1.2 BIODIVERSITY

1.2.1 Number of Wetland Types

(Check only one)

	One	=	9 points
X	Two	=	13
	Three	=	20
	Four	=	30

Number of Wetland Types Score
(maximum 30 points) _____ 13

1.2.2. Vegetation Communities

Use the data sheet provided in Appendix 4 to record and score vegetation communities (the completed form must be attached to this data record)

Scoring *(circle only one option for each of the columns below):*

Total # of communities with 1-3 forms	
1 =	1.5 pts
2 =	2.5
3 =	3.5
4 =	4.5
5 =	5
6 =	5.5
7 =	6
8 =	6.5
9 =	7
10 =	7.5
11 =	8
+ 0.5 for each additional community	
= 1.5	

Total # of communities with 4-5 forms	
1 =	2 pts ☐
2 =	3.5
3 =	5
4 =	6.5
5 =	7.5
6 =	8.5
7 =	9.5
8 =	10.5
9 =	11.5
10 =	12.5
11 =	13
+ 0.5 for each additional community	
= 3.5	

Total # of communities with 6 or more forms	
1 =	3 pts
2 =	5
3 =	7
4 =	9
5 =	10.5
6 =	12
7 =	13.5
8 =	15
9 =	16.5
10 =	18
11 =	19
+ 1.0 for each additional community	
=	

Vegetation Communities Score
(maximum 45 points) _____ 5

1.2.3 Diversity of Surrounding Habitat

Check all appropriate items. Only habitat within 1.5 km of the wetland boundary and at least 0.5 ha in size are to be scored.

X	row crop
	pasture
X	abandoned agricultural land
x	deciduous forest
	coniferous forest
X	mixed forest*
	abandoned pits and quarries
	open lake or deep river
	fence rows with deep cover, or shelterbelts
	terrain appreciably undulating, hilly or with ravines
X	creek flood plain

* *"Mixed forest" is defined as either 25% coniferous trees distributed singly or in clumps in deciduous forest, or 25% deciduous trees distributed singly or in clumps in coniferous forest. Note that Forest Resource Inventory (FRI) maps can be misleading since 25% conifer within a unit could be entirely concentrated around a lake.*

Score 1 point for each feature checked, up to a maximum of 7 points.

Diversity of Surrounding Habitat Score
(maximum 7 points) 5

1.2.4 Proximity to Other Wetlands

Check highest appropriate category. (Note: if the wetland is lacustrine, score option #1 at 8 points).

✓		Points
	Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river within 1.5 km	8
	Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	8
	Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river from 1.5 to 4 km away	5
	Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
X	Within 0.75 km of other wetlands (different dominant wetland type) or open water body, but not hydrologically connected by surface water	5
	Within 1 km of other wetlands, but not hydrologically connected by surface water	2
	No wetland within 1 km	0

Name and distance (from wetland) of wetlands/waterbodies scored above:
Burnham Woods Wetland 300m west and Downers Corner Wetland 600m west

Proximity to other Wetlands Score
(maximum 8 points) 5

1.2.5 Interspersion

Number of Intersections = 37

✓	Number of Intersections *(Check one only)*	Points
	26 or less	= 3
X	27 to 40	= 6
	41 to 60	= 9
	61 to 80	= 12
	81 to 100	= 15
	101 to 125	= 18
	126 to 150	= 21
	151 to 175	= 24
	176 to 200	= 27
	>200	= 30

Interspersion Score *(maximum 30 points)* 6

1.2.6 Open Water Types

NOTE: *this attribute is only to be scored for permanently flooded open water within the wetland (adjacent lakes do not count). Check one option only.*

✓	Open Water Type	Characteristic	Points
	Type 1	Open water occupies < 5 % of wetland area	= 8
	Type 2	Open water occupies 5-25% of wetland (occurring in central area)	= 8
	Type 3	Open water occupies 5-25% (occurring in various-sized ponds, dense patches of vegetation or vegetation in diffuse stands)	= 14
	Type 4	Open water occupies 26-75% of wetland (occurring in a central area)	= 20
	Type 5	Open water occupies 26-75% of wetlands (small ponds and embayments are common)	= 30
	Type 6	Open water occupies 76%-95% of wetland (occurring in large central area; vegetation is peripheral)	= 8
	Type 7	Open water occupies 76-95% of wetland (vegetation in patches or diffuse open stands)	= 14
	Type 8	Open water occupies more than 95% of wetland area	= 3
x	No open water		= 0

Open Water Type Score *(maximum 30 points)* 0

1.3 SIZE (BIOLOGICAL COMPONENT)

Total Size of Wetland = 3.65 ha

Sum of scores from Biodiversity Subcomponent

1.2.1
+ 1.2.2
+ 1.2.3
+ 1.2.4
+ 1.2.5
+ 1.2.6

34.5

Circle the appropriate score from the table below.

Wetland size (ha)	Total Score for Biodiversity Subcomponent									
	<37	37-47	48-60	61-72	73-84	85-96	97-108	109-120	121-132	>132
<20 ha	1	5	7	8	9	17	25	34	43	50
20-40	5	7	8	9	10	19	28	37	46	50
41-60	6	8	9	10	11	21	31	40	49	50
61-80	7	9	10	11	13	23	34	43	50	50
81-100	8	10	11	13	15	25	37	46	50	50
101-120	9	11	13	15	18	28	40	49	50	50
121-140	10	13	15	17	21	31	43	50	50	50
141-160	11	15	17	19	23	34	46	50	50	50
161-180	13	17	19	21	25	37	49	50	50	50
181-200	15	19	21	23	28	40	50	50	50	50
201-400	17	21	23	25	31	43	50	50	50	50
401-600	19	23	25	28	34	46	50	50	50	50
601-800	21	25	28	31	37	49	50	50	50	50
801-1000	23	28	31	34	40	50	50	50	50	50
1001-1200	25	31	34	37	43	50	50	50	50	50
1201-1400	28	34	37	40	46	50	50	50	50	50
1401-1600	31	37	40	43	49	50	50	50	50	50
1601-1800	34	40	43	46	50	50	50	50	50	50
1801-2000	37	43	47	49	50	50	50	50	50	50
>2000	40	46	50	50	50	50	50	50	50	50

Size Score (Biological Component) 1
(maximum 50 points) _____

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1 Wood Products

Check the option that best reflects the total area (ha) of forested wetland (i.e., areas where the dominant vegetation form is h or c). Note that this is the area of all the forested vegetation communities, not total wetland size. Do not include areas where harvest is not permitted. Check only one option.

Area of wetland used for scoring 2.1.1: 1.9

x	< 5 ha	=	0 pts
	5 - 25 ha	=	3
	26 – 50 ha	=	6
	51 – 100 ha	=	9
	101 – 200 ha	=	12
	> 200 ha	=	18

Source of information:

Wood Products Score *(maximum 18 points)* 0

2.1.2 Wild Rice

Check only one.

	Present (min. size 0.5 ha)	=	6 pts
x	Absent	=	0
	Harvest not permitted	=	0

Source of information:

Wild Rice Score *(maximum 6 points)* 0

Source: Field observations between June - September 2016, and June - October 2017.

2.1.3 Commercial Baitfish

Check only one.

X	Present	=	12 pts
	Absent	=	0
	Fishing not permitted	=	0

Source of information:

Source: Field observations

Commercial Fish Score *(maximum 12 points)* 12

2.1.4 Furbearers

Only species recognized as furbearers under the Fish & Wildlife Conservation Act may be scored here. Score 3 *points for each furbearer species listed, up to a maximum of 12 points.*
Score 0 points if trapping is prohibited.

	Name of furbearer	Source of information
1.	Raccoon-assumed to be present	
2.	Skunk-assumed to be present	
3.	Red Squirrel-assumed to be present	
4.	Red fox-assumed to be present	
5.		
6.		
7.		

Furbearer Score *(maximum 12 points)* 12

2.2 RECREATIONAL ACTIVITIES

Sources of information and reasons for scoring a wetland under high or moderate use below, must be included below.

Circle one score for each of the activities listed. Score is cumulative – add score for hunting, nature enjoyment and fishing together for final score.

Intensity of Use	Type of Wetland-Associated Use: Hunting	Nature Enjoyment/ Ecosystem Study	Fishing
High	40 points	40 points ☐	40 points
Moderate	20	20	20
Low	8	8	8 ☐
Not Possible/ No evidence	0	0	0

Sources of information (include evidence/criteria forming basis for score and any relevant reference used to obtain that information):
- e.g., Hunting scored at 20 points: 5 hunting blinds observed; hunters using area frequently monitored for compliance (source: D. Black, MNR Conservation Officer)

Hunting: Distance from residential properties would not permit hunting

Nature: ~~Possible enjoyment of nature area within Burnham Provincial Park~~

Fishing: ~~No Sportfishing Opoortunities~~

Recreational Activities Score *(maximum 80 points)* 8

2.3 LANDSCAPE AESTHETICS

2.3.1 Distinctness

Check only one.

	Clearly Distinct	= 3 pts
X	Indistinct	= 0

Landscape Distinctness Score *(maximum 3 points)* _____ 0

2.3.2 Absence of Human Disturbance

Check only one.

	Human disturbances absent or nearly so	= 7 pts
	One or several localized disturbances	= 4
X	Moderate disturbance; localized water pollution	= 2
	Wetland intact but impairment of ecosystem quality intense in some areas	= 1
	Extreme ecological degradation, or water pollution severe and widespread	= 0

Details regarding type, extent and location of disturbance scored:

Agricultural activities, road usage/runoff, storm water runoff.

Source of information:

~~Source: Field observations~~

Absence of Human Disturbance Score *(maximum 7 points)* _____ 2

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1 Educational Uses

Check highest appropriate category.

20	Frequent	=	20 pts
	Infrequent	=	12
0	No visits	=	0

Details regarding the type and frequency of education uses scored above:

Kawartha Montessori school uses the wetland and surrounding areas for botany, science, geography, history, culture, and stewardship lessons.

Source of information:

Email correspondence with Head of School/Principal at Kawartha Montessori school

Educational Uses Score *(maximum 20 points)* 20

2.4.2 Facilities and Programs

Check all appropriate options, score highest category checked.

	Staffed interpretation centre	=	8 pts
	No interpretation centre or staff, but a system of self-guiding trails or brochures available	=	4
	Facilities such as maintained paths (e.g., woodchips), boardwalks, boat launches or observation towers, but no brochures or other interpretation	=	2
x	No facilities or programs	=	0

Additional Notes/Comments:

Source of information:

Facilities and Programs Score *(maximum 8 points)* 0

2.4.3 Research and Studies

Check all that apply; score highest category checked.

	Long term research has been done	=	12 pts
	Research papers published in refereed scientific journal or as a thesis	=	10
	One or more (non-research) reports have been written on some aspect of the wetland's flora, fauna, hydrology, etc.	=	5
X	No research or reports	=	0

List of reports, publications, research studies etc. scored above:

Unable to determine use of wetland area

Research and Studies Score *(maximum 12 points)* 0

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT

Name of Settlement: Peterborough

Distance of wetland from settlement: Just outside of City of Peterborough's borders

Population of settlement: 82,000 (2017) (Source: peterborough.ca)

Circle only the highest score applicable

Distance of wetland to settlement	population >10,000	population 2,500-10,000	population <2,500 or cottage community
within or adjoining settlement	40 points ☐	26 points	16 points
0.5 to 10 km from settlement	26	16	10
10 to 60 km from settlement	12	8	4
>60 km from nearest settlement	5	2	0

Proximity to Human Settlement Score *(maximum 40 points)* 26

2.6 OWNERSHIP

FA of wetland held by or held under a legal contract by a conservation body (as defined by the *Conservation Land Act*) for wetland protection	____ x 10 = 0
FA of wetland occurring in provincially or nationally protected areas (e.g., parks and conservation reserves)	0.62 x 10 = 6.2
FA of wetland area in Crown/public ownership, not as above	____ x 8 = ____
FA of wetland area in private ownership, not as above	0.38 x 4 = 1.5

Source of information:

Source: make ~~a topo map~~

Ownership Score *(maximum 10 points)* 8

2.7 SIZE (SOCIAL COMPONENT)

Total Size of Wetland = 3.65 ha Sum of scores from Subcomponents 2.1, 2.2, and 2.5 = 58

Circle the appropriate score from the table below.

	Total for Size Dependent Social Features									
	<31	31-45	46-60	61-75	76-90	91-105	106-120	121-135	136-150	>150
<2 ha	1	2	4	8	10	12	14	14	14	15
2-4	1	2	4	8	12	13	14	14	15	16
5-8	2	2	5	9	13	14	15	15	16	16
9-12	3	3	6	10	14	15	15	16	17	17
13-17	3	4	7	10	14	15	16	16	17	17
18-28	4	5	8	11	15	16	16	17	17	18
29-37	5	7	10	13	16	17	18	18	19	19
38-49	5	7	10	13	16	17	18	18	19	20
50-62	5	8	11	14	17	17	18	19	20	20
63-81	5	8	11	15	17	18	19	20	20	20
82-105	6	9	11	15	18	18	19	20	20	20
106-137	6	9	12	16	18	19	20	20	20	20
138-178	6	9	13	16	18	19	20	20	20	20
179-233	6	9	13	16	18	20	20	20	20	20
234-302	7	9	13	16	18	20	20	20	20	20
303-393	7	9	14	17	18	20	20	20	20	20
394-511	7	10	14	17	18	20	20	20	20	20
512-665	7	10	14	17	18	20	20	20	20	20
666-863	7	10	14	17	19	20	20	20	20	20
864-1123	8	12	15	17	19	20	20	20	20	20
1124-1460	8	12	15	17	19	20	20	20	20	20
1461-1898	8	13	15	18	19	20	20	20	20	20
1899-2467	8	14	16	18	20	20	20	20	20	20
>2467	8	14	16	18	20	20	20	20	20	20

Total Size Score (Social Component) 4

2.8 ABORIGINAL VALUES AND CULTURAL HERITAGE

Either or both Aboriginal or Cultural Values may be scored. However, the maximum score permitted for 2.8 is 30 points.

Full documentation of sources must be attached to the data record.

2.8.1 Aboriginal Values

X	Significant	=	30 pts
	Not Significant	=	0
x	Unknown	=	0

Additional Comments/Notes:

Area has been assumed significant. There are Provincially Significant Wetlands in the area as well as some unevaluated wetlands – areas which are of great significance to Anishinaabeg peoples with regard to harvesting foods and medicines, "

2.8.2 Cultural Heritage

	Significant	=	30 pts
	Not Significant	=	0
x	Unknown	=	0

Additional Comments/Notes:

Through a preliminary online review this evaluation was unable to determine the cultural heritage significance of this wetland complex.

Aboriginal Values/Cultural Heritage Score 30
(maximum 30 points) _____

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

Check one of the following four options.

[ ] If wetland is a single contiguous coastal wetland, ➞ score 0 points for this section.

[ ] If all wetland units of a wetland complex are coastal wetland units, ➞ score 0 points for this section.

[ ] If wetland or wetland complex is entirely isolated in site type, ➞ score 100 points automatically.

[x] Wetland not as above – proceed through 'steps' A through L below.

