

Farsight Homes
Ballantrae WWTP Capacity Evaluation
Update of Capacity Evaluation for Farsight 141 Unit Subdivision

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2020-03-25	B	Final	I. Sapun	O. Koc	O. Koc
2020-02-05	A	Draft	I. Sapun	O. Koc	D. Mutombo
Date	Rev.	Status	Prepared By	Checked By	Approved By
HATCH					

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1. Introduction

The Ballantrae Wastewater Treatment Plant (WWTP) services the Ballantrae Golf and Country Club and associated community in the Town of Whitchurch-Stouffville, in the Region of York. The treatment process at the Ballantrae WWTP uses a Sequencing Batch Reactor (SBR) technology, followed by tertiary filtration and ultraviolet (UV) light disinfection. The plant is rated for an average day flow (ADF) capacity of 1,045 m³/d as per an Amended Environmental Compliance Approval (ECA) No. 4050-AWKJQK, issued by the Ministry of the Environment, Conservation and Parks (MECP) on December 8, 2018.

The Amended ECA was issued for the existing 894 condominium residential units and 94 new single family residential units which are presently under construction. The Ballantrae Golf and Country Club Update of the Capacity Evaluation Report dated January 24, 2017 and prepared by Hatch, estimated the flow increase to the plant after the construction of new single family units is complete. The report provided projected future average and peak daily flows to the Ballantrae WWTP. The report was accepted by the Regional Municipality of York (York Region) with recommendations to review the operation of the plant aeration system beyond the proposed development of 94 units.

Far Sight Homes is planning to develop a new residential subdivision of 141 units at 5584 Lakeshore Road at Ballantrae and connect the new sewer collection system to the Ballantrae WWTP. Hatch was retained by Far Sight Homes to estimate the additional flows to the WWTP generated by the new development and suggest the required upgrades to the plant to accommodate the increased flows.

2. Methodology and Assumptions

The capacity evaluation of the Ballantrae WWTP is based on the flow projections from the new development, since the characteristics of the future wastewater is expected to be very similar to the existing wastewater. Future flows are developed using a starting point methodology to establish future flows. The starting point for this report is the projected flows to the Ballantrae WWTP after construction of 94 new single family homes.

Wastewater flow design criteria are based on the following documents:

- Water and Wastewater Master Plan for Town of Whitchurch-Stouffville, prepared by GM BluePlan Engineering, November, 2018.
- The Regional Municipality of York Water and Wastewater Master Plan, November, 2016.
- The Regional Municipality of York, 2017 Development Charge Background Study, February 16, 2017.

The approach to determining wastewater flows for both existing and future growth varies from municipality to municipality. However, in general it is a common practise to utilise a per capita sanitary flow rate multiplied by a Harmon Peak Factor to determine a peak sanitary flow. An extraneous flow component is then added either on an area or per capita based I/I. Since the Town of Whitchurch-Stouffville is part of the York Region the projected design flows will be calculated using standard practice for both the Town and the Region. The higher of the two flow projections will be selected for the subsequent evaluation.

2.1 Flows Projections

2.1.1 *Current Flows to Ballantrae WWTP*

Currently, the Ballantrae WWTP services 894 condominium residential units. Based on the data for 2012-2016 (until September) the average flow was 444.3 m³/day, with the average flow per unit 497 L/d, or 248L/p/d. The average daily flow in 2019 was 491.7 m³/d (Appendix A) Ballantrae WWTP, Annual Summary 2019) or 275L/p/d. The maximum flow to the plant in 2019 was 778 m³/day.

2.1.2 *Short Term Flow Projections to Ballantrae WWTP*

According to the Ballantrae Golf and Country Club Update of the Capacity Evaluation Report the flow projection after construction of the 100 new single family residential units will be 639.8 m³/day. This value is based on the average flow from 2012-2016, and an estimation of the additional flows from residential and some additional non-residential sources. Since completion of this report, new data for the current flows to the Ballantrae WWTP has become available. Additionally, some wastewater design criteria have been re-evaluated by the York Region and the Town of Whitchurch-Stouffville. It is therefore required to review the projected flow calculations based on the new data and criteria.

Wastewater Flow Criteria for Growth for Town Whitchurch-Stouffville as per report by GM BluePlan Engineering, 2018:

- Average Dry Weather Flow – 350L/d/p
- I&I Allowance – 0.23L/s/ha
- Peaking Factor – Harmon Peaking Factor

Wastewater Flow Criteria for Growth for the York Region as per Wastewater Master Plan, 2016:

- Future Dry Weather Flow – 218 L/p/d (Table 3.3 for 2021)
- Dry Weather I/I Allowance – 90 L/p/d
- Wet Weather I/I Allowance – 0.26L/s/ha

The average number of persons per single family residential unit (ppu) is assumed to be 3.74 persons as per Table 3-4 of York Region Ten Years Growth Forecast, End-2016-End-2026 from the Development Charge Background Study, February 16, 2017.

The updated flows are shown in Table 2-1.

Table 2-1: Projected Flows after Construction of 94 Single Family Dwellings

Design Parameter	As per Hatch Report (dated January 24, 2017)	Based on Town Whitchurch-Stouffville Design Criteria	Based on the York Region Design Criteria
Existing Flow, m ³ /d	444.3	491.7	491.7
Number of Units	100	94	94
Persons Per Unit	3.5	3.74	3.74
Per Capita Flow, L/cap/d	450	350	218
Dry Weather I/I Allowance, L/cap/d	40	-	90
Additional Residential Flow, m ³ /d	171.5	123.0	108.3
Additional Non-residential Flow, m ³ /d	24	24	24
Average Daily Flow, m³/d	639.8	638.7	624.0
Wet Weather I/I Allowance, L/cap/d	227	N/A	N/A
Harmon Peak Factor	3.56	3.57	3.57
Non-residential Wet Weather Flow Peak Factor	4.0	4.0	4.0
Residential Peak Dry Weather Flow, m ³ /day	2,194.1	2,190.2	2,137.6
Wet Weather Allowance Rate, L/s/ha	N/A	0.23	0.26
Drainage Area, ha	N/A	7.88	7.88
Wet Weather I/I Flow, m ³ /d	485.3	156.6	177.0
Non-Residential Wet Weather Peak	96.0	96.0	96
Wet Weather Peak Flow, m³/d	2,775.5	2,442.8	2,410.6

Despite an increase in the current average daily flow to the plant of 47.4 m³/day in 2019 comparing to the period from 2012 to 2016, the calculated future average and wet weather peak flows are slightly reduced as a result of reductions in the capita rate assumptions. These assumptions remain higher than the actual per capita sewer generation for the existing subdivision.

The Wet Weather Peak flow calculated for the existing condominiums using the existing methodology would be 2,084.9 m³/day (for the average flow of 444.3m³/day) which is 2.7 times higher than the actual Wet Weather Peak flow of 778 m³/day at the plant in 2019. This indicates that the estimation of the peak flows is very conservative.

