i_____**Appendix K**
Odour Study - Waste Water Pump Station

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# TECHNICAL BRIEF

## Odour Impact Assessment of Water Corporation of Western Australia, Bennett Avenue Sewage Pump Station, North Coogee

**TO:** Peter Goff

**COMPANY:** MGA Town Planners

**SITE:** North Coogee Sewage Pump Station

**FROM:** John Hurley

**OUR REF:** #W1757R.03

**DATE:** **Thursday, March 08, 2012**

The Odour Unit WA Pty Limited (TOU) was commissioned by MGA Town Planners (MGA) in February 2012 to undertake an odour impact assessment (OIA) of the Water Corporation of Western Australia's Sewage Pump Station located at Bennett Avenue, North Coogee WA *(hereinafter referred to as **the pump station**)*.

The OIA was undertaken to define the current odour footprint from the pump station and determine if the footprint exceeds the WA EPA's odour separation distance (buffer) of 50 metres which by convention is taken from the odour source itself, in this case taken from the emission to atmosphere source at the pump station.

The pump station has a current capacity (throughput) of 190L/sec of sewage effluent wastewater and is projected to increase to 350L/sec as urban development increases in the area over the next decade.

Advice presented to MGA by Ms. Carissa Aitken of the WA Department of Environment and Conservations' (DEC) Works Approval and Emissions Licensing Section discusses that a buffer is taken from the source of the odour itself and not from the boundary of the site containing the odour source.

The aerial image below denotes the site and the 50 metre buffer around the odour source.

The emission to atmosphere source at the pump station is a mechanically exhausted stack at a height of 4 metres above ground. The stack is the final emission to atmosphere from captured and extracted odorous air inside the pump station sub-terrain wet well. The wet well is the well at which the incoming sewage effluent wastewater is collected from bulk underground pipe works (sewer pipes). The sewage effluent wastewater fills the well and is pumped from the well to either the next pump station or the final wastewater treatment facility downstream. The pump station wet well is in two halves and as such utilises two pumps to move the liquor further downstream.

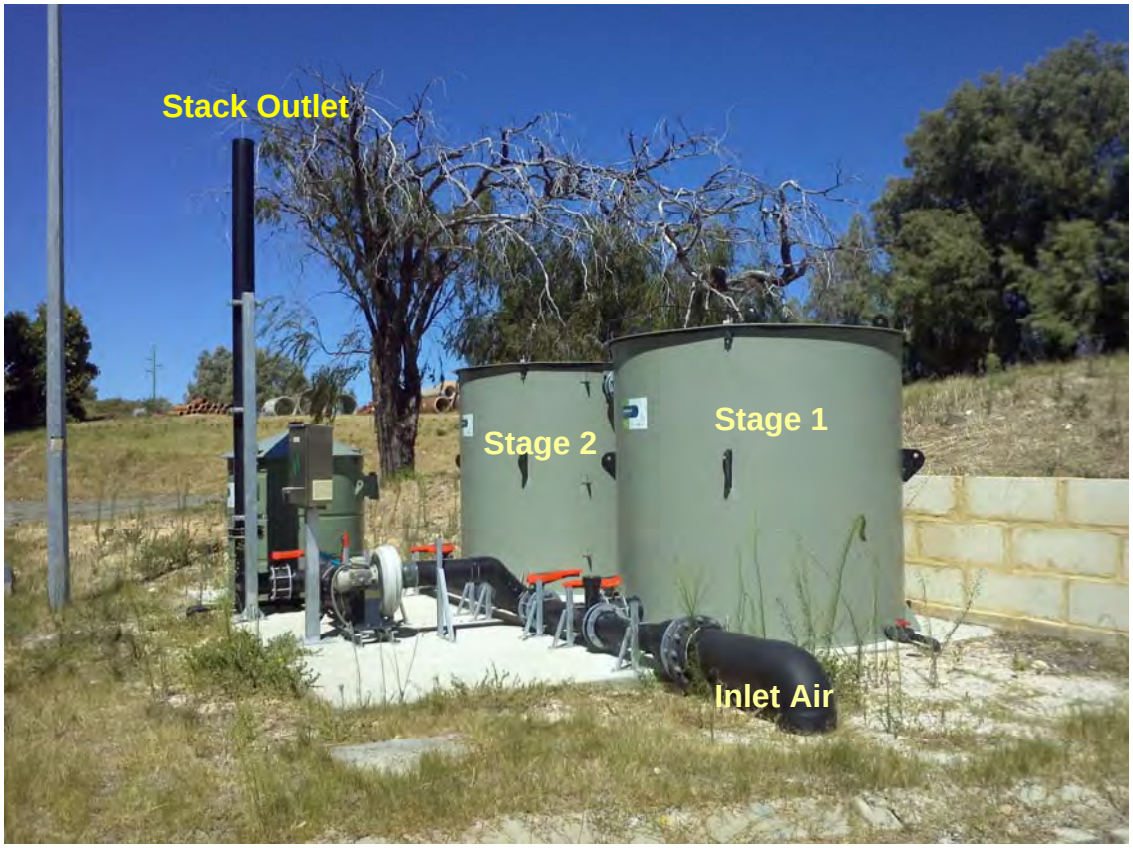
The pump station wet well is fully sealed as recent works at the site have removed the aging covers and replaced them with air tight steel covers which are bolted to the ground. The air within the wet well is extracted at a total volume of 800$m^3$/hr.

