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Feb 24, 2022

Michael Kerford **Via Email: michael@urstrong.com**

RE: Wetland Compensation Addendum for road route to Half Moon Bay development

At your request, we produced a wetland compensation analysis on August 9, 2021 for a possible road route on the County road allowance in order to access your proposed Half Moon Bay development. This addendum is a follow up to discuss wetland compensation for a road route that will be adjacent to, but not on, the road allowance. This new road route is based on road plans (Drawing C-101) supplied by Groundwork Engineering Ltd., who estimated amount of wetland lost (~ 0.25 ha) based on GPS wetland boundary measurements that we supplied.

The overall wetland is comprised of three separate patches with a total combined size of about 3.1 ha. The wetland patch impacted by the road route is approximate 1.2 ha and is comprised of treed swamp and meadow marsh. The wetland has no direct connection to the lake and offers little in flood protection or pollution attenuation. It does not contain waterfowl habitat or fish habitat, nor does it contain favorable turtle habitat features. It does support amphibian breeding, but the high use areas occur in a shrub swamp patch at the northwest end, outside of any proposed road route. The higher amphibian use likely occurs here because this wetland patch contains the most consistent standing water.

Compensation ratios typically applied are 1:1, 2:1, or 3:1 for wetland created to wetland lost. The lower ratios are normally applied when the wetland lost is less valuable, and in our opinion a 1:1 ratio would be sufficient here, due to the lower quality of this small wetland. However, there is room to create compensating wetland adjacent to existing wetland to up to a 3:1 compensation ratio.

Water levels in the wetland rise and fall with lake levels, likely percolating through the intervening cobble beach bar, as there is no direct surface water connection to the lake. As such, when the lake levels drop (as was observed in 2021) the entire wetland becomes dry. This can be deleterious to amphibian recruitment, and we therefore recommend that compensation excavations be dug deeper than the existing wetland bottom to provide a longer water retention time. The road itself is also expected to assist in water retention by acting as a water holding berm.

Groundworks Engineering has supplied a compensation model based on TRCA wetland compensation models for marsh, shrub swamp, and treed swamp replacement. The benefit of the three TRCA models is that they maximize spatial/structural diversity for above water features. Further to that, we recommend that excavations create multiple depths to maximize below water spatial/structural diversity as well. Although an approximate equal mix of treed swamp and meadow marsh will be lost, our preference would be for the creation of a more open wetland system, such as with open water marsh and shrub swamp as this would benefit amphibians to a greater degree and could also attract turtles and waterfowl to the wetland.

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Aug. 9, 2021

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RE: Wetland Compensation for road route to Half Moon Bay development

From a natural heritage perspective, wetland compensation will be required for road access to the proposed Half Moon Bay development, as it will need to be partly constructed through wetland habitat. The route will follow an existing Concession Line Road allowance.

To determine the amount of compensation required we first waited until the route was surveyed, so that we could follow the survey stakes. On June 16, 2021, Dale Kristensen and Rob Snetsinger of Ecological Services walked the surveyed route and determined the associated wetland boundary using the 50% wetland vegetation rule. If 50% of the plants were obligate or facultative wetland plants, then the site was considered wetland. In the adjacent image, the yellow line represents the road route, and the red line connects GPS reference points made at wetland edge locations. We did not observe any other wetland crossings in the road route.

Our wetland mapping has some similarities to that of Quinte Conservation (see adjacent) at the southeast location of the wetland/road route. We measured less wetland at the northwest end, with no wetland being impacted by the road route at this latter location.

Assuming a Prince Edward County rural Class 4 & 5 road, the width of the travelled pavement/gravel portion of the road could likely be reduced from 7 m to 6 m. It is our understanding that the actual width of the road required to raise it above the floodplain could be anywhere from 14 to 18 m, and this will need to be determined by a topographic survey. From our mapping the road will bisect wetland from W7 to W10, with the potential loss of 0.07 to 0.1 ha. of wetland. The road width will determine if, and how much, it intrudes into W1, W2, W3, W5, and W6. If the road can be pushed to the south edge of the 20 m wide road allowance, there may be only minimal wetland loss. If the road must be centered within the road allowance, the loss of wetland could be between 0.06 and 0. 09 ha.

In summary, depending on road width and road position, the amount of wetland compensation area can range from 0.13 ha. to 0.2 ha.

