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Report No.: 0394/13/ED/0354B

Quarterly EM&A Report

November 2016 - January 2017

Client : China International Water & Electric Corporation

Project: Providing Sufficient Water Depth for Kwai Tsing Container Basin
and its Approach Channel – CV/2013/04

Report No.: 0394/13/ED/0354B

Project Proponent:

Civil Engineering & Development Department
101 Princess Margaret Road,
Homantin,
Kowloon, Hong Kong.

Prepared by: Wingo So

Reviewed by: Cyrus Lai

Certified by: _____


Colin Yung
Environmental Team Leader for
Materialab Consultants Limited

Ref.: CEDDWKTBEM00_0_0311L.17

16 March 2017
By Post and Fax (2419 6218)

Mott MacDonald Hong Kong Ltd.
20/F, AIA Kowloon Tower,
Landmark East,
100 How Ming Street,
Kwun Tong, Kowloon

Attention: Mr Chan T P, Pan, Engineer's Representative

Dear Mr Chan,

**Re: Agreement No. CE 63/2008 (CE)
Dredging Works in Kwai Tsing Container Basin and its Approach Channel
– Investigation, Design and Construction)**

**Contract No. CV/2013/04
Dredging Works in Kwai Tsing Container Basin and its Approach Channel
Verification of Quarterly EM&A Report for November 2016 to January
2017**

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for November 2016 to January 2017 (ET's Report. No. 0394/13/ED/0354B) received by e-mail on 15 March 2017.

We write to verify the captioned report in accordance with Section 12.4 iii of EM&A Manual (AEIAR-156/2010).

Thank you very much for your kind attention and please do not hesitate to contact our Mr Andy Wong or the undersigned should you have any queries.

Yours faithfully,
For and on behalf of
Ramboll Environ Hong Kong Limited



Y H Hui
Independent Environmental Checker

Cc:	MMHK	Mr. C M Howley	2827 1823 (by fax)
	MateriaLab	Mr. Colin Yung	2450 6138 (by fax)
	CIWE	Mr. K.O. Leung and Mr. Lam Wai-hung	2419 6028 (by fax)

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EXECUTIVE SUMMARY

i. This is the Eleventh Quarterly Environmental Monitoring Audit (EM&A) Report – November 2016 – January 2017 for Contract No. CV/2013/04 – Dredging Works in Kwai Tsing and its Approach Channel (CE63/2008 – Providing Sufficient Water Depth for Kwai Tsing Container Basin and its Approach Channel). The dredging works commenced on 23 April 2014. This report presents the environmental monitoring and audit works conducted from 23 October 2016 to 22 January 2017.

ii. Construction Activities for the Reporting Period
During this reporting period, the principal work activities included:

November 2016	December 2016	January 2017
The construction work under this Contract was temporarily suspended since 13 August 2016. Works were resumed on 24 December 2016. During this period, there was no dredging work under this project.		Preparation works of dredging at Portion A / Zone 2B1 and 2B2 in EP.

iii. Water Quality Monitoring

Referring to the *Proposal for Temporary Suspension of Impact Water Quality Monitoring (0394_13_ED_0326F)* which was submitted to EPD in August 2016 with no objection was received from EPD; removal of routine water quality monitoring station at SR1 was therefore effective from the resumption of marine construction works on 24 December 2016.

Routine impact water quality monitoring at 21 designated monitoring stations namely C1, C2, C3, G1, G2, G3, G4, G5, G6, SR2, SR3, SR4, SR5, SR6, SR7, SR8, SR9, SR10, SR11, SR12 and SR13 were conducted during the reporting period. Exceedances of TIN (in-situ & lab) and Suspended Solids were recorded at various monitoring stations, detail of exceedance are summarized in **Table I and II**. However, investigation indicated these exceedances were not related to the Project works.

Table I Summary of Water Quality Exceedances – Routine Impact Monitoring (In-situ)

Station	Exceedance Level	DO (S&M)		DO (B)		Turbidity		NH3-N		UIA		TIN		Total	
		E	F	E	F	E	F	E	F	E	F	E	F	E	F
SR2	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR4	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR5	Action	0	0	0	0	0	0	-	-	-	-	1	1	1	1
	Limit	0	0	0	0	0	0	-	-	-	-	0	0	0	0
SR6	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR7	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR8	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR9	Action	0	0	0	0	0	0	-	-	-	-	5	5	5	5
	Limit	0	0	0	0	0	0	-	-	-	-	4	4	4	4
SR10	Action	0	0	0	0	0	0	-	-	-	-	4	5	4	5
	Limit	0	0	0	0	0	0	-	-	-	-	1	0	1	0
SR11	Action	0	0	0	0	0	0	-	-	-	-	2	4	2	4

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Station	Exceedance Level	DO (S&M)		DO (B)		Turbidity		NH3-N		UIA		TIN		Total	
	Limit	0	0	0	0	0	0	-	-	-	-	2	0	2	0
SR12	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR13	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
Total	Action	0	0	0	0	0	0	0	0	0	0	12	15	27	
	Limit	0	0	0	0	0	0	0	0	0	0	7	4	11	

Table II Summary of Water Quality Exceedances – Routine Impact Monitoring (Laboratory Analysis)

Station	Exceedance Level	Suspended Solids		BOD ₅		<i>E. coli</i>		NH ₃ -N		UIA		Synthetic Detergent		TIN		Total	
		E	F	E	F	E	F	E	F	E	F	E	F	E	F	E	F
SR2	Action	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
SR3	Action	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
SR4	Action	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	3	3	0	0	0	0	0	0	0	0	0	0	-	-	3	3
SR5	Action	0	1	-	-	-	-	-	-	-	-	-	-	1	1	1	2
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	0	0	0	0
SR6	Action	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR7	Action	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2	1
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR8	Action	1	0	-	-	-	-	-	-	-	-	-	-	-	-	1	0
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR9	Action	2	2	-	-	-	-	-	-	-	-	-	-	5	5	7	7
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	4	4	4	4
SR10	Action	1	1	-	-	-	-	-	-	-	-	-	-	4	5	5	6
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0
SR11	Action	1	1	-	-	-	-	-	-	-	-	-	-	2	4	3	5
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	2	0	2	0
SR12	Action	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	1	2	0	0	0	0	0	0	0	0	0	0	-	-	1	2
SR13	Action	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0
Total	Action	10	8	0	0	0	0	0	0	0	0	0	0	12	15	45	
	Limit	4	5	0	0	0	0	0	0	0	0	0	0	7	4	20	

Among the 21 monitoring stations, supplementary 24-hr water quality monitoring was also conducted at 7 of the stations, which are SR4, SR5, SR9, SR10, SR11, SR12 and SR13. No exceedance was recorded in the reporting month. Number of exceedances recorded in the reporting month at each impact station is summarized in **Table III**.

Table III Summary of the Exceedances Recorded in Reporting Quarter – 24-hr Monitoring

Station	Exceedance Level	Turbidity	DO	NH ₃ -N	Total
SR4	Action	0	0	0	0
	Limit	0	0	0	0
SR5	Action	0	0	-	0
	Limit	0	0	-	0
SR9	Action	0	0	-	0
	Limit	0	0	-	0
SR10	Action	0	0	-	0
	Limit	0	0	-	0
SR11	Action	0	0	-	0
	Limit	0	0	-	0
SR12	Action	0	0	0	0
	Limit	0	0	0	0
SR13	Action	0	0	-	0
	Limit	0	0	-	0
Total	Action	0	0	0	0
	Limit	0	0	0	0

iv. Waste Management

No inert or non-inert C&D material related to dredging works and a small amount of general refuse were disposed off site in the reporting period.

iii. Non-Compliance, Complaints, Notifications of Summons and Successful Prosecutions

No complaint, notification of prosecutions or summons was received in the reporting period.

iv. Site Inspections and Audit

The Environmental Team conducted 13 site inspections in the reporting period. No particular observation was recorded in the reporting month except Contractor was reminded to place the corrected NRMM labels for the two air compressors on the drilling barge 998.

According to Contractor, no archaeological deposit was found during reporting period.

v. Compliance with Specific EP conditions

Implementation of contractor's mitigation for waste management and preparation works and other general site practice were checked. It was concluded that the project in compliance with the EP requirements on site mitigation measures in general.

vi. Construction Activities for the Coming Reporting Period

During the coming reporting period, the principal work activities included:

- Preparation Works of Dredging at Portion A / Zone 2B1 and 2B2 in EP
- Dredging at Portion A / Zone 2B1, 2B2 and Zone 2C1 in EP

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According to information provided by the Contractor, dredging works and marine works will only be carried out at area outside Berth KC5 and Tsing Yi Submarine Outfall at Subzones Z1A, Z2B1, Z2B2 and Z2C1 in future. Refer to Section 2.1.4 and Section 2.1.10 of the EM&A Manual, routine water quality monitoring stations at SR6, SR7, SR8, SR9, SR10 and SR11 and 24 hour monitoring stations at SR9, SR10 and SR11 were proposed to be removed as according to the *Proposal on Removal of Some Water Quality Monitoring Stations After Resumption of Marine Construction Works (Dredging Works and Marine Works of the Northern Part of Kwai Tsing Container Basin Only)* (0394_13_ED_0332I) which no objection was received from EPD and relevant parties. The removal of the water quality monitoring at the mentioned stations will be effective from 23 January 2017.

Future Key Issues include:

- Regular inspection on silt curtain deployment
- Regular inspection on silt screen deployment
- Implementation of EM&A Programme
- Maintain dredging below allowable dredging rate in EP.
- Cleaning of excess material from the decks and exposed fittings of barges and dredgers before the vessel is moved.
- Barge loading shall be monitored to ensure material is not lost during transportation.
- Conditions in dumping permit shall be followed strictly.

1. INTRODUCTION

1.1 Background

- 1.1.1 The Project objective is to dredge approximately 4.0 million cubic metres of sediment from the seabed of Kwai Tsing Container Basin, as well as portions of Northern Fairway and Western Fairway, to provide sufficient depth of container basin and approach channel to Kwai Tsing Container Terminal (KTCT) for the safe navigation of Ultra Large Container Ships (ULCS).
- 1.1.2 The environmental monitoring and audit works of this Project is governed by Environmental Permit (EP) No. EP-426/2011/A, EM&A Manual (AEIAR-156/2010) and EM&A TIN (EPD Letter Ref: (34) in Ax(1) to EP2/N3/C/57Pt.7)).
- 1.1.3 The project proponent was the Civil Engineering & Development Department, HKSAR (CEDD). The Project General Layout is shown in **Figure 1**.
- 1.1.4 Mott MacDonald Hong Kong Ltd. (MMHK) was commissioned by CEDD as the Engineer for the Project. Ramboll Environ Hong Kong Limited (REHK) was employed as the Independent Environmental Checker (IEC) in the Project.
- 1.1.5 China International Water & Electric Corporation Limited (CIWE) was appointed as the main contractor for the dredging works.
- 1.1.6 Materialab Consultants Limited (MCL) was appointed as the Environmental Team (ET) to implement the Environmental Monitoring and Audit (EM&A) programme for the Project.
- 1.1.7 The construction phase of the Project under the EP was commenced on 23 April 2014. The impact EM&A programme of the Project commenced on 23 April 2014.

1.2 Purpose of the Report

- 1.2.1 This Eleventh Quarterly EM&A Report is prepared by MCL. This report presents a summary of the environmental monitoring and audit works, list of activities and mitigation measures proposed by the ET for the Project in 23 October 2016 to 22 January 2017.

1.3 Structure of the Report

- 1.3.1 The structure of this report is as follows:

- Section 1: Introduction, including background, purpose and structure of the report
- Section 2: Basic Project Information – summaries background and scope of the Contract, site description, project organization and contract details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.
- Section 3: Routine Impact Water Quality Monitoring – summaries the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency,

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monitoring locations, Action and Limit Levels, monitoring results and Event / Action Plans.

Section 4: 24-hr Water Quality Monitoring – summaries the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, monitoring results and Event / Action Plans.

Section 5: Environmental Site Inspection – summaries the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7: Non-Compliance, Complaints, notifications of summons and Prosecution – summaries any environmental complaints, environmental summons and successful prosecutions within the reporting period.

Section 8: Conclusions and Recommendation

2. BASIC PROJECT INFORMATION**2.1 Project Organizations**

2.1.1 The Project Organization structure is shown in **Appendix A**. The key personnel contact names and numbers are summarized in **Table 2.1**.

Table 2-1 Key Personnel Contact of the Contract

Party	Position	Name	Telephone	Fax
Engineer's Representative (MMHK)	Senior Resident Engineer	Ir. Felix Chau	2419 6008	2419 6218
Independent Environmental Checker (REHK)	Independent Environmental Checker	Mr. YH Hui	3465 2888	3465 2899
Contractor (CIWE)	Site Agent	Mr. KO Leung	2419 6008	2419 6218
	Environmental Officer	Mr. WH Lam	2419 6008	2419 6218
Environmental Team (MCL)	Environmental Team Leader	Mr. Colin Yung	3565 4114	3565 4160

2.2 Construction Programme and Synopsis of Work

2.2.1 The construction phase of the Project under the EP commenced on 23 April 2014.

2.2.2 The construction programme of the Project is shown in **Appendix B**.

2.2.3 The environmental mitigation measures implementation schedule is presented in **Appendix F**.

2.3 Works undertaken during the quarter

During the reporting period, according to the Contractor, the principal work activities include:

November 2016	December 2016	January 2017
The construction work under this Contract was temporarily suspended since 13 August 2016. Works were resumed on 24 December 2016. During this period, there was no dredging work under this project.		Preparation works of dredging at Portion A / Zone 2B1 and 2B2 in EP.

3. EM&A REQUIREMENTS – ROUTINE IMPACT MONITORING**3.1 Monitoring Parameters**

3.1.1 The monitoring parameters and frequency for both in-situ measurement and laboratory analysis are summarised in **Table 3.1**. Parameters for each monitoring station are specified in **Table 3.2**.

Table 3-1 Monitoring Parameters and Frequency

Parameters	Monitoring Frequency
<p><u>In-situ Measurement</u> Turbidity (in NTU), pH, Dissolved Oxygen (in mg/L and %), Temperature (in °C), Salinity (in ppt), ¹Ammonia-N (in mg/L-N and UIA); ²TIN: Ammonia-N (in mg/L), Nitrite (in mg/L), Nitrate (in mg/L)</p> <p><u>Laboratory Analysis</u> ¹Ammonia-N (in mg/L-N and UIA), Suspended Solids (SS), ²BOD₅, ²<i>E.coli</i>, ²Synthetic Detergent; ²TIN: Ammonia-N (in mg/L), Nitrite (in mg/L), Nitrate (in mg/L)</p>	<p>3 days per week, at mid-flood and mid-ebb tides (except detergent which shall be taken one day per month, at mid-flood and mid-ebb)</p> <p>36 hours interval was allowed between subsequent sets of measurement.</p>

Notes:

- Ammonia measurements and samples were taken at SR2, SR3, SR4, SR12, C1, C2, C3 only; UIA: In-situ unionized ammonia was calculated from in-situ measurement of NH₃-N, temperature, pH and salinity; Laboratory determined unionized ammonia was calculated from analysed NH₃-N from water samples and in-situ measurement of temperature, pH and salinity;
- Total Inorganic Nitrogen (TIN) measurements and samples were taken at SR5, SR9, SR10, SR11, G1, G2, G3, G4, G5, G6 only;
- BOD₅, *E.coli* and Synthetic Detergent samples were taken at SR4, SR12, C1, C2, C3 only.

Table 3-2 Water Quality Monitoring Parameters

ID	In-situ Measurement							Laboratory Analysis					
	pH	Temperature	Salinity	Turbidity	Dissolved Oxygen / Dissolved Oxygen%	NH ₃ -N / UIA	TIN (NH ₃ -N, NO ₂ & NO ₃)	Suspended Solids	BOD ₅	E. coli	NH ₃ -N / UIA	Synthetic Detergent	TIN (NH ₃ -N, NO ₂ & NO ₃)
SR2	○	○	○	○	○	○		○			○		
SR3	○	○	○	○	○	○		○			○		
SR4	○	○	○	○	○	○		○	○	○	○	○	
SR5	○	○	○	○	○		○	○					○
SR6	○	○	○	○	○			○					
SR7	○	○	○	○	○			○					
SR8	○	○	○	○	○			○					
SR9	○	○	○	○	○		○	○					○
SR10	○	○	○	○	○		○	○					○
SR11	○	○	○	○	○		○	○					○
SR12	○	○	○	○	○	○		○	○	○	○	○	
SR13	○	○	○	○	○			○					
G1	○	○	○	○	○		○	○					○
G2	○	○	○	○	○		○	○					○
G3	○	○	○	○	○		○	○					○
G4	○	○	○	○	○		○	○					○
G5	○	○	○	○	○		○	○					○
G6	○	○	○	○	○		○	○					○
C1	○	○	○	○	○	○		○	○	○	○	○	
C2	○	○	○	○	○	○		○	○	○	○	○	
C3	○	○	○	○	○	○		○	○	○	○	○	

Note:

1. UIA: In-situ unionized ammonia was calculated from in-situ measurement of NH₃-N, temperature, pH and salinity; laboratory determined unionized ammonia was calculated from analysed NH₃-N from water samples taken and in-situ measurement of temperature, pH and salinity.

3.2 Monitoring Locations

- 3.2.1 Referring to the Proposal for Temporary Suspension of Impact Water Quality Monitoring (0394_13_ED_0326F) which was submitted to EPD in August 2016 with no objection was received from EPD; removal of routine water quality monitoring stations at SR1 was therefore effective from the resumption of marine construction works on 24 December 2016.
- 3.2.2 Impact water quality monitoring was conducted at 21 locations, including 12 sensitive receivers (SR2-13), 6 gradient stations (G1-6) and 3 control stations (C1-3). The locations of the stations are also shown in **Figure 2**.
- 3.2.3 Revisions on monitoring locations were proposed in previous submission (MaterialLab Report No. Ref: 0394/13/ED/0103 – WATER QUALITY MONITORING LOCATION) and were agreed among AFCD, EMSD, WSD and EPD.

3.3 Results and Observations

3.3.1 Impact water quality monitoring was conducted at all designated monitoring stations in the reporting quarter. Impact water quality monitoring results graphical presentations are provided in **Appendix D**.

3.3.2 During the monitoring period, heavy marine traffic (not associated with the Project) was commonly observed nearby the Project site and its vicinity, that the propeller wash from vessels could lead to potential disturbance of seabed sediment and affect the water quality. The above conditions may affect monitoring results. Furthermore, the fish culturing or other activities occurring on the fish rack may cause adverse impact on the receiving water.

3.3.3 Exceedances were recorded for TIN (in-situ & lab) and Suspended Solids. Number of exceedances recorded in the reporting quarter at each impact station is summarized in **Table 3-3 and 3-4**.

Table 3-3 Summary of Water Quality Exceedance (In-situ Measurement)

Station	Exceedance Level	DO (S&M)		DO (B)		Turbidity		NH3-N		UIA		TIN		Total	
		E	F	E	F	E	F	E	F	E	F	E	F	E	F
SR2	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR4	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR5	Action	0	0	0	0	0	0	-	-	-	-	1	1	1	1
	Limit	0	0	0	0	0	0	-	-	-	-	0	0	0	0
SR6	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR7	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR8	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
SR9	Action	0	0	0	0	0	0	-	-	-	-	5	5	5	5
	Limit	0	0	0	0	0	0	-	-	-	-	4	4	4	4
SR10	Action	0	0	0	0	0	0	-	-	-	-	4	5	4	5
	Limit	0	0	0	0	0	0	-	-	-	-	1	0	1	0
SR11	Action	0	0	0	0	0	0	-	-	-	-	2	4	2	4
	Limit	0	0	0	0	0	0	-	-	-	-	2	0	2	0
SR12	Action	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	0	0	0	0	0	0	0	0	0	0	-	-	0	0
SR13	Action	0	0	0	0	0	0	-	-	-	-	-	-	0	0
	Limit	0	0	0	0	0	0	-	-	-	-	-	-	0	0
Total	Action	0	0	0	0	0	0	0	0	0	0	12	15	27	
	Limit	0	0	0	0	0	0	0	0	0	0	7	4	11	

Table 3-4 Summary of Water Quality Exceedance (Laboratory Analysis)

Station	Exceedance Level	Suspended Solids		BOD ₅		<i>E. coli</i>		NH ₃ -N		UIA		Synthetic Detergent		TIN		Total	
		E	F	E	F	E	F	E	F	E	F	E	F	E	F	E	F
SR2	Action	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
SR3	Action	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	0	0	0	0	-	-	-	-	0	0
SR4	Action	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	3	3	0	0	0	0	0	0	0	0	0	0	-	-	3	3
SR5	Action	0	1	-	-	-	-	-	-	-	-	-	-	1	1	1	2
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	0	0	0	0
SR6	Action	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR7	Action	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2	1
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR8	Action	1	0	-	-	-	-	-	-	-	-	-	-	-	-	1	0
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0
SR9	Action	2	2	-	-	-	-	-	-	-	-	-	-	5	5	7	7
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	4	4	4	4
SR10	Action	1	1	-	-	-	-	-	-	-	-	-	-	4	5	5	6
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0
SR11	Action	1	1	-	-	-	-	-	-	-	-	-	-	2	4	3	5
	Limit	0	0	-	-	-	-	-	-	-	-	-	-	2	0	2	0
SR12	Action	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0
	Limit	1	2	0	0	0	0	0	0	0	0	0	0	-	-	1	2
SR13	Action	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0
	Limit	0	0	-	-	-	-	-	-	0	0	-	-	-	-	0	0
Total	Action	10	8	0	0	0	0	0	0	0	0	0	0	12	15	45	
	Limit	4	5	0	0	0	0	0	0	0	0	0	0	7	4	20	

3.3.4 During the reporting period, 27 AL and 11 LL exceedances for TIN (in-situ), 18 AL and 9 LL exceedances for Total Suspended Solids, and 27 AL and 11 LL exceedances for TIN (lab) were recorded.

3.3.5 According to the investigations, the exceedances were considered caused by influences in the vicinity of the station or changes in ambient conditions and not related to the Project.

4. EM&A REQUIREMENTS – 24-HR WATER QUALITY MONITORING

4.1 Monitoring Parameters

- 4.1.1 Dissolved oxygen, temperature and turbidity are recorded every 5 minutes, 24 hours a day 7 days a week during dredging works.
- 4.1.2 In-situ NH₃-N at WSD Flushing Water Intake is measured every 20 minutes, 24 hours a day 7 days a week during works.
- 4.1.3 The water quality parameters measured at particular locations are shown in **Table 4.1**.

Table 4-1 24-hr Water Quality Monitoring Parameters

ID	Description	Parameters				
		Temperature	Turbidity	DO (mg/L)	DO%	NH ₃ -N
SR4	Tsuen Wan, WSD Flushing Water Intake	○	○	○	○	○
SR5	Ma Wan, Fish Culture Zone	○	○	○	○	
SR9	Cheung Sha Wan, Fish Culture Zone	○	○	○	○	
SR10	Lo Tik Wan, Fish Culture Zone	○	○	○	○	
SR11	Sok Kwu Wan, Fish Culture Zone	○	○	○	○	
SR12	Tsing Yi, WSD Flushing Water Intake	○	○	○	○	○
SR13	EMSD Cooling Water Intake for Kwai Chung Hospital	○	○	○	○	

4.2 Monitoring Locations

- 4.2.1 As shown in Table 4.1, the 24 hours water quality monitoring works are performed at SR4, SR5, SR9, SR10, SR11, SR12 and SR13.
- 4.2.2 Revisions on monitoring locations were proposed in previous submission (MaterialLab Report No. Ref: 0394/13/ED/0103 – WATER QUALITY MONITORING LOCATION) and were agreed among AFCD, EMSD, WSD and EPD.

4.3 Results and Observations

- 4.3.1 24-hr water quality monitoring was conducted at all designated monitoring stations in the reporting quarter. Monitoring result graphical presentations are provided in **Appendix E**.
- 4.3.2 During the reporting period, heavy marine traffic (not associated with the Project) was commonly observed nearby the Project site and its vicinity, that the propeller wash from vessels could lead to potential disturbance of seabed sediment and affect the water quality.

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The above conditions may affect monitoring results. Furthermore, the fish culturing or other activities occurring on the fish rack may cause adverse impact on the receiving water.

4.3.3 Number of exceedances recorded in the reporting period at each impact station is summarized in Table 4.2.

Table 4-2 Summary of Water Quality Exceedance (24-hr Monitoring)

Station	Exceedance Level	Turbidity	DO	NH ₃ -N	Total
SR4	Action	0	0	0	0
	Limit	0	0	0	0
SR5	Action	0	0	-	0
	Limit	0	0	-	0
SR9	Action	0	0	-	0
	Limit	0	0	-	0
SR10	Action	0	0	-	0
	Limit	0	0	-	0
SR11	Action	0	0	-	0
	Limit	0	0	-	0
SR12	Action	0	0	0	0
	Limit	0	0	0	0
SR13	Action	0	0	-	0
	Limit	0	0	-	0
Total	Action	0	0	0	0
	Limit	0	0	0	0

4.3.4 No exceedance was recorded in the reporting quarter.

5. ENVIRONMENTAL SITE INSPECTION AND AUDIT

5.1 Site Inspections

5.1.1 The Environmental Team conducted 13 site inspections in the reporting period. No particular observation was recorded in the reporting month except Contractor was reminded to place the corrected NRMM labels for the two air compressors on the drilling barge 998.

5.1.2 According to Contractor, no archaeological deposit was found during reporting period.

5.2 Implementation Status of Environmental Mitigation Measures

5.2.1 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in **Appendix F**. Most of the necessary mitigation measures were implemented properly.

5.2.2 The mitigation measures recommended in the EIA report and required by the EP are considered effective in minimizing environmental impacts. The Contractor has implemented the recommended mitigation measures except those mitigation measures not applicable at this stage.

5.3 Summary of Action taken

5.3.1 The exceedances recorded were considered not related to the Project, follow-up actions are not required.

5.4 Advice on the Solid and Liquid Waste Management Status

5.4.1 According to the Contractor, 30m³ general refuse were generated and disposed of in the reporting period. Summary of waste flow table is detailed in **Appendix G**.

5.4.2 No inert or non-inert C&D material related to dredging works and a small amount of general refuse were disposed off site in the reporting quarter. The details can be referred to the **Table 5-1**.

Table 5-1 Waste Quantities of Dredging Works

Month	Marine Sediment Type	Quantity Generated in Reporting Period (m ³)	Cumulative-to Reporting Period (m ³)	Disposal / Dumping Ground
November 2016	Type 1 – Open Sea Disposal	0	1683850	NA
	Type 2 – Confined Marine Disposal	0	625280	NA
	Type 3 – Special Treatment / Disposal	0	1260	NA
December 2016	Type 1 – Open Sea Disposal	0	1683850	NA
	Type 2 – Confined Marine Disposal	0	625280	NA
	Type 3 – Special Treatment / Disposal	0	1260	NA
January 2017	Type 1 – Open Sea Disposal	0	1683850	NA
	Type 2 – Confined Marine Disposal	0	625280	NA
	Type 3 – Special Treatment / Disposal	0	1260	NA

Note:

Only preparation works for dredging was carried out in the reporting period between 24 December 2016 to 22 January 2017 and no marine sediment was disposed in the reporting period.

5.5 Review of Action and Limit Level

5.5.1 Referring to the ER Letter ref. (CV/2013/04)/M45/400/1247 dated 19 March 2015, a Revised Baseline Water Quality Monitoring Test Methodology – Review of Action and Limit Levels has been submitted to EPD by ER in March 2015. The Action and Limit Level for the wet season (April – October) was effected and applied to the water quality monitoring data from 1 April 2015. The Action and Limit Level is given in **Appendix C**.

5.6 Quarterly Review of Construction Impacts on Water Quality

- 5.6.1 The construction impact on water quality was assessed by comparing the quarterly mean values with the relevant ambient or baseline mean values. Since the routine impact water quality monitoring was temporarily suspended and was resumed from 24 December 2016 in the reporting period, the quarterly mean was therefore taken from 24 December 2016 to 22 January 2017. Results showed that the mean values of TIN (in-situ) at all clusters of monitoring stations and quarterly mean values of TSS at cluster 1 and cluster 3 stations and TIN (lab) at cluster 1 were below the 1.3 x baseline value. Cluster stations with higher impact data are statistically compared to 1.3 x baseline levels or other relevant levels to assess the constructional impacts.
- 5.6.2 Quarterly means of cluster 2 stations of TSS (at mid ebb) are compared to their 1.3 x baseline data while data from flood tide are not analysed (data analysed for relative tide where clustered monitoring stations situate at downstream position and may be subject to project impact, reference made to Figure 2). Result shows the quarterly mean of cluster 2 TSS (at mid ebb) is significantly larger than 1.3 x baseline level ($p < 0.05$). They are further compared to the quarterly control level at C1, and the impact level in cluster 2 is not significantly different from that of control station ($P \geq 0.05$), indicating the quarterly construction impact is not significant.
- 5.6.3 For TIN (lab) at cluster 2 stations, quarterly means at mid ebb are compared to their 1.3 x baseline data while data from flood tide are not analysed (data analysed for relative tide where clustered monitoring stations situate at downstream position and may be subject to project impact, reference made to Figure 2). Result shows the quarterly mean of TIN (lab) at cluster 2 stations (at mid ebb) is significantly larger than 1.3 x baseline level ($p < 0.05$). As TIN is not detected at Control stations, quarterly mean of cluster 2 stations is further compared to the quarterly mean of gradient stations (G1 is the most upstream location at the gradient station among all impact stations at ebb tide, thus is used to compare to cluster 2 stations). Results indicated TIN level at that cluster 2 stations is significantly smaller than that of G1 ($p < 0.05$), it indicates the background TIN level is high and the contribution from the project is not significant.
- 5.6.4 Comparison between quarterly mean and 1.3 x baseline mean is given in Table 5.2, while the summary of key statistical analysis is provided in Table 5.3. Details of key statistical analysis results are provided in **Appendix H**.
- 5.6.5 As 24-hr monitoring is to supplement the routine WQM activities (EM&A Manual Section 2.1.10) and there is no baseline value and/or control / gradient value for a meaningful statistical analysis. Thus no statistical analysis was done for 24-hr monitoring. Also, statistical analysis was not performed for some parameters without exceedances (Turbidity, DO (S&M), DO (B), NH₃-N and UIA for both in-situ and lab results, *E. coli*, BOD₅ and Synthetic Detergent) in the reporting quarter.

Table 5-2 Comparison of Quarterly Mean to Baseline Mean

		TIN (In-situ)						TSS						TIN (Lab)					
		Dry Season Baseline	Baseline x 1.3	Average	Nov 2016 - Jan 2017	Average	Larger than Baseline x 1.3	Baseline	1.3 x Baseline	Average	Nov 2016 - Jan 2017	Average	Larger than Baseline x 1.3	Dry Season Baseline	1.3 x Baseline	Average	Nov 2016 - Jan 2017	Average	Larger than Baseline x 1.3
Control (Flood)	C1	NA	NA	NA	NA	NA	NA	7	9	NA	8	NA	no	NA	NA	NA	NA	NA	NA
	C2	NA	NA	NA	NA	NA	NA	4	6	NA	7	NA	yes	NA	NA	NA	NA	NA	NA
	C3	NA	NA	NA	NA	NA	NA	4	5	NA	7	NA	yes	NA	NA	NA	NA	NA	NA
Control (Ebb)	C1	NA	NA	NA	NA	NA	NA	6	7	NA	7	NA	no	NA	NA	NA	NA	NA	NA
	C2	NA	NA	NA	NA	NA	NA	5	7	NA	7	NA	no	NA	NA	NA	NA	NA	NA
	C3	NA	NA	NA	NA	NA	NA	4	5	NA	7	NA	yes	NA	NA	NA	NA	NA	NA
Gradient (Flood)	G1	0.42	0.55	NA	0.30	NA	no	7	10	NA	8	NA	no	0.30	0.39	NA	0.30	NA	no
	G2	0.44	0.57		0.29		no	5	7		7		no	0.31	0.40		0.29		no
	G3	0.42	0.55		0.39		no	6	8		7		no	0.30	0.39		0.29		no
	G4	0.56	0.73		0.52		no	8	10		8		no	0.35	0.46		0.52		yes
	G5	0.26	0.34		0.25		no	6	8		8		no	0.15	0.20		0.24		yes
	G6	0.20	0.26		0.20		no	4	5		7		yes	0.12	0.16		0.19		yes
Gradient (Ebb)	G1	0.40	0.52	NA	0.31	NA	no	5	7	NA	8	NA	yes	0.28	0.36	NA	0.30	NA	yes
	G2	0.38	0.49		0.29		no	5	7		6		no	0.28	0.36		0.29		yes
	G3	0.36	0.46		0.30		no	5	7		7		no	0.24	0.31		0.30		yes
	G4	0.53	0.69		0.52		no	7	9		8		no	0.34	0.44		0.52		yes
	G5	0.21	0.27		0.25		yes	5	7		7		no	0.13	0.17		0.24		yes
	G6	0.21	0.27		0.20		no	4	5		7		yes	0.13	0.17		0.19		yes
Cluster 1 (Flood)	SR2	NA	NA	0.51	NA	0.30	no	5	7	8.67	6	7.00	no	NA	NA	0.38	NA	0.29	no
	SR3	NA	NA		NA			5	7		6			NA	NA		NA		
	SR4	NA	NA		NA			7	9		8			NA	NA		NA		
	SR5	0.39	0.51		0.30			6	8		7			0.29	0.38		0.29		
	SR12	NA	NA		NA			9	12		8			NA	NA		NA		
Cluster 1 (Ebb)	SR2	NA	NA	0.53	NA	0.30	no	5	7	7.33	6	7.00	no	NA	NA	0.36	NA	0.30	no
	SR3	NA	NA		NA			5	6		7			NA	NA		NA		
	SR4	NA	NA		NA			5	7		8			NA	NA		NA		
	SR5	0.41	0.53		0.30			5	6		7			0.28	0.36		0.30		
	SR12	NA	NA		NA			7	9		7			NA	NA		NA		
Cluster 2 (Flood)	SR6	NA	NA	0.27	NA	0.20	no	5	6	6.17	8	6.83	yes	NA	NA	0.16	NA	0.19	yes
	SR7	NA	NA		NA			6	8		6			NA	NA		NA		
	SR8	NA	NA		NA			4	5		7			NA	NA		NA		
	SR9	0.20	0.26		0.23			5	7		7			0.11	0.14		0.23		
	SR10	0.22	0.29		0.19			5	7		7			0.13	0.17		0.19		
	SR11	0.20	0.26		0.17			3	4		6			0.12	0.16		0.16		
Cluster 2 (Ebb)	SR6	NA	NA	0.27	NA	0.20	no	4	6	5.83	8	7.00	yes	NA	NA	0.14	NA	0.20	yes
	SR7	NA	NA		NA			6	8		7			NA	NA		NA		
	SR8	NA	NA		NA			4	5		7			NA	NA		NA		
	SR9	0.20	0.26		0.24			4	6		8			0.11	0.14		0.23		
	SR10	0.22	0.28		0.20			4	5		6			0.11	0.14		0.19		
	SR11	0.20	0.26		0.17			4	5		6			0.11	0.14		0.17		
Cluster 3 (Flood)	SR13	NA	NA	NA	NA	NA	NA	16	21	21.00	8	8.00	no	NA	NA	NA	NA	NA	NA
Cluster 3 (Ebb)	SR13	NA	NA	NA	NA	NA	NA	10	14	14.00	8	8.00	no	NA	NA	NA	NA	NA	NA

NA: Not Applicable

- Control and Gradient stations are compared on individual stations for reference, no clustering analysis was performed. Impact stations are compared in clusters of stations, or
- Parameter is not monitored at the station.

Table 5-3 Summary of Statistical Analysis

Parameter	Cluster	Compared against	Results and Conclusions
TSS	Cluster 2	<p>Quarterly Mean at Impact Stations (ebb tide) against 1.3 x Baseline Level (ebb tide)</p> <p>Quarterly Mean at Impact Station (ebb tide) against Upstream Control (C1) Mean (ebb tide)</p>	<p>Quarterly mean at Impact Station (ebb tide) is significantly higher than 1.3 x Baseline mean (ebb tide) ($p < 0.05$).</p> <p>Impact Mean (ebb tide) is not significantly different than Upstream Control (C1) Mean (ebb tide) ($p \geq 0.05$), indicating the project impact is not significant.</p>
TIN (Lab)	Cluster 2	<p>Quarterly Mean at Impact Stations (ebb tide) against 1.3 x Baseline Level (ebb tide)</p> <p>Quarterly Mean at Impact Station (ebb tide) against Upstream Gradient (G1) Mean (ebb tide)</p>	<p>Quarterly mean at Impact Station (ebb tide) is significantly higher than 1.3 x Baseline mean (Ebb tide) ($p < 0.05$).</p> <p>Impact Mean (ebb tide) is significantly smaller than Upstream Gradient (G1) Mean (ebb tide) ($p < 0.05$), indicating the background TIN level is high and the project impact is not significant.</p>

5.6.6 Exceedance are considered to be due to change in ambient conditions or influences in the vicinity of the stations. Mitigation measures for dredging works were implemented in accordance with EP and EIA requirements.

6. NON-COMPLIANCE, COMPLAINTS, NOTIFICATION OF SUMMONS AND PROSECUTION

6.1.1 In this reporting period, no complaint, inspection notice, notification of summons or prosecution was received. Cumulative complaint log, summaries of complaints, notification of summons and successful prosecutions are presented in **Tables 6.1, 6.2 and 6.3.**

Table 6-1 Environmental Complaints Log

Complaint Log No.	Date of Receipt	Received From and Received By	Nature of Complaint	Date Investigated	Outcome	Date of Reply
Nil	-	-	-	-	-	-

Table 6-2 Cumulative Statistics on Complaints

Environmental Parameters	Cumulative No. Brought Forward	No. of Complaints This Period	Cumulative Project-to-Date
Air	0	0	0
Noise	0	0	0
Water	0	0	0
Waste	0	0	0
Total	0	0	0

Table 6-3 Cumulative Statistics on Successful Prosecutions

Environmental Parameters	Cumulative No. Brought Forward	No. of Prosecutions This Period	Cumulative Project-to-Date
Air	0	0	0
Noise	0	0	0
Water	0	0	0
Waste	0	0	0
Total	0	0	0

7. CONCLUSIONS

- 7.1.1 The dredging works was commenced on 23 April 2014. The EM&A programme was carried out in accordance with the EM&A Manual requirements. As per the EM&A Manual, water quality impact monitoring was conducted during the dredging works.
- 7.1.2 During the reporting period, exceedances were recorded for TIN (in-situ & lab) and SS in the routine impact monitoring. No exceedance was recorded in 24-hr monitoring. Investigation found that the exceedances were not project related and were considered caused by influences in the vicinity of the stations or change in ambient conditions.
- 7.1.3 13 environmental site inspections were carried out weekly in the reporting period.
- 7.1.4 No environmental complaint was received and followed up by Environmental Team in the reporting period.
- 7.1.5 No notification of summons and prosecution was received in the reporting period.
- 7.1.6 According to information provided by the Contractor, dredging works and marine works will only be carried out at area outside Berth KC5 and Tsing Yi Submarine Outfall at Subzones Z1A, Z2B1, Z2B2 and Z2C1 in future. Refer to Section 2.1.4 and Section 2.1.10 of the EM&A Manual, routine water quality monitoring stations at SR6, SR7, SR8, SR9, SR10 and SR11 and 24 hour monitoring stations at SR9, SR10 and SR11 were proposed to be removed as according to the *Proposal on Removal of Some Water Quality Monitoring Stations After Resumption of Marine Construction Works (Dredging Works and Marine Works of the Northern Part of Kwai Tsing Container Basin Only)* (0394_13_ED_0332I) which no objection was received from EPD and relevant parties. The removal of the water quality monitoring at the mentioned stations will be effective from 23 January 2017.

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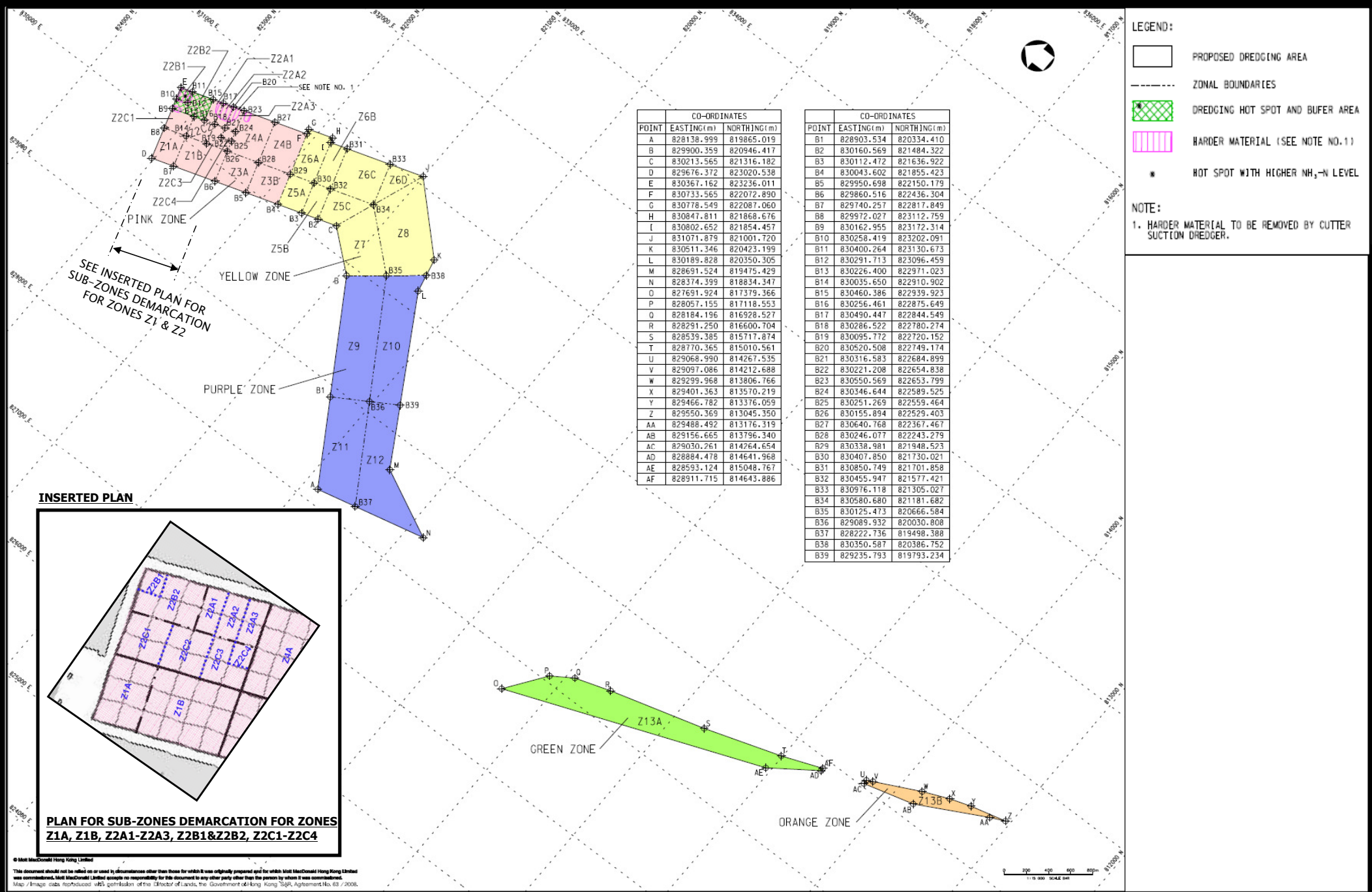
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Figure 1

Project General Layout



Project Title: Providing Sufficient Water Depth for Kwai Tsing Container Basin and its Approach Channel

Figure 2: Zones and Sub-zone of Dredging Plan Layout (Extracted from Figure 2 of Justification for the Proposed Demarcation of the Dredging Zones)

Environmental Permit No.:

EP-426/2011/A



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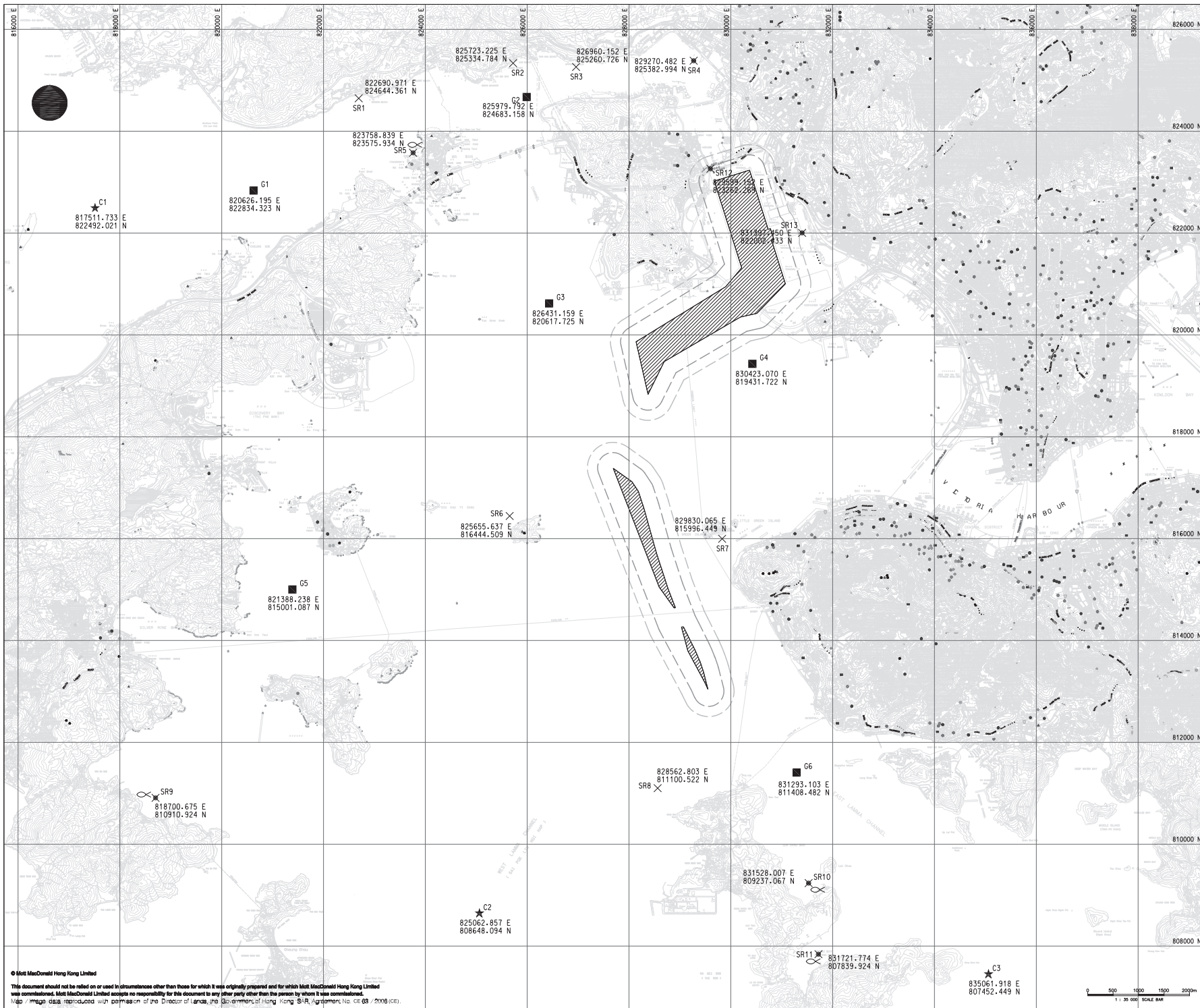
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Report No.: 0394/13/ED/0354B

Figure 2

Locations of Water Quality Monitoring Stations



NOTES:
 1. ALL COORDINATES ARE IN HONG KONG METRIC GRID (YY807).
 2. THE CONTRACTOR SHALL REFER TO RELEVANT SECTION(S) AND APPENDICES OF THE PARTICULAR SPECIFICATION REGARDING THE WATER QUALITY MONITORING.

- LEGEND:
- SITE BOUNDARY
 - × MONITORING STATION
 - ★ CONTROL STATION
 - GRADIENT STATION
 - 24-HRS MONITORING STATION
 - ∞ FISH CULTURE ZONE

1	APR 13	WH	TENDER ADDENDUM NO. 1	SL	CMH
0	APR 13	WH	TENDER DRAWING	SL	CMH
Rev	Date	Drawn	Description	Chk'd	App'd



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Client
 THE GOVERNMENT OF THE HONG KONG
 SPECIAL ADMINISTRATIVE REGION
 CIVIL ENGINEERING
 AND DEVELOPMENT DEPARTMENT

Project
 CONTRACT NO. : CV/2013/04
 DREDGING WORKS IN KWAI TSING
 CONTAINER BASIN AND ITS
 APPROACH CHANNEL

Title
 PROVISIONAL LOCATION
 OF WATER QUALITY
 MONITORING STATIONS

Designed	FC	<i>[Signature]</i>	Eng check	SL	<i>[Signature]</i>
Drawn	WH	<i>[Signature]</i>	Coordination	TF	<i>[Signature]</i>
Dwg check	FC	<i>[Signature]</i>	Approved	CMH	<i>[Signature]</i>
Scale at A1	Status		Rev		
1:35000	TEN		2		

Drawing Number
 MMH/259053/EM/403

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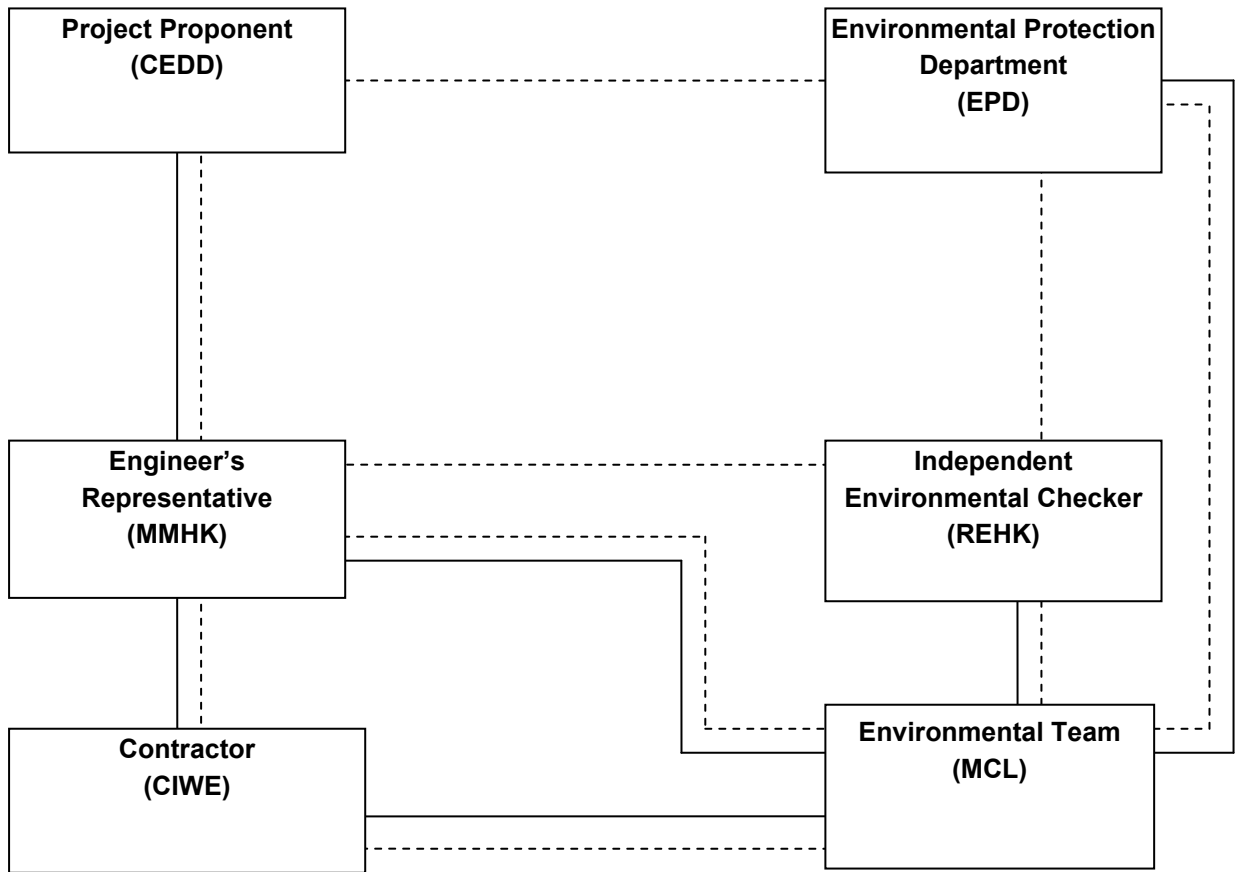
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Appendix A
Project Organization Chart



Legend:

— Line of Reporting

- - - Line of Communication

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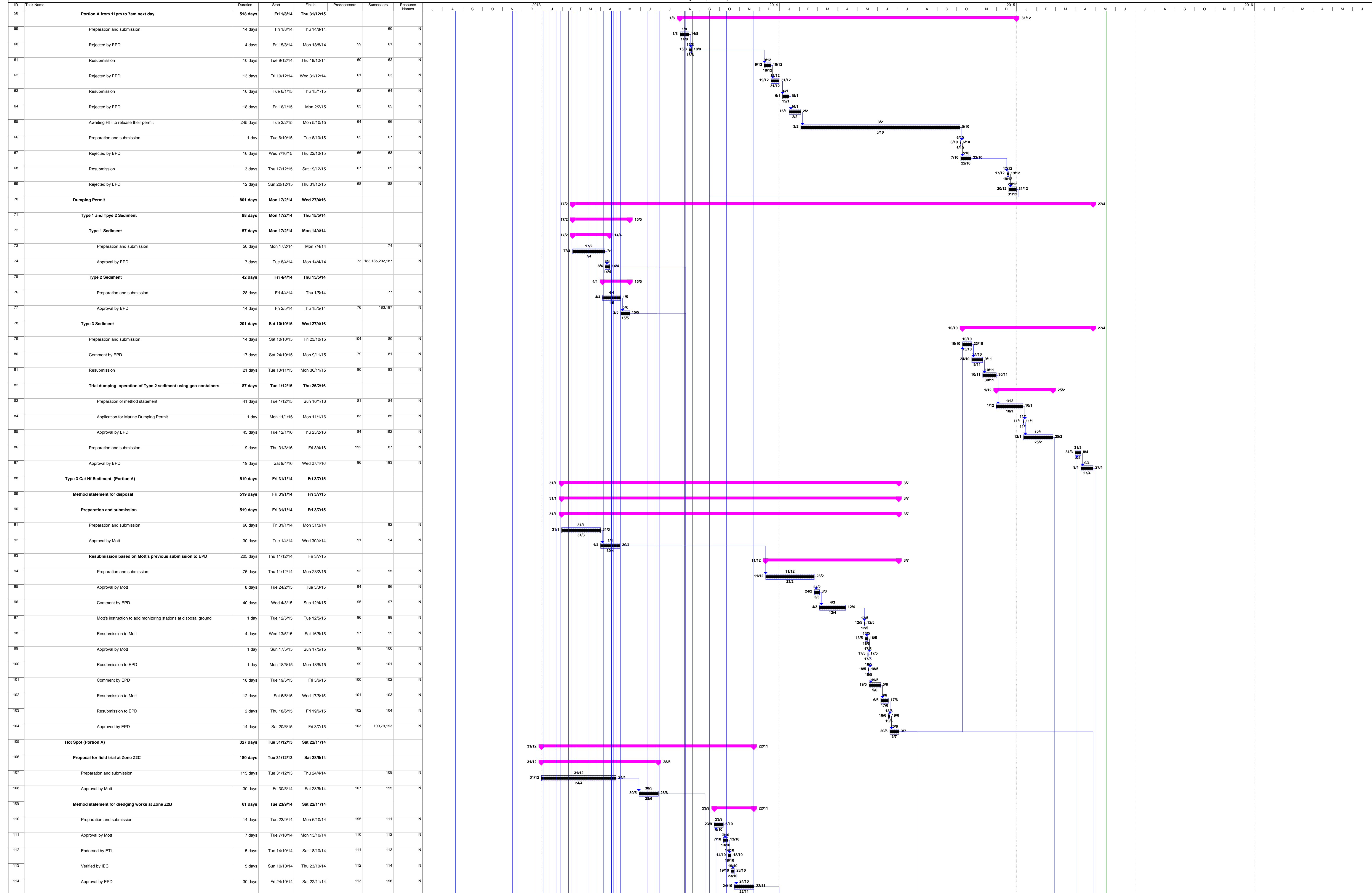
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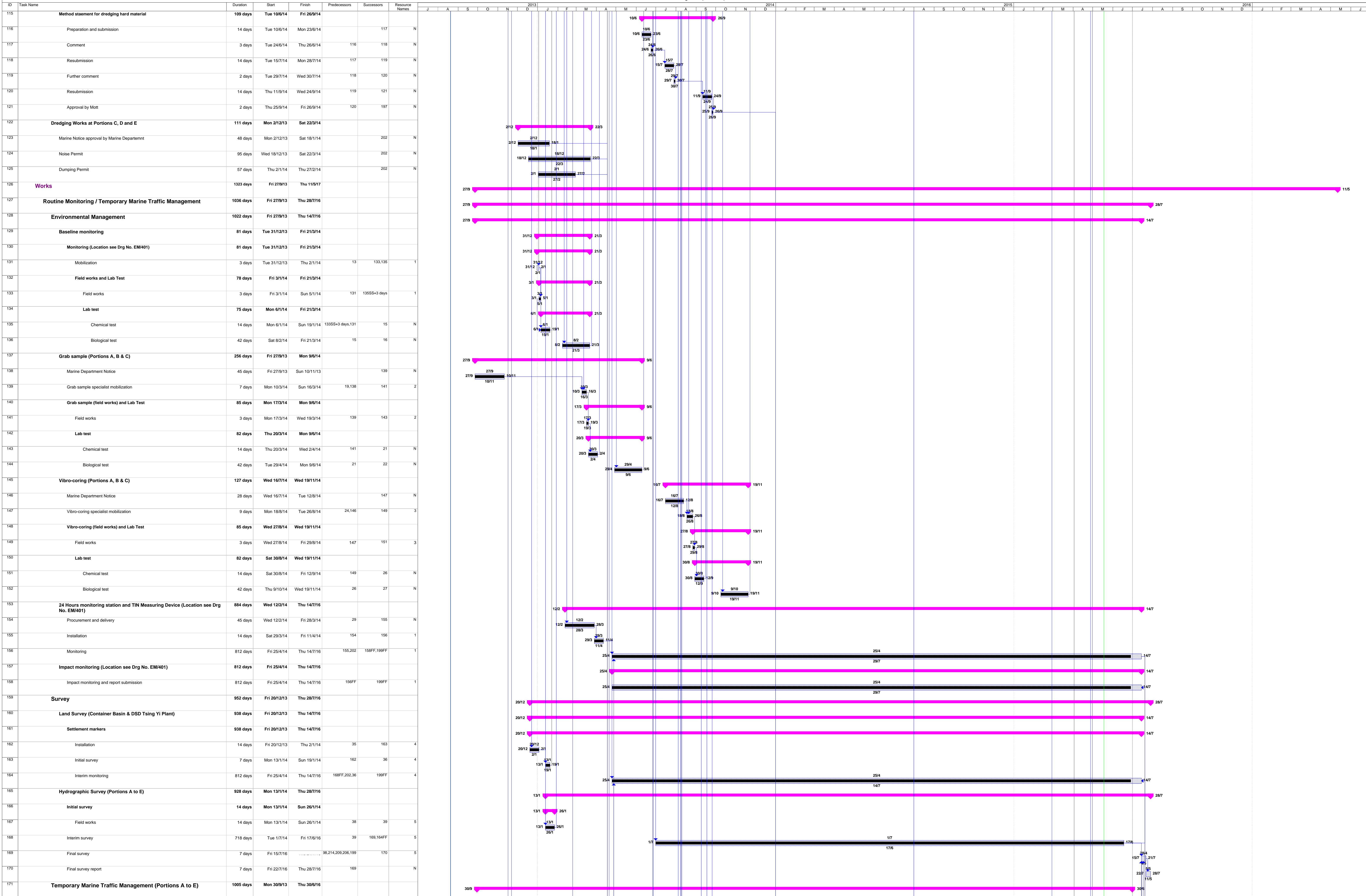
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Appendix B
Construction Programme

