

Appendix 3.8a Calculation of Odour Emission Rate

Location ID	Location	Serving Units	Odour Survey at Tai Po Sewage Treatment Works (2016)		Odour Survey at Tai Po Sewage Treatment Works (2016)		Odour Survey at Yuen Long Effluent Polishing Plant		Odour Survey at Sha Tin Cavern		Odour Survey at Stonecutter Island Sewage Treatment		Max. SOER from the Equivalent Sampling Points (ou/m2.s)
			Corresponding Odour Source in existing TPSTW	SOER (ou/m2.s)	Corresponding Odour Source in existing TPSTW	SOER (ou/m2.s)	Corresponding Odour Source in existing YLEPP	SOER(ou/m2.s)	Corresponding Odour Source in existing STC	SOER (ou/m2.s)	Corresponding Odour Source in existing SCISTW	SOER (ou/m2.s)	
DO 1	New West Plant Odour Control	Coarse Screen Channel	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		Coarse Screen Chamber	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		Wet Well No. 1	Inlet	120.95	Inlet pumping station (West part of TPSTW)	0.804	Inlet Well	6.98	Inlet Channel	5.15	Inlet Channel	5.42	120.95
		Wet Well No. 2	Inlet	120.95	Inlet pumping station (West part of TPSTW)	0.804	Inlet Well	6.98	Inlet Channel	5.15	Inlet Channel	5.42	120.95
		Grit Tank Channel	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		Grit Tanks	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		PST Distribution Tank	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		Fine Screen Channel	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		Fine Screen Chamber	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
		PS Filter Inlet Chamber	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89
PS Filter Channel	Screen House	96.89	-	-	Screen Skips at Inlet Works	6.98	Screening Skip	1.07	-	-	96.89		
		Biological Process Air	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
DO 2	Odour Control for East Plant PST, Aeration Tank	Primary Sedimentation Tank	-	-	Primary Sedimentation Tanks	10.2	Primary Treatment	0.196	Primary Sedimentation Tank	2.71	-	-	10.20
		Aeration Tank	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
		Aeration Tank	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
		Water channel	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
		Water channel	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
		Water channel	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
		Water channel	-	-	Bioreactor	0.56	Biological Treatment	0.41	Aeration Tank (Aerobic Zone)	0.071	-	-	0.56
S001	Final Sedimentation Tank 1	Final Sedimentation Tank 1	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S002	Final Sedimentation Tank 2	Final Sedimentation Tank 2	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S003	Final Sedimentation Tank 3	Final Sedimentation Tank 3	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S004	Final Sedimentation Tank 4	Final Sedimentation Tank 4	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S005	Final Sedimentation Tank 5	Final Sedimentation Tank 5	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S006	Final Sedimentation Tank 6	Final Sedimentation Tank 6	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S007	Final Sedimentation Tank 7	Final Sedimentation Tank 7	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S008	Final Sedimentation Tank 8	Final Sedimentation Tank 8	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S009	Final Sedimentation Tank 9	Final Sedimentation Tank 9	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S010	Final Sedimentation Tank 10	Final Sedimentation Tank 10	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S011	Final Sedimentation Tank 11	Final Sedimentation Tank 11	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
S012	Final Sedimentation Tank 12	Final Sedimentation Tank 12	-	-	Final Sedimentation Tank	0.078	DAF tank	0.0337	Final Sedimentation Tank	0.025	-	-	0.08
DO 3	Odour Control (East)	Primary Sludge Storage Tank	Primary sludge gravity thickener	1.64	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Primary Sludge Thickening Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Thickened SAS Storage	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		PS/SAS Receiving Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Centrate Storage Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Food Waste Storage	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Sludge Blend Tanks	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
DO 4	Odour Control (West)	Import Sludge Receiving Hopper	Primary sludge gravity thickener	1.64	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Import Diluted Sludge Storage	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Digested Sludge Storage Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Pre-dewatered Sludge Storage Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Centrate Storage Tank (Centrifuge)	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Paddle Dryer	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Cooling Screw	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Mixing Screw	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Sludge Cake Intermediate Storage Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Sludge Cake Silo	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
		Sidestream Reactors	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42
Sidestream Effluent Storage Tank	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42		
DO 5	Sludge Consolidation Tank	Sludge Consolidation Tank 1	Sludge consolidation tank	5.46	-	-	Thickening sludge holding tank	1.19	SAS Holding Tank	-	Sludge Treatment of Stonecutter Island STW	26.42	26.42

