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1. INTRODUCTION

1.1 The VISJET model was used to simulate the near-field plume behaviour of the outfall discharges within a relatively short distance from the effluent discharge location. Hence, the zone of initial dilution (ZID) and vertical structure of the plume could be located. For a surface plume, initial dilution is defined as the dilution obtained at the centre line of the plume when the sewage reaches the surface. For a trapped plume, initial dilution is defined as the dilution obtained at the center line of the plume where the plume reaches the maximum rise height when the vertical momentum / buoyancy of the plume becomes zero.

1.2 The initial dilution obtained from the near field model was used to assess the water quality impact in the near field. The near field results were also used to determine where the effluent loading from the SCISTW outfall would be placed within the far field model (both horizontally and vertically). The near field modelling was carried out with reference to the approach adopted in the EEFS. Details of the modelling approach are presented in the "EEFS Working Paper No. 7 Scenarios Simulation / Prediction Results (Final)".

2. MODEL INPUT

2.1 Key input to the near-field model include:

- Outfall diffuser configuration
- Ambient current speed
- Vertical density profile
- Effluent flow rate

2.2 Details of the outfall diffuser configuration adopted for the near field modelling are given in **Table A61-2.1**.

Table A61-2.1 Diffuser Configuration of SCISTW Outfall

Description	Value	Remarks
Modelling diffuser length (m)	1200	
Outfall diameter (m)	3.24	
Riser separation (m)	52	
No. of risers	24	
Riser height (m)	1.5	
Ports per riser	8	The horizontal angles of discharge for 8 ports are 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°.
Riser radius (m)	0.13	
Port diameter (m)	0.25	Port diameters ranges from 0.225m to 0.275. An average value of 0.25m is adopted for modeling.

2.3 Vertical density profiles were derived for the SCISTW outfall under the EEFS using the data from EPD's routine water quality monitoring for the period from 1994 to 2002. Four density profiles were available from the EEFS for one dry season profile (D1) and three wet season profiles, representing three degrees of wet season stratification, namely W1, W2 and W3 respectively. **Table A61-2.2** shows the density profiles for D1, W1, W2 and W3 and their probabilities of occurrence. Details of the vertical density profiles are given in the "EEFS Working Paper No. 7". Based on the EEFS, the total water depth was assumed to be 17 m.

Table A61-2.2 Density Profile of SCISTW outfall

Depth (m)	D1 (σ_t)	W1 (σ_t)	W2 (σ_t)	W3 (σ_t)
1	22.14	19.99	17.23	15.45
2	22.20	20.03	17.35	15.65
3	22.21	20.12	17.59	16.08
4	22.22	20.26	17.81	16.60
5	22.25	20.39	18.07	17.14
6	22.27	20.60	18.48	17.78
7	22.27	20.86	18.99	18.54
8	22.29	21.08	19.34	19.36
9	22.29	21.27	19.71	20.02
10	22.29	21.39	19.92	20.39
11	22.29	21.39	20.43	20.99
12	22.32	21.39	20.65	21.26
13	22.32	21.39	20.65	21.26
14	22.32	21.39	20.65	21.26
15	22.32	21.39	20.65	21.26
16	22.32	21.39	20.65	21.26
17	22.32	21.39	20.65	21.26
Probabilistic Occurrence:	**0.58**	**0.08**	**0.25**	**0.08**

2.4 Measurements of ambient current velocity were conducted under the EEFS. The current data were analyzed for different vertical depths under the EEFS and were calculated as 10, 50 and 90 percentile values for both dry and wet seasons, namely V10, V50 and V90 respectively as shown in **Table A61-2.3**. It is assumed that the outfall would be perpendicular to the orientation of the predominant current direction.