(A) Total wetland area = 3.65 ha

(B) Size of wetland's catchment = 26.8 ha

(C) Size of other detention areas in catchment = 0 ha

(D) Size of 'isolated' portions of wetland = 0 ha (FA = 0)

(E) Size of coastal units of wetland complex = 0 ha (FA = 0)

Points for Isolated Portion of Wetland (If not applicable, enter '0'):

(F) (FA of D) x 100 pts = 0 pts

Points for Coastal Portion(s) of Wetland (if not applicable, enter '0')

(G) (FA of E) x 100 pts = 0 pts

(H) Size of wetland minus the isolated and coastal portions = {A – D – E} = 3.65 ha

(I) Number of points available to score 'rest' of wetland = {100 – F – G} = 100 pts

(J) Total area of upstream detention areas = {A + C } = 3.65 ha

(K) Upstream Detention Factor = {(H/J) x 2} = 1.0 (maximum 1.0)

(L) Attenuation Factor = {(H/B) x 10} = 1.0 (maximum 1.0)

Flood Attenuation Final Score = {[((K + L) /2) x I] + F} = 100

Flood Attenuation Score *(maximum 100 points)* 100

3.2 WATER QUALITY IMPROVEMENT

3.2.1 Short Term Water Quality Improvement

Step 1: Determination of maximum initial score

	Wetland on one of the 5 defined large lakes or 5 major rivers (Go to Step 5A)
X	All other wetlands (Go through Steps 2, 3, 4, and 5B)

Step 2: Determination of Watershed Improvement Factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

(FA = area of site type/total area of wetland)

FA of isolated wetland	=	x 0.5 =	
FA of riverine wetland	=	x 1.0 =	
FA of palustrine wetland with no inflow	=	.10 x 0.7 =	
FA of palustrine wetland with inflows	=	x 1.0 =	1
FA of lacustrine on lake shoreline	=	x 0.2 =	
FA of lacustrine at lake inflow or outflow	=	x 1.0 =	

Sum (*WIF cannot exceed 1.0*) 1.0

Step 3: Determination of Catchment Land Use Factor (LUF)

(Choose the first category that fits upstream land use in the catchment.)

	Over 50% agricultural and/or urban	= 1.0
x	Between 30 and 50% agricultural and/or urban	= 0.8
	Over 50% forested or other natural vegetation	= 0.6

LUF (*maximum 1.0*) 0.8

Step 4: Determination of Pollutant Uptake Factor (PUF)

Calculation of PUF is based on the fractional area (FA) of each vegetation type that makes up the total area of the wetland. Base assessment on the dominant vegetation form for each community except where dead trees or shrubs dominate. In that case base assessment on the dominant live vegetation type.

(FA = area of vegetation type/total area of wetland)

FA of wetland with live trees, shrubs, herbs or mosses (c, h, ts, ls, gc, m)	= 0.9 x 0.75 =	0.675
FA of wetland with emergent, submergent or floating vegetation (re, be, ne, su, f, ff)	= 0.1 x 1.0 =	0.1
FA of wetland with little or no vegetation (u)	= x 0.5 =	

Sum (*PUF cannot exceed 1.0*) 0.775

Step 5: Calculation of final score

[ ]	Wetland on defined 5 major lakes or 5 major rivers	0
[X]	All other wetlands – calculate as follows	
	Initial score	60
	Watershed Improvement Factor (WIF)	1.0
	Land Use Factor (LUF)	0.8
	Pollutant Uptake Factor (PUF)	.775
	Final score: 60 x WIF x LUF x PUF =	37

Short Term Water Quality Improvement Score
(maximum 60 points) 37

3.2.2 Long Term Nutrient Trap

Step 1:

[ ]	Wetland on defined 5 major lakes or 5 major rivers = 0 points
[X]	All other wetlands (Proceed to Step 2)

Step 2: Choose only one of the following settings that best describes the wetland being evaluated

[ ]	Wetland located in a river mouth	= 10 pts
[X]	Wetland is a bog, fen, or swamp with more than 50% of the wetland being covered with organic soil	= 10
[ ]	Wetland is a bog, fen, or swamp with less than 50% of the wetland being covered with organic soil	= 3
[ ]	Wetland is a marsh with more than 50% of the wetland covered with organic soil	= 3
[ ]	None of the above	= 0

Long Term Nutrient Trap Score
(maximum 10 points) 10

3.2.3 Groundwater Discharge

Circle the characteristics that best describe the wetland being evaluated and then sum the scores. If the sum exceeds 30 points, assign the maximum score of 30). Note: for wetland type, wetland type scored does not have to the dominant type in the wetland.

Wetland Characteristics	Potential for Discharge		
	None to Little	Some	High
Wetland type	Bog = 0	Swamp/Marsh = 2 ✓	Fen = 5
Topography	Flat/rolling = 0 ✓	Hilly = 2	Steep = 5
Wetland area: Upslope catchment area	Large (>50%) = 0	Moderate (5-50%) = 2 ✓	Small (<5%) = 5
Lagg development	None found = 0 ✓	Minor = 2	Extensive = 5
Seeps	None = 0 ✓	≤ 3 seeps = 2	> 3 seeps = 5
Surface marl deposits	None = 0 ✓	≤ 3 sites = 2	> 3 sites = 5
Iron precipitates	None = 0 ✓	≤ 3 sites = 2	> 3 sites = 5
Located within 1 km of a major aquifer	N/A = 0	N/A = 0	Yes = 10 ☐ No = 0

Additional Comments/Notes:

Groundwater Discharge Score
(maximum 30 points) _____ 4

3.3 CARBON SINK

Check only one of the following:

[x]	Bog, fen or swamp with more than 50% coverage by organic soil	=	5 pts
[ ]	Bog, fen or swamp with between 10 to 50% coverage by organic soil	=	2
[ ]	Marsh with more than 50% coverage by organic soil	=	3
[ ]	Wetlands not in one of the above categories	=	0

Source of information:
Source: Field observations

Carbon Sink Score
(maximum 5 points) 5

3.4 SHORELINE EROSION CONTROL

From the wetland vegetation map determine the dominant vegetatino type within the erosion zone for lacustrine and riverine site type areas only. Score according to the factors listed below.

Step 1:

[x]	Wetland entirely isolated or palustrine	=	0 pts
[ ]	Any part of the wetland is riverine or lacustrine	=	Go to step 2

Step 2: *Choose the one characteristic that best describes the shoreline vegetation (see page 109 for description of "shoreline".)*

[ ]	Trees and shrubs	=	15 pts
[ ]	Emergent vegetation	=	8
[ ]	Submergent vegetation	=	6
[ ]	Other shoreline vegetation	=	3
[ ]	No vegetation	=	0

Shoreline Erosion Control Score
(maximum 15 points) 0

3.5 GROUNDWATER RECHARGE

3.5.1 Site Type

Wetland > 50% lacustrine (by area) or located on one of the five major rivers		= 0 pts	
Wetland not as above. Calculate final score as follows:			
■ FA of isolated or palustrine wetland	=	1.0 x 50 =	50.0
■ FA of riverine wetland	=	0.0 x 20 =	0
■ FA of lacustrine wetland (not dominant site type)	=	x 0 =	0

Groundwater Recharge/Wetland Site Type Score *(maximum 50 points)* 50.0

3.5.2 Soil Recharge Potential

*Circle only one choice that **best** describes the soils in **the area surrounding the wetland** being evaluated (the soils within the wetland are not scored here).*

Dominant Wetland Type	Group A, B, C (sands, gravels, loams)	Group D (clays, substrates in high water tables, shallow substrates over impervious materials such as bedrock)
Lacustrine or major river	0	0
Isolated	10	5
Palustrine	7 ✓	4
Riverine (not on a major river)	5	2

Groundwater Recharge/Wetland Soil Recharge Potential Score *(maximum 10 points)* 7

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

4.1.1 Wetland Types

Ecodistrict	Rarity within the Landscape (4.1.1.1)	Rarity of Wetland Type (4.1.1.2)			
		Marsh	Swamp	Fen	Bog
6E-1	60	40	0	80	80
6E -2	60	40	0	80	80
6E-4	60	40	0	80	80
6E-5	20	40	0	80	80
6E-6	40	20	0	80	80
6E-7	60	10	0	80	80
6E-8 ✓	20 ✓	20 ✓	0 ✓	80	80
6E-9	0	20	0	80	80
6E-10	20	0	20	80	80
6E-11	0	30	0	80	80
6E-12	0	30	0	60	80
6E-13	60	10	0	80	80
6E-14	40	20	0	40	80
6E-15	40	0	0	80	80
6E-16	60	20	0	80	60
6E-17	40	10	0	30	80
7E-1	60	0	60	80	80
7E-2	60	0	0	80	80
7E-3	60	00	0	80	80
7E-4	80	0	0	80	80
7E-5	60	20	0	80	80
7E-6	80	30	0	80	80

4.1.1.1 Rarity within the Landscape

Choose appropriate score from 2nd column above.

Score *(maximum 80 points)* _____20

4.1.1.2 Rarity of Wetland Type

Score is cumulative, based on presence/absence. Circle all appropriate scores from above table and sum.

Score *(maximum 80 points)* _____20

4.1.2 Species

4.1.2.1 Reproductive Habitat for an Endangered or Threatened Species

Under the "Activity" column, when scoring animal species, record what the animal was doing when observed (e.g., nesting, courtship, singing, etc).

Common Name	Scientific Name	Activity	Date Observed	Info Source
None Observed				Field Investigations

For each species score 250 points. (Score is cumulative, no maximum score)

Additional Notes/Comments:

No species classified as endangered or threatened that utilize the wetland for reproductive habitat within the Study Area were confirmed or documented through background research. See species list Appendix E. Background research consisted of E-bird Canada, iNaturalist, Ontario Breeding Bird Atlas and Natural Heritage Information Centre databases. The Ministry of Environment, Conservation and Parks was also consulted for Species at Risk records. No observations of endangered or threatened species were made during the evaluation that meet the criteria set out in the OWES.

Reproductive Habitat for Endangered or Threatened Species *(no maximum)* 0

4.1.2.2 Traditional Migration or Feeding Habitat for an Endangered or Threatened Species

Under the "Activity" column, when scoring animal species, record what the animal was doing when observed (e.g., nesting, courtship, singing, feeding, resting etc). Dates that species has been recorded using the wetland must be included in the table below.

Common Name	Scientific Name	Activity	Dates Observed	Info Source

For one species score 150 points; for each additional species score 75 points. (Score is cumulative)

Additional Notes/Comments:

None observed or found during background research . Background research consisted of a review of E-bird Canada, iNaturalist, Ontario Breeding Bird Atlas and Natural Heritage Information Centre databases. The Ministry of Environment, Conservation and Parks was also consulted for Species at Risk records.

Traditional Habitat for Endangered or Threatened Species *(no maximum)* 0

4.1.2.3 Provincially Significant Animal Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
Eastern Wood-Pewee	Contopus virens	Auditory	July, 17,	Field Obs.

Additional Notes/Comments:

Source: Field observations and background research. Background research consisted of a review of E-bird Canada, iNaturalist, Ontario Breeding Bird Atlas and Natural Heritage Information Centre databases. The Ministry of Environment, Conservation and Parks was also consulted for Species at Risk records.

One species = 50 pts	9 species = 140 pts	17 species = 160 pts
2 species = 80	10 species = 143	18 species = 162
3 species = 95	11 species = 146	19 species = 164
4 species = 105	12 species = 149	20 species = 166
5 species = 115	13 species = 152	21 species = 168
6 species = 125	14 species = 154	22 species = 170
7 species = 130	15 species = 156	23 species = 172
8 species = 135	16 species = 158	24 species = 174
		25 species = 176

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Animal Species *(no maximum)* _____	50

4.1.2.4 Provincially Significant Plant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
Black Ash	Fraxinus Nigra		April 30, 2020	Field Observation

Additional Notes/Comments:

Source: Field observations and background research. Background research consisted of a review of iNaturalist and Natural Heritage Information Centre databases. The Ministry of Environment, Conservation and Parks was also consulted for Species at Risk records.

One species = 50 pts	9 species = 140 pts	17 species = 160 pts
2 species = 80	10 species = 143	18 species = 162
3 species = 95	11 species = 146	19 species = 164
4 species = 105	12 species = 149	20 species = 166
5 species = 115	13 species = 152	21 species = 168
6 species = 125	14 species = 154	22 species = 170
7 species = 130	15 species = 156	23 species = 172
8 species = 135	16 species = 158	24 species = 174
		25 species = 176

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Plant Species *(no maximum)* _____ 50

4.1.2.5 Regionally Significant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
None Observed				Field Investigation
None referenced				Riley, J.L. 1989

One species= 20 pts	4 species = 45 pts	7 species = 58 pts
2 species = 30	5 species = 50	8 species = 61
3 species = 40	6 species = 55	9 species = 64
		10 species = 67

For each significant species over 10 in wetland, add 1 point.

Regionally Significant Species Score *(no maximum score)* _____ 0

4.1.2.6 Locally Significant Species

Common Name	Scientific Name	Activity	Dates Observed	Info Source
None observed				Field Investigation
None referenced				Oldham, 1999
None referenced				Riley, J.L. 1989

One species= 10 pts	4 species = 31 pts	7 species = 43 pts
2 species = 17	5 species = 38	8 species = 45
3 species = 24	6 species = 41	9 species = 47
		10 species = 49

For each significant species over 10 in wetland, add 1 point.

Locally Significant Species Score *(no maximum score)* _____ 0

4.2 SIGNIFICANT FEATURES AND HABITATS

4.2.1 Colonial Waterbirds

Record all available information. Score the highest applicable category. Include additional information as possible (e.g., nest locations, etc).

Activity	Species	Info Source	Points
Currently nesting			= 50
Known to have nested within the past 5 years			= 25
Active feeding area (great blue heron excluded)			= 15
None known			= 0

Additional Notes/Comments:

No species observed.

Colonial Waterbird Nesting Score *(maximum 50 points)* _____ 0

4.2.2 Winter Cover for Wildlife

Score highest appropriate category. Include rationale/sources of information.

	Provincially significant	= 100 pts
	Significant in Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Locally significant	= 10
x	Little or poor winter cover	= 0

Species/habitat/vegetation community scored *(e.g., winter deer cover in hemlock swamp, S3 and S4b)*:

Potential for white tail deer however winter cover is limited.

Source of information:

Winter Cover for Wildlife Score *(maximum 100 points)* _____ 0

4.2.3 Waterfowl Staging and/or Moulting Areas

Check highest level of significance for both staging and moulting; add scores for staging and for moulting together for final score. However, maximum score for evaluation under this section is 150 points.

	Staging		Moulting	
Nationally/internationally significant		= 150 pts		= 150 pts
Provincially significant		= 100		= 100
Significant in the Ecoregion		= 50		= 50
Significant in Ecodistrict		= 25		= 25
Known to occur		= 10		= 10
Not possible/Unknown	X	= 0	X	= 0

Species/habitat/vegetation community scored *(e.g., approx 20 mallards in W3)*:

Source of information:

Waterfowl Staging/Moulting Score
(maximum 150 points) 0

4.2.4 Waterfowl Breeding

Check highest level of significance.

	Nationally/internationally significant	= 150 pts
	Provincially significant	= 100
	Significant in the Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Habitat Suitable	= 10
0	Habitat not suitable	= 0

Species/habitat/vegetation community scored *(e.g., mallard in W3)*:

Source of information:
Source: Field observations

Waterfowl Breeding Score
(maximum 150 points) 0

4.2.5 Migratory Passerine, Shorebird or Raptor Stopover Area

Check highest level of significance.

	Nationally / internationally significant	= 150 pts
	Provincially significant	= 100
	Significant in Ecoregion	= 50
	Significant in Ecodistrict	= 25
	Known to occur	= 10
X	Not possible / Unknown	= 0

Species/habitat/vegetation community scored:

Source of information:
unknown

Passerine, Shorebird or Raptor Stopover Score
(maximum 100 points) 0

4.2.6 Fish Habitat

4.2.6.1 Spawning and Nursery Habitat

Area Factors for Low Marsh, High Marsh and Swamp Communities.

No. of ha of Fish Habitat	Area Factor
< 0.5 ha	0.1
0.5 – 4.9	0.2
5.0 – 9.9	0.4 ☐
10.0 – 14.9	0.6
15.0 – 19.9	0.8
20.0 +	1.0

0.03 ha (fish habitat App B)

Step 1:

☐	Fish habitat is not present within the wetland	Go to Step 7, Score 0 points
X	Fish habitat is present within the wetland	Go to Step 2

Step 2: *Choose only one option*

☐	Significance of the spawning and nursery habitat within the wetland is known	Go to Step 3
X	Significance of the spawning and nursery habitat within the wetland is not known	Go through Steps 4, 5 and 6

Step 3: *Select the highest appropriate category below, attach documentation:*

☐	Significant in Ecoregion	Go to Step 7, Score 100 points
☐	Significant in Ecodistrict	Go to Step 7, Score 50 points
☐	Locally Significant Habitat (5.0+ ha)	Go to Step 7, Score 25 points
☐	Locally Significant Habitat (<5.0 ha)	Go to Step 7, Score 15 points

Source of information:

Step 4: Low Marsh = the 'permanent' marsh area, from the existing water line out to the outer boundary of the wetland.