The design criteria for the Town of Whitchurch and the York Region produced very similar estimations of the average and wet weather flows to the Ballantrae following completion of the new 94 single detached units. As such, the starting points for estimation of future flows from the Far Sight Subdivision will be:

Average Daily Flow – 638.7 m³/day

Wet Weather Peak Flow – 2442.8 m³/day

2.1.3 Additional Flows from Far Sight Subdivision

The new subdivision will be located on Part of Lots 19 & 20, Concession 8, Town of Whitchurch-Stouffville, York Region at 5426, 5452 and 5584 Lakeshore Road, Ballantrae. The subdivision consists of 141 single detached residential homes, Storm Water Management Facilities, open space conservation areas, woodland and wetland protection areas. The total area of the subdivision is 16.29 ha. A detailed Schedule of Land Use is shown on the Draft Plan of Subdivision provided in Appendix B. A sewage pumping station will be constructed on site to convey sewage to the Ballantrae WWTP located a few hundred meters north from subdivision.

The same design criteria as in 2.1.2 are used for estimation of future flows from the new development. The Harmon Peaking Factor is calculated as:

$$HPF = 1 + (14/4 + P^{0.5}), \text{ where } P = \text{population in 1,000's}$$

Table 2-2 shows projected flows from new development.

Table 2-2: Projected Flows from 141 New Single Family Residential Units

Design Parameter	Based on Town Whitchurch-Stouffville Design Criteria	Based on the York Region Design Criteria
Number of Units	141	141
Persons Per Unit	3.74	3.74
Per Capita Flow (incl. dry weather I/I), L/p/d	350	308
Harmon Factor	3.98	3.98
Average Dry Weather Flow, m³/d	184.6	162.4
Residential Peak Dry Weather Flow, m ³ /day	731.3	643.5
Drainage Area, ha	16.27	16.27
I/I Allowance, l/s/ha	0.23	0.26
Wet Weather I&I, m ³ /day	323.7	365.9
Peak Wet Weather Flow, m³/day	1,055.0	1,009.5

The highest projected flows from the new subdivision are based on Town Whitchurch-Stouffville design criteria for the Average Daily Flow of 184.6 m³/day and Peak Wet Weather Flow of 1,055 m³/day.

3. Future Projected Flows

Using completion of construction of 94 units as a starting point the projected flows are shown in Table 3-1.

Table 3-1: Projected Flows to Ballantrae WWTP

Parameters	Flows		
	Current Flow	After Construction of 94 units	After Construction of 141 units
Average Daily Flow, m ³ /day	491.7	638.7	823.3

Parameters	Flows		
	Current Flow	After Construction of 94 units	After Construction of 141 units
Percent of WWTP Rated Capacity ¹	47.1	61.1	78.8
Peak Wet Weather Flow, m3/day	788	2442.8	3497.8
Percent of SPS Rated Capacity ²	13.9	43.1	61.7
Notes: 1. Based on 1,045 m3/day rated capacity. 2. Based on 5,665 m3/day rated capacity.			

Treatment plants are designed to treat the average flows. Pumping stations are sized to provide the Wet Weather Peak Flows. After completion of the new 141 units the average flow to the plant does not exceed 78.8% of the rated plant capacity. The Peak Wet Weather Flow will not exceed 61.7% of the pumping station rated capacity. Therefore, the Ballantrae WWTP and SPS both have sufficient capacity to accommodate sewage generated by the new subdivision.

4. Potential Constraints and Limitations for Future Flow Increase

4.1 Requirements for Aeration System Upgrade

During a review of the previous Capacity Evaluation Report, the Region indicated that an additional assessment and potential upgrade of the aeration system will be required prior to consideration of any additional growth at Ballantrae beyond the development of the 94 units currently undertaken. Details on this discussion with the Region are provided in Appendix C.

According to the same methodology (see Hatch Email from July 9, 2017 Clarifications on the Ballantrae Golf and Country Club WWTP Aeration Capacity in Appendix C.) the required aeration capacity for the future projected flow of 823.3 m³/day would be 129.7 L/s per blower/basin, which exceeds the existing 120.0L/s capacity. Therefore, this minor mechanical upgrade of the aeration system will be required, pursuant to the subdivision agreement.

Despite this upgrade could be undertaken with minor modifications to the existing blowers, Hatch recommends to bring the aeration system to the capacity of 164.6L/s per blower/basin, as calculated and presented in the report Appendix C, based on the Average Daily BOD₅ and Peak Daily TKN loadings for the rated plant capacity of 1,045m³/day.

Further details of the blower upgrade that suits to the flow requirement and, BOD₅ and TKN loadings needs to be determined through detailed assessment as part of a detailed design phase.

5. Conclusions

The Sewage Pumping Station and WWTP have sufficient capacity to treat the projected flows from the new 141 single family homes. Upgrade of the aeration system is recommended to address the potential oxygen deficiency when the average flow reaches to 823.3 m³/day.

The projected Peak Weather Flow is expected to be of 3,497.8 m³/day.

Appendix A

Annual Summary 2019



ANNUAL SUMMARY 2019

Ballantrae Waste Water Treatment Plant
45 Gentle Ben
Stouffville, Ontario

MONTH	Raw Sewage Flows		Effluent Flows		Usage	CBOD5			Suspended Solids			Total Phosphorus		
	Avg. Day Flow m ³	Max Day Flow m ³	Avg. Day Flow m ³	Max Day Flow m ³	% Plant Capacity	Avg. Raw CBOD (mg/L)	Avg. Eff. CBOD (mg/L)	Avg. Load CBOD (kg/day)	Avg. Raw S.S. (mg/L)	Avg. Eff. S.S. (mg/L)	Avg. Load S.S. (kg/day)	Avg. Raw T.P. (mg/L)	Avg. Eff. T.P. (mg/L)	Avg. Load T.P. (kg/day)
1	463.6	526.0	466.5	506.0	45%	113.2	2.20	1.03	94.6	1.80	0.84	2.8	0.05	0.02
2	457.5	590.0	453.6	596.0	43%	79.0	0.00	0.00	74.3	2.25	1.02	2.7	0.09	0.04
3	467.4	655.0	462.8	715.0	44%	129.8	0.00	0.00	217.8	2.00	0.93	5.4	0.07	0.03
4	477.8	573.0	472.7	586.0	45%	0.0	0.00	0.00	182.5	3.25	1.54	4.1	0.07	0.03
5	533.5	598.0	530.6	628.0	51%	124.6	0.00	0.00	159.2	1.40	0.74	4.1	0.08	0.04
6	581.7	778.0	582.9	792.0	56%	187.5	0.75	0.44	180.0	2.50	1.46	4.2	0.12	0.07
7	525.5	611.0	525.9	621.0	50%	83.0	0.00	0.00	147.3	0.75	0.39	3.8	0.08	0.04
8	485.2	558.0	489.6	567.0	47%	114.0	0.00	0.00	194.0	1.80	0.88	4.8	0.07	0.04
9	463.9	544.0	466.9	558.0	45%	135.0	0.00	0.00	167.5	2.00	0.93	4.1	0.10	0.05
10	486.1	526.0	489.1	583.0	47%	123.8	0.00	0.00	178.0	2.40	1.17	4.7	0.09	0.04
11	462.4	518.0	473.5	572.0	45%	102.5	0.00	0.00	132.5	1.00	0.47	3.9	0.06	0.03
12	495.9	544.0	500.3	565.0	48%	114.0	0.00	0.00	165.0	1.25	0.63	3.9	0.06	0.03
AVG	491.7	585.1	492.9	607.4	47%	108.9	0.25	0.12	157.7	1.87	0.92	4.0	0.08	0.04
MAX	581.7	778.0	582.9	792.0		187.5	2.20	1.03	217.8	3.25	1.54	5.4	0.12	0.07
C OF A	1045	3758	1045	3758			10.0	10.45		10.00	10.45		1.00	1.05

