Residuals Treatment Facility

2020 Report

Operational Certificate 109471

Capital Regional District | Parks & Environmental Services, Environmental Protection

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RESIDULALS TREATMENT FACILITY
2020 REPORT

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1. INTRODUCTION

The Residuals Treatment Facility (RTF) is owned by the Capital Regional District (CRD) and designed, built, financed, operated and maintained by Hartland Resource Management Group. The RTF is located 15 km northwest of Victoria, on the northwest corner of the Hartland Landfill property. The CRD received Operational Certificate 109471 from the BC Ministry of Environment and Climate Change Strategy (the Ministry) on May 29, 2020. The approved operating budget for the RTF is allocated under the Core Area Liquid Waste Management Plan.

The data reported herein is required to meet provincial regulatory requirements per Operational Certificate Section 5.1 and includes:

- Quantity of Class A biosolids produced each year (in dry tonnes),
- Quantity of biosolids sent to the cement kiln each year,
- Quantity of biosolids directed to the Hartland Landfill,
- Evaluation of treatment works performance and any changes,
- Implementation schedule for any alterations to the treatment and disposal works which may impact the discharge under the Operational Certificate,
- Summary and analysis of odour data collected as required by the approved Odour Control and Response Plan,
- Summary and analysis of all complaints received, and
- Summary and analysis of all non-compliance events.

2. SITE AND OPERATIONS OVERVIEW

The RTF is located in the District of Saanich, within the Tod Creek watershed, in the bedrock highlands of the Gowlland Range, northwest of Victoria, and Mount Work Regional Park lies to the west and south of the RTF. Willis Point Road borders the site to the north, and beyond that is a Department of National Defence rifle range. Private residential properties are located to the east and southeast of the RTF.

The RTF is a component of the recently constructed Core Area Wastewater Treatment Project and serves the population of the Core Area municipalities (Victoria, Esquimalt, Saanich, Oak Bay, View Royal, Langford and Colwood, as well as the Esquimalt and Songhees First Nations) totaling approximately 334,000 people. The RTF receives Core Area residual solids, produced at the McLoughlin Point Wastewater Treatment Plant via the residual solids conveyance line. Residual solids are treated at the RTF through mesophilic anaerobic digestion, thickening, dewatering and thermal drying to produce pelletized Class A biosolids, as defined by the *BC Organic Matter Recycling Regulation*, with a moisture content of around 5-7%.

Construction of the RTF was completed in September 2020, and commissioning activities are underway but extended. Under normal RTF operations, and in accordance with the CRD's approved Short-Term Biosolids Management Plan (Definitive Plan), the CRD will ship biosolids to Lafarge Canada Inc.'s Richmond Cement Plant to be used as an alternative fuel in their cement kiln. During planned cement-kiln maintenance periods, and in accordance with the CRD's approved Short-Term Contingency Plan, the dried Class A biosolids will be beneficially reused at Hartland as either a biosolids growing medium, or biocover. The long-term use of the CRD's biosolids is to be determined by July 2024.

3. BIOSOLIDS PRODUCTION AND USE

Due to delays in finalizing construction and commissioning of the RTF, the mesophilic digestion process was not operationalized by December 31, 2020. Therefore, no Class A dried biosolids were produced in 2020.

Class A biosolids production: No Class A biosolids were produced during 2020.

Biosolids sent to the cement kiln: No biosolids were sent Lafarge's cement kiln during 2020.

Landfilled biosolids: As part of RTF commissioning a total of 4,459 wet tonnes of dewatered lime-stabilized biosolids were sent to the Hartland Landfill during 2020.

4. TREATMENT WORKS PERFORMANCE

4.1 Introduction

The facility commenced commissioning on September 18, 2020 and commissioning continued to the end of the reporting period. Commissioning was conducted in accordance with the Ministry approved *"Hartland Resource Management Group: Start-up and Commissioning Plan"* to which there were no unapproved changes. There were no alterations made to the RTF that impacted authorized discharge controls during the reporting period.