Table A61-2.3 Ambient Current Velocity at SCISTW Outfall

Depth (m)	Dry V10 (cm/s)	Dry V50 (cm/s)	Dry V90 (cm/s)	Wet V10 (cm/s)	Wet V50 (cm/s)	Wet V90 (cm/s)
0 – 6	9.3	24.2	45.7	9.0	24.0	46.0
> 6	8.4	22.1	43.0	8.0	22.0	43.0
Probabilistic Occurrence:	**0.2**	**0.6**	**0.2**	**0.2**	**0.6**	**0.2**

3. MODELLING SCENARIOS

3.1 The near field impact was modelled for different combinations of vertical density profile and ambient current velocity for scenarios with different implement phase of HATS. For each scenario, a set of three effluent flow rates, Q10, Q50 and Q90 were used, all based on the percentile of occurrence. The Q50 flow rate (the flow rate below which 50 percent of all effluent flow rates occur) was based on the average flow rate. The Q10 flow rate (the flow rate below which 10 percent of all flow rates occur) was calculated using a Q10 to Q50 ratio of 0.60. The Q90 flow rate was calculated using a Q90 to Q50 ratio of 1.28. These ratios are based on the findings from EEFS which are also in line with the actual measurement of effluent flow from SCISTW in 2004 and 2005. Based on the EEFS, the Q10 was representative of the flow rates that occurred between the 0 and 20 percentile (20 percent) and the Q90 was representative of the flow rates that occurred between the 80 and 100 percentile (20 percent) whereas the Q50 was representative of the remaining 60 percent. **Table A61-3.1** below summarizes the adopted effluent flows.

Table A61-3.1 Effluent Flow Adopted in Near-Field Model

Average SCISTW Flow Rate (m^3/d)	Far Field Assessment Scenarios (refer to **Table 6.30** of main text)	Effluent Flow ID	% of occurrence	Total Flow (m^3/d)	Flow per Riser (m^3/s)	Flow per Port (m^3/s)
1,550,391	Scenario 1a (2014 without Stage 2A)	Q10	20	930,235	0.4486	0.0561
		Q50	60	1,550,391	0.7477	0.0935
		Q90	20	1,984,500	0.9570	0.1196
2,063,636	Scenario 1b (2014 early phase of Stage 2A)	Q10	20	1,238,182	0.5971	0.0746
		Q50	60	2,063,636	0.9952	0.1244
		Q90	20	2,641,454	1.2738	0.1592
1,628,146	Scenario 2a (2021 without Stage 2A)	Q10	20	976,888	0.4711	0.0589
		Q50	60	1,628,146	0.7852	0.0981
		Q90	20	2,084,027	1.0050	0.1256
2,169,681	Scenario 2b, 2c & 3a (2021 late phase of Stage 2A / early phase of Stage 2B)	Q10	20	1,301,809	0.6278	0.0785
		Q50	60	2,169,681	1.0463	0.1308
		Q90	20	2,777,192	1.3393	0.1674
1,952,713	Scenario 2d (2021 late phase of Stage 2A with less conservative flow rate)	Q10	20	1,171,628	0.5650	0.0706
		Q50	60	1,952,713	0.9417	0.1177
		Q90	20	2,499,473	1.2054	0.1507
2,446,906	Scenarios 2e & 3b (Stage 2A /Stage 2B using ultimate flow)	Q10	20	1,468,144	0.7080	0.0885
		Q50	60	2,446,906	1.1800	0.1475
		Q90	20	3,132,040	1.5104	0.1888

Note: Flows are divided equally amongst the risers and ports in the SCISTW outfall.

3.2 Based on the far field assessment scenarios, a total of six average SCISTW flow rates were assessed. Under each average flow rate, VISJET simulations were carried out for 36 scenarios (i.e. total 216 model runs were performed). **Table A61-3.2** summarizes the model runs performed for each average flow rate.

Table A61-3.2 Summary of Proposed VISJET Model Runs

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Probability of occurrence
	ID	Probability of occurrence	ID	Probability of occurrence	ID	Probability of occurrence	
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032

3.3 There are 24 risers for the SCISTW outfall. Thus, modelling all 24 risers would produce 192 sets of output information (8 jets per riser). Following the approach adopted under the EEFS, the number of risers to be analyzed for the outfall was reduced to 5 for each model run to simplify the modelling effort. As it is assumed in the near field model that the flow rate for each individual jet and each individual riser would be the same, the results obtained from modelling 5 risers would be the same as those from modelling all the 24 risers given that the ambient conditions were assumed to be the same for all the risers.