MONTH	Ammonia & Ammonium Nitrogen			Nitrite	Nitrate	Nitrite + Nitrate		TKN			Total Nitrogen		E. Coll	Sludge
	Avg. Raw NH3/NH4 (mg/L)	Avg. Eff. NH3/NH4 (mg/L)	Avg. Load NH3/NH4 (kg/day)	Avg. Eff. NO2 (mg/L)	Avg. Eff. NO3 (mg/L)	Avg. Eff. NO2/NO3 (mg/L)	Avg. Load NO2/NO3 (kg/day)	Avg. Raw TKN (mg/L)	Avg. Eff. TKN (mg/L)	Avg. Eff. TKN (kg/day)	Avg. Eff. Total N. (mg/L)	Avg. Eff. Total N. (kg/day)	Geo Mean counts /100ml	Volume Hauled m ³
1	22.2	0.17	0.08	0.01	1.96	1.97	0.92	25.20	0.65	0.3	2.62	1.22	0.0	308.0
2	20.3	0.19	0.09	0.05	1.84	1.89	0.86	24.00	0.61	0.3	2.51	1.14	0.0	220.0
3	20.0	0.11	0.05	0.01	1.14	1.15	0.53	24.50	0.56	0.3	1.70	0.79	0.0	220.0
4	23.5	0.39	0.18	0.09	1.12	1.21	0.57	29.75	0.89	0.4	2.09	0.99	0.0	308.0
5	23.6	0.25	0.13	0.01	1.48	1.49	0.79	28.60	0.60	0.3	2.09	1.11	0.0	440.0
6	19.8	0.22	0.13	0.01	1.67	1.68	0.98	27.00	0.66	0.4	2.34	1.36	0.0	350.0
7	23.5	0.44	0.23	0.08	1.44	1.52	0.80	30.50	0.79	0.4	2.31	1.21	0.0	396.0
8	23.4	0.50	0.24	0.01	1.42	1.43	0.70	28.80	0.96	0.5	2.39	1.17	0.0	395.0
9	25.5	0.42	0.20	0.06	1.88	1.94	0.90	30.25	1.10	0.5	3.04	1.42	0.0	351.0
10	25.2	0.14	0.07	0.02	2.04	2.06	1.01	31.60	0.77	0.4	2.83	1.38	0.0	441.0
11	26.8	0.16	0.08	0.05	1.86	1.91	0.90	31.50	0.77	0.4	2.68	1.27	0.0	388.0
12	25.3	0.34	0.17	0.03	1.54	1.57	0.78	30.50	0.82	0.4	2.39	1.19	0.0	308.0
AVG	23.2	0.3	0.1	0.0	1.6	1.7	0.8	28.5	0.8	0.4	2.4	1.2	0.0	340.4
MAX	26.8	0.50	0.24	0.09	2.04	2.06	1.01	31.6	1.1	0.5	3.04	1.42	0.0	
C OF A		1.00	1.05	3.60	3.60	3.60	3.76				5.60	5.85	14	

Reasons for failure / Other Problems:

1
 2
 3

Legend:

5.00 Exceeds C of A criteria

Appendix B

Draft Plan of Subdivision with 141 Single Family Residential Units



KEY PLAN



NTS

SCHEDULE OF LAND USE

Lot 1-141 - Concession 8 Single Detached Residential	7.27 ha	44 %
Block 142-144 - Storm Water Management (SWM)	0.30 ha	2 %
Block 145-146 - Open Space Conservation	4.04 ha	25 %
Block 147-149 - Open Space	0.09 ha	1 %
Block 150 - Emergency Access	0.01 ha	-
Block 151 - Pumping Station	0.03 ha	1 %
Block 152 - Private Road (11.0m)	2.30 ha	14 %
Block 153 - Road Widening	0.33 ha	2 %
Block 154 - Woodland & Wetland Protection Area	1.13 ha	7 %
Block 155 - Woodland & Wetland 15m Buffer	0.38 ha	1 %
Block 156-158 - Woodland Buffer	0.38 ha	2 %
TOTAL	18.29 ha	100.0%

OWNER'S AUTHORIZATION

We, hereby, authorize Alcorn & Associates Limited to prepare and submit this Revised Draft Plan of Subdivision (1970)14-003 to the Town of Whitechurch-Stouffville.

256639 Ontario Inc.

Date

Robert Robinson

Date

SURVEYOR'S CERTIFICATE

We, hereby, certify that the boundaries of the lands to be subdivided and their relationship to adjacent lands are accurately drawn and correctly shown.

1/1/00

Date

JTS Survey Limited

Draft Plan of Subdivision

PART OF LOTS 19 & 20, CONCESSION 8
TOWN OF WHITECHURCH - STOUFFVILLE
REGIONAL MUNICIPALITY OF YORK

Parsight Homes
5426, 5452 and 5584 Lakeshore Road, Ballantrac

SCALE 1:2000



ALCORN & ASSOCIATES LIMITED
Land Planning and Development Consultants

13 Drummond Circle,
Stouffville, Ontario L4A 2A4

TEL: (905) 940-0311

Orig. # 143 Final Draft Plan May 11/00

Appendix C

Aeration System Upgrade Correspondence

Sapun, Igor

From: Rafanan, Emil <Emil.Rafanan@york.ca>
Sent: Wednesday, June 14, 2017 4:46 PM
To: Schaefer, Steve
Cc: Modaressi, Katy; Bertolo, Daniel; McIntosh, Nick; Sapun, Igor
Subject: RE: Ballantrae WWTP capacity evaluation

Hi Steve,

Thank you for providing the letter from Hatch dated June 9, 2017 in response to the Region's questions.

