
SOUTHEND AIRPORT

BIOLOGICAL WATER QUALITY MONITORING

INTERIM REPORT COMPARING NOVEMBER 2012 WITH FEBRUARY 2013 SAMPLING RESULTS

This Interim Report sits within the two year biological baseline monitoring programme commissioned by London Southend Airport (LSA) in November 2011 to determine the nature of any impact the airport might have on the quality of surface water drainage from the airfield. In light of recent use of runway and hard surface de-icants on the airfield (potassium acetate products) the biological monitoring programme is now comparing the results of the biological sampling before and after known application of de-icants during the winter 2012/2013. In parallel with this programme LSA instigated continuous surface water quality and in-stream water quality monitoring at a discharge site into Eastwood Brook and downstream (d/s) of this discharge point to the brook. The results from this are found in a separate report.

Eastwood Brook

Referring to the graphs below and the attached Figure 1 showing sample point locations, the November 2012 samples generally look similar to the February 2013 samples in terms of Taxon Richness (TR), BMWP and ASPT at the following sites:

- d/s South Outfall;
- d/s North Outfall; and
- d/s North Outfall Recovery.

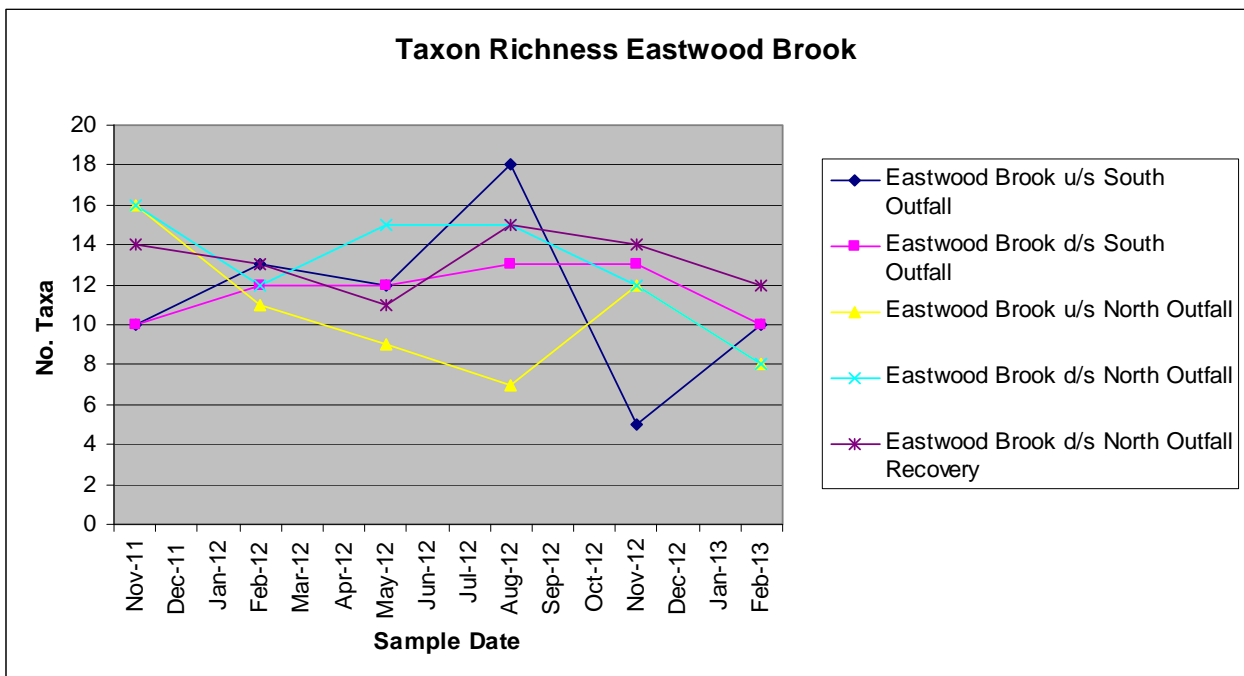
Low TR and BMWP at upstream (u/s) North Outfall seen in August 2012 has improved in the November 2012 sample.

