

Appendix 3.8

Details and Calculations of Odour Emission Sources

(Blank)

Shek Wu Hui Sewage Treatment Works

Details of Deodourisation Units (90% Odour Removal Efficiency)

Facilities	Source ID	Type	X	Y	MPD	Extract Vol. (cu.m/hr)	Temp	Vel.	Dia	Effective Surface Area	Height	SOER (ou/m2/s)	Emission Rate (ou/s)	Odour Removal Efficiency (%)	Mitigated Emission Rate (Without Temperature Adjustment) (ou/s)
Deodourising Unit 1	DOU1	POINT	830366	841139	9		298	10	2.50		10		57576.74	90	5757.67
Inlet Works No. 1						13601				2267		3.26	7389.93		
Primary Sedimentation Tank No. 1						3767				628		4.03	2529.96		
Primary Sedimentation Tank No. 2						3767				628		4.03	2529.96		
Primary Sedimentation Tank No. 3						3767				628		4.03	2529.96		
Primary Sedimentation Tank No. 4						3767				628		4.03	2529.96		
Primary Sedimentation Tank No. 5						3767				628		4.03	2529.96		
Primary Sedimentation Tank No. 6						5650				942		4.03	3794.94		
Primary Sedimentation Tank No. 7						5650				942		4.03	3794.94		
Primary Sedimentation Tank No. 8						3767				628		4.03	2529.96		
MBR Pretreatment Screen No. 1						805				134		4.03	540.73		
MBR Pretreatment Screen No. 2						805				134		4.03	540.73		
Bioreactor No. 1						13544				2257		1.65	3724.57		
Bioreactor No. 2						14098				2350		1.65	3877.08		
Bioreactor No. 3						14308				2385		1.65	3934.70		
Bioreactor No. 4						19013				3169		1.65	5228.63		
Bioreactor No. 5						17988				2998		1.65	4946.81		
Membrane Tank and Associated Facilities No. 1						2488				415		0.02	8.29		
Membrane Tank and Associated Facilities No. 2						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 3						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 4						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 5						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 6						2624				437		0.02	8.75		
Membrane Tank and Associated Facilities No. 7						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 8						2562				427		0.02	8.54		
Membrane Tank and Associated Facilities No. 9						2562				427		0.02	8.54		
Primary Sludge Thickener No. 1						1020				170		3.98	676.44		
Primary Sludge Thickener No. 2						1020				170		3.98	676.44		
SAS Consolidation House						4089				682		3.98	2712.48		
Sludge Holding Tank No. 1						1185				197		0.43	84.90		
Sludge Holding Tank No. 2						1185				197		0.43	84.90		
Sludge Holding Tank No. 3						1185				197		0.43	84.90		
Sludge Holding Tank No. 4						1185				197		0.43	84.90		
Dewatering House No. 1						14215				2369		0.06	142.15		
						Total	176193								
						Stack dimension	4.894	m2							
						stack diameter	2.496	m							

