



REPORT REVISION 1

REVIEW OF EAST LAKE – FYSHWICK STP ODOUR STUDY REPORTS

Lolita No 1 and Lolita No 2 Pty Ltd c/- Molonglo Group

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EXECUTIVE SUMMARY

Molonglo Group owns a site (hereafter "the Molonglo site") of more than 14 hectares in Fyshwick, ACT. The Molonglo Group has proposed to redevelop the Molonglo site as a highly sustainable eco village ('Fyshwick Eco Village') comprising approximately 200,000 m² of residential, community, commercial and retail activities.

In 2011, ActewAGL commissioned consultancy firm CH2M-Hill to investigate the potential impacts of odours from the nearby Fyshwick Sewage Treatment Plant (STP) on future development, and to develop a strategy to control odour emissions. Based on the findings of the CH2M-Hill reports, ActewAGL recommended a 500m exclusion zone from the boundary of the Fyshwick STP. This exclusion zone would render Molonglo Group's Fyshwick Eco Village untenable, as it would restrict any new residential, office, or other proposed development on the site.

PAEHolmes have been asked by Molonglo Group to review the CH2M-Hill reports and report on our findings. Our findings are that the CH2M-Hill reports are significantly flawed in many aspects which are summarised below.

1. During the period of the CH2M-Hill odour monitoring exercise, several key components of the Fyshwick STP were offline, being the AC polishing component of the Inlet Works Odour Control System, the Primary Digester and the Sludge Heating System. As such the CH2M-Hill odour emission inventory does not reflect the STP operating under its intended design (and odour mitigation). The CH2M-Hill odour monitoring thus overstates the odour emission expected under the STP's designed operating conditions.
2. The CH2M-Hill odour reports utilise an atmospheric dispersion model (Ausplume) which is not recommended for the evaluation of complex odour emission scenarios, dealing with wind conditions and terrain in a cruder and less accurate manner when compared with second-generation modelling tools.
3. The CH2M-Hill odour reports include the Maturation Ponds in their impact assessment evaluation. However, a strong argument is subsequently presented that these sources should be discounted within modelling (and subsequent evaluation of existing and future odour impacts).
4. There are cumulative effects associated with uncertainties around emission rates, omission of intended odour controls, anomalous meteorological data, lack of account for terrain and use of an inappropriate dispersion model. The atmospheric dispersion modelling undertaken is thus not currently adequate for the purpose of guiding independent and objective decision making.
5. The ActewAGL determination to provide an exclusion zone of 500m from the boundary of the STP assumes that there will be no further development on the Molonglo site for more than 10 years. This is incorrect, and this false assumption has guided all subsequent recommendations and conclusions within the CH2M-Hill odour reports.
6. The derivation of odour assessment criteria for the Molonglo site is based on the assumption that odours are potentially generated within the Molonglo site (when no such odour-generating activities exist), and that the site operates only during business hours – when in fact it operates 24 hours per day.
- 7.

The CH2M-Hill Odour Mitigation Report concludes that 67% of the Fyshwick STP's odour emission inventory may be mitigated at an estimated cost of approximately \$6.2M. If the Maturation Ponds are discounted from the site's odour emission inventory (as recommended within the review), this is raised to 97% of all odour emissions under standard operation.

By employing these relatively minor upgrades, it is anticipated that the Molonglo site could be developed into the proposed Fyshwick Eco Village without compromising the odour amenity of its residents.

Instead of proposing additional mitigation at the site, ACTEW essentially propose to transfer the cost of odour mitigation onto adjacent land owners through the imposition of an exclusion zone to future redevelopment.

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1 INTRODUCTION

Molonglo Group owns a site (hereafter, “the Molonglo site”) of more than 14 hectares in Fyshwick, a commercial and light industry suburb to the east of the South Canberra district. The site is of strategic importance - it is adjacent to the Central National Area, is 10 minutes by car from the City Centre, and is 5 minutes by car from the Airport - and has an outlook over the internationally significant Jerrabomberra Wetlands. The Molonglo site is separated from the main Fyshwick industrial area by the grade separated Monaro Highway, which provides accessibility to the Molonglo site.

The Molonglo site was formerly a central depot for the Commonwealth vehicle fleet. It was acquired by Molonglo Group some years ago, and is currently used as a short-term industrial and warehouse facility.

However, the company intends to redevelop the site for a range of land uses. The Molonglo Group has proposed a sustainable urban village (‘Fyshwick Eco Village’) comprising approximately 200,000 m² of residential, community, leisure, commercial and retail activities. It is the Molonglo Group’s intention to set new standards at this site with regard to both social and environmental sustainability. Subject to approvals, redevelopment of the site will begin in 2013.

This initiative is consistent with the principles of the Canberra Spatial Plan which provides an urban settlement strategy that contains up to 50% of the projected growth in the ACT and surrounding NSW within the existing urban area of Canberra. In particular, the ACT Government’s Strategic Direction seeks to contain up to 90% of future urban development over the next 30 years to areas no further than approximately a 15km radius of the City Centre.

Consistent with these planning objectives, the ACT Planning and Land Authority (ACTPLA) has initiated a major planning study for an area entitled ‘East Lake’. This concerns a large tract of unused and underutilised land generally between the Fyshwick and Kingston Foreshores. The concepts developed to date include accommodation for a population of around 9,000 - including a new workforce of more than 2,000 people - and will have a range of commercial, community and open-space uses. The Molonglo site has been included in the East Lake study area, and the ACT Government has given strong support to the redevelopment of the Molonglo site.

Both the specific proposals for the Molonglo site and the general proposals for East Lake require a Variation to the Territory Plan (*i.e.* a rezoning). ACTPLA has agreed in principle that Molonglo Group may initiate a Plan Variation for its own site ahead of the larger East Lake Variation. Part of this process requires Molonglo Group to undertake a number of planning studies to inform its Plan Variation, including a master plan concept.

An important issue is that the Molonglo site is adjacent to the Fyshwick Sewage Treatment Plant (STP) which is operated by ActewAGL. Fyshwick STP treats industrial and domestic waste from the industrial area of Fyshwick and adjacent suburbs. There has been some concern about the release of odours from the STP, and the potential impacts of these odours on any future residential population in the vicinity.

Figure 1.1 shows the location of the Molonglo site as well as its proximity to the Fyshwick STP.



Figure 1.1: Location of the Molonglo site in relation to the Fyshwick STP

In 2011 ActewAGL commissioned CH2M-Hill to investigate the potential impacts of odours from the Fyshwick STP on future sensitive receptors, and to develop a strategy to control and reduce odour emissions. The findings of the CH2M-Hill study were contained in the following reports:

- East Lake-Fyshwick STP Odour Study - Odour Investigation Report (**CH2M-Hill, 2011a**; hereafter “the CH2M-Hill Odour Investigation Report”).
- East Lake-Fyshwick STP Odour Study - Odour Mitigation Options Report (**CH2M-Hill, 2011b**; hereafter “the CH2M-Hill Odour Mitigation Report”).

The above reports are additionally referred to collectively as “the CH2M-Hill Odour Reports” in subsequent sections of this review. The Molonglo site is referred to as area C1 within the East Lake draft Staging Plan and the CH2M-Hill Odour Reports.

The CH2M-Hill Odour Mitigation Report included a number of general recommendations, one of the most significant of which was the introduction of a 500m buffer zone around the STP.

Molonglo Group are concerned that the concepts developed thus far for redevelopment of the Molonglo site may be significantly restricted and impeded by ActewAGL’s proposed buffer (residential exclusion zone) around the Fyshwick STP.

We understand that the Molonglo Group regards it as unacceptable that a major new development initiative be impeded by issues relating to ageing infrastructure, which would have a limited life anyway. Molonglo Group believes that ActewAGL has eschewed, on grounds of potential cost, those mitigation measures which rely on improvements or upgrades to the STP facilities to reduce the level of odour emissions at source. There is instead a preference to

declare the existing development on the Molonglo site a “non-sensitive” receptor which can form part of a buffer zone between the STP and future residential development.

It is within this context that Molonglo Group commissioned PAEHolmes to conduct a comprehensive review and critique of the CH2M-Hill odour impacts and mitigation studies associated with the Fyshwick STP. The findings of the PAEHolmes review are presented in this report.

2 OBJECTIVES AND SCOPE

The overall aim of the PAEHolmes review was to identify of any flaws, omissions, false assumptions or other issues in the CH2M-Hill Odour Reports. This report therefore addresses a number of different aspects of the CH2M-Hill Odour Reports:

- Evaluation of the Fyshwick STP (**Section 3**)
 - Whether the existing STP meets current standards and guidelines for a facility of its type.
 - The remaining useful life of a facility of this age and type.
 - The validity of the odour monitoring, modelling and benchmarks adopted.
- Evaluation of the Molonglo site (**Section 4**)
 - Whether the existing uses of the Molonglo site can legitimately be described as 'non-sensitive' given the nature of the contemporary industrial and commercial workplace.
 - What implications there are for the conclusions of the CH2M-Hill Odour Reports in light of the proposed redevelopment of the Molonglo site.
- Mitigation measures for the Fyshwick STP (**Section 5**)
 - Whether the full range of mitigation options has been properly identified, evaluated and costed.
 - Whether any mitigation options have been overlooked.
 - Recommendations for the full range of feasible and acceptable mitigation measures which could be used at the STP to remove or minimise potential odour issues for residential development of the site.

Report conclusions are provided within **Section 6**.

3 EVALUATION OF THE FYSHWICK STP

This section of the report evaluates whether the existing Fyshwick STP meets current standards and guidelines for a facility of its type. It additionally makes comment as to the remaining useful life of a facility of this age and type. Finally, comment is provided as to the validity of the odour monitoring, modelling and benchmarks adopted.

3.1 Remaining useful life

The Fyshwick STP was built in the 1960s. While it is assumed that some level of upgrade has been undertaken since its commissioning, it is not clear within the CH2M-Hill Odour Reports as to what extent this has been undertaken. It is however noted within the CH2M-Hill Odour Investigation Report that during 2003/2004, the Fyshwick STP operated a different (more odorous) biosolids handling strategy, comprising the use of sludge drying beds. We understand that the plant receives an average dry weather flow (ADWF) of approximately 4.5 ML/d. This is anticipated to be approximately 20,000 Equivalent Population (EP).

The ACTEW *Canberra Sewerage Strategy Fyshwick Treatment Plant Report* concludes that the trickling filter treatment technology employed at the Fyshwick STP is appropriate for approximately the next 20 years. This is understood to match ACTEW's view as to the remaining life of the Plant.

The *Canberra Sewerage Strategy Fyshwick Treatment Plant Report* recommends increasing the capacity of the Plant to treat 6 ML/d during that time to cover anticipated population increases in the catchment. This is consistent with the population increases proposed as part of the adjacent East Lake development.

As discussed in **Section 3.3.5**, the odour potential of the plant is not expected to be altered significantly due to increased plant flows in the future.

There is nothing contained within the CH2M-Hill Odour Reports to contradict the conclusion that the Fyshwick STP has a remaining life of 20 years, with plant capacity upgrades adequate to service sewerage projections through to 2030.

It is highlighted that the above comments relate to the technology employed, and the capacity requirements of, the Fyshwick STP. It does not relate to upgrades in odour control that may be required over this period.

Further we note that the trickling filters used on the site are considered in the wastewater industry to be old, and less effective technology compared to more modern treatment methods, which are capable of achieving lower discharge limits.

There is opportunity to modify the technologies / odour abatement employed at this STP as part of the ACTEW proposal to increase plant capacity.

3.2 Validity of the monitoring regime

The CH2M-Hill Odour Investigation Report provides detail of odour monitoring undertaken at the Fyshwick STP during February and March 2011. Odour monitoring employed numerous valid techniques including hydrogen sulphide (H₂S) monitoring using Odalog monitors, odour sampling (undertaken by The Odour Unit Pty Ltd) and field olfactometry using a Nasal Ranger instrument. The majority of sampling was performed in duplicate which is acceptable. Due to the variation associated with olfactometry duplicate sampling should be considered a minimum requirement for odour sampling.

The odour monitoring undertaken is comprehensive, allowing for a sound database of odour emissions to be taken forward within the odour dispersion modelling conducted within the CH2M-Hill Odour Reports.

It is highlighted however that the odour monitoring was undertaken when several key components of the system were offline (refer **Section 3.3.3** and **Section 3.3.4**)

3.3 Odour Emissions Inventory

As discussed in **Section 3.2**, odour monitoring at the Fyshwick STP has provided data sufficient to develop a comprehensive odour emission inventory for the site. This information is summarised in **Table 3.1**. This summarises the sources that were considered significant enough to merit odour dispersion modelling.

Table 3.1: Summary of the Odour Emission Inventory for Modelling Purposes (CH2M-Hill, 2011a)

Odour Rank	Source	Source Type	Odour Emission Rate (ou.m ³ /s)	% of Total Odour Emissions ¹	% of Total Odour Emissions, Maturation Ponds excluded
1	Maturation ponds (x4: Stages 1 and 2, Trains A and B)	Area	4355.02	30.7%	N/A
2	Trickling Filters (#1, #2 and #3)	Point	4082.4	28.8%	41.5%
3	PST Flow Splitter	Volume	3575.00	25.2%	36.3%
4	Secondary Digester (Sludge Seal)	Point	1097.2	7.7%	11.1%
5	Inlet Works OCS	Point	833	5.9%	8.5%
6	Sludge Mixing Tank	Area	89.3	0.6%	0.9%
7	Emergency Storage Lagoon	Area	39	0.3%	0.4%
8	Inlet screens	Volume	37.80	0.3%	0.4%
9	Grit Building	Volume	26.50	0.2%	0.3%
10	Humus Tanks (#1, #2 and #3)	Area	24.90	0.2%	0.3%
11	Primary Sedimentation Tanks (#1 and #2)	Area	17.80	0.1%	0.2%
12	Sludge Building	Volume	17.60	0.1%	0.2%

Note 1: The percentage of Total Odour Emissions is as calculated by PAEHolmes, based on the Odour Emission Rate data provided within Table 5-29 of the CH2M-Hill Odour Investigation Report. It is acknowledged that these percentages differ from those quoted within this Table.

It can be seen from **Table 3.1** that according to the CH2M-Hill Odour Investigation Report, five sources comprise 98% of the odour emissions at the Fyshwick STP. If the Maturation Ponds are discounted from the inventory, four sources are thus anticipated to comprise 97% of site odour emissions.

Some discussion is provided below regarding the treatment of several of these key sources within the modelling exercise. Discussions as to the cost and practicalities of odour mitigation for these sources are provided in **Section 5**.

3.3.1 Maturation Ponds

Section 7.4.2.2 of the CH2M-Hill Odour Investigation Report states:

"The inclusion of large area sources which have low odour emission rates, such as maturation ponds, in odour models can often result in overestimation of their impacts...Odour monitoring at Fyshwick STP showed minimal odour impact from the maturation ponds at the site boundary and around the perimeter of the ponds...a separate model was run with the maturation ponds omitted to provide a potentially more realistic prediction of the plant odour impact...The odour modelling results produced without the maturation ponds agreed more closely with observations from Nasal Ranger monitoring.."

Further, the CH2M-Hill Odour Mitigation Report states:

"Tertiary effluent treatment process units downstream of secondary clarifiers (or humus tanks for Fyshwick STP) do not normally emit offensive odours and are not generally considered odorous sources. As a tertiary treatment stage, the Maturation Ponds at Fyshwick STP would normally be categorised as non-odorous or a minor source."

There is therefore a strong argument presented within the CH2M-Hill Odour Reports that these sources should be discounted within modelling (and subsequent evaluation of existing and future odour impacts).

We note that removal of the Maturation Ponds from the modelling significantly alters the contours of predicted odour impact, and the conclusions subsequently drawn from them.

The inclusion of the Maturation Ponds in the emission inventory and subsequent modelling thus has the potential to overstate the likelihood of odour impacts on the Molonglo site.

3.3.2 Primary Sedimentation Tank (PST) Flow Splitter

Despite reportedly constituting such a significant portion of the STP's odour emission inventory, Section 4.4 of the CH2M-Hill Odour Mitigation Report states:

"[Proposed mitigation of] the PST Flow Splitter was removed due to the uncertainty regarding the emission rates used to model that particular source, which did not match the field monitoring results. It is proposed that no mitigation work be undertaken on the PST Flow Splitter until the emission rates can be firmed up".

The above statement has significant implications regarding the validity of the odour contours presented within the CH2M-Hill Odour Reports. Conclusions drawn within both CH2M-Hill Odour Reports have been guided by the above odour emission rates, and yet they appear to have been rejected when mitigation of what is stated as 40% of the odour emission inventory is considered.

If the PST Flow Splitter odour emission rates are accepted for the purposes of odour impact modelling, the uncertainty regarding the emission rate from this source should not in itself provide justification for dismissing additional mitigation of this source. This is particularly so given that, based on current estimates, the mitigation of 40% of site odour emissions could be achieved for a relatively minor cost (refer **Section 5.1.3**).

3.3.3 Secondary Digester

Section 4.2.1 of the CH2M-Hill Odour Mitigation Report notes that at the time of the CH2M-Hill odour audit, the primary digester was being "bypassed" (i.e. it was offline).

Further, the sludge heating system for the digester was also offline and consequently sludge digestion was taking place in a single digester and at ambient temperature, leading to incomplete digestion process and much increased odours.

The above is important since the implication is that the odour emission inventory collated within the CH2M-Hill Odour Investigation Report does not reflect the STP operating under its intended design (and odour mitigation) and more importantly under normal operating conditions. Adoption of the sludge heating system within the operational odour modelling scenario would serve to reduce the extent of predicted odour impacts.

Further, it is noted that if the intent of the digester is to act as a sludge holding tank only, it may be more applicable to replace it with a specific sludge holding tank and to decommission the existing digester. Such an option has not been explored in any detail within the CH2M-Hill Odour Mitigation Report.

While the formal costing of alternative techniques is outside the scope of the current review, it is highlighted that the adoption of a specific sludge holding tank would negate the odour mitigation option of retrofitting the digester with a water seal (refer **Section 5.1.4**). This would mean that the \$2.2M estimated for water seals could be used to offset costs of a dedicated sludge holding tank, while achieving similar levels of odour control.

3.3.4 Inlet Works Odour Control System (OCS)

At the time of the odour monitoring, the (existing) AC polishing component of the Inlet Works Odour Control System (OCS) was offline. Consistent with the observations made within **Section 3.3.3**, the odour emission inventory collated within the CH2M-Hill Odour Investigation Report therefore does not reflect the STP operating under its intended design (and odour mitigation). Adoption of the AC polishing component of the inlet works within the operational odour modelling scenario would serve to reduce the extent of predicted odour impacts.

3.3.5 Effect of Future Fyshwick STP Flows

Finally, it is important to acknowledge the effect of anticipated increases to the flows through the Fyshwick STP in the future. Section 2.3.2 of the CH2M-Hill Odour Mitigation Report notes:

"The only odorous facilities at Fyshwick STP likely to be affected by increased flows are the inlet works and PST weirs. Due to the presence of an OCS at the inlet works, the emitted odour is not expected to change at this source. The emissions from the PSTs were evaluated for the various expected flows to determine the change to their specific odour emission rate (SOER)...The effect of the increased odour emissions from this source was negligible on the total plant odour impact at the 2ou impact level. Based on those results, the odour potential of the plant is not expected to be altered significantly due to increased plant flows in the future."

3.4 Validity of Modelling

The CH2M-Hill Odour Reports utilise the Ausplume atmospheric dispersion model to produce odour contours for various odour emission scenarios.

The Ausplume model is not recommended for evaluation of complex odour emission scenarios. This is primarily due to its inability to effectively characterise dispersion under calm wind conditions, when odour impacts may be greatest. It additionally deals with terrain in a cruder manner compared with second-generation modelling tools such as AERMOD or Calpuff. It is important to note that Ausplume only incorporates terrain effects for thermally buoyant (hot) point sources. We note that the majority of the odour sources at the STP are not these sources. Adding terrain in Ausplume would therefore have little, if any effect on the model outputs.

The CH2M-Hill Odour Investigation Report does not provide adequate detail as to the validity and derivation of the meteorological input file referenced within the atmospheric dispersion modelling, leading to queries as to its suitability. Good practice reporting dictates that both the derivation of the file be explained, as well as a statistical review of the data generated.

By way of example, the CH2M-Hill Odour Investigations Report states:

“While the meteorological data was screened and compared with meteorological (sic) from the Ecowise station on the site of the Fyshwick STP, a small number of entries that appeared to be actual measurements, but were caused by atypical operation of the weather station, remained in the file. As the 99.9th percentile model results are used to present the odour impacts, the effect of the anomalous results is much more significant. The effect of the anomalous entries is to extend the odour impact from ground level sources in a southwards direction.”

While the above issue is identified, the report then states:

“The remainder of the report shows impacts based on the meteorological file with the anomalous entries present. In examining the impacts, the southward extension in the contours should be disregarded..”

Given the proximity of the Molonglo site to southern boundary of the Fyshwick STP, the decision to present odour impact contours using inappropriate data is at best unhelpful in the evaluation odour impact on this area.

3.5 Validity of odour criteria adopted

The CH2M-Hill Reports evaluate the Fyshwick STP consistent with the “Proposed Methodology for Impact Assessment of Nuisance Odours in the ACT, Draft 8” (June 2007), also referred to as the ACTEW Odour Assessment Guidelines.

This document does not appear to be in the public domain (i.e. is not freely available on the internet). As such, this document was not able to be reviewed, and this is acknowledged as a limitation of the current review.

However, comment is provided on the following components of this document, as quoted within the CH2M-Hill Odour Reports:

- Odour performance criteria for high density development of 2 odour units (ou), expressed as a 3-minute average, at the 99.9th percentile (CH2M-Hill, 2011a).
- Buffer zone distances around STPs of 500 to 1,000m (CH2M-Hill, 2011b).

3.5.1 Odour performance Criteria

A summary of the odour performance criteria used for evaluation purposes (in the context of high density development) for other states and territories in Australia is provided in **Table 3.2**.

Table 3.2: Summary of the Odour Performance Criteria applicable to High Density Development referenced in Australia

State / Territory	Criterion (ou)	Averaging time	Percentile
ACT	2	3-minute	99.9 th
NSW	2	1-second ¹	99 th
Vic	1 ²	3-minute	100 th
Qld	2.5	1 Hour	99.5 th

Note 1: 1-second (nose-response) average concentrations determined by applying a Peak-to-Mean factor to 1-hour average results (typically 2.3 for diffuse ground level sources).
 Note 2: Where design criteria contained in the SEPP (AQM) cannot be achieved, a risk assessment may be undertaken to the satisfaction of the Victorian EPA.

Evaluation of **Table 3.2** indicates that the odour criteria adopted within the ACTEW Odour Assessment Guidelines are likely to be conservative compared with those adopted in other states of Australia.

3.5.2 Buffer Distances for STPs

We are unaware of any prescribed buffer distances for ACT industry based on publically available information.

The NSW Office of Environment and Heritage *Technical framework: Assessment and management of odour from stationary sources in NSW* and associated Technical Notes (**OEH, 2006**) does not contain any buffers applicable to STPs. We have examined a number of buffer requirements for STPs in Queensland, South Australia, Victoria and Tasmania. These are summarised in **Table 3.3**.

Table 3.3: Relevant Buffer Requirements for STPs

State	Relevant Requirement/Document
ACT	None found
NSW	None found
Queensland	Queensland Odour Guideline Refers to Victorian Document A Q2/86 (Queensland Government, 2004)
Victoria	Document AQ 2/86 (VEPA, 1990)
South Australia	Guidelines for Separation Distances (EPA SA, 2007)
Tasmania	Air Quality and Attenuation Code (EPA Tasmania, 2010)

The buffer criteria detailed in **Table 3.3** are summarised in **Figure 3.1**.

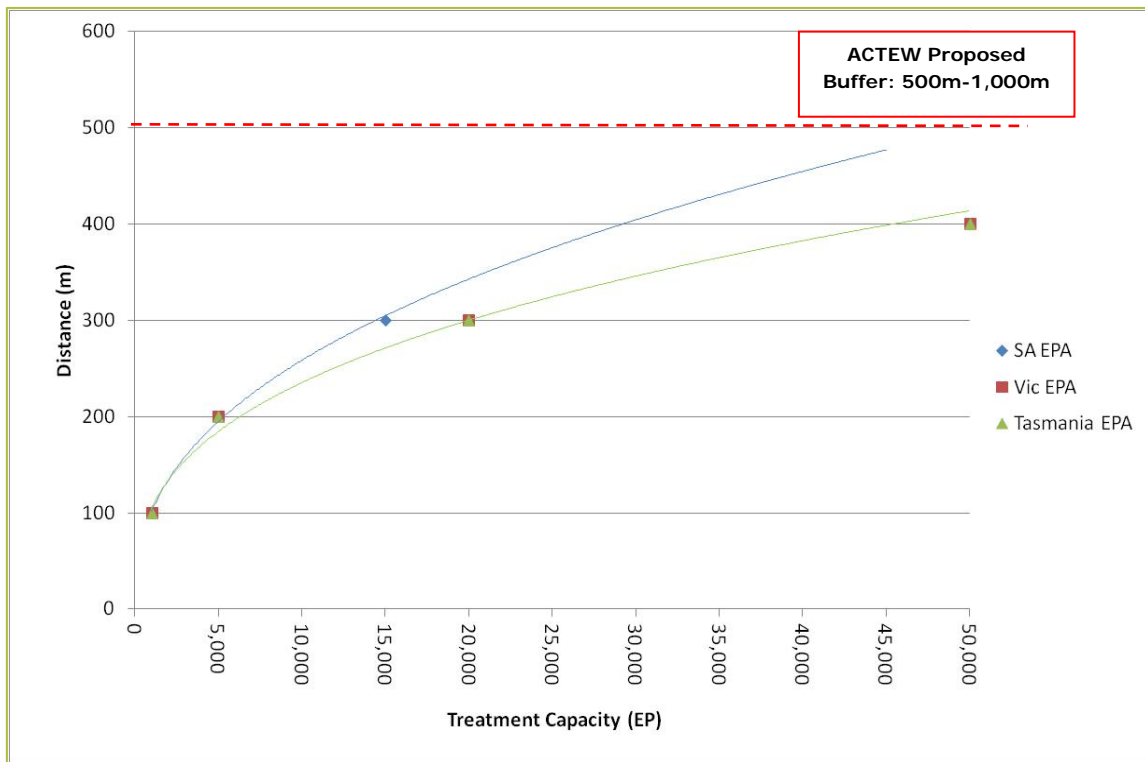


Figure 3.1: Buffer Requirements for mechanical/biological waste water treatment

Evaluation of **Figure 3.1** indicates that the ACTEW proposed buffer zone is not supported by comparison to other buffer distance guideline documentation.

Odour concentrations observed at the Fyshwick STP, as derived during the monitoring phase, are low. The CH2M-Hill Odour Reports conclude that this is likely mainly the result of the recycling of humus sludge to the inlet works and the short sewage age in the network.

It is anticipated that the modelling of the implementation of good practice odour controls (see **Section 5**) would indicate that the Fyshwick STP could support a buffer distance significantly below 500m without compromising local odour amenity or effective operation of the facility. Indeed as discussed in **Section 5** the application of mitigation measures would remove altogether the need for a buffer zone for the purposes of odour control under normal operating conditions.

Finally, it is noted that in those states that reference buffer distances, these are typically guidelines, and are not used in lieu of site specific odour impact evaluation or appropriate odour control on behalf of the emitter.

3.5.3 ACTEW Odour Assessment Guidelines in Context

As noted within Section 1.3 of the CH2M-Hill Odour Mitigation Report:

"..the referenced guidelines are not a legislative requirement. The ACT does not have legislated odour guidelines, unlike some other states. The guidelines referenced were authored by Ian Wallis of Consulting Environmental Engineers and ActewAGL, and voluntarily adopted by the ACTEW Corporation."

The author of the ACTEW Odour Assessment Guidelines was a participant for the multi-criteria analysis (MCA) workshop held to identify the preferred strategy for odour mitigation at the Fyshwick STP. The owners of the Molonglo site were not considered as stakeholders within this workshop.

As noted above, the ACTEW Odour Assessment Guidelines were developed by one individual in partnership with ActewAGL. The implication is therefore that there has been a limited level of technical consultation / peer review during their development.

In other Australian jurisdictions it is normal practice for odour guidelines to be developed by an independent government regulator (e.g. Environmental Protection Authority). In this instance, the odour guidelines have been developed by an entity engaged by the utility operating the plant and equipment.

Additionally, the ACTEW Odour Assessment Guidelines have only potentially been applied to a limited number of facilities (there are only five key water treatment plants within the ACT).

Out of necessity, the ACTEW Odour Assessment Guidelines have thus not been tested extensively for validity and appropriateness compared with odour guidelines / legislation authored in other states of Australia.

Overall, the guidelines, as they refer to both odour performance criteria and recommended buffer distances for STPs, appear to be more stringent compared to other states and territories odour legislation. The only more stringent state is Victoria, however in this state, when odour criteria are not demonstrated, a risk assessment may be undertaken to the satisfaction of the Victorian EPA. No evidence can be found that the ACT legislation allows for referral of a matter of this nature to an independent assessor / regulator.

3.6 Summary of Findings

While odour monitoring at the Fyshwick STP appears to have been comprehensive, and multiple odour scenarios have been modelled, several key odour scenarios have not been presented, namely:

- Inlet Works OCS and anaerobic digestion conducted consistent with the STP intended design, combined with accurate odour characterisation of PST Flow Splitters.
- Covering / venting of Trickling Filters, covering of PST Flow Splitters, water seal on Secondary Digester (or replacement with a new sludge holding tank), AC polishing at the Inlet Works OCS.

These scenarios should be presented both with and without the inclusion of the Maturation Ponds, the inclusion of which currently confound the findings of the modelling exercise.

The former scenario is considered to be more representative of odour impacts under the status quo. The latter scenario is consistent with the good practice odour mitigation developed within the CH2M-Hill Odour Mitigation Report (refer discussions in **Section 5**).

It is anticipated that the latter scenario would yield a 2ou contour (3-minute, 99.9th percentile) that does not impinge upon the Molonglo site.

The above model scenarios should be undertaken with a more appropriate (i.e. accurate) atmospheric dispersion model than the Ausplume dispersion model, which is largely out-dated and not recommended for complex odour evaluation. Similarly, a more robust meteorological

data set is suggested to provide more effective guidance as to appropriate odour mitigation. A more robust data set is required as the terrain in the surrounding area is likely to drive airflows during cool, calm wind periods, critical to odour dispersion.

There are cumulative effects associated with uncertainties around the PST emission rates, omission of the secondary digester and inlet works odour controls, anomalous meteorological data, lack of account for terrain and use of an inappropriate dispersion model. The atmospheric dispersion modelling undertaken to date is thus not currently adequate for the purpose of guiding independent and objective decision making.

The ACTEW Odour Assessment Guidelines are not a legislative requirement. They have had a limited authorship and applicability, and as such have not been tested as extensively as odour legislation in other states.

Further, the ACTEW Odour Assessment Guidelines have been prepared by the STP operator rather than an independent regulator, and do not appear to be in the public domain.

The odour performance criteria in the ACTEW guidelines are generally more stringent than those adopted elsewhere in Australia. A minimum buffer distance of 500m appears to be substantially more stringent than required elsewhere.

4 EVALUATION OF THE MOLONGLO SITE

In this section of the report the existing uses of the Molonglo site have been evaluated. An assessment has been made of whether the site (and associated 'receptors') can legitimately be described as 'non-sensitive' given the nature of the contemporary industrial and commercial workplace.

Additionally, the implications for the conclusions of the CH2M-Hill Odour Reports in light of the proposed redevelopment of the Molonglo site are provided.

4.1 Existing Land Use

The East Lake staging plan comprises of areas, or stages. The CH2M-Hill Odour Mitigation Report notes:

"Much of the development zone is currently used for commercial/business purposes, including Stages C2, 1b, 2a, 3, 4 and 5. The C1 zone [the Molonglo site] is currently used by light industry, while Stages 2b and 6 and the area marked as Stage "3-4" are currently mostly undeveloped or native bush land."

According to Section 1.3 of the CH2M-Hill Odour Investigation report, The ACTEW Odour Assessment Guidelines state that "where premises are not permanently occupied, a higher odour concentration may be allowed during periods with a reduced level of occupation".

The implication of the above would appear to be that odour criteria may be made less stringent for periods of reduced occupancy (i.e. outside of business hours).

This differs from the approach adopted within the CH2M-Hill Odour Reports, whereby a less stringent odour criterion of 5ou has been applied *for all periods*.

The rationale for this to be applied to the C1 area (Section 1.3 of the CH2M-Hill Odour Investigation Report) is:

"..this area is primarily occupied during daylight hours and being an industrial area is likely to contain industries producing their own odours with workers who are less sensitive to odour."

In the context of buffer zone development, Section 4.2.1 of the CH2M-Hill Odour Mitigation Report further notes:

"..these types of land uses usually generate their own odours and are normally located next to activities that also generate odours. For example, odours may be encountered on rural lands from cattle, pesticide use, or manure, while business estates can produce odours as fumes from processes such as welding, surface coating sprays, heating and combustion of fuels."

While the Molonglo site is currently used as a short-term industrial and warehouse facility, no odorous activities are undertaken within the site boundaries. This raises queries as to whether the existing land use at the Molonglo site is appropriate for inclusion with any buffer distance from the Fyshwick STP.

Further, it is understood that the existing transport services operating from the Molonglo site routinely do so on a 24 hour, seven day a week basis. This again raises queries as to whether odour criteria should be made less stringent on the basis of periods of reduced occupancy.

We note that most regulations in Australia do not specifically differentiate with regard to commercial or residential uses. All are considered sensitive receptors. Whilst allowances are sometime made for industrial locations, these do not occur if the future land use is ever likely to become residential.

4.2 Proposed Redevelopment

The findings, recommendations and conclusions of the CH2M-Hill Odour Reports are based on the false assumption that:

“..it is envisaged in the master plan that [the Molonglo site] will continue to be used for commercial or industrial activities”

Based on this, the CH2M-Hill Odour Reports award a less stringent odour goal to this area, and thus less stringent odour controls are deemed appropriate for the Fyshwick STP.

Redevelopment plans for the Molonglo site as a sustainable urban village (‘Fyshwick Eco Village’) incorporating community, leisure, commercial and retail activities are clearly well progressed. It is unclear therefore why such plans have not been acknowledged within the CH2M-Hill Odour Reports.

Section 3.2 of the CH2M-Hill Odour Mitigation Report explicitly states:

“The C1 business zone is indicated in the draft master plan for East Lake as remaining a business zone and so in the derivation of mitigation measures there was no driver to seek compliance with the 2ou residential criterion.”

This is however contradicted by an y acknowledgement that such plans exist for the Molonglo site provided in Section 1.3 of the CH2M-Hill Odour Mitigation Report:

“ACTPLA advised CH2M-Hill that negotiations are currently underway and C1 and C2 may be rezoned as residential areas in the future. Nonetheless, in the absence of firmer information regarding the timeline of this rezoning and any subsequent development in the commercial areas (C1 and C2), it is assumed that any rezoning and subsequent development will not happen in the next 10 years, as is typical for large and complex rezoning processes and development applications. Should rezoning of C1 include residential use, more stringent odour controls at the plant would be required.”

The assumption by CH2M-Hill that rezoning of this nature typically take up to 10 years or more is unsubstantiated. The process for the rezoning of land is prescribed in the ACT Planning and Development Act 2007. It is our understanding that the processes and procedures described in the Act are not inordinately onerous in comparison to other jurisdictions and not such so as to create an expectation that the rezoning process involve a ten year timeframe. Where other major urban consolidation projects have involved rezoning of land within the ACT this process has reportedly been completed in a significantly shorter period.

It is noted that the East Lake development is subject to the same statutory process. The ACT Government’s published Land Release Program envisages the first residential releases in East Lake in the 2012/13 financial year. The expectations of the ACT Government in regard to the rezoning and land release timeframes thus mirror those of the Molonglo Group.

Subject to approvals, redevelopment of the Molonglo site will begin in 2013. Therefore, the CH2M-Hill Mitigation Report objective *“to ensure regulatory compliance with the relevant odour*

criteria [i.e. 2ou] at the boundary of both existing sensitive receptors and those that would be located within the proposed East Lake development” has not been met.

4.3 Summary of Findings

It is queried as to whether under its existing land use, the Molonglo site should justifiably form a component of a 500m buffer around the Fyshwick STP.

Given the existing land use at the Molonglo site (referred to as the C1 zone in the East Lake staging plan), the application of a less stringent odour goal may be valid. However, the ACTEW Odour Guidelines appear to advise that these should only be applied when the area is not occupied (i.e. non-business hours).

The recommendations and conclusions of the CH2M-Hill Odour Reports would be very different if the correct assumption was made that residential development is planned for the Molonglo site (East Lake C1 zone). It is unclear as to why the acknowledged future use has not been considered with regard to odour impacts.

In light of the plans for residential development within the Molonglo site (East Lake C1 zone), the conclusion *“that minor mitigation measures at the Fyshwick STP will be sufficient to meet the required 2ou criterion for the nearest East Lake development sensitive receptor”* (Section 3.1.1 of the CH2M-Hill Odour Mitigation Report) is wrong.

Application of the correct assumption that the East Lake C1 zone will comprise residential receptors necessitates that the good practice odour controls identified within the CH2M-Hill Odour Mitigation Report be applied at the Fyshwick STP. This is discussed further in the subsequent Section.

5 MITIGATION MEASURES FOR THE FYSHWICK STP

This section evaluates whether the full range of mitigation options has been properly identified, evaluated and costed within the CH2M-Hill Odour Reports. It additionally makes comment as to whether any mitigation options have been overlooked.

Any recommendations for feasible and acceptable mitigation measures which could be used at the STP to remove or minimise potential odour issues for residential development of the site are provided.

5.1 Overview of Proposed Mitigation Measures

Proposed mitigation measures for the five key odour sources identified in **Section 3.3** are discussed sequentially. As noted in **Section 3.3**, these five sources comprise 98% of the odour emissions at the Fyshwick STP.

5.1.1 Maturation Ponds

As noted in **Section 3.3.1**, an argument is made within the CH2M-Hill Odour Reports that the Maturation Ponds should be discounted from the evaluation of existing and future odour impacts.

Consistent with this, Section 7.4.2.3 of the CH2M-Hill Odour Investigation Report notes:

"..mitigation measures for the maturation ponds are not considered necessary and the impacts of the ponds will not be considered further in this study."

The above statement is consistent with the current review findings. This statement supports the view (**Section 3.3.1**) that the Maturation Ponds should be removed from the modelling and any subsequent derivation of current / future odour impacts surrounding the STP.

5.1.2 Trickling Filters

Strategy 4 (Section 4.2.5 of the CH2M-Hill Odour Mitigation Report) considers covering and ventilating foul air from the trickling filters. A cost estimate of \$3.6M is provided. If the Maturation Ponds are excluded from the odour emission inventory, as suggested above, this would result in a removal of over 40% of the site's odour.

This mitigation option was not adopted within the CH2M-Hill Odour Mitigation Report recommendations.

5.1.3 PST Flow Splitter

As noted in **Section 3.3.2**, the CH2M-Hill Odour Mitigation Report concludes that no mitigation work be undertaken on the PST Flow Splitter until the emission rates for this source are further verified. Notwithstanding this, Strategy 3 (Section 4.2.4 of the CH2M-Hill Odour Mitigation Report) considers the covering of the PST flow Splitter. Costs associated with this measure are estimated to be of the order of \$350k, inclusive of an activated carbon (AC) unit to treat the foul air.

This mitigation option was not adopted within the CH2M-Hill Odour Mitigation Report recommendations.

5.1.4 Secondary Digester

Strategy 4 (Section 4.2.5 of the CH2M-Hill Odour Mitigation Report) considers the retrofit of the secondary digester with a water (as opposed to sludge) seal. This would act to mitigate approximately 10% of site odour emissions. Quoted costs within the CH2M-Hill Odour Mitigation Report for this are approximately \$2.2M.

This odour control option is only required if it is planned to treat primary sludge from the PSTs using anaerobic digestion.

The odour and cost implications of replacing the digester with a specific sludge holding tank (refer discussions within **Section 3.3.3**) are not explicitly considered within the CH2M-Hill Odour Mitigation Report.

No odour mitigation options applicable to the digester were adopted within the CH2M-Hill Odour Mitigation Report recommendations.

5.1.5 Inlet Works Odour Control System (OCS)

Section 4.2.2 of the CH2M-Hill Odour Mitigation Report indicates that the overall cost increase associated with removal of the biotrickling filter from operation and only running the AC unit are estimated to be of the order of \$3,400 per annum.

This is the only odour mitigation option currently being proposed at the Fyshwick STP as a result of the CH2M-Hill Odour Mitigation Report recommendations.

5.1.6 Assessment of Options

Section 4 of the CH2M-Hill Odour Mitigation Report describes the assessment process by which ACTEW evaluated the potential mitigation strategies. The assessment process involved a workshop with the participants identified and invited by ACTEW. External stakeholders with a direct interest in the matter, including the Molonglo Group and other land owners potentially affected were not invited. It thus appears that the assessment process looked at technical feasibility, ease of implementation and the financial implications from an ACTEW perspective.

The CH2M-Hill Odour Mitigation Report does not document any consideration of the impact upon, or the wider interests of, other parties. Consequently, the assessment of options was not undertaken in a manner which could reliably inform any decisions taken by an independent regulator or decision maker with a responsibility to take account of potential impacts on external parties.

5.2 Summary of Findings

The CH2M-Hill Odour Mitigation Report concludes that 67% of the Fyshwick STP's odour emission inventory may be mitigated at an estimated cost of approximately \$6.2M. If the Maturation Ponds are discounted from the site's odour emission inventory (as recommended above), this is raised to 97% of all odour emissions under standard operation. Given the costing models adopted by CH2M-Hill (for example, inclusion of a 30% contingency included for all capital items) these cost estimates appear reasonable.

As noted in **Section 3.6**, it is anticipated that the adoption of these good practice odour mitigation measures would fulfil the regulatory requirements for sensitive land uses within the C1 zone.

Put another way, adoption of these measure are anticipated to be adequate to yield a 2ou contour (3-minute, 99.9th percentile) that does not impinge upon the Molonglo site.

A high level of odour control is provided when all of the good practice odour control measures within the CH2M-Hill Odour Mitigation Report are adopted. It is therefore not considered that other reasonable and feasible odour mitigation options have been overlooked.

The only odour mitigation option currently being proposed at the Fyshwick STP as a result of the CH2M-Hill Odour Mitigation Report is the use of the (existing) AC unit within the inlet works Odour Control System. The overall cost increase associated with removal of the biotrickling filter from operation and only running the AC unit are estimated to be of the order of \$3,400 per annum.

Instead of proposing additional mitigation at the site, ACTEW essentially propose to transfer the cost of odour mitigation onto adjacent land owners through the imposition of an exclusion zone to future redevelopment.

6 CONCLUSION

Molonglo Group commissioned PAEHolmes to conduct a comprehensive review and critique of the CH2M-Hill odour impacts and mitigation studies associated with the Fyshwick STP.

The review recommends that atmospheric dispersion modelling should be undertaken with a more appropriate (i.e. accurate) atmospheric dispersion model. Similarly, a more robust meteorological data set is suggested to provide more effective guidance as to appropriate odour mitigation.

The review notes that the ACTEW Odour Assessment Guidelines are not a legislative requirement. Their applicability has not been tested as extensively as odour legislation in other states and their requirements are generally more stringent than those adopted elsewhere in Australia.

Application of the correct assumption in the CH2M-Hill Reports that the Molonglo site will comprise residential receptors necessitates that the good practice odour controls identified within the CH2M-Hill Odour Mitigation Report be applied at the Fyshwick STP.

If the influence of the Maturation Ponds is discounted, CH2M-Hill Odour Mitigation Report concludes that 97% of the Fyshwick STP's odour emission inventory may be mitigated at an estimated cost of approximately \$6.2M.

It is anticipated that the adoption of these good practice odour mitigation measures would fulfil the regulatory requirements with respect to odour mitigation appropriate for a future residential land use within the Molonglo site.

7 REFERENCES

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