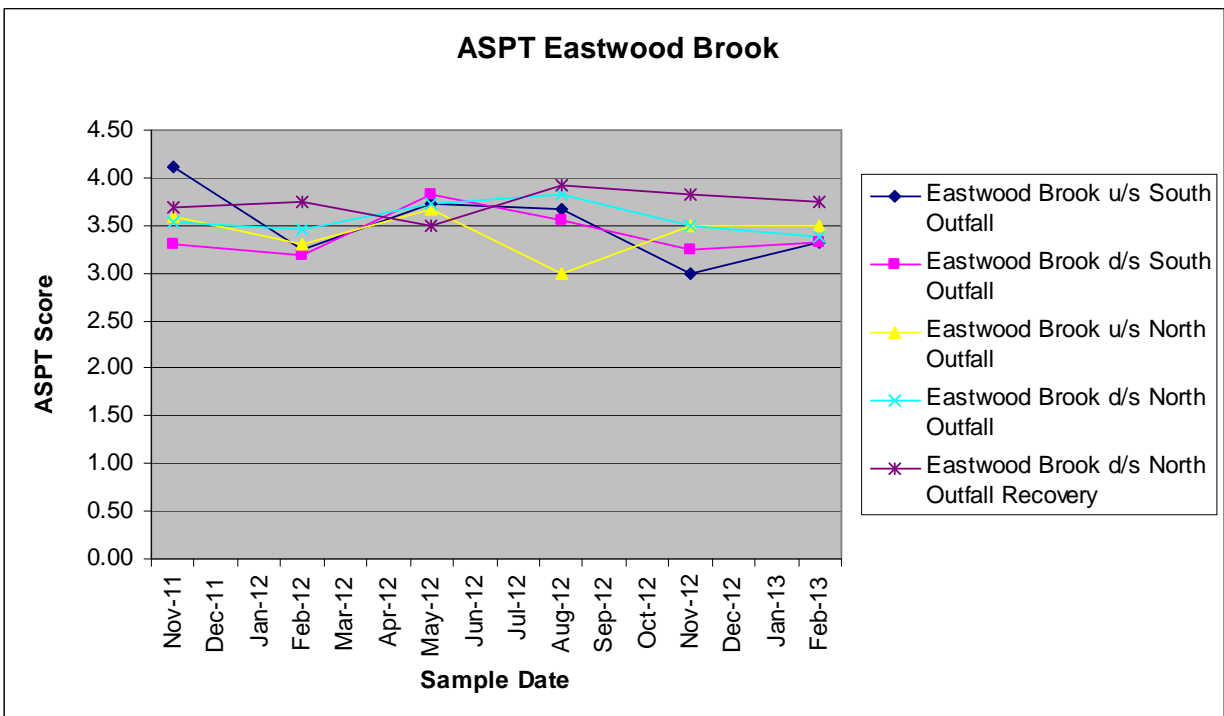
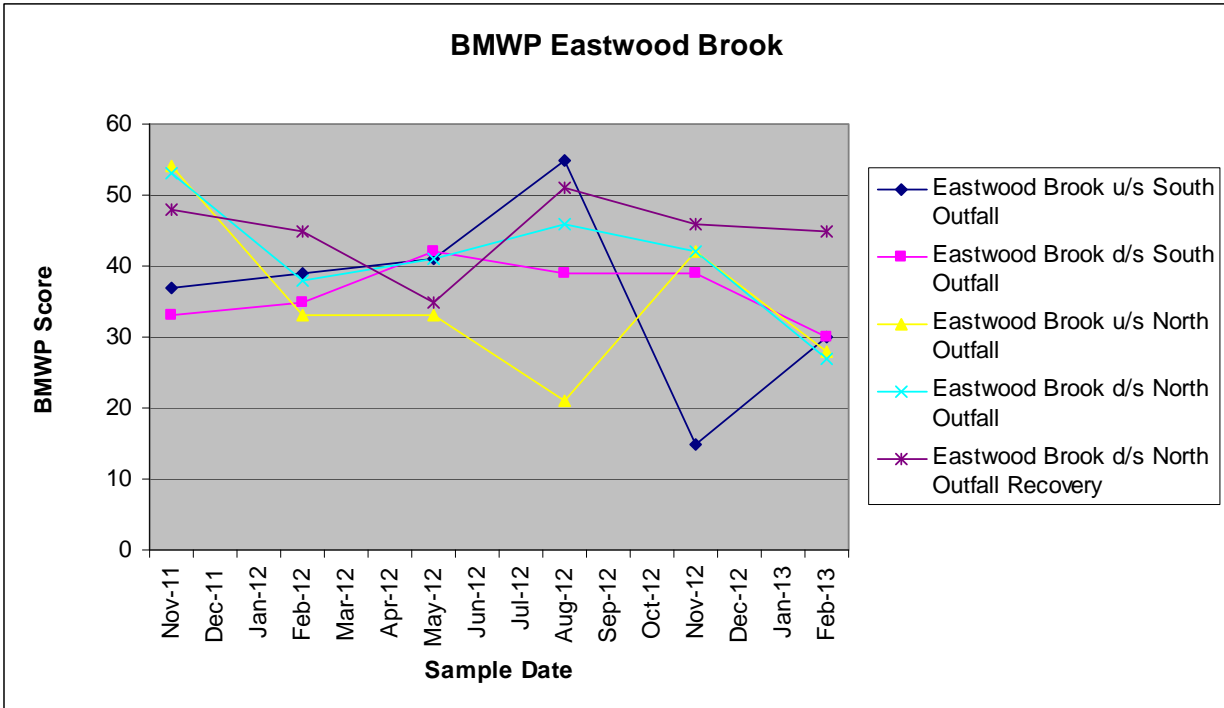
Good water quality results for TR and BMWP at u/s South Outfall seen in August 2012 show a strong drop in November 2012. Although the ASPT score is also lower, the graph does not look so dramatic. The cause for this decline cannot be Southend Airport as the site is upstream of any airport outfall to the brook.

