

Report

Statement of Expert Evidence on Buffer

Amendment C69 to Moyne Planning Scheme

195 and 199 Princes Highway, Port Fairy

22 August 2022

**This report has been requested by Rigby Cooke on behalf
of Sun Pharmaceutica Industries (Australia) Pty Ltd.**

Environment, Health &
Safety, and Sustainability
Consultants



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Appendix A Peter J Ramsay Curriculum Vitae

Appendix B Letter of Instruction

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Appendix D Odour Complaints Data

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USE OF REPORT

The preparation of this expert witness statement has been undertaken for the purpose of providing expert opinion on the appropriateness of the Amendment C69 to the Moyne Shire Planning Scheme with regard to the Sun Pharmaceutical Industries (Australia) Pty Ltd.'s facility at 195 and 199 Princes Highway, Port Fairy, Victoria. The report was prepared for submission to the Planning Panels Victoria. The report includes opinions on the appropriate buffer associated with the Sun Pharma operations from air quality, noise and odour aspects, and the impact of the Amendment on Sun Pharma operations, and it is not intended that this report should be used for any other purpose.

LIST OF ABBREVIATIONS

Act	Environment Protection Act 2017
BOM	Bureau of Meteorology
EPA	Environment Protection Authority Victoria
ERS	Environment Reference Standard
IRAE	Industrial Residual Air Emissions

1. EXPERT EVIDENCE DETAILS

1.1 Expert Witness Details

Expert Witness: Mr Peter Ramsay
Address: Level 10, 222 Kings Way, South Melbourne, Victoria, 3205
Company: Peter J Ramsay & Associates Pty Ltd

1.2 Expert's Qualifications and Experience

I am the Managing Director and Principal Consultant of Peter J Ramsay & Associates Pty Ltd. I am a chemical engineer and hold a Graduate Diploma of Management and a Master of Environmental Science. I have over 35 years' experience in environmental auditing, environmental impact assessment, air quality, site assessment and remediation. I also have extensive experience in determining appropriate buffer distances between industrial facilities and sensitive land uses to mitigate the impact of industrial residual air emissions. Prior to establishing Peter J Ramsay and Associates, I was Assistant Director of the Victorian Environment Protection Authority (EPA) and was responsible for Victoria's Air Quality Management Program.

I am a Fellow of Engineers Australia and a Chartered Professional Engineer. I am appointed as an Environmental Auditor under the Victorian *Environment Protection Act 2017* for both Industrial Facilities and Contaminated Land and accredited as a Site Auditor under the New South Wales *Contaminated Land Management Act 1997*. I am a Registered Professional Engineer in Queensland and I have written numerous papers on environmental management.

My curriculum vitae is provided in **Appendix A**.

Peter J Ramsay & Associates has provided consulting services to the operator of the Facility since 2012, initially with GlaxoSmithKline and with Sun Pharma since 2016. The services cover various aspects of the operation, such as conducting dispersion modelling, conducting risk assessments and preparation of Environment Improvement Plan.

1.3 Expert's Area of Expertise

My professional career has focused on identifying and resolving environmental issues at industrial and commercial facilities and the interface with residential land uses. This includes assessments of separation distances for industrial premises including landfills. I have expertise and experience in air quality assessments, dispersion modelling, waste management, and environmental auditing of odour emitting facilities.

1.4 Statement of Expertise

In view of my professional qualifications and expertise, I am well qualified to prepare and present this expert witness statement to the panel.

1.5 Other Significant Contributors to the Report

I have been assisted in the preparation of my report by Mr Nathan Williams.

Mr Nathan Williams, Senior Consultant, holds Bachelors' degrees in chemical engineering and science and has ten years' experience in environmental consulting. He is experienced in the preparation of odour impact assessments, air dispersion modelling, and designing and operating equipment for pollution control at industrial facilities. He has specific expertise in assessment of separation distances from industry for amenity impact (dust and odour) and environmental auditing of landfill facilities. Mr Williams has assisted me in the preparation of numerous expert evidence reports in relation to separation distances and amenity impact in Victoria.

1.6 Instructions that Defined the Scope of the Report

I received written instruction from Rigby Cooke Lawyers on behalf of Sun Pharmaceutical Industries (Australia) Pty Ltd on 26 July 2022. A copy of the instruction from Rigby Cooke Lawyers is provided in **Appendix B**.

The instruction I received is:

to prepare a witness statement within the scope of your expertise, and express your opinion as to whether the Amendment is appropriate having regard to:

- any regulatory framework applicable to the proposal which is within your expertise to examine and comment on;*
- your own judgement and experience; and*
- any other matter which you regard as relevant to the formulation of your opinion, stating clearly the basis of your views.*

The following documents have been provided:

- Titles of land owned by Sun Pharma
- Amendment C69 Exhibited documents
- Amendment C69 Supporting Documents
- Submissions to Amendment C69 by:
 - Sun Pharma
 - Rivers Run Estate

- 62 – EPA
- 63 • Documents associated with the Council Meeting held on 1 March 2022
- 64 • Moyne Planning Scheme Amendment C75 Planning Permit Application Explanatory
- 65 Report
- 66 • Sun Pharma submission to Amendment C75

67 **1.7 Facts, Matters and Assumptions on which the Report Proceeds**

68 The following facts, matters and assumptions were used in the preparation of this report:

- 69 • Facility has operated since the 1900s at the current location.
- 70 • Residential development has occurred along the Princess Highway in the vicinity of the Facility.
- 71 • There has been a history of conflict between these land uses as evidenced by historic complaints
- 72 from the nearby residents alleging noise and odour impacts due to emissions from the Facility.
- 73 • In the early 2010s, measures were implemented at the Facility to control emissions of noise and
- 74 odour to the extent practicable.
- 75 • Since this implementation, the frequency of complaints has decreased, but occasional complaints
- 76 continue to be received.
- 77 • Documents and other materials described in Section 1.8; and
- 78 • My professional judgement and expertise as specified in my curriculum vitae in **Appendix A**.

79 **1.8 Documents and Other Materials Used to Prepare the Report**

80 The documentation and materials used to prepare this report included:

81 **1.8.1 Site Visit**

82 I have visited the Facility on several occasions over the last ten years and am familiar with general
83 operation of the Facility.

84 My colleague who has contributed to this report, Mr Nathan Williams, visited the Facility on the 24th and
85 25th of January 2022 to conduct a field odour survey.

86 Mr Williams attended the Facility from 1 pm to 4 pm on the 25th of January and was given a tour of the
87 operation of the Facility by Mr Chris Quadroy. The operation of the biofilter was seen to be effective and
88 housekeeping was observed to be in good order. Solvent odour was observable within the processing
89 buildings but were generally not noted outdoors.

90 Mr Williams performed a field odour survey off-site along the Princes Highway downwind of the Facility
91 but did not observe any odour impacts beyond the boundary of the Facility. Mr Williams was informed

that the Site was not operating at full capacity at the time of this survey due to unexpected short time shutdown as a result of equipment malfunction.

A repeat survey the following morning was conducted while the Facility was operating at normal conditions. No odours were observed off-site to the south of the property under a northerly breeze.

1.8.2 Legislation and Guidelines

- Environment Protection Authority 2013, Guideline – Recommended Separation Distances for Industrial Residual Air Emissions, Publication 1518, March 2013;
- Environment Protection Authority 2021, Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues – the Noise Protocol, EPA Publication 1826.4, May 2021;
- Environment Reference Standard, S245, 26 May 2021, Victoria Government Gazette;
- Environment Protection Act 2017;
- Planning and Environment Act 1987;

1.8.3 Other Information Sources

- Summary of complaints provided by Sun Pharma.
- Plan of River Run Estate proposed residential development prepared by Mesh Planning, dated 4 May 2021.
- SLR, 2012, *Environmental Noise Assessment to 5 Atkins Crescent*, prepared by SLR for Glaxo Smith Kline, dated 6 August 2012
- SLR, 2013, *Environmental noise assessment*, Revision 0, prepared by SLR for Glaxo Smith Kline, report Number 640-01517, dated 4 December 2013
- Hygienics, 2018, *Noise Survey*, prepared by Hygienics Pty Ltd for Sun Pharmaceutical Industries Australia Pty Ltd, dated April 2018
- Marshall Day, 2021, *169A & 183 Princes Highway, Port Fairy – Proposed Residential Subdivision*, Rp 001 R01 20200531, prepared by Marshall Day Acoustics for Myers Planning Group, dated 5 May 2021
- Buffer Assessment prepared by PJRA, dated 28 June 2021.

1.9 Tests or Experiments

Field odour survey conducted by Mr Nathan Williams on the 24th and 25th of January 2022.

1.10 Summary of Opinions

A summary of my opinions is provided in Section 6 of this report.

123 **1.11 Provisional Opinions**

124 The opinions expressed are not provisional.

125 **1.12 Limitation**

126 I consider myself qualified to prepare and present the report. I have not addressed questions falling
127 outside my area of expertise, and do not consider it incomplete or inaccurate in any respect.

128 My advice is based on the Brief of Documents, which was provided by Rigby Cooke Lawyers,
129 documents and reports provided by Sun Pharma, my review of relevant legislation, guidelines and
130 documents referred to in **Section 1.8** and my experience with undertaking buffer assessments on similar
131 sites.

132 **1.13 Declaration**

133 I declare that:

134 *"I have made all the enquiries that I believe are desirable and appropriate and that no matters of*
135 *significance which I regard as relevant have to my knowledge been withheld from the Panel"*

136 Yours sincerely,

137 

138 Peter J Ramsay

2. BACKGROUND

Sun Pharmaceutical Industries Australia Pty Ltd (SunPharma) operates a pharmaceutical production facility (the Facility) which is located in Port Fairy, Victoria. The Facility is at 195 and 199 Princes Highway, Port Fairy (the Site).

Peter J Ramsay & Associates has provided consulting services to the operator of the Facility since 2012, initially with GlaxoSmithKline and with Sun Pharma since 2016.

The Facility has been in operation since the early 20th century. Land uses in the area are being reviewed through amendment C69 to the Moyne Planning Scheme, implementing the strategic directions of the Port Fairy Coastal and Structure Plan 2018 (the PFCSP).

The location of the Facility is close to the existing residential development which has occurred along the Princes Highway. Residential development has increased since the early 1990s causing increasing conflict with the operation of the Facility. Upgrades to the operation of the Facility have been necessary to further control odorous emissions to reduce impacts on neighbouring residential properties. The noise and lighting systems have also been adapted to reduce impact on existing residential dwellings in the vicinity of the Facility.

2.1 Process description

The Facility has been in operation since the early 20th century first operated as a milk processing factory. It was later modified to produce penicillin in the 1950s. Since then, the Facility has been used for processing opium poppies. The site it now used just for processing of poppies for extraction of opioids.

The Facility manufactures pharmaceutical products from milled poppy straw. The manufacturing process involves successive extraction processes to dissolve opioids, particularly morphine and thebaine from the poppy straw. The final product is a high purity crystalline pharmaceutical ingredient. The process involves several solvent extraction steps, followed by purification of the product by centrifuge.

The solvents used for extraction include both organic solvent and caustic solution. These processes generate a wastewater stream which is high in Biological Oxygen Demand (BOD) due to the presence of organic solvent, mostly xylenes. It can also contain high levels of alkalinity. Wastewater is disposed of as trade waste to sewer and is subject to continuous online monitoring. In case of an upset to the system, wastewater is diverted to a large calamity tank so that it can be stored until it is treated to allow disposal to sewer within the acceptance criteria.

The solvent extraction processes are performed in enclosed buildings and are fitted with emission capture equipment to control fugitive emissions. Captured emissions are treated in a biofilter to control odorous emissions. Odorous chemicals are oxidised by microbes living within the filter media and are converted to non-odorous chemicals.

The operation of the Facility requires transport, storage and use of dangerous goods and hazardous chemicals. The organic solvents used include flammable liquids. There is bulk storage of solvents at the Site and regular deliveries by road tankers are received.

The nature of the product, being a legally produced narcotic pharmaceutical necessitates a high level of security. The site requires illumination at night to allow visibility for security personnel and the site is monitored by closed-circuit television cameras.

The Facility can operate continuously depending on demand.

2.2 Site context

2.2.1 Site Location and Surrounding Land Use

The site is located approximately 250 km south west of Melbourne in Port Fairy. The site is on an Industrial 1 Zoned (IN1Z) land, surrounded by residential zoned land (GRZ1, RLZ, LDRZ) along the Princess Highway on its north, north east, west and south west, with farmland (FZ) on its south and east. A parcel of industrial zoned land is to the immediate north of the property boundary of the Facility. This parcel of land is being used for light industrial and commercial purposes.

The closest sensitive receptor is approximately 30 m from the main operation area of the plant on the opposite side of the Princes Highway to the west (refer to **Figure F1**).

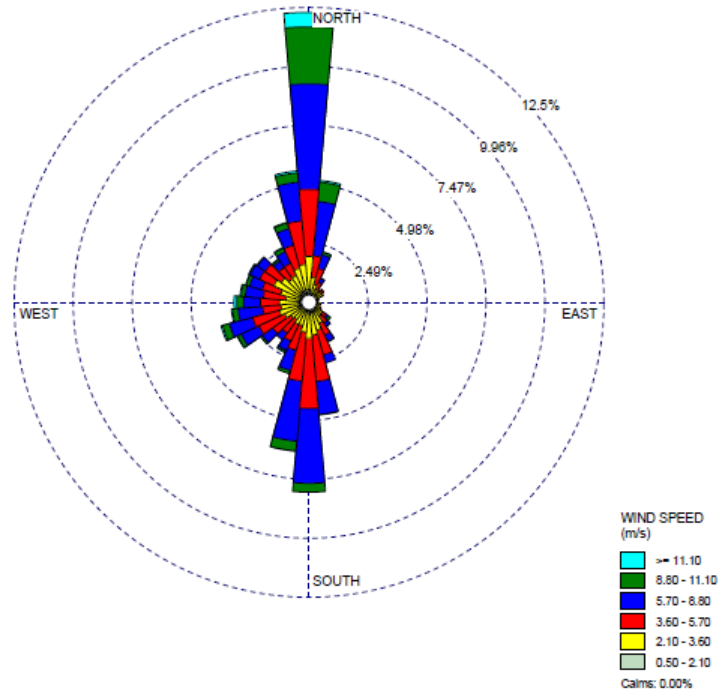
2.2.2 Topography

The site is located in a coastal area and the topography is essentially flat at an elevation of less than 10 m above sea level. There is no significant topographic feature to affect the dispersion of emissions from the Facility.

2.2.3 Meteorology

Data were obtained from the Port Fairy Bureau of Meteorology (BOM) station which is located approximately 4 km south of the site. In accordance with EPA Publication 1550, five years worth of data were used to prepare the AERMOD input metfiles. The metfiles are prepared by pDS Consulting and provided in **Appendix C**. Wind roses produced from meteorological data indicate that the predominant

winds are typically from the north, south and west. Seasonal variations generally bring southerly winds during the summer and northerly winds during autumn and winter.



3. LEGISLATIVE CONTEXT

3.1 Planning and Environment Act 1987

Section 60(1)(e) of the *Planning and Environment Act 1987* requires a responsible authority to consider any significant effects the environment may have on the use or development of land in considering issuing a planning permit under a planning scheme. The impact of existing industry (i.e., the SunPharma facility) is a part of the environment and must be considered by the responsible authority.

3.2 Environment Reference Standards and Environment Protection Act 2017

The Environment Reference Standard (ERS) is made under the *Environment Protection Act 2017* and provides a basis for assessing environmental conditions, including ambient air. The ERS requires that no offensive odours from industrial facilities should be discharged to protect environmental values of the

213 ambient air environment including local amenity and aesthetic enjoyment; and life, health and well-being
214 of humans.

215 In this context residential use is proposed near an existing industry and the developer would be the
216 agent of change. This involves a change to the zoning of the land in the vicinity of the Facility. Therefore,
217 it is the responsibility of the approval authority to consider and the developer to demonstrate whether the
218 existing air environment will be appropriate to protect local amenity and aesthetic enjoyment for the
219 resident of the proposed dwellings.

220 **3.3 EPA Publication 1518 – Recommended Separation Distances for Industrial Residual Air** 221 **Emissions**

222 The Environment Protection Authority Victoria (the EPA) provides guidance on appropriate separation
223 distances in the guideline Publication 1518. This provides guidance for appropriate separation distances
224 between typical industrial facilities in Victoria and sensitive land use, such as residential use.

225 The Facility does not fit into the categories within EPA Publication 1518. The threshold for imposing a
226 typical separation for a pharmaceutical production facility is 2,000 tons per annum. The Facility produces
227 an extremely high purity active ingredient rather than a ready to use product. The Facility produces
228 around 25 to 30 per cent of the global supply of licit opioid chemicals. The Facility has a designed
229 production capacity of 10,000 tonnes of poppy straw per year, and has a designed production capacity of
230 about 160 tonnes of alkaloid product per annum. The ongoing operation of the Facility is significant in
231 maintaining the global supply of opioid pain medication. It is by far the largest site for processing of
232 opium poppies in Australia.

233 EPA Publication 1518 provides guidance for separation distances for typical facilities. However, the
234 Facility in question is not typical. It is unique in Victoria and requires a site-specific consideration. An
235 appropriate buffer is still required to avoid conflict between the operation of the Facility and nearby
236 residents.

237 **3.4 EPA Publication 1826.4– Noise Limit and Assessment Protocol for the Control of Noise** 238 **from Commercial, Industrial and Trade Premises and Entertainment Venues – the Noise** 239 **Protocol**

240 The Noise Protocol provides a protocol for determining noise limits for existing industrial premises and is
241 an incorporated document under the *Environment Protection Act* 2017. All noise predictions,
242 measurements, assessments and analysis conducted within Victoria (including urban and regional
243 Victoria) are to be assessed in accordance with the Noise Protocol. This protocol is a legal requirement
244 which replaces EPA Publication 1411 – *Noise from Industry in Regional Victoria* for determining noise

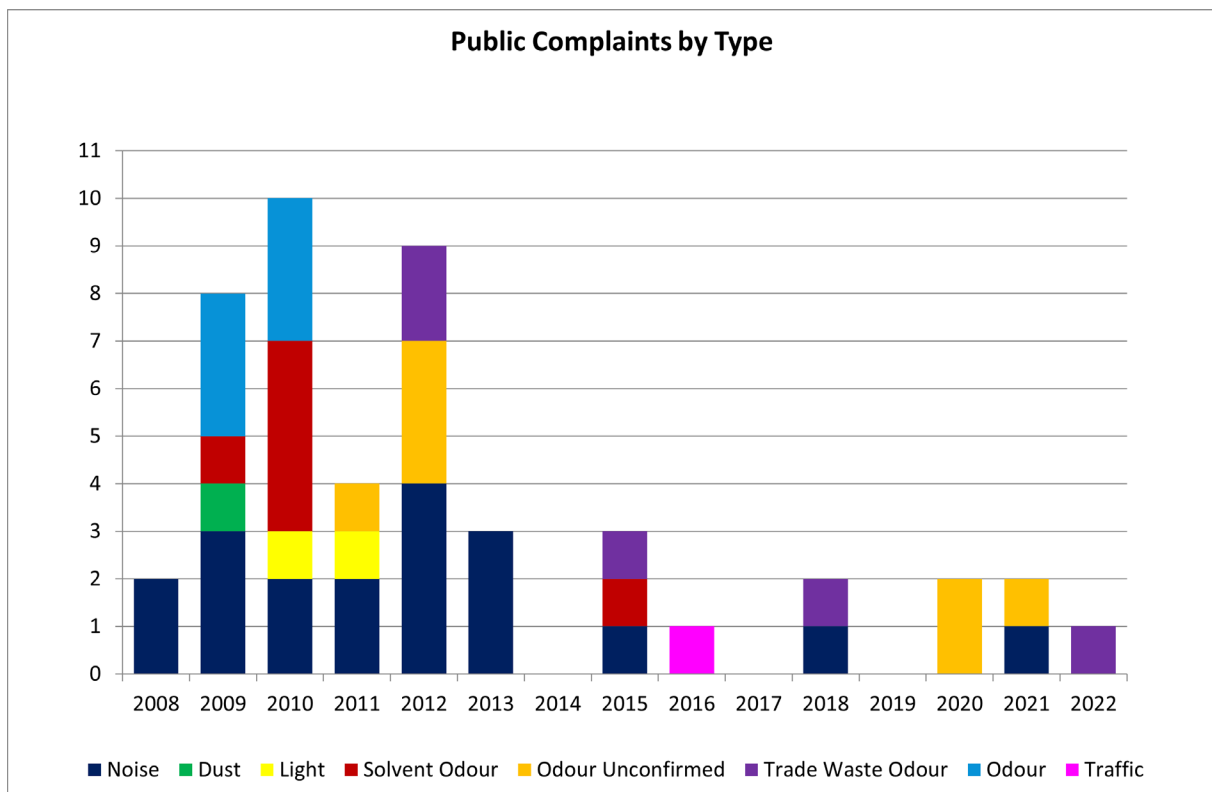
245 levels in rural Victoria. Publication 1411 was a non-statutory document and noise limits were not legally
 246 binding unless enforced through a statutory instrument.

247 4. COMPLAINTS ANALYSIS

248 A full record of odour complaints made to the operator of the Facility between 2008 and 2022 is provided
 249 in **Appendix D** of this report. A summary of the data is presented in Figure 2.

250 The majority of the complaints are related to noise and odour (40% and 41% respectively). 32%% of the
 251 odour complaints were attributed to trade waste odour, 36% were attributed to solvent odour from the
 252 bio-filters, 27% from unidentified sources and 5% are due a variety of sources including lime dust, water
 253 extraction and noscapine. Noise complaints are related to a number of sources, including, water
 254 extraction, nitrogen alarm, Thebaine 2 building, lift and forklift operation, emergency alarm testing, steam
 255 venting, bulk gas delivery.

256 The number of complaints has dropped markedly post 2013, which is likely to be due to the upgrade of
 257 the Facility in early 2012 which included the installation of a biofilter. Odour complaints post 2013 have
 258 generally been attributable to trade waste and unidentified fugitive odour sources. Only one event of
 259 solvent odour is reported post the upgrade.



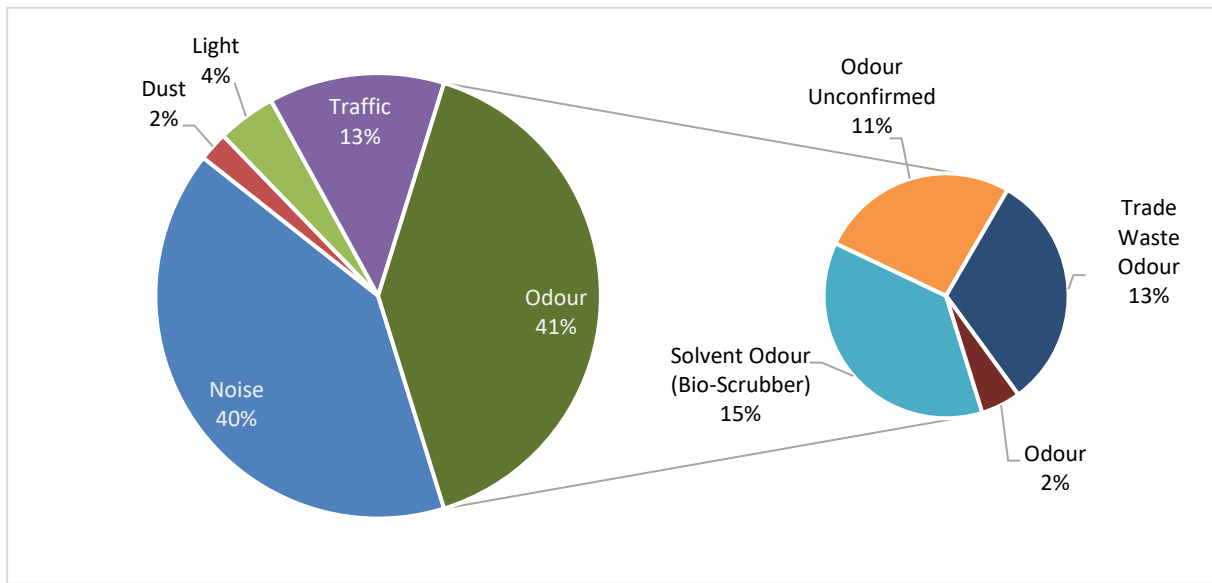


Figure 2 Complaints Summary Charts

5. ODOUR BUFFER ASSESSMENT

5.1 Approach

The Facility does not fit into the categories within EPA Publication 1518 as it does not meet the threshold for imposing a typical separation for a pharmaceutical production facility.

EPA Publication 1518 provides general guidance for typical facilities and the Facility in question is not typical. It is unique in Victoria and requires site-specific consideration. An appropriate buffer is still required to avoid conflict between the operation of the Facility and nearby residents.

The Facility is well run and implements best practice control of noise and odorous emissions. However, there are still complaints from existing residents. These appear to be more likely during upset conditions. Complaints have been infrequent at approximately once per year in the last five years. However, the ongoing occurrence of complaints indicates that a separation distance is necessary to avoid conflict with residential areas.

Dispersion modelling was undertaken to assess the aerial extent of potential amenity impacts when the calamity tank is operational (discussed in **Section 5.4**). The proposed buffer is intended to reduce the risk of impacts to nearby residential receptors to a low and acceptable level while the calamity tank is in operation.

279 **5.2 Methodology**

280 The EPA has stated that it intends to publish a new guideline, Publication 1883, Guidance for Assessing
281 Odour however the guideline is not available at the time of writing, although it is referred to in some EPA
282 Publications.

283 The odour impact risk assessment has been performed in accordance with current EPA Guidelines. The
284 source, pathway, receptor model of impact is considered. Dispersion modelling was performed to assess
285 the impact of odorous emissions from the calamity tank.

286 The risk of adverse amenity impact and conflict between future residents and the operator of the Facility
287 was then assessed. The frequency of impact and consequence of odour impact have been considered in
288 the risk assessment.

289 **5.3 Sensitive Receptors**

290 Existing sensitive receptors are present along the Princes Highway. These dwelling have been
291 developed since the early 1990s. Further odour controls at the Facility have been necessary to manage
292 conflict due to odour impacts.

293 It is worth noting that the residents of the existing dwellings have had a long history of living with the
294 presence of the Facility. However, there are still occasional odour complaints, once per year over the last
295 five years.

296 A new sensitive land use (residential sub-division) is proposed consisting of residential dwellings to the
297 south southwest of the Facility.

298 From our experience, new developments in which owner-occupiers have made significant investment
299 often generate more complaints for a given level of odour exposure. Therefore, odour impacts predicted
300 at the new receptors are likely to have a greater consequence, in that they are more likely to result in
301 complaints.

302 **5.4 Sources of Odorous Air Emissions**

303 The normal operation of the Site results in some fugitive emissions, however most of these are captured
304 and treated by the biofilter. The biofilter treats odorous emissions from the process however there are
305 residual emissions from the biofilter. Mostly vapour generated in the solvent extraction. Emissions from
306 the biofilter and fugitives from the Facility were not detectable outside of the Site during a field odour
307 survey. Under normal operating conditions, residual emissions from the biofilter appear to be minor in

308 causing odour impacts on the existing residential neighbours. However, malfunction of the biofilter could
 309 lead to complaints from the nearby residents.

310 Most odour complaints (as shown in Section 4) were attributable to the use of calamity tank. The
 311 operation of the calamity tank is necessary for when there is a malfunction at the Facility and this is
 312 expected to be the cause of future complaints. The calamity tank is in use on average 9 times a year.
 313 Therefore, emissions from the calamity tank are considered in the dispersion modelling.

314 Odorous emissions occur due to the anaerobic microbial decomposition of the organic chemicals present
 315 in the wastewater. These are released from the surface of the tank, which is open to the atmosphere.

316 The odour flux rate from the tank used for the dispersion modelling is based on the equivalent emission
 317 rate from primary settling tanks. A value of approximately 100 OU/s/m² was applied to assess emission
 318 rate from the tank. This was the average emission rate observed in flux measurements, (Friedrich, et. al.,
 319 2020).

320 The tank has a diameter of 5.5 metres and odorous emissions are released at a height of 3 metres
 321 above ground level.

322 **5.5 Air Dispersion Modelling**

323 In accordance with EPA Publications 1961, 1550 & 1551, dispersion modelling was used to predict the
 324 odour impact of discharges to air on the ambient environment from the Facility under a range of
 325 meteorological conditions and to consider the off-site amenity impact to nearby residential areas.

326 **5.5.1 Model Selection**

327 The site is at an approximate elevation of 10 m and the topography surrounding the site is relatively flat.
 328 Examination of meteorological data indicated that calms occur less than 5% of the time. Based on these
 329 considerations, it was considered appropriate to use the regulatory approved AERMOD dispersion
 330 model.

331 **5.5.2 Model Domain**

332 A 1.2 km x 1.2 km grid was used, with receptors placed 50 m apart, with the centre of the grid located
 333 near the centre of the site as per the recommendations in EPA Publication 1551.

334 Topography was incorporated into the model using a digital elevation model with approximately 30 m
 335 resolution, which has been gap filled. Since the terrain is relatively flat surrounding the site, the
 336 topographical resolution of the terrain was considered appropriate.

337 5.5.3 Dispersion

338 5.5.3.1 Climate Data

339 The nearest weather stations operated by Bureau of Meteorology (BOM) is station 090175 Port Fairy
340 AWS. It is located within 4 kilometres of the Facility.

341 5.5.4 Meteorological Input Files

342 The data file used for the AERMOD modelling was prepared by pDs Consultancy based on the
343 observational data taken from weather stations operated by the BOM.

344 5.5.5 Model Input Parameters

345 The predicted odour concentrations were modelled in accordance with EPA Publication 1550 and 1551.
346 The basic output from AERMOD is a one-hour average concentration prediction. In view of the practical
347 requirement that the approved USEPA version of AERMOD cannot be modified, three-minute average
348 predictions were calculated post-processing.

349 In addition, AERMOD includes an option for incorporating the effects of increased surface heating from
350 an urban area on pollutant dispersion under stable atmospheric condition. In accordance with EPA
351 Publication 1551 only the use of the Rural mode is approved by EPA Victoria and this mode was
352 selected in the modelling.

353 **Table 1 Summary of AERMOD Input Parameters**

Model Input Parameters	
Meteorological Data	Obtained from BOM data at station 086038 and 086282
Pollutant	Odour
Deposition	None
Depletion	None
Dispersion	Rural
Averaging time	Hourly. Results were converted to 3-minute values post processing as recommended in EPA Publication 1550.
Terrain	Elevated, 30 m resolution, from SRTM1
Gridded Receptors	1.2 m x 1.2 km, 50m spacing

354 5.5.6 Source Input Parameters

355 A full listing of all source input parameters used in the computer simulations is provided in Table 2.

356 **Table 2 Summary of Source Input Parameters for Dispersion Modelling Simulations**

Location No.	Source	Height	Emission Rate	Gas Exit Temperature	Stack Inside Diameter
		m	OUV/s/m2	°C	m
1	Calamity Tank	3	100	Ambient	0.28

5.5.7 Results of AERMOD Simulations and Interpretation

The results of the dispersion modelling are displayed in **Figure F2** attached to this report. An excerpt from Figure F2 is shown below, with a markup showing the general area from which odour complaints have been made.

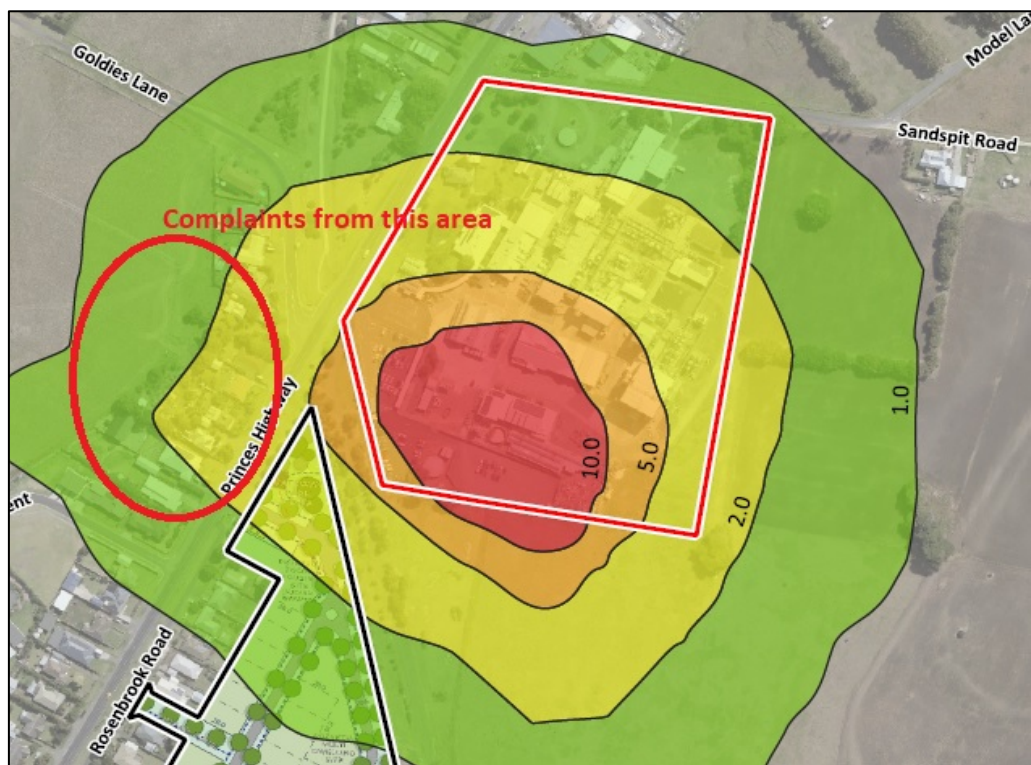


Figure 3 Excerpt from Figure F2 showing location of odour complaints

The results show that off-site odour is predicted at concentrations between 1 and 5 odour units in the vicinity of the area where historic odour complaints have been raised. This indicates that this level of predicted odour impact has resulted in complaints against the operation of the Facility.

Similar odour concentrations will be experienced in the north of the Rivers Run Estate site. These are more likely to generate complaints and cause conflict, due to the higher expectation of amenity from residents in new dwellings.

The northernmost residential lots and the areas marked for *Potential Social Housing Site* and *Potential Multi Dwelling Site* on the Rivers Run Plan. These are likely to experience occasional impact due to release of odorous emissions from the Facility.

5.6 Recommended Separation Distance

To avoid future conflict, it is recommended that a buffer of approximately 300m radius from the calamity tank that covers the area within 1 odour unit impact (as shown in **Figure F4**), should not be used for sensitive use, including residential dwellings.

Complaints have been received at the outer edge of the 1 odour unit isopleth. Therefore, additional sensitive receptors within the predicted 1 odour unit isopleth are likely to experience the same level of adverse amenity impacts. This is likely to increase the number of complaints received by the operator of the Facility.

This conclusion was based on the comparison of the history of odour complaints against the Facility and predicted odour impacts at ground level by dispersion modelling with the calamity tank as the source of odour. Routine fugitive emissions and odorous emissions under other upset conditions are likely to elevate the level of odour impacts modelled.

The comparison was done in the absence of relevant data regarding the emissions from the calamity tank. The emission rate will be dependent on the composition of the wastewater for each upset event. A single fixed emission rate is not calculable and even odour sampling will not necessarily be demonstrative of worst-case conditions. For example, a high or low pH may inhibit biological activity and reduce the rate of generation of odour causing chemicals. Whereas a high temperature excursion may increase the rate of biological activity and increase the rate of generation of odour causing compounds. The predicted emission rate from the surface of the calamity tank, which is based on emissions published for a settling tank, is likely an underestimate.

The odour impact as predicted by the dispersion modelling is not intended to provide quantitative data on odour concentrations that will be experienced while the calamity tank is in use. Rather, it is used to demonstrate where odour impacts have generated complaints. It follows that sensitive receptors introduced into nearby areas will experience a similar magnitude and frequency of impact.

5.7 Review of Separation Distance Assessment

An assessment was prepared as part of the supporting information for Amendment C75 to the Moyne Planning Scheme, for the development of the Rivers Run Estate. This report, *Separation Distance*

399 *Assessment, 169 Princes Highway, Port Fairy*, Rev 2, 3 June 2021 was prepared by Air Quality
400 Professionals Pty. Ltd. (the AQP Report).

401 The AQP report concludes that because the Facility does not meet the production capacity threshold in
402 Publication 1518 of 2,000 tonnes per annum, no separation distance is required between sensitive land
403 use and the Facility.

404 This ignores that fact that the Facility is not typical, it is unique in Victoria and is responsible for
405 production of more than 25% of the global production of licit opiate pharmaceuticals. It is noted in the
406 Publication 1518 that, “the recommended separation distances are EPA’s default minimum in the
407 absence of a detailed, site-specific assessment...”.

408 There is a history of odour complaints from nearby residents against the operation of the Facility. It is
409 apparent that a separation distance is required to ensure that future residential development is
410 compatible with the ongoing operation of the Facility.

411 **6. NOISE BUFFER ASSESSMENT**

412 I have reviewed the noise surveys listed in Section 1.8.3 and provided **Appendix E**.

413 **6.1 Determination of Noise Limits**

414 The noise limits are determined based on land zoning, background noise levels for day, evening and
415 night in accordance with EPA Publication 1826.4 (the Noise Protocol). The day, evening and night
416 periods are:

- 417 • Day: 0700-1800 Monday-Saturday
- 418 • Evening: 1800-2200 Monday to Saturday
- 419 0700-2200 Sundays and public holidays
- 420 • Night: 2200-0700

421 The Facility is located in IN1Z (the ‘generating zone’) and the closest sensitive receptor (dwellings in this
422 case) are located in zones FZ, GRZ1, RLZ, an LDRZ (the ‘receiving zones’). According to the Noise
423 Protocol, the zone-specific noise limit levels are:

424 **Table 3 The Zone-Level Noise Limits at the Noise-Sensitive Area (According to Table B of**
425 **the Noise Protocol)**

Receiving Zone	Zone Noise Limits, dB(A)
----------------	--------------------------

Receiving Zone	Zone Noise Limits, dB(A)		
	Day	Evening	Night
Rural Living Zone (RLZ)	50	45	40
Low Density Residential Zone (LDRZ)	52	47	42
Farming Zone (FZ)			
General Residential Zone 1 (GRZ1)	53	48	43

426 Traffic noise, especially noise from the Princes Highway, is expected to contribute to the background
427 noise level in the area.

428 There are discrepancies between the background noise levels measured by Marshall Day (2021) and
429 SLR (2012), as shown in **Table 4**. This might be due to traffic conditions at time of measurement or
430 changes to noise sources in the vicinity.

