



Governors Bay Wastewater Treatment Plant Annual Monitoring Report July 2016 – June 2017

Prepared by: Citycare Water
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On behalf of

Christchurch City Council, City Water & Waste Unit

30 Aug 2017



Resource Consent Number: CRC101760
File Number: CO6C/03694
Client Name: Christchurch City Council
To: Discharge Contaminants Into Water
Consent Location: Governors Bay Wastewater Treatment Plant, GOVERNORS BAY
Status: Active

07/08/2012 Consent Commenced
 07/08/2017 Lapse Date
 03/09/2012 Given Effect to Date
 31/12/2018 Expiry Date

Subject to the Following Conditions:

1	The discharge shall be only treated sewage from the Governors Bay Wastewater Treatment Plant, located at Lot 1 DP 55349, Jetty Road, Governors Bay. The Governors Bay Wastewater Treatment Plant shall only service municipal waste from the settlement of Governors Bay.
	Compliance
2	<ul style="list-style-type: none"> a. Treated sewage effluent shall only be discharged to Lyttelton Harbour/Whakaraupo via an existing ocean outfall located at or about map reference NZMS 260 M36:838-315. b. The discharge at this location shall cease on 31 December 2018.
	Compliance
3	The volume of effluent discharged shall not exceed 600 cubic metres per day at a maximum rate of 21 litres per second.
	Non-compliance; the instantaneous flow rate limit was exceeded 16 times between 1 Nov 2016 (21.2l/s) & 28 Feb 2017 (22.9l/s) – Maximum Daily volume was 466 m³
4	The consent holder shall measure inflows from the Governors Bay Wastewater Treatment Plant, on a continuous basis, to a degree of accuracy of plus or minus ten percent, and shall maintain a record of total daily inflows. This record shall be made available to the Canterbury Regional Council on request.
	Compliance
5	The median concentration of the five-day biological oxygen demand in the effluent discharged shall not exceed 30 grams per cubic metre from the date of commencement of this consent.
	Compliance
6	The median concentration of the suspended solids in the effluent discharged shall not exceed 30 grams per cubic metre from the date of commencement of this consent.
	Compliance: – refer attachment 2.1
7	<ul style="list-style-type: none"> a. The median concentration of faecal coliforms shall not exceed 700 colony forming units (CFU) per 100 millilitres of effluent. b. The median concentration of enterococci shall not exceed 1,750 MPN per 100 millilitres of effluent.
	Compliance
8	<p>For the purposes of determining whether the consent holder is complying with Conditions (5), (6) and (7):</p> <ul style="list-style-type: none"> a. The effluent shall be sampled at any point after treatment and prior to discharge, and analysed for the concentration of the five-day biological oxygen demand, suspended solids, faecal coliforms and enterococci. b. The effluent shall be sampled at the following frequency: <ul style="list-style-type: none"> i. at least monthly samples shall be taken from 1 March to 30 November; and ii. at least weekly samples, on separate days selected at random, shall be taken during December, January and February. c. For the purposes of Conditions (5), (6) and (7), whenever a new sample result is available for each determinand, it shall be grouped with the previous four results obtained under Conditions (8)(a) and (b) or Condition (9), and the median result recorded. d. The time of day samples are taken shall be recorded.
	Compliance
9	If any sample measured has a faecal coliform count greater than 700 faecal coliforms per 100 millilitres of effluent or an enterococci count of more than 1,750 MPN per 100 millilitres of effluent, the consent holder shall take a further sample of treated effluent within two days of obtaining that result and shall test for faecal coliform and enterococci concentrations.

	Compliance
10	<ul style="list-style-type: none"> a. If the median concentration of faecal coliforms or enterococci, as calculated in accordance with Condition 8(c), exceeds 700 faecal coliforms per 100 millilitres or 1,750 enterococci per 100 millilitres of effluent, the consent holder shall within five working days of the exceedance, write to the Canterbury Regional Council prepare a report outlining the measures the consent holder proposes to undertake to address the concentration exceedances, and the timeframe within which this will occur. b. The consent holder shall display the report required by condition 10(a) to the Canterbury Regional Council and display the report required by condition 10(a) on the consent holder's website. This report shall be uploaded within five working days of the exceedance occurring. c. The Consent Holder shall notify the Canterbury Regional Council and the parties set out in condition 21(b) within five working days of the exceedance described in condition 10(a).
	Compliance
11	<p>Prior to discharge, the effluent shall be sampled and analysed not less than once per month for the following:</p> <ul style="list-style-type: none"> a. Dissolved reactive phosphorus (grams per cubic metre); b. Ammoniacal nitrogen (grams per cubic metre); c. Total oxidized nitrogen (grams per cubic metre); and d. Total nitrogen (grams per cubic metre).
	Compliance
12	<p>Prior to discharge, the effluent shall be sampled at least annually during January and analysed for the following:</p> <ul style="list-style-type: none"> a. Arsenic (milligrams per cubic metre); b. Cadmium (milligrams per cubic metre); c. Chromium (milligrams per cubic metre); d. Copper (milligrams per cubic metre); e. Lead (milligrams per cubic metre); f. Nickel (milligrams per cubic metre); and g. Zinc (milligrams per cubic metre)
	Compliance
13	<p>The sampling and analysis required by condition 15 shall continue for a further 12 months from the date of cessation of discharge.</p>
	CCC to follow up
14	<ul style="list-style-type: none"> a. The water of the receiving environment shall be sampled in January, February, March, May, June, September, November and December, at each of the following locations: <ul style="list-style-type: none"> i. 50 metres due north of the outfall; ii. 50 metres due south of the outfall; iii. 50 metres due east of the outfall; iv. 50 metres due west of the outfall; and v. Surface water quality monitoring site SQ35187 (which is located at or about NZMS 260: M36:8636-3190, east of Quail Island/Otamahua). b. Each sample shall be analysed for the concentration of faecal coliforms, enterococci, total suspended solids, ammoniacal nitrogen, total oxidized nitrogen, total nitrogen, chlorophyll-a and dissolved reactive phosphorus. c. The time the samples are taken shall be recorded. d. Samples shall be taken at approximately 0.5 metres below the surface of the water. e. Samples shall not be taken on consecutive days. f. Samples shall be taken within one hour of low water.
	Compliance
15	<ul style="list-style-type: none"> a. The water of the receiving environment shall be sampled from the shore, once per month at Rapaki at or about NZMS 260:M36:845-332. b. Each sample shall be analysed for the concentration of faecal coliforms and shall also be analysed to determine the source(s) of the faecal contamination, where faecal coliform, levels exceed 260 faecal coliforms/100mL. c. The time the sample is taken shall be recorded. d. Each sample shall be taken at approximately 0.5 metres below the surface of the water. e. Each sample shall not be taken on consecutive days. f. Each sample shall be taken between three to five hours after the time of high tide.
	Compliance
16	<p>If any of the samples collected from around the mixing zone in accordance with Condition (14) contain concentrations of total nitrogen greater than 1.0mgN/l or ammoniacal nitrogen greater than 0.91 mgN/l, the consent holder shall undertake an investigation of the operation of the Wastewater Treatment Plant and shall re-sample the discharge for ammoniacal nitrogen, total oxidized nitrogen, total nitrogen and dissolved reactive phosphorus, within 48 hours of receiving the results of the initial survey. The consent holder shall report the findings of the investigation to Canterbury Regional Council and the parties set out in condition 21(b) within one week of receipt of the results of the re-sample.</p>
	Compliance