By February 2103, there are general slight declines in all indices observed, apart from the u/s South Outfall site, where improvements may relate to recovery from a pollution event which occurred between August and November 2012, and which was not related to discharges monitored within this study. Discharges from the North Outfall appear to have had little negative effect as TR, BMWP and ASPT, which are all similar for up and downstream of the outfall. Similarly, any discharges from the South Outfall appear to have had little negative effect on the February 2013 results, as again, TR, BMWP and ASPT are all similar for both the up and downstream samples of the outfall.

Water chemistry shows conductivity of between 620µS and 870µS for the Eastwood Brook sites in November 2012, while in February 2013 reported measurements of 1090µS to 1130 µS. (Conductivity relates to the availability of dissolved ions in the water, and higher values generally indicate greater nutrient or dissolved materials available in the water). Although the February conductivity results are higher than those in the previous autumn, these differences are not considered to be significant. In fact they reflect the general levels of conductivity that might be expected from winter urban runoff.

These post-February 2013 biological results suggest that declines in water quality observed are not due directly to airport discharges. However, it should be remembered that the overall scores for all indices on Eastwood Brook are low because the macro-invertebrate fauna is largely composed of species tolerant of organic pollution and low oxygen levels. These groups are less sensitive to changes in water quality. However, the assemblage of aquatic invertebrates found in East Wood Brook does contain a limited number of species that are more commonly associated with clean water systems and thereby these species may be used to determine whether outfalls into the Brook are having negative impacts. (See also attached data tables)



