APPENDIX A

Sanitary Demand &
WWTF Capacity Calculations

CROZIER CONSULTING ENGINEERS

Project: Glenelg Phase 3
Project No.: 1060-6220
Date: 26-May-23
By: AM
Check: JL'A

Dundalk Sanitary Capacity Evaluation

DESCRIPTION	April 2023	POST WWTP UPGRADES	UNITS
Available Capacity	1,832	3,025	m3/day
Average Day Flow	1,124	1,124	m3/day
Reserve Capacity	708	1,901	m3/day
Persons Per Existing Residential Unit (2016 Census Data)	2.6	2.6	Persons
Maximum Day Per Capita Flow	0.331	0.331	m3/day
Persons Per New **Equivalent Residential Unit** (2017 DC Background Study)	2.61	2.61	Persons
Average New Development Per Capita Flow	0.3	0.3	m3/day
Equivalent Flow Per Residential Unit	0.783	0.783	m3/day
Additional ERUs that can be serviced	**905**	**2427**	**ERUs**

TOTAL EQUIVALENT RESIDENTIAL UNIT (ERU) SUMMARY OF OCCUPIDE, COMMITTED AND UNCOMMITTED UNITS

DEVELOPMENT	OCCUPIED UNITS 2023	COMMITTED UNITS	UNCOMMITTED UNITS
White Rose (Phase 1& 2)	66	0	0
White Rose (Phase 3)	0	30	0
Flato North (Phase 3)	46	0	0
Flato North (Phase 4)	22	0	0
Flato North (Phase 5)	59	0	0
Flato North (Phase 6)	68	0	0
Glenelg (Phase 1)	31	152	0
Flato West Block 75	21	35	0
Flato East (Phase 7, 8 & 10)	0	188	0
Flato East (Phase 11)	0	123	0
Flato East (Commercial Block)	0	29	0
Infill Lots	0	5	0
TOTAL COMMITTED UNITS 2021		**562**	**1865**
White Rose (Phase 3)	0	**0**	47
Flato East (Phase 9)	0	**0**	47
Flato East (Phase 11)	0	**0**	50
Glenelg (Phase 2)	0	**0**	155
Glenelg (Phase 3)	0	**0**	459
Flato North West	0	**0**	250
TOTAL UNCOMMITTED UNITS			**1457**
Total Number of Available ERUs			**343**
Total Number of Available ERUs Upon Completion of WWTP Upgrades			**2427**
Total Projected ERUs of Reserve Capacity Available Upon Occupation of Committed Units			**1865**
Projected ERUs of Reserve Capacity Available Upon Occupation of The Above Uncommitted Units			**408**

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File: 1060-6220
Date: 2023.05.26
By: PM
Check By: JL'A

Glenelg Phase 3 Development (Bradley Street Connection) - Sanitary Design Criteria

Developed Site Area		10.38	ha
Number of Residential Units			
Single Residential		78	units
	TOTAL:	**78**	**units**
Person Per Unit		2.61	persons/unit
Residential Population		204	persons
Institutional Population			
School Students		700	students

Unit Sewage flows

Residential (Per New Development Unit Flow Rates, Triton Engineering (2022))	300	L/C/day
Institutional (Per MOE Sewage Works Design Stds.)	140	L/student/day
Infiltration (typical)	0.15	L/s/ha

Total Design Sewage Flows

Infiltration/Inflow Residential		1.56	L/sec
Average Daily Residential Flow		0.71	L/sec
Residential Peak Factor	(Harmon Formula)	4.15	
Average Daily Institutional Flow		1.13	L/sec
Institutional Peak Factor	(Per MOE Guidelines)	1.50	
Total Peak Daily Flow		**6.19**	**L/sec**

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Glenelg Phase 3 Development (Glenelg Connection) - Sanitary Design Criteria

Developed Site Area		12.76	ha
Number of Residential Units			
Single Residential		212	units
Semi		24	units
Townhouse		74	units
	TOTAL:	**310**	**units**
Person Per Unit		2.61	persons/unit
Residential Population		809	persons
Institutional Population			
School Students		700	students

Unit Sewage flows

Residential (Per New Development Unit Flow Rates, Triton Engineering (2022))	300	L/C/day
Institutional (Per MOE Sewage Works Design Stds.)	140	L/student/day
Infiltration (typical)	0.15	L/s/ha

