

Maer Lane STW Outfall Permit

Time Varying Coastal Modelling Results



**South West
Water**

Summary

The following summarises the results from the 10-year time series study of the Maer Lane STW Long Sea Outfall. These results effectively supersede the previous worst-case scenario results for the continuous maximum flow analysis originally undertaken for the LEP and reflect more realistic conditions with intermittent operation of the STW settled storm overflow.

These results reflect a full 10-year analysis using time varying combined storm and final effluent flows and concentrations from the STW, equally split discharging from the four diffusers. Winds are assessed on a 50% worst case / 50% calm basis.

Final effluent concentrations have been based on the geomean of the 2024 and 2025 efficacy data which has been calculated as 3,926 cfu/100ml.

Stormwater concentrations have been based upon default stormwater concentration from Kay et al with no allowance factored in for the expected benefit generated by settlement through the 7,000m³ storm tanks. A value of 2.5 x10⁶ cfu/100ml has been adopted for this analysis which is considered to be conservative.

Bathing Waters Results

In summary, assessment using the geomean of the as-measured FE concentrations there is no measurable impact at the bathing waters. See Table 1 below.

	90%ile E.coli cfu/100ml	95%ile E.coli cfu/100ml	90%ile IE cfu/100ml	95%ile IE cfu/100ml
Sandy Bay BW	<1	<1	<1	<1
Budleigh Salterton BW	<1	<1	<1	<1

Table 1 – Summary Bathing Water Results (Maximums) - FE at geomean concentration

For sensitivity additional analysis has been undertaken to establish the sensitivity of the results in relation to the input concentrations. When the FE concentrations assume a worst-case continuous 95%ile of the as-measured final effluent concentrations the following results are obtained. In these instances the impact at the Bathing Waters is still extremely small. See Table 2 below.

	90%ile E.coli cfu/100ml	95%ile E.coli cfu/100ml	90%ile IE cfu/100ml	95%ile IE cfu/100ml
Sandy Bay BW	5	9	2	3
Budleigh Salterton BW	3	5	1	1

Table 2 – Summary Bathing Water Results (Maximum) - FE at 95%ile concentration

Full results are included in Appendix A.

Shellfish Water Results

With regards to the Shellfish Waters the geomean values have been assessed at the SfW boundary and at points N, S, E & W at 60m and 120m distance. The tables detail the highest recorded geomean value and its recorded location. As per the Bathing Water results, **Table 1** Table 3 uses the measured geomean concentrations of the FE.

	E.coli Geomean (cfu/100ml)	IE Geomean (cfu/100ml)
Sandy Bay SfW	3	<1
Lyme Bay West SfW	1	<1

Table 3 - Summary Shellfish Water Results (Maximums) - FE at geomean concentration

For sensitivity additional analysis has been undertaken to establish the sensitivity of the results in relation to the input concentrations. When the FE concentrations assume a worst-case continuous 95%ile of the as-measured final effluent concentrations the following results are obtained. In these instances the impact at the Shellfish Waters is greater. See Table 4 below.

	E.coli Geomean (cfu/100ml)	IE Geomean (cfu/100ml)
Sandy Bay SfW	51	15
Lyme Bay West SfW	22	7

Table 4 - Summary Shellfish Water Results (Maximums) - FE at 95%ile concentration

Full results are included in Appendix B.