4. MODEL RESULTS

Model Output

4.1 Key model outputs include initial dilution, the plume depth, the plume half width, the plume thickness and the downstream distance at the edge of the ZID. **Table A61-4.2** to **Table A61-4.8** summarize the results from the VISJET simulations. Merging of plumes from adjacent risers was only found in 9 out of 216 model runs (namely Run ID W1-WV10-Q90, W2-WV10-Q90 and W3-WV10-Q90 under the average SCISTW flow rates of 2,063,636 m^3/d, 2,169,681 m^3/d and 2,446,906 m^3/d). Merging of plumes from adjacent jets on individual riser was observed in nearly all model runs. The plume merging would reduce the initial dilution. The composite dilution of merged jets was determined by the VISJET model.

4.2 The predicted composite initial dilution was corrected for the background concentration build up due to the tidal effects based on the "EEFS Working Paper No. 7". Explanation of the background build up correction is extracted from Section 7.5.4 of the "EEFS Working Paper No. 7" as follows:

"The basic assumption of any near field model is that the effluent plume is mixed with clean water. In actuality this is not true, particularly in a tidally mixed environment. It is known that the ebbing tide takes estuarine water out towards the open ocean, mixes and then returns on the following flood tide. This returning mixed water never returns as completely new ocean water. If this were so, one would never observe a build up of pollutants in an estuarine environment. In the case of the HATS, a portion of the effluent that was discharged into the receiving water on the ebbing tide remains with incoming flood tide after mixing with the off shore waters. This remaining concentration is referred to as "background build up", which must be accounted for or else risk that the calculated initial dilutions will be overestimated.

The HATS far field model was used to account for this background build up under the EEFS. This build up was quantified by performing a conservative tracer run on the effluent from the SCISTW outfalls. A conservative tracer, i.e. without decay or reaction, was used. The initial concentration of the tracer in the effluent was set to be 1000 mg/l. The direct results of this far field tracer run cannot be used to determine the dynamics of the near field (less than 50 to 100 meters of the outfalls), due to the lack of vertical and horizontal grid resolution needed for accurate simulation of the latter. The average annual results of the far field tracer run can provide the necessary details to supplement the near field modelling to incorporate the background build up. It should be noted that the results from the grid cell into which the tracer is loaded is not representative of the true background build up as this cell will always contain the background build up plus the continuous tracer loading, therefore, the necessary far field tracer results were taken from a cell located adjacent to the outfall grid cells."

4.3 The average tracer background build up concentrations for the SCISTW effluent were updated under this EIA for the corrections. The far field HATS model was used to predict the background build up concentrations for the six different average SCISTW flow rates for both dry and wet seasons. **Table A61-4.1** shows an example of background build up correction for the minimum initial dilution with HATS reaching its design flow rate (2,446,906 m^3/d). The corrected initial dilutions for the other model runs are included in **Table A61-4.2** to **Table A61-4.7**.

Table A61-4.1 Example of Background Build Up Correction

Scenario	Minimum Initial Dilution[1]	Initial Tracer Concentration in Effluent[2] (mg/L)	Average Tracer Concentration (mg/L) Dry Season[3]	Corrected Initial Dilution[4]
	(A)	(B)	(C)	(E)
3b	52.2	1000	9.521	35.1 (round up to 35)

Note: 1. Minimum initial dilution predicted by VISJET model for Scenario 3b. This dilution occurred under the dry season scenario (run ID D1-DV10-Q10);
2. Effluent tracer concentration assumed in far field modeling;
3. Average background buildup concentration for ultimate scenario predicted by the far field model. The dry season value is used for the correction in this case as the minimum dilution occurred under the dry season scenario.
4. Corrected Initial Dilution, (E) = (B) ÷ {[1 x (B) + ((A) – 1) x (C)] ÷ (A)}.