The road will cut off wetland at W6-W10 and a box culvert is recommended to maintain the wetland south of the road. At this location, the wetland is primarily composed of dense reed canary grass and cattail, which is a low diversity ecotype that would be tolerant to this impact. Some interspersion excavations within the canary reed grass and cattails that are south (with the southern landowner's permission) and north of the road could increase wetland biodiversity and enhance wetland value.

Culverts, although not necessarily box culverts, are recommended for the eastern extent of the road to maintain hydric flow under the road and for animal passage purposes. For this latter point we refer to MNRF (2016).

The wetlands existence depends on Lake Ontario water levels, as it appears to have no other significant source of water for maintaining wetland plants. During normal low water events in the lake, the wetland dries out. The road itself therefore could potentially enhance wetland hydrology by acting as a berm and keep water within the wetland longer. This could also benefit herpetofauna who need a longer more consistent water period in order to complete life cycle functions.

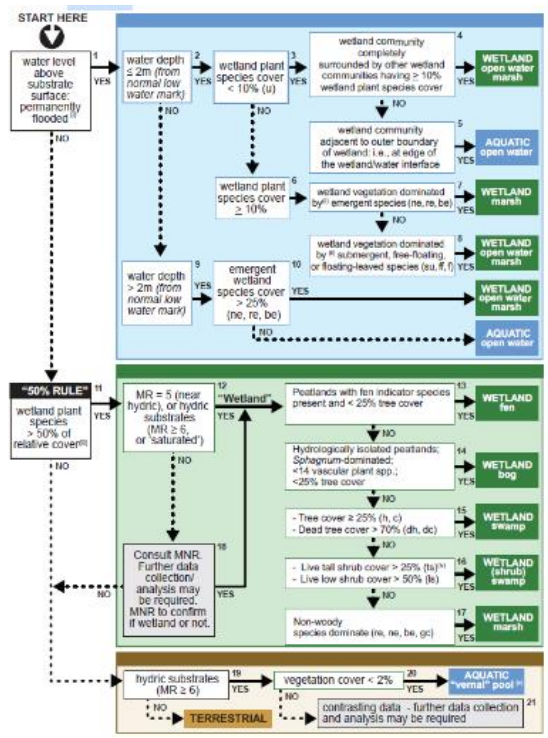
The Wetland

The wetland is an isolated coastal wetland of approximately 2.7 ha. in size, which is slightly above the 2 ha. minimum wetland size that is needed to undertake an evaluation using Ontario Wetland Evaluation System (MNR 2014, 3rd ed. Vol. 3.4). In our opinion it is too small and lacking in special features to be provincially significant. We have been undertaking wetland evaluations in the province since 1984 and have completed over 100 full wetland evaluations and many hundreds of wetland assessments since that time and feel we can speak with some authority on the subject.

The MNR (2014) evaluation process scores wetlands on the following four components:

> Biological: Primarily intended to score the biodiversity of the wetland. Larger wetlands can do well here as their breadth has a greater probability of having more features to score, and they also automatically receive more points based on size. This wetland would receive a very low Biological Component score.
>
> Social: Scores wetlands for their potential social value, such as with recreational use. This wetland would get a very low Social Component score due to its small size and its isolation on private property.
>
> Hydrological: Scores wetlands primarily for their flood and pollution attenuation abilities. Wetlands on the Great Lakes such as this one do not get high Hydrological Component scores because the lake hydrology overrides the wetlands potential value in this regard.
>
> Special Features: Scores wetlands primarily for rare species as well as for unusual biological features and fish habitat. This wetland does not contain fish habitat and no rare wetland species have been observed here in the last two years of field work, nor are they expected due to the lack of permanent water within the wetland.

Wetland boundary mapping was based on MNR (2014). The mapping process is best exemplified by the adjacent flow wetland boundary flow diagram from MNR (2014). From this, there are three key features that need to be considered: seasonal or permanent water, hydric substrates and coverage by at least 50% wetland vegetation.



Wetland boundary mapping was primarily based on the 50% rule as these wetlands do not have permanent water, and are primarily located on a firm non-hydric substrate. They are separated from Lake Ontario by a cobble/rock berm varying in height from 1 to 3 meters. Subsurface percolation through the berm from Lake Ontario determines the depth, breadth, and temporal water levels. As a result, water within the wetland is determined by Lake Ontario water levels. This argument is strengthened by the primarily firm substrates and relatively shallow soils often observed in the wetland areas.