☐	Low marsh not present	Go to Step 5
X	Low marsh present	Continue through Step 4, scoring as noted below

Scoring of Low Marsh:

1. Check the appropriate **Vegetation Group** (see Appendix 7) for each Low Marsh community. (Based on the one most clearly dominant plant species of the dominant form in each Low Marsh vegetation community.)
2. Sum the areas (ha) of the vegetation communities assigned to each **Vegetation Group.**
3. Use these areas to assign an **Area Factor** for each checked **Vegetation Group.**
4. Multiply the **Area Factor** by the **Multiplication Factor** for each row to calculate **Score.**
5. Sum all numbers in Score column to get **Total Score for Low Marsh.**

Scoring for Presence of Key Vegetation Groups – Low Marsh

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
1	Tallgrass				6	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed	x	0.032	0.1	5	0.5
4	Arrowhead-Pickerelweed				5	
5	Duckweed				2	
6	Smartweed-Waterwillow				6	
7	Waterlily-Lotus				11	
8	Waterweed-Watercress				9	
9	Ribbongrass				10	
10	Coontail-Naiad-Watermilfoil				13	
11	Narrowleaf Pondweed				5	
12	Broadleaf Pondweed				8	
	Total Score for Low Marsh (*maximum 75 points*)					0.5

Continue to Step 5

Step 5: High Marsh = the 'seasonal' marsh area, from the water line to the inland boundary of marsh wetland type. This is essentially what is commonly referred to as a wet meadow, in that there is insufficient standing water to provide fisheries habitat except during flood or high water conditions.

X	High marsh not present	Go to Step 6
	High marsh present	Continue through Step 5, scoring as noted below

Scoring of High Marsh:

1. Check the appropriate **Vegetation Group** (see Appendix 7) for each High Marsh community. (Based on the one most clearly dominant plant species of the dominant form in each High Marsh vegetation community.)
2. Sum the areas (ha) of the vegetation communities assigned to each **Vegetation Group**.
3. Use these areas to assign an **Area Factor** (from Table 8) for each checked **Vegetation Group**.
4. Multiply the **Area Factor** by the **Multiplication Factor** for each row to calculate **Score**.
5. Sum all numbers in Score column to get **Total Score for High Marsh**.

Scoring for Presence of Key Vegetation Groups – High Marsh

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
1	Tallgrass				6	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
	Total Score for High Marsh (*maximum 25 points*)					

Continue to Step 6

Step 6:

X	Swamp containing fish habitat not present	Go to Step 7
	Swamp containing fish habitat present	Continue through Step 6, scoring as follows

Scoring of Swamp:

1. Determine the total area (ha) of seasonally flooded swamp communities within the wetland containing fish habitat and record below.
2. Determine the total area (ha) of permanently flooded swamp communities within the wetland containing fish habitat and record below.
3. Use these areas to assign an **Area Factor** (from Table 8).
4. Multiply the Area Factor by the **Multiplication Factor** for each row to calculate **Score**.
5. Sum all numbers in Score column to get **Total Score for Swamp**.

Scoring Swamps for Fish Habitat (Seasonally flooded; Permanently flooded)

Swamp Containing Fish Habitat	Present (check)	Total Area (ha)	Area Factor (from Table 8)	Multiplication Factor	Score
Seasonally Flooded Swamp				10	
Permanently Flooded Swamp				10	
	Total Score for Swamp (*maximum 20 points*)				

Continue to Step 7

Step 7: CALCULATION OF FINAL SCORE

NOTE: Scores for Steps 4, 5 and 6 are only recorded if Steps 1 and 3 have not been scored.

A. Score from Step 1 (fish habitat not present) = _____
B. Score from Step 3 (significance known) = _____
C. Score from Step 4 (Low Marsh) = 0.5
D. Score from Step 5 (High Marsh) = 37
E. Score from Step 6 (Swamp) = _____

Calculation of Final Score for Spawning and Nursery Habitat = A or B or Sum of C, D, and E

Score for Spawning and Nursery Habitat *(maximum 100 points)* _____	1

4.2.6.2 Migration and Staging Habitat

Step 1:

X	Staging or Migration Habitat is not present in the wetland	Go to Step 4, Score 0 points
	Staging or Migration Habitat is present in the wetland, significance of the habitat is known	Go to Step 2
	Staging or Migration Habitat is present in the wetland, significance of the habitat is not known	Go to Step 3

Step 2: Select the highest appropriate category below. Ensure that documentation is attached to the data record.

	Significant in Ecoregion	Score 25 points in Step 4
	Significant in Ecodistrict	Score 15 points in Step 4
	Locally Significant	Score 10 points in Step 4
	Fish staging and/or migration habitat present, but not as above	Score 5 points in Step 4

Source of information:

_____

_____

Step 3: Select the highest appropriate category below based on presence of the designated site type (i.e. does not have to be the dominant site type). Refer to Site Types recorded earlier (section 1.1.3). Attach documentation.

	Wetland is riverine at rivermouth or lacustrine at rivermouth	Score 25 points in Step 4
	Wetland is riverine, within 0.75 km of rivermouth	Score 15 points in Step 4
	Wetland is lacustrine, within 0.75 km of rivermouth	Score 10 points in Step 4
	Fish staging and/or migration habitat present, but not as above	Score 5 points in Step 4

Step 4: Enter a score from only one of the three above Steps.

Score for Staging and Migration Habitat *(maximum 25 points)* _____	0

4.3 ECOSYSTEM AGE

		Fractional Area		Score
Bog	=		x 25 =	
Fen, on deeper soils; floating mats or marl	=		x 20 =	
Fen, on limestone rock	=		x 5 =	
Swamp	=	0.90	x 3 =	2.7
Marsh	=	0.10	x 0 =	0
	Total		=	

Ecosystem Age Score *(maximum 25 points)* 3

4.4 GREAT LAKES COASTAL WETLANDS

Choose one only. Only coastal wetland units may be scored.

☐	Wetland < 10 ha	=	10 pts
☐	Wetland 10-50 ha	=	25
☐	Wetland 51-100 ha	=	50
☐	Wetland > 100 ha	=	75

If the wetland is a complex, identify which wetlands units or wetland communities are being scored as coastal:

Great Lakes Coastal Wetland Score *(maximum 75 points)* 0

5.0 DOCUMENTATION OF WETLAND FEATURES NOT INCLUDED IN THE EVALUATION

5.1 INVASIVE SPECIES

Attach documentation of invasive species found in wetland (include location information and a coarse estimate of abundance [F = few, C = fairly common, A = abundant]):

Phragmities present in reM1-A:re*,h,ts

5.2 VERNAL POOLS

Documentation of information on vernal pools encountered during the wetland evaluation but not included as part of the evaluated wetland.

none observed

5.3 SPECIES OF SPECIAL INTEREST

5.3.1 Osprey

Check all that apply:

- [ ] Present and nesting
- [ ] Known to have nested in last 5 years
- [ ] Feeding area for Osprey
- [X] Not as above

5.3.2 Common Loon

Check all that apply:

- [ ] Nesting in wetland
- [ ] Feeding at edge of wetland
- [ ] Observed or heard on lake or river adjoining the wetland
- [X] Not as above

5.4 IMPORTANT DRINKING WATER AREA

Wetland located within:
(check all that apply)

- [ ] Wellhead Protection Area
- [ ] Intake Protection Zone
- [ ] Significant Recharge Area
- [ ] Vulnerable Aquifer Area

Source of information:
Source: MOECC. Retrieved from https://www.gisapplication.lrc.gov.on.ca/SourceWaterProtection/Index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-US

Additional Comments:
Otonabee - Peterborough S.P.A.

5.5 AREA OF WETLAND RESTORATION POTENTIAL

Check all that apply. Attach additional pages if necessary.

- [ ] Area of wetland restoration potential adjacent to evaluated wetland unit(s)
- [ ] Area of wetland restoration potential within 750m of evaluated wetland unit(s), but not adjacent
- [ ] Area of wetland restoration potential encountered elsewhere
- [ ] Area currently functioning as wetland (e.g., showing signs of degradation but still mapped as wetland).
- [ ] Adjacent Wetland Unit (if applicable): _____
- [ ] GPS Coordinates of Site: _____

Description of site (e.g., current land use, wetland characteristics of site, etc) and why it is identified as an area of restoration potential:

No potential for restoration exists.

Additional Notes/Comments (e.g., adjacent lands, etc)

None

General Information

Wetland Evaluator(s)

Name: Tyler R. Jones Affiliation: D.M. Wills Associates Limited

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Name: _____ Affiliation: _____

Date(s) wetland visited (in field): (May 30, 31, October 23 - 2019) April 27, 28, 30, May 1, 19, June 17,18,July 2 - 2020)

Date evaluation completed: September 2020

Estimated time devoted to completing the field survey in person hours: 24

Weather Conditions

i) at time of field work: Generally clear and sunny conditions.

ii) summer conditions in general: Average conditions.

WETLAND EVALUATION SCORING RECORD

WETLAND NAME: Burnham Line Complex

1.0 BIOLOGICAL COMPONENT

	1.1 PRODUCTIVITY
15	1.1.1 Growing Degree-Days/Soils
9	1.1.2 Wetland Type
2	1.1.3 Site Type
26	
	1.2 BIODIVERSITY
13	1.2.1 Number of Wetland Types
5	1.2.2 Vegetation Communities
5	1.2.3 Diversity of Surrounding Habitat
5	1.2.4 Proximity to Other Wetlands
6	1.2.5 Interspersion
0	1.2.6 Open Water Type
34	
1	1.3 SIZE (Biological Component)
61	TOTAL (Biological Component)

2.0 SOCIAL COMPONENT

	2.1 ECONOMICALLY VALUABLE PRODUCTS
0	2.1.1 Wood Products
0	2.1.2 Wild Rice
12	2.1.3 Commerical Baitfish
12	2.1.4 Furbearers
24	Total for Economically Valuable Products
8	2.2 RECREATIONAL ACTIVITIES
	2.3 LANDSCAPE AESTHETICS
0	2.3.1 Distinctness
2	2.3.2 Absence of Human Disturbance
2	Total for Landscape Aesthetics
	2.4 EDUCATION AND PUBLIC AWARENESS
20	2.4.1 Educational Uses
0	2.4.2 Facilities and Programs
0	2.4.3 Research and Studies
20	Total for Education and Public Awareness
26	2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT
8	2.6 OWNERSHIP
4	2.7 SIZE (Social Component)
	2.8 ABORIGINAL VALUES AND CULTURAL HERITAGE
30	2.8.1 Aboriginal Values
0	2.8.2 Cultural Heritage
122	TOTAL (Social Component)

3.0 HYDROLOGICAL COMPONENT

100	3.1 FLOOD ATTENUATION
	3.2 WATER QUALITY IMPROVEMENT
37	3.2.1 Short Term Water Quality Improvement
10	3.2.2 Long Term Nutrient Trap
4	3.2.3 Groundwater Discharge
51	Total for Water Quality Improvement
5	3.3 CARBON SINK
0	3.4 SHORELINE EROSION CONTROL
	3.5 GROUNDWATER RECHARGE
50	3.5.1 Site Type
7	3.5.2 Soil Recharge Potential
57	Total for Groundwater Recharge
213	TOTAL (Hydrological Component)

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

4.1.1 Wetlands

20	4.1.1.1 Rarity within the Landscape
20	4.1.1.2 Rarity of Wetland Type
40	Total for Wetland Rarity

4.1.2 Species

0	4.1.2.1 Reproductive Habitat for an Endangered or Threatened Species
0	4.1.2.2 Traditional Migration or Feeding Habitat for an Endangered or Threatened Species
50	4.1.2.3 Provincially Significant Animal Species
50	4.1.2.4 Provincially Significant Plant Species
0	4.1.2.5 Regionally Significant Species
0	4.1.2.6 Locally Significant Species
100	Total for Species Rarity

4.2 SIGNIFICANT FEATURES AND HABITATS

0	4.2.1 Colonial Waterbirds
0	4.2.2 Winter Cover for Wildlife
0	4.2.3 Waterfowl Staging and/or Moulting Areas
0	4.2.4 Waterfowl Breeding
0	4.2.5 Migratory Passerine, Shorebird or Raptor Stopover Area
0	4.2.6 Fish Habitat
0.5	4.2.6.1 Spawning and Nursery Habitat
0	4.2.6.2 Migration and Staging Habitat
1	Total for Significant Features and Habitats

3	4.3 ECOSYSTEM AGE
0	4.4 GREAT LAKES COASTAL WETLANDS
144	TOTAL FOR SPECIAL FEATURES COMPONENT (*not to exceed 250*)

SUMMARY OF EVALUATION RESULT

Wetland Burnham Line Wetland Complex

61 1.0 TOTAL FOR BIOLOGICAL COMPONENT

122 2.0 TOTAL FOR SOCIAL COMPONENT

213 3.0 TOTAL FOR HYDROLOGICAL COMPONENT

144 4.0 TOTAL FOR SPECIAL FEATURES COMPONENT

540 TOTAL WETLAND SCORE

FOR MNR USE ONLY

MNR Reviewer (Name & Position) Colin Higgins-Management Biologist

Reviewer Comments

MNR Approver (Name & Position) Deanna Cotter - Resources Management Supervisor

Approval Date

Appendix G

Flood Impact Assessment

WILLS

PARTNERS IN ENGINEERING, PLANNING & ENVIRONMENTAL SERVICES

April 12, 2021

Life at the Woodland Inc.
5 Brisdale Drive, Suite 201
Brampton, ON
L7A 0S9

Attention: Rubal Kundra, President

Dear Mr. Kundra:

Re: Life at the Woodland Subdivision
Otonabee-South Monaghan, ON
Flood Impact Assessment
D.M. Wills Associates Project No. 19-10874

1.0 Purpose

D.M. Wills Associates Limited (Wills) has been retained by Life at the Woodland Inc. to prepare a Flood Impact Assessment in support of the proposed Life at the Woodland Subdivision, located at Burnham Line, in the Township of Otonabee South Monaghan, Ontario (the site).

The site is currently undeveloped and is comprised of range, woodlot and two (2) wetland areas. The site is bounded by residential properties to the south and west, agricultural lands to the north and wetland to the east. The proposed development will consist of 28 residential lots with access provided from Burnham Line through a private access road.