17	The monitoring required under Condition (14) shall be undertaken on the same day as the monitoring required under Condition (8). In the event that the monitoring required under Conditions (14) and (8) cannot be undertaken on the same days, the reason shall be recorded and submitted to the Canterbury Regional Council and the parties set out in condition 21(b) with the results required to be submitted in accordance with Condition (19).
Compliance	
18	The laboratory carrying out the analyses for the purposes of Conditions (5), (6), (7), (9), (11), (12), (14) and (15) of this consent shall be accredited for the analyses to ISO Guide 25, either by International Accreditation New Zealand (IANZ), or by an organisation with a mutual agreement with IANZ.
Compliance	
19	The consent holder shall submit to the Canterbury Regional Council and the parties set out in condition 21(b): <ul style="list-style-type: none"> a. The results of any monitoring required each month under the conditions of this consent, by the 10th working day of the following month. b. The results of any sampling undertaken under Condition (9) that have a faecal coliform count greater than 700 faecal coliforms per 100 millilitres of effluent, or an enterococci count greater than 1,750 enterococci MPN per 100 millilitres of effluent, within three working days of receipt of any results. c. The interpretation of the sampling undertaken under condition (1) against the recreational Shellfish Gathering Guideline in the Microbiological Water quality Guidelines for Marine and Freshwater Recreation Areas (ministry for the Environment, 2003) shall be published monthly on the consent holder's website.
Compliance	
20	The consent holder shall submit to the Canterbury Regional Council and parties set out in condition 21(b) within three months of the commencement of this consent, a Management Plan. This shall include: <ul style="list-style-type: none"> a. An Operation and Maintenance Manual, which contains the key operation and maintenance tasks of the operator, normal operations, emergency operations and safety precautions. The emergency operations and safety precautions shall set out: <ul style="list-style-type: none"> i. The contingency measures to be taken at the pumping stations in the Governors Bay Wastewater Treatment Plant catchment and at the Treatment Plant in order to avoid the release of effluent to the environment during periods of any mechanical or electrical failure or power cut; and ii. The measures to be taken at the pumping stations in the Governors Bay catchment and at the Treatment Plant in the event of an emergency discharge or overflow. b. The Management Practices to ensure compliance with conditions of the resource consent. c. The Maintenance Contractor's monitoring programme and reporting provisions, including a specific requirement that monitoring is undertaken in accordance with Conditions (8), (9), (10), (11), (12), (13), (14), (15) and (16) of this consent.
Compliance; Management Plan submitted on 05/11/2012	
21	<ul style="list-style-type: none"> a. The consent holder shall submit a report to the Canterbury Regional Council, attention: RMA Compliance and Enforcement Manager, by 31 August of each year summarising the monitoring data collected and providing an interpretation of the results of monitoring. This report shall include an interpretation of the sampling undertaken under condition (15) against the Recreational Shellfish Gathering Guideline in the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry for the Environment, 2003). b. The consent holder shall supply a copy of the report referred to in condition 21(a) to all of the following organizations/groups/people: <ul style="list-style-type: none"> a. Governors Bay Community Association; b. Cass Bay Residents Association; c. Church Bay Neighborhood Association d. Governors Bay Community Association Incorporated; e. Lyttelton Harbour/Whakaraupo Issues Group; f. Paula Smith C/o 1 Purau Avenue, RD 2, Governors Bay; g. Te Hapu o Ngati Wheke (Rapaki) Runanga; h. Te Runanga o Koukourarata; i. Te Runanga o Ngati Tahu. a. The consent holder shall display all effluent and receiving environment monitoring data collected on the consent holder's website. This data shall be updated on a monthly basis.
Compliance via this report; CCC to distribute	
22	<ul style="list-style-type: none"> a. The consent holder shall prepare an implementation plan within 60 working days of the commencement of this resource consent. b. The implementation plan must describe the steps to be undertaken to ensure that by 31 December 2018 sewage is no longer discharged from Governors Bay outfall into Lyttelton Harbour/Whakaraupo, including: <ul style="list-style-type: none"> a. No later than 30 June 2015 all preliminary design details have been completed; b. No later than 30 September 2015, all necessary resource consents have been applied for; c. No later than 31 March 2017 detailed design work completed; d. No later than 31 July 2017 the contract to construct the works is let; e. No later than 31 December 2018 all works have been commissioned. a. The consent holder shall provide an annual report to the Canterbury Regional Council in July of each year, outlining progress on the Implementation Plan for the removal of the sewage discharge from Lyttelton Harbour/Whakaraupo. A copy of this annual report will also be forwarded to all organizations/groups represented on the Lyttelton Harbour/Whakaraupo Wastewater Working Party and also all parties listed in condition 21(b). b. The consent holder shall hold a public meeting once a year to discuss the monitoring data collected in the