All equipment outlined in the Operational Certificate was installed according to design and manufacturers' specifications and also registered with Technical Safety BC. Equipment commissioning activities were focused on optimizing the performance of the odour control system and demonstrating functional completion for all other equipment outlined in the Operational Certificate. Based on the completed commissioning and successful operation and maintenance of all equipment (excluding the odour control system), the facility operated within the authorized discharge limits designated in the Operational Certificate.

4.2 Odour Control System

The odour treatment stack (19 m height and 900 mm diameter exhaust cone), exhausts treated air from the odour control works. These works consist of an impingement pre-filter (AMACS mesh mist eliminator), tri bio-trickling filters (Evoqua model BTF-1236), and a three-stage chemical scrubber (Evoqua model LP-7000-HN). The average daily odour treatment stack discharge rate was in compliance with the authorized discharge limit of 660 m^3/min.

Figure 1 displays the daily average stack hydrogen sulfide (H_2S) values for the reporting period. During the reporting period, there were 24 days when the RTF was operating outside the Operational Certificate H_2S limit of 2 mg/s (see Table 1 for summary of exceedance dates). The 24 exceedances did not exceed the allocated 30-day maximum for the commissioning period, as outlined in the Operational Certificate. The eight consecutive exceedances from September 19 to 26, 2020 exceeded the Operational Certificate requirement to not have more than five successive non-compliance days for the first event, and the eight exceedances from September 29 to October 6 exceeded the Operational Certificate requirement to not have more than three consecutive non-compliance days for any following events.

The non-compliances in September and October occurred during the early stages of commissioning and were related to the need for growth and acclimation of the bio-trickling filters, and to the fine-tuning of the odour control system performance relative to the quality of residual solids being received at the RTF. The last two non-compliance days occurred in mid-December where, although the odour control system was fully functional for the removal of H_2S, focus was

put toward reducing methyl mercaptan, which was part of foul air composition. The plant has, at the time of writing, achieved a stable biological process, chemical dosages have been adjusted, the bio-trickling filters are acclimatized, and the risk of having H_2S releases above the Operational Certificate limits from the odour control system is low.

Additionally, two impingement pre-filters (AMACS mesh mist eliminator) installed in parallel (duty/standby) ensure particulate matter from the treatment stack is below the designated limits outlined in the Operational Certificate. The filter is replaced and cleaned as required and pressure differential is monitored to ensure successful performance.

