




**Odour Monitoring Report for Harbour Area  
Treatment Scheme Stage 2A  
(Operational Phase) (January 2023)**

Report No.: OT\_2023001

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## TABLE OF CONTENTS

1.	Introduction .....	1
1.1.	Background .....	1
1.2.	Objectives of the monitoring .....	1
1.3.	Objectives of the Report .....	1
2.	Odour Patrol.....	1
2.1.	Monitoring Requirement .....	1
2.2.	Monitoring Frequency .....	2
2.3.	Monitoring Location.....	2
2.4.	Monitoring Parameters .....	4
3.	Odour Patrol Monitoring Result.....	5
3.1.	Odour Intensity .....	5
3.2.	Meteorological Conditions.....	7
3.3.	Odour Patrol Result Discussion .....	7
4.	Summary of Odour Patrol Result .....	9
4.1.	Conclusion.....	9
4.2.	Recommendations .....	9
4.3.	Exceedance .....	9
5.	Odour Measurement .....	11
5.1.	Monitoring Requirement .....	11
5.2.	Monitoring Frequency .....	12
5.3.	Monitoring Location.....	12
5.4.	Monitoring Parameter .....	13
6.	Odour Measurement Result .....	14
6.1.	Odour Concentration and Odour Emission Rate .....	14
6.2.	Odour Measurement Result Discussion.....	14
7.	Summary of Odour Measurement.....	15
7.1.	Conclusion.....	15
7.2.	Recommendation.....	16

7.3. Correlation between Odour and H<sub>2</sub>S Concentration.....16

#### LIST OF TABLES

Table 2.1	Odour Patrol Monitoring Locations
Table 2.2	Description of Odour Intensity Levels
Table 3.1	Summary of the Odour Patrol Results
Table 3.2	Action / Limit Levels of the Odour Patrol
Table 3.3	Comparison between Baseline Data and Impact Data of Odour Patrol
Table 4.1	Event/Action Plan for Operation Air Quality Monitoring
Table 4.2	On-site Observation
Table 5.1	Odour Monitoring Locations for Odour Measurement
Table 6.1	Summary of Odour Emission Rate
Table 6.2	Comparison between Impact Monitoring Data and Data Obtained from EIA and Baseline Monitoring Data
Table 6.3	Action / Limit Levels of the Odour Measurement
Table 7.1	In-house H <sub>2</sub> S Concentration from Sensors and Odour Concentration from Odour Measurement

#### LIST OF APPENDICES

Appendix A	Layout of Odour Patrol Monitoring Locations
Appendix B	Odour Certificates
Appendix C	Field Record and Photo Record
Appendix D	Meteorological Information from the Hong Kong Observatory Station
Appendix E	Layout of Odour Monitoring Locations for Odour Measurement
Appendix F	Odour Measurement Result
Appendix G	Total Odour Emission Rate Extracted from EIA Report

#### LIST OF GRAPHS

Graph 1	Overall Correlation between Odour and H <sub>2</sub> S Concentration
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## 1. Introduction

### 1.1. Background

- 1.1.1. Bestwise – Sun Fook Kong Joint Venture (the Contractors) appointed 3NV Technology Limited (3NV) to undertake the Odour Monitoring for the Operational Phase of the Harbour Area Treatment Scheme Stage 2A (hereafter referred to as “the Project”).
- 1.1.2. The Project is reference to Environmental Permit No. EP-322/2008/G issued on 9th May 2014 by the Environmental Protection Department (hereinafter called EPD) to the Drainage Services Department (hereinafter called the DSD) as the Permit Holder and the EM&A Manual for the HATS Stage 2A.
- 1.1.3. The odour measurement and odour patrol shall be conducted in the first five years upon commissioning of the expanded SCISTW. For the 1<sup>st</sup> year, odour monitoring had been conducted every three months. For the 2<sup>nd</sup> year, the monitoring frequency are remained unchanged. For the 3<sup>rd</sup> to 5th year, if the monitoring results from the 2<sup>nd</sup> year comply with the requirements stated in Section 2.38 and Section 2.41 of EM&A Manual, the frequency of the monitoring could be reduced to once every 6 months subject to EPD’s approval.

### 1.2. Objectives of the monitoring

- 1.2.1. The objective of odour patrol and odour measurement is to compare the result obtained from the operational phase with the baseline data at the designated points in order to determine the impact from the operation.

### 1.3. Objectives of the Report

- 1.3.1. The purpose of the odour monitoring report for the operational phase is to provide analysis and graphical presentation to determine if there are any changes of odour impacts with respect to the implementation of HATS Stage 2A.

## 2. Odour Patrol

### 2.1. Monitoring Requirement

- 2.1.1. An odour patrollist with at least 3 independent trained personnel / competent persons, will be provided to conduct the odour patrol work at 23 designated odour monitoring locations and at the site boundary of 8 PTW and the SCISTW. The patrollist will be “calibrated” with reference to European Standard Method:

BS EN13725 to ensure the patrollist odour sensitivity within 20-80 ppb/V. The Odour Certificates are shown in **Appendix B**.

2.1.2. The monitoring shall not be conducted on rainy days. Meteorological conditions including ambient temperature, relative humidity, wind speed and wind direction will be recorded with photo showing the sampling locations during each monitoring.

2.1.3. The independent trained personnel / competent persons shall:

- have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725).
- be at least 16 years of age and willing and able to follow instructions.
- be free from any respiratory illnesses.
- be engaged for a sufficient period to build up and monitor/detect at several monitoring location;
- not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 min before and during odour intensity analysis;
- take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics;
- not communicate with each other about the results of their choices.

## **2.2. Monitoring Frequency**

2.2.1. Odour Patrol shall be conducted every three months for the operation for 8 PTWs and expended SCISTW. The first odour monitoring shall be conducted within one month, after the operation of the upgraded PTWs and expended SCISTW. Subsequent odour monitoring shall be conducted at the 4th, 7th and 10th month.

## **2.3. Monitoring Location**

2.3.1. According to section 2.23 of the EM&A Manual, odour patrol monitoring will be conducted at the odour monitoring locations listed in **Table 2.1** and at the site boundary of 8 PTWs and SCISTW.

2.3.2. The layout of odour patrol monitoring locations is shown in **Appendix A**.

**Table 2.1 Odour Patrol Monitoring Locations**

ASR ID in EIA Report	Monitoring Station ID	Location
NP3	OM_NP1	King's Road Playground & Skating Area
NP4	OM_NP2	Customs HQ Tower (planned)
NP5	OM_NP3	K. Wah Centre
WC3	OM_WC1	Society for the Prevention of Cruelty to Animals
WC4	OM_WC2	Rest Garden near Wan Chai Interchange
C1	OM_C1	Sheung Wan Fire Station
C2	OM_C2	Water Front Divisional Police Station
C3	OM_C3	Sheung Wan Gala Point
FM2	OM_FM1	Western Wholesale Food Market
SB1	OM_SB1	University of Hong Kong Stanley Ho Sports Centre Pitch
SB2	OM_SB2	Home for the Elderly
SB3	OM_SB3	Maclehose Medical Rehabilitation Centre
SB4	OM_SB4	The Duchess of Kent Children's Hospital
CB1	OM_CB1	Cyber Centre
CB2	OM_CB2	Le Meridien Cyberport
WF2	OM_WF1	Wah Ming House, Wah Fu Estate
AB4	OM_AB1	Dairy Farm Ice and Cold Storage

ALC3	OM_ALC1	Shell Ap Lei Chau Depot
SCI1	OM_SCI1	Government Dockyard Offices
SCI3	OM_SCI2	COSCO Hit Terminal
SCI4	OM_SCI3	KMB Depot Office
SCI5	OM_SCI4	Planned FSD Diving Rescue and Diving Training Centre
SCI6	OM_SCI5	Club House

## 2.4. Monitoring Parameters

2.4.1. During the patrolling, the meteorological and surrounding information are recorded:

- the prevailing weather condition;
- the wind direction;
- the wind speed;
- location where odour is spotted;
- source of odour;
- perceived intensity of the odour;
- duration of odour; and
- characteristics of the odour detected
- some relevant meteorological data such as daily average temperature, and daily average humidity, on the day of odour patrol should be obtained from the nearest Hong Kong Observatory station for reference.

2.4.2. The perceived intensity is to be divided into 5 levels which are ranked in a descending order as shown in **Table 2.2**.

**Table 2.2 Description of Odour Intensity Levels**

Odour Level	Odour Intensity	Classification Criteria
0	Not detected	No odour perceives or an odour so weak that it cannot be easily characterised or described
1	Slight	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong	Strong identifiable, likely to have odour nuisance
4	Extreme	Extreme severe odour, and unacceptable odour level

### 3. Odour Patrol Monitoring Result

#### 3.1. Odour Intensity

3.1.1. The odour patrol monitoring result on 11<sup>th</sup> January 2023 is summarized in **Table 3.1**. The field record and photo record at the ASRs during the patrols are attached in **Appendix C**.

**Table 3.1 Summary of the Odour Patrol Results**

Monitoring Location	Odour Patrol Member		
	O-1	O-2	O-3
	Odour Intensity (0 to 4)		
OM_NP1	0	0	0
OM_NP2	0	0	0
OM_NP3	0	0	0
North Point PTW Boundary	0	0	0
OM_WC1	0	0	0
OM_WC2	0	0	0
Wan Chai East PTW Boundary	0	0	0



OM_C1	0	0	0
OM_C2	0	0	0
OM_C3	0	0	0
Central PTW Boundary	0	0	0
OM_FM1	0	0	0
OM_SB1	0	0	0
OM_SB2	0	0	0
OM_SB3	0	0	0
OM_SB4	0	0	0
Sandy Bay PTW Boundary	0	0	0
OM_CB1	0	0	0
OM_CB2	0	0	0
Cyberport PTW Boundary	0	0	0
OM_WF1	0	0	0
Wah Fu PTW Boundary	0	0	0
OM_AB1	0	0	0
Aberdeen PTW Boundary	0	0	0
OM_ALC1	0	0	0
Ap Lei Chau PTW Boundary	0	0	0
OM_SCI1	0	0	0
OM_SCI2	0	0	0
OM_SCI3	0	0	0
OM_SCI4	0	0	0
OM_SCI5	0	0	0
SCISTW Boundary Location A	1	1	1
SCISTW Boundary Location A1	1	1	1
SCISTW Boundary	0	0	0

Location B			
SCISTW Boundary Location C	0	0	0
SCISTW Boundary Location D	0	0	0

### 3.2. Meteorological Conditions

3.2.1. The meteorological conditions (including temperature, wind speed, wind direction, relative humidity) from the nearest Hong Kong Observatory's Weather Stations for each of the odour patrols were provided for reference in **Appendix D**.

### 3.3. Odour Patrol Result Discussion

3.3.1. Generally, the odour intensities detected around the SCISTW and PTWs were found to be ranging from level 0 up to level 1. With reference to the Action / Limit Level as shown in **Table 3.2**, no exceedance was found.

