# LIVEWELL PHARMACY & DOCTOR'S OFFICE
# 271 RIDGEWAY ROAD, CRYSTAL BEACH

## FUNCTIONAL SERVICING DESIGN BRIEF
## EXISTING STORM, SANITARY AND WATER SERVICES

REV 2 – February 01, 2023

PREPARED BY:

HALLEX PROJECT #221113


HALLEX NIAGARA
4999 VICTORIA AVENUE
NIAGARA FALLS, ON L2E 4C9

HALLEX HAMILTON
745 SOUTH SERVICE ROAD, UNIT 205
STONEY CREEK, ON L8E 5Z2

# TABLE OF CONTENTS

# 1. INTRODUCTION

The proposed Livewell Pharmacy & Doctor's Office development consists of the interior renovation of the existing Crystal Beach Fire Station complete with minor site modifications. This development is located at 271 Ridgeway Road, which is west of the Ridgeway Road and Roxborough Ave intersection in the Town of Fort Erie, ON. The subject property also fronts and has access to Cambridge Road East.

The purpose of the service assessment is to determine the functional sizing of the proposed storm, sanitary and water services in addition to the post-development flows from the site to determine the impact on the existing municipal infrastructure.

# 2. EXISTING MUNICIPAL INFRASTRUCTURE

## 2.1 EXISTING SITE DRAINAGE & STORM SEWER

The existing site currently drains via overland flow partly to the drainage system at Ridgeway Road and partly to the drainage system at Cambridge Road East. The site also does not appear to be serviced with a storm lateral connection as the roof downspouts discharge to grade. The existing drainage infrastructure at Ridgeway Road consists of a 300mm municipal storm sewer and a 1200mm municipal storm sewer. The existing drainage infrastructure at Cambridge Road East consists of a 300mm municipal storm sewer.

## 2.2 SANITARY SEWER

The existing site is currently serviced as it consisted of the existing Crystal Beach Fire Station, however the location of the existing sanitary lateral is unknown. The Proctor & Redfern Ltd. Dwg A1-79423-P27, Revision 1, dated January 1982 indicates the sanitary lateral drains towards the sanitary infrastructure at Cambridge Road East. The existing sanitary sewer infrastructure at Cambridge Road East consists of a 250mm municipal sanitary sewer with a 200mm PE Liner. The existing sanitary sewer infrastructure at Ridgeway Road consists of a 300mm municipal sanitary sewer with a 250mm PE Liner.

## 2.3 WATERMAIN

The existing site is currently serviced as it consisted of the existing Crystal Beach Fire Station, however the location of the existing water service is unknown. The Proctor & Redfern Ltd. Dwg A1-79423-P27, Revision 1, dated January 1982 indicates the water service connects to the watermain infrastructure at Cambridge Road East. The site also consists of a fire hydrant located at the northwest corner of the site. The existing watermain infrastructure at Cambridge Road East consists of a 150mm municipal watermain. The existing watermain infrastructure at Ridgeway Road consists of a 150mm municipal watermain.

# 3. STORM SEWER/DRAINAGE SYSTEM

## 3.1 PRE-DEVELOPMENT SITE FLOW

The total drainage area for the subject development is 0.190 hectares with an existing runoff coefficient of 0.84 based on the existing roof, asphalt and grass surfaces. The catchment area plan for the pre-development site condition is provided on Hallex Sketch CSK1, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the allowable peak flow for the pre-development site is as follows:

| Storm Event | Pre-Development Storm Flow |
|---|---|
| 5-year Storm | 37.8 L/s |

These flows are calculated using the Town of Fort Erie intensity-duration-frequency curves. The pre-development flows for the existing site are provided in Exhibit #1 for the five -year storm, attached.