Table A61-4.2 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 1,550,391 m^3/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	128.8	72	4.5	7.3	9.6	13
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	80.4	54	4.3	7.2	10.3	15
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	67.0	**48**	4.3	7.8	12.2	16
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	192.4	88	3.7	11.1	10.4	79
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	202.1	90	2.4	13.4	13.1	96
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	202.9	90	1.8	14.2	15.0	102
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	346.3	110	5.1	12.1	8.9	237
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	279.7	102	4.3	12.6	11.0	184
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	261.7	100	4.0	12.8	12.2	176
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	81.5	59	6.3	12.0	8.8	15
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	92.1	64	5.6	14.2	11.7	17
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	103.9	69	5.3	16.1	13.4	22
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	119.9	76	8.3	10.2	7.3	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	118.6	75	7.9	11.0	9.4	39
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	115.4	74	7.7	11.8	10.8	35
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	174.0	95	8.8	8.3	6.5	90
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	159.2	90	8.5	9.3	8.1	83
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	155.0	89	8.4	10.1	9.1	80
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	86.7	61	8.9	10.6	7.6	14
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	101.3	68	8.3	14.2	10.5	14
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	122.1	77	8.1	16.9	12.2	17
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	74.2	55	10.5	6.9	5.9	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	74.8	55	10.3	9.1	7.8	27
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	78.8	57	10.6	9.8	9.1	26
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	108.8	71	10.9	6.1	5.1	61
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	104.7	70	10.7	7.2	6.6	57
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	107.4	71	10.7	8.0	7.6	57
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	64.9	50	9.1	10.6	7.3	12
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	82.2	59	8.7	14.7	10.0	14
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	97.5	66	8.5	16.6	11.7	17
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	74.9	55	10.6	6.8	5.8	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	78.6	57	10.4	8.9	7.7	25
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	79.8	58	10.3	9.6	9.0	25
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	104.6	70	11.0	6.0	5.0	58
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	102.1	68	10.8	7.1	6.5	55
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	103.3	69	10.7	7.9	7.5	54

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

Table A61-4.3 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 2,063,636 m³/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	97.5	55	4.4	7.1	8.8	14
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	65.3	43	4.3	7.3	12.5	17
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	56.5	**39**	4.5	7.6	14.5	19
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	192.4	75	3.0	12.2	11.7	86
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	196.9	76	1.7	14.3	15.3	101
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	178.0	73	1.2	14.3	17.4	91
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	298.5	87	4.7	12.4	9.9	194
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	244.2	82	3.9	12.3	12.4	166
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	233.9	81	3.6	12.8	14.0	165
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	82.1	54	5.9	13.5	10.2	14
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	101.8	62	5.3	16.1	13.7	21
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	105.9	63	5.0	17.0	16.1	24
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	118.2	67	8.1	9.9	8.4	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	117.1	67	7.7	12.3	11.1	36
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	127.1	70	7.6	14.2	12.9	41
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	164.9	80	8.6	8.8	7.3	86
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	155.3	78	8.4	10.2	9.3	80
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	158.9	79	8.2	11.3	10.7	82
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	76.8	52	8.5	13.0	9.1	15
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	102.3	62	8.1	17.0	12.5	18
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	117.7	67	7.9	17.0	14.0	22
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	78.3	52	10.4	8.0	6.9	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	82.7	54	10.2	9.9	9.4	26
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	92.2	58	10.1	11.2	11.0	29
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	106.8	64	10.8	6.7	5.8	59
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	106.3	63	10.6	8.1	7.7	56
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	109.8	65	10.6	9.2	9.0	56
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	70.5	49	8.8	12.0	8.7	12
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	93.6	59	8.5	16.2	12.5	18
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	118.2	67	8.4	17.0	13.0	21
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	76.4	51	10.5	7.9	6.8	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	80.5	53	10.3	9.6	9.2	25
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	92.1	58	10.2	11.3	10.8	29
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	103.2	62	10.9	6.6	5.8	56
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	104.1	63	10.7	8.0	7.6	54
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	106.2	63	10.7	9.0	8.8	53