Total Design Sewage Flows

Infiltration/Inflow Residential	1.91	L/sec
Average Daily Residential Flow	2.81	L/sec
Residential Peak Factor (Harmon Formula)	3.86	
Total Peak Daily Flow	**12.75**	**L/sec**

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GLENELG PHASE 3 RESIDENTIAL DEVELOPMENT - EXTERNAL

BY: PM
CHECK: JL'A
SUBMISSION: 2nd FSRSWM

Peak Factor (M) = 1+(14/4+(P/1000)^0.5)
Avg. Daily/Capita Flow = 300 L/cap.d
Q infiltration = 0.15 L/ha.s

N = 0.013
Population = 2.61 p.p.u.

	CATCHMENT AREA	FROM MH	TO MH	LENGTH (m)	INC. AREA (Ha)	CUM. AREA (Ha)	LOTS	INC. POP.	TOTAL POP.	PEAK FACTOR	AVG. FLOW (L/S)	MAX FLOW (L/S)	INFIL. (L/S)	TOTAL INFIL.	COMBINED (L/S)
Phase 2	1	SAN7-PH2	SAN6-PH2	13.4	0.18	0.18	3	8	8	4.42	0.03	0.12	0.03	0.03	**0.15**
	2	SAN6-PH2	SAN5-PH2	67.3	0.62	0.8	13	34	42	4.33	0.15	0.63	0.12	0.12	**0.75**
	3	SAN5-PH2	SAN4-PH2	16.6	0.19	0.99	0	0	42	4.33	0.15	0.63	0.15	0.15	**0.78**
	4	SAN4-PH2	SAN3-PH2	96.2	0.63	1.62	9	23	65	4.29	0.23	0.97	0.24	0.24	**1.21**
	5	SAN7-PH2	SAN8-PH2	37	0.19	0.19	4	10	10	4.41	0.04	0.16	0.03	0.03	**0.19**
	6	SAN8-PH2	SAN9-PH2	67	0.46	0.65	7	18	29	4.36	0.10	0.43	0.10	0.10	**0.53**
	10	SAN10-PH2	SAN9-PH2	83.3	0.38	0.38	6	16	16	4.39	0.05	0.24	0.06	0.06	**0.30**
	Phase 3	SANPLUG2-PH3	SAN9-PH2		4.71	4.71	106	277	277	4.09	0.96	3.93	0.71	0.71	**4.64**
	7	SAN9-PH2	SAN15-PH2	59.7	0.4	6.14	9	23	345	4.05	1.20	4.85	0.92	0.92	**5.77**
	8	SAN15-PH2	SAN3-PH2	58.9	0.42	6.56	11	29	373	4.04	1.30	5.23	0.98	0.98	**6.21**
	9	SAN3-PH2	SAN2-PH2	80	0.4	8.58	7	18	457	3.99	1.59	6.33	1.29	1.29	**7.62**
	11	SAN10-PH2	SAN14-PH2	87.7	0.62	0.62	19	50	50	4.32	0.17	0.74	0.09	0.09	**0.84**
	12	SAN14-PH2	SAN2-PH2	54.1	0.39	1.01	12	31	81	4.27	0.28	1.20	0.15	0.15	**1.35**
	13	SAN2-PH2	SAN1-PH2	80	0.35	9.94	6	16	553	3.95	1.92	7.59	1.49	1.49	**9.08**
	Phase 3	SANPLUG1-PH3	SAN11-PH2		9.25	9.25	183	478	478	3.98	1.66	6.61	1.39	1.39	**8.00**
	14	SAN10-PH2	SAN11-PH2	83.3	0.39	0.39	7	18	18	4.39	0.06	0.28	0.06	0.06	**0.34**
	19	SANMH13	SAN12-PH2	41.6	0.11	0.11	2	5	5	4.44	0.02	0.08	0.02	0.02	
	17	SAN12-PH2	SAN11-PH2	41.6	0.24	0.24	2	5	5	4.44	0.02	0.08	0.04	0.04	**0.12**
	15	SAN11-PH2	SAN13-PH2	88.1	0.62	10.5	15	39	540	3.96	1.88	7.42	1.58	1.58	**9.00**
	16	SAN13-PH2	SAN1-PH2	77.7	0.58	11.08	15	39	579	3.94	2.01	7.93	1.66	1.66	**9.59**
	18	SAN1-PH2	SAN PLUG1	61	0.34	21.36	6	16	1148	3.76	3.99	14.99	3.20	3.20	**18.20**