**Table 3.2 Action / Limit Levels of the Odour Patrol**

Parameter	Action	Limit
Odour Nuisance	Odour Intensity of 2 is measured from odour patrol	Odour Intensity of 3 or above is measured from odour patrol

3.3.2. By comparing our impact monitoring data with the baseline monitoring data, generally, there are no significant difference between two sets of data. A summary table are shown in **Table 3.3**.

**Table 3.3 Comparison between Baseline Data and Impact Data of Odour Patrol**

Monitoring Location	Operational Phase Baseline*	Operational Phase Impact <sup>#</sup>
	Odour Intensity (0 to 4)	
OM_NP1	0	0
OM_NP2	0	0
OM_NP3	0	0

North Point PTW Boundary	0	0
OM_WC1	0	0
OM_WC2	0	0
Wan Chai East PTW Boundary	0	0
OM_C1	0	0
OM_C2	0	0
OM_C3	0	0
Central PTW Boundary	0	0
OM_FM1	0	0
OM_SB1	0	0
OM_SB2	0	0
OM_SB3	0	0
OM_SB4	0	0
Sandy Bay PTW Boundary	0	0
OM_CB1	0	0
OM_CB2	0	0
Cyberport PTW Boundary	0	0
OM_WF1	0	0
Wah Fu PTW Boundary	0	0
OM_AB1	0	0
Aberdeen PTW Boundary	0	0
OM_ALC1	0	0
Ap Lei Chau PTW Boundary	0	0
OM_SCI1	0	0
OM_SCI2	0	0
OM_SCI3	1	0
OM_SCI4	0	0
OM_SCI5	0	0
SCISTW Boundary	1	1

Location A		
SCISTW Boundary Location A1	1	1
SCISTW Boundary Location B	2	0
SCISTW Boundary Location C	3	0
SCISTW Boundary Location D	1	0

Remark(s):

1. \* The Largest Data throughout the baseline period are extracted.
2. # The Largest Data among the three Odour Patrol Member are extracted.

#### 4. Summary of Odour Patrol Result

##### 4.1. Conclusion

4.1.1. In general, the odour patrol result is similar to the baseline data. There was no exceedance recorded.

##### 4.2. Recommendations

4.2.1. With the odour patrol result, it is recommended to keep maintaining the plants and deodorization units in good condition.

##### 4.3. Exceedance

4.3.1. There was no exceedance recorded. **Table 4.1** shown the Event/Action Plan for Operation Air Quality Monitoring.

**Table 4.1 Event/Action Plan for Operation Air Quality Monitoring**

Event	Action	
	Person-in-charge of Odour Monitoring	DSD
<b>Action Level</b>		
Exceedance of action level	<ol style="list-style-type: none"> <li>1. Identify source/reason of exceedance;</li> <li>2. Repeat odour patrol to confirm finding;</li> <li>3. Repeat odour</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out investigation to identify the source/reason of exceedance.</li> </ol>

	<p>measurement at exhaust stacks of deodorization system of SCISTW (if exceedance at SCISTW) to confirm finding</p>	<p>2. Investigation shall be completed within 2 week; 3. Implement more mitigation measures if necessary.</p>
<b>Limit Level</b>		
Exceedance of Limit level	<p>1. Identify source / reason of exceedance; 2. Repeat odour patrol to confirm finding; 3. Repeat odour measurement at exhaust stacks of deodorization system of SCISTW (if exceedance at SCISTW) to confirm finding 4. Increase monitoring frequency to monthly; 5. If exceedance stops, cease additional monitoring.</p>	<p>1. Carry out investigation to identify the source/reason of exceedance. Investigation shall be completed within 2 week; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure amended working methods and remedial actions properly implemented; 5. If exceedance continues, consider what mitigation measures shall be implemented.</p>

## 5. Odour Measurement

### 5.1. Monitoring Requirement

5.1.1. Air samples will be collected by passive sampling technique at the odour monitoring station. A Nalophan™ sampling bag will be placed inside an air-tight sampler and then drawn to vacuum for sampling. Approximately 60 litres of the gas sample is collected into the sampling bag for testing. A diagram of the passive sampling equipment that will be used for the sampling is shown below:



Figure 1: Passive Sampler

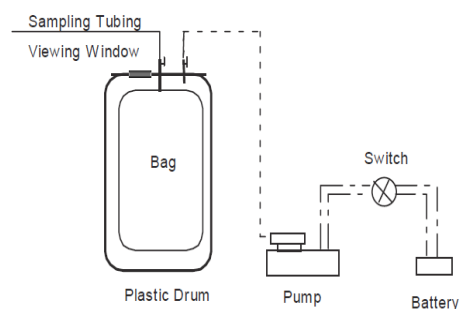


Figure 2: A Schematic Diagram of Sampling Device

- 5.1.2. Air samples in Nalophane bags shall be kept in cool condition not under direct sunlight exposure during the collection. If any condensate is observed on the inner surface of the sampled bag, the sample shall be discarded.
- 5.1.3. All samples collected during the sampling day shall be returned to laboratory at the same day. All olfactometry testing shall be conducted and finished within 24 hours after sampling.
- 5.1.4. The selected laboratory is the local laboratory for the measurement of odour concentration following the European Standard Method BS EN13725:2003 (by dynamic olfactometry). The Reporting Limit for the Olfactometry Analysis is 11 OUE/m<sup>3</sup>.
- Odour concentration of the sample is determined by Forced-choice Dynamic Olfactometer in accordance to European Standard Method: BS EN13725:2003.
  - Testing should be performed by five qualified panellists who have been trained and complied with the requirement of the European Standard Method: BS EN13725:2003 in the range of 20 to 80 ppb/v and a

standard deviation of  $R < 2.3$ .

- Testing shall be started immediately after sample receipt and all testing to be completed with 24 hours after sampling.

5.1.5. 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 OUE/m<sup>3</sup>. The odour concentration is then expressed in terms of multiples of the detection threshold.



Figure 3: Olfactory Laboratory with Scentroid™ SS600 Olfactometer

5.1.6. During each odour sampling day, one blank sample should be collected for quality control. The sample will be taken by purging pure nitrogen gas into the odour bag directly on site as a blank sample.

5.1.7. All equipment for odour measurement and analysis are maintained and calibrated in according to the requirement of the European Standard Method EN13725.

## 5.2. Monitoring Frequency

5.2.1. Odour measurement shall be conducted every three months for the operation for the expanded SCISTW. The first odour measurement shall be conducted within one month after operation of the expanded SCISTW. Subsequent odour measurement shall be conducted at the 4th, 7th and 10th month.

## 5.3. Monitoring Location

5.3.1. According to section 2.36 of the EM&A Manual, odour measurement will be conducted at 15 exhaust stacks of the deodorization system at SCISTW. The odour measurement locations are listed in **Table 5.1**. As suggested by the

contractor, the location ID is renamed to better identify the deodorization unit which is different from that on the detailed reporting requirement of odour monitoring report.

- 5.3.2. The layout of odour monitoring locations for odour measurement is shown in **Appendix E**.

**Table 5.1 Odour Monitoring Locations for Odour Measurement**

Location Point
DOU 1-R <sup>(1)</sup>
DOU 1-PS <sup>(2)</sup>
DOU 1B-1
DOU 1B-2
DOU 2-PS <sup>(3)</sup>
DOU 3
DOU 4-PS <sup>(4)</sup>
DOU 5-PS <sup>(5)</sup>
DOU 6
DOU 6A
DOU 6B
DOU 8-1
DOU 8-2
DOU 9-1
DOU 9-2

Notes:

- (1) Replace DOU 4-2 stated in Detailed Reporting Requirement of Odour Monitoring Report (Renaming to distinguish the source of odour is different from that of DOU4)
- (2) Replace DOU 1 stated in Detailed Reporting Requirement of Odour Monitoring Report (A polishing stage (PS) is added after the treatment of DOU 1 to enhance odour treatment performance)
- (3) Replace DOU 2 stated in Detailed Reporting Requirement of Odour Monitoring Report (A polishing stage (PS) is added after the treatment of DOU 2 to enhance odour treatment performance)
- (4) Replace DOU 4 stated in Detailed Reporting Requirement (A polishing stage (PS) is added after the treatment of DOU 4 to enhance odour treatment performance)
- (5) Replace DOU 5 stated in Detailed Reporting Requirement (A polishing stage (PS) is added after the treatment of DOU 5 to enhance odour treatment performance)

#### **5.4. Monitoring Parameter**

- 5.4.1. During sampling, following items will be recorded:

- ambient temperature;
- relative humidity;
- wind speed; and



- wind direction
- photo showing the sampling locations relative to existing land features

## 6. Odour Measurement Result

### 6.1. Odour Concentration and Odour Emission Rate

- 6.1.1. The odour measurement was conducted on 11<sup>th</sup> January 2023. The detail of location photo is shown in **Appendix E**.
- 6.1.2. The odour emission rate is listed in **Table 6.1**. The total odour emission rate is calculated to be 7612 ou/s. **Appendix F** shown the detail monitoring results for each monitoring location.

**Table 6.1 Summary of Odour Emission Rate**

Location ID	Odour Emission Rate (ou/s)
DOU 1-R	184
DOU 1-PS	163
DOU 1B-1	228
DOU 1B-2	194
DOU 2-PS	<103
DOU 3	1,697
DOU 4-PS	260
DOU 5-PS	1,181
DOU 6	2,336
DOU 6A	<101
DOU 6B	711
DOU 8-1	<8
DOU 8-2	<8
DOU 9-1	255
DOU 9-2	182

### 6.2. Odour Measurement Result Discussion

- 6.2.1. The total odour emission rate presented in EIA Report Table 3.14 are given in **Appendix G**, the design total mitigated odour emission rate is 11,506.21 ou/s

for Option 2 – Decentralized Design.

6.2.2. Comparison between impact monitoring data and data obtained from EIA is shown in **Table 6.2**.

**Table 6.2 Comparison between Impact Monitoring Data and Data Obtained from EIA**

Total Odour Emission Rate (ou/s)	
Operation Phase Impact	EIA
10,049	11,506.21

6.2.3. According to Table 2.3 of EM&A Manual, the Action / Limit Level is shown in **Table 6.3**.

**Table 6.3 Action / Limit Levels of the Odour Measurement**

Parameter	Action	Limit
Odour Nuisance	<ul style="list-style-type: none"> <li>- When two documented complaints are received; or</li> <li>- Measured total odour emission rate from exhaust stacks of deodorization system at SCSITW <math>\geq 0.9 \times</math> Total mitigated odour emission rate presented in EIA Report</li> </ul>	<ul style="list-style-type: none"> <li>- Five or more consecutive genuine documented complaints within a week; or</li> <li>- Measured total odour emission rate from exhaust stacks of deodorization system at SCISTW <math>\geq</math> Total mitigated odour emission rate presented in EIA Report</li> </ul>

## 7. Summary of Odour Measurement

### 7.1. Conclusion

7.1.1. The impact total odour emission rate is smaller than the 90% of total mitigated

odour emission rate presented in the EIA report (10355.59 ou/s). The odour measurement is acceptable and no exceedance is recorded.