431 **Table 4 Background Noise Levels (Marshall Day Acoustics 2021 & SLR 2012)**

Consultant	Background Noise Levels, L_{A90} , dB(A)		
	Day	Evening	Night
Marshall Day Acoustics, 2021	45	41	39
SLR, 2012	38	34	32

432 Locations of the receptors and compliance to noise level are shown in **Figure F3a** and **F3b**.

433 **Table 5 The Background Adjusted Noise Limits at the Noise-Sensitive Areas (According to**
434 **Table B of the Noise Protocol)**

Sensitive Receptors	Background Adjusted Noise Limits, dB(A)		
	Day	Evening	Night
184 Princes Highway	53	47	44
5 Atkins Crescent	53	46	44
Princes Hwy - Opposite Main Gate	53	46	44
Cnr Princes Hwy and Atkins Cres	53	47	44
Bike Path - 300m From Highway	53	47	44
164 Model Lane	53	46	44
Cnr Sandspit Road and Model Lane	58	53	48

Sensitive Receptors	Background Adjusted Noise Limits, dB(A)		
210 Princes Highway	53	48	44
222 Princes Highway	53	47	44
204 Princes Highway	53	48	44
3 Goldies Lane	53	48	44
9 Goldies Lane	53	47	44
196 Princes Highway	53	48	44
Closest point of the proposed residential use (Marshall Day 2021)	53	48	44

435

436 6.2 Review of Marshall Day Acoustic Assessment Report

437 Marshall Day Acoustics' (MDA) acoustic assessment is in relation to the Rivers Run Estate's proposed
 438 residential development on the land adjoining the Facility on the south.

439 The report refers to EPA Publication 1411 Noise from Industry in Regional Victoria (NIRV). The NIRV is
 440 no longer valid and has now been replaced by the EPA Publication 1826.4 the Noise Protocol, however
 441 the methodology provided is consistent.

442 6.2.1 Noise Limits

443 In reviewing the report against the Noise Protocol, the noise limits are developed in general accordance
 444 with the Noise Protocol, with a minor derivation. It is unclear how background noise level was measured,
 445 Table 5 of the report indicates that the measurements were taken within a 30 min period during each of
 446 the day, evening and night period rather than, as required by the Noise Protocol, over each hour of the
 447 period that the premises operates. The Facility operates 24 hours and 7 days. The background noise
 448 level may not be a good representation of the environmental noise levels in the area. However, the
 449 Protocol also provides a short background method when continuously monitoring cannot be achieved,
 450 then at least two measurements of the LA90 must be made, each of at least 10-minutes duration, so as
 451 to obtain a representative measure of the background level.

452 The methodology by which the background noise levels were obtained is not clear from the Marshall Day
 453 report.

454 6.2.2 Noise Measurements

455 The Noise Protocol requires assessing noise emissions on an average of 30-minute period, while MDA
 456 assessed noise impacts using the lowest noise level recorded by the loggers. Noise limit is determined

with consideration of the background level noise, which should account for the background noise experienced at the Rivers Run Estate site. Use of the lowest plant noise level is not necessary. The measurements are expected to be an underestimate of the actual noise impact that will be experienced at the Estate site.

6.2.3 Noise Survey Results

The results of the MDA's noise survey states that the Facility *"exceed the night-time recommended level by up to 2 dB"* at the proposed residential development.

Noise is one of the major reasons for complaints and accounts for 40% of all complaints between 2008 and 2022 received by Sun Pharma (as shown in Section 5). It is understood that noise complaints have been received from neighbours located at a distance 50m to 100m from the site.

MDA concluded that:

"The development of the subject site for residential purposes will add to the number of noise sensitive receivers that may be affected by noise from Sun Pharma but will not result in any new noise receivers being closer to the manufacturing plant than any existing receivers"

This implies that no new receptors would experience greater impact than the existing residents in the vicinity.

Noise mitigation measures were required to reduce the noise impact on the existing receptors, but these are not protective of the noise environment at the proposed development.

The introduction of more residents that may be affected by noise and are new to this noise environment, is likely to result in higher number of noise complaints. There might be potential disruption to Sun Pharma operations in order to address the complaints.

It should be noted that the predominant wind direction of northerlies in the direction towards the Rivers Run Estate site favours the propagation of sound. The prevailing winds will increase the noise impact from the Facility on the residential development, above what is experienced to the west of the Facility by existing receptors on the Princes Highway.

6.3 Review of Sun Pharma Noise Surveys

The noise observations from the SunPharma noise surveys show that noise level exceeded the allowable noise limits based on background noise at up to 120 metres from the boundary of the Facility. Similar noise impacts are expected to be experienced at the proposed residential development within this distance.

The operator of the Facility has been able to address most noise impacts reported by residents, however noise complaints are still being alleged against the operator at a rate of once every three years since 2014, as shown in odour complaints data provided in **Appendix D**. I understand recent complaints are due to upset conditions such as malfunctioning alarms.

The purpose of a separation distance between the non-compatible land uses is to account for both impacts from routine operations and residual impacts following appropriate source control. The noise surveys that have been performed around the Facility demonstrate that the Facility has been required to introduce mitigation measures to control noise impacts at existing residential receptors. Further residential development will increase the frequency and severity of noise complaints against the operation of the Facility. Additional mitigation measures may not be practicable.

Based on previously conducted noise surveys, residential development may be impacted by noise above the recommended levels up to 150 metres from the boundary of the Facility. Residential development should be avoided within 150 metres from the Facility. It is recommended that noise buffer be taken from Sun Pharma's property boundary to the distance (150 m) where the next compliant noise level was detected at (Corner of Princes Highway and Atkins Crescent). The proposed noise buffer is shown in **Figure F5** and **Figure F6**.

7. CONCLUSIONS

There are existing and ongoing odour complaints against the operation of the Facility by existing residents. These complaints are generally associated with the use of the calamity tank at the Site.

Dispersion modelling shows that the predicted odour impact on the northern portion of the proposed Rivers Run Estate development and the vacant land south and east of the Facility (as shown on **Figure F2**) will be similar to that which is already generating odour complaints.

Past noise survey shows exceedance of night-time noise limits at the northern portion of the Rivers Run Estate development.

512 A separation distance is required to protect the amenity of air quality and noise impact of unavoidable
513 emissions from the Facility from impacting on future residential receptors. Failure to maintain an
514 adequate separation distance is likely to lead to conflict between incompatible land uses.

515 In such conflict, the onus is on the operator of the Facility to not impact on the amenity of the residents.
516 The presence of existing residents within the recommended separation distances is not ideal. The
517 introduction of more receptors can only exacerbate the conflict and may impact on the ongoing operation
518 of the Facility.

519 A separation distance, measured at 300 metres from the location of the calamity tank is appropriate to
520 make sure that future residential development is compatible with the ongoing operation of the Facility.

521 A separation distance of 150 metres between the boundary of the Facility and future residential
522 receptors is appropriate to prevent noise impacts exceeding the relevant criteria for future residents.

Figures





PETER J RAMSAY
& ASSOCIATES

Legend

- Site Boundary
- Sun Pharma Activity Boundary
- Proposed Development Boundary
- Closest Sensitive Receptor

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021



0 50 100 150 200 m

Main Map Scale 1 :4,500 @ A4
Coordinate System: GDA94 / MGA z54

SITE PLAN WITH SURROUNDING LAND USES

Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F1



PETER J RAMSAY
& ASSOCIATES

Legend

- Site Boundary
- Proposed Development Boundary

Odour Concentration

- 1 OU
- 2 OU
- 5 OU
- 10 OU

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021



0 50 100 150 200 m

Main Map Scale 1 :4,500 @ A4
Coordinate System: GDA94 / MGA z54

ODOUR CONCENTRATION CONTOUR

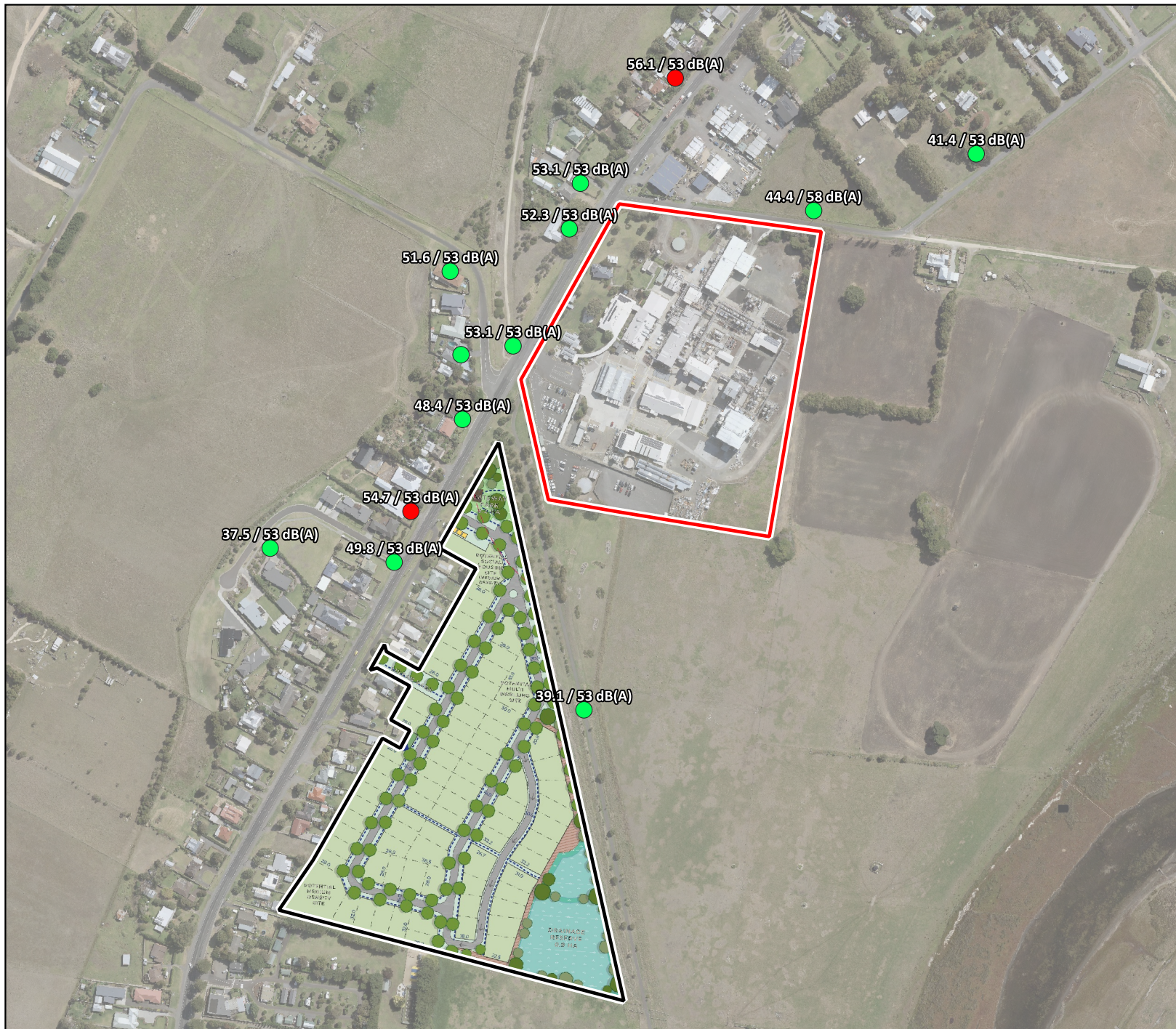
Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F2



PETER J RAMSAY
& ASSOCIATES

Legend

- Site Boundary
- Proposed Development Boundary
- Noise Measurement Locations (Hygienist, 2018)
 - Compliant
 - Non-compliant
- Measured Noise Level / Noise Limit

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021
 Noise level measurements: Source - Hygienics Pty Ltd, 2018, Noise Survey-Sun Pharmaceutical Industries Australia Pty Ltd Port Fairy, dated April 2018, prepared for Sun Pharmaceutical



0 50 100 150 200 m

Main Map Scale 1 :5,000 @ A4
 Coordinate System: GDA94 / MGA z54

NOISE SURVEY - DAY MEASUREMENTS

Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
 Date: 12/08/2022
 Revision: RevA
 Designed: NW
 Drawn: AD
 Reviewed: NW

Figure
F3a



PETER J RAMSAY
& ASSOCIATES

Legend

- Site Boundary
- Proposed Development Boundary
- Noise Measurement Locations (Hygienist, 2018)
 - Compliant
 - Non-compliant
- Measured Noise Level / Noise Limit

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021

Noise level measurements: Source - Hygienics Pty Ltd, 2018, Noise Survey-Sun Pharmaceutical Industries Australia Pty Ltd Port Fairy, dated April 2018, prepared for Sun Pharmaceutical



0 50 100 150 200 m

Main Map Scale 1 :5,000 @ A4
Coordinate System: GDA94 / MGA z54

NOISE SURVEY - NIGHT MEASUREMENTS

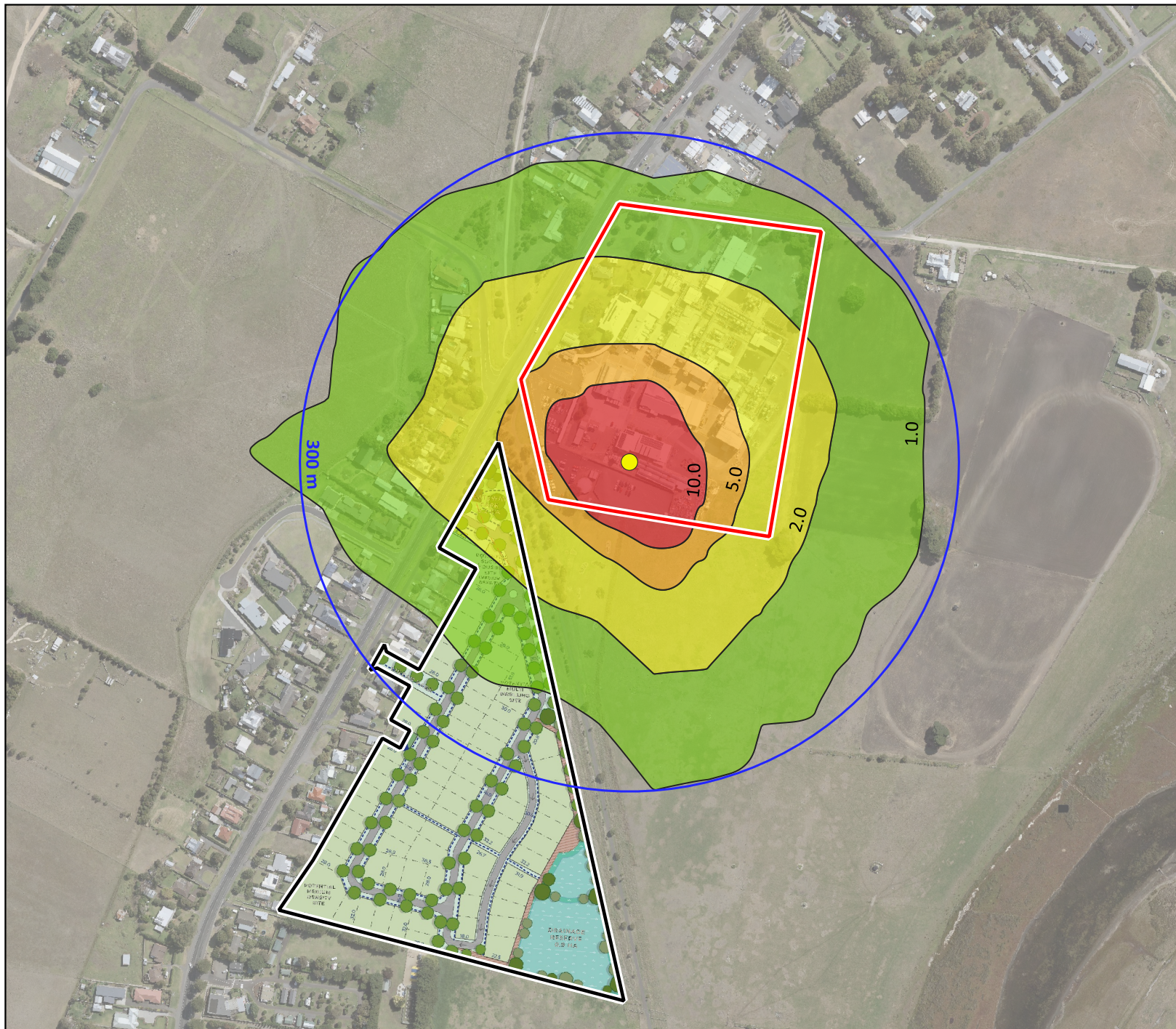
Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F3b



PETER J RAMSAY
& ASSOCIATES

Legend

- Site Boundary
- Proposed Development Boundary
- Proposed Odour Buffer 300m From Calamity Tank
- Calamity Tank

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021



0 50 100 150 200 m

Main Map Scale 1 :5,000 @ A4
Coordinate System: GDA94 / MGA z54

ODOUR BUFFER

Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F4



**PETER J RAMSAY
& ASSOCIATES**

Legend

- Site Boundary
- Proposed Development Boundary
- Proposed Noise Buffer 150m from Site Boundary

Noise Measurement Locations (Hygienist 2018)

- Compliant (Day)
- Non-compliant (Day)

Measured Noise Level / Noise Limit

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021

Noise level measurements: Source - Hygienics Pty Ltd, 2018, Noise Survey-Sun Pharmaceutical Industries Australia Pty Ltd Port Fairy, dated April 2018, prepared for Sun Pharmaceutical



0 50 100 150 200 m

Main Map Scale 1 :5,000 @ A4
Coordinate System: GDA94 / MGA z54

NOISE BUFFER

Buffer Assessment

Princes Highway, Port Fairy, Victoria







Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F5



Legend

-  Site Boundary
-  Proposed Development Boundary
-  Proposed Odour Buffer 300m
From Calamity Tank
-  Proposed Noise Buffer 150m
from the Site Boundary
-  Calamity Tank
-  Area Sensitive Use Not Recommended

Data Sources

Aerial imagery: Source - MetroMap, photograph dated 17/03/2021



0 50 100 150 200 m

Main Map Scale 1 :5,000 @ A4
Coordinate System: GDA94 / MGA z54

ODOUR AND NOISE BUFFER

Buffer Assessment

Princes Highway, Port Fairy, Victoria

Client: Sun Pharmaceutical Industries Australia Pty Ltd

Project: 908.7
Date: 12/08/2022
Revision: RevA
Designed: NW
Drawn: AD
Reviewed: NW

Figure
F6

Appendix A





Fields of Competence

- Lead environmental auditing of landfills and industrial facilities
- Auditing of wastewater facilities and works approvals
- Expert witness and legal representation
- Auditing of environmental management systems
- Contaminated site assessment and remediation
- Environmental improvement plans and pollution reduction programs
- Environmental impact assessment
- Cleaner production and waste minimisation
- EHS management

Experience Summary

Peter has been Managing Director and Principal Consultant of Peter J Ramsay & Associates Pty Ltd since February 1988. He has over 30 years' experience in environmental auditing, pollution control, cleaner production, due diligence audits, environmental management systems and environmental assessment. Peter is a Chartered Professional Engineer and a Fellow of the Institution of Engineers Australia. He is appointed as an Environmental Auditor under the Victorian Environment Protection Act 1970 for both contaminated land and industrial facilities. He is also accredited as a Site Auditor under the New South Wales Contaminated Land Management Act 1997 and is a registered professional engineer in Queensland.

Education

Diploma of Chemical Engineering, RMIT, 1970.

Graduate Diploma of Management, RMIT, 1973.

Master of Environmental Science, Monash University, 1978.

Language Proficiency

(None, Fair, Moderate, Excellent, Native)

- English: Speak/Read/Write - Native/Native/Native

Professional Affiliations and Registrations

- Fellow of the Institution of Engineers Australia (FIEAust).
- Fellow of The Australian Institute of Company Directors.
- Past Chairman of the Environmental Branch, Victorian Division, Engineers Australia, 1987/88.
- Member of Clean Air Society of Australia and New Zealand.
- Member of Australian Water and Wastewater Association.
- Member of Air and Waste Management Association (USA).
- Australian Environment Business Network
- Australian Sustainable Business Group

Key Projects

Lead auditor for environmental audits of Alcoa aluminium smelters, BHP steel mills and manufacturing facilities.

53V Audits of construction of wastewater facilities.

Works approval application for new industrial facilities in Victoria.

Statutory environmental audits of the construction and assessment of design for new landfill cells.

Statutory environmental audits of risk of harm to air, wastes and groundwaters at landfills throughout Victoria.

Expert evidence on separation distance for industrial facilities including landfills.

Auditor verification of monitoring programs at industrial facilities.

Cleaner production and waste minimisation strategies for industries.

Due diligence audits for mergers and acquisitions for major real estate transactions.

Management of Phase I and II environmental assessments of soil and groundwater at large scale industrial facilities.

Air quality management and assessment for industry.

Odour control and impact assessment for industrial facilities ranging from wastewater treatment plants to manufacturing facilities.

Waste to energy projects and greenhouse gas assessments.

Regulatory permitting for new and existing industrial facilities.

Environmental impact assessment for new facilities.

Environmental Health and Safety (EHS) policies and procedures. Preparing and documenting sound EHS management systems.

Hazard and Operability Studies (HAZOPS) to determine regulatory compliance.

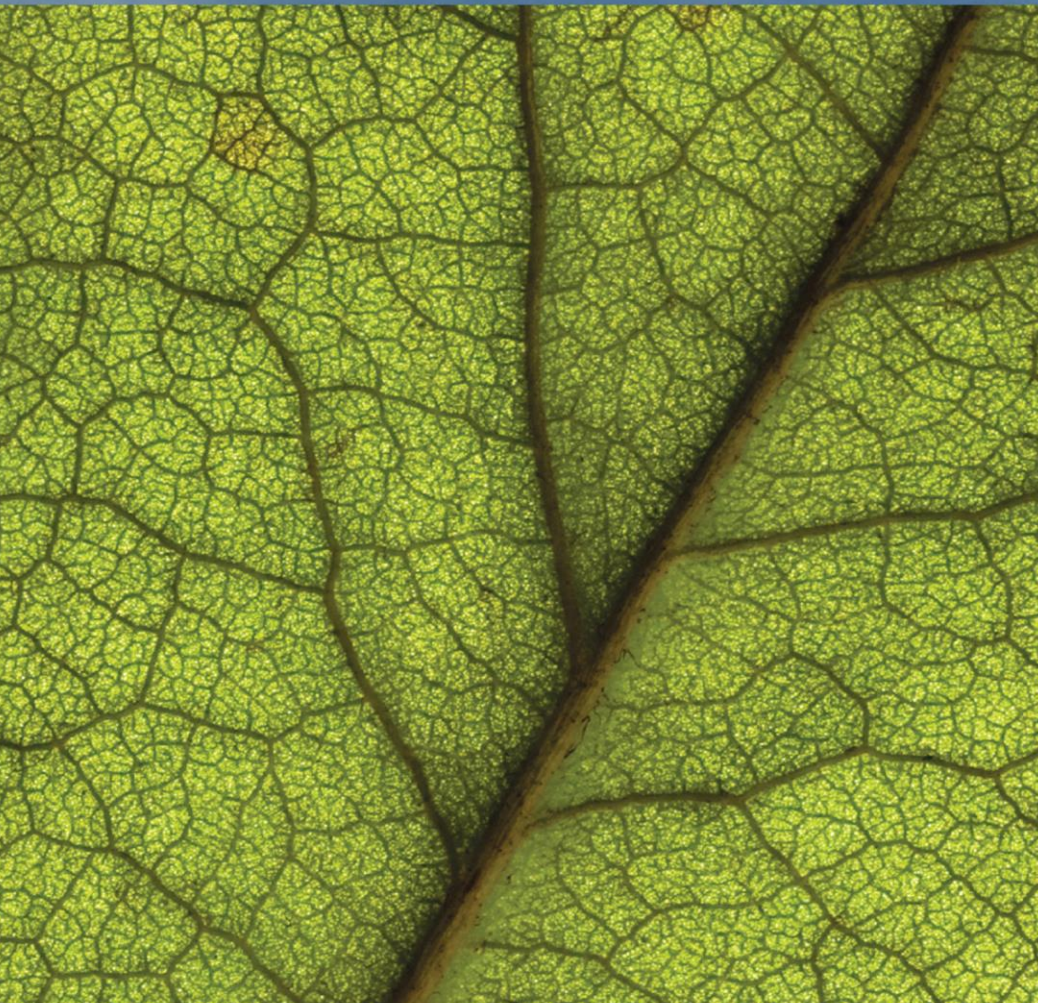
Environmental risk assessment to determine regulatory compliance.

Publications

- Ramsay, P.J. *Sustainable Challenges Facing Business*, Paper presented at the Environment Essentials Conference, Australian Environment Business Network (AEBN), Parkville, 16 September 2004.
- Ramsay, P.J. Property Council of Australia *Guide to Due Diligence*, author of Environmental section of the 2003 (current) edition, Brisbane 2003.
- Ramsay, P.J. Property Council of Australia Publication *Guide to Due Diligence*, Author of Environmental section, Brisbane, 1998.
- Ramsay, P.J. and Van Schoten, M.W. *The Critical Need for Quality Assurance in Contaminated Site Assessment*, Paper presented at the 3rd National Hazardous Solid Waste Convention, Darling Harbour, Sydney, 26-30 May 1996.
- Ramsay, P.J. and Wareham, A.E. *The Role of Buffer Zones in Environmental Management*, Symposium on Siting, Engineering and Management of Hazardous Industries, Institution of Engineers Australia, Melbourne, Australia, 13 and 14 April 1983.
- Ramsay, P.J. *Report on Study: Fluoride Levels in Vegetation and Ambient Air in the Portland Area*, Environment Protection Authority, Publication 148, Melbourne, Australia, 1982.
- Ramsay, P.J. *Stationary Source Control in Victoria: The benefits of Licensing and Monitoring*, 50th Annual Conference of Australian Institute of Health Surveyors, Victoria Division, Moonee Valley, Melbourne, Australia, 22 May 1981.
- Ramsay, P.J. *Air Pollution Control of Aluminium Smelters in North America. A Review of Emission Limits and Control Strategies for Aluminium Smelters in North America with implications for Victoria*, Environment Protection Authority, Publication 114, Melbourne, Australia, 1980.
- Hulme, J. and Ramsay, P. *Industrial Pollution and Community Attitudes*, Monash University. Victoria, Australia, 1978



Appendix B



Our ref: **REA:20220600**
Your ref:

Direct dial: 9321 7832
Direct email: randerson@rigbycooke.com.au
Page: 1/5

26 July 2022

Peter Ramsay
Peter J Ramsay & Associates
Level 10, 222 Kings Way
SOUTH MELBOURNE VIC 3205

By Email: peter.ramsay@pjra.com.au

Dear Peter

195 and 199 Princes Highway, Port Fairy Planning Scheme Amendment C69moyn

We act for Sun Pharmaceutical Industries (Australia) Pty Ltd (**Sun Pharma**) the owner of land at 195 and 199 Princes Highway, Port Fairy (**Land**).

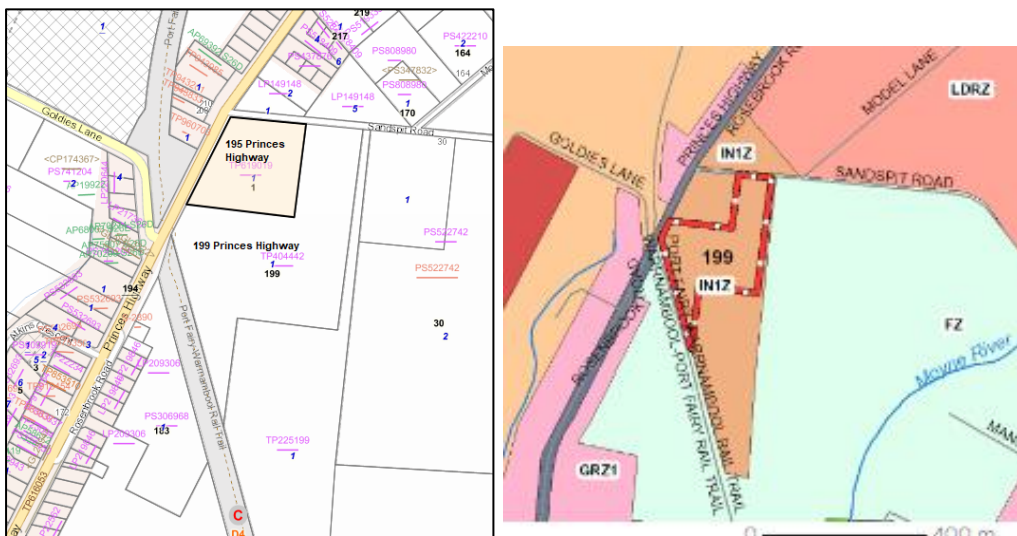
Sun Pharma is a submitter to Amendment C69 to the Moyne Planning Scheme (**Scheme**).

We are instructed to request you prepare a witness statement and present expert evidence at a panel hearing before Planning Panels Victoria listed for the following dates:

- Hearing from **5 September 2022 until 16 September 2022**.

Land and Planning Controls

The Land comprises two lots.



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Your ref:

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195 Princes Highway is zoned Industrial 1 Zone (**IN1Z**) and is affected by a Design and Development Overlay Schedule 21 (**DDO21**).

199 Princes Highway is zoned IN1Z and is affected by DDO21, it is also partially affected by a Land Subject to Inundation Overlay Schedule 2 (**LSIO2**) along the eastern boundary.

A map of the Sun Pharma operations is included in Tab 10 of your brief of materials.

Sun Pharma Operations

Sun Pharma manufactures starting materials for opiate based pain relief medicines (Narcotic Raw Materials). The Poppies are grown in Tasmania and transported to the Land and the opiates are extracted. Sun Pharma produce 4 opiates – Morphine, Codeine, Thebaine and Oripavine.

Our client produces approx. 25 – 35 percent of the global supply of opiate based pain relief medicines.

As the operations of Sun Pharma produce less than 2,000 tonnes per annum, a separation distance under the EPA publication 1518 does not apply. The EPA made a submission during the exhibition periods of Amendment C69. The EPA Submission communicated “that a pre-determined separation distance in accordance with EPA Publication 1518 does not apply to the Sun Pharma site” (See Tab 9 of your brief of materials).

Poppies are a controlled substance and the processing of poppies requires licences from Federal and State Governments. We are instructed that the licences include strict requirements such as:

- physical security
- product security
- selection and screening of personnel and contractors
- transport security

Sun Pharma is also accredited under the Known Consignor Scheme and signs its own aviation security clearance certificates which means that the air cargo flows through the airport security with minimal delays. As part of the accreditation process the location of the Land is risk assessed.

Sun Pharma employ approximately 120 staff and utilise local businesses.

Amendment C69

In August 2018, Moyne Shire Council (**Council**) adopted the Port Fairy Coastal and Structure Plan (**PFCSP**). In conjunction with the PFCSP, Council prepared Amendment C69 to the Scheme to implement the land use and development framework of the PFCSP. (see Tab 3 of your brief of materials).

Amendment C69 proposes to (among other things):

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Your ref:

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- (a) Rezone land in the Farming Zone (FZ), Low Density Residential Zone (LDRZ) and one site in the Industrial 1 Zone (IN1Z) around Belfast Lough and outside the town settlement boundary to the Rural Conservation Zone (RCZ2).
- (b) Apply a Development Plan Overlay (DPO4) to Growth Area A and part of Growth Area B identified in the Structure Plan.
- (c) Replace the existing 19 Design and Development Overlays with seven (7) Design and Development Overlays to areas identified in the Structure Plan.
- (d) Apply an Environmental Significance Overlay (ESO7) to a 500 metre buffer around the Wannon Water – Port Fairy Water Reclamation Plant.
- (e) Introduce a Land Subject to Inundation Overlay (LSIO4) and Floodway Overlay (FO3) to the Port Fairy Township to identify areas subject to coastal inundation and a 1.2 metre sea level rise as per the findings of the Translation of Port Fairy Coastal Hazard Assessment (Cardno, 2019).

Sun Pharma Submissions

On 13 July 2020, Chris Quadroy, Head of Environment Health Safety (EHS), Supply Chain & Customer Service at Sun Pharma prepared a submission (see **Tab 5, Doc A** of your brief of materials). We also refer you to the submission dated 15 June 2020 on behalf of Rivers Run Estate in relation to the residential development of the adjoining site (submission 69) (see **Tab 5, Doc D** of your brief of materials).

On 31 January 2021, Raph Krelle of Centrum Town Planning, lodged a further submission on behalf of Sun Pharma (see **Tab 5, Doc B** of your brief of materials). Note reference is made in this submission to a Buffer Assessment prepared by yourself dated 28 June 2021 which had been provided to Council. (see **Tab 5, Doc C** of your brief of materials).

Sun Pharma's submissions propose inclusion of the Land in an ESO (as was previously proposed to be applied to the Wannon Water Port Fairy Water Reclamation Plant) to manage future encroachment from neighbours and to ensure new land use and development (on the adjoining industrial zoned land proposed to be rezoned to Rural Conservation) does not compromise Sun Pharma's operations.

The EPA also made a submission and stated "that a pre-determined separation distance in accordance with EPA Publication 1518 does not apply to the Sun Pharma site" (See **Tab 9** of your brief of materials).

Council Review of Submissions

On 1 March 2022, Council considered the submissions at the Ordinary Council Meeting and resolved to abandon parts of the Amendment relating to the application of the Parking Overlay (PO) to the commercial town centre, and the application of the Environmental Significance Overlay (ESO) to the Wannon Water Port Fairy Water Reclamation Plant, and to refer the remaining submissions to a Planning Panel. (see **Tab 6, Docs A & B** of your brief of materials).

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Your ref:

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Amendment C75 – Rivers Run Estate

Sun Pharma has also lodged a submission to the proposed Amendment C75 – Rivers Run Estate. Amendment C75 relates to an application received by Council in June 2021 under section 96A of the Planning and Environment Act 1987 from the owner of land at 169A and 183 Princes Highway, Port Fairy (**Rivers Run Land**), located south-west of the Land (see image below).



Amendment C75 includes:

- (a) a request for a planning scheme amendment to:
 - (i) Rezone the land from the Farming Zone and General Residential Zone to the Neighbourhood Residential Zone; and
 - (ii) Apply a Development Plan Overlay.
- (b) an application for a planning permit to enable earthworks to be undertaken (cut and fill), subdivide land into 75 lots and construct 10 dwellings on a lot (on proposed Lot 20).

RIGBY COOKE LAWYERS

Our ref: **REA:20220600**
Your ref:

Letter to: Peter Ramsay
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On 31 January 2021, Raph Krelle of Centrum Town Planning, lodged a submission on behalf of Sun Pharma. (see **Tab 8, Docs B & C** of your brief of materials). The key issue is concerns surrounding limiting sensitive uses in close proximity (50 metres from the Sun Pharma Land).

Amendment C75 is currently on hold.

Instructions

You are instructed to prepare a witness statement within the scope of your expertise, and express your opinion as to whether the Amendment is appropriate having regard to:

- any regulatory framework applicable to the proposal which is within your expertise to examine and comment on;
- your own judgement and experience; and
- any other matter which you regard as relevant to the formulation of your opinion, stating clearly the basis of your views.

Expert evidence should be completed by **Friday, 12 August 2022** and is due for circulation by **12:00pm Friday, 19 August 2022**.

Client Details

The client will be directly responsible for the payment of your fees and any disbursements.

Please send your fee proposal and all invoices to

Attention: Chris Quadroy
Sun Pharmaceutical Industries (Australia) Pty Ltd
PO Box 163
PORT FAIRY VIC 3284
chris.quadroy@sunpharma.com

If you have any questions, please contact Rhodie Anderson on 9321 7832 or Michael Pavlidis on 9321 7821.

Yours faithfully



Rigby Cooke Lawyers

Appendix C



The background features a large, faint, light gray watermark of a stylized 'P' or 'D' shape. Overlaid on this are several geometric elements: a large purple circle with a blue outline and a red outer ring in the top right; a smaller circle with a purple center, a green ring, and a blue outline in the middle right; and a large blue circle with a light blue ring in the bottom right. A thin blue line extends from the top left towards the purple circle, and a thin gray line extends from the top left towards the bottom right.

AERMOD ready Meteorological data files for Port Fairy- VIC

This file was exclusively compiled
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pDs Consultancy
@1999-2022



pds





INTRODUCTION

New generation regulatory model AERMOD requires hourly averaged meteorological data from a single site that is preferably within the model domain ('on-site' or site-specific data). However, data from the nearest 'off-site' meteorological station can be used when on-site data are not available, and the off-site data are representative of the area of concern (i.e. the meteorological parameters as well as surface characteristics characterise the transport and dispersion conditions of the location in question).

It is also preferable that:

- The compilation of the input meteorological data file is done in accordance with 'best practice', with procedures and algorithms recommended or set by environment regulators/US & VIC EPA.

pDs Consultancy has been engaged by **PJRA** to compile an 'AERMOD-ready' meteorological files for an application site in **Port Fairy** in Victoria. **Port Fairy weather station** (maintained by BoM Australia) data found to be representing this application site.

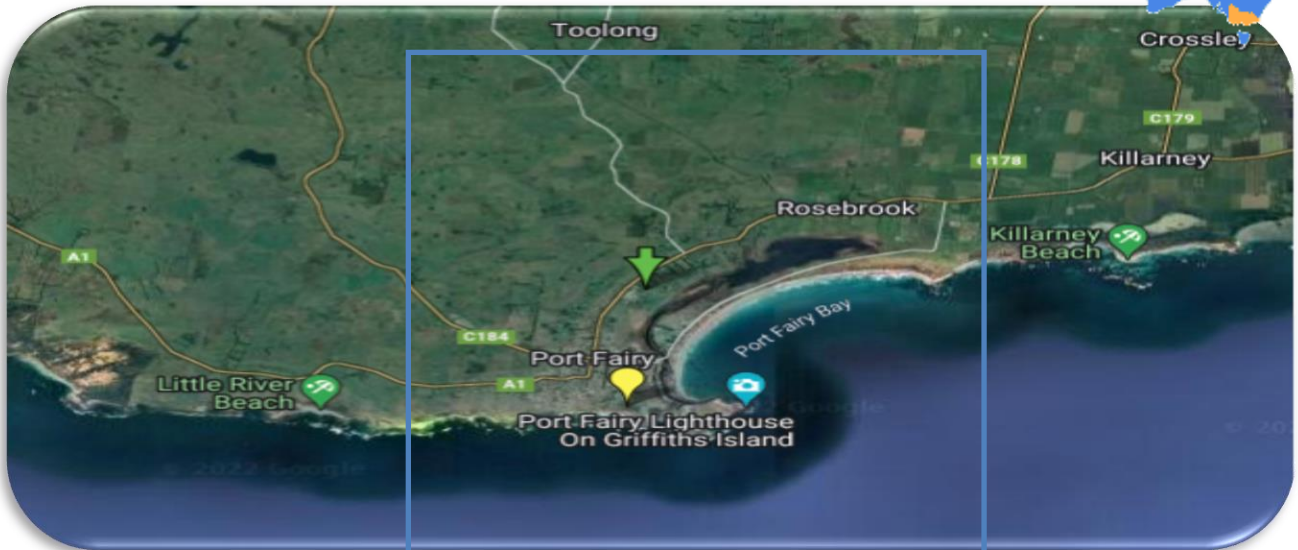
This input meteorological data files have been compiled basically following the EPA, Victoria's draft guidelines: "Construction of input meteorological data files for EPA Victoria's regulatory air pollution model (AERMOD) (Publication No.1550)".