Regional Staff have reviewed the letter, and are satisfied that Hatch's calculations demonstrate that the aeration system will be sufficient for the additional flows from the proposed Ballymore development of 94 units. The Region is also in agreement that additional assessment and completion of potential upgrades to the aeration system will be required prior to consideration of any additional growth in this system beyond the proposed development (94 units).

Finally, based on discussions during our meeting dated June 6, 2017, it is our understanding that the owner of the Ballantrae Golf and Country Club WWTP will be notified of the requirement to update the ECA to accurately reflect the units installed at the plant, and that a copy of the updated ECA be provided to the Strategy and Innovation Group at the Region.

If there are any outstanding questions or concerns, please let me know.

Thank you,

Emil Rafanan | Project Manager, Infrastructure Asset Management, Capacity Monitoring and Development Approval

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O: 1-877-464-9675 ext. 77689 | **C:** 289-338-1259 | emil.rafanan@york.ca | york.ca
Our Values: Integrity, Commitment, Accountability, Respect, Excellence



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From: Schaefer, Steve [<mailto:sschaefer@scsconsultinggroup.com>]
Sent: Monday, June 12, 2017 12:18 PM
To: Rafanan, Emil
Cc: Modaressi, Katy; Bertolo, Daniel; McIntosh, Nick; Sapun, Igor
Subject: RE: Ballantrae WWTP capacity evaluation

Emil,

Further to our meeting, please see the attached response letter which addresses your comments below.

We trust this will be sufficient to confirm the capacity for the proposed additional flows from the proposed Ballymore on Hwy 48.

We look forward to your response.

Steve Schaefer, P. Eng.

Principal

SCS Consulting Group Ltd.

30 Centurian Drive, Suite 100

Markham, ON, L3R 8B8

Phone: (905) 475-1900 (ext. 2223)

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E-Mail: sschaefer@scsconsultinggroup.com

<http://www.scsconsultinggroup.com>

From: Rafanan, Emil [<mailto:Emil.Rafanan@york.ca>]

Sent: May-15-17 5:09 PM

To: Schaefer, Steve <sschaefer@scsconsultinggroup.com>

Cc: Modaressi, Katy <Katy.Modaressi@york.ca>; Bertolo, Daniel <Daniel.Bertolo@york.ca>; McIntosh, Nick <nmcintosh@scsconsultinggroup.com>

Subject: RE: Ballantrae WWTP capacity evaluation

Hi Steve,

Thank you for providing the updated CofA as part of the response package. We will be sharing the CofA with our Compliance Department.

Regional Staff have reviewed the memo from Hatch dated April 28, 2017 in response to the Region's request for clarification, dated April 20, 2017. In general, Hatch's response addresses majority of the items highlighted by the Region. However, Region still has some questions, primarily with respect to the potential loading impacts on the aeration system capacity.

In response A9, Hatch noted the following in reference to the aeration system capacity:

"The aeration system capacity was addressed in Hatch's initial report on Ballantrae Golf and Country Club WWTP Capacity Evaluation (Section 3.5 on Aeration System) and in the supplier's report from November 22, 2016."

1. In Hatch's initial report, Ballantrae Golf and Country Club WWTP Capacity Evaluation, did the calculated capacity of the aeration system include an allowance for peak loading in accordance with the MOECC Design Guidelines (Chapter 8, Table 8-2)? If not, what effect would this have on the capacity evaluation of the aeration system?
2. In the supplier's report, Wastewater Experts, Inc. state that "the blowers can easily be sped up to provide up to 40% more air flow for aeration." If additional aeration capacity is required for the facility to meet its treatment objectives at its CofA rated capacity, the Region would like to see a plan, including timing, for aeration system upgrades or modification to ensure that sufficient aeration capacity is in place prior to bringing in additional flow and loading. In addition, please clarify the impact of changing the sheave (as per the recommendation from page 3 of the memo from Wastewater Experts, Inc.) on associated aeration system piping and appurtenances.

In response A2, Hatch noted the following in reference to the capacity of the UV disinfection system, and the omission of the grinders from the CofA:

"This analysis is being done for the Owner of the WWTP and the Owner is fully aware of these two discrepancies. These discrepancies do not affect plant performance in any way, and since we are not proposing any equipment or process upgrade at this time Hatch believes that the existing CoA is sufficient for operation of the plant."

3. It is the Region's understanding that the CofA must accurately represent the equipment installed at the facility. Since the capacity of the UV disinfection system is lower than the capacity listed in the CofA, then the CofA needs to be updated to represent the actual capacity of the equipment installed. If this is the case, the Region will require a copy any updated Environmental Compliance Approval (ECA) for the Ballantrae Golf and Country Club WWTP.

Upon receipt of your response, and if required, a meeting can be scheduled to finalize this review. Please provide supporting calculations (where applicable) in response to the questions above.

If you have any questions or concerns, please let me know.

Regards,

Emil Rafanan | Project Manager, Infrastructure Asset Management, Capacity Monitoring and Development Approval

The Regional Municipality of York | 17250 Yonge Street | Newmarket, ON L3Y 6Z1
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From: Schaefer, Steve [<mailto:sschaefer@scsconsultinggroup.com>]

Sent: Tuesday, May 02, 2017 10:19 AM

To: Rafanan, Emil

Cc: Modaressi, Katy; Bertolo, Daniel; McIntosh, Nick

Subject: RE: Ballantrae WWTP capacity evaluation

Emil,

Please see the attached response prepared by Hatch. As discussed, we would be please to meet with you (if required) in a week or two following your review of the response letter in case you have any final follow-up questions.

Steve Schaefer, P. Eng.

Principal

SCS Consulting Group Ltd.

30 Centurian Drive, Suite 100

Markham, ON, L3R 8B8

Phone: (905) 475-1900 (ext. 2223)

Fax: (905) 475-8335

Cell: (647) 209-8400

From: Rafanan, Emil [<mailto:Emil.Rafanan@york.ca>]
Sent: April-20-17 9:25 AM
To: Schaefer, Steve <sschaefer@scsconsultinggroup.com>
Cc: Modaressi, Katy <Katy.Modaressi@york.ca>; Bertolo, Daniel <Daniel.Bertolo@york.ca>
Subject: RE: Ballantrae WWTP capacity evaluation

Hi Steve,

I recently joined York Region, and have been assigned to this project. I apologize for the delay in responding.

On February 6, 2017, SCS Consulting Group Ltd. (SCS) responded to the comments provided by XCG Consulting Ltd. (XCG) on the Ballantrae Golf and Country Club WWTP Capacity Evaluation. Regional Staff have reviewed the submission, and the following items require further clarification:

1. Table 1-1: Please provide clarification on the Hatch response to the last item in more detail.
2. The Region would like to know if the discrepancies confirmed in Table 1-2 were communicated to the owner of the Ballantrae Golf and Country Club WWTP and what actions were taken to address these inconsistencies.
3. If the Certificate of Approval (CofA) is amended to update the equipment specifications, the Region will require a copy of the updated Environmental Compliance Approval (ECA).
4. In addition to the discrepancies confirmed by the consultant, the following two items from the Hatch submission are inconsistent with the CofA.

Current CofA	Hatch Submission
<u>Equalization Tanks</u> CofA: The equalization tank is equipped with two (2) pumps, each with a rated capacity of 65.6 L/s (5,668 m3/d)	<u>Equalization Tanks</u> Hatch: The equalization tank is equipped with two (2) pumps, each with a rated capacity of 43.5 L/s (3,758 m3/d)
<u>Aeration and Mixing</u> CofA: The SBRs are equipped with fine bubble diffusers and submersible mixers	<u>Aeration and Mixing</u> Hatch: The SBRs are equipped with jet aeration (Table 1 from the 2013 Capacity Evaluation) and no submersible mixers (Table 1-1 of the 2017 Update of Capacity Evaluation) Wastewater Experts, Inc.: Mixing is provided by the recirculation jet motive pumps (Appendix C of the 2017 Update of Capacity Evaluation)

5. Please confirm the equalization tank pump specifications installed at the WWTP.
6. Please confirm the specifications of the aeration and mixing equipment actually installed at the WWTP and that mixing is provided in the SBRs during unaerated steps.
7. Please confirm that all projected flows will be conveyed to the WWTP through the pumping station.
8. In the submission, Hatch indicated that operations staff had implemented the recommendation to manually control the aeration/anoxic cycles to increase the duration of anoxic periods in the SBR to promote denitrification, and that the results of these changes would be available. Please provide the results of the recommended operational changes.
9. The modelling conducted by Hatch to verify SBR performance at projected flows and loadings was conducted using fixed DO concentration setpoints. Does the modelling take into consideration the capacity of the aeration

system? Please confirm that adequate aeration capacity at projected flows and loads (including maximum month loading conditions) is available.

10. Please confirm that there will be sufficient BOD loading and alkalinity at the projected flows to support denitrification since the plant is required to denitrify.

If the consultant would like, the Region is amenable to a meeting to finalize this review. Please provide a response to the comments 10 business days in advance of the meeting.

Regards,

Emil Rafanan | Project Manager, Infrastructure Asset Management, Capacity Monitoring and Development Approval

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From: Schaefer, Steve [<mailto:sschaefer@scsconsultinggroup.com>]

Sent: Thursday, March 23, 2017 6:22 PM

To: Bertolo, Daniel

Cc: Modaressi, Katy; Rafanan, Emil

Subject: RE: Ballantrae WWTP capacity evaluation

Thank you. Much appreciated.

Steve Schaefer, P. Eng.

Principal

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From: Bertolo, Daniel [<mailto:Daniel.Bertolo@york.ca>]

Sent: March-23-17 4:20 PM

To: Schaefer, Steve <sschaefer@scsconsultinggroup.com>

Cc: Modaressi, Katy <Katy.Modaressi@york.ca>; Rafanan, Emil <Emil.Rafanan@york.ca>

Subject: RE: Ballantrae WWTP capacity evaluation

Hi Steve;

We are currently conducting our review and anticipate having comments for you by next week.

Regards,

Daniel Bertolo, P.Eng. | Senior Project Manager - Approvals, Capacity Assignment and Servicing Agreements, Infrastructure Asset Management, Environmental Services

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York Region telephone extensions have changed to five digits by adding 7 as the first digit. My new extension is 71597.

Please consider the environment before printing this email.

From: Schaefer, Steve [<mailto:sschaefer@scsconsultinggroup.com>]

Sent: Thursday, March 23, 2017 8:13 AM

To: Bertolo, Daniel

Subject: Ballantrae WWTP capacity evaluation

Daniel,

I'm following up on our conversation a few weeks ago regarding the Region's review of the response to the XCG comments on the Ballantrae WWTP. At that time you had estimated it could be reviewed in a few weeks time.

Can you please give us an update on the expected timing?

Thank you.

Steve Schaefer, P. Eng.

Principal

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June 9, 2017

Emil Rafanan, Project Manager
The Regional Municipality of York
17250 Yonge Street
Newmarket, ON L3Y 6Z1

Subject: Clarifications on the Ballantrae Golf and Country Club WWTP Aeration Capacity

Dear Mr. Rafanan:

The intent of this letter is to address the question of aeration capacity of the Ballantrae Waste Water Treatment Plant (WWTP). This was raised in your email dated March 15, 2017, followed by a discussion during the meeting between the Region of York Region, SCS Consulting Group Ltd. and Hatch on June 6, 2017.

- Q1.** In Hatch's initial report, Ballantrae Golf and Country Club WWTP Capacity Evaluation, did the calculated capacity of the aeration system include an allowance for peak loading in accordance with the Ministry of the Environment and Climate Change (MOECC) Design Guidelines (Chapter 8, Table 8-2)? If not, what effect would this have on the capacity evaluation of the aeration system?
- A1.** The issue of whether the aeration capacity at the Ballantrae WWTP is adequate at projected flows was initially addressed in Hatch's letter "Clarifications on the Ballantrae Golf and Country Club WWTP Capacity Evaluation" dated April 28, 2017 (Answer 7). This answer was based on the original calculations and the supplier's comments on the flexibility of the aeration system outlined in their report "SBR Performance at Ballantrae WWTP, Aeration Capacity and Future Plant Loading". This answer is still valid for the original design assumptions and calculations.

The plant was designed and constructed in 1999-2000, and the supplier JetTech calculated the oxygen requirements based on the average daily Biochemical Oxygen Demand (BOD) and Total Kjeldahl Nitrogen (TKN) loadings. The new MOECC Design Guidelines requires design of the aeration system based on the Average Daily BOD₅ Loading (based on Design Average Daily Flow) and Peak Daily TKN Loading (based on Design Peak Daily Flow). These new requirements mean that the aeration capacity of the Ballantrae WWTP has to be reviewed. The review below is based on the available influent parameters at the plant during last 3.5 years, from January of 2014 to June of 2017. Table 1 below shows the Peak Daily TKN Loadings based on the actual Peak Daily Flows. The operational data for these years are available in digital format upon request.