## 3.2 POST-DEVELOPMENT SITE FLOW

The proposed development includes the interior renovation of the existing Crystal Beach Fire Station complete with minor site modifications. The total drainage for the subject development is 0.190 hectares with a proposed runoff coefficient of 0.78 based on the existing surfaces and the minor site modifications to walkways and sheds. Given the minor site alterations that are proposed, the original drainage intent of overland sheet flow to the street shall be maintained. The catchment area plan for the post-development site condition is provided on Hallex Sketch CSK2, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the calculated peak flow for the post-development site is as follows:

| Storm Event | Post-Development Storm Flow |
|---|---|
| 5-year Storm | 35.2 L/s |

These flows are calculated using the Town of Fort Erie intensity-duration-frequency curves. The post-development flows for the proposed development are provided in Exhibit #2 for the five -year storm, attached.

## 3.3 STORMWATER QUANTITY CONTROL

The post-development storm water runoff for the subject site will decrease by 2.6 L/s for the five-year storm from the pre-development flow from the site. As such, storm water quantity controls are not proposed for this development and the original drainage intent of overland sheet flow to the street is proposed to be maintained.

## 4. SANITARY SEWER SYSTEM

Given the proposed Livewell Pharmacy & Doctor's Office development consists of the interior renovation of the existing building complete with minor site modifications, the intent of this analysis is to compare the pre- and post-development sanitary flow rates to determine whether there will be an increase or a decrease in wastewater flows to ensure the existing servicing would be sufficient for the proposed use of the building.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The existing Crystal Beach Fire Station consists of a fire truck garage which has been denoted as warehouse for the purpose of calculating the daily wastewater flows in accordance with Table 8.2.1.3.B of the Ontario Building Code. The warehouse area of the building consists of 2 water closets and 4 loading bays.
- The remaining area of the existing Crystal Beach Fire Station has been denoted as office for the purposes of calculating the daily wastewater flows in accordance with Table 8.2.1.3.B of the Ontario Building Code. The office area of the building consists of a floor area of 270.7$m^2$.
- The proposed Livewell Pharmacy & Doctor's Office has been denoted as doctor's office for the purposes of calculating the daily wastewater flows in accordance with Table 8.2.1.3.B of the Ontario Building Code. The office is assumed to consist of 11 practitioners and 1 employee per 8-hour shift.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #3 are existing.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #4 are assumed and may not represent the final building plumbing design.

The peak drainage rate for the Crystal Beach Fire Station is determined to be 177.0 L/min based on the fixtures and the 43.0 fixture units shown in Exhibit #3, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the probable peak drainage rate for the total fixture units. The wastewater generation is determined to be 4,690 L/day using Table 8.2.1.3B of the O.B.C. as shown in Exhibit #3, attached.

The peak drainage rate for the Livewell Pharmacy & Doctor's Office is determined to be 174.9 L/min based on the fixtures and the 41.5 fixture units shown in Exhibit #4, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the probable peak drainage rate for the total fixture units. The wastewater generation is determined to be 3,100 L/day using Table 8.2.1.3B of the O.B.C. as shown in Exhibit #4, attached.

The post-development sanitary peak flow for the subject site will decrease by 2.1 L/min from the pre-development sanitary peak flow. Given this reduction in peak flow, the existing sanitary sewer should be sufficiently sized for the development provided it is a minimum 100mm diameter sanitary sewer @ 1.0% as it is capable of a draining a maximum hydraulic load of 180 fixture units as per OBC Table 7.4.10.8. The owner is responsible for having the sewer to be reused video inspected prior to the renovation to confirm the size and condition of the sewer. Should the size be too small or the condition of the pipe is poor, the lateral shall be replaced with a minimum 100mm diameter sanitary sewer @ 1.0%.