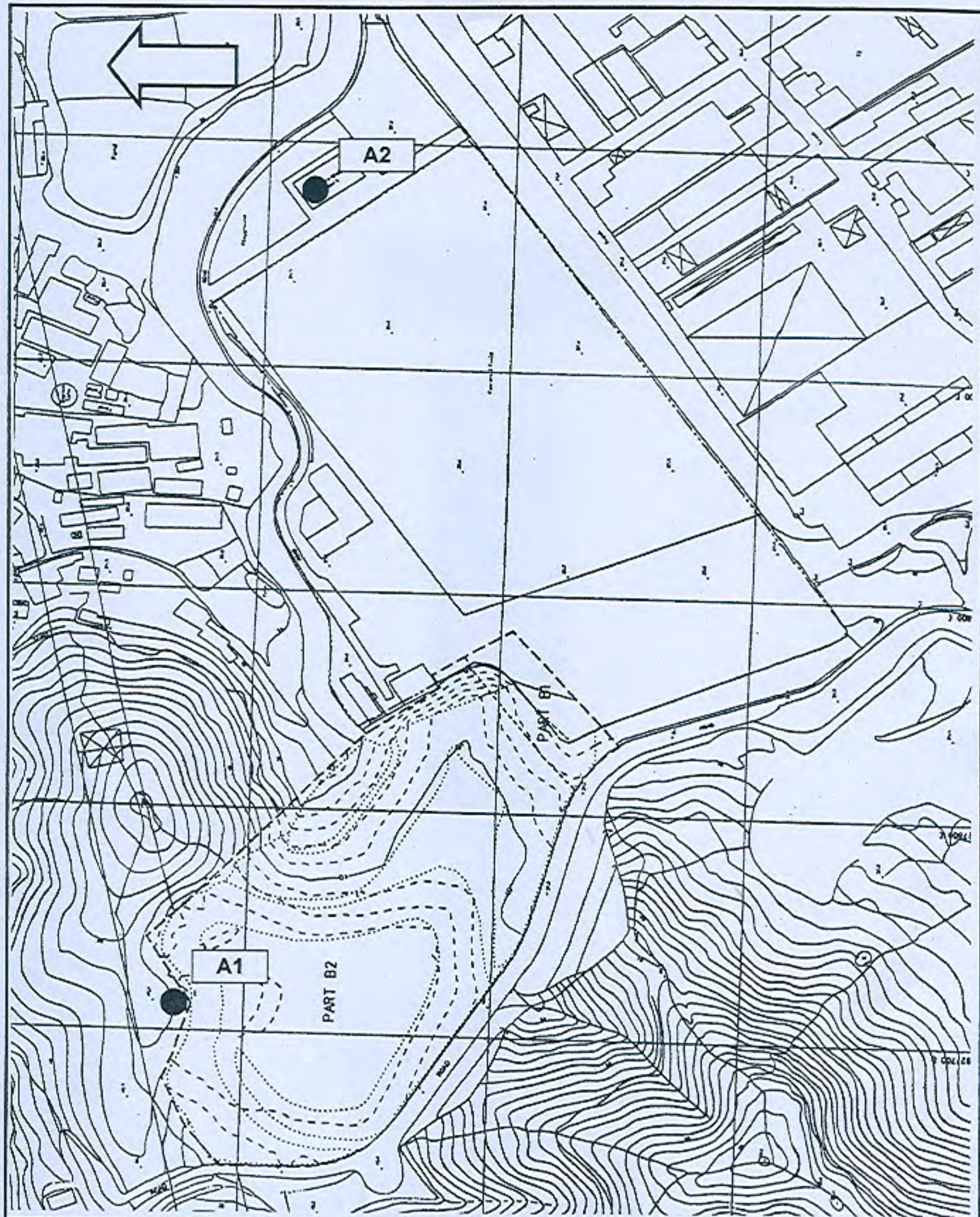
Shek Wu Hui Sewage Treatment Works

Source ID	Source Type	X Y		X-dim	Y-dim	Radius/ Angle	Height	Odour Emission Rate (Without Temperature Adjustment)
				(m)	(m)	(m) or (°)	(mAG)	(OU/s)
DOU1	Deodourising Unit 1	830366	841139	-	-	-	10	5.7577E+03

