

Letter



Date: Wednesday, 28 August 2019

Lolita (ACT) No 1 Pty Ltd & Lolita (ACT) No 2 Pty Ltd
GPO Box 1565, Canberra ACT 2601

FAO: Gordon Lowe

Project Name: Dairy Road – Fyshwick STP Independent Expert Review
Reference: 18.1091.FR1V1

Dear Gordon

This letter presents my considered opinion in relation to the odour assessment reporting performed by ERM in relation to the proposed development at Dairy Road, ACT, and specifically the risk of odour impacts from the Fyshwick STP presenting constraints for development for residential uses.

If you require any further information or clarification, please do not hesitate to contact the undersigned at your convenience.

For and on behalf of

Northstar Air Quality Pty Ltd

A handwritten signature in black ink, appearing to read 'Gary Graham', with a horizontal line underneath.

Gary Graham

Director

Reviewed by: MD

INTRODUCTION

This letter presents a summary of my opinion in relation to the odour assessment reporting performed by ERM in relation to the proposed development at Dairy Road, Fyshwick ACT, and specifically the risk of odour impacts from the Fyshwick STP presenting constraints for development for residential uses. This opinion is offered in the capacity of the appointed Independent Expert Reviewer.

The following documentation has been reviewed:

- ERM (15 Nov 2018) Fyshwick STP Odour Assessment (ref: 0435540) (ERM 2018);
- Ektimo (3 June 2019) Odour Emission Testing Report – Fyshwick Sewage Treatment Plant, ACT (ref: R007578 [DRAFT]) (Ektimo 2019);
- ERM (undated) May 2019 Field Obs.xls (provided via email on 5 Jun 2019) (ERM 2019a);
- ERM (undated) Results Summary.xls (provided via email on 5 Jun 2019) (ERM 2019b);
- ERM (undated) Summary Field Odour Observation Methodology (provided via email on 21 Jun 2019) (ERM 2019c); and
- ERM (12 Aug 2019) Fyshwick STP Field Odour Observation Results (ref: 0435540) (ERM 2019d).

CONTEXT

The original odour assessment report (ERM 2018) was reviewed and discussed at a Stakeholder Meeting on 21 February 2019. A summary of the discussion is presented in the Minutes of that meeting, but the main concerns related to the derivation and application of odour emissions rates and sensitivity of the conclusions to that data. An action agreed at the Stakeholder Meeting was that the uncertainty regarding the odour emission rates would be resolved through a program of supplementary odour testing on the PST flow splitter and trickling filters.

The subsequent odour emissions testing was performed by Ektimo and reported in their odour emission testing report (Ektimo 2019). Supplementary analysis and interpretation were provided in various spreadsheets by ERM during June 2019 (ERM 2019b and ERM 2019c). That additional analysis demonstrated that the retested emission conditions did generally not support the assumptions presented in the (ERM 2018) report.

On 11 June 2019, a discussion between ERM, Molonglo Group and Northstar was held to review the retesting emission results (Ektimo 2019) and how the model represents the perceived conditions and potential environmental constraint at Dairy Road. A discussion regarding anecdotal observations of odour experienced around the Dairy Road site, observations made through field ambient odour monitoring (ERM 2019a), and the discrepancy between those anecdotal observations, field observations and modelled odour predictions.

To evaluate the discrepancy between those observations and predictions, it was agreed that a series of further field ambient odour assessments (FAOA) would be of value to evaluating actual conditions as an alternative to evaluating performance through predictive modelling.

The methodology adopted in the FAOA is based on VDI3940 as reported in (ERM, 2019d).

The agreed methodology is well established and used across Australia (and globally) to evaluate performance / compliance of operating odour sources.

In regard to the justification of the approach, with respect to evaluating environmental performance / compliance of existing operations, evidence derived from odour observations and surveys has a number of advantages over predictive modelling techniques. Predictive modelling techniques are extremely useful to evaluate design criteria / and specification for *proposed* activities or to evaluate the potential outcome of improvement options. However, for *operating* activities the defining metric of performance is not necessarily defined by achieving the relevant design criterion, but whether the neighbours are subjected to an environmental nuisance, as defined by the Environment Protection Act 1997.

Under the Environment Protection Act 1997, environmental nuisance is defined as:

environmental nuisance means an unreasonable interference with the enjoyment by the public, a section of the public or a person of a place or area, if the interference caused or likely to be caused by—

- (a) dust, fumes, light, noise, odour or smoke; or
- (b) an unhealthy, unsightly or otherwise offensive condition because of pollution.

