Appendix A. Matters Raised by PPV - Expert Witness

Name and address of the expert

Tracy Joanne Freeman
456 Camberwell Road, Camberwell
Victoria 3124.

The expert's qualifications, experience and area of expertise

I have a Masters Degree in Chemical Engineering from the National University of Singapore, and a First Class Honours Degree in Chemical and Process Engineering from the University of Canterbury, New Zealand.

I have 27 years' experience in air quality consulting. The first 18 years of my experience were based in New Zealand, and I moved to Australia in March 2011.

I am a financial member of the Clean Air Society of Australia and New Zealand (CASANZ). From 2010 to 2014 I was the Chair of the Odour Special Interest Group of CASANZ, a group comprised of many of the foremost consultants and regulators in odour assessment in Australia and New Zealand.

I have assessed environmental effects from the discharge of contaminants to air on many occasions throughout my years of experience, including emissions from a wide range of industries.

I have provided expert evidence on odour issues for the Environment Court of New Zealand, the Victorian Civil and Administrative Tribunal, and Planning Panels Victoria on a number of occasions.

I have been involved in many planning applications involving amenity conflicts between neighbouring incompatible land uses due to odour emissions from an activity causing, or having the potential to cause, nuisance for dwellings on neighbouring properties.

I have investigated and assessed odour issues for a wide range of activities including wastewater treatment plants, industrial waste treatment facilities, landfills, refuse transfer stations, recycling parks, composting plants, broiler farms, turkey farms, pig farms, rendering plants, abattoirs and fellmongeries.

In these matters I have advised a range of stakeholders at various times, including applicants, local government, and environmental regulators.

Since 1993 I have visited and conducted odour investigation studies at a large number of sewage treatment plants in both Australia and New Zealand.

I have been carrying out atmospheric dispersion modelling since 1993, and am proficient in the use of various models including CALMET, CALPUFF, AERMOD, TAPM, and AUSPLUME. I have conducted 3 training courses in the use of dispersion models in New Zealand.
My curriculum vitae attached in Appendix B summarises my experience relevant to this hearing.

**Any private or business relationship between the expert witness and the party for whom the report is prepared**

I am aware of no private or business relationship which has the potential to represent a conflict of interest.

However I have been engaged by YVW for the development of an odour model for the BCSTP since April 2019, and the company I work for, Jacobs, has a continuing-services agreement with YVW for engineering services. Through this engagement, I have had contact with Ms Hackett from YVW and access to other YVW engineering and operations staff and have had various conversations with YVW about the BCSTP over the last few months to seek information relevant to the development of the odour model. I was subsequently engaged by Maddocks to provide an expert statement for this hearing.

**All instructions that define the scope of the statement (original and supplementary and whether in writing or verbal)**

I received a letter of instruction from Maddocks dated 8 October 2019. That letter detailed my retainment to provide expert evidence for this hearing, and is attached in Appendix C.

The letter of instruction did not specify any particular matters that I should address in my evidence statement, other than that in broad terms my analysis should focus on the proximity of the site of the proposed residential development within the buffer zone of the STP and the potential effects it may have on the STP and on the proposed residential development. I was instructed to report on key issues, and review relevant submissions and respond to those submissions.

I was instructed by Maddocks to consider or take account of the GHD Report “3 Holloway Rd Wonga Park – Odour Assessment” prepared for Intrapac Property Pty Ltd, dated August 2019.

All other documents used in making the report are listed in the references at the end of the main body of my evidence.

I have also had subsequent meetings and discussions with Maddocks to discuss facts relating to the case and my preliminary opinions; these meetings could be regarded as verbal instructions from Maddocks although I have no recollection of specific additional instructions provided during those meetings.

**Details and qualifications of any person who carried out any tests or experiments upon which the expert relied in making this statement**

Not applicable – no tests or experiments have been carried out nor relied on in this report. All technical analysis and modelling conducted and detailed in this statement was conducted by me.
Appendix B. Curriculum Vitae  -  Tracy Freeman
Tracy Freeman

PRINCIPAL AIR QUALITY SPECIALIST

Tracy is a Principal Air Quality Specialist, with over 26 years’ experience in environmental and air quality consulting services and a background of chemical and process engineering education. She has provided advice on air quality issues to a broad range of infrastructure, industrial, and regulatory/policy clients.

Tracy also has a speciality in odour assessment and management for wastewater, solid waste, livestock farming, and industrial activities, and is particularly well-regarded for her expertise in odour nuisance risk assessment. She was the Chair of the Odour Special Interest Group of the Clean Air Society of Australia & NZ from 2010 to 2014.

She is well respected for her competence in dispersion modelling and consequential interpretation of impact or nuisance risk assessment.

Areas of Expertise

- Wastewater treatment emissions
- Atmospheric dispersion modelling including TAPM, AERMOD, CALPUFF
- Dust and odour generation, management, control, impact assessment
- Local factors that influence air quality – meteorology, topography, neighbours
- Buffer zones and separation distances
- EIS and Works Approvals
- EPA licence compliance and negotiation of conditions
- Industrial emissions and hazardous air pollutants
- Particulates, nitrogen oxides, sulphur dioxide and other priority pollutants
- Chicken and pig farming, abattoirs and rendering facilities
- Ambient air quality and meteorology monitoring and analysis
- Reverse amenity impacts from developments
- NEPM (National Environment Protection Measure – Air Quality) compliance
- NPI (National Pollutant Inventory) reporting
- Nuisance impacts (dust, odour)
- Investigation of complaints
- Expert witness testimony

Relevant Project Experience – Wastewater

Melton RWP (VIC), 2019.

Client: Western Water

Scope/Description: Meteorological and atmospheric dispersion modelling, identification of odour emissions inventory, and evaluation of odour control options from Melton RWP before and after commissioning of proposed waste-to-energy plant, for Works Approval application.
Tracy Freeman
PRINCIPAL AIR QUALITY SPECIALIST

Wallan STP (VIC), 2019.
Client: Yarra Valley Water
Scope/Description: Dispersion modelling and evaluation of odour emissions from Wallan STP to recommend site-specific separation distance for STP and identify residential encroachment risks.

Brushy Creek STP (VIC), 2019.
Client: Yarra Valley Water
Scope/Description: Dispersion modelling and evaluation of odour emissions from Brushy Creek STP to recommend site-specific separation distance for STP, identify residential encroachment risks, and identify sources with highest risk of causing off-site odour impacts.

Eastern Treatment Plant Validation of Onsite Met Station (VIC), 2018.
Client: Melbourne Water
Scope/Description: Comparison of wind data from new onsite meteorological monitoring station (12 months data) with nearby Bureau of Meteorology data, and comparison of CALPUFF and AERMOD dispersion model results with and without the inclusion of the onsite data – including effect of using measured turbulence data, and 10-minute timestep versus 1-hour timestep.

Western Treatment Plant Biogas Combustion Emissions (VIC), 2018.
Client: Melbourne Water
Scope/Description: Dispersion modelling and air quality impact assessment of biogas-fuelled power generator combustion emissions from the Western Treatment Plant.

Meteorological Data Files for Modelling of Western Water RWP (VIC), 2018
Client: Western Water
Scope/Description: Preparation of meteorological data files (TAPM, CALMET and AERMET) for dispersion modelling for four RWP locations, as subcontractor to CH2M.

CASANZ Working Group on Field Odour Assessments, 2018
Client: N/A
Scope/Description: Participation in CASANZ Working Group on Field Odour Assessments, including national workshop hosted by CASANZ Odour Special Interest Group in Brisbane in November 2018.

Epsom WRP Separation Distance Assessment for ESO (VIC), 2017
Client: Coliban Water
Scope/Description: Expert report on recommended separation distances around Epsom Water Reclamation Plant (Bendigo) for Environmental Significance Overlay. Modelling conducted using CALPUFF.
Tracy Freeman  
PRINCIPAL AIR QUALITY SPECIALIST

Separation Distance Assessment Goulburn Valley Water (VIC), 2016-17.

Client: Goulburn Valley Region Water Corporation
Scope/Description: Separation distance assessment for three wastewater management facilities located at Mansfield, Bonnie Doon, and Merrijig, including odour dispersion modelling at Mansfield.

SE Water treatment plants odour modelling (VIC), 2016.

Client: South East Water
Scope/Description: Development of meteorological data files for running AERMOD at six wastewater treatment facilities in the South East Water catchment (AERMOD modelling conducted by CH2M). Peer review of modelling methodology. Provision of training to South East Water on running the resultant AERMOD models, including preparation of training slides and demonstration data, and delivery of two training sessions.

Eastern Treatment Plant CALPUFF Model Development (VIC), 2016.

Client: Melbourne Water
Scope/Description: Conversion of AERMOD atmospheric model for Eastern Treatment Plant into CALPUFF, including preparation of CALMET meteorological models and testing of sensitivity of CALMET/CALPUFF input parameters, and provision of training to Melbourne Water on running the resultant CALPUFF model.

Sunbury Wastewater Treatment Plant Reverse Amenity Impact, VIC, 2016

Client: Victoria University
Scope/Description: Assessment of reverse amenity impact of proposed residential development on existing nearby wastewater treatment plant.

Epsom Groundwater Treatment Plant Proposal (VIC), 2016

Client: Coliban Water
Scope/Description: Odour dispersion modelling using CALPUFF for odour assessment of proposed mine groundwater treatment plant and brine storage lagoon at Epsom WRP.