Table 1: Analyses of TKN Loadings (January 2015 - June 2017)

Parameters	Year			
	2014	2015	2016	2017
Peak Flow, m ³ /day	571	558	600	651
Average Flow, m ³ /day	444	432	445	482
Flow Peak Factor	1.29	1.29	1.32	1.35
Average Weekly TKN Concentration ¹ , mg/l	46.0	35.0	34.0	29.0
Average Yearly TKN Concentration, mg/L	43.2	39.1	34.7	31.0
Maximum TKN Load based on Peak Daily Flow ² , kg/day	26.27	19.5	20.40	18.88
Notes: 1. Weekly TKN Concentration for the week when Peak Flow occurred. 2. Peak flow is recorded on the daily basis, but TKN concentration is analysed on a weekly basis. Therefore TKN peak loading is calculated as Peak Flow x Average Weekly TKN Concentration/1000.				

The maximum TKN load of 26.27 k/day occurred on June 2, 2014. Considering that the Flow Peak Factor is very consistent over the years the TKN load increase could be pro-rated as the maximum present TKN load multiplied by the factor 1.44 (640.3/444.3) for future expansion of 640.3 m³/day and 2.35 (1,045/640.3) for the rated plant capacity of 1,045 m³/day.

The total oxygen requirements for the original design and calculated requirements based on Ontario Guidelines for the current and future capacities are shown in Table 2 below.

Table 2: Oxygen Requirements

Parameters	Original Design ¹	Current Average Flow	Expansion to 640.3m ³ /day	Rated Plant Capacity at 1,045 m ³ /day
Average Flow, m ³ /day	1,045	444.3	640.3	1,045
Influent BOD ₅ , mg/l	220	220 ²	220	220
Influent TKN, mg/l	40	40	40	40
Oxygen Requirements, kg O ₂ /kg BOD removed	1.25	1.5 ³	1.5	1.5
Oxygen Requirements, kg O ₂ /kg TKN removed	4.6	4.6	4.6	4.6
Credit kg O ₂ /kg NO ₃ denitrified	2.86	2.86	2.86	2.86
Total Oxygen Requirements for BOD Removal, kg/day	-	146.6 ⁴	211.3	344.9
Total Oxygen Requirements for TKN Oxidizing, kg/day	-	120.8 ⁵	174.1 ⁶	284.2 ⁷
Denitrification Efficiency	0.6	0.6	0.6	0.6
Oxygen Denitrification Credit, kg O ₂ /day	52	22.1 ^{8,9}	31.9	52.0
Actual Oxygen Required, AOR, kg/day	386	245.3	353.6	577.1
Standard Oxygen Required, SOR, kg/day	578	367.3 ¹⁰	529.5	864.2
SOR for Aeration Design kg/hr	29.0 ¹¹	18.4	26.5	43.4
Required Blower Capacity (per basin), L/s	110.0	70.0	100.8	164.6
Notes: 1. From Design Calculations provided by Jet Tech, see Appendix A. 2. As per modeling data. 3. For extended aeration mode as per MOECC Guidelines. 4. 1.5 kg O ₂ /kg BOD				

5. 4.6 kg O₂/kg max. TKN load for 444.3m³/day.
6. (4.6 kg O₂/kg max. TKN load for 444.3m³/day) x1.44.
7. (4.6 kg O₂/kg max. TKN load for 444.3m³/day)x2.35.
8. Calculated for 75% of total TKN being oxidised to 1.0mg/l
9. Calculated for the Average Daily Flow.
10. Based on the Conversion Formula as shown on p.4 of supplier's calculations.
11. Based on 10hrs/basin/day operation.

The following conclusions can be drawn from the results in Table 2:

1. The required aeration blower capacity as calculated per the original design is 110 L/s. At the current average capacity of 444.3 m³/day the aeration requirement is only 70 L/s, increasing up to 100.8 L/s when the plant reaches the capacity of 640.3 m³/day.

The actual capacity of each of the two existing aeration blowers (one per basin) is 120 L/s. Therefore, this capacity is sufficient for the future flow of 640.3 m³/day, and an upgrade of the aeration system is not required.

2. The required aeration capacity for the plant rated flow of 1,045 m³/day is 164.6 L/s per blower which is 37.2% higher than the existing aeration capacity. Therefore, after plant reaches the capacity of 640.3 m³/day the additional review of the oxygen requirements is recommended when a new expansion is considered. This review could be based on the available operational data, stress testing or any other means to determine the future oxygen requirements.

If during this review the oxygen deficiency is indicated, the aeration system has to be upgraded by either increasing the blower capacity or improving the oxygen transfer. The actual course of action will be selected based on technical and economic considerations during the time of investigation.

We believe that these clarifications are sufficient and follow our discussion during the recent meeting.

Please let me know if you have any further questions.

Igor Sapun, P.Eng.

Senior Project Engineer/Infrastructure

IS:is
Attachment(s)/Enclosure

Appendix A Jet Tech Design Calculations.

cc: David Mutombo, Hatch



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Tel: +1 (905) 315 3500 www.hatch.com

April 28, 2017

Emil Rafanan, Project Manager
The Regional Municipality of York
17250 Yonge Street
Newmarket, ON L3Y 6Z1

Dear Mr. Rafanan:

Subject: Clarifications on the Ballantrae Golf and Country Club WWTP Capacity Evaluation Report

The intent of this letter is to address the questions the Region of York raised during the review of the Ballantrae WWTP Capacity Evaluation Update provided to the Region by SCS Consulting Group Ltd. on February 6, 2017.

Q1. Table 1-1: Please provide clarification on the Hatch response to the last item in more detail.

A1. Table 1-1 is shown below (highlighted area).

Table 1-1: Summary of Hatch's Responses to XCG's Comments – Projected Flows

XCG's Comment	Hatch's Response
Hatch completed a review of historic wastewater flows over the period of 2010 to Sept. 22, 2014.	Data for this evaluation are based on the flow reports from January 2012 to Sept. 1, 2016.
Although it is not explicitly stated, it is assumed that "historical strength" does not include the results from 2010.	2010 was not included in Hatch's analyses due to flows associated with the high water table and infiltration. This issue was resolved by the Owner in 2010-2011.
The projected flow from additional 200 units were based on an average person per unit (PPU) density of 3.5, yielding population growth of 700 persons.	The new projection for an additional 100 units yields a design population of 350 persons.
The overall per capita flow used for new growth was assumed to be 490 L/cap/day.	Although it is a conservative approach, the same per capita flow has been utilized for the revised projection.
An allowance for an increase of 24 m ³ /d in non-residential flow was included in the flow projections. Current estimated non-residential flows are 17 m ³ /d. Neither the basis for this volumetric increase in flow nor the anticipated characteristics of this non-residential wastewater were defined.	17 m ³ /d was based on non-residential billing information for 2012 (see Appendix F). The suggested increase is 41% up to 24 m ³ /d. Hatch believes that it is a conservative approach to incorporate future increases and the low flows associated with this will not affect the biological load to the plant in any significant way.
Projections for future MDF were not developed.	Projections for the Peak Sewage Flows are developed in this report.
It was noted that historic raw wastewater characteristics were lower than the design	Historic annual TKN concentrations slightly exceeded the design raw wastewater

basis concentrations for all parameters (exception of TKN). Historic annual TKN concentrations (excluding 2010 data) ranged from 41 to 45 mg/L, while the design raw wastewater concentration was 40 mg/L.	concentration. This is taken into consideration during the evaluation of SBR operations.
It is recommended that additional details be provided with respect to the anticipated characteristics of these flows. If the projected strength is higher than historic values, controls that could be put in place to limit loadings to the WWTP should be defined and/or an updated projection of future raw wastewater characteristics should be developed.	Considering that the projected flows are conservative in nature, there is no reason to suggest that the projected flows will provide a higher load to the plant even if the strength of these flows could be higher. The biological treatment capacity will be analysed based on the actual strength and future flow projections.

Hatch's analyses for this report are based on data for the original design and present quality of the sewage influent to the plant. According to the data, the actual influent BOD₅ to the plant is slightly lower than the design BOD₅ of 220 mg/l. On the other hand, the actual influent TKN is 41-45 mg/l which is higher than 40mg/l assumed in the original design. Our assumptions for modelling, were presented in section 3.1.2 of the Influent Parameters and SBR Cycling Time for Modelling of the report and assumed the highest concentrations for both BOD and TKN, 220 mg/l and 45 mg/l respectively.

There is no reason to suggest that the new construction of 100 single family units will change the strength of the sewage influent. Moreover, the flow increase up to 640.3 m³/day is below the rated capacity of the plant at 1,045 m³/day and the current improvements in denitrifications (See response to Question 8) indicate that there are no operational problems at the current flow of 444.3 m³/day.

- Q2.** The Region would like to know if the discrepancies confirmed in Table 1-2 were communicated to the owner of the Ballantrae Golf and Country Club WWTP and what actions were taken to address these inconsistencies.
- A2.** Hatch's original report referred to CoA No. 3-1822-98-997 issued by the MOECC on August 6, 1999 (see Appendix A). After the XCG comments were issued, Hatch verified the actual size of relevant equipment on site which was reflected in Table 1-2 of our response. It is unclear which CoA XCG used when it described the discrepancy between the CoA and the actual equipment on site. Table 1-2 below provides XCG comments, CoA description and Hatch's latest comments.

Table 1-2: XCG Comments vs CoA Description & Hatch Description

XCG's Comment	CoA No. 3-1822-98-997	Hatch Comments
Grinders: CoA does not include grinders in the list of equipment.	Grinder: CoA does not include grinders.	There are two in-line grinders
CoA notes that there are two vortex grit tanks, but Hatch 's report mention only one.	There is one (1) 1.65m diameter vortex grit removal unit having a rated maximum flow capacity of 5,665m ³ /d (65.6L/s) (p.1)	There is one vortex grit tank as per Hatch original report

SBRs: CoA specifies reactor volumes of 21.5m x4.85m x5.0m SWD and indicates a mixer in each SBR.	SBR: two (2) 11.7m x8.05m x 6.7m SWD tanks with 2 centrifugal pumps for aeration, mixing and sludge wasting (p.2). No indication of a mixer (p.1,2)	Reactor dimensions are 11.7m x8.05m x 6.7m SWD, no mixer
As per Hatch report the peak capacity of the UV system is 65.6L/s, not 205L/s as per CoA.	The UV's peak flow rate capacity is 205 L/s	Hatch has verified the peak capacity of the UV system – to be 43.5 L/s
Hatch indicated there are 3 blowers each with a rated capacity of 108L/s, 2 dedicated to SBR and 1 providing air to sludge holding tank or standby for SBR, but CoA notes 4 blowers – 3 blowers at 104 L/s dedicated to SBRs, 1 blower at 102 L/s providing air to sludge holding tank or standby for SBRs.	Three (3) blowers with a rated capacity of 108L/s each.	There are 3 blowers with a rated capacity of 108 L/s each – 2 dedicated to SBRs, 1 providing air to grit removal & sludge storage or as standby for SBRs

As evident from this table there are only two discrepancies between the CoA description and the actual equipment installed on the site. The actual capacity of the UV system is 43.5L/s (3,758m³/day), not 205L/s as shown in the CoA; and the 2 grinders installed before the grit removal system are incorrectly missing from the CoA.

This analysis is being done for the Owner of the WWTP and the Owner is fully aware of these two discrepancies. These discrepancies do not affect plant performance in any way, and since we are not proposing any equipment or process upgrade at this time Hatch believes that the existing CoA is sufficient for operation of the plant.

- Q3.** If the Certificate of Approval (CofA) is amended to update the equipment specifications, the Region will require a copy of the updated Environmental Compliance Approval (ECA).
- A3.** An amended ECA is not anticipated to be required since there are no process or equipment changes proposed to the WWTP.
- Q4.** In addition to the discrepancies confirmed by the consultant, the following two items from the Hatch submission are inconsistent with the CoA.

Current CofA	Hatch Submission
<u>Equalization Tanks</u> CofA: The equalization tank is equipped with two (2) pumps, each with a rated capacity of 65.6 L/s (5,668 m ³ /d)	<u>Equalization Tanks</u> Hatch: The equalization tank is equipped with two (2) pumps, each with a rated capacity of 43.5 L/s (3,758 m ³ /d)
<u>Aeration and Mixing</u> CofA: The SBRs are equipped with fine bubble diffusers and submersible mixers	<u>Aeration and Mixing</u> Hatch: The SBRs are equipped with jet aeration (Table 1 from the 2013 Capacity Evaluation) and no submersible mixers (Table 1-1 of the 2017 Update of Capacity Evaluation) Wastewater Experts, Inc.: Mixing is provided by the recirculation jet motive pumps (Appendix C of the 2017 Update of Capacity Evaluation)

A4. Hatch believes that the first item in this table is refers to “ a 3.05m diameter by 8.4m SWD sewage pumping station constructed upstream of the sewage treatment facility with two (2) submersible pumps, each pump having a rated capacity of 65.6L/s at TDH of 17.4m” described in the CoA. Hatch, was referring to the pumps providing feed to the Tertiary Filtration and installed after the Equalization Decant Tank.

It is unclear where the second discrepancy arises from. According to the CoA (p.2) “Each tank is equipped with five (5) unidirectional jet nozzle assemblies mounted uniformly along one side of the manifold to provide aeration to biological oxidation and mixing”. There is no reference to the mixers and fine bubble aeration.

Q5. Please confirm the equalization tank pump specifications installed at the WWTP.

A5. The capacity of this pump is 43.5L/s (3,758m³/day). This is based on the maximum capacity of the plant. The sewer pumping station capacity, is based on the maximum flow to preliminary treatment and determined as 65.6L/s (5,665m³/day).

Q6. Please confirm the specifications of the aeration and mixing equipment actually installed at the WWTP, and that mixing is provided in the SBRs during unaerated steps.