- previous year and also to provide an update on progress relating to the cessation of the discharge at map reference NZMS 260 M36:838-815 on 31 December 2018, and the removal of the sewage discharge from Lyttleton Harbour/Whakaraupo.
- c. The consent holder shall continue to sample the receiving environment as specified in condition (15) for the 12 months following the cessation of the discharge at map reference NZMS 260 M36:838-815.

CCC to follow up

- 23** The Canterbury Regional Council may, once per year, on any of the last five working days of June or November each year, serve notice of its intention to review the conditions of this consent for the purposes of:
- Dealing with any adverse effects which may arise from the exercise of this consent and which it is appropriate to deal with later; or
 - Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
 - Complying with the requirements of a relevant rule in an operative regional plan; or Amending the frequency of monitoring and the parameters monitored; or
 - Amending the frequency of monitoring and the parameters monitored.

ECAN to request

Treatment Plant Effluent Monitoring

Daily flows for the Governors Bay Wastewater Treatment Plant (WWTP) were under the 600 m³/d limit with the maximum flow through the plant being 466m³/day (6 April 17).

Peak instantaneous flowrates exceeded 21l/s on 16 occasions with the largest being 22.9 l/s – it should be noted that the flow meter is on the incoming flow and the buffering/dampening effect of the plant treatment tanks would bring the discharge flows to within the consented allowable 21 l/s.

The plant operated with full compliance for effluent water quality relating to BOD₅, faecal coliforms (FC), Enterococci (ENT), and TSS limits (30 mg/l). Maximum medians for organic loading parameters were 8.9 mg/L for BOD₅ compared to 30-mg/L limits and 29 mg/l for TSS. Results for human health-related parameters with maximum medians of 140 CFU/100 mL (700 CFU/100ml consent) for FC and 31 MPN/100 mL (1,750 MPN/100 mL consented) for ENT.

Receiving Environment Monitoring

The receiving environment was monitored around the outfall and at one control site (Rapaki) (Attachment 2.1). Human health related parameters of FC and ENT were usually at or below the respective detection limits although up to 22 CFU/100 mL was measured for FC. Trigger levels of 1 mg/L for TN and 0.91 mg/L for NH₃ were not exceeded at any of the sites with maximum values of 0.37 mg/L TN at 50 m due East of the outfall (8 Feb 17) and 0.024 mg/L NH₃ at 50 m due North of the outfall (13 Dec 16). Monitoring results did not appear to be significantly different between the outfall sites and the control site.

The receiving environment was also sampled at Rapaki for comparison to the Recreational Shellfish Gathering Guidelines (Attachment 2.2). Accordingly, the median during the monitoring period was 10 CFU/100 mL which is less than the recommended maximum of 43 CFU/100 mL. The highest reading for FC cfu/100ml was 78 cfu/100ml (19 May 17).

Table 1. Summary of Exceedances and Non-Compliances from July 2015 - June 2016.