## 5. WATER DISTRIBUTION SYSTEM

Given the proposed Livewell Pharmacy & Doctor's Office development consists of the interior renovation of the existing building complete with minor site modifications, the intent of this analysis is to compare the pre- and post-development water demand rates to determine whether there will be an increase or a decrease in water demands to ensure the existing servicing would be sufficient for the proposed use of the building.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #5 are existing.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #6 are assumed and may not represent the final building plumbing design.
- The existing Crystal Beach Fire Station is of non-combustible construction and does not have sprinklers and hose cabinets installed throughout the building.
- The proposed Livewell Medical building will remain of non-combustible construction and will not have sprinklers and hose cabinets installed throughout the building.

The domestic water demand for the Crystal Beach Fire Station is determined to be 170.2 L/min based on the fixtures and the 38.8 fixture units shown in Exhibit #5, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the water demands for the total fixture units.

The domestic water demand for the Livewell Pharmacy & Doctor's Office is determined to be 167.0 L/min based on the fixtures and the 37.4 fixture units shown in Exhibit #6, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the water demands for the total fixture units.

The minimum water supply flow rate for fire protection of the Crystal Beach Fire Station is determined to be 5,000 L/min based on the above assumptions as shown in Exhibit #7, attached. The Fire Underwriters Survey – 1999 Water Supply for Public Fire Protection is used to determine the water supply flow rate for the fire protection of the building.

The minimum water supply flow rate for fire protection of the Livewell Pharmacy & Doctor's Office is determined to be 4,000 L/min based on the above assumptions as shown in Exhibit #8, attached. The Fire Underwriters Survey – 1999 Water Supply for Public Fire Protection is used to determine the water supply flow rate for the fire protection of the building.

There are three existing municipal fire hydrants located near the site. The first is located at the northwest corner of the site. The second is located adjacent to the northeast corner of the site on the east side of Ridgeway Road. The third is approximately 30.3m northwest of the property on the westerly corner side of the Essex Place and Cambridge Road East intersection.

The post-development domestic water demand for the subject site will decrease by 3.2 L/min from the pre-development domestic water demand. Given this reduction in water demand, the existing water service should be sufficiently sized for the development provided it is a minimum 25mm diameter water service as it is capable of a draining a maximum hydraulic load of 41 fixture units as per ASHRAE Table A-2.6.1.1.(1). This recommendation is provided assuming a maximum 24.0m water service length and a pressure of 46-60psi in the municipal watermain. Should the size be too small or the condition of the pipe is poor, the lateral shall be replaced with a minimum 25mm diameter water service.

Additionally, the post-development minimum water supply flow rate for fire protection will decrease by 1,000 L/min from the pre-development flow rate. Given this reduction in the minimum water supply flow rate for fire protection, the existing hydrants surrounding the development should provide sufficient coverage for the fire protection of the building.