Appendix A – Bathing Water Results

Bathing Water Sites	Using the Geomean of the Measured Input Concentrations				Using the 95%ile of the Measured Input Concentrations			
	E.C. 90 percentile value	E.C. 95 percentile values	I.E. 90 percentile value	I.E. 95 percentile values	E.C. 90 percentile value	E.C. 95 percentile values	I.E. 90 percentile value	I.E. 95 percentile values
SB_BW1	0.2	0.3	0.1	0.1	3.9	6.0	1.1	1.8
SB_BW2	0.2	0.4	0.1	0.1	4.5	7.2	1.3	2.1
SB_BW3	0.5	0.8	0.1	0.2	9.1	14.8	2.6	4.4
SB_BW4	0.8	1.3	0.2	0.4	14.9	23.0	4.3	6.7
SB_BW5	1.4	2.5	0.4	0.7	27.5	46.7	8.0	13.5
SB_BW6	0.3	0.4	0.1	0.1	5.1	8.7	1.5	2.5
SB_BW7	0.3	0.5	0.1	0.2	6.0	9.6	1.7	2.9
SB_BW8	0.6	1.1	0.2	0.3	11.6	19.0	3.4	5.6
SB_BW9	1.0	1.8	0.3	0.5	19.7	32.7	5.7	9.6
SB_BW10	1.5	2.6	0.4	0.8	28.7	50.1	8.3	14.6
SB_BW11	0.2	0.4	0.1	0.1	4.4	7.6	1.3	2.2
SB_BW12	0.3	0.5	0.1	0.1	5.5	8.8	1.6	2.6
SB_BW13	0.5	0.9	0.1	0.3	10.0	16.7	2.9	4.9
SB_BW14	0.8	1.4	0.2	0.4	15.2	24.9	4.4	7.4
SB_BW15	1.0	1.7	0.3	0.5	18.8	32.8	5.4	9.6
BS_BW1	0.3	0.4	0.1	0.1	4.9	7.2	1.4	2.1
BS_BW2	0.4	0.6	0.1	0.2	8.0	11.7	2.3	3.4
BS_BW3	0.4	0.6	0.1	0.2	7.8	11.0	2.3	3.2
BS_BW4	0.2	0.3	0.0	0.1	2.9	4.8	0.9	1.4
BS_BW5	0.3	0.5	0.1	0.1	5.8	8.3	1.7	2.4
BS_BW6	0.3	0.4	0.1	0.1	5.1	7.4	1.5	2.2
BS_BW7	0.1	0.1	0.0	0.0	1.2	2.2	0.3	0.6
BS_BW8	0.1	0.3	0.0	0.1	2.8	5.1	0.8	1.5
BS_BW9	0.1	0.2	0.0	0.1	2.4	4.7	0.7	1.4

Table 5 - Bathing Water Results

Note: Highlighted locations are closest to the EA bathing water monitoring points