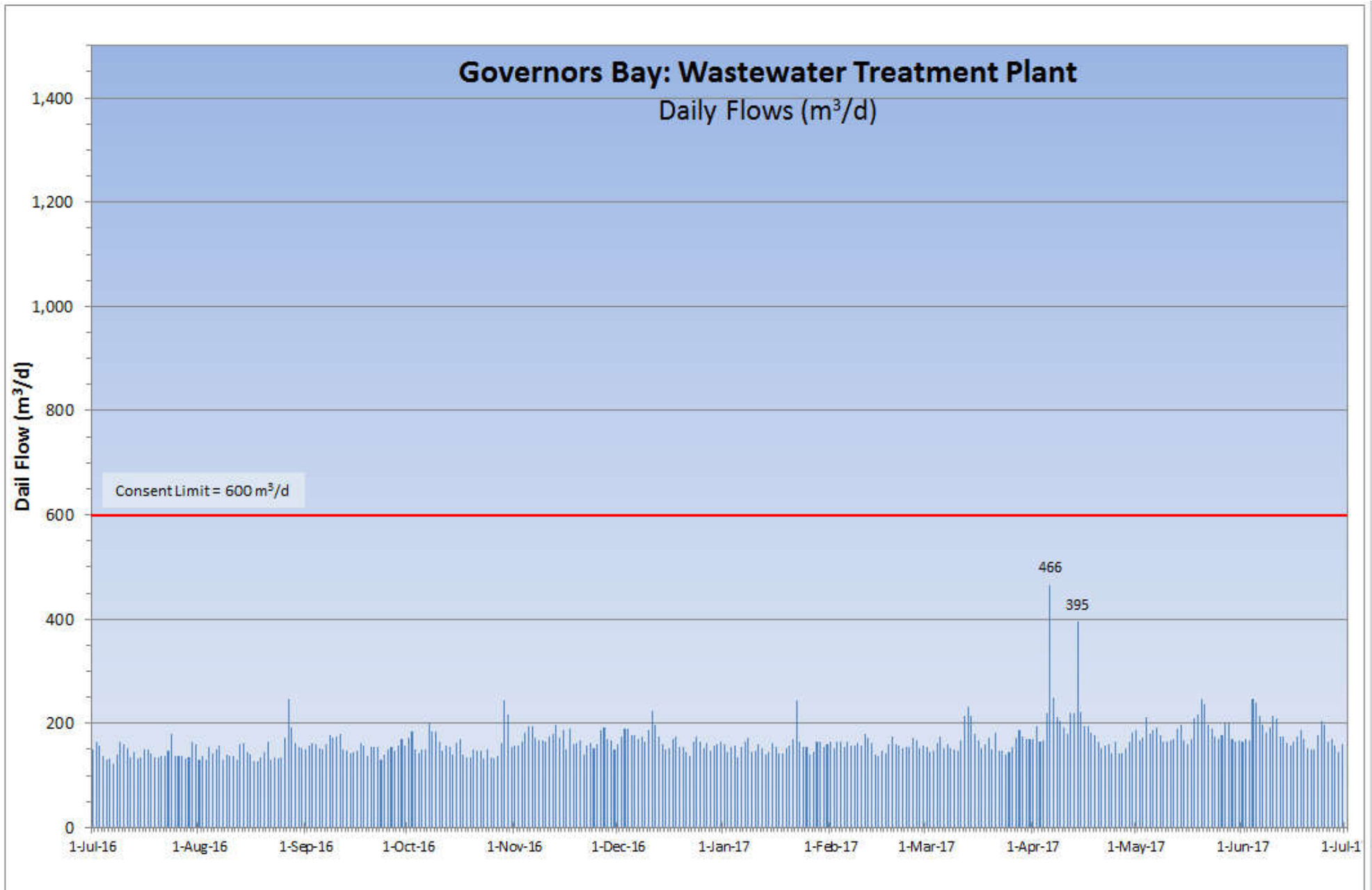
Parameter	Exceedances of Trigger Value
Flow >600 m ³ /d	0
Flow >21 L/s	16
BOD ₅ median >30 mg/L	0
TSS median >30 mg/L	0
FC >700 CFU/100 mL	0
ENT >1,750 MPN/100 mL	0
Receiving TN >1 mg/L	0
Receiving NH ₃ >0.91 mg/L	0