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

Table A61-4.4 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 1,628,146 m^3/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	122.6	68	4.5	7.3	9.7	13
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	77.3	52	4.3	7.5	10.6	15
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	64.9	**46**	4.3	7.3	12.6	17
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	178.8	83	3.6	10.6	10.5	75
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	203.6	88	2.3	13.7	13.5	98
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	196.9	87	1.7	14.2	15.4	101
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	347.6	107	5.1	12.4	9.1	239
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	275.6	99	4.3	12.6	11.2	182
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	244.3	95	3.9	12.3	12.5	166
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	82.6	59	6.2	12.1	9.0	15
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	91.6	63	5.5	14.4	11.9	17
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	101.9	68	5.3	16.2	13.8	21
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	119.6	75	8.2	9.2	7.5	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	119.4	75	7.9	11.3	9.7	39
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	117.4	74	7.7	12.4	11.1	36
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	171.3	92	8.7	8.4	6.6	89
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	159.0	89	8.5	9.6	8.3	83
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	155.4	88	8.3	10.3	9.3	80
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	70.0	52	8.8	11.0	7.8	14
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	83.2	59	8.3	14.8	10.9	14
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	102.7	68	8.1	17.0	12.6	18
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	76.7	56	10.5	7.0	6.0	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	82.5	59	10.3	9.3	8.1	27
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	82.6	59	10.2	9.9	9.4	26
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	108.5	71	10.9	6.3	5.2	61
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	105.0	69	10.7	7.4	6.8	57
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	106.0	69	10.6	8.1	7.8	56
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	71.5	53	9.1	11.3	7.5	12
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	89.8	62	8.6	16.2	10.3	14
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	93.7	64	8.5	16.2	12.3	18
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	84.3	59	10.6	7.7	5.9	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	87.4	61	10.4	9.6	7.9	26
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	88.7	62	10.3	10.8	9.3	25
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	115.6	73	11.0	6.9	5.1	58
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	112.0	72	10.8	8.0	6.7	55
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	112.4	72	10.7	8.4	7.7	54

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

Table A61-4.5 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 2,169,681 m^3/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	93.2	52	4.4	7.3	9.1	14
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	63.2	41	4.4	7.6	13.0	17
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	55.1	**38**	4.5	8.1	15.0	19
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	193.7	73	2.9	12.4	12.0	88
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	193.1	73	1.6	14.2	15.7	99
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	176.8	71	1.2	14.6	17.9	90
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	295.4	84	4.6	12.6	10.1	193
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	215.1	76	3.8	11.3	12.7	149
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	237.4	79	3.5	13.2	14.5	168
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	86.5	55	5.8	14.2	10.5	15
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	103.9	62	5.2	16.5	14.1	22
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	106.6	63	5.0	17.0	16.6	25
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	118.0	66	8.0	10.0	8.6	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	119.1	67	7.7	12.9	11.4	37
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	130.2	70	7.5	14.5	13.3	42
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	163.2	79	8.6	8.9	7.5	86
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	156.2	77	8.3	10.4	9.6	80
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	158.3	77	8.2	11.5	11.0	81
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	81.5	53	8.5	12.8	9.4	16
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	104.0	62	8.0	17.0	12.9	18
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	120.1	67	7.9	17.0	14.4	23
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	78.8	52	10.4	8.2	7.1	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	82.8	54	10.2	10.0	9.7	26
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	95.0	59	10.1	11.7	11.3	30
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	105.1	62	10.8	6.8	6.0	58
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	106.9	63	10.6	8.2	8.0	56
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	108.8	63	10.6	9.3	9.3	55
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	86.7	55	8.8	13.6	9.0	12
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	93.8	58	8.5	17.0	12.2	18
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	120.5	67	8.4	17.0	13.4	21
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	84.8	55	10.5	8.4	7.0	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	88.8	56	10.3	11.1	9.5	25
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	99.6	60	10.2	11.9	11.1	29
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	112.9	65	10.9	7.5	5.9	56
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	112.3	65	10.7	8.6	7.9	54
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	113.0	65	10.7	9.5	9.1	53

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

Table A61-4.6 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 1,952,713 m^3/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	102.6	58	4.4	7.7	8.5	13
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	67.7	45	4.3	7.7	12.1	16
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	58.2	**40**	4.4	7.9	14.0	18
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	189.3	77	3.2	11.8	11.4	83
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	201.6	79	1.8	14.2	14.9	102
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	182.3	76	1.3	14.3	16.9	93
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	300.5	91	4.7	12.4	9.7	196
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	263.7	87	4.0	12.8	12.1	177
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	228.4	83	3.6	12.3	13.6	160
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	81.4	55	6.0	12.9	10.0	14
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	99.0	62	5.3	15.6	13.2	20
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	105.6	65	5.1	17.0	15.5	24
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	118.6	70	8.1	9.7	8.2	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	113.4	68	7.7	11.5	10.7	34
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	125.1	72	7.6	13.9	12.4	40
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	165.8	83	8.6	8.7	7.1	87
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	155.2	81	8.4	10.0	9.0	80
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	157.9	81	8.3	11.1	10.4	82
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	75.8	52	8.6	12.8	8.8	15
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	96.8	61	8.1	16.5	12.0	17
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	108.4	66	8.0	17.0	13.9	21
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	78.0	53	10.4	7.7	6.7	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	82.1	55	10.2	9.8	9.1	26
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	89.1	58	10.2	10.6	10.6	28
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	106.3	65	10.8	6.6	5.7	59
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	106.6	65	10.7	7.9	7.5	57
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	109.0	66	10.6	8.9	8.7	56
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	67.7	48	8.9	12.0	8.4	11
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	97.2	62	8.5	16.6	11.6	17
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	114.8	68	8.4	17.0	12.7	20
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	76.0	52	10.5	7.7	6.6	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	80.0	54	10.3	9.5	8.9	25
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	89.7	59	10.3	10.9	10.4	28
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	102.7	64	10.9	6.5	5.6	56
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	103.1	64	10.7	7.8	7.4	54
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	106.9	65	10.7	8.9	8.6	54

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

Table A61-4.8 Summary of Results from VISJET Simulations for Average SCISTW Flow Rate of 2,446,906 m^3/d