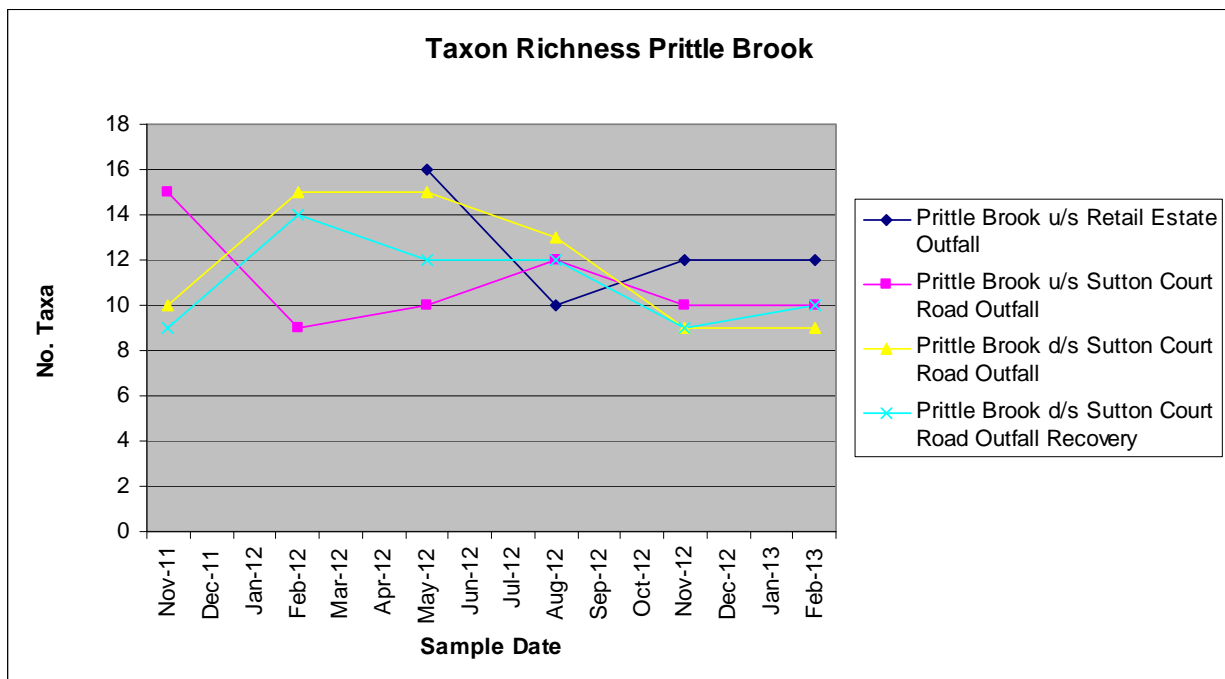


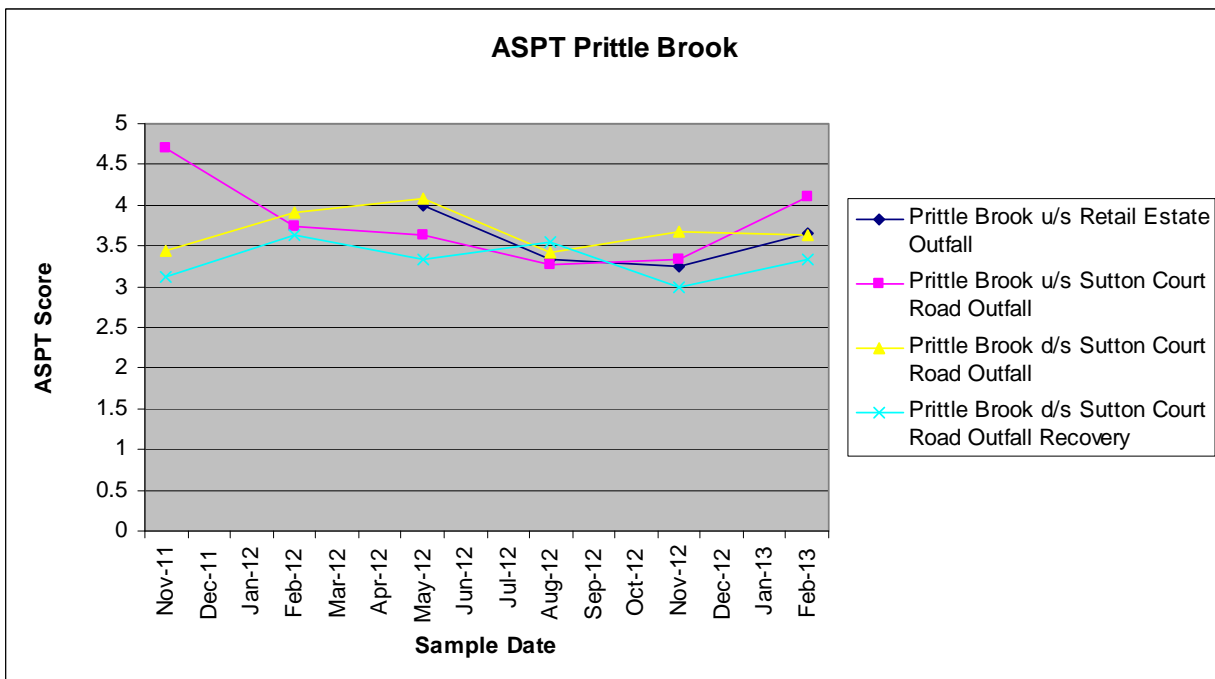
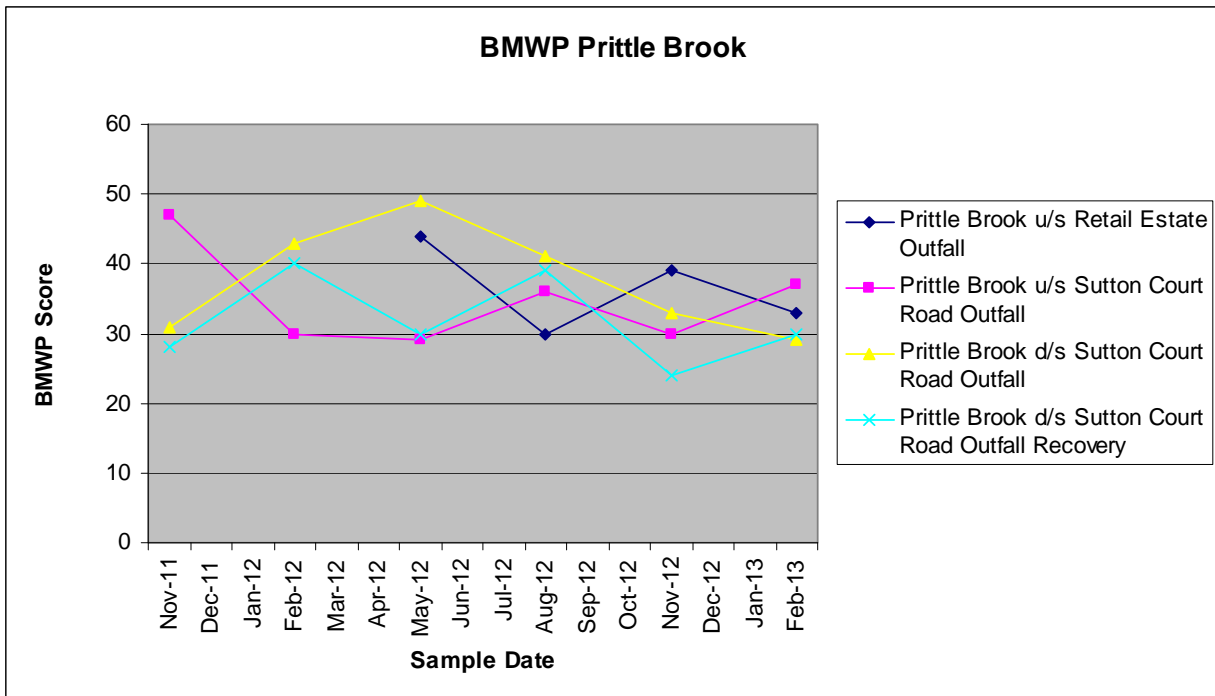
Prittle Brook