Sheung Shui Slaughter House

Source ID	Source Type	X	Y	X-dim (m)	Y-dim (m)	Stack Height (m)	Stack Diameter (m)	Exit Vel (m/s)	Temperature (C)	Unmit Odour (OU/s)	Removal Eff (%)	Active Time (Hour)	Mit Odour (OU/s)
SSSH1	Lairages	830130	841578	-	-	14.4	1.25	10.4	27	22795			597.25
	Pig Lairage	-	-	-	-	-	-	-	-	21700	97.5		542.5
	Manure Collection Rooms	-	-	-	-	-	-	-	-	1095	95		54.75
SSSH2	Slaughter Block Room 1	830196	841488	-	-	17	0.8	9.72	27	2237			223.7
	Blood Handling Room	-	-	-	-	-	-	-	-	2062	90		206.2
	Isolation Lairage	-	-	-	-	-	-	-	-	175	90		17.5
SSSH3	Slaughter Block Room 2	830229	841441	-	-	17	0.5	7.43	27	306.3			30.63
	Manure Pump Room	-	-	-	-	-	-	-	-	97.2	90		9.72
	Pig Bristle Chute Room	-	-	-	-	-	-	-	-	77.8	90		7.78
	By-Product Collection Room & Unloading Bay	-	-	-	-	-	-	-	-	131.3	90		13.13
SSSH4	BBP Process Exhaust	830137	841435	-	-	17	0.35	15.59	450	0	99.5		0
SSSH5	By-Product Plant	830122	841488	-	-	17	1.3	16.95	27	22707			1980.7
	BPP Room	-	-	-	-	-	-	-	-	16907	90		1690.7
	Wastewater Treatment Plant	-	-	-	-	-	-	-	-	5800	95		290
SSSH6	Wastewater Treatment Plant	830159	841532	-	-	17	1.4	9.42	27	5800	95		290
T1	Livestock Transit Pens	830068	841667	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T2	Livestock Transit Pens	830068	841642	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T3	Livestock Transit Pens	830069	841617	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T4	Livestock Transit Pens	830072	841592	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T5	Livestock Transit Pens	830075	841567	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T6	Livestock Transit Pens	830078	841542	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T7	Livestock Transit Pens	830083	841517	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T8	Livestock Transit Pens	830088	841493	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T9	Livestock Transit Pens	830094	841468	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T10	Livestock Transit Pens	830101	841444	11.6	1.4	3	-	-	-	130	90	1200-1600, 1600-2000	13
T11	Train	830028	841661	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T12	Train	830029	841635	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T13	Train	830030	841610	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T14	Train	830033	841585	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T15	Train	830036	841560	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T16	Train	830039	841536	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T17	Train	830044	841511	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T18	Train	830049	841486	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T19	Train	830055	841462	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T20	Train	830062	841438	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T21	Train	830018	841660	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T22	Train	830019	841635	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T23	Train	830020	841609	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T24	Train	830023	841584	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T25	Train	830026	841560	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T26	Train	830029	841535	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T27	Train	830034	841510	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T28	Train	830039	841485	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T29	Train	830045	841461	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
T30	Train	830052	841437	11.6	1.4	3	-	-	-	78	90	1200-1600, 1600-2000	7.8
UNL	Livestock Truck Unloading Area	830085	841675	5.52	1.4	3				146.9	90	0700-1700	14.69

Odour Monitoring Record at Ma Tso Lung Restored Landfill



CONTRACT NO EP/SP/30/95

NORTH WEST NEW TERRITORIES LANDFILLS AND GIN DRINKERS BAY LANDFILL RESTORATION

SWIRE SITA
WASTE SERVICES LIMITED

ENVIRONMENTAL MONITORING AT MA TSO LUNG



ODOUR

NWNT & GIN DRINKERS BAY LANDFILLS RESTORATION

CONTRACT EP/SP/30/95

Ma Tso Lung : Summary of Odour Monitoring

Location: Ma Tso Lung (A1 & A2)

		Ma Tso Lung Site Boundary (A1)		Ma Tso Lung Sport Center (A2)	
<i>Date of monitoring</i>	<i>Time</i>	<i>Result of Odour Patrol</i>	<i>Time</i>	<i>Result of Odour Patrol</i>	
10-Jan-07	10:15	No odour detected	10:30	No odour detected	
18-Apr-07	10:11	No odour detected	10:25	No odour detected	
11-Jul-07	10:00	No odour detected	10:15	No odour detected	
25-Oct-07	10:50	No odour detected	11:15	No odour detected	
16-Jan-08	10:10	No odour detected	10:27	No odour detected	
16-Apr-08	10:10	No odour detected	10:35	No odour detected	
16-Jul-08	10:25	No odour detected	10:45	No odour detected	
16-Oct-08	10:40	No odour detected	10:55	No odour detected	
13-Jan-09	10:30	No odour detected	10:45	No odour detected	
15-Apr-09	10:55	No odour detected	10:40	No odour detected	
22-Jul-09	10:40	No odour detected	10:55	No odour detected	
22-Oct-09	10:40	No odour detected	11:05	No odour detected	
20-Jan-10	10:50	No odour detected	11:05	No odour detected	
22-Apr-10	10:30	No odour detected	10:55	No odour detected	
9-Jul-10	10:25	No odour detected	10:55	No odour detected	
20-Oct-10	10:30	No odour detected	11:05	No odour detected	
19-Jan-11	10:46	No odour detected	11:03	No odour detected	
19-Apr-11	10:31	No odour detected	10:50	No odour detected	
5-Jul-11	10:40	No odour detected	11:10	No odour detected	
13-Oct-11	10:30	No odour detected	10:50	No odour detected	
18-Jan-12	10:25	No odour detected	10:50	No odour detected	
24-Apr-12	10:40	No odour detected	10:56	No odour detected	
25-Jul-12	11:16	No odour detected	11:00	No odour detected	
16-Oct-12	15:14	No odour detected	15:40	No odour detected	