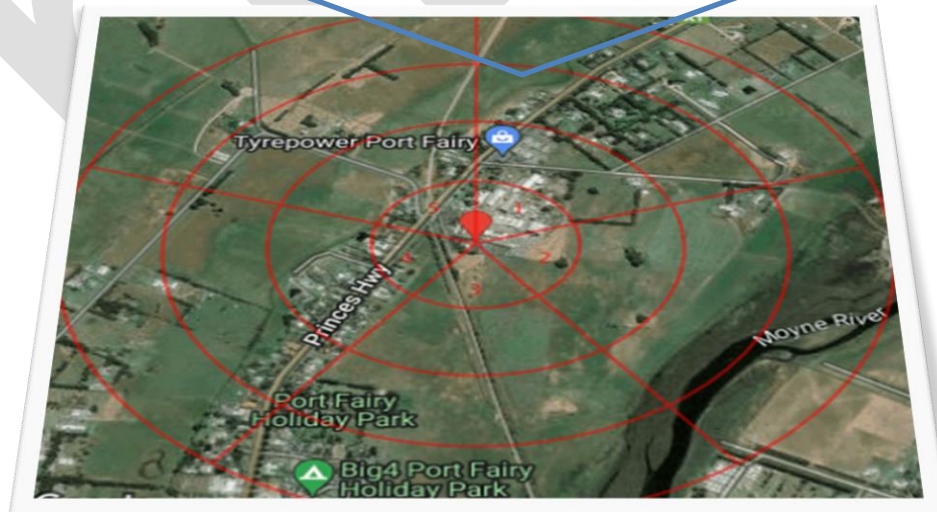


LOCATIONS OF THE APPLICATION SITE AND THE DATA SITE: PORT FAIRY, PORT FAIRY VIC

Green down arrow showing application site, yellow place holder showing the met station



Application site is within 4 KM radius of the data site





Data Processing

Input Information

Data Used for the compilation

Meteorological Data

1. Mandatory Data (Site-Representative, Port Fairy)

- i. 10m Wind Direction and Speed
- ii. Ambient Temperature (Screen Level)

2. Supplementary data (Port Fairy)

- i. Surface Pressure
- ii. 3 Hourly Cloud observations (Warrnambool)
- iii. Relative Humidity
- iv. Rainfall Rate

3. Upper air Data (BoM's Mt. Gambier Airport)

- i. Pressure Levels
- ii. Geopotential Heights
- iii. Temperature
- iv. Dew Point



Data Source

- National Climate Centre, Bureau of Meteorology, Melbourne for all 3 types of data
- Data Source: Port Fairy, Warrnambool and Mt Gambier, VIC
- Period :1 Jan 2016 to 31 Dec 2020 (5 years)

QA/QC ON RAW DATA

- I. Hourly averaged winds both direction and speed and temperature examined for gaps and wind stalls
 - Suspected wind stalls (both wind direction and speed) removed and filled appropriately preserving the temporal consistency.
 - Note that BoM Syncrotec Anemometer's lowest detection limit of wind speed is 2 KM/Hour (Wind Speed Threshold)
- II. Small gaps filled with pervious or following hour records
- III. Days with big gaps removed maintaining 90% data recovery
- IV. Parameters QA/QCed based on extreme values
- V. Gaps in vertical temperature profiles were filled with previous or following day data for the completeness.
 - Upper air data for 2018 has of lots of gaps therefore Melbourne data was used for 2018.



METSITE INFORMATION

pDsAUSMET - E:\pDs\MyAUSMET\PortFairy_PIRA\2016\PortFairy.xml

File Input Files Site Info Output Files Create AERMOD Create AUSPLUME QA/QC Format About

Surface Met Site Met Sites' Info.

Site IDs

UA ID: 0099 UA Station: Mt.Gambier

SF ID: 0011 SF Station: Warrnambool

OS ID: 0022 OS Station: PortFairy

Ref Heights

Wind: 10 Temperature: 2

Auxiliary Parameters

PCode: 11 VPTG: 0.005 Wind Threshold: 0.6

Maximum CBL: 3000 Minimum CBL: 50

Daylight Savings

☒ Apply Daylight Savings Offset to Sunset and Sunrise

Beta options

☐ Apply u* Adjustment

Station Info

BoM ST

DATA COVERAGE:

Year	2016	2017	2018	2019	2020
Season	Coverage %				
Summer	100	98	81	96	100
Autumn	100	100	98	100	100
Winter	100	100	91	100	100
Spring	93	100	100	100	100
Annual	98.4	99.7	92.9	99.2	100

Annual coverage is > 90%. It is meeting regulatory requirement (90% or better). Seasonal coverage is also meeting the requirement.





DETERMINATION OF SURFACE CHARACTERISTICS

All available surface maps including google maps examined to determine correct land use categories within 10 Km by 10 KM area centring the application site.

Albedo and **Bowen ratio** were determined using land use categories shown below.

pDsAUSMET - E:\pDs\MyAUSMET\PortFairy_PIRA\2016\PortFairy.xml

File Input Files Site Info Output Files Create AERMOD Create AUSPLUME QA/QC Format About

Surface Met Site **Met Sites' Info.**

Address: Sandspit Road, Port Fairy Locate

Latitude: -38.368 Longitude: 142.235 Time Zone: 9 109 Rainy Days Data Find

Northing: 5752594.823 Easting: 607872.890 UTM Zone: 54 Average Rainy Days: 0

Roughness **Albedo** **Bowen**

Number of sectors: 1

	Summer	Autumn	Winter	Spring
Land Use	0.5144	0.7421	0.7421	0.6093

Land Use Categories in a Sector

Land Use Category	Summer	Autumn	Winter	Spring
<input checked="" type="checkbox"/> Industrial/Commercial	1.5000	1.5000	1.5000	1.5000
<input checked="" type="checkbox"/> Low intensity Residential	0.8000	1.0000	1.0000	0.8000
<input checked="" type="checkbox"/> Shrub land (Non-Arid F	1.0000	1.5000	1.5000	1.0000
<input checked="" type="checkbox"/> Deciduous Forest	0.3000	1.0000	1.0000	0.7000
<input checked="" type="checkbox"/> Open Water	0.1000	0.1000	0.1000	0.1000
<input type="checkbox"/> Industrial/Commercial	1.5000	1.5000	1.5000	1.5000

Wetness: Normal Ok Cancel

10km x 10km Google Earth Hybrid All sectors same All seasons same





SURFACE ROUGHNESS

Sector dependent surface roughness was determined considering 5 sectors.

The roughness for each sector was determined professionally examining 4 arc segments (250m).

pDsAUSMET - E:\pDs\MyAUSMET\PortFairy_PJRA\2016\PortFairy.xml

File Input Files Site Info Output Files Create AERMOD Create AUSPLUME QA/QC Format About

Surface Met Site **Met Sites' Info.**

Address: Sandspit Road, Port Fairy Locate

Latitude: -38.368 Longitude: 142.235 Time Zone: 9 109 Rainy Days D:

Northing: 5752594.823 Easting: 607872.890 UTM Zone: 54 Average Rainy Days: 109 Normal

Roughness **Albedo** **Bowen**

Number of sectors: 5

	Summer	Autumn	Winter	Spring
1 Land Use	0.7293	0.7293	0.6746	0.7059
2 Land Use	0.3000	0.3000	0.3000	0.3000
3 Land Use	0.3044	0.3044	0.3000	0.3044
4 Land Use	0.3878	0.3878	0.3000	0.3878
5 Land Use	0.3000	0.3000	0.3000	0.3000

1km x 1km Google Earth Hybrid All sectors same All seasons same





The following parameters were determined/computed following EPA, VIC and US EPA guidelines.

Sensible Heat flux –Calculated based on cloud observations

- I. Friction Velocity (U^*)
- II. Monin–Obukhov Length (L)
- III. Height of the Stable Boundary Layer(SBL)
- IV. Vertical Velocity Scale (W^*)
- V. Height of the Convective Boundary Layer (CBL)

Mixing height (Convective)–CBL

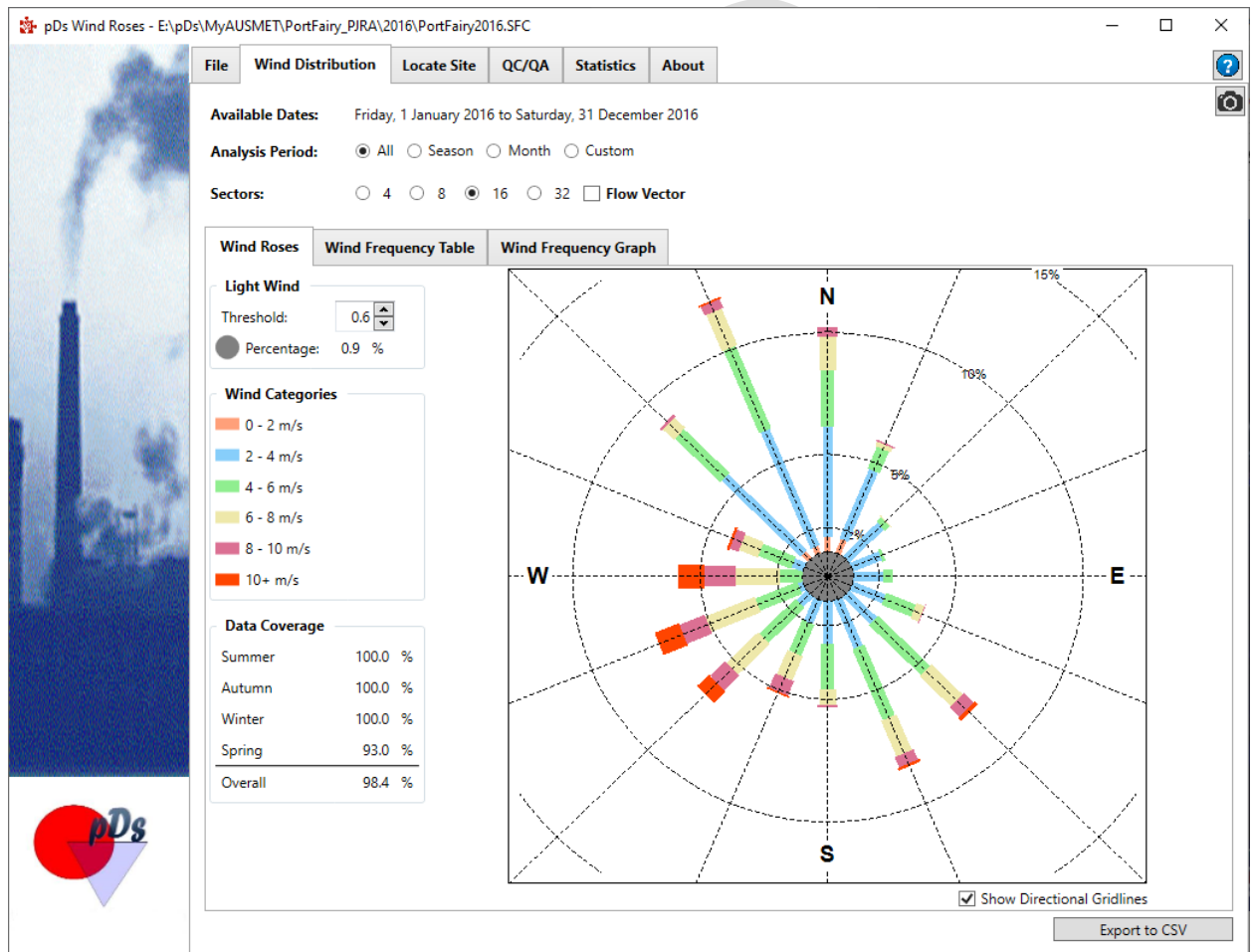
DEFINITION:

The convective mixing height, the depth of the surface mixed layer is the height of the atmosphere above the ground, which is well mixed due either to mechanical turbulence or convective turbulence. This height was determined by using the methodology of Benkley and Schulman (Journal of Applied Meteorology, Volume 18, 1979, pp 772–780). **Mt Gambier Airport** upper air observation containing temperature and moisture profiles and surface temperature, pressure and relative humidity at **Port Fairy** were used to determine daytime mixing height.



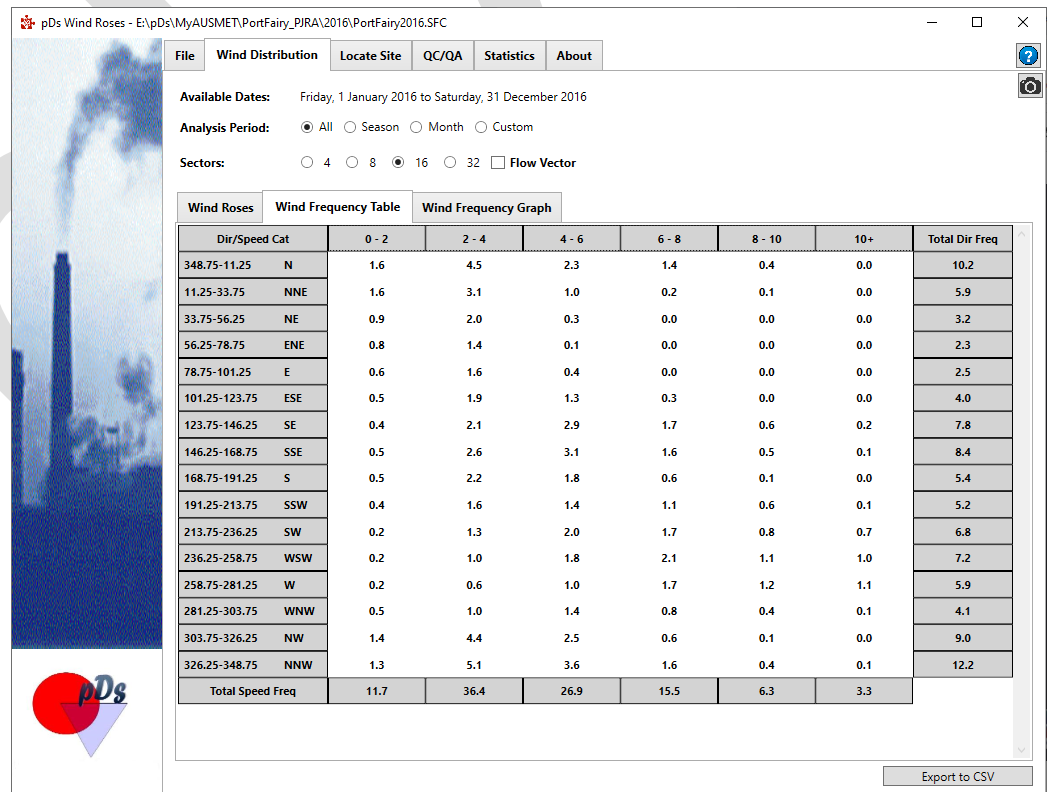
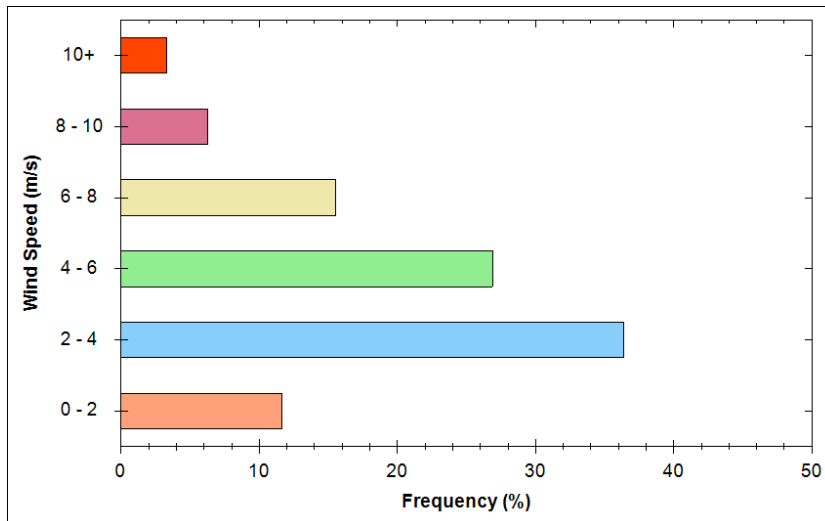
DATA ANALYSIS

ANNUAL WINDROSES FOR PORT FAIRY-2016-BASE YEAR





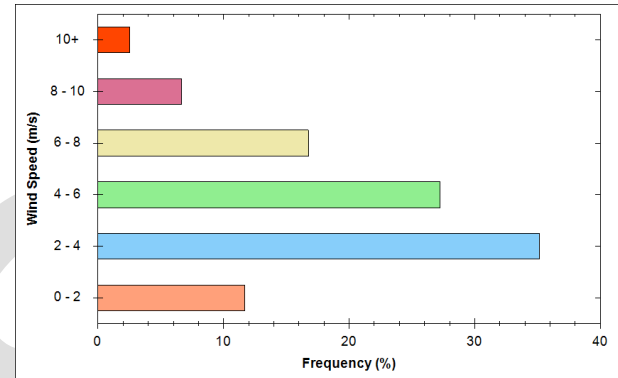
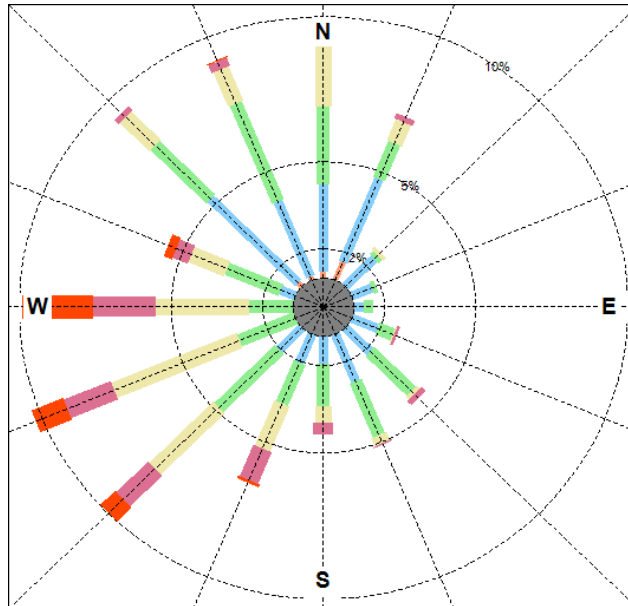
FREQUENCY OF WIND SPEED



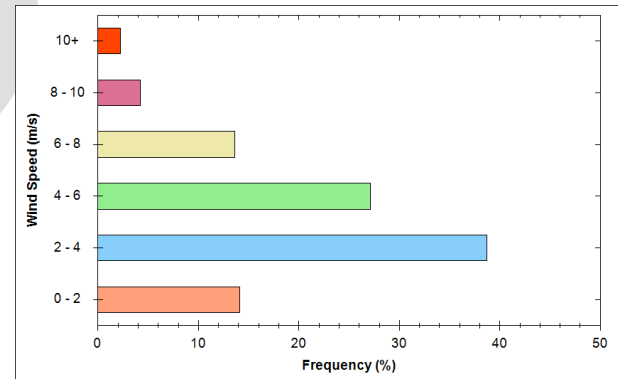
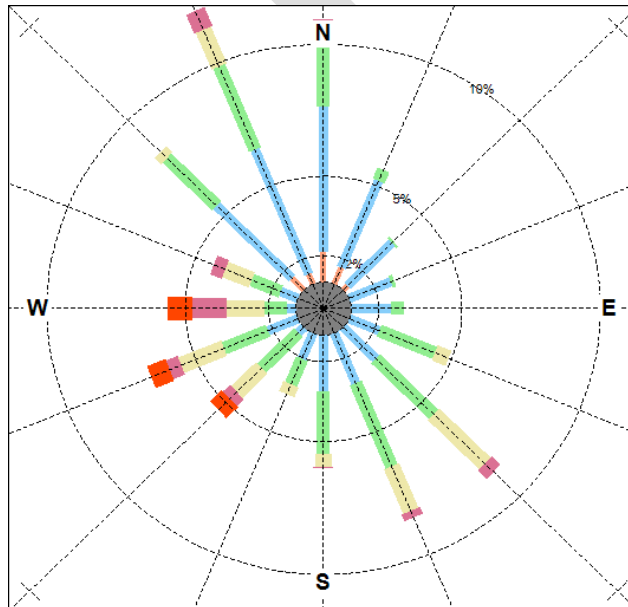


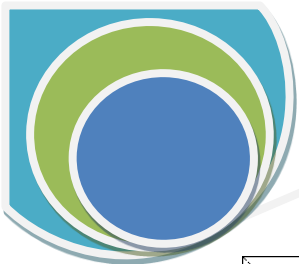
SEASONAL WINDROSES

Summer

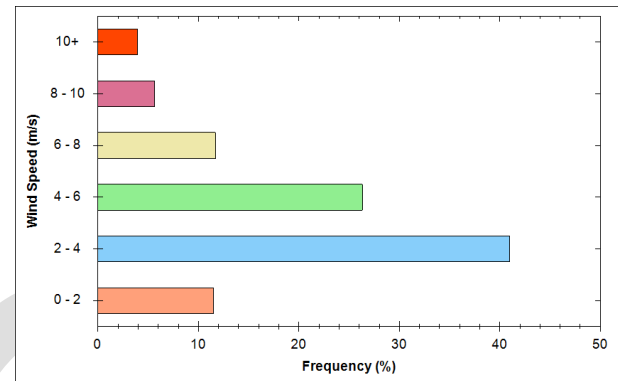
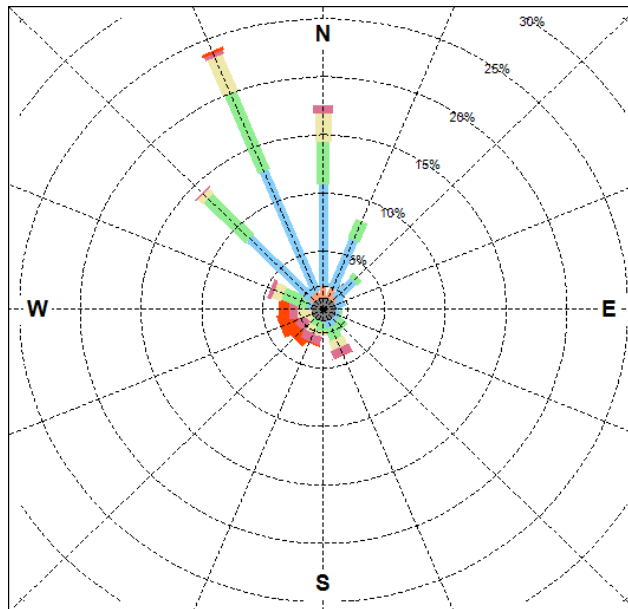


Autumn

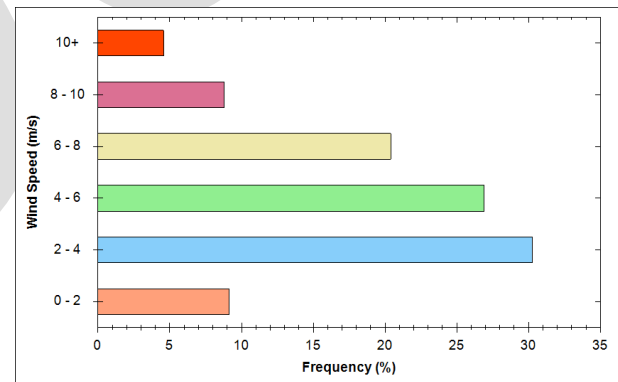
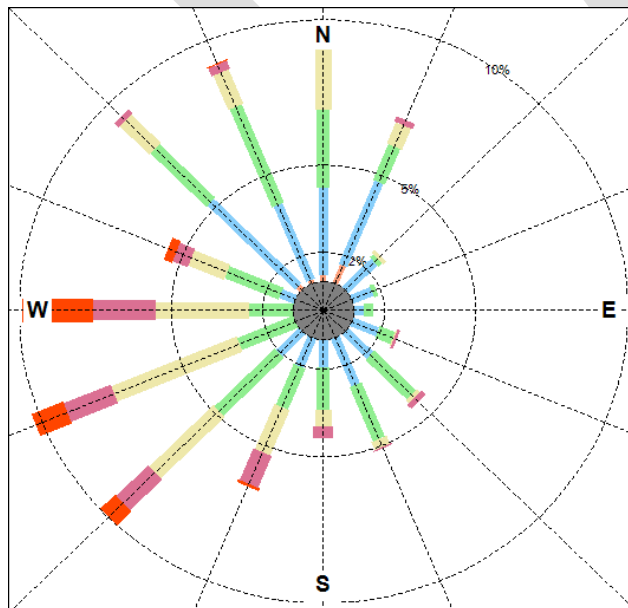




Winter



Spring

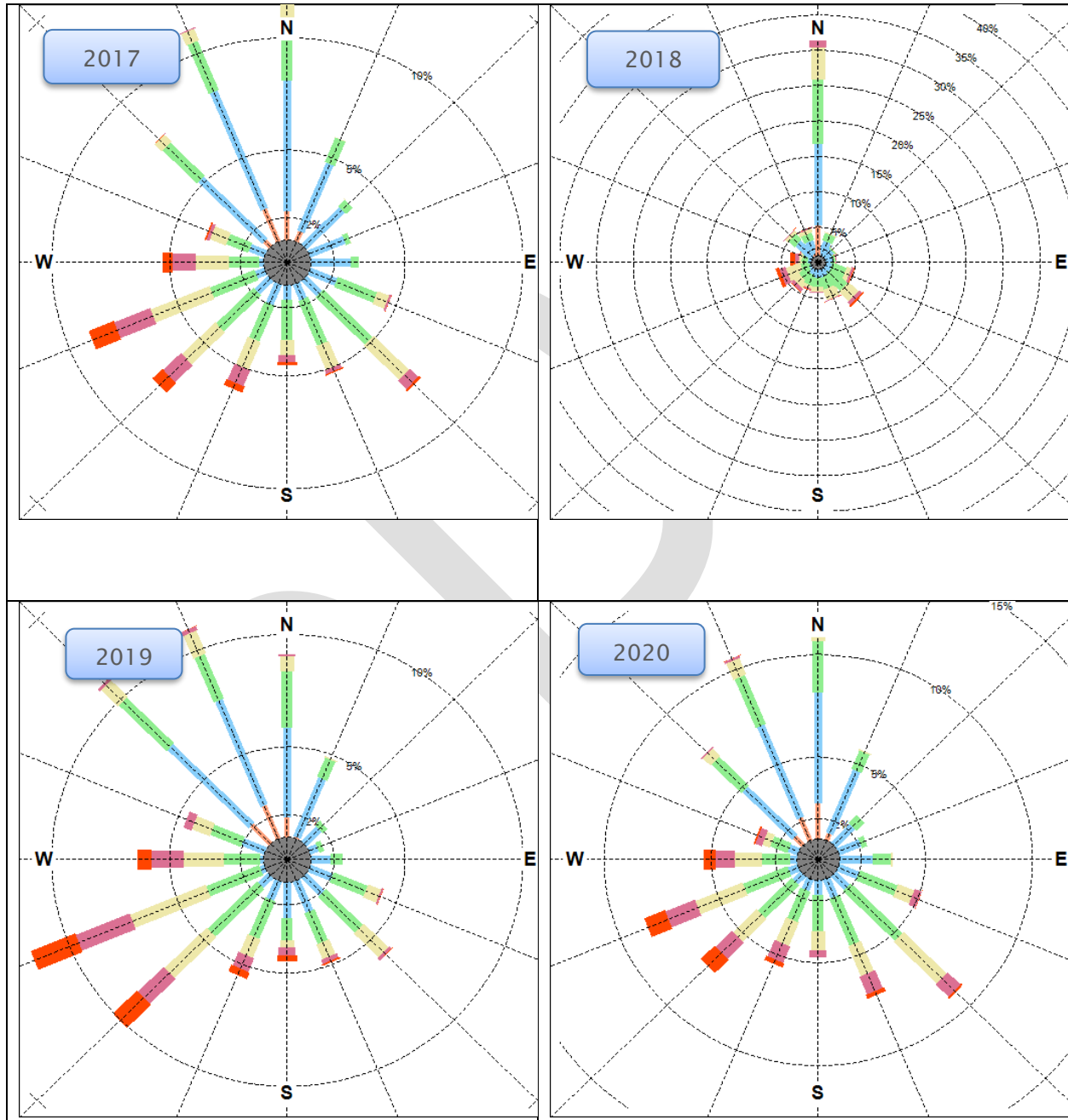


Seasonal variations are clearly depicted.

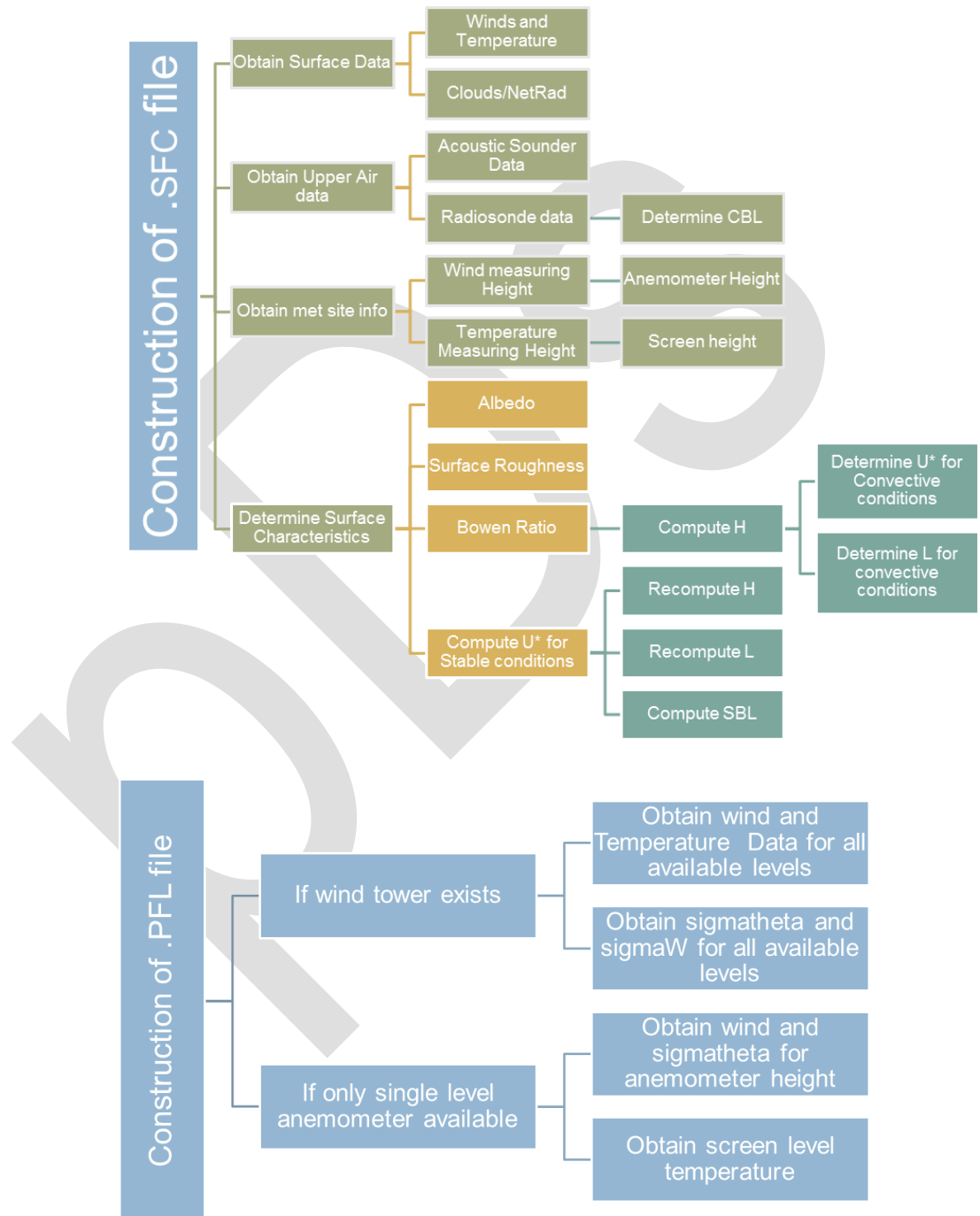




ANNUAL WINDROSES FOR PORT FAIRY-2017-2020



FLOW CHARTS - CONSTRUCTION PROCEDURE





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USEPA, 2000, Meteorological Monitoring Guidance for Regulatory Modelling Applications, EPA-450/R-99-005. United States Environmental Protection Agency, Washington DC, USA.

USEPA, Office of Air Quality Planning and Standards, AERSURFACE User's Guide, Research Triangle Park, North Carolina, EPA 454/B-08-001

USEPA, Office of Air Quality Planning and Standards, User's Guide for the AERMOD Meteorological Processor (AERMET) and Addendum, Research Triangle Park, North Carolina, EPA 454/B-03-002.





DISCLAIMER

Compilation of input meteorological data files for AERMOD was done under the supervision of qualified and experienced meteorologists. Although all due care has been taken, we cannot give any warranty, nor accept any liability (except that required by law) in relation to the information given, its completeness or its applicability to a particular problem. These data and other material are supplied on the condition that you agree to indemnify us and hold us harmless from and against all liability, losses, claims, proceedings, damages, costs and expenses, directly or indirectly relating to, or arising from the use of or reliance on the data and material which we have supplied.

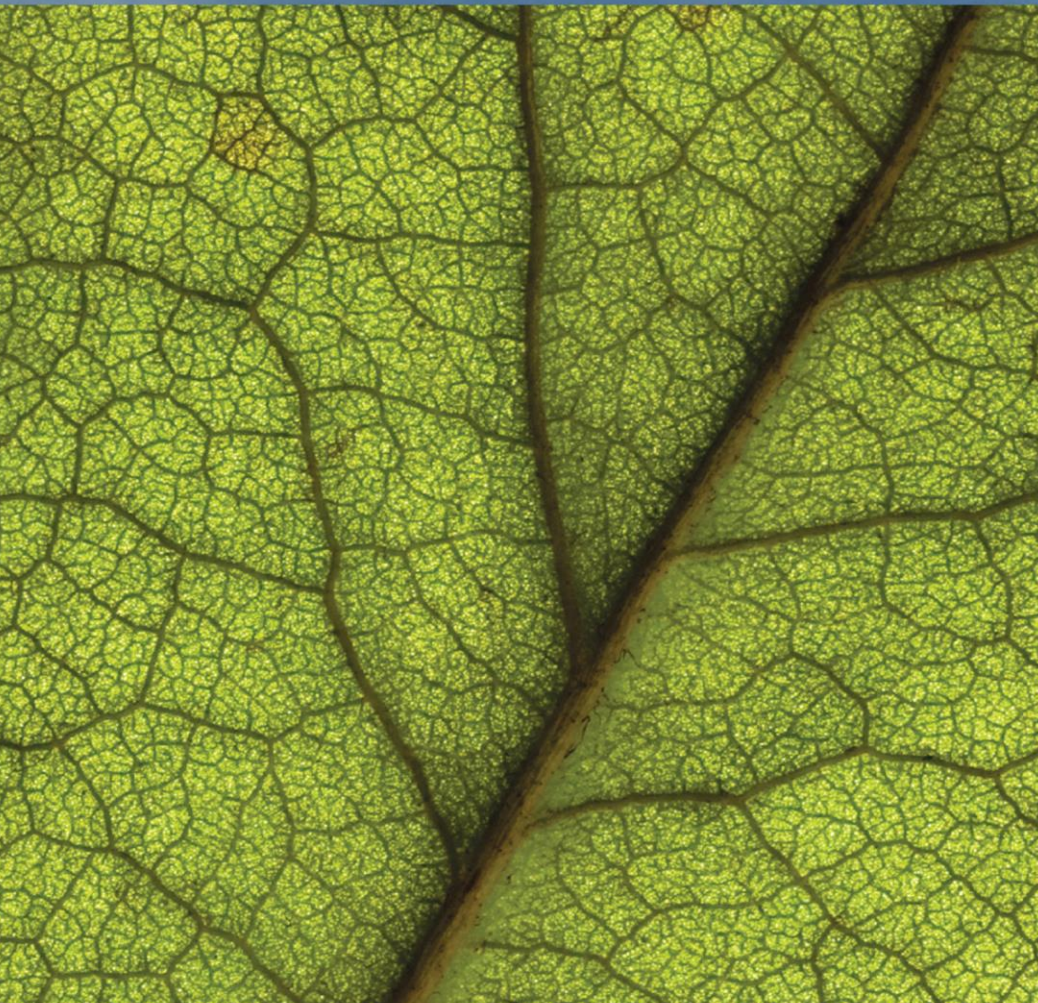
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Appendix D



Sun Pharmaceuticals

EHS Management System

601.04.01 Public Complaints Summary

EHS Manager Incident	Date of Incident	Year	Description	Count	Odour Attributed To	
HSIN211	17-Apr-08	2008	Noise	1	Water Extraction	
HSIN352	04-Dec-08	2008	Noise	1	Water Extraction	
HSIN383	10-Feb-09	2009	Noise	1	Water Extraction	
HSIN405	11-Apr-09	2009	Odour	1	Lime Dust	
HSIN441	22-Jun-09	2009	Noise	1	Water Extraction	
HSIN495	10-Oct-09	2009	Noise	1	Nitrogen Alarm	
HSIN517	28-Oct-09	2009	Dust	1	Water Extraction	
HSIN516	18-Nov-09	2009	Odour Solvent	1	Bio-Scrubber	
HSIN519	19-Nov-09	2009	Odour	1	Water Extraction	
HSIN533	04-Dec-09	2009	Odour	1	Water Extraction	
HSIN575	26-Feb-10	2010	Odour Solvent	1	Bio-Scrubber	
HSIN574	05-Mar-10	2010	Odour Solvent	1	Bio-Scrubber	
HSIN583	22-Mar-10	2010	Odour	1	Water Extraction	
HSIN588	01-Apr-10	2010	Odour Solvent	1	Bio-Scrubber	
HSIN598	20-Apr-10	2010	Odour Solvent	1	Bio-Scrubber	
HSIN668	03-Oct-10	2010	Noise	1	Thebaine 2	
HSIN677	15-Oct-10	2010	Odour	1	Noscapine	
HSIN695	28-Oct-10	2010	Odour	1	Noscapine	
HSIN693	29-Oct-10	2010	Light	1	Thebaine 2	
HSIN739	07-Dec-10	2010	Noise	1	Thebaine 2	
HSIN742	24-Jan-11	2011	Light	1	Thebaine 2	
HSIN740	02-Feb-11	2011	Noise	1	Thebaine 2	
HSIN741	17-Feb-11	2011	Noise	1	Thebaine 2	
HSIN878	22-Oct-11	2011	Odour Unconfirmed	1	Not Confirmed	
HSIN973	01-Mar-12	2012	Odour Unconfirmed	1	Not Confirmed	
HSIN950	13-Mar-12	2012	Odour Unconfirmed	1	Not Confirmed	
HSIN959	14-Mar-12	2012	Trade Waste Odour	1	Trade Waste	
HSIN961	16-Mar-12	2012	Trade Waste Odour	1	Trade Waste	
HSIN964	19-Mar-12	2012	Noise	1	Thebaine 2	
HSIN980	01-Apr-12	2012	Odour Unconfirmed	1	Not Confirmed	
HSIN981	13-Apr-12	2012	Noise	1	Thebaine 2	
HSIN1108	08-Dec-12	2012	Noise	1	Scissor Lift?	
HSIN1109	13-Dec-12	2012	Noise	1	Forklift Reversing	
HSIN1107	09-Jan-13	2013	Noise	1	Scissor Lift	
HSIN1107	09-Jan-13	2013	Noise	1	Emergency Alarm Testing	
HSIN1107	09-Jan-13	2013	Noise	1	Steam Venting	
	11-Oct-15	2015	Trade Waste Odour	1	Trade Waste	Calamity Tank
	18-Oct-15	2015	Noise	1	Water Extraction	Upstairs Vacuum Pumps
	25-Oct-15	2015	Odour Solvent	1	Bio-Scrubber	via EPA followng rebuild
	02-Feb-16	2016	Traffic	1	External supplier deliveries	
Refer Velocity	07-Mar-18	2018	Trade Waste Odour	1	Trade Waste	Temperature diversion to Calamity Tank.
Refer Velocity	07-Mar-18	2018	Noise	1	Water Extraction	Mufflers on Drum Filter Vacuum Pumps. Internal packing fouled.
Refer Velocity	15-Oct-20	2020	Odour Unconfirmed	2	Not Confirmed	
Refer Velocity	10-Feb-21	2021	Noise	1	Bulk gas delivery CO2 Pressure Relief Valve	
Refer Velocity	04-Jun-21	2021	Odour Unconfirmed	1	Not Confirmed	
Refer Velocity	08-Feb-22	2022	Trade Waste Odour	1	Noted by CQ following diversion to the on site Calamity Tank.	Escalated for action.