Epsom WRP Neighbour Rezoning Appeals (VIC), 2015

Client: Coliban Water
Scope/Description: Expert evidence for Planning Panels Victoria hearing on Bendigo urban growth strategy, focussing on new residential zoning proposals close to Bendigo Water Reclamation Plant and appropriate separation distances. Modelling conducted using CALPUFF.
Tracy Freeman  
PRINCIPAL AIR QUALITY SPECIALIST

**McCain’s Potato Wastes Anaerobic Pond Desludging Odour Monitoring, Ballarat (VIC), 2015**

**Client:** Epsom Environmental, Bendigo  
**Scope/Description:** Development and training of odour scout monitoring programme on behalf of contractor engaged by McCain’s to carry out anaerobic pond desludging. Including documentation of methodology, results sheets, and preparation of spreadsheets for data entry and analysis.

**Sewage Pumping Station Odour Control Testing (SA), 2015**

**Client:** SA Water and Leed Engineering  
**Scope/Description:** Odour monitoring at sewage pumping station and advice on upgrade of existing odour pollution control equipment.

**Melbourne Eastern Treatment Plant AERMET and AERMOD Models (VIC), 2015**

**Client:** Melbourne Water  
**Scope/Description:** Audit and validation of AERMET and AERMOD models for Eastern Treatment Plant.

**Bendigo and Castlemaine Wastewater Treatment Plants (VIC), 2015**

**Client:** Coliban Water  
**Scope/Description:** Odour dispersion modelling using AERMOD for CH2M Ltd (main contractor) for investigation of odour buffer zones around Bendigo and Castlemaine WWTPs. Included preparation of AERMET files for both sites.

**Rosny Wastewater Treatment Plant (TAS), 2014-15**

**Client:** TasWater  
**Scope/Description:** Review of odour monitoring methods for proactive odour management at Rosny WWTP, Hobart.

**Warrnambool Planning Scheme Amendment C90 (Fonterra WWTP Buffer Zone), 2014**

**Client:** Select Group  
**Scope/Description:** Expert evidence for Planning Panels Victoria hearing on planning scheme amendment. Issue of contention was suitable separation distance for odour protection between Fonterra Dennington wash water treatment plant and land that can be zoned for residential development (hearing April 2014).

**Eltham WWTP Odour Investigations (NZ), 2014**

**Client:** South Taranaki District Council  
**Scope/Description:** Odour assessment and preparation of odour management plan for short term odour control from Eltham WWTP – a small town WWTP with significant recent odour problems and alleged associated health effects for neighbours due to 3M litres of buttermilk liquid waste from nearby dairy factory being stored on the WWTP site in a covered but not airtight anaerobic basin awaiting treatment. Other issues with trade waste discharges complicated the odour problems. Project also involved consultation with community, Department of Health, and regulator.
Tracy Freeman
PRINCIPAL AIR QUALITY SPECIALIST

Dairy Byproducts Storage and Land Irrigation, Odour Assessment (NZ), 2014

Client: Fonterra

Scope/Description: Preparation of odour assessment for storage of dairy byproducts in ponds and irrigation to land on two locations. Included CALMET and CALPUFF modelling.

Clifton WWTP Air Discharges Impact Assessment (NZ), 2013-14

Client: Invercargill City Council


Callington Proposed WWTP (SA), 2013

Client: Alano Water

Scope/Description: Odour assessment for proposed wastewater treatment plant for population of 35,000 people in Callington, South Australia. Preparation of evidence statement for appeal.

Wanganui WWTP Odour Enforcement (NZ), 2013

Client: Horizons Regional Council

Scope/Description: Technical advisor to Regional Council seeking enforcement of “no offensive or objectionable odour” rule at Wanganui WWTP, New Zealand. WWTP had effectively biologically “failed” and was generating enough odour to draw significant media and political attention.

Proposed Robertson WWTP (NSW), 2011

Clients: Wingecarribee Shire Council, and AJ Lucas

Scope/Description: Preparation of odour impact assessment report for Environment Protection Licence for proposed WWTP in Robertson, New South Wales. Involved CALPUFF dispersion modelling with meteorology processed using TAPM.

North East Water Country Towns Proposed WWTPs (VIC), 2011

Client: North East Water

Scope/Description: Preparation of odour impact assessment reports for Works Approval applications for two proposed WWTPs in country town areas of northeast Victoria.

Taupo WWTP Air Discharge Consent Review (NZ), 2010

Client: Waikato Regional Council

Scope/Description: Review of air discharge consent application on behalf of Environment Waikato, report to support Section 42a Officer’s Report, including submissions analysis. Hearing September 2010.
Tracy Freeman
PRINCIPAL AIR QUALITY SPECIALIST

Ballarat WWTPs Odour Buffer Zones (VIC), 2006

Client: Ballarat City Council

Scope/Description: Tracy carried out a project for Ballarat City Council to define odour buffer zones around three Ballarat WWTPs by dispersion modelling. The project involved consultation with EPA Victoria and Department of Sustainability and Environment, and included a review of EPA Victoria policies for air quality management (SEPP AQM 2001) and buffer zones (AQ2/86). Dispersion modelling was carried out using AUSPLUME after consultation with EPA Victoria and the Bureau of Meteorology.

Christchurch Wastewater Treatment Plant (NZ), 1996-2011

Client: Christchurch City Council

Responsibilities: In initial years, environmental engineer responsible for execution of work packages and report writing. Expert evidence preparation. In later years, technical expert and expert witness, with some work packages carried out by support staff under Tracy's direction and verification.

Scope/Description: Tracy carried out a number of projects including: two rounds (ten years apart) of preparation of reports for air discharge consent applications for all odour and combustion source emissions from CWTP, assessment of odour discharges associated with biosolids drying options, several rounds of atmospheric dispersion modelling, odour monitoring programmes, recommendations for odour mitigation strategies (and followup as they were implemented over time), expert evidence, negotiation of consent conditions with Canterbury Regional Council, attendance at public meetings and targeted stakeholder meetings.

Watercare Wastewater Treatment Plant, Auckland (NZ), 1994 - 2009

Client: Watercare Services Ltd

Responsibilities: In initial years, environmental engineer responsible for execution of work packages and report writing. Expert evidence preparation. In later years, technical expert and expert witness, with some work packages carried out by support staff under Tracy's direction and verification.

Scope/Description: Tracy carried out a range of projects including both AUSPLUME and CALMET/CALPUFF modelling, odour monitoring and modelling, recommendations for odour control strategy (and follow-up in subsequent years as the strategy was implemented), EIS preparation, expert evidence, dispersion modelling of biogas combustion products, definition of buffer zones, odour testing research, monitoring reports on odour and dust for compliance with licence conditions, review of design tenders for odour control specification conformance, advice to contractor for upgrade of WWTP on management plans and plant design to ensure licence conditions for odour and dust are complied with, subsequent assistance to contractor to demonstrate that contractual odour performance conditions have been met, and assessment of environmental effects for proposals to landfill biosolids in two reserved areas within the Mangere wastewater treatment plant site (CALMET/CALPUFF).
Curriculum Vitae

Tracy Freeman

PRINCIPAL AIR QUALITY SPECIALIST

Clifton WWTP Odour Prosecutions and Control Options (NZ), 2007-08

**Client:** Invercargill City Council

**Scope/Description:** Assistance to Invercargill City Council to review evidence collected by Environment Southland to support six prosecutions for odour infringements brought against the City Council. Review of odour control supplements proposed as solution to odour emitted from sludge lagoons at Clifton WWTP. Recommendations for trialling and monitoring effectiveness.

Tasman Mill Wastewater Treatment Plant Odour Emissions Consents (NZ), 2007-10

**Client:** Water and Waste Services JV


Puketutu Island Rehabilitation Project (NZ), 2007-09

**Client:** Watercare Services Ltd

**Scope/Description:** Resource consent application for air discharges associated with biosolids disposal and quarry rehabilitation at Puketutu Island, Mangere. Also involved considering cumulative effects of odour from neighbouring green waste composting facility.

Multiple Small WWTP Installations (NZ), 1993 - 2010

**Scope/Description:** Multiple odour studies, reports, licence applications or court evidence for small WWTPs in NZ (1000 people to 100,000 people). Including Mangawhai, Tahuna (Waikato), Belfast, Gisborne, Napier, Nelson (Bells Island), Westport, Invercargill, Tauranga, Rotorua, Wainui.

Melbourne Water Eastern Treatment Plant, 2002-03

**Scope/Description:** Review of AUSPLUME model setup for plant.

Water Corporation of Western Australia, 2000

**Scope/Description:** Report on validity of AUSPLUME model for predicting odour contours.

Hamilton Wastewater Treatment Plant (NZ), 1996-98

**Client:** Hamilton City Council

**Scope/Description:** Odour monitoring and modelling of all existing odour sources. Recommendation to Council for odour management plan for the existing plant. Identification of odour buffer and appropriate boundary odour standards around the treatment plant in relation to adjacent land use. Odour modelling of proposed plant upgrade, and preparation of technical material for the AEE to accompany the resource consent applications. Expert assistance (odour related) to Hamilton City Council during consent processing, notification and hearing period, including preparation of expert evidence and appearance at hearing (1996-97). Specification for design of upgraded plant to ensure compliance with conditions of air discharge consent for wastewater treatment plant (1998).
Curriculum Vitae

Tracy Freeman
PRINCIPAL AIR QUALITY SPECIALIST

Relevant Project Experience – Sample of Other Projects

Vic Planning Provisions Rule 53.10 review, VIC, 2019
Client: Dept of Environment, Land, Water and Planning
Scope/Description: Review of separation distance policies in Victoria and other Australian states, and contribution to review of clause 53.10 of Victoria Planning Provisions which specifies separation distances for incompatible land uses.