Up to February 2013, TR for all sites has remained constant. However, a decline in BMWP was observed at the most upstream site (u/s Retail Estate Outfall), which is upstream of the airport. The pollution impact reflected in this sample was seen to have recovered at the site u/s Sutton Court Road Outfall, which indicated improvements in BMWP and ASPT since the November 2012 sample (it should be noted that the surveyors during the February survey identified grey fungus at the Sutton Court Road Outfall but that this did not extend any distance downstream).

At the site d/s Sutton Court Road Outfall, BMWP levels drop again, suggesting some effect from airport runoff from this outfall. However, ASPT remained constant, suggesting only a minor impact upon the receiving watercourse. The d/s Sutton Court Road Recovery site showed improvements in both BMPW and ASPT indices, as expected.

Therefore, on Prittle Brook, there appears to be some negative impact upon water quality resulting from winter discharges from the Sutton Court Road Outfall. Although these effects are slight, the fauna is already largely limited to pollution and low-oxygen tolerant groups and so general the aquatic fauna is not so sensitive to water chemistry changes driven by surface water inputs. As with Eastwood Brook, Prittle Brook also supports a limited number of species which are slightly more sensitive to water quality impacts. (See also attached data tables)





Data Tables

Taxon Richness at Southend Airport, November 2011 to February 2013

	10/11/2011	23/02/2012	31/05/2012	07/08/2012	13/11/2012	20/02/2013
Eastwood Brook u/s South Outfall	10	13	12	18	5	10
Eastwood Brook d/s South Outfall	10	12	12	13	13	10
Eastwood Brook u/s North Outfall	16	11	9	7	12	8
Eastwood Brook d/s North Outfall	16	12	15	15	12	8
Eastwood Brook d/s North Outfall Recovery	14	13	11	15	14	12
Prittle Brook u/s Retail Estate Outfall	NO DATA	NO DATA	16	10	12	12
Prittle Brook u/s Sutton Court Road Outfall	15	9	10	12	10	10
Prittle Brook d/s Sutton Court Road Outfall	10	15	15	13	9	9
Prittle Brook d/s Sutton Court Road Outfall Recovery	9	14	12	12	9	10