A6. The aeration and mixing equipment are installed as per CoA description. Mixing is provided by pump and aeration (jet aeration) during the Aerated Fill and React and only by the pump during Mixed Anoxic Fill and React Denitrification.

Q7. Please confirm that all projected flows will be conveyed to the WWTP through the pumping station.

A.7 All projected flows will be conveyed through the Pumping Station.

Q8. In the submission, Hatch indicated that operations staff had implemented the recommendation to manually control the aeration/anoxic cycles to increase the duration of anoxic periods in the SBR to promote denitrification, and that the results of these changes would be available. Please provide the results of the recommended operational changes.

A8. Changes in operational parameters were conducted by the plant operators with input from Hatch. This trial started from December 8, 2016 and was based on conclusions in the Hatch Update of Capacity Evaluation Report. Initially, the blower's ON/OFF operation time was selected as a control parameter. These settings provided excellent results, but required more attention from the operators. Since the beginning of 2017 the DO settings became the main controlling parameter which was gradually reduced from 3.0/3.5 mg/l down to 0.5/1.5 mg/l producing excellent results for NOx and ammonia.

The results of these tests are summarized in Table 2 below. The detail analysis of effluent water for this period by Maxxam Lab are attached in Appendix B- Tests Results.

Table 2: Effluent Nitrogen Parameters from October 27, 2016 to March 16, 2017¹

Sampling Date	Total Ammonia - N, mg/l	Organic N, mg/l	TKN, mg/l	NOx (Nitrates+ Nitrites), mg/l	Total Nitrogen, mg/l	DO Control Setting Low/High, mg/l	Comments

October 27, 2016	0.018	1.18	1.2	3.71	4.91	3.0/3.5	
November, 2016							
November 3	0	0.77	0.77	3.64	4.41	3.0/3.5	
November 10	0.05	0.31	0.36	3.08	3.44	3.0/3.5	
November 17	0.067	0.333	0.4	2.44	2.84	3.0/3.5	
November 24	0.12	0.85	0.97	2.8	3.77	3.0/3.5	
November Average	0.06	0.57	0.63	2.99	3.31		
December, 2016							
December 1	0	0.63	0.63	2.42	3.05	3.0/3.5	
December 8	0.072	0.518	0.59	1.99	2.58	3.0/3.5	Air ON/OFF, 25/25min ²
December 15	0.33	0.87	1.2	1.00	2.20	3.0/3.5	Air ON/OFF, 60/60min
December Average	0.134	0.67	0.81	1.80	2.39		
January 2017							
January 3				1.26		0.6/1.75	DO Control Started ³
January 5	0.06	0.39	0.45	2.52	2.97	0.6/1.75	
January 12	0.76	0.44	1.2	0.58	1.78	0.5/1.60	
January 19	0.1	0.54	0.64	1.26	1.9	0.6/1.75	
January 26	0	0.47	0.47	1.83	2.3	0.6/1.75	
January Average	0.23	0.46	0.69	1.49	2.1		
February, 2107							
February 2	0.071	0.079	0.15	1.61	1.76	1.5/0.5	
February 9	0.2	0.66	0.86	1.61	2.47	1.5/0.5	
February 16	0.98	0.62	1.6	1.11	2.71	1.5/0.5	Mixing pump problems
February 23	0.37	0.63	1.00	1.3	2.3	1.5/0.5	
February Average	0.41	0.50	0.90	1.41	2.31		
March, 2017							
March 2	0.07	0.63	0.70	1.26	1.96	1.5/0.5	
March 9	0.64	0.86	1.50	0.54	2.04	1.5/0.5	
March 16	0.43	0.67	1.10	0.39	1.49	1.5/0.4	
March Average	0.38	0.72	1.10	0.73	1.77		
Notes:							
1. The results for the second half of December, 2016 were not available.							
2. Operation based on blower time ON/OFF control begins here.							
3. Operation based on DO settings control begins here.							

Before changes, when the DO setting was 3.0/3.5 mg/l the plant met all the monthly effluent parameters, but did not meet more stringent objectives for NO_x and sometimes also not for TN, which was caused by the elevated NO_x. After DO settings were lowered, the plant met all the monthly effluent parameters without exception.

Generally, NO_x dropped down from 2.0-2.5 mg/l to 0.73-1.8 mg/l (the objective is 2.0 mg/l) and TN dropped from 3.0-4.0 mg/l to 1.77-2.39 mg/l (the objective is 3.5mg/l). The effluent ammonia went up slightly from 0.1-0.2 mg/l to 0.3-0.4 mg/l while staying within the objective of 0.5 mg/l.

Presently, the plant's settings are as per the March, 2017 settings.

- Q9.** The modelling conducted by Hatch to verify SBR performance at projected flows and loadings was conducted using fixed DO concentration setpoints. Does the modelling take into consideration the capacity of the aeration system? Please confirm that adequate aeration capacity at projected flows and loads (including maximum month loading conditions) is available.
- A9.** The modelling was conducted based on the assumption that the aeration system has enough capacity to maintain DO settings as shown in each modelling run. The aeration system capacity was addressed in Hatch's initial report on Ballantrae Golf and Country Club WWTP Capacity Evaluation (Section 3.5 on Aeration System) and in the supplier's report from November 22, 2016. As well, the current expansion represents only about 60% of the rated capacity of the facility, and each of the existing aeration blowers can produce up to 40% more air by changing only the sheave as shown in Hatch's last report.
- Q10.** Please confirm that there will be sufficient BOD loading and alkalinity at the projected flows to support denitrification since the plant is required to denitrify.
- A10.** The existing ratio of BOD/TAN/Alkalinity is sufficient for very deep nitrification/denitrification. As well, the effluent has very healthy residual alkalinity of 180-190 mg/l. There is no indication that BOD/TAN/Alkalinity ratio will change dramatically with increased flow. However, if this does happen the supplementary BOD/alkalinity source could be easily introduced.

Please let me know if you have any further questions.



Igor Sapun, P.Eng.

Senior Project Engineer/Infrastructure

IS:is
Attachment(s)/Enclosure

Appendix A
Appendix B

cc: David Mutombo, Hatch

BLOCK 143
SWM
0.05 ha

BLOCK 144
OPEN SPACE
CONSERVATION
2.20 ha

BLOCK 157
10m Woodland and
Wetland Buffer
0.28 ha

BLOCK 158
Woodland Buffer
(Average 10m buffer)
0.07 ha

BLOCK 156
WOODLAND / WETLAND
PROTECTION AREA
1.13 ha

BLOCK 159
Woodland Buffer
(Average 14m buffer)
0.13 ha

BLOCK 160
Woodland Buffer
(Average 12m buffer)
0.18 ha

BLOCK 154
PRIVATE ROADS