ID	Task Name	Duration	Start	Finish	Predecessors	Successors	Resource Names
1	Contract Period	1351 days	Fri 30/8/13	Thu 11/5/17			
2	Contract Commencement Date	0 days	Fri 30/8/13	Fri 30/8/13		4SS	
3	Extended Contract Completion Date	0 days	Mon 9/5/16	Mon 9/5/16		284FF	
4	Possession of Site	0 day			S,18SS,31SS,41SS	N	
5	Section 1	1351 days	Fri 30/8/13	Thu 11/5/17			
6	Submission	972 days	Fri 30/8/13	Wed 27/4/16			
7	Routine Monitoring / Temporary Marine Traffic Management	484 days	Fri 30/8/13	Fri 26/12/14			
8	Environmental Management	484 days	Fri 30/8/13	Fri 26/12/14			
9	Baseline monitoring	231 days	Fri 30/8/13	Thu 17/4/14			
10	ETL and relevant site personal	30 days	Fri 30/8/13	Sat 28/9/13		4SS,13	N
11	Lab Test	30 days	Fri 30/8/13	Sat 28/9/13		4SS,13	N
12	Monitoring (Location see Drg No. EM/401)	201 days	Sun 29/9/13	Thu 17/4/14			
13	Plan	93 days	Sun 29/9/13	Mon 30/12/13	10,11	131	N
14	Sediment Report	88 days	Mon 20/1/14	Thu 17/4/14			
15	Preliminary report	19 days	Mon 20/1/14	Fri 7/2/14	135	136	N
16	Final report	27 days	Sat 22/3/14	Thu 17/4/14	136	183,185,202	N
17	Grab sample (Portions A, B & C)	321 days	Fri 30/8/13	Wed 16/7/14			
18	Grab sample specialist	30 days	Fri 30/8/13	Sat 28/9/13		4SS,19	N
19	Sediment testing and sampling plan	162 days	Sun 29/9/13	Sun 9/3/14	18	139	N
20	Sediment report	105 days	Thu 3/4/14	Wed 16/7/14			
21	Preliminary report	26 days	Thu 3/4/14	Mon 28/4/14	143	144	N
22	Final report	37 days	Tue 10/5/14	Wed 16/7/14	144	187	N
23	Vibro-coring (Portions A, B & C)	159 days	Mon 21/7/14	Fri 26/12/14			
24	Sediment testing and sampling plan	28 days	Mon 21/7/14	Sun 17/8/14		147	N
25	Sediment report	105 days	Sat 13/9/14	Fri 26/12/14			
26	Preliminary report	26 days	Sat 13/9/14	Wed 8/10/14	151	152	N
27	Final report	37 days	Thu 20/11/14	Fri 26/12/14	152	187FS-139 days	N
28	24 Hours monitoring station and TIN Measuring Device (Location see Drg No. EM/401)	79 days	Mon 25/11/13	Tue 11/2/14			
29	Instrumentation	79 days	Mon 25/11/13	Tue 11/2/14		154	N
30	Survey	179 days	Fri 30/8/13	Mon 24/2/14			
31	Surveyor	35 days	Fri 30/8/13	Thu 3/10/13		4SS,35,38	N
32	Geophysicist	35 days	Sun 3/11/13	Sat 7/12/13		202	N
33	Land Survey (Container Basin & DSD Tsing Yi Plant)	67 days	Tue 26/11/13	Fri 31/1/14			
34	Settlement markers	67 days	Tue 26/11/13	Fri 31/1/14			
35	Method Statement for Installation and Monitoring	24 days	Tue 26/11/13	Thu 19/12/13	31	162	N
36	Initial report	12 days	Mon 20/1/14	Fri 31/1/14	163	164	N
37	Hydrographic Survey (Portions A to E)	144 days	Fri 4/10/13	Mon 24/2/14			
38	Method Statement	36 days	Fri 4/10/13	Fri 8/11/13	31	167	N
39	Initial survey Report	29 days	Mon 27/1/14	Mon 24/2/14	167	168	N
40	Temporary Marine Traffic Management (Portions A to E)	144 days	Fri 30/8/13	Mon 20/1/14			
41	Consultant, Risk Manager and Marine Traffic Engineer	28 days	Fri 30/8/13	Thu 26/9/13		4SS,43	N
42	Independent Checking Engineer (ICE)	25 days	Fri 27/12/13	Mon 20/1/14		173FS-60 days	N
43	Webbase software and Trial Run	50 days	Fri 27/9/13	Fri 15/11/13	41	173	N
44	Dredging Works (Portions A to E)	896 days	Thu 14/11/13	Wed 27/4/16			
45	Independent Checking Engineer (ICE)	21 days	Thu 14/11/13	Wed 4/12/13		51	N
46	Silt screen deployment plan and report (Location see Drg No. EM/401)	77 days	Fri 6/12/13	Thu 20/2/14			
47	Method statement	77 days	Fri 6/12/13	Thu 20/2/14		185,178	N
48	Dredging method statement and silt curtain deployment plan	118 days	Thu 28/11/13	Tue 25/3/14			
49	Method statement for dredging works	104 days	Thu 28/11/13	Tue 11/3/14		202	N
50	Silt curtain deployment plan	118 days	Thu 28/11/13	Tue 25/3/14			
51	Design	70 days	Tue 17/12/13	Mon 24/2/14	45	52FS-89 days	N
52	Deployment plan	118 days	Thu 28/11/13	Tue 25/3/14	51FS-89 days	202	N
53	Dredging Works at Portions A and B	891 days	Tue 19/11/13	Wed 27/4/16			
54	General seabed	891 days	Tue 19/11/13	Wed 27/4/16			
55	Marine Notice approval by Marine Departemnt	247 days	Tue 19/11/13	Wed 23/7/14		185	N
56	Noise Permit	739 days	Mon 23/12/13	Thu 31/12/15			
57	General	101 days	Mon 23/12/13	Wed 2/4/14		183,185	N







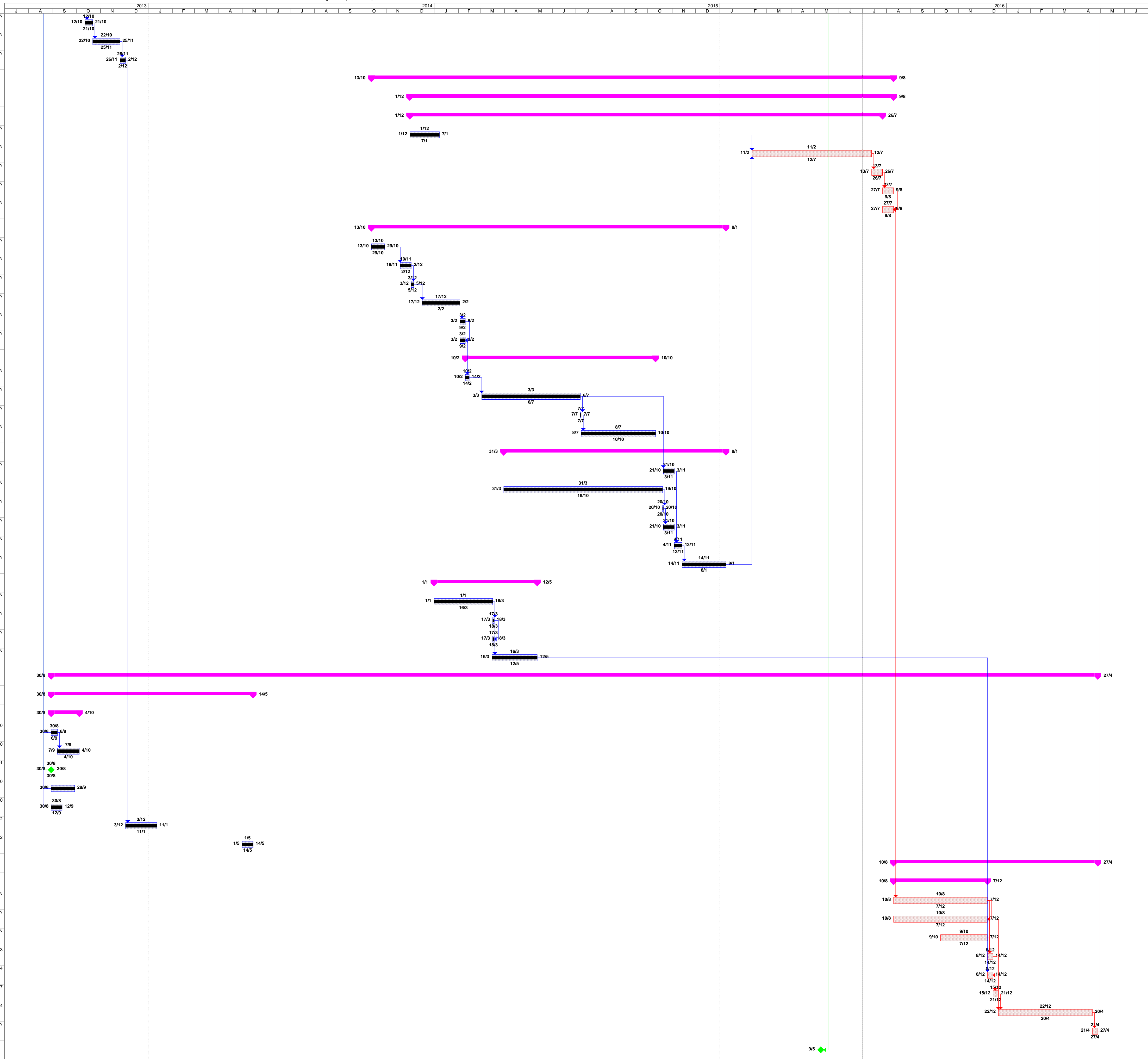
China International Water & Electric Corp. Task Critical Task Milestone Summary

* Subject to availability of working windows

ID	Task Name	Duration	Start	Finish	Predecessors	Successors	Resource Names
172	Organizing meeting for information collection	990 days	Mon 30/9/13	Wed 15/6/16			N
173	Temporary marine traffic management and TMTM meeting	952 days	Fri 22/11/13	Thu 30/6/16	42FS-60 days,43		N
174	Dredging Works (Portions A to E)	964 days	Sun 1/12/13	Thu 21/7/16			
175	Interface with other contractors or utility undertakings	943 days	Sun 1/12/13	Thu 30/6/16			N
176	Organizing coordination meeting	943 days	Sun 1/12/13	Thu 30/6/16			N
177	Silt screen (Location see Drg No. EM/401)	882 days	Fri 21/2/14	Thu 21/7/16			
178	Installation of silt screen	7 days	Fri 21/2/14	Thu 27/2/14	47	179,202	6
179	Maintenance of silt screen	813 days	Thu 24/4/14	Thu 14/7/16	178	180,199FF	6
180	Removal of silt screen	7 days	Fri 15/7/16	Thu 21/7/16	179		6
181	Dredging Works at Portions A and B	710 days	Mon 9/6/14	Wed 18/5/16			
182	General seabed	701 days	Mon 9/6/14	Mon 9/5/16			
183	Mobilization	42 days	Fri 27/6/14	Thu 7/8/14	74,77,16,57	185	7
184	Fabrication of silt curtain	7 days	Mon 9/6/14	Sun 15/6/14		185	8
185	Pilot test for silt curtain	2 days	Fri 8/8/14	Sat 9/8/14	164,74,16,47,55,57	187	7
186	Monitoring brief for unidentified sonar contacts & masked areas	3 days	Wed 27/7/14	Fri 4/7/14		187	N
187	Dredging works 1 (subject to availability of working windows)	30 days	Sun 10/8/14	Mon 1/9/14	74,77,22,27FS-139 days	195	7
188	Dredging works 2 (subject to availability of working windows)	595 days	Tue 23/9/14	Mon 9/5/16	195,69	169,199	7
189	Type 3 Cat Hf Sediment (Portion A)	292 days	Sat 1/8/15	Wed 18/5/16			
190	Procurement and delivery of Geo-container	112 days	Sat 1/8/15	Fri 20/11/15	104	192	N
191	Trial dumping operation of Type 2 sediment using geo-containers	34 days	Fri 26/2/16	Wed 30/3/16			
192	Trial dumping	34 days	Fri 26/2/16	Wed 30/3/16	85,190	193,86	7
193	Dredging works	21 days	Thu 28/4/16	Wed 18/5/16	104,192,87		7
194	Hot Spot (Portion A)	609 days	Tue 9/9/14	Mon 9/5/16			
195	Field trial at Zone Z2C	14 days	Tue 9/9/14	Mon 22/9/14	187,108	188,110	7
196	Dredging works at Z2B *	493 days	Thu 1/1/15	Mon 9/5/16	114	169	7
197	Dredging of hard material *	493 days	Thu 1/1/15	Mon 9/5/16	121	169	7
198	Outfall demolition works*	70 days	Tue 1/3/16	Mon 9/5/16		169,199	7
199	Removal of high spots*	66 days	Tue 10/5/16		58FF,164FF,179FF	220FS-14 days,169	7
200	Dredging Works for Portions C, D and E	707 days	Fri 18/4/14	Thu 24/3/16			
201	Dredging Works for Portion D	666 days	Fri 18/4/14	Fri 12/2/16			
202	Mobilization	7 days	Fri 18/4/14	Ti	1,16,52,123,124,125	203,204,156,164	9
203	Pilot test of silt curtain	2 days	Fri 25/4/14	Sat 26/4/14	202	204FF	9
204	Trial dredging	2 days	Fri 25/4/14	Sat 26/4/14	202,203FF	205	9
205	Dredging works	153 days	Sun 27/4/14	Fri 26/9/14	204	208,206	9
206	Removal of high spots	1 day	Fri 12/2/16	Fri 12/2/16	205,209FF	169	9
207	Dredging Works for Portion E	504 days	Sat 27/9/14	Fri 12/2/16			
208	Dredging Works	51 days	Sat 27/9/14	Sun 16/11/14	205	209,211,213	9
209	Removal of high spots	1 day	Fri 12/2/16	Fri 12/2/16	208,214SS+20 days	169,208FF	9
210	Dredging Works for Portion C	478 days	Wed 3/12/14	Thu 24/3/16			
211	Northern west section	260 days	Wed 3/12/14	Wed 19/8/15	208		7,9
212	Middle section	16 days	Thu 5/11/15	Fri 20/11/15	213FS+4 days	214	7
213	Southern east section	321 days	Mon 15/12/14	Sat 31/10/15	208	212FS+4 days	7,9
214	Removal of high spots	62 days	Sat 23/1/16	Thu 24/3/16	212	169,209SS+20 days	7,9
215	Marine Ground Investigation Works near KC5 in Portion A	74 days	Fri 14/4/16	Mon 13/6/16			
216	Mobilization	7 days	Fri 14/4/16	Thu 7/4/16		217	15
217	Drilling*	32 days	Fri 8/4/16	Mon 9/5/16		216	15
218	Report	35 days	Tue 10/5/16	Mon 13/6/16		217	N
219	Remaining Works	315 days	Fri 1/7/16	Thu 11/5/17			
220	Removal of rock material outside berth KC5 (Details to be confirmed later)*	304 days	Fri 1/7/16	Sun 30/4/17	199FS-14 days		16
221	Dredging works around Tsing Yi Submarine Outfall*	14 days	Fri 28/4/17	Thu 11/5/17	283		7
222	Section 2	1337 days	Fri 30/8/13	Thu 27/4/17			
223	Submission	1064 days	Wed 11/9/13	Tue 9/8/16			
224	Preliminaries (Portion F)	83 days	Wed 11/9/13	Mon 2/12/13			
225	Engineer Principal Accommodation	83 days	Wed 11/9/13	Mon 2/12/13			
226	Preparation and submission of location and layout	0 days	Wed 11/9/13	Wed 11/9/13		227	N
227	Approval of location and layout	30 days	Thu 12/9/13	Fri 11/10/13		226	N
228	Independent Checking Engineer (ICE)	14 days	Mon 7/10/13	Sun 20/10/13	229FF-1 day		N



ID	Task Name	Duration	Start	Finish	Predecessors	Successors	Resource Names	
229	Preparation of calculation	10 days	Sat 12/10/13	Mon 21/10/13	227	230,228FF-1 day	N	
230	Comment and resubmission of calculation	35 days	Tue 22/10/13	Mon 25/11/13	229	231	N	
231	Approval of calculation	7 days	Tue 26/11/13	Mon 2/12/13	230	272	N	
232	Outfall Modification Works (Location see Drg No. S202)	667 days	Mon 13/10/14	Tue 9/8/16				
233	Method statement for modification works	618 days	Mon 1/12/14	Tue 9/8/16				
234	Preparation and submission	604 days	Mon 1/12/14	Tue 26/7/16				
235	Preparation and submission	38 days	Mon 1/12/14	Wed 7/1/15		236	N	
236	Awaiting resolving TMTA constraints	153 days	Thu 11/2/16	Tue 12/7/16	235,258	237	N	
237	Resubmission	14 days	Wed 13/7/16	Tue 26/7/16	236	238	N	
238	Approval by Mott	14 days	Wed 27/7/16	Tue 9/8/16	237	239FF	N	
239	Approval by DSD	14 days	Wed 27/7/16	Tue 9/8/16	238FF	276	N	
240	Flow Measurement Survey	453 days	Mon 13/10/14	Fri 8/1/16				
241	Preparation and submission	17 days	Mon 13/10/14	Wed 29/10/14		242	N	
242	Resubmission	14 days	Wed 19/11/14	Tue 2/12/14	241	243	N	
243	Further comment by Mott	3 days	Wed 3/12/14	Fri 5/12/14	242	244	N	
244	Resubmission	48 days	Wed 17/12/14	Mon 2/2/15	243	245	N	
245	Approval by Mott	7 days	Tue 3/2/15	Mon 9/2/15	244	246FF	N	
246	Approval by DSD	7 days	Tue 3/2/15	Mon 9/2/15	245FF	248	N	
247	Flow Survey Measurement report	243 days	Tue 10/2/15	Sat 10/10/15				
248	Analyzing survey data	5 days	Tue 10/2/15	Sat 14/2/15	246	249	N	
249	Preparation and submission	126 days	Tue 3/3/15	Mon 6/7/15	248	253,250	N	
250	Approval by Mott	1 day	Tue 7/7/15	Tue 7/7/15	249	251	N	
251	Approval by DSD	95 days	Wed 8/7/15	Sat 10/10/15	250		N	
252	Engineer's Assessment Report on Flow Measurement Survey	284 days	Tue 31/3/15	Fri 8/1/16				
253	Assessment calculations	14 days	Wed 21/10/15	Tue 3/11/15	249	257	N	
254	Preparation and submission	203 days	Tue 3/13/15	Mon 19/10/15	255		N	
255	Further comment by Mott	1 day	Tue 20/10/15	Tue 20/10/15	254	256	N	
256	Resubmission	14 days	Wed 21/10/15	Tue 3/11/15	255	257	N	
257	Approval by Mott	10 days	Wed 4/11/15	Fri 13/11/15	256,253	258	N	
258	Approval by DSD	56 days	Sat 14/11/15	Fri 8/1/16	257	236	N	
259	Video Filming and Dye Test	132 days	Thu 1/1/15	Tue 12/5/15				
260	Preparation and submission	75 days	Thu 1/1/15	Mon 16/3/15		261,263FS-1 day	N	
261	Approval by Mott	2 days	Tue 17/3/15	Wed 18/3/15	260	262FF	N	
262	Approval by DSD	2 days	Tue 17/3/15	Wed 18/3/15	261FF		N	
263	Using digital camera in lieu of CCTV	58 days	Mon 16/3/15	Tue 12/5/15	260FS-1 day	280	N	
264	Works	1337 days	Fri 30/8/13	Thu 27/4/17				
265	Preliminaries (Portion F)	258 days	Fri 30/8/13	Wed 14/5/14				
266	Contractor's mobilization	36 days	Fri 30/8/13	Fri 4/10/13				
267	Site clearance	8 days	Fri 30/8/13	Fri 6/9/13		4SS,268	10	
268	Contractor's site office	28 days	Sat 7/9/13	Fri 4/10/13		267	10	
269	Security Guard	0 days	Fri 30/8/13	Fri 30/8/13		4SS	11	
270	Temporary electricity power supply	30 days	Fri 30/8/13	Sat 28/9/13		4SS	10	
271	Engineer's Initial Temporary Accommodation	14 days	Fri 30/8/13	Thu 12/9/13		4SS	10	
272	Engineer's Principal Accommodation	40 days	Tue 3/12/13	Sat 11/1/14		231	12	
273	Engineer's Car Park	14 days	Thu 1/5/14	Wed 14/5/14			12	
274	Outfall Modification Works (Location see Drg No. S202)	261 days	Wed 10/8/16	Thu 27/4/17				
275	Procurement of material	120 days	Wed 10/8/16	Wed 7/12/16				
276	Non return valves	120 days	Wed 10/8/16	Wed 7/12/16		239	277FF,279	N
277	Flange adaptors	120 days	Wed 10/8/16	Wed 7/12/16		276FF	282,279	N
278	1200mm diameter concrete pipes	60 days	Sun 9/10/16	Wed 7/12/16			282,279	N
279	Dye test	7 days	Thu 8/12/16	Wed 14/12/16		278,276,277	280FF	13
280	Video filming	7 days	Thu 8/12/16	Wed 14/12/16		279FF,263	281	14
281	Dredging works	7 days	Thu 15/12/16	Wed 21/12/16		280	282	7
282	Modification works	120 days	Thu 22/12/16	Thu 20/4/17		277,278,281	283	14
283	As-built video submission	7 days	Fri 21/4/17	Thu 27/4/17		282	221	N
284	Extended Contract Completion Date	0 days	Mon 9/5/16	Mon 9/5/16		3FF		



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Report No.: 0394/13/ED/0354B

Appendix C
Action and Limit Levels

Action and Limit Levels for Routine Water Quality Monitoring (Dry Season)

Monitoring Station	DO (mg/L) Surface & Middle		DO (mg/L) Bottom		Turbidity (NTU) Depth-Averaged		Suspended Solids (mg/L) Depth-averaged		BOD5(mg/L) Depth- averaged		E.coli (CFU /100mL) Depth- averaged		NH3-N (mg/L) Depth-averaged		UIA (mg/L) Depth- averaged		Synthetic Detergent as MBAS (mg/L) Depth- averaged		TIN (mg/L) Depth Averaged	
	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL
Seawater Intake																				
SR4	2	2	2	2	<10	<10	<10	<10	<10	<10	<20,000	<20,000	<1	<1	0.021	0.021	<5	<5	NA	NA
SR12																				
Fish Culture Zone																				
SR5	5.45	5.39 [#]	5.43	5.27 ⁺	6.7 or 120% ^{C*}	10.1 or 130% ^{C^}	12 or 120% ^{C*}	19 or 130% ^{C^}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.36	0.39
SR9	6.11	6.02 [#]	6.11	6.04 ⁺	2.9 or 120% ^{C*}	4.8 or 130% ^{C^}	9 or 120% ^{C*}	18 or 130% ^{C^}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22	0.29
SR10																				
SR11																				
Gazetted Beach																				
SR2	5.45	5.39 [#]	5.43	5.27 ⁺	6.7 or 120% ^{C*}	10.1 or 130% ^{C^}	12 or 120% ^{C*}	19 or 130% ^{C^}	NA	NA	NA	NA	0.21 or 120% ^{C*}	0.24 or 130% ^{C^}	0.021	0.021	NA	NA	NA	NA
SR3																				
Corals																				
SR6	6.11	6.02 [#]	6.11	6.04 ⁺	2.9 or 120% ^{C*}	4.8 or 130% ^{C^}	9 or 120% ^{C*}	18 or 130% ^{C^}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SR7																				
SR8																				
EMSD Cooling Water Intake																				
SR13	5.31	5.22 [#]	5.29	5.12 ⁺	13.1 or 120% ^{C*}	15.7 or 130% ^{C^}	23 or 120% ^{C*}	38 or 130% ^{C^}	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note:

* Or 120% of upstream control station at the same tide of the day

^ Or 130% of upstream control station at the same tide of the day

According to EM&A Manual, LL of DO (surface & middle) is 5 mg/L or 1 percentile of baseline data in FCZ; 4 mg/L or 1 percentile of baseline data in other impact monitoring stations.

+ According to EM&A Manual, LL of DO (bottom) is 2 mg/L or 1 percentile of baseline data

For DO measurement, non-compliance occurs when monitoring result is lower than the limits;

For TIN, UIA, NH₃-N, SS, BOD₅, E.coli, synthetic detergent and turbidity, non-compliance of water quality results when monitoring results is higher than the limits;

AL/LL of TIN and NH₃-N are determined from laboratory results for better accuracy and reliability. These AL/LL will be applied to both laboratory and in-situ measurements at impact stage.

Dry Season: November to March

Action and Limit Levels for Routine Water Quality Monitoring (Wet Season)

Monitoring Station	DO (mg/L) Surface & Middle		DO (mg/L) Bottom		Turbidity (NTU) Depth-Averaged		Suspended Solids (mg/L) Depth-averaged		BOD5 (mg/L) Depth- averaged		E.coli (CFU /100mL) Depth-averaged		NH3-N (mg/L) Depth-averaged		UIA (mg/L) Depth-averaged		Synthetic Detergent as MBAS (mg/L) Depth-averaged		TIN (mg/L) Depth Averaged	
	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL	AL	LL
Seawater Intake																				
SR4	2	2	2	2	<10	<10	<10	<10	<10	<10	<20,000	<20,000	<1	<1	0.021	0.021	<5	<5	NA	NA
SR12																				
Fish Culture Zone																				
SR5	5.00#	5.00#	4.11	4.04+	10.8 or 120%C*	15.0 or 130%C^	12 or 120%C*	19 or 130%C^											0.45	0.50
SR9									NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
SR10	5.00	5.00#	4.41	4.25+	4.0 or 120%C*	8.7 or 130%C^	9 or 120%C*	18 or 130%C^											0.37	0.49
SR11																				
Gazetted Beach																				
SR2	4.68	4.62#	4.11	4.04+	10.8 or 120%C*	15.0 or 130%C^	12 or 120%C*	19 or 130%C^	NA	NA	NA	NA	0.21 or 120%C*	0.24 or 130%C^	0.021	0.021	NA	NA	NA	NA
SR3																				
Corals																				
SR6																				
SR7	5.00	4.82#	4.41	4.25+	4.0 or 120%C*	8.7 or 130%C^	9 or 120%C*	18 or 130%C^	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SR8																				
EMSD Cooling Water Intake																				
SR13	4.24	4.17#	3.70	3.58+	13.1 or 120%C*	15.7 or 130%C^	23 or 120%C*	38 or 130%C^	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note:

* Or 120% of upstream control station at the same tide of the day

^ Or 130% of upstream control station at the same tide of the day

According to EM&A Manual, LL of DO (surface & middle) is 5 mg/L or 1 percentile of baseline data in FCZ; 4 mg/L or 1 percentile of baseline data in other impact monitoring stations. (5%ile & 1 %ile determined from wet season baseline data for cluster 1 (4.68mg/L & 4.62mg/L) and cluster 2 (5.00mg/L & 4.82mg/L) are 5mg/L or below, thus 5mg/L was adopted as the AL & LL for the SR in FCZ)

+ According to EM&A Manual, LL of DO (bottom) is 2 mg/L or 1 percentile of baseline data

Referring to the ER Letter ref. (CV/2013/04)/M45/400/1247 dated 19 March 2015, a Revised Baseline Water Quality Monitoring Test Methodology – Review of Action and Limit Levels has been submitted to EPD by ER in March 2015. The Action and Limit Level for the wet season (April – October) was effected and applied to the water quality monitoring data from 1 April 2015.

For DO measurement, non-compliance occurs when monitoring result is lower than the limits;

For TIN, UIA, NH₃-N, SS, BOD₅, E.coli, synthetic detergent and turbidity, non-compliance of water quality results when monitoring results is higher than the limits;

AL/LL of TIN and NH₃-N are determined from laboratory results for better accuracy and reliability. These AL/LL will be applied to both laboratory and in-situ measurements at impact stage.

Wet season: April to October

Action and Limit Levels for 24-hr Water Quality Monitoring (Dry Season)

Monitoring Station	DO (mg/L) Surface		Turbidity (NTU) Surface		Ammonia-N (mg/L) Surface	
	AL	LL	AL	LL	AL	LL
WSD Seawater Intake						
SR4	2	2	<10	<10	<1	<1
SR12						
Fish Culture Zone						
SR5	5.46	5.39	6.0	7.9	NA	NA
SR9	6.12	5.97	2.8	4.7		
SR10						
SR11						
EMSD Cooling Water Intake						
SR13	5.28	5.22	11.9	13.3	NA	NA

Note: According to EM&A Manual, LL of DO (surface & middle) is 5 mg/L or 1 percentile of baseline data in FCZ; 4 mg/L or 1 percentile of baseline data in other impact monitoring stations.

Dry Season: November to March.

Action and Limit Levels for 24-hr Water Quality Monitoring (Wet Season)

Monitoring Station	DO (mg/L) Surface		Turbidity (NTU) Surface		Ammonia-N (mg/L) Surface	
	AL	LL	AL	LL	AL	LL
WSD Seawater Intake						
SR4	2	2	<10	<10	<1	<1
SR12						
Fish Culture Zone						
SR5	5.24	5.13	9.7	14.4	NA	NA
SR9	5.13	5.00#	5.9	7.1		
SR10						
SR11						
EMSD Cooling Water Intake						
SR13	4.23	4.17	11.9	13.3	NA	NA

Note: # According to EM&A Manual, LL of DO (surface & middle) is 5 mg/L or 1 percentile of baseline data in FCZ; 4 mg/L or 1 percentile of baseline data in other impact monitoring stations. (1 %ile determined from wet season baseline data for cluster 2 (4.78mg/L) is below 5mg/L, thus 5mg/L was adopted as the DO (surface) LL for the SR in FCZ in cluster 2 stations)

Referring to the ER Letter ref. (CV/2013/04)/M45/400/1247 dated 19 March 2015, a Revised Baseline Water Quality Monitoring Test Methodology – Review of Action and Limit Levels has been submitted to EPD by ER in March 2015. The Action and Limit Level for the wet season (April – October) was effected and applied to the water quality monitoring data from 1 April 2015.

Wet Season: April to October

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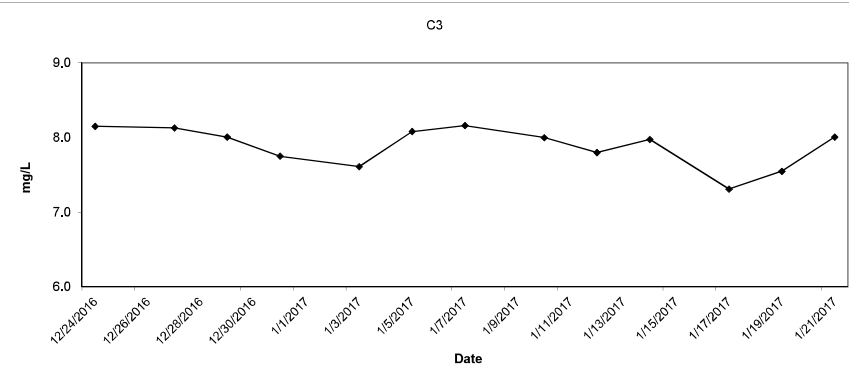
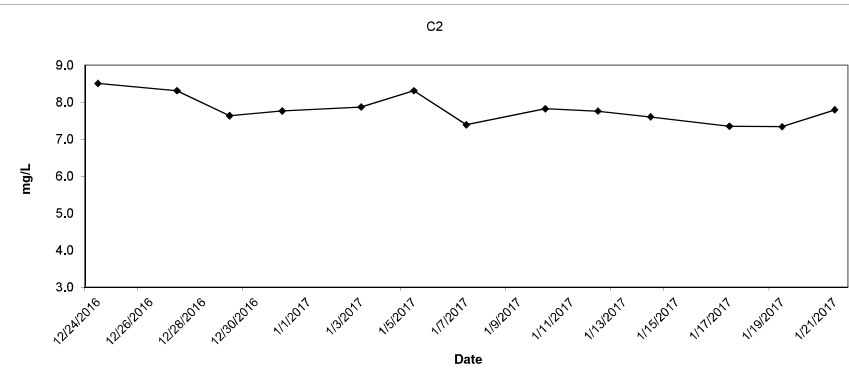
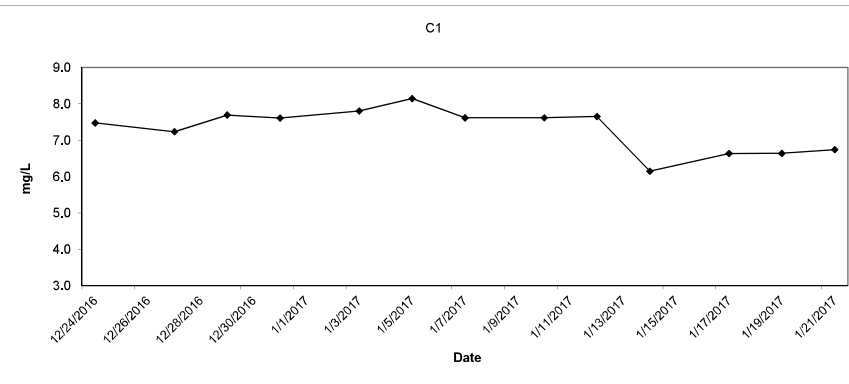
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Report No.: 0394/13/ED/0354B

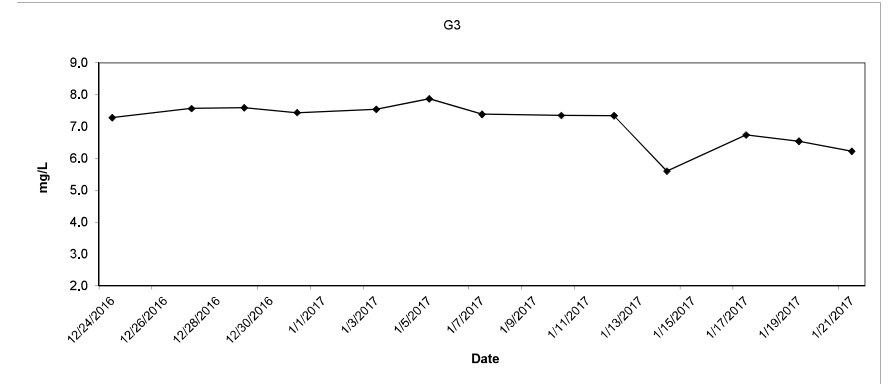
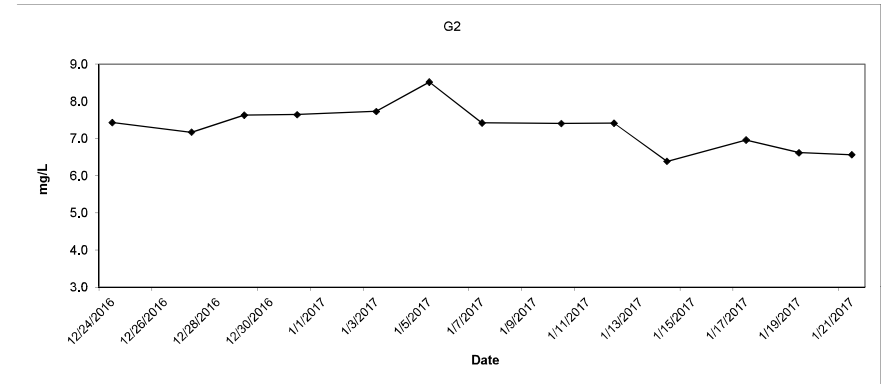
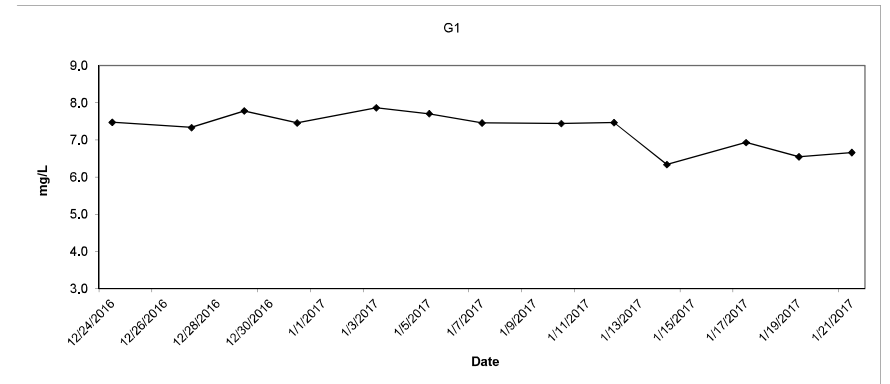
Appendix D

Graphical Presentation – Routine Impact Monitoring Results

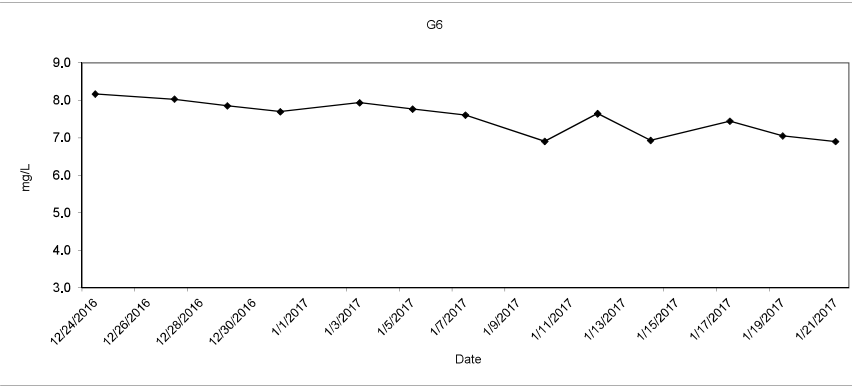
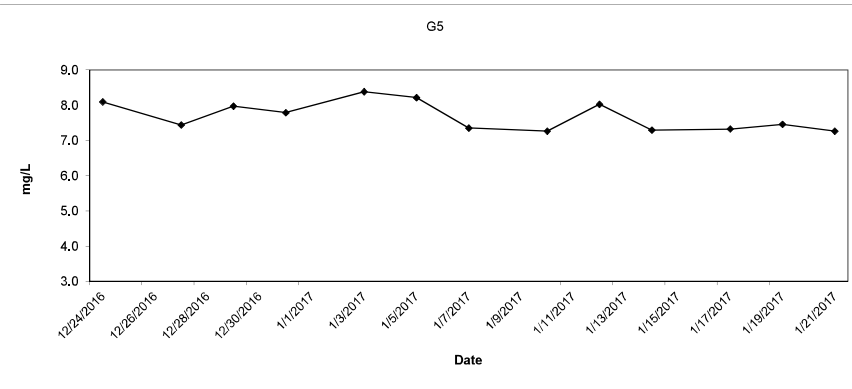
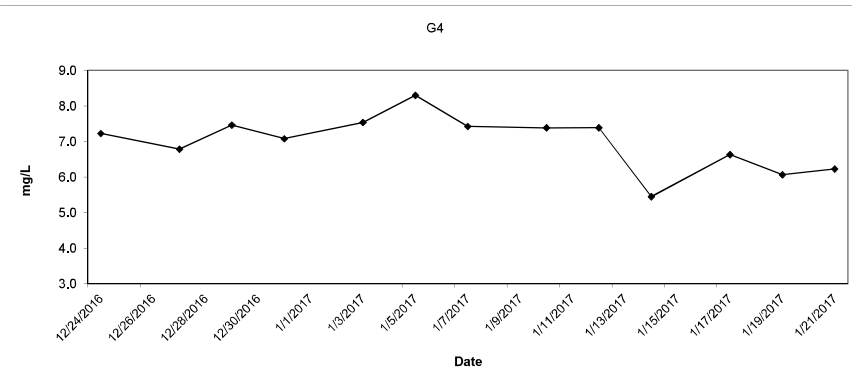
Dissolved Oxygen (Surface and Middle) at Mid-Ebb Tide



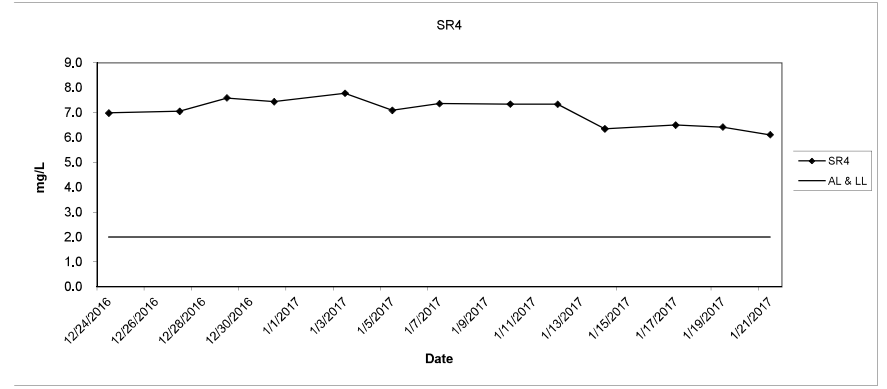
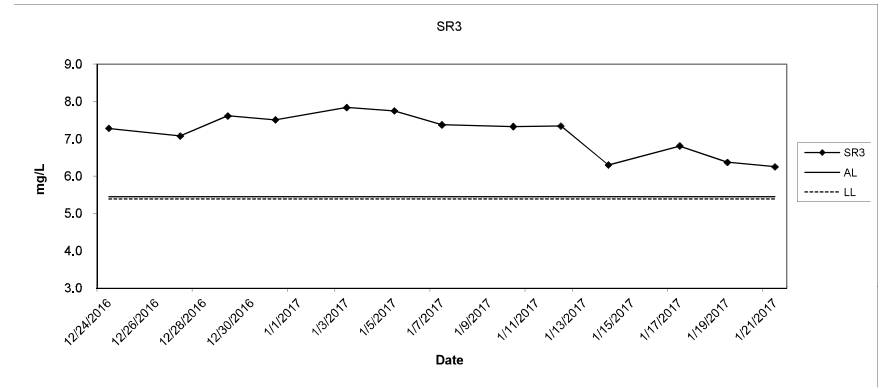
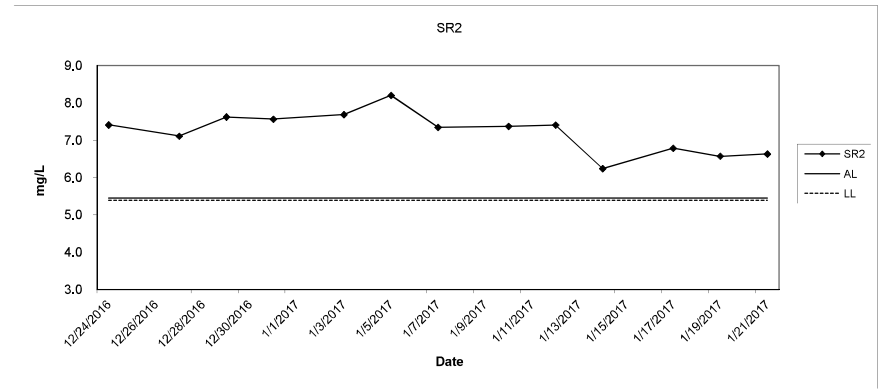
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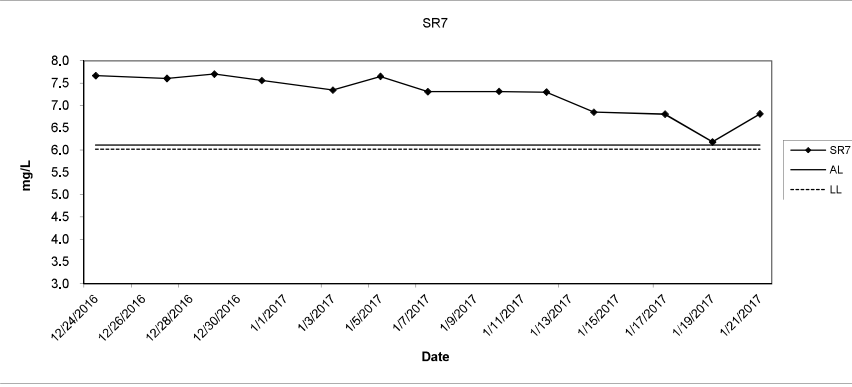
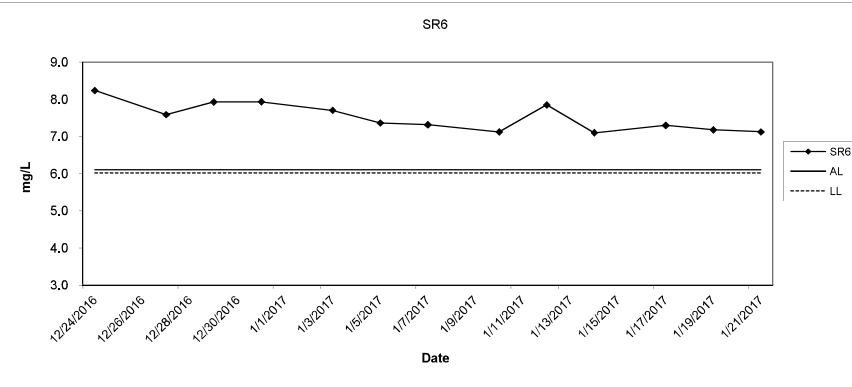
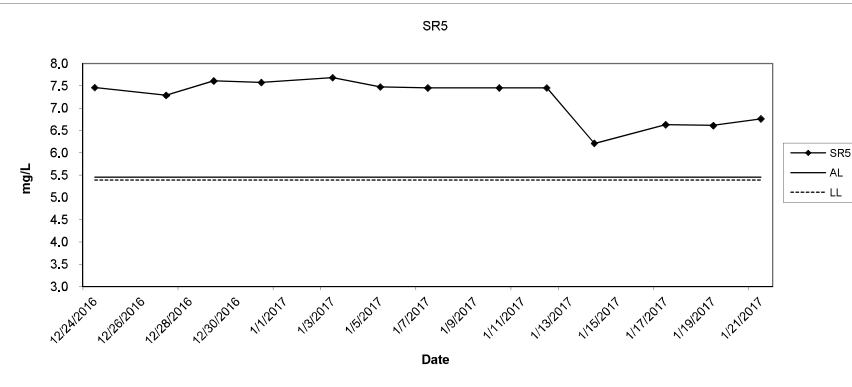
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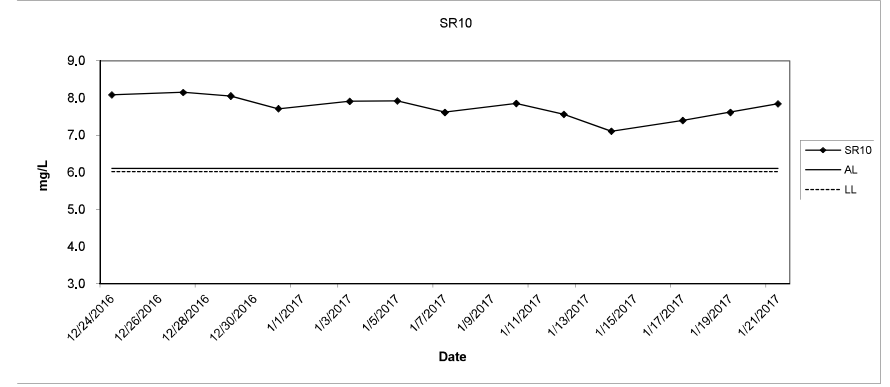
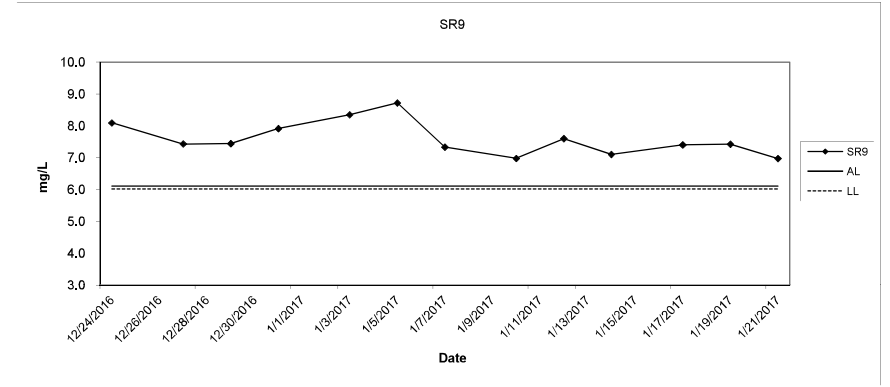
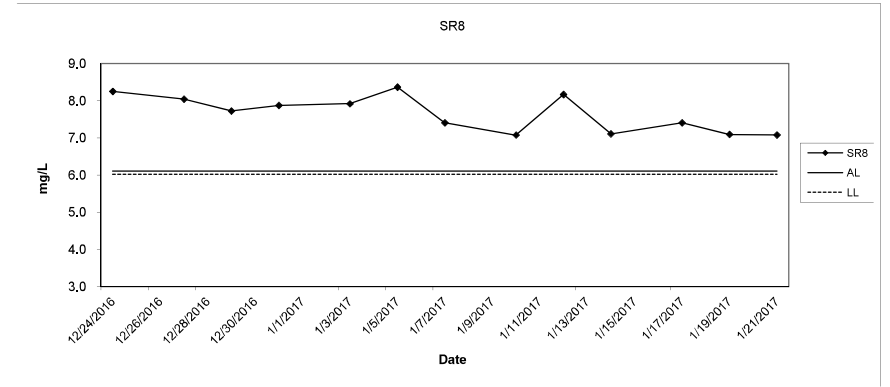
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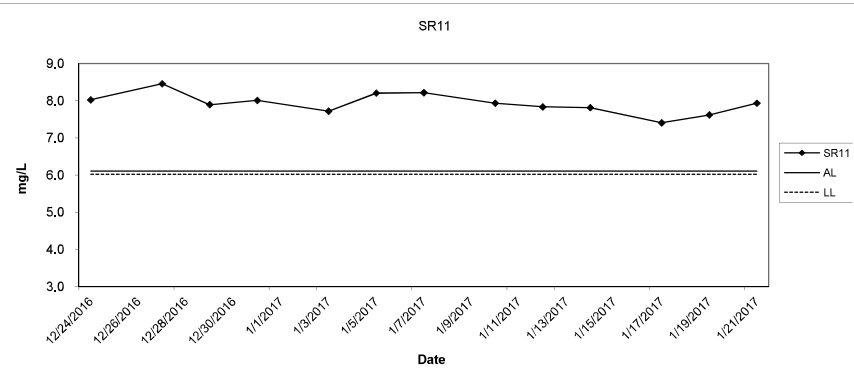
Dissolved Oxygen (Surface and Middle) at Mid-Ebb Tide



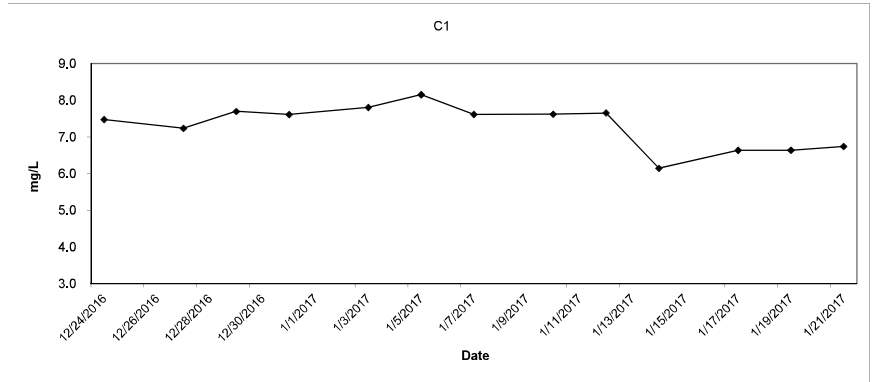
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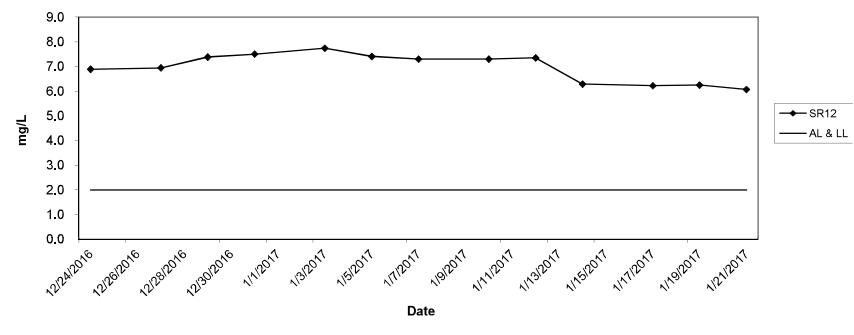
Dissolved Oxygen (Surface and Middle) at Mid-Ebb Tide



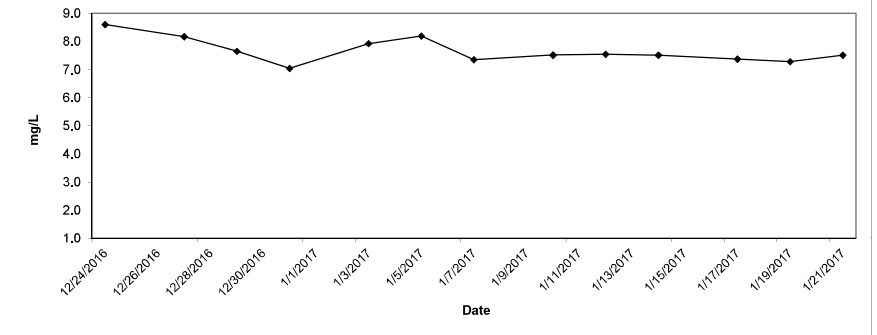
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