**7.2. Recommendation**

7.2.1. The operator is reminded to check the performance of the plants and deodorization units and to keep a close monitoring on the in-house H2S sensors to ensure that no odour nuisance is induced by SCSITW.

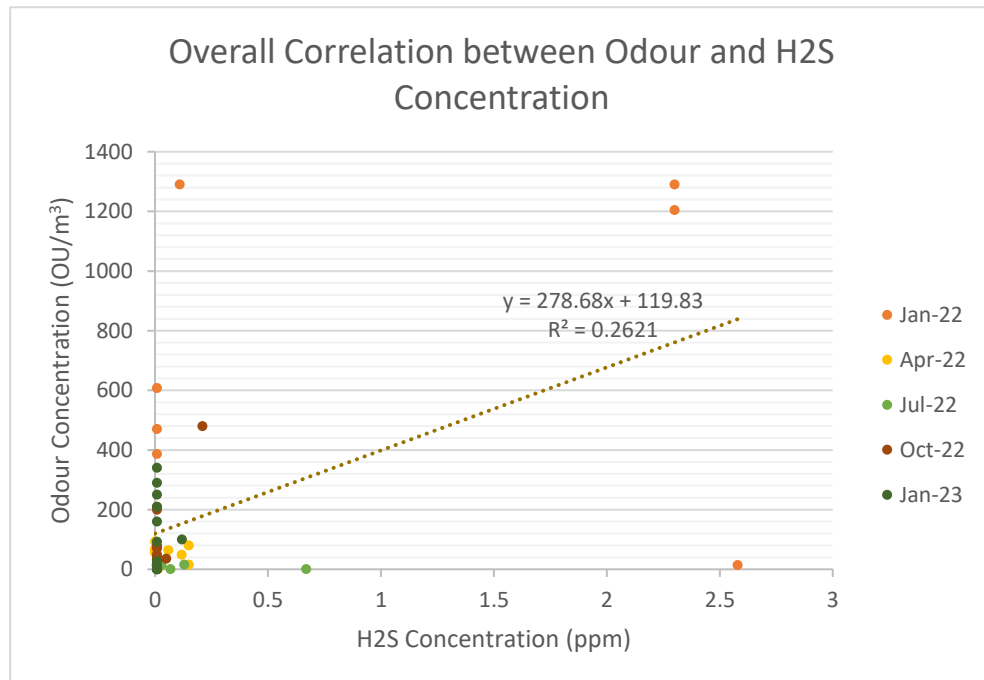
**7.3. Correlation between Odour and H2S Concentration**

7.3.1. To further understand the gas composition, the overall correlation between H2S concentrations and odour units of available DOUs was plotted in **Graph 1**. In-house H2S concentration from sensors and odour concentration from odour measurement for January 2023 was listed in **Table 7.1**.

**Table 7.1 In-house H2S Concentration from Sensors and Odour Concentration from Odour Measurement for January 2023**

Location ID	In-house H2S Concentration (ppm)	Odour Concentration (OU/m <sup>3</sup> )
DOU 1-R	<0.01	210
DOU 1-PS	<0.01	15
DOU 1B-1	<0.01	290
DOU 1B-2	<0.01	250
DOU 2-PS	<0.01	<11
DOU 3	<0.01	160
DOU 4-PS	<0.01	27
DOU 5-PS	0.12	100
DOU 6	<0.01	340
DOU 6A	<0.01	<11
DOU 6B	<0.01	93
DOU 8-1	<0.01	<11
DOU 8-2	<0.01	<11
DOU 9-1	N/A	170
DOU 9-2	N/A	130

**Graph 1 Overall Correlation between Odour and H2S Concentration**



Remark:

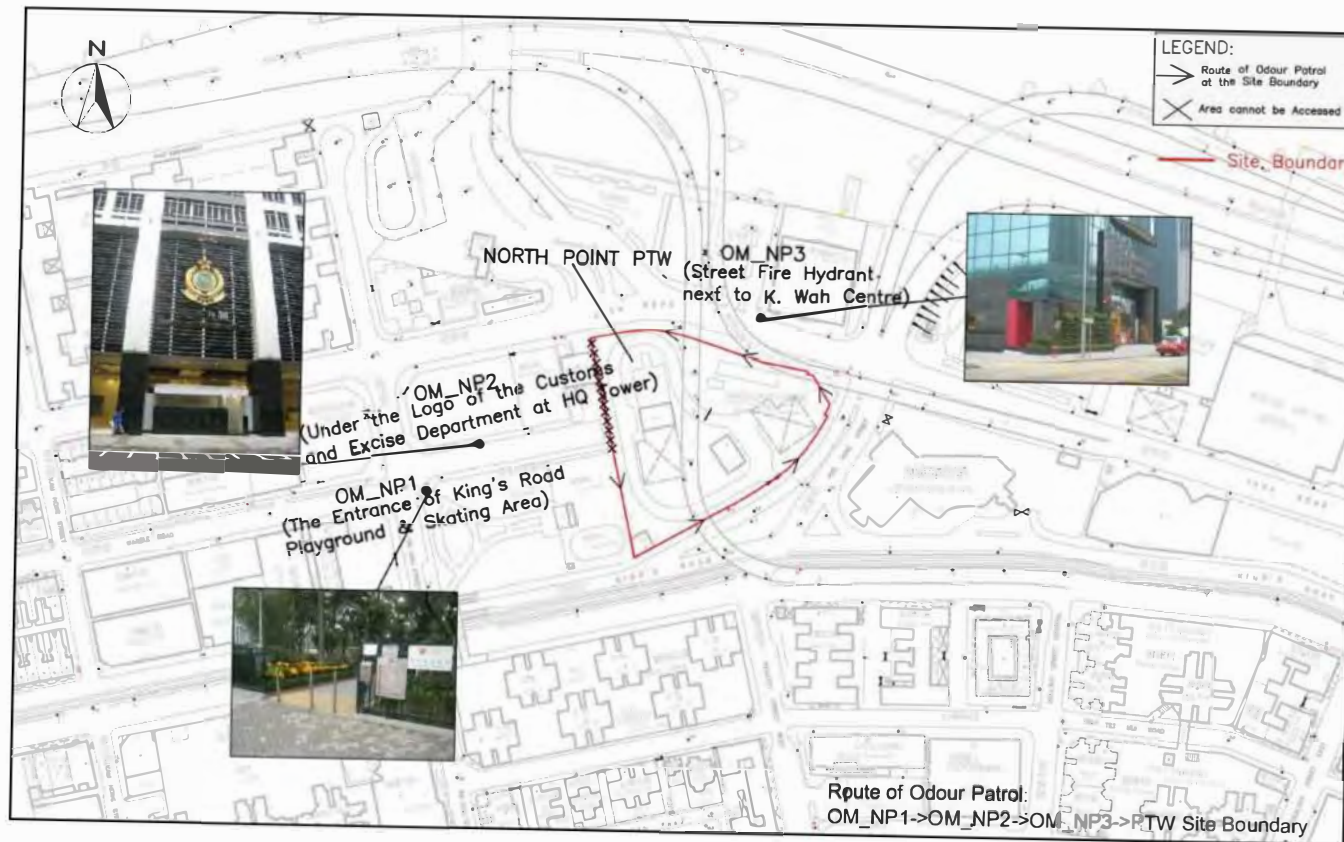
1. Data smaller than detection limit would be plotted as zero for graph presentation

- 7.3.2. According to **Graph 1**, no correlation can be established generally. With the above-mentioned observation, the monitoring results in April 2022, July 2022 and October 2022 were similar. It is believed that the fine-tuned operating mode including change of quantities of chemical used at the wet chemical scrubbers and replacement of activated carbon at the activated carbon filters after odour measurement exceedance in January 2022 can effectively minimize the odour nuisance. However, the odour concentration and in-house H2S concentration from sensors shown a slightly difference in January 2023. The operators are recommended to check if the plants, deodorization units and H2S sensors are operated in good condition.
- 7.3.3. To conclude, the operators are reminded to maintain the equipment and plants in good condition and have a close monitoring on the performance of the deodorization units.