Client: Environmental Justice Australia
Scope/Description: Expert witness (odour) for Western Region Environment Centre Inc. for VCAT appeal of proposed extension of current landfill operations at Wests Road Refuse Disposal Facility, 470 Wests Road Werribee. Instructed by Environmental Justice Australia.

Girgarre Dairy Factory Odour Assessment, VIC, 2018
Client: Australian Consolidated Milk
Scope/Description: Odour impact assessment report for proposed dairy factory in Girgarre, including odour emissions from lagoon-based wastewater treatment plant.

Warrnambool Protein Recovery Plant, VIC, 2017-18
Client: Midfield Group
Scope/Description: Odour impact assessment report for new protein recovery plant (rendering plant).

NSW Poultry Odour Modelling Guide (NSW), 2016-17
Client: NSW EPA
Scope/Description: Preparation of recommendations for modelling of odour from poultry farms in complex terrain. Includes field work to validate model (CALPUFF and AERMOD) for a case study site, testing of model sensitivity for multiple input variations, transfer of findings to two other case study sites, and report preparation. 2017 – extension of project to include two new case study sites.

Riversdale Mill Odour Abatement Investigations (VIC), 2015-16
Client: Riversdale Mill
Scope/Description: Odour emissions, dispersion and mitigation investigation in response to PAN issued by EPA Victoria to Riversdale Mill, a woolscour in Geelong. Dispersion modelling of air discharges using CALMET and CALPUFF due to complex terrain issues.

Confirmed Odour Complaint Protocol (NSW), 2016.
Client: NSW EPA
Scope/Description: Preparation of recommended procedures for investigating odour complaints. Project included survey of procedures used by other regulators in Australia and New Zealand, literature review, workshop with EPA senior compliance and policy officers, preparation of report, and preparation of training materials for EPA staff.
Tracy Freeman  
PRINCIPAL AIR QUALITY SPECIALIST

Technical Papers


Appendix C. Brief provided by Maddocks
MEMORANDUM TO EXPERT

1. Introduction

1.1 Maddocks acts for Yarra Valley Water (YVW). YVW operates the Brushy Creek Sewerage Treatment Plant (the Plant).

1.2 We are instructed to seek your expert witness services in respect of Amendment C176 (Amendment) to the Yarra Ranges Planning Scheme (the Scheme).

1.3 Broadly speaking, your brief is to prepare an expert witness statement and appear before an independent Planning Panel appointed to consider the Amendment. We expect your analysis will focus on the proximity of the site of the proposed residential development within the buffer zone of the Plant and its potential effects it may have on the Plant and on the proposed residential development.

1.4 You will be familiar with this Amendment as you:

1.4.1 are currently engaged by YVW to undertake independent odour modelling and an investigation with the view to providing a recommendation on the shape and extent of the odour buffer for the relevant site; and

1.4.2 have been provided with a copy of a report by GHD dated August 2019 by YVW which provided an odour assessment of the proposal.

2. Relevant Background

2.1 In broad terms, the Amendment relates to a proposed rezoning and residential subdivision of land situated at Lot 3 Holloway Road in Wonga Park (Subject Land). The proponent is Ashlyn Springs Pty Ltd (Proponent) and is represented by Mark Naughton of Planning & Property Partners.

2.2 The Amendment followed the standard planning scheme amendment process under the Planning and Environment Act 1987 (Planning Act). Yarra Ranges Shire Council (Council) is the Planning Authority.

2.3 The Amendment was placed on exhibition from 20 December 2018 until 8 February 2019.

2.4 Council received 51 submissions during the exhibition. Of these:

2.4.1 44 submissions opposed the Amendment to some degree;

2.4.2 1 submission by the Environment Protection Authority opposed part of the Amendment;

2.4.3 1 submission by the Department of Environment, Land, Water and Planning (DELWP) opposed part of the Amendment;

2.4.4 1 submission by the Country Fire Authority proposing several modifications to the proposed plan of subdivision.

2.5 The submissions generally raised 2 key concerns – excessive vehicle traffic and loss of vegetation. The following issues were also raised:

- inadequate lot sizes;
- detrimental impact of new dwellings;
- vermin impact due to disruption of habitat;
- impact on flooding;
- fire risk;
- inadequate infrastructure;
- impact of construction vehicles and large trucks generally;
- need for fences;
- impact on indigenous culture.

2.6 We understand that:

2.6.1 YVW advised EPA of its concerns relating to the proximity of the Subject Land to the Plant and also emailed Council raising similar concerns dated 22 February 2019 (a copy has been included in your Brief).

2.6.2 YVW’s concerns were addressed in EPA’s submission to Council. A copy of the EPA’s submission has been included in your Brief.

2.7 By letter dated 1 August 2019, Planning Panels Victoria (PPV) advised YVW that it granted Council’s request to seek the appointment of a Panel to consider the Amendment and that the following members had been appointed as the Panel to consider the Amendment:

2.7.1 Tim Hcllston (Chair);
2.7.2 Elissa Bell (Member); and
2.7.3 Kate Partenio (Member).

2.8 A directions hearing took place on Monday 26 August 2019 which dealt with various procedural-related matters including confirmation of dates and venues to host the hearing. We are scheduled to provide our submissions and to call your evidence on Wednesday 13 November 2019. We confirm that you are available to attend on that date. Version 2 of the Panel’s timetable for the hearing has been included in your Brief.

2.9 The Proponent intends to call expert evidence from, amongst others, Michael Asimakis of GHD on odour emissions.

3. Exhibition and Submissions

3.1 A detailed summary of the background to the Amendment and Council’s consideration of the submissions it received is provided in the Council officer report dated 23 July 2019. A copy of this report is provided in your Brief.

3.2 The exhibited Amendment proposes to:

3.2.1 rezone the Subject Land to allow subdivision into 48 residential lots and open space including wetlands. The areas of open space and wetlands are proposed to be owned by Council and managed partly by Council and partly by Melbourne Water through a management plan;
3.2.2 rezone approximately 3.186 hectares of land from a Rural Living Zone to Neighbourhood Residential Zone - Schedule 1;

3.2.3 rezone approximately 7.030 hectares of land from a Rural Living Zone to Urban Floodway Zone;

3.2.4 apply a Significant Landscape Overlay (Schedule 23) to the proposed Neighbourhood Residential Zone part of the Subject Land;

3.3 The planning permit application seeks approval for:

3.3.1 residential subdivision;

3.3.2 removal of vegetation; and

3.3.3 works associated with a wetland and sediment pond.

4. Scope of works

4.1 Subject to YVW approving your quote, your services required include:

<table>
<thead>
<tr>
<th>Scope of works</th>
<th>Timeframes</th>
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</thead>
</table>
| **Stage 1:** Report on key issues and response to submissions | • Review Amendment documentation and Council reports (as relevant).  
• Review relevant submissions and responds to those submissions.  
• Liaise with YVW lawyers in relation to the preparation of your report.  
• One (1) meeting with YVW and Maddocks will be scheduled during Stage 1. |
| **Stage 2:** Prepare Planning Panel Expert Witness Statement | • Prepare an expert witness statement.  
• One (1) meeting with YVW and Maddocks may be scheduled during Stage 2. This meeting will provide an opportunity to discuss the draft expert witness statement and brief the expert witness about the Panel Hearing proceedings. |
| **Stage 3:** Expert Witness at the Panel Hearing | Appear for YVW as an expert witness at the Panel Hearing to speak to the expert witness statement, with the potential for cross examination by any opposing party. |
| **Stage 4:** Attend to other specific matters prior to, during and following Panel | Assist YVW and Maddocks to respond to issues raised prior to, during and following the Panel Hearing, in respect to planning matters. This may include, but is not limited to:  
• reviewing relevant expert witness statements filed by an opposing party, to assist Maddocks with cross-examining witnesses. |

Your draft expert witness statement must be provided to YVW and Maddocks by 5.00pm on Friday, 25 October 2019 for the final version to be filed by 2pm Friday, 1 November 2019.

Hearing scheduled to commence Monday, 11 November 2019 for 9 days ending on 22 November 2019.
5. **Fee proposal**

5.1 Before commencing any work, we kindly request you provide us with an electronic copy of your fee proposal for the requested scope of work, for YVW's immediate consideration.

5.2 Please also provide a schedule of fees and rates in the event that you are required to perform additional tasks in the future relating to this matter. The fee proposal should:

5.2.1 Specify the task(s), estimated time and fees required to complete each stage/task listed above.

5.2.2 Provide details on the personnel expected to work on each stage of the project. For each person, provide:

   (a) relevant qualifications and experience;

   (b) role on this project and hourly charge out rate; and

   (c) expected number of hours.

5.2.3 Provide an hourly or daily rate, in the event additional hours which have not been allocated for in this brief are necessary.

5.2.4 Provide an hourly rate for representation for each day that the Panel is in session, to assist YVW budget for the project under different timeframes.

5.3 Please note that if your fee proposal is approved, all accounts for this matter should be sent to Yarra Valley Water marked to the attention of Natalie Hackett who can be contacted by email on Natalie.Hackett@yvw.com.au

6. **Timelines**

6.1 The Panel hearing is scheduled to take place on the following dates and specified venues:

<table>
<thead>
<tr>
<th>Dates (2019)</th>
<th>Venue</th>
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</table>
| **Week 1: 11, 13, 14 and 15 November** | **11 and 13 November**   
Chirnside Park Community Hub, Kimberley Reserve  
33 Kimberley Drive, Chirnside Park     |
|                               | **14 and 15 November**     
Montrose Town Centre             
935 Mt Dandenong Tourist Road, Montrose       |
| **Week 2: 18-22 November (inclusive)** | **18, 20 and 22 November**   
Chirnside Park Community Hub, Kimberley Reserve  
33 Kimberley Drive, Chirnside Park     |
|                               | **19 and 21 November**     
Montrose Town Centre             
935 Mt Dandenong Tourist Road, Montrose       |

6.2 The hearing of the Amendment will commence on 11 November 2019. We are scheduled to provide our submissions and to call your evidence on Wednesday 13 November 2019.

