APPENDIX 4B:

Details of Operational Phase Noise Assessment

Plant Equipment for San Wai STW

	SPL for each Equipment	Corrected SPL for each Equipment	No	Total SPL
Main Pump	109	109	6	116.8
Main Motor	105	105	6	112.8
Deodourisation Unit	90	96	2	99.0
Ventilation Fan	90	96	8	105.0
Transformer	85	91	1	91.0

Plant Equipment for Ha Tsuen Existing PS

	SPL for each Equipment	Corrected SPL for each Equipment	No	Total SPL
Main Pump	109	109	4	115.0
Main Motor	105	105	4	111.0
Deodourisation Unit	90	96	1	96.0
Ventilation Fan	90	96	1	96.0

Plant Equipment for Ha Tsuen New PS

	SPL for each Equipment	Corrected SPL for each Equipment	No	Total SPL
Main Pump	109	109	2	112.0
Main Motor	105	105	2	108.0
Deodourisation Unit	90	96	1	96.0
Ventilation Fan	90	96	1	96.0

Note:
For main pumps and motors, one-third octave band field measurement data revealed that the noise emissions did not show characteristics of tonality, impulsiveness and intermittency.
No correction was therefore applied to main pumps and motors.

According to TM-NCO, 6 dB(A) for tonality correction was applied to ventilation fan, deodourisation unit and transformer as conservative assumption in this assessment.
The correction is applied in the SPL of individual for ease of calculation.

San Wai STW - Unmitigated Scenario

Distance to NSR

	N37	N38	N39	N40	N42
Distance from site boundary (m)	212	192	260	270	213
*Distance from NNS (m)	335	325	397	334	400

* Notional Noise Source (NNS) for operational phase is assumed to be located at the San Wai STW transfer pumping station for the purpose of operational noise only.

Equipment

Equipment Name	SWL dB(A)	No.	Total SWL dB(A)
Main Pump	109	6	116.8
Main Motor	105	6	112.8
Deodourisation Unit	96	2	99.0
Ventilation Fan	96	8	105.0
Transformer	91	1	91.0
Total:			118.5

SPL at NSRs

	SPL-N37 dB(A)	SPL-N38 dB(A)	SPL-N39 dB(A)	SPL-N40 dB(A)	SPL-N42 dB(A)	
Total SPL at NSR (dB(A))	**63.0**	**63.3**	**61.5**	**63.0**	**61.5**	
Criteria for NSR (dB(A))	50	50	50	50	50	Day Time
Criteria for NSR (dB(A))	45	45	45	45	45	Night Time
Comply with Noise Criteria?	No	No	No	No	No	

San Wai STW - Mitigated Scenario

Minimum Absorption Coefficients of Materials inside Transfer Pumping Station

Frequency (Hz)	Ceiling, floor, and wall Concrete (300mm)	Doors Timber (43mm)	Windows Glass (2.5mm)	Gate Aluminium (0.9mm)
63	0.01	0.01	0.01	0.01
125	0.01	0.01	0.01	0.01
250	0.01	0.01	0.01	0.01
500	0.02	0.01	0.01	0.01
1000	0.02	0.01	0.01	0.01
2000	0.02	0.01	0.01	0.01
4000	0.03	0.01	0.01	0.01
8000	0.03	0.01	0.01	0.01

Minimum Transmission Loss (dB) of Materials inside Transfer Pumping Station

Frequency (Hz)	Ceiling, floor, and wall Concrete (300mm)	Doors Timber (43mm)	Windows Glass (2.5mm)	Gate Aluminium (0.9mm)
63	37	13	23	8
125	40	17	23	11
250	45	21	12	10
500	52	26	18	10
1000	59	29	22	18
2000	63	31	29	23
4000	67	34	27	25
8000	72	32	21	30

Noise Levels of Equipment inside Transfer Pumping Station

Frequency (Hz)	Main Pump SWL dB(A)	Main Motor SWL dB(A)
63	73.80	65.80
125	84.90	78.90
250	94.40	88.40
500	99.80	96.80
1000	106.00	100.00
2000	104.20	100.20
4000	100.00	95.00
8000	91.90	84.90

References:

- Acoustics and noise control, 2nd Edition, B J Smith, R J Peters, etc. Addison Wesley Longman Limited, 1996
- Strategic Sewage Disposal Scheme Stage 1 Principle Collection and Treatment System, Environmental Impact Assessment, Volume II, Appendix C3, May 1996, Montgomery Watson
- Strategic Sewage Disposal Scheme, Environmental Impact Assessment Study, Volume II, Appendix A7.2, January 2000, Montgomery Watson

San Wai STW - Mitigated Scenario

Floor and wall (Concrete, 300mm)		
Length	70	m
Width	25	m
Depth:	3	m
Area of floor:	1750	m^2
Area of wall:	570	m^2

Doors (Timber, 43mm)		
Width:	2	m
Height:	2	m
Number:	0	
Area:	0	m^2

* Assume doors are facing away from the NSR and can be omitted in calculation

Windows (Glass, 2.5mm)		
Width:	0.8	m
Height:	0.5	m
Number:	4	
Area:	2	m^2

Gate (Aluminium, 0.9mm)		
Width:	4	m
Height:	2.5	m
Number:	0	
Area:	0	m^2

* Assume gates are facing away from the NSR and can be omitted in calculation

San Wai STW - Mitigated Scenario

Main Pumps

Frequency (Hz)	SWL dB(A)	No of Equip.	Total SWL dB(A)
63	73.80	6	81.58
125	84.90	6	92.68
250	94.40	6	102.18
500	99.80	6	107.58
1000	106.00	6	113.78
2000	104.20	6	111.98
4000	100.00	6	107.78
8000	91.90	6	99.68
Total	109.56		117.34

Main Motors

Frequency (Hz)	SWL dB(A)	No. of Equip.	Total SWL dB(A)
63	65.80	6	73.58
125	78.90	6	86.68
250	88.40	6	96.18
500	96.80	6	104.58
1000	100.00	6	107.78
2000	100.20	6	107.98
4000	95.00	6	102.78
8000	84.90	6	92.68
Total	104.70		112.48

Areas for Absorption Coefficient

		Pumping Station			
Concrete (300mm)			Timber(43mm)	Glass (2.5mm)	Alumin.(0.9mm)
Ceiling	Wall	Floor	Doors	Windows	Gate
1750	570	0	0	1.6	0
Total		2320	0	1.6	0

Areas for Transmission Loss

		Pumping Station		
Concrete (300mm)		Timber(43mm)	Glass (2.5mm)	Alumin.(0.9mm)
Ceiling	Wall	Doors	Windows	Gate
1750	570	0	1.6	0
Total	2320	0	1.6	0

San Wai STW - Mitigated Scenario

Room Constants

	Absorption Coefficient				Average	Room Const.
	Concrete (300mm)	Timber (43mm)	Glass (2.5mm)	Aluminium (0.9mm)	Ab. Coef.	
Area	2320	0	2	0		
Total Area		2322				
Frequency						
63	0.01	0.01	0.01	0.01	0.010	23.5
125	0.01	0.01	0.01	0.01	0.010	23.5
250	0.01	0.01	0.01	0.01	0.010	23.5
500	0.02	0.01	0.01	0.01	0.020	47.4
1000	0.02	0.01	0.01	0.01	0.020	47.4
2000	0.02	0.01	0.01	0.01	0.020	47.4
4000	0.03	0.01	0.01	0.01	0.030	71.8
8000	0.03	0.01	0.01	0.01	0.030	71.8

Transmission Loss Through Transfer Pumping Station

	Transmission loss (dB)					Average
	Concrete (300mm)	Timber (43mm)	Glass (2.5mm)	Aluminium (0.9mm)	Total area	T.L. (dB)
Area	2320	0	2	0	2322	
Frequency						
63	37	13	23	8		36.93
125	40	17	23	11		39.86
250	45	21	12	10		41.24
500	52	26	18	10		47.64
1000	59	29	22	18		52.51
2000	63	31	29	23		58.64
4000	67	34	27	25		58.03
8000	72	32	21	30		52.57

Distance to NSRs

	N37	N38	N39	N40	N42
Distance from N	335	325	397	334	400

SPL close to the external wall

Frequency (Hz)	Total SWL dB(A)	Long Area (sq. m)	Rev. SPL dB(A)	SPL (1m) from External Wall dB(A)
63	82.22	2322	74.54	37.61
125	93.65	2322	85.97	46.12
250	103.15	2322	95.47	54.23
500	109.35	2322	98.61	50.97
1000	114.75	2322	104.02	51.51
2000	113.44	2322	102.70	44.07
4000	108.97	2322	96.44	38.41
8000	100.47	2322	87.93	35.37