The private access road will require crossing the central wetland area, which is within the Otonabee Conservation (ORCA) development control area and, therefore, a permit will be required in accordance with Ontario Regulation 167/06 for construction of the proposed development. This Flood Impact Assessment has been prepared in support of the development to address ORCA's requirements and includes the following objectives:

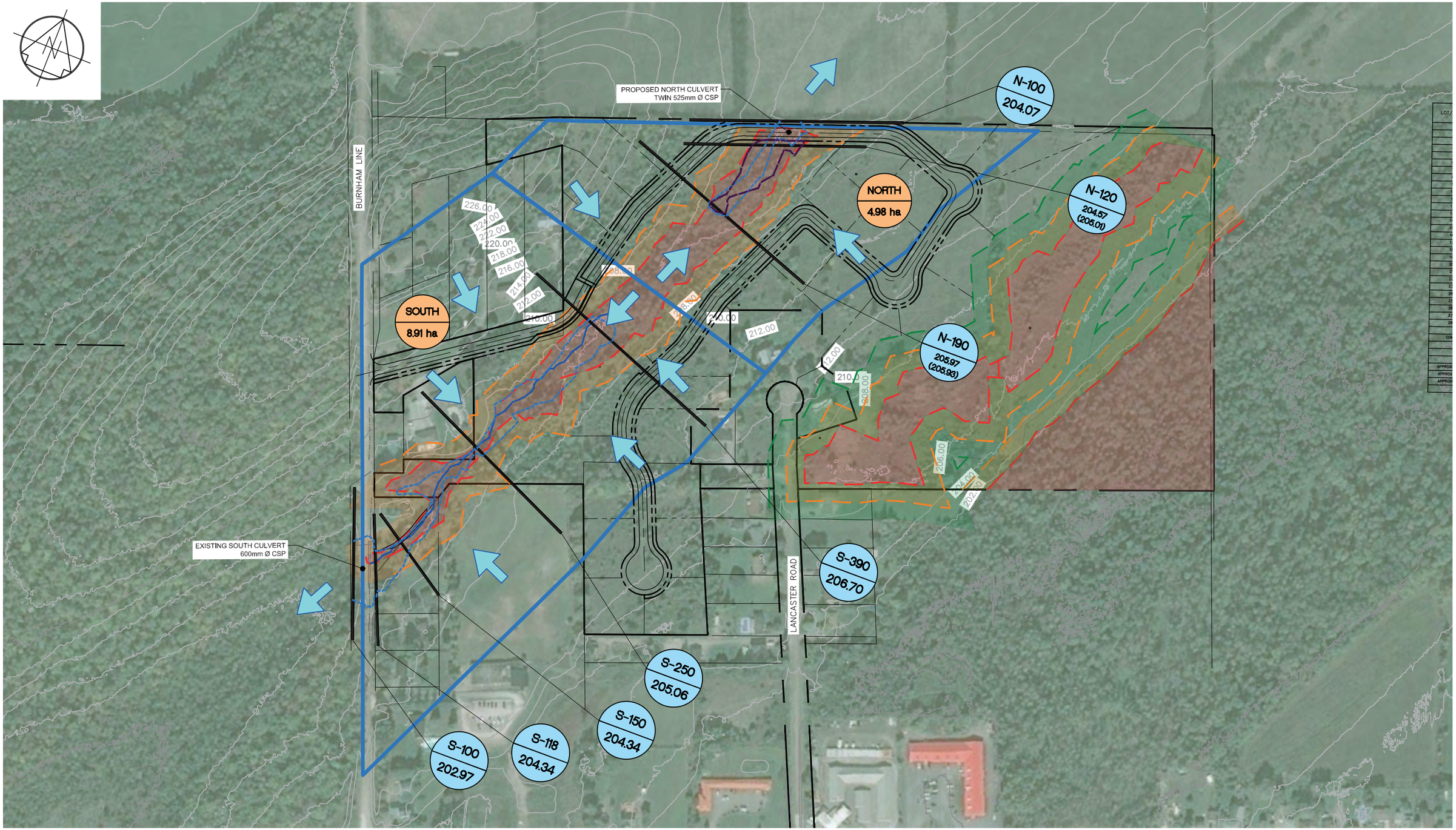
- To determine the existing flood hazard limits across the site.
- To confirm that development of the site will not increase flood potential to adjacent properties.
- To confirm that safe access will be provided to the proposed development, through the appropriate sizing of drainage infrastructure.
- To minimize disturbances within the flood hazard limits.

Figure 1 – Site Location

A topographic survey of the site, wetland and watercourse was completed by JBF Surveyors in January 2020. This survey data was used to determine elevations and locations of existing site features and cross-sections of the watercourse used for the hydraulic modelling. LiDAR topographic data was also used to supplement the topographic survey where access was not available or additional information was required for catchment delineation.

2.0 Hydrology

For the purpose of this Flood Impact Assessment, the hydrologic and hydraulic analyses will be focussed on the central wetland feature. Drainage from the central wetland is split between two (2) outlet locations, referred to as the North and South Outlets. The North Outlet drains across agricultural land to another wetland area and into a tributary of Meade Creek. The South Outlet drains through an existing culvert under Burnham Line and through a separate tributary of Meade Creek. For the purpose of this report, catchments have been delineated based on the existing topography to each outlet location as shown on **Figure 2**. Hydrologic parameters for each catchment area are summarized in **Table 1** and documented in the **Appendix**.



EX-100 / 0.22 ha — CATCHMENT ID / CATCHMENT AREA

CATCHMENT BOUNDARY

N-100 / 204.07 / (204.07) — RIVER STATION / EXISTING FLOOD ELEVATION / PROPOSED FLOOD ELEVATION

CROSS-SECTION LOCATION

EXISTING FLOOD LIMIT

PROPOSED FLOOD LIMIT

WETLAND

WETLAND 15m OFFSET

WETLAND 30m OFFSET

Sketch No.

FIGURE 2
LIFE AT THE WOODLAND
PRE-DEVELOPMENT
DRAINAGE AREA PLAN

WILLS

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Peterborough, Ontario
Canada K9J 0B9

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E. wills@dmwills.com

Drawn By: RC	Scale: 1: 3000
Designed By: RC	Plot Date: MARCH 2021
Checked By: CPB	Project No.: 10874
Engineer: CPB	Drawing File No.: 10874_DP

Table 1 – Hydrologic Parameters

Nashyd[1]					
Catchment ID	**Area (ha)**	**Impervious %**	**CN*[2]**	**Ia[3]**	**Tp[4] (hrs)**
SOUTH	8.91	5.7	64.0	7.1	0.17
NORTH	4.98	2.2	64.6	8.8	0.17

Notes:
1. Command Line refers to the unit hydrograph used in the VO3 hydrologic model for the respective catchment area.
2. CN* refers to the modified CN number adjusted to Antecedent Moisture Conditions II. Excludes Impervious Area for Standhyd.
3. Ia refers to Initial Abstraction. Excludes Impervious Area for Standhyd.
4. Tp refers to Time of Peak.

Hydrologic parameters such as soil infiltration properties, land use and runoff response were determined based on literature review. Topographic mapping and AutoCAD Civil 3D 2019 software were used to establish sub-catchment areas, land use and slopes.

Rainfall data for the site is taken from the City of Peterborough Engineering Design Standards (March 2016) as well as the Peterborough Airport climate station, is included in the **Appendix**. The Regulatory Flow is defined by the Ministry of Natural Resources and Forestry (MNRF) in the Technical Guide for River and Stream Systems: Flooding Hazard Limit as the greater peak flow rate of the 100-year and the Regional Storm. This peak flow rate is used as the basis for determining the water surface elevations in the hydraulic model. The 6-hour, 12-hour and 24 hour SCS storm distributions were modelled as well as the Timmins Regional storm.

Visual OTTHYMO Version 3 (VO3) was used as the hydrologic model for this project. Peak flow rates have been analyzed at the outlet locations based on the hydrologic parameters shown in **Table 1,** for each storm distribution. The proposed development will be required to control post development peak flow rates to pre-development levels, at each outlet location. As such, the proposed development will have no impact on peak flow rates. A summary of the peak flow rates is shown in **Table 2.**

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Table 2 – Peak Flow Summary

Storm Distribution	Return Period	Rainfall Volume (mm)	Peak Flow Rate (m^3/s)	
			North Outlet	South Outlet
6 hour SCS Storm	100-Year	89.9	**0.545**	**0.987**
12 hour SCS Storm	100-Year	98.4	**0.545**	0.986
24 hour SCS Storm	100-Year	108.7	0.544	0.982
Timmins Storm	Regional	193.0	0.388	0.692

A review of Table 2, notes that the highest peak flow rates are generated by the 100-year, 6-hour SCS storm distribution, which have been used as the regulatory flows within the hydraulic modelling.

3.0 Hydraulics

Based the nature of the proposed development, a simple HEC-RAS hydraulic model was created, analyzing each outlet as separate reaches. Culvert crossings and cross-section locations are illustrated on **Figure 2**.

Two (2) modelling scenarios were analyzed. The existing scenario models the site in the pre-development condition and the proposed scenario models the site with the proposed private roadway crossing. Twin 525 mm CSP culverts are proposed under the private roadway to ensure that the crossing does not overtop during major storm events. A summary of the results for the regulatory flows is presented in **Table 3** and supporting calculations can be found in the **Appendix.** The existing and proposed flood limits are illustrated on **Figure 2**.

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Table 3 – Regulatory Water Surface Elevations

Station	Location	Outlet	Water Surface Elevation (m)		Flow Depth (m)	
			Existing	Proposed	Existing	Proposed
S-100	D/S of Burnham Line Culvert Crossing	South	202.97	202.97	0.24	0.24
S-109	Burnham Line Culvert Crossing	South	204.34	204.34	0.12	0.12
S-118	U/S of Burnham Line Culvert Crossing	South	204.34	204.34	0.97	0.97
S-150		South	204.34	204.34	0.62	0.62
S-250		South	205.06	205.06	0.25	0.25
S-390		South	206.70	206.70	0.19	0.19
N-100	North Property Boundary	North	204.07	204.07	0.17	0.17
N-110	Private Roadway Culvert Crossing	North	204.57	204.57	0.00	0.00
N-120	U/S of Private Roadway Culvert Crossing	North	204.57	**205.01**	0.13	**0.57**
N-190		North	205.97	**205.93**	0.15	**0.11**

4.0 Flood Hazard Evaluation

A review of **Table 3** and **Figure 2** show that the regulatory flood limits are contained within the existing wetland areas, with the exception of the spill over Burnham Line. Without accounting for any flow attenuation in the wetland areas, the maximum flow depth over Burnham Line is estimated to be 0.12 m, which meets the criteria for safe access.

Flood elevations immediately upstream of the proposed private roadway will increase as a result of the development; however, the flood limits will be contained within the wetland area, will not overtop the proposed roadway and will not extend to adjacent properties.

5.0 Conclusion

The existing and proposed flooding hazard limits across the site have been determined. It has been confirmed that the proposed development will not increase flood potential to adjacent properties and that safe access will be provided from the site for emergency vehicles. The proposed grading plan should consider these flood limits and seek to minimize disturbance within the floodplain.

Respectfully submitted,

Chris Proctor-Bennett, P.Eng.
Water Resources Engineer

CPB/kr

Statement of Limitations

This report has been prepared by D.M. Wills Associates Limited on behalf of Life at the Woodland Inc. to address the requirements of Otonabee Conservation.

The conclusions and recommendations in this report are based on available background documentation and discussions with applicable agencies at the time of preparation.

The report is intended to document the methodology and assumptions used to estimate the regulatory flood limits across the subject property and to demonstrate how the site can be developed in conformance with applicable regulations and without increasing flood potential to adjacent properties. The report is applicable only to the project described in the text, constructed substantially in accordance with the plans and details accompanying this report.

Any use which a third party makes of this report other than a Flood Impact Assessment for the proposed development is the responsibility of such third parties. D.M. Wills Associates Limited accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or action taken based on using this report for purposes other than a Flood Impact Assessment for the Life at the Woodland, Otonabee South-Monaghan development.

6 Hour SCS Type II Intensity Hyetographs
2006 Peterborough Airport Weather Station
(mm/hr)

Time (min.)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
0	0	0	0	0	0	0
15	1.6	2.1	2.5	2.9	3.3	3.6
30	1.6	2.1	2.5	2.9	3.3	3.6
45	2.3	3.2	3.7	4.4	4.9	5.4
60	2.3	3.2	3.7	4.4	4.9	5.4
75	2.3	3.2	3.7	4.4	4.9	5.4
90	2.3	3.2	3.7	4.4	4.9	5.4
105	3.9	5.2	6.2	7.3	8.1	9.0
120	3.9	5.2	6.2	7.3	8.1	9.0
135	4.6	6.3	7.4	8.8	9.8	10.8
150	4.6	6.3	7.4	8.8	9.8	10.8
165	23.2	31.4	36.9	43.7	48.9	53.9
180	60.4	81.78	95.9	113.7	127.0	140.2
195	8.5	11.5	13.5	16.0	17.9	19.8
210	8.5	11.5	13.5	16.0	17.9	19.8
225	3.9	5.2	6.2	7.3	8.1	9.0
240	3.9	5.2	6.2	7.3	8.1	9.0
255	3.1	4.2	4.9	5.8	6.5	7.2
270	3.1	4.2	4.9	5.8	6.5	7.2
285	2.3	3.2	3.7	4.4	4.9	5.4
300	2.3	3.2	3.7	4.4	4.9	5.4
315	1.6	2.1	2.5	2.9	3.3	3.6
330	1.6	2.1	2.5	2.9	3.3	3.6
345	1.6	2.1	2.5	2.9	3.3	3.6
360	1.6	2.1	2.5	2.9	3.3	3.6

Design Chart 1.04: Timmins Storm

	Depth		Percent of 12 hour
	(mm)	(inches)	
1st hour	15	0.6	8
2nd hour	20	0.8	10
3rd hour	10	0.4	6
4th hour	3	0.1	1
5th hour	5	0.2	3
6th hour	20	0.8	10
7th hour	43	1.7	23
8th hour	20	0.8	10
9th hour	23	0.9	12
10th hour	13	0.5	6
11th hour	13	0.5	7
12th hour	8	0.3	4
	193	7.6	100

Drainage Area (km^2)	Percentage
0 to 25	100.0
26 to 50	97
51 to 75	94
76 to 100	90
101 to 150	87
151 to 200	84
201 to 250	82
251 to 375	79
376 to 500	76
501 to 750	74
751 to 1000	70
1001 to 1250	68
1251 to 1500	66
1501 to 1800	65
1801 to 2100	64
2101 to 2300	63
2301 to 2600	62
2601 to 3900	58
3901 to 5200	56
5201 to 6500	53
6501 to 8000	50

Source: Ministry of Transportation, MTO (1989)

Design Chart 1.05: SCS Type II Distribution

6 hour			12 hour			24 hour		
Time end'g, hour	F_{inc} (%)	F_{cum} (%)	Time end'g, hour	F_{inc} (%)	F_{cum} (%)	Time end'g, hour	F_{inc} (%)	F_{cum} (%)
0	0	0	0	0	0	0	0	0
0.5	2	2	2	5	5	2	2.2	2.2
1	3	5	3	3	8	4	2.6	4.8
1.5	3	8	3.5	2	10	6	3.2	8.0
2	5	13	4	2	12	7	-	-
2.5	6	19	4.5	3	15	8	4.0	12.0
2.75	15	34	5	4	19	8.5	-	-
3	39	73	5.5	6	25	9	2.7	14.7
3.5	11	84	5.75	12	37	9.5	1.6	16.3
4	5	89	6	33	70	9.75	-	-
4.5	4	93	6.5	9	79	10	1.8	18.1
5	3	96	7	4	83	10.5	2.3	20.4
6	4	100	7.5	3	86	11	3.1	23.5
			8	3	89	11.5	4.8	28.3
			10	7	96	11.75	10.4	38.7
			12	4	100	12	27.6	66.3
						12.5	7.2	73.5
						13	3.7	77.2
						13.5	0.7	77.9
						14	4.1	82.0
						16	6.0	88.0
						20	7.2	95.2
						24	4.8	100

Source: Ministry of Natural Resources - MNR (1986)

Hydrologic Parameters for NORTH

WILLS

Project No: 10874
Project Name: Life at Woodland
Designed/Checked By: RC/CPB
Date: 13-Apr-21

Land Use

Agriculture	0.00	0.00	ha
Range	2.17	0.00	ha
Grass	0.16	0.00	ha
Woods	1.43	0.47	ha
Wetland	0.00	0.64	ha
Gravel	0.00	0.00	ha
Impervious	0.11	0.00	ha
SUM	**3.87**	**1.11**	
Hydrologic Soil Group[1]	B	C	
Soil Type	Otonabee Loam	Foxboro Silt Loam	
C	0.25	0.10	
CN (Nashyd)	63.2	58.9	

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**4.98**	ha
Impervious Area	**0.11**	ha
Percent Impervious	**2.2%**	