CROZIER CONSULTING ENGINEERS

GLENELG PHASE 3 RESIDENTIAL DEVELOPMENT - EXTERNAL

BY: PM
CHECK: JL'A
SUBMISSION: 2nd FSRSWM

Peak Factor (M) = 1+(14/4+(P/1000)^0.5)
Avg. Daily/Capita Flow = 300 L/cap.d
Q infiltration = 0.15 L/ha.s

N = 0.013
Population = 2.61 p.p.u.

	CATCHMENT AREA	FROM MH	TO MH	LENGTH (m)	INC. AREA (Ha)	CUM. AREA (Ha)	LOTS	INC. POP.	TOTAL POP.	PEAK FACTOR	AVG. FLOW (L/S)	MAX FLOW (L/S)	INFIL. (L/S)	TOTAL INFIL.	COMBINED (L/S)
Phase 1	14, 15	SANMH13	SANMH6	83.29	1.18	1.18	11	29	29	4.36	0.10	0.43	0.18	0.18	**0.61**
	13	SANMH13	SANMH1	93.96	0.6	0.6	14	37	37	4.34	0.13	0.55	0.09	0.09	**0.64**
	1	SANMH1	SANMH2	95.07	0.58	1.18	14	37	73	4.28	0.25	1.09	0.18	0.18	**1.26**
	of Phase 2 and some Phase	SANPLUG 1	SANMH2	19	21.36	21.36	0	0	1148	3.76	3.99	14.99	3.20	3.20	**18.20**
	2	SANMH2	SANMH3	80	0.79	23.33	12	31	1253	3.73	4.35	16.25	3.50	3.50	**19.75**
	16	SANMH14	SANMH6	87.81	0.58	0.58	11	29	29	4.36	0.10	0.43	0.09	0.09	**0.52**
	5A	SANMH6	SANMH5A	26.09	0.1	1.86	1	3	60	4.30	0.21	0.90	0.28	0.28	**1.17**
	5	SANMH5A	SANMH5	57.2	0.37	2.23	8	21	81	4.27	0.28	1.20	0.33	0.33	**1.53**
	4	SANMH5	SANMH4	64.46	0.38	2.61	12	31	112	4.23	0.39	1.65	0.39	0.39	**2.04**
	3	SANMH4	SANMH3	64.46	0.26	2.87	7	18	131	4.21	0.45	1.91	0.43	0.43	**2.34**
	7	SANMH3	SANMH8	80	0.56	26.76	10	26	1409	3.70	4.89	18.10	4.01	4.01	**22.12**
	17	SANMH14	SANMH15	87.66	0.64	0.64	12	31	31	4.35	0.11	0.47	0.10	0.10	**0.57**
	18	SANMH15	SANMH16	18.59	0.11	0.75	0	0	31	4.35	0.11	0.47	0.11	0.11	**0.59**
	19	SANMH16	SANMH12	66.74	0.43	1.18	4	10	42	4.33	0.15	0.63	0.18	0.18	**0.80**
	21	SANMH18	SANMH17	25.8	0.33	0.33	6	16	16	4.39	0.05	0.24	0.05	0.05	**0.29**
	20	SANMH17	SANMH12	24.74	0.16	0.49	2	5	21	4.38	0.07	0.32	0.07	0.07	**0.39**
	12	SANMH12	SANMH11	58.04	0.34	2.01	6	16	78	4.27	0.27	1.16	0.30	0.30	**1.46**
	11	SANMH11	SANMH7	58.03	0.32	2.33	5	13	91	4.25	0.32	1.35	0.35	0.35	**1.70**
	6	SANMH5	SANMH7	83.29	0.48	0.48	7	18	18	4.39	0.06	0.28	0.07	0.07	**0.35**
	10	SANMH7	SANMH10	76.05	0.46	3.27	13	34	144	4.20	0.50	2.09	0.49	0.49	**2.58**
	9	SANMH10	SANMH8	76.05	0.43	3.7	12	31	175	4.17	0.61	2.53	0.56	0.56	**3.09**
	8	SANMH8	SANMH9	65.5	0.43	30.89	8	21	1605	3.66	5.57	20.39	4.63	4.63	**25.02**
	8A	SANMH9	*SANMH106*	69.95	0.45	31.34	8	21	1626	3.65	5.65	20.63	4.70	4.70	**25.33**
External	MH153	*SANMH106*	*SANMH105*	65.85	0.00	31.34	0	0	1626	3.65	5.65	20.63	4.70	4.70	**25.33**

