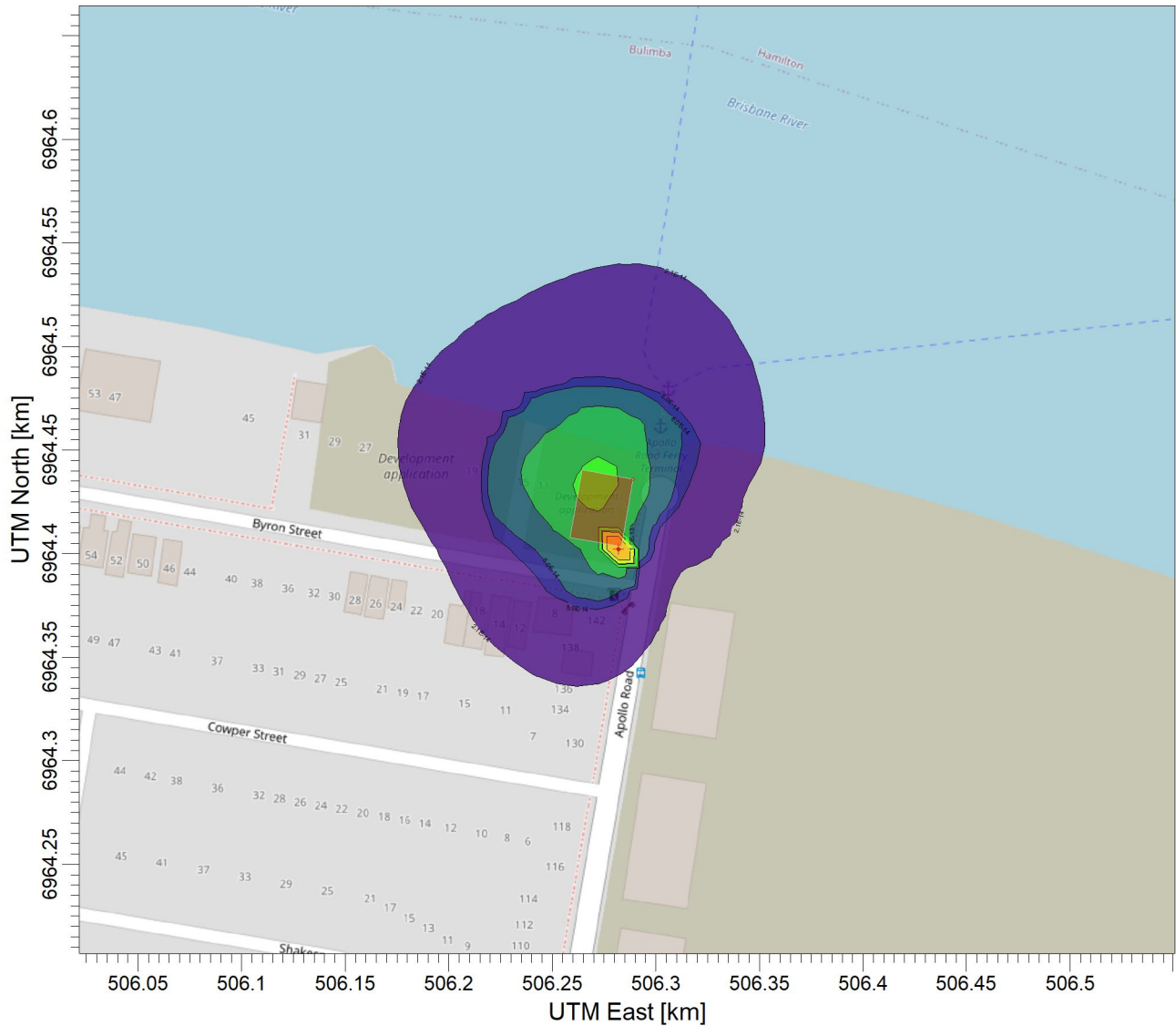


PROJECT NO.:

25364

PROJECT TITLE:

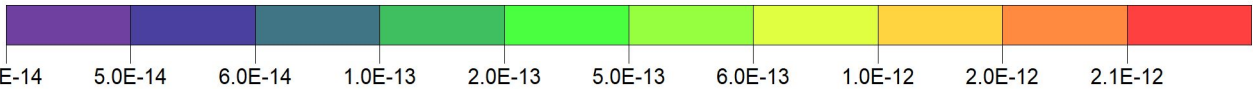
3-9 Byron St, Bulimba, QLD 4171
PM10 - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (PM10)

g/m³

Max = 2.1E-12 [g/m³] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:3,328

0

0.1 km

DATE:

30/10/2025

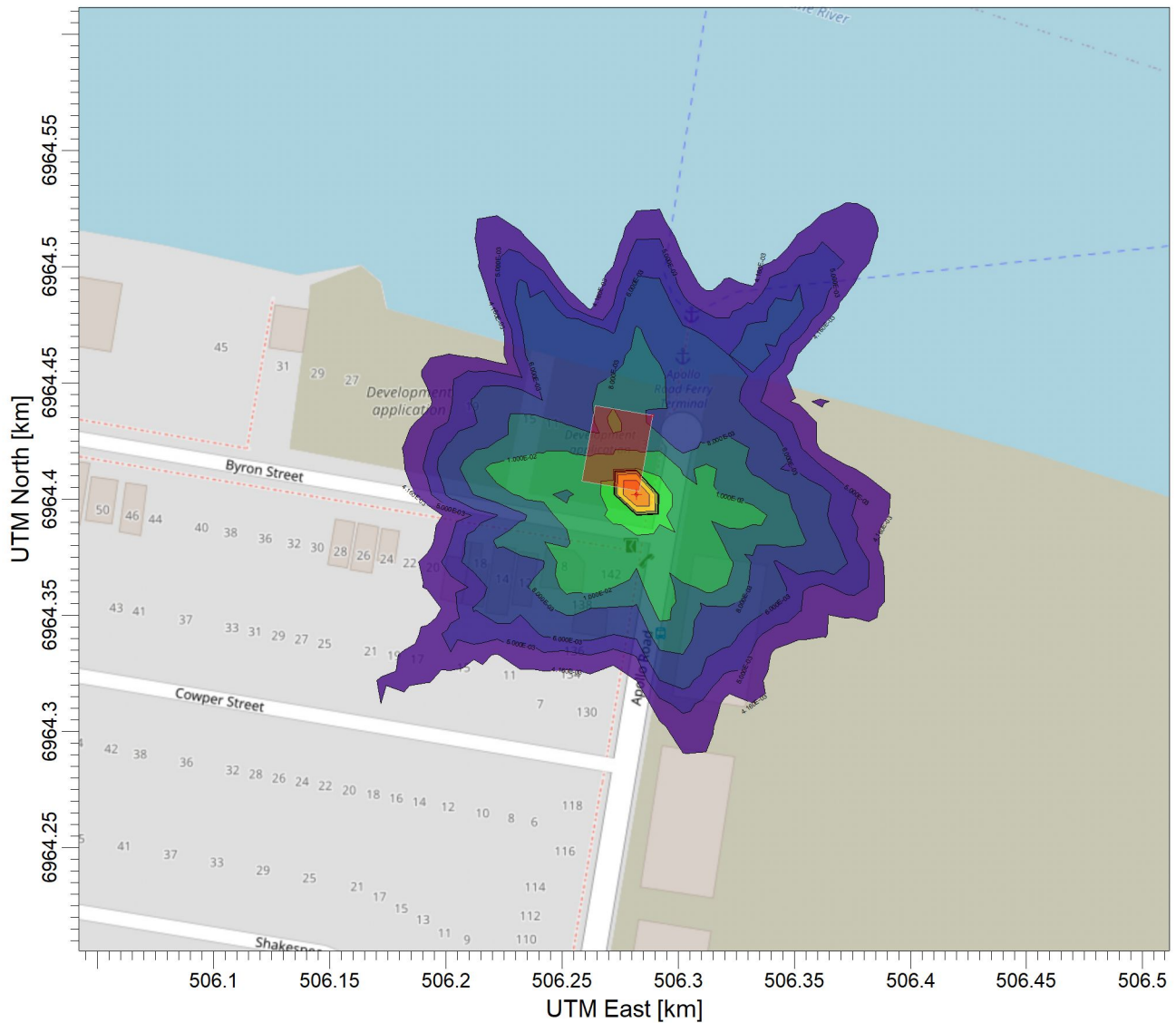


PROJECT NO.:

25364

PROJECT TITLE:

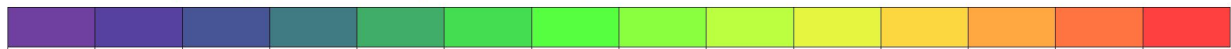
3-9 Byron St, Bulimba, QLD 4171
ODOR - 1 HR Average Concentration



1 RANK 1 HOUR AVERAGE CONCENTRATION (ODOR)

g/m**3

Max = 4.160E-01 [g/m**3] at (X = 506282.00, Y = 6964402.00)



4.160E-01 3.000E-01 2.000E-01 1.000E-01 0.500E-01 0.200E-01 0.100E-01 0.050E-01 0.020E-01 0.010E-01 0.005E-01 0.002E-01 0.001E-01

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,954

0 0.05 km

DATE:

11/11/2025

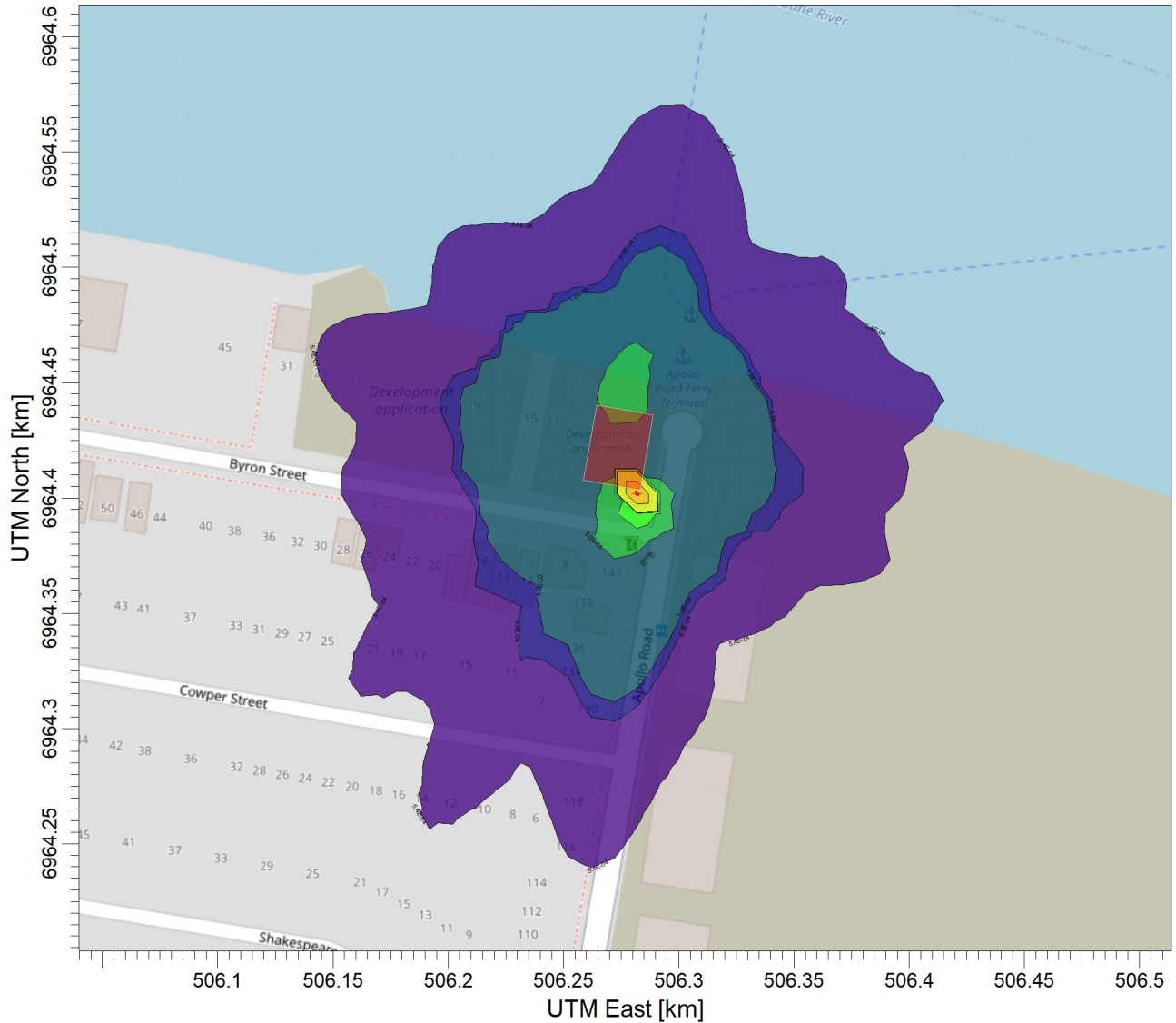


PROJECT NO.:

25364

PROJECT TITLE:

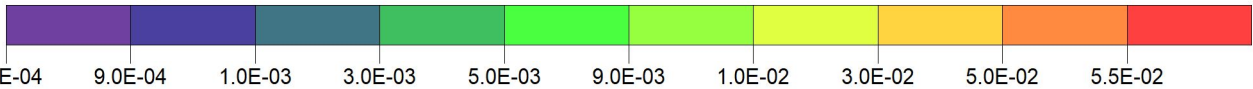
3-9 Byron St, Bulimba, QLD 4171
ODOR - 24 HR Average Concentration



1 RANK 24 HOUR AVERAGE CONCENTRATION (ODOR)

g/m**3

Max = 5.5E-02 [g/m**3] at (X = 506282.00, Y = 6964402.00)



COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE:

1:2,981

0  0.05 km

DATE:

11/11/2025

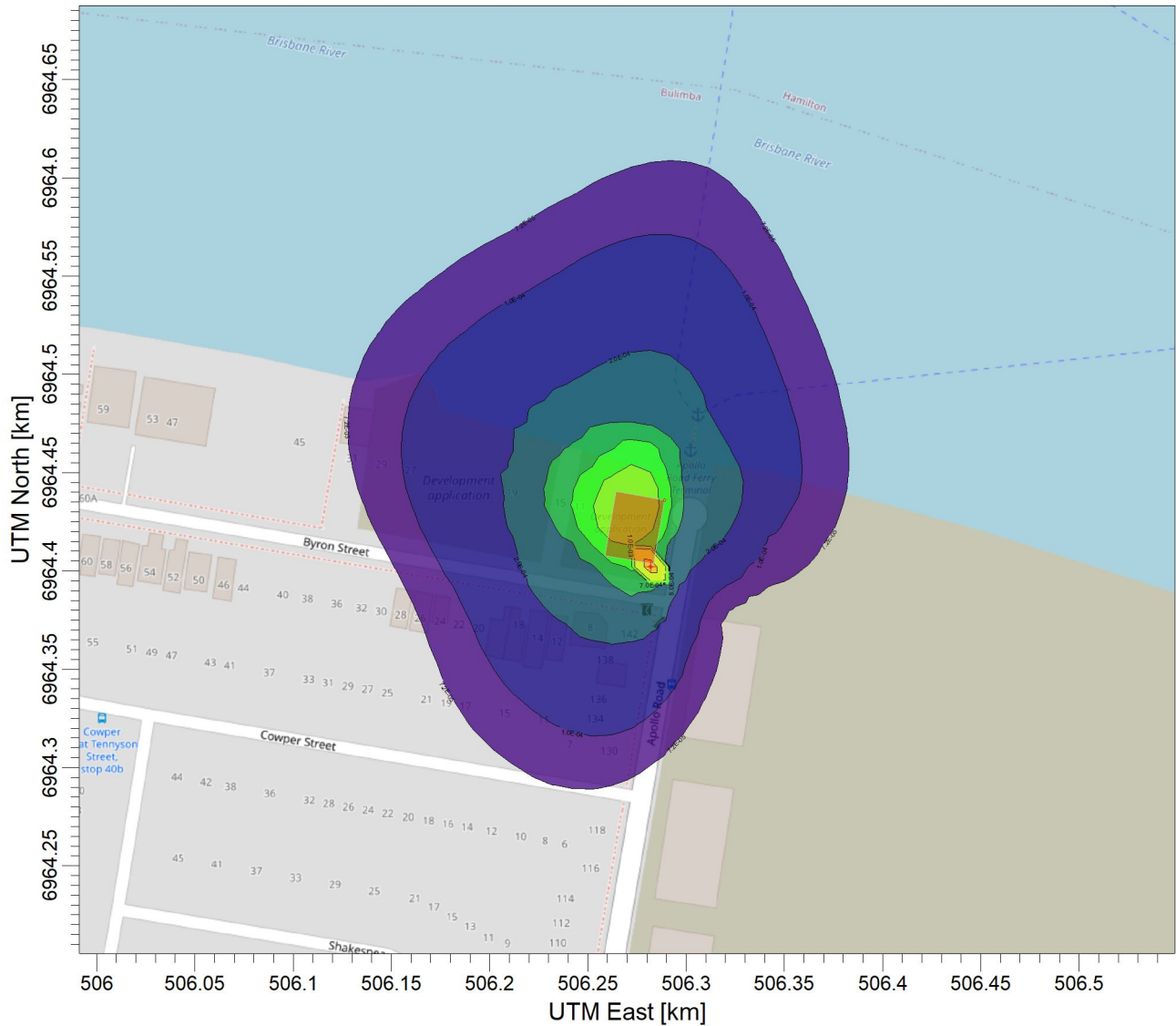
PROJECT NO.:

25364



PROJECT TITLE:

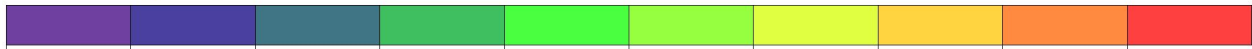
3-9 Byron St, Bulimba, QLD 4171
ODOR - 1 YR Average Concentration



VALUE 8793 HOUR AVERAGE CONCENTRATION (ODOR)

g/m**3

Max = 7.2E-03 [g/m**3] at (X = 506282.00, Y = 6964402.00)



7.2E-05 1.0E-04 2.0E-04 5.0E-04 7.0E-04 1.0E-03 2.0E-03 5.0E-03 7.0E-03 7.2E-03

COMMENTS:

COMPANY NAME:

SEED ENGINEERS

MODELER:

FK

SCALE: 1:3,508

0 0.1 km

DATE:

11/11/2025



PROJECT NO.:

25364

END OF REPORT