The extracted air passes through a two-stage biofiltration unit designed and installed by Odatech with a performance guarantee of >99% destruction of $H_2S$ efficiency. When the unit is required to be taken offline for maintenance the airstream is passed through a purpose built activated carbon filter which delivers an even greater destruction efficiency. The $H_2S$ destruction parameter (performance guarantee) for the Odatech design is <1ppm. $H_2S$ is the primary odorant in the airstream. The treated air is ejected to atmosphere via a 0.2m diameter stack at a discharge height of 4 metres above ground.

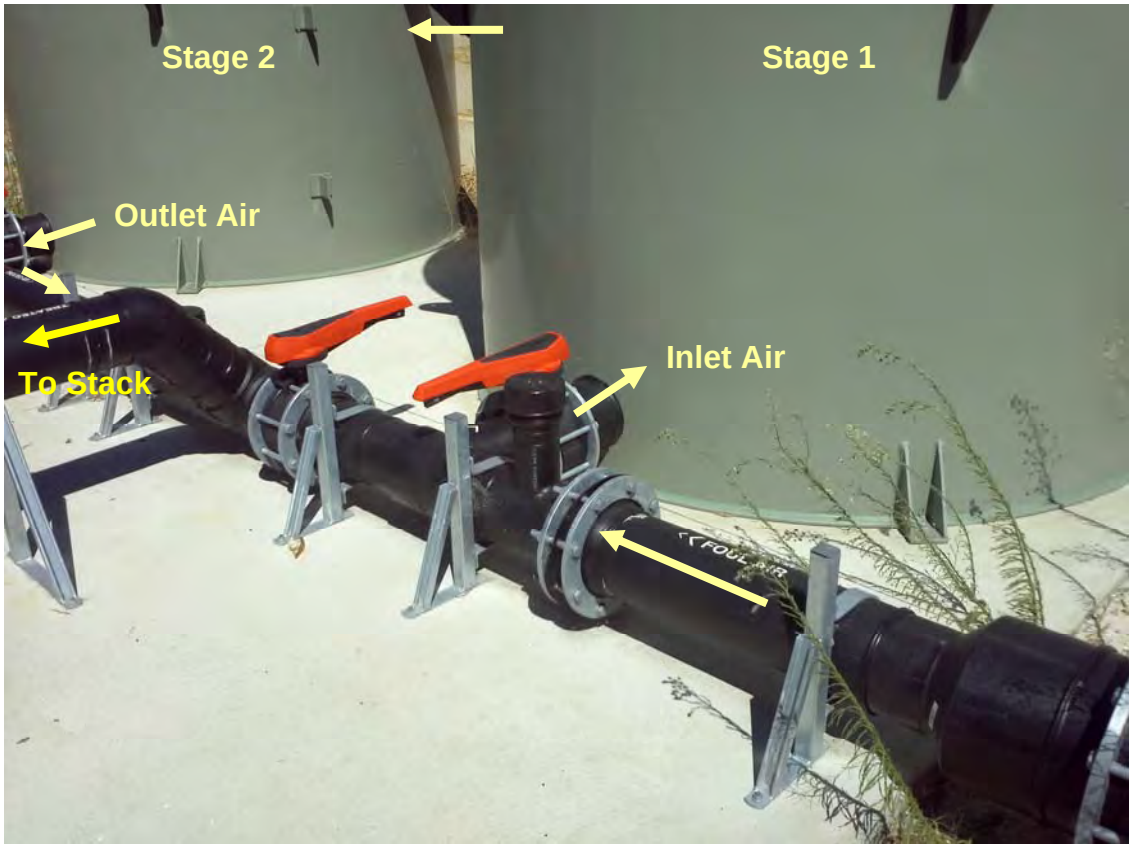
The following images show the pump station site and Odatech biofiltration setup.

**Wet Well (fully sealed)**

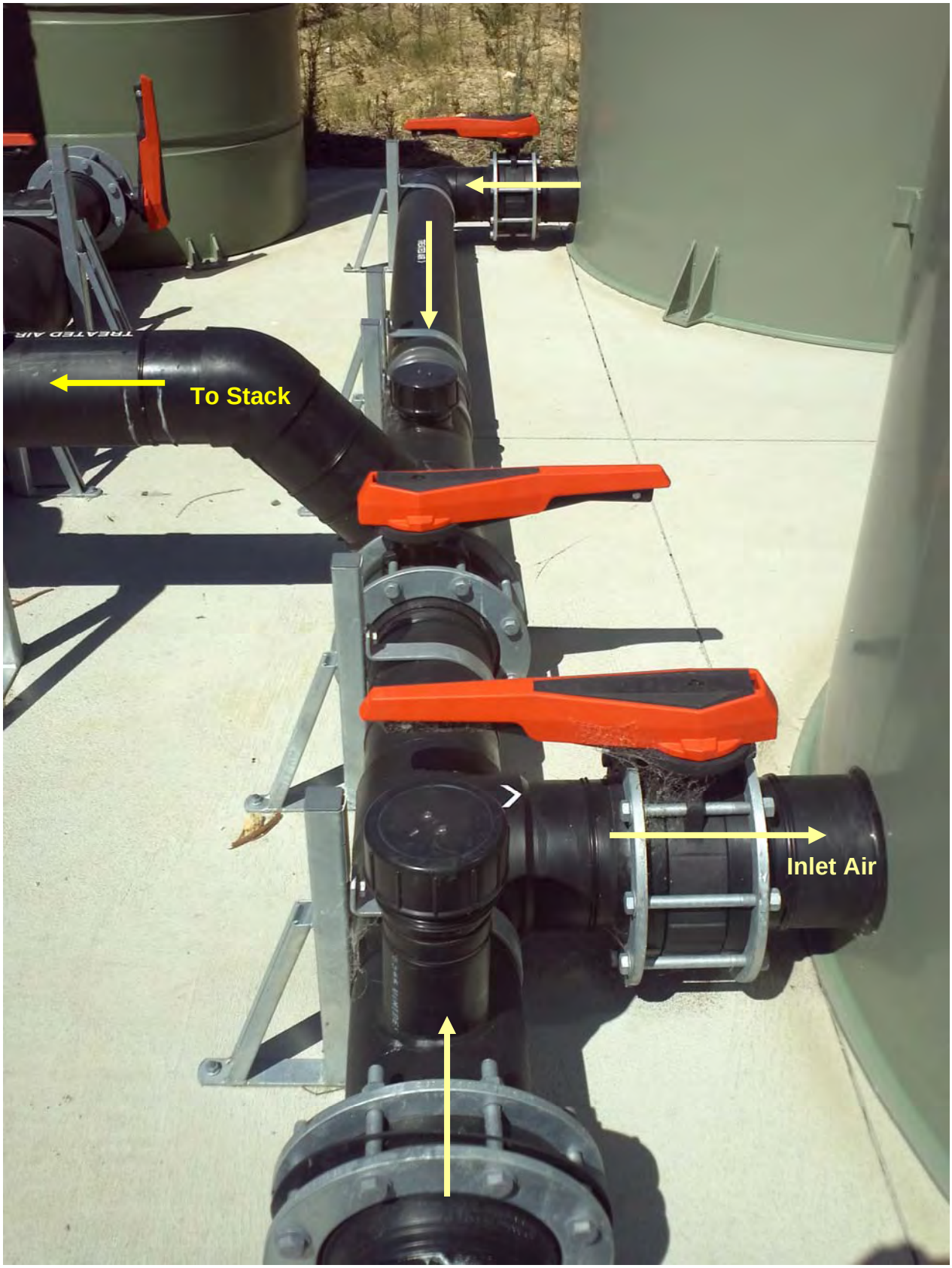
**Wet Well with Odatech Treatment in background**




**Odatech Treatment Plant**




**Process Air Flow through Odatech Plant**




**Process Air Flow through Odatech Plant**

The Odatech system was installed in May 2011 with the initial commissioning stages of air capture, extraction and treatment utilising the carbon filter as the final air treatment stage. This is the normal approach when commissioning air treatment technologies to allow the main system time to adapt and grow microbial populations (bugs) able to treat the captured odorous air. In June 2011 the activated carbon filter was switched off allowing the Odatech system to do all the work. The Odatech system in full has now been running at capacity since June 2011 (unaided by the activated carbon filter).