	Pervious	
Length	140	m
US Elev	226.0	m
DS Elev	206.0	m
Slope	14.3	%
	Hilly	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2]**, C**	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.25	n.a.
	C	0.53	0.36	0.24	0.16	0.05	0.84	0.90	0.10	
SCS Curve No.[3]**, CN**	B	74	65	61	58	50	85	98	63.2	62.2
	C	82	76	74	71	50	89	98	58.9	58.9
Initial Abstraction[5]**, mm**		6.0	8.0	5.0	10.0	10.0	2.5	2.0	8.8	8.9

Time of Concentration[6]

Total Length	140	m	
Average Slope	14.3	%	
Airport	14.1	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	4.0	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	4.98 ha	
Runoff Coefficient	0.22	
SCS Curve No.	62.2	61.4
Modified Curve No.[4]**, CN***	**64.6**	63.8
Initial Abstraction.	**8.8**	8.9

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Based on the results of the Uplands Method
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 15 minutes

Visual Otthymo Model for NORTH

WILLS

Project No: 10874
Project Name: Life at Woodland
Designed/Checked By: RC/CPB
Date: 13-Apr-21

Design Storm (yr)	24hr SCS	12hr SCS	6hr SCS	1hr AES	12hr AES	1hr Chic	4hr Chic	6 hr Chic
2								
5								
10								
25								
50								
100	0.544	**0.545**	**0.545**					
Regional	**0.388**							

Notes:

1. Storm used to determine peak flow values **0**

NASHYD	
DT (min)	5.0
Area (ha)	4.98
DWF (m3/s) - Default [0.0]	0.0
CN*	64.6
IA (mm)	8.8
N - Default [3.0]	3
TP (hr)	0.17

Hydrologic Parameters for SOUTH

Project No: 10874
Project Name: Life at Woodland
Designed/Checked By: RC/CPB
Date: 13-Apr-21

Land Use

Agriculture	0.00	0.00	ha
Range	2.29	0.00	ha
Grass	3.45	0.00	ha
Woods	2.00	0.00	ha
Wetland	0.00	0.66	ha
Gravel	0.00	0.00	ha
Impervious	0.51	0.00	ha
SUM	**8.25**	**0.66**	
Hydrologic Soil Group[1]	B	C	
Soil Type	Otonabee Loam	Foxboro Silt Loam	
C	0.25	0.05	
CN (Nashyd)	63.7	50.0	

Rainfall Data

Gauging Station = Peterborough
12 hr, 100 Yr Rainfall = 90.4 mm

Drainage Area	**8.91**	ha
Impervious Area	**0.51**	ha
Percent Impervious	**5.7%**	

	Pervious	
Length	140	m
US Elev	226.0	m
DS Elev	206.0	m
Slope	14.3	%
	Hilly	

Parameter	Soil Group	Land Use							Weighted Value	
		Agriculture	Range	Grass	Woods	Wetland	Gravel	Imperv.	Incl. Imperv. NASHYD	Not Incl. Imperv. STANDHYD
Runoff Coefficient[2], C	B	0.40	0.30	0.19	0.14	0.05	0.76	0.90	0.25	n.a.
	C	0.53	0.36	0.24	0.16	0.05	0.84	0.90	0.05	
SCS Curve No.[3], CN	B	74	65	61	58	50	85	98	63.7	61.4
	C	82	76	74	71	50	89	98	50.0	50.0
Initial Abstraction[5], mm		6.0	8.0	5.0	10.0	10.0	2.5	2.0	7.1	7.4

Time of Concentration[6]

Total Length	140	m	
Average Slope	14.3	%	
Airport	13.8	min.	Flat: 0-2% Slopes Rolling: 2-6% Slopes Hilly: >6% Slopes
Bransby - Williams	3.8	min.	
Applicable Minimum[7]	**15.0**	min.	
Time to Peak	10.1	min.	
	0.17	**hr.**	

Composite Parameters

Drainage Area	8.91 ha	
Runoff Coefficient	0.24	
SCS Curve No.	62.7	60.5
Modified Curve No.[4], CN*	**64.0**	62.0
Initial Abstraction.	**7.1**	7.4

Notes:

1. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
2. Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
3. SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
4. The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents anticedent moisture conditions Type II
5. Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
6. Based on the results of the Uplands Method
7. Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 15 minutes

Visual Otthymo Model for SOUTH

WILLS

Project No: 10874
Project Name: Life at Woodland
Designed/Checked By: RC/CPB
Date: 13-Apr-21

Design Storm (yr)	24hr SCS	12hr SCS	6hr SCS	1hr AES	12hr AES	1hr Chic	4hr Chic	6 hr Chic
2								
5								
10								
25								
50								
100	0.982	0.986	**0.987**					
Regional	**0.692**							

Notes:

1. Storm used to determine peak flow values **0**

NASHYD	
DT (min)	5.0
Area (ha)	8.91
DWF (m3/s) - Default [0.0]	0.0
CN*	64.0
IA (mm)	7.1
N - Default [3.0]	3
TP (hr)	0.17

```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                    *****  D E T A I L E D   O U T P U T *****


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out
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sum


DATE: 02-26-2021                          TIME: 05:12:54

USER:


COMMENTS: _____________________________________________________


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  ** SIMULATION NUMBER:   1 **
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|                  |              860fbb98-44ea-4f05-86f9-2da5dc98138e\5585e635
| Ptotal= 89.93 mm |    Comments: 100-Year, 6 hour SCS Type II - Peterboro
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    3.60 |  1.75    9.00 |  3.25   19.80 |  4.75    5.40
                0.50    3.60 |  2.00    9.00 |  3.50   19.80 |  5.00    5.40
                0.75    5.40 |  2.25   10.80 |  3.75    9.00 |  5.25    3.60
                1.00    5.40 |  2.50   10.80 |  4.00    9.00 |  5.50    3.60
                1.25    5.40 |  2.75   53.90 |  4.25    7.20 |  5.75    3.60
                1.50    5.40 |  3.00  140.20 |  4.50    7.20 |  6.00    3.60

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD    (1102) |   Area     (ha)=   4.98   Curve Number    (CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.60 | 1.583    9.00 | 3.083   19.80 |  4.58    5.40
               0.167    3.60 | 1.667    9.00 | 3.167   19.80 |  4.67    5.40
               0.250    3.60 | 1.750    9.00 | 3.250   19.80 |  4.75    5.40
               0.333    3.60 | 1.833    9.00 | 3.333   19.80 |  4.83    5.40
               0.417    3.60 | 1.917    9.00 | 3.417   19.80 |  4.92    5.40
```



```
               0.500    3.60 | 2.000    9.00 | 3.500   19.80 |  5.00    5.40
               0.583    5.40 | 2.083   10.80 | 3.583    9.00 |  5.08    3.60
               0.667    5.40 | 2.167   10.80 | 3.667    9.00 |  5.17    3.60
               0.750    5.40 | 2.250   10.80 | 3.750    9.00 |  5.25    3.60
               0.833    5.40 | 2.333   10.80 | 3.833    9.00 |  5.33    3.60
               0.917    5.40 | 2.417   10.80 | 3.917    9.00 |  5.42    3.60
               1.000    5.40 | 2.500   10.80 | 4.000    9.00 |  5.50    3.60
               1.083    5.40 | 2.583   53.90 | 4.083    7.20 |  5.58    3.60
               1.167    5.40 | 2.667   53.90 | 4.167    7.20 |  5.67    3.60
               1.250    5.40 | 2.750   53.90 | 4.250    7.20 |  5.75    3.60
               1.333    5.40 | 2.833  140.20 | 4.333    7.20 |  5.83    3.60
               1.417    5.40 | 2.917  140.20 | 4.417    7.20 |  5.92    3.60
               1.500    5.40 | 3.000  140.20 | 4.500    7.20 |  6.00    3.60

     Unit Hyd Qpeak  (cms)=   1.119

     PEAK FLOW       (cms)=   0.545 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  29.766
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.331

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (1101) |   Area     (ha)=   8.91   Curve Number    (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   7.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   2.002

     PEAK FLOW       (cms)=   0.987 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  30.286
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.337

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************


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|                  |              860fbb98-44ea-4f05-86f9-2da5dc98138e\76c8441d
| Ptotal= 98.48 mm |    Comments: 100-Year, 12 hour SCS Type II, Environme
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.50 |  3.25    3.90 |  6.25   17.70 |  9.25    3.40
                0.50    2.50 |  3.50    3.90 |  6.50   17.70 |  9.50    3.40
                0.75    2.50 |  3.75    3.90 |  6.75    7.90 |  9.75    3.40
                1.00    2.50 |  4.00    3.90 |  7.00    7.90 | 10.00    3.40
                1.25    2.50 |  4.25    5.90 |  7.25    5.90 | 10.25    2.00
                1.50    2.50 |  4.50    5.90 |  7.50    5.90 | 10.50    2.00
                1.75    2.50 |  4.75    7.90 |  7.75    5.90 | 10.75    2.00
                2.00    2.50 |  5.00    7.90 |  8.00    5.90 | 11.00    2.00
                2.25    3.00 |  5.25   11.80 |  8.25    3.40 | 11.25    2.00
                2.50    3.00 |  5.50   11.80 |  8.50    3.40 | 11.50    2.00
                2.75    3.00 |  5.75   47.20 |  8.75    3.40 | 11.75    2.00
                3.00    3.00 |  6.00  129.90 |  9.00    3.40 | 12.00    2.00

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD    (1102) |   Area     (ha)=   4.98   Curve Number    (CN)= 64.6
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	3.083	3.90	6.083	17.70	9.08	3.40
0.167	2.50	3.167	3.90	6.167	17.70	9.17	3.40
0.250	2.50	3.250	3.90	6.250	17.70	9.25	3.40
0.333	2.50	3.333	3.90	6.333	17.70	9.33	3.40
0.417	2.50	3.417	3.90	6.417	17.70	9.42	3.40
0.500	2.50	3.500	3.90	6.500	17.70	9.50	3.40
0.583	2.50	3.583	3.90	6.583	7.90	9.58	3.40
0.667	2.50	3.667	3.90	6.667	7.90	9.67	3.40
0.750	2.50	3.750	3.90	6.750	7.90	9.75	3.40
0.833	2.50	3.833	3.90	6.833	7.90	9.83	3.40
0.917	2.50	3.917	3.90	6.917	7.90	9.92	3.40
1.000	2.50	4.000	3.90	7.000	7.90	10.00	3.40
1.083	2.50	4.083	5.90	7.083	5.90	10.08	2.00
1.167	2.50	4.167	5.90	7.167	5.90	10.17	2.00
1.250	2.50	4.250	5.90	7.250	5.90	10.25	2.00
1.333	2.50	4.333	5.90	7.333	5.90	10.33	2.00
1.417	2.50	4.417	5.90	7.417	5.90	10.42	2.00
1.500	2.50	4.500	5.90	7.500	5.90	10.50	2.00
1.583	2.50	4.583	7.90	7.583	5.90	10.58	2.00
1.667	2.50	4.667	7.90	7.667	5.90	10.67	2.00
1.750	2.50	4.750	7.90	7.750	5.90	10.75	2.00
1.833	2.50	4.833	7.90	7.833	5.90	10.83	2.00
1.917	2.50	4.917	7.90	7.917	5.90	10.92	2.00
2.000	2.50	5.000	7.90	8.000	5.90	11.00	2.00
2.083	3.00	5.083	11.80	8.083	3.40	11.08	2.00
2.167	3.00	5.167	11.80	8.167	3.40	11.17	2.00
2.250	3.00	5.250	11.80	8.250	3.40	11.25	2.00
2.333	3.00	5.333	11.80	8.333	3.40	11.33	2.00
2.417	3.00	5.417	11.80	8.417	3.40	11.42	2.00
2.500	3.00	5.500	11.80	8.500	3.40	11.50	2.00
2.583	3.00	5.583	47.20	8.583	3.40	11.58	2.00
2.667	3.00	5.667	47.20	8.667	3.40	11.67	2.00
2.750	3.00	5.750	47.20	8.750	3.40	11.75	2.00
2.833	3.00	5.833	129.90	8.833	3.40	11.83	2.00
2.917	3.00	5.917	129.90	8.917	3.40	11.92	2.00
3.000	3.00	6.000	129.90	9.000	3.40	12.00	2.00

Unit Hyd Qpeak (cms)= 1.119

PEAK FLOW (cms)= 0.545 (i)
TIME TO PEAK (hrs)= 6.000
RUNOFF VOLUME (mm)= 35.012
TOTAL RAINFALL (mm)= 98.475
RUNOFF COEFFICIENT = 0.356

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (1101)	Area (ha)= 8.91 Curve Number (CN)= 64.0
ID= 1 DT= 5.0 min	Ia (mm)= 7.10 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17

Unit Hyd Qpeak (cms)= 2.002

PEAK FLOW (cms)= 0.986 (i)
TIME TO PEAK (hrs)= 6.000
RUNOFF VOLUME (mm)= 35.516
TOTAL RAINFALL (mm)= 98.475
RUNOFF COEFFICIENT = 0.361

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

** SIMULATION NUMBER: 3 **

READ STORM	Filename: C:\Users\cproctorbennett\AppD

	ata\Local\Temp\
	860fbb98-44ea-4f05-86f9-2da5dc98138e\0bd5fc7e
Ptotal=108.80 mm	Comments: 100-Year, 24 hour SCS Type II, Environme

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.20	6.25	2.20	12.25	15.70	18.25	2.00
0.50	1.20	6.50	2.20	12.50	15.70	18.50	2.00
0.75	1.20	6.75	2.20	12.75	8.00	18.75	2.00
1.00	1.20	7.00	2.20	13.00	8.00	19.00	2.00
1.25	1.20	7.25	2.20	13.25	1.50	19.25	2.00
1.50	1.20	7.50	2.20	13.50	1.50	19.50	2.00
1.75	1.20	7.75	2.20	13.75	8.90	19.75	2.00
2.00	1.20	8.00	2.20	14.00	8.90	20.00	2.00
2.25	1.40	8.25	2.90	14.25	3.30	20.25	1.30
2.50	1.40	8.50	2.90	14.50	3.30	20.50	1.30
2.75	1.40	8.75	2.90	14.75	3.30	20.75	1.30
3.00	1.40	9.00	2.90	15.00	3.30	21.00	1.30
3.25	1.40	9.25	3.50	15.25	3.30	21.25	1.30
3.50	1.40	9.50	3.50	15.50	3.30	21.50	1.30
3.75	1.40	9.75	3.90	15.75	3.30	21.75	1.30
4.00	1.40	10.00	3.90	16.00	3.30	22.00	1.30
4.25	1.70	10.25	5.00	16.25	2.00	22.25	1.30
4.50	1.70	10.50	5.00	16.50	2.00	22.50	1.30
4.75	1.70	10.75	6.70	16.75	2.00	22.75	1.30
5.00	1.70	11.00	6.70	17.00	2.00	23.00	1.30
5.25	1.70	11.25	10.40	17.25	2.00	23.25	1.30
5.50	1.70	11.50	10.40	17.50	2.00	23.50	1.30
5.75	1.70	11.75	45.20	17.75	2.00	23.75	1.30
6.00	1.70	12.00	120.00	18.00	2.00	24.00	1.30

CALIB	
NASHYD (1102)	Area (ha)= 4.98 Curve Number (CN)= 64.6
ID= 1 DT= 5.0 min	Ia (mm)= 8.80 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.20	6.083	2.20	12.083	15.71	18.08	2.00
0.167	1.20	6.167	2.20	12.167	15.70	18.17	2.00
0.250	1.20	6.250	2.20	12.250	15.70	18.25	2.00
0.333	1.20	6.333	2.20	12.333	15.70	18.33	2.00
0.417	1.20	6.417	2.20	12.417	15.70	18.42	2.00
0.500	1.20	6.500	2.20	12.500	15.70	18.50	2.00
0.583	1.20	6.583	2.20	12.583	8.00	18.58	2.00
0.667	1.20	6.667	2.20	12.667	8.00	18.67	2.00
0.750	1.20	6.750	2.20	12.750	8.00	18.75	2.00
0.833	1.20	6.833	2.20	12.833	8.00	18.83	2.00
0.917	1.20	6.917	2.20	12.917	8.00	18.92	2.00
1.000	1.20	7.000	2.20	13.000	8.00	19.00	2.00
1.083	1.20	7.083	2.20	13.083	1.50	19.08	2.00
1.167	1.20	7.167	2.20	13.167	1.50	19.17	2.00
1.250	1.20	7.250	2.20	13.250	1.50	19.25	2.00
1.333	1.20	7.333	2.20	13.333	1.50	19.33	2.00
1.417	1.20	7.417	2.20	13.417	1.50	19.42	2.00
1.500	1.20	7.500	2.20	13.500	1.50	19.50	2.00
1.583	1.20	7.583	2.20	13.583	8.90	19.58	2.00
1.667	1.20	7.667	2.20	13.667	8.90	19.67	2.00
1.750	1.20	7.750	2.20	13.750	8.90	19.75	2.00
1.833	1.20	7.833	2.20	13.833	8.90	19.83	2.00
1.917	1.20	7.917	2.20	13.917	8.90	19.92	2.00
2.000	1.20	8.000	2.20	14.000	8.90	20.00	2.00
2.083	1.40	8.083	2.90	14.083	3.30	20.08	1.30
2.167	1.40	8.167	2.90	14.167	3.30	20.17	1.30
2.250	1.40	8.250	2.90	14.250	3.30	20.25	1.30
2.333	1.40	8.333	2.90	14.333	3.30	20.33	1.30
2.417	1.40	8.417	2.90	14.417	3.30	20.42	1.30
2.500	1.40	8.500	2.90	14.500	3.30	20.50	1.30
2.583	1.40	8.583	2.90	14.583	3.30	20.58	1.30
2.667	1.40	8.667	2.90	14.667	3.30	20.67	1.30

2.750	1.40	8.750	2.90	14.750	3.30	20.75	1.30
2.833	1.40	8.833	2.90	14.833	3.30	20.83	1.30
2.917	1.40	8.917	2.90	14.917	3.30	20.92	1.30
3.000	1.40	9.000	2.90	15.000	3.30	21.00	1.30
3.083	1.40	9.083	3.50	15.083	3.30	21.08	1.30
3.167	1.40	9.167	3.50	15.167	3.30	21.17	1.30
3.250	1.40	9.250	3.50	15.250	3.30	21.25	1.30
3.333	1.40	9.333	3.50	15.333	3.30	21.33	1.30
3.417	1.40	9.417	3.50	15.417	3.30	21.42	1.30
3.500	1.40	9.500	3.50	15.500	3.30	21.50	1.30
3.583	1.40	9.583	3.90	15.583	3.30	21.58	1.30
3.667	1.40	9.667	3.90	15.667	3.30	21.67	1.30
3.750	1.40	9.750	3.90	15.750	3.30	21.75	1.30
3.833	1.40	9.833	3.90	15.833	3.30	21.83	1.30
3.917	1.40	9.917	3.90	15.917	3.30	21.92	1.30
4.000	1.40	10.000	3.90	16.000	3.30	22.00	1.30
4.083	1.70	10.083	5.00	16.083	2.00	22.08	1.30
4.167	1.70	10.167	5.00	16.167	2.00	22.17	1.30
4.250	1.70	10.250	5.00	16.250	2.00	22.25	1.30
4.333	1.70	10.333	5.00	16.333	2.00	22.33	1.30
4.417	1.70	10.417	5.00	16.417	2.00	22.42	1.30
4.500	1.70	10.500	5.00	16.500	2.00	22.50	1.30
4.583	1.70	10.583	6.70	16.583	2.00	22.58	1.30
4.667	1.70	10.667	6.70	16.667	2.00	22.67	1.30
4.750	1.70	10.750	6.70	16.750	2.00	22.75	1.30
4.833	1.70	10.833	6.70	16.833	2.00	22.83	1.30
4.917	1.70	10.917	6.70	16.917	2.00	22.92	1.30
5.000	1.70	11.000	6.70	17.000	2.00	23.00	1.30
5.083	1.70	11.083	10.40	17.083	2.00	23.08	1.30
5.167	1.70	11.167	10.40	17.167	2.00	23.17	1.30
5.250	1.70	11.250	10.40	17.250	2.00	23.25	1.30
5.333	1.70	11.333	10.40	17.333	2.00	23.33	1.30
5.417	1.70	11.417	10.40	17.417	2.00	23.42	1.30
5.500	1.70	11.500	10.40	17.500	2.00	23.50	1.30
5.583	1.70	11.583	45.20	17.583	2.00	23.58	1.30
5.667	1.70	11.667	45.20	17.667	2.00	23.67	1.30
5.750	1.70	11.750	45.20	17.750	2.00	23.75	1.30
5.833	1.70	11.833	119.99	17.833	2.00	23.83	1.30
5.917	1.70	11.917	120.00	17.917	2.00	23.92	1.30
6.000	1.70	12.000	120.00	18.000	2.00	24.00	1.30

Unit Hyd Qpeak (cms)= 1.119

PEAK FLOW (cms)= 0.544 (i)
TIME TO PEAK (hrs)= 12.000
RUNOFF VOLUME (mm)= 41.659
TOTAL RAINFALL (mm)= 108.800
RUNOFF COEFFICIENT = 0.383

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
NASHYD (1101)	Area (ha)=	8.91	Curve Number (CN)=	64.0			
ID= 1 DT= 5.0 min	Ia (mm)=	7.10	# of Linear Res.(N)=	3.00			
	U.H. Tp(hrs)=	0.17					

Unit Hyd Qpeak (cms)= 2.002

PEAK FLOW (cms)= 0.982 (i)
TIME TO PEAK (hrs)= 12.000
RUNOFF VOLUME (mm)= 42.139
TOTAL RAINFALL (mm)= 108.800
RUNOFF COEFFICIENT = 0.387

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

** SIMULATION NUMBER: 4 **

READ STORM	Filename: C:\Users\cproctorbennett\AppData\Local\Temp\

Ptotal=193.00 mm	860fbb98-44ea-4f05-86f9-2da5dc98138e\8e342073 Comments: 12 hour Timmins Regional Storm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB							
NASHYD (1102)	Area (ha)=	4.98	Curve Number (CN)=	64.6			
ID= 1 DT= 5.0 min	Ia (mm)=	8.80	# of Linear Res.(N)=	3.00			
	U.H. Tp(hrs)=	0.17					

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 1.119

PEAK FLOW (cms)= 0.388 (i)
TIME TO PEAK (hrs)= 7.000
RUNOFF VOLUME (mm)= 104.544
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.542

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD    (1101) |   Area    (ha)=   8.91   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.10   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   2.002

     PEAK FLOW       (cms)=   0.692 (i)
     TIME TO PEAK    (hrs)=   7.000
     RUNOFF VOLUME    (mm)= 104.738
     TOTAL RAINFALL   (mm)= 193.000
     RUNOFF COEFFICIENT   =   0.543

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH
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HEC-RAS Plan: EX Profile: 100-YR 6-hr SCS

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
South	South	390	100-YR 6-hr SCS	0.99	206.51	206.70		206.70	0.004314	0.28	3.47	26.18	0.25
South	South	250	100-YR 6-hr SCS	0.99	204.81	205.06	205.06	205.12	0.075537	1.09	0.91	7.77	1.02
South	South	150	100-YR 6-hr SCS	0.99	203.72	204.34		204.34	0.000818	0.24	4.16	11.69	0.13
South	South	118	100-YR 6-hr SCS	0.99	203.37	204.34	203.84	204.34	0.000013	0.05	21.96	37.65	0.02
South	South	109		Culvert									
South	South	100	100-YR 6-hr SCS	0.99	202.73	202.97	202.93	202.98	0.030022	0.61	1.63	16.93	0.62
North	North	190	100-YR 6-hr SCS	0.54	205.82	205.97	205.93	205.98	0.019854	0.41	1.31	17.72	0.49
North	North	120	100-YR 6-hr SCS	0.54	204.44	204.57		204.57	0.020212	0.38	1.43	22.02	0.48
North	North	100	100-YR 6-hr SCS	0.54	203.90	204.07	204.04	204.08	0.030035	0.55	0.99	11.98	0.61

HEC-RAS Plan: PR Profile: 100-YR 6-hr SCS

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
South	South	390	100-YR 6-hr SCS	0.99	206.51	206.70		206.70	0.004314	0.28	3.47	26.18	0.25
South	South	250	100-YR 6-hr SCS	0.99	204.81	205.06	205.06	205.12	0.075537	1.09	0.91	7.77	1.02
South	South	150	100-YR 6-hr SCS	0.99	203.72	204.34		204.34	0.000818	0.24	4.16	11.69	0.13
South	South	118	100-YR 6-hr SCS	0.99	203.37	204.34	203.84	204.34	0.000013	0.05	21.96	37.65	0.02
South	South	109		Culvert									
South	South	100	100-YR 6-hr SCS	0.99	202.73	202.97	202.93	202.98	0.030022	0.61	1.63	16.93	0.62
North	North	190	100-YR 6-hr SCS	0.54	205.82	205.93	205.93	205.96	0.091410	0.74	0.74	13.31	0.99
North	North	120	100-YR 6-hr SCS	0.54	204.44	205.01	204.64	205.02	0.001830	0.49	1.12	41.71	0.21
North	North	110		Culvert									
North	North	100	100-YR 6-hr SCS	0.54	203.90	204.07	204.04	204.08	0.030035	0.55	0.99	11.98	0.61

Appendix H

Wetland Compensation Concept Plan

Wetland Compensation Concept Plan

Part of Lot 27, Concession 10,
Township of Otonabee-South
Monaghan County of Peterborough,
Ontario

D.M. Wills Project Number 10874

D.M. Wills Associates Limited
Partners in Engineering, Planning and
Environmental Services
Peterborough

April 2021

Prepared for:
Life at the Woodland Inc.,
c/o Rubal Kundra

WILLS

Summary of Revisions

Revision No.	Revision Title	Date of Release	Description of Revisions
0	Draft Wetland Compensation Concept Plan	April 15, 2021	Draft Submission to Client
1	Final Wetland Compensation Concept Plan	February 7, 2022	Final Submission to Client

This report has been formatted considering the requirements of the Accessibility for Ontarians with Disabilities Act.

Table of Contents

Figures

Appendices

1.0 Introduction

D.M. Wills Associates Limited (Wills) was retained by Mr. Rubal Kundra of Life at the Woodland Inc. (Client) to complete a Wetland Compensation Concept Plan for the loss of wetland habitat associated with the wetland areas around Burnham Line impacted by the proposed residential development. The proposed development is a plan of subdivision with 27 lots.

The Project Lands cover an area directly east of Burnham Line, see **Figure 1** for details.

The proposed development is located on lands regulated by the Otonabee Region Conservation Authority (ORCA) and as such, are subject to Ontario Regulation 167/06 (O. Reg. 167/06). Wills submitted a report titled *Addendum to Species at Risk (SAR) Assessment and Wetland Report,* dated August 2019*,* which described existing natural heritage features and wildlife, and outlined environmental protection and mitigation measures related to proposed lot development in the vicinity.

The development footprint (i.e. area of impact) within/adjacent to the wetland is approximately 404.9 m^2, which includes vegetation clearing, grading, and construction of the proposed residential development.

This Wetland Compensation Concept Plan will address the requirements of ORCA and comply with the Provincial Policy Statement, 2020 (PPS). The purpose of the Wetland Compensation Concept Plan is to detail the proposed wetland mitigation and protection activities to conform with O. Reg. 167/06, and provincial goals of achieving no net loss (and more recently, net gain) of wetlands (MNRF, 2015; APAC-C 11-2016). Three (3) areas of Wetland Compensation are proposed, and all three (3) are in excess of the 3:1 ratio that was requested by ORCA in a meeting prior to the preparation of this report. The measures outlined herein will maintain and enhance the form and function of the wetland features identified within the Project Lands.

Legend

Project Lands

Figure 1 – Project Lands

Part of Lot 27, Concession 10,
Township of Otonabee-South
Monaghan

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

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F. 705.748.9944
E. wills@dmwills.com

Drawn By BR	Scale See Scale Bar
Checked	Date March 2021
Project No. 10874	Drawing File No. Figure 1

2.0 Wetland Compensation Planting Plan Goals and Objectives

The goals and objectives of the Wetland Compensation Concept Plan include:

1. Achieve a net gain in wetland function.
2. Where possible, maintain existing hydrological and ecological linkages by locating the compensation wetland within the same drainage area as the impacted wetland.

3.0 Project Lands

The Project Lands encompass approximately 16.1 ha (39.8 acres) located east of Burnham Line. They are legally described as Part Lot 27, Concession 10, within the Township of Otonabee-South Monaghan (Subject Property).

Surrounding land uses to the south of the Project Lands are generally within the "Hamlet" area designation as defined in the Otonabee-South Monaghan Official Plan. Mark S. Burnham Provincial Park is located directly to the west of Burnham Line, and agricultural fields are located to the north of the Project Lands. Lands designated as "rural" in the Otonabee-South Monaghan Official Plan are located to the west of the Project Lands.

The Project Lands are predominantly undeveloped including wetland and terrestrial meadow features. A watercourse runs through a wetland located at the southwest portion of the Project Lands. Refer to **Section 4.0** for details regarding surrounding natural heritage features.

4.0 Existing Conditions

4.1 Terrestrial

Field investigations were undertaken by Wills on May 30 and May 31, 2019 to conduct wetland delineations throughout the Project Lands according to the *Ontario Wetland Evaluation System Southern Manual* (MNRF, 2014). Results of this investigation confirmed that the area of the proposed work is made up of one community type – SWD2-1 (Black Ash Mineral Deciduous Swamp).

Although there are a number of vegetation community types on the Project Lands, none are significant with respect to rarity. The surrounding land is residential and agricultural, dominated by residential houses, and agricultural fields. There is a watercourse feature located in the southeastern portion of the Project Lands. The watercourse flows to the southeast in the southeastern portion. Towards the north end of the watercourse, a high point in the topography is found where the watercourse then flows northwest. The watercourse is located in the SWD2-1 community.

5.0 Description of the Proposed Development

5.1 Proposed Residential Development

The proposed development contains a private road with 27 associated residential lots. The construction of the road and residential lots will infill approximately 404.9 m^2 of the existing wetland located towards the northern portion of the Project Lands. In order to offset the impact of the development, ORCA has required a 3:1 compensation. Three (3) areas of wetland compensation have been considered in this report. The proposed works and Wetland Compensation Concept Areas are provided in **Appendix A.**

6.0 Compensation Wetland Options

To facilitate construction of the private road and 27 lots, an area of existing wetland habitat equal to approximately 404.9 m^2will be impacted. To compensate for this infill, a compensation area, equal to three (3) times greater than the disturbed wetland area, will be created in the Project Lands.

Three (3) Wetland Compensation Concept Areas have been identified as potential offsetting areas. Compensation Concept Area 3 has been divided into two (2) smaller areas, identified as Area 3A and 3B. The sizes of each Compensation Concept Area are as follows:

- Compensation Concept Area 1: 1,216.9 m^2
- Compensation Concept Area 2: 1,318.3 m^2
- Compensation Concept Area 3: 834.8 m^2 + 433.5 m^2 = 1,268.3 m^2

Section 6.1 to **Section 6.3** will investigate each Compensation Concept Area individually, and will look at the potential benefits and limitations of each Compensation Concept Area. The existing terrestrial conditions of each Compensation Concept Area will be assessed, and a prospective ELC community for the Compensation Concept Area will be identified. See **Appendix A** for the location of each Compensation Concept Area.

6.1 Compensation Concept Area 1

Compensation Concept Area 1 is located towards the southern end of the Project Lands, along the south side of the Black Ash Mineral Deciduous Swamp (SWD 2-1). At this portion of the wetland, the watercourse flows in a southwest direction. Located just south of the wetland is a relatively dense Eastern White Cedar (*Thuja occidentalis*) stand. The northwestern portion of this stand is the proposed location of Compensation Concept Area 1.

Eastern White Cedar stands are commonly located adjacent to wetland community types such as Black Ash Mineral Deciduous Swamps. Eastern White Cedars have the capability to grow in both upland and wetland habitats, making their stands very