NOTE: SANITARY MH 100 SERIES REPRESENT EXTERNAL MANHOLES

TOWNSHIP OF SOUTHGATE

Township of Southgate

LEGEND:

PROPERTY
- EXISTING PROPERTY LINE
- DRAFT PLAN APPROVED DEVELOPMENT PARCEL
- DRAFT PLAN APPROVED DEVELOPMENT PHASES
- WATERCOURSES
- WETLAND (GRCA)

MANHOLES
- SANITARY MANHOLE
- MH-159 MUNICIPALLY OWNED MANHOLE NUMBER
- PMH-200 MANHOLE NOT YET ADOPTED BY MUNICIPALITY

FLOW/CAPACITY (%)
- < = 20.0
- < = 40.0
- < = 60.0
- < = 80.0
- < = 100.0

PIPE MATERIAL
- AC ASBESTOS CEMENT
- CONC CONCRETE
- PVC POLYVINYL CHLORIDE

DIAMETER / MATERIAL / LENGTH @ SLOPE — FLOW/CAPACITY

- IN-LINE CLEAN OUT AND SHUT-OFF VALVE
- FORCEMAIN

NOTES:

This is a schematic representation of the sanitary sewer distribution system. While this drawing and its detail views are shown to a scale, symbols and sanitary sewers are not plotted to scale. This mapping should be used for general purposes only.

DUNDALK SANITARY COLLECTION SYSTEM

FEBRUARY 2022
SCALE 1:3,000
A4179 R02 / A4160 R44/R45

DRAFT

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Fergus, Ontario

CROZIER
CONSULTING ENGINEERS

DESIGNED BY: PM
REVIEWED BY: JL'A
DATE: 2023.05.26

DOWN STREAM SANITARY SEWER CAPACITY ANALYSIS - GLENELG PHASE 3

CATCHMENT AREA	FROM MH	TO MH	LENGTH (m)	COMBINED (L/S)	Combined + additional	DIA. (mm)	SLOPE (%)	CAP. (l/s)	VEL. (m/s)	Percent Full
Additional flow coming into MH-32 From Hwy 10	MH-32	MH-31	93	0	0	250	0.25%	**29.73**	0.61	0%
	MH-31	MH-30	93	0.1	0.1	250	0.26%	**30.32**	0.62	0%
	MH-30	MH-29	99.4	0.5	0.5	250	0.26%	**30.32**	0.62	2%
	MH-29	**MH-88**	105.8	1.2	1.2	250	0.29%	**32.02**	0.65	4%
Additional flow coming into MH-120 From Braemore St E	MH-120	MH-119	85	0.3	0.3	250	0.28%	**31.47**	0.64	1%
	MH-119	MH-118	71.6	0.3	0.3	250	0.29%	**32.02**	0.65	1%
	MH-118	**MH-88**	10.4	0.4	0.4	250	2.03%	**84.73**	1.73	0%
	MH-88	MH-28	77.1	1.6	1.6	250	0.23%	**28.52**	0.58	6%
	MH-28	MH-27	118.9	1.9	1.9	250	0.42%	**38.54**	0.79	5%
	MH-27	MH-26	118.6	2.2	2.2	250	0.40%	**37.61**	0.77	6%
	MH-26	MH-25	119.5	2.4	2.4	250	0.43%	**39.00**	0.79	6%
	MH-25	MH-22	118.9	2.7	2.7	250	0.45%	**39.89**	0.81	7%
	MH-22	MH-21	118.6	5.6	5.6	250	1.43%	**71.11**	1.45	8%
	MH-21	MH-20	118.3	5.9	5.9	300	0.26%	**49.31**	0.70	12%
	MH-20	**MH-19**	117.7	6.2	6.2	300	0.45%	**64.87**	0.92	10%
Additional flow coming into MH-152 From Braemore St W	MH-152	MH-146	104.2	0.2	0.2	250	0.42%	**38.54**	0.79	1%
	MH-146	MH-82	74.1	0.4	0.4	250	0.46%	**40.33**	0.82	1%
	MH-82	MH-49	126.2	0.6	0.6	250	0.27%	**30.90**	0.63	2%
	MH-49	MH-48	95.7	0.9	0.9	250	0.22%	**27.89**	0.57	3%
	MH-48	**MH-47**	94.5	1.2	1.2	250	0.33%	**34.16**	0.70	4%
Additional flow coming into MH-134 From Highpoint St	MH-134	MH-133	38	0.1	0.1	200	1.29%	**37.25**	1.19	0%
	MH-133	MH-130	81.5	0.4	0.4	200	0.59%	**25.19**	0.80	2%
	MH-130	MH-135	94.1	1.2	1.2	200	0.45%	**22.00**	0.70	5%
	MH-135	MH-137	57.1	1.5	1.5	200	0.49%	**22.96**	0.73	7%
	MH-137	MH-138	48.4	1.6	1.6	200	0.37%	**19.95**	0.64	8%
	MH-138	MH-139	99.2	1.6	1.6	200	0.36%	**19.68**	0.63	8%
	MH-139	MH-140	61.5	1.6	1.6	200	0.44%	**21.76**	0.69	7%
	MH-140	MH-141	53.5	1.6	1.6	200	0.41%	**21.00**	0.67	8%
	MH-141	MH-75	14.4	1.6	1.6	200	0.21%	**15.03**	0.48	11%
	MH-75	MH-74	91.4	1.8	1.8	200	0.39%	**20.48**	0.65	9%
	MH-74	**MH-47**	20.7	2.4	2.4	200	0.77%	**28.78**	0.92	8%
	MH-47	MH-46	79.3	3.8	3.8	250	0.42%	**38.54**	0.79	10%
	MH-46	MH-45	71.6	3.9	3.9	250	0.40%	**37.61**	0.77	10%
	MH-45	**MH-19**	124.1	4.1	4.1	250	0.40%	**37.61**	0.77	11%
	MH-19	MH-18	87.8	10.2	10.2	375	0.42%	**113.63**	1.03	9%
	MH-18	**MH-17**	110.6	10.7	10.7	375	0.41%	**112.27**	1.02	10%
Additional flow coming from Glenelg Phase 3					6.19					
From White Rose Phase 3					3.26					
From Bradely St	MH-126	MH-125	64	3.46	9.65	200	0.44%	**21.76**	0.69	44%
	MH-125	MH-124	75	3.66	9.85	200	0.52%	**23.65**	0.75	42%
	MH-124	MH-123	36	3.76	9.95	200	0.42%	**21.26**	0.68	47%
	MH-123	MH-86	43.3	4.36	10.55	200	0.46%	**22.24**	0.71	47%
	MH-86	MH-85	71.9	4.56	10.75	200	0.47%	**22.49**	0.72	48%
	MH-85	MH-80	129.5	4.56	10.75	200	0.41%	**21.00**	0.67	51%
	MH-80	MH-69	112.2	5.46	11.65	200	0.43%	**21.51**	0.68	54%
Toronto Street to Owen Sound Street Leg	MH-69	MH-68	124.7	9.16	15.35	200	0.37%	**19.95**	0.64	77%
	MH-68	MH-67	71	9.56	15.75	250	0.23%	**28.52**	0.58	55%
	MH-67	MH-43	69.8	9.56	15.75	250	0.26%	**30.32**	0.62	52%
	MH-43	MH-42	112.5	9.66	15.85	250	0.38%	**36.66**	0.75	43%
	MH-42	**MH-17**	128.6	10.16	16.35	250	0.43%	**39.00**	0.79	42%
	MH-17	MH-16	93	17.1	23.29	450	0.40%	**180.32**	1.13	13%
	MH-16	**MH-15**	93.9	17.3	23.49	450	0.39%	**178.05**	1.12	13%

CROZIER CONSULTING ENGINEERS

DESIGNED BY: PM
REVIEWED BY: JL'A
DATE: 2023.05.26

DOWN STREAM SANITARY SEWER CAPACITY ANALYSIS - GLENELG PHASE 3

CATCHMENT AREA	FROM MH	TO MH	LENGTH (m)	COMBINED (L/S)	Combined + additional	DIA. (mm)	SLOPE (%)	CAP. (l/s)	VEL. (m/s)	Percent Full
Additional flow coming into MH-153					25.33					
From Glenelg	MH-153	MH-108	65.9	0	25.33	250	0.29%	**32.02**	0.65	79%
	MH-108	MH-107	100	0	25.33	250	0.30%	**32.57**	0.66	78%
	MH-107	MH-105	100	0.1	25.43	250	0.30%	**32.57**	0.66	78%
	MH-105	MH-104	100	0.1	25.43	250	0.30%	**32.57**	0.66	78%
	MH-104	MH-154	92	0.2	25.53	250	0.30%	**32.57**	0.66	78%
	MH-154	MH-51	97	0.2	25.53	250	0.30%	**32.57**	0.66	78%
	MH-51	MH-50	89.6	1.5	26.83	300	0.15%	**37.45**	0.53	72%
	MH-50	MH-38	99.1	1.6	26.93	300	0.22%	**45.36**	0.64	59%
	MH-38	**MH-15**	122.2	1.9	27.23	300	0.36%	**58.02**	0.82	47%
	MH-15	MH-83	71.9	25.6	57.12	525	0.39%	**268.57**	1.24	21%
	MH-83	MH-14	75.9	25.8	57.32	525	0.20%	**192.33**	0.89	30%
	MH-14	MH-13	68	26.4	57.92	525	0.29%	**231.60**	1.07	25%
	MH-13	MH-12	126.2	35.9	67.42	525	0.36%	**258.04**	1.19	26%
	MH-12	MH-11	125.9	36.4	67.92	525	0.37%	**261.60**	1.21	26%
	MH-11	MH-10A	80.2	36.4	67.92	600	0.22%	**288.00**	1.02	24%
	MH-10A	MH-10B	13.3	36.5	68.02	600	0.08%	**173.67**	0.61	39%
From Hanbury St	MH-201	MH-202	100.6	0.3	0.3	200	0.71%	**27.64**	0.88	1%
	MH-202	MH-204	72.5	0.5	0.5	250	0.28%	**31.47**	0.64	2%
	MH-204	MH-205	72.8	0.5	0.5	250	0.27%	**30.90**	0.63	2%
	MH-205	MH206	46.6	0.6	0.6	250	0.28%	**31.47**	0.64	2%
	MH-206	MH-207	104.2	0.7	0.7	250	0.28%	**31.47**	0.64	2%
	MH-207	MH-208	82.3	0.8	0.8	250	0.27%	**30.90**	0.63	3%
	MH-208	MH-10B	82.3	0.8	0.8	250	0.28%	**31.47**	0.64	3%
	MH-10B	MH-9	95.8	37.3	136.84	600	0.22%	**288.00**	1.02	48%
	MH-9	MH-8	92.7	37.4	136.94	600	0.25%	**307.01**	1.09	45%
	MH-8	MH-7	102.7	37.5	137.04	600	0.18%	**260.50**	0.92	53%
	MH-7	MH-6	104.5	37.6	137.14	600	0.14%	**229.74**	0.81	60%
	MH-6	MH-5	99.4	37.7	137.24	600	0.22%	**288.00**	1.02	48%
	MH-5	MH-4	104.6	37.8	137.34	600	0.25%	**307.01**	1.09	45%
	MH-4	MH-3	111.9	37.9	137.44	600	0.18%	**260.50**	0.92	53%
	MH-3	MH-2	106.4	38.1	137.64	600	0.24%	**300.80**	1.06	46%
	MH-2	MH-1	94.8	39.2	138.74	600	0.25%	**307.01**	1.09	45%
Wastewater Treatment Facility	MH-1	WWTF	110	39.3	138.84	600	0.19%	**267.64**	0.95	52%