BMWP Scores at Southend Airport, November 2011 to February 2013

	10/11/2011	23/02/2012	31/05/2012	07/08/2012	13/11/2012	20/02/2013
Eastwood Brook u/s South Outfall	37	39	41	55	15	30
Eastwood Brook d/s South Outfall	33	35	42	39	39	30
Eastwood Brook u/s North Outfall	54	33	33	21	42	28
Eastwood Brook d/s North Outfall	53	38	41	46	42	27
Eastwood Brook d/s North Outfall Recovery	48	45	35	51	46	45
Prittle Brook u/s Retail Estate Outfall	NO DATA	NO DATA	44	30	39	33
Prittle Brook u/s Sutton Court Road Outfall	47	30	29	36	30	37
Prittle Brook d/s Sutton Court Road Outfall	31	43	49	41	33	29
Prittle Brook d/s Sutton Court Road Outfall Recovery	28	40	30	39	24	30

ASPT Scores at Southend Airport, November 2011 to February 2013

	10/11/2011	23/02/2012	31/05/2012	07/08/2012	13/11/2012	20/02/2013
Eastwood Brook u/s South Outfall	4.11	3.25	3.73	3.67	3.00	3.33
Eastwood Brook d/s South Outfall	3.30	3.18	3.82	3.55	3.25	3.33
Eastwood Brook u/s North Outfall	3.60	3.30	3.67	3.00	3.50	3.50
Eastwood Brook d/s North Outfall	3.53	3.45	3.73	3.83	3.50	3.38
Eastwood Brook d/s North Outfall Recovery	3.69	3.75	3.50	3.92	3.83	3.75
Prittle Brook u/s Retail Estate Outfall	NO DATA	NO DATA	4.00	3.33	3.25	3.66
Prittle Brook u/s Sutton Court Road Outfall	4.70	3.75	3.63	3.27	3.33	4.11
Prittle Brook d/s Sutton Court Road Outfall	3.44	3.91	4.08	3.42	3.67	3.63
Prittle Brook d/s Sutton Court Road Outfall Recovery	3.11	3.64	3.33	3.55	3.00	3.33

Chemical Determinands for Southend Airport Biological Monitoring Sites

Watercourse	Site	Nov-12			Feb-12			May-12			Aug-12			Nov-12			Feb-13		
		pH	Conductivity (µs)	Temperature (°C)	pH	Conductivity (µs)	Temperature (°C)	pH	Conductivity (µs)	Temperature (°C)	pH	Conductivity (µs)	Temperature (°C)	pH	Conductivity (µs)	Temperature (°C)	pH	Conductivity (µs)	Temperature (°C)
Eastwood Brook	u/s South Outfall	9.05	944	10.6	8.73	1317	10.4	7.01	826	18.7	7.34	730	18.2	8.03	620	11.0	8.75	1090	5.2
	d/s South Outfall	8.94	925	10.9	8.24	1304	11.5	7.19	851	18.2	7.61	739	17.6	8.30	870	11.0	8.69	1090	5.2
	u/s North Outfall	8.76	1005	11.9	7.95	1415	11.7	6.73	1118	16.7	7.21	846	16.7	8.05	800	11.1	7.88	1120	5.9
	d/s North Outfall	8.75	1005	12.1	8.03	1429	11.4	6.7	1100	17.9	7.09	841	16.7	8.10	790	11.0	7.88	1130	5.9
	d/s North Outfall Recovery	8.62	997	12.2	8.02	1396	11.4	6.86	1110	17.8	7.06	826	18	8.21	800	11.1	7.98	1100	5.8
Prittle Brook	u/s Retail Estate Outfall	8.95	935	11.6				6.53	1019	18.1	7.01	839	17.6	8.17	830	12.7	8.23	1130	7.3
	u/s Sutton Court Road Outfall	8.92	927	12.5	8.15	1128	10.9	6.21	993	16.5	6.83	826	16.7	8.17	840	11.0	8.23	1080	4.8
	d/s Sutton Court Road Outfall	8.97	937	12.3	8.16	1113	11	6.5	1000	16.6	7.03	840	16.3	8.04	830	11.0	8.13	1060	5.0
	d/s Sutton Court Road Outfall Recovery	8.98	928	11.7	8.05	1136	11.5	6.79	979	17.4	6.96	831	16.8	8.00	830	11.0	8.13	1040	5.0