For Ove Arup & Partners Hong Kong Limited

**Determination of Odour Emission Rates
at Shak Wu Hui Sewage Treatment Works**

A Draft Report

30 September 2011

Department of Civil & Structural Engineering

The Hong Kong Polytechnic University

On behalf of

PolyU Technology & Consultancy Co. Ltd

1. Background

A new Sewage Treatment Works is proposed at Fu Tei Au, Fanling to cater for the sewage generated by the population of NENT NDA. The design of STW is anticipated to be similar with existing Shek Wu Hui Sewage Treatment Works (SWHSTW). A service of odour sampling and olfactometry analysis was required by Ove Arup & Partners Hong Kong Limited to determine the odour emission rates and odour strength at various odour sources within the SWHSTW.

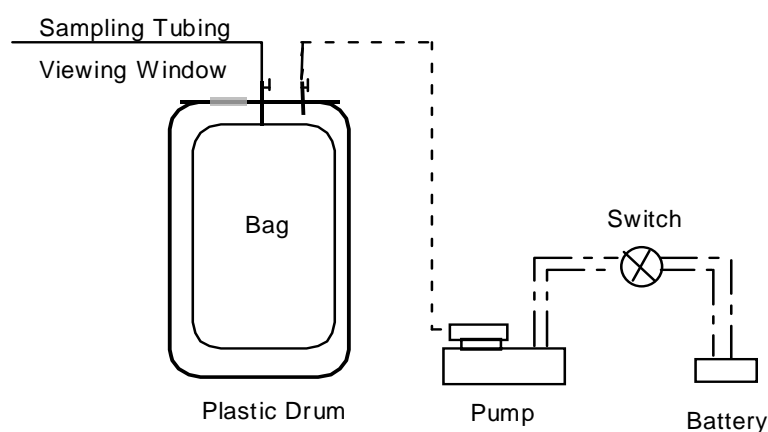
2. Scope of the work

- On-site odour sampling to collect a total of 52 odour samples from 13 odour sources within SWHSTW.
- Olfactometry measurement of all odour samples at the Odour Laboratory of PolyU
- Calculation of odour emission rates at each odour source
- Preparation of an odour survey report

3. Methodology

3.1. Odour Sampling

Odour gaseous sample is collected by using an odour sampling system, which includes a battery-operated air pump, a sampling vessel, and an odour bag as shown below. During air sampling, an empty sample bag is placed in the vessel, a rigid plastic container, and the container is then evacuated at a controlled rate and the bag is filled with foul gas. About 60 L of foul gas is collected for each sample.



To determine an odour emission rate from an area source such as water surface, air sampling can use a “hood” method, whereby a wind tunnel or dynamic flux hood is placed on the odour emission surface of selected locations and a stream of odour-free nitrogen gas from a certified gas cylinder is supplied into the wind tunnel to simulate parallel winds blowing on the main section of sampling hood at a known gas flow velocity. The emission rate is then determined by the air flow through the hood and the odour concentration of the exit air. Air samples shall be collected using the sampling vessel and Nalophane NATM odour bags.



Dynamic flux hood

Diameter = 0.4 m, Area = 0.13 m²

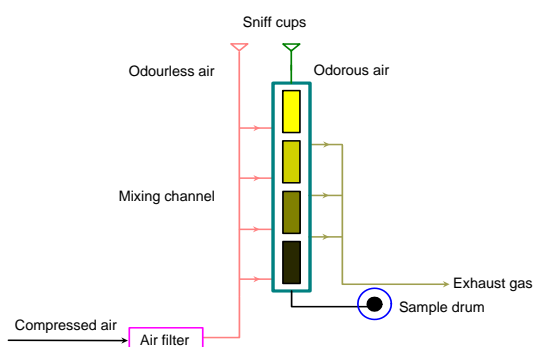


Wind tunnel

Dimension: L = 0.80 m, W = 0.40 m, and H = 0.13 m (Effective height above water surface = 0.10 m)

3.2. Odour Measurement by Olfactometry

Odour concentration was determined by a Forced-choice Dynamic Olfactometer (Olfactomat-n2) in accordance with the European Standard Method (EN13725). This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow. This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor. The unit of measurement is the odour unit per cubic metre: ou/m³. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 ou/m³. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10¹ ou/m³ to 10⁷ ou/m³.