Appendix E



6 August 2012

640.01517 Atkins Cr 20120803.docx

Glaxo Smith Kline
PO Box 163
Port Fairy, Vic. 3284

Attention: Mr. Chris Quadroy

Dear Chris,

Environmental noise assessment to 5 Atkins Crescent

1 Introduction

Recent concerns of excessive noise from the Glaxo Smith Kline factory has been received from a resident at 5 Atkins Crescent, Port Fairy. The resident is located approximately 270m south-west from the factory boundary as shown in **Figure 1**. They have complained of tonal noise from the factory during day time and night time periods.

SLR Consulting Australia Pty. Ltd. was retained to measure the level of noise at the residence and determine the main sources of noise from the factory.

2 Measurement procedure

Noise measurements were carried out on the night of Tuesday 31 July 2012 between 2200h and 2400h. Weather conditions during the period were a light to moderate south-east breeze and no rain. This wind direction was not favourable for the propagation of noise from the factory to the residence but neither was it in the opposite direction.

Various suspected items of plant were switched off together and then switched on individually in an effort to identify the contributing sources of plant and measure their level of noise and frequency. This procedure was not able to be followed exactly as planned since some items of plant could not operate without also operating other associated plant items.

Noise measurements were carried out in the vacant block on the north side of no. 5 Atkins Crescent at a height of 1.5m above the ground, 12m north of the boundary fence and 18m west of the other boundary fence. This position was considered representative of the noise to 5 Atkins Crescent, and avoided any significant reflections from the dwelling.

Noise measurements were also carried out at three positions around the boundary of the factory and locally around the suspected items of plant. The three boundary positions are indicated in **Figure 1** below as the SW carpark of the factory, 208 Princes Highway (being the closest residence), and the north gate on Sandspit Road.

Noise measurements were carried out with a Type 1 Rion NA27 sound level meter which was checked for correct calibration before and after measurements were made. Digital recordings were taken during the measurements for post-measurement analysis.

Figure 1 Locality map

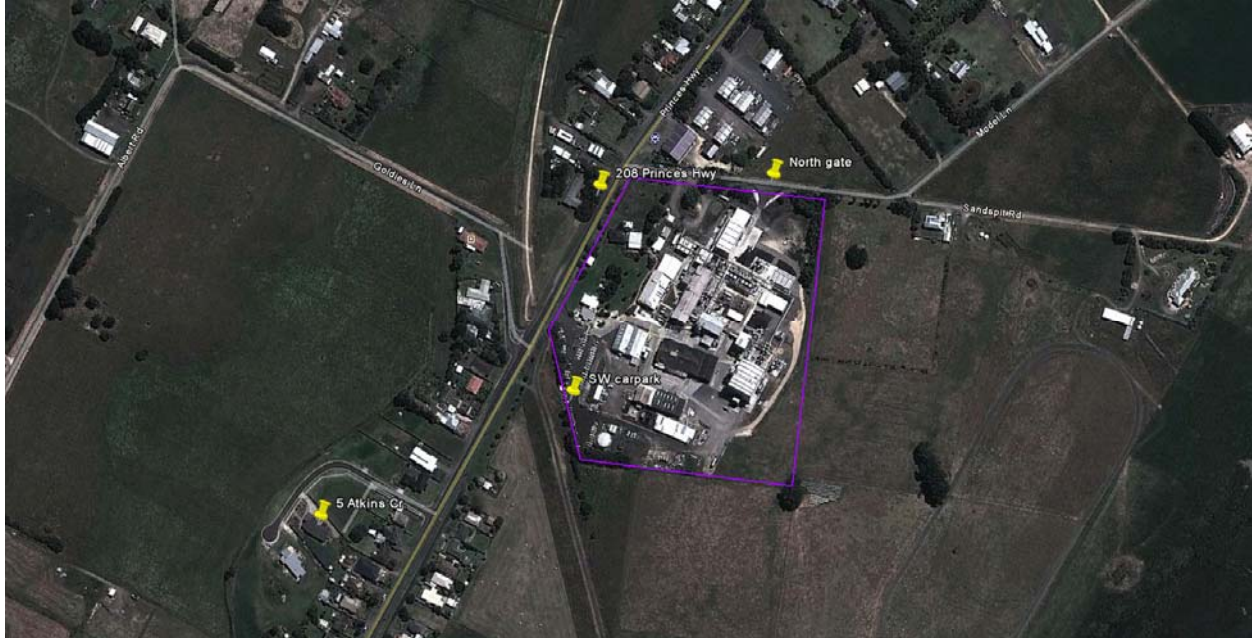


Image courtesy of Google Earth

3 EPA noise limit

The Environment Protection Authority (EPA) does not have an enforceable policy on noise from industry in regional Victoria.

A recently introduced guideline titled "Noise from Industry in Regional Victoria" (NIRV), publication 1411 October 2011, has been provided by the EPA to determine recommended maximum noise levels for industries in regional areas. It uses land use zonings as a basis for establishing recommended noise levels at residential receivers. There are adjustments that can be made to the recommended noise level due to high background noise, multiple industries, distance from the industry zone, and where the industry is an extractive type industry.

There are separate recommended noise levels for the day, evening and night periods defined as follows.

Day	Monday - Friday 0700h to 1800h Saturday 0700h to 1300h
Evening	Monday - Friday 1800h to 2200h Saturday 1300h to 2200h Sunday 0700h to 2200h
Night	Monday – Sunday 2200h to 0700h

The noise from industry is assessed according to State Environment Protection Policy No. N-1 (Control of Noise from Commerce, Industry and Trade), (SEPP N-1). To determine if noise emissions from a factory or other business are excessive under the Policy, the recommended maximum noise level is compared with the effective noise level. The effective noise level is the level due to the industry measured at a residential dwelling or noise sensitive location, which has had adjustments applied to it to account for certain characteristics such as tone, impulse, duration, intermittency, etc. which may make the noise more or less annoying to residents than the measured level alone would indicate.

The calculation of the recommended maximum noise level according to NIRV is summarised as follows:

NIRV Part 3.1 Recommended maximum noise levels – general commerce, industry and trade.

- Step 1 Zone levels, Generating zone = IN1Z, Receiver zone = R1Z, from Table 1;

Day = 53 dBA Evening = 48 dBA Night = 43 dBA

- Step 2 Distance adjustment over 260m;

Distance adjustment = -2 dB

Day = 51 dBA Evening = 46 dBA Night = 41 dBA

- Step 3 Base noise level check;

Day = 45 dBA Evening = 37 dBA Night = 32 dBA

Adopt greater of distance-adjusted level and base noise level.

- Step 4 Background noise check

Approximate background noise levels:

Day = 38 dBA Evening = 34 dBA Night = 32 dBA

Night – Adopt greater of background level plus 5 dB and Step 3;

Day = 51 dBA Evening = 46 dBA Night = 41 dBA

Therefore the Recommended Maximum Noise Levels as determined by NIRV at 5 Atkins Crescent is:

Day = 51 dBA Evening = 46 dBA Night = 41 dBA

Since the factory operates continuously during the day and night the night time limit is the most critical. Noise limits at other residential receivers closer to the factory would be slightly higher because there would be no distance adjustment.

4 Measurement results

A summary of the overall measured noise levels at Atkins Crescent and along the factory boundary are given below. Obvious extraneous noise from passing traffic, dogs barking and bird calls were excluded from the measured results.

Table 1 Measured environmental noise levels, normal plant operation

Position	Time	Noise level, dBA, Leq	Adjustment, dB	Effective noise level, dB
5 Atkins Cr.	2152h – 2158h	37.0	+2 (Tonal)	39
208 Princes Hwy.	0003h – 0005h	49.0	+2 (Tonal)	51
Sandspit Rd. gate	0008h – 0010h	51.0	+2 (Tonal)	53
Glaxo carpark	0012h – 0013h	46.5	+2 (Tonal)	49

From the above results at the two residential positions and comparing them with the NIRV noise limits (Night = 41 dBA) it can be seen that compliance is achieved at Atkins Crescent but not at 208 Princes Highway where the effective noise level exceeds the night time limit by 10 dBA.

Bearing in mind that the wind conditions during the measurements were not the most favourable for propagation from the factory to the Atkins Crescent dwelling, the effective noise level could be up to approximately 5 dBA higher under favourable conditions.

5 Source identification

Two methods of measurement were used to identify the contribution of plant items to the environmental noise at Atkins Crescent. One was by measuring the main suspected items of plant operating individually, and the second was to measure the main noise frequencies generated by each suspected item of plant and matching them with the frequencies measured at the dwelling position.

5.1 Separate plant operation

The separate operation of the main items of plant was carried out between 2238h and 2337h on 31 July 2012. It was not always possible to operate each plant item individually from other items, and there was some concern as to whether the correct item of plant was actually operating.

The remainder of the factory plant was still operating during this period, however there was a noticeable reduction in overall noise level with the selected plant items switched off.

The measurements at the Atkins Crescent position were influenced by wind conditions and background noise as well.

Table 2 Separate plant operation noise level, Atkins Cr.

Plant item	Measured noise level, dBA, Leq	Comment
Water Extraction Vacuum Pumps ON (unable to switch OFF)	35.6	Not audible
TH2 building ventilation fan	37.0	Not audible
TH2 Pre-breaker extraction fan	39.9	Just audible
TH2 Dust fan FA920	42.3	Not audible
TH2 Mills + TH2 Pre-breaker extraction fan+ TH2 Dust fan FA920	37.9	Tone audible, Pulse jets audible
Waste Effluent pumps	35.7	Just audible
Water extraction Dust fan	36.1	Just audible
Water extraction Mill + Dust fan	37.2	

I don't believe that the overall measured noise level as shown in the table above indicates accurately the contribution from each item operating as there was noticeable variations in noise level due to weather conditions. What was more noticeable was the audibility of plant items due to the tonal noise being present.

5.2 Noise frequency identification

Detailed narrowband FFT analysis of the measured noise at Atkins Crescent was compared with a similar analysis of measurements carried out close to the items of plant to match their dominant noise frequencies. The table below shows the plant items measured and their dominant noise frequencies.

Table 3 Measured narrowband noise frequencies

Plant item	Measured noise frequencies, Hz			
	Close to item	At Atkins Cr.	208 Princes Hwy.	Sandspit Rd.
Water Extraction Vacuum Pumps ON (unable to switch OFF)	445, 890	-	-	-
TH2 building ventilation fan	-	-	-	-
TH2 Pre-breaker extraction fan	645, 1288, 1401	645 (just)	-	-
TH2 Dust fan FA920	-	-	-	-
TH2 Mills + TH2 Pre-breaker extraction fan+ TH2 Dust fan FA920	-	645 (dominant)	-	-
Waste Effluent pumps	239	396, 890	-	-
Water extraction Straw Hopper Dust fan	396	396, 890	-	-
Water extraction Mill + Dust fan	-	396, 890	-	-
All plant operating as normal	-	396, 445, 644, 889, 1405	175, 396, 644, 833, 1155	396, 644, 833, 1369

The narrowband frequency spectra for all the above measurements are attached to the end of this letter.

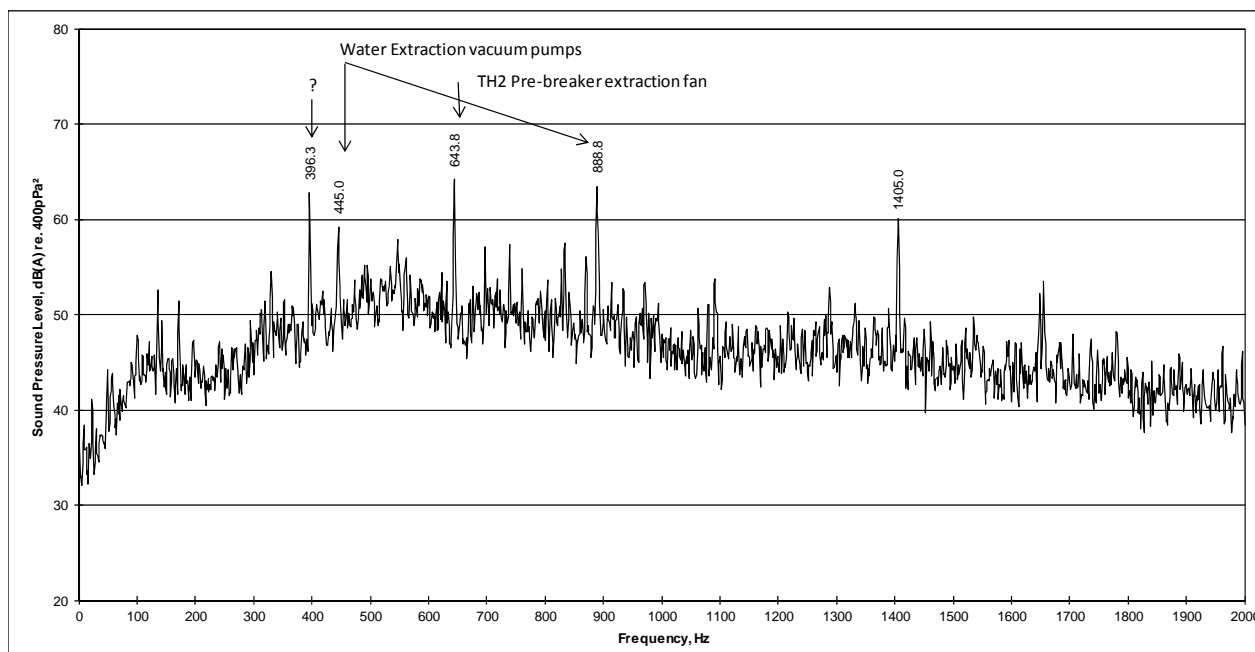
The spectrum below shows the narrowband FFT analysis of the measured noise for normal factory operation at Atkins Crescent. The dominant frequencies are marked and the ones that appear to match with the measurements carried out close to plant items are 445 Hz, 643/644Hz, and 889/890Hz.

Figure 2 Measured FFT analysis of overall noise at Atkins Cr.

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2346h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/03



There appears to be some doubt as to the source of the 396Hz frequency. Although the measurement on the roof of the Water Extraction building at approximately 3m away from the outlet of the Straw Hopper Dust Fan indicates a frequency of noise at 396 Hz, it is not significant and I suspect it is from another plant item, possibly the large Nash Pump.

6 Noise control options

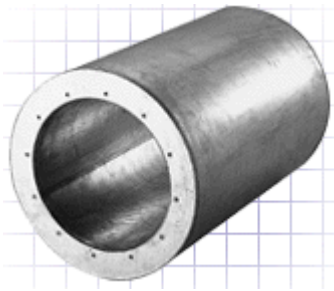
The main sources of noise that we have determined so far include:

6.1 The TH2 Pre-Breaker Extraction Fan FA900

The dominant measured frequency was 645 Hz, and sound pressure level on the roof was 76 dBA @4m being approximately 102 dBA sound power level. Due to its elevation on the roof it is detected on all boundaries around the factory and is the dominant tone at Atkins Cr.

We recommend installing an absorptive silencer not less than 1800mm long. This can be a circular silencer with 75mm thick glasswool or rockwool insulation lining (60kg/m³ density) and nominal 10% perforated steel internal facing 0.8mm thick and 3mm thick plain galvanised steel outer skin.

It is assumed that the outlet duct from the fan is nominally 300mm diameter. The silencer is to match the internal diameter (i.e. the silencer would have an internal diameter of 300mm and an external diameter of 450mm). The silencer can be positioned in the outlet duct anywhere but preferably closer to the fan.



6.2 The Water Extraction Vacuum Pumps

The frequencies at the outlets were measured to be 445 Hz & 889/890 Hz. The sound pressure level was 71 dBA @ 6m away being approximately 94 dBA sound power level, and is detected south of the factory including at Atkins Cr.

It is understood that silencers have been ordered for these pump outlets. We would recommend silencers similar to those described above but because the pipe diameter is smaller they can be smaller in external diameter. The insulation lining should be the same and the length should be not less than 1200mm.

6.3 The Trade Waste Effluent Pumps

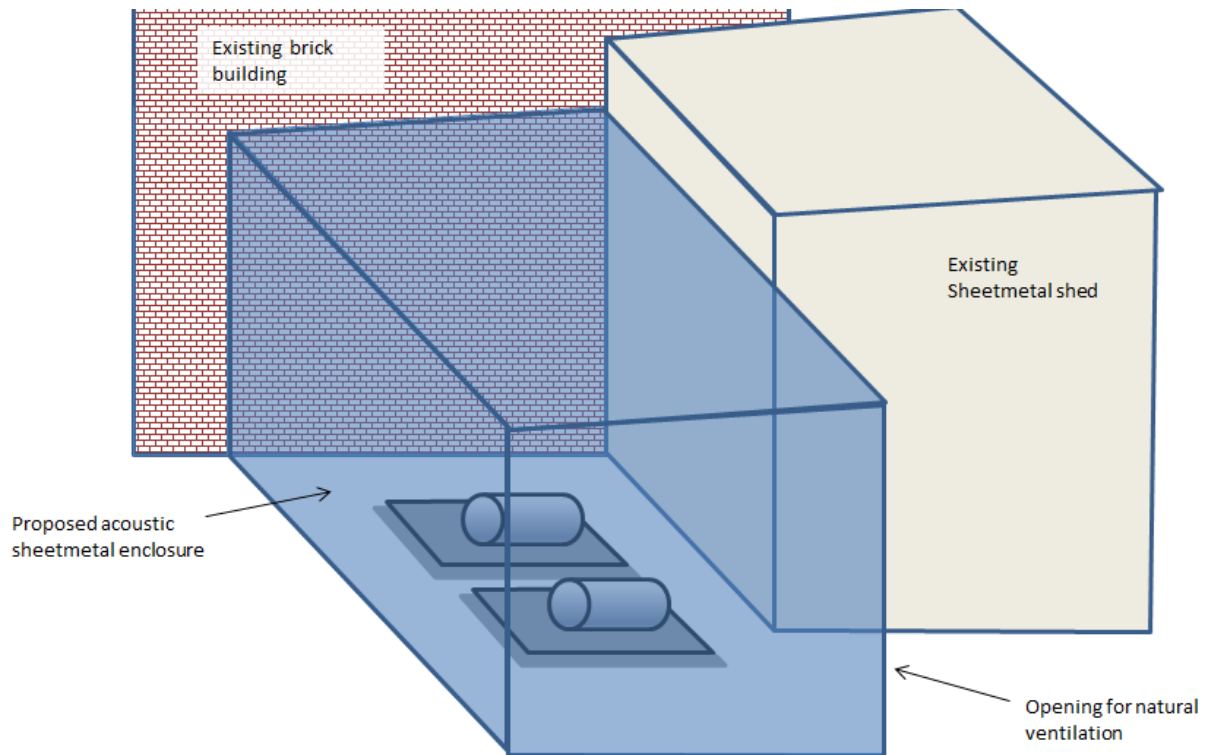
The measured frequency of these two pumps was 238 Hz at 100% speed. The measured sound pressure level was 85 dBA @1m, being approximately 93 dBA sound power level. However they are at ground level and are potentially shielded by other buildings, and due to their variable speed drive can be emitting a much lower level of noise at times. Their noise frequency was not detected at the boundary or at Atkins Crescent.

Although not indicating that this source is dominating at the nearest residences, it will be contributing to the overall noise emitted from the site especially to areas south of the factory. There is reflection of the noise off the adjacent brick building and sheetmetal shed.

We would recommend installing a large enclosure encompassing the pumps and pipework rather than smaller enclosures over each pump separately. The enclosure should include between 75 and 100mm thick glasswool or rockwool insulation of density between 18 and 60 kg/m³ lining on the sheetmetal walls and under the roof deck, (e.g. Insulation Solutions Sonobatt Type 1, or CSR Bradford SoundScreen R2.5 rockwool).

Due to the reflection of noise off the adjacent brick building it is recommended that a roof be part of the enclosure as shown below.

Figure 3 Trade Waste Effluent Pump acoustic enclosure



Yours faithfully,
SLR Consulting

Graeme R. Campbell
Principal Project Consultant – Acoustics, Noise and Vibration

www.slrconsulting.com

Figure 4 At 208 Princes Highway

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : 208 Princes Hwy. residence opposite factory
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 0003h
Date Recorded : 2012-08-01
Date Analysed : 2012/08/06

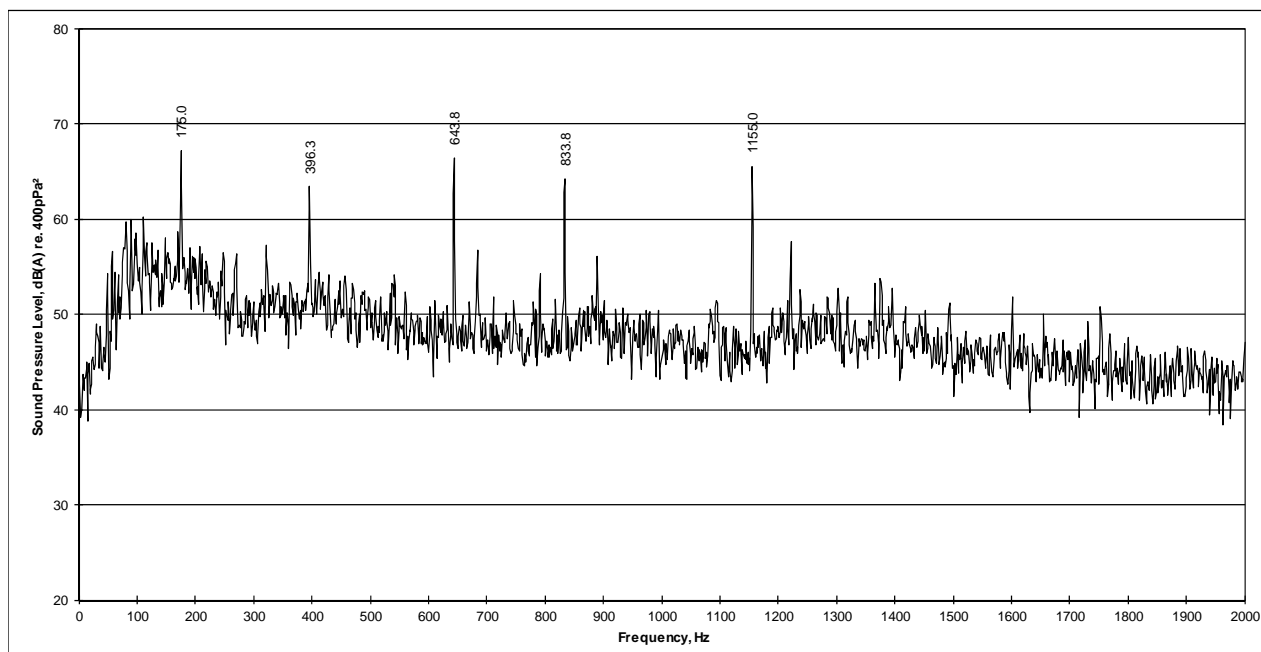


Figure 5 At Sandspit Road factory gate

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : Sandspit Road, north gate of factory
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 0008h
Date Recorded : 2012-08-01
Date Analysed : 2012/08/06

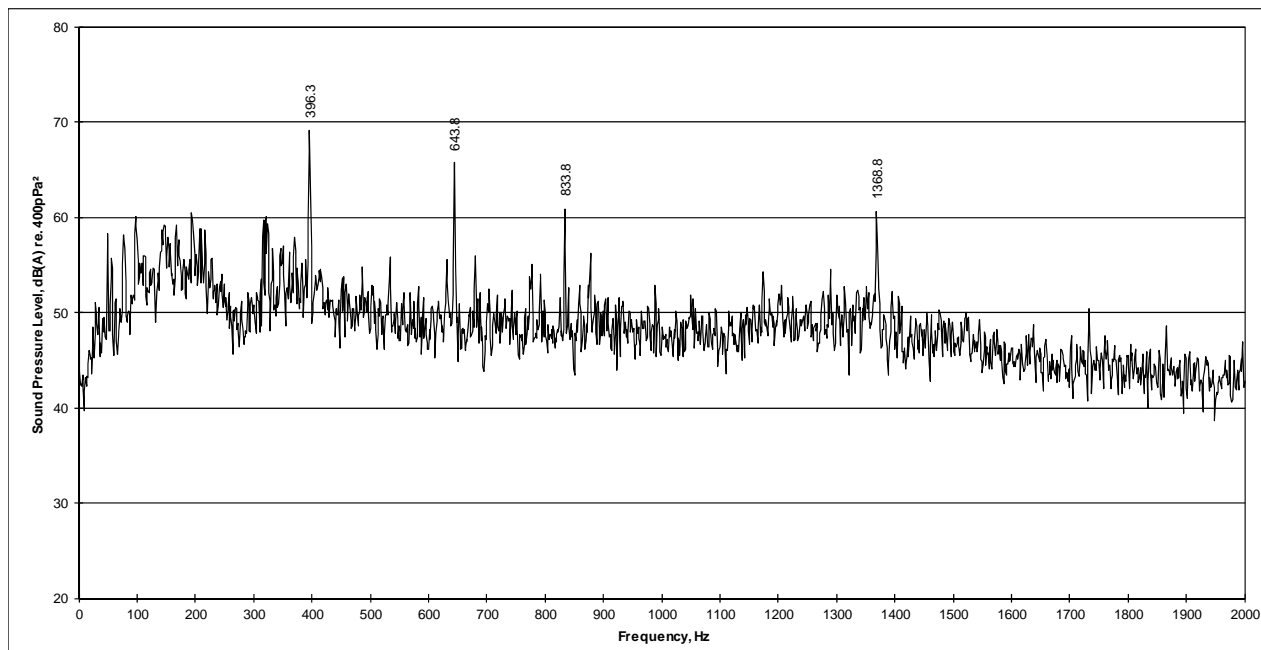


Figure 6 At Factory Carpark SW corner

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : Carpark of factory, SW corner
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 0:00:00
Date Recorded : 2012-08-01
Date Analysed : 2012/08/06

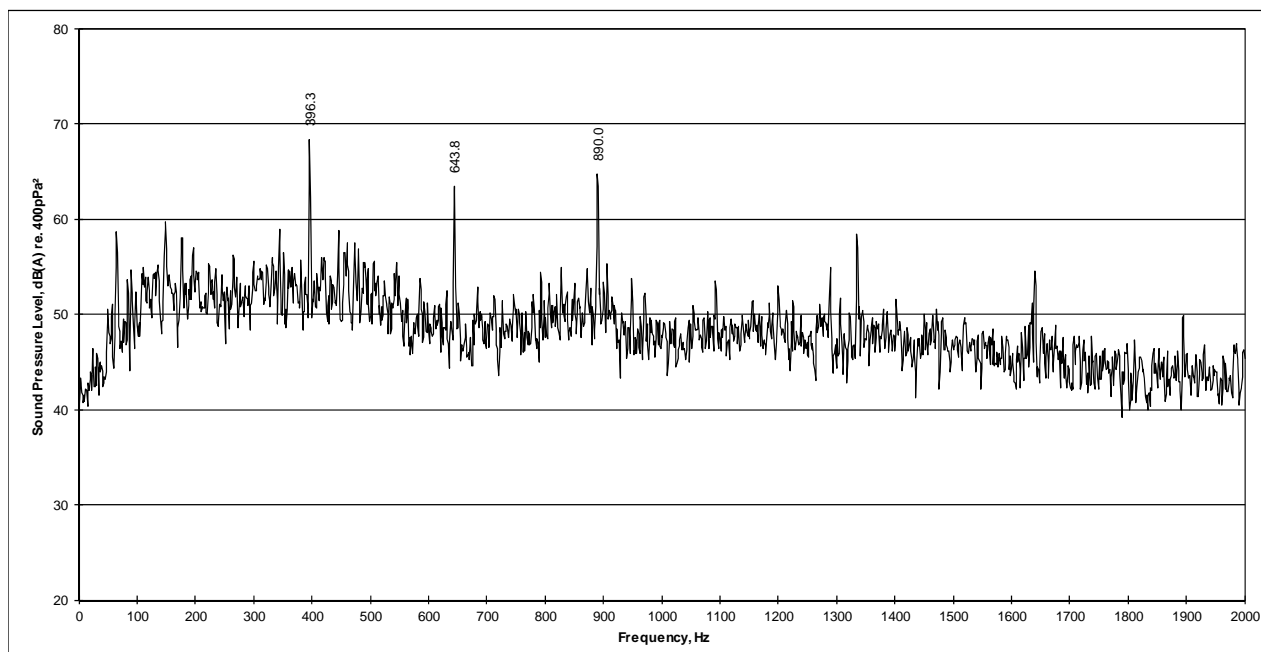


Figure 7 Water Extraction Vacuum Pumps at Atkins Cr.

Condition : 2) Main sources OFF, Water Extraction vacuum pumps ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2240h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

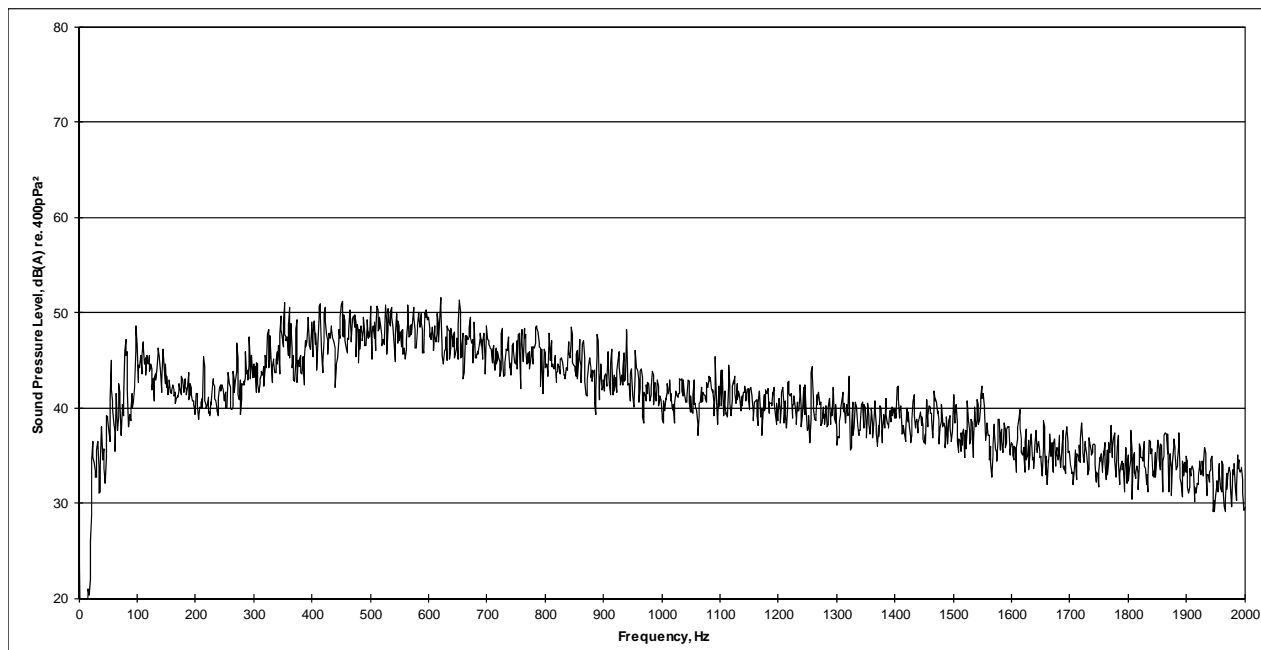


Figure 8 Atkins Cr. With TH2 Building Ventilation Fan at Atkins Cr.

Condition : Main sources OFF, TH2 building vent fan ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2249h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

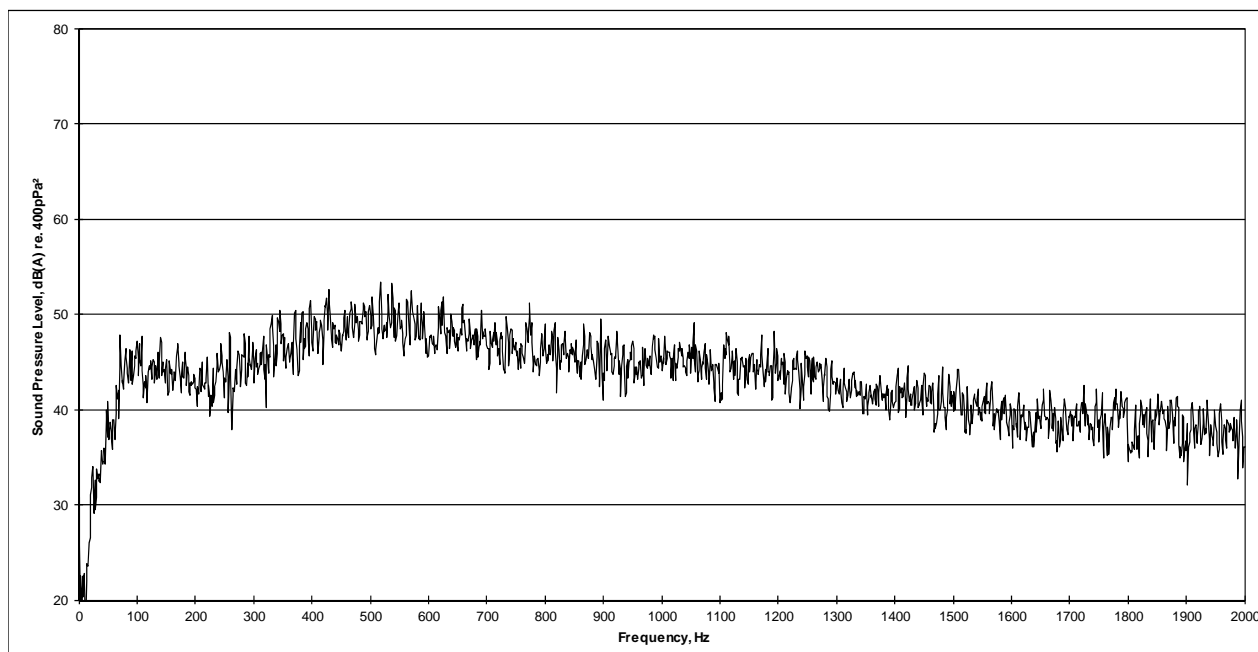


Figure 9 Atkins Cr. With TH2 Pre-Breaker Dust Fan at Atkins Cr.

Condition : Main sources OFF, TH2 Pre-breaker Extraction fan ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2258h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

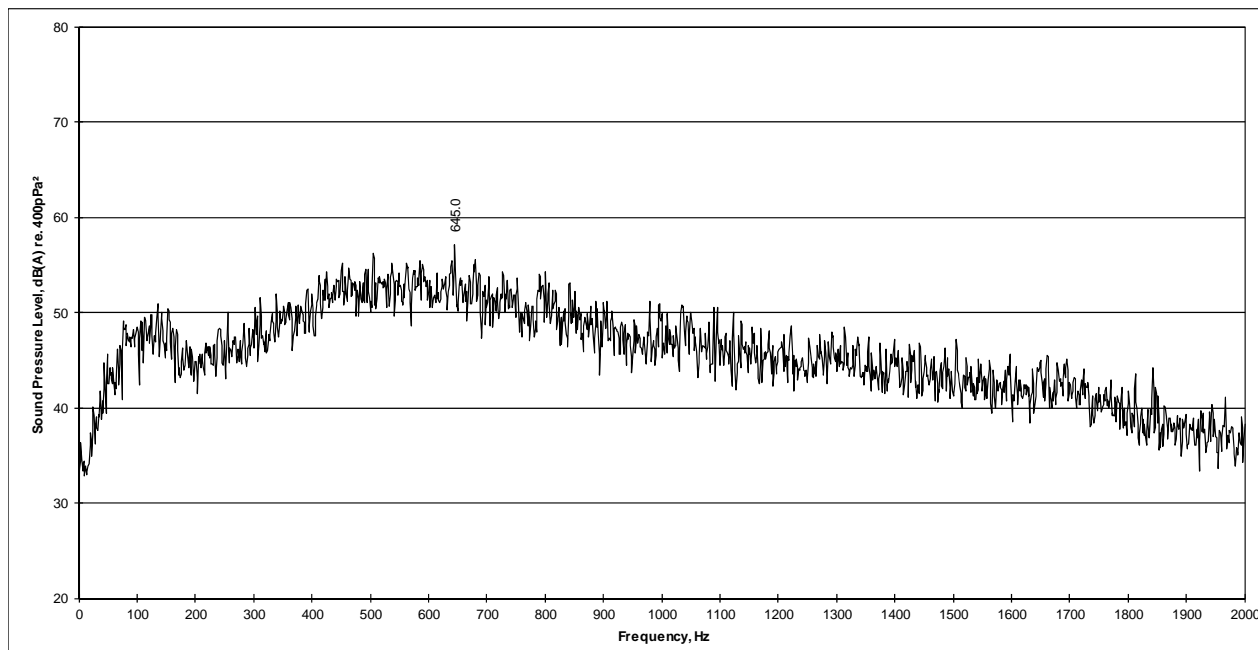


Figure 10 Atkins Cr. With TH2 FA920 Dust Fan at Atkins Cr.