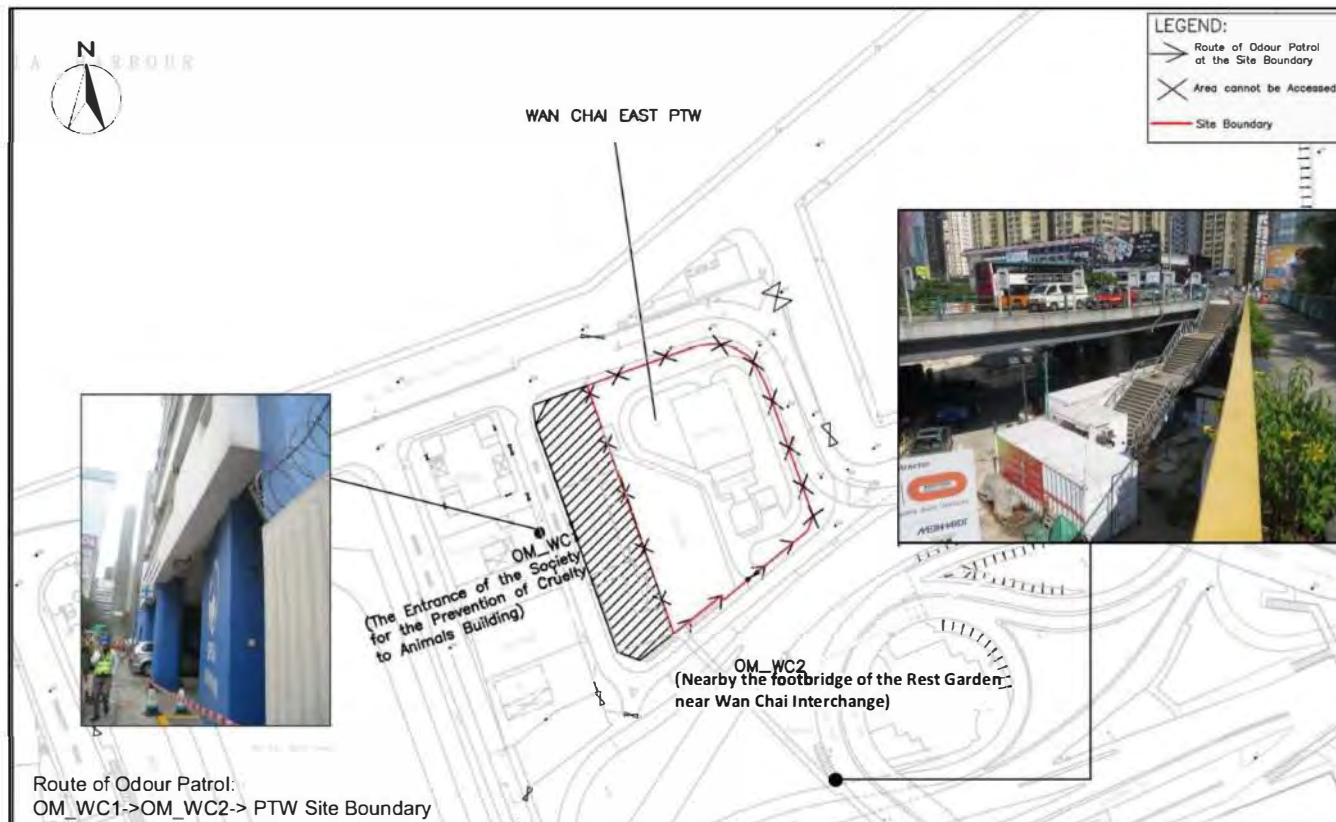
- End of Report -

## **Appendix A**

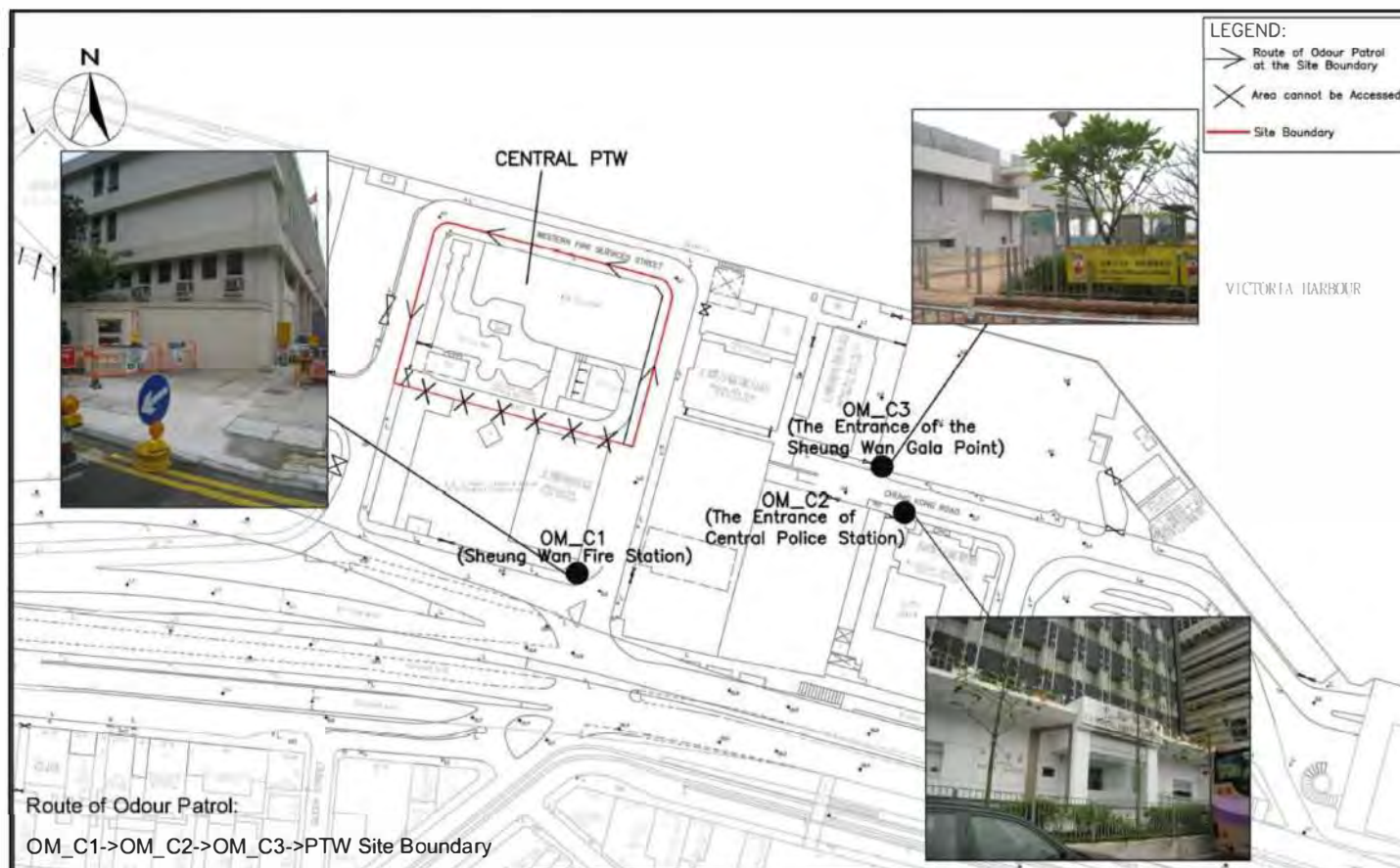
### **Odour Patrol Monitoring Locations**