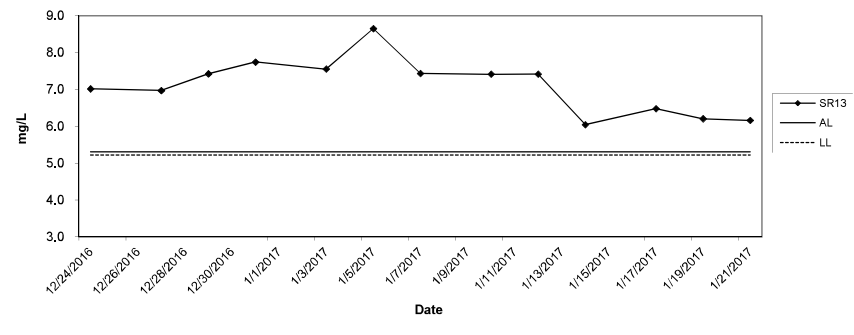
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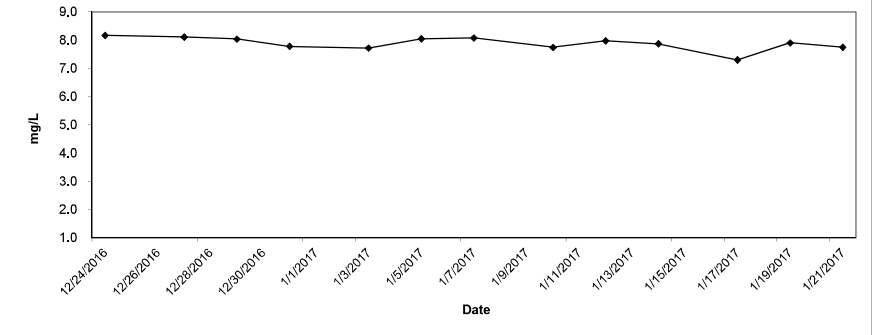
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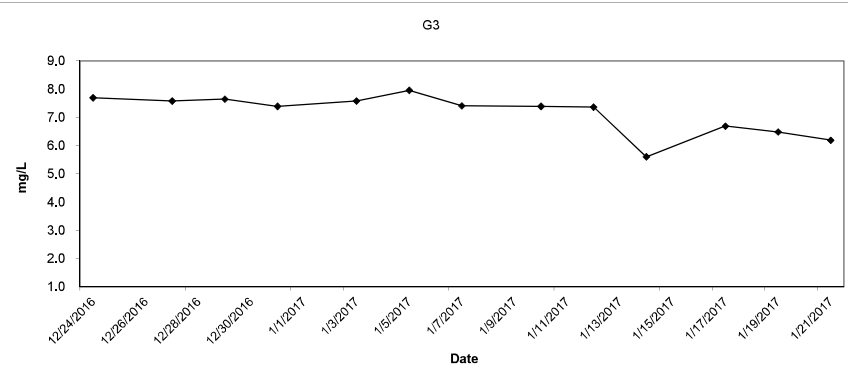
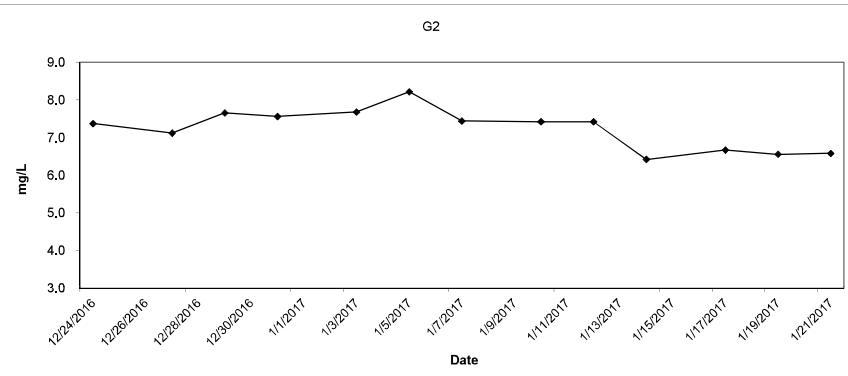
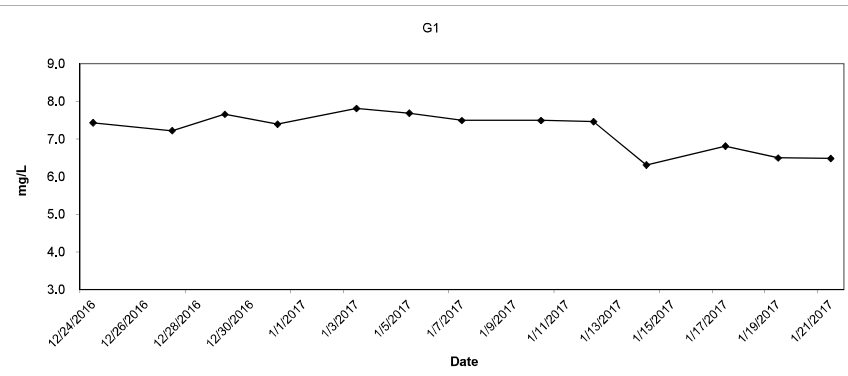
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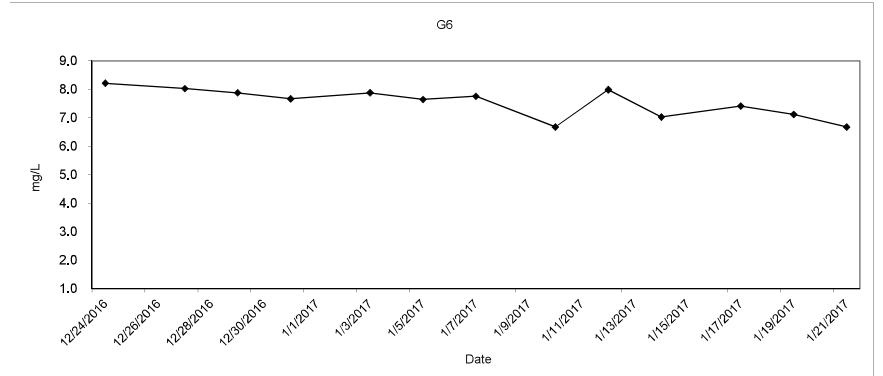
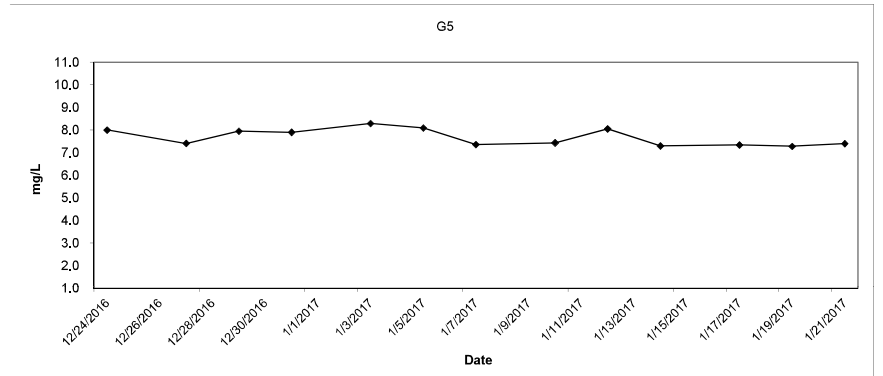
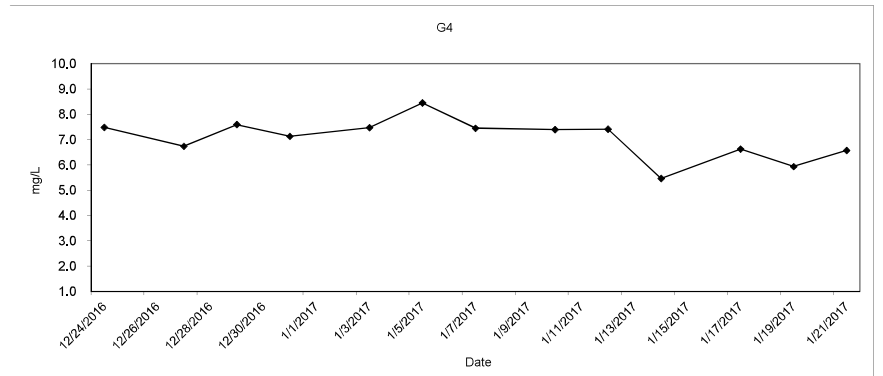
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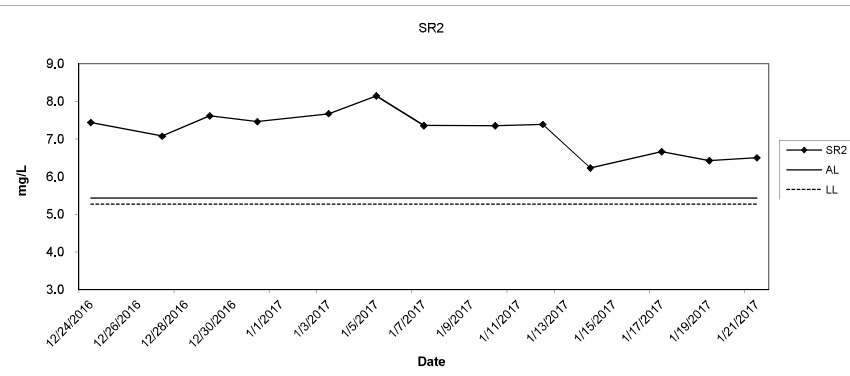
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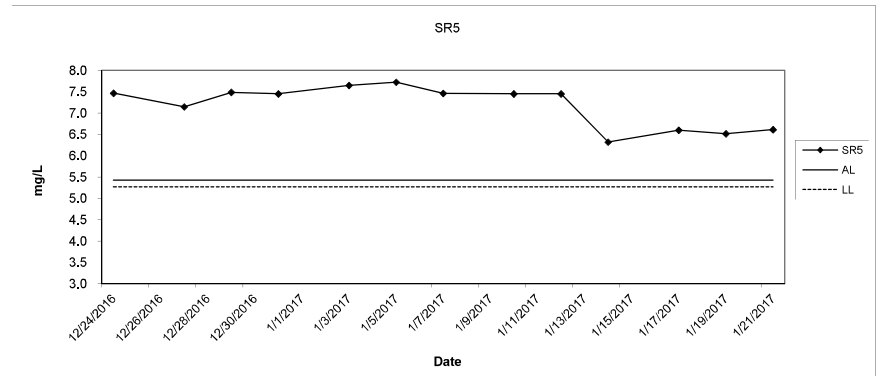
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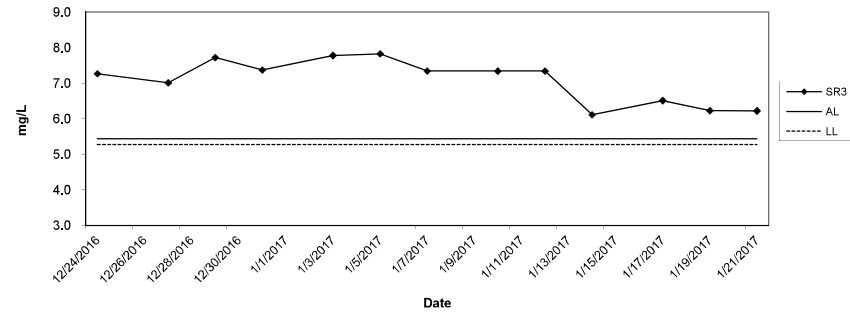
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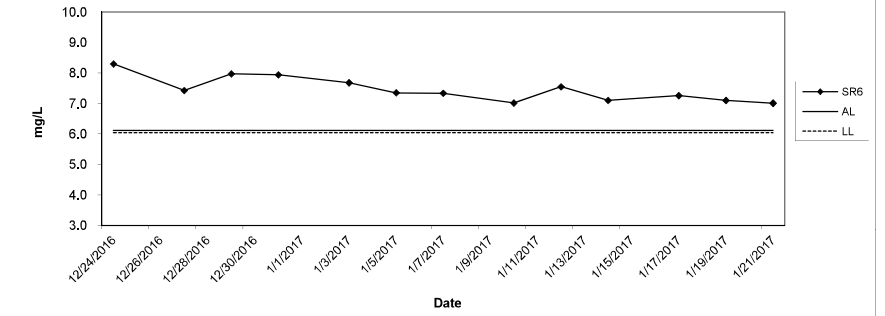
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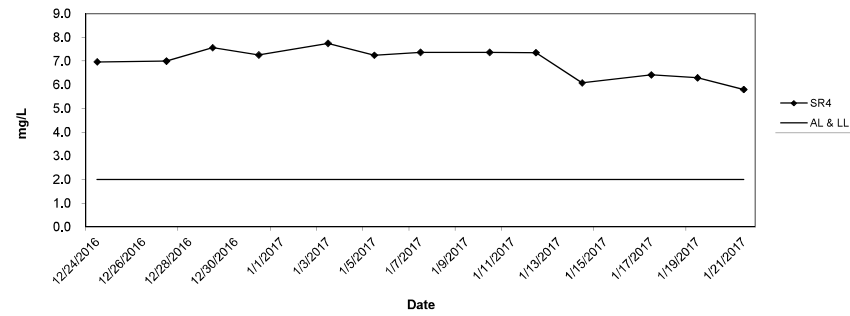
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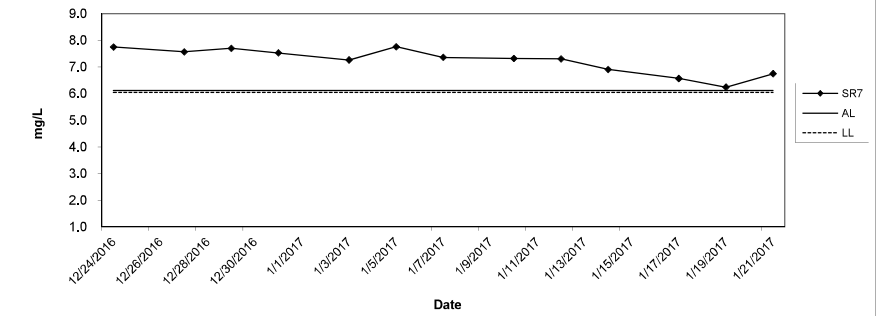
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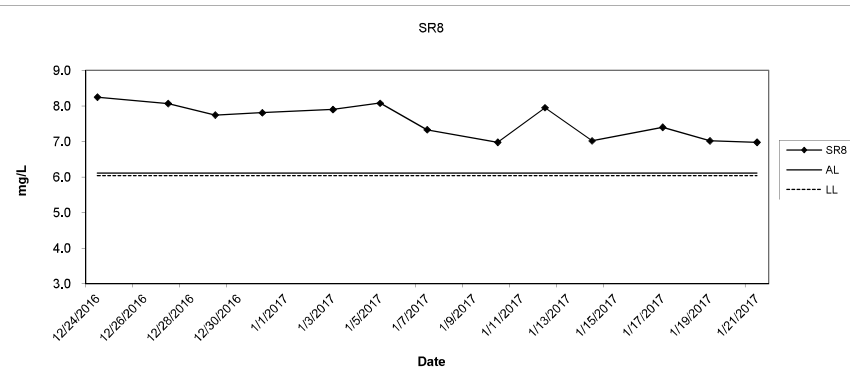
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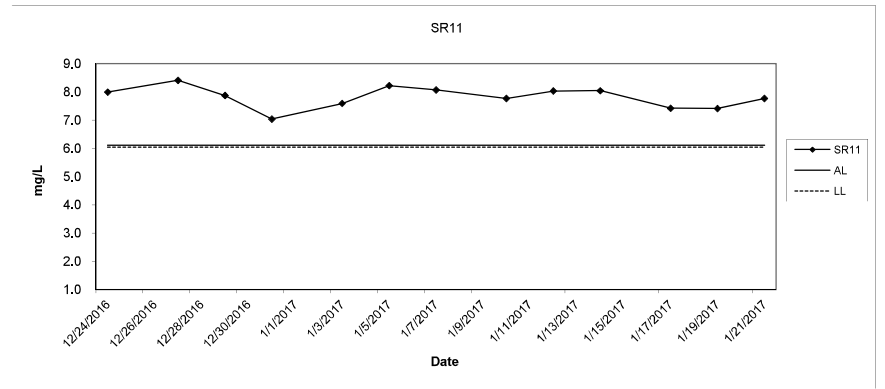
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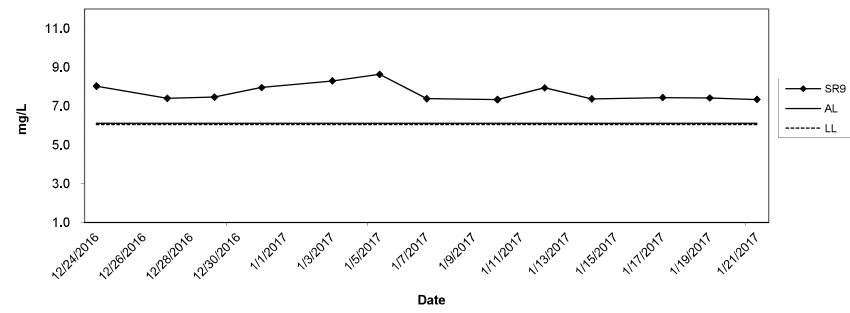
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



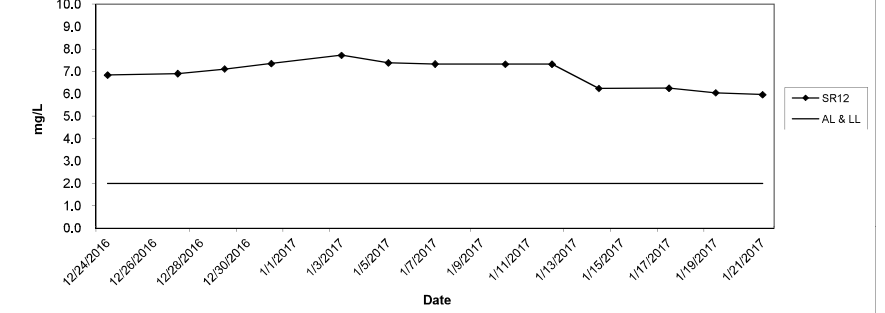
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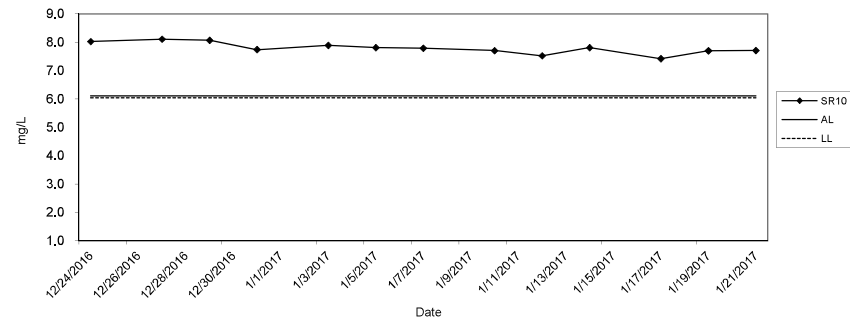
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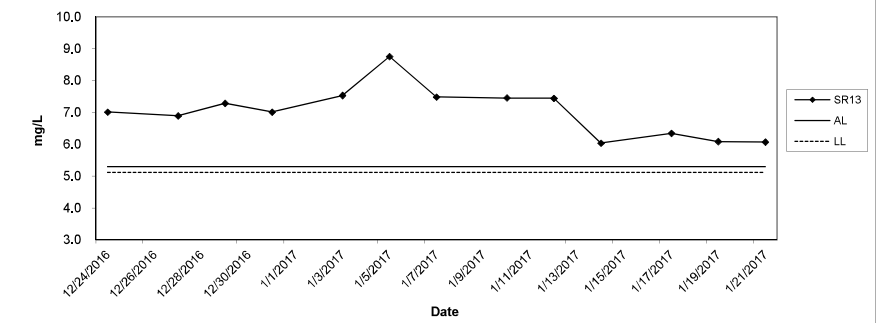
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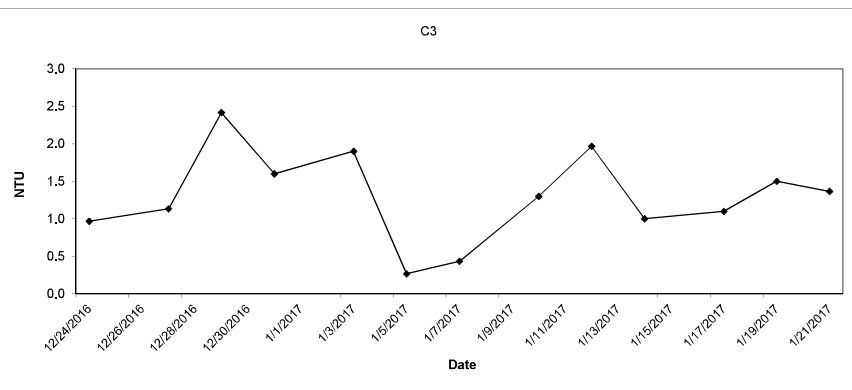
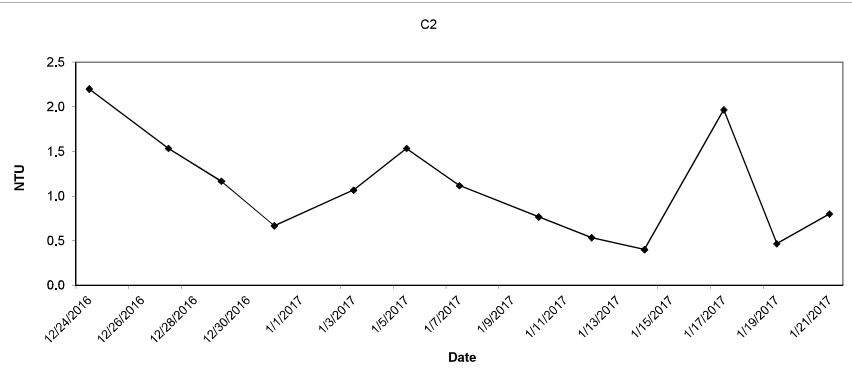
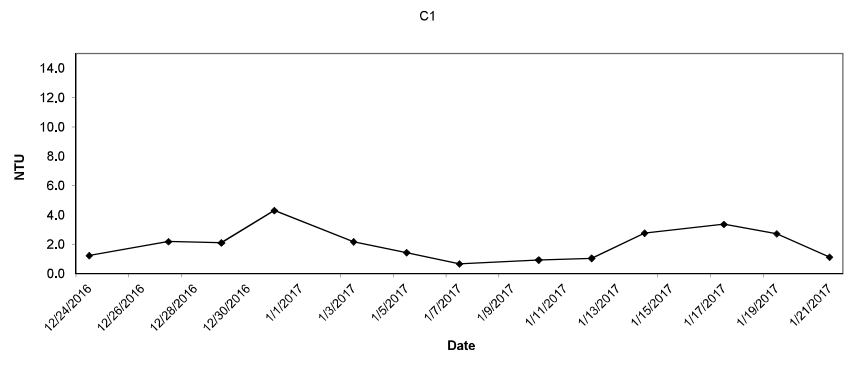
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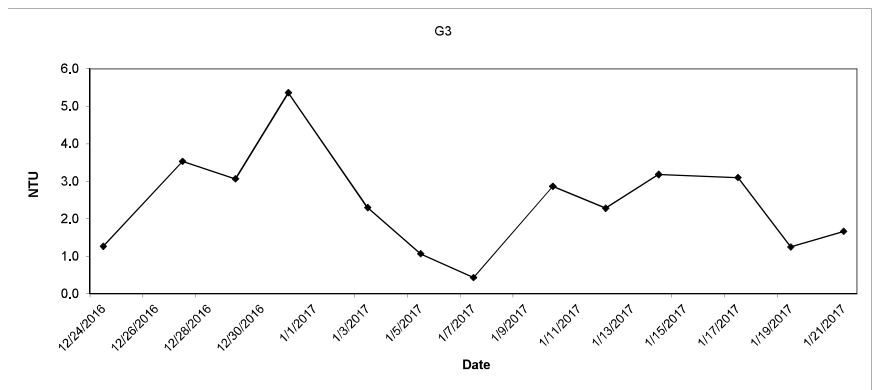
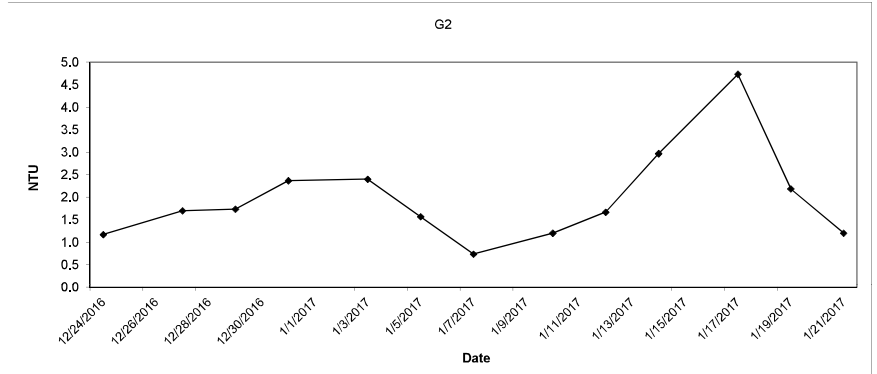
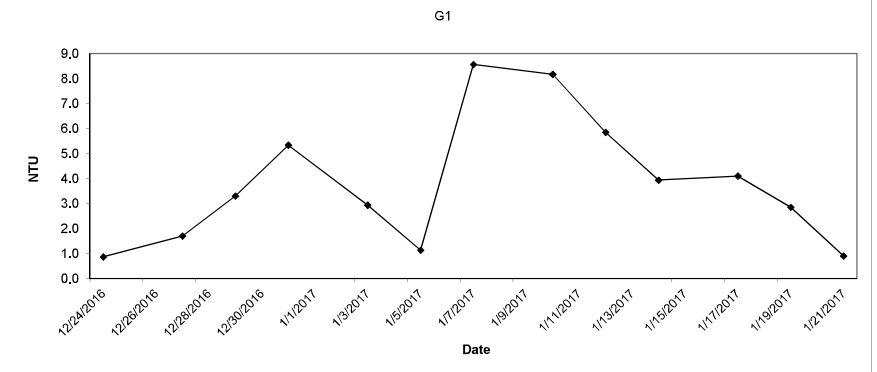
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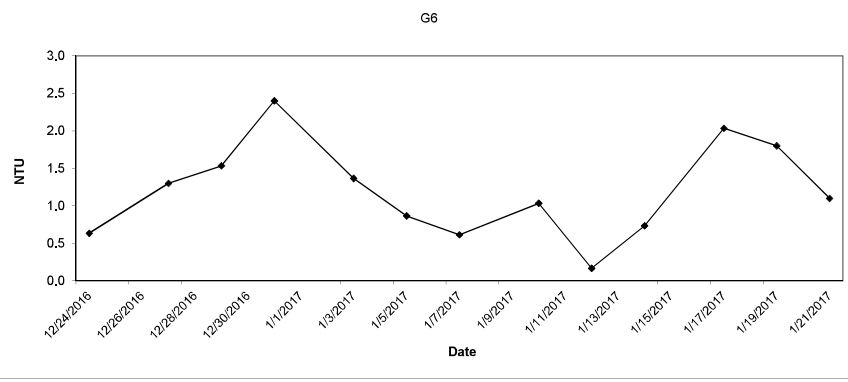
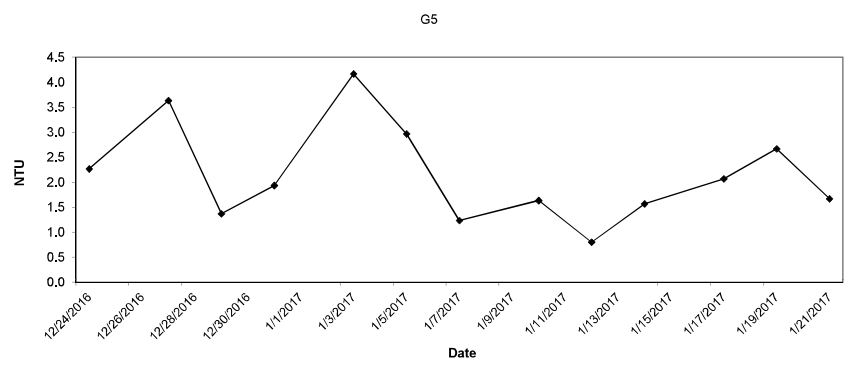
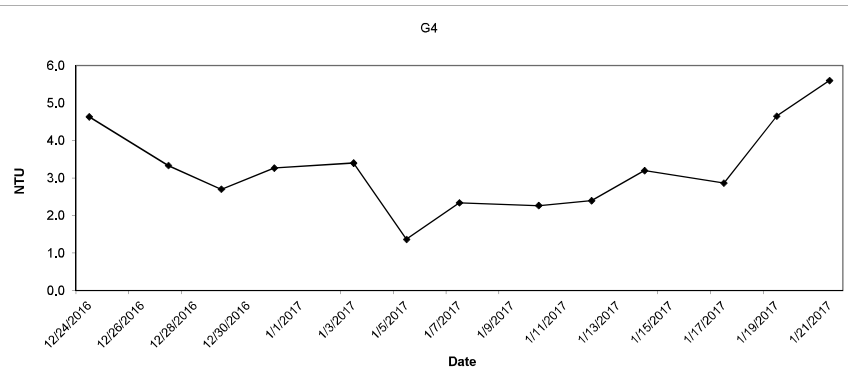
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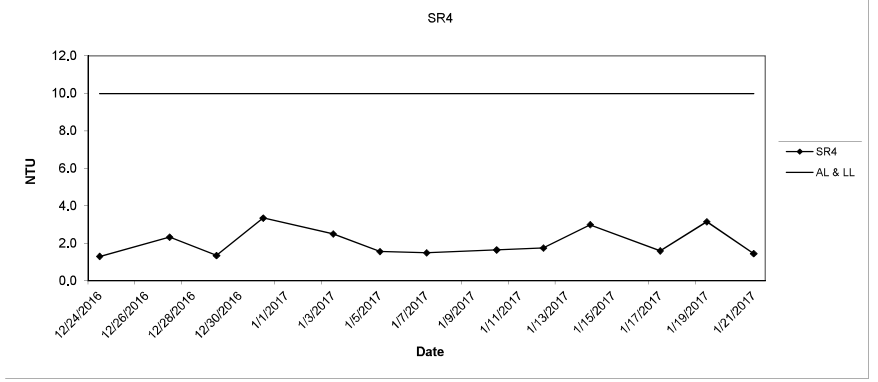
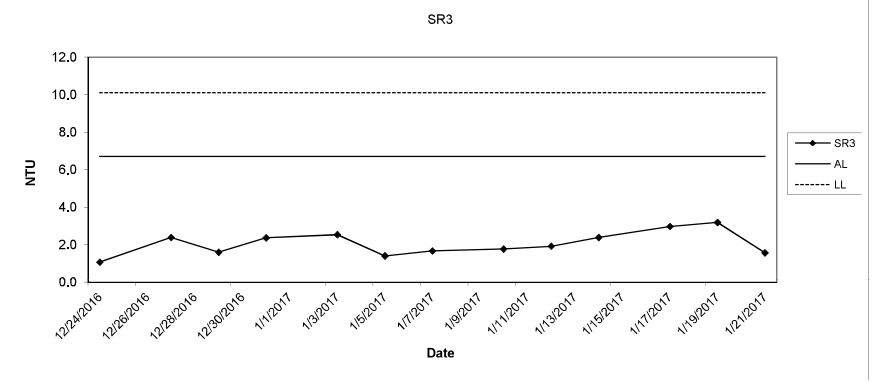
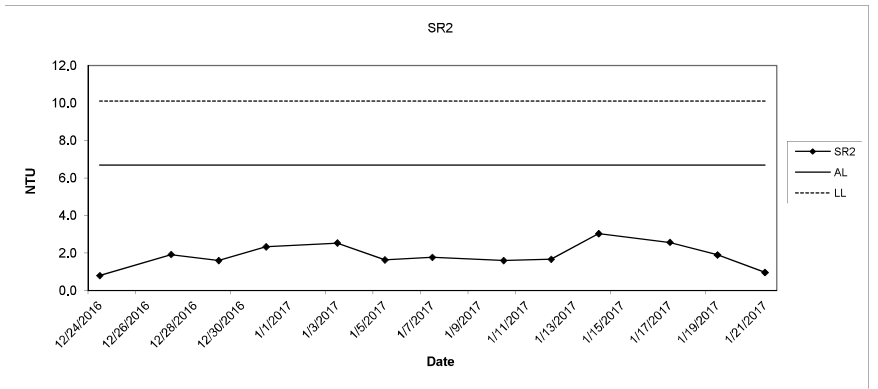
Turbidity (Depth average) at Mid-Ebb Tide



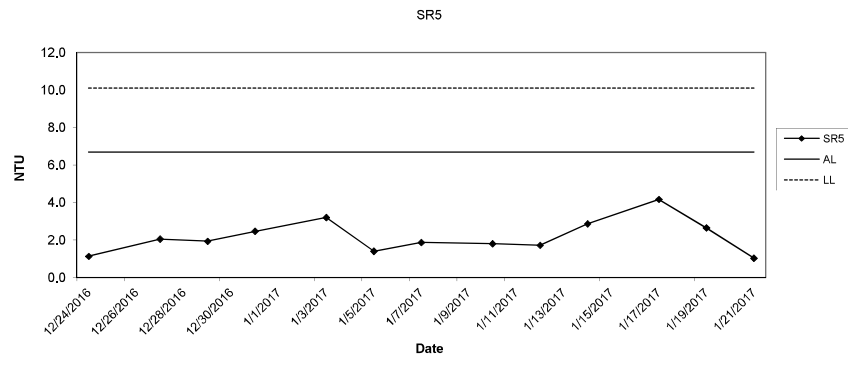
Turbidity (Depth average) at Mid-Ebb Tide



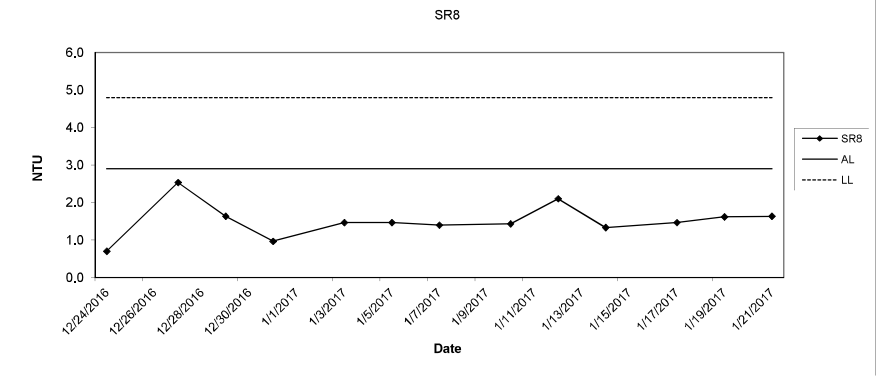
Turbidity (Depth average) at Mid-Ebb Tide



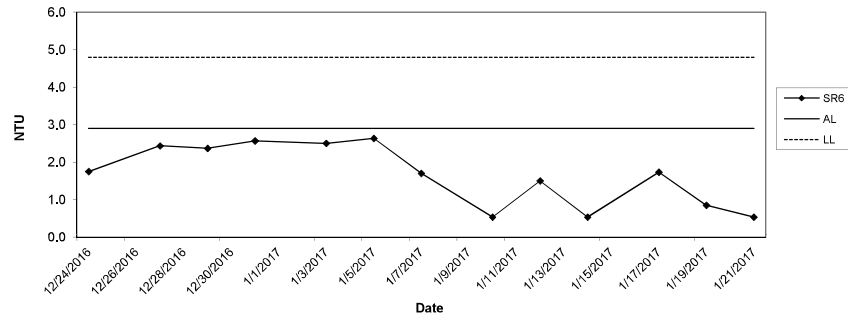
Turbidity (Depth average) at Mid-Ebb Tide



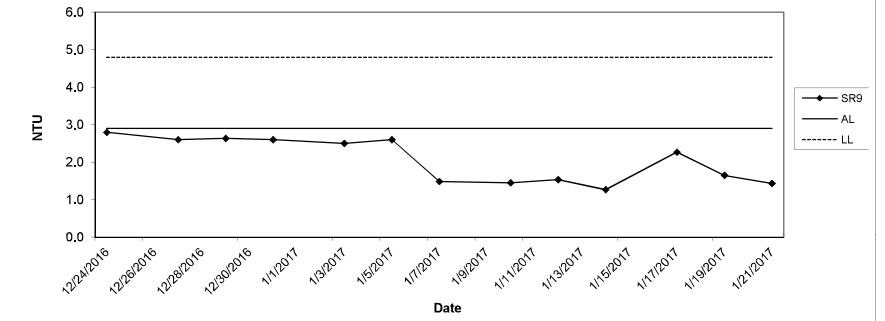
Turbidity (Depth average) at Mid-Ebb Tide



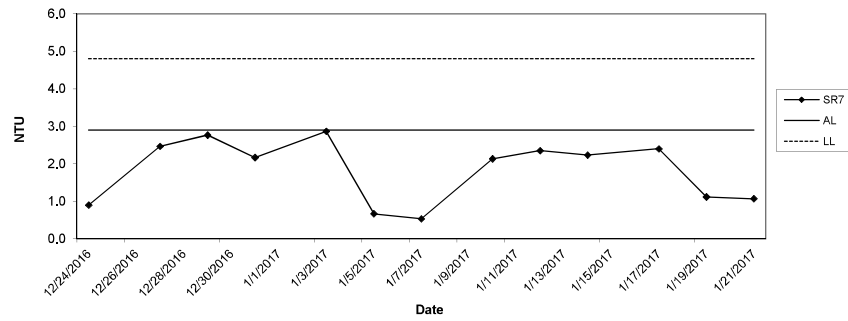
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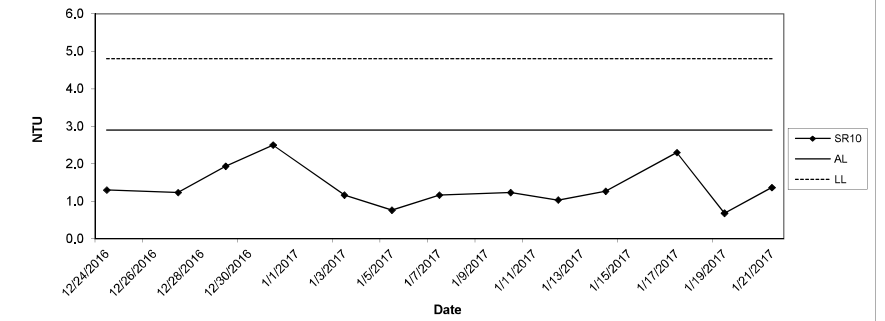
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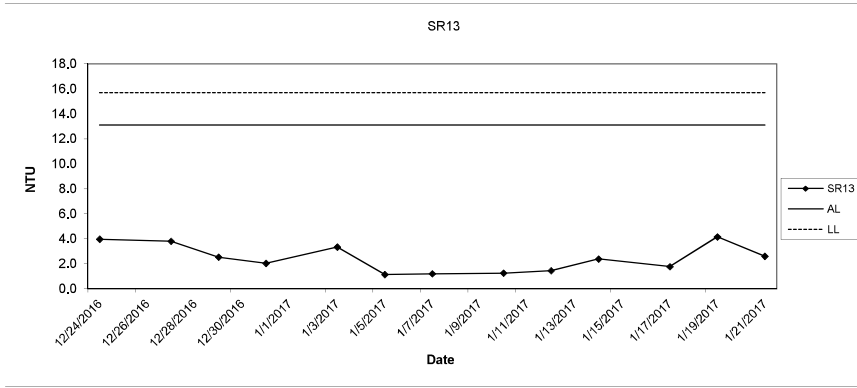
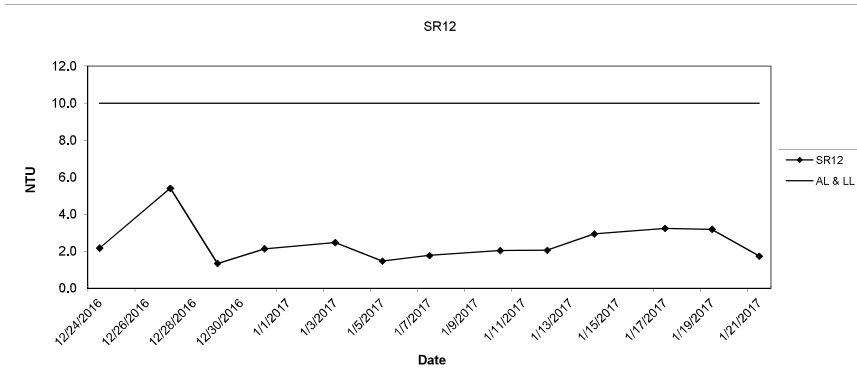
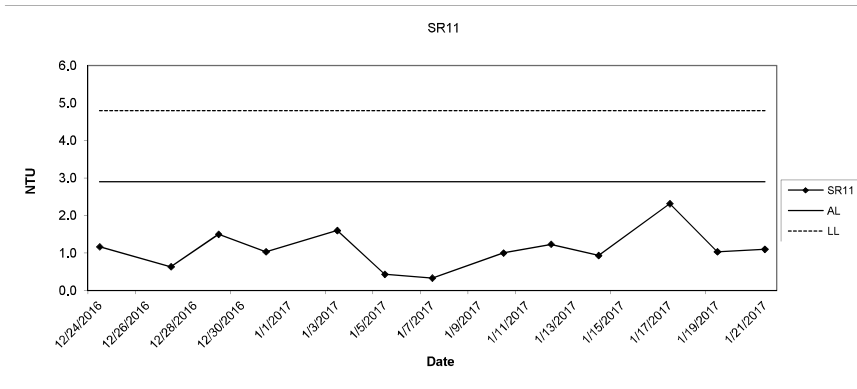
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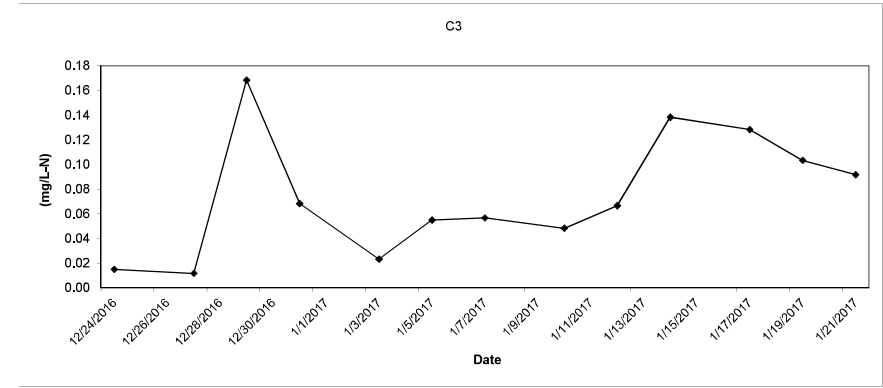
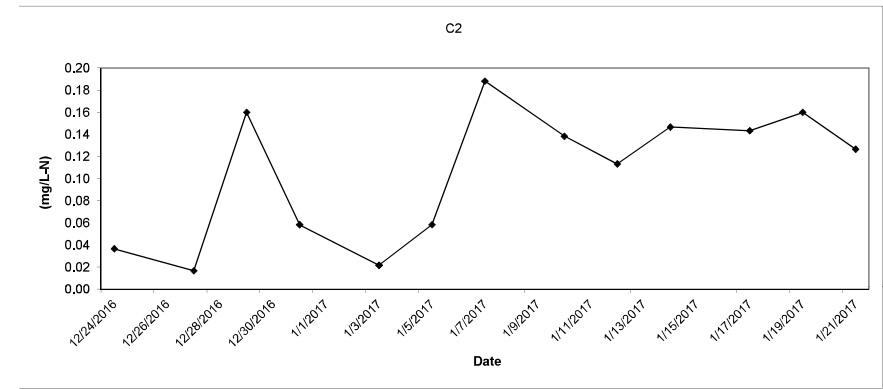
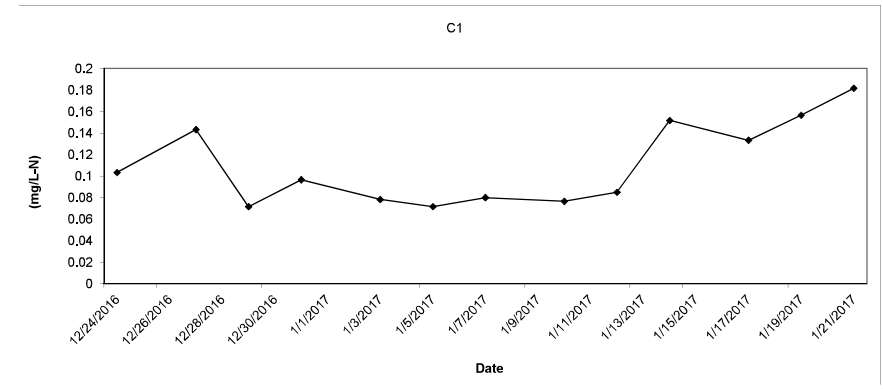
SR10



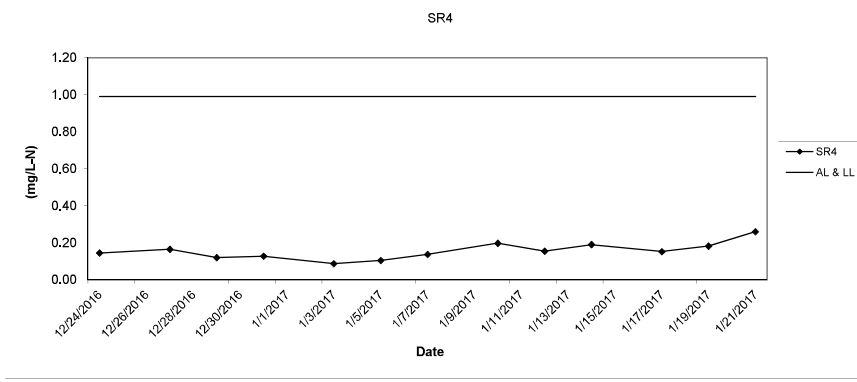
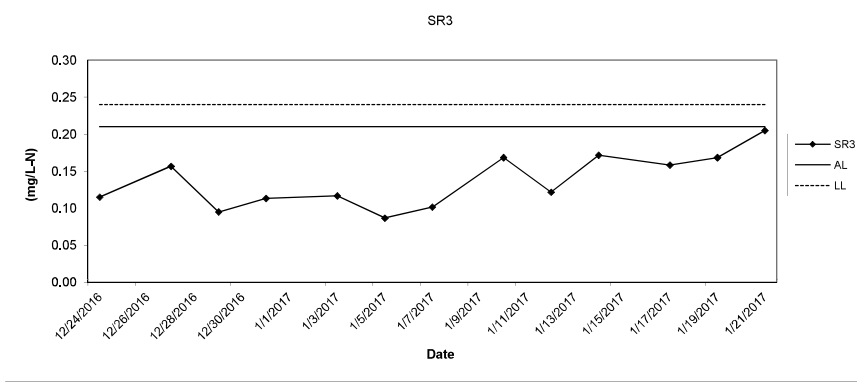
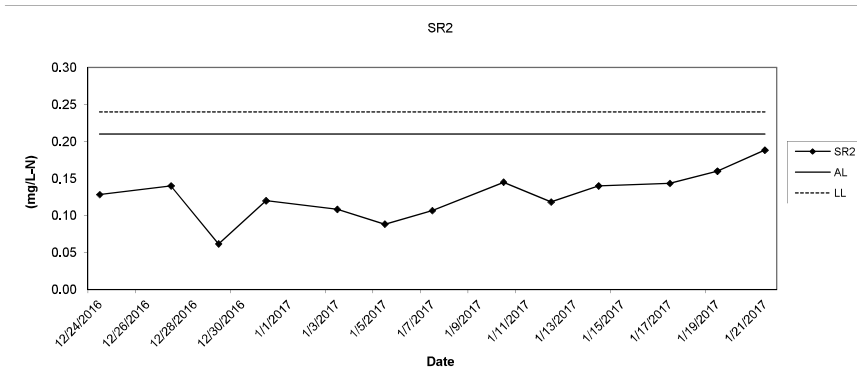
Turbidity (Depth average) at Mid-Ebb Tide



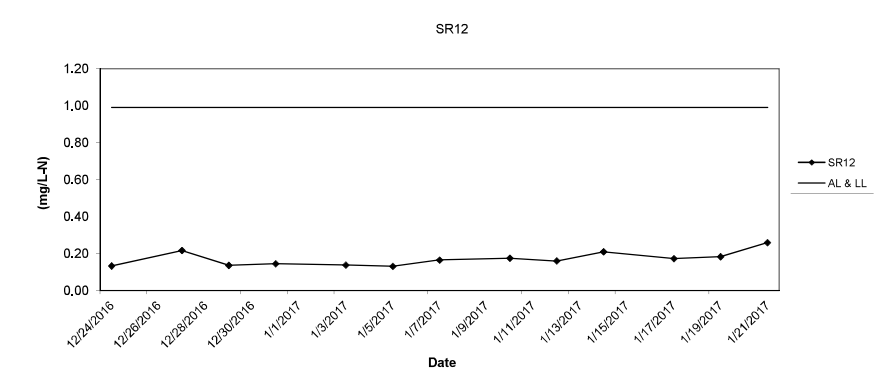
In-situ Ammonia (Depth average) at Mid-Ebb Tide



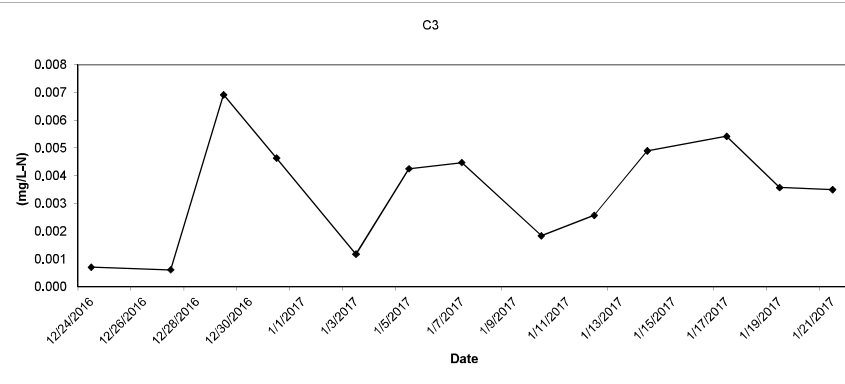
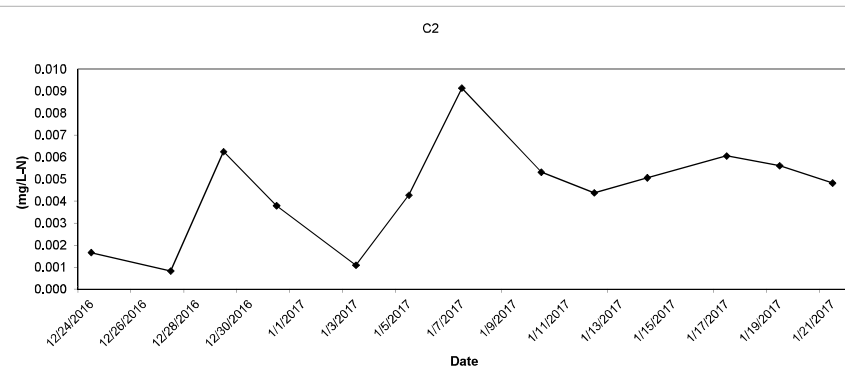
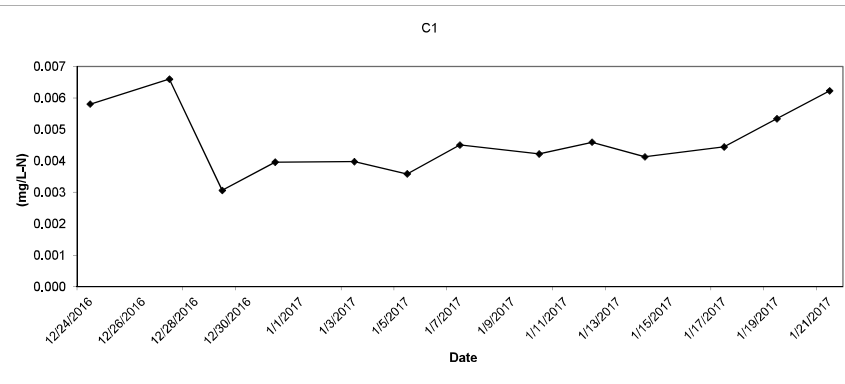
In-situ Ammonia (Depth average) at Mid-Ebb Tide



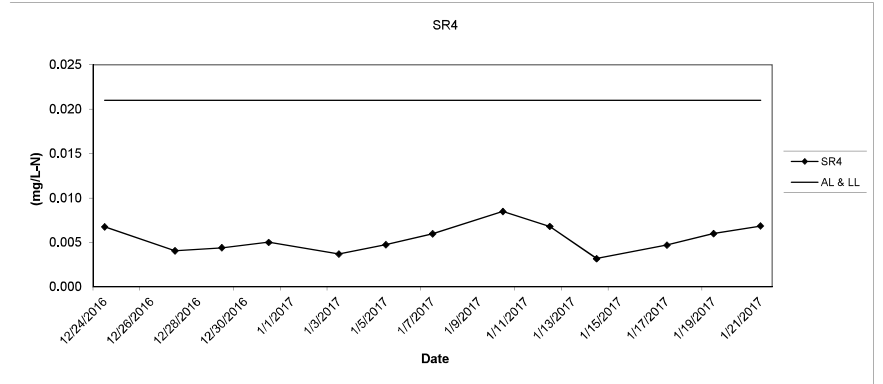
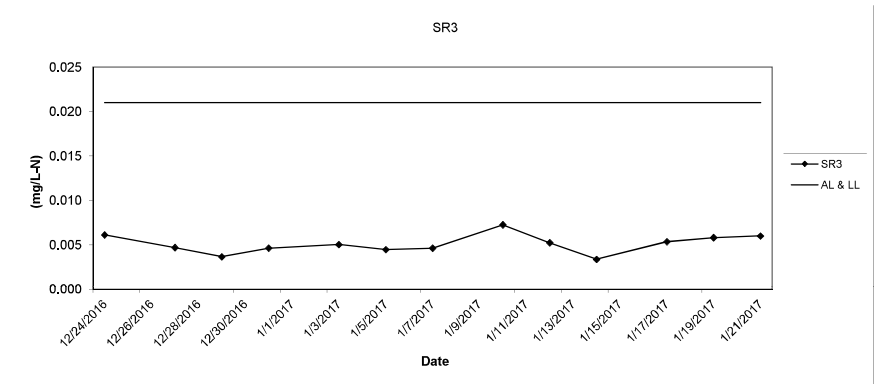
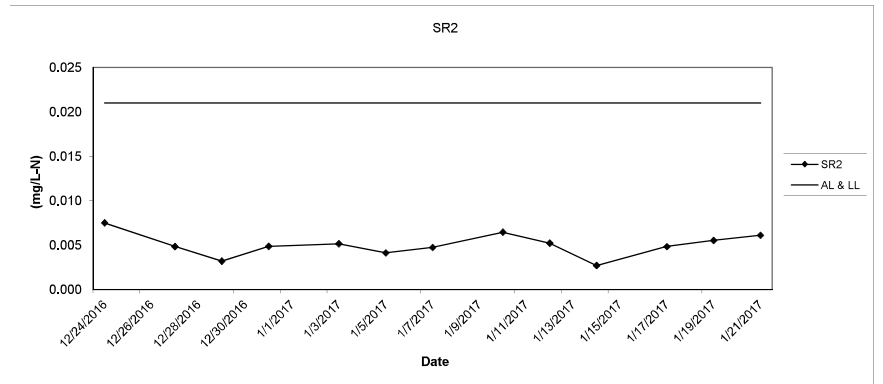
In-situ Ammonia (Depth average) at Mid-Ebb Tide



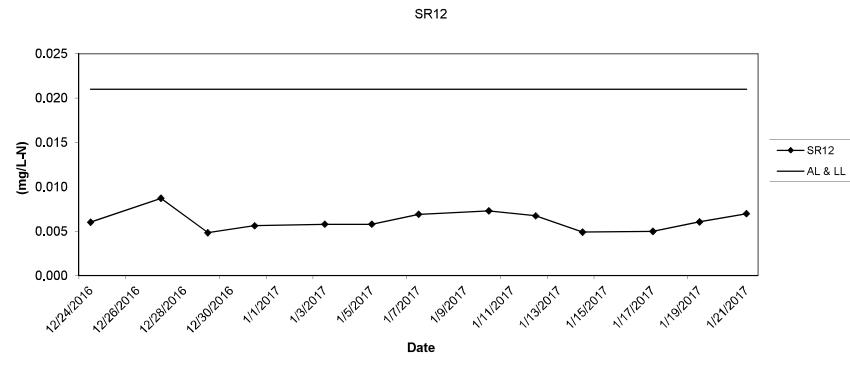
In-situ UJA (Depth average) at Mid-Ebb Tide