Condition : Main sources OFF, TH2 Dust fan FA920 ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2302h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

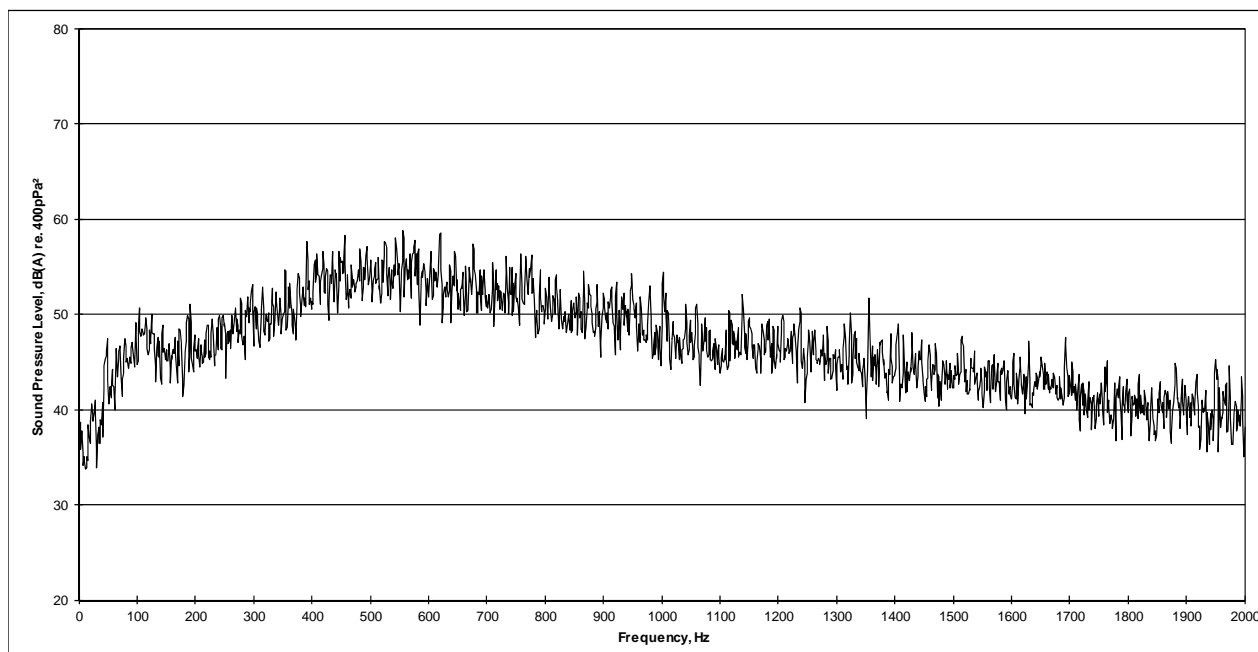


Figure 11 Atkins Cr. With TH2 Mills + Pre-Breaker Dust Fan at Atkins Cr.

Condition : Main sources OFF, TH2 Mills, Pre-breaker and Dust fans ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2311h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

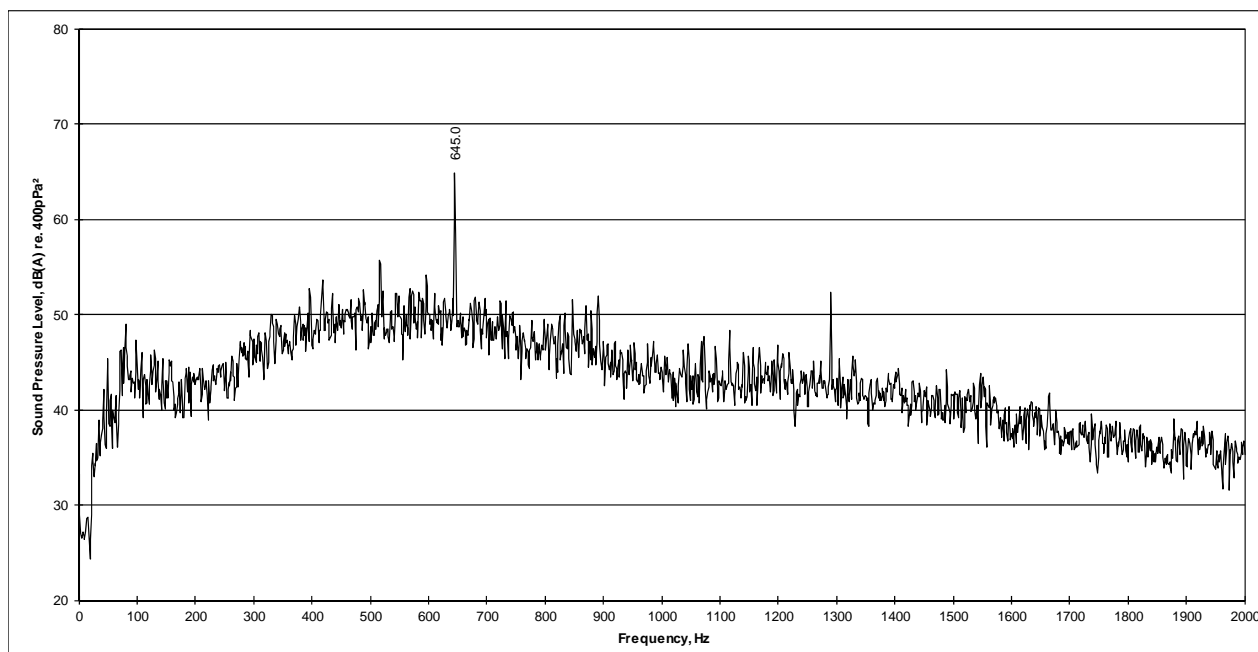


Figure 12 Atkins Cr. With Trade Waste Effluent Pumps at Atkins Cr.

Condition : Main sources OFF, Trade Waste Effluent Pumps ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2320h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

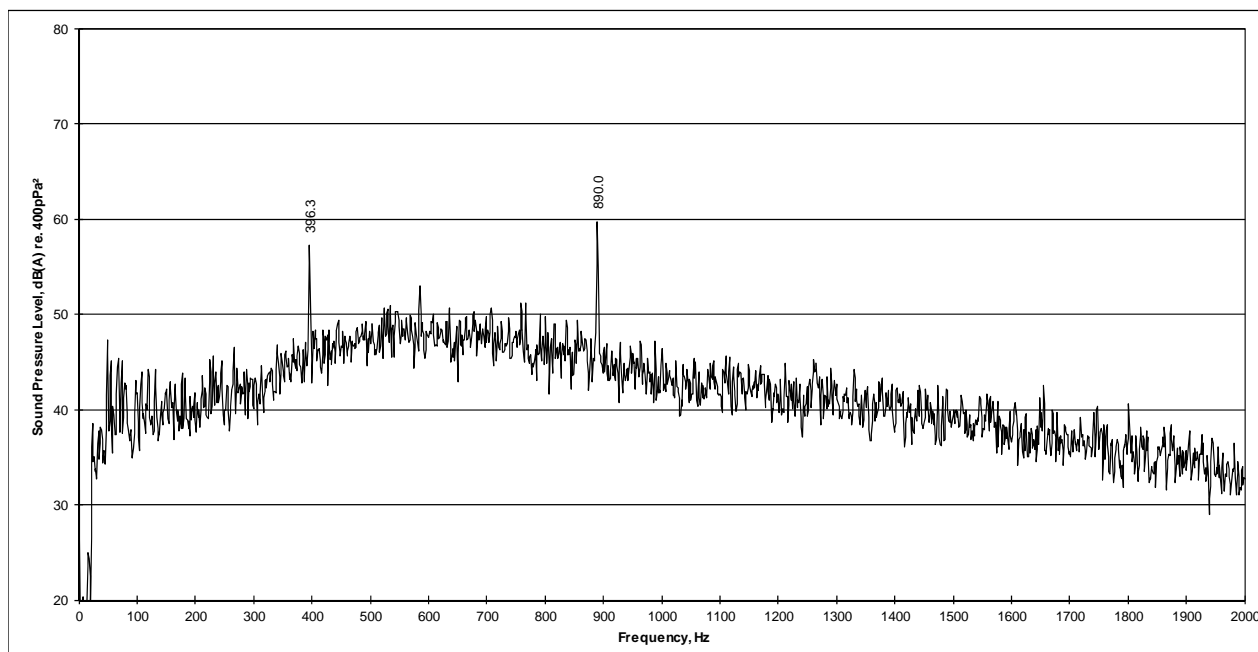


Figure 13 Atkins Cr. With Water Extraction Straw Hopper Dust Fan at Atkins Cr.

Condition : Main sources OFF, Water Extraction Straw Hopper Dust Fan C
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2329h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

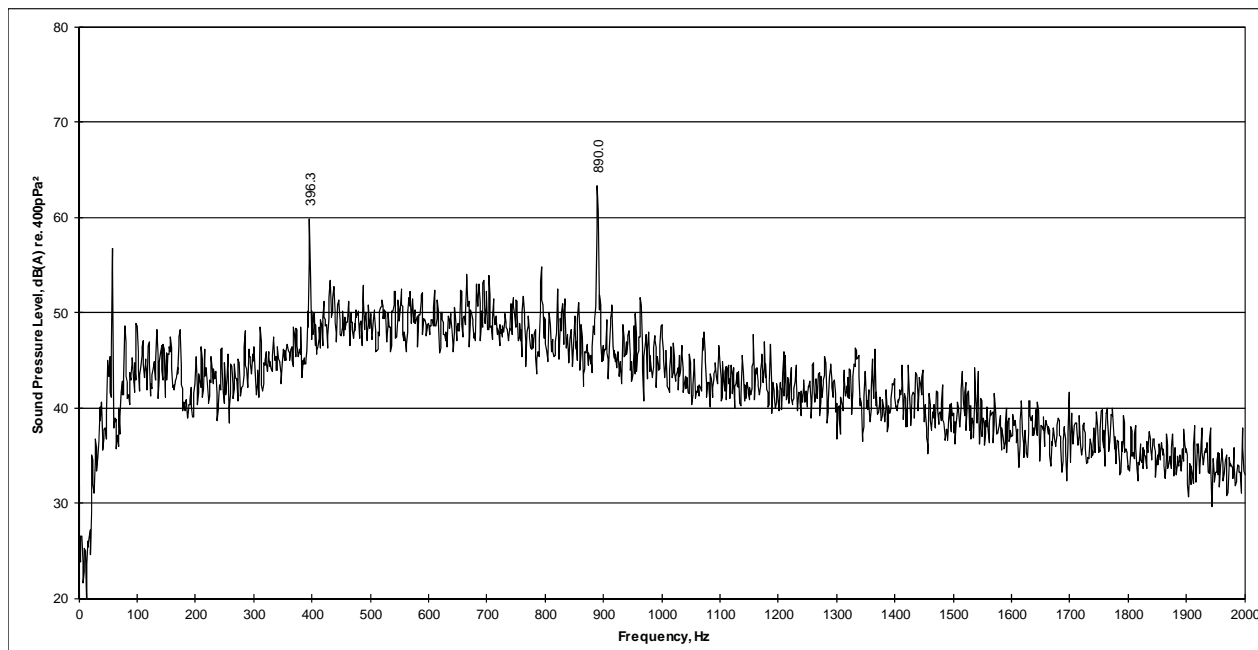


Figure 14 Atkins Cr. With Water Extraction Mills + Dust Fan at Atkins Cr.

Condition : Main sources OFF, Water Extraction Mills + Dust Fan ON
Analysis range: 0Hz to 2000Hz
Comments :

Position : Beside 5 Atkins Cr.
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2337h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

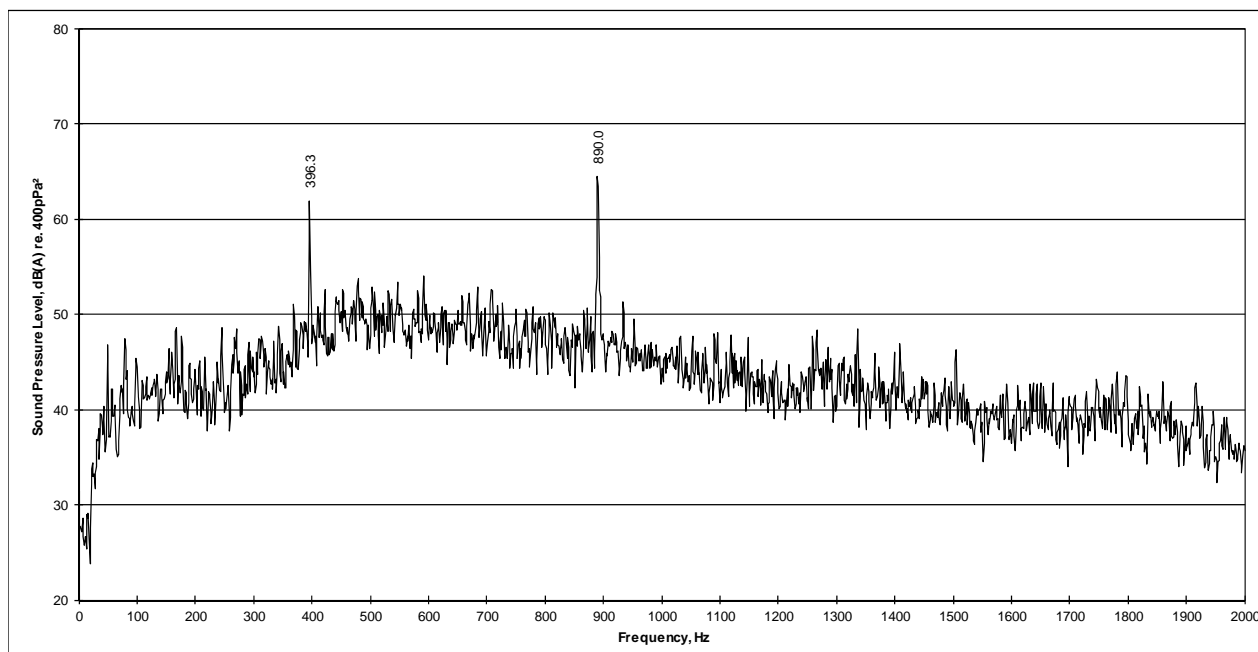


Figure 15 Boiler no.1 Burner Fan

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : 0.5m from Boiler no.1. burner inlet fan
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1400h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

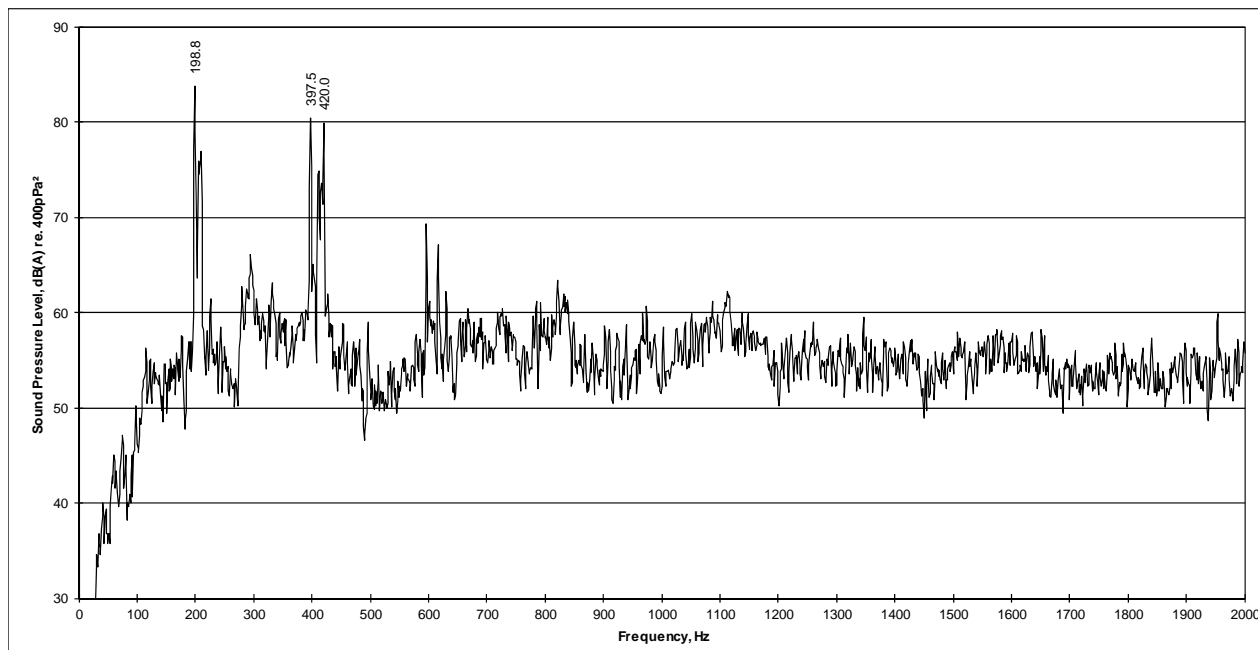


Figure 16 Trade Waste Effluent Pumps

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : 1m from Trade waste effluent pumps, 100%
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1330h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

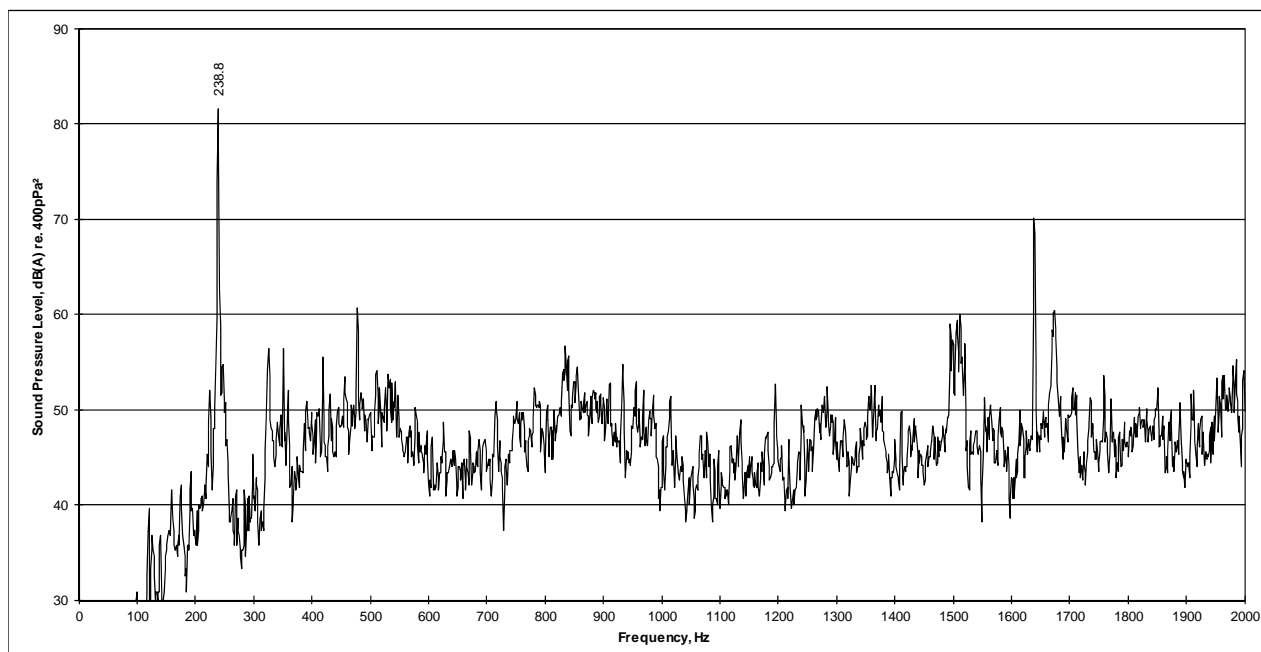


Figure 17 TH2 Building Ventilation Roof Hood

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : 0.3m from TH2 building ventilation hood on roof
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1300h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

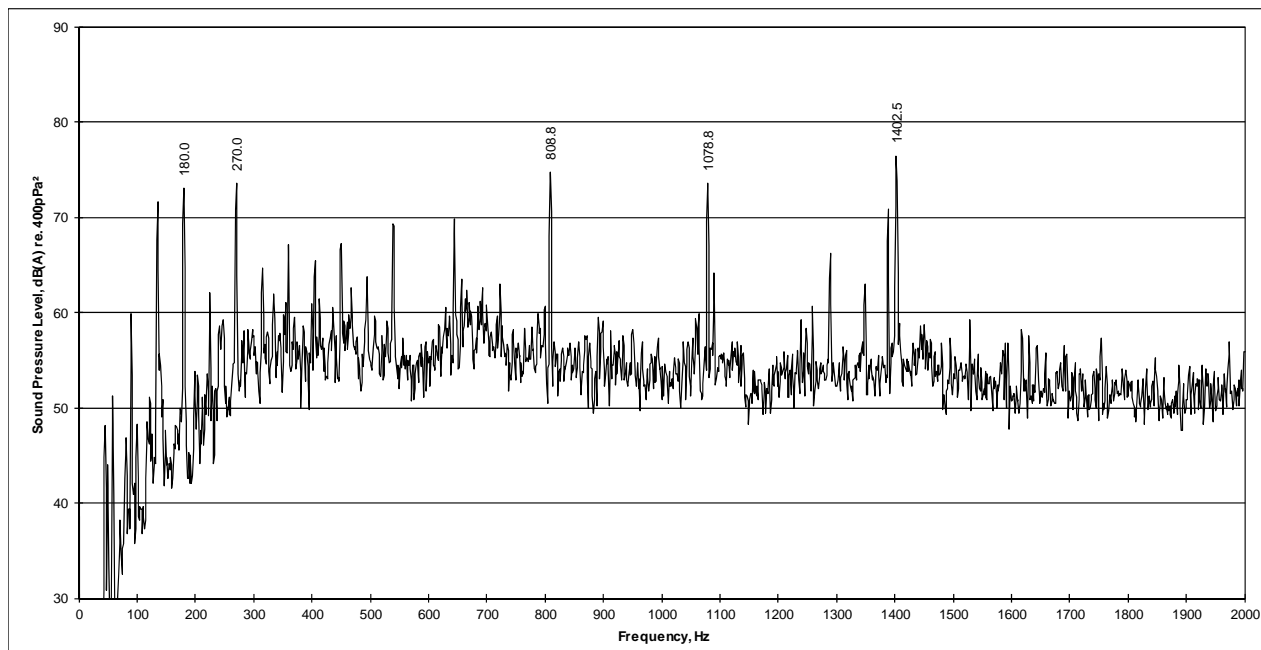


Figure 18 TH2 Pre-Breaker Extraction Fan outlet

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : ~4m from Pre-breaker Extraction Fan outlet on roof of TH2
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1310h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

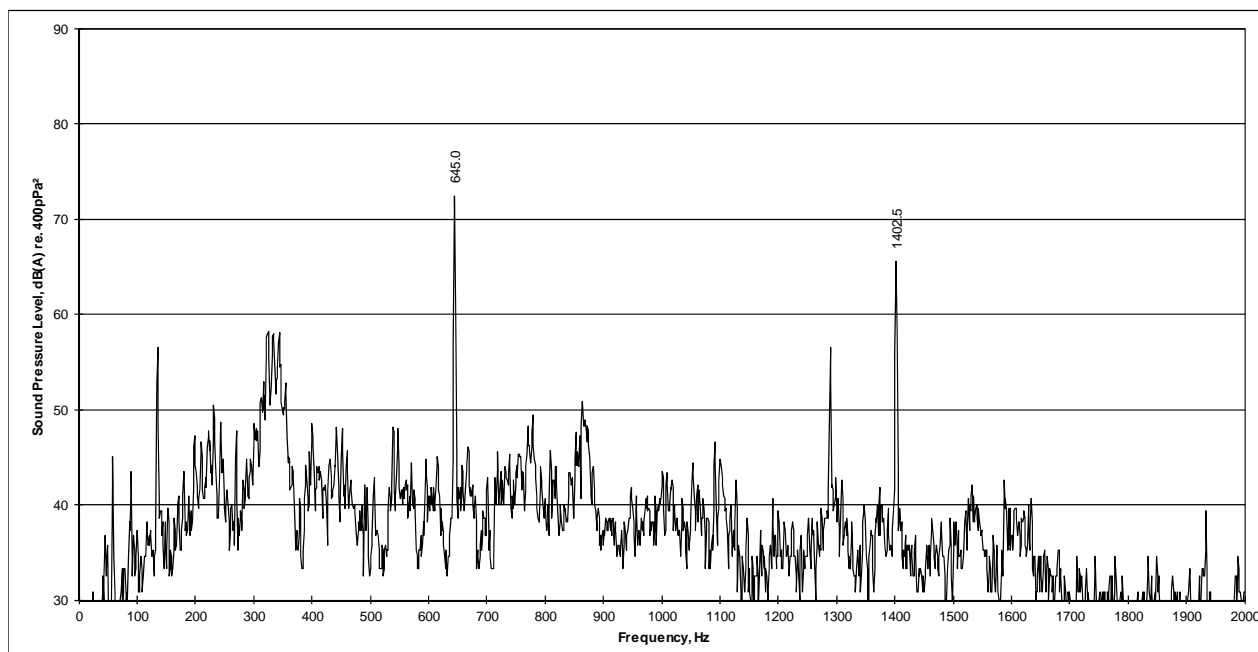


Figure 19 Water Extraction Straw Hopper Dust Fan outlet

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : ~3m from Water Extraction straw hopper dust fan outlet on roof
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1325h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

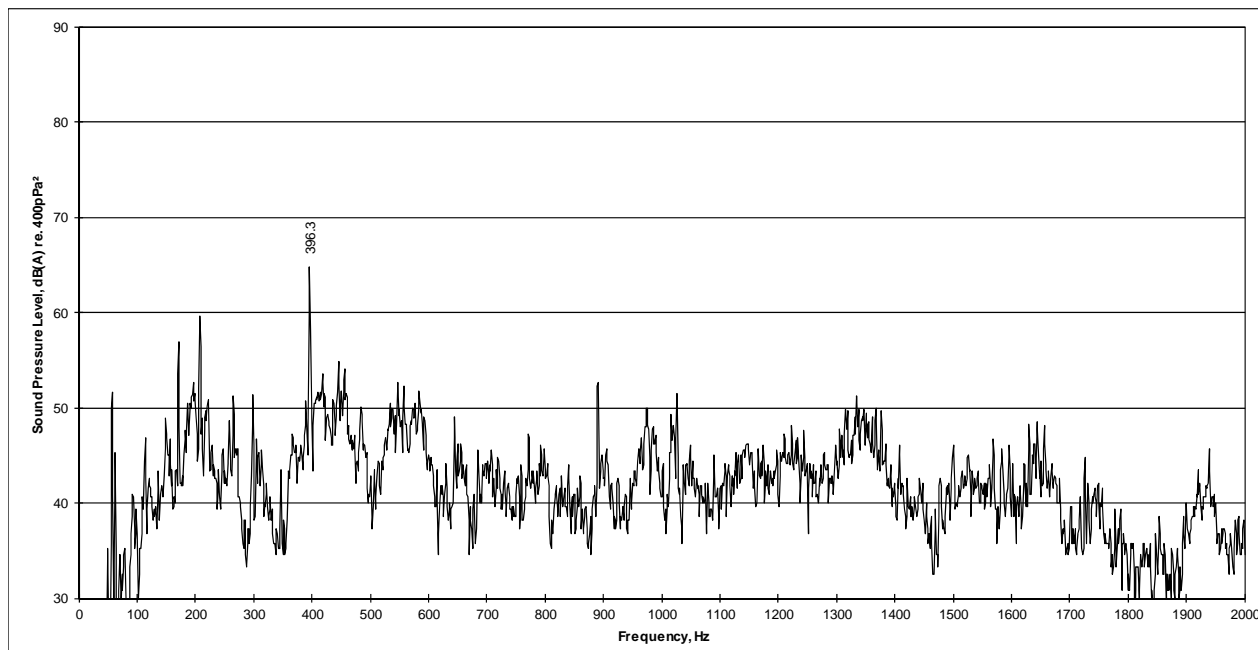


Figure 20 Water Extraction Nash Pumps

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : ~1m from Water Extraction Vacuum Nash pumps
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1328h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06

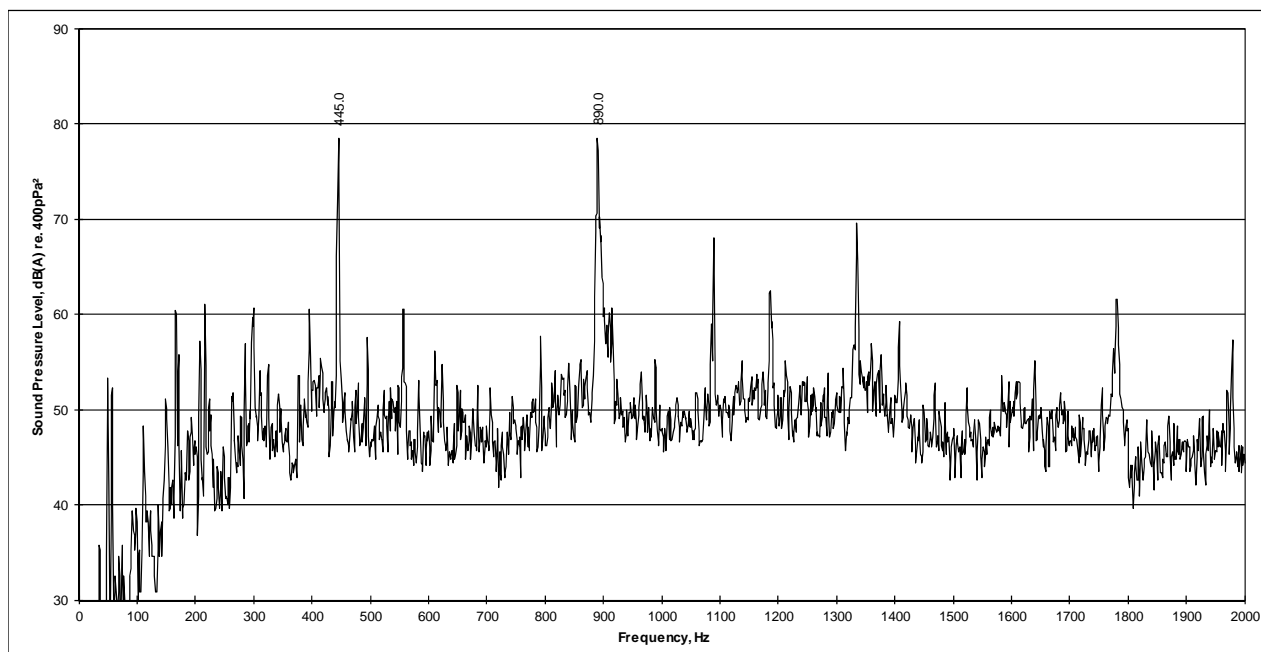
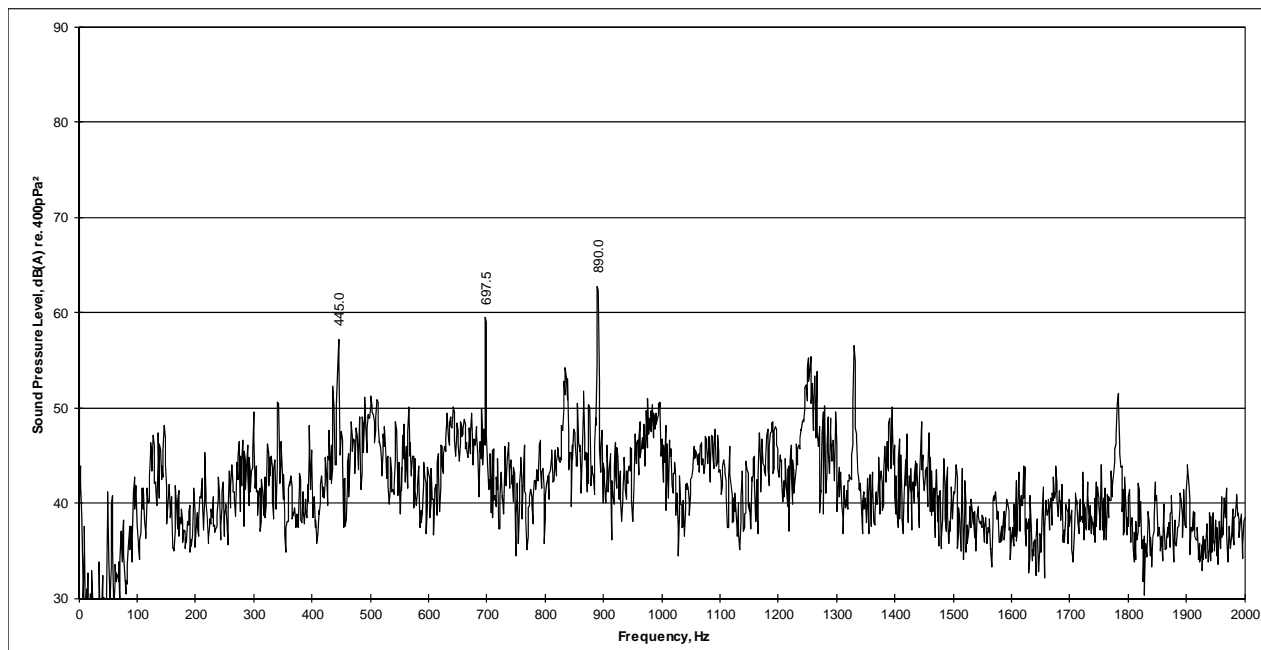


Figure 21 Water Extraction Nash Pump outlets

Condition : 1) Normal operating conditions
Analysis range: 0Hz to 2000Hz
Comments :

Position : ~5m from Water Extraction Vacuum Nash pumps outlets
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 1322h
Date Recorded : 2012-07-31
Date Analysed : 2012/08/06





global environmental solutions

Glaxo Smith Kline, Port Fairy Environmental noise assessment

Report Number 640-01517

4 December 2013

Glaxo Smith Kline

Version: Revision 0

Glaxo Smith Kline, Port Fairy

Environmental noise assessment

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DOCUMENT CONTROL

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APPENDICES

Appendix A	One-third octave band frequency spectra
Appendix B	Narrowband FFT frequency spectra

1 INTRODUCTION

SLR Consulting Australia Pty. Ltd. was retained to measure the level of environmental noise emitted from the factory and identify major noisy plant items.

Previous noise measurements were carried out in July 2012 in response to a noise complaint from the resident at 5 Atkins Crescent. Subsequent noise control work has been carried out on several items of plant at the factory.

The aim of this stage of work was to assess the noise level at the complaints dwelling to determine the success of noise control works, and also determine the main contributing items of plant to the dwellings along the Princes Highway opposite the factory, in particular near the boilerhouse.

2 NOISE MEASUREMENTS

The noise survey was carried out during the night of Monday 25 November 2013 specifically because of the presence of a east-north-easterly wind direction which favoured the propagation of noise from the factory to 5 Atkins Crescent.

Noise measurements were also carried out during the day close to loud items of plant around the boilerhouse vicinity as this plant was known to be loud and in close proximity to residential dwellings along the Princes Highway.

The following **Figure 1** shows the approximate location of the environmental measurements around the outside of the factory. These locations were chosen because they were either near to residential dwellings or they represented a direction of dwellings that were further away.

These noise measurements were carried out over a period of several minutes each. Obvious extraneous noise such as passing vehicles or dogs barking was excluded. Because the factory noise was essentially steady, there was no need to measure the noise for a greater period of time. Often the period of time to accumulate a representative sample of factory noise was much longer due to the occasional presence of extraneous noise.

The wind direction during the Monday night measurement period was ENE at 15km/h at the Port Fairy Bureau of Meteorology weather station. The wind strength was slightly stronger than what was desirable, and as a consequence there was wave noise from the beach audible at some easterly locations.

Table 1 and **Table 2** shows the overall measured noise level at each of these locations as well as close to major items of plant near the boilerhouse.

Figure 1 Aerial photo showing environmental noise measurement positions & level



Image courtesy of Google Earth

Note : * measured noise was not due to the factory.

Table 1 Major plant item noise levels

No.	Position	Measured noise level, dBA, Leq	Comment
1	Solvent extraction pump	85 @1m	Beside door on north end of Solvent Extraction building, 736Hz
2	Supply pump to PowerPax Chiller	87 @1m	North of boilerhouse, shielded by right-angle masonry wall, 1873Hz
3	PowerPax chiller	79 @0.2m	North of boilerhouse
4	Water pump to cooling tower, south unit	82 @1m	East of cooling tower, 837Hz
5	Water pump to cooling tower, north unit	78 @1m	East of cooling tower, 837Hz
6	PowerPax chiller	78 @0.2m	North of boilerhouse
7	Cooling tower fan inlet	77 @1m	Cooling tower east of boilerhouse
8	Boilerhouse louvre	74 @1m	West façade of boilerhouse
9	Trade waste pump	76 @1m	Beside Fine Chemicals Building
10	Discharge pump	76 @1m	XM775/01 east side, beside tanks, multiple frequencies
11	Boiler no.1 burner fan inlet	94 @0.5m	Variable speed, 195Hz, 388Hz

Table 2 Boundary and residential noise measurements

No.	Position	Measured noise level, dBA, Leq	Comment
11	164 Model Lane	44	Factory not clearly audible, mainly ocean noise
12	Corner Model Lane & Sandspit Road	46	Factory just audible, ocean audible
13	Sandspit Road, factory gate, east end	51	Mainly factory noise
14	Sandspit Road, factory gate, west end	52	Opposite tyre yard, Mainly factory noise
15	210 Princes Highway	48	Opposite Sandspit Road Mainly factory noise
16	222 Princes Highway	43	Factory not clearly audible, pulse jets audible
17	204 Princes Highway	47	Opposite factory boilerhouse, Mainly factory noise
18	Princes Highway	47	Opposite factory main entrance, Mainly factory noise
19	3 Goldies Lane	47	Opposite factory carpark, Mainly factory noise
20	9 Goldies Lane	44	North corner of Goldies Lane Factory just audible
21	196 Princes Highway	46	Factory audible
22	184 Princes Highway	44	Factory just audible
23	Corner Princes Highway & Atkins Crescent	45	Factory just audible
24	5 Atkins Crescent	43	Factory just audible, measured in vacant land north of dwelling, Some noise from frogs
25	Bike path south of factory, at seat	47	Factory audible,
26	Bike path south of factory, approx. 300m from Princes Hwy intersection	45	Factory audible

3 ENVIRONMENTAL NOISE LEVELS

The Environment Protection Authority (EPA) does not have an enforceable policy on noise from industry in regional Victoria.