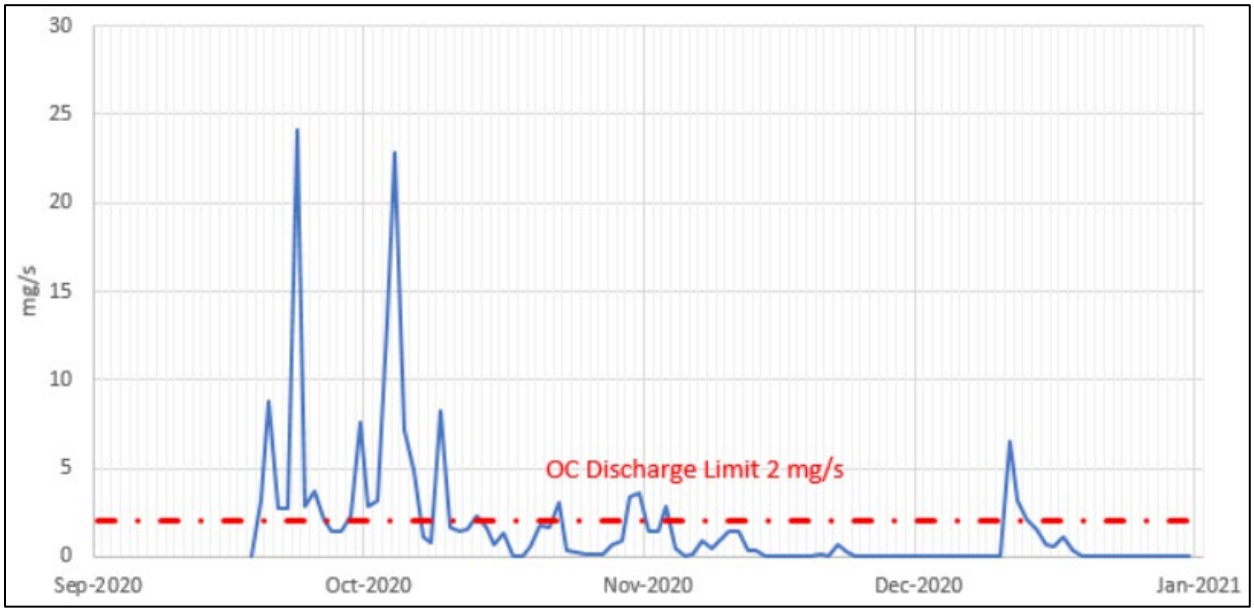


Figure 1. Daily Average Odour Treatment H_2S Discharge Data

Table 1. Exceedances of stack H_2S Authorized Discharge limit of 2 mg/s

Date	Average daily H_2S discharge (mg/s)	Date	Average daily H_2S discharge (mg/s)
19/09/2020	3.2	03/10/2020	13.2
20/09/2020	8.8	04/10/2020	22.8
21/09/2020	2.7	05/10/2020	7.2
22/09/2020	2.7	06/10/2020	4.9
23/09/2020	24.1	09/10/2020	8.3
24/09/2020	2.9	13/10/2020	2.3
25/09/2020	3.7	22/10/2020	3.1
26/09/2020	2.1	30/10/2020	3.4
29/09/2020	2.3	31/10/2020	3.6
30/09/2020	7.6	03/11/2020	2.8
01/10/2020	2.9	12/12/2020	3.19
02/10/2020	3.2	13/12/2020	2.43

4.3 Biogas Flare

Biogas is harvested from the digesters and digested solids storage tank. From there it is either pressurized by the blower or flared off. The Varec 244E series enclosed waste gas burner system was installed according to design and manufacturer specifications. The flare was commissioned in September and the system began successfully flaring biogas on December 16.

4.4 Boilers

Boiler stacks are in place to provide heat to the digesters and RTF operations, as required. The boilers are dual fuel, running off either digester gas or supplemental fuel (propane). The installed boiler stacks are Superior Boilers (model 6-X-500-FMCF-W30-LP/DG), and one 250 BHP boiler (Superior Boilers model 6-X-1250-FMCF-W30-LP/DG). The boilers were installed according to design and manufacturer specifications. The boilers were commissioned in September and maintained successful and consistent operation through to the end of the reporting period.

4.5 Thermal Oil Heater

Biogas, supplemented as required, is used as the primary fuel in a dedicated thermal oil heater. Thermal oil is pumped to the in-bed heat exchanger to maintain the fluidized bed dryer at 85°C. The Ascentec S/TH-50-BE Thermal Oil Heater was installed according to design and manufacturer specifications. The Thermal Oil Heater was commissioned in September and operated successfully (as needed by dryer commission) through to the reporting period.

4.6 Diesel Pump and Generators

The Operational Certificate has authorized discharge of miscellaneous sources, which include as follows:

- Two (2) 1,000 kW diesel power generators (Mitsubishi model MDI000)
- One (1) 160 Hp diesel pump (Clarke/John Deere model JU6H-UF34)

During the reporting period, the usage of the miscellaneous sources was limited to 34.5 hours for the generators and seven hours for the diesel fire pump. All operation was done in accordance with Part 2, Section 6 of the *Environmental Management Act*.

5. ODOUR CONTROL & RESPONSE

As part of RTF commissioning, the main focus around odour was to establish successful performance of the odour control system and limit the release of H_2S from the odour treatment stack (see Section 4.2 for discussion). As outlined in the Odour Control and Response Plan, RTF staff began to complete routine perimeter odour checks to monitor for odour emanating from the RTF. Provided in Appendix A is a summary of the completed perimeter checks and in Appendix B is a summary of all RTF-related odour complaints received during the reporting report.

In summary, odours emanating from the RTF were largely attributed to the releases of odours from manholes and vents connected to the centrate return line. Odour mitigation measures have been installed along the centrate return line, including sealing manholes and vents and installing carbon canisters and bioxide dosing. Planning and implementation of design modifications to the centrate return line to mitigate odours were initiated in 2020 and continued into 2021.