San Wai STW - Mitigated Scenario

SPL at NSRs

Frequency (Hz)	SPL-N37 dB(A)	SPL-N38 dB(A)	SPL-N39 dB(A)	SPL-N40 dB(A)	SPL-N41 dB(A)
63	9.77	10.03	8.29	9.79	8.23
125	18.28	18.54	16.80	18.30	16.74
250	26.39	26.65	24.91	26.41	24.85
500	23.13	23.39	21.66	23.16	21.59
1000	23.66	23.93	22.19	23.69	22.12
2000	16.22	16.49	14.75	16.25	14.68
4000	10.56	10.83	9.09	10.59	9.02
8000	7.52	7.79	6.05	7.55	5.98
Total SPL:	**30.04**	**30.30**	**28.56**	**30.06**	**28.50**

San Wai STW - Mitigated Scenario

Distance to NSR

	N37	N38	N39	N40	N42
Distance from NNS (m)	335	325	397	334	400

Equipment outdoors

(Assume both deodourisation units and ventilation fans installed with silencer with 10dB(A) reduction)

Equipment Name	SWL dB(A)	reduced SWL dB(A)	No.	Total SWL dB(A)
SW-TPS				
Deodorisation Unit	96	86	2	89.01
Ventilation Fan	96	86	8	95.03
Transformer	91		1	91.00
Sub-total:				97.2

SPL at NSRs

Caused by outdoor equip. of:	SPL-N37 dB(A)	SPL-N38 dB(A)	SPL-N39 dB(A)	SPL-N40 dB(A)	SPL-N42 dB(A)
SW-TPS	41.69	41.96	40.22	41.72	40.15

San Wai STW - Mitigated Scenario

Summary

						Refer to
NSR	N37	N38	N39	N40	N42	Figure 4.1
Easting (m)	816585	816590	816660	816478	816615	
Northing (m)	834504	834450	834463	834648	834151	
Distance from NNS (m)	335	325	397	334	400	Table 4.7
Noise caused by:						
Indoor Equip. (dB(A))	30.04	30.30	28.56	30.06	28.50	SW-Indoor
Outdoor Equip. (dB(A))	41.69	41.96	40.22	41.72	40.15	SW-Outdoor
Total SPL at NSR (dB(A))	**42.0**	**42.2**	**40.5**	**42.0**	**40.4**	
Criteria for NSR (dB(A))	50.0	50.0	50.0	50.0	50.0	Day Time
Criteria for NSR (dB(A))	45.0	45.0	45.0	45.0	45.0	Night Time
Comply with Noise Criteria?	Yes	Yes	Yes	Yes	Yes	

Ha Tsuen PS - Unmitigated Scenario

Distance to NSR

	N1	N2	N3	N5	N6	N7
Distance from site boundary (m)	134	170	173	220	100	125
*Distance from NNS (m)	238	259	211	265	152	138

	N8	N11	N12	N43	N44	N45
Distance from site boundary (m)	155	183	224	126	59	59
*Distance from NNS (m)	178	267	311	243	135	90

	N46	N47	N48	N49	N50
Distance from site boundary (m)	58	60	32	33	57
*Distance from NNS (m)	98	140	99	65	90

* Notional Noise Source (NNS) for operational phase is assumed to be located at the nearest Ha Tsuen PS wet wells of the site for the purpose of operational noise only.

Equipment

Equipment Name	SWL dB(A)	No.	Total SWL dB(A)
Main Pump	109	6	116.8
Main Motor	105	6	112.8
Deodourisation Unit	96	2	99.0
Ventilation Fan	96	2	99.0
Total:			118.3

SPL at NSRs

	SPL-N1 dB(A)	SPL-N2 dB(A)	SPL-N3 dB(A)	SPL-N5 dB(A)	SPL-N6 dB(A)	SPL-N7 dB(A)
Total SPL at NSR (dB(A))	**65.8**	**65.1**	**66.9**	**64.9**	**69.7**	**70.5**
Criteria for daytime NSR (dB(A))	60	60	65	65	60	60
Criteria for nighttime NSR (dB(A))					50	50
Comply with Noise Criteria?	No	No	No	Yes	No	No