During low lake level periods, such as during the June 16, 2021 site visit, the wetland had no standing water. In contrast, there were some ephemeral pooling (~5 cm deep) (see adjacent image) during the June 26, 2020 site visit as the lake was visibly higher at that time. Due to local topographic features, it is our opinion that catchment water flowing from the land side of the wetland does not provide a significant source of water for this wetland.

Ecological Land Classification (ELC)

Ecological land classification mapping in was based on Lee et al. (1998) and provides context for the wetland compensation. The mapping is presented in Figure 1, followed by a description of the ELC mapping terms.

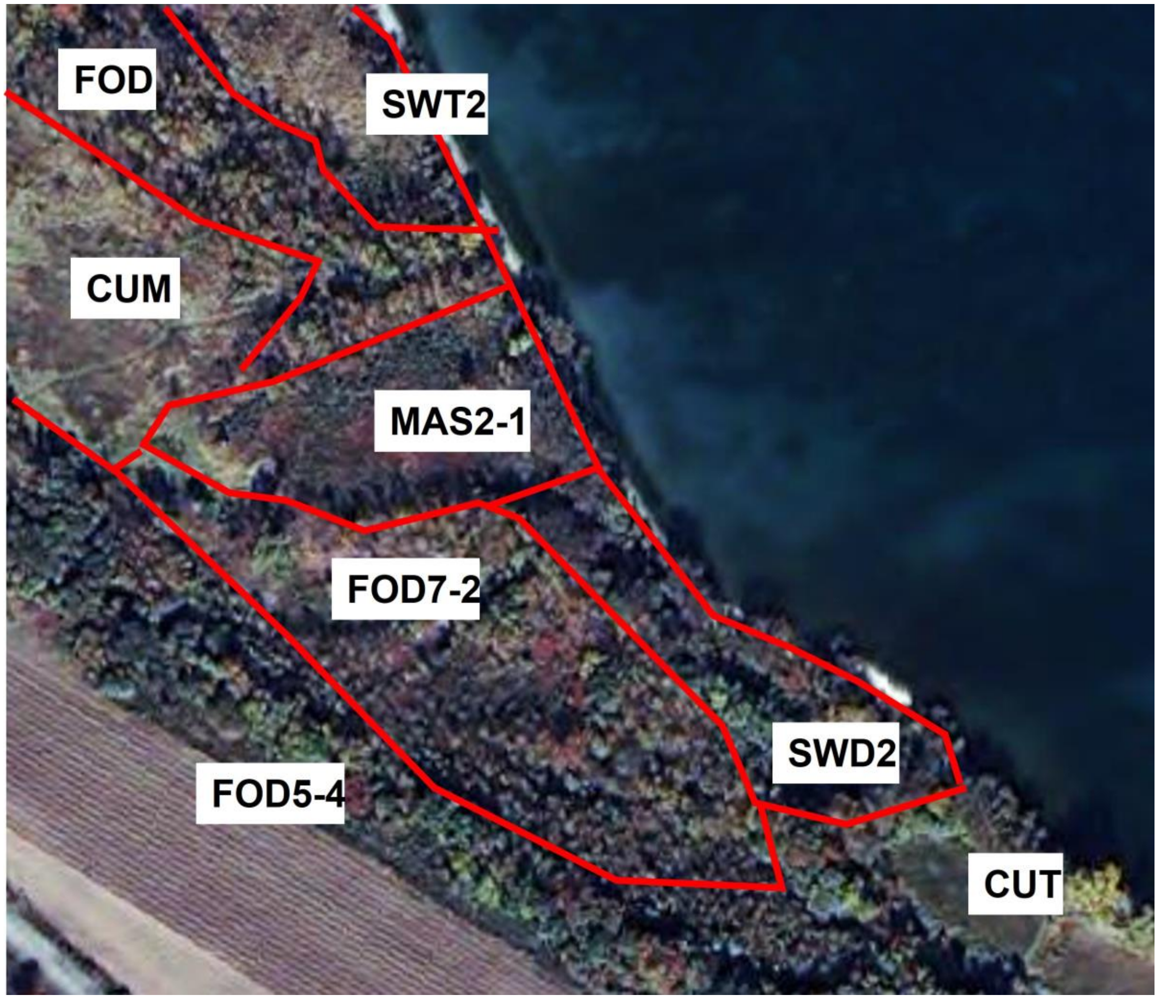


Figure 1. Wetland compensation ELC mapping.