Run ID	Effluent Flow		Density Profile		Ambient Current Velocity		Joint Prob. of Occurrence	Initial Dilution[1]	Corrected Initial Dilution[2]	Average Plume Depth (m)	Average Plume Thickness (m)	Average Plume Half-Width per Riser (m)	Downstream Distance at Edge of ZID (m)
	ID	Prob.	ID	Prob.	ID	Prob.							
D1-DV10-Q10	Q10	0.2	D1	0.58	Dry V10	0.2	0.0232	84.0	47	4.3	7.7	9.9	14
D1-DV10-Q50	Q50	0.6	D1	0.58	Dry V10	0.2	0.0696	58.9	38	4.4	7.7	13.8	18
D1-DV10-Q90	Q90	0.2	D1	0.58	Dry V10	0.2	0.0232	52.2	**35**	4.6	7.5	15.3	21
D1-DV50-Q10	Q10	0.2	D1	0.58	Dry V50	0.6	0.0696	198.3	69	2.6	13.0	12.7	93
D1-DV50-Q50	Q50	0.6	D1	0.58	Dry V50	0.6	0.2088	186.2	67	1.4	14.4	16.7	95
D1-DV50-Q90	Q90	0.2	D1	0.58	Dry V50	0.6	0.0696	170.1	65	1.0	14.7	19.4	86
D1-DV90-Q10	Q10	0.2	D1	0.58	Dry V90	0.2	0.0232	284.9	77	4.4	12.6	10.7	187
D1-DV90-Q50	Q50	0.6	D1	0.58	Dry V90	0.2	0.0696	226.3	72	3.7	12.2	13.5	159
D1-DV90-Q90	Q90	0.2	D1	0.58	Dry V90	0.2	0.0232	246.8	74	3.3	14.0	15.5	177
W1-WV10-Q10	Q10	0.2	W1	0.08	Wet V10	0.2	0.0032	90.2	54	5.7	14.4	11.3	16
W1-WV10-Q50	Q50	0.6	W1	0.08	Wet V10	0.2	0.0096	104.9	59	5.1	16.7	15.3	23
W1-WV10-Q90	Q90	0.2	W1	0.08	Wet V10	0.2	0.0032	105.2	59	4.8	17.0	18.0	27
W1-WV50-Q10	Q10	0.2	W1	0.08	Wet V50	0.6	0.0096	118.9	63	7.9	10.7	9.2	39
W1-WV50-Q50	Q50	0.6	W1	0.08	Wet V50	0.6	0.0288	124.8	64	7.6	13.8	12.3	40
W1-WV50-Q90	Q90	0.2	W1	0.08	Wet V50	0.6	0.0096	134.3	67	7.5	15.2	14.2	43
W1-WV90-Q10	Q10	0.2	W1	0.08	Wet V90	0.2	0.0032	160.4	73	8.5	9.2	7.9	84
W1-WV90-Q50	Q50	0.6	W1	0.08	Wet V90	0.2	0.0096	157.8	72	8.3	11.0	10.2	82
W1-WV90-Q90	Q90	0.2	W1	0.08	Wet V90	0.2	0.0032	161.6	73	8.2	12.1	11.9	82
W2-WV10-Q10	Q10	0.2	W2	0.25	Wet V10	0.2	0.0100	78.9	50	8.3	13.5	10.2	14
W2-WV10-Q50	Q50	0.6	W2	0.25	Wet V10	0.2	0.0300	101.1	58	8.0	17.0	13.8	21
W2-WV10-Q90	Q90	0.2	W2	0.25	Wet V10	0.2	0.0100	115.8	62	7.9	17.0	15.4	25
W2-WV50-Q10	Q10	0.2	W2	0.25	Wet V50	0.6	0.0300	80.0	50	10.3	9.0	7.6	26
W2-WV50-Q50	Q50	0.6	W2	0.25	Wet V50	0.6	0.0900	87.1	53	10.2	10.3	10.5	27
W2-WV50-Q90	Q90	0.2	W2	0.25	Wet V50	0.6	0.0300	88.8	53	10.1	11.5	12.2	32
W2-WV90-Q10	Q10	0.2	W2	0.25	Wet V90	0.2	0.0100	104.0	58	10.7	7.1	6.4	57
W2-WV90-Q50	Q50	0.6	W2	0.25	Wet V90	0.2	0.0300	108.2	60	10.6	8.8	8.6	56
W2-WV90-Q90	Q90	0.2	W2	0.25	Wet V90	0.2	0.0100	111.6	61	10.5	10.1	10.0	56
W3-WV10-Q10	Q10	0.2	W3	0.08	Wet V10	0.2	0.0032	78.0	49	8.7	13.7	16.4	13
W3-WV10-Q50	Q50	0.6	W3	0.08	Wet V10	0.2	0.0096	113.6	61	8.4	17.0	12.5	20
W3-WV10-Q90	Q90	0.2	W3	0.08	Wet V10	0.2	0.0032	95.7	56	8.4	17.0	14.3	23
W3-WV50-Q10	Q10	0.2	W3	0.08	Wet V50	0.6	0.0096	78.0	49	10.4	8.7	7.5	25
W3-WV50-Q50	Q50	0.6	W3	0.08	Wet V50	0.6	0.0288	87.4	53	10.3	10.5	10.2	27
W3-WV50-Q90	Q90	0.2	W3	0.08	Wet V50	0.6	0.0096	96.6	56	10.2	12.2	12.1	31
W3-WV90-Q10	Q10	0.2	W3	0.08	Wet V90	0.2	0.0032	101.8	58	10.8	7.0	6.3	55
W3-WV90-Q50	Q50	0.6	W3	0.08	Wet V90	0.2	0.0096	105.0	59	10.7	8.6	8.5	53
W3-WV90-Q90	Q90	0.2	W3	0.08	Wet V90	0.2	0.0032	109.0	60	10.6	10.0	9.9	54

Note: 1. Values calculated by VISJET model;
2. Initial dilution was corrected using the background buildup concentration predicted by the far field model (see Section 4.2 and 4.3). Bolded and shaded values indicated minimum initial dilution.