	SPL-N8 dB(A)	SPL-N11 dB(A)	SPL-N12 dB(A)	SPL-N43 dB(A)	SPL-N44 dB(A)	SPL-N45 dB(A)
Total SPL at NSR (dB(A))	**68.3**	**64.8**	**63.5**	**65.6**	**70.7**	**74.3**
Criteria for daytime NSR (dB(A))	60	55	55	60	60	60
Criteria for nighttime NSR (dB(A))	50	45	45	50	50	50
Comply with Noise Criteria?	No	No	No	No	No	No

	SPL-N46 dB(A)	SPL-N47 dB(A)	SPL-N48 dB(A)	SPL-N49 dB(A)	SPL-N50 dB(A)
Total SPL at NSR (dB(A))	**73.5**	**70.4**	**73.4**	**77.1**	**74.3**
Criteria for daytime NSR (dB(A))	60	60	60	60	65
Criteria for nighttime NSR (dB(A))			50	50	55
Comply with Noise Criteria?	No	No	No	No	No

Ha Tsuen PS - Mitigated Scenario

Minimum Absorption Coefficients of Materials inside PSs

Frequency (Hz)	Ceiling, floor, and wall Concrete (300mm)	Doors Timber (43mm)
63	0.01	0.01
125	0.01	0.01
250	0.01	0.01
500	0.02	0.01
1000	0.02	0.01
2000	0.02	0.01
4000	0.03	0.01
8000	0.03	0.01

Minimum Transmission Loss (dB) of Materials inside PSs

Frequency (Hz)	Ceiling, floor, and wall Concrete (300mm)	Doors Timber (43mm)
63	37	13
125	40	17
250	45	21
500	52	26
1000	59	29
2000	63	31
4000	67	34
8000	72	32

Noise Levels of Equipment inside PSs

Frequency (Hz)	Main Pump SWL dB(A)	Main Motor SWL dB(A)
63	73.80	65.80
125	84.90	78.90
250	94.40	88.40
500	99.80	96.80
1000	106.00	100.00
2000	104.20	100.20
4000	100.00	95.00
8000	91.90	84.90

References:

- Acoustics and noise control, 2nd Edition, B J Smith, R J Peters, etc. Addison Wesley Longman Limited, 1996
- Strategic Sewage Disposal Scheme Stage 1 Principle Collection and Treatment System, Environmental Impact Assessment, Volume II, Appendix C3, May 1996, Montgomery Watson
- Strategic Sewage Disposal Scheme, Environmental Impact Assessment Study, Volume II, Appendix A7.2, January 2000, Montgomery Watson

Ha Tsuen PS - Mitigated Scenario

Existing Pumping Station		
Floor and wall (Concrete, 300mm)		
Depth:	3	m
Area of floor:	1444	m^2
Area of wall:	153	m^2
Doors (Timber, 43mm)		
Width:	2	m
Height:	2	m
Number:	1	
Area:	4	m^2
New Pumping Station		
Floor and wall (Concrete, 300mm)		
Depth:	3	m
Area of floor:	1490	m^2
Area of wall:	203	m^2
Doors (Timber, 43mm)		
Width:	2	m
Height:	2	m
Number:	1	
Area:	4	m^2

Ha Tsuen PS - Mitigated Scenario

Main Pumps (Existing PS)

Frequency (Hz)	SWL dB(A)	No of Equip.	Total SWL dB(A)
63	73.80	4	79.82
125	84.90	4	90.92
250	94.40	4	100.42
500	99.80	4	105.82
1000	106.00	4	112.02
2000	104.20	4	110.22
4000	100.00	4	106.02
8000	91.90	4	97.92
Total	109.56		115.58

Main Motors (Existing PS)

Frequency (Hz)	SWL dB(A)	No. of Equip.	Total SWL dB(A)
63	65.80	4	71.82
125	78.90	4	84.92
250	88.40	4	94.42
500	96.80	4	102.82
1000	100.00	4	106.02
2000	100.20	4	106.22
4000	95.00	4	101.02
8000	84.90	4	90.92
Total	104.70		110.72

Areas for Absorption Coefficient

Concrete (300mm) Pumping Station			Timber (43mm)
Ceiling	Wall	Floor	Doors
1444	153	0	4
Total		1597	4