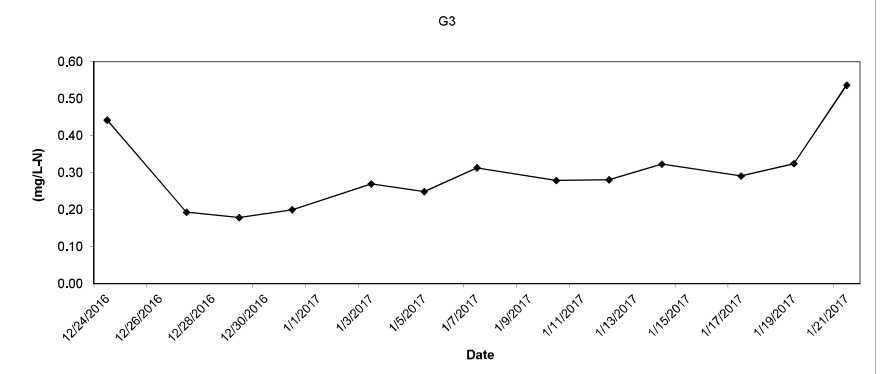
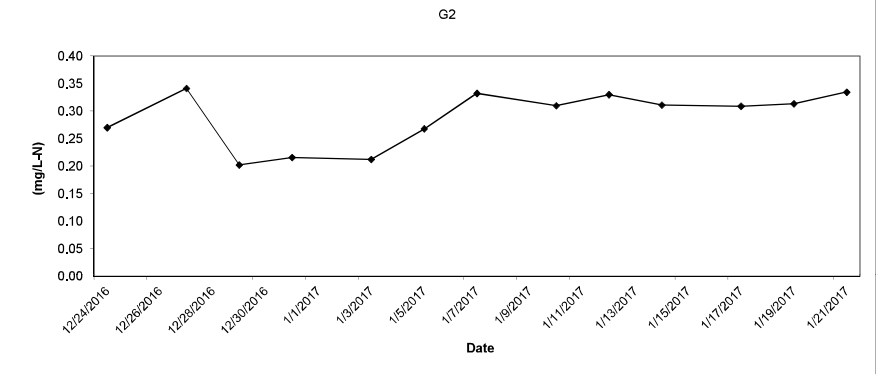
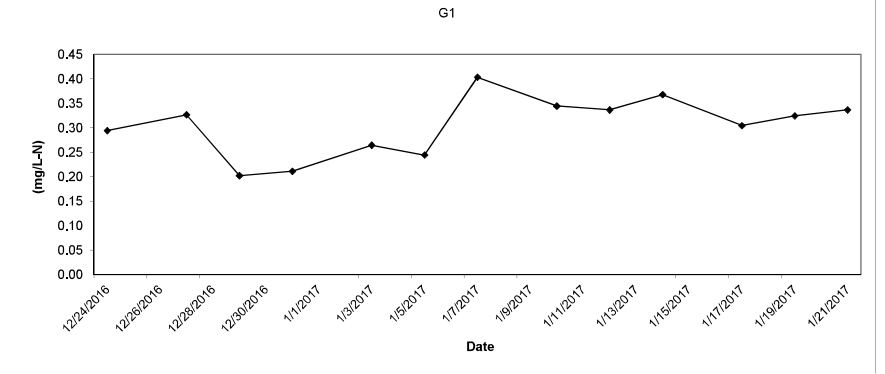
In-situ UJA (Depth average) at Mid-Ebb Tide



In-situ UJA (Depth average) at Mid-Ebb Tide

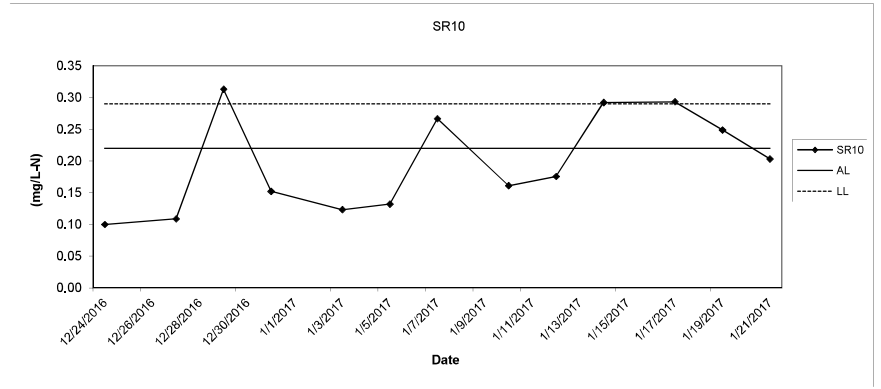
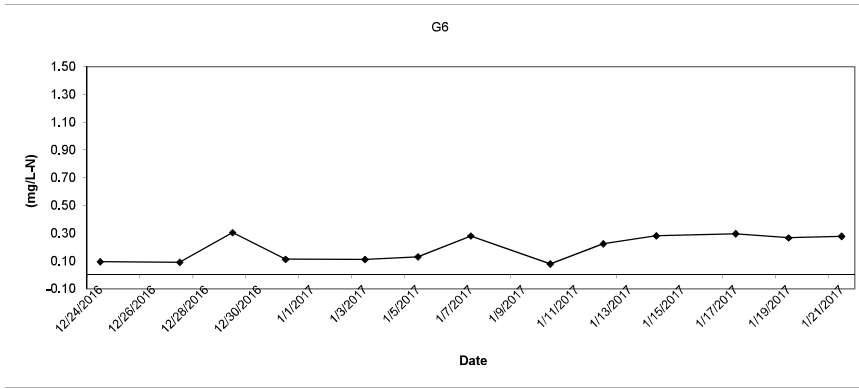
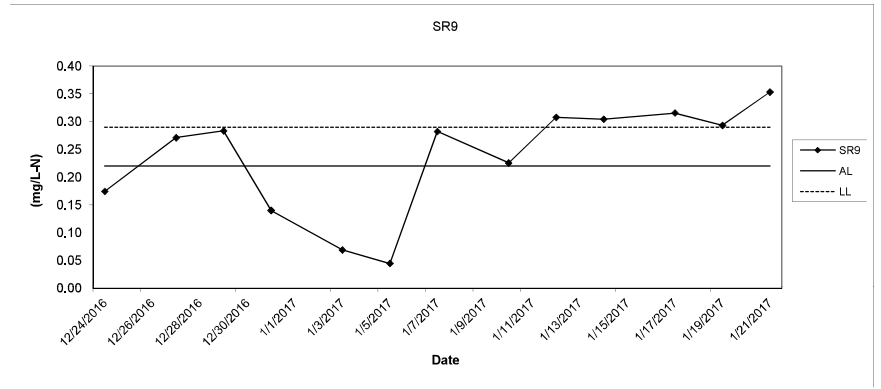
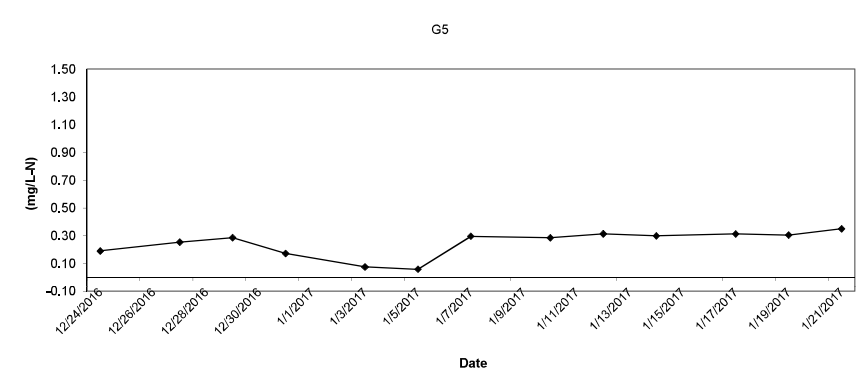
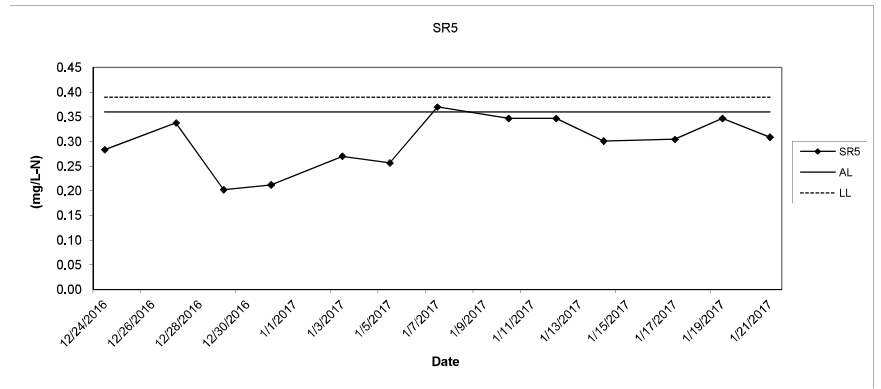
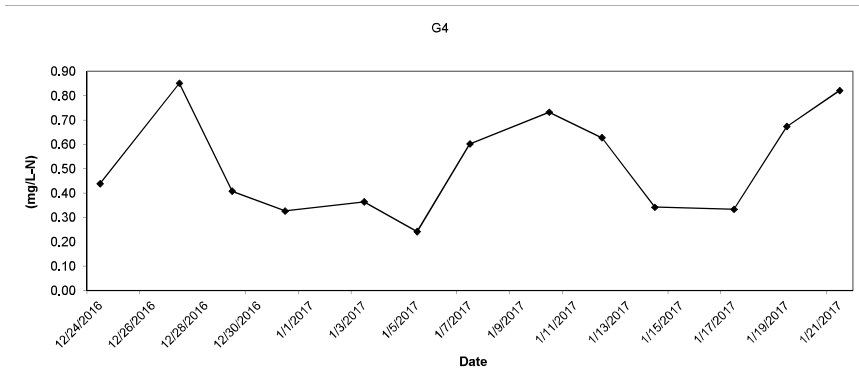


In-situ TIN (Depth average) at Mid-Ebb Tide

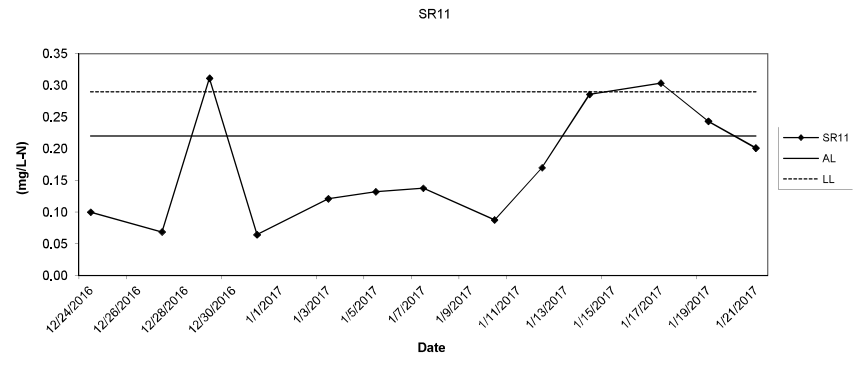


In-situ TIN (Depth average) at Mid-Ebb Tide

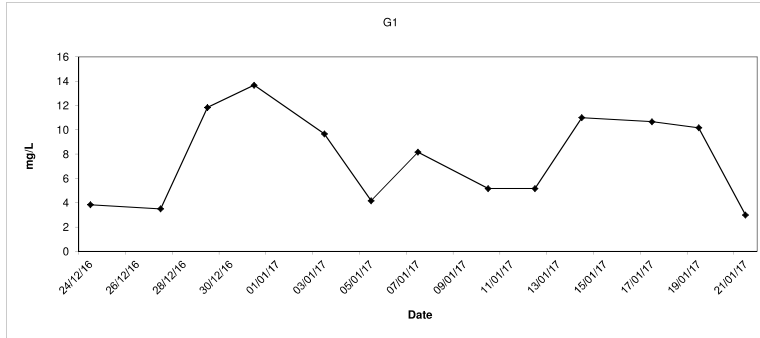
In-situ TIN (Depth average) at Mid-Ebb Tide



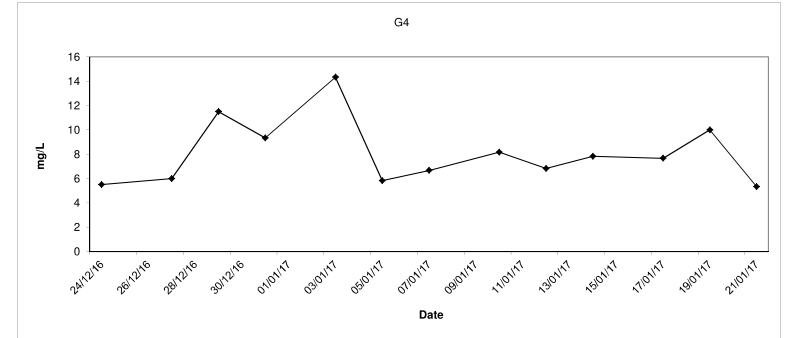
In-situ TIN (Depth average) at Mid-Ebb Tide



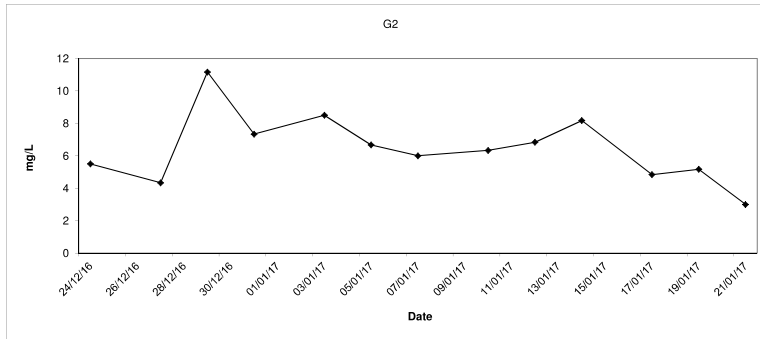
Total Suspended Solids (Depth average) at Mid-Ebb Tide



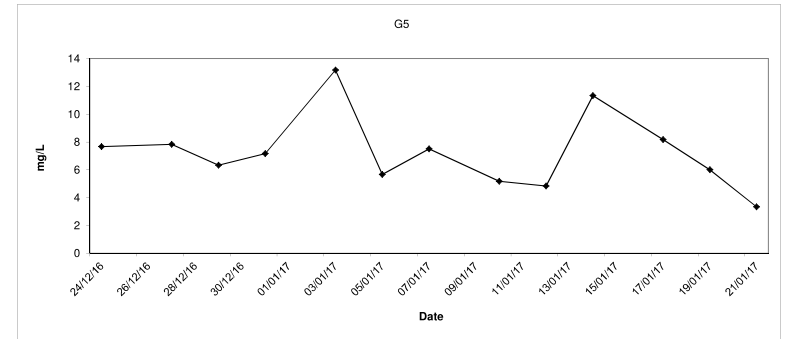
Total Suspended Solids (Depth average) at Mid-Ebb Tide



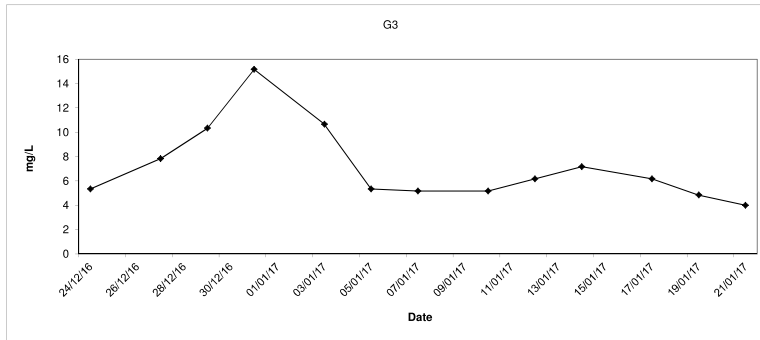
G2



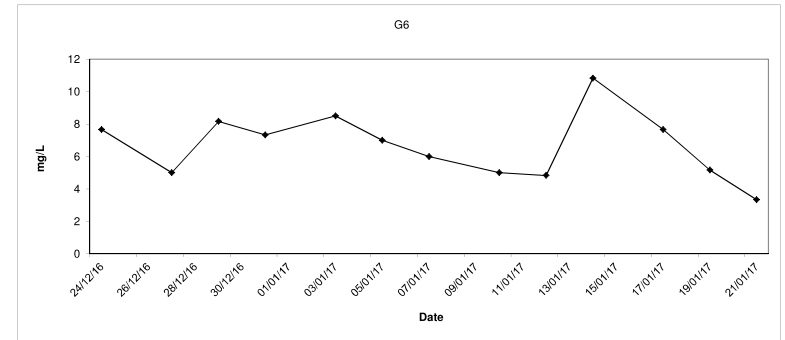
G5



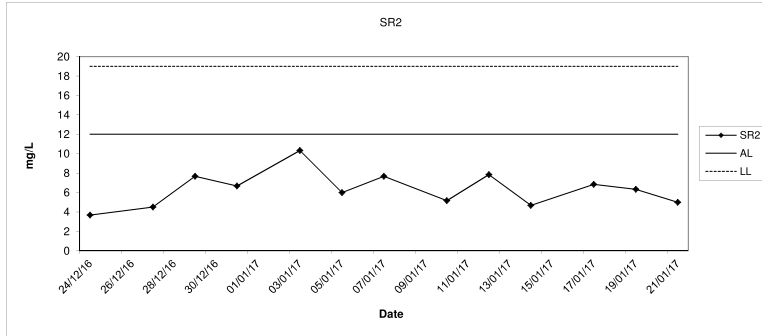
G3



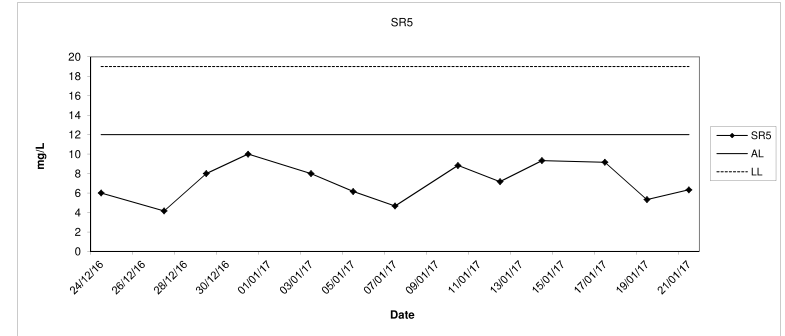
G6



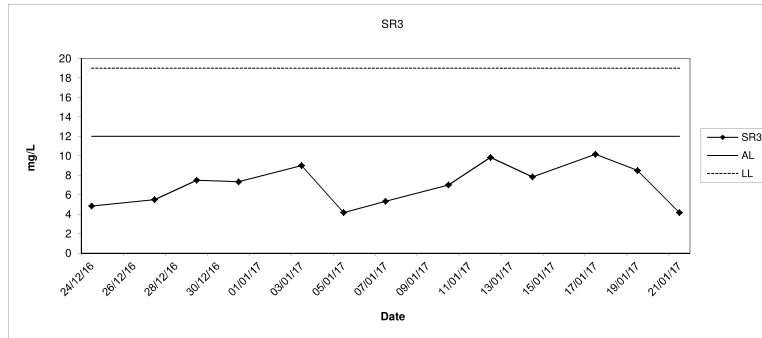
Total Suspended Solids (Depth average) at Mid-Ebb Tide



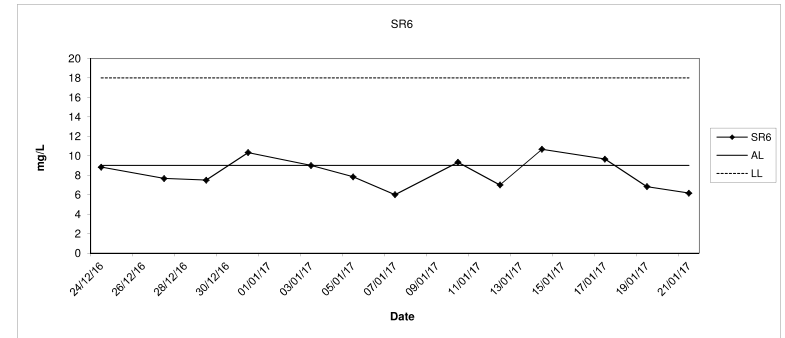
Total Suspended Solids (Depth average) at Mid-Ebb Tide



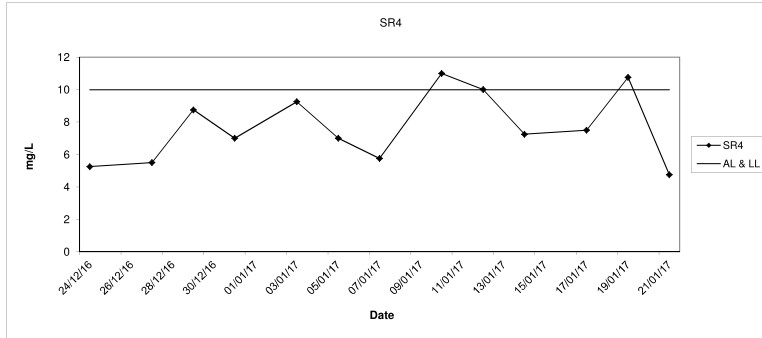
SR3



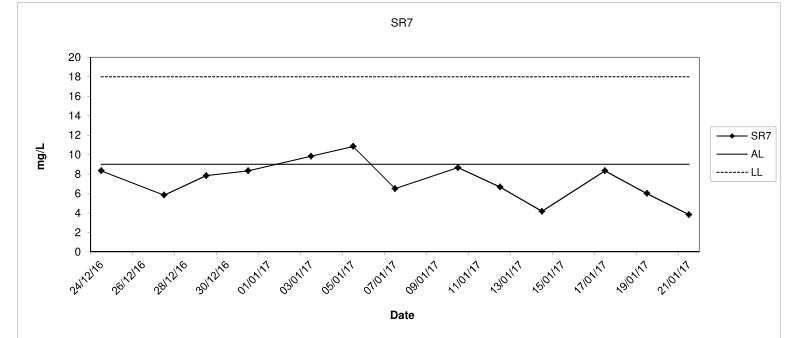
SR6



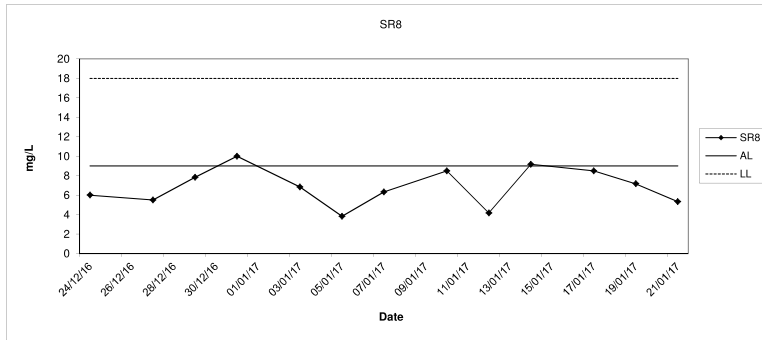
SR4



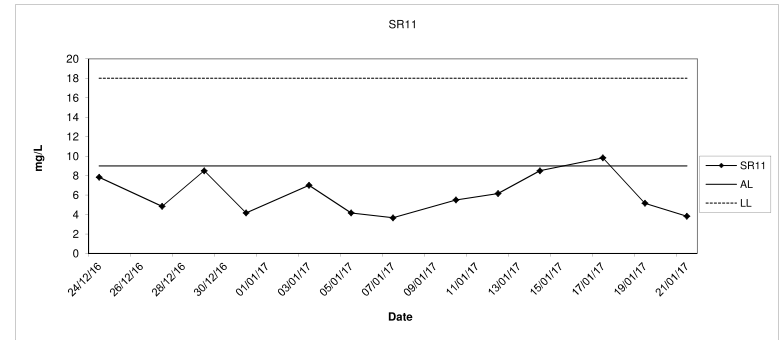
SR7



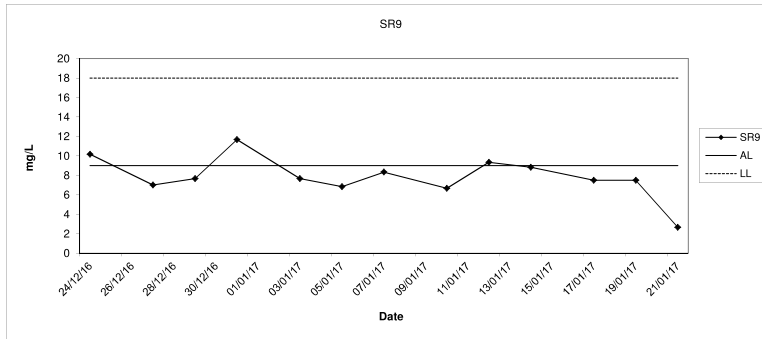
Total Suspended Solids (Depth average) at Mid-Ebb Tide



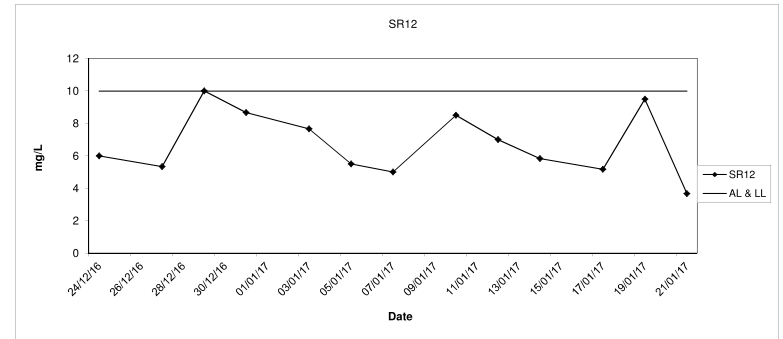
Total Suspended Solids (Depth average) at Mid-Ebb Tide



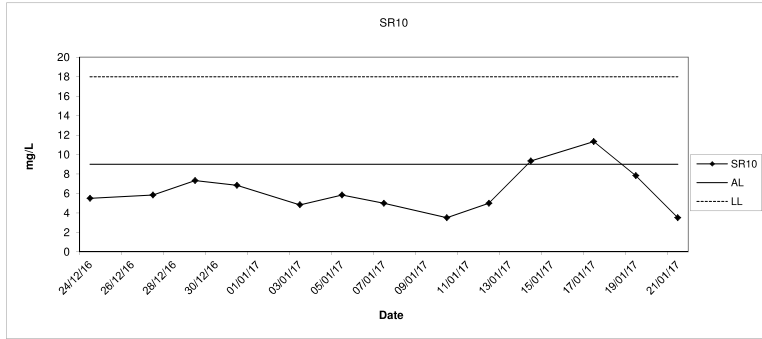
SR9



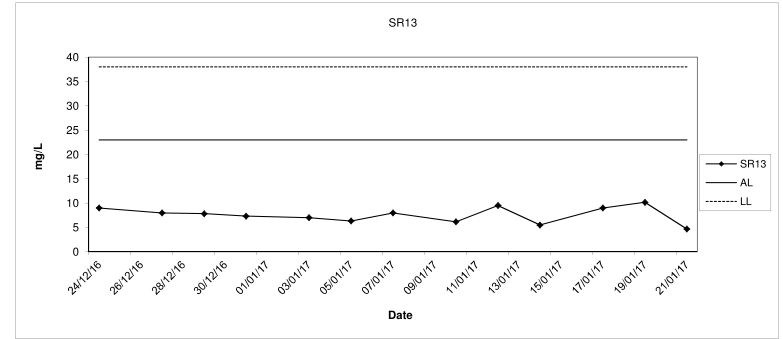
SR12



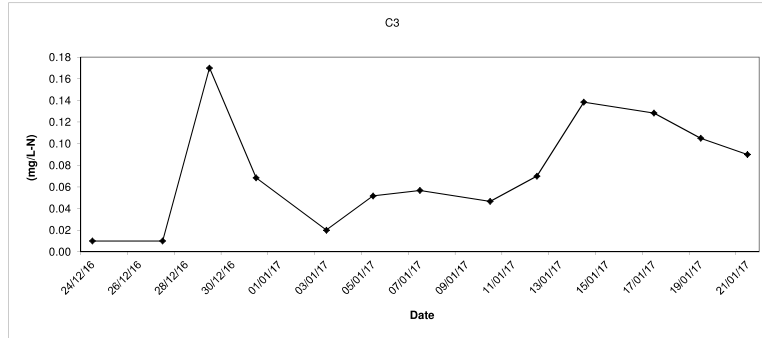
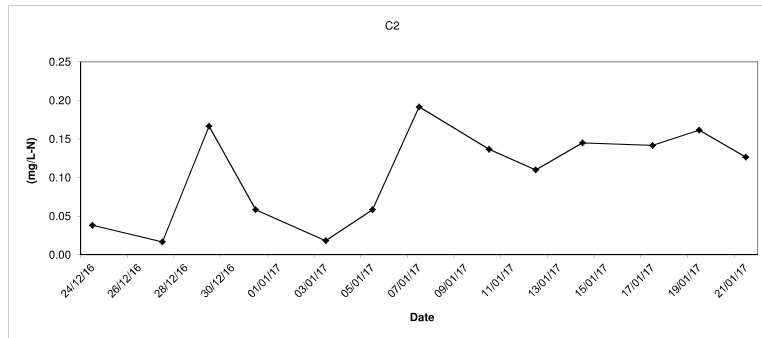
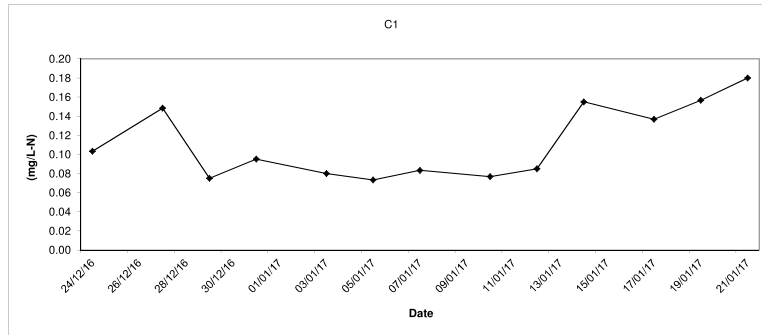
SR10



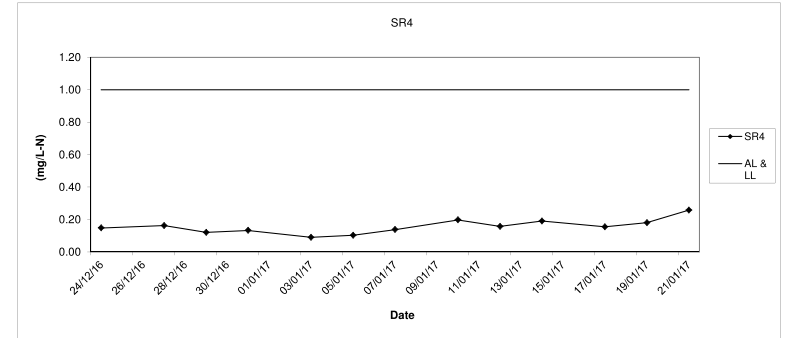
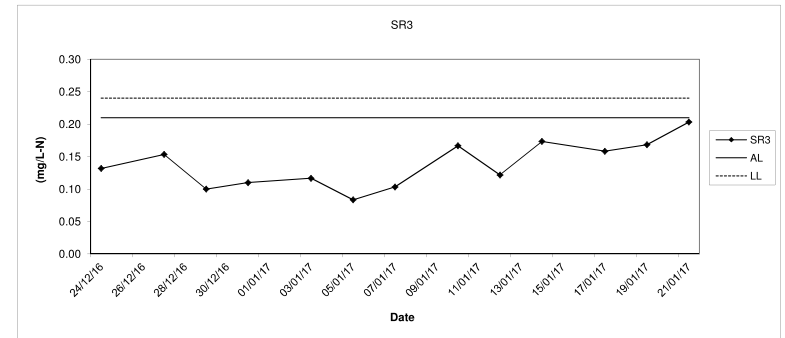
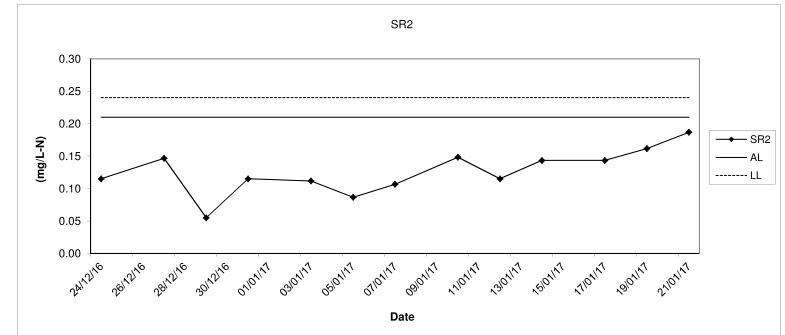
SR13



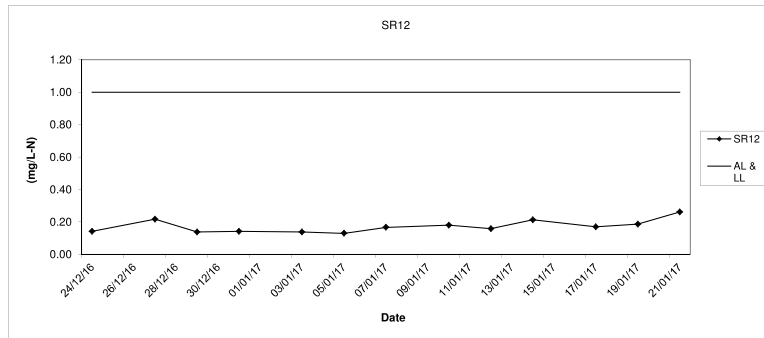
Ammonia Nitrogen (Depth average) at Mid-Ebb Tide



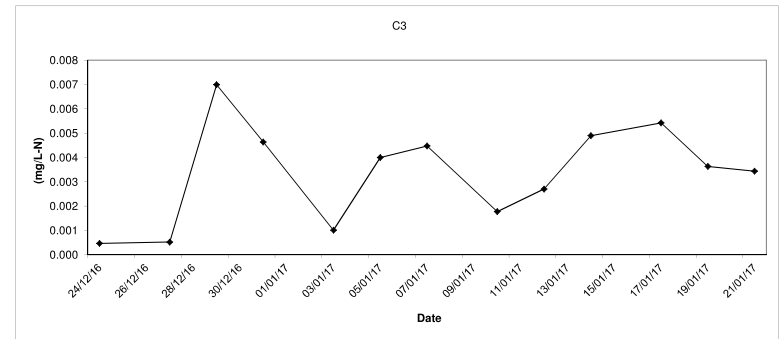
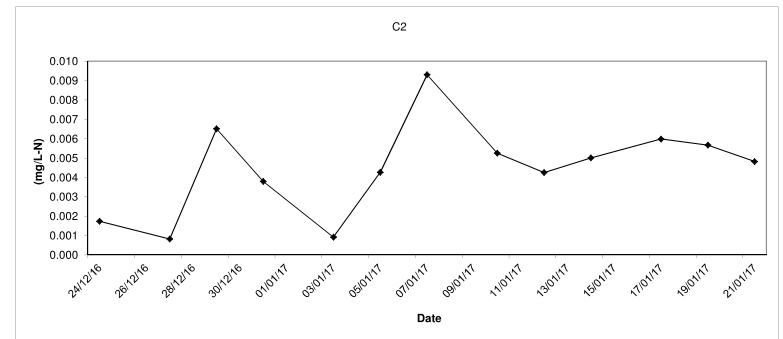
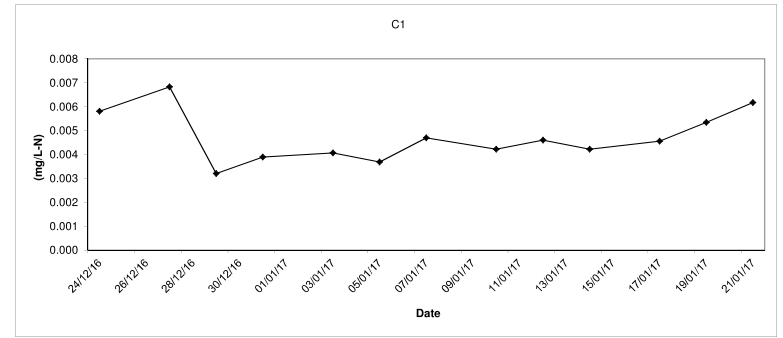
Ammonia Nitrogen (Depth average) at Mid-Ebb Tide



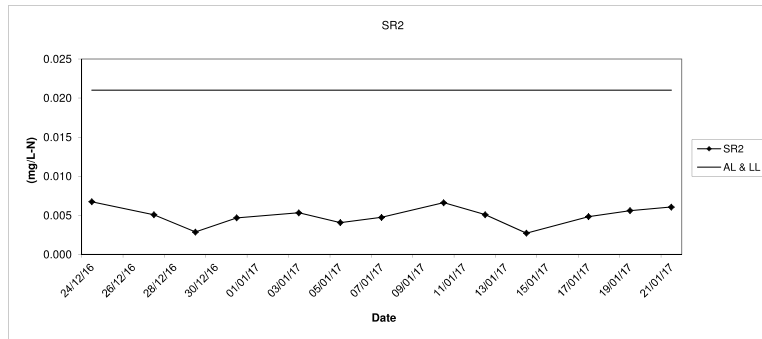
Ammonia Nitrogen (Depth average) at Mid-Ebb Tide



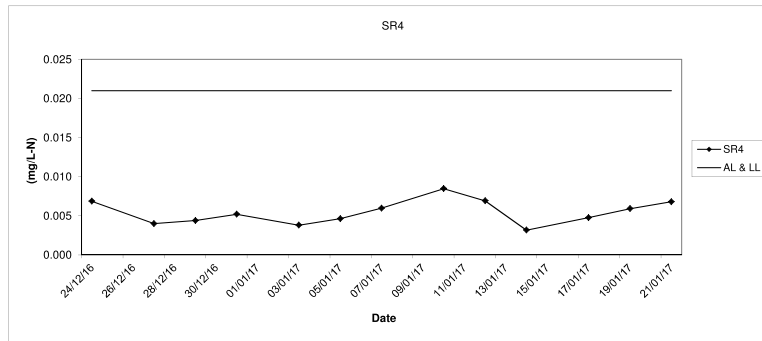
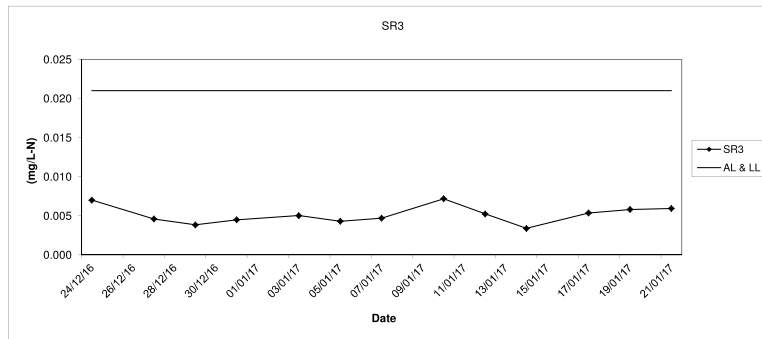
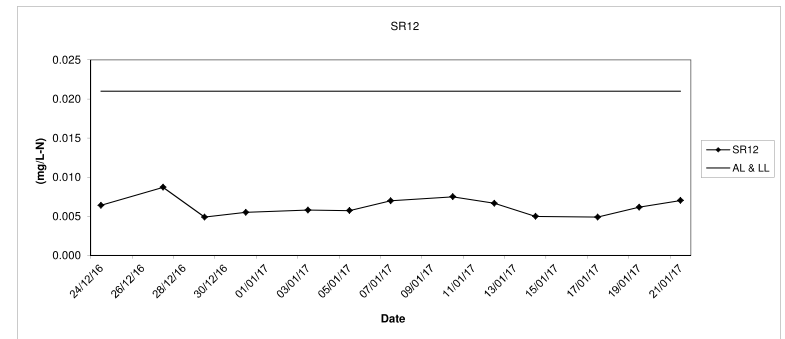
Laboratory Analysis UIA (Depth average) at Mid-Ebb Tide



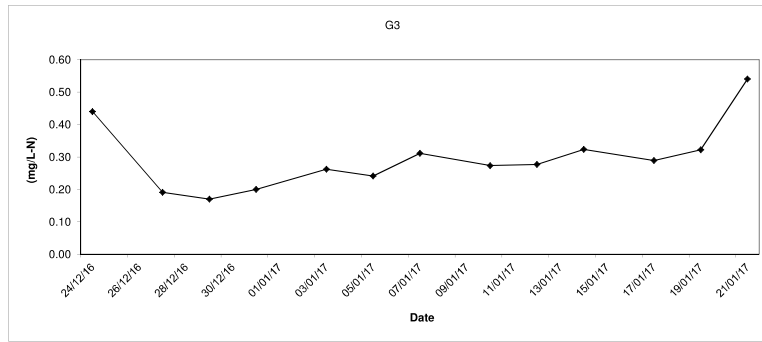
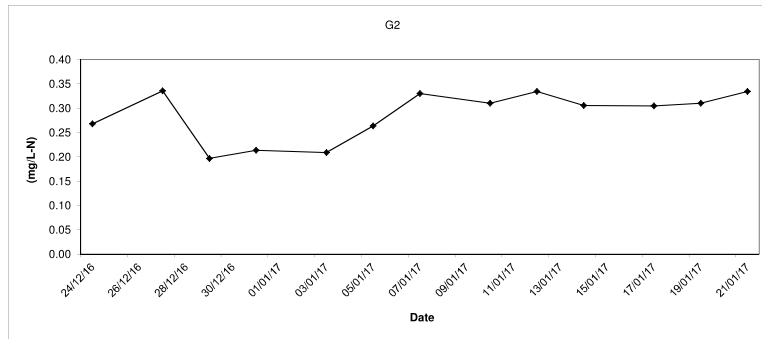
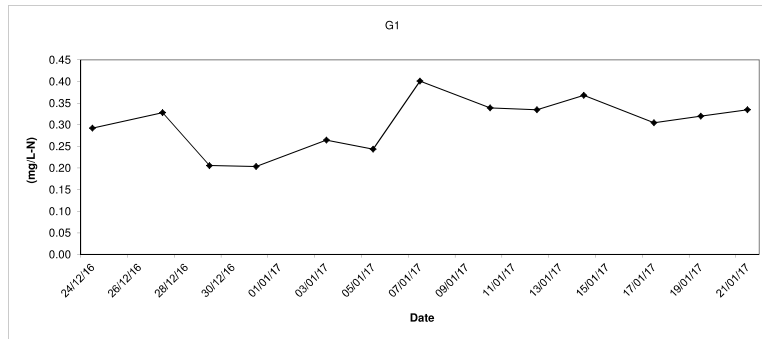
Laboratory Analysis UIA (Depth average) at Mid-Ebb Tide



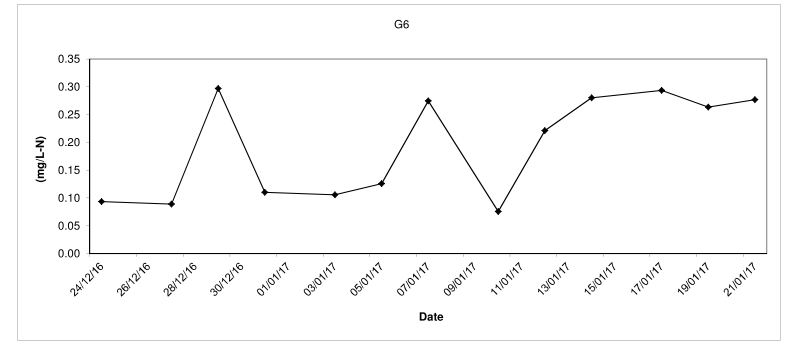
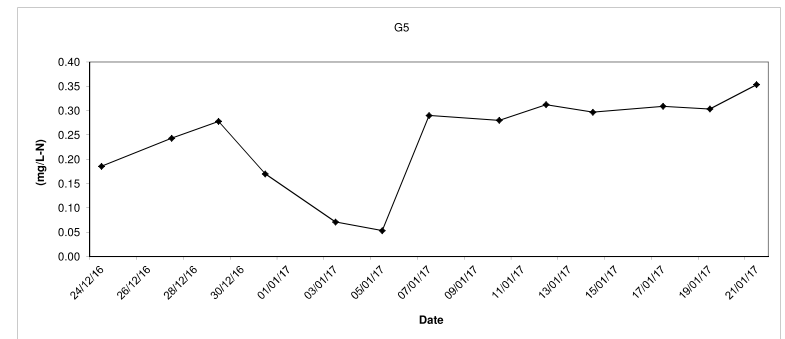
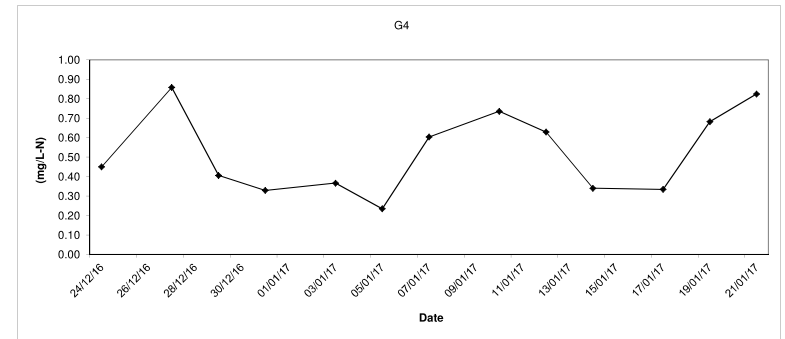
Laboratory Analysis UIA (Depth average) at Mid-Ebb Tide



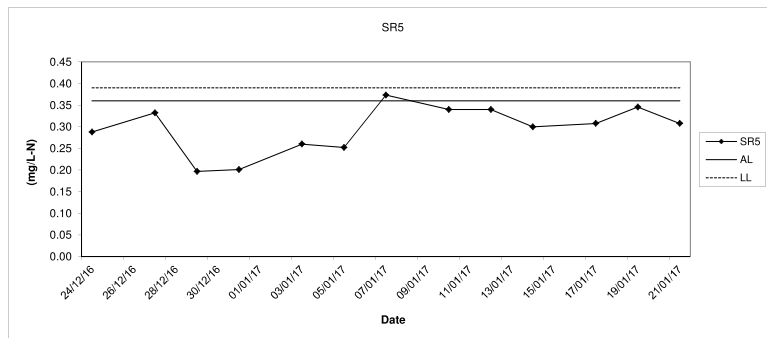
Laboratory Analysis TIN (Depth average) at Mid-Ebb Tide



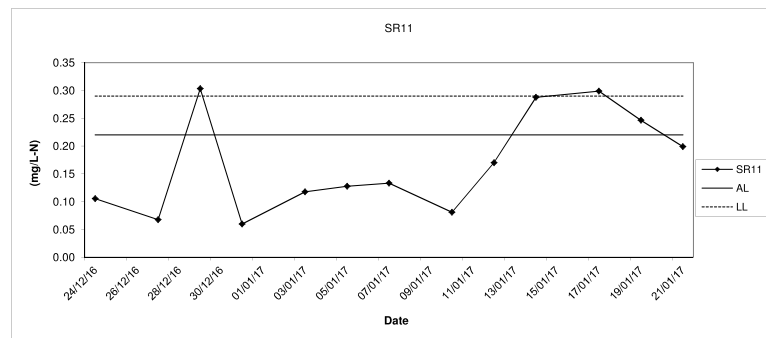
Laboratory Analysis TIN (Depth average) at Mid-Ebb Tide



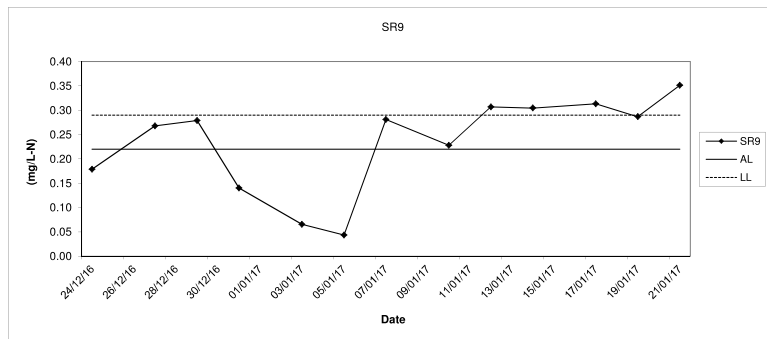
Laboratory Analysis TIN (Depth average) at Mid-Ebb Tide



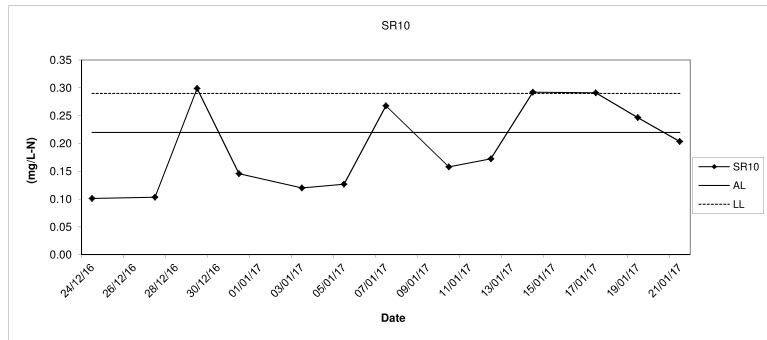
Laboratory Analysis TIN (Depth average) at Mid-Ebb Tide



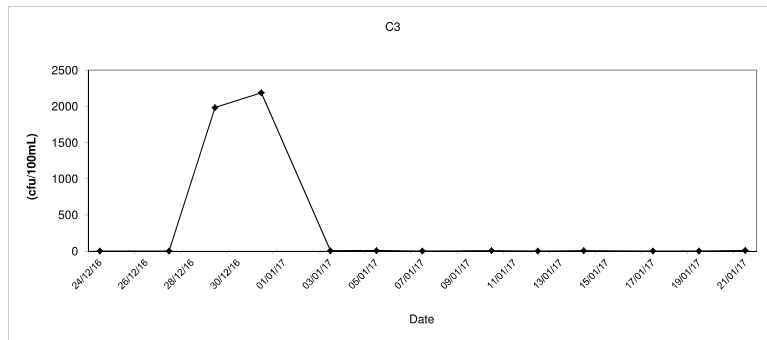
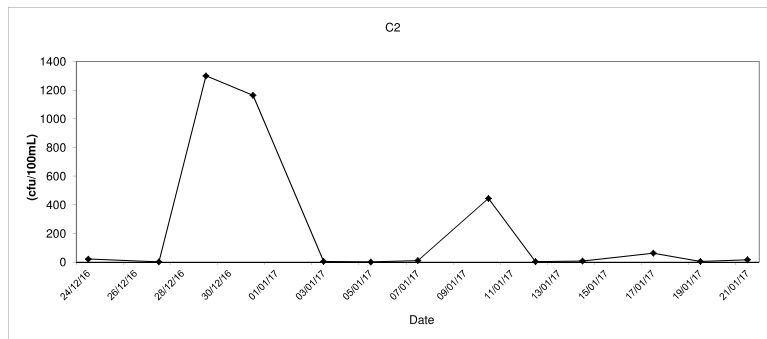
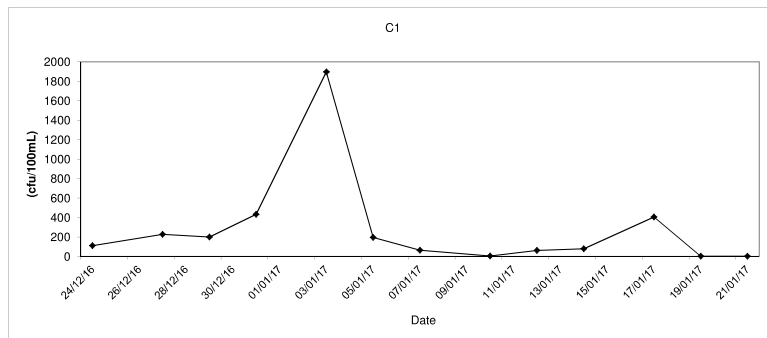
SR9



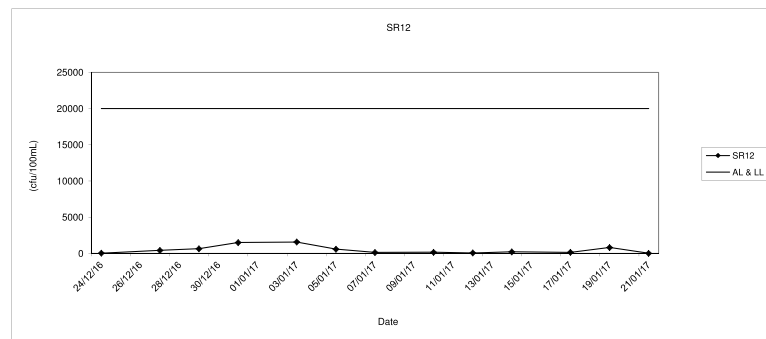
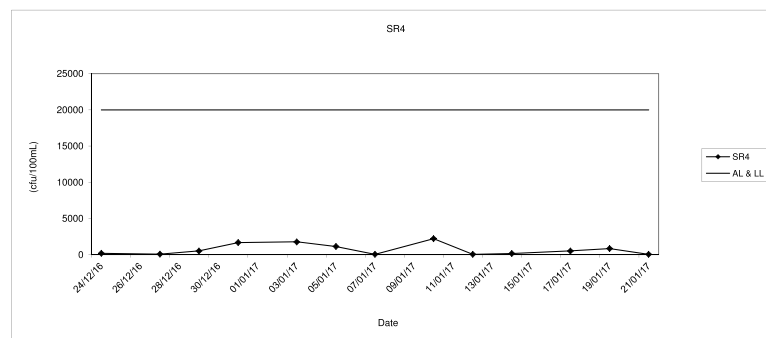
SR10



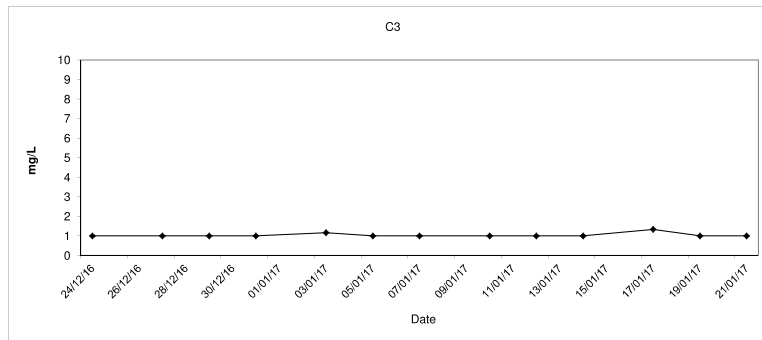
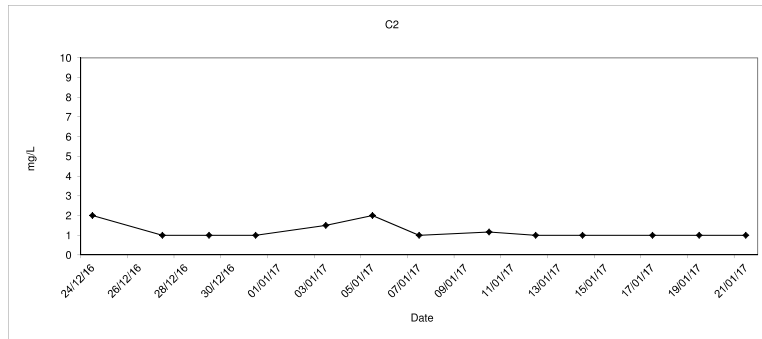
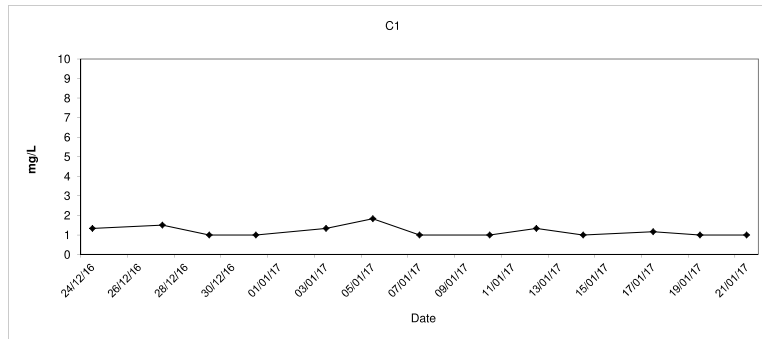
E.coli (Depth average) at Mid-Ebb Tide



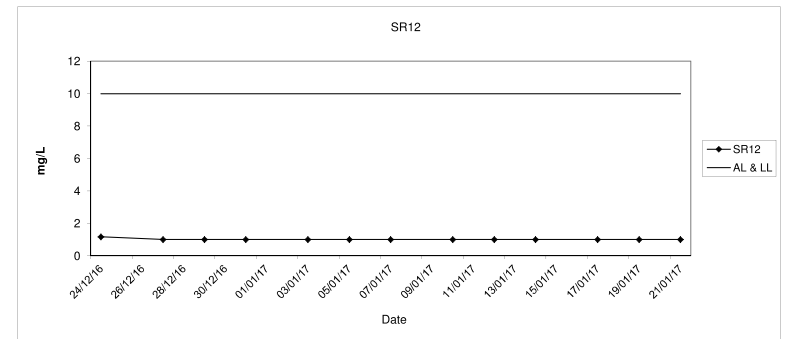
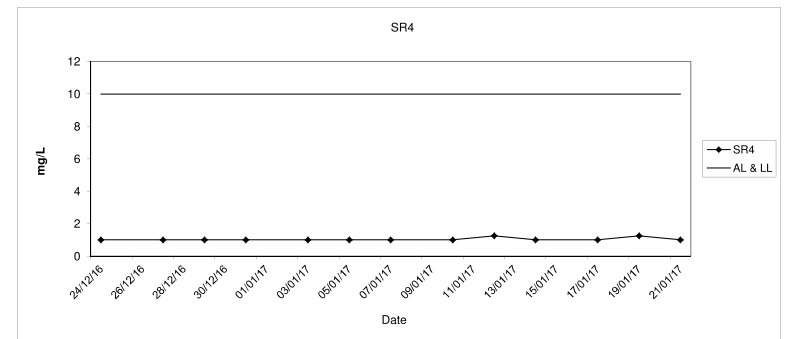
E.coli (Depth average) at Mid-Ebb Tide



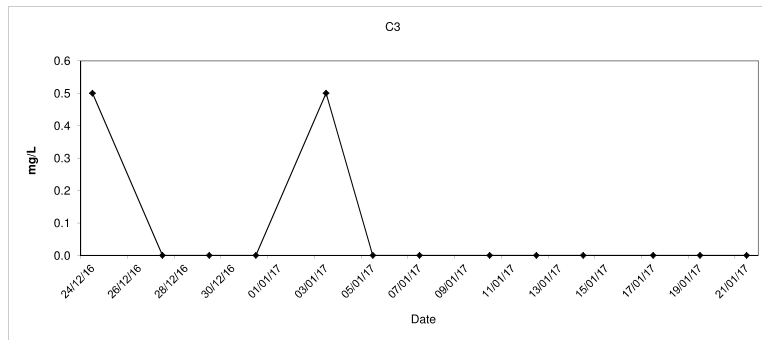
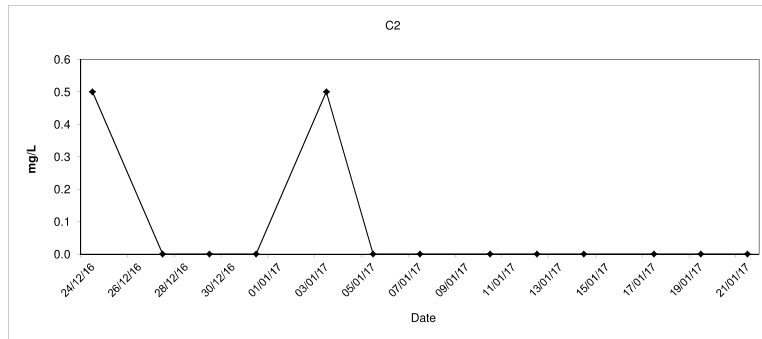
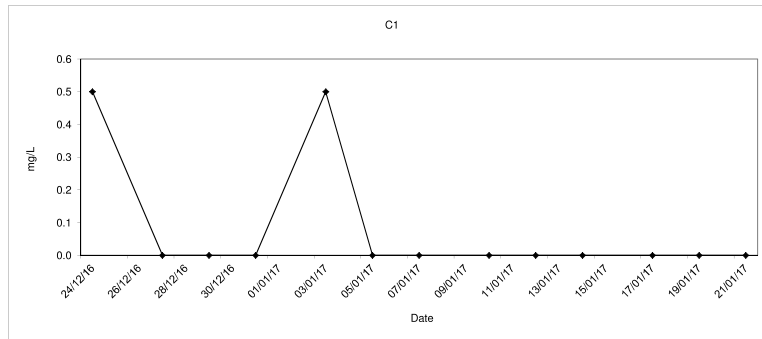
BOD₅ (Depth average) at Mid-Ebb Tide



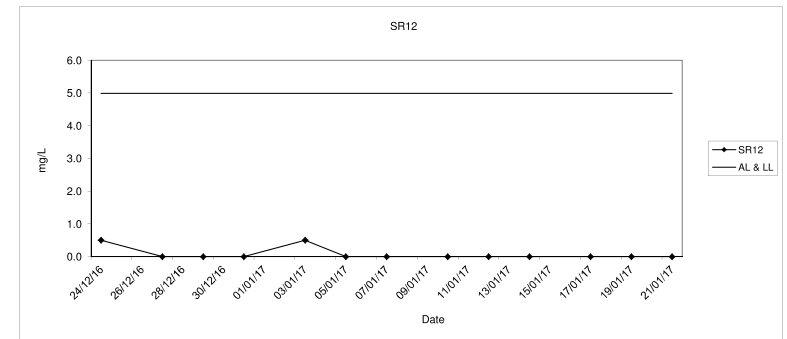
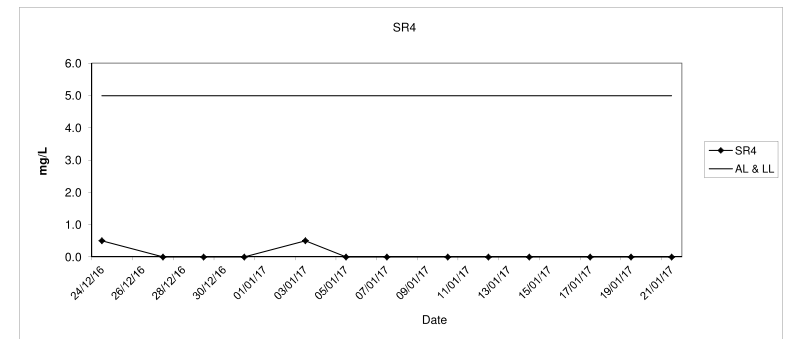
BOD₅ (Depth average) at Mid-Ebb Tide



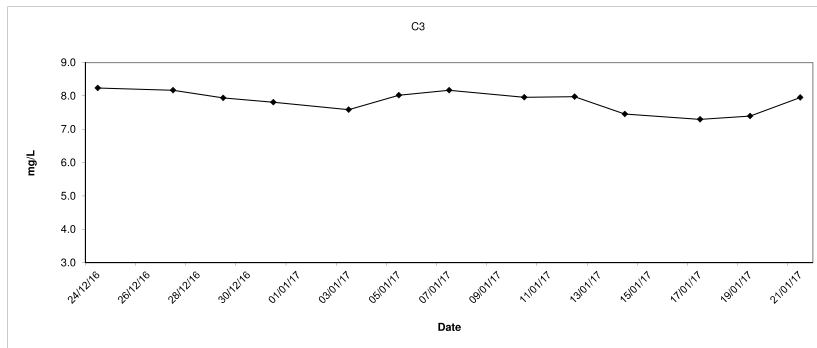
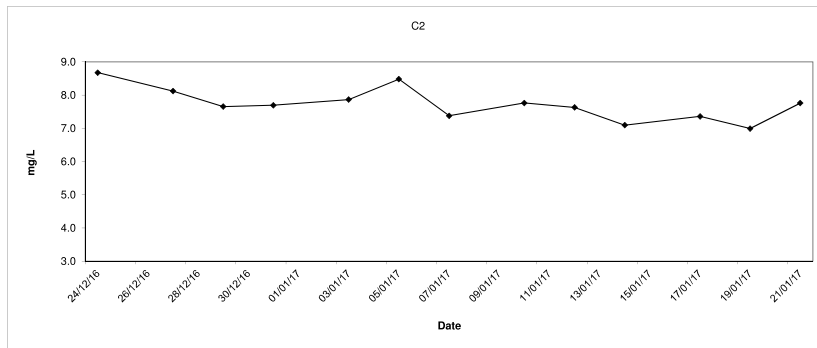
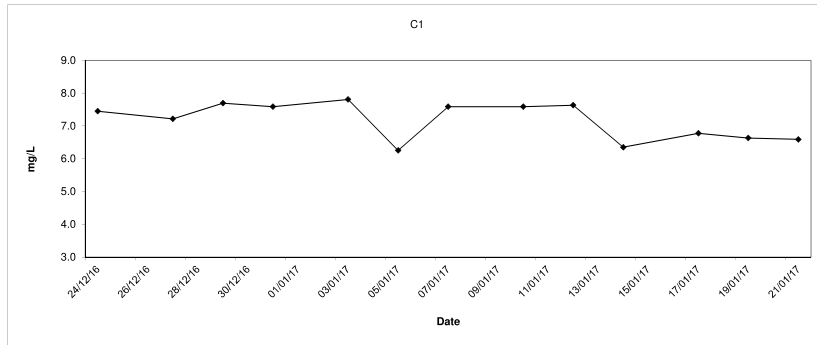
Synthetic Detergent (Depth average) at Mid-Ebb Tide



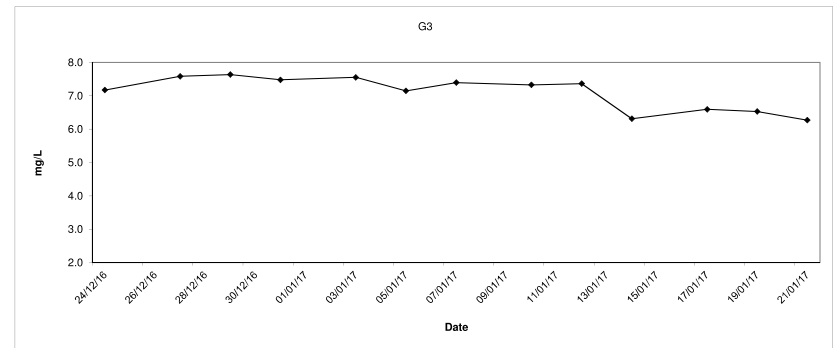
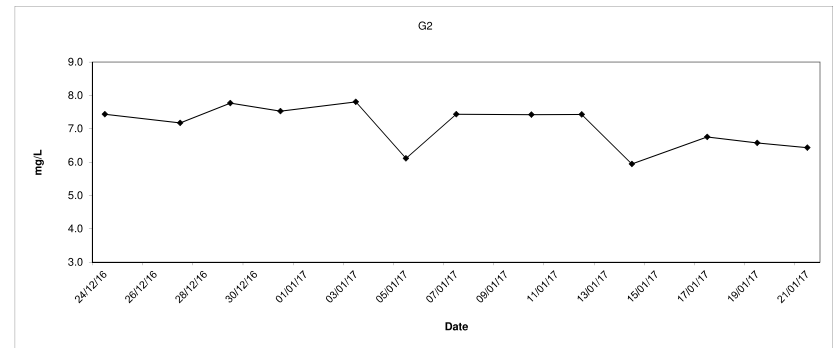
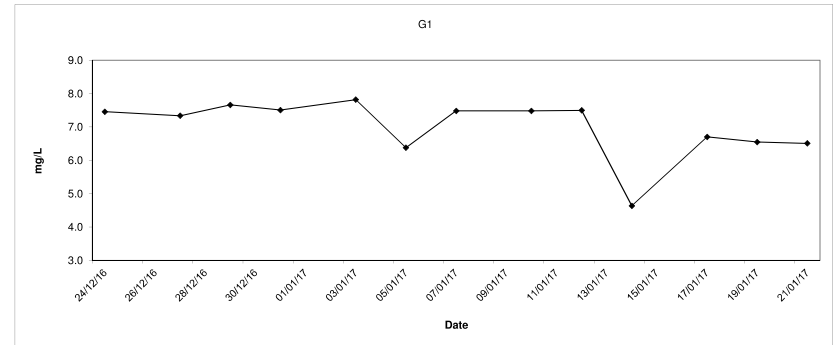
Synthetic Detergent (Depth average) at Mid-Ebb Tide



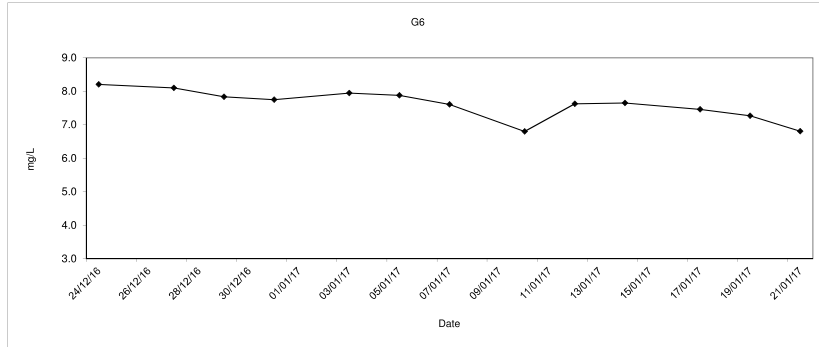
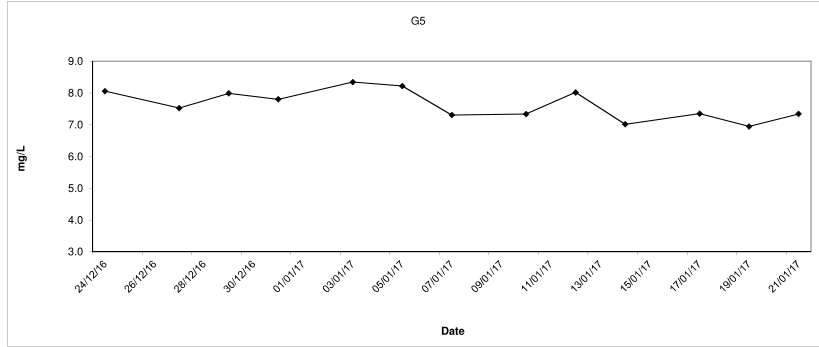
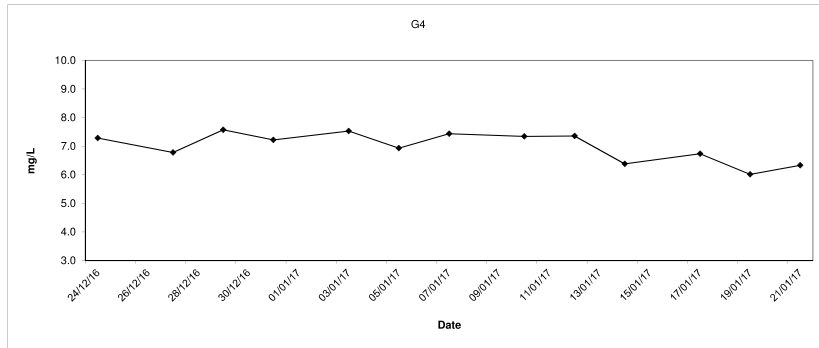
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



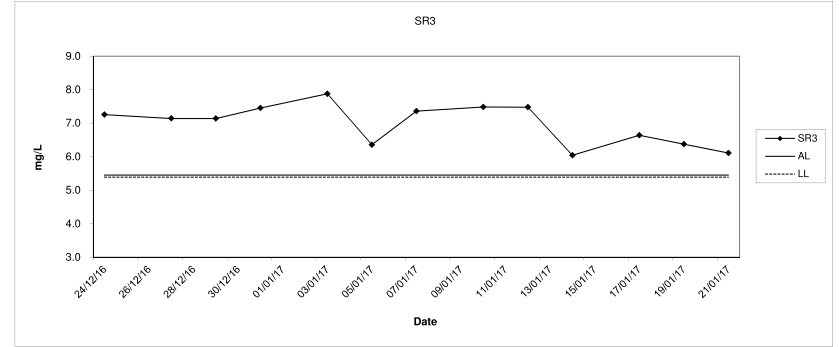
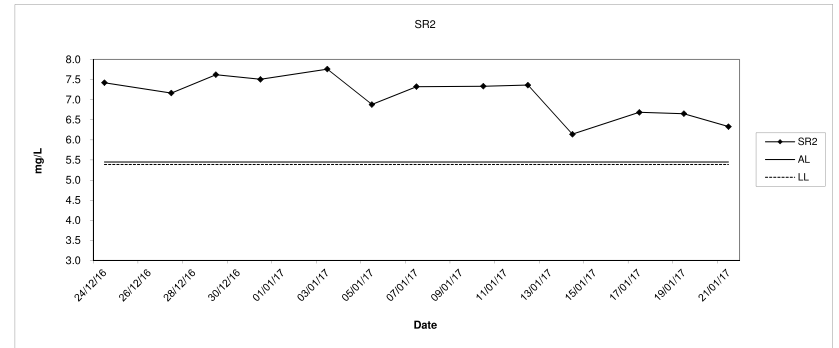
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



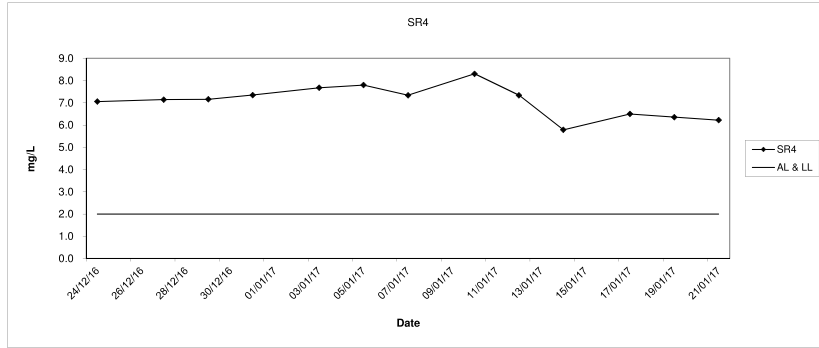
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



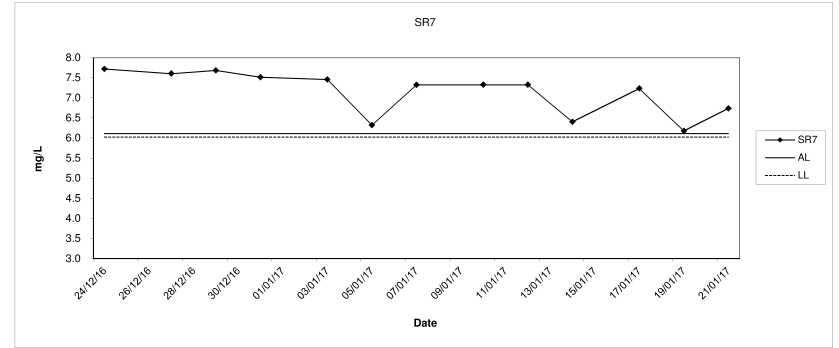
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



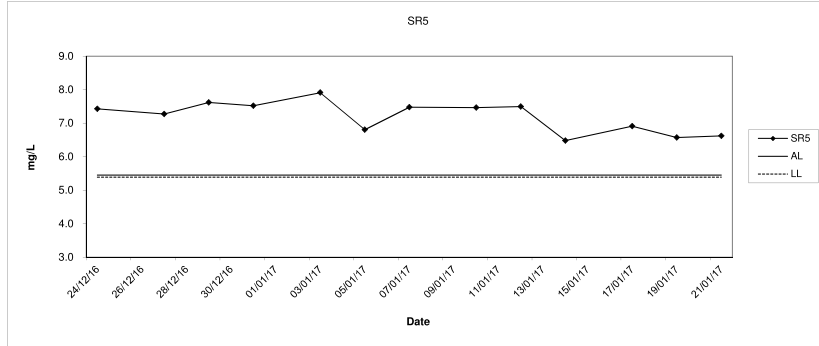
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



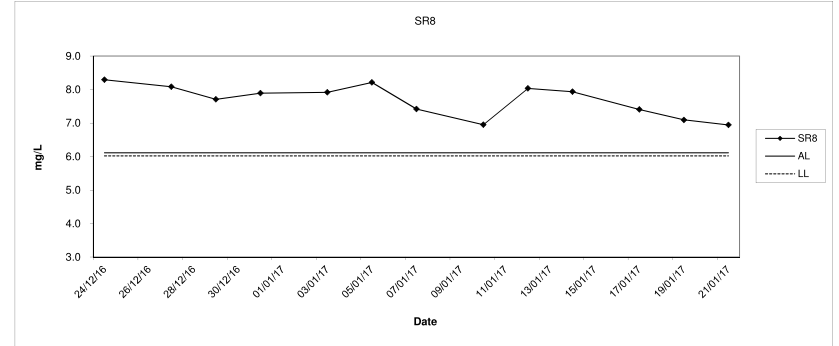
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



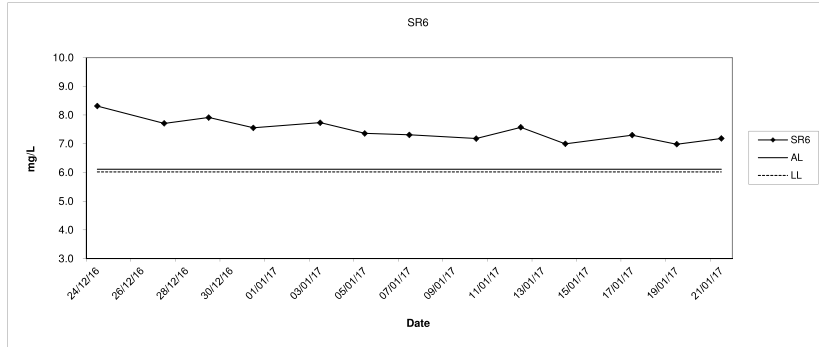
SR5



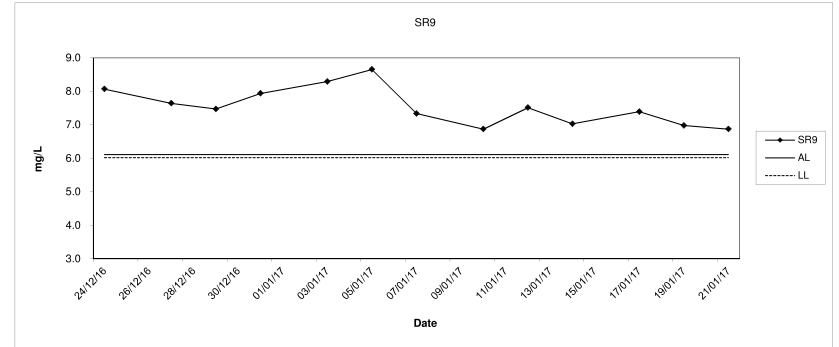
SR8



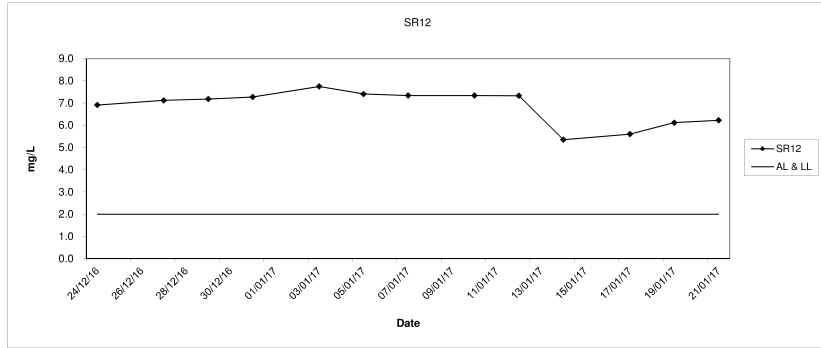
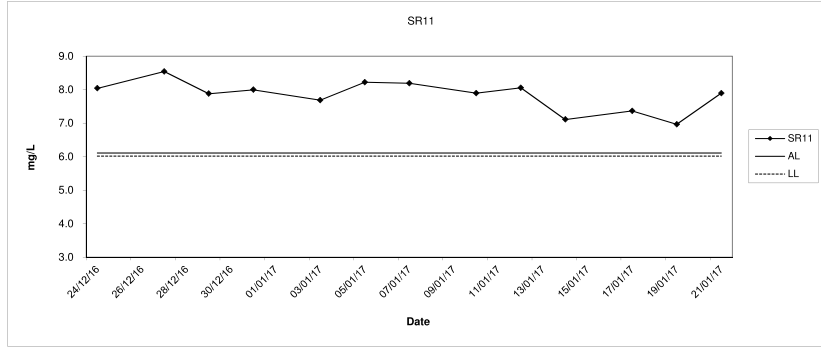
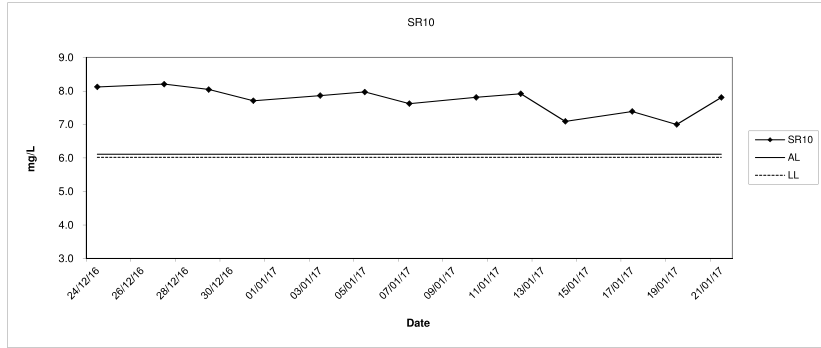
SR6



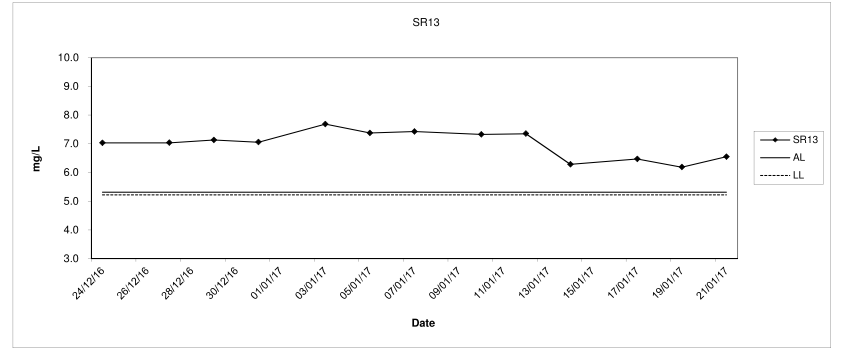
SR9



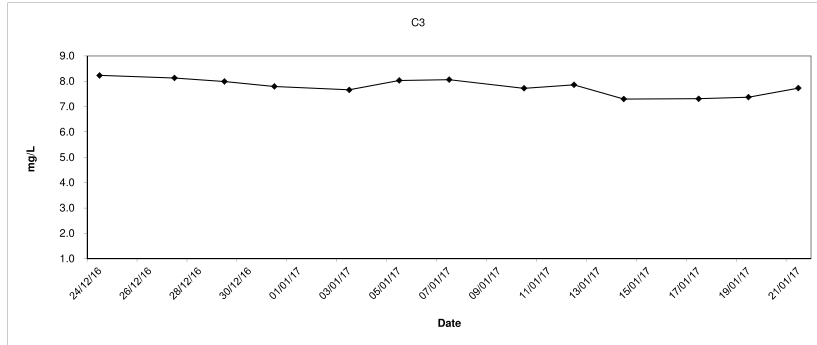
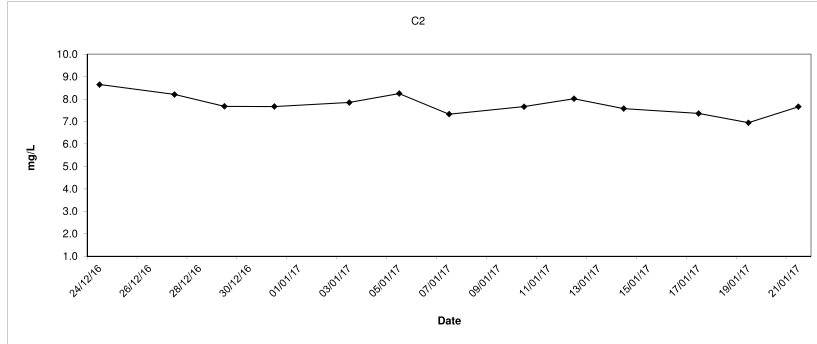
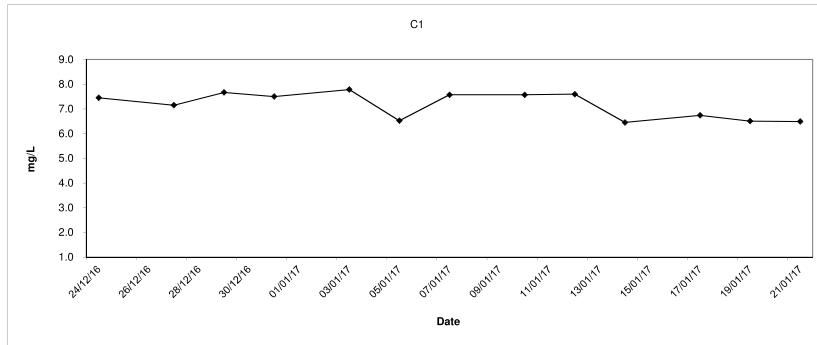
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



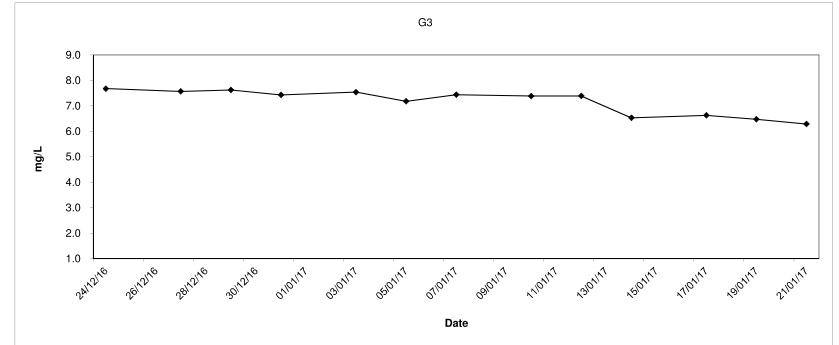
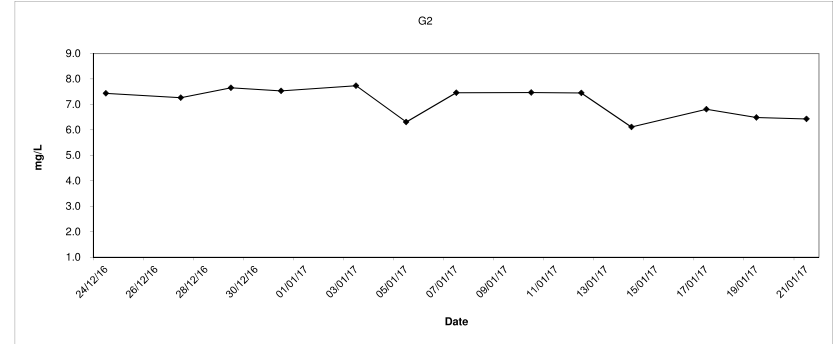
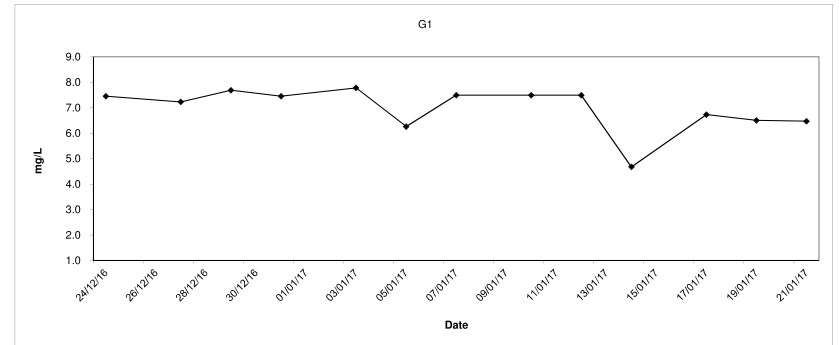
Dissolved Oxygen (Surface and Middle) at Mid-Flood Tide



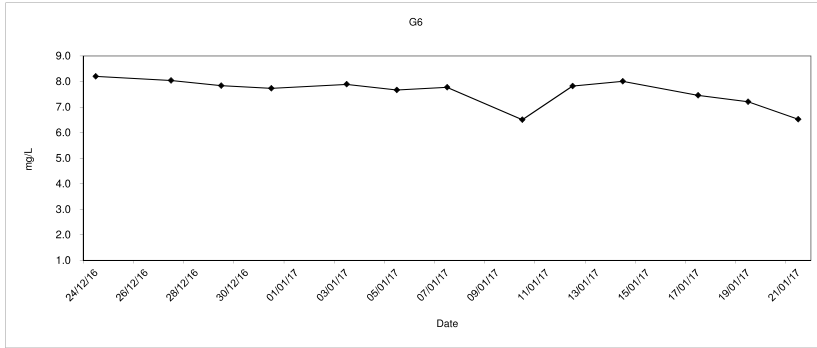
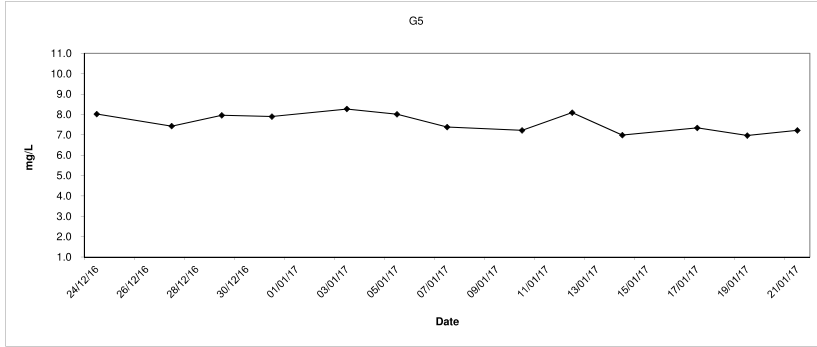
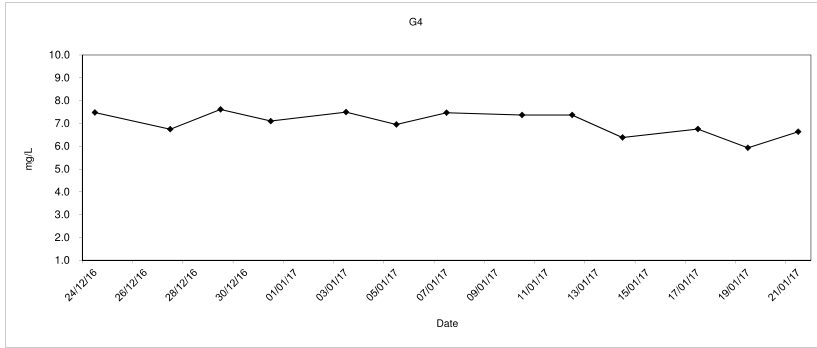
Dissolved Oxygen (Bottom) at Mid-Flood Tide



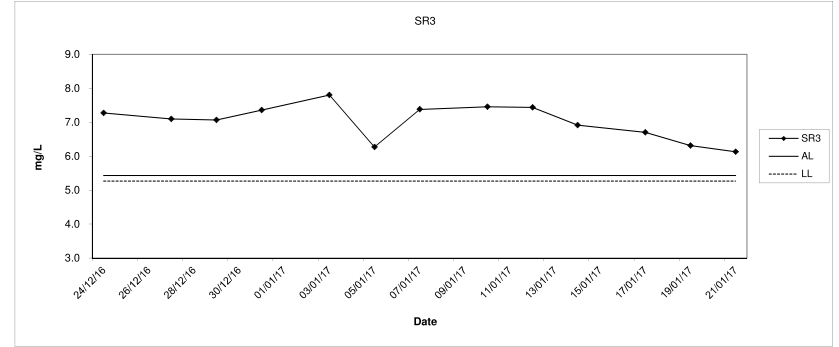
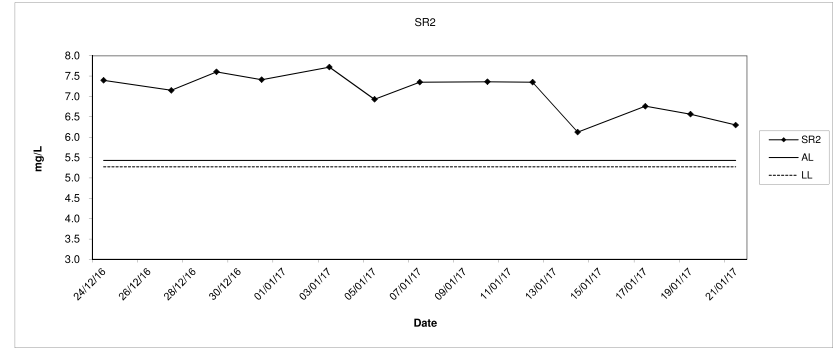
Dissolved Oxygen (Bottom) at Mid-Flood Tide



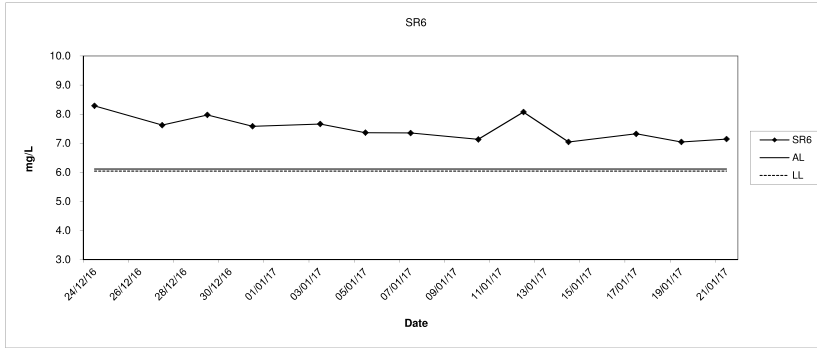
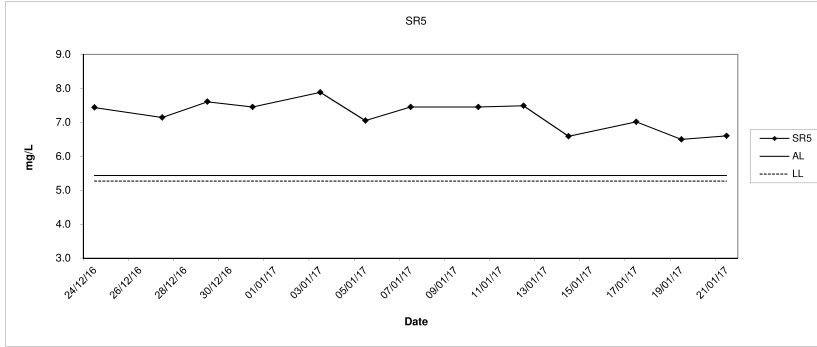
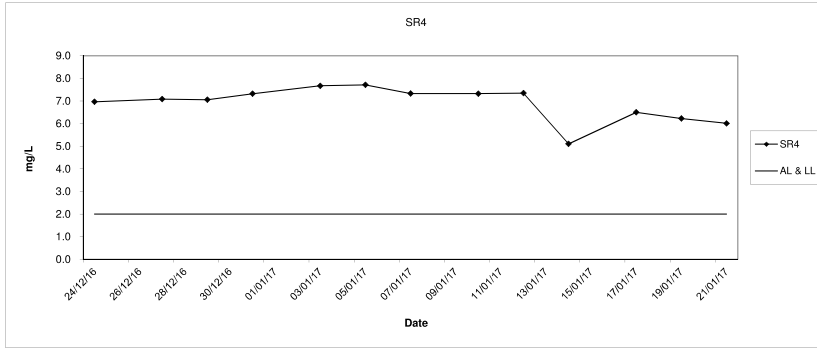
Dissolved Oxygen (Bottom) at Mid-Flood Tide



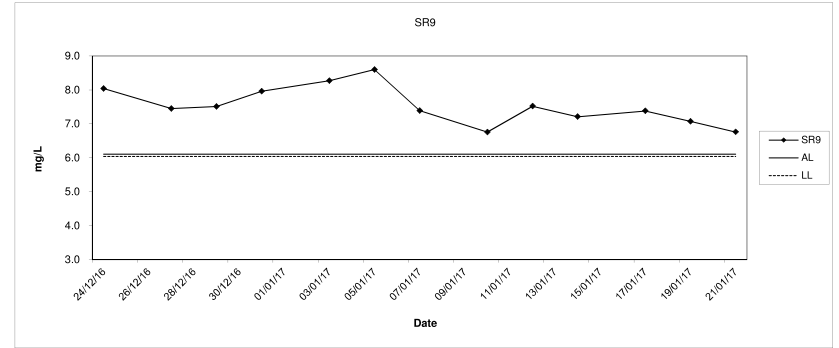
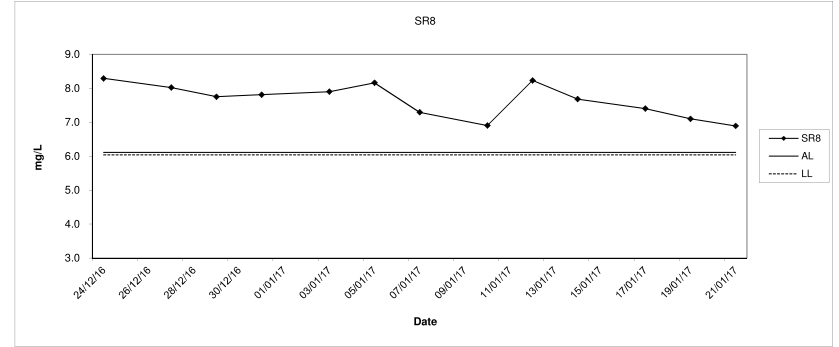
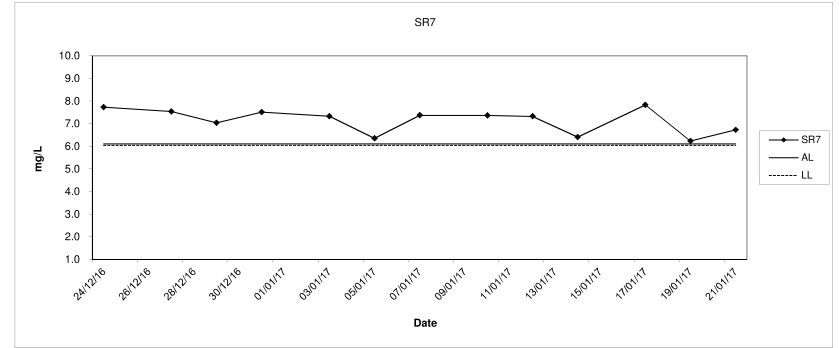
Dissolved Oxygen (Bottom) at Mid-Flood Tide



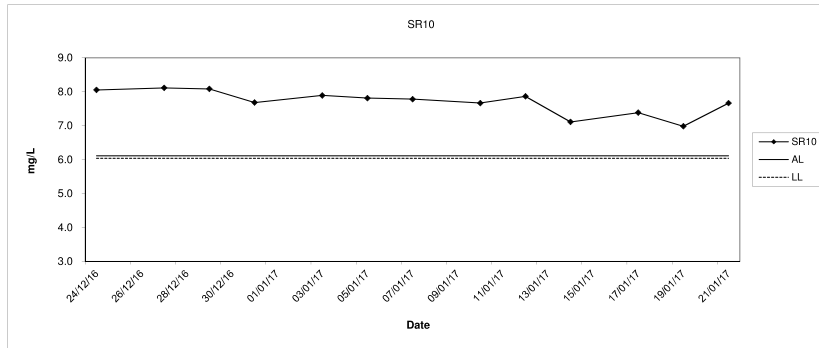
Dissolved Oxygen (Bottom) at Mid-Flood Tide



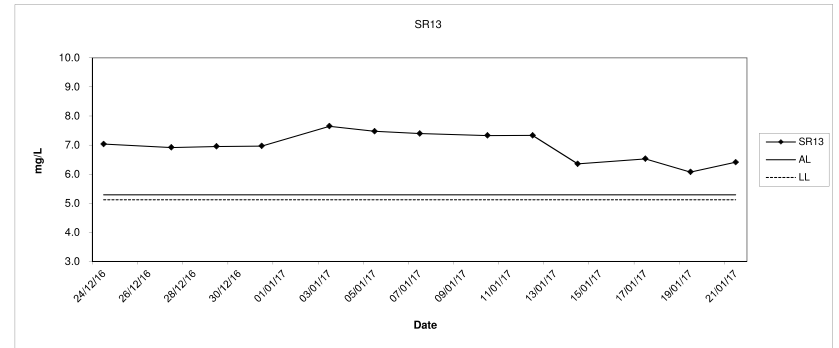
Dissolved Oxygen (Bottom) at Mid-Flood Tide



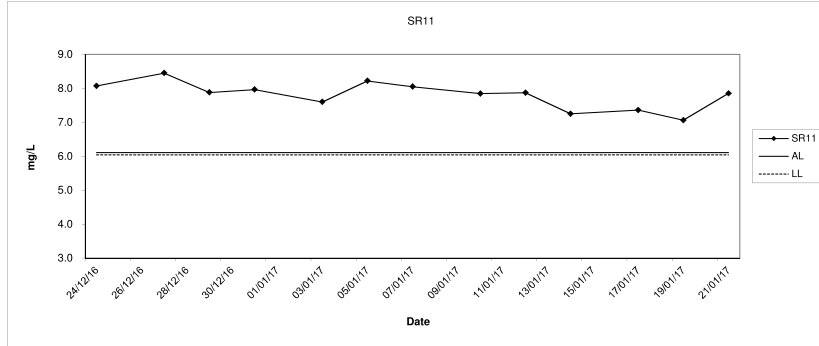
Dissolved Oxygen (Bottom) at Mid-Flood Tide



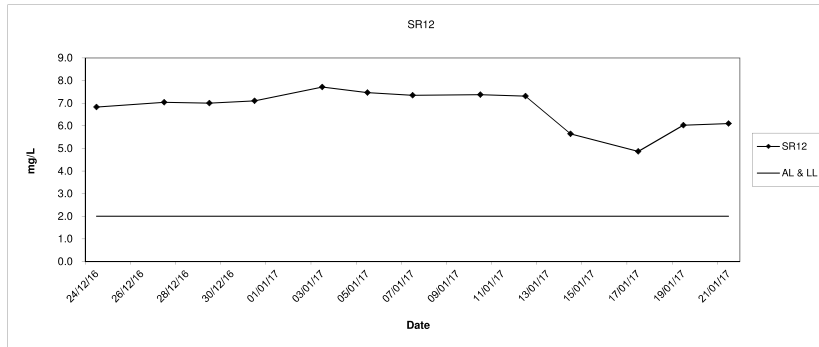
Dissolved Oxygen (Bottom) at Mid-Flood Tide



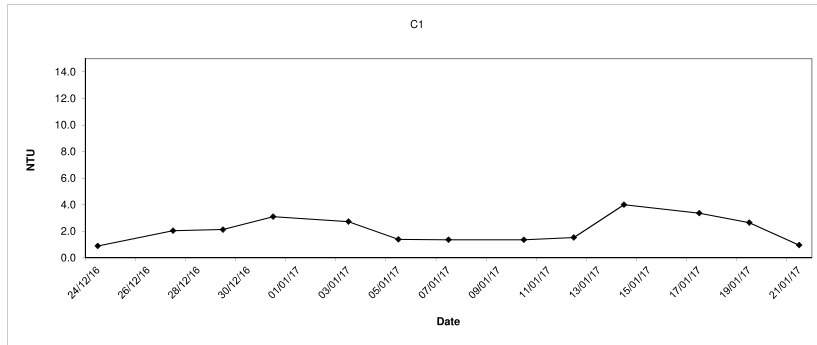
SR11



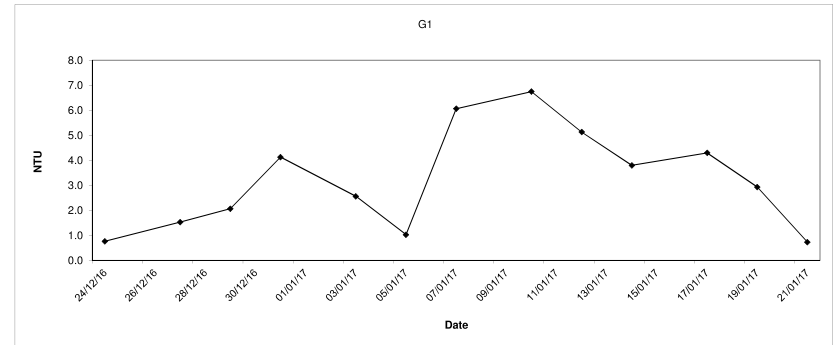
SR12



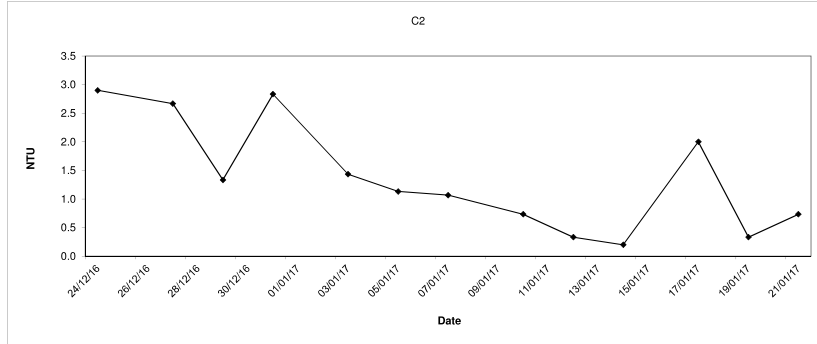
Turbidity (Depth average) at Mid-Flood Tide



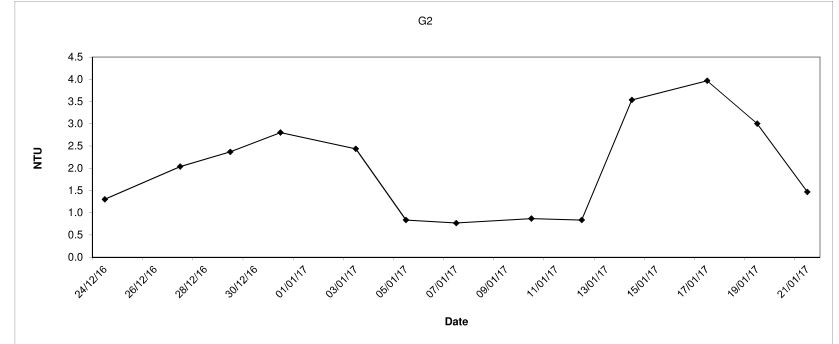
Turbidity (Depth average) at Mid-Flood Tide



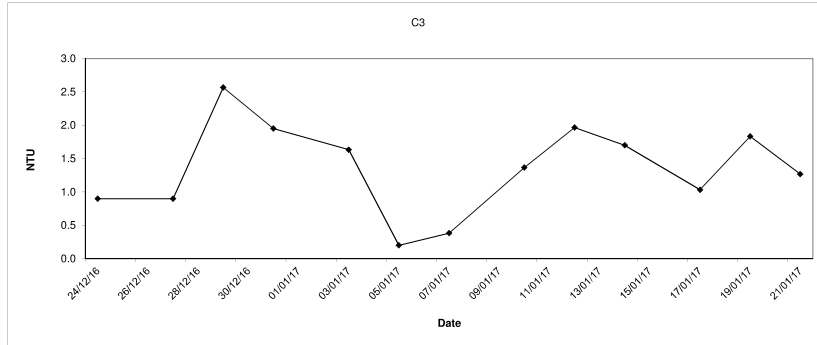
C2



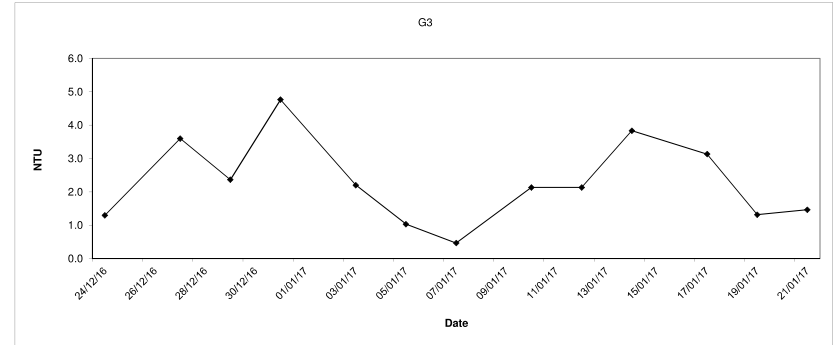
G2



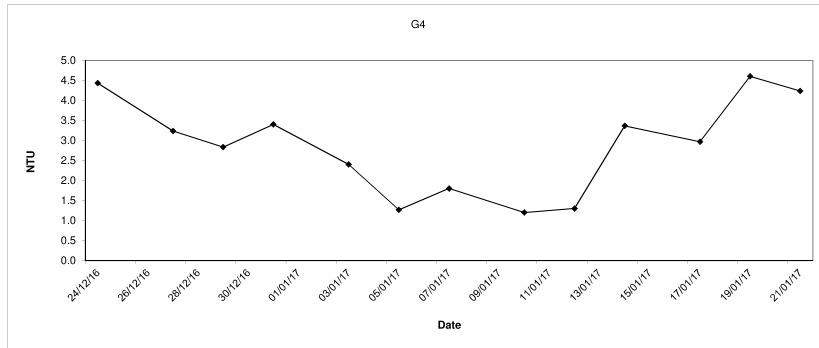
C3



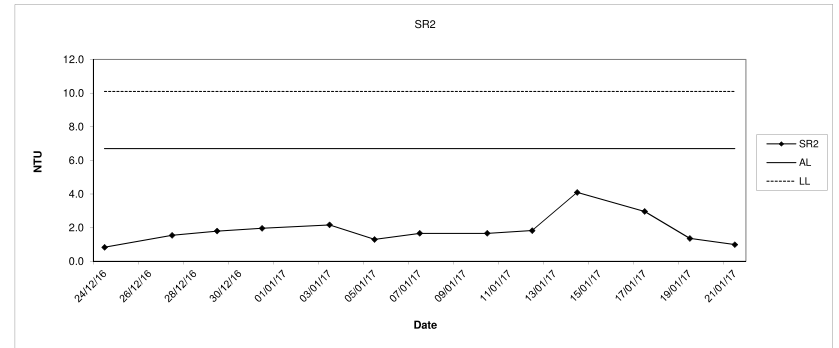
G3



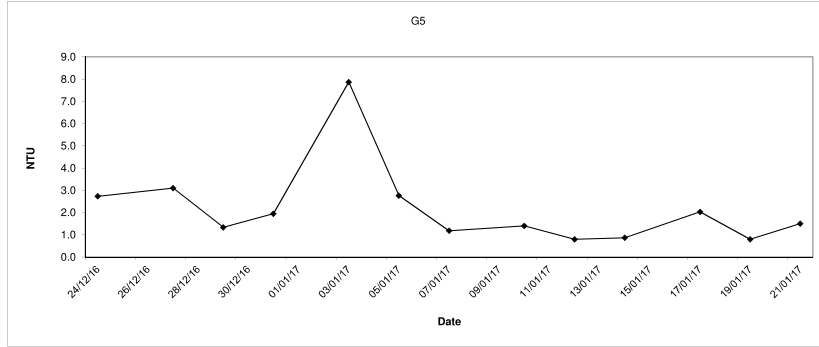
Turbidity (Depth average) at Mid-Flood Tide



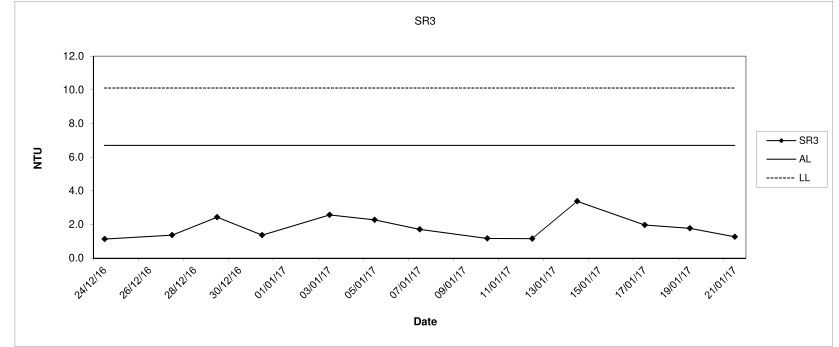
Turbidity (Depth average) at Mid-Flood Tide



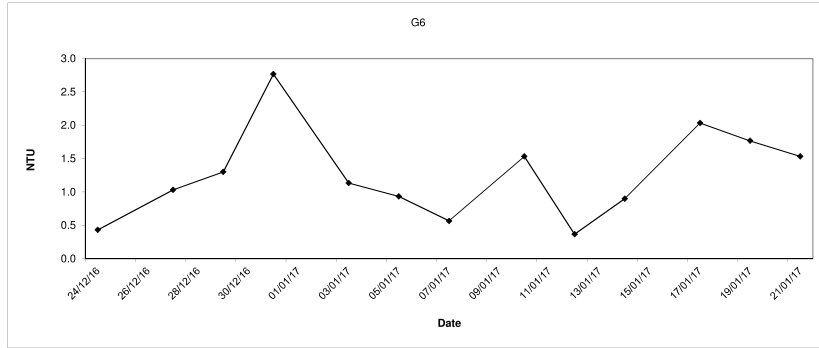
G5



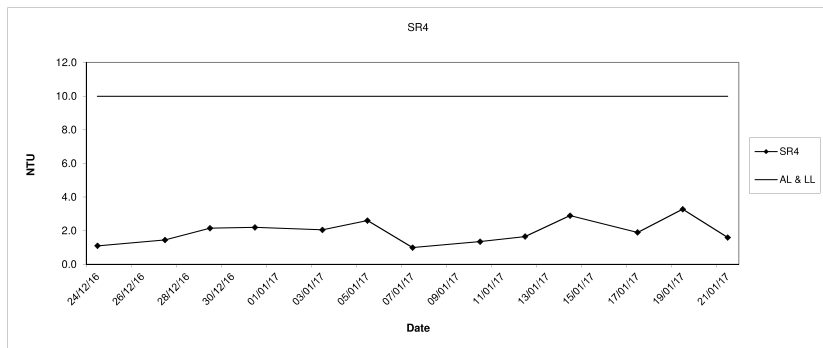
SR3



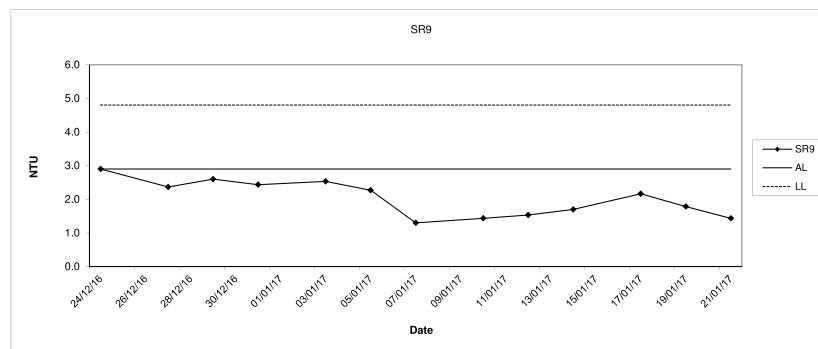
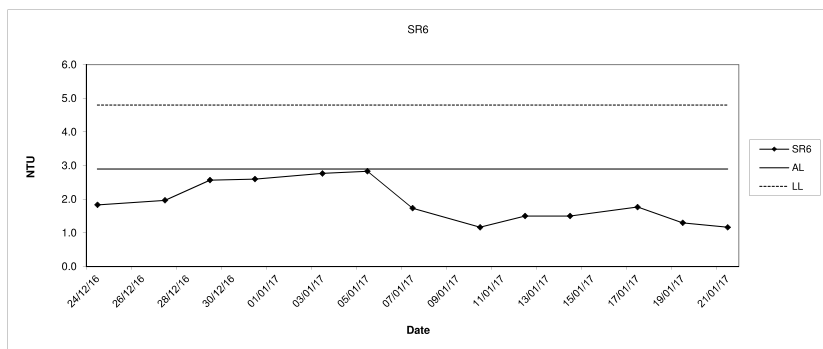
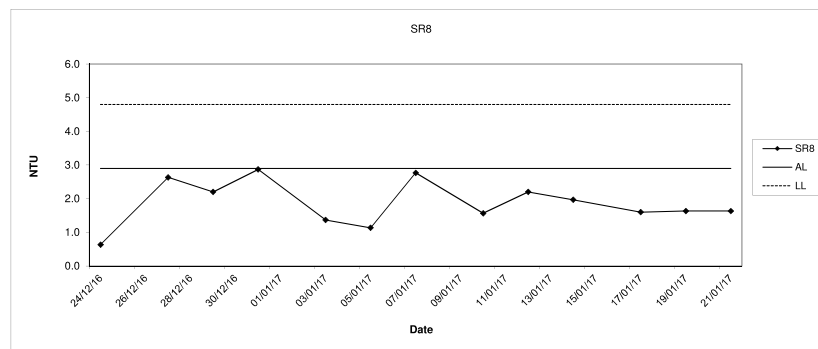
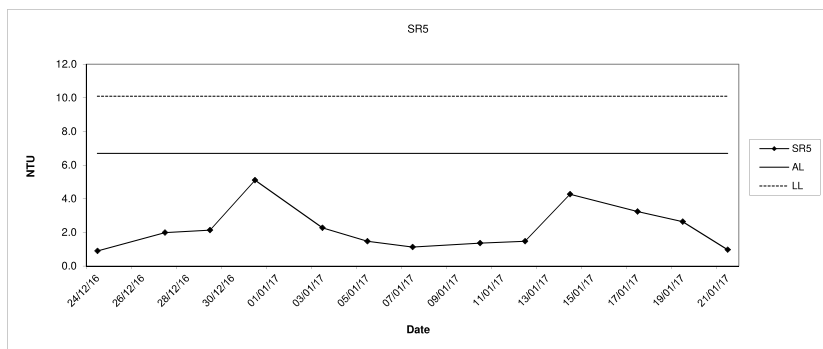
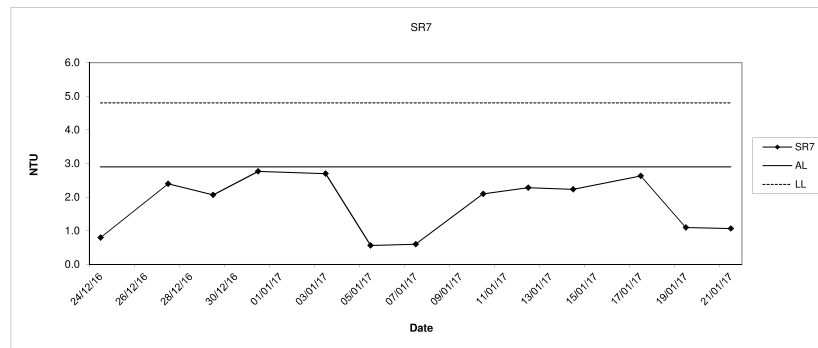
G6



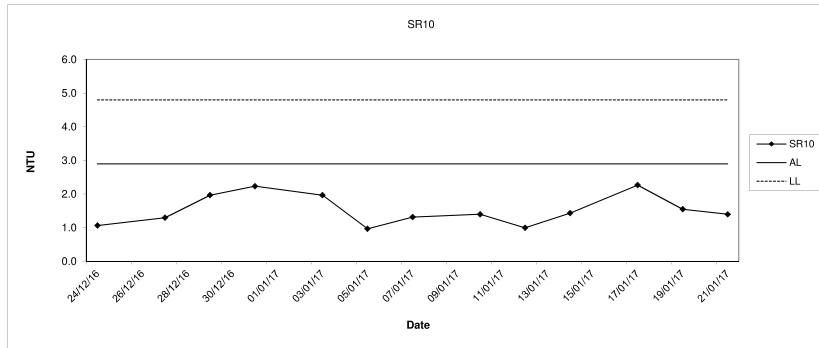
Turbidity (Depth average) at Mid-Flood Tide



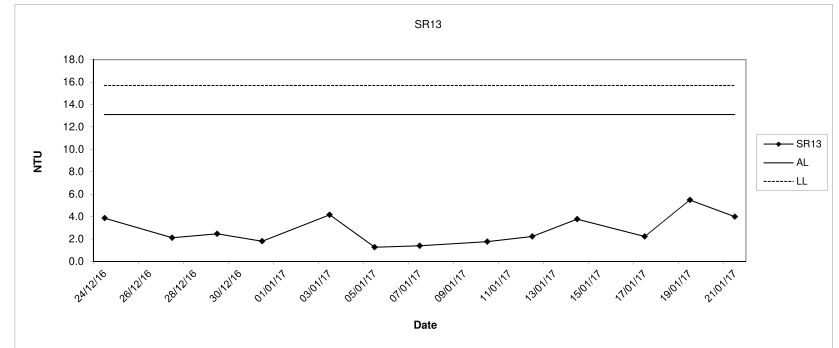
Turbidity (Depth average) at Mid-Flood Tide



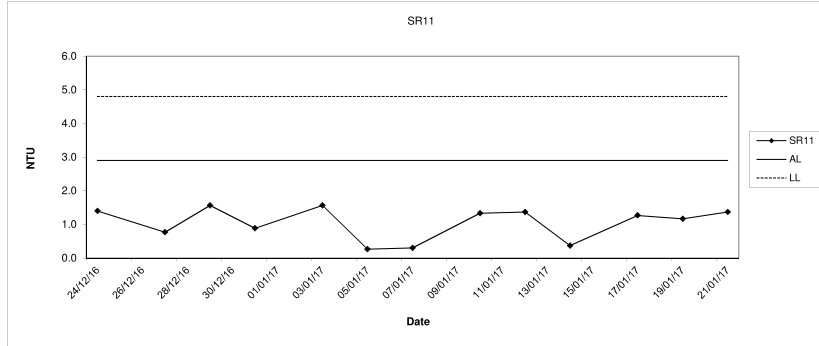
Turbidity (Depth average) at Mid-Flood Tide



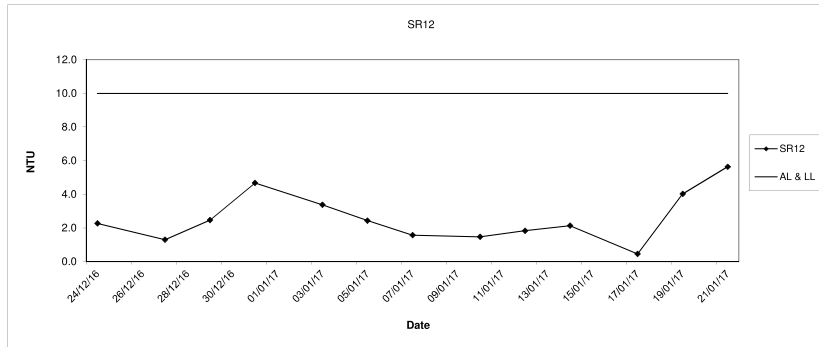
Turbidity (Depth average) at Mid-Flood Tide



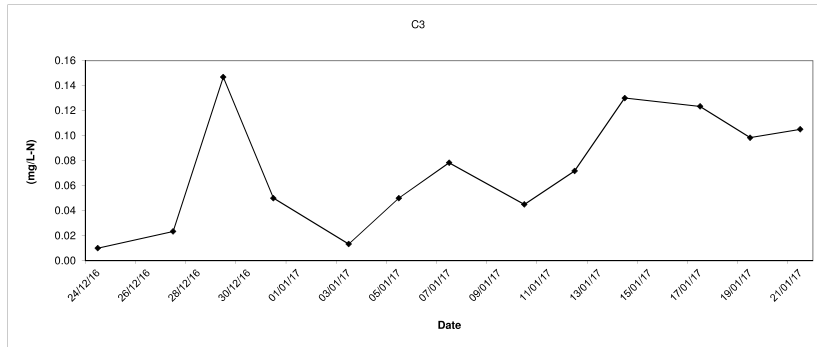
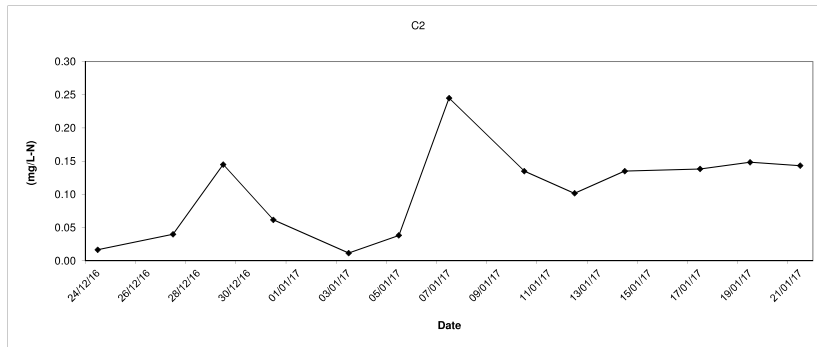
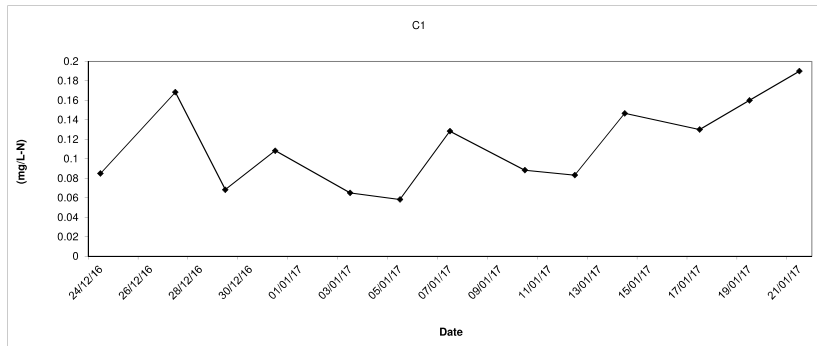
SR11



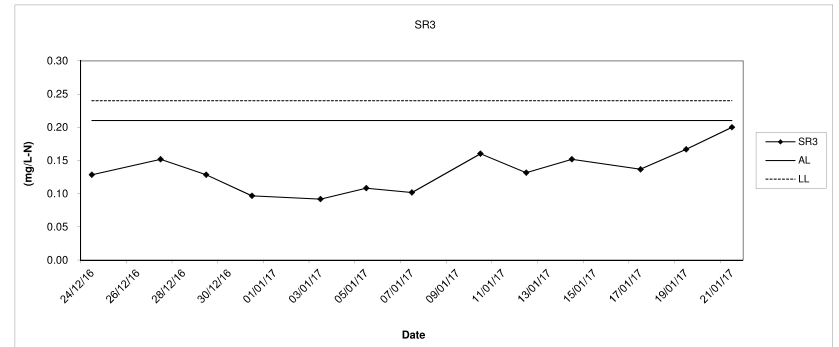
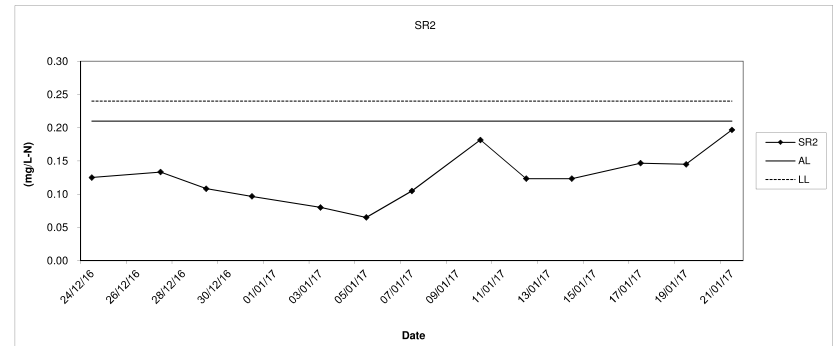
SR12



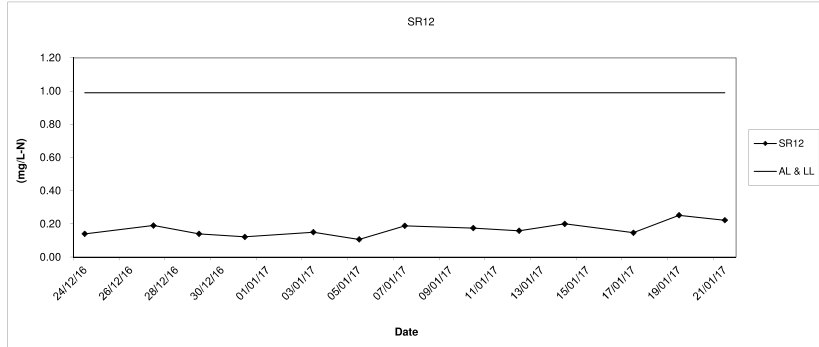
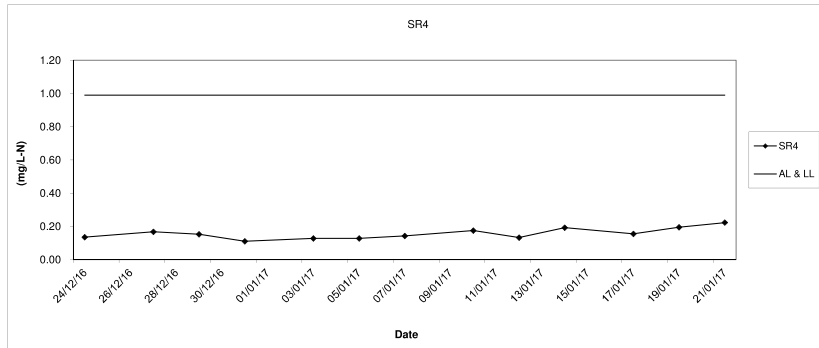
In-situ Ammonia (Depth average) at Mid-Flood Tide



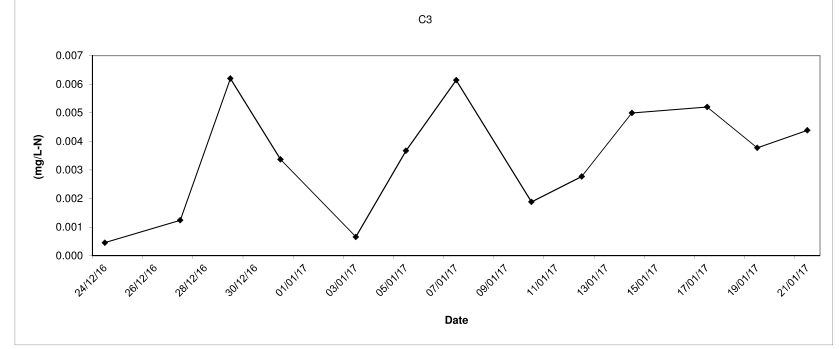
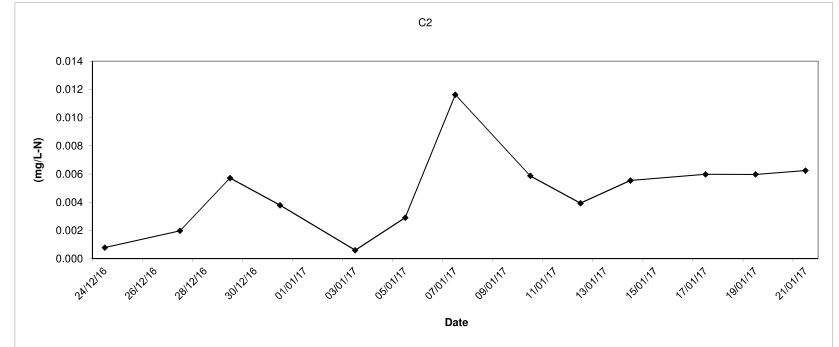
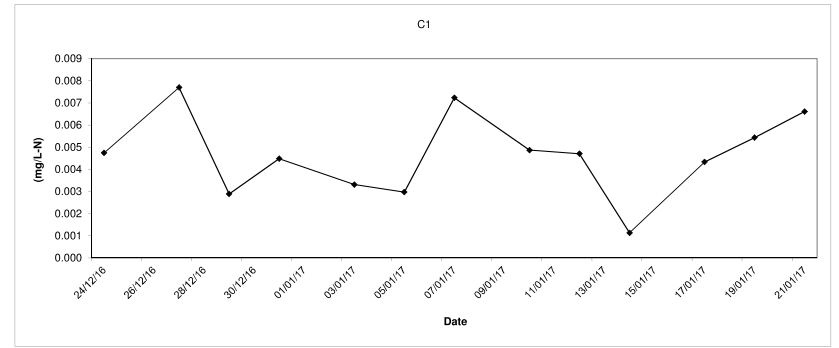
In-situ Ammonia (Depth average) at Mid-Flood Tide



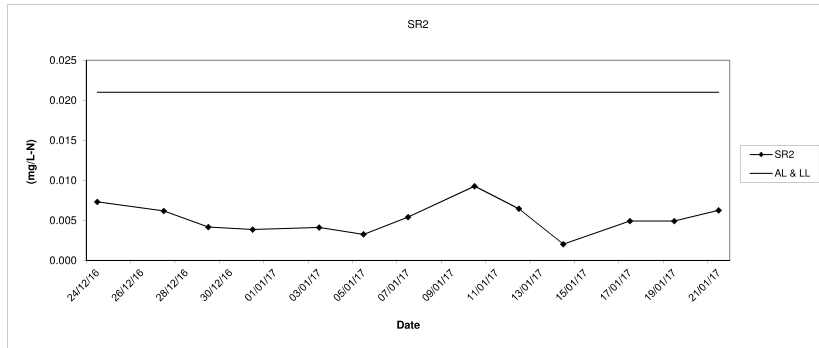
In-situ Ammonia (Depth average) at Mid-Flood Tide



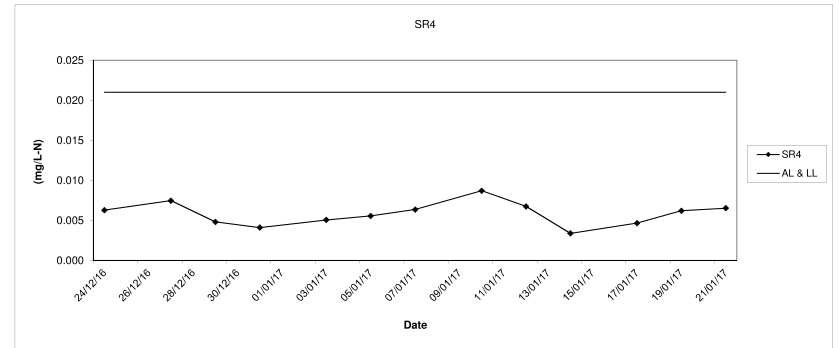
In-situ UIA (Depth average) at Mid-Flood Tide



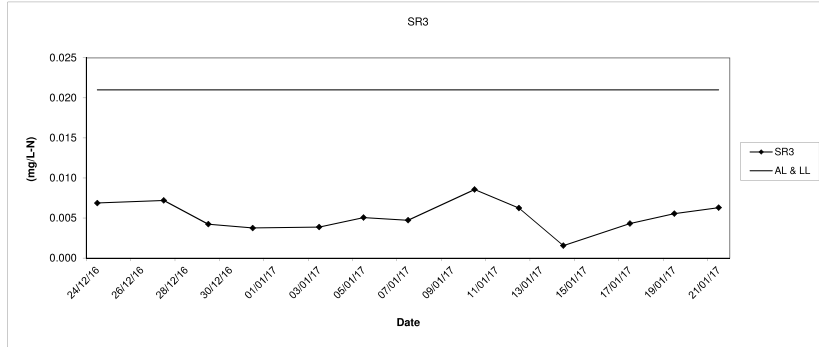
In-situ UIA (Depth average) at Mid-Flood Tide



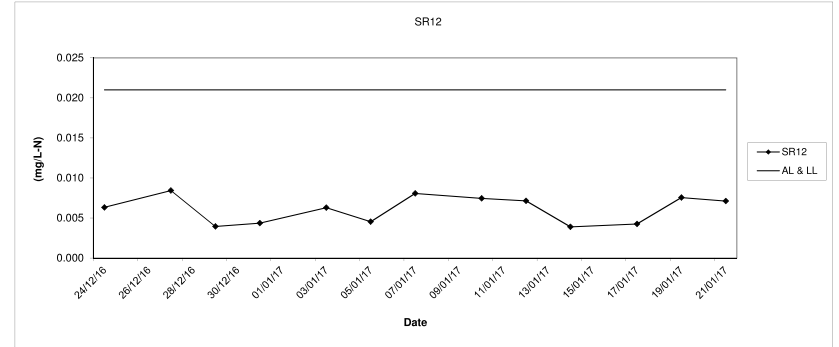
In-situ UIA (Depth average) at Mid-Flood Tide



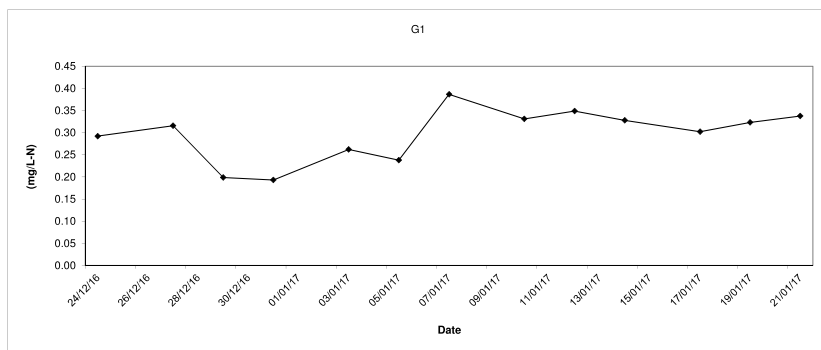
SR3



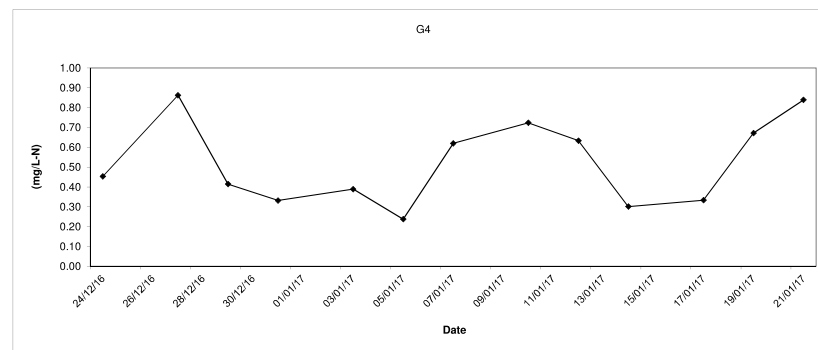
SR12



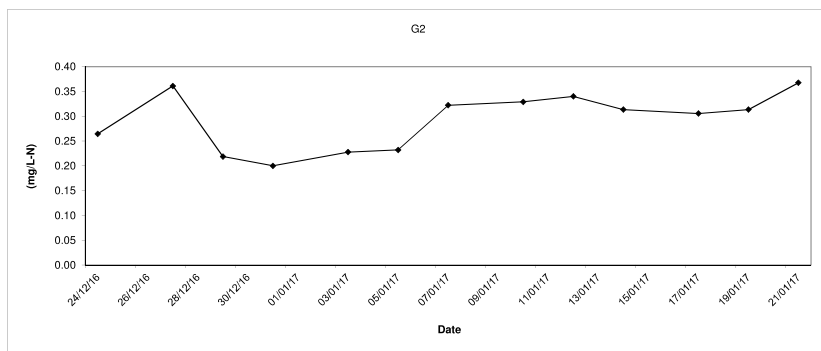
In-situ TIN (Depth average) at Mid-Flood Tide



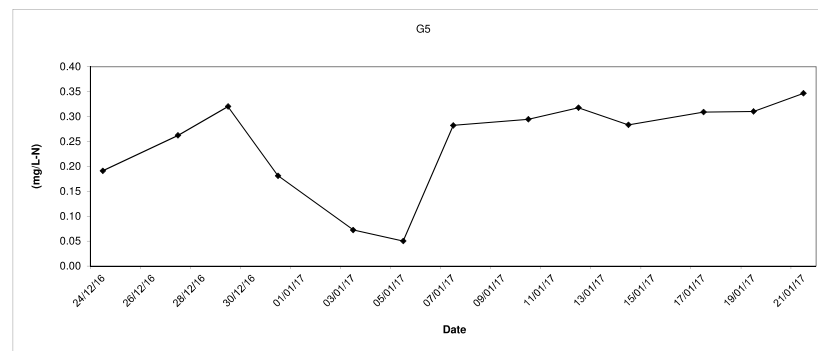
In-situ TIN (Depth average) at Mid-Flood Tide



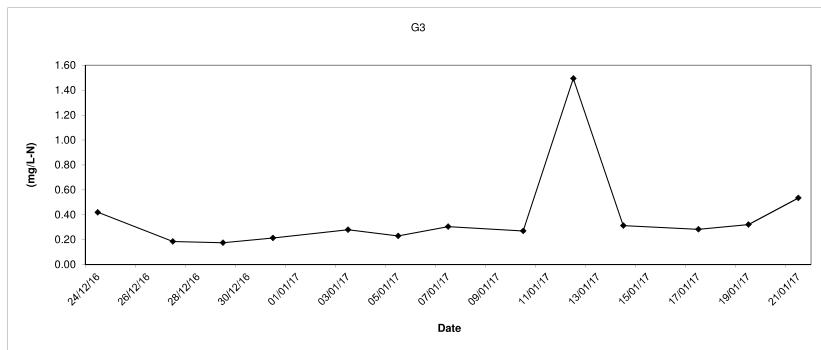
G2



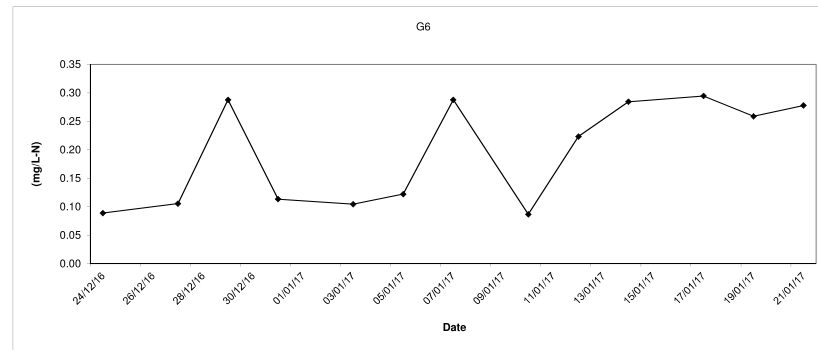
G5



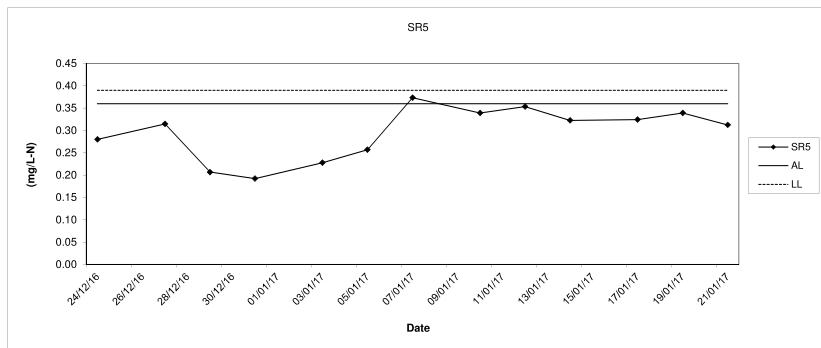
G3



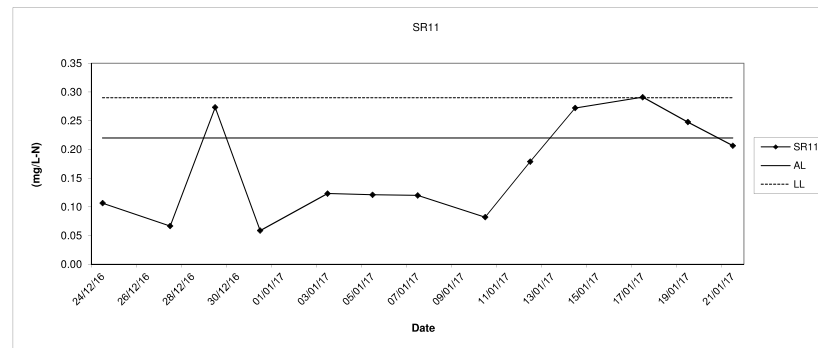
G6



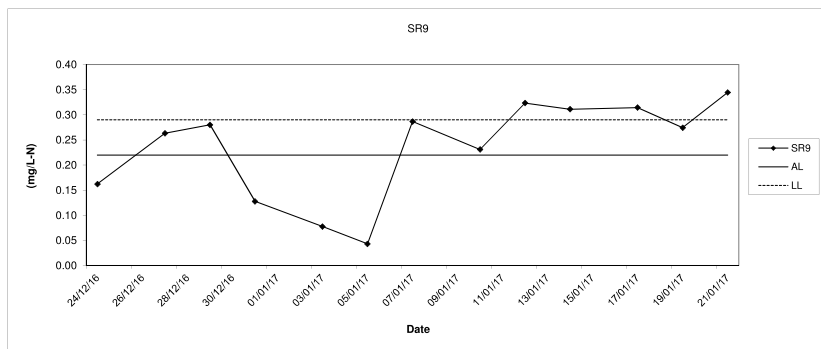
In-situ TIN (Depth average) at Mid-Flood Tide



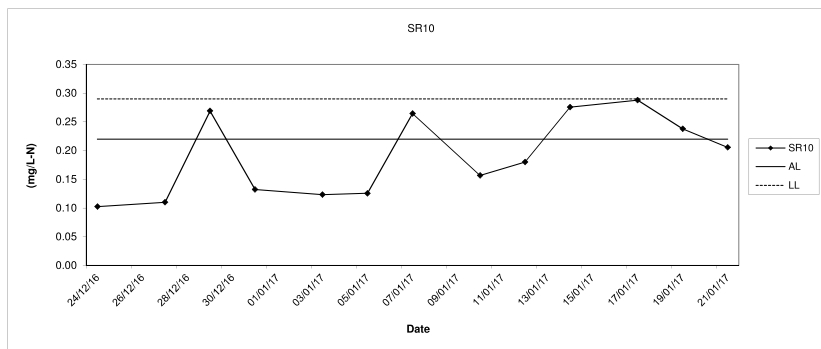
In-situ TIN (Depth average) at Mid-Flood Tide



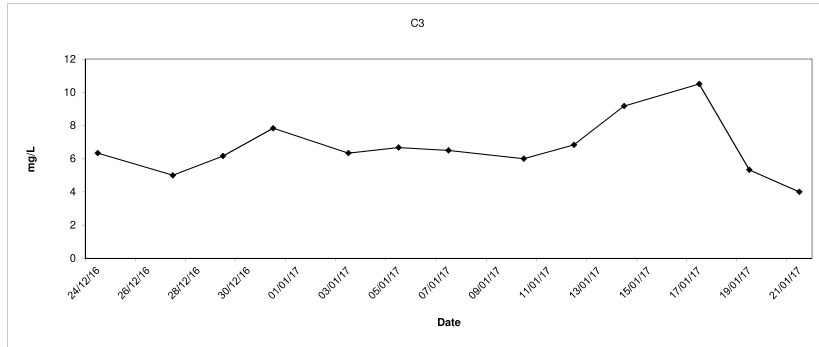
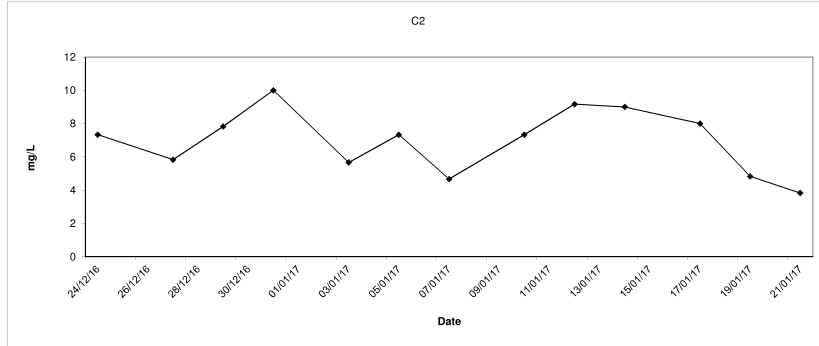
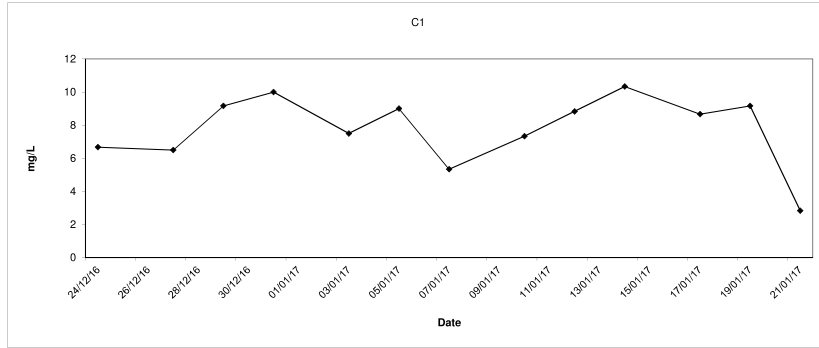
SR9



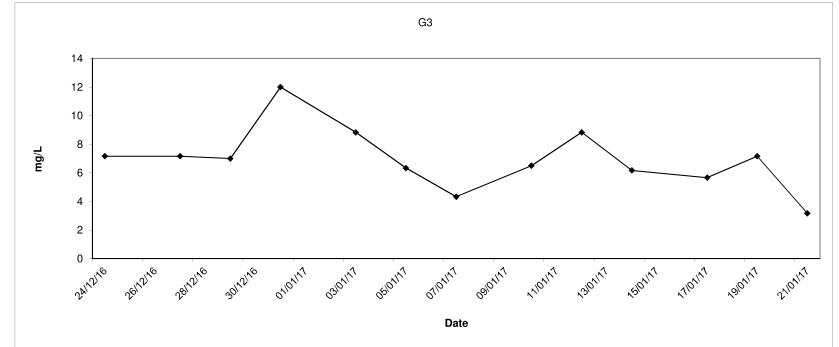
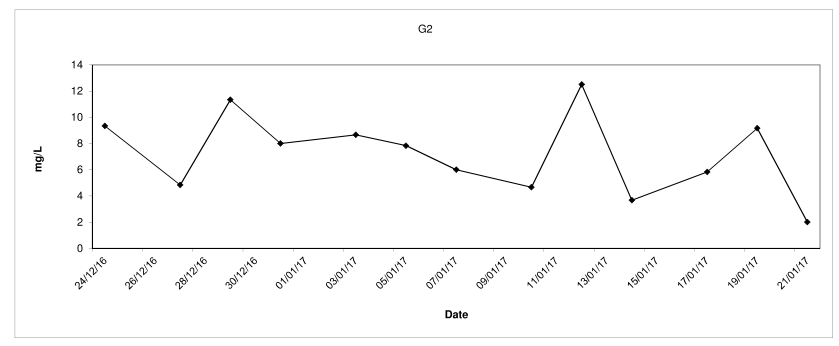
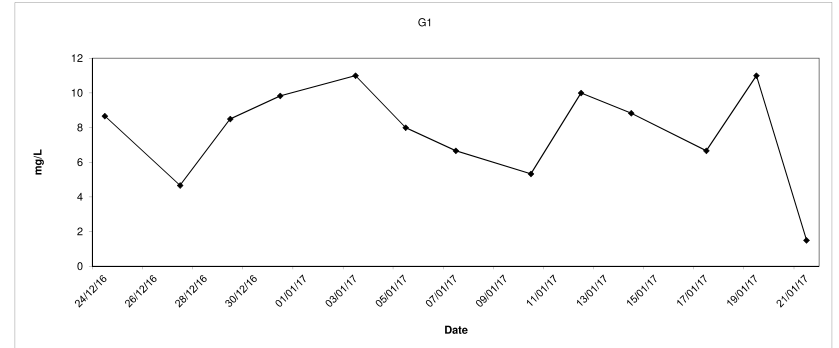
SR10



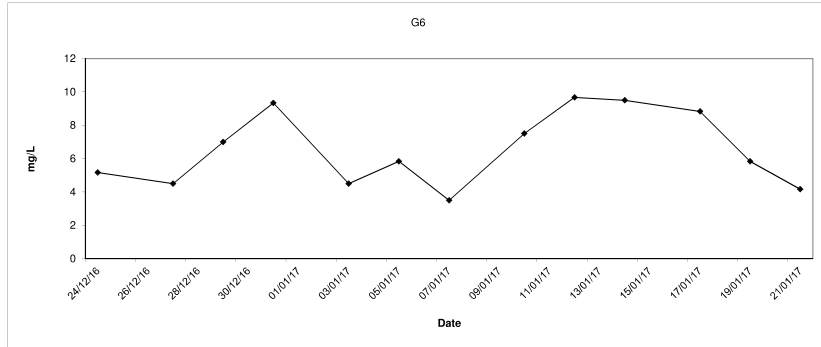
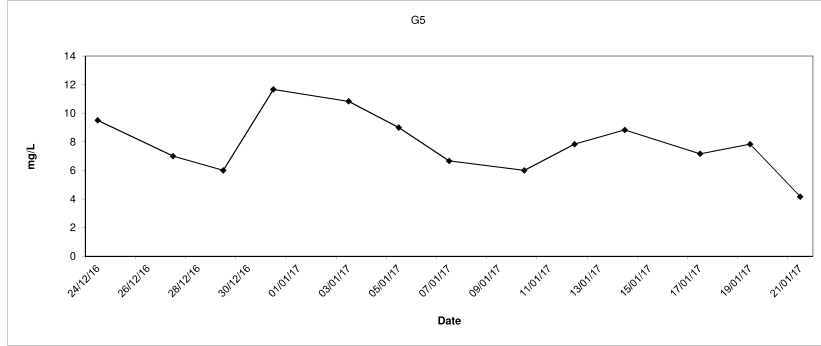
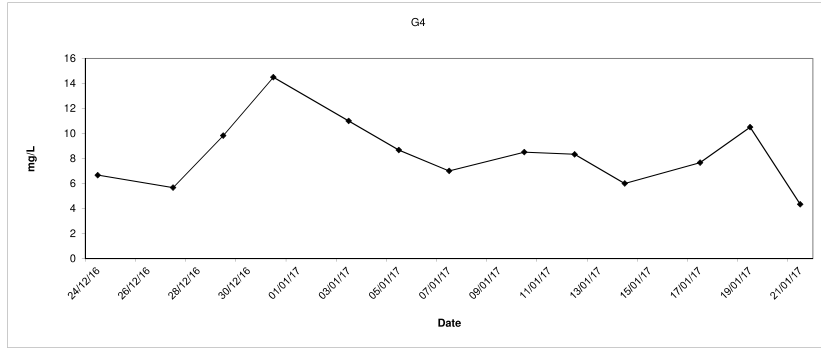
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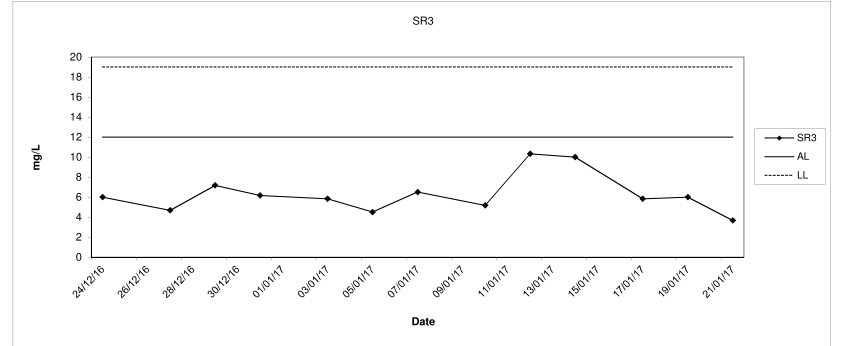
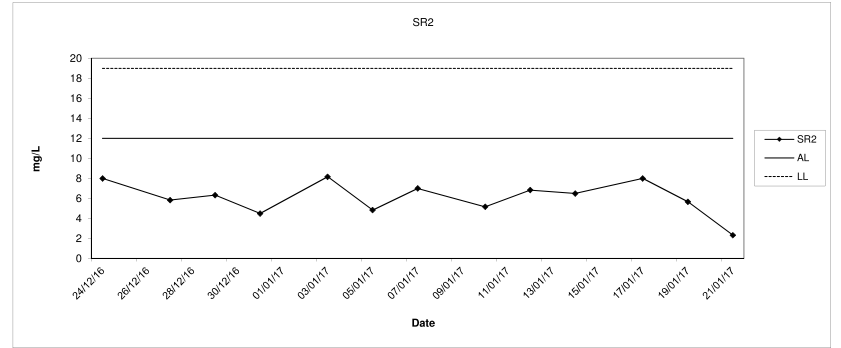
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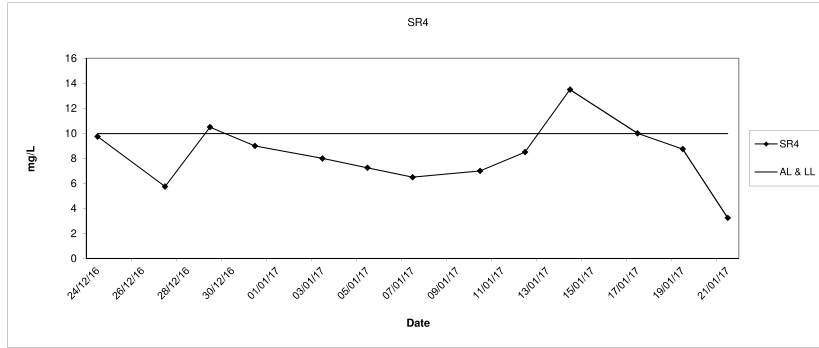
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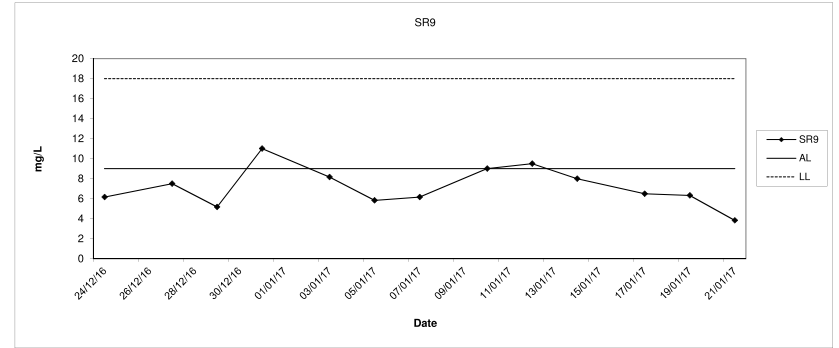
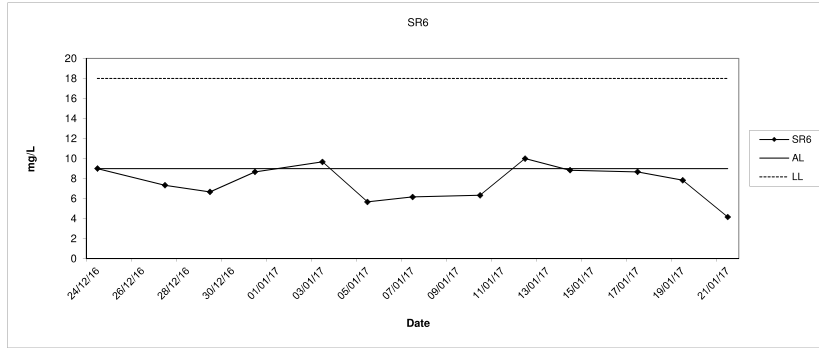
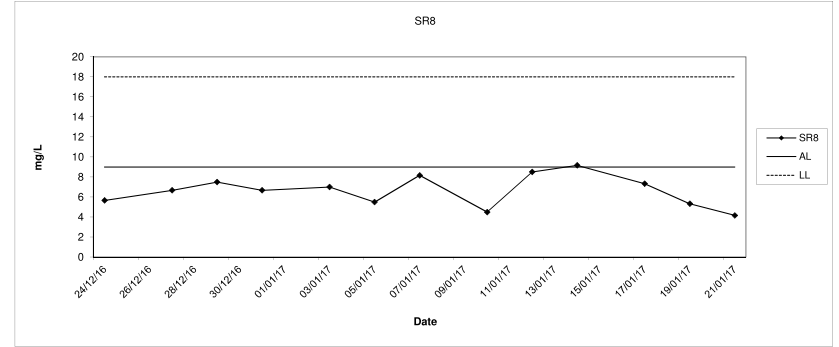
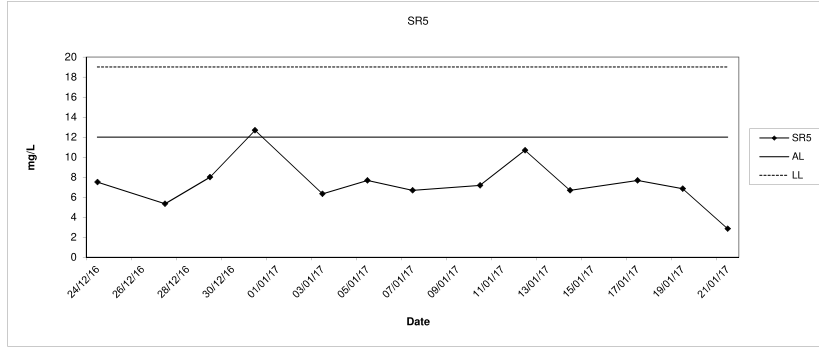
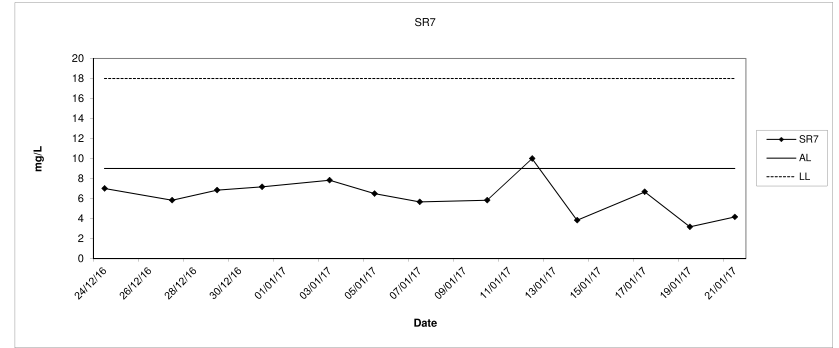
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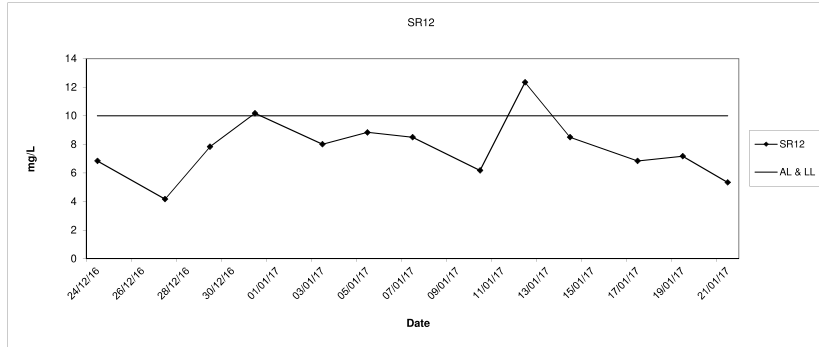
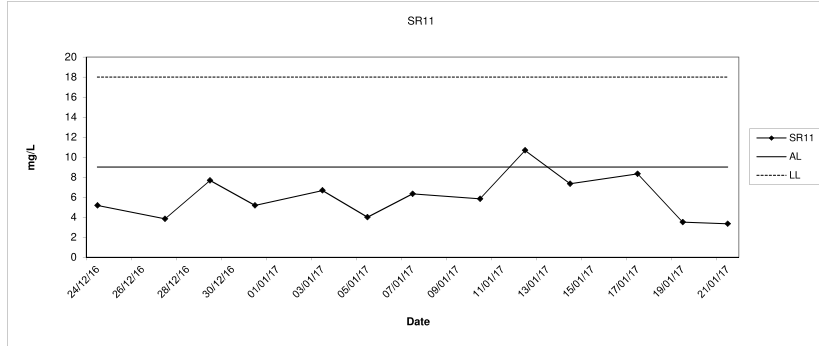
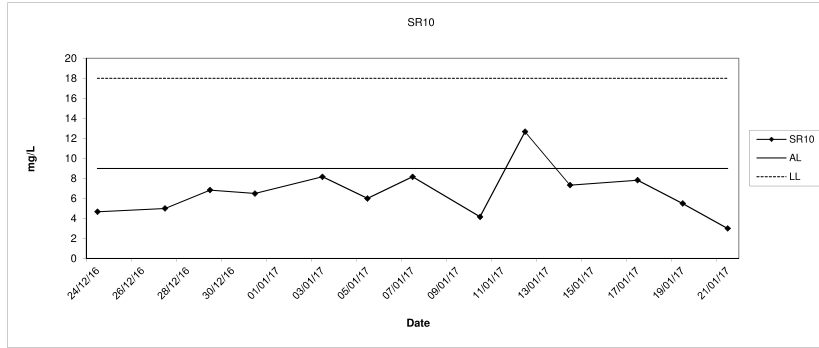
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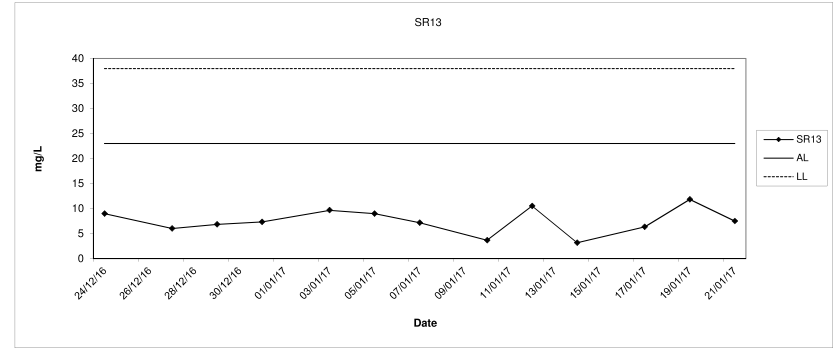
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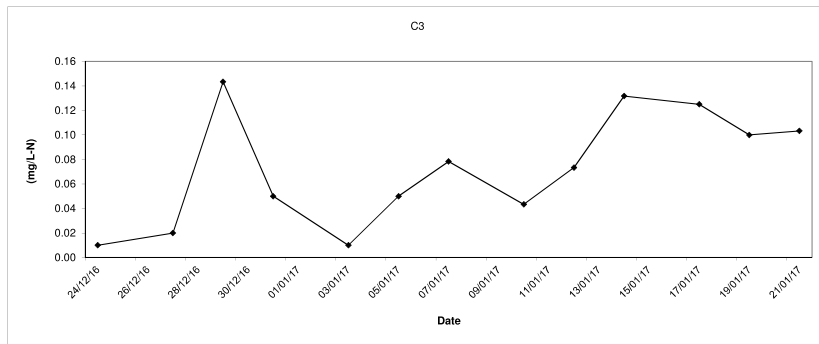
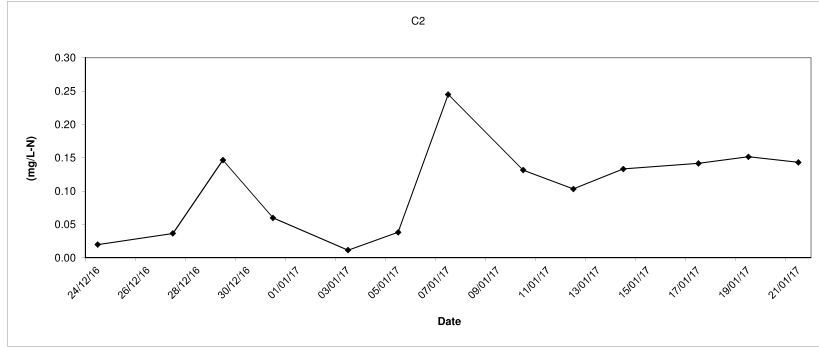
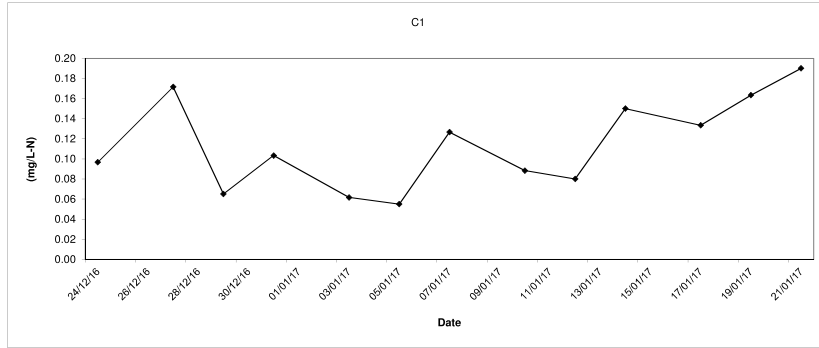
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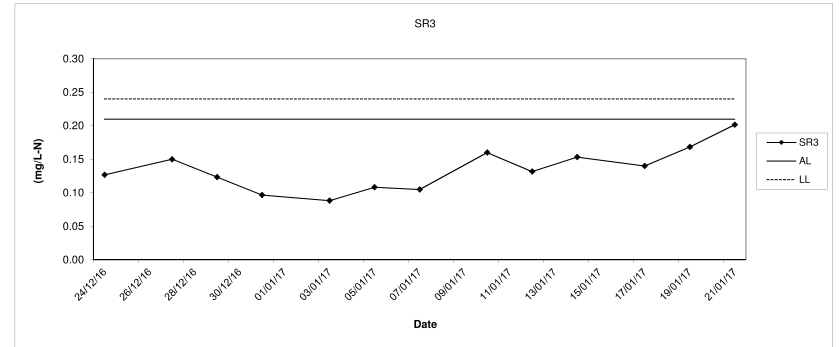
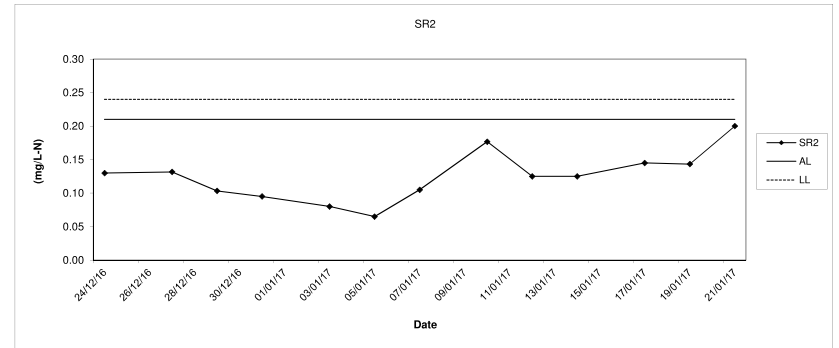
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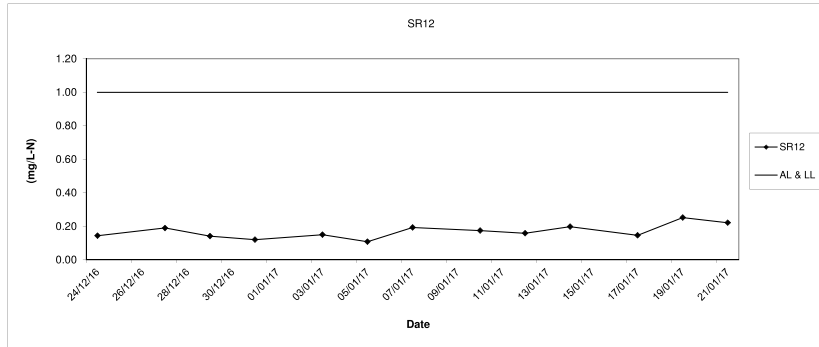
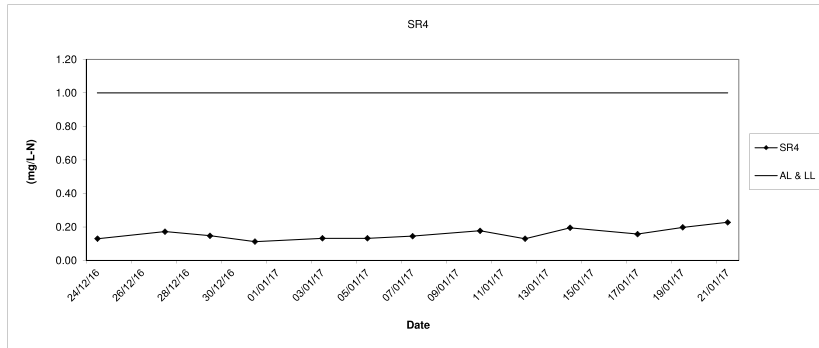
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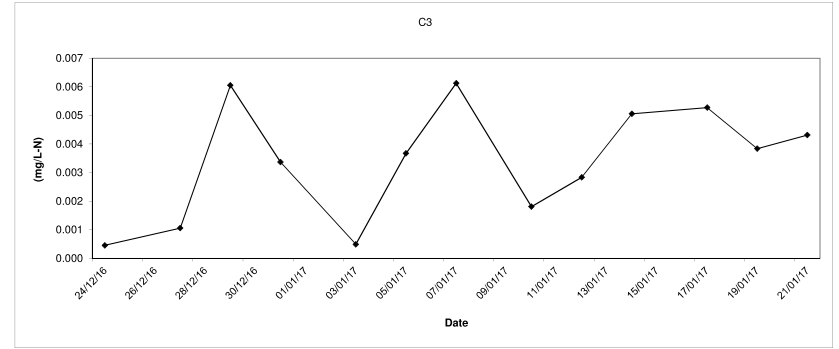
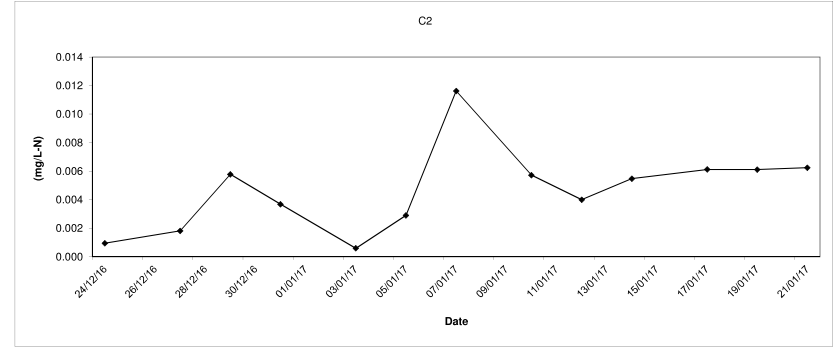
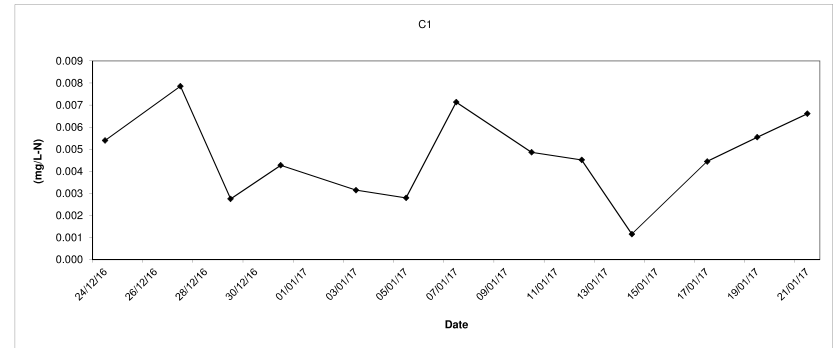
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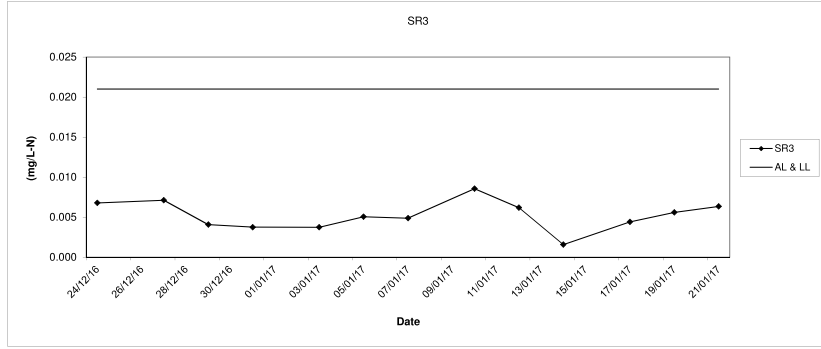
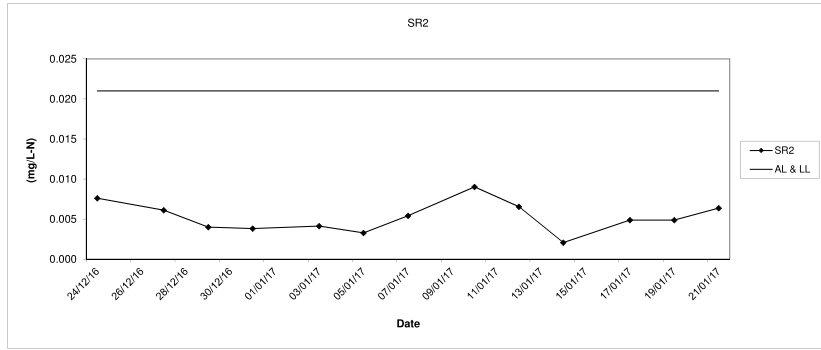
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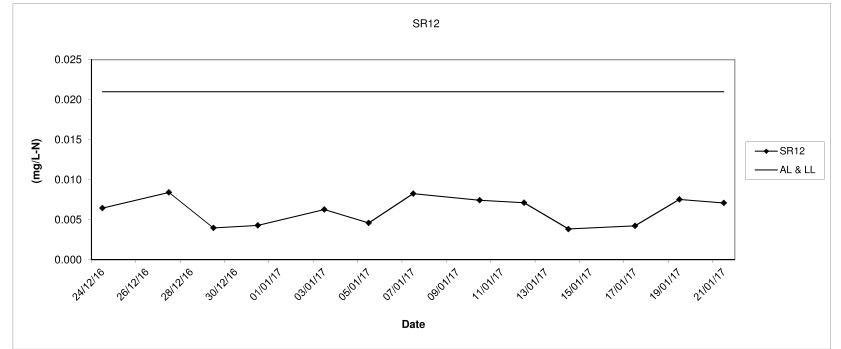
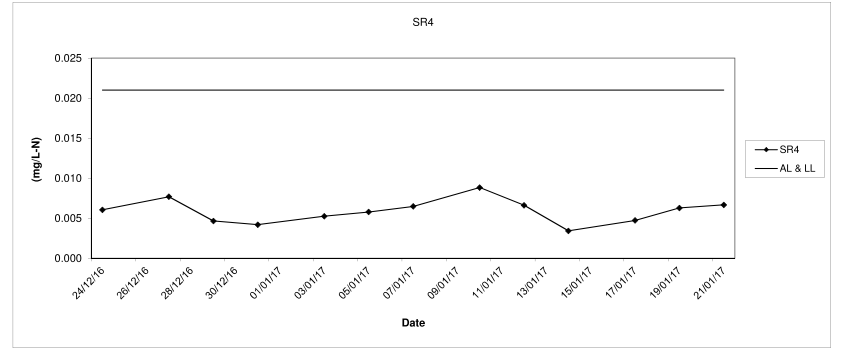
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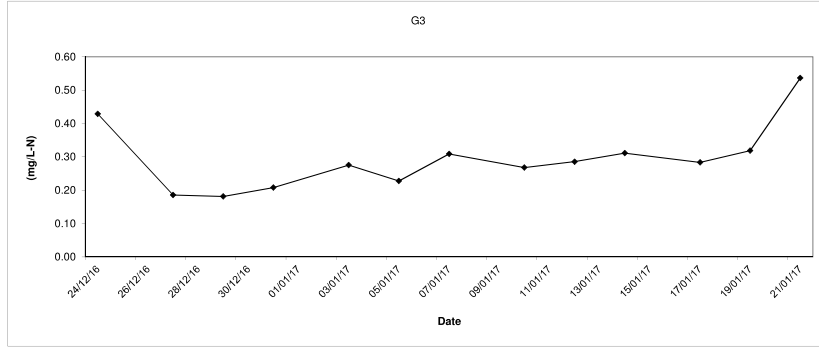
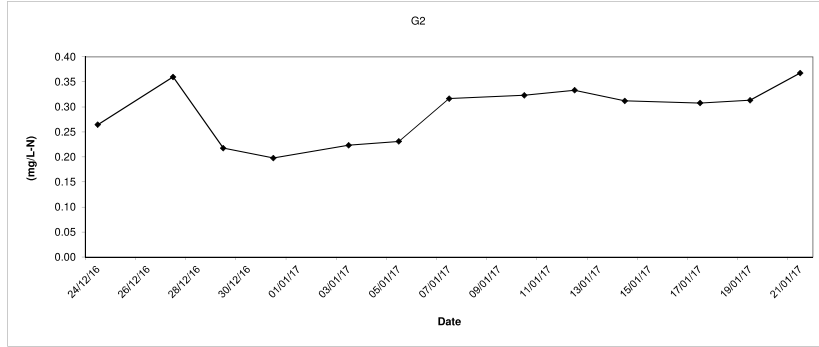
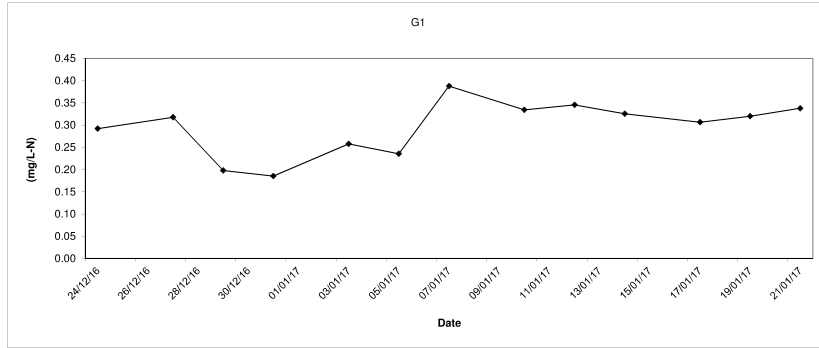
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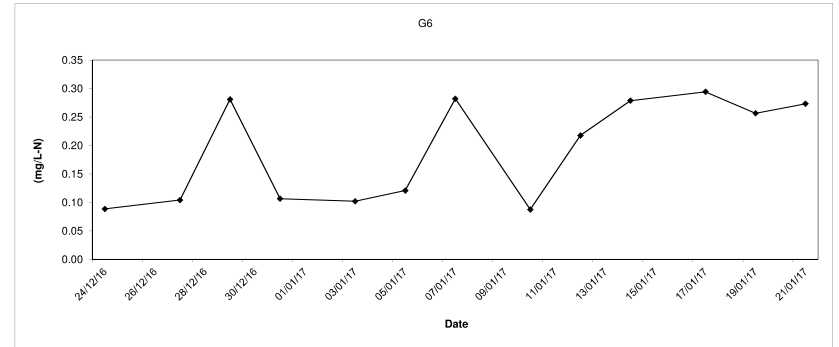
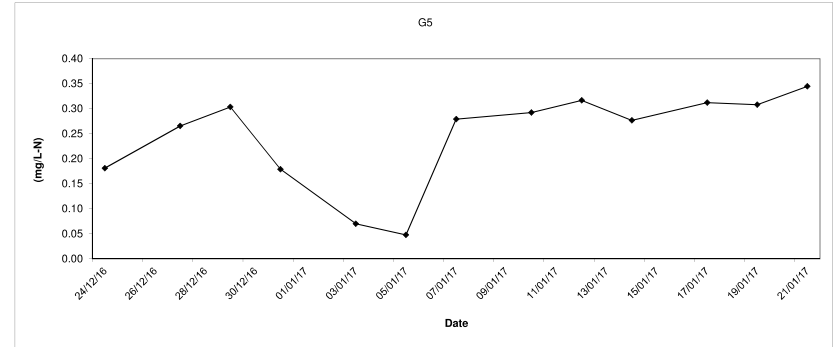
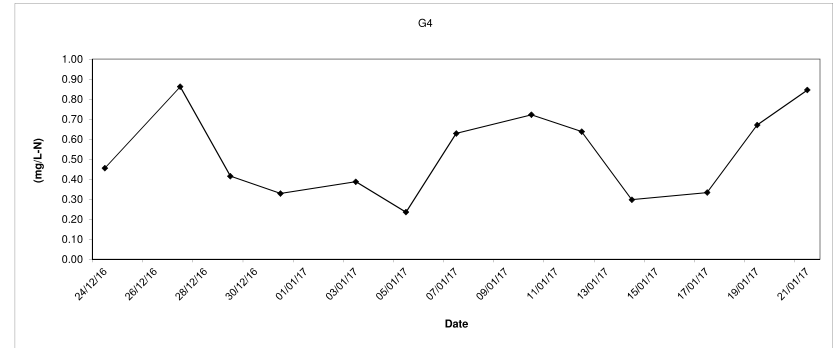
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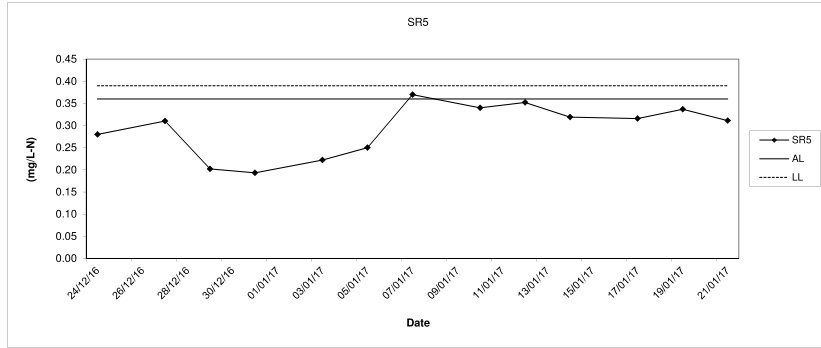
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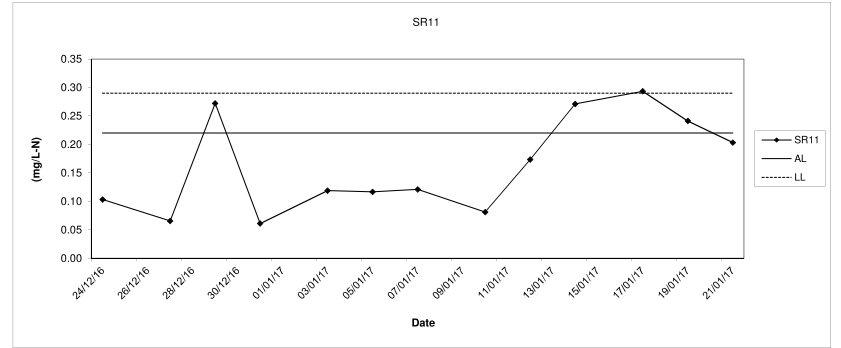
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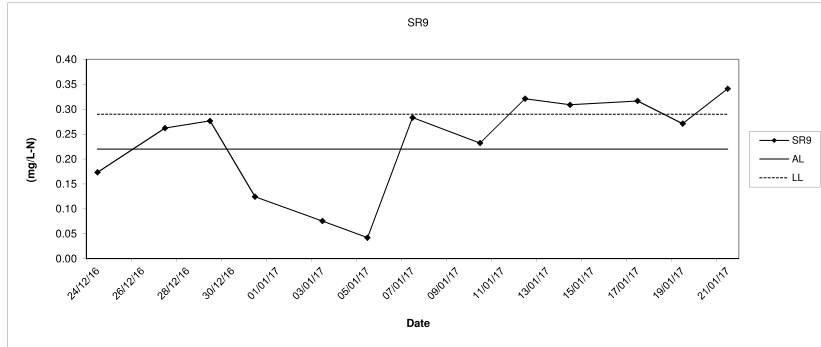
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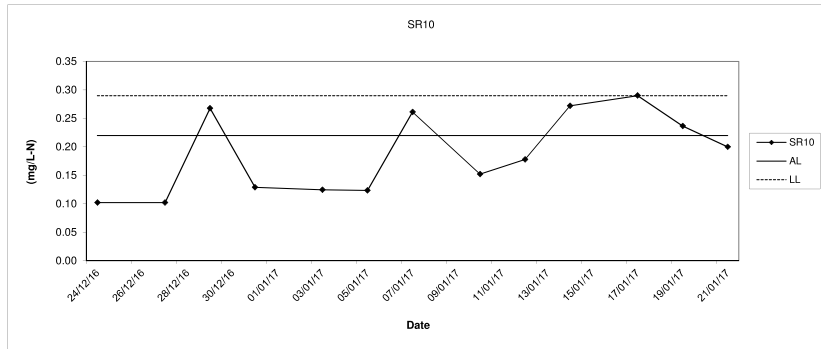
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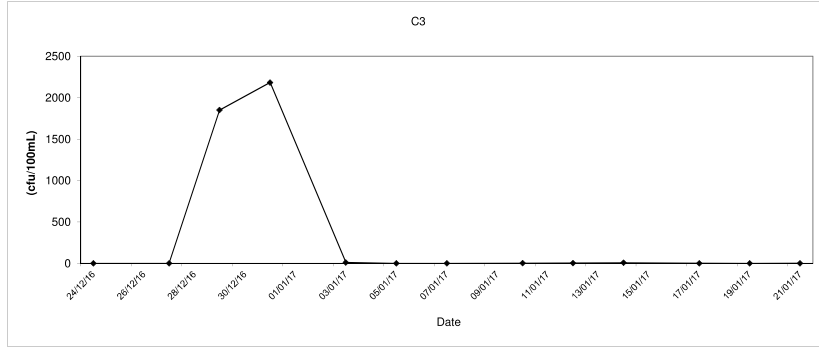
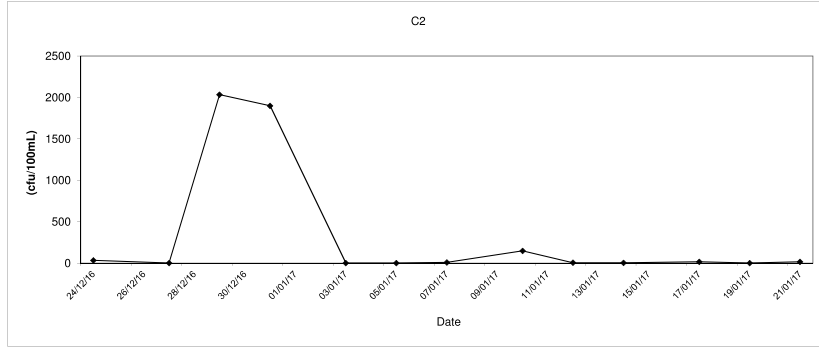
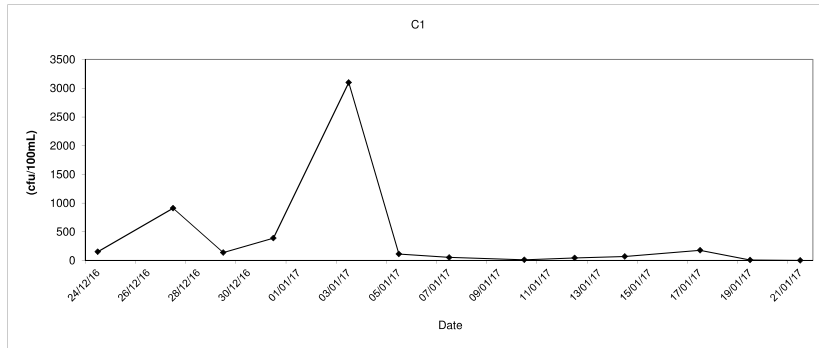
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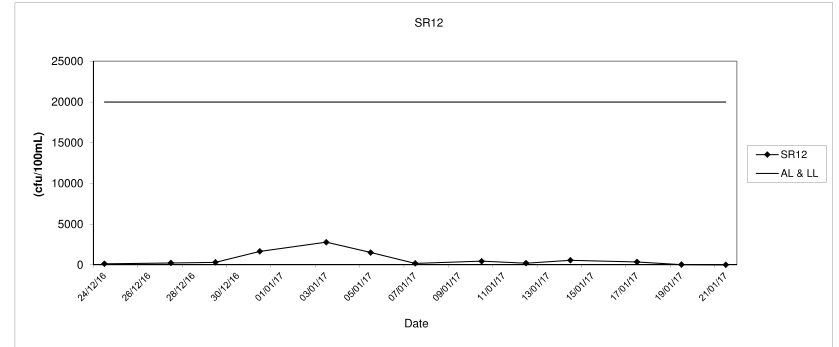
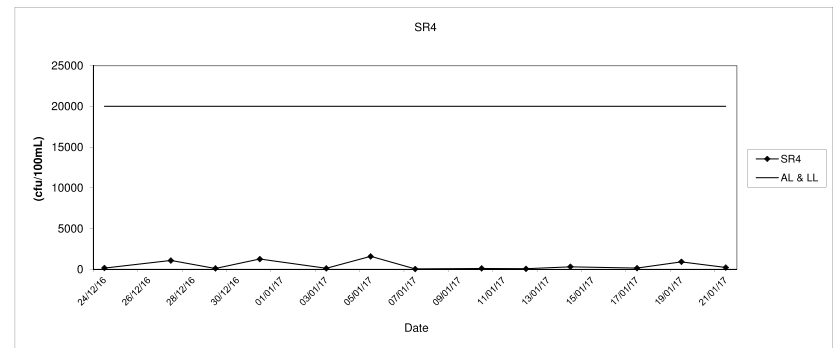
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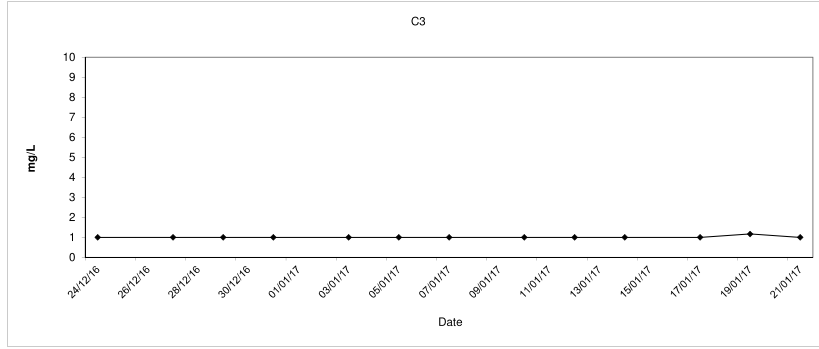
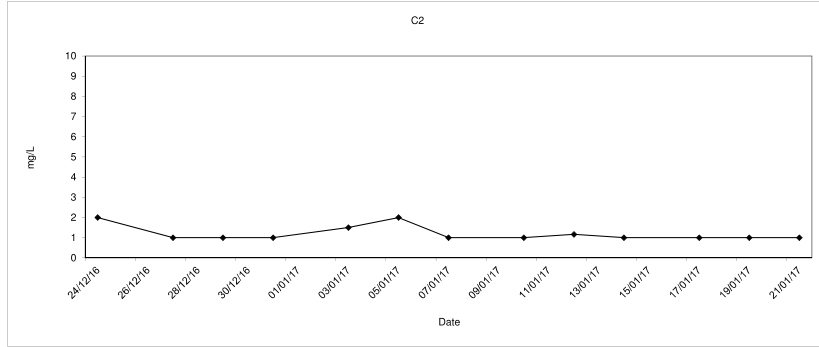
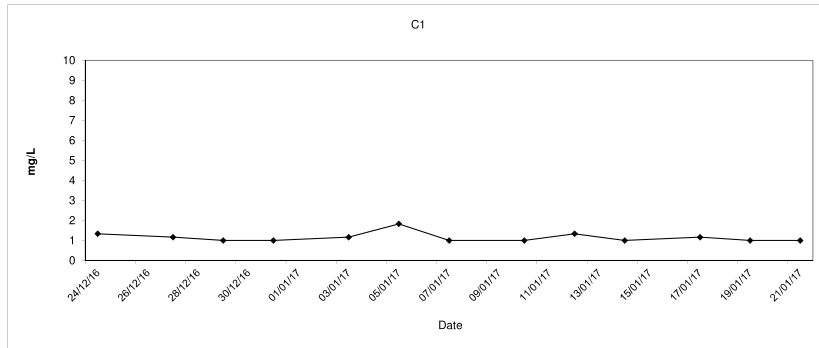
E. coli (Depth average) at Mid-Flood Tide



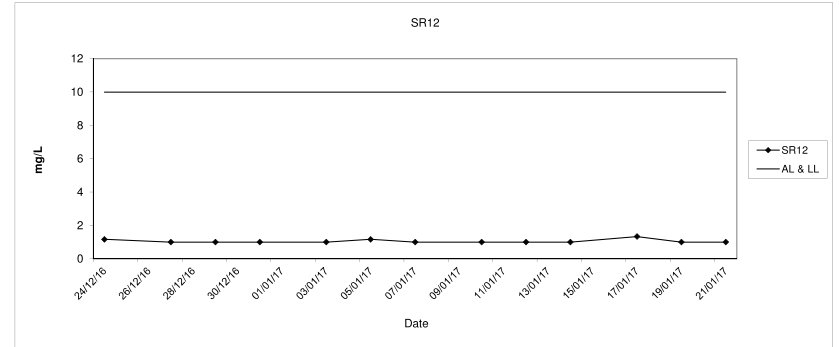
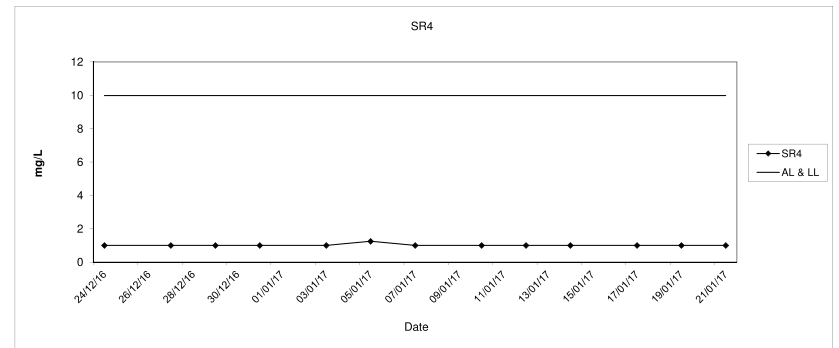
E. coli (Depth average) at Mid-Flood Tide



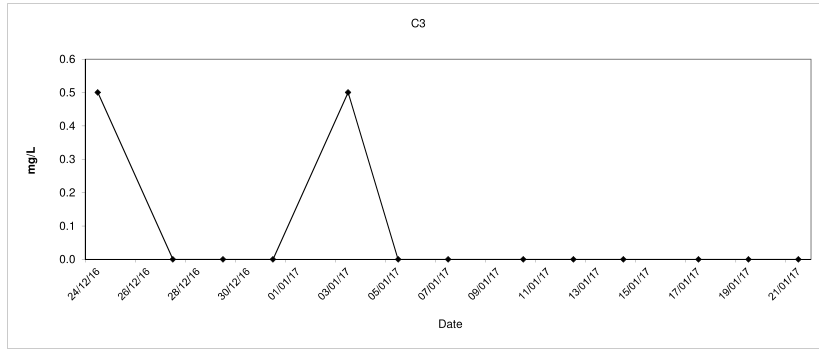
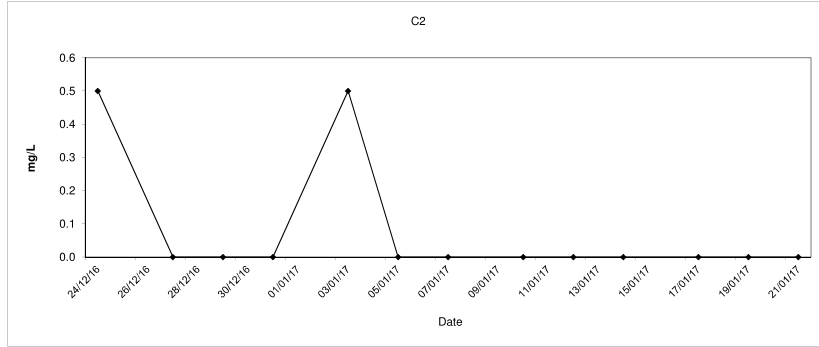
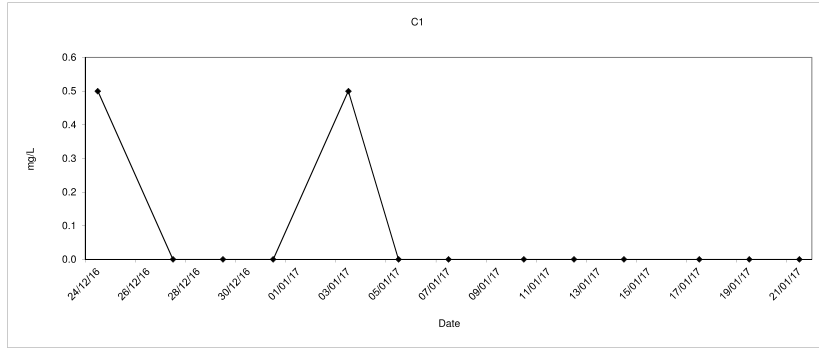
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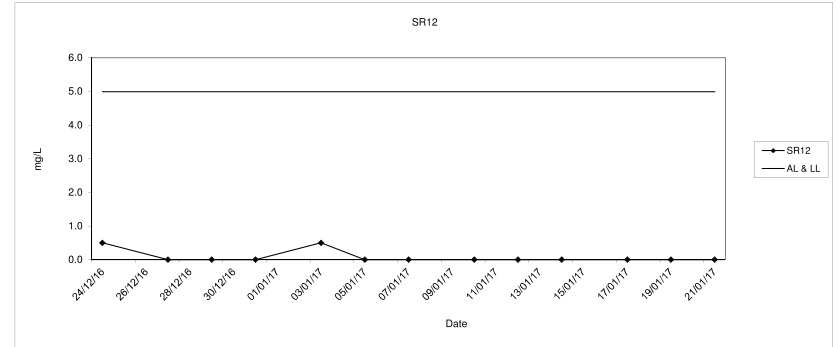
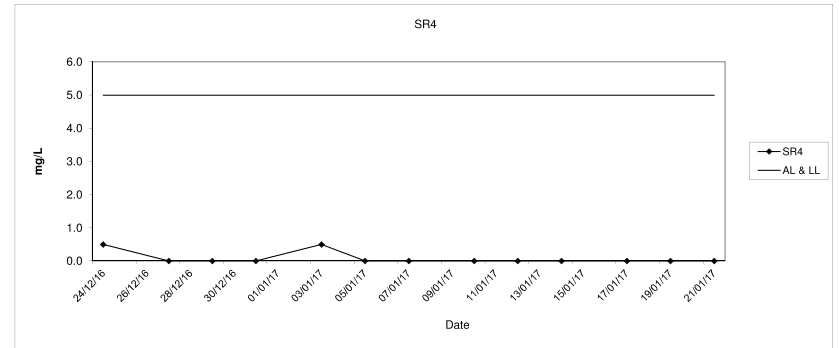
BOD₅ (Depth average) at Mid-Flood Tide



Synthetic Detergent (Depth average) at Mid-Flood Tide



Synthetic Detergent (Depth average) at Mid-Flood Tide



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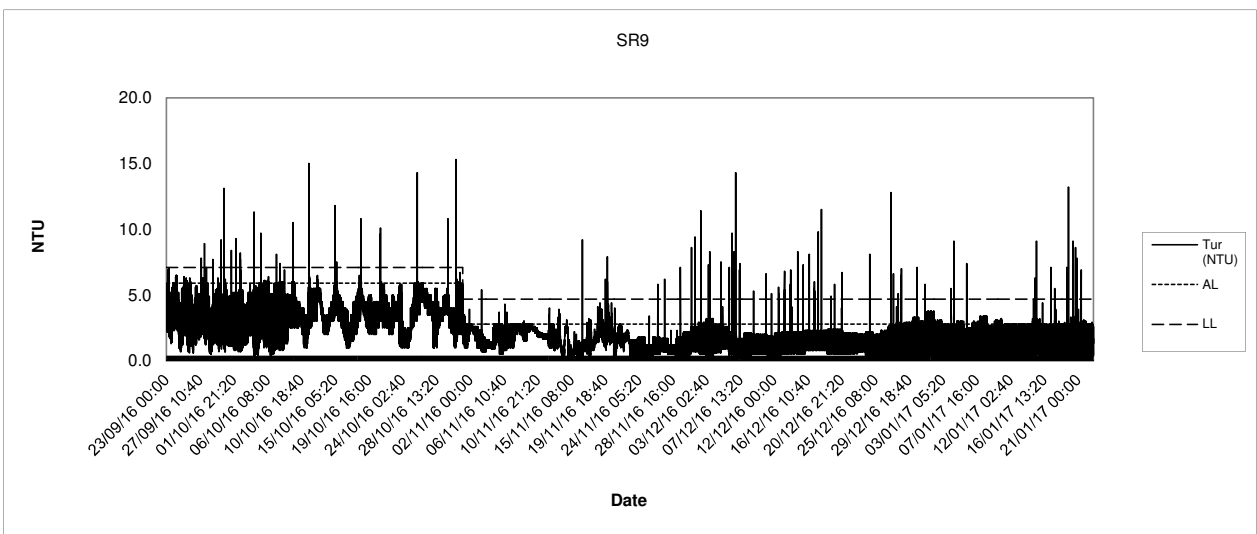
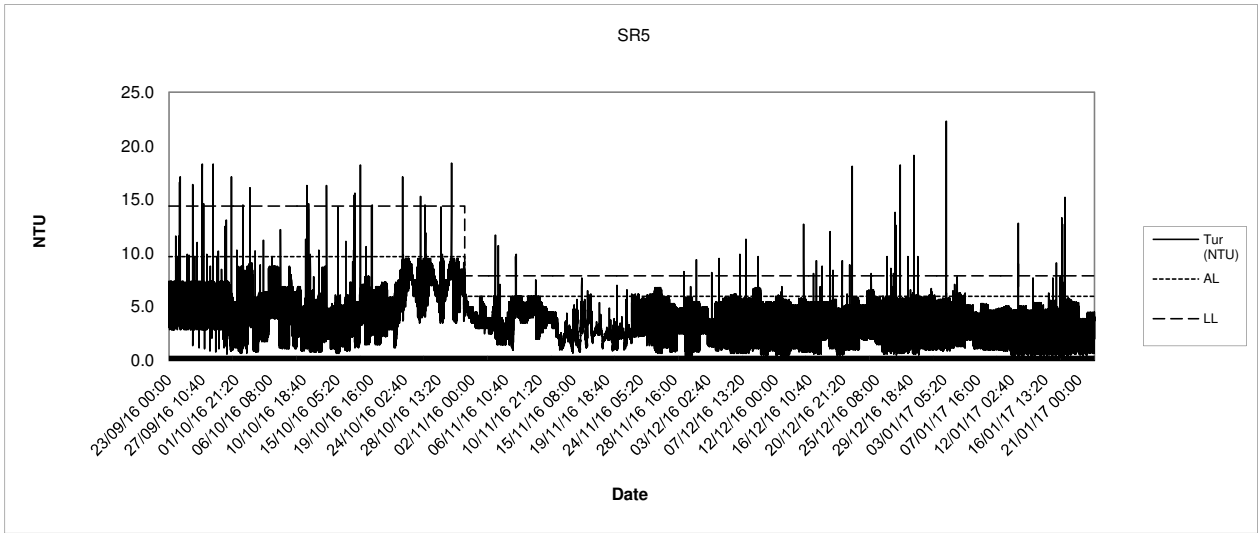
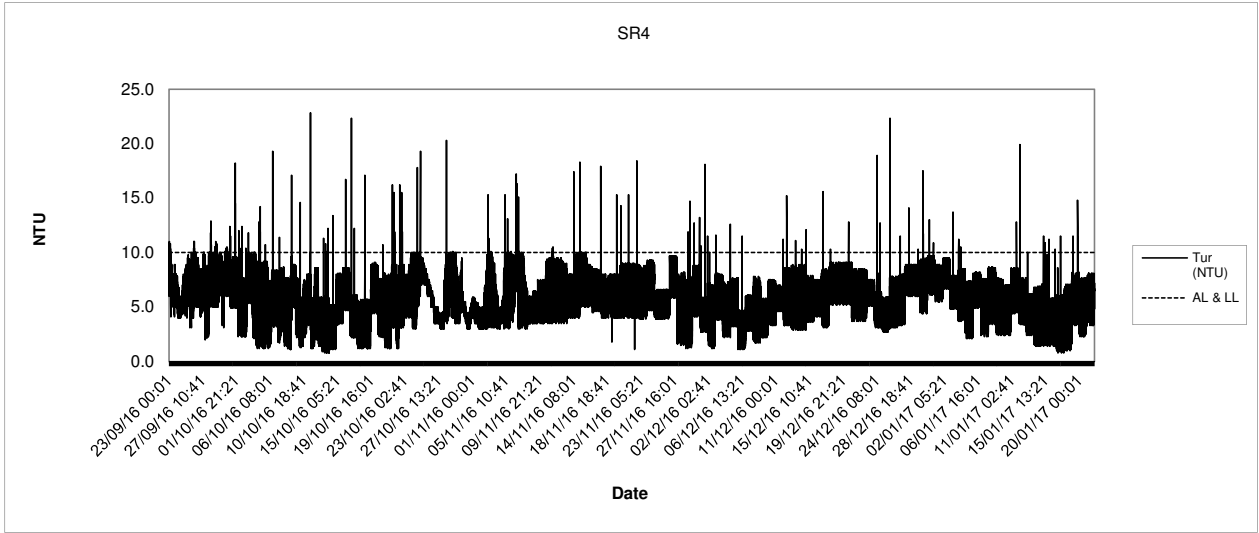
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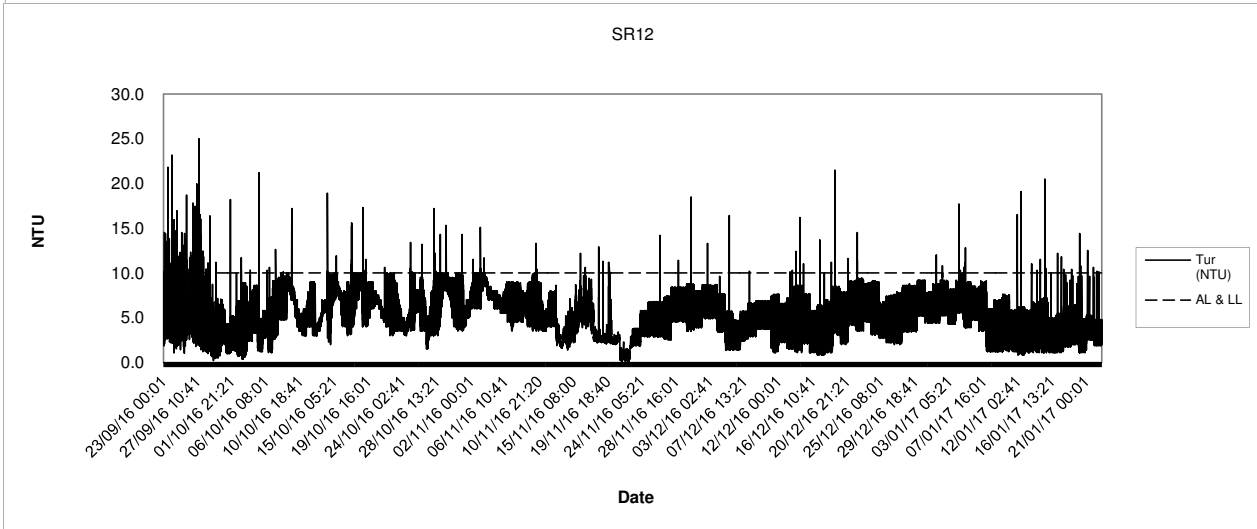
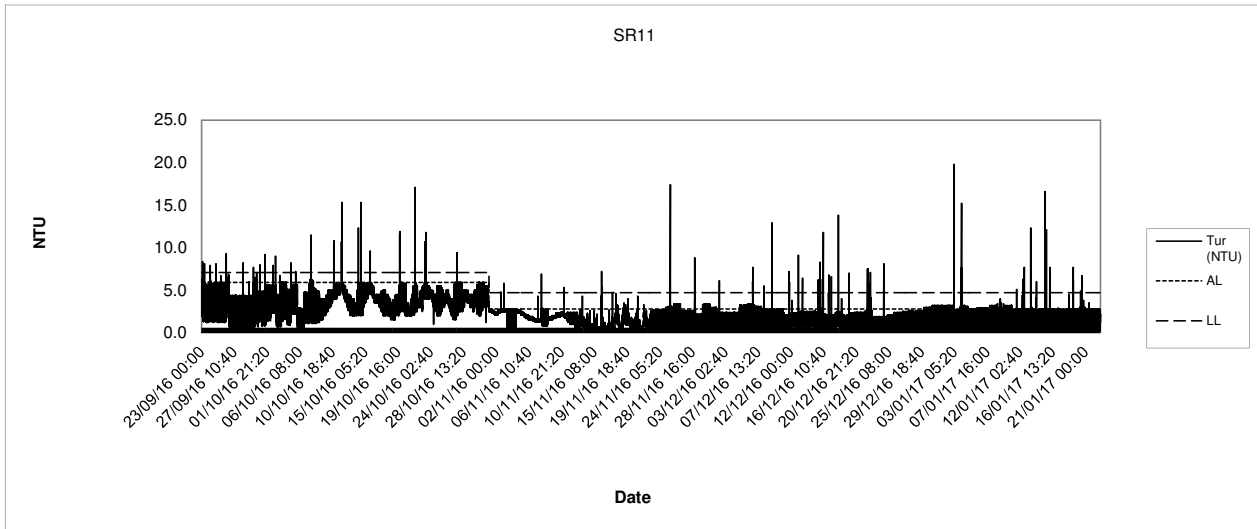
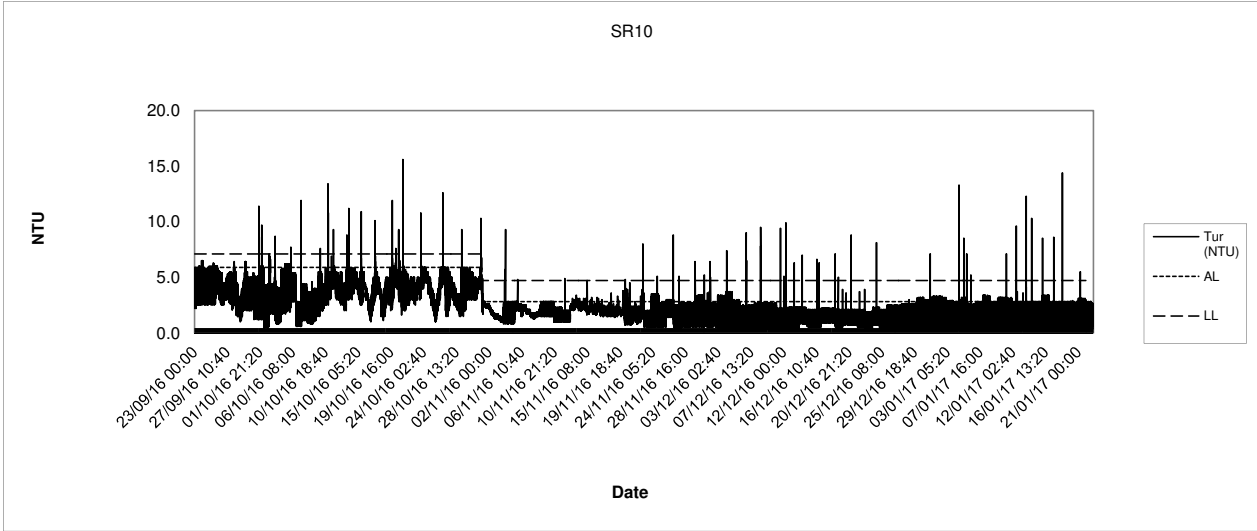
Appendix E

Graphical Presentation – 24-hr Monitoring Results

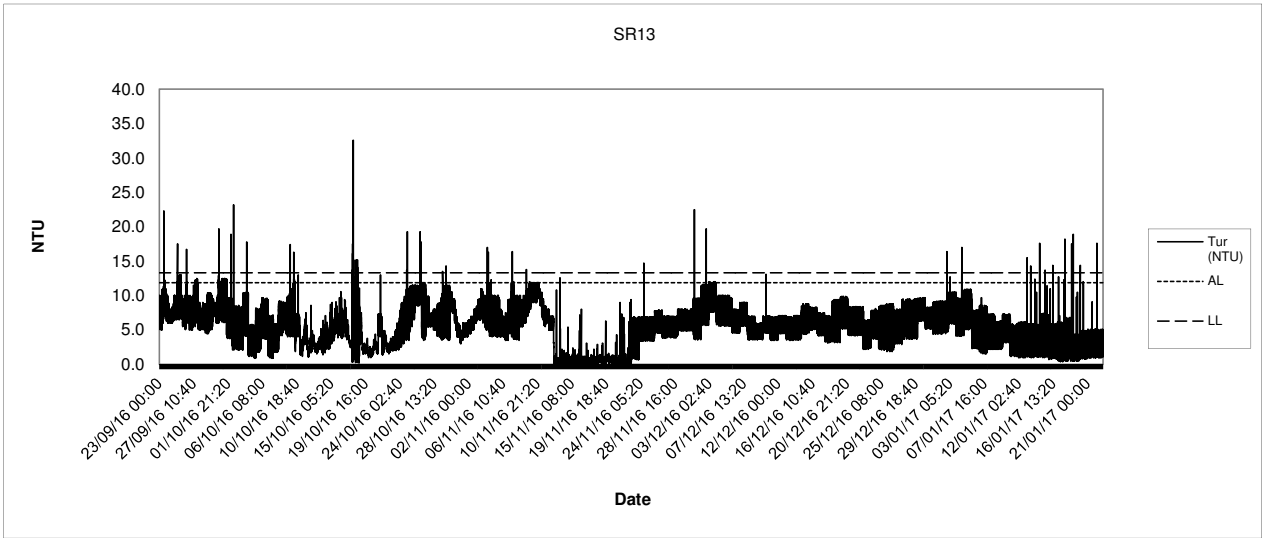
**Turbidity
24-hr Water Quality Monitoring**



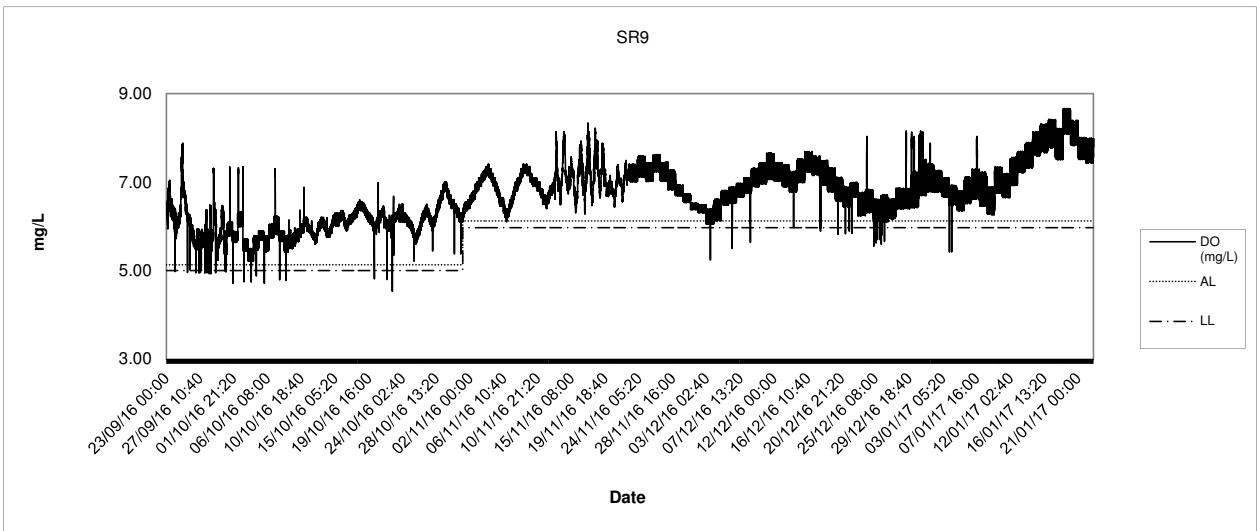
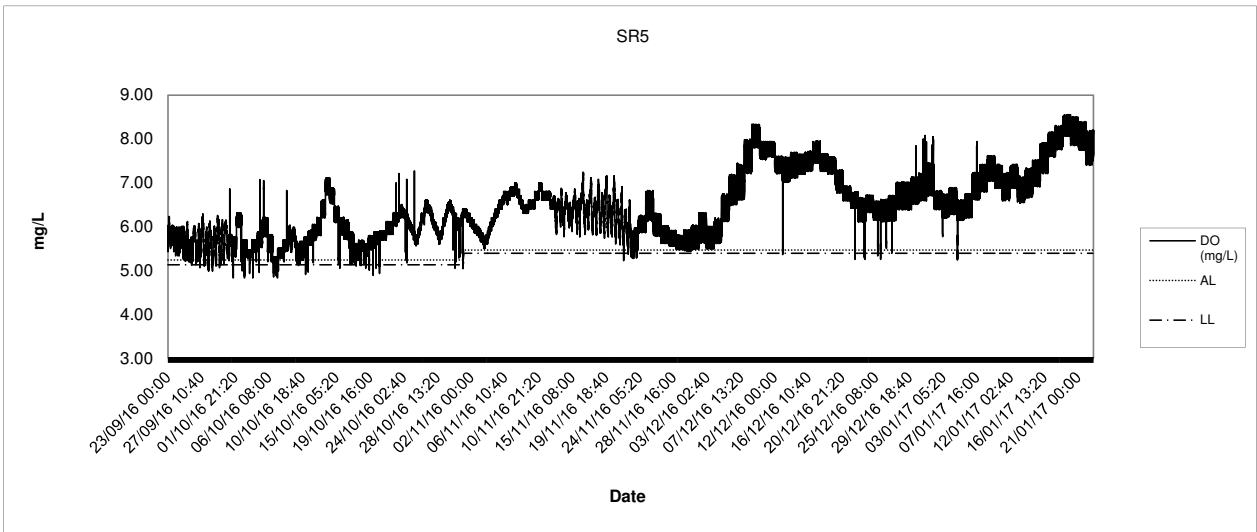
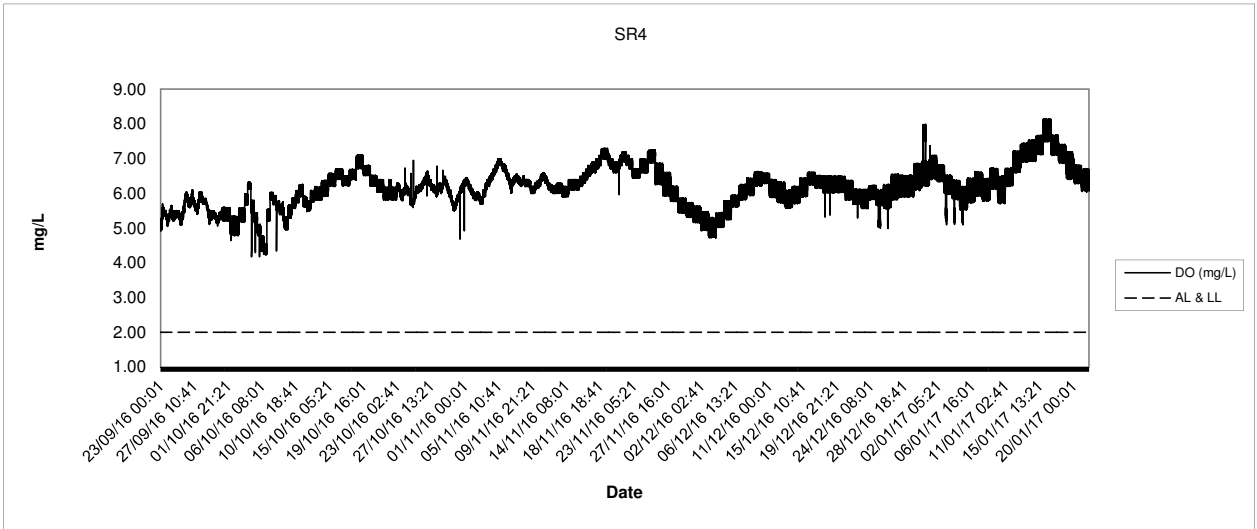
Turbidity 24-hr Water Quality Monitoring



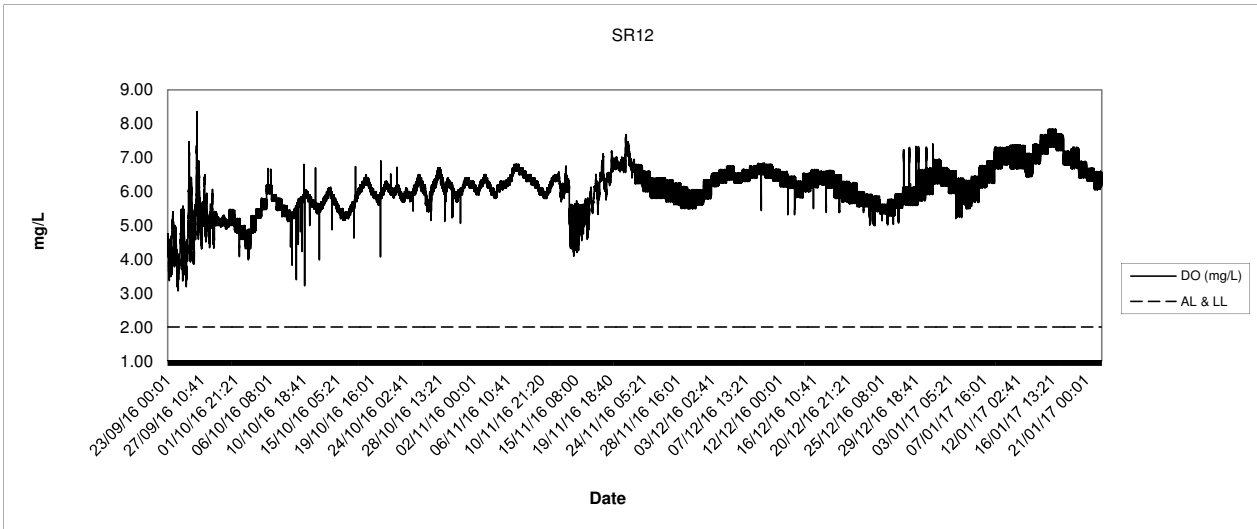
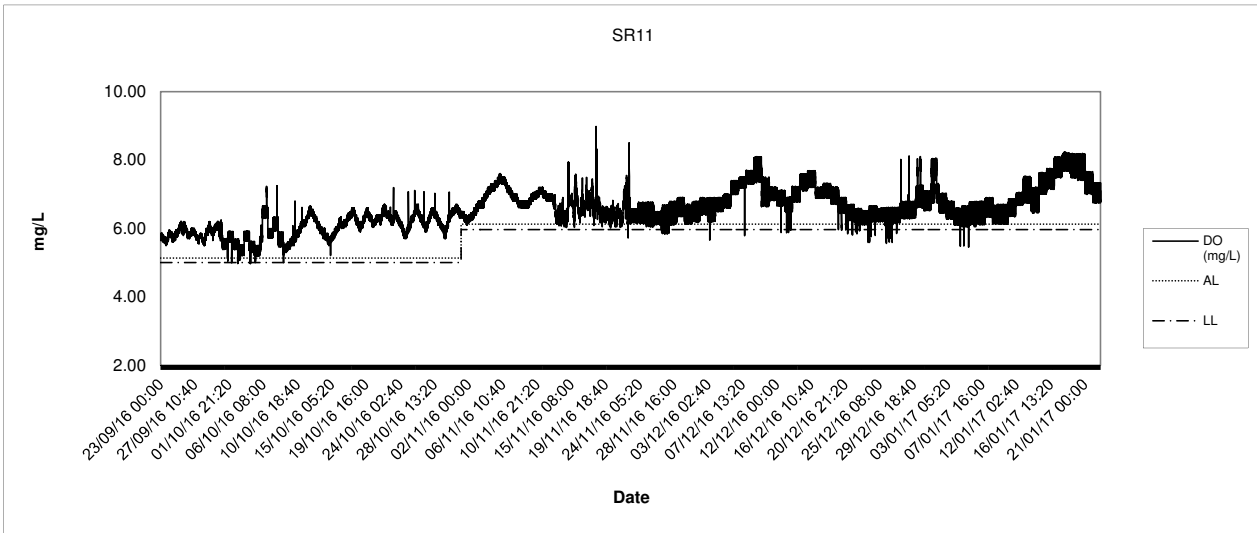
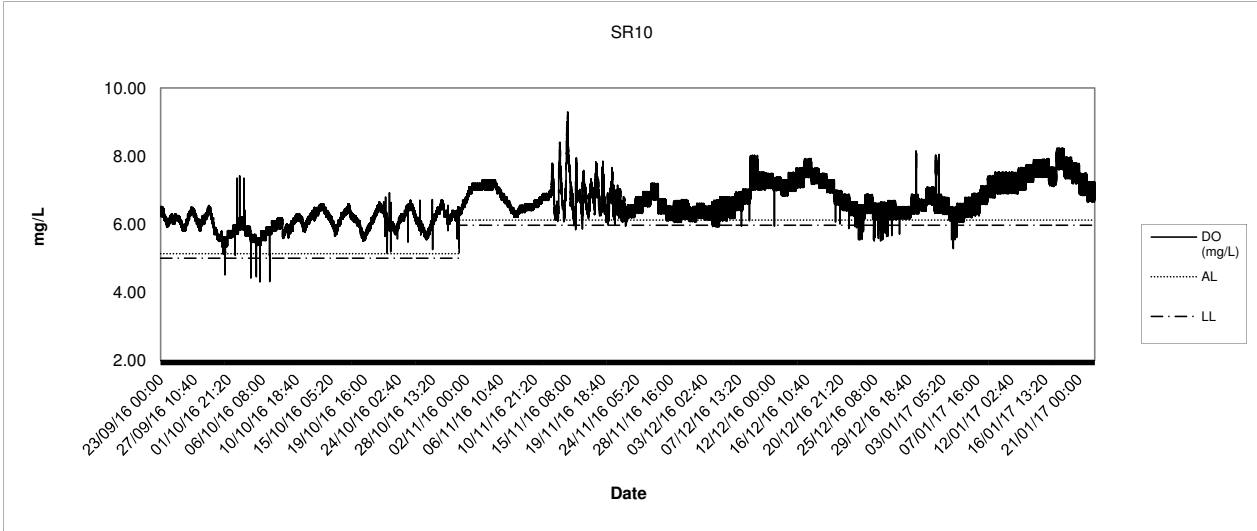
Turbidity 24-hr Water Quality Monitoring



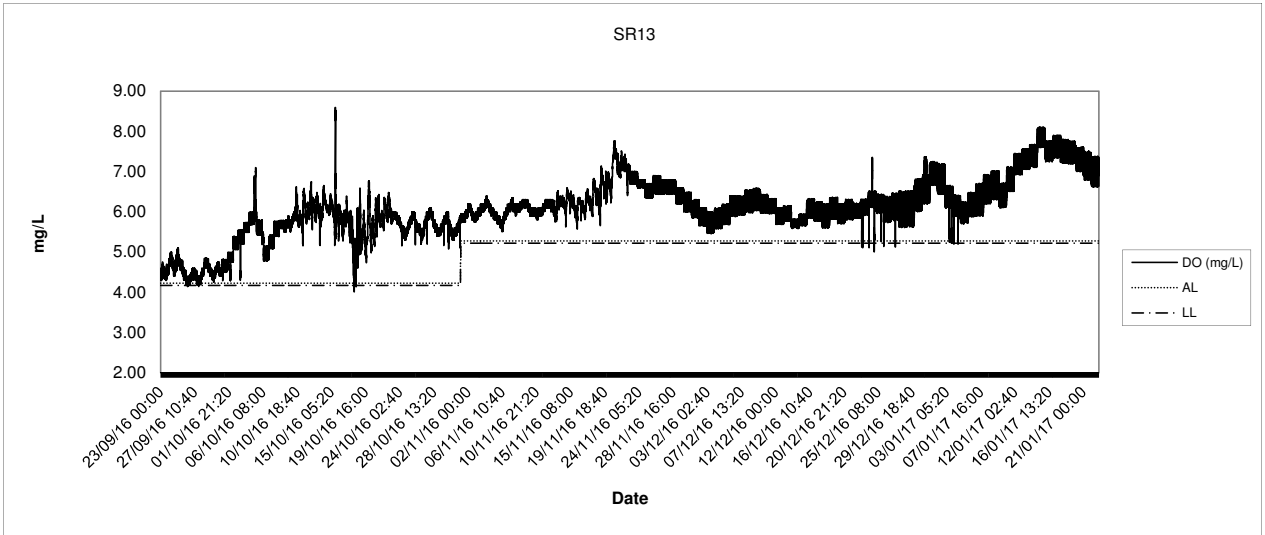
Dissolved Oxygen
24-hr Water Quality Monitoring



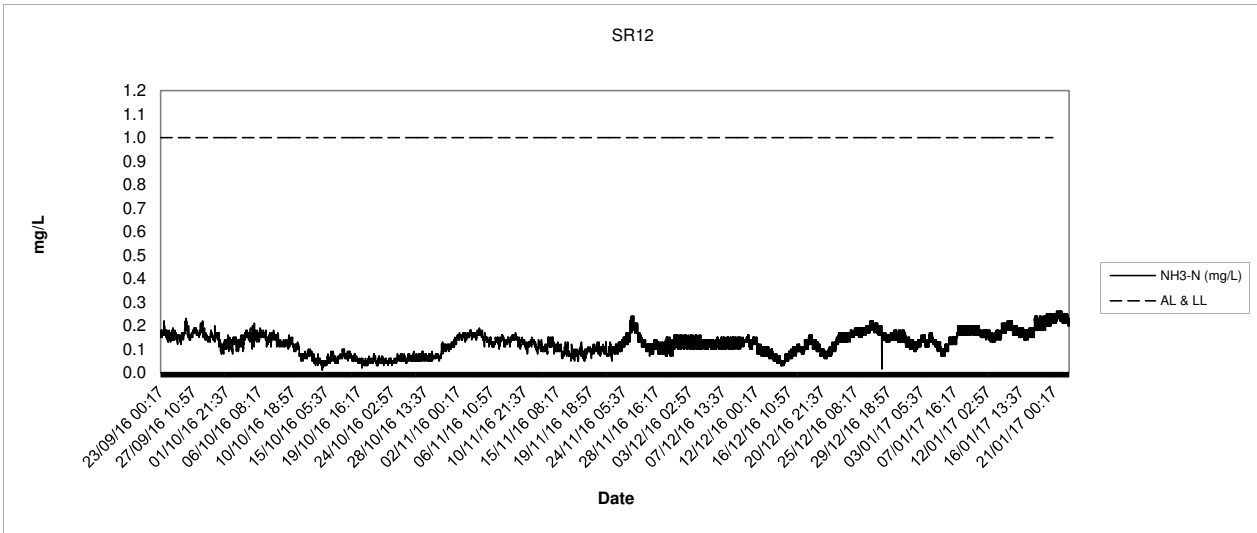
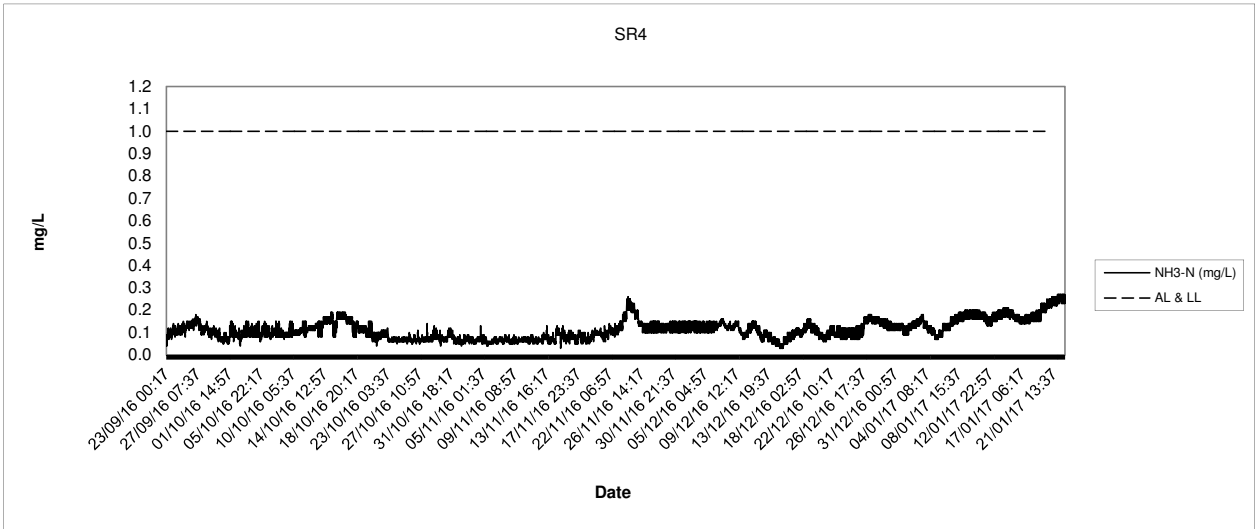
Dissolved Oxygen
24-hr Water Quality Monitoring



Dissolved Oxygen
24-hr Water Quality Monitoring



**Ammonia-N
24-hr Water Quality Monitoring**



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Appendix F

Environmental Mitigation Implementation Schedule

EIA Ref	EM&A Ref	No.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to Address	Who to implement the measure	Location of the measure	When to implement the measure?	Implementation Status
		A	Water Quality					
3.8	2.9		<u>Use of Silt Screens</u>	Minimize the effect of potential increase in SS levels at the seawater intakes	Contractor	WSD8, WSD9 and EMSD1	Construction Phase	Implemented
	A1	Silt Screens shall be installed at the flushing water intakes WSRs WSD1, WSD8, WSD9 and EMSD1 to minimise the effect of potential increase in SS levels at the seawater intakes.						
3.8	2.9		<u>Use of Silt Curtains</u>	Minimize the release of suspended soil from the dredging area	Contractor	Construction Work Sites	Construction Phase	NA-no dredging work carried out in reporting month
	A2	To minimize the potential SS impact from dredging, deployment of silt curtains around the grab dredgers is recommended; and Before commencement of dredging works, the holder of the Environmental Permit shall submit detailed proposal of the design and arrangement of the frame type silt curtain to EPD for approval.						
3.10	2.9	A3	Water Quality Monitoring Program	Perform water quality monitoring at sensitive receivers during construction phase	ET	Monitoring Locations as stated in Table 2.1 of the EM&A Manual	Construction Phase	Implemented
			Water quality monitoring shall be carried out in accordance with Section 2 of the Environmental Monitoring and Audit (EM&A) Manual. Event and Action Plan (EAP) for water quality shall be followed in case of any exceedance in action and limit level.					
3.8 (EP Ref 3)	-		Dredging Operation	Minimize potential adverse effect as a result of dredging activities	Contractor	Construction Work Sites	Construction Phase	NA-no dredging work carried out in reporting month
	A4	Only two types of dredgers are allowed for this Project: (a) grab dredger with closed grab, and (b) cutter suction dredger spud pole grab dredger.						
	A5	The speed of any construction vessels shall not exceed 10 knots when passing through the area of the Project.						
	A6	No more than three two grab dredgers with closed grab (or one cutter suction dredger with two closed grab dredgers) shall be operated within the Project Area at any one time for the Project.						
	A7	Only one closed grab dredger or one cutter suction dredger shall be operated in Zone 2B and during which no other closed grab dredger shall be allowed in other zones within the Project Area.						
	A8	No more than one grab dredger with closed grab (or one cutter suction dredger) shall be operated within each of the five main zones at any one time for the Project in which the cutter suction dredger shall only be operated in Zones 2 and 4 with maximum dredging rate of 700 m ³ in 30 minutes in any given hour (max. 8,400 m ³ /day, based on a 12-hour operation per day).						
	A9	The maximum dredging rate for closed grab dredger at Rambler Channel – Zones 1 to 2 (subzones Z1A, Z1B, Z2A, Z2B and Z2C) shall follow the Dredging Plan for the Hotspot, as shown in EP-426/2011/A.						
	A10	The maximum dredging rate for closed grab dredger at Rambler Channel – Zones 3 to 4 (subzones Z3A to Z4B) shall not exceed 1,600 m ³ per day during dry season or 3,440 m ³ per day during wet season as shown in EP-426/2011/A.						
	A11	The maximum dredging rate for closed grab dredger at Rambler Channel – Zones 5 to 6 (subzones Z5A, Z5B and Z6A) shall not exceed 4,000 m ³ per day during both dry and wet seasons as shown in EP-426/2011/A.						
	A12	The maximum dredging rate for closed grab dredger at Rambler Channel –						

EIA Ref	EM& A Ref	No.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to Address	Who to implement the measure	Location of the measure	When to implement the measure?	Implementation Status
			Zones 5 to 8 (subzones Z5C, Z6B, Z6C, Z6D, Z7 and Z8) shall not exceed 4,000 m ³ per day during both dry and wet seasons as shown in EP-426/2011/A.					
		A13	The maximum dredging rate for closed grab dredger at Northern Fairway – Zones 9 to 12 shall not exceed 4,000 m ³ per day during both dry and wet seasons as shown in EP-426/2011/A.					
		A14	The maximum dredging rate for closed grab dredger at Western Fairway – Zone 13A shall not exceed 4,000 m ³ per day during both dry and wet seasons as shown in EP-426/2011/A.					
		A15	The maximum dredging rate for closed grab dredger at Western Fairway – Zone 13B shall not exceed 4,000 m ³ per day during both dry and wet seasons as shown in EP-426/2011/A.					
		A16	The dredging pump of cutter suction dredger shall be operated during cutting to reduce the sediment loss to water body.					NA-no CSD employed
		A17	Project dredging works within Zone 1 to 6 (including sub-zones) of the Container Basin shall not be carried out at the same time with Terminal Operator's maintenance dredging activities.					NA-No Terminal Operator's maintenance dredging carried out
		A18	Cutter suction dredger is only to be deployed for the removal of harder material during daytime only (07:00 to 19:00) in Zone 2 (including subzones) of the Container Basin.					NA-no CSD employed
		A19	In case of rainstorm warning in effect during dredging works, the dredged material on barge shall be covered properly before transportation to disposal site.					NA-no dredging material generated
		A20	In case of exceedance of SS and NH ₃ -N at the Tsing Yi WSD flushing intake due to dredging operation is evidenced, the Contractor shall propose mitigation measures not limited to reducing dredging rate. If exceedance persists, the Contractor shall propose not to undertake dredging operation in close proximity to the Tsing Yi flushing water intake during flood tide. The Contractor shall liaise with the ETL, IEC, ER, EPD and WSD for the proposed mitigation measures.					NA-no exceedance due to dredging operation
		A21	If further mitigation measures are required due to continuous exceedance of SS and NH ₃ -N, consideration shall then be given to dredge only on the state of the tide which would avoid migration of SS towards the WSD and EMSD intakes.					NA-no exceedance due to dredging operation
		A22	Dredging sub-zone Z2B where high NH ₃ -N in sediment is found shall be isolated with dredging works to be carried out towards the end of construction programme.					NA-no dredging works in such area
		A23	Administrative control in terms of dredging rate adjustment in controlling the release of contaminants shall be employed as mitigation measures.					Implemented
		A24	Field trials shall be carried out to propose the most effective dredging process and rate to control the release of ammoniacal nitrogen and UIA into the water column and achieve compliance at the WSD1 seawater intake (NH ₃ -N) and at the beaches for UIA.					Implemented

EIA Ref	EM& A Ref	No.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to Address	Who to implement the measure	Location of the measure	When to implement the measure?	Implementation Status
			Capital dredging works in dredging sub-zone Z2B (Figure 1.2h refers) should not therefore be carried out until the proposed method and rate are confirmed.					
		A25	Detailed dredging plan shall be prepared providing details of individual dredging subzones and dredging rate taking into account of the field trial results.					Implemented
3.8	-		<u>Other Good Site Practices for Dredging</u>	Minimize potential adverse effect as a result of dredging activities	Contractor	Construction Work Sites	Construction Phase	NA-no dredging work carried out in reporting period
		A26	All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.					
		A27	The speed of all Contractor's vessels should be controlled within the works area to prevent propeller wash from stirring up the seabed sediments.					
		A28	All barges / dredgers used should be fitted with tight fitting seals to their bottom openings to prevent leakage of material.					
		A29	Construction activities should not cause foam, oil, grease, scum, litter or other objectionable matter to be present on the water within the site or dumping grounds.					
		A30	No overflow of dredged mud should be allowed. Barges or hopper should not be filled to a level that will cause the overflow of materials or polluted water during loading or transportation.					
		B	Waste Management					
			<u>Good Site Practices</u>	Minimize potential adverse effect arising from the handling of dredged material	Contractor	Construction Work Sites (General)	Construction Phase	
4.5	3.3	B1	Obtain the profile of different sediment categories and careful planning of sediment removal.					Implemented
		B2	Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.					Implemented
		B3	Training of site personnel in proper waste management and chemical handling procedures.					Implemented
		B4	Provision of sufficient waste disposal points and regular collection of waste.					Implemented
		B5	Well planned delivery programme for offsite disposal such that adverse environmental impact from transporting sediment material is not anticipated.					Implemented
		B6	Use well maintained PME on site.					Implemented
			<u>General Refuse</u>	Minimize the adverse effect arising from the handling of site general refuse	Contractor	Construction Work Sites (General)	Construction Phase	
4.5	3.3	B7	General refuse should be stored in enclosed bins. A reputable waste collector should be employed by the contractor to remove general refuse from the site.					Implemented
			<u>Chemical Waste</u>	Minimize the adverse effect arising from the handling of site chemical waste	Contractor	Construction Work Site	Construction Phase	
4.5	3.3	B8	If chemical wastes are produced at the construction site, the Contractor shall be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes shall be used, and incompatible chemicals should be stored separately. Appropriate labels shall be securely attached on each chemical waste container indicating the corresponding					Implemented

EIA Ref	EM& A Ref	No.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to Address	Who to implement the measure	Location of the measure	When to implement the measure?	Implementation Status
			chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the approved Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.					
4.5	3.3		Marine Dredged Sediment	Control of transportation and disposal of dredged material in a manner to minimize potential impacts on water quality	Contractor	Construction Work Site	Construction Phase	NA-no marine dredged sediment generated in the reporting period
		B9	Control of transportation and disposal of dredged material in a manner to minimize potential impacts on water quality.					
		B10	Bottom opening of barges will be fitted with tight fitting seals to prevent leakage of material. Excess material shall be cleaned from the decks and exposed fittings of barges and dredgers before the vessel is moved.					
		B11	Monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the EPD.					
		B12	Barges or hopper barges shall not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation.					
		B13	Sediment Quality Report shall be prepared and submit to EPD under DASO.					
		B14	If disposal of Type 3 sediment is identified, agreement with EPD shall be reached regarding the treatment of sediment before disposal.					
		B15	Project works shall not be carried out before obtaining confirmation from MFC on disposal option.					
		B16	Follow strictly all conditions stipulated in the dumping permit.					
		C	Marine Ecology	Review and assess the potential adverse effect on marine ecology	Contractor	Construction Work Sites	Construction Phase	Implemented
5.7	4.1	C1	Water quality monitoring results shall be reviewed from time to time to assess if there were any impact to marine ecology due to dredging operation.					
		D	Fisheries	Review and assess the potential adverse effect on fisheries	Contractor	Construction Work Sites	Construction Phase	Implemented
6.7	5.1	D1	Water quality monitoring results shall be reviewed from time to time to assess if there were any impact to fisheries due to dredging operation.					
		E	Hazard to Life		Contractor	Construction Work Sites (General)	Construction Phase	Implemented
7.8.2	6.2	E1	Sound communication channel shall be established with the oil companies, Marine Department, and Fire Services Department for effective notification and emergency evacuation in case of accidents.					
		E2	Proper safety and emergency training shall be given to the relevant operation staff at the dredging site. Emergency plans and procedures should be prepared and drills should be performed periodically.					
		F	Landscape Visual and Glare	Minimize landscape and visual impacts during construction phase	Contractor	Construction activities' area	Throughout design, construction phase	Implemented
8.9 Table 8-3 & 8-6	7.2	F1	Visa shields to the lights of dredgers shall be provided.					
		F2	The light source shall not point directly to any VSRs.					
		F3	Lights shall be switched off if they are not in use.					
		G	Cultural Heritage	Minimize potential marine archaeological	Contractor	Locations of the 20	During Construction	
9.5	8		Monitoring Brief					

EIA Ref	EM& A Ref	No.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to Address	Who to implement the measure	Location of the measure	When to implement the measure?	Implementation Status
		G1	A monitoring brief shall be conducted during the dredging. It shall only be required during dredging at the locations of the 20 unidentified sonar contacts and masked areas and does not need to cover all of the dredging activities. Dredging staff should be briefed about the possibility of locating archaeological objects and a marine archaeologist shall be available to monitor the dredged spoil and provide advice. If material indicative of archaeological remains is retrieved, the AMO should be contacted as soon as possible.	impact during dredging activities		unidentified sonar contacts and masked areas	works	NA- no archaeological deposit was found during reporting period.
		H	Noise					
10.8	9		<u>Good Site Practices</u>	Control and minimize the generation of undue noise nuisance	Contractor	Construction Work Sites (Along the alignment of dredging)	Construction Phase	
	H1	Only well-maintained plant shall be operated on-site and plant should be serviced regularly during the construction program.	Implemented					
	H2	Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum.	Implemented					
	H3	Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from nearby NSRs.	Implemented					
	H4	If dredging is to be carried out during restricted hours, work locations close to NSRs shall be avoided.	Implemented					
		I	Construction Dust					
11.7	10		<u>Dust Control</u>	Good site practice to control dust and odour impact to the nearby sensitive receivers	Contractor	Construction Work Sites (General)	Construction Phase	
	I1	Requirements of the Air Pollution Control (Construction Dust) Regulation, where relevant, shall be adhered to during the construction period.	Implemented					
			<u>Odour</u>		Contractor	Construction Work Sites (General)	Construction Phase	
	I2	To minimize potential odour emissions, if dredged sediment is anticipated to be placed on barge for more than a day the load shall be properly covered as far as practicable to minimise the exposed area and potential odour.	NA-no work in such condition					
		I3	If dredged sediment is found to be malodorous it shall be removed from site as soon as possible within one hour after the barge being filled up.					NA-no work in such condition

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Report No.: 0394/13/ED/0354B

Appendix G

Waste Generation in Reporting Period

Name of Department : Civil Engineering and Development Department
 Contract No. : CV/2013/04

Monthly Summary Waste Flow Table for 2016 (year)

Month/Year	Actual Quantities of Inert C&D Materials Generated Monthly					Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Broken Concrete (see Note 4)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Metals	Paper/cardboard packaging	Plastics (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 kg)	(in '000 kg)	(in '000 kg)	(in '000 kg)	(in '000 m ³)
Jan/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Feb/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Mar/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Apr/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
May/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Jun/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Jul/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Aug/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Sep/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Oct/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Nov/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Dec/2016	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Total	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.12

Notes:

- (1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
- (2) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
- (3) Broken concrete for recycling into aggregates

Name of Department : Civil Engineering and Development Department

Contract No. : CV/2013/04

Monthly Summary Waste Flow Table for 2017 (year)

Year	Actual Quantities of Inert C&D Materials Generated Monthly					Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Broken Concrete (see Note 4)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Metals	Paper/cardboard packaging	Plastics (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 m ³)	(in '000 kg)	(in '000 kg)	(in '000 kg)	(in '000 kg)	(in '000 m ³)
2017	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01
Jan										
Feb										
Mar										
Apr										
May										
Jun										
Jul										
Aug										
Sep										
Oct										
Nov										
Dec										
Total	nil	nil	nil	nil	nil	nil	nil	nil	nil	0.01

Notes:

- (1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
- (2) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
- (3) Broken concrete for recycling into aggregates

Yearly Summary Waste Flow Table

Year	Estimated Annual Quantities of Inert C&D Materials (in '000m ³)										Estimated Annual of C&D Wastes										
	Total Quantity Generated		Broken Concrete (see Note 3)		Reused in the Contract		Reused in other Projects		Disposed as Public Fill		Metals		Paper/cardboard packaging		Plastics (see Note 2)		Chemical Waste		Others, e.g. general refuse		
	(a)		(b)		(c)		(d)		(a-b-c-d)		(in '000 kg)		(in '000 kg)		(in '000 kg)		(in '000 kg)		(in '000 m ³)		
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	
2013	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0.003	0.01
2014	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0.2	0.16
2015	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	13	14.4	0.2	0.12	
2016	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	17	Nil	0.2	0.12	
2017	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	10	-	0.15	-	
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2020																					
2021																					
Grand Total	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	30	-	0.603	-	

Notes:

- (1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
- (2) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material
- (3) Broken concrete for recycling into aggregates.

Monthly Summary of Sediment Disposal (2014-2017)

Marine Sediment Type	Type 1 – Open Sea Disposal	Type 2 – Confined Marine Disposal	Type 3 – Special Treatment / Disposal
Month	Monthly Quantity (m ³)	Monthly Quantity (m ³)	Monthly Quantity (m ³)
2014			
Jan-Dec	549,430	99,660	nil
2015			
Jan-Dec	938,560	372,370	nil
2016			
January	12,580	22,290	nil
February	47,980	30,300	nil
March	34,550	20,070	nil
April	31,040	14,540	nil
May	23,960	20,490	1,260
June	29,950	26,820	nil
July	9,500	18,040	nil
August	6,300	700	nil
September	nil	nil	nil
October	nil	nil	nil
November	nil	nil	nil
December	nil	nil	nil
2017			
January	nil	nil	nil
Total	1,683,850	625,280	1,260

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Report No.: 0394/13/ED/0354B

Appendix H
Quarterly Assessment of Construction Impact

Cluster 2 SS
1.3 x Baseline vs Impact

Baseline x 1.3 SS (mg/L)			
SR6	1/4/2014	Mid-Ebb	6
SR6	1/7/2014	Mid-Ebb	8
SR6	1/9/2014	Mid-Ebb	5
SR6	1/11/2014	Mid-Ebb	5
SR6	1/14/2014	Mid-Ebb	8
SR6	1/16/2014	Mid-Ebb	7
SR6	1/18/2014	Mid-Ebb	6
SR6	1/21/2014	Mid-Ebb	4
SR6	1/23/2014	Mid-Ebb	4
SR6	1/25/2014	Mid-Ebb	5
SR6	1/27/2014	Mid-Ebb	3
SR6	1/29/2014	Mid-Ebb	6
SR7	1/4/2014	Mid-Ebb	9
SR7	1/7/2014	Mid-Ebb	17
SR7	1/9/2014	Mid-Ebb	5
SR7	1/11/2014	Mid-Ebb	6
SR7	1/14/2014	Mid-Ebb	7
SR7	1/16/2014	Mid-Ebb	17
SR7	1/18/2014	Mid-Ebb	7
SR7	1/21/2014	Mid-Ebb	5
SR7	1/23/2014	Mid-Ebb	4
SR7	1/25/2014	Mid-Ebb	6
SR7	1/27/2014	Mid-Ebb	3
SR7	1/29/2014	Mid-Ebb	8
SR8	1/4/2014	Mid-Ebb	6
SR8	1/7/2014	Mid-Ebb	3
SR8	1/9/2014	Mid-Ebb	4
SR8	1/11/2014	Mid-Ebb	6
SR8	1/14/2014	Mid-Ebb	6
SR8	1/16/2014	Mid-Ebb	7
SR8	1/18/2014	Mid-Ebb	6
SR8	1/21/2014	Mid-Ebb	3
SR8	1/23/2014	Mid-Ebb	4
SR8	1/25/2014	Mid-Ebb	6
SR8	1/27/2014	Mid-Ebb	3
SR8	1/29/2014	Mid-Ebb	6
SR9	1/4/2014	Mid-Ebb	6
SR9	1/7/2014	Mid-Ebb	5
SR9	1/9/2014	Mid-Ebb	9
SR9	1/11/2014	Mid-Ebb	6
SR9	1/14/2014	Mid-Ebb	10
SR9	1/16/2014	Mid-Ebb	7
SR9	1/18/2014	Mid-Ebb	5
SR9	1/21/2014	Mid-Ebb	3
SR9	1/23/2014	Mid-Ebb	5
SR9	1/25/2014	Mid-Ebb	3
SR9	1/27/2014	Mid-Ebb	3
SR9	1/29/2014	Mid-Ebb	8
SR10	1/4/2014	Mid-Ebb	6
SR10	1/7/2014	Mid-Ebb	4
SR10	1/9/2014	Mid-Ebb	3
SR10	1/11/2014	Mid-Ebb	4
SR10	1/14/2014	Mid-Ebb	6
SR10	1/16/2014	Mid-Ebb	7
SR10	1/18/2014	Mid-Ebb	5
SR10	1/21/2014	Mid-Ebb	4
SR10	1/23/2014	Mid-Ebb	4
SR10	1/25/2014	Mid-Ebb	7
SR10	1/27/2014	Mid-Ebb	4
SR10	1/29/2014	Mid-Ebb	4
SR11	1/4/2014	Mid-Ebb	4
SR11	1/7/2014	Mid-Ebb	3
SR11	1/9/2014	Mid-Ebb	7
SR11	1/11/2014	Mid-Ebb	5
SR11	1/14/2014	Mid-Ebb	6
SR11	1/16/2014	Mid-Ebb	4
SR11	1/18/2014	Mid-Ebb	5
SR11	1/21/2014	Mid-Ebb	2
SR11	1/23/2014	Mid-Ebb	3
SR11	1/25/2014	Mid-Ebb	5
SR11	1/27/2014	Mid-Ebb	5
SR11	1/29/2014	Mid-Ebb	7

Impact SS (mg/L)			
SR6	12/24/2016	Mid-Ebb	9
SR6	12/27/2016	Mid-Ebb	8
SR6	12/29/2016	Mid-Ebb	8
SR6	12/31/2016	Mid-Ebb	10
SR6	1/3/2017	Mid-Ebb	9
SR6	1/5/2017	Mid-Ebb	8
SR6	1/7/2017	Mid-Ebb	6
SR6	1/10/2017	Mid-Ebb	9
SR6	1/12/2017	Mid-Ebb	7
SR6	1/14/2017	Mid-Ebb	11
SR6	1/17/2017	Mid-Ebb	10
SR6	1/19/2017	Mid-Ebb	7
SR6	1/21/2017	Mid-Ebb	6
SR7	12/24/2016	Mid-Ebb	8
SR7	12/27/2016	Mid-Ebb	6
SR7	12/29/2016	Mid-Ebb	8
SR7	12/31/2016	Mid-Ebb	8
SR7	1/3/2017	Mid-Ebb	10
SR7	1/5/2017	Mid-Ebb	11
SR7	1/7/2017	Mid-Ebb	7
SR7	1/10/2017	Mid-Ebb	9
SR7	1/12/2017	Mid-Ebb	7
SR7	1/14/2017	Mid-Ebb	4
SR7	1/17/2017	Mid-Ebb	8
SR7	1/19/2017	Mid-Ebb	6
SR7	1/21/2017	Mid-Ebb	4
SR8	12/24/2016	Mid-Ebb	6
SR8	12/27/2016	Mid-Ebb	6
SR8	12/29/2016	Mid-Ebb	8
SR8	12/31/2016	Mid-Ebb	10
SR8	1/3/2017	Mid-Ebb	7
SR8	1/5/2017	Mid-Ebb	4
SR8	1/7/2017	Mid-Ebb	6
SR8	1/10/2017	Mid-Ebb	9
SR8	1/12/2017	Mid-Ebb	4
SR8	1/14/2017	Mid-Ebb	9
SR8	1/17/2017	Mid-Ebb	9
SR8	1/19/2017	Mid-Ebb	7
SR8	1/21/2017	Mid-Ebb	5
SR9	12/24/2016	Mid-Ebb	10
SR9	12/27/2016	Mid-Ebb	7
SR9	12/29/2016	Mid-Ebb	8
SR9	12/31/2016	Mid-Ebb	12
SR9	1/3/2017	Mid-Ebb	8
SR9	1/5/2017	Mid-Ebb	7
SR9	1/7/2017	Mid-Ebb	8
SR9	1/10/2017	Mid-Ebb	7
SR9	1/12/2017	Mid-Ebb	9
SR9	1/14/2017	Mid-Ebb	9
SR9	1/17/2017	Mid-Ebb	8
SR9	1/19/2017	Mid-Ebb	8
SR9	1/21/2017	Mid-Ebb	3
SR10	12/24/2016	Mid-Ebb	6
SR10	12/27/2016	Mid-Ebb	6
SR10	12/29/2016	Mid-Ebb	7
SR10	12/31/2016	Mid-Ebb	7
SR10	1/3/2017	Mid-Ebb	5
SR10	1/5/2017	Mid-Ebb	6
SR10	1/7/2017	Mid-Ebb	5
SR10	1/10/2017	Mid-Ebb	4
SR10	1/12/2017	Mid-Ebb	5
SR10	1/14/2017	Mid-Ebb	9
SR10	1/17/2017	Mid-Ebb	11
SR10	1/19/2017	Mid-Ebb	8
SR10	1/21/2017	Mid-Ebb	4
SR11	12/24/2016	Mid-Ebb	8
SR11	12/27/2016	Mid-Ebb	5
SR11	12/29/2016	Mid-Ebb	9
SR11	12/31/2016	Mid-Ebb	4
SR11	1/3/2017	Mid-Ebb	7
SR11	1/5/2017	Mid-Ebb	4
SR11	1/7/2017	Mid-Ebb	4
SR11	1/10/2017	Mid-Ebb	6
SR11	1/12/2017	Mid-Ebb	6
SR11	1/14/2017	Mid-Ebb	9
SR11	1/17/2017	Mid-Ebb	10
SR11	1/19/2017	Mid-Ebb	5
SR11	1/21/2017	Mid-Ebb	4

Cluster 2 SS
1.3 x Baseline vs Impact

Baseline x 1.3 SS		Impact SS	
Raw Statistics		Raw Statistics	
Number of Valid Observations	72	Number of Valid Observations	78
Number of Distinct Observations	27	Number of Distinct Observations	41
Minimum	1.95	Minimum	2.667
Maximum	17.29	Maximum	11.67
Mean of Raw Data	5.567	Mean of Raw Data	7.045
Standard Deviation of Raw Data	2.554	Standard Deviation of Raw Data	2.066
Kstar	6.323	Kstar	10.29
Mean of Log Transformed Data	1.639	Mean of Log Transformed Data	1.905
Standard Deviation of Log Transformed Data	0.383	Standard Deviation of Log Transformed Data	0.322
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.869	Correlation Coefficient R	0.996
Approximate Shapiro Wilk Test Statistic	0.775	Approximate Shapiro Wilk Test Statistic	0.976
Approximate Shapiro Wilk P Value	4.00E-15	Approximate Shapiro Wilk P Value	0.425
Lilliefors Test Statistic	0.201	Lilliefors Test Statistic	0.0556
Lilliefors Critical (0.95) Value	0.104	Lilliefors Critical (0.95) Value	0.1
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs		
User Selected Options		
Full Precision	OFF	
Confidence Coefficient	95%	
Substantial Difference	0	
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)	
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median	
Area of Concern Data: Impact SS		
Background Data: Baseline x 1.3 SS		
Raw Statistics		
	Site	Background
Number of Valid Observations	78	72
Number of Distinct Observations	41	27
Minimum	2.667	1.95
Maximum	11.67	17.29
Mean	7.045	5.567
Median	7	5.417
SD	2.066	2.554
SE of Mean	0.234	0.301
Wilcoxon-Mann-Whitney (WMW) Test		
H0: Mean/Median of Site or AOC <= Mean/Median of Background		
Site Rank Sum W-Stat	7193	
WMW Test U-Stat	4.903	
WMW Critical Value (0.050)	1.645	
P-Value	4.71E-07	
Conclusion with Alpha = 0.05		
Reject H0, Conclude Site > Background		
P-Value < alpha (0.05)		

Cluster 2 SS
Control C1 vs Impact

Control C1 SS (mg/L)			
C1	12/24/2016	Mid-Ebb	8
C1	12/27/2016	Mid-Ebb	5
C1	12/29/2016	Mid-Ebb	10
C1	12/31/2016	Mid-Ebb	9
C1	1/3/2017	Mid-Ebb	10
C1	1/5/2017	Mid-Ebb	5
C1	1/7/2017	Mid-Ebb	5
C1	1/10/2017	Mid-Ebb	6
C1	1/12/2017	Mid-Ebb	7
C1	1/14/2017	Mid-Ebb	10
C1	1/17/2017	Mid-Ebb	9
C1	1/19/2017	Mid-Ebb	8
C1	1/21/2017	Mid-Ebb	3

Impact SS (mg/L)			
SR6	12/24/2016	Mid-Ebb	9
SR6	12/27/2016	Mid-Ebb	8
SR6	12/29/2016	Mid-Ebb	8
SR6	12/31/2016	Mid-Ebb	10
SR6	1/3/2017	Mid-Ebb	9
SR6	1/5/2017	Mid-Ebb	8
SR6	1/7/2017	Mid-Ebb	6
SR6	1/10/2017	Mid-Ebb	9
SR6	1/12/2017	Mid-Ebb	7
SR6	1/14/2017	Mid-Ebb	11
SR6	1/17/2017	Mid-Ebb	10
SR6	1/19/2017	Mid-Ebb	7
SR6	1/21/2017	Mid-Ebb	6
SR7	12/24/2016	Mid-Ebb	8
SR7	12/27/2016	Mid-Ebb	6
SR7	12/29/2016	Mid-Ebb	8
SR7	12/31/2016	Mid-Ebb	8
SR7	1/3/2017	Mid-Ebb	10
SR7	1/5/2017	Mid-Ebb	11
SR7	1/7/2017	Mid-Ebb	7
SR7	1/10/2017	Mid-Ebb	9
SR7	1/12/2017	Mid-Ebb	7
SR7	1/14/2017	Mid-Ebb	4
SR7	1/17/2017	Mid-Ebb	8
SR7	1/19/2017	Mid-Ebb	6
SR7	1/21/2017	Mid-Ebb	4
SR8	12/24/2016	Mid-Ebb	6
SR8	12/27/2016	Mid-Ebb	6
SR8	12/29/2016	Mid-Ebb	8
SR8	12/31/2016	Mid-Ebb	10
SR8	1/3/2017	Mid-Ebb	7
SR8	1/5/2017	Mid-Ebb	4
SR8	1/7/2017	Mid-Ebb	6
SR8	1/10/2017	Mid-Ebb	9
SR8	1/12/2017	Mid-Ebb	4
SR8	1/14/2017	Mid-Ebb	9
SR8	1/17/2017	Mid-Ebb	9
SR8	1/19/2017	Mid-Ebb	7
SR8	1/21/2017	Mid-Ebb	5
SR9	12/24/2016	Mid-Ebb	10
SR9	12/27/2016	Mid-Ebb	7
SR9	12/29/2016	Mid-Ebb	8
SR9	12/31/2016	Mid-Ebb	12
SR9	1/3/2017	Mid-Ebb	8
SR9	1/5/2017	Mid-Ebb	7
SR9	1/7/2017	Mid-Ebb	8
SR9	1/10/2017	Mid-Ebb	7
SR9	1/12/2017	Mid-Ebb	9
SR9	1/14/2017	Mid-Ebb	9
SR9	1/17/2017	Mid-Ebb	8
SR9	1/19/2017	Mid-Ebb	8
SR9	1/21/2017	Mid-Ebb	3
SR10	12/24/2016	Mid-Ebb	6
SR10	12/27/2016	Mid-Ebb	6
SR10	12/29/2016	Mid-Ebb	7
SR10	12/31/2016	Mid-Ebb	7
SR10	1/3/2017	Mid-Ebb	5
SR10	1/5/2017	Mid-Ebb	6
SR10	1/7/2017	Mid-Ebb	5
SR10	1/10/2017	Mid-Ebb	4
SR10	1/12/2017	Mid-Ebb	5
SR10	1/14/2017	Mid-Ebb	9
SR10	1/17/2017	Mid-Ebb	11
SR10	1/19/2017	Mid-Ebb	8
SR10	1/21/2017	Mid-Ebb	4
SR11	12/24/2016	Mid-Ebb	8
SR11	12/27/2016	Mid-Ebb	5
SR11	12/29/2016	Mid-Ebb	9
SR11	12/31/2016	Mid-Ebb	4
SR11	1/3/2017	Mid-Ebb	7
SR11	1/5/2017	Mid-Ebb	4
SR11	1/7/2017	Mid-Ebb	4
SR11	1/10/2017	Mid-Ebb	6
SR11	1/12/2017	Mid-Ebb	6
SR11	1/14/2017	Mid-Ebb	9
SR11	1/17/2017	Mid-Ebb	10
SR11	1/19/2017	Mid-Ebb	5
SR11	1/21/2017	Mid-Ebb	4

Cluster 2 SS
Control C1 vs Impact

Impact SS		Control C1 SS	
Raw Statistics		Raw Statistics	
Number of Valid Observations	78	Number of Valid Observations	13
Number of Distinct Observations	41	Number of Distinct Observations	11
Minimum	2.667	Minimum	3.333
Maximum	11.67	Maximum	9.833
Mean of Raw Data	7.045	Mean of Raw Data	7.244
Standard Deviation of Raw Data	2.066	Standard Deviation of Raw Data	2.129
Kstar	10.29	Kstar	8.462
Mean of Log Transformed Data	1.905	Mean of Log Transformed Data	1.934
Standard Deviation of Log Transformed Data	0.322	Standard Deviation of Log Transformed Data	0.331
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.996	Correlation Coefficient R	0.973
Approximate Shapiro Wilk Test Statistic	0.976	Shapiro Wilk Test Statistic	0.931
Approximate Shapiro Wilk P Value	0.425	Shapiro Wilk Critical (0.95) Value	0.866
Lilliefors Test Statistic	0.0556	Approximate Shapiro Wilk P Value	0.439
Lilliefors Critical (0.95) Value	0.1	Lilliefors Test Statistic	0.157
Data appear Normal at (0.05) Significance Level		Lilliefors Critical (0.95) Value	0.246
		Data appear Normal at (0.05) Significance Level	

t-Test Site vs Background Comparison for Full Data Sets without NDs					
User Selected Options					
Full Precision	OFF				
Confidence Coefficient	95%				
Substantial Difference (S)	0				
Selected Null Hypothesis	Site or AOC Mean Less Than or Equal to Background Mean (Form 1)				
Alternative Hypothesis	Site or AOC Mean Greater Than the Background Mean				
Area of Concern Data: Impact SS					
Background Data: Control C1 SS					
Raw Statistics					
	Site	Background			
Number of Valid Observations	78	13			
Number of Distinct Observations	41	11			
Minimum	2.667	3.333			
Maximum	11.67	9.833			
Mean	7.045	7.244			
Median	7	7.667			
SD	2.066	2.129			
SE of Mean	0.234	0.59			
Site vs Background Two-Sample t-Test					
H0: Mu of Site - Mu of Background <= 0					
Method	DF	t-Test Value	Critical t (0.050)	P-Value	
Pooled (Equal Variance)	89	-0.32	1.662	0.625	
Satterthwaite (Unequal Variance)	16	-0.313	1.746	0.621	
Pooled SD 2.075					
Conclusion with Alpha = 0.050					
* Student t (Pooled) Test: Do Not Reject H0, Conclude Site <= Background					
* Satterthwaite Test: Do Not Reject H0, Conclude Site <= Background					
Test of Equality of Variances					
Numerator DF	Denominator DF	F-Test Value	P-Value		
12	77	1.061	0.808		
Conclusion with Alpha = 0.05					
* Two variances appear to be equal					

Cluster 2 TIN(Lab)
1.3 x Baseline vs Impact

Baseline x 1.3 TIN (lab) (mg/L)		
SR9	1/4/2014 Mid-Ebb	0.10
SR9	1/7/2014 Mid-Ebb	0.16
SR9	1/9/2014 Mid-Ebb	0.38
SR9	1/11/2014 Mid-Ebb	0.40
SR9	1/14/2014 Mid-Ebb	0.23
SR9	1/16/2014 Mid-Ebb	0.22
SR9	1/18/2014 Mid-Ebb	0.13
SR9	1/21/2014 Mid-Ebb	0.04
SR9	1/23/2014 Mid-Ebb	0.03
SR9	1/25/2014 Mid-Ebb	0.03
SR9	1/27/2014 Mid-Ebb	0.03
SR9	1/29/2014 Mid-Ebb	0.03
SR10	1/4/2014 Mid-Ebb	0.19
SR10	1/7/2014 Mid-Ebb	0.20
SR10	1/9/2014 Mid-Ebb	0.20
SR10	1/11/2014 Mid-Ebb	0.21
SR10	1/14/2014 Mid-Ebb	0.14
SR10	1/16/2014 Mid-Ebb	0.13
SR10	1/18/2014 Mid-Ebb	0.13
SR10	1/21/2014 Mid-Ebb	0.12
SR10	1/23/2014 Mid-Ebb	0.15
SR10	1/25/2014 Mid-Ebb	0.08
SR10	1/27/2014 Mid-Ebb	0.09
SR10	1/29/2014 Mid-Ebb	0.12
SR11	1/4/2014 Mid-Ebb	0.18
SR11	1/7/2014 Mid-Ebb	0.17
SR11	1/9/2014 Mid-Ebb	0.19
SR11	1/11/2014 Mid-Ebb	0.21
SR11	1/14/2014 Mid-Ebb	0.14
SR11	1/16/2014 Mid-Ebb	0.12
SR11	1/18/2014 Mid-Ebb	0.10
SR11	1/21/2014 Mid-Ebb	0.12
SR11	1/23/2014 Mid-Ebb	0.18
SR11	1/25/2014 Mid-Ebb	0.12
SR11	1/27/2014 Mid-Ebb	0.07
SR11	1/29/2014 Mid-Ebb	0.09

Impact TIN (lab) (mg/L)		
SR9	12/24/2016 Mid-Ebb	0.18
SR9	12/27/2016 Mid-Ebb	0.27
SR9	12/29/2016 Mid-Ebb	0.28
SR9	12/31/2016 Mid-Ebb	0.14
SR9	1/3/2017 Mid-Ebb	0.07
SR9	1/5/2017 Mid-Ebb	0.04
SR9	1/7/2017 Mid-Ebb	0.28
SR9	1/10/2017 Mid-Ebb	0.23
SR9	1/12/2017 Mid-Ebb	0.31
SR9	1/14/2017 Mid-Ebb	0.30
SR9	1/17/2017 Mid-Ebb	0.31
SR9	1/19/2017 Mid-Ebb	0.29
SR9	1/21/2017 Mid-Ebb	0.35
SR10	12/24/2016 Mid-Ebb	0.10
SR10	12/27/2016 Mid-Ebb	0.10
SR10	12/29/2016 Mid-Ebb	0.30
SR10	12/31/2016 Mid-Ebb	0.15
SR10	1/3/2017 Mid-Ebb	0.12
SR10	1/5/2017 Mid-Ebb	0.13
SR10	1/7/2017 Mid-Ebb	0.27
SR10	1/10/2017 Mid-Ebb	0.16
SR10	1/12/2017 Mid-Ebb	0.17
SR10	1/14/2017 Mid-Ebb	0.29
SR10	1/17/2017 Mid-Ebb	0.29
SR10	1/19/2017 Mid-Ebb	0.25
SR10	1/21/2017 Mid-Ebb	0.20
SR11	12/24/2016 Mid-Ebb	0.11
SR11	12/27/2016 Mid-Ebb	0.07
SR11	12/29/2016 Mid-Ebb	0.30
SR11	12/31/2016 Mid-Ebb	0.06
SR11	1/3/2017 Mid-Ebb	0.12
SR11	1/5/2017 Mid-Ebb	0.13
SR11	1/7/2017 Mid-Ebb	0.13
SR11	1/10/2017 Mid-Ebb	0.08
SR11	1/12/2017 Mid-Ebb	0.17
SR11	1/14/2017 Mid-Ebb	0.29
SR11	1/17/2017 Mid-Ebb	0.30
SR11	1/19/2017 Mid-Ebb	0.25
SR11	1/21/2017 Mid-Ebb	0.20

Cluster 2 TIN(Lab)
1.3 x Baseline vs Impact

Baseline x 1.3 TIN (lab)		Impact TIN (Lab)	
Raw Statistics		Raw Statistics	
Number of Valid Observations	36	Number of Valid Observations	39
Number of Distinct Observations	31	Number of Distinct Observations	37
Minimum	0.026	Minimum	0.0433
Maximum	0.396	Maximum	0.351
Mean of Raw Data	0.145	Mean of Raw Data	0.199
Standard Deviation of Raw Data	0.0824	Standard Deviation of Raw Data	0.09
Kstar	2.637	Kstar	3.778
Mean of Log Transformed Data	-2.115	Mean of Log Transformed Data	-1.741
Standard Deviation of Log Transformed Data	0.68	Standard Deviation of Log Transformed Data	0.551
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.947	Correlation Coefficient R	0.966
Shapiro Wilk Test Statistic	0.9	Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical (0.95) Value	0.935	Shapiro Wilk Critical (0.95) Value	0.939
Approximate Shapiro Wilk P Value	0.00319	Approximate Shapiro Wilk P Value	0.00614
Lilliefors Test Statistic	0.114	Lilliefors Test Statistic	0.161
Lilliefors Critical (0.95) Value	0.148	Lilliefors Critical (0.95) Value	0.142
Data not Normal at (0.05) Significance Level		Data not Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs			
User Selected Options			
Full Precision	OFF		
Confidence Coefficient	95%		
Substantial Difference	0		
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)		
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median		
Area of Concern Data: Impact TIN (Lab)			
Background Data: Baseline x 1.3 TIN (lab)			
Raw Statistics			
	Site	Background	
Number of Valid Observations		39	36
Number of Distinct Observations		37	31
Minimum		0.0433	0.026
Maximum		0.351	0.396
Mean		0.199	0.145
Median		0.199	0.133
SD		0.09	0.0824
SE of Mean		0.0144	0.0137
Wilcoxon-Mann-Whitney (WMW) Test			
H0: Mean/Median of Site or AOC <= Mean/Median of Background			
Site Rank Sum W-Stat		1718	
WMW Test U-Stat		2.497	
WMW Critical Value (0.050)		1.645	
P-Value		0.00626	
Conclusion with Alpha = 0.05			
Reject H0, Conclude Site > Background			
P-Value < alpha (0.05)			

Cluster 2 TIN(Lab)
G1 vs Impact

G1 TIN (lab) (mg/L)			
G1	12/24/2016	Mid-Ebb	0.29
G1	12/27/2016	Mid-Ebb	0.33
G1	12/29/2016	Mid-Ebb	0.21
G1	12/31/2016	Mid-Ebb	0.20
G1	1/3/2017	Mid-Ebb	0.26
G1	1/5/2017	Mid-Ebb	0.24
G1	1/7/2017	Mid-Ebb	0.40
G1	1/10/2017	Mid-Ebb	0.34
G1	1/12/2017	Mid-Ebb	0.33
G1	1/14/2017	Mid-Ebb	0.37
G1	1/17/2017	Mid-Ebb	0.30
G1	1/19/2017	Mid-Ebb	0.32
G1	1/21/2017	Mid-Ebb	0.33

Impact TIN (lab) (mg/L)			
SR9	12/24/2016	Mid-Ebb	0.18
SR9	12/27/2016	Mid-Ebb	0.27
SR9	12/29/2016	Mid-Ebb	0.28
SR9	12/31/2016	Mid-Ebb	0.14
SR9	1/3/2017	Mid-Ebb	0.07
SR9	1/5/2017	Mid-Ebb	0.04
SR9	1/7/2017	Mid-Ebb	0.28
SR9	1/10/2017	Mid-Ebb	0.23
SR9	1/12/2017	Mid-Ebb	0.31
SR9	1/14/2017	Mid-Ebb	0.30
SR9	1/17/2017	Mid-Ebb	0.31
SR9	1/19/2017	Mid-Ebb	0.29
SR9	1/21/2017	Mid-Ebb	0.35
SR10	12/24/2016	Mid-Ebb	0.10
SR10	12/27/2016	Mid-Ebb	0.10
SR10	12/29/2016	Mid-Ebb	0.30
SR10	12/31/2016	Mid-Ebb	0.15
SR10	1/3/2017	Mid-Ebb	0.12
SR10	1/5/2017	Mid-Ebb	0.13
SR10	1/7/2017	Mid-Ebb	0.27
SR10	1/10/2017	Mid-Ebb	0.16
SR10	1/12/2017	Mid-Ebb	0.17
SR10	1/14/2017	Mid-Ebb	0.29
SR10	1/17/2017	Mid-Ebb	0.29
SR10	1/19/2017	Mid-Ebb	0.25
SR10	1/21/2017	Mid-Ebb	0.20
SR11	12/24/2016	Mid-Ebb	0.11
SR11	12/27/2016	Mid-Ebb	0.07
SR11	12/29/2016	Mid-Ebb	0.30
SR11	12/31/2016	Mid-Ebb	0.06
SR11	1/3/2017	Mid-Ebb	0.12
SR11	1/5/2017	Mid-Ebb	0.13
SR11	1/7/2017	Mid-Ebb	0.13
SR11	1/10/2017	Mid-Ebb	0.08
SR11	1/12/2017	Mid-Ebb	0.17
SR11	1/14/2017	Mid-Ebb	0.29
SR11	1/17/2017	Mid-Ebb	0.30
SR11	1/19/2017	Mid-Ebb	0.25
SR11	1/21/2017	Mid-Ebb	0.20

Cluster 2 TIN(Lab)
G1 vs Impact

Impact TIN (Lab)		G1 TIN (Lab)	
Raw Statistics		Raw Statistics	
Number of Valid Observations	39	Number of Valid Observations	13
Number of Distinct Observations	37	Number of Distinct Observations	12
Minimum	0.0433	Minimum	0.203
Maximum	0.351	Maximum	0.401
Mean of Raw Data	0.199	Mean of Raw Data	0.303
Standard Deviation of Raw Data	0.09	Standard Deviation of Raw Data	0.0596
Kstar	3.778	Kstar	19.95
Mean of Log Transformed Data	-1.741	Mean of Log Transformed Data	-1.214
Standard Deviation of Log Transformed Data	0.551	Standard Deviation of Log Transformed Data	0.21
Normal Distribution Test Results		Normal Distribution Test Results	
Correlation Coefficient R	0.966	Correlation Coefficient R	0.977
Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical (0.95) Value	0.939	Shapiro Wilk Critical (0.95) Value	0.866
Approximate Shapiro Wilk P Value	0.00614	Approximate Shapiro Wilk P Value	0.577
Lilliefors Test Statistic	0.161	Lilliefors Test Statistic	0.151
Lilliefors Critical (0.95) Value	0.142	Lilliefors Critical (0.95) Value	0.246
Data not Normal at (0.05) Significance Level		Data appear Normal at (0.05) Significance Level	

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Full Data Sets without NDs			
User Selected Options			
Full Precision	OFF		
Confidence Coefficient	95%		
Substantial Difference	0		
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)		
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median		
Area of Concern Data: Impact TIN (Lab)			
Background Data: G1 TIN (Lab)			
Raw Statistics			
	Site	Background	
Number of Valid Observations	39	13	
Number of Distinct Observations	37	12	
Minimum	0.0433	0.203	
Maximum	0.351	0.401	
Mean	0.199	0.303	
Median	0.199	0.32	
SD	0.09	0.0596	
SE of Mean	0.0144	0.0165	
Wilcoxon-Mann-Whitney (WMW) Test			
H0: Mean/Median of Site or AOC <= Mean/Median of Background			
Site Rank Sum W-Stat	864		
WMW Test U-Stat	-3.593		
WMW Critical Value (0.050)	1.645		
P-Value	0.00016376		
Conclusion with Alpha = 0.05			
Do Not Reject H0, Conclude Site <= Background			
P-Value < alpha (0.05)			