## 6. CONCLUSION

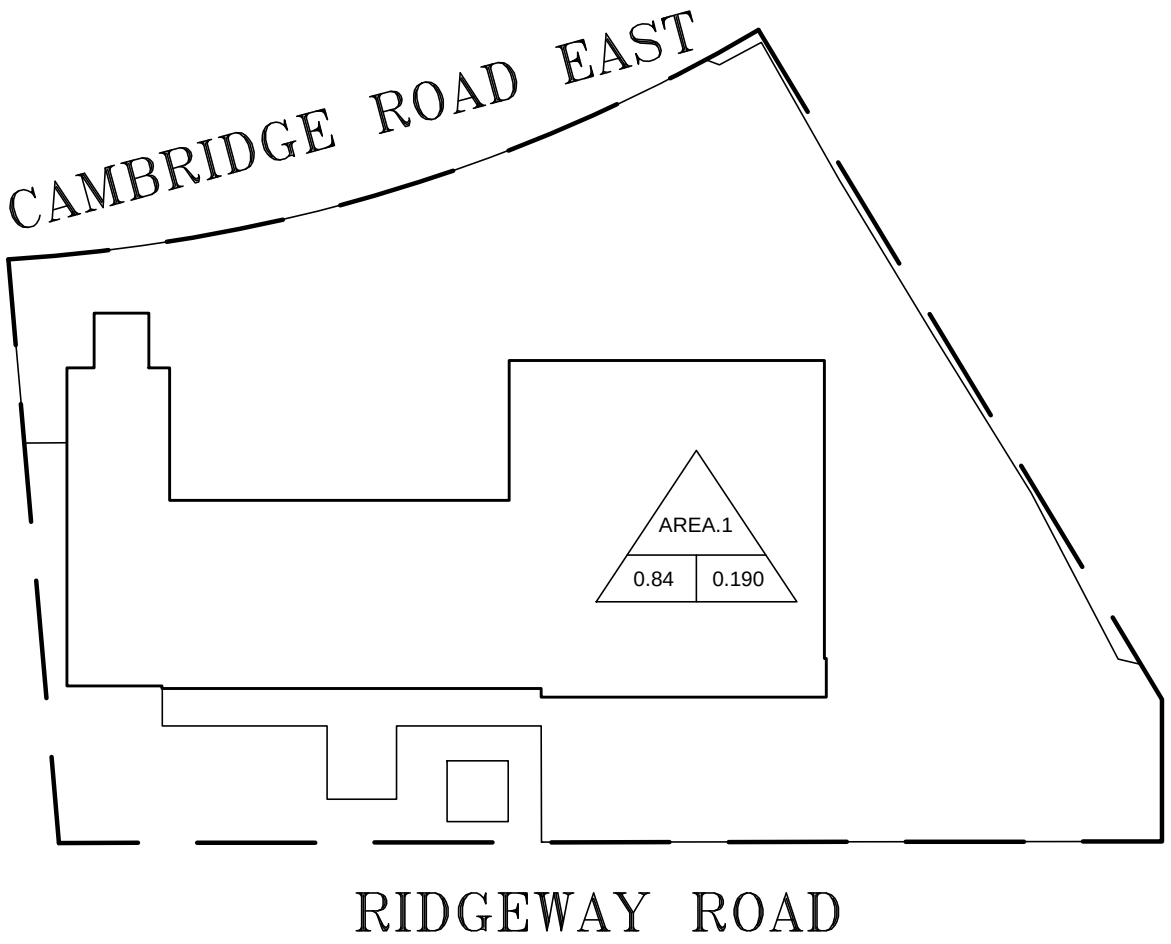
The aforementioned calculations and recommendations for the storm, sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

We trust this report meets your approval. Please contact the undersigned should you have any questions or comments.