A force-choice olfactometer



Olfactometer in PolyU (Olfactomat-n2)

3.3. Determination of Specific Odour Emission Rate

A wind tunnel system as a “hood” was employed in this sampling work to collect odour samples from water surface, in which an odour-free gas from a nitrogen gas cylinder was

supplied to generate a known air inflow at a fixed velocity or a fixed flow rate inside the hood. A specific odour emission rate (SOER) at each area source can be calculated by the following equation:

$$\text{SOER (ou/m}^2\text{/s)} = \frac{\text{Odour concentration (ou/m}^3\text{)} \times \text{Air flow rate inside hood (m}^3\text{/s)}}{\text{Covered water surface area (m}^2\text{)}}$$

4. Sampling Requirements

A total of 13 sampling locations were identified by the client in advance and 4 odour samples need to be collected at each location. The sampling time were also proposed by the client according to the operation of SWHSTW as summarized in Table 1.

Table 1 Sampling location, number and proposed time period

No	Location	Number of samples	Proposed sampling time
S1	Inlet pumping station	4	12:00pm-4:00pm
S2	Fine Screening (at screen debris chamber)	4	12:00pm-4:00pm
S3	Grit Channels	4	12:00pm-4:00pm
S4	Degritting	4	12:00pm-4:00pm
S5	Primary Sedimentation Tank (Weir Zone)	4	12:00pm-4:00pm
S6	Primary Sedimentation Tank (Quiescent Zone)	4	12:00pm-4:00pm
S7	Bioreactor	4	12:00pm-4:00pm
S8	Feed Channel to FST	4	12:00pm-4:00pm
S9	Final Sedimentation Tank	4	12:00pm-4:00pm
S10	Sludge Holding Tank	4	12:00pm-4:00pm
S11	Dewatering House	4	9:00am-4:00pm
S12	Thickener	4	12:00pm-4:00pm
S13	Sludge Conditioning Tank	4	12:00pm-4:00pm
Total no of samples		13 sampling locations x 4 samples/ location = 52 samples	

5. Sampling Activities

The sampling work was conducted on 4 separate dates of 19th, 21st, 22nd, and 27th September 2011, respectively, according to the weather forecast. During the odour sampling, relevant weather conditions were recorded on the sites for references, including ambient temperature, relative humidity, wind speed, and wind direction. Four odour samples were collected at each location on two different days using either the dynamic flux hood at an air flow rate of 5 L/min or the wind tunnel system at an air flow velocity of 0.01 m/s. A total of 52 odour samples were collected for laboratory analysis and the sampling conditions are summarized in Table 2.

Table 2: Summary of sampling conditions

Sample ID	Location	Date	Time	Method	AT °C	RH %	WS m/s	WD
S1	Inlet pumping station	21-9-2011	14:40	FH	32.6	49.8	0.5	N
			14:50	FH	32.5	50.3	0.7	N
		27-9-2011	13:50	FH	34.0	55.5	0.3	E
			14:00	FH	34.3	55.4	0.5	E
S2	Fine Screening (at screen debris chamber)	21-9-2011	15:10	FH	32.8	49.5	0.4	N
			15:20	FH	32.9	49.3	0.5	N
		27-9-2011	14:10	FH	34.5	54.8	0.2	E
			14:20	FH	34.9	54.2	0.4	E
S3	Grit Channels	19-9-2011	15:20	FH	32.8	58.4	0.4	E
			15:30	FH	32.6	58.7	0.3	E
		22-9-2011	14:45	FH	33.6	43.0	0.2	NE
			14:55	FH	33.5	43.1	0.1	NE
S4	Degritting	19-9-2011	15:45	FH	32.5	58.8	0.2	E
			15:55	FH	32.5	58.9	0.3	E
		22-9-2011	15:05	FH	33.2	43.3	0.3	NE
			15:15	FH	33.0	43.6	0.2	NE
S5	Primary Sedimentation Tank (Weir Zone)	19-9-2011	14:15	WT	34.4	56.5	0.7	E
			14:25	WT	34.2	56.9	0.6	E
		22-9-2011	13:50	WT	32.8	44.0	0.3	NE
			14:00	WT	33.0	43.7	0.4	NE
S6	Primary Sedimentation Tank (Quiescent Zone)	19-9-2011	14:40	WT	33.5	57.8	0.9	E
			14:50	WT	33.2	58.1	1.1	E
		22-9-2011	14:05	WT	33.1	43.2	0.6	NE
			14:15	WT	33.2	43.2	0.5	NE
S7	Bioreactor	19-9-2011	13:45	WT	34.5	56.8	0.8	E
			13:55	WT	34.8	56.2	0.6	E
		22-9-2011	13:15	WT	32.5	44.6	0.4	NE
			13:25	WT	32.7	44.2	0.6	NE
S8	Feed Channel to FST	19-9-2011	13:25	WT	33.9	57.6	1.5	E
			13:35	WT	34.2	57.0	1.0	E
		22-9-2011	12:50	WT	32.4	44.7	1.2	NE
			13:00	WT	32.3	44.8	0.9	NE
S9	Final Sedimentation Tank	19-9-2011	12:50	WT	33.6	57.9	0.9	E
			13:00	WT	33.8	57.8	0.7	E
		22-9-2011	12:20	WT	32.2	44.9	1.8	NE
			12:30	WT	32.2	45.0	1.5	NE
S10	Sludge Holding Tank	21-9-2011	13:50	FH	32.1	50.7	0.8	N
			14:00	FH	32.4	50.3	0.6	N
		27-9-2011	15:25	FH	34.6	54.6	0.6	E
			15:35	FH	34.4	54.7	0.3	E
S11	Sludge Dewatering House	21-9-2011	13:25	FH	32.2	50.7	0.2	N
			13:35	FH	32.3	50.3	0.1	N
		27-9-2011	13:15	FH	33.2	56.7	0.2	E
			13:25	FH	33.4	56.5	0.1	E
S12	Thickener	21-9-2011	15:30	FH	32.3	50.6	0.3	N