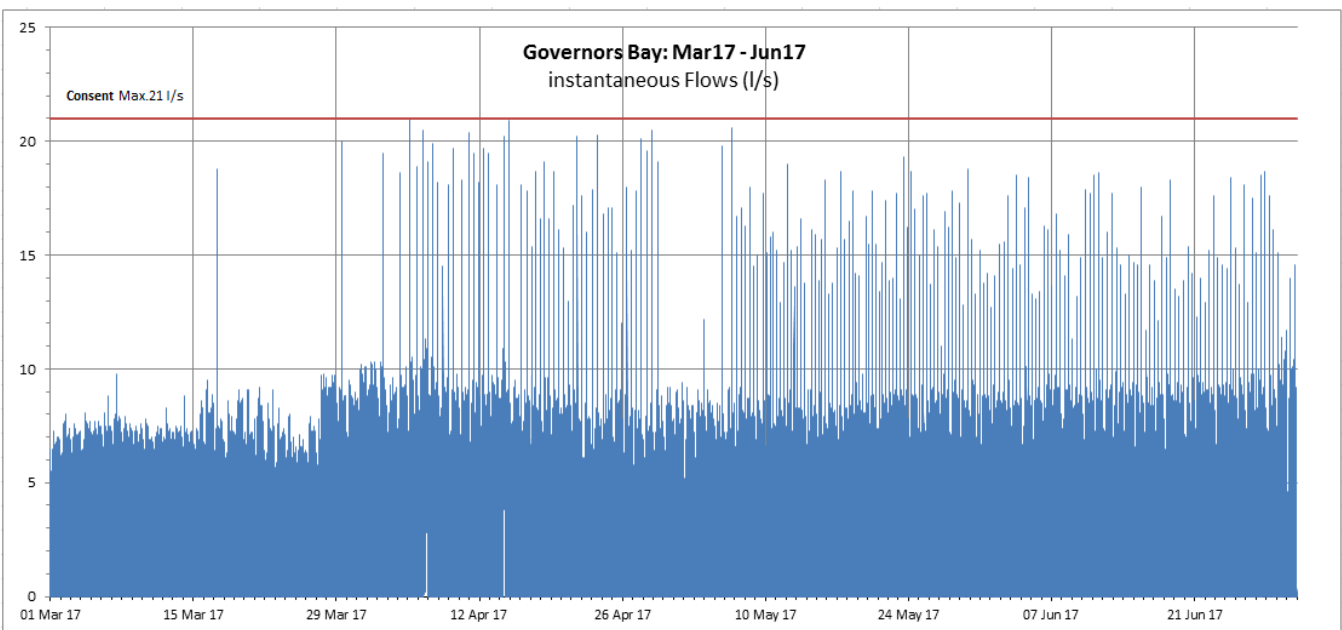
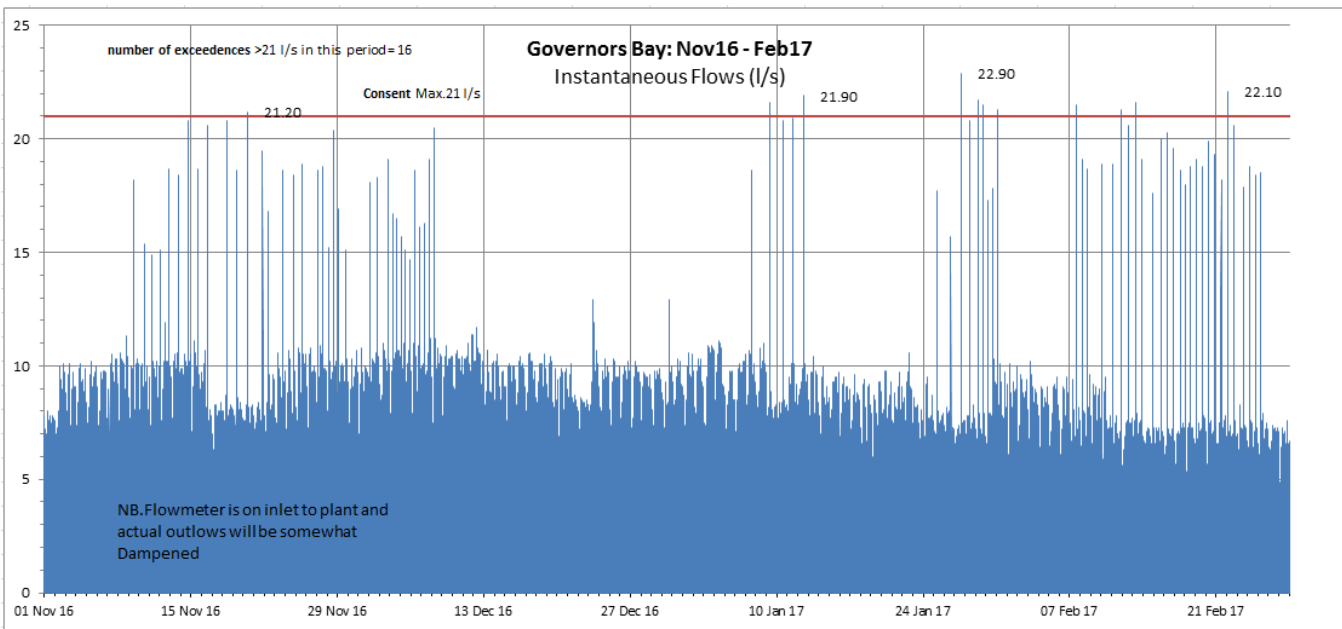
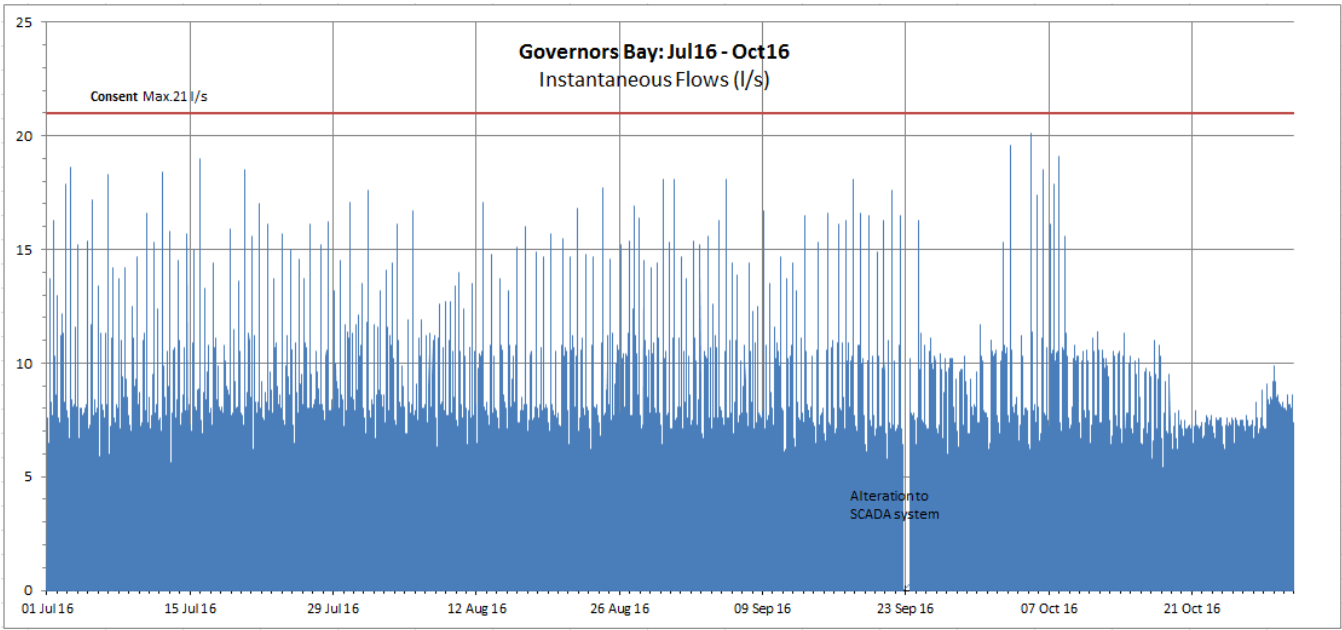
Attachment 1.1: Flows, Governors Bay, Data