6.3 Your draft expert witness report must be provided to YVW and Maddocks by 5.00pm on Friday 25 October 2019.

6.4 Expert witness reports are required to be circulated to the Panel by 2pm Friday 1 November 2019.
6.5 As an expert witness, you will only be required to attend the Panel Hearing during your evidence, including any time associated with cross examination by an opposing party.

7. Brief of documents

7.1 Please see enclosed a brief of documents to the Amendment which includes a copy of the ‘Guide to Expert Evidence’ published by PPV. You will need to ensure that your expert witness report adheres to the requirements provided in this guide.

7.2 Aside from EPA’s submission, please also let us know if there are particular submissions or any other documents you require.

8. Conflict of interest

8.1 Any expert witness must declare any issue which may be perceived to be or may lead to a conflict of interest regarding their submission or participation in the supply of the goods or services described. An expert witness must describe a strategy whereby any conflict of interest will be avoided.

9. Maintaining client legal privilege and confidentiality

9.1 The advice that you are being asked to provide may be relied upon for any future hearing or litigation and for the purposes of providing legal advice to our client. You must treat all communications relating to the scope of works as being confidential and subject to client legal privilege.

10. Access arrangements

10.1 If you require access to the Subject Land for any site inspections, please contact us with your availability and we will make arrangements for you to access the Subject Land.

11. Maddocks and YVW Representatives

11.1 YVW’s legal representative in relation to the Amendment will be Maria Marshall of Maddocks Lawyers. Maria will be assisted by Thy Nguyen.

11.2 YVW’s representative in relation to the Amendment is Natalie Hackett, Senior Engineer.

12. Other matters

12.1 We thank you for accepting this brief. We look forward to receiving your fee proposal no later than COB Friday 11 October 2019.

12.2 Please contact Maria Marshall on 03 9258 3551 or maria.marshall@maddocks.com.au or Thy Nguyen on 03 9258 3503 or thy.nguyen@maddocks.com.au should you have any queries in relation to this brief.

Dated: 8 October 2019

Maddocks
Appendix D. Figures

Figure 1: Default separation distances around BCSTP calculated with formula from Table 6 of EPA 1518.
Figure 2: BCSTP layout.
Figure 3: Topographical relief map of wider region, showing location of Brushy Creek STP and Coldstream BOM and EPA Mooroolbark meteorological monitoring stations, and likely direction of katabatic air flows. Map prepared using CALPUFF View software (Lakes Environmental).
Figure 4: Topographical relief map of area, showing location of Brushy Creek STP, the proposed new subdivision, and EPA Mooroolbark automatic weather station. Map prepared using CALPUFF View software (Lakes Environmental).
Figure 6: Land uses around Brushy Creek STP.

- residential (cyan)
- school/recreation (pink)
- Lot 3 Holloway Road site (yellow)
- Proposed subdivision (green)
- Perimeter around odour sources at Brushy Creek STP (red)
- Location of Brushy Creek draining to the north (blue line)
- YVW property boundary (white)
- Public reserve (orange).
Figure 7: Aerial photograph of Brushy Creek STP and environs overlaid with terrain elevation contours shown in white and labelled in metres above mean sea level.

- Proposed subdivision (green)
- Perimeter around odour sources at Brushy Creek STP (red)
Figure 8: Distribution of hourly-average wind directions and speeds, Coldstream BOM meteorological monitoring station; January 2012 – December 2018. Data source – BOM.
Figure 9: Distribution of hourly-average wind directions and speeds, EPA Mooroolbark AWS; January 2012 – December 2018. Data source – EPA.
Figure 10: Distribution of hourly-average wind directions and speeds, extracted from CALMET model M6 at location of EPA Mooroolbark AWS; January – December 2012.

Figure 11: Distribution of hourly-average wind directions and speeds, extracted from CALMET model M7 at location of EPA Mooroolbark AWS; January – December 2012.
Figure 12: Distribution of hourly-average wind directions and speeds, extracted from CALMET model M6 at location of BCSTP; January – December 2012.

Figure 13: Distribution of hourly-average wind directions and speeds, extracted from CALMET model M7 at location of BCSTP; January – December 2012.
Figure 14: Wind field snapshot from CALMET model M6 at 4 January 2012 2am (wind speed at BCSTP = 0.62 m/s).
Figure 15: Wind field snapshot from CALMET model M7 at 4 January 2012 2am (wind speed at BCSTP = 0.26 m/s).
Figure 16: CALPUFF dispersion model result, 99.9\textsuperscript{th} percentile, for test odour source with CALMET M6 wind field. Note – number labels on concentration contours are for comparative purposes only and are meaningless for interpretation of potential risk of odour effects.
Figure 17: CALPUFF dispersion model result, 99.9th percentile, for test odour source with CALMET M7 wind field. Note – number labels on concentration contours are for comparative purposes only and are meaningless for interpretation of potential risk of odour effects.
Appendix E. Photos of BCSTP

Photo 1 – IPS1 and associated stack

Photo 2 – IPS2 (no stack)
Photo 3 – Screen and discharge chutes to grit and screenings bins

Photo 4 – Aeration tank (one of six)
Photo 5 – Holding tank (full with diverted sewage)

Photo 6 – Sand filters and back wash tanks, clarifiers
Photo 7 – Sludge receival pit

Photo 8 – Inside sludge receival pit, mixing well
Appendix F. Ektimo report on odour testing at BCSTP
REPORT NUMBER R008139

Brushy Creek Sewage Treatment Plant - Odour Emission Testing  
Yarra Valley Water, Mitcham
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   7.2 Appendix 2 – Logged Hydrogen Sulphide Concentrations
1 EXECUTIVE SUMMARY

1.1 Background

Yarra Valley Water (YVW) is a water and sewage utility provider that services the eastern suburbs and surrounding municipalities of Melbourne Victoria. As part of the sanitation process, sewage is sent to treatment plants spread throughout the northeast of Melbourne; an example of this is the Brushy Creek plant located in Croydon. Ektimo was engaged to conduct odour emission monitoring at the Brushy Creek plant to provide data to Yarra Valley Water for dispersion modelling purposes.

The monitoring scope and respective sources can be seen below and in figure 1. Numbers shown in column 1 below pertain to locations shown in figure 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Location</th>
<th>Condition</th>
<th>Test Date</th>
<th>Test Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inlet Pump Station 1</td>
<td>Peak System Loading</td>
<td>26/09/2019</td>
<td>Odour (inclusive of character &amp; hedonic tone)</td>
</tr>
<tr>
<td>2</td>
<td>Sludge Receival Pit</td>
<td>Receiving Lilydale Sludge</td>
<td>16/09/2019</td>
<td>Odour (inclusive of character &amp; hedonic tone)</td>
</tr>
<tr>
<td>3</td>
<td>Sewage Storage Tank</td>
<td>Standard Operating Conditions</td>
<td>12/09/2019</td>
<td>Odour (inclusive of character &amp; hedonic tone)</td>
</tr>
<tr>
<td>4</td>
<td>Extended Aeration Tank 4</td>
<td>Aeration &amp; Settling Phase</td>
<td>12/09/2019</td>
<td>Odour (inclusive of character &amp; hedonic tone)</td>
</tr>
<tr>
<td>5</td>
<td>Extended Aeration Tank 8</td>
<td>Aeration &amp; Settling Phase</td>
<td>12/09/2019</td>
<td>Odour (inclusive of character &amp; hedonic tone)</td>
</tr>
</tbody>
</table>

1.2 Outcome and concluding comments

Monitoring results are summarized in the following table:

<table>
<thead>
<tr>
<th>Location</th>
<th>Test Date</th>
<th>Average Concentration ou</th>
<th>Flux Rate ou/m²/min</th>
<th>Mass Rate ou/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet Pump Station 1</td>
<td>26/09/2019</td>
<td>3,500</td>
<td>-</td>
<td>130,000</td>
</tr>
<tr>
<td>Sludge Receival Pit</td>
<td>16/09/2019</td>
<td>380</td>
<td>1,000</td>
<td>4,100</td>
</tr>
<tr>
<td>Sewage Storage Tank</td>
<td>12/09/2019</td>
<td>81</td>
<td>3</td>
<td>1,200</td>
</tr>
<tr>
<td>Extended Aeration Tank 4 (Aerating)</td>
<td>12/09/2019</td>
<td>56</td>
<td>5.2</td>
<td>1,900</td>
</tr>
<tr>
<td>Extended Aeration Tank 4 (Settling)</td>
<td>12/09/2019</td>
<td>37</td>
<td>1</td>
<td>500</td>
</tr>
<tr>
<td>Extended Aeration Tank 8 (Aerating)</td>
<td>12/09/2019</td>
<td>46</td>
<td>2.9</td>
<td>1,200</td>
</tr>
<tr>
<td>Extended Aeration Tank 8 (Settling)</td>
<td>12/09/2019</td>
<td>&lt;30</td>
<td>&lt;1</td>
<td>&lt;400</td>
</tr>
</tbody>
</table>
1.3 Odour Sources & Monitoring Overview

A total of 5 area sources were chosen for monitoring (figure 1). Ektimo chose sample locations in consultation with Yarra Valley Water & Consulting Environmental Engineers based on a-site visit that took place prior to sampling. A depiction of the sewage flow through the plant can be seen in appendix 1.