Sample ID	Location	Date	Time	Method	AT °C	RH %	WS m/s	WD
S13	Sludge Conditioning Tank	27-9-2011	15:40	FH	32.2	50.6	0.8	N
			14:50	FH	34.8	54.3	0.7	E
			14:40	FH	34.7	54.3	0.9	E
		21-9-2011	12:40	FH	32.7	50.2	1.6	N
			12:50	FH	32.6	50.4	1.3	N
		27-9-2011	12:40	FH	33.7	56.1	0.4	E
			12:50	FH	33.6	56.2	1.0	E

Remark: AT: Air temperature; RH: Relative humidity; WS: Wind speed; WD: Wind direction; WT: Wind tunnel; FH: Flux hood.

Some photos about the sampling activities are presented as follows:



Inlet pumping station (S1)



Fine Screening
at screen debris chamber (S2)



Grit Channels (S3a)



Grit Channels (S3b)



Degritting (S4)



Primary Sedimentation Tank
at Weir Zone (S5)



Primary Sedimentation Tank
at Quiescent Zone (S6)



Bioreactor (S7)



Feed Channel to FST (S8)



Final Sedimentation Tank (S9)



Sludge Holding Tank (S10a)



Sludge Holding Tank (S10b)



Sludge Dewatering House (S11a)



Sludge Dewatering House (S11b)



Thickener (S12a)



Thickener (S12b)



Sludge Conditioning Tank (S13a)



Sludge Conditioning Tank (S13b)

6. Olfactometry Analysis

A total of 52 odour samples were transported to the Odour Laboratory immediately after the sampling for olfactometry analysis using a forced-choice dynamic olfactometer at PolyU within 24 hours in accordance with the European Standard Method (EN13725).

Five qualified panellists participated in the odour testing session, who were previously selected through a screening test by using a 48 ppm of certified n-butanol gas as a standard reference.

7. Determination of Specific Odour Emission Rate

According to the odour concentration determined for each sample and the air flow rate applied inside the wind tunnel, the specific odour emission rate of each sample was calculated as follows:

For use of wind tunnel:

$$\text{SOER (ou/m}^2\text{/s)} = \frac{\text{Odour conc. (ou/m}^3\text{)} \times \text{Air flow velocity (0.01 m/s)} \times \text{Cross section area (0.04 m}^2\text{)}}{\text{Covered water surface area (0.32 m}^2\text{)}}$$

For use of flux hood:

$$\text{SOER (ou/m}^2\text{/s)} = \frac{\text{Odour conc. (ou/m}^3\text{)} \times \text{Air flow rate (5 L/min)}}{\text{Covered water surface area (0.13 m}^2\text{)}}$$

The odour concentrations of 52 odour samples and the specific odour emission rates at the 13 odour emission sources are summarized in Table 3.