Areas for Transmission Loss

Concrete (300mm) Pumping Station			Timber (43mm)
Ceiling	Wall	Floor	Doors
1444	153	0	4
Total		1597	4

Ha Tsuen PS - Mitigated Scenario

Room Constants

	Absorption Coefficient		Average	Room Const.
	Concrete (300mm)	Timber (43mm)	Ab. Coef.	
Area	1597	4		
Total area	1601			
Frequency				
63	0.01	0.01	0.010	16.2
125	0.01	0.01	0.010	16.2
250	0.01	0.01	0.010	16.2
500	0.02	0.01	0.020	32.6
1000	0.02	0.01	0.020	32.6
2000	0.02	0.01	0.020	32.6
4000	0.03	0.01	0.030	49.4
8000	0.03	0.01	0.030	49.4

Transmission Loss Through Pumping Station

	Transmission loss (dB)			Average
	Concrete (300mm)	Timber (43mm)	Total area	T.L. (dB)
Area	1597	4	1601	
Frequency				
63	37	13		34.89
125	40	17		38.25
250	45	21		42.89
500	52	26		49.01
1000	59	29		53.56
2000	63	31		56.05
4000	67	34		59.23
8000	72	32		57.85

Distance to NSRs

	N1	N2	N3	N5	N6	N7
Distance from N	295	314	213	265	202	169
	N8	N11	N12	N43	N44	N45
Distance from N	185	267	311	298	189	115
	N46	N47	N48	N49	N50	
Distance from N	98	140	99	65	90	

SPL close to the external wall

Frequency	Total SWL	Long Area	Rev. SPL	SPL (1m) from External Wall
(Hz)	dB(A)	(sq. m)	dB(A)	dB(A)
63	80.46	1601	74.39	39.50
125	91.89	1601	85.83	47.58
250	101.39	1601	95.33	52.44
500	107.58	1601	98.47	49.46
1000	112.99	1601	103.88	50.31
2000	111.68	1601	102.56	46.51
4000	107.21	1601	96.29	37.06
8000	98.71	1601	87.79	29.94

Ha Tsuen PS - Mitigated Scenario

SPL at NSRs

Frequency (Hz)	SPL-N1 dB(A)	SPL-N2 dB(A)	SPL-N3 dB(A)	SPL-N5 dB(A)	SPL-N6 dB(A)	SPL-N7 dB(A)
63	11.15	10.61	13.98	12.08	14.44	15.99
125	19.22	18.68	22.05	20.16	22.51	24.06
250	24.08	23.54	26.91	25.01	27.37	28.92
500	21.11	20.57	23.94	22.04	24.40	25.95
1000	21.96	21.42	24.79	22.89	25.25	26.80
2000	18.16	17.62	20.99	19.09	21.45	23.00
4000	8.71	8.17	11.54	9.64	12.00	13.55
8000	1.59	1.04	4.41	2.52	4.87	6.42
Total SPL:	28.53	27.99	31.36	29.46	31.82	33.37

Frequency (Hz)	SPL-N8 dB(A)	SPL-N11 dB(A)	SPL-N12 dB(A)	SPL-N43 dB(A)	SPL-N44 dB(A)	SPL-N45 dB(A)
63	15.20	12.01	10.69	11.06	15.02	19.33
125	23.28	20.09	18.76	19.14	23.09	27.41
250	28.14	24.95	23.62	24.00	27.95	32.27
500	25.16	21.98	20.65	21.02	24.98	29.29
1000	26.01	22.83	21.50	21.87	25.83	30.14
2000	22.21	19.03	17.70	18.07	22.03	26.34
4000	12.76	9.58	8.25	8.62	12.58	16.89
8000	5.64	2.45	1.13	1.50	5.45	9.77
Total SPL:	32.59	29.40	28.07	28.44	32.40	36.71

Frequency (Hz)	SPL-N46 dB(A)	SPL-N47 dB(A)	SPL-N48 dB(A)	SPL-N49 dB(A)	SPL-N50 dB(A)
63	20.72	17.62	20.63	24.29	21.46
125	28.80	25.70	28.71	32.36	29.54
250	33.65	30.56	33.57	37.22	34.39
500	30.68	27.58	30.59	34.25	31.42
1000	31.53	28.43	31.44	35.10	32.27
2000	27.73	24.63	27.64	31.30	28.47
4000	18.28	15.18	18.19	21.85	19.02
8000	11.16	8.06	11.07	14.72	11.90
Total SPL:	38.10	35.01	38.02	41.67	38.84