All sources were sampled at what would be considered a worst-case scenario with respect to odour emissions. The inlet pump station 1 was sampled at 0100 on the 26th of September 2019. Sample times were chosen based on logged hydrogen sulphide concentrations. Hydrogen sulphide is commonly considered indicative of odour, particularly within the wastewater industry. Logged hydrogen sulphide data can be seen in appendix 2.

Sampling at the sludge recieval pit was conducted while sludge was being received. Sampling encapsulated the filling of the pit, sludge receival and washdown. On the date of testing, sludge was being received from the Yarra Valley Water’s Lilydale site.

Sampling of the sewage storage tank was conducted under standard operating conditions. A single extended aeration (E.A.) tank was sampled to represent sets 1 & 2. There are 4 tanks in set 1 and 2, in set 2. Each tank can be divided into an inner and outer ring. The inner ring serves as a clarifier, the outer treats activated sludge through a cyclic process alternating between an aeration and settling phase. The outer ring was sampled as the sludge is considered more primal and therefore believed to be more odourous. Both phases (settling & aerating) were sampled. Sampling was conducted at the commencement of aeration and the end of the settling phase.
2 RESULTS

2.1 Inlet Pump Station 1

<table>
<thead>
<tr>
<th>Date</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>26/09/19</td>
<td>Yarra Valley Water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Stack ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>R008139</td>
<td>Inlet Pump Station 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Licence No.</th>
<th>Location</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Croydon</td>
<td>VIC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ektimo Staff</th>
<th>Process Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronson Stoneham</td>
<td>Please refer to client records.</td>
</tr>
</tbody>
</table>

### Sampling Plane Details
- **Sampling plane dimensions**: 350 mm
- **Sampling plane area**: 0.0962 m²
- **Sampling port size, number & depth**: 1" Plug (x1), 0 mm
- **Access & height of ports**: Ground level 0 m
- **Duct orientation & shape**: Horizontal Circular
- **Downstream disturbance**: Centrifugal fan 2 D
- **Upstream disturbance**: Bend 4 D
- **No. traverses & points sampled**: 1 8
- **Sample plane compliance to AS4323.1 & EPA Pub. 440.1**: Non-compliant

#### Comments
The number of traverses sampled is less than the requirement.
The discharge is assumed to be composed of dry air and moisture.

The sampling plane is deemed to be non-compliant due to the following reasons:
- The stack or duct does not have the required number of access holes (ports)
- The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D
- The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

### Stack Parameters
- **Moisture content, %v/v**: 1.2
- **Gas molecular weight, g/g mole**: 28.8 (wet) 29.0 (dry)
- **Gas density at STP, kg/m³**: 1.29 (wet) 1.29 (dry)

### Gas Flow Parameters
- **Flow measurement time(s) (hhmm)**: 0050
- **Temperature, °C**: 11
- **Velocity at sampling plane, m/s**: 6.4
- **Volumetric flow rate, actual, m³/min**: 37
- **Volumetric flow rate (wet STP), m³/min**: 36
- **Volumetric flow rate (dry STP), m³/min**: 35
- **Mass flow rate (wet basis), kg/hour**: 2800

### Sulfur Gases

#### Sampling time
- **Hydrogen sulfide**
  - **Concentration (ppb)**: Test 1 230 Test 2 260
  - **Mass Rate (g/min)**: Test 1 0.012 Test 2 0.014

#### Odour

#### Testing Parameter

<table>
<thead>
<tr>
<th>Results</th>
<th>Average</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concentration (ppb)</strong></td>
<td>3500</td>
<td>3200</td>
<td>3900</td>
</tr>
<tr>
<td><strong>Mass Rate (um³/min)</strong></td>
<td>130000</td>
<td>120000</td>
<td>140000</td>
</tr>
</tbody>
</table>

**Odour character**
- **Hedonic tone**: very unpleasant
- **Odour character**: sewage

**Analysis date & time**
- **Holding time**: 15 hours
- **Dilution factor**: 1
- **Bag material**: Teflon™

**Butanol threshold (ppb)**: 48
**Laboratory temp (°C)**: 21
**Last calibration date**: October 2018

* Analysis was conducted using a Jerome Analyser and is not covered under Ektimo’s scope of NATA Accreditation.
### 2.2 Sludge Receival Pit

<table>
<thead>
<tr>
<th>Client</th>
<th>Yarra Valley Water</th>
<th>Test Location</th>
<th>Sludge Receival Pit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>16/09/2019</td>
<td>Plant/Site</td>
<td>Brushy Creek - Sewage Treatment Plant</td>
</tr>
<tr>
<td>Report No.</td>
<td>R008139</td>
<td></td>
<td>Croydon, VIC</td>
</tr>
<tr>
<td>Ektimo Staff</td>
<td>Bronson Stoneham &amp; Eddie Camilleri</td>
<td>Test Location Details</td>
<td>Outlet face of pit</td>
</tr>
</tbody>
</table>

#### Test Location Details
- **GPS co-ordinates**: 37°45'52"S, 145°17'49"E
- **Location Description**: Sludge face of pit
- **Surface Description**: Industrial
- **Area Classification**: Enclosure/Wind Row Slice
- **Sampling Method**: Sludge covered grating
- **Sampling Results**:
  - **Sampling time, hrs**: Test 1: 1131 - 1146, Test 2: 1131 - 1146
  - **Sample dilution**: 1
  - **Odour concentration, ou**: Test 1: 360, Test 2: 410
  - **Hedonic tone**: mildly unpleasant
  - **Odour character**: sewage, stagnant water
  - **Average Odour Concentration, ou**: 380
  - **Odour Flux Rate, ou/m²/min**: 1000
  - **Odour mass rate, ou/min**: 4100
- **Enclosure Parameters**:
  - **Covered test area, m²**: 4
  - **Flow rate @ STP wet, m³/min**: 11
  - **Chamber temperature, °C**: 15
  - **Ambient temperature, °C**: 15

*Test area calculated from google earth imagery.*
## 2.3 Sewage Storage Tank

<table>
<thead>
<tr>
<th>Client</th>
<th>Test Location</th>
<th>Report No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarra Valley Water</td>
<td>Sewage Storage Tank</td>
<td>R008139</td>
</tr>
</tbody>
</table>

**Ektimo Staff** Bronson Stoneham & Eddie Camilleri

### Test Location Details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS co-ordinates</td>
<td>37°45'51&quot;S, 145°17'49&quot;E</td>
</tr>
<tr>
<td>Location Description</td>
<td>Northern side of the plant</td>
</tr>
<tr>
<td>Surface Description</td>
<td>Calm brown effluent with debris present</td>
</tr>
<tr>
<td>Area Classification</td>
<td>Industrial</td>
</tr>
<tr>
<td>Source area, m²*</td>
<td>415</td>
</tr>
<tr>
<td>Sampling Method</td>
<td>AS4323.4 (Flux)</td>
</tr>
</tbody>
</table>

### Sampling Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling time, hrs</td>
<td>1239 - 1247</td>
<td>1249 - 1257</td>
</tr>
<tr>
<td>Sample dilution</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Odour concentration, ou</td>
<td>81</td>
<td>**</td>
</tr>
<tr>
<td>Hedonic tone</td>
<td>neutral</td>
<td>neutral</td>
</tr>
<tr>
<td>Odour character</td>
<td>no discernible character</td>
<td>**</td>
</tr>
<tr>
<td>Odour Concentration, ou</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Odour Flux Rate, ou/m²/min</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Odour mass rate, ou/min</td>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

### Flux Testing Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equilibration time, hrs</td>
<td>1214 - 1238</td>
</tr>
<tr>
<td>Sweep Rate @ STP, L/min</td>
<td>4.73</td>
</tr>
<tr>
<td>Penetration Depth, mm</td>
<td>4</td>
</tr>
<tr>
<td>Static Pressure, Pa</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Surface temperature, °C</td>
<td>16</td>
</tr>
<tr>
<td>Chamber temperature, °C</td>
<td>21</td>
</tr>
<tr>
<td>Ambient temperature, °C</td>
<td>20</td>
</tr>
</tbody>
</table>

* Source area provided by YVV personnel

** Insufficient sample volume to complete olfactometry analysis.
2.4 Extended Aeration (E.A.) Tank 4 – Set 1

2.4.1 Aeration Phase

<table>
<thead>
<tr>
<th>Test Location Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS co-ordinates</td>
</tr>
<tr>
<td>Location Description</td>
</tr>
<tr>
<td>Surface Description</td>
</tr>
<tr>
<td>Area Classification</td>
</tr>
<tr>
<td>Aeration rate, m³/min**</td>
</tr>
<tr>
<td>Source area, m²*</td>
</tr>
<tr>
<td>Sampling Method</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Location</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant/Site</td>
<td>Brushy Creek - Sewage Treatment Plant</td>
<td>Croydon, VIC</td>
</tr>
<tr>
<td>Report No.</td>
<td>R008139</td>
<td></td>
</tr>
<tr>
<td>Ektimo Staff</td>
<td>Bronson Stoneham &amp; Eddie Camilleri</td>
<td>198521</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sampling Results</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling time, hrs</td>
<td>0904 - 0912</td>
<td>0913 - 0921</td>
</tr>
<tr>
<td>Sample dilution</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Odour concentration, ou</td>
<td>58</td>
<td>55</td>
</tr>
<tr>
<td>Hedonic tone</td>
<td>neutral</td>
<td>mildly unpleasant</td>
</tr>
<tr>
<td>Odour character</td>
<td>musty</td>
<td>damp, stagnant water</td>
</tr>
<tr>
<td>Average Odour Concentration, ou</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Odour Flux Rate, ou/m²/min</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Odour mass rate, ou/min</td>
<td>1900</td>
<td></td>
</tr>
</tbody>
</table>

* The source area displayed represents the outer ring of a single tank only. The area has been calculated by subtracting the area of the inner ring - 300m² (sourced from google earth) from the total tank area - 660m² (provided by YVW personnel).