common where a low-lying area (i.e. wetland) gradually becomes upland, generally known as transition zones.

The wetland community to be constructed in Compensation Concept Area 1 could be a White Cedar – Hardwood Organic Mixed Swamp Ecosite (SWM4-1). As not all of the Eastern White Cedar stand will be impacted by Compensation Concept Area 1, the introduction of Eastern White Cedars in a wetland environment would allow for a natural transition into the existing Eastern White Cedar stand. This would also increase the width of the wetland and an existing choke point, where it is currently approximately 5 m wide.

6.2 Compensation Concept Area 2

Compensation Concept Area 2 is located towards the northeastern end of the Project Lands along the northwest side of a Black Ash Mineral Deciduous Swamp (SWD 2-1). This wetland is located to the east of the wetland that is described as Compensation Concept Area 1. The existing wetland is of lesser quality than the wetland located to the west, as vegetation is sparser, and there is no standing water. The existing wetland is surrounded by a Cultural Meadow (CUM) ELC community. The Cultural Meadow is on relatively steep slopes, sloping down towards the southeast.

The wetland community to be constructed in Compensation Concept Area 2 would be a Black Ash Mineral Deciduous Swamp (SWD 2-1), with additional Trembling Aspen (*Populous tremuloides*) planted within it. This would match the existing wetland conditions, and provide additional habitat as an animal movement corridor as this small wetland is in close vicinity to larger, unevaluated wetland to the southeast.

6.3 Compensation Concept Area 3

Compensation Concept Area 3 is divided into Area 3A and 3B. Compensation Concept Area 3A is located just to the north of Compensation Concept Area 1, while Area 3B is located towards the north end of the Project Lands, along the east side of the same existing wetland. Where Area 3A is proposed, the existing habitat is a Deciduous Forest (FOD) ELC community that slopes up towards the northwest. Where Area 3B is proposed, the existing habitat is a Cultural Woodland (CUW). Topography in this area is relatively flat.

The wetland community to be constructed in Compensation Concept Area 3A and 3B would be a Black Ash Mineral Deciduous Swamp (SWD 2-1), as that matches the existing wetland habitat conditions at both Areas. As vegetation is sparser in Areas 3A and 3B than the rest of the existing wetland, the construction of these Concept Areas would provide an enhanced buffer to the watercourse that is found within the existing wetland.

7.0 Conclusions and Recommendations

The Wetland Compensation Concept Plan provides details on the proposed three (3) Compensation Concept Areas, of which one (1) will provide direct compensation (over 3:1) for the removal of approximately 1,214.8 m^2 of wetland on the Project Lands.

Based on the three (3) Compensation Concept Area options, Wills is of the opinion that Compensation Concept Area 1 will provide the greatest benefit to the impacted wetland and habitat on the Project Lands. Compensation Concept Area 1 is located on the same wetland that is proposed to be infilled, thereby limiting overall impact to the overall health of the wetland. As discussed in **Section 6.1**, Compensation Concept Area 1 is within an existing Eastern White Cedar stand. The construction of a White Cedar – Hardwood Organic Mixed Swamp would allow for the introduction of Eastern White Cedars into the existing wetland, as well as a natural transition from the Black Ash Mineral Deciduous Swamp into the Eastern White Cedar stand, of which a part of will remain following construction.

Compensation Concept Area 2 is not located on the same wetland that is proposed to be infilled. It is proposed to be constructed on a wetland of lesser quality. While Compensation Concept Area 2 will maintain and improve conditions as an animal movement corridor, the overall benefit to the impacted wetland's health does not match Compensation Concept Area 1, therefore, Compensation Concept Area 2 is not recommended over Compensation Concept Area 1.

Compensation Concept Area 3 is divided into two (2) smaller Areas adjacent to the impacted wetland. Compensation Concept Area 3 is a viable option for wetland compensation, as it is located on the impacted wetland. Area 3A and 3B would also provide an improved buffer to the watercourse which is located within the wetland. However, Wills believes that by dividing Compensation Concept Area 3 into two (2) smaller sections, this limits the overall benefit to the impacted wetland.

If Compensation Concept Area 1 is chosen, direct compensation and buffer improvements (over 3:1 ratio) will be achieved. This would conform with ORCA's watershed development policies, O.Reg. 167/06 and the provincial goals of achieving no net loss of wetlands.

Details and associated mitigation measures on the approved Compensation Concept Area will be included in the Wetland Compensation Plan, that will follow this report. A detailed planting plan will be included, as well as environmental protection/mitigation measures that will ensure existing hydrological functions, ecological structure, habitat function and long-term resilience of the wetland features found within the Project Lands are maintained.

Respectfully submitted,

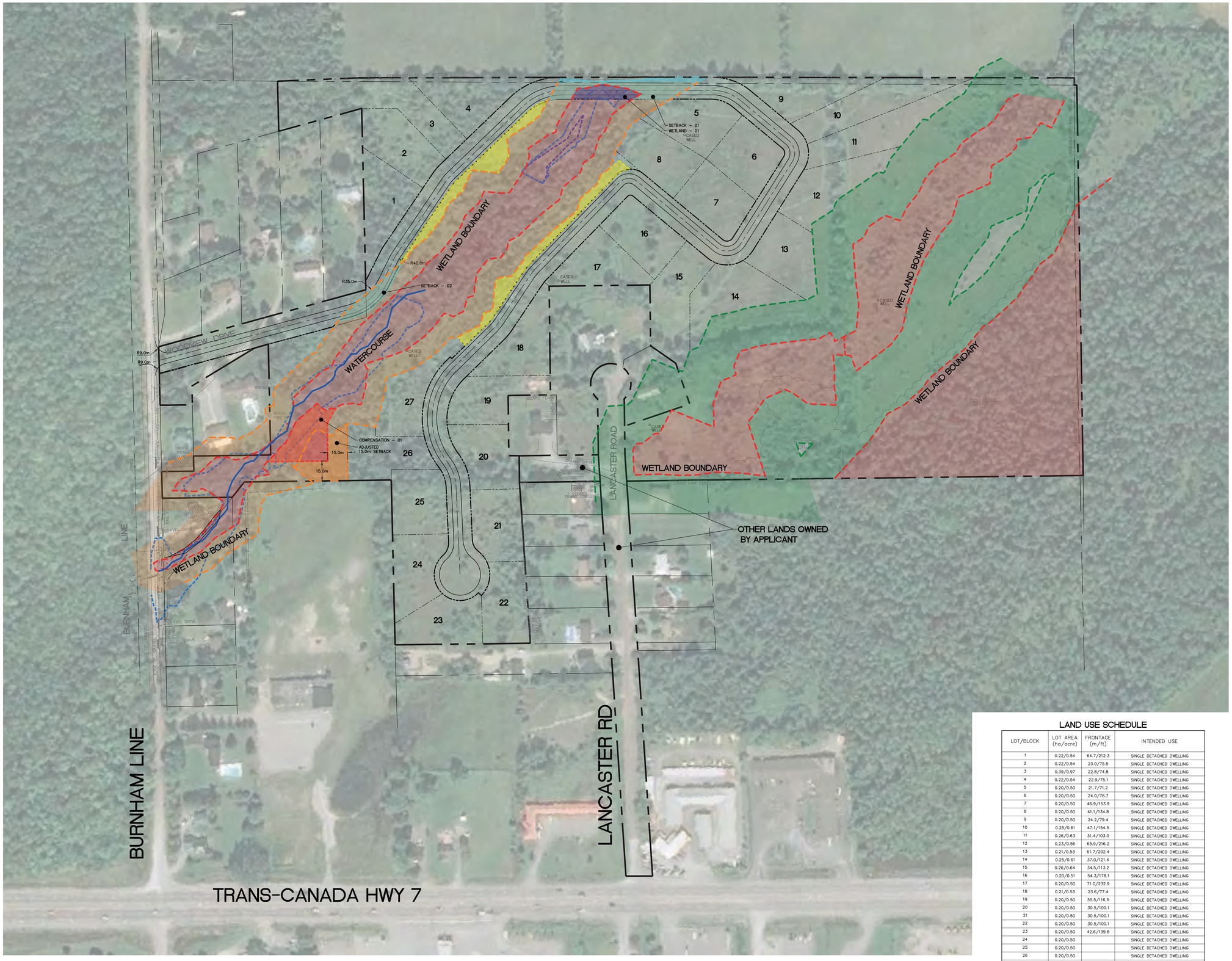
Ben Radford, B.Sc.
Project Biologist

Tyler Jones, B.Sc.
Senior Biologist

BR/TJ/avg

Appendix A

Wetland Compensation Concept Areas



LAND USE SCHEDULE

LOT/BLOCK	LOT AREA (ha/acre)	FRONTAGE (m/ft)	INTENDED USE
1	0.22/0.54	64.7/212.3	SINGLE DETACHED DWELLING
2	0.22/0.54	23.0/75.5	SINGLE DETACHED DWELLING
3	0.39/0.97	22.8/74.8	SINGLE DETACHED DWELLING
4	0.22/0.54	22.9/75.1	SINGLE DETACHED DWELLING
5	0.20/0.50	21.7/71.2	SINGLE DETACHED DWELLING
6	0.20/0.50	24.0/78.7	SINGLE DETACHED DWELLING
7	0.20/0.50	46.9/153.9	SINGLE DETACHED DWELLING
8	0.20/0.50	41.1/134.8	SINGLE DETACHED DWELLING
9	0.20/0.50	24.2/79.4	SINGLE DETACHED DWELLING
10	0.25/0.61	47.1/154.5	SINGLE DETACHED DWELLING
11	0.26/0.63	31.4/103.0	SINGLE DETACHED DWELLING
12	0.23/0.56	65.9/216.2	SINGLE DETACHED DWELLING
13	0.21/0.53	61.7/202.4	SINGLE DETACHED DWELLING
14	0.25/0.61	37.0/121.4	SINGLE DETACHED DWELLING
15	0.26/0.64	34.5/113.2	SINGLE DETACHED DWELLING
16	0.20/0.51	54.3/178.1	SINGLE DETACHED DWELLING
17	0.20/0.50	71.0/232.9	SINGLE DETACHED DWELLING
18	0.21/0.53	23.6/77.4	SINGLE DETACHED DWELLING
19	0.20/0.50	35.5/116.5	SINGLE DETACHED DWELLING
20	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
21	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
22	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
23	0.20/0.50	42.6/139.8	SINGLE DETACHED DWELLING
24	0.20/0.50		SINGLE DETACHED DWELLING
25	0.20/0.50		SINGLE DETACHED DWELLING
26	0.20/0.50		SINGLE DETACHED DWELLING
27	0.20/0.50		SINGLE DETACHED DWELLING
MULTI-UNIT BUILDING AREA =			
COMMUNAL WATER SYSTEM BLOCK =			0.06 ha / 0.14 acre
SEPTIC AREA =			0.35 ha / 0.86 acre
RIGHT-OF-WAY AREA =			0.94 ha / 2.32 acre
DEVELOPABLE AREA =			–
APPROXIMATE IMPACTED AREA (ENTRANCE) =			0.10 ha / 0.26 acre
APPROXIMATE IMPACTED AREA (OPTION 1) =			0.07 ha / 0.18 acre
APPROXIMATE IMPACTED AREA (OPTION 2) =			0.03 ha / 0.07 acre
TOTAL SITE AREA =			17.34 ha / 42.85 acre

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1:1000

TRUE NORTH

KEY PLAN

REVISIONS

No.	Description	Date

METRIC — Dimensions are in METRES and/or MILLIMETRES unless otherwise shown.

LEGEND — TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

LEGEND

- EDGE OF ROADWAY
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- 15m WETLAND OFFSET
- 30m WETLAND OFFSET
- EXISTING FLOOD LIMIT
- PROPOSED FLOOD LIMIT
- PR. WETLAND IMPACT AREA
- PR. SETBACK IMPACT AREA
- PR. WETLAND COMPENSATION AREA
- PR. ADJUSTED 15.0m SETBACK AREA
- PR. ADJUSTED 30.0m SETBACK AREA
- PR. UNDEVELOPED AREA

OPTION 1

WILLS

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E. wills@dmwills.com

Project Name/Location

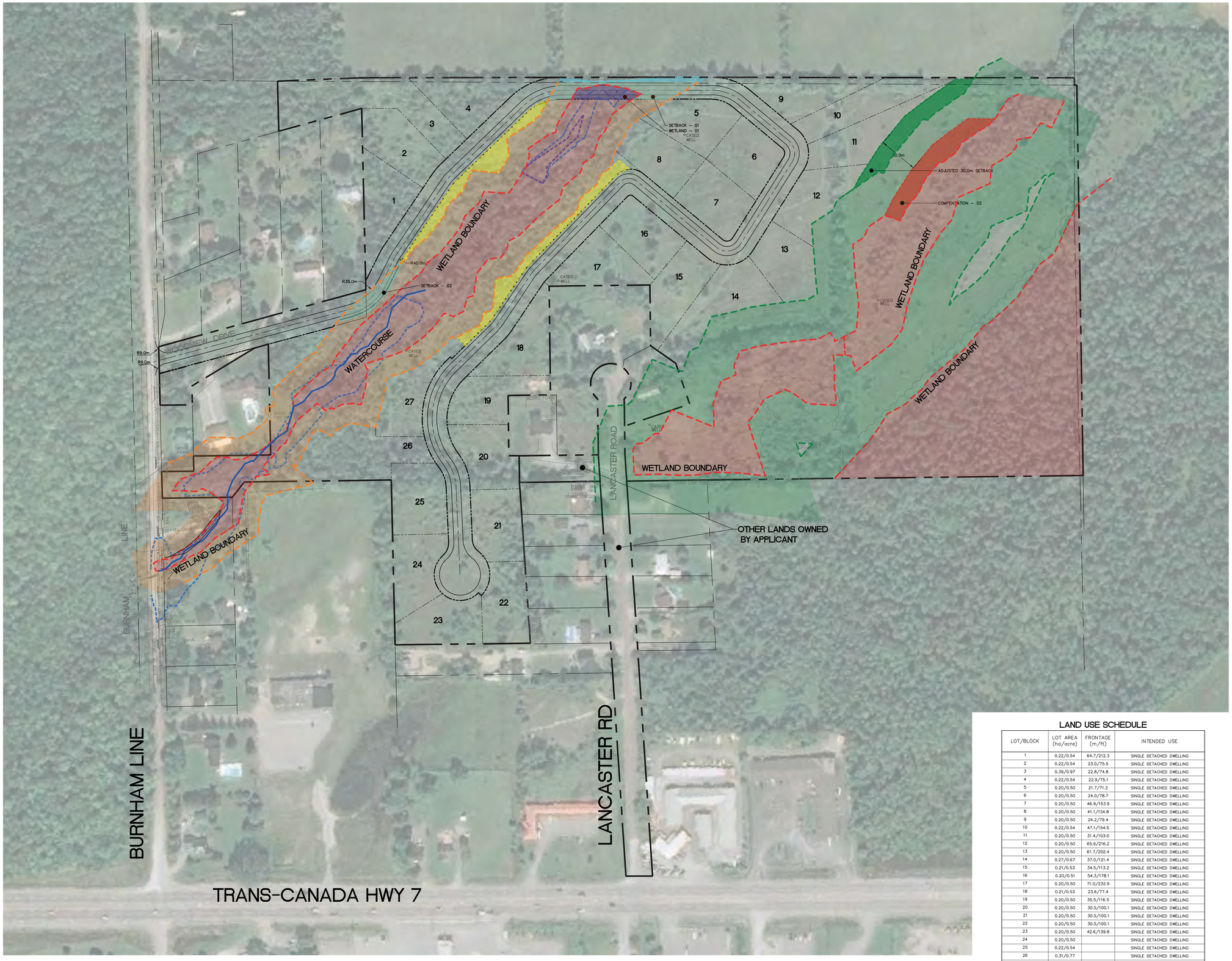
LIFE AT THE WOODLAND

OTONABEE–SOUTH MONAGHAN

Drawing Title

DRAFT PLAN /w WETLAND BOUNDARIES

Drawn By:	---	SCALE: Horz. 1:1000	Vert.
Designed By:	---	Plot Date: March 19, 2021	
Checked By:	---	Project No.: 10874	SH. No.:
Engineer:	---	Dwg File No.: 10874 – SP – OPTX.DWG	



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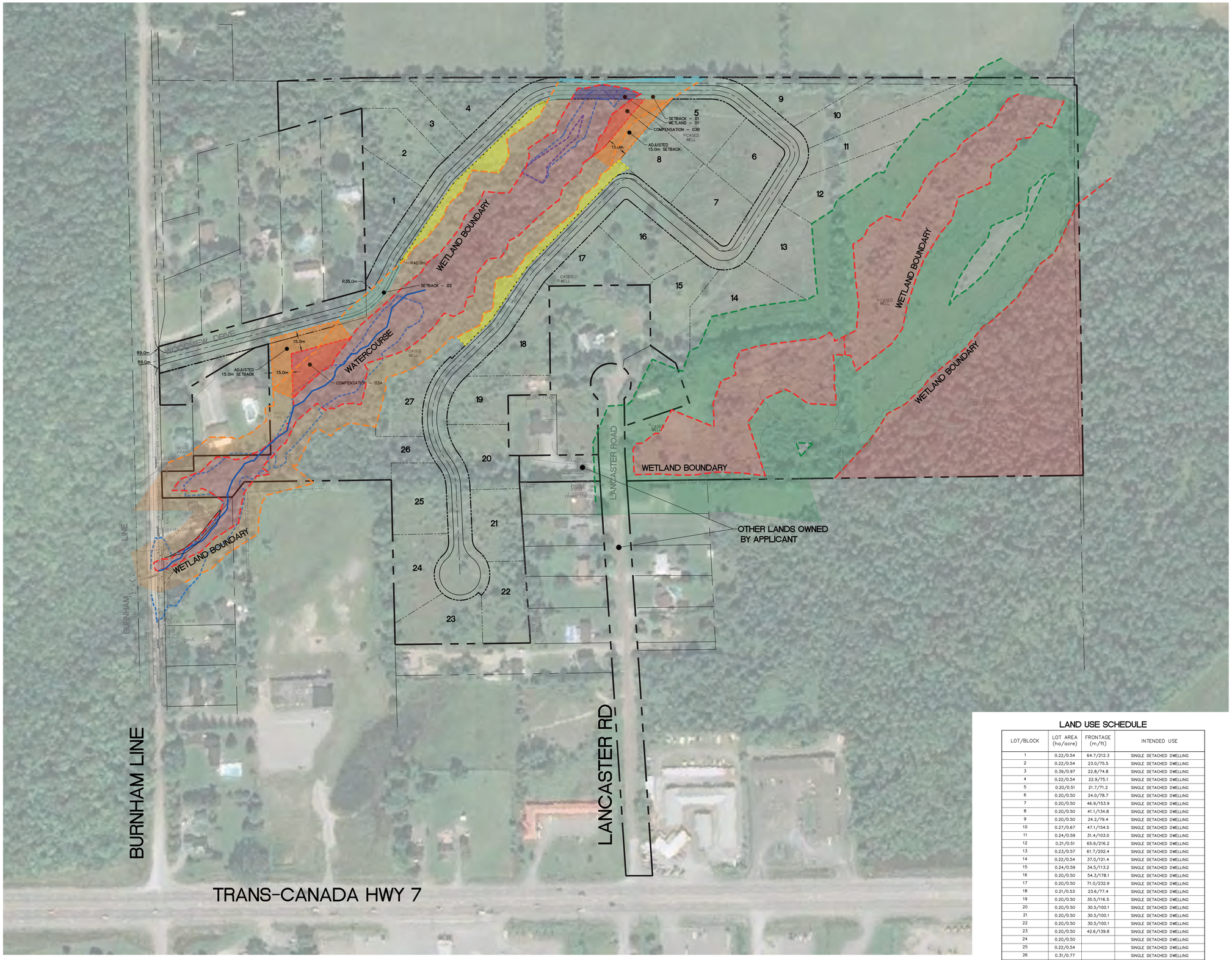

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LEGEND

- EDGE OF ROADWAY
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- PROPERTY/LOT LINE
- MUNICIPAL SERVICE BLOCK
- WETLAND BOUNDRY
- 15m WETLAND OFFSET
- 30m WETLAND OFFSET
- EXISTING FLOOD LIMIT
- PROPOSED FLOOD LIMIT
- PR. WETLAND IMPACT AREA
- PR. SETBACK IMPACT AREA
- PR. WETLAND COMPENSATION AREA
- PR. ADJUSTED 15.0m SETBACK AREA
- PR. ADJUSTED 30.0m SETBACK AREA
- PR. UNDEVELOPED AREA

OPTION 3

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
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P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Project Name/Location

LIFE AT THE WOODLAND

OTONABEE–SOUTH MONAGHAN

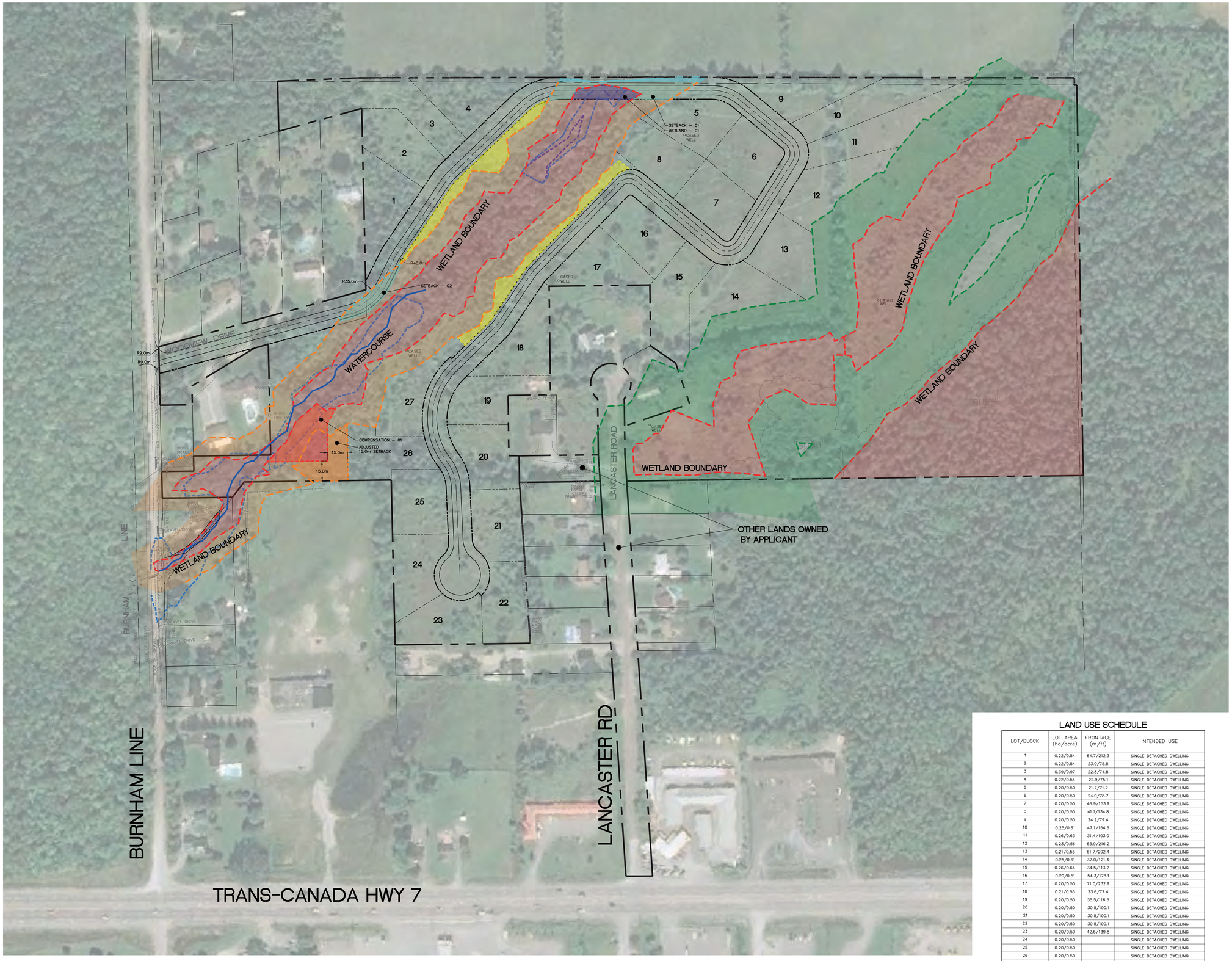
Drawing Title

DRAFT PLAN /w WETLAND BOUNDARIES

Drawn By:	---	SCALE: Horz. 1:1000 Vert.	
Designed By:	---	Plot Date: March 19, 2021	
Checked By:	---	Project No.: 10874	SH. No.:
Engineer:	---	Dwg File No.: 10874 – SP – OPTX COMP	

Appendix I

Site Plan Drawings



LAND USE SCHEDULE

LOT/BLOCK	LOT AREA (ha/acre)	FRONTAGE (m/ft)	INTENDED USE
1	0.22/0.54	64.7/212.3	SINGLE DETACHED DWELLING
2	0.22/0.54	23.0/75.5	SINGLE DETACHED DWELLING
3	0.39/0.97	22.8/74.8	SINGLE DETACHED DWELLING
4	0.22/0.54	22.9/75.1	SINGLE DETACHED DWELLING
5	0.20/0.50	21.7/71.2	SINGLE DETACHED DWELLING
6	0.20/0.50	24.0/78.7	SINGLE DETACHED DWELLING
7	0.20/0.50	46.9/153.9	SINGLE DETACHED DWELLING
8	0.20/0.50	41.1/134.8	SINGLE DETACHED DWELLING
9	0.20/0.50	24.2/79.4	SINGLE DETACHED DWELLING
10	0.25/0.61	47.1/154.5	SINGLE DETACHED DWELLING
11	0.26/0.63	31.4/103.0	SINGLE DETACHED DWELLING
12	0.23/0.56	65.9/216.2	SINGLE DETACHED DWELLING
13	0.21/0.53	61.7/202.4	SINGLE DETACHED DWELLING
14	0.25/0.61	37.0/121.4	SINGLE DETACHED DWELLING
15	0.26/0.64	34.5/113.2	SINGLE DETACHED DWELLING
16	0.20/0.51	54.3/178.1	SINGLE DETACHED DWELLING
17	0.20/0.50	71.0/232.9	SINGLE DETACHED DWELLING
18	0.21/0.53	23.6/77.4	SINGLE DETACHED DWELLING
19	0.20/0.50	35.5/116.5	SINGLE DETACHED DWELLING
20	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
21	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
22	0.20/0.50	30.5/100.1	SINGLE DETACHED DWELLING
23	0.20/0.50	42.6/139.8	SINGLE DETACHED DWELLING
24	0.20/0.50		SINGLE DETACHED DWELLING
25	0.20/0.50		SINGLE DETACHED DWELLING
26	0.20/0.50		SINGLE DETACHED DWELLING
27	0.20/0.50		SINGLE DETACHED DWELLING
MULTI-UNIT BUILDING AREA =			
COMMUNAL WATER SYSTEM BLOCK =			0.06 ha / 0.14 acre
SEPTIC AREA =			0.35 ha / 0.86 acre
RIGHT-OF-WAY AREA =			0.94 ha / 2.32 acre
DEVELOPABLE AREA =			–
APPROXIMATE IMPACTED AREA (ENTRANCE) =			0.10 ha / 0.26 acre
APPROXIMATE IMPACTED AREA (OPTION 1) =			0.07 ha / 0.18 acre
APPROXIMATE IMPACTED AREA (OPTION 2) =			0.03 ha / 0.07 acre
TOTAL SITE AREA =			17.34 ha / 42.85 acre

0 10 20 30 40
1:1000

TRUE NORTH

KEY PLAN

REVISIONS

No.	Description	Date

METRIC — Dimensions are in METRES and/or MILLIMETRES unless otherwise shown.

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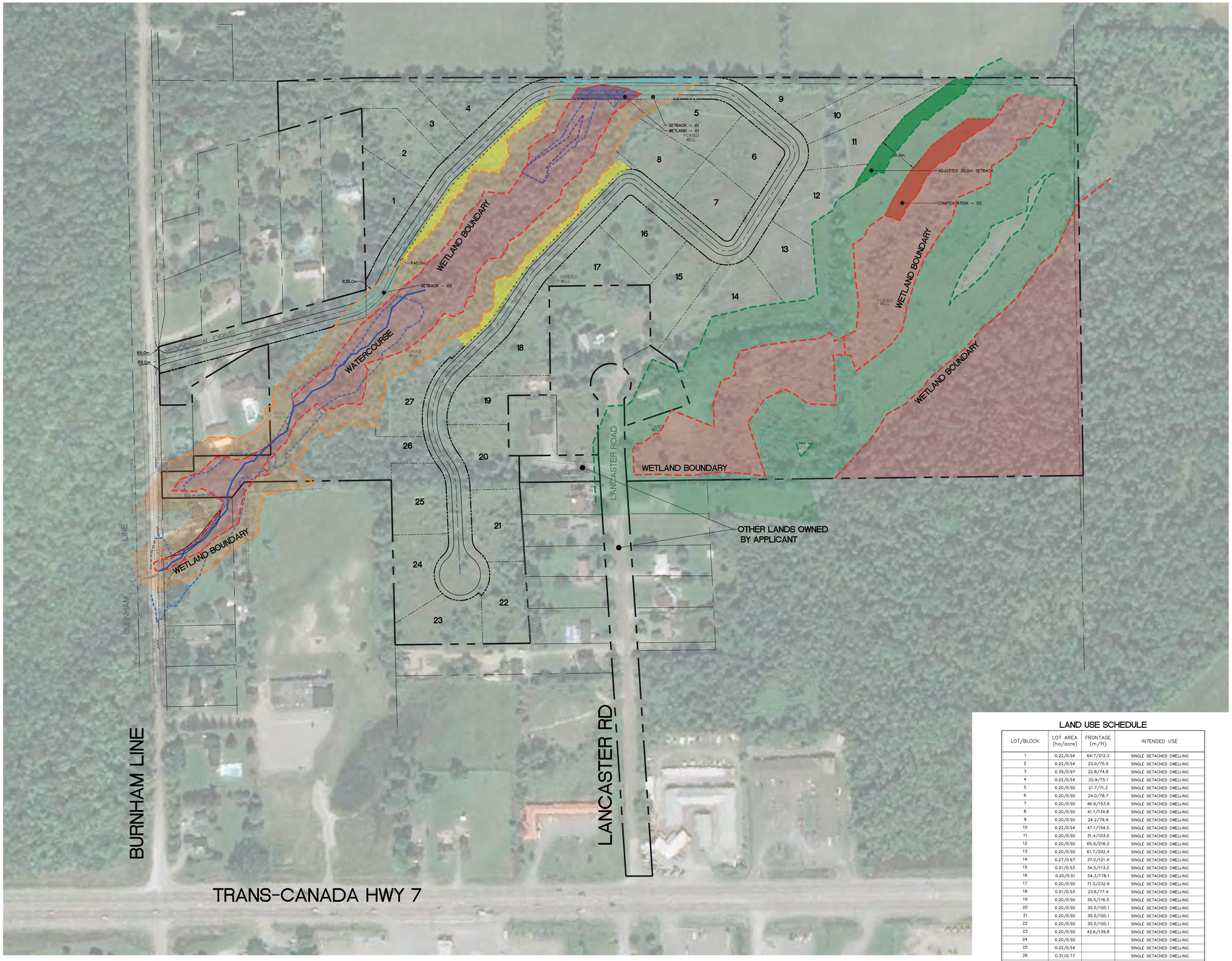

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