Plant : Governors Bay Wastewater Treatment, Banks Peninsula:							
Asset owner: Christchurch City Council							
Date	Flow (m ³ /d)	Date	Flow (m ³ /d)	Date	Flow (m ³ /d)	Date	Flow (m ³ /d)
1-Jul-16	150	1-Oct-16	172	1-Jan-17	159	1-Apr-17	171
2-Jul-16	166	2-Oct-16	184	2-Jan-17	145	2-Apr-17	194
3-Jul-16	158	3-Oct-16	151	3-Jan-17	154	3-Apr-17	166
4-Jul-16	138	4-Oct-16	142	4-Jan-17	158	4-Apr-17	168
5-Jul-16	131	5-Oct-16	151	5-Jan-17	135	5-Apr-17	219
6-Jul-16	133	6-Oct-16	150	6-Jan-17	156	6-Apr-17	466
7-Jul-16	123	7-Oct-16	200	7-Jan-17	166	7-Apr-17	249
8-Jul-16	141	8-Oct-16	184	8-Jan-17	172	8-Apr-17	212
9-Jul-16	166	9-Oct-16	185	9-Jan-17	146	9-Apr-17	205
10-Jul-16	160	10-Oct-16	165	10-Jan-17	147	10-Apr-17	191
11-Jul-16	152	11-Oct-16	147	11-Jan-17	159	11-Apr-17	179
12-Jul-16	135	12-Oct-16	157	12-Jan-17	152	12-Apr-17	219
13-Jul-16	145	13-Oct-16	156	13-Jan-17	140	13-Apr-17	220
14-Jul-16	132	14-Oct-16	141	14-Jan-17	145	14-Apr-17	395
15-Jul-16	134	15-Oct-16	162	15-Jan-17	163	15-Apr-17	223
16-Jul-16	150	16-Oct-16	170	16-Jan-17	155	16-Apr-17	195
17-Jul-16	150	17-Oct-16	139	17-Jan-17	142	17-Apr-17	195
18-Jul-16	143	18-Oct-16	135	18-Jan-17	142	18-Apr-17	182
19-Jul-16	135	19-Oct-16	134	19-Jan-17	152	19-Apr-17	178
20-Jul-16	135	20-Oct-16	150	20-Jan-17	157	20-Apr-17	164
21-Jul-16	137	21-Oct-16	147	21-Jan-17	171	21-Apr-17	153
22-Jul-16	138	22-Oct-16	147	22-Jan-17	245	22-Apr-17	158
23-Jul-16	148	23-Oct-16	133	23-Jan-17	164	23-Apr-17	161
24-Jul-16	179	24-Oct-16	151	24-Jan-17	154	24-Apr-17	142
25-Jul-16	137	25-Oct-16	136	25-Jan-17	154	25-Apr-17	165
26-Jul-16	138	26-Oct-16	133	26-Jan-17	141	26-Apr-17	143
27-Jul-16	138	27-Oct-16	138	27-Jan-17	146	27-Apr-17	143
28-Jul-16	132	28-Oct-16	162	28-Jan-17	166	28-Apr-17	153
29-Jul-16	134	29-Oct-16	244	29-Jan-17	165	29-Apr-17	165
30-Jul-16	166	30-Oct-16	217	30-Jan-17	154	30-Apr-17	182
31-Jul-16	159	31-Oct-16	154	31-Jan-17	160	1-May-17	186
1-Aug-16	129	1-Nov-16	157	1-Feb-17	164	2-May-17	167
2-Aug-16	137	2-Nov-16	158	2-Feb-17	153	3-May-17	173
3-Aug-16	131	3-Nov-16	164	3-Feb-17	166	4-May-17	211
4-Aug-16	154	4-Nov-16	181	4-Feb-17	164	5-May-17	179
5-Aug-16	143	5-Nov-16	195	5-Feb-17	156	6-May-17	188
6-Aug-16	149	6-Nov-16	195	6-Feb-17	166	7-May-17	191
7-Aug-16	158	7-Nov-16	172	7-Feb-17	157	8-May-17	177
8-Aug-16	130	8-Nov-16	168	8-Feb-17	158	9-May-17	166
9-Aug-16	140	9-Nov-16	167	9-Feb-17	163	10-May-17	166
10-Aug-16	138	10-Nov-16	166	10-Feb-17	158	11-May-17	168
11-Aug-16	138	11-Nov-16	174	11-Feb-17	180	12-May-17	170
12-Aug-16	129	12-Nov-16	179	12-Feb-17	172	13-May-17	190
13-Aug-16	160	13-Nov-16	197	13-Feb-17	163	14-May-17	196
14-Aug-16	163	14-Nov-16	172	14-Feb-17	140	15-May-17	168
15-Aug-16	145	15-Nov-16	187	15-Feb-17	137	16-May-17	161
16-Aug-16	141	16-Nov-16	149	16-Feb-17	148	17-May-17	171
17-Aug-16	128	17-Nov-16	189	17-Feb-17	143	18-May-17	210
18-Aug-16	127	18-Nov-16	160	18-Feb-17	160	19-May-17	216
19-Aug-16	135	19-Nov-16	162	19-Feb-17	174	20-May-17	246