4.4 It is noted that all the predicted minimum dilution rates occurred in the dry season under the 90%ile effluent flow (Q90) with the smallest ambient current (DV10). **Table A61-4.8** summarizes the initial dilution factors.

Table A61-4.8 Summary of VISJET Initial Dilution Factors

Average SCISTW Flow Rate (m^3/d):	1,550,391	2,063,636	1,628,146	2,169,681	1,952,713	2,446,906
Far Field Assessment Scenario:	1a	1b	2a	2b, 2c and 3a	2d	2e and 3b
Minimum VISJET Dilution Factor	48	39	46	38	40	35
5%ile VISJET Dilution Factor	53	47	52	49	47	45
10%ile VISJET Dilution Factor	55	52	54	53	52	49

Input to the Far Field Model

4.5 The near field modeling results were used to determine the appropriate vertical and horizontal grid cell(s) into which the SCISTW discharge would be allocated into the far field 3D model. Under each of the average SCISTW flow rate, two weighted averages of the plume depth were calculated for dry (D1) and wet seasons (W1, W2 and W3) respectively based on their joint probabilities of occurrence as shown in **Table A61-3.2**. Two weighted averages of the plume thicknesses were also calculated for dry (D1) and wet seasons (W1, W2 and W3) respectively. The weighted average plume depths and plume thicknesses for dry and wet seasons were used to determine the appropriate vertical grid cell(s) into which the SCISTW discharge would be allocated.

4.6 The number of horizontal grid cell(s) of the far field model to be used for loading input is based on the average dimensions of the ZID. Under each SCISTW flow rate, the average of all the downstream distances predicted amongst the 36 model runs is used as the average width of the ZID. The average of all the plume width results predicted amongst the 36 model runs is used for calculating the average length of the ZID. It is assumed that the dimension of ZID would be the same in dry and wet seasons for far field modelling. **Table A61-4.9** illustrates the calculation.

Table A61-4.9 Summary of Results for Far Field Model

Far Field Assessment Scenario ID	Weighted Average Plume Depth (m below surface)	Weighted Average Plume Thickness (m)	Average Plume Half-Width (m)	Average Downstream Distance (m)	Average Dimension of ZID (m)
1a	Dry: 3.3	Dry: 11.8	10	53	1220[i] x 106[ii]
	Wet: 9.6	Wet: 9.8			
1b	Dry: 2.8	Dry: 12.3	11	52	1222[i] x 104[ii]
	Wet: 9.4	Wet: 11.0			
2a	Dry: 3.2	Dry: 11.9	10	53	1220[i] x 106[ii]
	Wet: 9.6	Wet: 10.2			
2b, 2c and 3a	Dry: 2.7	Dry: 12.3	11	52	1222[i] x 104[ii]
	Wet: 9.4	Wet: 11.4			
2d	Dry: 2.9	Dry: 12.3	11	52	1222[i] x 104[ii]
	Wet: 9.5	Wet: 10.8			
3b	Dry: 2.6	Dry: 12.6	12	53	1224[i] x 106[ii]
	Wet: 9.4	Wet: 11.6			

Note: i. Length of ZID = 1200 (diffuser length) + average half plume width x 2;
ii. Width of ZID = average downstream distance x 2.

4.7 Based on the predicted dimension of ZID, pollution loading from the SCISTW discharge would be evenly distributed to 6 grid cells of the water quality model along the alignment of the diffuser for all the far field modelling scenarios. The vertical allocation of pollution load would be based on the average plume depth and average plume thickness. Given that the HATS model is a 3 dimensional model which consists of 10 evenly distributed vertical layers and the total water depth assumed in the VISJET modelling was 17 m, the pollution loads for dry season were specified in the first to sixth layer from the surface for all far field modelling scenarios whilst for the wet season, the pollution loads were allocated in the third to ninth layer from the surface for all scenarios.