North Point PTW

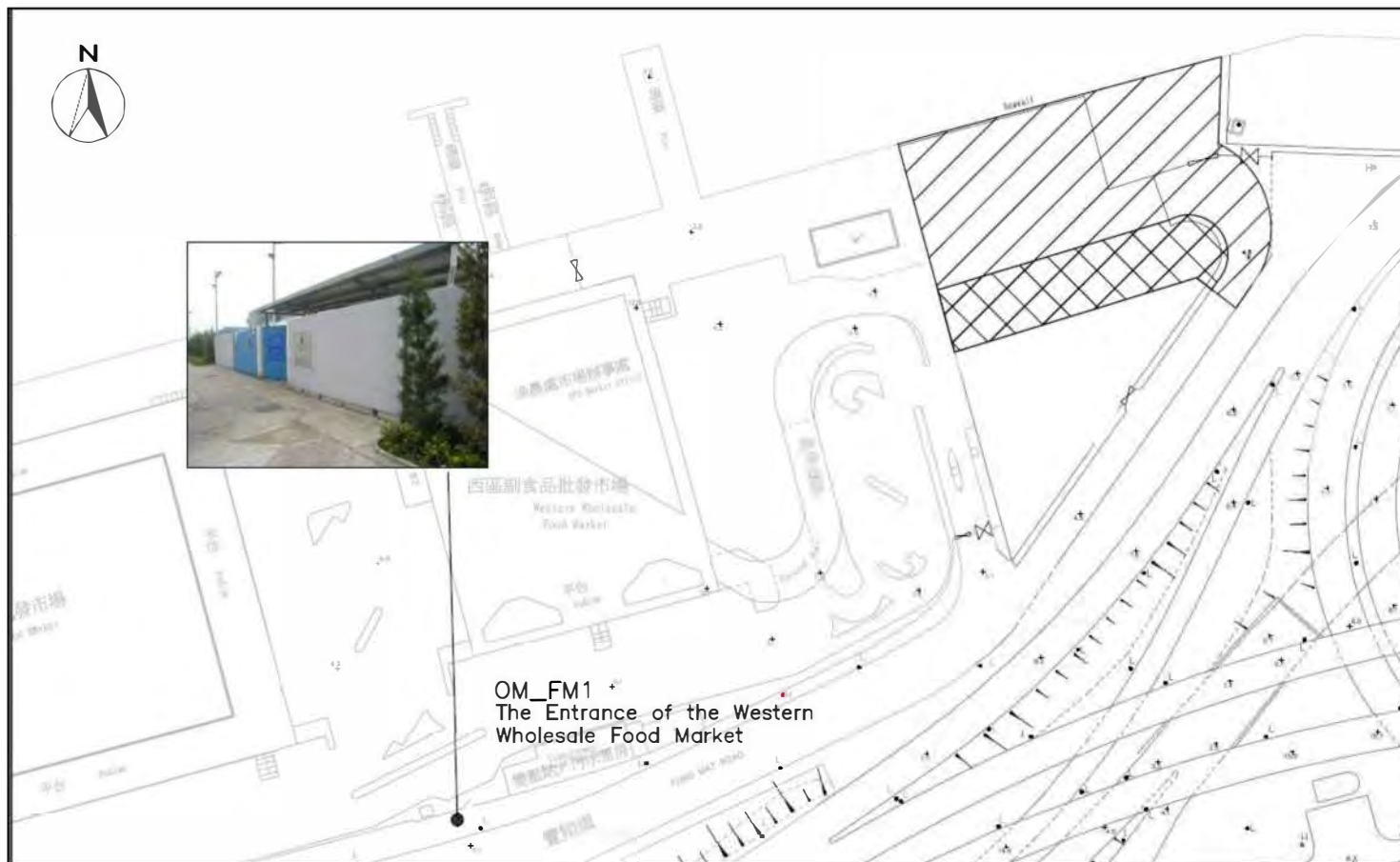


Wan Chai East PTW

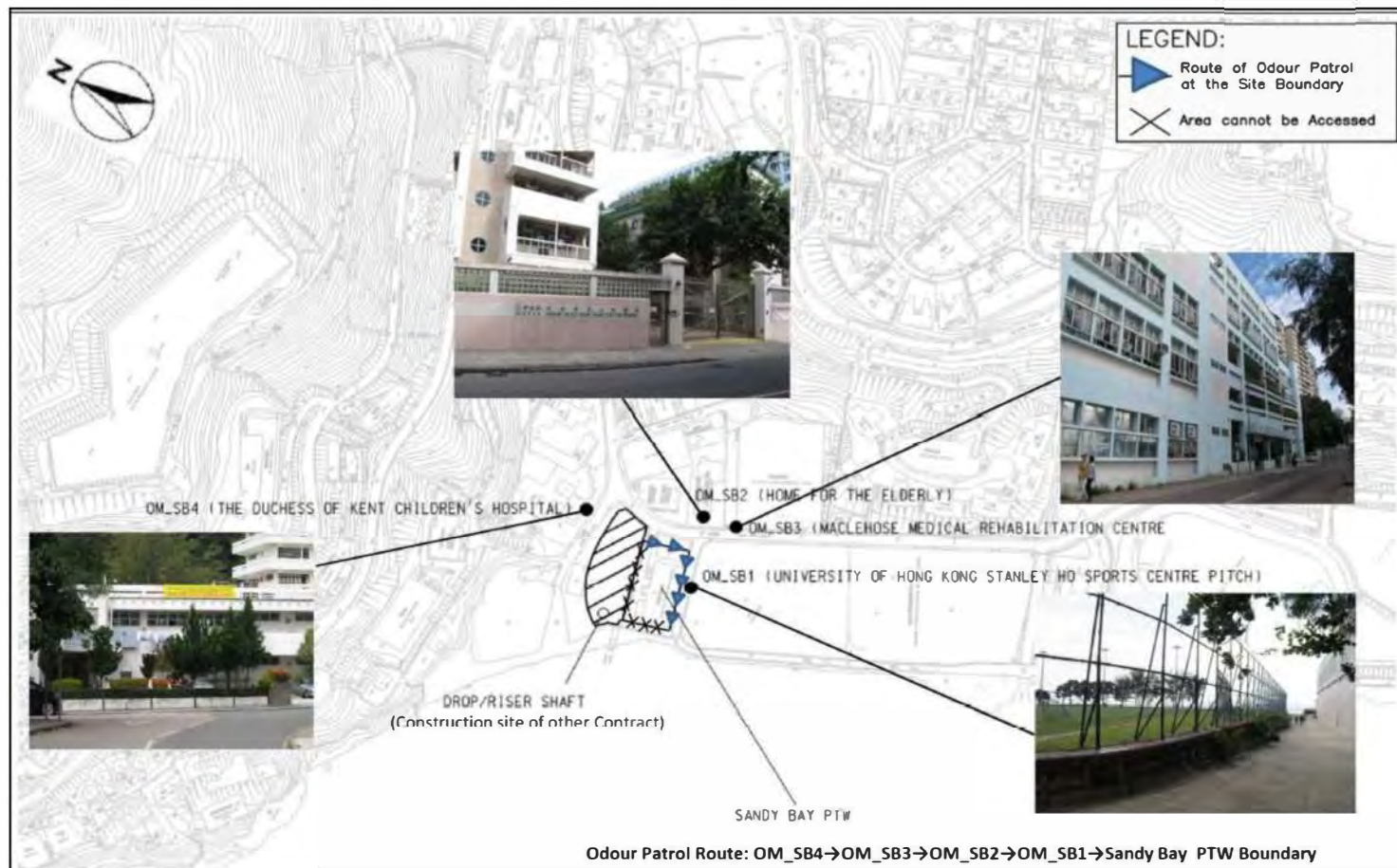


Central PTW





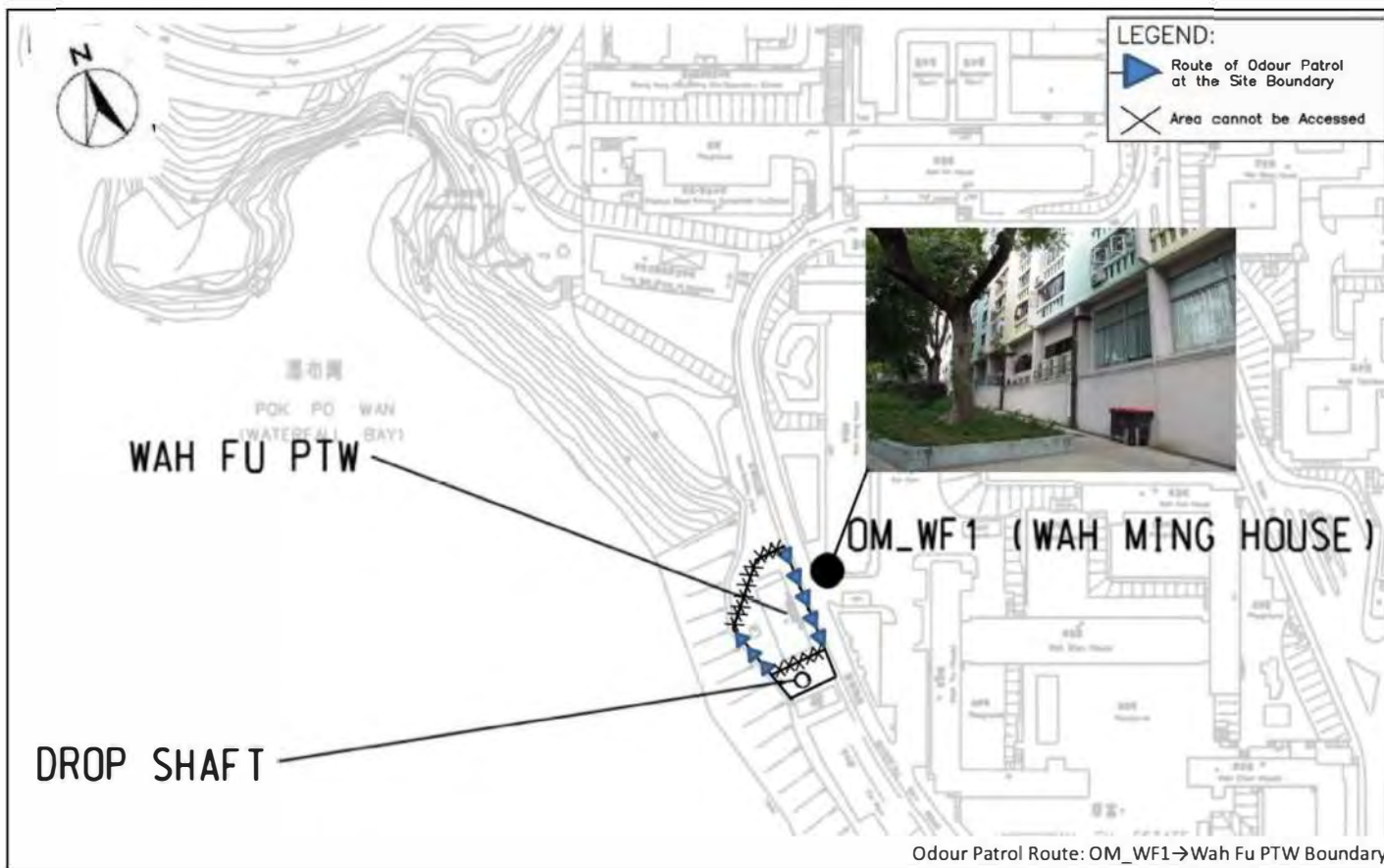
Western Wholesale Food Market



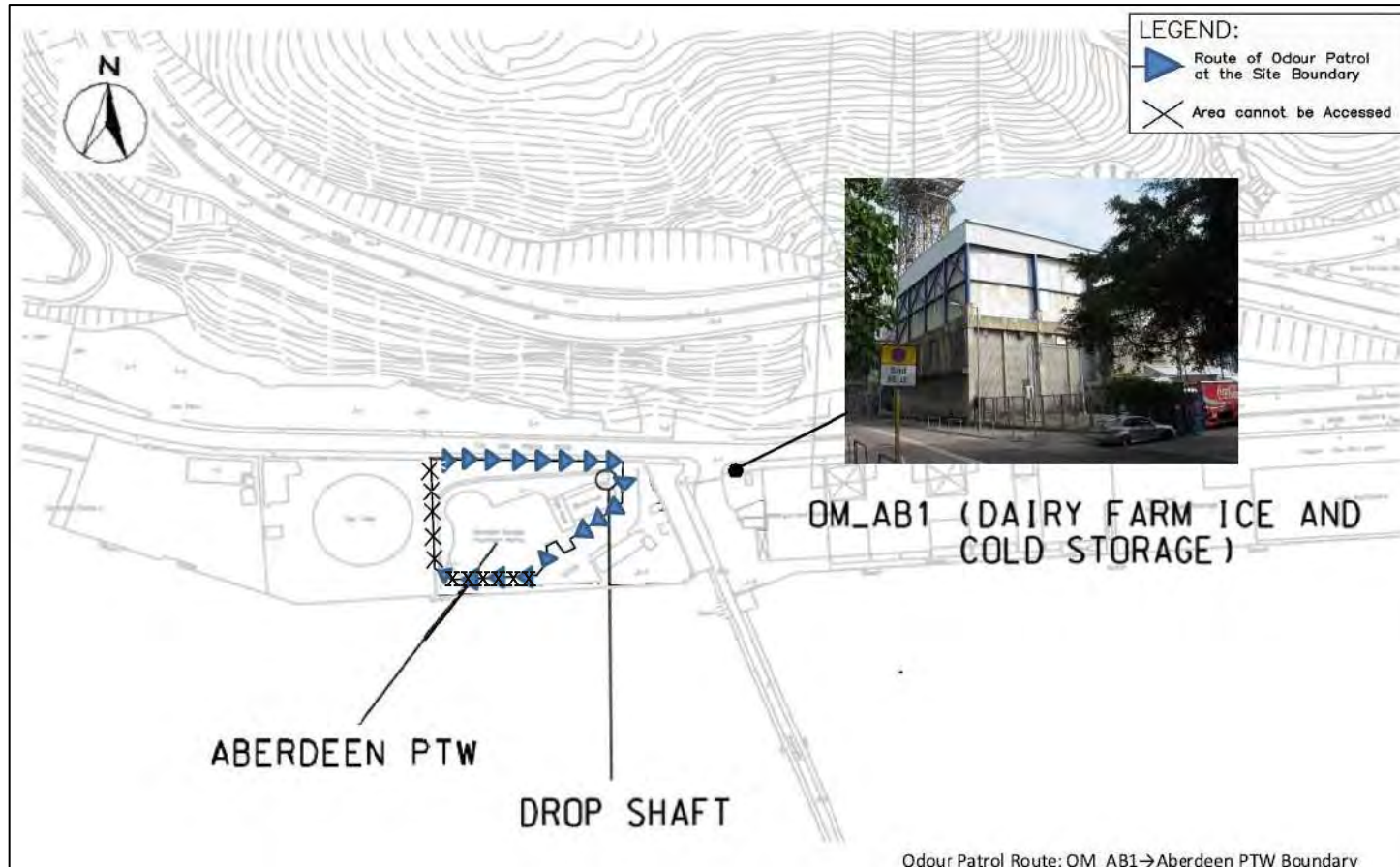
### Sandy Bay PTW



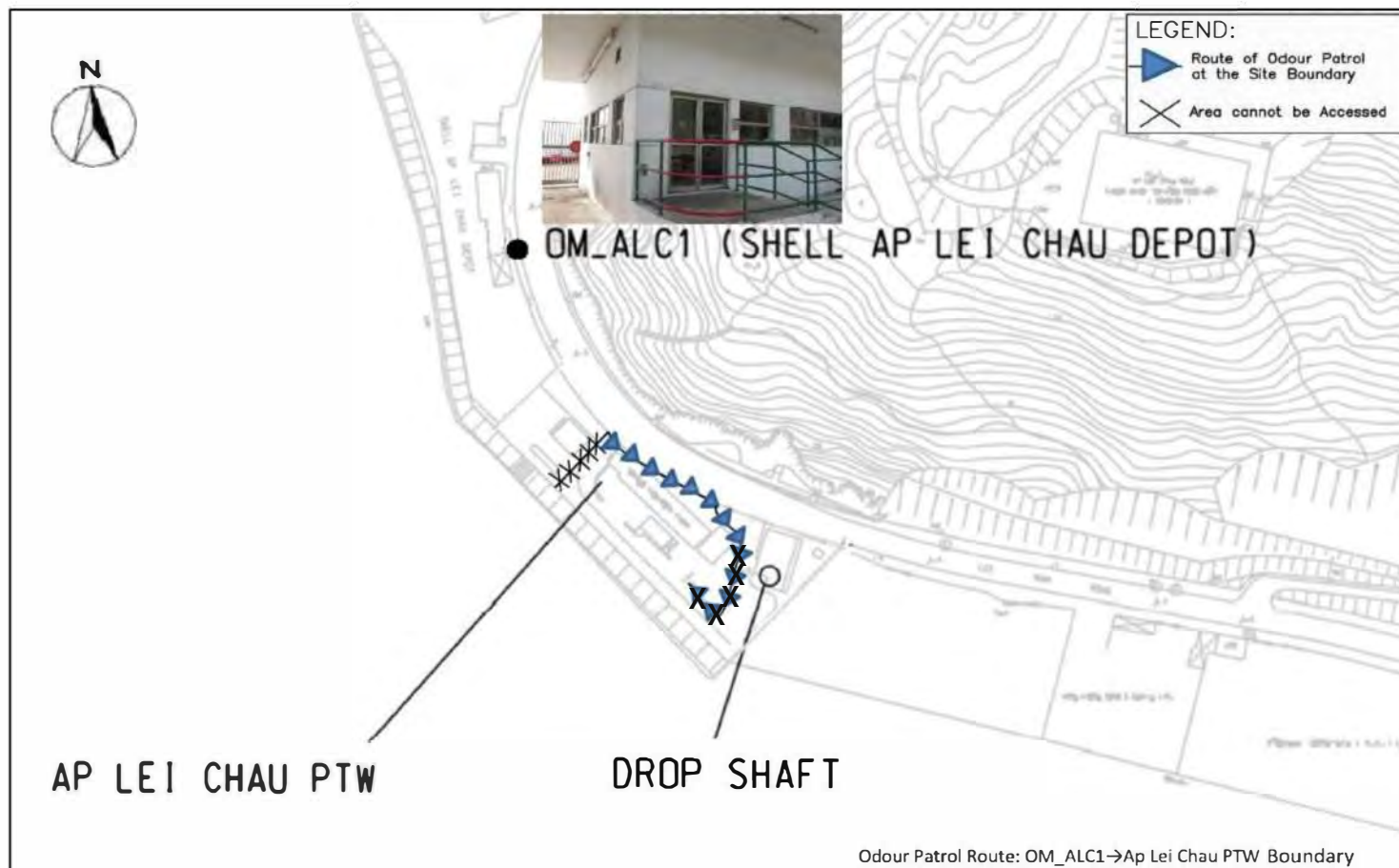
Cyberport PTW



Wah Fu PTW

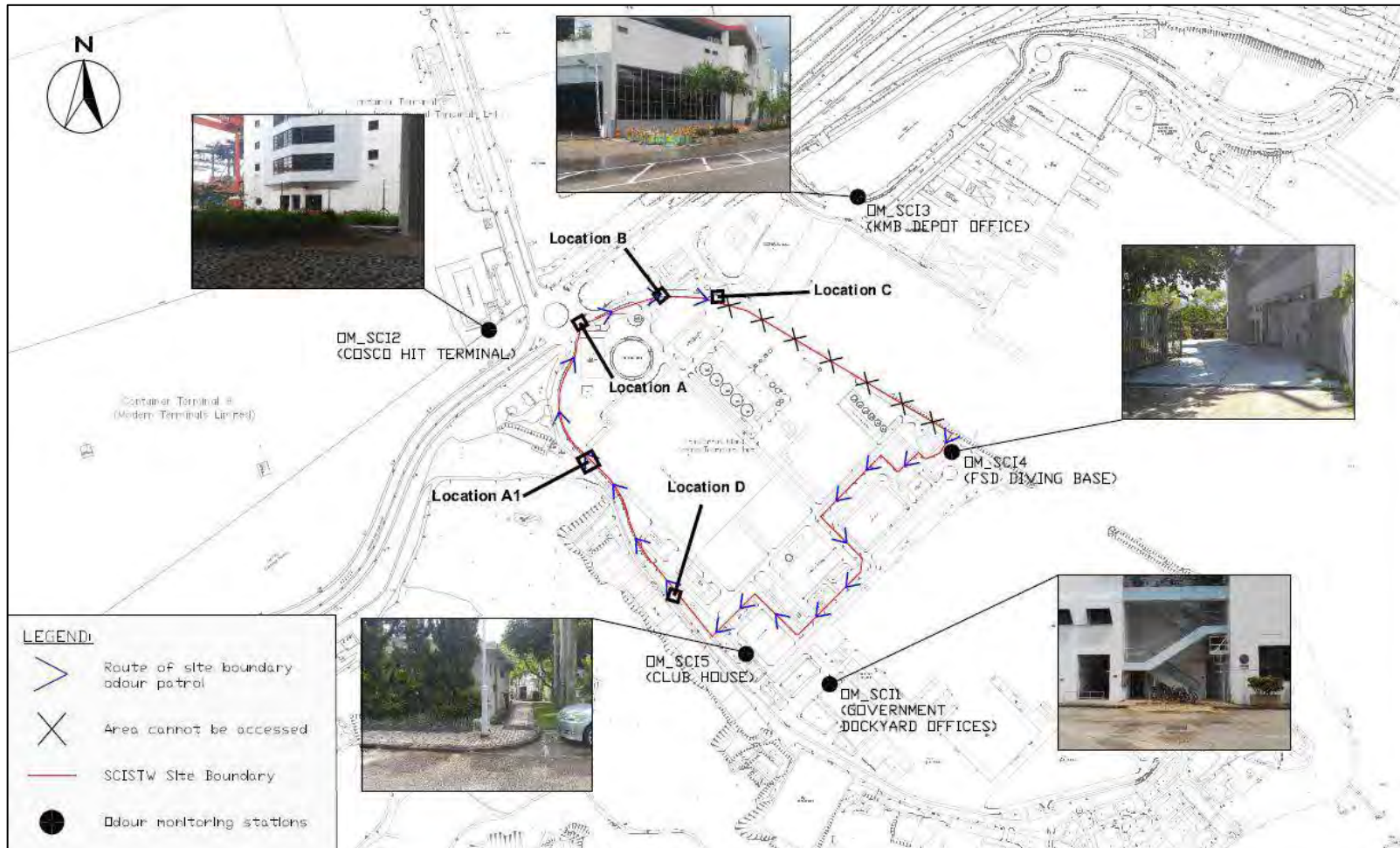


Aberdeen PTW



Ap Lei Chau PTW

**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



**SCISTW**

## **Appendix B**

### **Odour Certificates**





## Certificate for a Qualified Odour Panellist

This is to certify that

LO TING YI

has participated in Ten (10) sets of individual N-Butanol Screening Test  
during 18 March 2022 – 24 March 2022

**with Individual Threshold: 36 ppb/v**

and

fulfill the Requirement of the European Standard Method of Air Quality –  
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) –

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v  
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

24 March 2022  
Issue Date

24 March 2023  
Valid Until

  
Fung Lim Chee, Richard



## Certificate for a Qualified Odour Panel Member

**Serial No.** : P-047

**Odour Panel Member** : Andrew Yuen

**Date of Screening Test** : 08 Aug 2022  
10 Aug 2022  
12 Aug 2022

**Valid Until** : 11 Feb 2023

This is to certify that Mr. Andrew Yuen participated in a set of n-butanol screening tests in our laboratory between 08 Aug 2022 and 12 Aug 2022.

The odour threshold test results of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of  $R < 2.3$ , which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN 13725).

The participant is Approved and Authorized as Qualified Odour Panel Member for odour patrol and olfactometry analysis.

Signed for and on behalf of  
CMA Industrial Development Foundation Limited

A handwritten signature in black ink, appearing to be 'Wu Chun Fai', written over a horizontal line.

Wu Chun Fai  
Assistant Manager – Environmental Division

Date: 12 Aug 2022



## Certificate for a Qualified Odour Panel Member

**Serial No.** : P-054

**Odour Panel Member** : Michael Lee

**Date of Screening Test** : 08 Aug 2022  
10 Aug 2022  
12 Aug 2022

**Valid Until** : 11 Feb 2023

This is to certify that Mr. Michael Lee participated in a set of n-butanol screening tests in our laboratory between 08 Aug 2022 and 12 Aug 2022.

The odour threshold test results of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of  $R < 2.3$ , which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN 13725).

The participant is Approved and Authorized as Qualified Odour Panel Member for odour patrol and olfactometry analysis.

Signed for and on behalf of  
CMA Industrial Development Foundation Limited

A handwritten signature in black ink, appearing to be 'Wu Chun Fai', written over a horizontal line.

Wu Chun Fai  
Assistant Manager – Environmental Division

Date: 12 Aug 2022