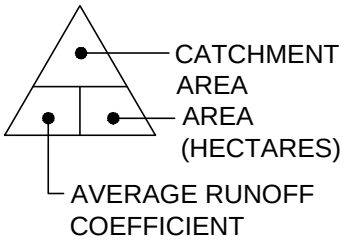
Yours truly,
HALLEX ENGINEERING LTD


Jim Halucha P.Eng
Civil/Structural Engineer

Jonathan Skinner, C.E.T., B.Tech
Civil Technologist




LEGEND



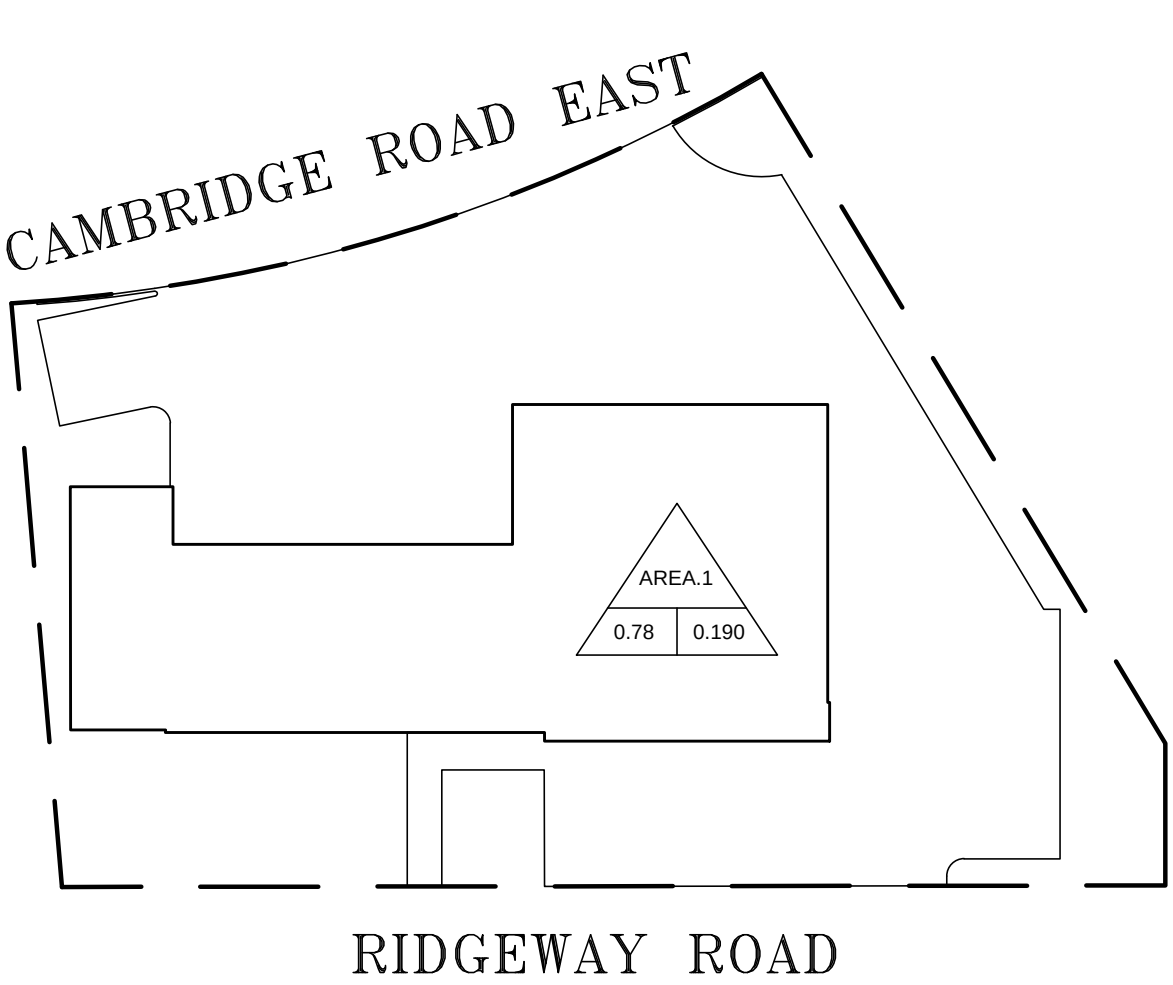

HALLEX ENGINEERING LTD.
4999 Victoria Avenue, Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105
745 South Service Rd. Unit 205, Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

**PROJECT:**
LIVEWELL MEDICAL
271 RIDGEWAY ROAD, CRYSTAL BEACH , ON

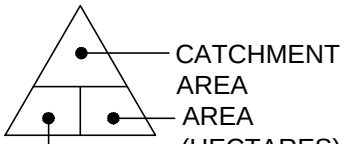
**SHEET TITLE:**
PRE-DEVELOPMENT CATCHMENT AREA PLAN

**DATE:** 02/01/2023
**SCALE:** 1:400
**DR. BY:** JF
**CH. BY:** JS/JH

**JOB No.:** 221113
**DWG.** CSK1
**REV.** 1




LEGEND




HALLEX ENGINEERING LTD.
4999 Victoria Avenue, Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105
745 South Service Rd. Unit 205, Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