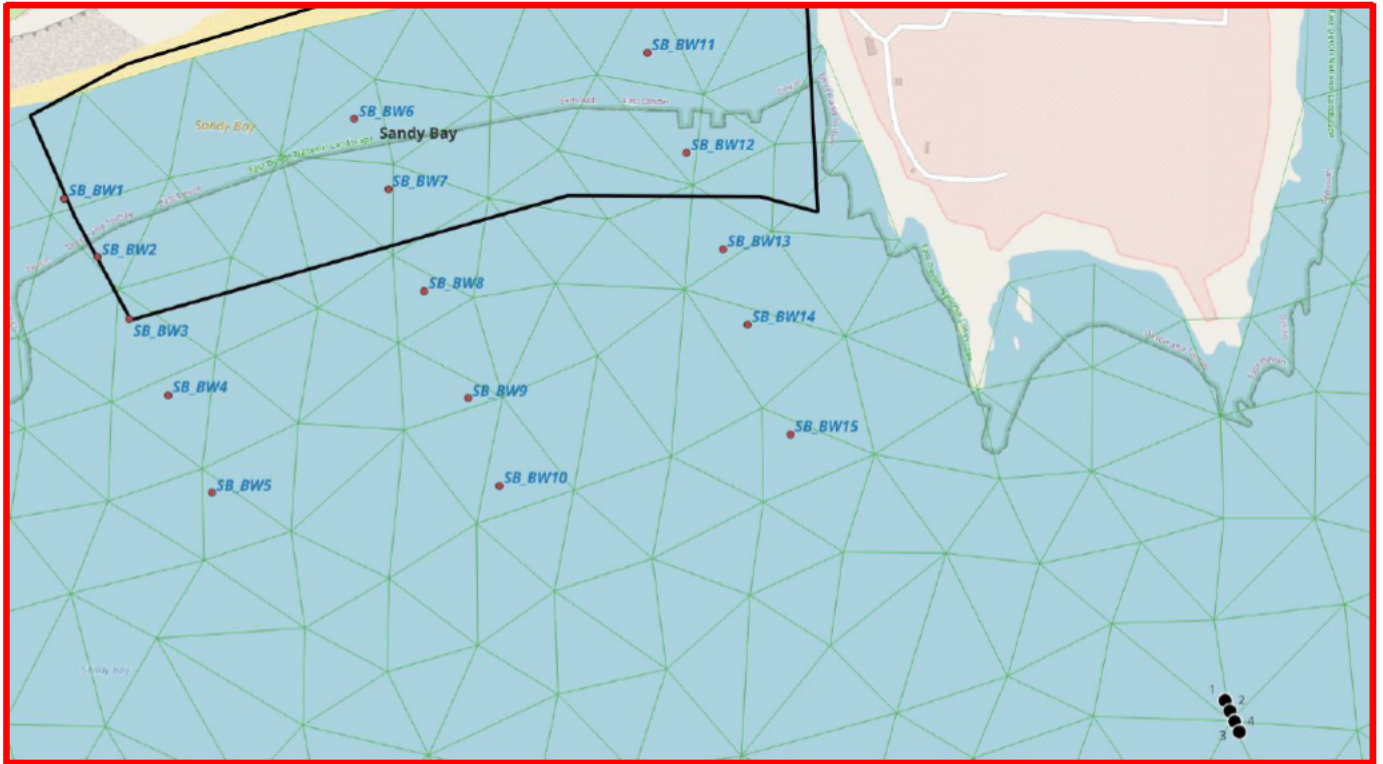


Figure 1 - Model Assessment Points - Sandy Bay Bathing Water

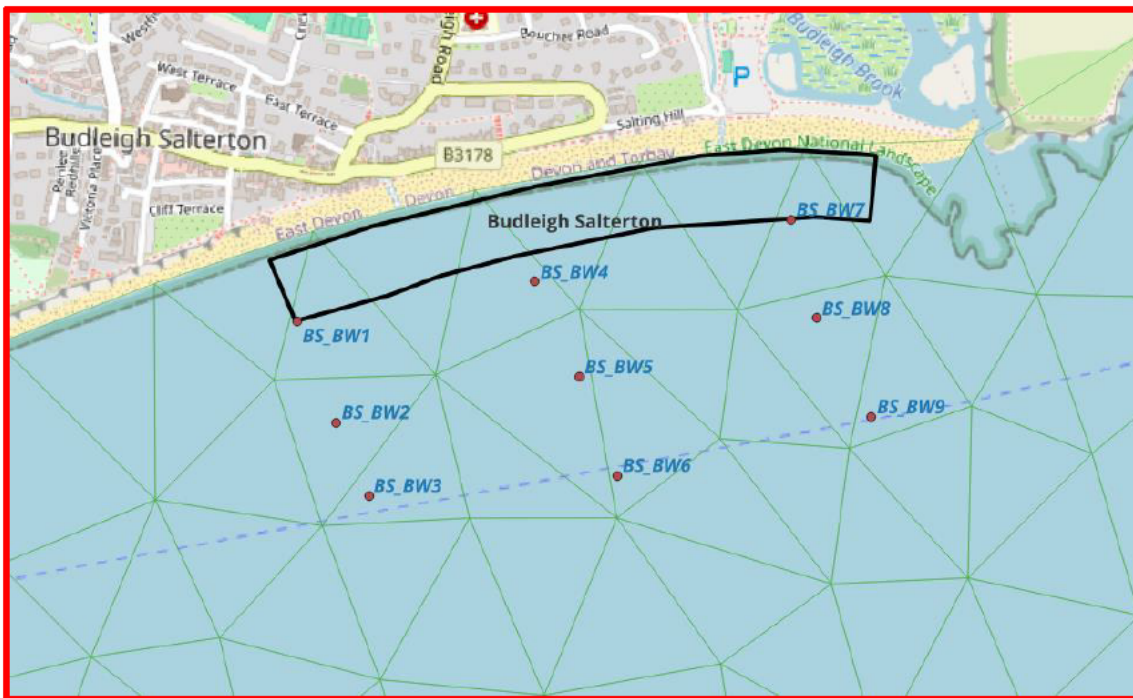


Figure 2 - Model Assessment Points - Budleigh Salterton Bathing Water

Appendix B – Shellfish Water Results

Emission from diffusers at geometric mean of measured sample conc.			
S. No.	Shellfish Water Sites	E.C. Geomean	I.E. Geomean
1	SW_SB_E1	2.0924	0.6057
2	SW_SB_E2	1.7554	0.5080
3	SW_SB_N1	2.8994	0.8393
4	SW_SB_N2	1.1165	0.3232
5	SW_SB_W1	1.9767	0.5722
6	SW_SB_W2	1.6393	0.4741
7	SW_SB_S1	1.8892	0.5470
8	SW_SB_S2	1.3966	0.4041
9	SW_LB1	1.2561	0.3632
10	SW_LB2	0.5712	0.1652
11	SW_LB3	0.0343	0.0163
12	SW_LB4	0.0127	0.1231
Emission from diffusers at 95%ile of measured sample conc.			
S. No.	Shellfish Water Sites	E.C. Geomean	I.E. Geomean
1	SW_SB_E1	36.5902	10.8673
2	SW_SB_E2	30.7498	9.1279
3	SW_SB_N1	50.7349	15.0659
4	SW_SB_N2	19.5235	5.7985
5	SW_SB_W1	34.5810	10.2693
6	SW_SB_W2	28.7839	8.5407
7	SW_SB_S1	33.0312	9.8103
8	SW_SB_S2	24.4664	7.2638
9	SW_LB1	22.0631	6.5463
10	SW_LB2	10.0257	2.9751
11	SW_LB3	0.3115	0.0922
12	SW_LB4	0.0250	0.0082