## **Appendix C**

### **Field Record and Photo Record**

**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



Location ID	Panellist	Weather	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_NP1	1	Cloudy	1131	17.8	87	0.8	NE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_NP2	1	Cloudy	1130	17.8	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_NP3	1	Cloudy	1125	17.9	87	0.9	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_NP Boundary	1	Cloudy	1134	17.9	87	0.9	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WC1	1	Cloudy	1443	18.1	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WC2	1	Cloudy	1440	18.1	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WC Boundary	1	Cloudy	1438	17.8	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_C1	1	Cloudy	1419	17.9	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				

**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



Location ID	Panellist	Weather	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_C2	1	Cloudy	1417	17.9	87	2.2	E	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_C3	1	Cloudy	1416	17.9	87	1.7	NE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_C Boundary	1	Cloudy	1412	17.8	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_FM	1	Cloudy	1402	18.1	87	1.1	E	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB1	1	Cloudy	1348	17.7	87	0.7	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB2	1	Cloudy	1344	17.7	87	0.3	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB3	1	Cloudy	1343	17.8	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB4	1	Cloudy	1345	17.8	87	0.9	SW	0	NA	NA	NA	NA
	2							0				
	3							0				

**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



Location ID	Panellist	Weather	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_SB Boundary	1	Cloudy	1347	17.7	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_CB1	1	Cloudy	1337	17.7	87	0.4	NW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_CB2	1	Cloudy	1338	17.8	87	0.8	NW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_CB Boundary	1	Cloudy	1334	17.8	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WF Boundary	1	Cloudy	1319	18.5	87	0.3	NW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WF1	1	Cloudy	1320	18.5	87	0.7	SW	0	NA	NA	NA	NA
	2							0				
	3							0				

**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



Location ID	Panellist	Weather	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_AB1	1	Cloudy	1309	18.4	87	1.2	E	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_AB Boundary	1	Cloudy	1310	18.5	87	0.4	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_ALC1	1	Cloudy	1203	18.2	87	1.6	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_ALC Boundary	1	Cloudy	1201	18.2	87	0.8	S	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI1	1	Cloudy	1009	17.1	87	0.8	N	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI2	1	Cloudy	1039	17.4	87	2.0	NE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI3	1	Cloudy	1041	17.5	87	0.8	SW	0	NA	NA	NA	NA
	2							0				
	3							0				



**Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) (January 2023)**



Location ID	Panellist	Weather	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_SCI4	1	Cloudy	1014	17.1	87	0.6	NE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI5	1	Cloudy	1020	17.3	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
SCISTW-Location A	1	Cloudy	1032	17.3	87	0.6	NW	1	Continuous	Side Wind	Garbage	Refuse Collection Vehicles
	2							1				
	3							1				
SCISTW-Location A1	1	Cloudy	1028	17.2	87	0.0	NA	1	Continuous	NA	Garbage	Refuse Collection Vehicles
	2							1				
	3							1				
SCISTW-Location B	1	Cloudy	1033	17.2	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
SCISTW-Location C	1	Cloudy	1035	17.3	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				
SCISTW-Location D	1	Cloudy	1025	17.2	87	0.0	NA	0	NA	NA	NA	NA
	2							0				
	3							0				



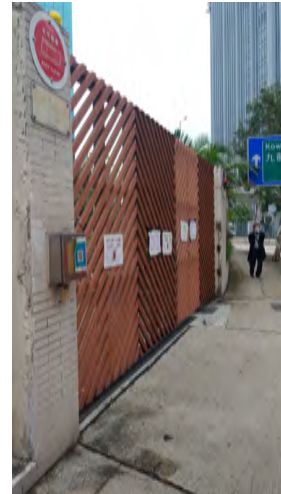
OM\_NP1



OM\_NP2



OM\_NP3



North Point PTW Boundary



OM\_WC1



OM\_WC2



Wan Chai East PTW Boundary



OM\_C1



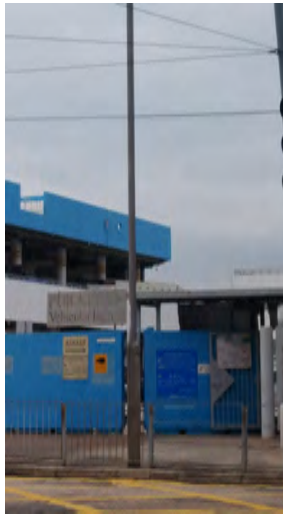
OM\_C2



OM\_C3



Central PTW Boundary



OM\_FM1

	
<p>OM_SB1</p>	<p>OM_SB2</p>
	
<p>OM_SB3</p>	<p>OM_SB4</p>
	
<p>Sandy Bay PTW Boundary</p>	<p>OM_CB1</p>

	
<p>OM_CB2</p>	<p>Cyberport PTW Boundary</p>
	
<p>OM_WF1</p>	<p>Wah Fu PTW Boundary</p>
	
<p>OM_AB1</p>	<p>Aberdeen PTW Boundary</p>



OM\_ALC1



OM\_ALC1



OM\_SCI1







OM\_SCI2



OM\_SCI3



OM\_SCI4

	
<p>OM_SC15</p>	<p>Location A</p>
	
<p>Location A1</p>	<p>Location B</p>
	
<p>Location C</p>	<p>Location D</p>

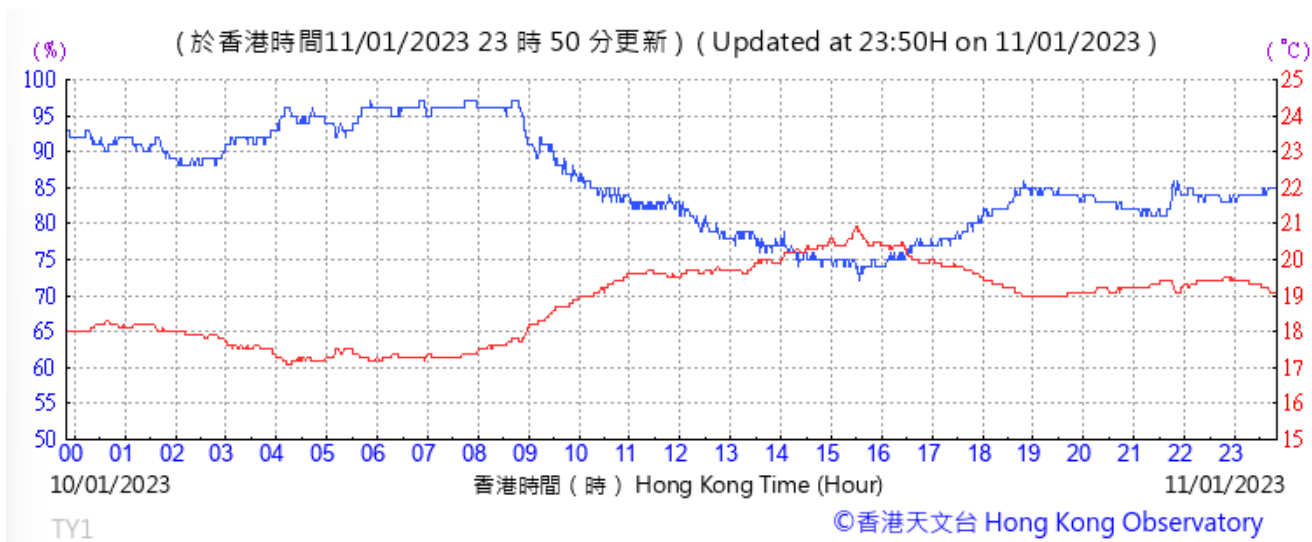
## **Appendix D**

### **Meteorological Information from the Hong Kong Observatory Station**

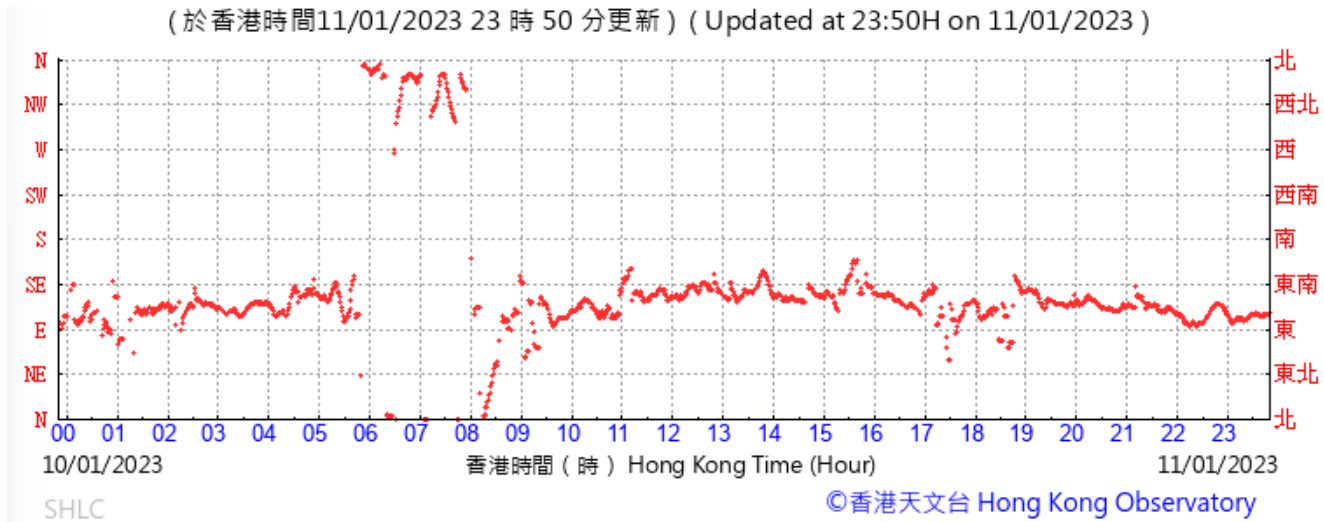


### Meteorological Information from the Hong Kong Observatory Station

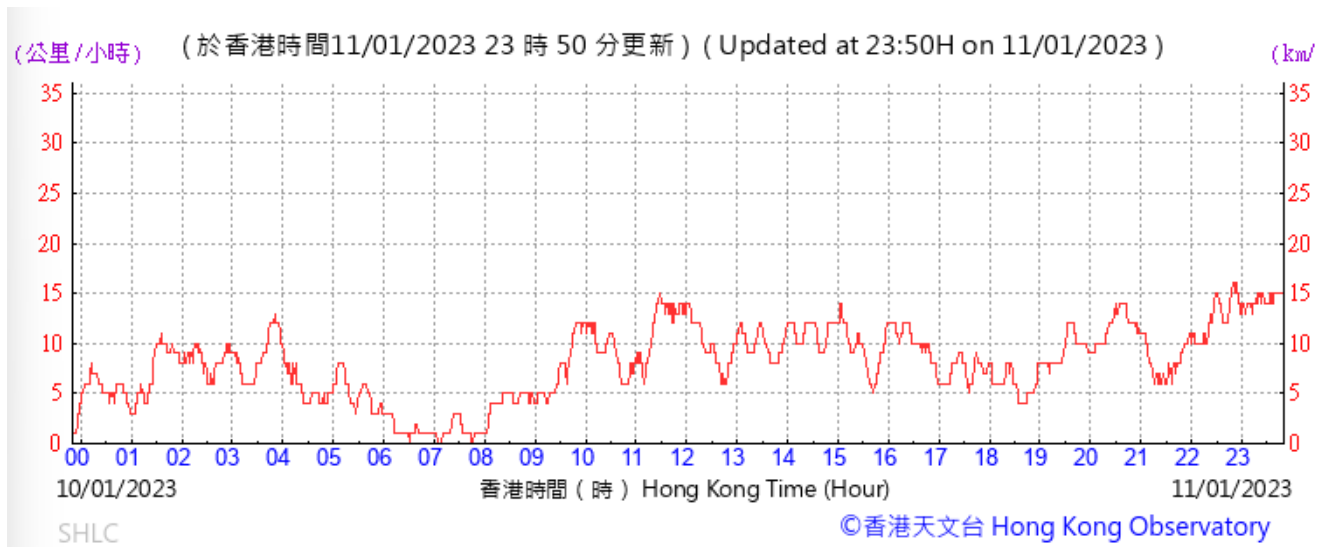
Temperature/Humidity:



Wind Direction:

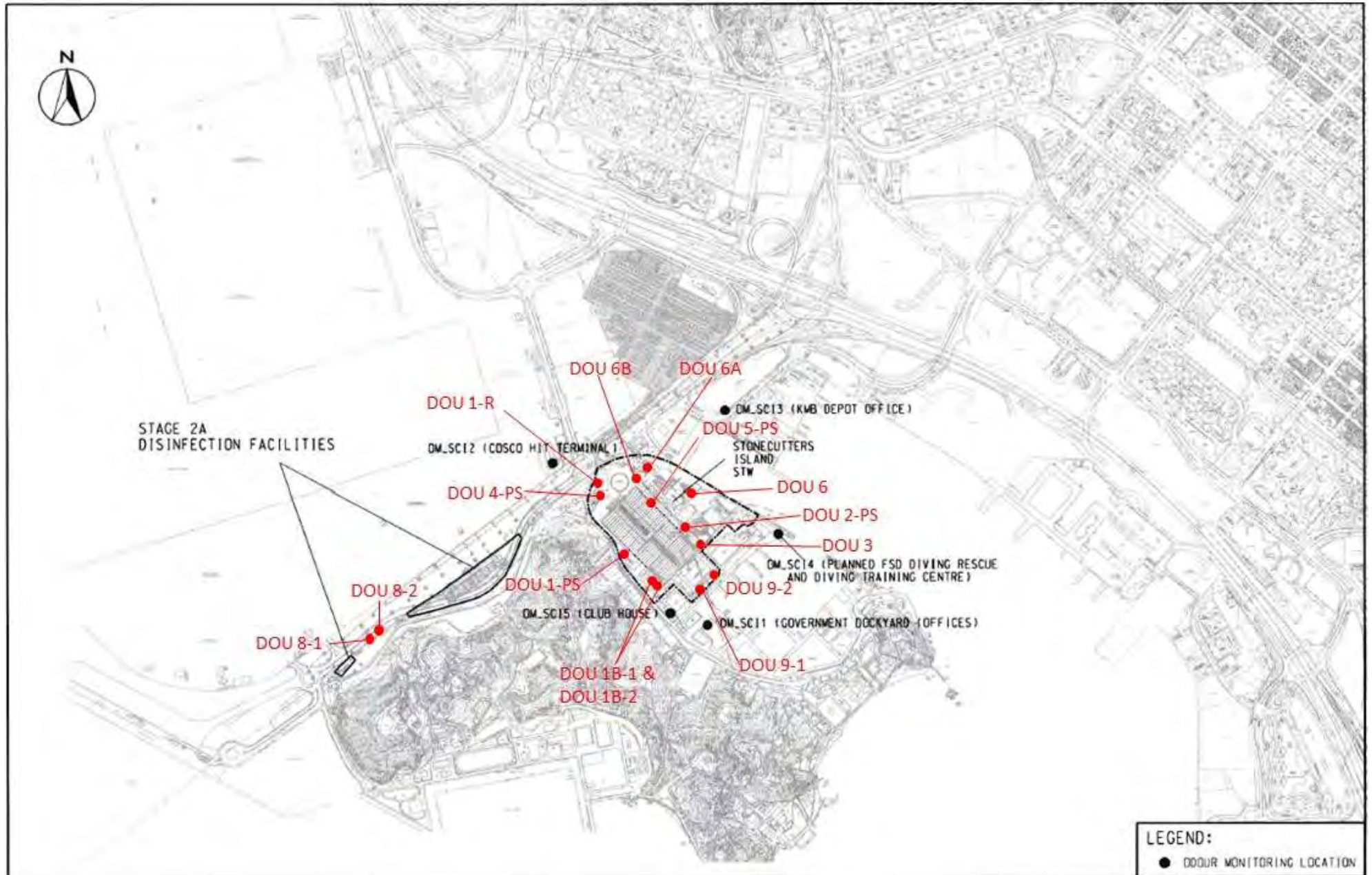


Wind Speed:



## **Appendix E**

### **Layout of Odour Monitoring Locations for Odour Measurement**



Sampling Locations Photos



DOU 1B-1



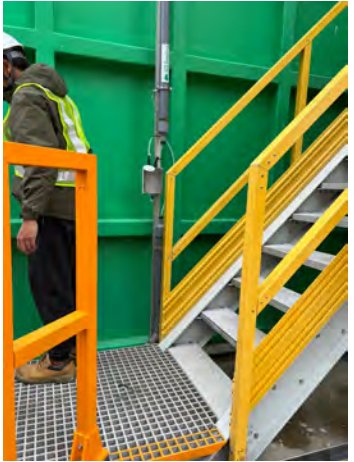
DOU 1B-2



DOU 1-PS



DOU 1-R



DOU 2-PS



DOU 3



DOU 4-PS



DOU 5-PS

Sampling Location Photos



DOU 6



DOU 6A



DOU 6B



DOU 8-1



DOU 8-2



DOU 9-1



DOU 9-2

## **Appendix F**

### **Odour Measurement Result**

Odour Monitoring Report for Harbour Area Treatment  
Scheme Stage 2A (Operational Phase) (January 2023)



Sample ID	Location ID	Sampling Date	Sampling Time	Analysis Date	Analysis Time	LOR <sup>[Note 1]</sup> (ou <sub>E</sub> /m <sup>3</sup> )	Odour Concentration (ou <sub>E</sub> /m <sup>3</sup> )	Duct Volumetric Flow Rate <sup>[Note 2]</sup> (m <sup>3</sup> /hr)	Odour Emission Rate (ou <sub>E</sub> /s)
LB030646-3	DOU 1B-1	11-Jan-23	10:40	11-Jan-23	16:30-17:30	<11	290	2,826	228
LB030646-4	DOU 1B-2	11-Jan-23	11:00	11-Jan-23		<11	250	2,796	194
LB030646-2	DOU 1-PS	11-Jan-23	10:20	11-Jan-23		<11	15	39,226	163
LB030646-15	DOU 1-R	11-Jan-23	14:00	11-Jan-23		<11	210	3,151	184
LB030646-8	DOU 2-PS	11-Jan-23	12:20	11-Jan-23		<11	<11	33,670	<103
LB030646-7	DOU 3	11-Jan-23	12:00	11-Jan-23		<11	160	38,191	1,697
LB030646-1	DOU 4-PS	11-Jan-23	10:00	11-Jan-23		<11	27	34,651	260
LB030646-12	DOU 5-PS	11-Jan-23	14:20	11-Jan-23		<11	100	42,530	1,181
LB030646-9	DOU 6	11-Jan-23	12:40	11-Jan-23		<11	340	24,731	2,336
LB030646-10	DOU 6A	11-Jan-23	13:00	11-Jan-23		<11	<11	32,939	<101
LB030646-11	DOU 6B	11-Jan-23	13:20	11-Jan-23		<11	93	27,540	711
LB030646-13	DOU 8-1	11-Jan-23	14:40	11-Jan-23		<11	<11	2,645	<8
LB030646-14	DOU 8-2	11-Jan-23	15:00	11-Jan-23		<11	<11	2,645	<8
LB030646-5	DOU 9-1	11-Jan-23	11:20	11-Jan-23		<11	170	5,400	255
LB030646-6	DOU 9-2	11-Jan-23	11:40	11-Jan-23		<11	130	5,040	182
Blank	BLANK	-	-	-	-	-	<11		
<b>Total Emissions <sup>[Note 3]</sup></b>									<b>7,612</b>

Note:

1. LOR denotes limit of reporting.
2. The volumetric flow rate data were provided by th client.
3. If calculated odour emission rate are lower than a certain value, integer will be used for calculating the total emission.
4. All the collected sample volume of the gas bags was sufficient for olfactometry analysis.
5. Field Blank containing pure and odourous nitrogen gas was filled by CMA staff.



Odour Monitoring Report for Harbour Area Treatment  
Scheme Stage 2A (Operational Phase) (January 2023)



Sample ID	Location ID	Sampling Date	Measured Time	Weather Condition	Ambient Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Barometric Pressure (hPa)
LB030646-3	DOU 1B-1	11-Jan-23	10:40	Cloudy	22.3	89	-	S	1017
LB030646-4	DOU 1B-2	11-Jan-23	11:00	Cloudy	23.3	86	-	S	1017
LB030646-2	DOU 1-PS	11-Jan-23	10:20	Cloudy	21.2	91	-	S	1017
LB030646-15	DOU 1-R	11-Jan-23	14:00	Cloudy	22.1	91	-	W	1017
LB030646-8	DOU 2-PS	11-Jan-23	12:20	Cloudy	20.4	93	-	E	1017
LB030646-7	DOU 3	11-Jan-23	12:00	Cloudy	22.3	78	-	NE	1017
LB030646-1	DOU 4-PS	11-Jan-23	10:00	Cloudy	20.3	91	-	SW	1017
LB030646-12	DOU 5-PS	11-Jan-23	14:20	Cloudy	21.5	87	-	NW	1017
LB030646-9	DOU 6	11-Jan-23	12:40	Cloudy	20.3	88	-	SE	1017
LB030646-10	DOU 6A	11-Jan-23	13:00	Cloudy	21.0	83	-	SW	1017
LB030646-11	DOU 6B	11-Jan-23	13:20	Cloudy	21.5	78	-	E	1017
LB030646-13	DOU 8-1	11-Jan-23	14:40	Cloudy	21.8	86	-	N	1017
LB030646-14	DOU 8-2	11-Jan-23	15:00	Cloudy	21.8	86	-	N	1017
LB030646-5	DOU 9-1	11-Jan-23	11:20	Cloudy	23.0	83	3.0	SW	1017
LB030646-6	DOU 9-2	11-Jan-23	11:40	Cloudy	22.8	83	2.8	SW	1017

## **Appendix G**

### **Total Odour Emission Rate Extracted from EIA report**

Odour Monitoring Report for Harbour Area Treatment Scheme  
Stage 2A (Operational Phase) (January 2023)



Option 2 - Decentralized Design							
CEPT Facilities (Odd No. Units) & Flow Distribution Channel)	146162.21	S-O2-DO1	12	1.86	20	1	4384.87
CEPT Facilities (Even No. Units) & NWKPS + NWKPS O/F chamber	136086.21	S-O2-DO2	12	1.86	20	1	4082.59
Sludge Treatment Facilities (include Sludge Storage Tanks, Sludge Dewatering Building 1 & 2, Existing and New Sludge Cake Silos)	19057.82	S-O2-DO3	6	2.40	12.58	3	571.73
Stage 1 MPS & Riser Shaft	6518.89	S-O2-DO4	18	1.13	12.28	4	195.57
Stage 2A MPS & Riser Shaft	6518.89	S-O2-DO5	18	1.13	12.28	4	195.57
NWKPTW	19963.88	S-O2-DO6	13	2.26	12.28	8	598.92
Flow Distribution Chambers	2688.01	S-O2-DO7	4.5	0.32	10.48	2	80.64
New Flow Distribution Chamber							
Chlorination Contact Tank	37776.64	S-C-DO1	11	1.13	7.2	4	1133.30
Drop Shaft and Chamber 15A	2630.22	S-C-DO2	4	0.57	8.84	2	263.02

**Total: 11,506.21**

Note: (1) CEPT facilities include Influent upflow structure, distribution channel, flocculation tanks, sedimentation tanks & effluent weirs, drop shafts, scum pit and rapid mixing tank of sedimentation tanks  
(2) MPS is Main Pumping Station  
(3) NWKPTW, NWKPS & NWKO/F chambers are North West Kowloon PTW, NWKPTW Pumping Station & NWKPTW Overflow Chamber, respectively  
(4) The emission rate included a 1.31 ambient temperature correction factor.