6. CONCLUSIONS

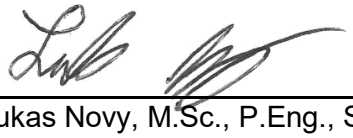
Construction of the RTF was completed in September 2020 and the facility underwent an extended commissioning period through the end of the reporting period. No Class A biosolids were produced and none were sent to the Lafarge cement manufacturing facility during 2020. A total of 4,459 wet tonnes of dewatered lime-stabilized biosolids were sent to the Hartland Landfill.

As a result of the commissioning activities and atypical operational conditions, there were 24 exceedances of authorized discharges from the odour control system as defined by the Operational Certificate. A total of 21 odour control stack exceedances occurred during commissioning activities in September and October and were related to the need for growth and acclimation of the bio-trickling filters. Once the system was stabilized, the frequencies of exceedances decreased to only three instances in November and December combined. The biogas flare, boilers, thermal oil heater, and diesel pump and generators were all installed and maintained, as per design and manufacturer specifications.

Activities completed as part of the approved Odour Control and Response Plan (routine perimeter odour surveys and receipt of odour complaints) indicated that odours emanating from the RTF were largely attributed to manholes and vents connected to the centrate return line. Odour mitigation measures were undertaken and design modifications were initiated to address odour from these sources for 2021.

7. REPORT SIGNOFF

Prepared by:



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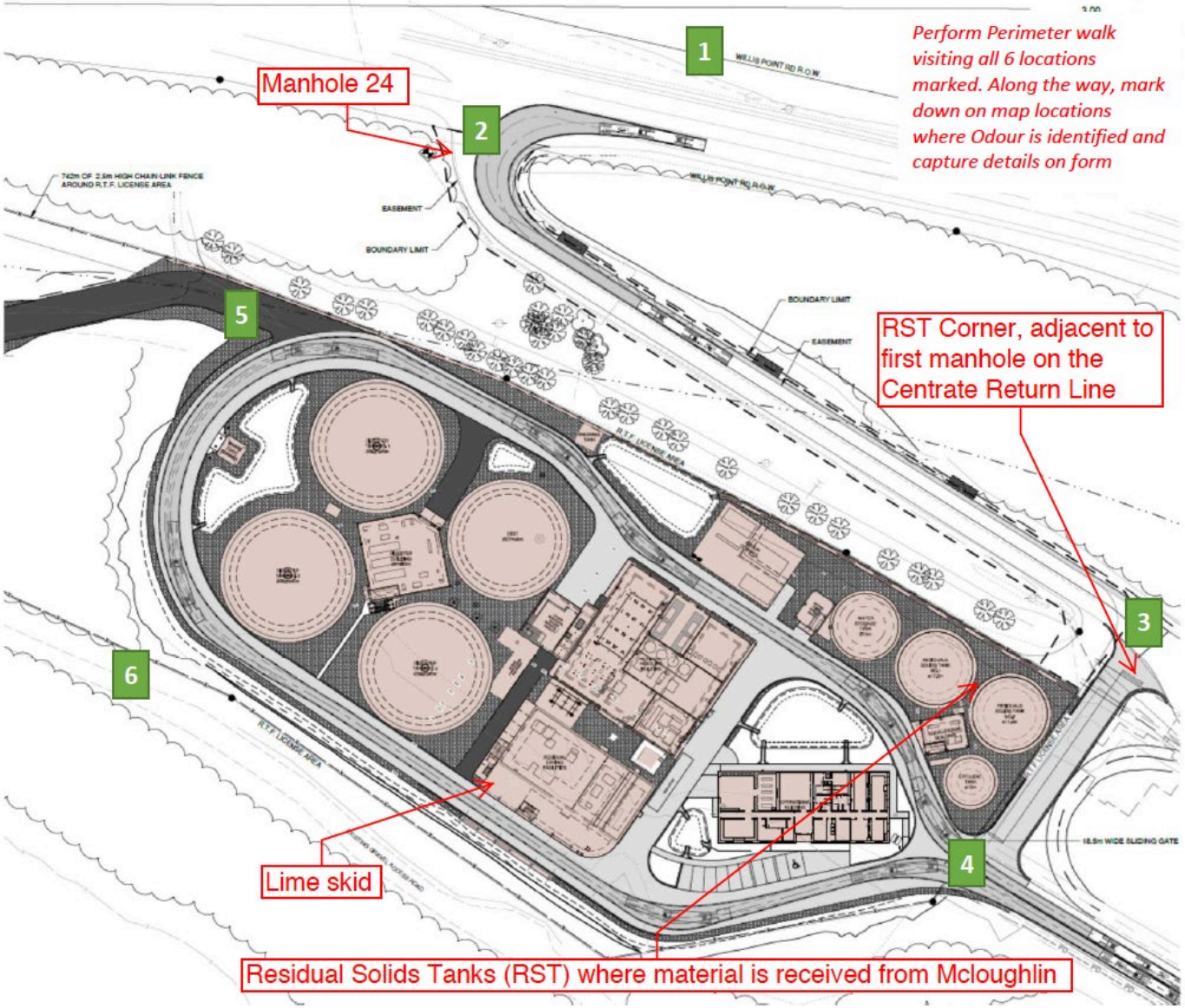
Appendix A – Summary of Perimeter Odour Surveys