Ha Tsuen PS - Mitigated Scenario

Main Pumps (New PS)

Frequency (Hz)	SWL dB(A)	No of Equip.	Total SWL dB(A)
63	73.80	2	76.81
125	84.90	2	87.91
250	94.40	2	97.41
500	99.80	2	102.81
1000	106.00	2	109.01
2000	104.20	2	107.21
4000	100.00	2	103.01
8000	91.90	2	94.91
Total	109.56		112.57

Main Motors (New PS)

Frequency (Hz)	SWL dB(A)	No. of Equip.	Total SWL dB(A)
63	65.80	2	68.81
125	78.90	2	81.91
250	88.40	2	91.41
500	96.80	2	99.81
1000	100.00	2	103.01
2000	100.20	2	103.21
4000	95.00	2	98.01
8000	84.90	2	87.91
Total	104.70		107.71

Areas for Absorption Coefficient

Concrete (300mm) Pumping Station			Timber (43mm)
Ceiling	Wall	Floor	Doors
1490	203	0	4
Total		1693	4

Areas for Transmission Loss

Concrete (300mm) Pumping Station			Timber (43mm)
Ceiling	Wall	Floor	Doors
1490	203	0	4
Total		1693	4

Ha Tsuen PS - Mitigated Scenario

Room Constants

	Absorption Coefficient		Average	Room Const.
	Concrete (300mm)	Timber (43mm)	Ab. Coef.	
Area	1693	4		
Total area	1697			
Frequency				
63	0.01	0.01	0.010	17.1
125	0.01	0.01	0.010	17.1
250	0.01	0.01	0.010	17.1
500	0.02	0.01	0.020	34.6
1000	0.02	0.01	0.020	34.6
2000	0.02	0.01	0.020	34.6
4000	0.03	0.01	0.030	52.4
8000	0.03	0.01	0.030	52.4

Transmission Loss Through Pumping Station

	Transmission loss (dB)			Average
	Concrete (300mm)	Timber (43mm)	Total area	T.L. (dB)
Area	1693	4	1697	
Frequency				
63	37	13		34.99
125	40	17		38.33
250	45	21		42.99
500	52	26		49.13
1000	59	29		53.74
2000	63	31		56.25
4000	67	34		59.44
8000	72	32		58.10

Distance to NSRs

	N1	N2	N3	N5	N6	N7
Distance from N	238	259	211	273	152	138
	N8	N11	N12	N43	N44	N45
Distance from N	178	310	350	243	135	90
	N46	N47	N48	N49	N50	
Distance from N	99	166	149	125	146	

SPL close to the external wall

Frequency	Total SWL	Long Area	Rev. SPL	SPL (1m) from External Wall
(Hz)	dB(A)	(sq. m)	dB(A)	dB(A)
63	77.45	1697	71.13	36.14
125	88.88	1697	82.56	44.23
250	98.38	1697	92.06	49.08
500	104.57	1697	95.21	46.07
1000	109.98	1697	100.61	46.87
2000	108.67	1697	99.30	43.05
4000	104.20	1697	93.03	33.59
8000	95.70	1697	84.53	26.43

Ha Tsuen PS - Mitigated Scenario

SPL at NSRs

Frequency (Hz)	SPL-N1 dB(A)	SPL-N2 dB(A)	SPL-N3 dB(A)	SPL-N5 dB(A)	SPL-N6 dB(A)	SPL-N7 dB(A)
63	9.91	9.17	10.95	8.72	13.80	14.64
125	18.00	17.26	19.04	16.80	21.89	22.73
250	22.84	22.11	23.89	21.65	26.74	27.58
500	19.84	19.11	20.89	18.65	23.73	24.57
1000	20.64	19.90	21.68	19.44	24.53	25.37
2000	16.81	16.08	17.86	15.62	20.71	21.55
4000	7.36	6.62	8.40	6.16	11.25	12.09
8000	0.20	-0.54	1.24	-1.00	4.09	4.93
Total SPL:	27.26	26.52	28.30	26.07	31.15	31.99