The recently introduced guideline titled “Noise from Industry in Regional Victoria” (NIRV), publication 1411 October 2011, has been provided by the EPA to determine recommended maximum noise levels for industries in regional areas. It uses land use zonings as a basis for establishing recommended noise levels at residential receivers. There are adjustments that can be made to the recommended noise level due to high background noise, multiple industries, distance from the industry zone, and where the industry is an extractive type industry.

The noise emitted from industry is assessed according to State Environment Protection Policy No. N-1 (Control of Noise from Commerce, Industry and Trade), (SEPP N-1). To determine if noise emissions from a factory or other business are excessive under the Policy, the recommended maximum noise level is compared with the effective noise level. The effective noise level is the level due to the industry measured at a residential dwelling or noise sensitive location, which has had adjustments applied to it to account for certain characteristics such as tone, impulse, duration, intermittency, etc. which may make the noise more or less annoying to residents than the measured level alone would indicate

The NIRV recommended maximum noise level for dwellings near to the Glaxo factory is between 41 and 43 dBA. The lower noise limit being for dwellings further away like 5 Atkins Crescent, and the higher noise limit being for dwellings closer to the factory. The minimum noise limit would be 37 dBA for dwellings even further away. This level is based on the previously measured level of background noise plus 5 dB.

The measured factory noise at nearby dwellings was between 43 and 48 dBA. The factory noise was not tonal but there was audible impulsive noise from the dust collector pulse jets at most locations which would attract an adjustment of +2 dB.

It can therefore be concluded that dwellings to the west and south-west of the factory at the same distance as 5 Atkins Crescent or closer, exceed the recommended maximum noise level under favourable wind conditions.

For the furthest-most dwellings the factory noise is likely to comply under neutral or non-favourable wind conditions. However for dwellings close to the factory on Princes Highway opposite the factory, the wind conditions will have less influence and their level of exposure will remain similar.

The measured noise level at 5 Atkins Crescent was 6 dBA higher than the previous measured noise level. However it was not tonal like the previous measured noise and included some extraneous noise from frogs and wind noise. This result indicates that the treatment applied to the TH2 pre-breaker extraction fan has been effective because the previously dominant tonal noise has been reduced.

Figure 2 Measured narrowband frequency spectrum at 5 Atkins Crescent

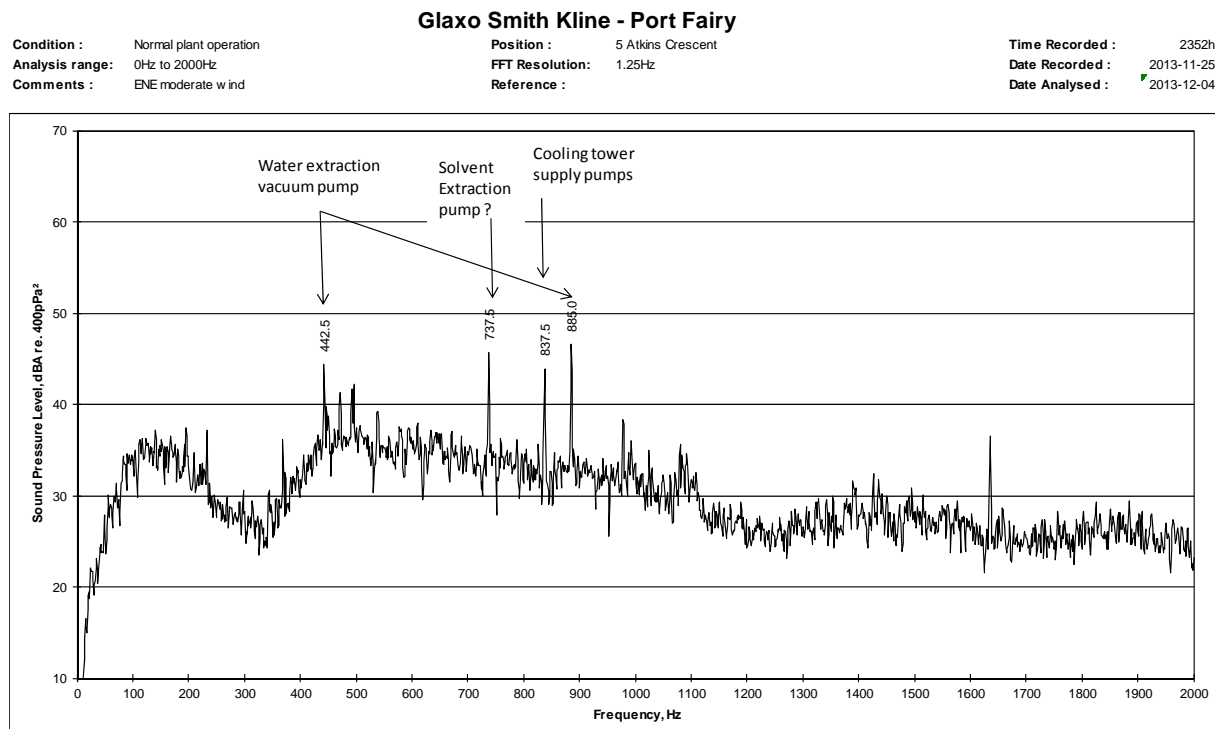
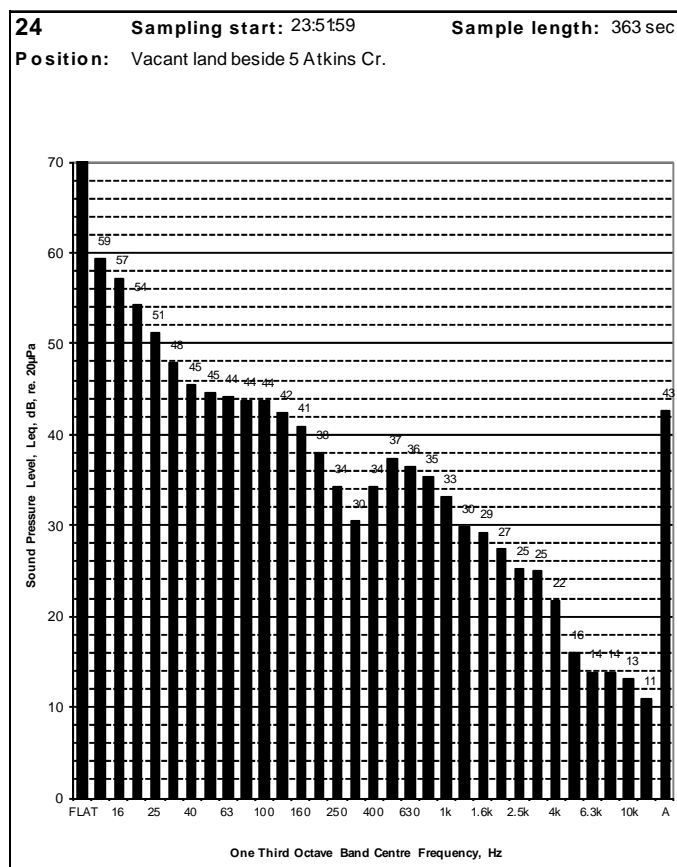


Figure 3 Measured noise spectrum beside 5 Atkins Crescent



4 PLANT NOISE SOURCES AND TREATMENT OPTIONS

A focus was made on identifying noisy plant items near the north-west side of the factory because this is known to include the noisy boilerhouse, and it is in close proximity to dwellings along Princes Highway.

The most obvious items of plant within the factory due to their overall level of noise were:

1. Boiler no. 1 burner fan inlet
2. Cooling tower water supply pumps x 2
3. Chiller water supply pump
4. Solvent Extraction pump
5. Water Extraction vacuum pumps
6. Dust collector pulse jet exhaust - various

The last two items are not near the north-west boundary but are audible generally around the site.

4.1 Boiler no.1 burner fan inlet

This is a centrifugal fan with an open single-sided inlet direct to the fan inside the boilerhouse. The tonal noise from this fan is audible outside the boilerhouse because of the louvered ventilation openings on the side of the building.

The measured noise spectrum close to the fan is shown in **Figure 4**. The fan is a variable speed fan and so the blade passage spectrum noise frequency varies with the speed of the fan. Therefore the dominant noise frequencies are in the region around 194Hz and 388Hz. Both these frequencies are evident in the measured noise spectrum at dwellings opposite the factory, for example 210 Princes Highway, see

Figure 4 Boilerhouse burner fan narrowband noise spectrum @0.5m

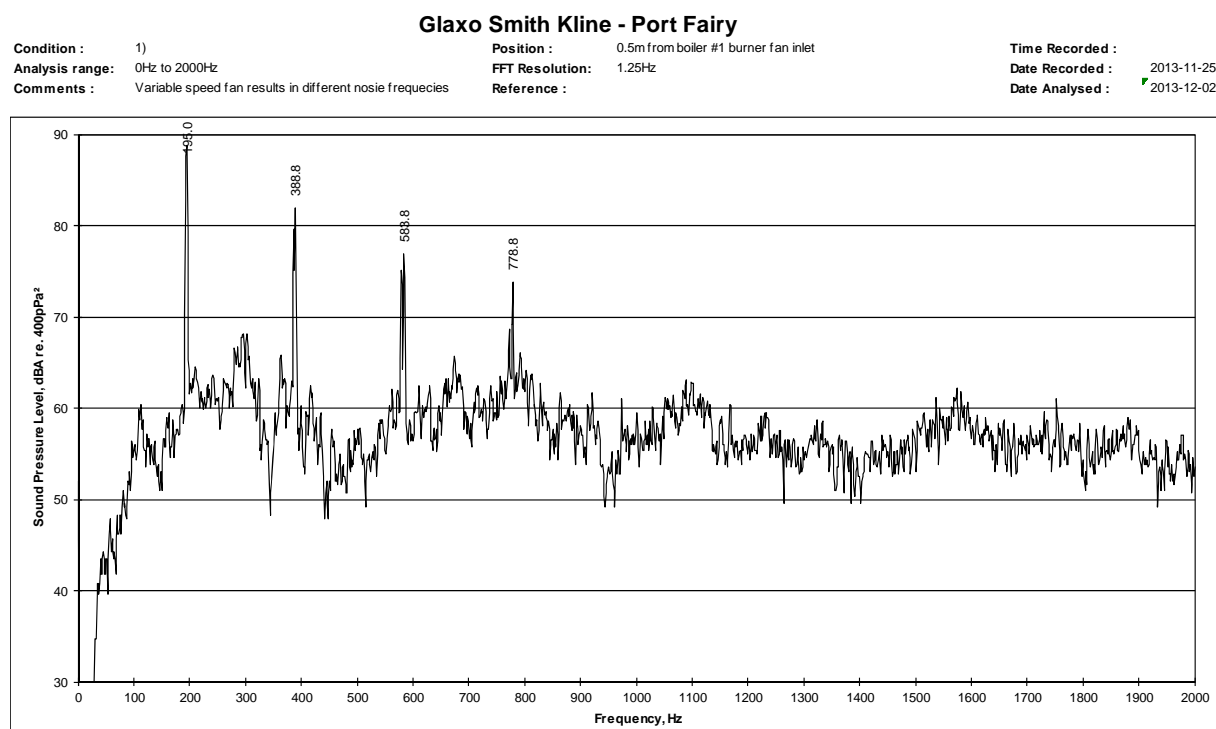


Figure 5 Measured narrowband noise spectrum at 210 Princes Highway, opposite Sandspit Road

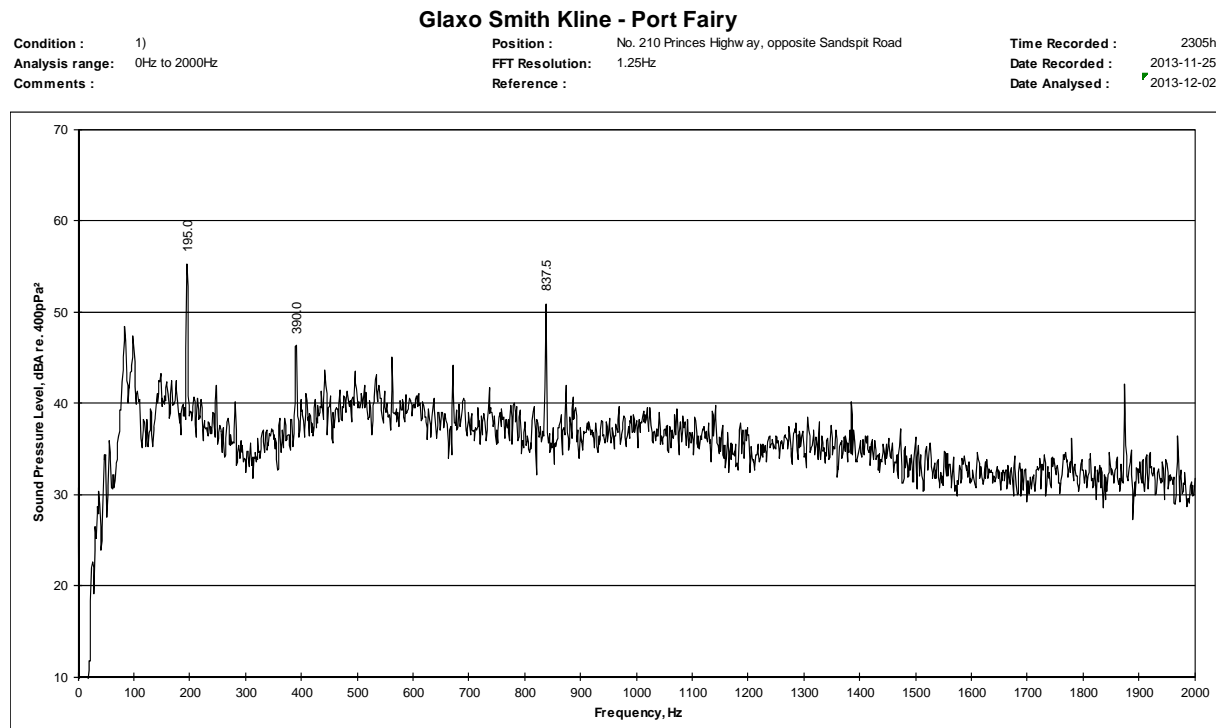


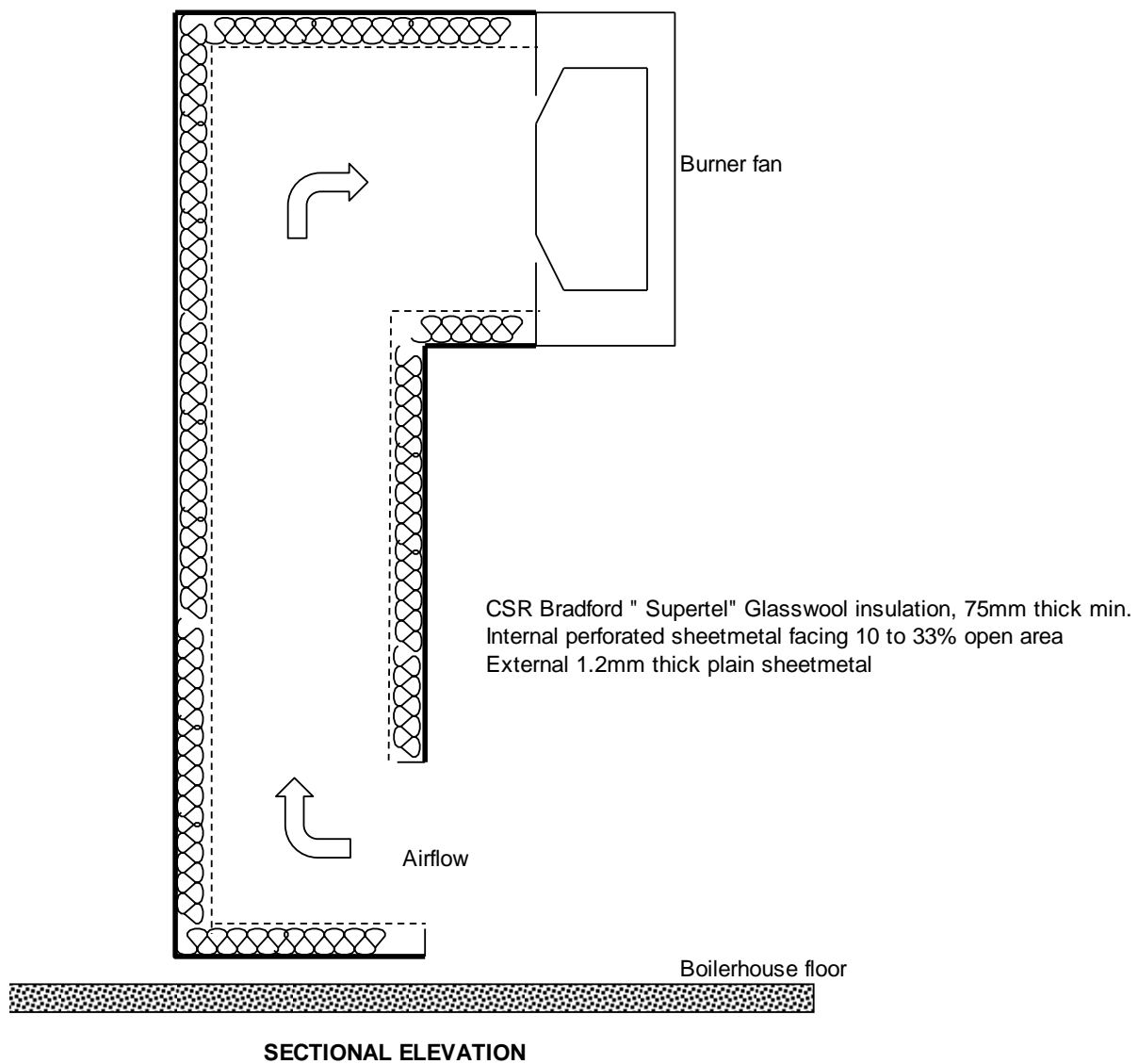
Figure 6 shows a drawing of a square or rectangular silenced inlet duct for the fan inlet. It is essentially an internally insulated duct mounted over the inlet of the fan. Due to the restriction of space opposite the fan inlet the duct needs to be directed at 90° either downwards or vertically upwards.

The inlet duct may introduce some airflow disturbance to the fan and so if it is desired turning vanes can be included at the right-angled bend before the fan inlet. The silenced inlet duct should allow for as much straight line duct just before the fan inlet to allow for settling of the airflow.

The cross-sectional free area of the duct should not be significantly larger than is necessary so as to provide as much noise attenuation as possible. Therefore as a minimum the cross-sectional free area of the duct should be no less than the fan inlet area and no more than four times the fan inlet area.

For example if the fan inlet diameter is 350mm, then the duct should be no larger than 600mm square internally, which becomes 750mm externally.

Figure 6 Boiler no.1 burner fan inlet noise attenuator



4.2 Dust collector pulse jet noise

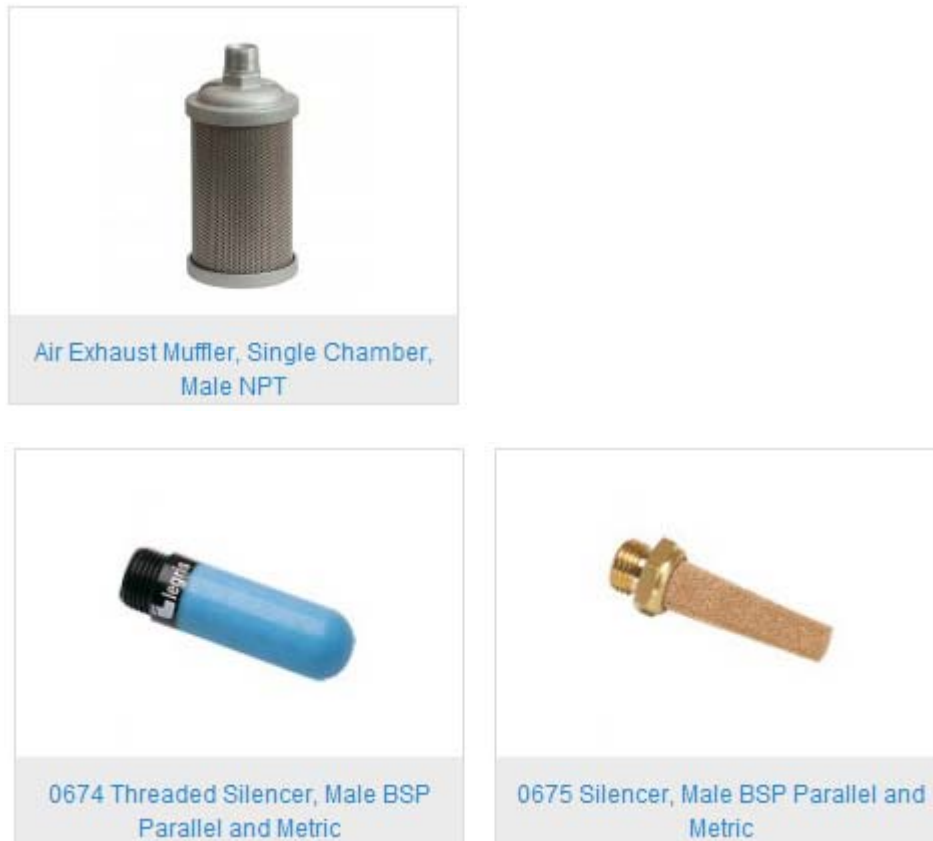
The noise from the pulse jet exhausts on various dust collectors within the factory site is audible at most nearby residential dwellings. This is mainly because it is a very characteristic noise and an elevated source.

The easiest method of reducing their noise emission is to fit exhaust silencers on them such as those shown in **Figure 7**. The first model shown is a larger unit with greater free area and therefore provides less resistance to the exhaust.

All the silencers shown are generally intended for internal use and therefore for the external dust collectors a weatherproof covering should be fitted over them to minimise the collection of dirt and the consequent clogging of the exhaust outlet. This can be in the form of a sheetmetal canopy over the length of the dust collector immediately above the exhaust outlets.

Another option for noise control would be to construct an internally insulated plenum chamber around the exhaust outlets with an opening at each end or on the underside.

Figure 7 Pulse jet valve exhaust silencer



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Fax : 07 3216 7065

Email : sales@pneumaticsolutions.com.au

4.3 Pumps and motors generally

There were several pumps and motors that were considered to be very loud or tonal. These included:

- Chiller supply pump (surrounded by a right-angled masonry wall) = 87 dBA @1m
- Solvent extraction pump = 85 dBA @1m
- Cooling Tower supply pump (South and North) = 82 dBA @1m, 837Hz
- Trade Waste pump = 76 dBA @1m

In most cases it was the motor that was the dominant source of noise and not the pump. It is recommended that a localised acoustical enclosure be placed over both the motor and the pump.

A concept design for an enclosure is given in **Figure 8** and **Figure 9**.

The top face of the enclosure could be constructed as a hinged lid so that quick access can be gained to the motor and pump. Similarly the enclosure could be split into two halves lengthwise so that there is one enclosure over the motor and another over the pump. The join between the two enclosures should consist of a perforated sheetmetal strip nominally 150mm wide to allow ventilation air to escape.

Figure 8 Motor and pump acoustical enclosure

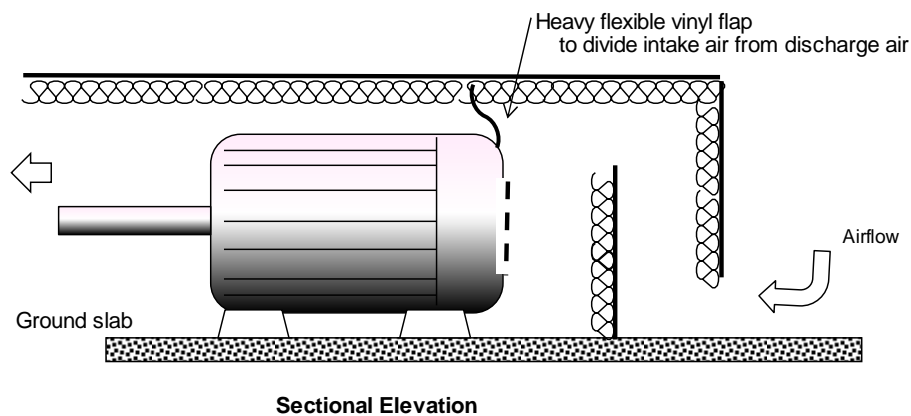
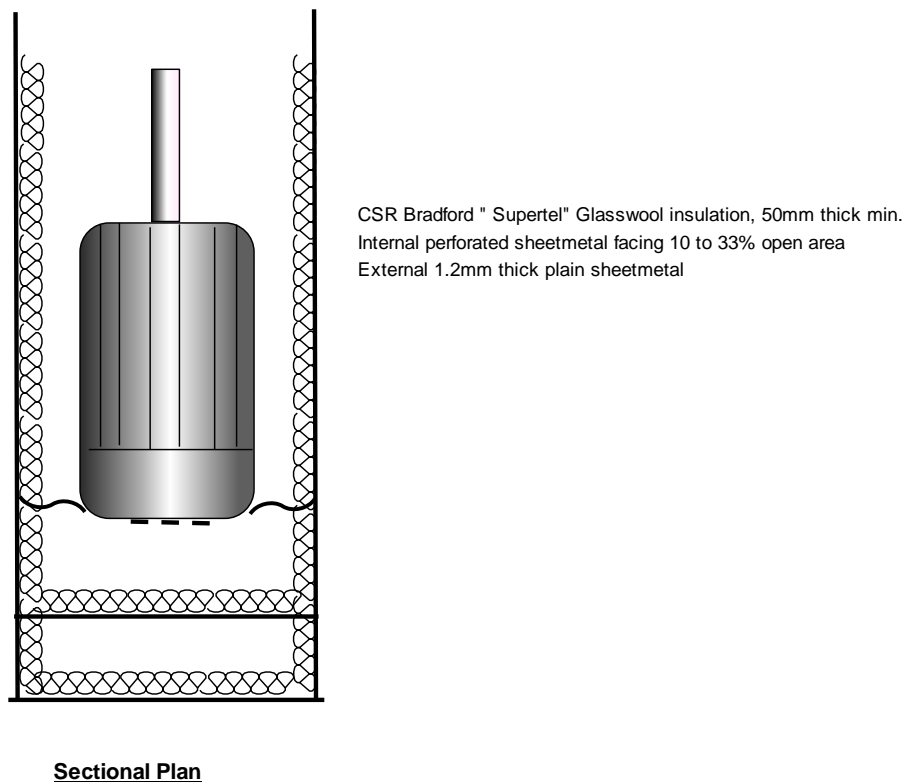


Figure 9 Motor and pump acoustical enclosure



The ventilation air is allowed into the enclosure at the fan end of the motor via a gap under the end panel. This gap is to be the full width of the enclosure and at least 1½ times as large in area as the fan.

The sides of the enclosure extend down to the concrete slab with a soft rubber or neoprene gasket around the bottom to seal to the slab.

A suitable supplier of these products is:

dB Acoustics
dB Acoustics Pty Ltd
62 Nissan Drive
Dandenong South
Victoria 3175
Australia

Telephone : 61-3-9793-2340
Fax : 61-3-9794-5193

4.4 Water extraction vacuum pump

Tonal noise at 442Hz and 885Hz was measured at many locations around the factory. These tones have been traced back to the water extraction vacuum pump(s) on the upper floor of the water extraction building. It is understood that a silencer has been installed on the outlets of these pumps since our last survey.

It would appear that the silencer has not provided sufficient reduction in the noise output and that a second or possibly third silencer is required on the exhaust outlet pipe.

The noise level around these pumps is also high at 85 dBA @1m and it would be worth considering localised acoustic enclosures over each motor and pump since the building's walls are only a lightweight structure.

Yours faithfully,

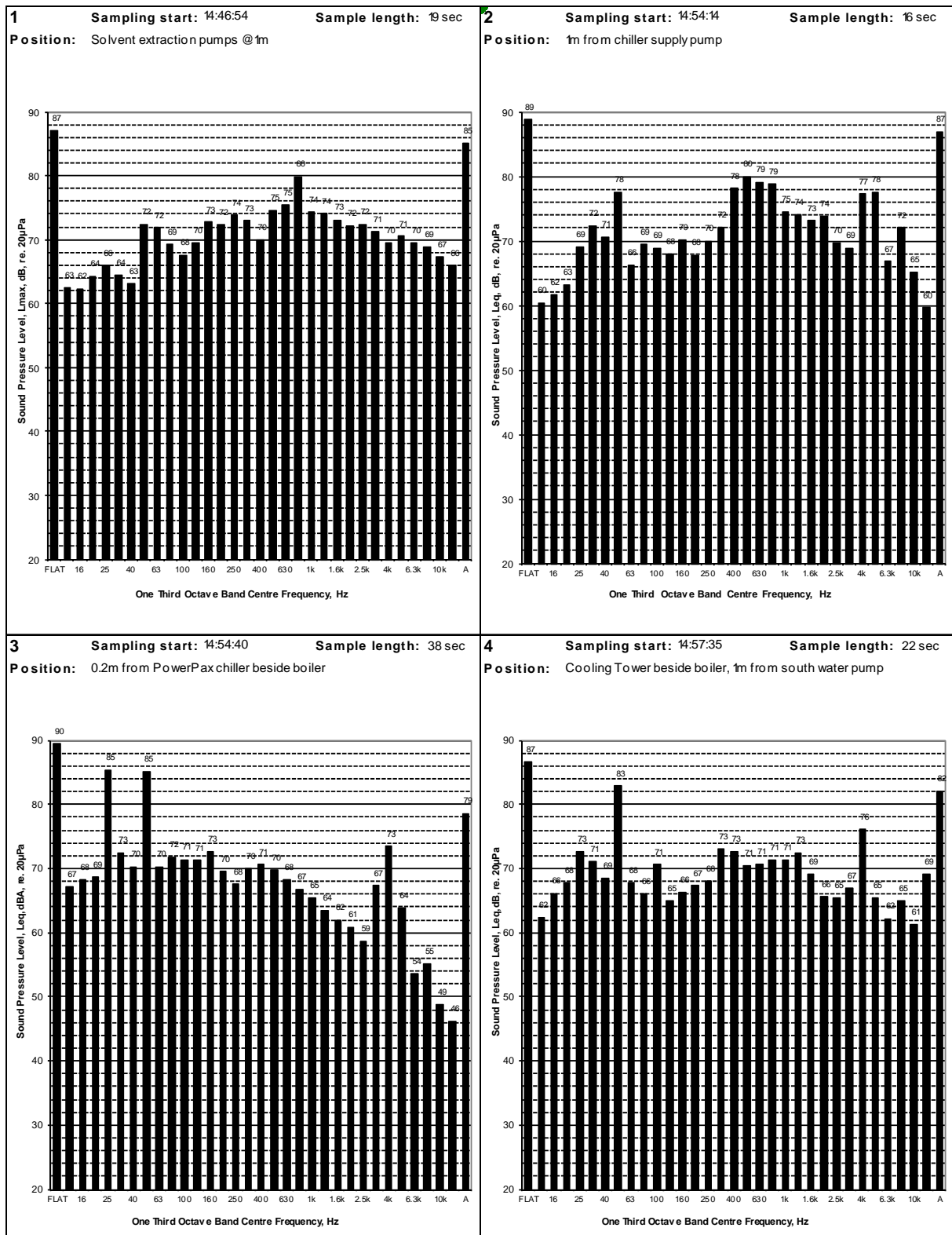
SLR Consulting

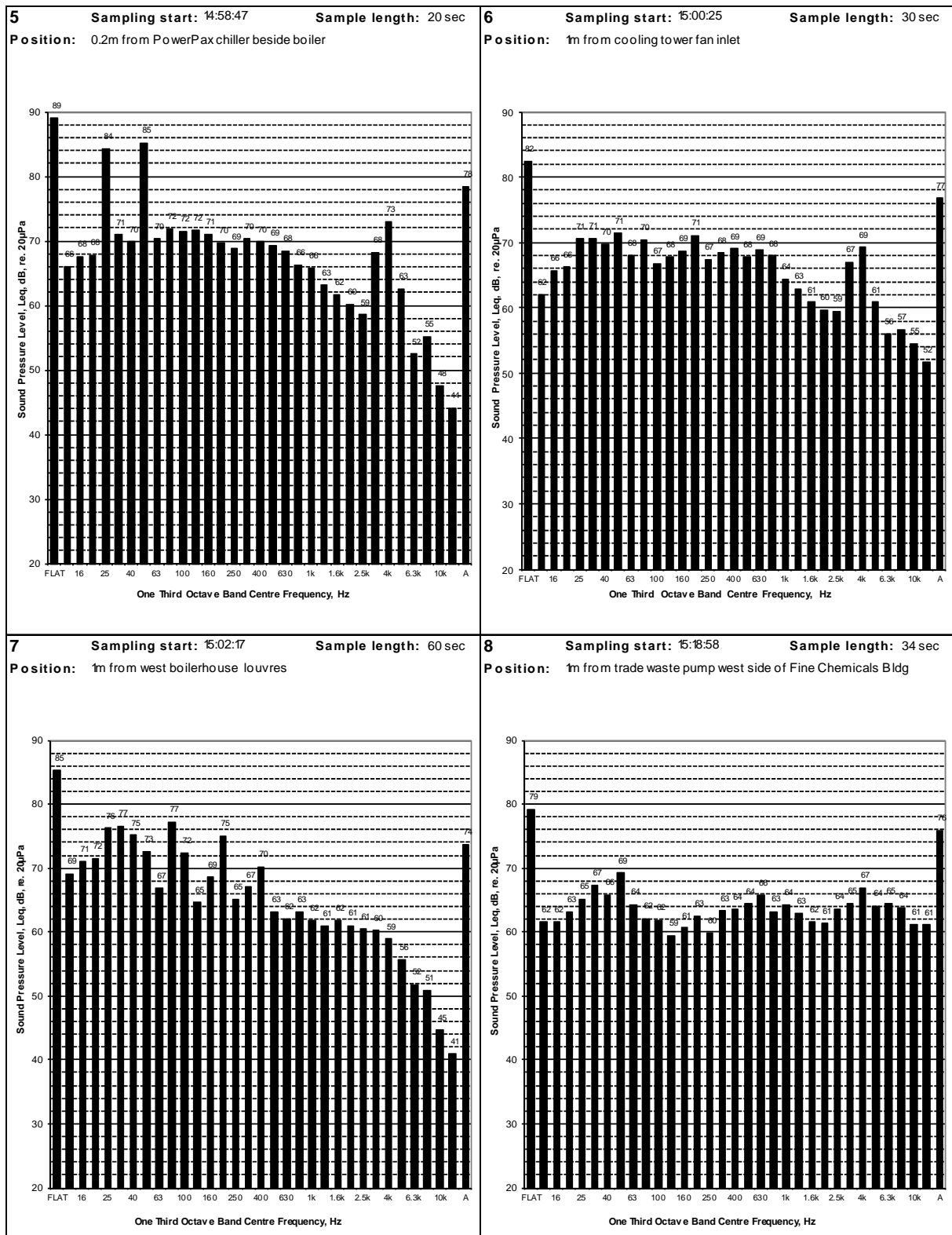


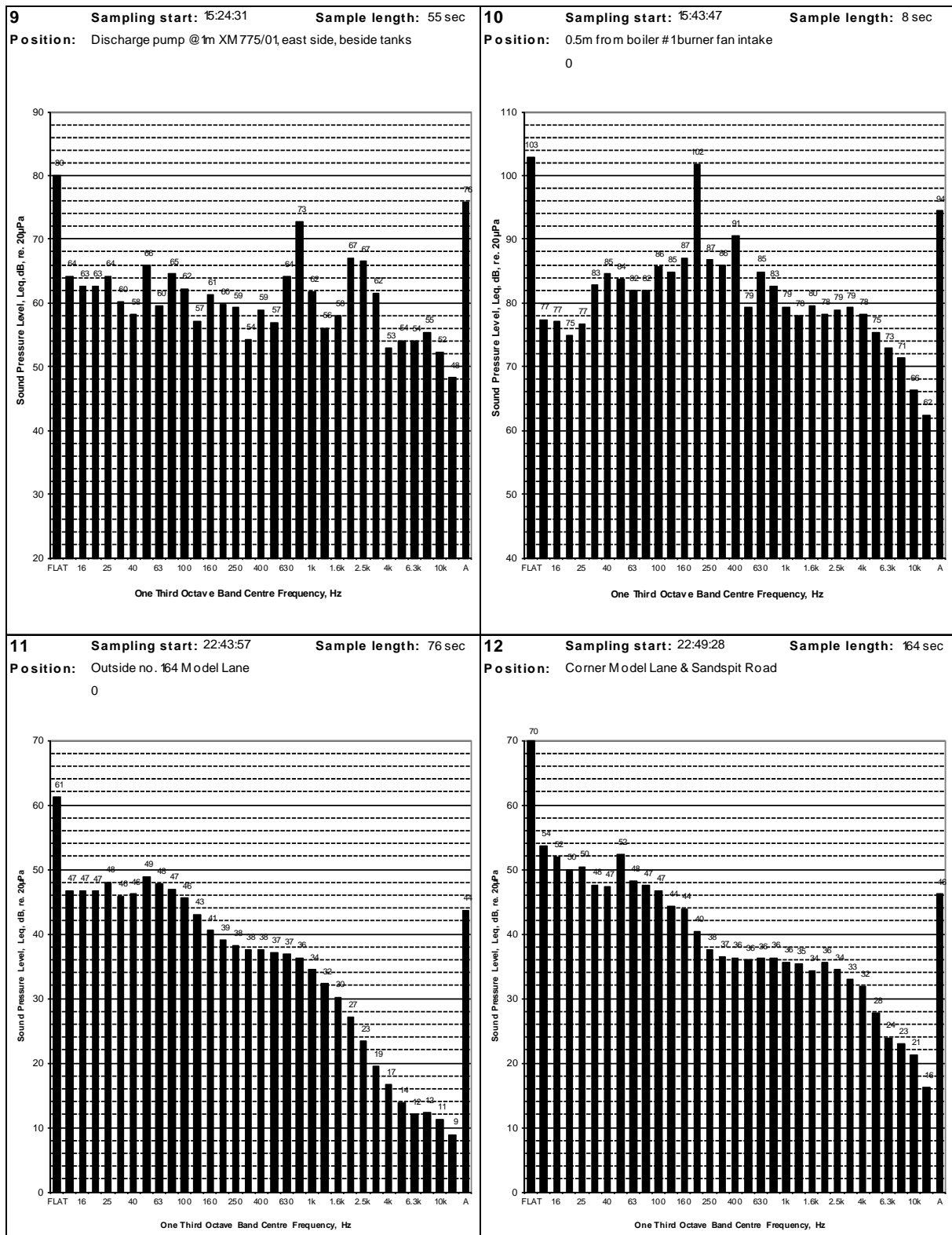
Graeme R. Campbell

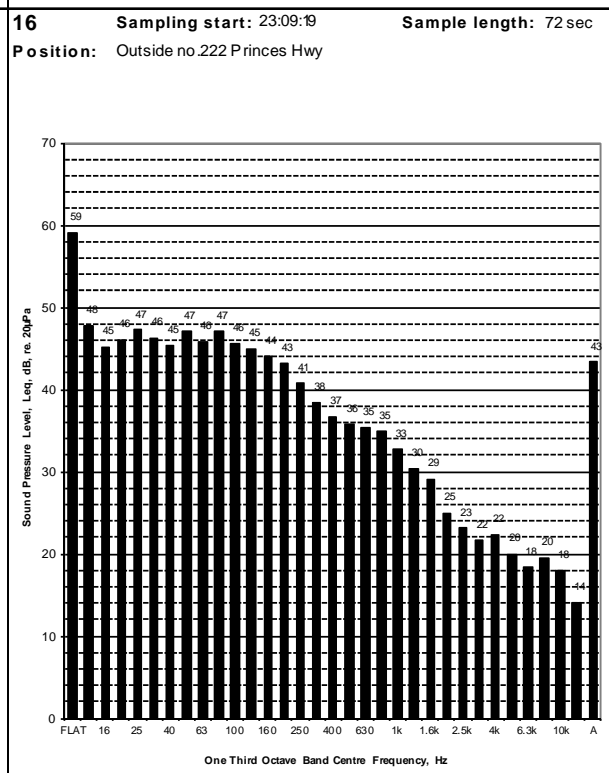
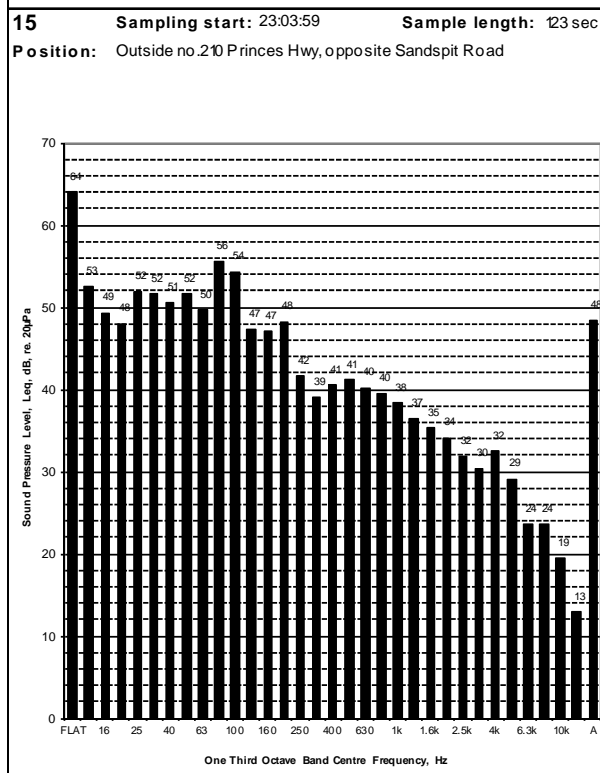
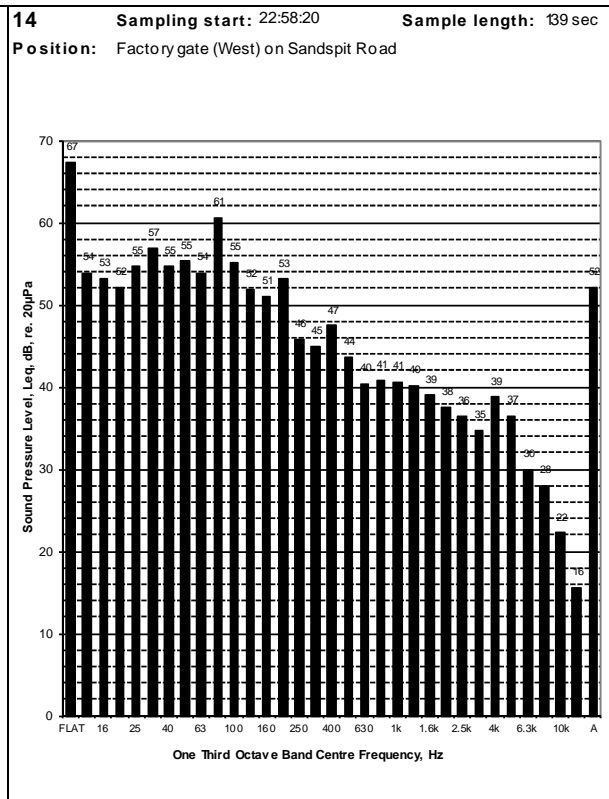
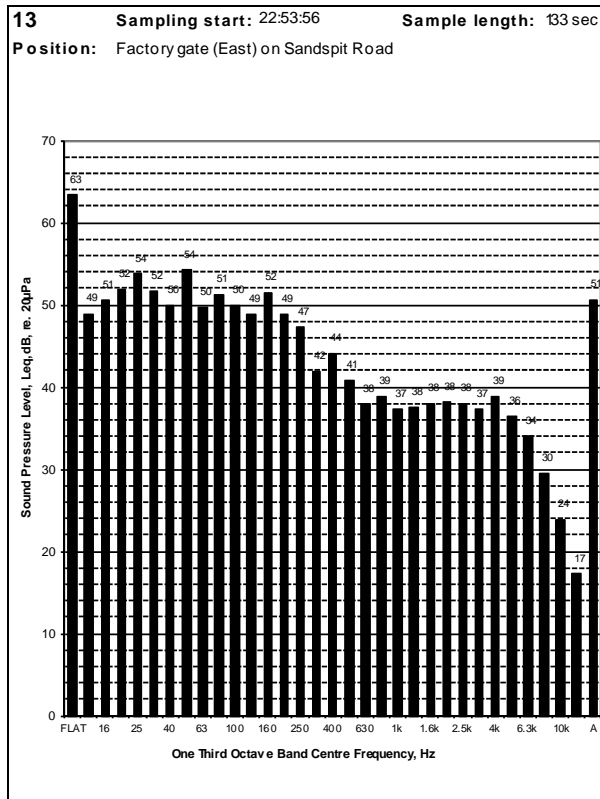
Principal – Acoustics, Noise and Vibration

www.slrconsulting.com

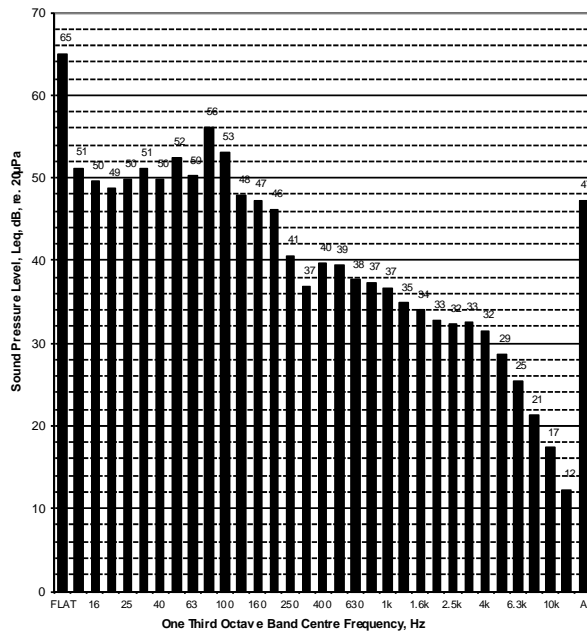




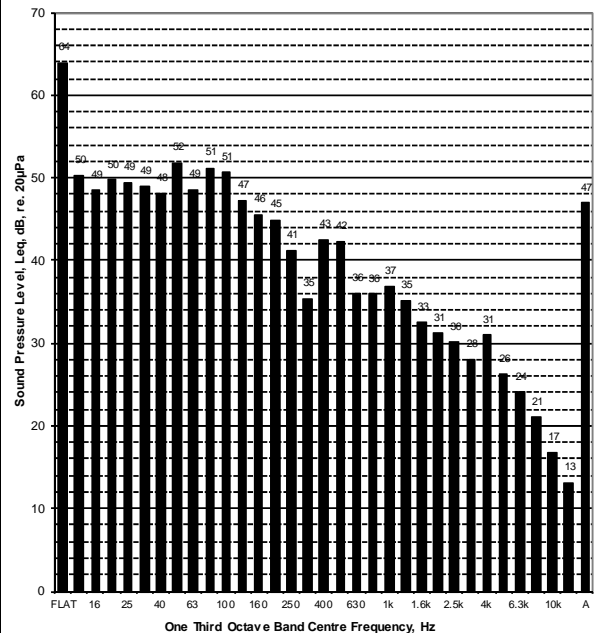




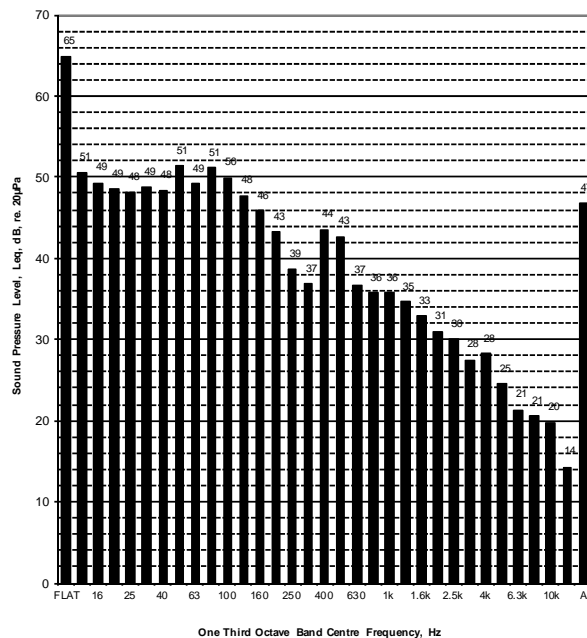
17 Sampling start: 23:13:41 Sample length: 118 sec
 Position: Outside no.204 Princes Hwy, opposite boilerhouse



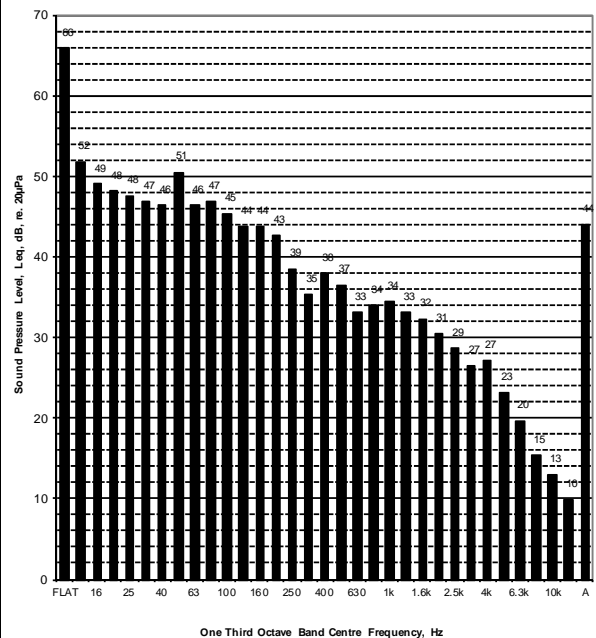
18 Sampling start: 23:26:24 Sample length: 130 sec
 Position: Princes Hwy opposite main entrance

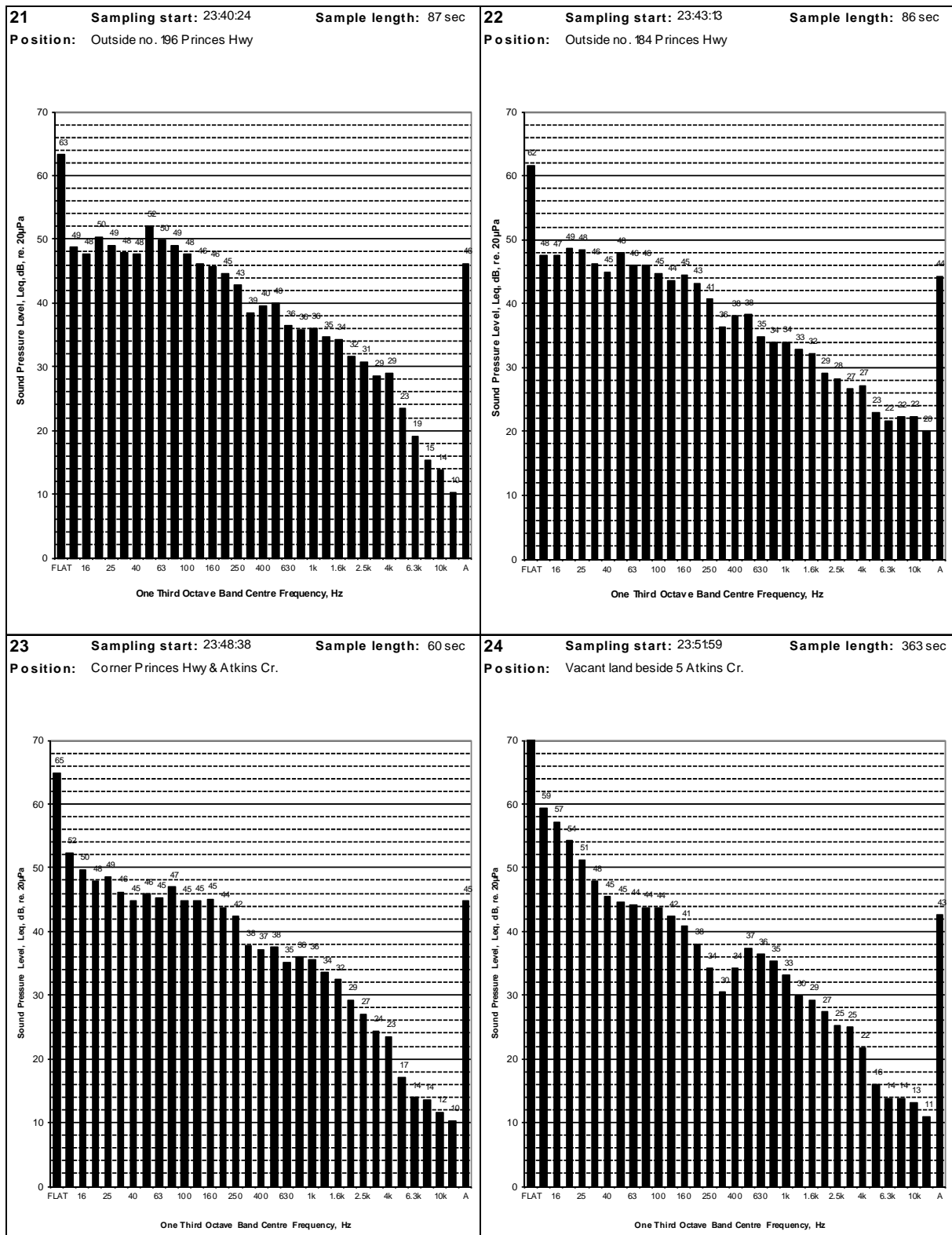


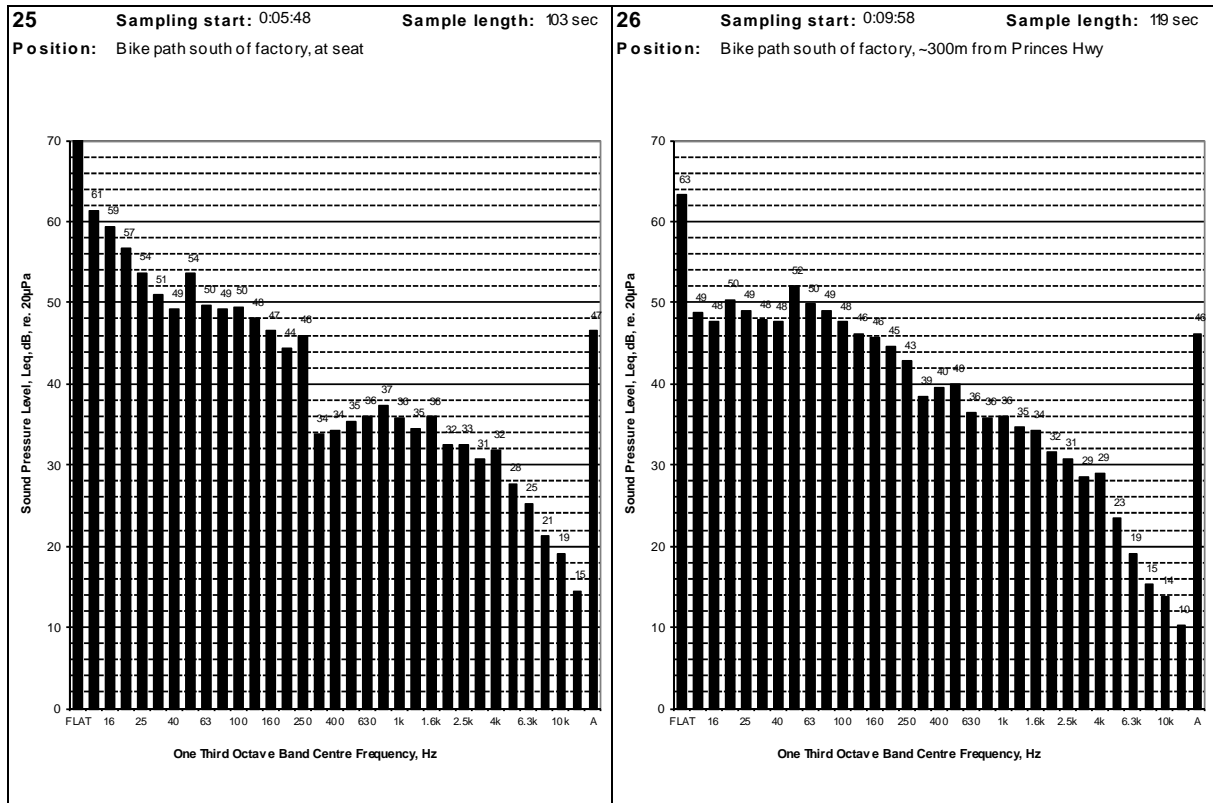
19 Sampling start: 23:30:35 Sample length: 107 sec
 Position: 3 Goldies Lane house,



20 Sampling start: 23:33:36 Sample length: 143 sec
 Position: 9 Goldies Lane, house on north end corner





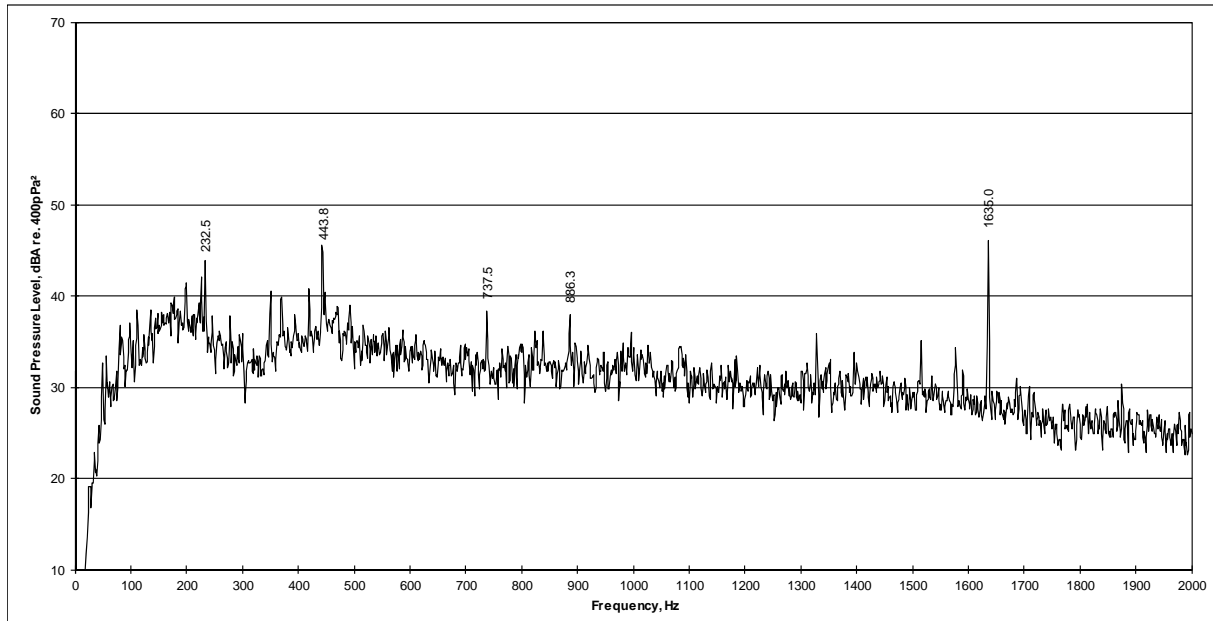


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : No. 184 Princes Highway
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2343h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

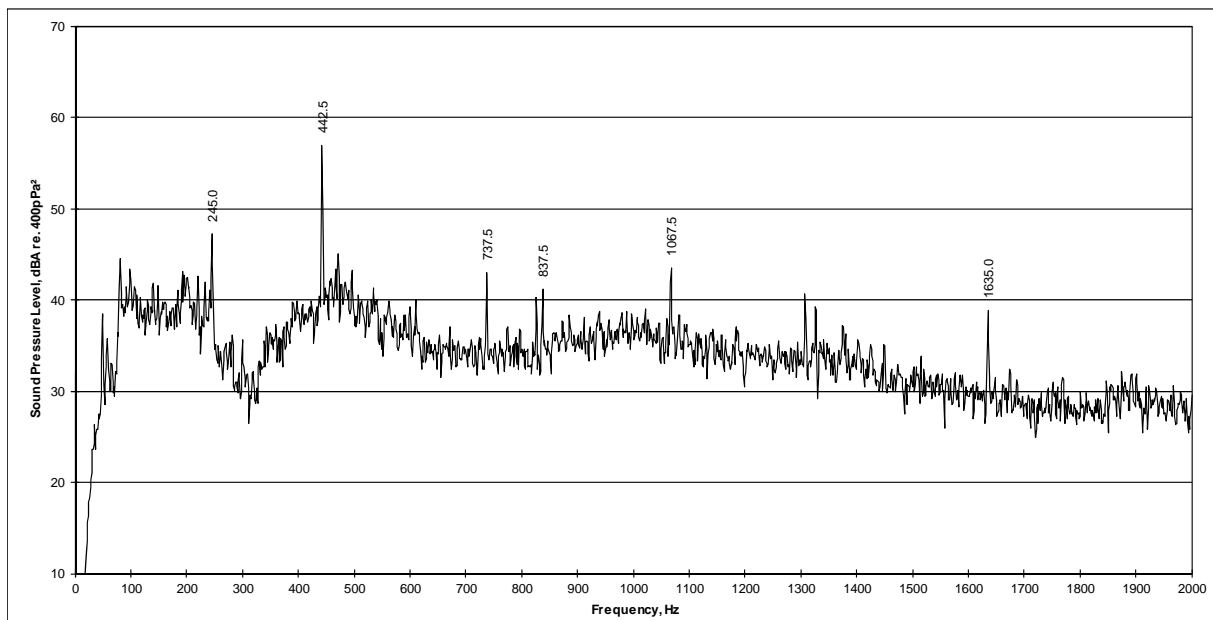


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : Princes Highway, opposite main entrance
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2327h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

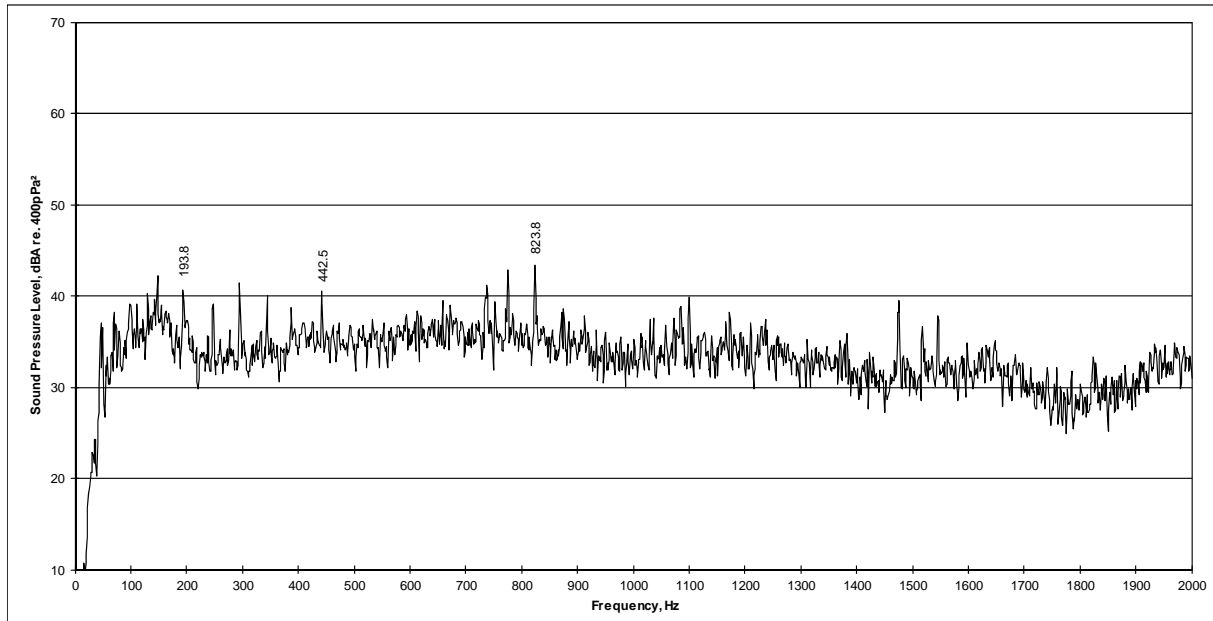


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : Corner Model Lane & Sandspit Road
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2252h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

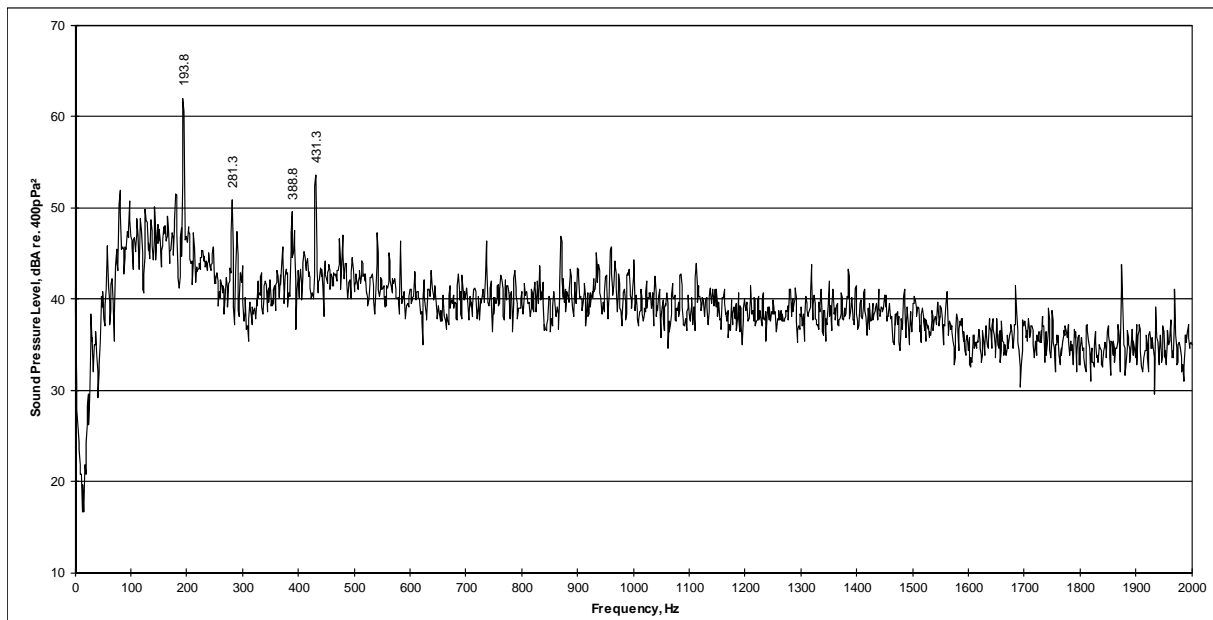


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : Sandspit Road factory gate, near Princes Highway
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2259h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

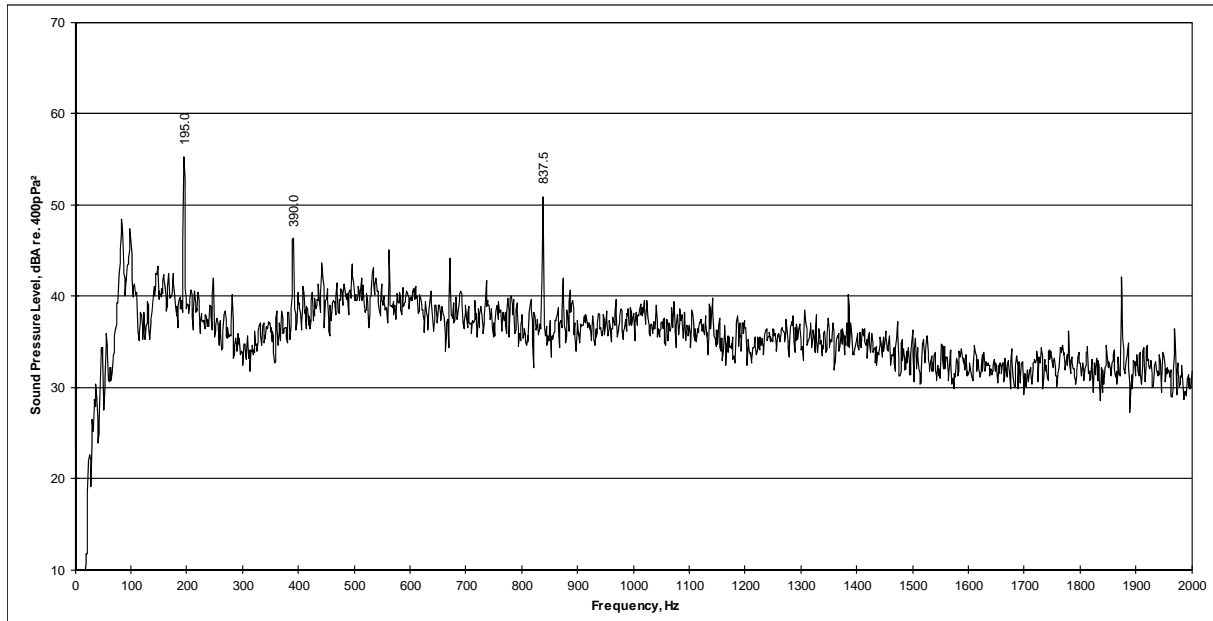


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : No. 210 Princes Highway, opposite Sandspit Road
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2305h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

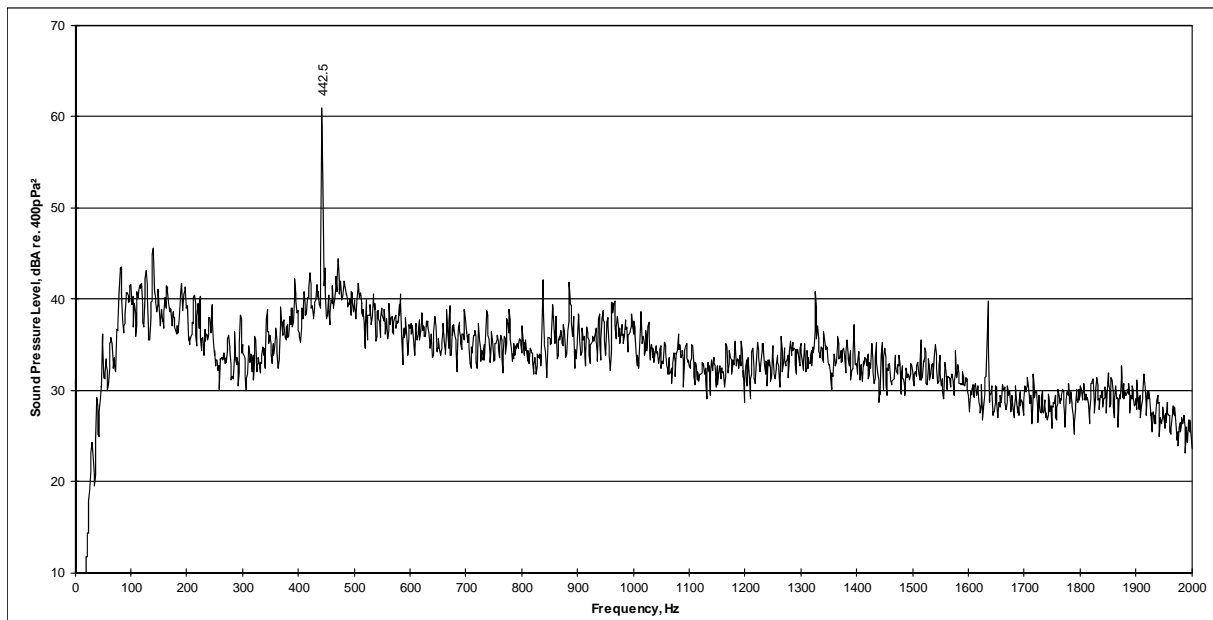


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : 3 Goldies Lane
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2330h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

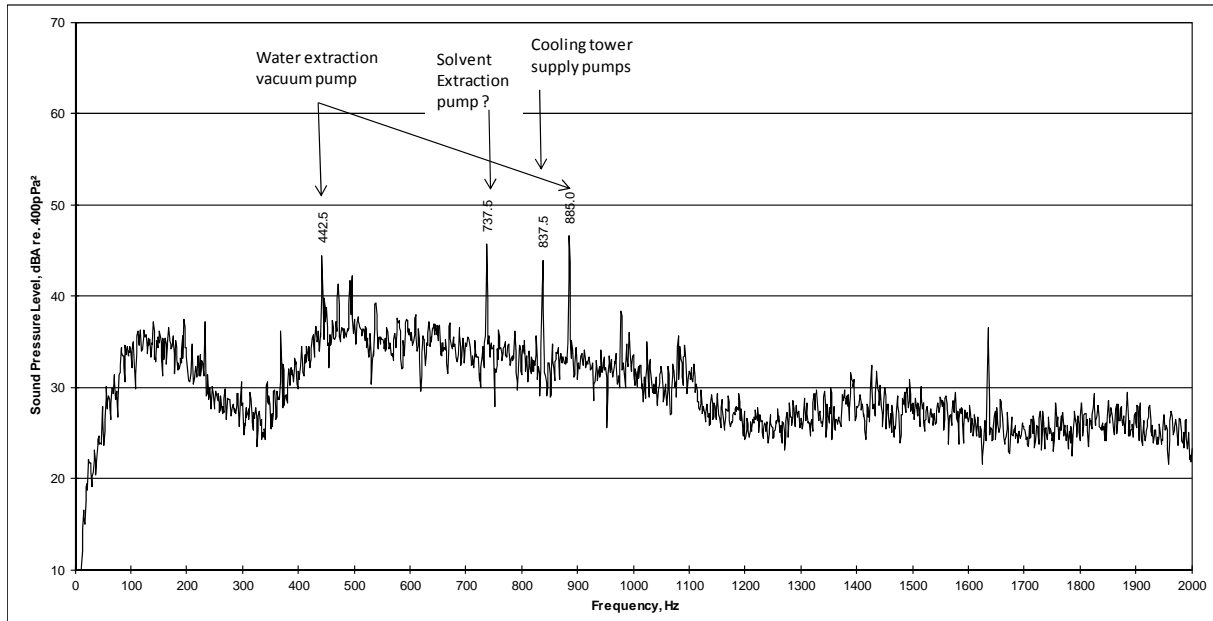


Glaxo Smith Kline - Port Fairy

Condition : Normal plant operation
Analysis range: 0Hz to 2000Hz
Comments : ENE moderate w ind

Position : 5 Atkins Crescent
FFT Resolution: 1.25Hz
Reference :

Time Recorded : 2352h
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

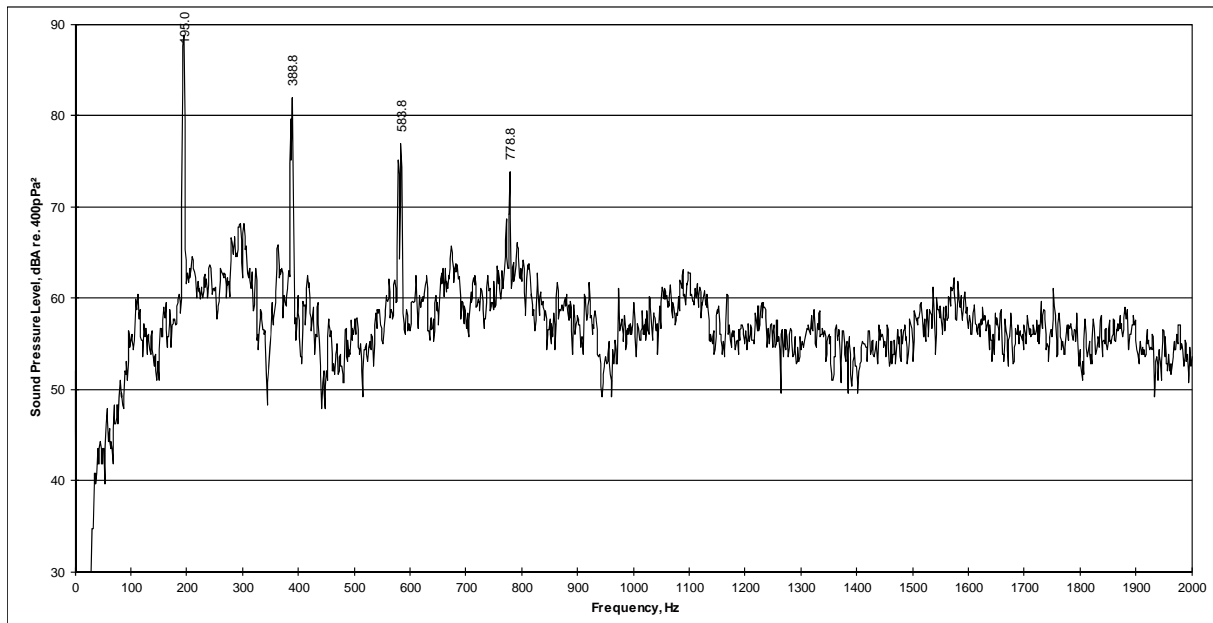


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments : Variable speed fan results in different noise frequencies