		Description							Wind						
Date	Time	Sharp	Rotten Eggs	Damp Earth	Ammonia	Septic	Manure	Garbage	Direction	Speed (km/h)	Weather	Temp. (°C)	Location(s) *	Strength **	Source / Explanation
12/Nov	21:00	N	N	Y	Y	Y	Y	N	SE	17	Rain	7	2, 3	4, 4	manholes
13/Nov	03:00	Y	Y	Y	N	N	Y	N	SE	8	overcast	4	digesters	3, 4	landscaping (compost application)
14/Nov	11:45	N	Y	N	N	Y	N	Y	ESE	14	rain/overcast	6	2, E site boundary, S of digesters 2 & 3	3, 4, 4	manholes, landfill refuse, digesters/unknown
15/Nov	14:45	N	N	N	N	Y	N	Y	S	14	rain	8	SE property boundary, 2 to 3	2, 4	landfill refuse, manholes
16/Nov	10:00	N	Y	N	N	Y	N	N	N	7	rain	5	b/w 2 & 3, S boundary near 3, outfall	2, 4, 3	Manhole
18/Nov	20:00	N	N	N	N	Y	Y	Y	SW	11	overcast	6	2, 3, 4	2, 4, 3	manhole, lime treatment area, landfill refuse
19/Nov	09:30	N	N	N	N	Y	Y	Y	S	10	partly cloudy	4	3, 2, SE boundary	3, 2, 3	lime treatment, manhole, landfill refuse
19/Nov	16:40	N	N	N	N	Y	Y	Y	S	16	partly cloudy	6	2, SE boundary, 3	3, 3, 3	manhole, lime treatment area, landfill refuse
20/Nov	02:00	N	N	N	N	Y	Y	Y	S	8	overcast/rain	4	2, SE boundary, 3	3, 3, 4	manhole, lime treatment area
21/Nov	16:00	N	N	Y	N	Y	Y	Y	NE	6	overcast	5	3, 2, lime skid	3, 3, 3	refuse, manhole, lime treatment area
22/Nov	15:50	N	N	Y	N	Y	Y	Y	NW	5	overcast	3	3, 2, lime skid	3, 2, 4	refuse, manhole, lime treatment area
22/Nov	19:30	N	N	Y	N	Y	Y	N	WNW	3	overcast	5	3, 2, lime skid	3, 2, 4	manhole, lime treatment area
23/Nov	08:44	N	N	Y	N	Y	Y	Y	N	6	overcast/rain	3	3, 2, lime skid	3, 3, 3	refuse, manhole, lime treatment area
23/Nov	20:30	N	N	N	N	Y	Y	N	S	6	overcast	6	3, 2, lime skid	3, 3, 3	manhole, lime treatment area
24/Nov	07:35	N	N	Y	N	Y	Y	Y	S	10	overcast/rain	5	3, 2, lime skid	4, 3, 4	manhole, lime treatment area
25/Nov	02:00	N	N	N	N	Y	Y	Y	SSW	10	overcast	4	3, 2, lime skid	4, 3, 4	manhole, lime treatment area
26/Nov	10:00	N	N	N	N	Y	Y	Y	N	5	overcast	7	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
27/Nov	---	N	N	N	N	Y	Y	Y	N	5	overcast	6	3, 2, lime skid	3,3,3	manhole, lime treatment area
28/Nov	12:00	N	N	N	N	Y	Y	Y	S	3	mostly sunny	9	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
2/Dec	08:30	N	Y	N	N	N	N	N	NW	13	partly cloudy	3	Willis Point Road, 3, 3	3, 4, 3	manhole, lime treatment area
3/Dec	00:00	N	N	Y	N	Y	Y	Y	NNW	10	---	4	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
4/Dec	11:00	N	N	Y	N	Y	Y	Y	---	---	---	---	---	---	---
5/Dec	20:30	N	N	N	N	Y	Y	Y	NNW	6	overcast	6	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