**PROJECT:**
LIVEWELL MEDICAL
271 RIDGEWAY ROAD, CRYSTAL BEACH , ON

**SHEET TITLE:**
POST-DEVELOPMENT CATCHMENT AREA PLAN

**DATE:** 02/01/2023
**SCALE:** 1:400
**DR. BY:** JF
**CH. BY:** JS/JH

**JOB No.:** 221113
**DWG.** CSK2
**REV.** 1

# Livewell Medical
## Exhibit #1 - 5 Year Pre - Development Calculations

2/1/2023
Job: 221113

MUNICIPALITY: **Fort Erie**

manning's n = 0.013 Conc Pipe
0.013 PVC Pipe
0.024 Corr. Stl Pipe

Rainfall Intensity Values = A= 747.930
B= 6.800
C= 0.768

| Location | | | Length of Pipe | Area | | Flow Time | | Rainfall Intensity | Unit rate of Runoff | Design Flows | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | From Node | To Node | | Incre-ment | Cum Total | To Upper | In Sectio | | | Cum Flow | Cum Flow |
| | | | (m) | (ha) | (ha) | (min) | (min) | mm/hr | $m^3$/ha*day | ($m^3$/d) | ($m^3$/s) |
| **1** | **Area.1** | **Street** | **N/A** | **0.190** | **0.190** | **10.00** | **N/A** | **86** | **61682** | **3265.0** | **0.0378** |
| Roof | - | - | - | 0.055 | - | - | - | - | 19532.5 | 1074.3 | - |
| Paved | - | - | - | 0.112 | - | - | - | - | 18504.5 | 2072.5 | - |
| Grass | - | - | - | 0.023 | - | - | - | - | 5140.1 | 118.2 | - |

Run-off Coefficients Used:

| | | |
|---|---|---|
| Roof Structure | C = | 0.95 |
| Paved Surface | C = | 0.90 |
| Gravel Surface | C = | 0.60 |
| Perm. Paver | C = | 0.30 |
| Grass Surface | C = | 0.25 |

Velocity Range:

Minimum Velocity = 0.80 m/s
Maximum Velocity = 6.00 m/s

Time of Concentration = 10 min

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9



745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

# Livewell Medical
## Exhibit #2 - 5 Year Post - Development Calculations

2/1/2023
Job: 221113

MUNICIPALITY: **Fort Erie**

Rainfall Intensity Values =

| | |
|---|---|
| A= | 747.930 |
| B= | 6.800 |
| C= | 0.768 |

| Location | | | Length of Pipe | Area | | Flow Time | | Rainfall Intensity | Unit rate of Runoff | Design Flows | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | From Node | To Node | | Incre-ment | Cum Total | To Upper | In Section | | | Cum Flow | Cum Flow |
| | | | (m) | (ha) | (ha) | (min) | (min) | mm/hr | $m^3$/ha*day | ($m^3$/d) | ($m^3$/s) |
| **1** | **Area 1** | **Street** | **N/A** | **0.190** | **0.190** | **10.00** | **N/A** | **86** | **43177** | **3037.8** | **0.0352** |
| Roof | - | - | - | 0.055 | - | - | - | - | 19532.5 | 1074.3 | - |
| Paved | - | - | - | 0.095 | - | - | - | - | 18504.5 | 1757.9 | - |
| Grass | - | - | - | 0.040 | - | - | - | - | 5140.1 | 205.6 | - |

Run-off Coefficients Used:

| | | |
|---|---|---|
| Roof Structure | C = | 0.95 |
| Paved Surface | C = | 0.90 |
| Gravel Surface | C = | 0.60 |
| Perm. Paver | C = | 0.30 |
| Grass Surface | C = | 0.25 |

Velocity Range:

| | | |
|---|---|---|
| Minimum Velocity = | 0.80 | m/s |
| Maximum Velocity = | 6.00 | m/s |

Time of Concentration:

Time of Concentration = 10 min

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

# Livewell Medical
# Exhibit #3 - Pre-Development Wastewater Generation Rate & Peak Drainage Rate

2/1/2023
Job: 221113

## WASTEWATER GENERATION ASSESSMENT

| Occupancy | Development Statistics | Volume (Table 8.2.1.3. A / B) | Total Daily Volume | Notes |
|---|---|---|---|---|
| Warehouse Water Closets | 2 WCs | 950 L/WC | 1900 L/day | Add water closets & loading bays |
| Warehouse Loading Bays | 4 bays | 150 L/bay | 600 L/day | Add water closets & loading bays |
| Office Building Area | 29.2 9.3m2s | 75 L/9.3m2 | 2190 L/day | Choose greater of staff & area |
| | | Total = | 4690 L/day | |

Therefore the total calculated sanitary flow from the site is determined to be 4690 L/day.

## MAXIMUM PROBABLE DRAINAGE RATE

| Fixture | # of Plumbing Fixtures | Fixture Units (Table 7.4.9.3.) | Total Sanitary Fixture Units |
|---|---|---|---|
| Urinal (private, wall washout) | 2 fixtures | 1.5 FUs | 3 FUs |
| Lavatory (private, domestic) | 6 fixtures | 1.5 FUs | 9 FUs |
| Water closet w/ flush tank (private) | 6 fixtures | 4 FUs | 24 FUs |
| Clothes washer (private, domestic) | 1 fixture | 1.5 FUs | 1.5 FUs |
| Dishwasher (domestic) | 1 fixture | 1 FUs | 1 FUs |
| Sink (domestic) | 1 fixture | 1.5 FUs | 1.5 FUs |
| Shower drain (private, 1 head) | 2 fixtures | 1.5 FUs | 3 FUs |
| | | Total = | 43.0 FUs |
| | | Total Flow = | 177.0 L/min |

Therefore the total calculated peak drainage rate is determined to be 177L/min.

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

# Livewell Medical
# Exhibit #4 - Post-Development Wastewater Generation Rate & Peak Drainage Rate

2/1/2023
Job: 221113

## WASTEWATER GENERATION ASSESSMENT

| Occupancy | Development Statistics | Volume (Table 8.2.1.3. A / B) | Total Daily Volume | Notes |
|---|---|---|---|---|
| Doctors Office Practitioner | 11 persons | 275 L/person | 3025 L/day | Add practitioners & staff |
| Doctors Office Staff | 1 person | 75 L/person | 75 L/day | Add practitioners & staff |
| | | Total = | 3100 L/day | |

Therefore the total calculated sanitary flow from the site is determined to be 3100 L/day.

## MAXIMUM PROBABLE DRAINAGE RATE

| Fixture | # of Plumbing Fixtures | Fixture Units (Table 7.4.9.3.) | Total Sanitary Fixture Units |
|---|---|---|---|
| Water closet w/ flush tank (private) | 4 fixtures | 4 FUs | 16 FUs |
| Lavatory (private, domestic) | 4 fixtures | 1.5 FUs | 6 FUs |
| Sink (domestic) | 2 fixtures | 1.5 FUs | 3 FUs |
| Dishwasher (domestic) | 1 fixture | 1 FUs | 1 FUs |
| Lavatory (dental) | 11 fixtures | 1 FUs | 11 FUs |
| Shower drain (private, 1 head) | 1 fixture | 1.5 FUs | 1.5 FUs |
| Sink (service or mop basin) | 1 fixture | 3 FUs | 3 FUs |
| | | Total = | 41.5 FUs |
| | | Total Flow = | 174.9 L/min |

Therefore the total calculated peak drainage rate is determined to be 174.9L/min.

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9



745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX ENGINEERING LTD.