Position : 0.5m from boiler #1 burner fan inlet
FFT Resolution: 1.25Hz
Reference :

Time Recorded :
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

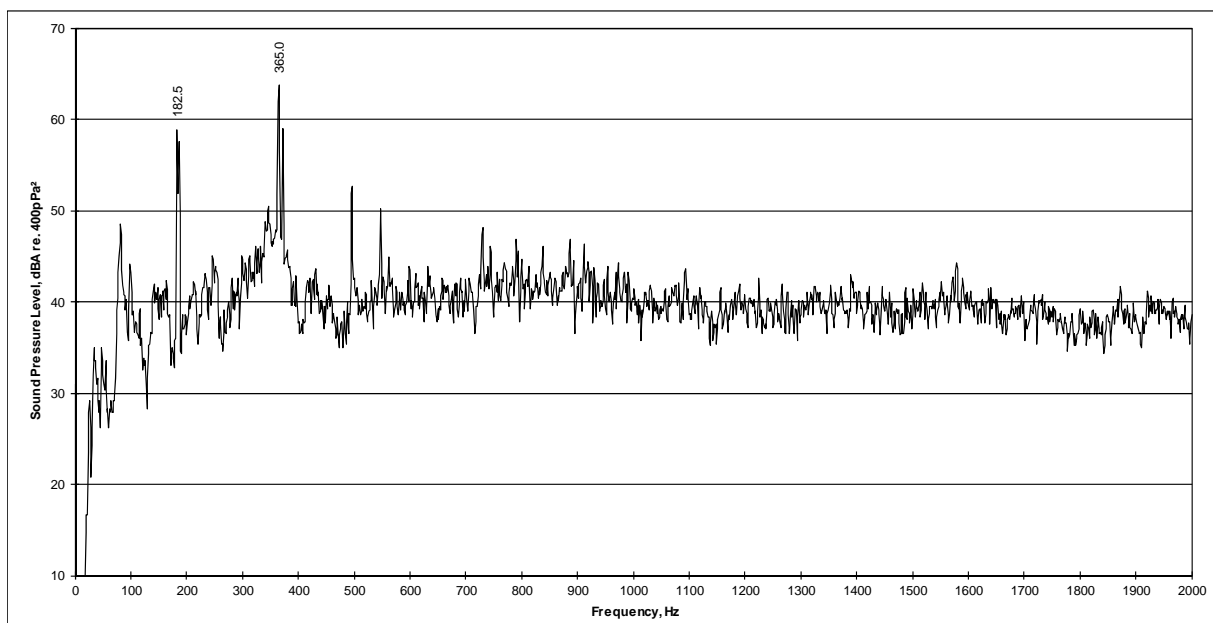


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments : Variable speed fan results in different noise frequencies

Position : 1m outside boiler #1 west façade louvre
FFT Resolution: 1.25Hz
Reference :

Time Recorded :
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

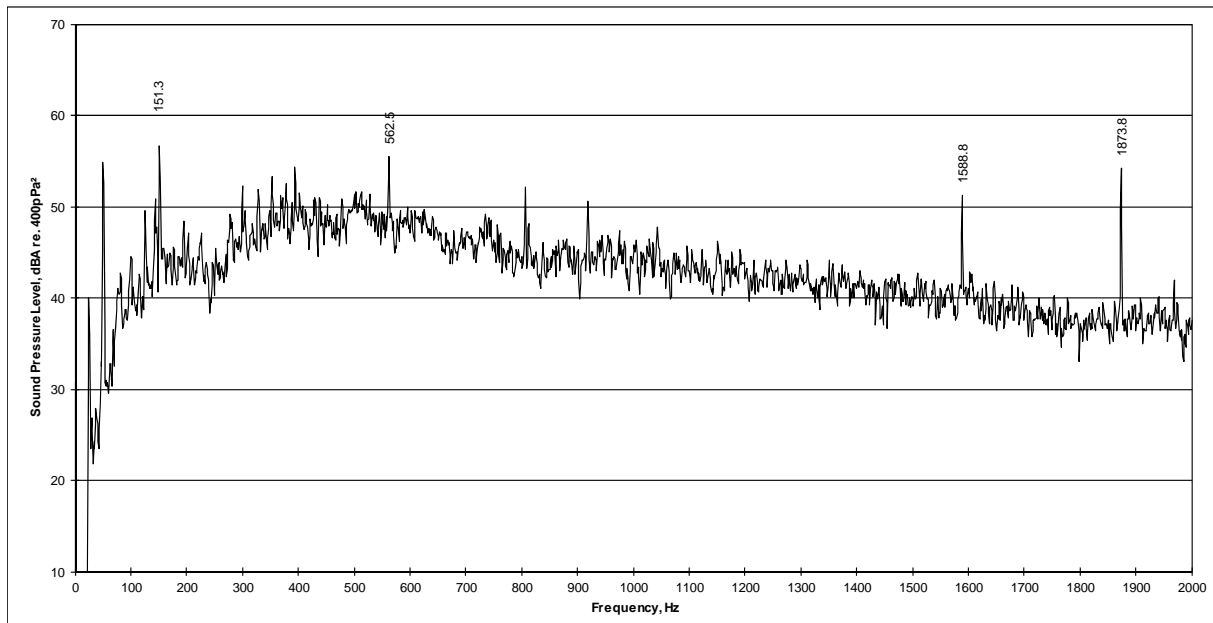


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : 0.2m from Chiller north of boilerhouse
FFT Resolution: 1.25Hz
Reference :

Time Recorded :
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

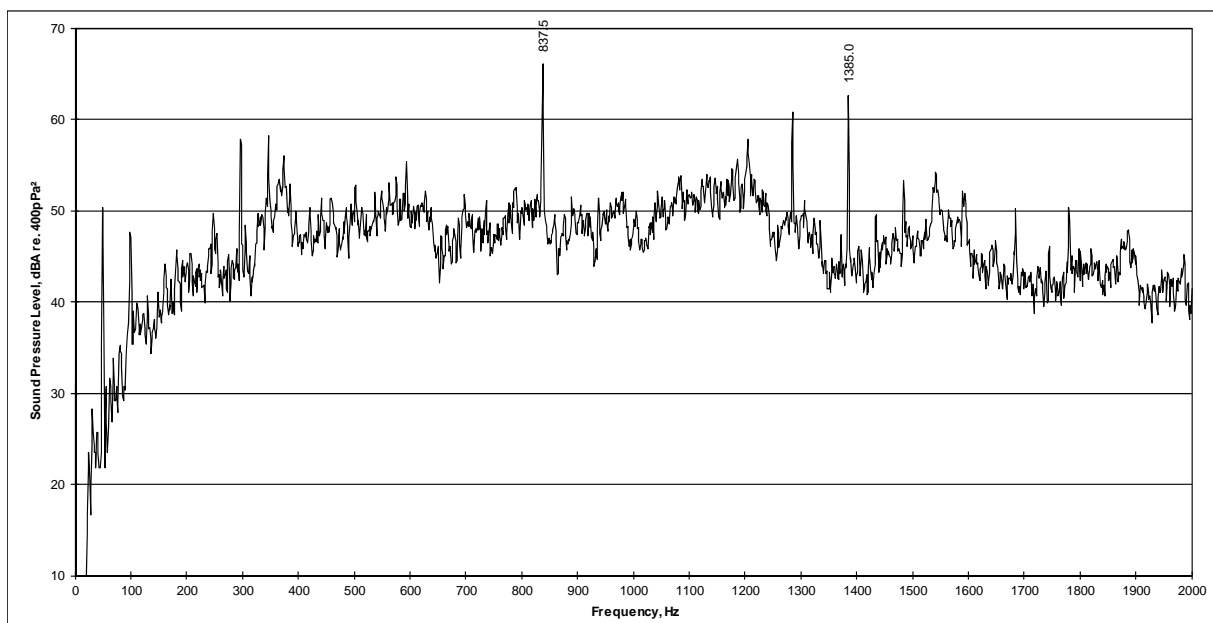


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : 1m from Cooling Tower north pump
FFT Resolution: 1.25Hz
Reference :

Time Recorded :
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04

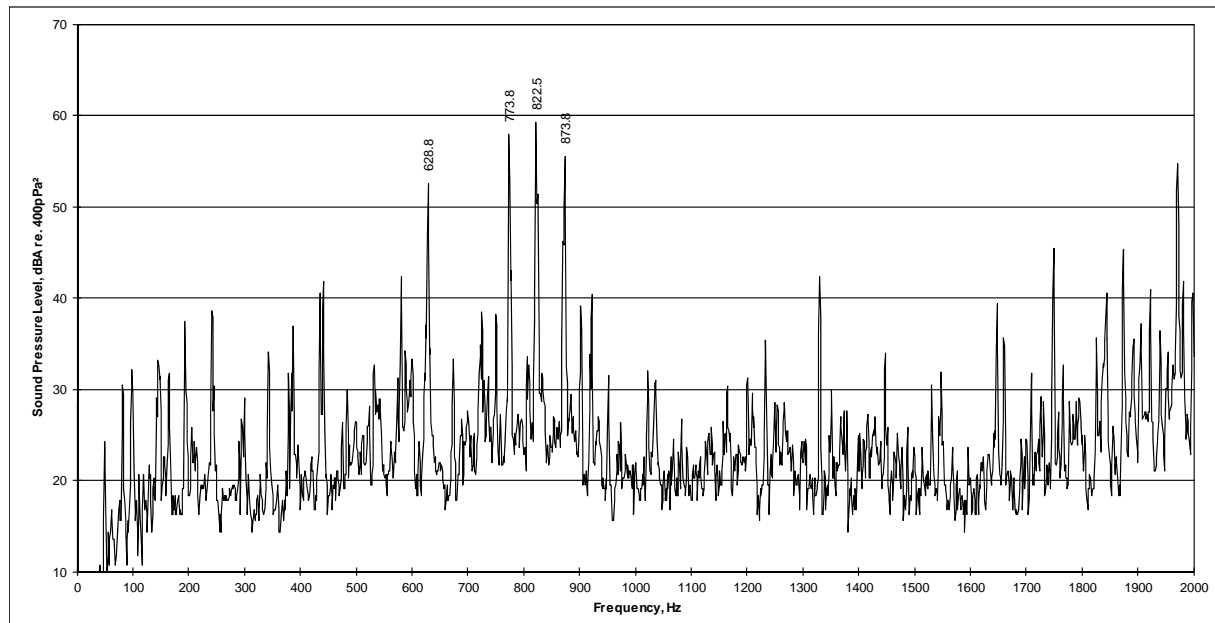


Glaxo Smith Kline - Port Fairy

Condition : 1)
Analysis range: 0Hz to 2000Hz
Comments :

Position : 1m from discharge pump
FFT Resolution: 1.25Hz
Reference :

Time Recorded :
Date Recorded : 2013-11-25
Date Analysed : 2013-12-04





Noise Survey

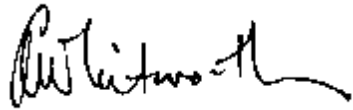
**Sun Pharmaceutical Industries Australia
Pty Ltd**

Port Fairy

April 2018

Noise Survey

Prepared by



Graeme Whitworth
Hygienics Pty. Ltd.

For

Sun Pharmaceutical Industries Australia
Pty Ltd
Princes Highway
Port Fairy VIC 3284

April 2018

Disclaimer

This report was prepared for Sun Pharmaceutical Industries Australia Pty Ltd solely for the purpose set out herein and it is not intended that any other person use or rely on it. Whilst this report is accurate to the best of our knowledge and belief, Hygienics Pty. Ltd. cannot guarantee completeness or accuracy of any descriptions or conclusions based on information supplied to it during site visits, interviews and surveys. Responsibility is disclaimed for any loss or damage, including but not limited to that suffered by Sun Pharmaceutical Industries Australia Pty Ltd arising from the use of this report or suffered by any person for any reason whatsoever.

Executive Summary

Sun Pharmaceutical Industries Australia Pty Ltd commissioned Hygienics Pty Ltd to assess operator exposures to noise and environmental noise emissions at their Port Fairy premises in April 2018.

Sound Pressure Level Measurements

Engineering

In the workshop area noise levels are intermittent and task dependent.

Highest noise levels were recorded in the Welding Bay when the belt grinder was operated. Reportedly, the Welding Bay is a mandatory hearing protection area.

Finishing

At the time of measurement much of the Finishing area was not operating. Noise levels recorded were in the range 70 to 74 dB(A).

Lab/TD

When milling operations were performed with Mills 001 and 002 noise levels were elevated by approximately 7 dB(A) with rapid paddle use.

During the task the operator was observed to be wearing hearing protection.

Recovery

At the time of measurement the columns in the Recovery area were not operating. Noise levels recorded were in the range 72 to 73 dB(A).

TH1 and TH2

Both areas have ambient noise levels typically ranging from 79 – 85 dB(A) however, at certain times particular equipment and processes operated which elevated noise levels significantly.

The highest levels were recorded around Separator 195 in TH1 and P930 in TH2.

Wet Extraction

The Wet Extraction Plant was not in full operation at the time of measurement.

Operation of the High Pressure Belt Wash System resulted in elevated noise levels.

Dosimetry

Ten operators were each fitted with a personal noise dosimeter which was worn for more than 4 hours on either 10 or 11 April 2018. On both days some sections of Plant were non-operational.

Results indicate that none of the wearers experienced a projected daily noise exposure which exceeded the 8-hour Exposure Standard of 85 dB(A) or the 12-hour Exposure Standard of 83.5 dB(A).

Peak noise levels exceeding 140 dB(C) were recorded on two dosimeters. The origin of these Peak levels is not known.

Hearing Protection

With the ear plugs and muffs provided and assuming they are in good condition and fitted properly operators required to wear hearing protection could be expected to obtain sufficient attenuation to bring the in-ear noise level down below 83.5 dB(A).

Recommendations

A number of recommendations, in accordance with the Occupational Health and Safety Regulations 2017, have been included in the body of the report.

Environmental Noise Measurements

Noise level measurements taken in the Day Period in community areas around the Sun Pharamaceuticals Plant were significantly affected by traffic and other extraneous noises.

With the volume of traffic and other industries operating continuously and close to some measurement locations even the L_{90} is elevated beyond what reasonably could be expected to be emissions from the Plant.

However, it is believed that the L_{90} level can be used as a reliable estimate of the noise emissions from the Plant to community areas during the Night Period on 11-12 April 2018.

On the night of measurements certain areas of the Plant were not operating, therefore on other nights noise emissions from the Plant may vary.

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1. Aims

1.
To assess the exposure to noise of personnel working at Sun Pharmaceutical Industries Australia Pty Ltd, Port Fairy in accordance with the requirements of the *Occupational Health and Safety Regulations 2017*.
2.
To identify those tasks/locations contributing most to noise exposures at the premises.

3.
To evaluate suitability of current hearing protection devices and if necessary recommend others more suitable.
4.
To conduct measurements of environmental noise levels at pre-determined test locations in the nearby community.

2. Background

Sun Pharmaceutical Industries Australia Pty Ltd commissioned Hygienics Pty Ltd to assess operator exposures to noise and environmental noise emissions around its Port Fairy premises in April 2018.

The Occupational Health and Safety Regulations state that an employee's exposure to noise should not exceed 85 dB(A) averaged over an 8 hour day, that is Leq 8hr 85 dB(A). This can be considered a noise dose of 100%.

An equivalent noise dose of 100% can be reached by shorter exposures to louder sounds or, conversely, longer exposures to quieter sounds (see Table 1).

For employees working other than "standard" 8 hr shifts the exposure limit alters, e.g. for twelve hour shifts, the 85 dB(A) exposure limit reduces to **83.5 dB(A)**. This is based on a 3dB halving principle; that is, for every 3 dB increase in noise levels there must be a halving of the exposure duration.

The Regulations also state that a peak hold sound pressure level of 140 dB(C) should not be exceeded.

Table 1

L_{Aeq} 8hr = 85 dBA (noise dose = 100%)	
Average Noise Level (Leq dBA)	Time Spent (hours)
82	16
83.5	12
85	8
88	4
91	2
94	1
97	0.5
100	0.25

3. ***Systems of Work***

Sun Pharmaceutical Industries Australia Pty Ltd, Port Fairy operates as a producer of opiates medicinal products.

Poppy straw is brought to the Plant where it undergoes both physical and chemical processes to extract the active products.

Further chemical and physical processes are performed on the extracted material to produce dry powdered active products.

Dry active products are transported from the site for further processing, either in Australia or overseas, to yield medicinal products in a form suitable for patient use.

At Sun Pharmaceutical Industries Australia Pty Ltd most employees work a 12-hour shift.

4. ***Procedure***

The noise survey comprised:

sound pressure levels may be measured at operator manned workstations or near operating equipment and or at other locations in general work areas.

personal dosimetry conducted on representative employees over part of the working shift.

environmental noise measurements taken at various locations in the nearby community.

5. Sound Pressure Levels

At selected locations, in accordance with a previous survey, the following measurements were recorded:

Leq dB(A) (over 20 seconds)
Peak dB(C) (if required)

If, during the course of the survey, other noisy locations, equipment or tasks were identified measurements were also taken.

An Leq measurement represents the equivalent continuous sound pressure level over the observation period, at each location, measured in A decibels and referenced to 20 micropascals.

A-weighted measurements are more generally used and approximate the effect the noise in question has on the human ear.

The peak noise measurement is usually recorded at those workstations where impact noises are thought to be a problem. This is defined as the peak C-weighted sound pressure level reading in decibels referenced to 20 micropascals.

6. Dosimetry

Ten representative employees were fitted with a personal noise dosimeter. These were considered to cover job descriptions over the site where noise exposure required assessment.

A noise dosimeter is small sound level meter with microphone attached. It is fitted to the wearer's collar or overalls as close as practical to the ear.

It is worn for a sufficiently representative period of the employee's shift, generally at least four hours during which time all noises experienced by the wearer are recorded and logged.

Data can then be retrieved and various parameters of noise exposure assessed.

Logged data can be also presented in graphical format.

7. Environmental Noise Levels

In accordance with a previous survey at 16 test locations the following measurements of environmental noise were recorded:

Leq dB(A)

L₉₀ dB(A)

Measurements were taken at the 16 locations during both the Day and Night Periods (*Noise from industry in regional Victoria* ('NIRV' — EPA publication 1411) and *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* ('SEPP N-1')

An Leq measurement represents the equivalent continuous sound pressure level over the observation period, at each location, measured in A decibels and referenced to 20 micropascals.

An L₉₀ represents the noise level, over the measurement period, which was exceeded for more than 90% of the time. This is often used as a measure of background level or in this case noise emissions from the Plant.

During the Day Period a 5 minute continuous measurement period was used at each test location.

During the Night Period a 3 minute continuous measurement period was used at each test location. This was considered appropriate given the absence of variable noise sources.

8. Sound Pressure Level Measurements

8.1 Leq Measurements

Results of noise measurements conducted on 10, 11 and 12 April 2018 at various locations appear on a separate spreadsheet.

8.2 Discussion of Sound Pressure Levels

FCF2

Noise levels from operating equipment were generally not excessive in FCF2. Highest noise levels were recorded near pumps with VS303 Transfer Pump recording the highest of 89.7 dB(A).

As is often the case in FCF2 a number of pumps and other items, in close proximity, are operating at once. The combined effect of a number of items was measured and still was not excessive. The additive effect of two items with similar noise outputs is approximately 3 dB (eg 80 + 80 = 83 dB).

Engineering

As is generally the case in workshops noise levels are intermittent and task dependent. At the time of measurement there was little activity in the Workshop.

A number of pieces of equipment were started but most had no product worked on and thus recorded noise measurements may not be a true indication of noise when tasks are performed.

Highest noise levels were recorded in the Welding Bay when the belt grinder was operated. Reportedly, the Welding Bay is a mandatory hearing protection area.

Finishing

At the time of measurement much of the Finishing area was not operating.

Noise levels recorded were in the range 70 to 74 dB(A).

Lab/TD

Activities in the Milling Room produced highest noise levels in the Lab area.

When milling operations were performed with Mills 001 and 002 noise levels were significantly elevated with the use of the steel paddle to push the material towards the grinding parts. Noise levels were elevated by approximately 7 dB(A) with rapid paddle use.

Each milling operation was of short duration but repeated many times over the day. During the task the operator was observed to be wearing hearing protection.

Recovery

At the time of measurement the columns in the Recovery area were not operating.

Noise levels recorded were in the range 72 to 73 dB(A).

TH1

Noise levels throughout TH1 were generally in the range 81 to 85 dB(A), however certain actions which occur sporadically over the day elevated noise levels at most locations. These included operation of the Trade Waste Pump and most significantly Separator discharges. Separator 195 discharge was measured at 119.7 Peak dB(C).

TH2

Noise levels throughout TH2 were generally in the range 79 to 83 dB(A), however at the end of each batch, which occurs approximately every 45 minutes, noise levels are elevated at most locations on the Ground Floor. At specified test locations levels were elevated by 6 to 9 dB(A).

Noise levels close to P930 reached 95.2 dB(A) during its operation.

Wet Extraction

The Wet Extraction Plant was not in full operation at the time of measurement.

With the main belt filter operating noise levels noise levels from Ground to Level 2 were in the range 73 to 85 dB(A).

Operation of the High Pressure Belt Wash System elevated the measured noise level at a test location on the opposite side of the belt by more than 4 dB(A). It is expected that at most test locations some elevation of noise levels would be experienced.

Reportedly this system operates for approximately 75 minutes once every 24 hours.

9. Dosimetry Results

9.1 Exposure Standards

As required by the Occupational Health and Safety Regulations 2017 - operator exposures to noise in the workplace are to be compared with set exposure standards. These are:

- Leq 8hr = 85dB(A)
- Peak = 140 dB(C)

Projected exposures can then be compared with the standard of 85 dB(A) over 8 hours.

For 12-hour shifts the exposure standard reduces to 83.5dB(A).

Measurements of any Peak noise levels during high impact noises can be compared directly with the standard of 140 dB(C).

9.2 Summary of Results

Wearer	Name/Job description	Run Time (hrs:min)	Projected dose (8 hrs)	Leq dB(A) (Av 8hrs)	L Peak dB(C)
1	Sean Murphy/ FCF2	6:19	17.7%	77.5	122.0
2	Peter Chamberlain /Finishing	5:53	8.1%	74.1	130.9
3	Michael Watts/ Recovery	6:11	7.1%	73.5	128.5
4	Adison Cognian/ Oriparvine	5:17	10.2%	75.1	139.5
5	Bill McNulty/ Recovery	5:38	17.4%	77.4	144.6
6	Adison Cognian/ Oriparvine WIP	4:02	46.9%	81.7	144.0
7	Brett Unwin/ FCF2	6:28	6.5%	73.1	123.7
8	Adrian Brian/ Finsihing	6:28	28.1%	79.4	136.6
9	John McElgunn/ TH2	6:34	45.6%	81.5	128.3
10	Cameron Brown/ Wet Extraction	6:34	36.6%	80.6	116.9

Table 2

9.3 Discussion of Operator Exposures

Ten operators were each fitted with a personal noise dosimeter which was worn for more than 4 hours on either 10 or 11 April 2018. On both days some sections of Plant were non-operational.

For each wearer a graph of noise levels experienced over the sample period together with relevant data is attached in the Appendix.

The traces to follow on each graph are the lower trace which plots the wearer's minute by minute Leq dB(A) values and the top trace which shows the minute by minute Peak noise level (dB(C)) experienced.

As the Data in the Appendix shows, and as is summarised in Table 2 above, none of the wearers experienced a projected daily noise exposure which exceeded the 8-hour Exposure Standard of 85 dB(A) or the 12-hour Exposure Standard of 83.5 dB(A)

Some of the wearers were working in areas where sections of plant or particular processes were not operating. This may have resulted in dosimetry results which do not accurately reflect normal operations, hence noise exposures, in those areas.

Peak Noise Levels

Two operators (Wearers 5 and 6) experienced Peak noise levels of 144.6 and 144.0 dB(C) respectively which exceed the Exposure Standard of 140 dB(C).

The Peak level for Wearer 5 seems inconsistent with Peak levels experienced throughout the rest of the measurement period and would seem to be of spurious origin.

Peak levels for Wearer 6 were more variable over the measurement period. The source of the elevated Peaks is not known.

10. Environmental Noise Level Measurements

10.1 Day Period Measurements

Results of noise measurements conducted at 16 test locations during the Day Period on 11 April 2018 appear in Table 3.

Measurement times: 0945 – 1230 hrs

Wind: ESE to E 10-15 knots

10.2 Night Period Measurements

Results of noise measurements conducted at 16 test locations during the Night Period on 11-12 April 2018 appear in Table 4.

Measurement times: 2300 – 0100 hrs

Wind: ENE 5-15 knots

Table 3 Day Period

Test Number	Test Location	Leq (dB(A))	L ₉₀ dB(A)	Comments
1	164 Model Lane	53.6	41.4	Birds. Plant faintly audible. 2 cars passed
2	Cnr Sandspit Rd and Model Lane	54.7	44.4	Plant audible. Birds. Distant dog
3	Sandspit Rd – east Plant gate	49.2	45.5	Plant audible. Birds. Car passed. Trucks on highway
4	Sandspit Rd – west Plant gate	58.5	53.6	Air Liquide discharging. Generator in tyre yard (<1min). Car passed. Car into tyre yard. Plant audible
5	210 Princes Hwy	69.3	53.1	Vehicles on highway (up to 85dBA). Plant only audible when no traffic. Tyre fitting
6	222 Princes Hwy	72.2	56.1	Engineering workshop noise. Traffic on highway. Plant not audible
7	204 Princes Hwy	69.0	52.3	Traffic on highway. Plant audible when no traffic (Plant ~ 51dBA).
8	Princes Hwy – opposite Main Gate	69.8	53.1	Traffic on highway. Plant audible when no traffic (Plant ~ 49dBA)
9	3 Goldies Lane	64.8	51.6	Traffic on highway. Plant audible. Birds. Trucks leaving Plant
10	9 Goldies Lane	64.8	51.6	Traffic on highway. Plant audible when no traffic (Plant ~ 49dBA). Dog nearby
11	196 Princes Hwy	67.9	48.4	Traffic on highway. Plant audible when no traffic (Plant ~ 46dBA)
12	184 Princes Hwy	70.2	54.7	Traffic on highway. Plant just audible when no traffic
13	Cnr Princes Hwy and Atkins Cres	66.3	49.8	Traffic on highway. Plant just audible when no traffic (Plant ~ 44dBA). Dog
14	5 Atkins Cres	40.9	37.5	Plant not audible except PA system. Traffic on highway. Birds
15	Bike path south of factory – near seat	53.1	45.8	Traffic on highway. Plant audible
16	Bike path – 300m from highway	42.4	39.1	Plant just audible (~ 38dBA). Birds. Wind blowing plastic on fence. Steam/air release near TH2 increased noise level by ~2dBA

Table 4 Night Period

Test Number	Test Location	Leq (dB(A))	L90 dB(A)	Comments
1	164 Model Lane	42.3	40.5	Plant faintly audible. Ocean audible
2	Cnr Sandspit Rd and Model Lane	45.7	43.3	Plant audible. Wind noise
3	Sandspit Rd – east Plant gate	45.3	42.6	Plant audible. More sheltered from wind. Truck on highway
4	Sandspit Rd – west Plant gate	49.7	49.0	Plant audible. No traffic on highway
5	210 Princes Hwy	46.8	46.0	Plant audible. No traffic on highway
6	222 Princes Hwy	43.7	41.1	Plant audible. Birds. No traffic on highway
7	204 Princes Hwy	45.5	44.4	Plant audible. Birds. No traffic on highway
8	Princes Hwy – opposite Main Gate	44.8	43.9	Plant audible. No traffic on highway
9	3 Goldies Lane	46.8	45.8	Plant audible. Wind chimes. No traffic on highway
10	9 Goldies Lane	46.7	45.5	Plant audible. No traffic on highway
11	196 Princes Hwy	44.7	43.5	Plant audible. No traffic on highway
12	184 Princes Hwy	43.5	42.4	Plant audible. No traffic on highway
13	Cnr Princes Hwy and Atkins Cres	43.7	42.4	Plant audible. No traffic on highway
14	5 Atkins Cres	39.7	38.3	Plant faintly audible. No traffic on highway
15	Bike path south of factory – near seat	44.4	42.1	Plant audible. One car on highway
16	Bike path – 300m from highway	44.9	42.8	Plant audible. Plastic on fence. No traffic on highway

10.3 Discussion of Environmental Noise Measurements

Day Period

Noise level measurements, particularly average levels over time, taken in the Day Period in community areas around operating industries are often significantly affected by traffic and other extraneous noises. This was evident in measurements recorded on 11 April 2018 around the Sun Pharmaceuticals Plant

The most significant noise source was traffic, particularly trucks, travelling along the Princes Highway.

An L_{90} represents the noise level, over the measurement period, which was exceeded for more than 90% of the time. This is often used as a measure of background level or in this case noise emissions from the Plant.

With the volume of traffic and other industries operating continuously and close to some measurement locations even the L_{90} is elevated beyond what reasonably could be expected to be emissions from the Plant.

For those test locations more distant from the highway and other industries the L_{90} more closely reflects the likely noise emissions from the Plant. Test locations 1, 2, 3, 14, 15 and 16 were sufficiently distant from the highway to give more accurate estimates of noise resulting from activities and processes at the Plant.

For some test locations, where possible, a record of noise levels was taken when no extraneous noise sources were heard. This instantaneous level may indicate the noise emissions from the Plant.

Night Period

For all 16 test locations there was less than 3 dB(A) difference between the measured 3 minute L_{eq} and the L_{90} level.

This indicates little effect from extraneous noise sources. Where such sources were present they have been recorded in Table 4.

It is believed that the L_{90} level can be used as a reliable estimate of the noise emissions from the Plant to community areas during the measurement period on 11-12 April 2018.

On the night of measurements certain areas of the Plant were not operating, therefore on other nights noise emissions from the Plant may vary.

11. Noise Control

11.1 Hierarchy of Noise Control

It is the responsibility of the employer to ensure that each employee's exposure to noise is controlled to minimise risk to health and safety. To facilitate noise control, the following hierarchy of noise control mechanisms exist.

1. Engineering controls
2. Administrative controls
3. Hearing Protection Devices

It is important to understand that the thrust of the Occupational Health and Safety Regulations 2017 is to ultimately achieve noise control by engineering modifications, where practicable.

Administrative controls, to reduce time spent by employees in noisy areas or working with noisy equipment, should be used if engineering modifications are not sufficient.

Only if both engineering and administrative controls are insufficient should hearing protection devices be considered. With respect to hearing protectors, there is merit in providing a range of appropriate alternatives to enable employees to suit their individual needs. For instance, personnel who take their hearing protection off frequently or who may need to fit it on a few occasions during the shift may prefer muffs or bands.

11.2 Hearing Protection

Selection of appropriate hearing protection devices should be based on the range of noise frequencies and intensities experienced in the workplace. The selection can be made on the basis of an octave band centre frequency analysis or, as is more commonly done, on the C-weighted sound level in which it is to be worn.

For each type of hearing protection device the specified SLC_{80} value represents a dB(A) reduction at the ear.

In practice the SLC_{80} value of a hearing protector is subtracted from the C-weighted sound level of the noise in which it is to be worn. The result is the estimated A-weighted sound level to which the wearers will be exposed. For example, if the noise level in an area is 110 dB(C), 80% of people wearing a hearing protector with an SLC_{80} value of 25 dB could be expected to receive an in-ear level of 85 dB(A), if the hearing protector is in good condition and properly fitted. The performance of worn or damaged hearing protectors deteriorates rapidly.

It is worth noting that, in practice, many wearers may receive considerably less than the advertised protection because of poor fit of hearing protection devices.

A variety of protectors will enable individual preference and thus assist in encouraging personnel to wear them.

Care should be taken in the selection of hearing protection devices to ensure that the wearer will not be overprotected in a given work area.

Wearing hearing protection devices which provide too much attenuation in a given area (overprotection) can often result in the wearer feeling isolated from general communication and may prevent the wearer from hearing necessary communication including warning signals. Consequently, there may be a reluctance to wear such hearing protection.

Signage

Signs, indicating the need for hearing protection, should be placed in areas designated as mandatory hearing protection zones.

In areas where the intermittent operation of certain machines or pieces of equipment may result in elevated noise levels signage at the machine may be required.

11.3 Suitability of Current Hearing Protection Devices

Many different hearing protection devices were observed to be available for operators at the Sun Pharmaceutical Industries Australia Pty Ltd premises.

The following may not be a complete list:

Prosafe Prosoft ear plugs
SLC₈₀ value of 25 dB

Howard Leight QB3 headband ear plugs
SLC₈₀ value of 20 dB

3M Classic EAR ear plugs
SLC₈₀ value of 23 dB

Wurth ear plugs
SLC₈₀ value of 27 dB

Moldex ear muffs Model #M2
SLC₈₀ value of 33 dB

With the ear plugs and muffs provided and assuming they are in good condition and fitted properly operators, required to wear hearing protection, could be expected to obtain sufficient attenuation to bring the in-ear noise level down below the Exposure Standard of 85 dB(A) for an 8-hour shift or 83.5 dB(A) for a 12-hour shift.

It should be remembered that many wearers may receive considerably less than the advertised SLC₈₀ because of poor fit of hearing protection devices.

The current exposure standards of 85 dB(A) averaged over an 8 hour day (Leq 8hr, 85 dB(A)) day should not simply be considered a safe exposure level where there is no potential for health effects over time. In fact, the current exposure standards provide regulation to what is perceived as an “acceptable” level of risk for employees.

It has been shown that 85% of men would suffer a 10% loss of hearing after working at the current noise exposure standards over 40 years (*Australian Standard AS/NZS 1269.4 Occupational noise management, Part 4 Auditory assessment*).

12. Conclusion

Sound Pressure Level Measurements

Engineering

In the workshop area noise levels are intermittent and task dependent.

Highest noise levels were recorded in the Welding Bay when the belt grinder was operated. Reportedly, the Welding Bay is a mandatory hearing protection area.

Finishing

At the time of measurement much of the Finishing area was not operating. Noise levels recorded were in the range 70 to 74 dB(A).

Lab/TD

When milling operations were performed with Mills 001 and 002 noise levels were elevated by approximately 7 dB(A) with rapid paddle use.

During the task the operator was observed to be wearing hearing protection.

Recovery

At the time of measurement the columns in the Recovery area were not operating. Noise levels recorded were in the range 72 to 73 dB(A).

TH1 and TH2

Both areas have ambient noise levels typically ranging from 79 – 85 dB(A) however, at certain times particular equipment and processes operated which elevated noise levels significantly.

The highest levels were recorded around Separator 195 in TH1 and P930 in TH2.

Wet Extraction

The Wet Extraction Plant was not in full operation at the time of measurement.

Operation of the High Pressure Belt Wash System resulted in elevated noise levels.

Dosimetry

Ten operators were each fitted with a personal noise dosimeter which was worn for more than 4 hours on either 10 or 11 April 2018. On both days some sections of Plant were non-operational.

Results indicate that none of the wearers experienced a projected daily noise exposure which exceeded the 8-hour Exposure Standard of 85 dB(A) or the 12-hour Exposure Standard of 83.5 dB(A).

Peak noise levels exceeding 140 dB(C) were recorded on two dosimeters. The origin of these Peak levels is not known.

Environmental Noise Measurements

Noise level measurements taken in the Day Period in community areas around the Sun Pharmaceuticals Plant were significantly affected by traffic and other extraneous noises.

With the volume of traffic and other industries operating continuously and close to some measurement locations even the L_{90} is elevated beyond what reasonably could be expected to be emissions from the Plant.

However, it is believed that the L_{90} level can be used as a reliable estimate of the noise emissions from the Plant to community areas during the Night Period on 11-12 April 2018.

On the night of measurements certain areas of the Plant were not operating, therefore on other nights noise emissions from the Plant may vary.

13. Recommendations

The following recommendations are suggested for consideration. These are in line with the Occupational Health and Safety Regulations 2017.

1.

That regular maintenance be performed on plant and equipment to ensure unnecessary noises from friction or imbalances are minimised.

2.

That an investigation be conducted to determine if there are mechanisms to reduce noise emissions from the High Pressure Belt Wash System in the Wet Extraction Plant.

3.

That additional training be provided to operators in the Milling Room of the Lab specifically targeting use of the steel paddle when milling.

4.

That the wearing of hearing protection devices be maintained during the performance of tasks in the Welding Bay in Engineering and in the Milling Room of the Lab. The devices currently available to operators in those locations should provide adequate protection even if, in some cases, they are not properly fitted.

5.

That consideration be given to making available ear muffs, particularly for the intermittent use when operators are required to enter Ground Floor areas of TH1 and TH2. This would obviate the need to fit ear plugs with hands that may have foreign material which could be transferred to the plugs.

6.

That a review be conducted of signage indicating the need for hearing protection in certain areas of the Plant or when operating specific equipment or tools.

7.

That appropriate training be provided to all employees whose exposure to noise is likely to exceed the exposure standard of 83.5 dB(A) for 12 hour shifts. The training should address:

- the effects of exposure to noise
- the control mechanisms implemented to reduce exposure to noise
- the purpose and nature of audiometric testing
- the selection, use, fit and maintenance of hearing protection devices.

8.

That audiometric testing be repeated bi-annually for all employees who are required to wear hearing protection devices to control exposure to noise or for those whose noise exposure may exceed the recommended maximum daily noise exposure.

APPENDIX

(Separate documents)

Sound Pressure Level Measurements

Spreadsheet indicating sound pressure level measurements at
designated test locations

Dosimetry Data

Results for each wearer of noise dosimeter



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& ASSOCIATES