6/Dec	10:00	N	N	N	N	Y	Y	Y	S	5	overcast	8	lime skid, 2, 3	4, 3, 3	lime treatment area, manhole
6/Dec	20:00	N	N	N	N	Y	Y	Y	NW	4	overcast	4	3, 2, lime skid	3, 4, 4	manhole, lime treatment area
7/Dec	21:00	N	N	N	N	Y	Y	Y	S	13	rain	7	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
8/Dec	19:00	N	N	N	N	Y	Y	Y	WSW	6	overcast	7	3, 2, lime skid	3, 3, 4	manhole, lime treatment area
9/Dec	15:00	N	Y	N	N	Y	N	Y	S	2	rain	4	lime skid, RH building, 3	4, 3, 3	manhole, lime treatment area
10/Dec	18:00	Y	Y	N	N	Y	Y	N	W	5	partly cloudy	8	lime skid, 3, 2	4, 3, 3	manhole, lime treatment area
11/Dec	12:00	N	Y	N	N	N	N	N	W	2	mostly cloudy	7	lime skid, 1, 2,3	4, 3, 3	manhole, lime treatment area
12/Dec	01:00	N	N	Y	N	Y	N	N	SE	8	partly cloudy	4	lime skid, 2, 3	4, 3, 3	manhole, lime treatment area
13/Dec	20:00	N	N	N	N	Y	Y	Y	NNW	7	overcast/rain	5	3, 2, lime skid	3, 4, 4	manhole, lime treatment area
14/Dec	15:00	Y	Y	Y	N	Y	Y	Y	S	7	partly cloudy	7	lime skid, 2, 3	---	manhole, lime treatment area
15/Dec	09:30	N	Y	N	N	Y	N	N	SE	13	overcast/rain	8	2, 3, lime skid	4, 3, 4	manhole, lime treatment area
17/Dec	20:00	N	Y	Y	N	Y	Y	N	None	n/a	rain	6	lime skid, 2, 3	4, 3, 3	manhole, lime treatment area
18/Dec	04:20	N	Y	Y	N	Y	Y	N	None	n/a	overcast	4	lime skid, 2, 3	4, 3 ,3	manhole, lime treatment area

* Please see attached odour survey sheet for referenced locations.
** On a scale of 1-5 for odour strength: (1) Not detectable; (2) Barely detectable; (3) Noticeably present; (4) Very strong; (5) Offensive.

RTF Odour Detection/Complaint Perimeter Check Map



Appendix B – Summary of Complaints Received

Date of Complaint	Nature of Complaint	Details	Response
9-Dec-2020	Odour	Via telephone – General complaint of odour in the vicinity of the RTF – driving by	Advised that the RTF is undergoing commissioning and that odour could be expected until the system is fully up and running.
9-Dec-2020	Odour	Via telephone – Odour complaint from resident on Kiowa Place	Advised that the RTF is undergoing commissioning and that odour could be expected until the system is fully up and running.
11-Dec-2020	Odour	Via telephone – General complaint of odour in the vicinity of the RTF – driving by	Advised that the RTF is undergoing commissioning and that odour could be expected until the system is fully up and running.
29-Dec-2020	Odour	Via telephone – odour detected along Willis Pt Road near Durrance Lake	Advised that the RTF is undergoing commissioning and that odour could be expected until the system is fully up and running.