** The aeration rate figure used is an indicative average provided by YVW as the flow meter for the set 1 tanks has been offline for a prolonged period of time. The aeration rate given (8000m³/hr) was recorded prior to a manifold that services four tanks. This value has been scaled to represent a single tank. The assumption has been made that the airflow is distributed evenly.
### 2.4.2 Settling Phase

<table>
<thead>
<tr>
<th>Test Location Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS co-ordinates</strong></td>
<td>37°45'53&quot;S, 145°17'49&quot;E</td>
</tr>
<tr>
<td><strong>Location Description</strong></td>
<td>Outer ring, north western quadrant</td>
</tr>
<tr>
<td><strong>Surface Description</strong></td>
<td>Calm dark effluent</td>
</tr>
<tr>
<td><strong>Area Classification</strong></td>
<td>Industrial</td>
</tr>
<tr>
<td><strong>Source area, m²</strong></td>
<td>360</td>
</tr>
<tr>
<td><strong>Sampling Method</strong></td>
<td>AS4323.4 (Flux)</td>
</tr>
<tr>
<td><strong>Sampling Results</strong></td>
<td>Test 1</td>
</tr>
<tr>
<td><strong>Sampling time, hrs</strong></td>
<td>1117 - 1125</td>
</tr>
<tr>
<td><strong>Sample dilution</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Odour concentration, ou</strong></td>
<td>39</td>
</tr>
<tr>
<td><strong>Hedonic tone</strong></td>
<td>neutral</td>
</tr>
<tr>
<td><strong>Odour character</strong></td>
<td>stale</td>
</tr>
<tr>
<td><strong>Average Odour Concentration, ou</strong></td>
<td>37</td>
</tr>
<tr>
<td><strong>Odour Flux Rate, ou/m²/min</strong></td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Odour mass rate, ou/min</strong></td>
<td>500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flux Testing Parameters</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equilibration time, hrs</strong></td>
<td>1048 - 1116</td>
</tr>
<tr>
<td><strong>Sweep Rate @ STP, L/min</strong></td>
<td>4.77</td>
</tr>
<tr>
<td><strong>Penetration Depth, mm</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Static Pressure, Pa</strong></td>
<td>&lt;2</td>
</tr>
<tr>
<td><strong>Surface temperature, °C</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Chamber temperature, °C</strong></td>
<td>21</td>
</tr>
<tr>
<td><strong>Ambient temperature, °C</strong></td>
<td>20</td>
</tr>
</tbody>
</table>

*The source area displayed represents the outer ring of a single tank only. The area has been calculated by subtracting the area of the inner ring - 300m² (sourced from google earth) from the total tank area - 660m² (provided by YVW personnel).*
### 2.5 Extended Aeration (E.A.) Tank 8 – Set 2

#### 2.5.1 Aeration Phase

<table>
<thead>
<tr>
<th>Client</th>
<th>Test Location</th>
<th>Plant/Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarra Valley Water</td>
<td>Extended Aeration Tank 8 - Set 2</td>
<td>Brushy Creek - Sewage Treatment Plant</td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/09/2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R008139</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ektimo Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bronson Stoneham &amp; Eddie Camilleri</td>
<td></td>
<td>Croydon, VIC</td>
</tr>
</tbody>
</table>

### Test Location Details

- **GPS co-ordinates**: 37°45′53″S, 145°17′49″E
- **Location Description**: Outer ring, north western quadrant
- **Surface Description**: Homogenous aeration
- **Area Classification**: Industrial
- **Aeration rate, m³/min****: 25
- **Source area, m²**: 406
- **Sampling Method**: Collection Hood (Aeration)

### Sampling Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Sampling time, hrs</th>
<th>Sample dilution</th>
<th>Odour concentration, ou</th>
<th>Hedonic tone</th>
<th>Odour character</th>
<th>Average Odour Concentration, ou</th>
<th>Odour Flux Rate, ou/m³/min</th>
<th>Odour mass rate, ou/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1131 - 1139</td>
<td>1</td>
<td>54</td>
<td>mildly unpleasant</td>
<td>stagnant water, musty</td>
<td>46</td>
<td>2.9</td>
<td>1200</td>
</tr>
<tr>
<td>2</td>
<td>1140 - 1148</td>
<td>1</td>
<td>37</td>
<td>mildly unpleasant</td>
<td>stagnant water, sewage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The source area displayed represents the outer ring of a single tank only. The area has been calculated by subtracting the area of the inner ring - 300m² (sourced from google earth) from the total tank area - 706m² (provided by YVW personnel).

** Aeration rates have been provided by YVW. The aeration rate given (50.76 m³/min) was recorded prior to a manifold that services two tanks. This value has been scaled to represent a single tank. The assumption has been made that the airflow is distributed evenly.
### 2.5.2 Settling Phase

<table>
<thead>
<tr>
<th>Client</th>
<th>Test Location</th>
<th>Date</th>
<th>Plant/Site</th>
<th>Report No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarra Valley Water</td>
<td>Extended Aeration Tank 8 - Set 2</td>
<td>12/09/2019</td>
<td>Brushy Creek - Sewage Treatment Plant</td>
<td>R008139</td>
</tr>
<tr>
<td>Ektimo Staff</td>
<td>Bronson Stoneham &amp; Eddie Camilleri</td>
<td></td>
<td>Croydon, VIC</td>
<td></td>
</tr>
</tbody>
</table>

#### Test Location Details
- **GPS co-ordinates**: 37°45'53"S, 145°17'49"E
- **Location Description**: Outer ring, north western quadrant
- **Surface Description**: Calm highly foamed effluent
- **Area Classification**: Industrial
- **Source area, m²**: 406
- **Sampling Method**: AS4323.4 (Flux)

#### Sampling Results

<table>
<thead>
<tr>
<th>Sampling Results</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling time, hrs</td>
<td>1024 - 1032</td>
<td>1033 - 1041</td>
</tr>
<tr>
<td>Sample dilution</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Odour concentration, ou</td>
<td>&lt;30</td>
<td>&lt;30</td>
</tr>
<tr>
<td>Hedonic tone</td>
<td>neutral</td>
<td>neutral</td>
</tr>
<tr>
<td>Odour character</td>
<td>musty</td>
<td>no discernible character</td>
</tr>
</tbody>
</table>

**Average Odour Concentration, ou**: <30
**Odour Flux Rate, ou/m²/min**: <1
**Odour mass rate, ou/min**: <400

#### Flux Testing Parameters

<table>
<thead>
<tr>
<th>Flux Testing Parameters</th>
<th>Test 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equilibration time, hrs</td>
<td>0950 - 1024</td>
</tr>
<tr>
<td>Sweep Rate @ STP, L/min</td>
<td>4.81</td>
</tr>
<tr>
<td>Penetration Depth, mm</td>
<td>6</td>
</tr>
<tr>
<td>Static Pressure, Pa</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Surface temperature, °C</td>
<td>17</td>
</tr>
<tr>
<td>Chamber temperature, °C</td>
<td>17</td>
</tr>
<tr>
<td>Ambient temperature, °C</td>
<td>18</td>
</tr>
</tbody>
</table>

*The source area displayed represents the outer ring of a single tank only. The area has been calculated by subtracting the area of the inner ring, 300m² (sourced from google earth) from the total tank area, 706m² (provided by YVW personnel).*
3 PLANT OPERATING CONDITIONS

Inlet Pump Station 1

- Sampling was conducted under peak system loading based on historical hydrogen sulphide data. H₂S readings were also conducted with a Jerome analyser to verify that samples were taken under similar H₂S concentrations.

Sludge Receiver Pit

- Receiving sludge from the YVW Lilydale site. Sampling was conducted over the filling, sludge receipt and washdown stages.

Sewage Storage Tank

- Standard operation conditions – presumed pumping.

Extended Aeration Tanks

- Set 1 aeration cycle commenced 0845 on the 12th September 2019.
- Set 1 aeration cycle stopped 1045 on the 12th September 2019.
- Set 2 aeration cycle stopped 0900 on the 12th September 2019.
- Set 2 aeration cycle commenced 1115 on the 12th September 2019.

4 TEST METHODS

All sampling will be performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sampling Method</th>
<th>Analysis Method</th>
<th>Uncertainty*</th>
<th>NATA Accredited</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sampling</td>
</tr>
<tr>
<td>Sample plane criteria</td>
<td>AS 4323.1</td>
<td>NA</td>
<td>NA</td>
<td>✓</td>
</tr>
<tr>
<td>Flow rate, temperature and velocity</td>
<td>NA</td>
<td>ISO 10780</td>
<td>8%, 2%, 7%</td>
<td>NA</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>Acrulog</td>
<td>Acrulog</td>
<td>not specified</td>
<td>×</td>
</tr>
<tr>
<td>Area sources (collection hood &amp; temporary enclosures)</td>
<td>collection hood</td>
<td>AS 4323.3</td>
<td>not specified</td>
<td>×</td>
</tr>
<tr>
<td>Area sources (equilibrium flux chamber)</td>
<td>AS 4323.4</td>
<td>NA</td>
<td>not specified</td>
<td>✓</td>
</tr>
<tr>
<td>Odour (grab samples and analysis)</td>
<td>AS 4323.3</td>
<td>AS4323.3</td>
<td>Result dependant</td>
<td>✓</td>
</tr>
<tr>
<td>Odour Characterisation</td>
<td>NA</td>
<td>direct observation</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

X Odour analysis conducted at the Ektimo VIC laboratory by forced choice olfactometry.

¥ Odour analysis conducted at the Mitcham, VIC laboratory, by forced choice olfactometry, NATA accreditation number 14601. Results were reported to Ektimo on the 12th, 16th & 26th of September 2019 in report numbers OV-00167, OV-00170 & OV-00189 respectively.
5 QUALITY ASSURANCE/QUALITY CONTROL INFORMATION

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA’s website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised worldwide.
6 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

% v/v  Volume to volume ratio, dry or wet basis
<  Less than
>  Greater than
≥  Greater than or equal to
APHA  American public health association, Standard Methods for the Examination of Water and Waste Water
AS  Australian Standard
BSP  British standard pipe
CARB  Californian Air Resources Board
CEM  Continuous Emission Monitoring
CEMS  Continuous Emission Monitoring System
CTM  Conditional test method
D  Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}  ‘Cut size’ of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC  Department of Environment & Climate Change (NSW)
Disturbance  A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER  Department of Water and Environmental Regulation (WA)
DEHP  Department of Environment and Heritage Protection (QLD)
EPA  Environment Protection Authority
FTIR  Fourier Transform Infra-red
ISC  Intersociety committee, Methods of Air Sampling and Analysis
ISO  International Organisation for Standardisation
Lower Bound  Defines values reported below detection as equal to zero.
Medium Bound  Defines values reported below detection are equal to half the detection limit.
NA  Not applicable
NATA  National Association of Testing Authorities
NIOSH  National Institute of Occupational Safety and Health
NT  Not tested or results not required
OM  Other approved method
OU  The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM_{10}  Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
PM_{2.5}  Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA  Particle size analysis
RATA  Relative Accuracy Test Audit
Semi-quantified VOCs  Unknown VOCs (those not matching a standard compound), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration will be determined by matching the integrated area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP  Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
TM  Test Method
TOC  The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
USEPA  United States Environmental Protection Agency
VDI  Verein Deutscher Ingenieure (Association of German Engineers)
Velocity Difference  The percentage difference between the average of initial flows and afterflows.
Vic EPA  Victorian Environment Protection Authority
VOC  Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
Upper Bound  Defines values reported below detection are equal to the detection limit.
95% confidence interval  Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.
7 APPENDICES

7.1 Appendix 1: Process Flow

Source: Yarra Valley Water (2019)
7.2 Appendix 2 – Logged Hydrogen Sulphide Concentrations

Hydrogen Sulphide Concentrations Vs. Time

Date & Time

Hydrogen Sulphide Concentration (PPB)
Appendix G. GHD methodology statement and EPA approval email (received 25 June 2019).
Dear David,

**3 Holloway Rd Wonga Park - Odour Assessment Proposal for Consultancy Services**

GHD is pleased to provide Intrapac Properties Pty Ltd (Intrapac) with this proposal and associated fee estimate to conduct an empirical Odour Assessment with regards to the proposed rezoning at 3 Holloway Road, Wonga Park, Victoria.

1 Appreciation

GHD understands that Intrapac are proposing to rezone land at 3 Holloway Road Wonga Park for residential purposes (the proposal). The proposal includes rezoning of land to allow subdivision into 48 residential lots. GHD understands that Intrapac recently exhibited the proposal with Shire of Yarra Ranges (Council) as part of Amendment C176, which consists of a combined planning scheme amendment and planning permit application.

An EPA letter¹, dated 11 February 2019, provided to Council requests further assessment to be undertaken as part of the overall planning approval process. This is to assess the impact of residual air emissions (in accordance with EPA separation distance guideline 1518) from the Brushy Creek Waste Water Treatment Plant (WWTP) operated by Yarra Valley Water (YVW) on the proposal.

The EPA letter requests that the agent of change (Intrapac) provide evidence that a variation from the recommended separation distance is appropriate. EPA has calculated the default recommended separation distance for the WWTP to be 391 linear metres based upon information provided by YVW. GHD notes that there are already a large number of existing residential dwellings within this default separation distance.

The EPA letter states that any variation to the default separation distance will need to be in accordance with Table 4 in Publication 1518; which outlines the criteria for a site-specific variation to the separation distance.

Subsequent to the EPA letter, GHD met with EPA, Council, Intrapac and Urbis (acting for Intrapac) on 3 June 2019, to discuss and agree on an appropriate assessment methodology. The agreed outcomes from the meeting are outlined in this proposal.

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¹ EPA Reference 5009212
2 Methodology

The odour assessment approach discussed with the EPA was based on Section 9 of the EPA separation distance guideline 1518. Section 9 of the guideline outlines a number of criteria to consider for variations from a recommended separation distance. This includes an empirical odour assessment to determine the likely risk of industrial residual air emissions (in this case odour during an upset or malfunction i.e. equipment failure, accidents and abnormal weather conditions) having an impact out to the distance of the separation distance. Under routine operations the WWTP will be required to meet its regulatory licence objective of no offensive odours beyond the site boundary. Therefore, the assessment will focus on understanding the likelihood of odour emissions during an upset event.

Given there are a number of existing residents already within the default separation distance, GHD considers that an empirical assessment with ‘ground truthing’ the site-specific experience as the most appropriate method to determine the likely risk of odour impact to the proposal site. This approach is supported by the EPA.

2.1 Site inspection and meeting with YVW

GHD propose to visit the WWTP to consult with YVW representatives to obtain the relevant input information to conduct the odour assessment. EPA has also indicated that they would like to attend the site with GHD as an accompanied visit.

2.2 Default Separation Distances

GHD will scribe the published default separation distance as a radial distance from the envelope of potential sources at the WWTP in accordance with the EPA Victoria’s Recommended Separation Distances for Industrial Residual Guidelines (Publication 1518, 2013). The default radial buffer is a function of the type of odour source and the ‘effective population’. The result of the default separation distance assessment will demonstrate if there are any potential constraints, and if so, which parts of the site are affected.

2.3 Site Specific Variation to Default Separation Distances

As noted above, the EPA separation distance guideline allows for a variation to the default separation distance as summarised in Table 4 of the guideline (EPA Victoria, 2013, p.14) under the agent of change principle (Section 9). This provides the opportunity to assess the particular circumstances surrounding the WWTP and whether or not there is potential to vary the default separation distance to reflect those circumstances.

GHD proposes to address the following four criteria as part of the empirical odour assessment to evaluate a potential variation to the default separation distance and potential impacts on the proposal:
<table>
<thead>
<tr>
<th>Criteria for site-specific variation – EPA 1518</th>
<th>GHD Review</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant equipment and operation</strong></td>
<td>GHD will review the current operations and technology of the WWTP including what emission controls and management procedures are in place to mitigate offsite odour impacts during an upset or malfunction at the plant.</td>
</tr>
<tr>
<td><strong>Likelihood of industrial residual air emissions (IRAES)</strong></td>
<td>The likelihood of residual emissions from the WWTP would need to be assessed once specific operational information was obtained from YVW regarding operations including how frequently upset conditions occur (including a review of past upsets) and the assessment would rely on a detailed complaint history and history of EPA breaches.</td>
</tr>
<tr>
<td><strong>Environmental risk assessment (ERA)</strong></td>
<td>GHD propose to utilise the Institute of Air Quality Management (IAQM’s) UK Guidance on the assessment of odour for planning (July 2018) to conduct a qualitative risk-based assessment, in particular - The Source-Pathway-Receptor (S-P-R) concept. Odour surveillance (e.g. is odour detected, how strong and frequently) is also proposed to be conducted to investigate the on ground likelihood of residual odour emissions being detected offsite during conditions identified by WWTP operators likely to generate offsite odour. Further details of the program are provided below.</td>
</tr>
<tr>
<td><strong>Topography or Meteorology</strong></td>
<td>GHD proposes to undertake an assessment of local meteorology to account for the effects it has on air dispersion. Meteorology will also be used to establish the likelihood and subsequent risk of industrial residual air emissions occurring during an upset.</td>
</tr>
</tbody>
</table>

### 2.3.1 Odour Surveillance

An odour surveillance campaign (e.g. is odour detected, how strong and frequently) is proposed to be conducted to investigate the on ground likelihood of residual odour emissions being detected offsite at the proposal site and surrounding area - including within the default separation distance.

The surveillance campaign would involve two trained and certified odour consultants (as per AS4323.3) ‘sniff’ surveying the area during a range of winds, to assess whether odour is detected. The program would be conducted in accordance with the EPA’s methodology for a Dynamic Plume Assessment, which incorporates both grid based (random surveys) and plume based (wind based) surveys. The surveys will involve starting downwind of the odour source and actively walking back to the source by crisscrossing the plume on foot and following it as the wind shifts.
During the field odour survey, GHD would record odour intensity ratings to provide an understanding of the time varying intensity at a survey location. The developed methodology is designed to investigate the extent, intensity, character and frequency of odours and is an effective forensic tool in understanding the ambient odour environment.

During the field survey, any detectable odours would be noted and the following details recorded:

- Time
- Location
- Odour intensity
- Odour duration
- Odour characteristic
- Meteorological conditions (i.e. wind speed, wind direction, temperature).

The survey campaign will be conducted over a number of weeks to capture a variety of different weather conditions and operating conditions (the target conditions will be discussed in consultation with YVW i.e. when they think odour emissions from the site is greatest - could be due to operations, weather or a combination of both). GHD propose to conduct two surveys per week over a 3-week period (subject to the above conditions). GHD consider winter to be the best time to conduct the surveys as offsite odour impact is worse in winter time as meteorological dispersion conditions are poorest i.e. cold nights with low winds and stable conditions.

3 Scope of works

GHD proposes to complete the works following the task sequence below:

1. Site inspection and meeting with YVW to obtain input information
2. Information request to YVW and EPA including an FOI to EPA to request complaint history and other relevant information
3. Provide an overview of EPA Publication 1518 and its applicability to the assessment
4. Assess and plot the default separation distance for the WWTP
5. Review of WWTP plant and operation including emission controls
6. Assess the likelihood of industrial residual air emissions (IRAEs) from the WWTP
7. Undertake a qualitative risk-based assessment for the site using the source-receptor-pathway concept
8. Characterise the meteorology at the site
9. Based on meteorology establish the likelihood and subsequent risk of industrial residual air emissions occurring during an upset.
10. Conduct the odour surveillance program
11. Recommendations and reporting of the above findings
Hi Michael,

The approach looks sound, please note that I am currently reviewing our odour assessment guidance and odour surveillance methods with a view to release them as formal EPA guidance in the near future. As GHD has been basically piloting this approach I will be sure to circulate drafts for comment.

Regards,

Chris Bydder (Principal Expert – Odour)
Environment Protection Officer – Regulatory Specialist
Metropolitan Region

Environment Protection Authority Victoria
Ernest Jones Drive Macleod VIC 3085 | GPO Box 4395 Melbourne Vic 3001 | DX 210675
☎ 1300 372 842 (1300 EPA VIC) | ☏ 0439 612 634 | E chris.bydder@epa.vic.gov.au | www.epa.vic.gov.au

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---

Hi Chris,

Please see attached GHD’s proposed methodology and scope of works to undertake the empirical odour assessment at Wonga Park we discussed last week. Could you please review and confirm EPA’s support for the proposed methodology and approach.

Regards,

Michael Asimakis
Team Leader – Air, Noise and Meteorology, Victoria
Senior Air Quality Scientist/Meteorologist
Certified Air Quality Professional

GHD
Proudly employee owned
T: 61 3 8687 8568 | M: 0408 965 342 | V: 318568 | E: michael.asimakis@ghd.com
Level 8, 180 Lonsdale Street Melbourne Victoria Australia 3000 | http://www.ghd.com/
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Appendix H. Advice from YVW to GHD on hydraulic modelling of the BCSTP.
Hi Michael,

Sorry for not replying earlier sooner. I was away Friday and Monday and then overlooked your email.

See below for a response. Kimjan when he is back on Monday will be able to provide advice re the likely growth in PE.

Let me know if you require anything further.

Regards,

Natalie Hackett
Senior Engineer
Lucknow St, Mitcham, Victoria 3132
T:+61398721293 M:+61402060523
E:Natalie.Hackett@yvw.com.au

We proudly acknowledge the Traditional Owners of the land on which we work and live, and pay respect to their Elders past and present. We also acknowledge and pay respect to other Elders within the community.

Hi Natalie,

Thanks for meeting with us today, it was a really useful visit.
As discussed one of our tasks is to plot the default buffer for the site in accordance with EPA Publication 1518. To do this we will require the equivalent population for the plant or the BOD loading. If you have future forecasts that would also be useful. Could you please provide this information? Estimated PE (May 2019), 64600. Kimjan to provide future forecasts

Could you also please provide some further information around the upgrade that was made to the pump capacity – Shane mentioned some figures with regards to flows but I didn’t quite catch them. If you could provide an overview of the upgrade and when it was done that would be appreciated.

Any other details on upgrades to the site that has resulted in a more efficient process leading to reduced odour emissions or the potential for odour emissions to occur would also be useful. i.e. the increase in pump capacity has resulted in the concrete basins not being needed over the last few years.

In 2016 Pumps 1 & 2 in IPS1 were reinstated. The pumps, operating as duty/standby, act on level control in the wet well and pump sewage directly into one of the three steel Storm Storage Tanks (EA Tanks 1 – 3). Using these pumps and the available storage in EA tanks 1 – 3 enables excess flows (greater than plant treatment capacity) to be diverted to the metro system without treatment. Prior to this the system operated such that during large storms the incoming sewer would surcharge and fill the concrete storm basins. This revised operation has eliminated use of the concrete storage basins during wet weather events. Hydraulic modelling indicates that during the critical 1 in 5 year storm the concrete basins will be filled; we just haven’t had a storm that large since revising the operation.

Finally as discussed, in the unlikely event that one or more of the three tanks are used to store excess sewage are used and emptied in the coming weeks could you please let me know so we can time our odour survey to capture this event. I have ccd Shane Smith in this response. He is part of the operations team and is best placed to advise on this should it occur.

Thanks.

Regards,

Michael Asimakis
Team Leader – Air, Noise and Meteorology, Victoria
Senior Air Quality Scientist/Meteorologist
Certified Air Quality Professional (CAQP)

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Appendix I. ASG assessment of GHD Report
3 ASG Assessment

Is the information provided to ASG satisfactory to conduct an assessment? Is further information required?
(If further information is required please email/call the PAO)

No further info required

What are the main issues or impacts likely to be experienced?

1. Is the methodology satisfactory and as agreed?

The approach is sound and shows a good examination of the site. They have taken on board all recommendations from our meeting (that are being adopted wholesale in our upcoming review of publication 1518.). A few comments below:

Page 6 “Under routine operations, the WWTP will be required to meet its regulatory licence objective of no offensive odours beyond the site boundary. Therefore, the assessment focuses on understanding the likelihood of odour emissions during an upset event”.

The main issue with this is that the separation distance of 401/470 metres accounts for residual odour emissions (i.e. from routine operations and assuming best practice, these allow for attenuation of post-control emissions). EPA’s power to require further improvement (up to the site boundary) is very limited. So, if odours are discharged into areas within the separation distances but not beyond there is not necessarily a breach of licence.

2. Have they adequately considered noise as suggested at our meeting with GHD?

There is no noise assessment in the report.

3. Do you agree with the findings of the report regarding:

   • Calculation of the separation distance (noting default and directional buffers)

   The determination of separation distance made by GHD is supported by the evidence that there have been no odour reports regarding the facility in over 7 years (at least).

   • Assertions regarding plant equipment

   Main risk here as assessed is: “In recent years, the PLC hardware has been experiencing intermittent faults, becoming unreliable, resulting in interrupted operation of the treatment plant. There is no spare equipment available and there is no redundancy for this asset. If this asset were to fail in the meantime, prior to upgrading, the risk of odour emanating from the site would be high as the plant would have to be run in manual mode and it would take some time (many days to a week) to initiate this. The consequence of this is that untreated sewage may be stored in the concrete basins for extended periods, and possible failure of the biology in one or more of the aeration tanks”

   So, if there is a failure there will be odour, but may not be an issue as” the programmable logic controller (PLC) is proposed to be upgraded with completion expected by January 2021.”

   No odour reports within 500m of the plant have been received by EPA (2012 to date), so assertions regarding plant and equipment are likely to be apt.

   • Number and location of odour surveys undertaken

   They conducted 6 odour surveys, and only detected weak, intermittent odour from the plant on one occasion (at 100 m from the WWTP).
• Assessment of meteorology

I have no issues with the meteorological assessment

• Conclusion that the directional buffer could be further varied based on nearest potential odour source which results in 209m buffer.

All the other avenues of their enquiry would indicate that,

1. Routine emission of odour is rare from the premises to any significant distance based on 6 odour surveys
2. Given the complete lack of complaints the site is not causing odour impacts.
3. There is no issue with the standard of technology at the plant.
4. Source Pathway Receptor analysis shows only a slight adverse effect of odour.
5. The plant does continuously upgrade its operations with the PLC system to be upgraded by Jan 2021.

They have only modified the shape of the odour buffer based on area of operations and prevailing weather patterns; EPA has also applied this approach in assessments we have made at other sites. It makes sense given the lack of reports in the area and the low frequency of winds towards the subject site to vary that separation distance to the NW.

4. Is there enough evidence for justification of a variation in the separation distance to 209m?

There would appear to be enough evidence, and certainly there is an absence of any evidence to the contrary

5. Are there likely to be impacts from the treatment plant on the proposal?

Yes, there will be impacts from the treatment plant as you can never guarantee no odour but based on the available evidence these will be rare.

Is there anything else that should have been considered or you think is likely to cause impact on the proposed development?

Yarra Valley Water may be protective of this encroachment, but they would have to satisfy the responsible authority that they had enough evidence to disprove GHD’s findings.

Also, there has been no noise assessment.

Based on the information provided, what controls or conditions should be placed on this development to reduce any potential impacts?

(This section may include main themes or summaries - e.g. condition operating hours 7am-6pm, specific forms of technology to be utilised, adhere to noise limits, limit volumes of materials to be stored., etc)

There are no controls or conditions that can be placed on the development in any case.

Does the development comply with State Environment Protection Policies (SEPP), or other relevant environmental guidelines? If no, please highlight deficiencies.

It would appear so, but with the exception of an NIRV/SEPP-N1 assessment

Any other comments?