It is noted that the odour assessment criterion (as relevant to a modelling study) is a design tool rather than a regulatory tool. The benchmark for operational facilities is not the odour assessment criteria outlined above but whether the emission of odour may give rise to environmental nuisance.

Performing field odour observations / surveys is a direct way to evaluate the environmental nuisance conditions, rather than evaluating potential through comparison to an indirect (predictive) design criterion.

The potential discrepancy between modelled odour dispersion and on-ground observations is well established. The discrepancy may be resultant from various factors including:

- Over-estimation of odour concentration through dynamic olfactometry;
- Poor identification and/or delineation between offensive, neutral and inoffensive odour;
- Limitations of dispersion modelling, particularly in calm / stable atmospheric conditions;
- The change in emphasis from odour concentration (modelling) to odour quality (compliance).

The application of odour observation / surveys techniques are supported by the SA EPA (2016) *Ambient air quality assessment* guidelines (emphasis added):

Odour assessment methods

The modelling process should not be seen as obviating the need to adopt a BATEA approach to process or emissions control, where there is a risk of adverse environmental impacts. Modelling should not be the only method used to assess the potential odour impacts of a development. Other tools include:

- *complaints history*

- *previous practical experience with the activity or similar activities*
- *consultation outcomes*
- *community odour diaries and surveys*
- *assessment of emission control proposals.*

ACT Govt (2018) *Separation distance guidelines or air emissions* also supports this approach (emphasis added)

5. AMENDMENTS TO SEPARATION DISTANCES

If site specific circumstances appear to indicate a reason for departing from the recommended separation distance (e.g. scale of operation, local topography, state of the art technology etc.), a separation distance different from the recommended distances may be justified.

The onus will be on the party seeking an amendment to the recommended distance to demonstrate that the recommended separation distance is inappropriate for the particular situation.

As a guide, the following criteria should be addressed when seeking a site-specific variation from the recommended separation distance: ...

- *an environmental audit of residual emission (air, water, noise, waste) from an existing plant on the proposed site or a similar plant at another site, that has been carried out and made available to support an increase/decrease to the recommended separation distance*

FAOA OBSERVATIONS

The field ambient odour assessment was performed in accordance with the methodology outlined (ERM, 2019c). As agreed, the definitions of odour intensity are presented in the agreed methodology and reproduced in Table 1.

Table 1 Odour intensity scale and interpretation (ERM, 2019c)

Perceived Odour Strength	Intensity Rating	Interpretation Source: VDI 3490 (1993) and modified interpretations from Pitt (2014) ¹
Extremely Strong	6	In normal circumstances, this should be very rare in a field situation. For an offensive type of odour, the reaction would be to immediately mitigate against further exposure until the exposure level is reduced. The odour cannot be tolerated.
Very Strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even if in a different context or situation - for example, not knowing or expecting what type of odour may be present. The odour is tolerable – even for an offensive odour.

¹ Pitt, D. (2014). Field odour assessments for estimating odour concentrations. *Air Quality and Climate Change*, 48(1), 24-32.

VDI. (1993). Determination of odorants in ambient air by field inspections intensity VDI3940. Dusseldorf: Kommission Reinhaltung der Luft im VDI und DIN.

Perceived Odour Strength	Intensity Rating	Interpretation Source: VDI 3490 (1993) and modified interpretations from Pitt (2014) ¹
Weak	2	A detectable weak odour stronger than very weak and less strong than distinct.
Very Weak	1	Odour only just detectable.
Not Perceptible	0	No odour present.

Briefly, the adopted FAOA methodology requires observation of odour at downwind locations at an interval of 10 seconds for a 10-minute period. Odour is evaluated in terms of its intensity on a scale from 0 (not detectable) to 6 (extremely strong). The resulting definition of odour representing an environmental nuisance is represented by “strong” odour [I=4].

The FAOA performed by ERM on the Fyshwick STP cover two periods:

- FAOA 1: 7 May 2019 – 8 May 2019; and
- FAOA 2: 22 July 2019 – 25 July 2019

FAOA 1 (May 2019) was principally performed on-site at the STP to provide further clarity regarding the odour emission rates used in the modelling, and as such is not representative of off-site conditions, as required to assess conditions at Dairy Road, and more useful to determine the extent of off-site environmental nuisance. FAOA 2 (July 2019) was targeted on conditions surrounding the STP.

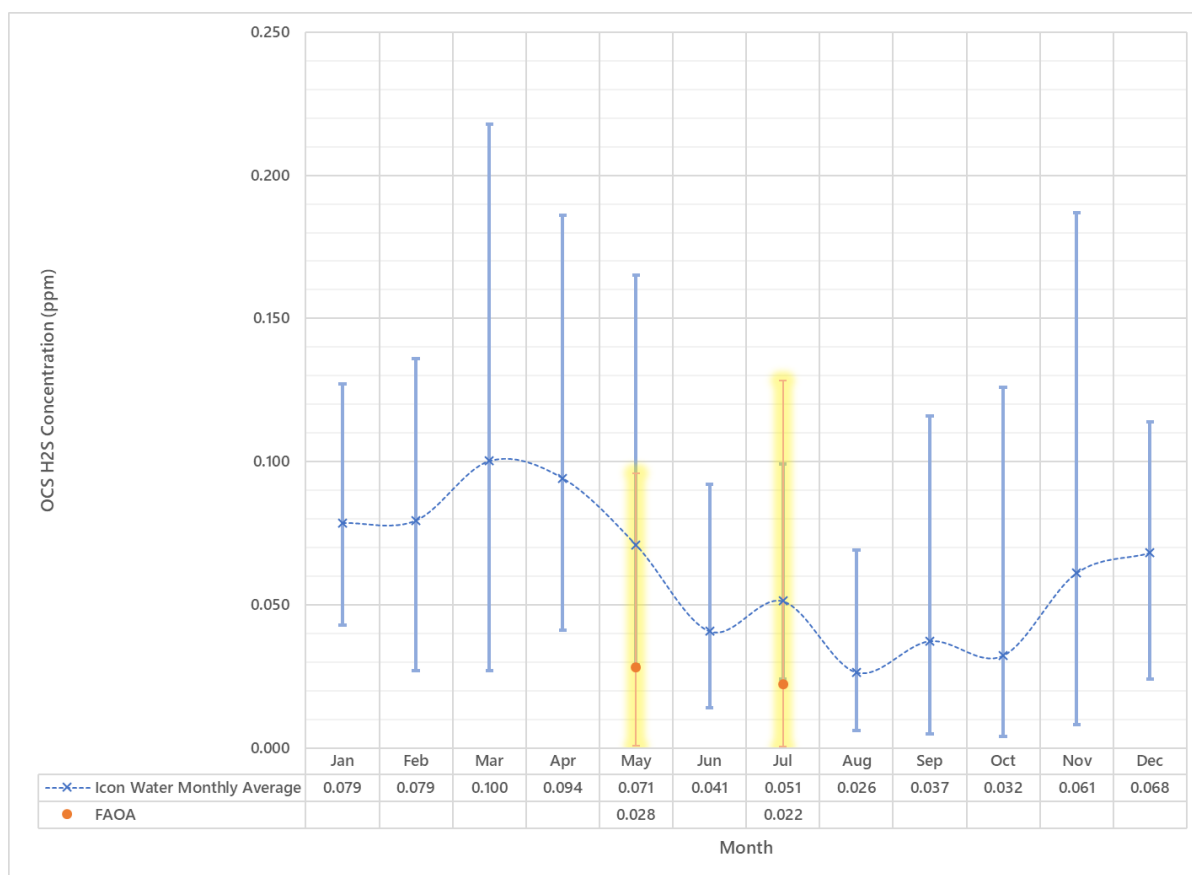
The FAOA was performed in accordance with the agreed standard methodology.

The timing of observations during FAOA 2 covered conditions during early morning and evening during at which times the dispersion potential is significantly reduced and the potential for environmental nuisance is increased.

A potential limitation of the approach adopted is whether the conditions prevailing over the survey period represents the longer-term conditions. To provide some evaluation of the variability of emission rates from the STP, the hourly-average monthly average inlet works OCS H₂S measurements supplied by Icon Water (ERM 2018) have been plotted as the monthly average, minimum and maximum H₂S concentration (ppm). Overlaid on this plot are the OCS H₂S concentrations over the FAOA observation periods (May and July 2019), with the July 2019 data being the most significant data (as discussed above).

These data are presented in Figure 1, and for each data point, the corresponding minimum and maximum value is represented by the corresponding y-error bars.

Figure 1 Monthly 1-hour average OCS H₂S measurements



As may be observed, the average H₂S concentration from the inlet works OCS during FAOA 2 (July 2019) of 0.022 ppm (47 OU)² is at the lower extent of the Icon Water monthly average range (ERM 2018) for July of 0.024 ppm (51 OU) to 0.099 ppm (211 OU). The maximum H₂S concentration measured during the survey (0.128 ppm (273 OU)), as represented by the upper y-axis error bar is higher than the Icon Water 'typical' maximum hourly concentration value of 0.099 ppm (211 OU).

The corresponding maximum OCS H₂S measurement during FAOA 2 of 0.128 ppm (273 OU) was recorded at 11:00 on 22 July 2019, shortly before the first round of odour observation surveying. During that period of surveying, 'very weak' odour [I=2] was observed at locations approaching the boundary between the STP and towards Dairy Road, which would not be considered to be representative of environmental nuisance conditions. No odour observations were made of strong intensity odour [I=4] at any locations off-site.

Whilst the average H₂S concentrations measured at the OCS during FAOA 2 are lower than the Icon Water monthly average conditions, the range is not dissimilar and can therefore be reasonably assumed to be generally representative of operating conditions.

² Assuming an odour detection threshold (ODT) of 0.00047 ppm

CONCLUSION

The conclusion drawn in the ERM summary report of the odour observations (ERM 2019d) is:

As discussed above, the results from the field odour observations show that the observed levels of odour best agree with what was presented in the assessment report for the main assessment scenarios (Scenario 1 and Scenario 2). There was nothing observed that suggested that any of the sensitivity analysis scenarios better represent the odour impacts at the Dairy Road proposed development site. Odour was only detected as very weak (only just detectable) along the northern entryway to the site (around the security gate)...

... It was suggested in the assessment report that commercial developments could be established along the Dairy Road frontage within the 200m contour as a way to provide additional buffer for residential areas further in at site. The results from the field odour observations support this suggestion and that a redevelopment of the Dairy Road site including residential land uses can coexist with the existing Fyshwick STP operations without odour related land use conflict.

In consideration of the above and based upon the information reviewed, I support this conclusion.

Appendix A - CV

Gary Graham

Director

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qualifications

- Bachelor of Science with Honours BSc (hons), Environmental Science, 1992
- Master of Science (MSc), Wastes Management, 1994
- Certified Air Quality Professional (CAQP), CASANZ
- Chartered Scientist (CSci), Science Council
- Chartered Environmentalist (CEnv), Society of the Environment
- Chartered Water and Environmental Manager (C.WEM), CIWEM
- PRINCE2 Foundation and Practitioner

membership

- Elected Member of Clean Air Society of Australia and New Zealand (CASANZ) Committee for NSW, NSW Treasurer
- Member of the Chartered Institution of Water and Environmental Management (MCIWEM)
- Institute of Acoustics Certificate and Competence in Environmental Noise Measurement (IoA CoC)

special expertise

Gary provides a range of expertise including:

- Expert witness, testimony and evidence
- Peer review of technical reports
- Air quality impact assessment
- Air quality monitoring programs
- Air toxics human health risk assessment
- Odour and dust management
- Indoor air quality and occupational exposure
- Process due diligence and Industrial regulation
- Management of Environmental Impact Assessment studies and planning applications

background

Gary is a Director with Northstar and has over 25 years' experience in environmental management and assessment with a specialism in air quality sciences.

He is a Certified Air Quality Professional (CAQP), Chartered Scientist (CSci), Chartered Environmentalist (CEnv), Chartered Water and Environmental Manager (C.WEM MCIWEM) and a PRINCE2 certified project manager with extensive experience in multi-disciplinary consultancy with an emphasis within the air quality, environmental permitting, compliance, environmental planning and waste management sectors. He has significant expertise in odour management.

He has provided technical and management advice to a broad cross-section of clients, including the World Bank, European Bank for Reconstruction and Development, central government agencies in Europe and Australia, (including Australian DOD, NSW DECCW/EPA, NSW OEH, WA DOP, INSW, UK DEFRA and Highways Agency), councils, development agencies, energy, industry, infrastructure, waste and urban renewal sectors.

He has substantial experience in advising clients through the environmental assessment process, and has directed and managed scores of multi-disciplinary Environmental Assessments for a wide range of developments.

He regularly provides peer review services on behalf of Councils and other stakeholders, and is regularly requested to provide expert witness, testimony and evidence across Australia on air quality, dust, odour and spray drift matters. He has been engaged as an expert witness on behalf of NSW EPA, NSW Department of Planning and Environment, WA State Solicitor's Office, UK Highways Agency, and direct appointed by the NSW Land and Environment Court.

selected project experience



Agribusiness

- Australian Turf Club, Warwick Farm, Odour Management Plan & Waste Management Plan, NSW
- Cessnock City Council, Peer Review, NSW
- Intensive Poultry Facility, Peer Review, NSW
- Intensive Poultry Facility, Peer Review, WA
- Intensive Poultry Facility, Peer Review and Expert Witness, VIC
- Equine Odour Risk Assessment, NSW
- Pig Rearing Facility Peer Review (1), WA
- Blayney Abattoir, NSW
- Broiler Farm Peer Review, Dungog, NSW
- Pig Rearing Facility Peer Review (2), WA
- Westmere Grains, VIC
- Walfertan Tannery Odour Assessment, Expert Witness, NSW
- Kurri Kurri Viniculture Spray Draft Assessment, NSW
- Carbon Foot-printing Tool, Horticultural Trades Association, UK

Clients in this sector include: 360 Environmental, Australian Turf Club, Darley Estates, Shire of Serpentine Jerrahdale, Hunter Thoroughbred Breeders Association, Saines Lucas Solicitors, TFE Pastoral Company, UK Horticultural Association.



Resources & Waste

- Perilya North Mine, Air Quality Auditor, Broken Hill, NSW
- SUEZ, Lucas Heights, Air Quality Auditor, NSW
- Pentarch Industrial, Waste Ordnance Light Flashing Furnace, NSW
- Pentarch Industrial, HF Risk Assessment, Australia
- TNG, Independent Peer Review, NSW
- SUEZ, Lucas Heights STP, NSW
- Melbourne Regional Landfill, Expert Witness, VIC
- Kewdale Waste Transfer Station, Expert Witness for WA Department of Planning, WA

- Tellus Holdings, Chandler Integrated Mining and Waste Facility, NT
- Tellus Holdings, East Arm Waste Transfer Station Risk Assessment, NT
- WA Limestone, Bayswater Concrete Batching Plant, Expert Witness, WA
- Cleanaway, Erskine Park Waste Transfer Station, NSW
- Genesis Landfill, Expert Witness for NSW EPA
- Boral Kooragang Concrete Batching Plant, NSW
- Bingo Waste Transfer Stations (St Marys, Mortdale), NSW
- Institute of Quarrying Australia Field Booklet – Dust Management
- Woodlawn Bioreactor Project, NSW
- Eastern Creek Organic Resource Recovery Facility, NSW
- Redhill Waste Management Facility, WA
- Tropicana Gold Mine, WA
- Area C Iron Ore Mine, WA
- Rockdale Waste Transfer Station, NSW
- Kemps Creek Alternative Waste Treatment Facility, NSW
- Carrow/Koppio Project, SA
- Chullora, Resource Recovery Park,
- North Ryde Resource Recovery Centre, NSW
- Wafi Golpu, PNG
- Freida River Project, PNG
- Metropolitan Colliery Independent Auditor NSW
- P'nyang Project, PNG
- Eastern Creek Landfill Odour Assessment, NSW
- Genesis Landfill, Expert Auditor, NSW
- Centennial Coal Company, PRP Assessments, NSW
- Roy Hill Iron Ore Project, WA
- Peabody Energy, PRP Assessments, NSW
- FMG Solomon, WA
- Tropicana Gold Project, WA
- Boral Scoresby, VIC
- Drayton South Peer Review, NSW
- Hidden Valley Mine Project, PNG
- Tamperkan Project, Philippines
- Woodsreef Mine Rehabilitation Project, NSW

- Waste Management Centre, Expert Opinion, NSW
- Cavehill Quarry, VIC
- Donald's Mineral Sands, VIC
- Wagga Wagga Sand and Gravel Extraction, NSW
- Bigryli Uranium Exploration Project, NT
- East Guyong Quarry, NSW
- UHG Phase II Mine Extension, Mongolia
- Pre-Acquisition Advice, UK
- Energy from Waste Plant PPC, UK
- Blue Circle Compliance Program, UK
- NEWS Loss of Amenity Study, UK
- Assessment of the Risks to Human Health of Waste Transfer Stations, UK

Clients in this sector include: Aggregates UK Energy Resources, Anglo Gold Ashanti, APP Corporation, BHP BIO, Blue Circle, Cleanaway, Coffey International, Eastern Metropolitan Regional Council, Energy Metals, Environmental Earth Sciences, Gamut Consulting, Hanson, Hunter Thoroughbred Breeders Association, Institute of Quarrying Australia, Mongolian Mining Corporation, Norfolk Environmental Waste Service, NSW DPE, NSW EPA, NSW Dept of Mines, NSW WAMC, Peabody Energy, Perilya, Port Stephens Council, Roy Hill Iron Ore, SITA, SUEZ, Tellus Holdings, UK Environment Agency, Vallance, WA Department of Planning, WA Limestone, WA State Solicitors Office.



Property

- Rivergum College Street, Port Adelaide, SA
- Minmi Link Road North, NSW
- Residential Subdivision Tenambit, Expert Witness, NSW
- Childcare Centre, Expert Witness, NSW LEC
- Kitchen Exhaust Ventilation Assessment. Expert Witness, NSW DC,
- Beerwah Land Sterilisation Investigation, QLD
- Marsden Park North Development, NSW
- Leppington Precinct Development, NSW
- South Orange Urban Release Area, NSW
- Oakdale Central Development, NSW

- Warehouse and Distribution Facility, Chullora NSW
- Berry's Bay Marina Project, NSW
- Warwick Farm Equestrian Centre, Peer Review and s.34 Conferencing, NSW
- Wilton Junction Land Use Mapping, NSW
- Oakdale West Development, NSW
- Mercure Odour Audit, NSW
- Crowne Plaza Hunter Valley Brewery Odour Assessment, NSW
- Willoughby Council Compliance Assessment, NSW
- Crowne Plaza Newcastle Brewery Odour, NSW
- Hurricanes Bar & Grill Odour Management, Darling Harbour, Bondi, Brighton-le-Sands, NSW
- Bungarabee Estate Data Centre, NSW
- Ridges World Square Schwartz Brewery Odour Audit, NSW
- Environa, Environa South, Tralee, Jerrabomberra and Queanbeyan Land Use Change, ACT
- Residential Risk Assessment, Peer Review, NSW
- Odour Risk Assessment, Peer Review, NSW
- McDonalds Retained Odour Expert, Expert Witness LEC Multiple Sites, NSW
- Catherine Fields Part Precinct, NSW
- Smash Repair Facility Odour Peer Review, Peer Review, NSW
- Brooklyn Child Care Centre, NSW
- Countess of Chester Health Park Environmental Expert, UK
- Bacton Homes Background Environmental Studies, UK
- Environmental Auditing (Pre-acquisition), UK

Clients in this sector include: Bellway Homes, Camden Council, City of Sydney Council, Elton Consulting, English Partnerships, GAT & Associates, Geolyse, Goodman, Hosking Munro, Hurricanes, JBA Planning, Kamrani Estates, NSW DPE, NSW EPA, NSW Land and Environment Court (direct appointment), Port Stephens Council, Shine Pre-School, Valad Property Group, Worley Parsons, Willoughby Council.



Transport & Infrastructure

- WestConnex, Peer Review, Strathfield Council, NSW
- WestConnex St Peter's Interchange, Odour Management, NSW
- NorthConnex Peer Review, NSW
- Lower Main North Quadruplication Lite, NSW
- Sydney Harbour Bridge Lead Paint Removal Compliance and Verification, NSW
- Capital Metro Stage 1 EIS, ACT
- WestConnex Peer Review, NSW
- NorthWest Rail Link, Baseline Program, NSW
- Kranji Marshes, Singapore
- Toowoomba Second Range Crossing, QLD
- Sentosa Gateway Junction Project, Singapore
- JSF Impact Assessment, NSW, NT, QLD, SA, WA
- Enfield Intermodal Logistics Centre, NSW
- North Ryde Transport Orientated Development, NSW
- Enfield to Chatswood Rail Line, NSW
- Mitchell's Transportation Efficiency Project, WA
- M1 Motorway Service Station, NSW
- Brisbane North Guided Busway, QLD
- RAAF Williamtown AQ Program Review, NSW
- New Raynesway Grade Separated Junction Expert Witness, UK
- Manchester Airport Freight Forwarding Unit EIA
- Farnworth Multi-Use Development UK
- Manchester Airport T3 Apron Extension EIA, UK
- Beverley Southern Relief Road EIA, UK
- A1 Dualling and Realignment Stage 2/3, UK
- Templeborough Estates EIA, UK
- Denbigh Multi-Use Development EIA, UK
- Liverpool Water Environmental Co-ordinator, UK
- Preston East Employment Park EIA, UK
- ForthQuarter Development EIA, UK
- Liverpool Garden Festival EIA, UK
- Merseytravel Mersey Rapid Transit EIA, UK
- Bishkek Public Transport Assessment, Ministry for Transport, Kyrgyzstan
- Woolston Riverside EIA, UK

- WWTW Odour Impact Assessment (multiple sites), UK
- Lower Liffey Crossing, Eire
- M60 Improvement Program J12-J18, UK
- Local Air Quality Management, AQRA, Local Authorities (numerous) UK

Clients in this sector include: Australian DoD, Bank of Ireland, Camden Council, Cathco Property Group, East Riding of Yorkshire Council, EG Property Group, ForthQuarter plc, Grampian Water, Hornsby Shire Council, Jaguar Estates, Kamrani Estates, Langree Housing, Lend Lease, Manchester Airport plc, Merseytravel plc, Mitchell's, NSW DPE, NSW EPA, NSW Land and Environment Court (direct appointment), NSW Ports, Peel Group, QLD DTMR, South East England Development Agency, Strathfield Council, Sydney Harbour Bridge Alliance, Sydney Motorway Corporation, Sydney Water, Transport for NSW, UK Highways Agency, Urbis, Yorkshire Water, World Bank / EBRD.



Industry

- Slow Lane Brewing, Botany, NSW
- Pettigrew Family Funerals, Mayfield, NSW
- Department of Planning & Environment, Independent Expert, NSW
- Gunlake Concrete Batching Plant, Expert Witness, NSW
- NSW OEH, Load-based Licensing (LBL) Review, NSW
- Department of Planning & Environment, Independent Auditor (2017-18, 2016-17, 2015-16), Shoalhaven, NSW
- NSW OEH, Review of International Best Practice – Air Quality Monitoring Network Design and Operation, Australia
- NSW OEH, Review of NEPM Monitoring Networks, Australia
- Regulatory and Planning Advice, Licella, NSW, ACT & UK

- APC Performance Evaluation Insurance Advice, NSW
- Modular Brewing, Odour Management, WA
- Boral Kooragang Island Materials Recycling Facility, NSW
- Bayswater Concrete Batching Plant, Expert Witness, WA SAT
- NSW Fire and Rescue Compartmental Fire Behaviour Training Facility, NSW
- Frenchs Forest Bushland Crematorium, NSW
- Crash Repair Facility, Peer Review and s34 Conferencing, NSW
- Pentarch Munitions Disposal Project, NSW
- Orica Accidental Ammonia Discharge, Peer Review and Expert Opinion, NSW
- Boral Scoresby Opportunities and Constraints Assessment, VIC
- Port of Melbourne Peer Review, VIC
- Tuggeranong Crematorium, ACT
- VOC Exposure from Household Sources NSW EPA, NSW
- Boral Berrima Cement Works, NSW
- Nuplex POEO Review, NSW
- Boral Granville Concrete Batching Plant, NSW
- Givaudan Odour Management, NSW
- HCMC Bakery Odour Assessment, Vietnam
- Hunter River Remediation Project Compliance Program, NSW
- Walfertan Tannery Odour Assessment, Expert Witness, NSW
- Adelaide Desalination Plant Environmental Management Plans, SA
- Nestlé, Hayes Odour Management, UK
- Nestlé, Burton-on-Trent, Odour Management, UK
- Quinn Radiators, UK
- Ford Dagenham Compliance Program, UK
- Ford Halewood Compliance Program, UK
- Ardagh Glass, UK
- Humber Energy / Fibres Worldwide PPC, UK
- British Steel / Tata Compliance Program, UK
- UK HMIP / Environment Agency Clinical & Chemical Incineration Sector Compliance Program

Clients in this sector include: AB Mauri, Ardagh Glass, British Steel / Tata Steel, City of Sydney Council, Darley Stud, Environmental Property Services, Fibres Worldwide, Ford Motor Company, Givaudan, Ignite Architects, Moray & Agnew, Nestlé, NSW Fire and Rescue, Nuplex, Pentarch, Port of Melbourne Corporation, Quinn Radiators, SA Water, Theiss, WA Limestone, UK Environment Agency.



Energy

- Lend Lease, Barangaroo CHP, NSW
- Alinta Energy, Reeves Plains Power Station, SA
- Alinta Energy, Fate of Emissions Study, WA
- Confidential, Expert Witness, QLD
- Port Hedland Power Station, WA
- Sydney Exhibition Centre at Glebe Island, NSW
- West Qurna II Gas Field Development, Iraq
- LGI Landfill Flare Assessments, NSW
- Geelong Refinery Semi-Quantitative Occupational Risk Assessment, VIC
- Solomon Project, WA
- Santos Fairview CS1&2 LNG, QLD
- Immingham Gas Terminal Compliance Program, UK
- Industrial Regulation Advice, UK
- PFI Hospital Site GHG Emissions Trading Scheme Applications, (multiple sites) UK
- Bioverda Energy EIA, PPC, COMAH Assessments, UK
- Isles of Scilly Waste from Energy Plant, UK
- Stockton Energy from Waste, UK
- Tees Valley Biofuels Seed Crushing Plant, UK

Clients in this sector include: Alinta Energy, Balfour Beatty Capital Projects, Bioflame, Bioverda Energy, Coffey International, FMG, Immingham Gas Terminal, INSW, Jersey States, Landfill Gas Industries, Lend Lease, Santos, Shell, SUEZ, Tees Valley Biofuels.

publications

- Balch A, Graham G & Knaggs B, *FIDOL Factors, Odour Nuisance and Risk: The Adaptation of Field Based Odour Assessments using a Field Olfactometer* Proceedings of the 22nd International Clean Air and Environment Conference, Melbourne 2015
- Graham G, *Dust Management Field Booklet* The Institute of Quarrying Australia 2014
- Rahaman F, Lawrence K, Starke G, Graham G & Doyle M, *Estimation of Odour Emissions from Broiler Farms – An Alternative Approach* Proceedings of the 21st Clean Air Society for Australia and New Zealand, Sydney 2013
- Graham G, Lawrence K & Doyle M, *Development of Odour Impact Assessment Methodologies Accounting for Odour 'Offensiveness' or Hedonic Tone* Proceedings of the 21st Clean Air Society for Australia and New Zealand, Sydney 2013
- Graham G, & Lawrence K, *Managing Emissions to Air* Monograph 28 - Australasian Mining and Metallurgical Operating Practices (AMMOP) - Third Edition, Published by The Australasian Institute of Mining and Metallurgy, 2013
- Graham G *Sensitivities in Assessing Cumulative Impacts from Extractive Processes* Proceedings of the 4th Annual Dust Management Strategies, Brisbane, Australia, 2010
- Bradbeer E, Clayton J, Graham G & Wood S, *Cost Effective Health Risk Assessments: An Occupational Health and Safety Approach* Proceedings of the 5th International Workshop on Chemical Bioavailability in the Environment, Adelaide, Australia 2009

expert witness

Listed below is a summary of expert witness work, or appointment by Councils (or other regulatory bodies) to act as an independent expert of various air quality matters. This does not include review for private companies.

2019

- Perilya North Mine, Air Quality Auditor approved by Department of Planning & Environment

2018

- Cessnock City Council, Independent Peer Review and Representation, Barton Bridge Poultry Sheds Odour Assessment (2018)
- Environment, Planning and Sustainable Development, Environment Protection Authority, and ICON Water, Independent Expert Reviewer, Dairy Road Air Quality Assessment
- Limousin No1 Estate Pty Ltd v Liverpool City Council, Land and Environment Court LEC 251058 of 2017
- Mount Atkinson Holdings and Environment Protection Authority and Landfill Operations Pty Ltd, Victorian Civil and Administrative Tribunal VCAT P790/2017, P794/2017, P795/2017, P805/2017, P877/2017
- NSW Planning & Environment, Independent Air Quality Scientist, Kings Park Metal Recycling Facility (PROC-2001562)
- NSW Department of Planning & Environment, Independent Odour Auditor, Shoalhaven Starches, Manildra (2017-18)

2017

- Cessnock City Council, Independent Peer Review and Representation, Barton Bridge Poultry Sheds Odour Assessment (2017)
- Cleanaway Pty Ltd and Presiding Member of the Metro Central Joint Development Assessment Panel (2017) State Administrative Tribunal of Western Australia WASAT 74
- Gunlake Quarries Pty Ltd v The Minister for Planning, Land and Environment Court, 2017/00108663
- NSW Department of Planning & Environment, Independent Odour Auditor, Shoalhaven Starches, Manildra (2016-17)

2016

- Allan and Narelle Nothdurft v QGC Pty & Others, Land Court of Queensland, PGP114-16
- McCudden v Cowra Shire Council, Land and Environment Court, 2015/20774
- Cleanaway Pty Ltd and Presiding Member of the Metro Central Joint Development Assessment Panel, State Administrative Tribunal of Western Australia, DR 161 of 2016
- Gunlake Concrete Pty Limited v Bayside Council, Land and Environment Court No 340542 of 2016
- Kamrani Holdings Pty Ltd & Anor v Willoughby City Council, Class 1 Proceedings, Land and Environment Court, 10064 of 2015
- NSW Department of Planning & Environment, Independent Odour Auditor, Shoalhaven Starches, Manildra (2015-16)
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