# Livewell Medical
## Exhibit #5 - Pre-Development Water Demand

2/1/2023
Job: 221113

DOMESTIC WATER SUPPLY

| Fixture | # of Plumbing Fixtures | Fixture Units (Table 7.6.3.2.A.) | Total Water Fixture Units |
|---|---|---|---|
| Urinal (private, wall washout) | 2 fixtures | 3 FUs | 6 FUs |
| Lavatory (private, domestic) | 6 fixtures | 1 FUs | 6 FUs |
| Water closet w/ flush tank (private) | 6 fixtures | 3 FUs | 18 FUs |
| Clothes washer (private, domestic) | 1 fixture | 1.4 FUs | 1.4 FUs |
| Dishwasher (domestic) | 1 fixture | 1.4 FUs | 1.4 FUs |
| Sink (domestic) | 1 fixture | 2 FUs | 2 FUs |
| Shower drain (private, 1 head) | 2 fixtures | 2 FUs | 4 FUs |
| | | Total = | 38.8 FUs |
| | | Total Flow = | 170.2 L/min |

Therefore the maximum domestic water demand is determined to be 170.2 L/min.

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9



745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

# Livewell Medical
## Exhibit #6 - Post-Development Water Demand

2/1/2023
Job: 221113

DOMESTIC WATER SUPPLY

| Fixture | # of Plumbing Fixtures | Fixture Units (Table 7.6.3.2.A.) | Total Water Fixture Units |
|---|---|---|---|
| Water closet w/ flush tank (private) | 4 fixtures | 3 FUs | 12 FUs |
| Lavatory (private, domestic) | 4 fixtures | 1 FUs | 4 FUs |
| Sink (domestic) | 2 fixtures | 2 FUs | 4 FUs |
| Dishwasher (domestic) | 1 fixture | 1.4 FUs | 1.4 FUs |
| Lavatory (dental) | 11 fixtures | 1 FUs | 11 FUs |
| Shower drain (private, 1 head) | 1 fixture | 2 FUs | 2 FUs |
| Sink (service or mop basin) | 1 fixture | 3 FUs | 3 FUs |
| | | Total = | 37.4 FUs |
| | | Total Flow = | 167.0 L/min |

Therefore the maximum domestic water demand is determined to be 167 L/min.

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9



745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

# Livewell Medical
# Exhibit #7 - Pre-Development Fire Water Demand

2/1/2023
Job: 221113

FIRE WATER SUPPLY

Building Type: No Fire Protection

| Floor Area | | | Reduct. | |
|---|---|---|---|---|
| First Floor | 545.2 | $m^2$ | 1.00 | 545.2 $m^2$ |
| | | | | 545.2 $m^2$ |

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 4000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -600 L/min

2nd Preliminary Fire Flow = 3400 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

| | | | |
|---|---|---|---|
| North | 14.5 | m | 0.15 |
| South | 12.0 | m | 0.15 |
| West | 26 | m | 0.10 |
| East | 42.5 | m | 0.05 |
| | | | 0.45 |

Net Increase = 1530 L/min

**FINAL FIRE FLOW = 5000.0 L/min**

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey

# Livewell Medical
# Exhibit #8 - Post-Development Fire Water Demand

2/1/2023
Job: 221113

FIRE WATER SUPPLY

Building Type: No Fire Protection

| Floor Area | | | Reduct. | |
|---|---|---|---|---|
| First Floor | 545.2 | $m^2$ | 1.00 | 545.2 $m^2$ |
| | | | | 545.2 $m^2$ |

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 4000 L/min

Fire Hazard: Non-Combustible

Fire Hazard Factor: -0.25

Net Decrease = -1000 L/min

2nd Preliminary Fire Flow = 3000 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

| | | | |
|---|---|---|---|
| North | 14.5 | m | 0.15 |
| South | 12.0 | m | 0.15 |
| West | 26 | m | 0.10 |
| East | 42.5 | m | 0.05 |
| | | | 0.45 |

Net Increase = 1350 L/min

**FINAL FIRE FLOW = 4000.0 L/min**

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey