

<i>Development Year</i>	<i>Residential</i>	<i>Employment</i>	<i>Total Population</i>
Base 2012 ¹	15,455	5,045	20,500
2016 ²	16,742	5,558	22,300
2018 ³	17,441	5,813	23,254
2029 ¹	21,285	7,215	28,500
2041 ⁴	26,100	9,300	35,400

Population Forecasts are derived from:

- 1) Region of Waterloo, 2029 Regional Official Plan, Table 1 Regional Population and Employment Forecast
- 2) Township of Wilmot Official Plan (November 2006 Consolidation), Table 1 Township Population and Household Forecast
- 3) Extrapolated between 2016 and 2029 Residential/Employment Populations
- 4) Region of Waterloo, June, 2011, Baden and New Hamburg Water and Wastewater Master Plan Update, Table 1.16
Baden/New Hamburg Population Serviced Growth Scenarios, 2041 High Population



TABLE 1-1
TOWNSHIP OF WILMOT (BADEN/NEW HAMBURG) ESTIMATED POPULATION GROWTH
WASTEWATER SERVICING STUDY

<i>Development Year</i>	<i>Total Population</i>	<i>Calculated WWTP Loading</i>	<i>BNHWWMP Phased Effluent Limits</i>
Base 2012	20,500	4,920 m ³ /day	C of A = 5,200 m ³ /day
2016	22,300	5,352 m ³ /day	Phase 1 = 5,400 m ³ /day
2018	23,254	5,580 m ³ /day	Phase 2 = 7,800 m ³ /day
2029	28,500	6,840 m ³ /day	Phase 3a = 8,100 m ³ /day
2041	35,400	8,496 m ³ /day	Phase 3b = 9,100 m ³ /day
Note: The BNHWWMP Phased Effluent Limits exceed the calculated sanitary flow loading, based on the 240 L/capita/day flow rate.			



TABLE 1-2
ESTIMATED FLOWS COMPARED TO BNHWWMP PHASED EFFLUENT LIMITS
WASTEWATER SERVICING STUDY

<i>Owner Of Registered Lots</i>	<i>Units Registered</i>	<i>2012 Units Completed</i>	<i>Type</i>	<i>Location</i>
Baden Country Estates: Approx. Area 66.4 ha Activa Phase (1,2,3a,3b,4a,4b,5)	602	503	SF	Baden
Vesper Village: Approx. Area 1.5 ha	16	16	TH	Baden
Baden West Development: Approx. Area 9.4 ha	156	156	SF/SD	Baden
Dr. Barton Severance: Approx. Area 0.1 ha	1	0	SF	Baden
Ferguson: Approx. Area 0.1 ha	2	0	SF	Baden
Connolly: Approx. Area 0.1 ha	2	2	SD	Baden
Note: Units – Residential, SF – Single Family, TH – Townhouse, SD – Semi Detached				



TABLE 1-3
NEW DEVELOPMENTS IN THE TOWN OF BADEN
WASTEWATER SERVICING STUDY

<i>Owner Of Registered Lots</i>	<i>Units Registered</i>	<i>2012 Units Completed</i>	<i>Type</i>	<i>Location</i>
Stonecroft: Approx. Area 41.2 ha Phase (1-6, 30 CDM-01601)	490	336	SF	New Hamburg
Forest Glen Phase 2: Approx. Area 6.8 ha	49	49	SF	New Hamburg
Township Semi Lots: Approx. Area 0.5 ha	18	18	SD	New Hamburg
MAK: Approx. Area 14.3 ha	210	96	SF/SD/TH	New Hamburg
Hamilton Rd: Approx. Area 4.7 ha	96	96	SF/TH	New Hamburg
PAB - Hostetler Ext.: Approx. Area 4.5 ha	73	48	SF/SD/TH	New Hamburg
Sunvest -Catharine St: Approx. Area 4.4 ha	74	63	SF	New Hamburg
Deutschmann-Fairview St: Approx. Area 2.0 ha	14	0	TH	Hew Hamburg
Note: Units - Residential, SF - Single Family, TH - Townhouse, SD - Semi Detached				



TABLE 1-4
NEW DEVELOPMENT IN THE TOWN OF NEW HAMBURG
WASTEWATER SERVICING STUDY

<i>Owner Of Registered Lots</i>	<i>Est. 2012 Population</i>	<i>Peak Flow & I/I (L/S)</i>	<i>Entry Manhole</i>	<i>Location</i>
Baden Country Estates: Approx. Area 66.4 ha Activa Phase (1,2,3a,3b,4a,4b,5)	1402	31.04	MH14	Baden
Vesper Village: Approx. Area 1.5 ha	45	1.00	MH62	Baden
Baden West Development: Approx. Area 9.4 ha	435	8.45	MH33	Baden
Dr. Barton Severance: Approx. Area 0.1 ha	0	0.02*	MH159	Baden
Ferguson: Approx. Area 0.1 ha	0	0.02*	MH32	Baden
Connolly: Approx. Area 0.1 ha	6	0.10	MH25	Baden
Note: * - Peak Flow due only to Inflow/Infiltration (I/I)				



TABLE 1-5

2012 POPULATION, PEAK FLOW AND ENTRY MANHOLE - NEW DEVELOPMENTS IN THE TOWN OF BADEN

WASTEWATER SERVICING STUDY

<i>Owner Of Registered Lots</i>	<i>Est. 2012 Population</i>	<i>Peak Flow & I/I (L/S)</i>	<i>Entry Manhole</i>	<i>Location</i>
Stonecroft: Approx. Area 41.2 ha Phase (1-6, 30 CDM-01601)	938	20.62	MH387	New Hamburg
Forest Glen Phase 2: Approx. Area 6.8 ha	137	3.32	PS#1	New Hamburg
Township Semi Lots: Approx. Area 0.5 ha	50	0.94	2 MH's west of MH347 MH 7-3 MH 7-11	New Hamburg
MAK: Approx. Area 14.3 ha	268	6.61	2 MHs west of MH347	New Hamburg
Hamilton Rd: Approx. Area 4.7 ha	268	5.17	MH1A	New Hamburg
PAB – Hostetler Ext.: Approx. Area 4.5 ha	134	2.94	MH306	New Hamburg
Sunvest –Catharine St: Approx. Area 4.4 ha	176	3.64	MH4-10	New Hamburg
Deutschmann-Fairview St: Approx. Area 2.0 ha	0	0.30*	MH 1-68	Hew Hamburg
Note: * - Peak Flow due only to Inflow/Infiltration (I/I)				



TABLE 1-6

2012 POPULATION, PEAK FLOW AND ENTRY MANHOLE - NEW DEVELOPMENTS IN THE TOWN OF NEW HAMBURG

WASTEWATER SERVICING STUDY

Alternative A:

Baden

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	T	Future Intensification	0.79			47		47
2	BB	Industrial Growth	9	205	102	561		868
3	U	Future Intensification	0.96			57		57
4	S,R,V	Future Intensification	17.17			1030		1030
5	P	Residential	16.6			514	150	664
6	O	Residential	27.3	309	168	409	206	1092
7	AA	Industrial Growth	121				834	834
8	Y	Residential	14.9				596	596
9	Z	Residential	6.8				204	204

*Required Additional
Baden Population*

ResSub 0
ResInten 569
Emp 0

New Hamburg

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	N	Industrial Growth	57	308	153	841	1251	2553
2	H	Future Intensification	0.8			48		48
3	A	Residential	11	440				440
4	J	Future Intensification	1.99			120		120
5	K	Future Intensification	0.33			20		20
6	F1	Residential	20.7	23	172	633		828
	F2	Residential	2		80			80
7	G1	Residential	13.3					0
	G2	Residential	15.4					0
8	C	Residential	14.9					0
9	B	Residential	17.3					0
10	Q	Residential	30.3					0
11	L	Residential	32					0
12	M	Residential	28					0
13	X	Residential	12					0
14	W	Residential	33					0

*Required Additional
New Hamburg
Population*

ResSub 2484
ResInten 2367
Emp 0

Note: No anticipated population growth.

TABLE 3-1
PROPOSED DISTRIBUTION OF ADDITIONAL POPULATION
ALTERNATIVE A (DO NOTHING)
WASTEWATER SERVICING STUDY



Alternative B:

Baden

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	T	Future Intensification	0.79			47		47
2	BB	Industrial Growth	9	205	102	561		868
3	U	Future Intensification	0.96			57		57
4	S,R,V	Future Intensification	17.17			1030		1030
5	P	Residential	16.6			514	150	664
6	O	Residential	27.3			886	206	1092
7	AA	Industrial Growth	121				834	834
8	Y	Residential	14.9				596	596
9	Z	Residential	6.8				204	204

<i>Required Additional Baden Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	0	9.5 Ha
<i>ResInten</i>	569	
<i>Emp</i>	0	

New Hamburg

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	N	Industrial Growth	57	308	153	841	1251	2553
2	H	Future Intensification	0.8			48		48
3	A	Residential	11			440		440
4	J	Future Intensification	1.99			120		120
5	K	Future Intensification	0.33			20		20
6	B	Residential	17.3				692	692
7	C	Residential	14.9				596	596
8	F1	Residential	20.7	23	252	553		828
	F2	Residential	2			80		80
9	G1	Residential	13.3			135	397	532
	G2	Residential	15.4			616		616
10	L	Residential	32				48	48
11	W	Residential	33					0
12	M	Residential	28					0
13	X	Residential	12					0
14	Q	Residential	30					0

<i>Required Additional New Hamburg Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	0	39.5 Ha
<i>ResInten</i>	2368	
<i>Emp</i>	0	

Note: [] No anticipated population growth.



TABLE 3-2
PROPOSED DISTRIBUTION OF ADDITIONAL POPULATION
ALTERNATIVE B
WASTEWATER SERVICING STUDY

Alternative C:

Baden

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	T	Future Intensification	0.79			47		47
2	BB	Industrial Growth	9	205	102	561		868
3	U	Future Intensification	0.96			57		57
4	S,R,V	Future Intensification	17.17			1030		1030
5	P	Residential	16.6			514	150	664
6	O	Residential	27.3			886	206	1092
7	AA	Industrial Growth	121				834	834
8	Y	Residential	14.9				596	596
9	Z	Residential	6.8				204	204

<i>Required Additional Baden Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	0	9.5 Ha
<i>ResInten</i>	569	
<i>Emp</i>	0	

New Hamburg

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	N	Industrial Growth	57	308	153	841	1251	2553
2	H	Future Intensification	0.8			48		48
3	A	Residential	11			440		440
4	J	Future Intensification	1.99			120		120
5	K	Future Intensification	0.33			20		20
6	Q	Residential	30					0
7	W	Residential	33					0
8	X	Residential	12					0
9	F1	Residential	20.7	23	252	553		828
	F2	Residential	2			80		80
10	G1	Residential	13.3			135	397	532
	G2	Residential	15.4			616		616
11	L	Residential	32				48	48
12	M	Residential	28					0
13	C	Residential	14.9				596	596
14	B	Residential	17.3				692	692
15	AA	Industrial Growth	121					0

<i>Required Additional New Hamburg Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	0	39.5 Ha
<i>ResInten</i>	2368	
<i>Emp</i>	0	

Note: No anticipated population growth.

TABLE 3-3
PROPOSED DISTRIBUTION OF ADDITIONAL POPULATION
ALTERNATIVE C
WASTEWATER SERVICING STUDY



Alternative D:

Baden

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	T	Future Intensification	0.79			47		47
2	BB	Industrial Growth	9	205	102	561		868
3	U	Future Intensification	0.96			57		57
4	S,R,V	Future Intensification	17.17			1030		1030
5	P	Residential	16.6			514	150	664
6	O	Residential	27.3			886	206	1092
7	AA	Industrial Growth	121				834	834

<i>Required Additional Baden Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	800	9.5 Ha
<i>ResInten</i>	569	
<i>Emp</i>	0	

New Hamburg

Priority	Dev.	Development Status	Area(ha)	2016	2018	2029	2041	Dev. Pop.
1	N	Industrial Growth	57	308	153	841	1251	2553
2	H	Future Intensification	0.8			48		48
3	A	Residential	11			440		440
4	J	Future Intensification	1.99			120		120
5	K	Future Intensification	0.33			20		20
6	F1	Residential	20.7	23	252	553		828
	F2	Residential	2			80		80
7	G1	Residential	13.3			135	397	532
	G2	Residential	15.4			616		616
8	C	Residential	14.9					0
9	B	Residential	17.3					0
10	L	Residential	32				1280	1280
11	M	Residential	28				856	856
12	W	Residential	33					0
13	X	Residential	12					0
14	Q	Residential	30					0
15	Z	Residential	6.8					0
16	Y	Residential	14.9					0

<i>Required Additional New Hamburg Population</i>		<i>Dev. Area</i>
<i>ResSub</i>	-800	39.5 Ha
<i>ResInten</i>	2368	
<i>Emp</i>	0	

Note: No anticipated population growth.



TABLE 3-4
PROPOSED DISTRIBUTION OF ADDITIONAL POPULATION
ALTERNATIVE D
WASTEWATER SERVICING STUDY

CRA - Conestoga-Rovers & Associates						Revised: 2014 Feb 21										2014 Feb 21															
EVALUATED BY/DATE: S. G. Wong/August 2013 G. Wong July 2, 2013						MUNICIPALITY: Township of Wilmet PROJECT: Wastewater Servicing Study for New Growth Areas Baden & New Hamburg										Sheet No. 1.00															
SANITARY SEWER PRELIMINARY EVALUATION SHEET - ALTERNATIVE A (DO NOTHING)																						M = 1 + 14/(4 + (Pop) ^{0.5} Pop = Population in 1,000's Qa = q li × A [L/sec] Qp = Qa × M [L/sec] Qi = I × A [L/sec] Qd = Qp + Qi [L/sec]									
0.35 cu m/c/d = avg flow Average urban RESIDENTIAL flow 0.150 L/sec/ha = infiltration flow						Pop = 2.79 people/unit																									
SEWER LINE LOCATION			INDIVIDUAL		CUMMULATIVE		Peaking	Average	Peak	Infiltration	Pk Dign	Grade	Pipe	Diam.	Cap'y Cf	Full veloc.	Qd/Of	Vd/Vf	Qd veloc.	% depth	Evaluation	Capacity Test on									
STREET	FROM	TO	Area - A	Pop.	Area - A	Res Pop.	factor M	Flow Qa	Flow Qp	Flow Qi	Flow Qd	[%]	Matl	[mm]	[L/sec]	[m/sec]	[chart]	[chart]	[m/sec]			Existing sewer									
NAME/CATCHMENT	MH	MH	[ha]		[ha]			[L/sec]	[L/sec]	[L/sec]	[L/sec]																				
BADEN SANITARY																															
LIVINGSTON BLVD.	MH282	MH14	0.96	24	110.26	3,436	3.39	13.92	47.20	16.539	63.74	0.30%	PVC	300	53.0	0.75	1.203	1.130	0.85	SURC	SURCHARGED										
	MH280	MH282	1.91	48	109.30	3,411	3.39	13.82	46.91	16.396	63.30	0.30%	PVC	300	53.0	0.75	1.195	1.130	0.85	SURC	SURCHARGED										
	MH279	MH280	0.96	24	67.57	2,111	3.57	8.55	30.51	10.135	40.64	0.30%	PVC	300	53.0	0.75	0.767	1.109	0.83	64%	ADEQUATE										
	MH243	MH279	13.78	349	66.61	2,087	3.57	8.45	30.19	9.992	40.18	0.40%	PVC	250	37.6	0.77	1.068	1.151	0.88	SURC	SURCHARGED										
ISAAC SHANTZ DR.	MH223	MH243	1.91	48	52.83	1,738	3.63	7.04	25.58	7.925	33.50	0.50%	PVC	200	23.2	0.74	1.445	1.130	0.83	SURC	SURCHARGED										
	MH209	MH223	8.36	212	50.92	1,690	3.64	6.85	24.93	7.639	32.57	0.60%	PVC	200	25.4	0.81	1.282	1.130	0.91	SURC	SURCHARGED										
	MH211	MH209	5.97	151	19.62	697	3.90	2.82	11.00	2.943	13.95	0.60%	PVC	200	25.4	0.81	0.549	1.021	0.83	53%	ADEQUATE										
WAGLER AVE.	MH269	MH280	6.97	176	39.83	1,252	3.73	5.07	18.94	5.974	24.91	0.50%	PVC	200	23.2	0.74	1.074	1.151	0.85	SURC	SURCHARGED										
	MH261	MH269	2.32	59	32.86	1,075	3.78	4.36	16.47	4.929	21.39	1.65%	PVC	200	42.1	1.34	0.508	1.000	1.34	50%	ADEQUATE										
	MH262	MH261	13.94	353	30.54	1,017	3.80	4.12	15.63	4.580	20.21	1.35%	PVC	200	38.1	1.21	0.530	1.011	1.23	51%	ADEQUATE										
JACOB CRESSMAN DR.	MH206	MH209	3.72	94	22.94	781	3.87	3.16	12.24	3.441	15.68	0.60%	PVC	200	25.4	0.81	0.617	1.053	0.85	56%	ADEQUATE										
	MH205	MH206	3.16	80	19.22	687	3.90	2.78	10.85	2.884	13.74	0.85%	PVC	200	30.2	0.96	0.454	0.964	0.93	47%	ADEQUATE										
	MH201	MH205	0.93	24	16.07	607	3.93	2.46	9.66	2.410	12.07	0.60%	PVC	200	25.4	0.81	0.475	0.978	0.79	48%	ADEQUATE										
	MH200	MH201	1.49	38	15.14	584	3.94	2.36	9.31	2.270	11.58	1.00%	PVC	200	32.8	1.04	0.353	0.899	0.94	41%	ADEQUATE										
RES. DEVEL. AREA O	2016-29	MH200 & 211	27.30	1,092	27.30	1,092	3.78	4.42	18.70	4.095	20.79																				
RES. DEVEL. AREA P	2016-29	MH282	16.60	664	16.60	664	3.91	2.89	10.51	2.490	13.00																				
RES. DEVEL. AREA Y	>2029	MH16	14.90	596	14.90	596	3.93	2.41	9.50	2.235	11.73																				
RES. DEVEL. AREA Z	>2029	MH16	6.80	204	6.80	204	4.14	0.83	3.43	1.020	4.45																				
INTEN. AREA S, R, V	2029	MH43	17.17	1,030	17.17	1,030	3.79	4.17	15.82	2.576	18.40	0.29%	PVC	200	17.7	0.56	1.042	1.191	0.65	SURC	SURCHARGED	MH68 DS MH67									
INTEN. AREA U	2029	MH12	0.96	57	0.96	57	4.30	0.23	0.99	0.144	1.14																				
INTEN. AREA T	2029	MH50	0.79	47	0.79	47	4.32	0.19	0.82	0.118	0.94																				
INDUSTRIAL AREA BB	2016-29	MH6	9.00	668	9.00	668	3.84	3.52	13.50	1.350	14.85																				
INDUSTRIAL AREA AA	>2029	MH6	121.00	834	121.00	834	3.85	3.38	13.01	18.150	31.16																				
NEW HAMBURG SANITARY																															
DEVELOPMENT AREAS F1 & F2	2016-29	FOR GLPS	22.70	908	22.70	908.00	3.83	3.68	14.08	3.405	17.48																				
RES. DEVEL. AREA A	2016-29	MH1-74	11.00	440	11.00	440	4.00	1.78	7.13	1.650	8.78	0.48%	PVC	200	22.7	0.72	0.387	0.921	0.67	43%	ADEQUATE	MH378 DS MH380									
INTEN. AREA H	2029	MH1-74	0.80	48	0.80	48	4.32	0.19	0.84	0.120	0.96																				
INTEN. AREA K	2029	MH6-7	0.33	20	0.33	20	4.38	0.08	0.35	0.050	0.40																				
INTEN. AREA J	2029	MH3-32	1.99	120	1.99	120	4.22	0.49	2.05	0.299	2.35																				

Legend:

- Existing Sewer Flows
- Proposed Development Flows
- Development Flows into Hydraulic Model
- Capacity Testing of Existing Sewer



TABLE 3-5
PRELIMINARY SANITARY FLOW EVALUATION
ALTERNATIVE A
BADEN AND NEW HAMBURG
WASTEWATER SERVICING STUDY

CRA - Conestoga-Rovers & Associates					EVALUATED BY/DATE: S. G. Wong/August 2013 G. Weng July 2, 2013										MUNICIPALITY: Township of Wilmet PROJECT: Wastewater Servicing Study for New Growth Areas Baden & New Hamburg										Sheet No. 1.00									
SANITARY SEWER PRELIMINARY EVALUATION SHEET - ALTERNATIVE B																																		
0.35 cu m/c/d = avg flow 0.150 L/sec/ha = infiltration flow										Average urban RESIDENTIAL flow										Pop. = 2.79 people/unit					$M = 1 + 14/(4 + (Pop)^{0.5})$ $Q_a = q_i \times A$ [L/sec] $Q_p = Q_a \times M$ [L/sec] $Q_i = I \times A$ [L/sec] $Q_d = Q_p + Q_i$ [L/sec]					Pop = Population in 1,000's				
SEWER LINE LOCATION																																		
STREET NAME/CATCHMENT		FROM MH	TO MH	Area - A [ha]	Pop.	CUMMULATIVE Area - A [ha]	Res Pop.	Peaking factor M	Average Flow Q _a [L/sec]	Peak Flow Q _p [L/sec]	Infiltration Flow Q _i [L/sec]	Pk.Dsgn Flow Q _d [L/sec]	Grade (%)	Pipe Matl	Diam (mm)	Cap'y Q _f [L/sec]	Full veloc. [m/sec]	Q _d /Q _f [chart]	V _d /V _f [chart]	Q _d veloc. [m/sec]	% depth	Evaluation	Capacity Test on Existing sewer											
BADEN SANITARY																																		
LIVINGSTON BLVD		MH-282	MH114	0.96	24	82.96	2,344	3.53	9.49	33.52	12.444	45.97																						
		MH-280	MH282	1.91	48	82.00	2,319	3.53	9.40	33.21	12.301	45.51	0.30%	PVC	300	53.0	0.75	0.859	1.135	0.85	70%	ADEQUATE												
		MH-279	MH280	0.96	24	40.27	1,019	3.79	4.13	15.67	6.040	21.71	0.30%	PVC	300	53.0	0.75	0.410	0.935	0.70	44%	ADEQUATE												
		MH-243	MH279	13.78	349	39.31	995	3.80	4.03	15.32	5.897	21.22	0.40%	PVC	250	37.6	0.77	0.564	1.027	0.79	53%	ADEQUATE												
WAGLER AVE		MH-269	MH280	6.97	176	39.83	1,252	3.73	5.07	18.94	5.974	24.91	0.50%	PVC	200	23.2	0.74	1.074	1.151	0.85	SURC	SURCHARGED												
		MH-261	MH269	2.32	59	32.86	1,075	3.78	4.36	16.47	4.929	21.39	1.65%	PVC	200	42.1	1.34	0.508	1.000	1.34	50%	ADEQUATE												
		MH-262	MH261	13.94	353	30.54	1,017	3.80	4.12	15.63	4.580	20.21	1.35%	PVC	200	38.1	1.21	0.530	1.011	1.23	51%	ADEQUATE												
RES. DEVEL. AREA Q		2016-29	MH114	17.30	1,092	27.30	1,092	3.78	4.42	16.70	4.085	20.79																						
RES. DEVEL. AREA P		2016-29	MH262	16.60	664	16.60	664	3.91	2.69	10.51	2.490	13.00																						
RES. DEVEL. AREA Y		>2029	MH16	14.90	596	14.90	596	3.93	2.41	9.50	2.235	11.73																						
RES. DEVEL. AREA Z		>2029	MH16	6.50	204	6.50	204	4.14	0.83	3.43	1.020	4.45																						
INTEN. AREA S, R, V		2029	MH143	17.17	1,030	17.17	1,030	3.79	4.17	15.82	2.576	18.40	0.29%	PVC	200	17.7	0.56	1.042	1.181	0.65	SURC	SURCHARGED	MH18 DS MH17											
INTEN. AREA U		2029	MH12	0.96	57	0.96	57	4.30	0.23	0.99	0.144	1.14																						
INTEN. AREA T		2029	MH150	0.79	47	0.79	47	4.32	0.19	0.82	0.119	0.94																						
INDUSTRIAL AREA BB		2016-29	MH16	9.00	968	9.00	868	3.64	3.52	13.50	1.350	14.85																						
INDUSTRIAL AREA AA		>2029	MH16	121.00	834	121.00	834	3.85	3.38	13.01	18.150	31.16																						
NEW HAMBURG SANITARY																																		
INDUSTRIAL AREA N		2016-29	MH1415	57.00	2,553	172.60	5945	3.17	24.06	76.45	25.890	102.34	0.50%	PVC	375	124.0	1.12	0.825	1.126	1.26	86%	ADEQUATE												
RES. DEVEL. AREA B		2016-29		17.30	692	115.60	3392	3.40	13.74	46.67	17.340	64.01	0.50%	PVC	300	88.4	0.97	0.936	1.156	1.13	76%	ADEQUATE												
RES. DEVEL. AREA C		2016-29		14.90	596	98.30	2700	3.48	10.94	38.07	14.745	52.82	0.50%	PVC	300	88.4	0.97	0.772	1.112	1.08	85%	ADEQUATE												
RES. DEVEL. AREAS F1 & F2		2016-29		32.70	908	83.40	2,104	3.57	8.52	30.42	12.510	42.93	0.50%	PVC	300	88.4	0.97	0.628	1.058	1.02	57%	ADEQUATE												
RES. DEVEL. AREAS C1 & C2		2016-29		38.70	1,148	50.70	1,106	3.75	4.84	18.16	9.105	27.27	0.50%	PVC	250	42.0	0.86	0.848	1.089	0.92	58%	ADEQUATE												
RES. DEVEL. AREA L		>2029		12.00	48	32.00	48	4.32	0.19	0.84	4.800	5.64	0.50%	PVC	200	33.2	0.74	0.243	0.606	0.60	34%	ADEQUATE												
RES. DEVEL. AREA W		>2029		13.00	0																													
RES. DEVEL. AREA M		>2029		18.00	0																													
RES. DEVEL. AREA X		>2029		12.00	0																													
RES. DEVEL. AREA Q		2016-29		10.00	0																													
RES. DEVEL. AREA A		2016-29	MH11-74	11.00	440	11.00	440	4.00	1.78	7.13	1.650	8.78	0.48%	PVC	200	22.7	0.72	0.387	0.921	0.67	43%	ADEQUATE	MH379 DS MH389											
INTEN. AREA H		2029	MH11-74	0.90	48	0.90	48	4.32	0.19	0.84	0.120	0.96																						
INTEN. AREA K		2029	MH6-7	0.33	20	0.33	20	4.38	0.08	0.35	0.050	0.40																						
INTEN. AREA J		2029	MH13-32	1.99	120	1.99	120	4.22	0.49	2.05	0.299	2.35																						

Legend:

- Existing Sewer Flows
- Proposed Development Flows
- Development Flows into Hydraulic Model
- Capacity Testing of Existing Sewer

TABLE 3-6
PRELIMINARY SANITARY FLOW EVALUATION
ALTERNATIVE B
BADEN AND NEW HAMBURG
WASTEWATER SERVICING STUDY



EVALUATED BY/DATE: S.G Wong/August 2013 G. Wong July 2, 2013					MUNICIPALITY: Township of Wilmet PROJECT: Wastewater Servicing Study for New Growth Areas Baden & New Hamburg					Sheet No 1.00														
SANITARY SEWER PRELIMINARY EVALUATION SHEET - ALTERNATIVE C					M = 1 + 14/4 * (Pop) ^{0.5} Qa = ci * A [L/sec] Qp = Qa * M [L/sec] Qi = i * A [L/sec] Qd = Qp + Q [L/sec]										Pop = Population in 1,000's									
0.35 cu m/c/d = avg flow 0.150 L/sec/ha = infiltration flow					Average urban RESIDENTIAL flow					Pop. = 2.79 people/unit														
SEWER LINE LOCATION					INDIVIDUAL		CUMMULATIVE		Peaking factor M	Average Flow Qa [L/sec]	Peak Flow Qp [L/sec]	Infiltration Flow Qi [L/sec]	Pk Dsgn Flow Qd [L/sec]	Grade [%]	Pipe Matl	Diam [mm]	Cap'y Qi [L/sec]	Full veloc. [m/sec]	Qd/Qi [chart]	Vd/Vi [chart]	Qd veloc. [m/sec]	% depth	Evaluation	Capacity Test on Existing sewer
BADEN SANITARY																								
LIVINGSTON BLVD.		MH282	MH114	0.96	24	82.96	2344	3.53	9.49	33.52	12.444	45.97												
		MH280	MH282	1.91	48	82.00	2319	3.53	9.40	33.21	12.301	45.51	0.30%	PVC	300	53.0	0.75	0.859	1.135	0.85	70%	ADEQUATE		
		MH279	MH280	0.96	24	40.27	2271	3.54	9.20	32.59	6.040	38.63	0.30%	PVC	300	53.0	0.75	0.729	1.099	0.82	63%	ADEQUATE		
		MH243	MH279	13.78	349	39.31	995	3.80	4.03	15.32	5.897	21.22	0.40%	PVC	250	37.6	0.77	0.564	1.027	0.79	53%	ADEQUATE		
WAGLER AVE		MH269	MH280	8.97	176	39.83	1252	3.73	5.07	18.94	5.974	24.91	0.50%	PVC	200	23.2	0.74	1.074	1.151	0.85	SURC	SURCHARGED		
		MH261	MH269	2.32	59	32.86	1075	3.78	4.36	16.47	4.929	21.39	1.65%	PVC	200	42.1	1.34	0.508	1.000	1.34	50%	ADEQUATE		
		MH262	MH261	13.94	353	30.54	1017	3.80	4.12	15.63	4.580	20.21	1.35%	PVC	200	38.1	1.21	0.530	1.011	1.23	51%	ADEQUATE		
RES. DEVEL AREA C		2016-29	MH114	27.30	1,092	27.30	1092	3.78	4.42	16.70	4.095	20.79												
RES. DEVEL AREA P		2016-29	MH282	16.60	684	16.60	684	3.91	2.89	10.51	2.490	13.00												
RES. DEVEL AREA Y		2029	MH116	14.90	596	14.90	596	3.93	2.41	9.50	2.235	11.73												
RES. DEVEL AREA Z		2029	MH116	8.60	204	8.60	204	4.14	0.83	3.43	1.020	4.45												
INTEN AREAS R, V		2029	MH143	17.17	1,030	17.17	1030	3.79	4.17	15.82	2.576	16.40	0.29%	PVC	200	17.7	0.50	1.042	1.161	0.65	SURC	SURCHARGED	MH66 DS MH67	
INTEN AREA U		2029	MH112	0.96	57	0.96	57	4.30	0.23	0.99	0.144	1.14												
INTEN AREA T		2029	MH150	0.79	47	0.79	47	4.32	0.19	0.82	0.119	0.94												
INDUSTRIAL AREA BB		2016-29	MH16	9.00	688	9.00	886	3.84	3.52	13.50	1.350	14.85												
INDUSTRIAL AREA AA EAST		2029	MH16	60.50	417	60.50	417	4.01	1.69	6.78	9.075	15.85												
NEW HAMBURG SANITARY																								
INDUSTRIAL AREA N		2016-29	MH115	57.00	2,553	233.10	8362	3.15	25.77	81.09	34.965	116.06	0.50%	PVC	375	124.0	1.12	0.936	1.166	1.30	78%	ADEQUATE		
RES. DEVEL AREA B		2016-29		17.30	692	115.60	3392	3.40	13.74	46.67	17.340	84.01	0.50%	PVC	300	68.4	0.97	0.936	1.166	1.12	78%	ADEQUATE		
RES. DEVEL AREA C		2016-29		14.90	596	98.30	2700	3.48	10.94	38.07	14.745	52.82	0.50%	PVC	300	68.4	0.97	0.772	1.112	1.08	65%	ADEQUATE		
RES. DEVEL AREAS F1 & F2		2016-29		22.70	608	83.40	2,104	3.57	8.52	30.42	12.510	42.93	0.50%	PVC	300	68.4	0.97	0.628	1.058	1.02	57%	ADEQUATE		
RES. DEVEL AREAS G1 & G2		2016-29		28.70	1,148	60.70	1198	3.75	4.84	18.16	9.105	27.27	0.50%	PVC	250	42.0	0.80	0.646	1.069	0.92	58%	ADEQUATE		
RES. DEVEL AREA L		2029		32.00	48	32.00	48	4.32	0.19	0.84	4.800	5.64	0.50%	PVC	200	33.2	0.74	0.243	0.606	0.60	34%	ADEQUATE		
INDUSTRIAL AREA AA WEST		2029	MH115	60.50	417	60.50	417	4.01	1.69	6.78	9.075	15.85	0.98%	PVC	250	58.9	1.20	0.269	0.833	1.00	36%	ADEQUATE	MH12A DS MH11A	
RES. DEVEL AREA A		2016-29	MH11-74	11.00	440	11.00	440	4.00	1.78	7.13	1.650	8.78	0.46%	PVC	200	22.7	0.72	0.387	0.921	0.67	43%	ADEQUATE	MH379 DS MH38C	
INTEN AREA H		2029	MH11-74	0.60	48	0.60	48	4.32	0.19	0.84	0.120	0.96												
INTEN AREA K		2029	MH16-7	0.33	20	0.33	20	4.38	0.08	0.35	0.050	0.40												
INTEN AREA J		2029	MH13-32	1.99	120	1.99	120	4.22	0.49	2.05	0.298	2.35												

Legend:

- Existing Sewer Flows
- Proposed Development Flows
- Development Flows into Hydraulic Model
- Capacity Testing of Existing Sewer



TABLE 3-7
PRELIMINARY SANITARY FLOW EVALUATION
ALTERNATIVE C
BADEN AND NEW HAMBURG
WASTEWATER SERVICING STUDY

CRA - Cornstoga-Rovers & Associates					EVALUATED BY/DATE: S. G. Wong/August 2013 G. Wong July 2, 2013										MUNICIPALITY: Township of Wilmot PROJECT: Wastewater Servicing Study for New Growth Areas Baden & New Hamburg										Sheet No 1.00									
SANITARY SEWER PRELIMINARY EVALUATION SHEET - ALTERNATIVE D																																		
0.35 cum/c/d = avg flow 0.150 L/sec/ha = infiltration flow										Average urban RESIDENTIAL flow										Pop. = 2.79 people/unit					M = 1 + 14/(4 + (Pop) ^{0.5}) Qa = q _u × A [L/sec] Qp = Qa × M [L/sec] Qi = I × A [L/sec] Qd = Qp + Qi [L/sec] Pop = Population in 1,000's									
SEWER LINE LOCATION					INDIVIDUAL					CUMULATIVE					Peaking factor M	Average Flow Qa [L/sec]	Peak Flow Qp [L/sec]	Infiltration Flow Qi [L/sec]	PL Dsgn Flow Qd [L/sec]	Grade [%]	Pipe Matl	Diam [mm]	Cap'y Qf [L/sec]	Full veloc. [m/sec]	Qd/Qf [chart]	Vd/Vf [chart]	Qd veloc. [m/sec]	% depth	Evaluation	Capacity Test on Existing sewer				
STREET NAME/CATCHMENT					FROM MH	TO MH	Area - A [ha]	Pop.	Area - A [ha]	Res Pop.																								
BADEN SANITARY																																		
LIVINGSTON BLVD.					MH282	MH114	0.96	24	82.96	2344	3.53	3.49	33.52	12.444	45.97																			
					MH280	MH282	1.91	48	82.00	2319	3.53	3.40	33.21	12.301	45.51	0.30%	PVC	300	53.0	0.75	0.859	1.135	0.85	70%	ADEQUATE									
					MH279	MH280	0.96	24	40.27	2271	3.54	3.20	32.59	6.040	38.63	0.30%	PVC	300	53.0	0.75	0.729	1.099	0.82	63%	ADEQUATE									
					MH243	MH279	13.78	349	39.31	995	3.80	4.03	15.32	5.897	21.22	0.40%	PVC	250	37.6	0.77	0.564	1.027	0.79	63%	ADEQUATE									
WAGLER AVE.					MH269	MH280	6.97	176	39.63	1252	3.73	3.07	18.94	5.974	24.91	0.50%	PVC	200	23.2	0.74	1.074	1.151	0.85	SURC	SURCHARGED									
					MH261	MH269	2.32	59	32.66	1075	3.78	4.36	16.47	4.929	21.39	1.65%	PVC	200	42.1	1.34	0.508	1.000	1.34	60%	ADEQUATE									
					MH262	MH261	13.94	353	30.54	1017	3.80	4.12	15.63	4.580	20.21	1.35%	PVC	200	38.1	1.21	0.530	1.011	1.23	61%	ADEQUATE									
RES. DEVEL. AREA Q					2016-29	MH114	27.30	1,092	27.30	1092	3.78	4.42	16.70	4.095	20.79																			
RES. DEVEL. AREA P					2016-29	MH262	16.60	664	16.60	664	3.91	2.69	10.51	2.400	13.00																			
INTEN. AREA S. R. V					2029	MH143	17.17	1,030	17.17	1030	3.79	4.17	15.82	2.576	18.40	0.29%	PVC	200	17.7	0.56	1.042	1.161	0.65	SURC	SURCHARGED	MH68 DS MH67								
INTEN. AREA U					2029	MH112	0.96	57	0.96	57	4.30	2.23	0.99	0.144	1.14																			
INTEN. AREA T					2029	MH150	0.75	47	0.75	47	4.32	3.19	0.82	0.119	0.94																			
INDUSTRIAL AREA BB					2016-29	MH6	9.00	868	9.00	868	3.84	3.52	13.50	1.350	14.85																			
INDUSTRIAL AREA AA					2029	MH6	121.00	834	121.00	834	3.85	3.38	13.01	18.150	21.16																			
NEW HAMBURG SANITARY																																		
INDUSTRIAL AREA N					2016-29	MH115	57.00	2,553	168.40	6,745	3.12	27.32	85.31	25.260	110.57	0.50%	PVC	375	124.0	1.12	0.892	1.145	1.29	73%	ADEQUATE									
RES. DEVEL. AREAS F1 & F2					2016-29	FOR GLPS	22.70	908	111.40	4,192	3.32	16.98	56.29	18.710	73.00	0.50%	PVC	375	124.0	1.12	0.589	1.037	1.16	64%	ADEQUATE									
RES. DEVEL. AREAS G1 & G2					2016-29		26.70	1,148	86.70	3,284	3.41	13.30	45.35	13.305	58.65	0.50%	PVC	300	68.4	0.97	0.858	1.135	1.10	70%	ADEQUATE									
RES. DEVEL. AREA L					2029		32.00	1,280	60.00	2,136	3.56	3.65	30.83	9.000	39.83	0.50%	PVC	250	42.0	0.86	0.947	1.157	0.98	76%	ADEQUATE									
RES. DEVEL. AREA M					2029		26.00	856	28.00	856	3.84	3.47	13.32	4.200	17.52	0.50%	PVC	200	23.2	0.74	0.756	1.105	0.62	64%	ADEQUATE									
RES. DEVEL. AREA A					2016-29	MH1-74	11.00	440	11.00	440	4.00	1.78	7.13	1.650	8.78	0.48%	PVC	200	22.7	0.72	0.387	0.921	0.67	43%	ADEQUATE	MH379 DS MH383								
INTEN. AREA H					2029	MH1-74	0.80	48	0.80	48	4.32	3.19	0.84	0.120	0.96																			
INTEN. AREA K					2029	MH6-7	0.33	20	0.33	20	4.38	3.08	0.35	0.050	0.40																			
INTEN. AREA J					2029	MH3-32	1.99	120	1.99	120	4.22	3.49	2.05	0.299	2.35																			

Legend:

- Existing Sewer Flows
- Proposed Development Flows
- Development Flows into Hydraulic Model
- Capacity Testing of Existing Sewer



TABLE 3-8
PRELIMINARY SANITARY FLOW EVALUATION
ALTERNATIVE D
BADEN AND NEW HAMBURG
WASTEWATER SERVICING STUDY

**TABLE 3-9 PRELIMINARY COST ESTIMATES/PHASED TIME PERIOD
WASTEWATER SERVICING STUDY FOR NEW GROWTH AREAS BADEN AND NEW HAMBURG
SANITARY SEWER PROPOSAL FOR
ALTERNATIVE B - PROPOSED SANITARY TRUNK SEWER WITH PUMP STATION IN NEW HAMBURG**

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 3 & 5 (Dev. Areas <u>Y,Z,O,P,R,S,T,V,U,BB,AA</u>)				
B-PH-1 (2018 to 2021)	* Rehabilitation/Upgrading of Existing Baden Sewer & Trunk Sewer <i>Refer to Figures 3-16A & 3-17A</i>	973	m	\$ 2,600	\$ 2,529,800
B-PH-1 (2018 to 2021)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Figure 2-19</i>	1	L.S.	\$ 150,000	\$ 150,000
B-PH-2 (2022 to 2025)	* Upgrade Existing Pump Station (Foundry Baden PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-19</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
B-PH-2 (2022 to 2025)	* Twining Forcemain (Baden PS to New Hamburg) <i>Refer to Figures 2-19 to 2-20</i>	3300	m	\$ 655	\$ 2,161,500
B-PH-3 (2026 to 2029)	* New Pump Station (Baden Dev. Area O) Operation & Maintenance (50 Years) <i>Refer to Figure 2-19</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
B-PH-3 (2026 to 2029)	* New Forcemain (Baden Dev. Area O to Snyder's Rd W/Foundry St.) <i>Refer to Figure 2-19</i>	1280	m	\$ 680	\$ 870,400
	* 15% Construction Contingency	1	L.S.	\$ 2,026,755	\$ 2,026,755
Sub-Catchment 3 Total =					\$ 15,538,455

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 5 (Dev. Areas <u>A,N,H,J & K</u>)				
NH-PH-1 (2016 to 2018)	* New Pump Station (New Hamburg Dev. Area A) Operation & Maintenance (50 Years) <i>Refer to Figure 2-20</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
NH-PH-1 (2016 to 2018)	* Forcemain (Dev. Area A Fairview St. to Bleams Rd. W) <i>Refer to Figure 2-20</i>	600	m	\$ 680	\$ 408,000
NH-PH-2 (2018 to 2020)	* Rehabilitation/Upgrading of Existing Trunk Sewer (New Hamburg) <i>Refer to Figures 3-23A, 3-25A & 3-26A</i>	463	m	\$ 2,600	\$ 1,203,800
NH-PH-2 (2018 to 2020)	* Upgrade Existing Pump Station (Morningside New Hamburg PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-20</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
NH-PH-2 (2018 to 2020)	* Install Additional Huron Street Siphon Crossing <i>Refer to Figure 3-27A</i>	1	L.S.	\$ 700,000	\$ 700,000
NH-PH-3 (2020 to 2022)	* New Sanitary Sewer & Manholes (New Hamburg Ind. Area N) <i>Refer to Figure Alt. B 3-1, (STA. 1+000) to Figure Alt. B 3-2, (STA. 1+950)</i>				
	- Sewer Installation Depth 3m to 5m	425	m	\$ 1,667	\$ 708,645
	- Sewer Installation Depth 5m to 7.5m	525	m	\$ 2,084	\$ 1,094,231
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 1,787,201	\$ 1,787,201
Sub-Catchment 5 Total =					\$13,701,878

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 1 (Dev. Areas <u>F,G & L</u>, Inc. Christner Rd. PS)				
NH-PH-3 (2020 to 2022)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Profile on Figure Alt. B 3-2</i>	1	L.S.	\$ 150,000	\$ 150,000
NH-PH-4 (2022 to 2025)	* New Pump Station (New Hamburg Christner Rd.) Operation & Maintenance (50 Years) <i>Refer to Figure Alt. B 3-3, (STA. 1+000)</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
NH-PH-4 (2022 to 2025)	* New Forcemain (New Hamburg Christner Rd. to North of Railway Track) <i>Refer to Figure 2-20</i>	2750	m	\$ 610	\$ 1,677,500
NH-PH-6 (2029-2033)	* New Sanitary Sewer & Manholes (New Hamburg, Waterloo St.) <i>Refer to Figure Alt. B 3-6, (STA. 2+600) to Figure Alt. B 3-7, (STA. 3+375)</i>				
	- Sewer Installation Depth 3m to 5m	775	m	\$ 1,667	\$ 1,292,235
	- Sewer Installation Depth 5m to 7.5m	0	m	\$ 2,084	\$ -
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 1,045,460	\$ 1,045,460
Sub-Catchment 1 Total =					\$ 8,015,195

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 4 (Dev. Areas <u>B & C</u>)				
NH-PH-5 (2025 to 2029)	* New Sanitary Sewer & Manholes (New Hamburg Christner Rd.) <i>Refer to Figure Alt. B 3-3, (STA. 1+000) to Figure Alt. B 3-5, (STA. 2+600)</i>				
	- Sewer Installation Depth 3m to 5m	125	m	\$ 1,667	\$ 208,425
	- Sewer Installation Depth 5m to 7.5m	525	m	\$ 2,084	\$ 1,094,231
	- Sewer Installation Depth >7.5m	950	m	\$ 2,501	\$ 2,376,045
	* 15% Construction Contingency	1	L.S.	\$ 551,805	\$ 551,805
Sub-Catchment 4 Total =					\$ 4,230,506

Notes:

- Based on estimated 2013 construction pricing for Sanitary Sewer & Manhole Installation, excludes restoration costs.
- Construction price based on Treasury Board of Canada, Class D Estimate, accurate to between +50% and -20%.
- Estimate is based on capital installation, Operation and Maintenance Costs over 50 years and does not include cost sharing breakdown between the Township and Region of Waterloo.
- Estimate also excludes land acquisition, easement or legal costs.
- Engineering fees are not included in the cost estimates.

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**TABLE 3-10 PRELIMINARY COST ESTIMATES/PHASED TIME PERIOD
WASTEWATER SERVICING STUDY FOR NEW GROWTH AREAS BADEN AND NEW HAMBURG
SANITARY SEWER PROPOSAL FOR
ALTERNATIVE C - PROPOSED SANITARY TRUNK SEWER UPGRADE WITH PUMP STATION IN NEW HAMBURG**

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 3 & 5 (Dev. Areas <u>Z,Y,O,P,R,S,T,V,U,BB,AA</u>)				
B-PH-1 (2018 to 2021)	* Rehabilitation/Upgrading of Existing Baden Sewer & Trunk Sewer <i>Refer to Figure 2-21, Figure 3-31A & 3-32A</i>	973	m	\$ 2,600	\$ 2,529,800
B-PH-1 (2018 to 2021)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Figure 2-19</i>	1	L.S.	\$ 150,000	\$ 150,000
B-PH-2 (2022 to 2025)	* Upgrade Existing Pump Station (Foundry Baden PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-21</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
B-PH-2 (2022 to 2025)	* Twinning Forcemain (Baden PS to New Hamburg) <i>Refer to Figures 2-21 to 2-22</i>	3300	m	\$ 655	\$ 2,161,500
B-PH-3 (2026 to 2029)	* New Pump Station (Baden Dev. Area O) Operation & Maintenance (50 Years) <i>Refer to Figure 2-21</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
B-PH-3 (2026 to 2029)	* New Forcemain (Baden Dev. Area O to Snyder's Rd W/Foundry St.) <i>Refer to Figure 2-21</i>	1280	m	\$ 680	\$ 870,400
	* 15% Construction Contingency	1	L.S.	\$ 2,026,755	\$ 2,026,755
Sub-Catchment 3 Total =					\$ 15,538,455

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 5 (Dev. Areas <u>A,N,H,J & K</u>)				
NH-PH-1 (2016 to 2018)	* New Pump Station (New Hamburg Dev. Area A) Operation & Maintenance (50 Years) <i>Refer to Figure 2-22</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
NH-PH-1 (2016 to 2018)	* Forcemain (Dev. Area A Fairview St. to Bleams Rd. W) <i>Refer to Figure 2-22</i>	600	m	\$ 680	\$ 408,000
NH-PH-2 (2018 to 2020)	* Rehabilitation/Upgrading of Existing Trunk Sewer (New Hamburg) <i>Refer to Figures 3-38A, 3-40A & 3-41A</i>	463	m	\$ 2,600	\$ 1,203,800
NH-PH-2 (2018 to 2020)	* Upgrade Existing Pump Station (Morningside New Hamburg PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-22</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
NH-PH-2 (2018 to 2020)	* Install Additional Huron Street Siphon Crossing <i>Refer to Figure 3-42A</i>	1	L.S.	\$ 700,000	\$ 700,000
NH-PH-3 (2020 to 2022)	* New Sanitary Sewer & Manholes (New Hamburg Dev. Area N) <i>Refer to Figure Alt. C 3-1, (STA. 1+000) to Figure Alt. C 3-2, (STA. 1+950)</i>				
	- Sewer Installation Depth 3m to 5m	425	m	\$ 1,667	\$ 708,645
	- Sewer Installation Depth 5m to 7.5m	525	m	\$ 2,084	\$ 1,094,231
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 1,787,201	\$ 1,787,201
Sub-Catchment 5 Total =					\$13,701,878

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 1 (Dev. Areas <u>F,G & L</u>, Inc. Christner Rd. PS)				
NH-PH-3 (2020 to 2022)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Profile on Figure Alt. C 3-2</i>	1	L.S.	\$ 150,000	\$ 150,000
NH-PH-4 (2022 to 2025)	* New Pump Station (New Hamburg Christner Rd.) Operation & Maintenance (50 Years) <i>Refer to Figure Alt. B 3-5, (STA. 1+000)</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
NH-PH-4 (2022 to 2025)	* New Forcemain (New Hamburg Christner Rd. to North of Railway Track) <i>Refer to Figure 2-22</i>	1640	m	\$ 610	\$ 1,000,400
NH-PH-5 (2025 to 2029)	* New Sanitary Sewer & Manholes (New Hamburg, Waterloo St.) <i>Refer to Figure Alt. C 3-5, (STA. 1+000) to Figure Alt. C 3-7, (STA. 2+250)</i>				
	- Sewer Installation Depth 3m to 5m	950	m	\$ 1,667	\$ 1,584,030
	- Sewer Installation Depth 5m to 7.5m	300	m	\$ 2,084	\$ 625,275
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 1,081,456	\$ 1,081,456
Sub-Catchment 1 Total =					\$ 8,291,161

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 4 (Dev. Areas <u>B & C</u>)				
NH-PH-6 (2029 to 2033)	* New Sanitary Sewer & Manholes (New Hamburg Christner Rd.) <i>Refer to Figure Alt. C 3-3, (STA. 1+000) to Figure Alt. C 3-4, (STA. 1+925)</i>				
	- Sewer Installation Depth 3m to 5m	50	m	\$ 1,667	\$ 83,370
	- Sewer Installation Depth 5m to 7.5m	450	m	\$ 2,084	\$ 937,913
	- Sewer Installation Depth >7.5m	400	m	\$ 2,501	\$ 1,000,440
	* 15% Construction Contingency	1	L.S.	\$ 303,258	\$ 303,258
Sub-Catchment 4 Total =					\$ 2,324,981

Notes:

- Based on estimated 2013 construction pricing for Sanitary Sewer & Manhole Installation, excludes restoration costs.
- Construction price based on Treasury Board of Canada, Class D Estimate, accurate to between +50% and -20%.
- Estimate is based on capital installation, Operation and Maintenance Costs over 50 years and does not include cost sharing breakdown between the Township and Region of Waterloo.
- Estimate also excludes land acquisition, easement or legal costs.
- Engineering fees are not included in the cost estimates.

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**TABLE 3-11 PRELIMINARY COST ESTIMATES/PHASED TIME PERIOD
WASTEWATER SERVICING STUDY FOR NEW GROWTH AREAS BADEN AND NEW HAMBURG
SANITARY SEWER PROPOSAL FOR
ALTERNATIVE D - PROPOSED SANITARY UPGRADE OFF NAFZIGER RD. WITH PUMP STATION IN NEW HAMBURG**

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 3 & 5 (Dev. Areas <u>O,P,R,S,T,V,U,BB,AA</u>)				
B-PH-1 (2018 to 2021)	* Rehabilitation/Upgrading of Existing Baden Sewer & Trunk Sewer <i>Refer to Figure 3-46A</i>	804	m	\$ 2,600	\$ 2,090,400
B-PH-1 (2018 to 2021)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Figure 2-19</i>	1	L.S.	\$ 150,000	\$ 150,000
B-PH-2 (2022 to 2025)	* Upgrade Existing Pump Station (Foundry Baden PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-23</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
B-PH-2 (2022 to 2025)	* Twining Forcemain (Baden PS to New Hamburg) <i>Refer to Figures 2-23 to 2-24</i>	3300	m	\$ 655	\$ 2,161,500
B-PH-3 (2026 to 2029)	* New Pump Station (Baden Dev. Area O) Operation & Maintenance (50 Years) <i>Refer to Figure 2-23</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
B-PH-3 (2026 to 2029)	* New Forcemain (Baden Dev. Area O to Snyder's Rd W/Foundry St.) <i>Refer to Figure 2-23</i>	1280	m	\$ 680	\$ 870,400
	* 15% Construction Contingency	1	L.S.	\$ 1,960,845	\$ 1,960,845
Sub-Catchment 3 Total =					\$ 15,033,145

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 5 (Dev. Areas <u>A,N,H,I & K</u>)				
NH-PH-1 (2016 to 2018)	* New Pump Station (New Hamburg Dev. Area A) Operation & Maintenance (50 Years) <i>Refer to Figure 2-24</i>	1 50	L.S. Years	\$ 1,850,000 \$ 40,000	\$ 1,850,000 \$ 2,000,000
NH-PH-1 (2016 to 2018)	* Forcemain (Dev. Area A Fairview St. to Bleams Rd. W) <i>Refer to Figure 2-24</i>	600	m	\$ 680	\$ 408,000
NH-PH-1 (2016 to 2018)	* Upgrading of Existing New Hamburg Trunk Sewer to Morningside PS <i>Figure 3-51A</i>	1148	m	\$ 2,600	\$ 2,984,800
NH-PH-2 (2018 to 2020)	* Rehabilitation/Upgrading of Existing Trunk Sewer (New Hamburg) <i>Refer to Figures 3-53A & 3-56A</i>	463	m	\$ 2,600	\$ 1,203,800
NH-PH-2 (2018 to 2020)	* Upgrade Existing Pump Station (Morningside New Hamburg PS) Operation & Maintenance (50 Years) <i>Refer to Figure 2-24</i>	1 50	L.S. Years	\$ 1,950,000 \$ 40,000	\$ 1,950,000 \$ 2,000,000
NH-PH-2 (2018 to 2020)	* Install Additional Huron Street Siphon Crossing <i>Refer to Figure 3-57A</i>	1	L.S.	\$ 700,000	\$ 700,000
NH-PH-3 (2020 to 2022)	* New Sanitary Sewer & Manholes (New Hamburg Ind. Area N) <i>Refer to Figure Alt. D 3-1, (STA. 1+000) to Figure Alt. D 3-2, (STA. 1+950)</i>				
	- Sewer Installation Depth 3m to 5m	425	m	\$ 1,667	\$ 708,645
	- Sewer Installation Depth 5m to 7.5m	525	m	\$ 2,084	\$ 1,094,231
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 1,657,421	\$ 1,657,421
Sub-Catchment 5 Total =					\$16,556,898

Phased Time Period	Item Description	Quantity	Unit	Unit Price	Amount
	- Sub - Catchment 1 (Dev. Areas <u>F,G,L,M,W,X,Q</u>)				
NH-PH-3 (2020 to 2022)	* Sanitary Railway Crossing with Casing Pipe <i>Refer to Profile on Figure Alt. D 3-2</i>	1	L.S.	\$ 150,000	\$ 150,000
NH-PH-4 (2022 to 2025)	* New Sanitary Forcemain (New Hamburg South to Railway Track) <i>Refer to Figure 2-24</i>	1060	m	\$ 610	\$ 646,600
NH-PH-4 (2022 to 2025)	* Upgrade Existing Pump Station (New Hamburg Forest Glen) Operation & Maintenance (50 Years) <i>Refer to Figure 2-24 & Figure Alt. D 3-3</i>	1 50	L.S. Years	\$ 1,100,000 \$ 40,000	\$ 1,100,000 \$ 2,000,000
NH-PH-5 (2025 to 2029)	* New Sanitary Sewer & Manholes (New Hamburg Waterloo St.) <i>Refer to Figure Alt. D 3-3, (STA. 1+000) to Figure Alt. D 3-4, (STA. 1+625)</i>				
	- Sewer Installation Depth 3m to 5m	300	m	\$ 1,667	\$ 500,220
	- Sewer Installation Depth 5m to 7.5m	75	m	\$ 2,084	\$ 156,319
	- Sewer Installation Depth >7.5m	250	m	\$ 2,501	\$ 625,275
NH-PH-6 (2029 to 2033)	* New Sanitary Sewer & Manholes (New Hamburg Waterloo St.) <i>Refer to Figure Alt. D 3-4, (STA. 1+625) to Figure Alt. D 3-4, (STA. 2+150)</i>				
	- Sewer Installation Depth 3m to 5m	175	m	\$ 1,667	\$ 291,795
	- Sewer Installation Depth 5m to 7.5m	350	m	\$ 2,084	\$ 729,488
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
NH-PH-7 (2041 to 2044) (Provisional)	* Additional Sanitary Sewer & Manholes (From Baden) <i>Refer to Figure Alt. D 3-4, (STA. 2+150) to Figure Alt. D 3-7, (STA. 3+050)</i>				
	- Sewer Installation Depth 3m to 5m	875	m	\$ 1,667	\$ 1,458,975
	- Sewer Installation Depth 5m to 7.5m	250	m	\$ 2,084	\$ 521,063
	- Sewer Installation Depth >7.5m	0	m	\$ 2,501	\$ -
	* 15% Construction Contingency	1	L.S.	\$ 929,954	\$ 929,954
Sub-Catchment 1 Total (Excluding Provisional)=					\$ 7,129,651
Sub-Catchment 1 Total (Including Provisional)=					\$ 9,406,694

Notes:

- Based on estimated 2013 construction pricing for Sanitary Sewer & Manhole Installation, excludes restoration costs.
- Construction price based on Treasury Board of Canada, Class D Estimate, accurate to between +50% and -20%.
- Estimate is based on capital installation, Operation and Maintenance Costs over 50 years and does not include cost sharing breakdown between the Township and Region of Waterloo.
- Estimate also excludes land acquisition, easement or legal costs.
- Engineering fees are not included in the cost estimates.

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TABLE 3-12
WASTEWATER SERVICING STUDY FOR NEW GROWTH AREAS
BADEN AND NEW HAMBURG

EVALUATION MATRIX FOR SANITARY SERVICING ALTERNATIVES

Evaluation Criteria	Alternative B Sub-Catchments (1 to 5) Grading Scale (0 to 5)			Alternative C Sub-Catchments (1 to 5) Grading Scale (0 to 5)			Alternative D Sub-Catchments (1 to 5) Grading Scale (0 to 5)			Highest Sub-Catchment Score	Alternative Selection
	(0-5) x WF =		Product	(0-5) x WF =		Product	(0-5) x WF =		Product	MAX Product	Alternative
1) Highest Hydraulic Feasibility Weighted Factor 10%	1.	1.00	0.10	1.	2.00	0.20	1.	5.00	0.50	0.50	D
	2.	0.00	0.00	2.	0.00	0.00	2.	0.00	0.00	0.00	N/A
	3.	5.00	0.50	3.	5.00	0.50	3.	4.00	0.40	0.50	B,C
	4.	1.00	0.10	4.	2.00	0.20	4.	5.00	0.50	0.50	D
	5.	4.00	0.40	5.	4.00	0.40	5.	5.00	0.50	0.50	D
2) Optimum Development Timing Weighted Factor 5%	1.	1.00	0.05	1.	3.00	0.15	1.	5.00	0.25	0.25	D
	2.	0.00	0.00	2.	0.00	0.00	2.	0.00	0.00	0.00	N/A
	3.	4.00	0.20	3.	4.00	0.20	3.	5.00	0.25	0.25	D
	4.	1.00	0.05	4.	2.00	0.10	4.	5.00	0.25	0.25	D
	5.	3.00	0.15	5.	3.00	0.15	5.	3.00	0.15	0.15	B,C,D
3) Least Public/Environmental Disturbance Weighted Factor 20%	1.	3.00	0.60	1.	3.00	0.60	1.	3.00	0.60	0.60	B,C,D
	2.	0.00	0.00	2.	0.00	0.00	2.	0.00	0.00	0.00	N/A
	3.	4.00	0.80	3.	4.00	0.80	3.	5.00	1.00	1.00	D
	4.	3.00	0.60	4.	1.00	0.20	4.	5.00	1.00	1.00	D
	5.	3.50	0.70	5.	3.50	0.70	5.	2.50	0.50	0.70	B,C
4) Least Indicative Cost Estimate Weighted Factor 65%	1.	4.04	2.63	1.	4.00	2.60	1.	4.16	2.71	2.71	D
	2.	0.00	0.00	2.	0.00	0.00	2.	0.00	0.00	0.00	N/A
	3.	3.15	2.05	3.	3.15	2.05	3.	3.22	2.09	2.09	D
	4.	4.41	2.87	4.	4.67	3.04	4.	5.00	3.25	3.25	D
	5.	3.40	2.21	5.	3.40	2.21	5.	2.98	1.94	2.21	B,C
RESULTING CATCHMENT TOTALS FOR ALTERNATIVE	3.38			3.55			4.06			4.06	D
	0.00			0.00			0.00			0.00	N/A
	3.55			3.55			3.74			3.74	D
	3.62			3.54			5.00			5.00	D
	3.46			3.46			3.09			3.09	D*
OVERALL TOTALS/ALTERNATIVE	14.00			14.10			15.89			15.89	D

D* - Eastern Trunk Sewer from Highway 7/8 to the Morningside Pump Station must be upgraded, in order to support Alternative D flows.