TOU collected one Inlet air sample and two Outlet air samples on the 6th March 2012. The odour concentration data of the outlet samples was then averaged and modelled using Ausplume v6.0. The odour data and derived odour emission rates are table below.

| Odour Concentration Data and Derived Odour Emission Rates | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Location | Time | Flow | Flow | Stack Dia. | Stack Temp. | Stack Velocity | Stack Height | Odour Conc'n | OER |
| | | $m^3$/hr | $m^3$/sec | (m) | ($^0$C) | (m/s) | (m) | ou | ou.$m^3$/sec |
| Inlet | 11:02 | 800 | 0.22 | | | | | 80,684 | 17,750 |
| Outlet (s#1) | 10:52 | 800 | 0.22 | 0.2 | 35.5 | 7.07 | 4.00 | 588 | 131 |
| Outlet (s#2) | 10:55 | 800 | 0.22 | 0.2 | 35.5 | 7.07 | 4.00 | 630 | 140 |

The average odour emission rate (OER) ejected to atmosphere was 135ou.$m^3$/sec. The inlet OER was 17,750ou.$m^3$/sec. The odour destruction performance is therefore 99.24%.

The Ausplume modelling setup utilised the synthetic meteorological (met) screening file (metsamp) within Ausplume to derive the worst case met condition which was:

| Date | Temp. | Wind Speed | Wind Direction | Stability Class | Mixing Height |
|---|---|---|---|---|---|
| 00010101 | 25 | 1.0 | 270 | D | 100 |

Additionally, TOU also used a site-specific met file derived from 2008 observations at the Water Corporations' Woodman Point Wastewater Treatment Plant automatic weather station. Both met datasets returned a zero result for all of the following odour performance criterions:

I. 2.5ou at ground level, 99.5$^{th}$ percentile with 1 hour averaging times;
II. 8ou at ground level, 99.9$^{th}$ percentile with 1 hour averaging times, and
III. 1ou at ground level, 99.5$^{th}$/99.9$^{th}$ percentiles with 1 hour averaging times.

The outcome of a zero result at all 3 odour performance criterions was expected given the extremely low OER of the treated air through the 4 metre stack outlet.

The stack outlet itself is 50 metres from the northern boundary of the pump station site, 40 metres from the western boundary and 70 metres from the eastern and southern boundaries. The location of the stack alone (the odour source) already complies with the applicable 50 metre odour separation distance, albeit 40 metres on the western boundary, however, given the nil modelling predictions and the Odatech performance guarantee of $H_2S$ destruction (the primary odorant) at >99% the likelihood of any malodour impact from the Odatech stack emissions is likely to be nil. The current location of the stack should not change, thus further ensuring the odour source is as far away from all site boundaries as practicable. The only foreseeable incidences of malodour impacts would be from the failure of the Odatech unit itself which does have contingency in place in the form of an activated carbon filter, additionally, the removal of the covers on the wet well is likely to have an impact for malodour, however, this would be transient, predictable and in line with typical State Water Authority maintenance procedures for all sewage effluent wastewater wet wells throughout Australia.

On the basis of the findings herein and the performance guarantee of the Odatech system TOU sees no issues for odour impacts from the Odatech Odour Treatment Plant at the Bennett Avenue Effluent Wastewater Pump Station. The site itself is well maintained, the wet well is full sealed (air tight) and the Odatech air treatment technology in place is well suited for the application. Should the wet well throughput increase to 350L/sec the expectation would be that the Odatech system also increases in size to handle the additional capacity of the well and hence the expected increase in the wet well throughput is also of no concern with respect to odour impacts off-site. The 50 metre odour separation distance (buffer) that is currently in place effectively ensures that odour impacts from the pump station would not exceed the sites' boundary given that the odour source (the Odatech stack) is 50 metres from the boundary.