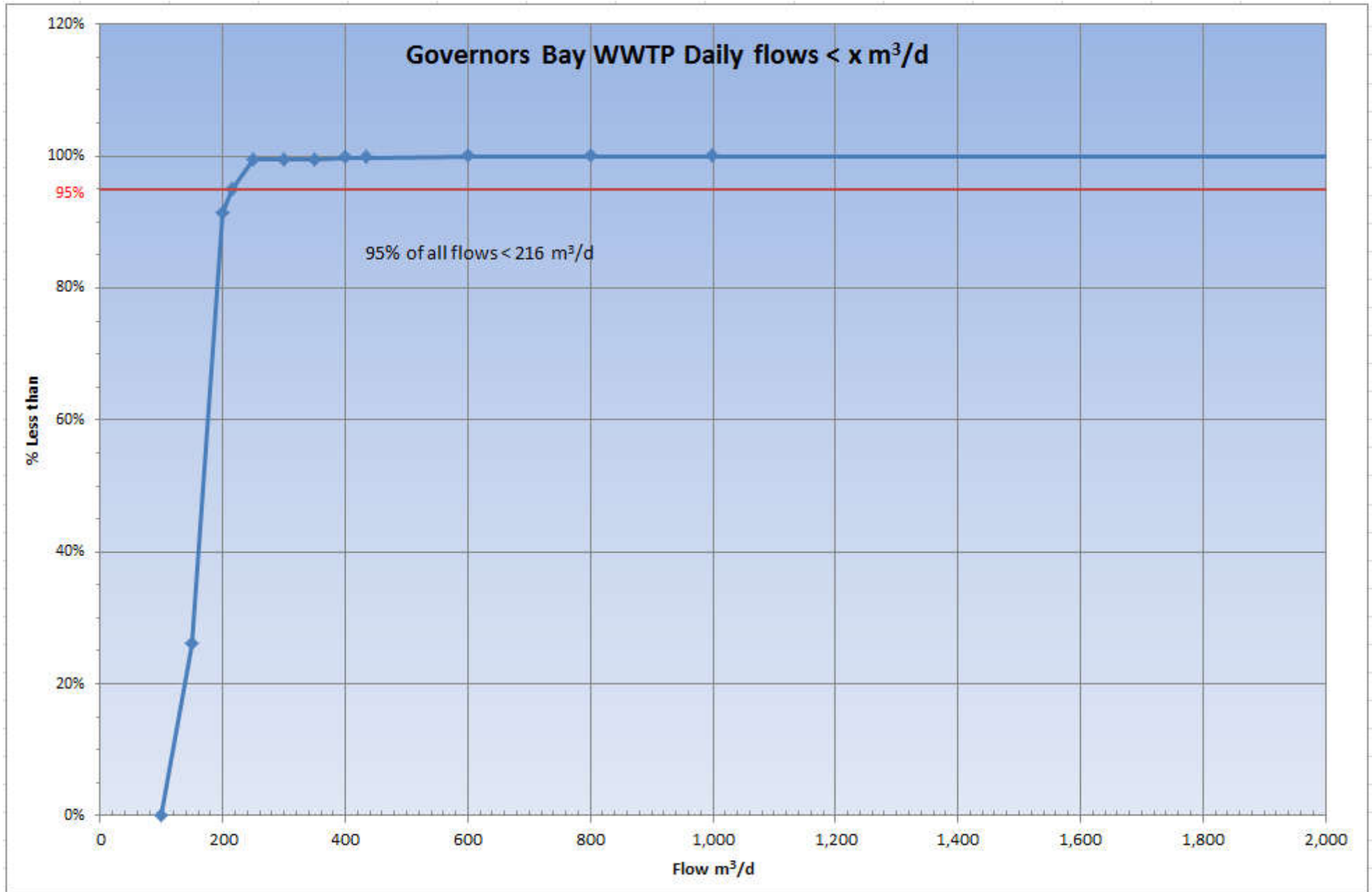
Date	Flow (m3/d)	Date	Flow (m3/d)	Date	Flow (m3/d)	Date	Flow (m3/d)
20-Aug-16	146	20-Nov-16	168	20-Feb-17	161	21-May-17	238
21-Aug-16	166	21-Nov-16	140	21-Feb-17	158	22-May-17	197
22-Aug-16	130	22-Nov-16	157	22-Feb-17	152	23-May-17	190
23-Aug-16	135	23-Nov-16	163	23-Feb-17	155	24-May-17	174
24-Aug-16	132	24-Nov-16	152	24-Feb-17	155	25-May-17	171
25-Aug-16	135	25-Nov-16	161	25-Feb-17	172	26-May-17	178
26-Aug-16	172	26-Nov-16	187	26-Feb-17	168	27-May-17	200
27-Aug-16	246	27-Nov-16	193	27-Feb-17	153	28-May-17	200
28-Aug-16	193	28-Nov-16	169	28-Feb-17	157	29-May-17	171
29-Aug-16	163	29-Nov-16	168	1-Mar-17	154	30-May-17	165
30-Aug-16	154	30-Nov-16	151	2-Mar-17	145	31-May-17	167
31-Aug-16	153	1-Dec-16	159	3-Mar-17	148	1-Jun-17	165
1-Sep-16	149	2-Dec-16	175	4-Mar-17	162	2-Jun-17	169
2-Sep-16	157	3-Dec-16	190	5-Mar-17	174	3-Jun-17	167
3-Sep-16	163	4-Dec-16	189	6-Mar-17	153	4-Jun-17	247
4-Sep-16	161	5-Dec-16	178	7-Mar-17	159	5-Jun-17	239
5-Sep-16	152	6-Dec-16	178	8-Mar-17	152	6-Jun-17	215
6-Sep-16	149	7-Dec-16	171	9-Mar-17	150	7-Jun-17	196
7-Sep-16	159	8-Dec-16	175	10-Mar-17	148	8-Jun-17	183
8-Sep-16	178	9-Dec-16	166	11-Mar-17	167	9-Jun-17	191
9-Sep-16	172	10-Dec-16	186	12-Mar-17	215	10-Jun-17	214
10-Sep-16	176	11-Dec-16	224	13-Mar-17	231	11-Jun-17	209
11-Sep-16	179	12-Dec-16	196	14-Mar-17	215	12-Jun-17	175
12-Sep-16	150	13-Dec-16	176	15-Mar-17	179	13-Jun-17	174
13-Sep-16	148	14-Dec-16	160	16-Mar-17	167	14-Jun-17	162
14-Sep-16	143	15-Dec-16	149	17-Mar-17	153	15-Jun-17	157
15-Sep-16	146	16-Dec-16	152	18-Mar-17	159	16-Jun-17	166
16-Sep-16	148	17-Dec-16	171	19-Mar-17	173	17-Jun-17	176
17-Sep-16	162	18-Dec-16	174	20-Mar-17	151	18-Jun-17	188
18-Sep-16	158	19-Dec-16	156	21-Mar-17	181	19-Jun-17	170
19-Sep-16	137	20-Dec-16	155	22-Mar-17	148	20-Jun-17	152
20-Sep-16	155	21-Dec-16	146	23-Mar-17	147	21-Jun-17	149
21-Sep-16	155	22-Dec-16	138	24-Mar-17	141	22-Jun-17	151
22-Sep-16	155	23-Dec-16	164	25-Mar-17	145	23-Jun-17	178
23-Sep-16	131	24-Dec-16	175	26-Mar-17	154	24-Jun-17	204
24-Sep-16	141	25-Dec-16	166	27-Mar-17	172	25-Jun-17	197
25-Sep-16	149	26-Dec-16	153	28-Mar-17	186	26-Jun-17	165
26-Sep-16	154	27-Dec-16	162	29-Mar-17	176	27-Jun-17	171
27-Sep-16	148	28-Dec-16	148	30-Mar-17	169	28-Jun-17	157
28-Sep-16	157	29-Dec-16	157	31-Mar-17	171	29-Jun-17	145
29-Sep-16	170	30-Dec-16	160			30-Jun-17	161
30-Sep-16	158	31-Dec-16	166				

Attachment 1.2: Flows, Governors Bay, Chart





Attachment 1.3: Flows, Governors Bay, '% less than'



Attachment 2.3: Lab Data, Receiving Environment

Governors Bay Consent CRC101760																				
Date	OF - 50m due					Quail Control	OF - 50m due					Quail Control	OF - 50m due					Quail Control		
	North	East	South	West	North		East	South	West	North	East		South	West	North	East	South		West	
	TN	TN	TN	TN	TN	NH3	NH3	NH3	NH3	NH3	NOX	NOX	NOX	NOX	NOX	DRP	DRP	DRP	DRP	DRP
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
14-Sep-16	0.17	0.16	0.17	0.19	0.18	0.005	0.0095	0.005	0.005	0.005	0.01	0.01	0.01	0.01	0.01	0.01	0.011	0.011	0.012	0.0081
9-Nov-16	0.16	0.15	0.14	0.15	0.12	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.01	0.011	0.01	0.01	0.01	0.012	0.011	0.009
13-Dec-16	0.21	0.19	0.19	0.16	0.16	0.024	0.014	0.011	0.022	0.006	0.01	0.01	0.022	0.01	0.01	0.012	0.011	0.019	0.013	0.013
11-Jan-17	0.25	0.22	0.27	0.19	0.19	0.005	0.008	0.005	0.005	0.005	0.01	0.01	0.017	0.01	0.01	0.014	0.012	0.027	0.013	0.012
8-Feb-17	0.36	0.37	0.23	0.26	0.2	0.011	0.01	0.007	0.01	0.013	0.09	0.055	0.01	0.01	0.01	0.049	0.037	0.026	0.026	0.021
1-Mar-17	0.19	0.16	0.16	0.17	0.19	0.0055	0.005	0.005	0.005	0.005	0.01	0.01	0.01	0.01	0.01	0.016	0.016	0.017	0.016	0.011
19-May-17	0.13	0.17	0.13	0.12	0.14	0.005	0.007	0.013	0.005	0.005	0.01	0.012	0.016	0.01	0.01	0.014	0.013	0.014	0.014	0.013
20-Jun-17	0.18	0.17	0.15	0.16	0.16	0.005	0.005	0.005	0.005	0.005	0.011	0.013	0.017	0.012	0.021	0.015	0.014	0.015	0.015	0.015
average	0.151	0.199	0.180	0.175	0.168	0.008	0.008	0.007	0.008	0.006	0.020	0.016	0.014	0.010	0.011	0.018	0.016	0.018	0.015	0.013
maximum	0.360	0.370	0.270	0.260	0.200	0.024	0.014	0.013	0.022	0.013	0.090	0.055	0.022	0.012	0.021	0.049	0.037	0.027	0.026	0.021

Date	OF - 50m due					Quail Control	OF - 50m due					Quail Control	OF - 50m due					Quail Control		
	North	East	South	West	North		East	South	West	North	East		South	West	North	East	South		West	
	TSS	TSS	TSS	TSS	TSS	Chla	Chla	Chla	Chla	Chla	ENT	ENT	ENT	ENT	ENT	FC	FC	FC	FC	FC
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml
14-Sep-16	24	25	28	25	13	3	5.4	4.3	4.3	5.5	10	10	10	10	10	1	1	1	2	9
9-Nov-16	26	23	25	27	22	1	1	1	1	1	10	10	10	10	10	2	1	1	2	7
13-Dec-16	80	69	75	74	100	1.4	1.4	1.4	1.4	1	41	20	75	10	10	29	22	32	49	16
11-Jan-17	41	35	39	37	75	3.7	3.4	3.8	3.3	4.1	10	10	10	10	10	1	2	9	1	5
8-Feb-17	34	35	41	31	53	3.5	3.6	3.4	3.5	5.2	10	10	10	10	10	27	18	1	1	1
1-Mar-17	24	23	18	19	17	3.1	3	2.9	3.2	4	10	10	10	10	10	3	1	1	1	1
19-May-17	19	11	18	15	32	2.5	3.2	3.1	3.4	4.4	10	10	10	10	10	1	2	1	2	1
20-Jun-17	11	16	19	13	20	4.5	4.5	4.1	4.2	4	10	10	10	10	10	1	4	1	2	4
average	32.38	29.63	32.88	30.13	41.50	2.84	3.19	3.00	3.04	3.65	13.88	11.25	18.13	10.00	10.00	8.13	6.38	5.88	7.50	5.50
maximum	80.00	69.00	75.00	74.00	100.00	4.50	5.40	4.30	4.30	5.50	41.00	20.00	75.00	10.00	10.00	29.00	22.00	32.00	49.00	16.00