Table 3: Results of odour concentrations and specific odour emission rates

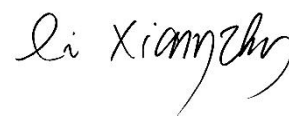
Sample ID	Sampling					Analysis		Calculation
	Location	Date	Time	Method	V/Q	OC (ou/m ³)	SOER (ou/m ² /s)	
S1	Inlet pumping station	21-9-2011	14:40	FH	5 L/min	6215	5101	3.26
			14:50	FH	5 L/min	5980		
		27-9-2011	13:50	FH	5 L/min	4422		
			14:00	FH	5 L/min	4122		
S2	Fine Screening (at screen debris chamber)	21-9-2011	15:10	FH	5 L/min	4931	5487	3.51
			15:20	FH	5 L/min	5125		
		27-9-2011	14:10	FH	5 L/min	6215		
			14:20	FH	5 L/min	5773		
S3	Grit Channels	19-9-2011	15:20	FH	5 L/min	5536	2874	1.84
			15:30	FH	5 L/min	5327		
		22-9-2011	14:45	FH	5 L/min	1489		
			14:55	FH	5 L/min	1554		
S4	Degritting	19-9-2011	15:45	FH	5 L/min	2460	1712	1.10
			15:55	FH	5 L/min	1810		
		22-9-2011	15:05	FH	5 L/min	1607		
			15:15	FH	5 L/min	1202		
S5	Primary Sedimentation Tank (Weir Zone)	19-9-2011	14:15	WT	0.01 m/s	1023	1232	1.54
			14:25	WT	0.01 m/s	1057		
		22-9-2011	13:50	WT	0.01 m/s	1622		
			14:00	WT	0.01 m/s	1309		
S6	Primary Sedimentation Tank (Quiescent Zone)	19-9-2011	14:40	WT	0.01 m/s	3727	3226	4.03
			14:50	WT	0.01 m/s	3841		
		22-9-2011	14:05	WT	0.01 m/s	2706		
			14:15	WT	0.01 m/s	2798		
S7	Bioreactor	19-9-2011	13:45	WT	0.01 m/s	1366	1323	1.65
			13:55	WT	0.01 m/s	1103		
		22-9-2011	13:15	WT	0.01 m/s	1202		
			13:25	WT	0.01 m/s	1693		
S8	Feed Channel to FST	19-9-2011	13:25	WT	0.01 m/s	18	12	0.02
			13:35	WT	0.01 m/s	10		
		22-9-2011	12:50	WT	0.01 m/s	10		
			13:00	WT	0.01 m/s	10		
S9	Final Sedimentation Tank	19-9-2011	12:50	WT	0.01 m/s	18	16	0.02
			13:00	WT	0.01 m/s	10		
		22-9-2011	12:20	WT	0.01 m/s	18		
			12:30	WT	0.01 m/s	18		
S10	Sludge Holding Tank	21-9-2011	13:50	FH	5 L/min	1622	666	0.43
			14:00	FH	5 L/min	1554		
		27-9-2011	15:25	FH	5 L/min	318		
			15:35	FH	5 L/min	245		
S11	Sludge Dewatering House	21-9-2011	13:25	FH	5 L/min	92	86	0.06
			13:35	FH	5 L/min	96		

Sample ID	Sampling					Analysis		Calculation
	Location	Date	Time	Method	V/Q	OC (ou/m ³)		SOER (ou/m ² /s)
S12	Thickener	27-9-2011	13:15	FH	5 L/min	89	6204	3.98
			13:25	FH	5 L/min	71		
		21-9-2011	15:30	FH	5 L/min	4581		
			15:40	FH	5 L/min	4725		
		27-9-2011	14:40	FH	5 L/min	7831		
			14:50	FH	5 L/min	8740		
S13	Sludge Conditioning Tank	21-9-2011	12:40	FH	5 L/min	339	308	0.20
			12:50	FH	5 L/min	297		
		27-9-2011	12:40	FH	5 L/min	264		
			12:50	FH	5 L/min	339		

Remark: WT: Wind tunnel; FH: Flux hood; V: Air flow velocity inside wind tunnel; Q: Air flow rate inside flux hood; OC: Odour concentration; SOER: Specific odour emission rate.

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Signed:



Appendix A: Odour Sampling Locations within SWHSTW