Table 6 - Shellfish Water Results

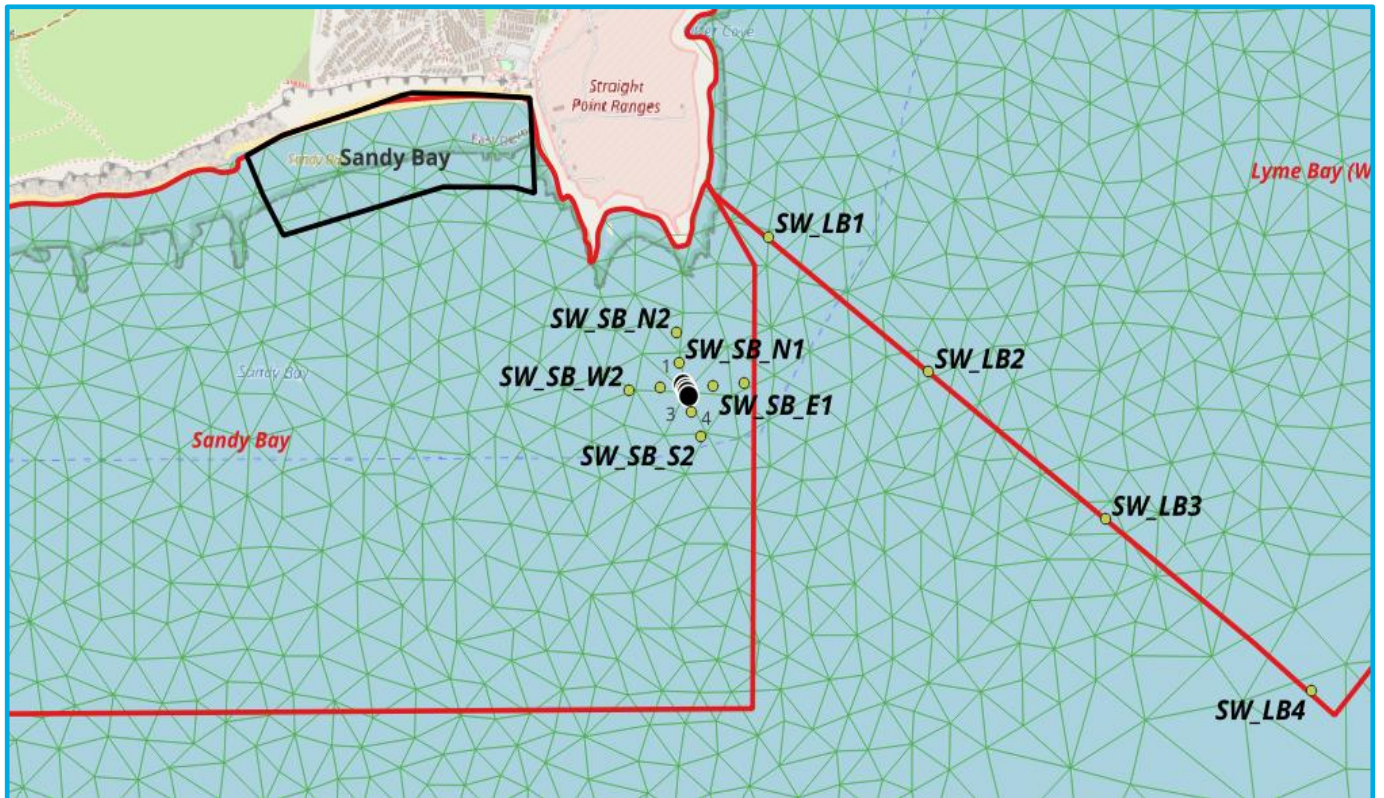


Figure 3 - Model Assessment Points – Sandy Bay and Western Edge of Lyme Bay (West) Shellfish Water

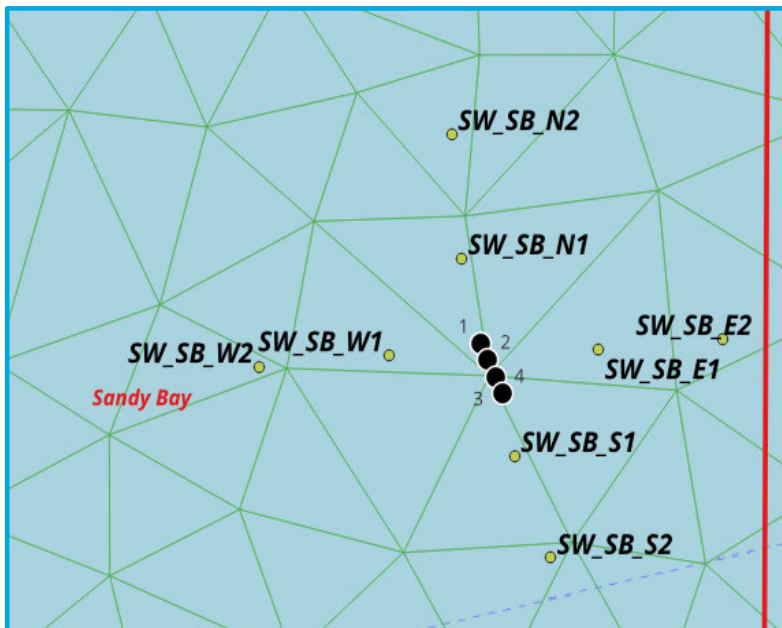


Figure 4 - Model Assessment Points – Close to Diffuser