

# **APPENDIX 'G'**

## **Water Usage**

## Pool Operation

### Pool Dimensions

The volumes and surface areas of the pools are summarized in Table 1. The pool volumes were obtained from pool designer corresponding to the Pool Layout drawing dated 2018 10 24 (Lipski, 2018).

Table 1: Pool Volume and Surface Area

| Pool                   | Approx. Volume [L] | Approx. Volume [USG] | Approx. Surface Area [m <sup>2</sup> ] |
|------------------------|--------------------|----------------------|--|
| 25 m Lap Pool          | 668,256            | 176,537              | 317.5                                  |
| Multi-use Leisure Pool | 88,957             | 23,500               | 191.8                                  |
| <b>TOTAL</b>           | <b>757,213</b>     | <b>200,037</b>       | <b>509.3</b>                           |

### Maximum Bather Load

The Maximum bather load was determined to be 264, using the following formula from Newfoundland and Labrador Public Pools Regulations under the Public Health Act O.C. 96-572. However, it was confirmed to be about 272 persons (Lap pool ~ 160 and Multi-use Leisure Pool ~112) from the pool designer, which was the figure used for the following calculations (Lipski, 2018).

$$\text{Maximum bather load} = \frac{D}{2.5} + \frac{S}{1.4}$$

D = area in m<sup>2</sup> of the part of the pool that is deeper than 1.35 m

S = area in m<sup>2</sup> of the part of the pool that is 1.35 m in depth or shallower

### Make-up Water

Based off the Newfoundland and Labrador Public Pools Regulations under the Public Health Act O.C. 96-572 the minimum make-up water for the pool is 14 L/bather and cannot exceed 15% of the water quantity in the pool. Based on the maximum bather load of 272 the facility must be capable of producing 3808 L of make-up water per day, Table 2.

Table 2: Make-up Water Summary

|                               | # Bathers  | Make-up water/ person [L/person] | Make-up Water [L] |
|-------------------------------|------------|----------------------------------|-------------------|
| <b>25 m Lap Pool</b>          | 160        | 14                               | 2240              |
| <b>Multi-use Leisure Pool</b> | 112        | 14                               | 1568              |
| <b>TOTAL</b>                  | <b>272</b> | <b>14</b>                        | <b>3808</b>       |

### Cleaning

The facility will be hosed regularly for cleaning therefore there will be multiple floor drains in the facility. The assumed quantity and location of floor drains, and catch basins located in the shower rooms, are in Table 3. The estimated daily sewage contribution from floor drains was found to be 5120 L.

Table 3: Floor drain contribution

| Location                         | Qty of Floor Drains | LPD per unit<br>(Public Health Act, 2016) | LPD         |
|----------------------------------|---------------------|---|-------------|
| Locker room (x2)                 | 2                   | 190                                       | 380         |
| Washroom (x5)                    | 5                   | 190                                       | 950         |
| Shower room (x2)                 | 2                   | 375                                       | 750         |
| Multi-use Leisure pool deck area | 6                   | 190                                       | 1140        |
| 25 m Lap pool deck area          | 10                  | 190                                       | 1900        |
| <b>Total</b>                     | <b>25</b>           | <b>190</b>                                | <b>5120</b> |

### Fitness Centre/ Walking Track

The estimated daily sewage flow for the facility was determined by using the NB Technical Guidelines for On-site Sewage Disposal Systems. For a Public Swimming Pool, the estimated peak flow is given as 30 per person based on designed bather load, given that there are showers in the facility for pool users this rate was increased to 50 LPD for conservatism. The estimated daily sewage flow for the pool users was found to be 13600 LPD. For the fitness center users, the estimated peak flow rate is 40 LPD per person and 75 LPD per staff. Assuming 100 people use the fitness centre and walking track daily, and there are 6 staff present all day, their contribution to the daily sewage is estimated to be 4450 LPD.

| LPD                             |          |             |
|---------------------------------|----------|-------------|
| <b>Public Swimming Pool</b>     | 50       | per person  |
| Max. bather load                | 272      |             |
| <b>13600</b> LPD                |          |             |
| <b>Fitness / Workout Centre</b> | 40       | per person  |
|                                 | 75       | per staff   |
| Walking track/fitness centre    | 100      |             |
| Staff members                   | 6        |             |
| <b>4450</b> LPD                 |          |             |
|                                 | LPD rate | Qty         |
| Floor drains                    | 190      | 23          |
| Catch basins                    | 375      | 2           |
|                                 |          | <b>LPD</b>  |
|                                 |          | <b>4370</b> |
|                                 |          | <b>750</b>  |

## Total Daily Water Usage

The total daily water usage was estimated as 15% more than the estimated daily sewage flows in addition to the estimated quantity of make-up water. The estimated maximum daily water usage was found to be 43.8 m<sup>3</sup>.

Table 4: Summary of Estimated daily sewage and water usage

| Estimated daily sewage flow              | Liters per day |
|--|----------------|
| Swimmers                                 | 13600          |
| Fitness Centre / Walking track users     | 4000           |
| Staff                                    | 450            |
| Floor Drains and Catch basins            | 5120           |
| <b>TOTAL SEWAGE</b>                      | <b>23170</b>   |
| <b>Total Sewage x 1.5 Safety Factor</b>  | <b>34755</b>   |
| Water consumption (15% more than sewage) | 39968          |
| Make-up Water                            | 3696           |
| <b>TOTAL</b>                             | <b>43776</b>   |
| <b>Total [m<sup>3</sup>]</b>             | <b>43.8</b>    |

## Benchmarking

The Garcelon Civic Centre in St. Stephen NB estimates that they use approximately 200-500 gallons(909-2273L) of make-up water weekly in their smaller pool with a water slide, with an average number of total bathers of 75 per day (McShane, 2018). Extrapolating from this data the VGM pool, with a maximum of 112 bathers in the smaller pool would require about 300-750 gallons (1365-3410 L) of make-up water weekly. This equates to about 485 L per day (for the leisure pool only), which is about a third of the estimated 1568 L required by the NL Public Pools Regulations under the Public Health Act O.C. 96-572.

*Table 5: Average number of swimmers*

|                   | <b>Sussex Potash Corp civic Centre</b> | <b>St. Stephen Garcelon Civic Centre</b> | <b>VGM</b> |
|-------------------|--|--|------------|
| <b>Population</b> | 4312                                   | 4415                                     | 2630       |
| <b>Min</b>        | 150                                    | 75                                       | -          |
| <b>Max</b>        | 300                                    | 150                                      | -          |

Water meter data will be acquired from the Sussex Potash Corp Civic Centre (July 10<sup>th</sup>), a larger facility, to benchmark the total water usage estimation.

## 1 References

Coffin, A., & Sherwood. (2018, 06 27). RE: Benchmarking water usage. (S. Hawkins, Interviewer)

Lipski, A. (2018, 06 27). RE: Grand Manan Aquatic and Wellness Centre Design. (S. Hawkins, Interviewer)

McShane, J. (2018, 06 26). RE: Benchmarking water usage. (S. Hawkins, Interviewer)

Public Health Act. (2016). *New Brunswick Technical Guidelines for On-site Sewage Disposal Systems*. Fredericton.