Appendix 3.8b Calculation of Odour Emission Rate

Location ID	Location	X	Y	Flow Rate (m ³ /s)	Velocity (m/s)	Height of the Deodorizer Exhaust Point	Diameter of the Deodorizer Exhaust Point (m)	Serving Units	Width (m)	Length (m)	Diameter (m)	Number	Odour Emission Area (m ²)	Max. SOER from the Equivalent location (ou/m ³ s)	Odour Emission Rate (ou/s) at each location	Odour Emission Rate (ou/s) at each DO before Treatment	Removal Efficiency	Odour Emission Rate (ou/s) at each DO after Treatment
DO 1	New West Plant Odour Control	837521	835084	22.9	9.00	15.0	1.8	Coarse Screen Channel	8.0	2.0	-	2	32	96.89	3100			
								Coarse Screen Chamber	10.0	1.5	-	4	60	96.89	5813			
								Wet Well No. 1	12.0	6.0	-	1	72	120.95	8708			
								Wet Well No. 2	12.0	6.0	-	1	72	120.95	8708			
								Grit Tank Channel	12.0	1.5	-	2	36	96.89	3488			
								Grit Tanks	5.0	5.0	-	4	100	96.89	9689			
								PST Distribution Tank	4.0	4.0	-	2	32	96.89	3100			
								Fine Screen Channel	8.0	2.0	-	2	32	96.89	3100			
								Fine Screen Chamber	10.0	2.0	-	3	60	96.89	5813			
								PS Filter Inlet Chamber	8.0	2.0	-	2	32	96.89	3100			
PS Filter Channel	8.0	2.0	-	6	96	96.89	9301											
Biological Process Air	100.0	65.0	-	1	6500	0.56	3660	67584	99%	675.8								
DO 2	Odour Control for East Plant PST, Aeration Tank	837801	835284	61.4	19.5	15.0	2.0	Primary Sedimentation Tank	48.0	15.0	-	4	2880	10.20	29376			
								Aeration Tank	15.0	70.0	-	6	6300	0.56	3547			
								Aeration Tank	20.0	51.0	-	1	1020	0.56	574			
								Water channel	74.0	4.5	-	1	333	0.56	187			
								Water channel	75.0	3.5	-	1	263	0.56	148			
								Water channel	35.0	3.5	-	1	123	0.56	69			
								Water channel	37.0	3.5	-	1	130	0.56	73	33974	99%	339.7
S001	Final Sedimentation Tank 1	837781	835253	-	-	-	-	Final Sedimentation Tank 1	-	-	32.0	-	800	0.078	62.4			
S002	Final Sedimentation Tank 2	837816	835253	-	-	-	-	Final Sedimentation Tank 2	-	-	32.0	-	800	0.078	62.4			
S003	Final Sedimentation Tank 3	837781	835218	-	-	-	-	Final Sedimentation Tank 3	-	-	32.0	-	800	0.078	62.4			
S004	Final Sedimentation Tank 4	837816	835218	-	-	-	-	Final Sedimentation Tank 4	-	-	32.0	-	800	0.078	62.4			
S005	Final Sedimentation Tank 5	837781	835183	-	-	-	-	Final Sedimentation Tank 5	-	-	32.0	-	800	0.078	62.4			
S006	Final Sedimentation Tank 6	837816	835183	-	-	-	-	Final Sedimentation Tank 6	-	-	32.0	-	800	0.078	62.4			
S007	Final Sedimentation Tank 7	837857	835253	-	-	-	-	Final Sedimentation Tank 7	-	-	32.0	-	800	0.078	62.4			
S008	Final Sedimentation Tank 8	837892	835253	-	-	-	-	Final Sedimentation Tank 8	-	-	32.0	-	800	0.078	62.4			
S009	Final Sedimentation Tank 9	837857	835218	-	-	-	-	Final Sedimentation Tank 9	-	-	32.0	-	800	0.078	62.4			
S010	Final Sedimentation Tank 10	837892	835218	-	-	-	-	Final Sedimentation Tank 10	-	-	32.0	-	800	0.078	62.4			
S011	Final Sedimentation Tank 11	837857	835183	-	-	-	-	Final Sedimentation Tank 11	-	-	32.0	-	800	0.078	62.4			
S012	Final Sedimentation Tank 12	837892	835183	-	-	-	-	Final Sedimentation Tank 12	-	-	32.0	-	800	0.078	62.4			
DO 3	Odour Control (East)	837683	835318	25.0	12.41	15	1.6	Primary Sludge Storage Tank	9.2	9.2	-	2	169	26.42	4472			
								Primary Sludge Thickening Tank	11	11	-	2	242	26.42	6394			
								Thickened SAS Storage	5.5	5.5	-	1	30	26.42	799			
								PS/SAS Receiving Tank	9.2	9.2	-	4	339	26.42	8945			
								Centrate Storage Tank	5.5	5.5	-	2	61	26.42	1598			
								Food Waste Storage	5.0	5.0	-	3	75	26.42	1982			
Sludge Blend Tanks	8.0	8.0	-	3	192	26.42	5073	29263	99%	292.6								
DO 4	Odour Control (West)	837573.00	835162.00	58.7	18.68	15	2	Import Sludge Receiving Hopper	15.0	4.0	-	3	180	26.42	4756			
								Import Diluted Sludge Storage	18.0	18.0	-	1	324	26.42	8560			
								Digested Sludge Storage Tank	22.0	22.0	-	1	484	26.42	12787			
								Pre-dewatered Sludge Storage Tank	7.5	7.5	-	1	56	26.42	1486			
								Centrate Storage Tank (Centrifuge)	6.0	6.0	-	1	36	26.42	951			
								Paddle Dryer	8.0	2.0	-	4	64	26.42	1691			
								Cooling Screw	6.0	1.5	-	4	36	26.42	951			
								Mixing Screw	6.0	1.5	-	4	36	26.42	951			
								Sludge Cake Intermediate Storage Tank	6.0	6.0	-	1	36	26.42	951			
								Sludge Cake Silo	8.0	8.0	-	3	192	26.42	5073			
								Sidestream Reactors	18	18	-	2	648	26.42	17120			
								Sidestream Reactors (due to ammonia)*	18	18	-	2	648	3.42	2217			
								Sidestream Effluent Storage Tank	6.0	6	-	1	36	26.42	951	58446	99%	584.5
DO 5	Sludge Consolidation Tank	837727	835367	3.4	17.1	15	0.5	Sludge Consolidation Tank 1	-	-	16.0	3	603	26.42	15936	15936	99%	159.4
OWPC	Organic Waste Pre-treatment Centre	837801	835434	21.3	12.1	30	1.5	Organic Waste Pre-treatment Centre	-	-	-	-	-	6400	6400	-	6400	