Frequency (Hz)	SPL-N8 dB(A)	SPL-N11 dB(A)	SPL-N12 dB(A)	SPL-N43 dB(A)	SPL-N44 dB(A)	SPL-N45 dB(A)
63	12.43	7.61	6.56	9.73	14.83	18.35
125	20.52	15.70	14.65	17.82	22.92	26.44
250	25.37	20.55	19.49	22.66	27.77	31.29
500	22.36	17.54	16.49	19.66	24.76	28.29
1000	23.16	18.34	17.29	20.46	25.56	29.08
2000	19.34	14.52	13.46	16.63	21.74	25.26
4000	9.88	5.06	4.01	7.17	12.28	15.80
8000	2.72	-2.10	-3.15	0.02	5.12	8.64
Total SPL:	29.78	24.96	23.91	27.08	32.18	35.70

Frequency (Hz)	SPL-N46 dB(A)	SPL-N47 dB(A)	SPL-N48 dB(A)	SPL-N49 dB(A)	SPL-N50 dB(A)
63	17.53	13.04	13.98	15.50	14.15
125	25.61	21.13	22.06	23.59	22.24
250	30.46	25.97	26.91	28.44	27.09
500	27.46	22.97	23.91	25.43	24.08
1000	28.26	23.77	24.70	26.23	24.88
2000	24.43	19.94	20.88	22.41	21.06
4000	14.97	10.48	11.42	12.95	11.60
8000	7.82	3.33	4.26	5.79	4.44
Total SPL:	34.88	30.39	31.33	32.85	31.50

Ha Tsuen PS - Mitigated Scenario

Distance to NSR

	N1	N2	N3	N5	N6	N7
Distance from NNS (m)	295	314	213	265	202	169
	N8	N11	N12	N43	N44	N45
Distance from NNS (m)	185	267	311	298	189	115
	N46	N47	N48	N49	N50	
Distance from NNS (m)	98	140	99	65	90	

Equipment outdoors

(Assume both deodourisation units and ventilation fans installed with silencer with 10dB(A) reduction)

Equipment Name	SWL dB(A)	reduced SWL dB(A)	No.	Total SWL dB(A)
HT-PS				
Deodorisation Unit	96	86	1	86.00
Ventilation Fan	96	86	1	86.00
Sub-total:				89.01

SPL at NSRs

Caused by outdoor equip. of:	SPL-N1 dB(A)	SPL-N2 dB(A)	SPL-N3 dB(A)	SPL-N5 dB(A)	SPL-N6 dB(A)	SPL-N7 dB(A)
Existing HT-PS	34.61	34.07	37.44	35.55	37.90	39.45
Caused by outdoor equip. of:	SPL-N8 dB(A)	SPL-N11 dB(A)	SPL-N12 dB(A)	SPL-N43 dB(A)	SPL-N44 dB(A)	SPL-N45 dB(A)
Existing HT-PS	38.67	35.48	34.16	34.53	38.48	42.80
Caused by outdoor equip. of:	SPL-N46 dB(A)	SPL-N47 dB(A)	SPL-N48 dB(A)	SPL-N49 dB(A)	SPL-N50 dB(A)	
Existing HT-PS	44.19	41.09	44.10	47.75	44.93	

Ha Tsuen PS - Mitigated Scenario

Distance to NSR

	N1	N2	N3	N5	N6	N7
Distance from NNS (m)	238	259	211	273	152	138

	N8	N11	N12	N43	N44	N45
Distance from NNS (m)	178	310	350	243	135	90

	N46	N47	N48	N49	N50
Distance from NNS (m)	99	166	149	125	146

Equipment outdoors

(Assume both deodourisation units and ventilation fans installed with silencer with 10dB(A) reduction)

Equipment Name	SWL dB(A)	reduced SWL dB(A)	No.	Total SWL dB(A)
HT-PS				
Deodorisation Unit	96	86	1	86.00
Ventilation Fan	96	86	1	86.00
Sub-total:				89.01

SPL at NSRs

Caused by outdoor equip. of:	SPL-N1 dB(A)	SPL-N2 dB(A)	SPL-N3 dB(A)	SPL-N5 dB(A)	SPL-N6 dB(A)	SPL-N7 dB(A)
New HT-PS	36.48	35.74	37.52	35.29	40.37	41.21

Caused by outdoor equip. of:	SPL-N8 dB(A)	SPL-N11 dB(A)	SPL-N12 dB(A)	SPL-N43 dB(A)	SPL-N44 dB(A)	SPL-N45 dB(A)
New HT-PS	39.00	34.18	33.13	36.30	41.40	44.93

Caused by outdoor equip. of:	SPL-N46 dB(A)	SPL-N47 dB(A)	SPL-N48 dB(A)	SPL-N49 dB(A)	SPL-N50 dB(A)
New HT-PS	44.10	39.61	40.55	42.07	40.72

Ha Tsuen PS - Mitigated Scenario

Summary

							Refer to
NSR	N1	N2	N3	N5	N6	N7	Figure 4.2
Easting (m)	818007	818053	818142	818192	818030	818073	
Northing (m)	834504	834508	834202	834160	834394	834310	
Distance from Existing Wet Well (m)	295	314	213	265	202	169	
Distance from New Wet Well (m)	238	259	211	273	152	138	
Noise caused by:							
Indoor Equip. (dB(A))	28.53	27.99	31.36	29.46	31.82	33.37	HT-indoor (Existing)
Indoor Equip. (dB(A))	27.26	26.52	28.30	26.07	31.15	31.99	HT-indoor (New)
Outdoor Equip. (dB(A))	34.61	34.07	37.44	35.55	37.90	39.45	HT-outdoor (Existing)
Outdoor Equip. (dB(A))	36.48	35.74	37.52	35.29	40.37	41.21	HT-outdoor (New)
Total SPL at NSR (dB(A))	**39.3**	**38.7**	**41.2**	**39.2**	**43.0**	**44.1**	
Criteria for NSR (dB(A))	60.0	60.0	65.0	65.0	60.0	60.0	Day Time
Criteria for NSR (dB(A))					50.0	50.0	Night Time
Comply with Noise Criteria?	Yes	Yes	Yes	Yes	Yes	Yes	

NSR	N8	N11	N12	N43	N44	N45	Figure 4.2
Easting (m)	818115	817683	817627	817903	817867	817834	
Northing (m)	834226	834039	834046	834515	834403	834309	
Distance from Existing Wet Well (m)	185	267	311	298	189	115	
Distance from New Wet Well (m)	178	310	350	243	135	90	
Noise caused by:							
Indoor Equip. (dB(A))	32.59	29.40	28.07	28.44	32.40	36.71	HT-indoor (Existing)
Indoor Equip. (dB(A))	29.78	24.96	23.91	27.08	32.18	35.70	HT-indoor (New)
Outdoor Equip. (dB(A))	38.67	35.48	34.16	34.53	38.48	42.80	HT-outdoor (Existing)
Outdoor Equip. (dB(A))	39.00	34.18	33.13	36.30	41.40	44.93	HT-outdoor (New)
Total SPL at NSR (dB(A))	**42.6**	**38.7**	**37.4**	**39.2**	**43.8**	**47.7**	
Criteria for NSR (dB(A))	60.0	55.0	55.0	60.0	60.0	60.0	Day Time
Criteria for NSR (dB(A))	50.0	45.0	45.0	50.0	50.0	50.0	Night Time
Comply with Noise Criteria?	Yes	Yes	Yes	Yes	Yes	Yes	

NSR	N46	N47	N48	N49	N50		Figure 4.2
Easting (m)	817807	817772	817827	817895	817964		
Northing (m)	834245	834159	834128	834129	834112		
Distance from Existing Wet Well (m)	98	140	99	65	90		
Distance from New Wet Well (m)	99	166	149	125	146		
Noise caused by:							
Indoor Equip. (dB(A))	38.10	35.01	38.02	41.67	38.84		HT-indoor (Existing)
Indoor Equip. (dB(A))	34.88	30.39	31.33	32.85	31.50		HT-indoor (New)
Outdoor Equip. (dB(A))	44.19	41.09	44.10	47.75	44.93		HT-outdoor (Existing)
Outdoor Equip. (dB(A))	44.10	39.61	40.55	42.07	40.72		HT-outdoor (New)
Total SPL at NSR (dB(A))	**47.9**	**44.2**	**46.5**	**49.7**	**47.2**		
Criteria for NSR (dB(A))	60.0	60.0	60.0	60.0	65.0		Day Time
Criteria for NSR (dB(A))			50.0	50.0	55.0		Night Time
Comply with Noise Criteria?	Yes	Yes	Yes	Yes	Yes		