*With reference to Appendix A of Dynamic of nitric oxide and nitrous oxide emission during full-scale reject water treatment (Kampschreur, et. al, 2008), the calculation is presented below:

	Unit	TPSTW	Reference from
Dewatering centrate flow	m ³ /day	4384	773
Ammonia Gas emission	ppm	76	13
Ammonia Gas emission	OU/m ³	2054	362
odour extraction air flow rate	m ³ /s	1.08	
Surface Area of Sidestream Reactors	m ²	648	
SOER	OU/m ² /s	3.42	

LEGEND

- Project Boundary
- Proposed Upgrading Works Boundary
- West Plant
- New West Plant
- 1 Sewage Treatment Facilities
- 2 Co-digestion & Sludge Related Facilities
- 3 Biogas Recovery and Storage Facilities & Administration /Maintenance Buildings
- 4 Existing Facilities and Proposed Buildings
- 5 Existing Buildings & Digesters
- 6 Co-digestion and Sludge Related Facilities, Reclaimed Water Plant & Effluent Pumping Station
- 7 Existing Buildings
- S001 Existing Final Sedimentation Tanks
- Odour Emission Point

Revision	Description			
	Designed	Reviewed	Drawn	Checked
Initial	-	-	-	-
Date	11/18	11/18	11/18	11/18

Approved _____

Agreement No. **CE 50/2019 (DS)**

Project Title
Upgrading of Tai Po Sewage Treatment Works – Investigation

Figure Title
Location of Odour Emission Source

Drawing No. **Appendix 3.8c** Revision **-**

Scale
A3: 1:2,000

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香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION
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