CUM (Cultural Meadow). As noted by Lee et al (1998), cultural sites are those that have resulted from, or are maintained by anthropogenic based disturbances. This site is an unused grass dominated meadow that is primarily owned by the Half Moon Bay wintery.

CUT (Cultural Thicket). As noted by Lee et al (1998), cultural sites are those that have resulted from, or are maintained by anthropogenic based disturbances. From historic aerial photography the site was used as an orchard at one time. It is not known when orchard activities ended, but the lack of remnant orchard trees today suggests they were removed, perhaps to make way to some other use. It would normally take less than 20 years for a fallow site to succeed from field to woodland, and so the continued presence of field and shrub species is informative of recent disturbances. We note in some of the more recent historical aerial imagery, lawnmower sized pathways had been cut through this property for lake access.

Cultural sites, such as this one, are generally considered to have a relatively low ecological value as they often contain many non-native species. The dominant shrub cover is staghorn sumac, but other shrubs present include Virginia creeper, grape, red cedar, raspberry species, and European buckthorn. Tree species are beginning to invade this thicket, including white and green ash, sugar maple, basswood, and black walnut. Many of the ground cover forbs are non-native weedy species such as wild carrot, horseweed, daisy fleabane, vetch, and thistles.

FOD5-4 (Dry-Fresh Sugar Maple – Ironwood Deciduous Forest Type). Located on the plateau top and within the slope, it is a common deciduous forest type in the region. Sugar maple is the dominant tree in the overstory. Other trees present include ironwood, white ash, oaks, basswood, bitternut hickory, black walnut, and poplars. A shrub layer is mostly lacking, but the invasive European buckthorn is the most common shrub present. Evidence of the Emerald Ash Borer is apparent, and if similar trajectories of other sites are followed, most of the ash trees will succumb to this invasive pest. There is limited sapling regeneration and shrub growth, which is typical for these woodlands at this stage of their development. Regeneration would further be inhibited by the allelopathic influence of the dense invasive garlic mustard ground cover (see above image). Other common ground cover species observed included showy tick trefoil, poison ivy, and mayapple.

FOD7-2 (Fresh Moist Ash Lowland Deciduous Forest Type). Comprised mostly of green ash, it is located within parts of the slope and valley floor. It grades into the adjacent SWT ecotype and this involves a wide ecotone boundary. The boundary line was primarily determined by the density of upland obligate and facultative ground cover and shrubs such as raspberries, prickly ash, gooseberry, buckthorn, goldenrod, nightshade, garlic mustard, poison ivy, snakeroot, dog strangling vine, and Canada anemone.

SWT2 (Mineral Thicket Swamp Ecosite). A more detailed ecotype could not be provided due the plant variability. It is part of a diffuse thicket swamp that is defined by Lake Ontario water levels. It is dominated by shrubs, but also contains up to 25% tree cover, primarily composed of green ash, American elm, and willow.

However, it is dominated by shrub cover that varies throughout. It is primarily bordered by silky dogwood, but also contains other shrub species including slender willow, black alder, red-osier dogwood, and nannyberry. Ground cover included various obligate and facultative wetland plants such as water willow, sensitive fern, touch me net, wetland sedge/grasses, and water parsnip.

SWD2 (Ash Mineral Swamp Ecosite). A more detailed ecotype could not be provided due to the plant variability. It is part of a diffuse treed swamp that is defined by Lake Ontario water levels.

It is dominated by both green and black ash, although red and silver maple were also observed. The shrub layer is relatively diverse and includes various dogwood shrubs. The herb layer is diverse and patchy and includes marsh marigold, marsh stinging nettles, frogbit, touch-me-not, bedstraws, ferns and sedges.

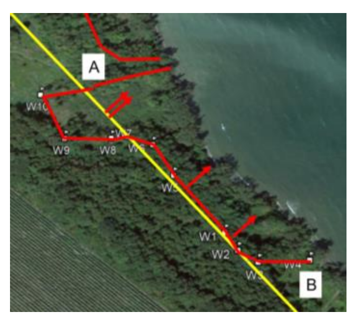
The substrate is relatively firm, reflecting its mineral nature and proximity to the underlying limestone pavement. This gives further credence to this wetland being maintained by lake seepage through the cobble beach bar. This means that as lake levels rise and fall, so do the water levels in this wetland.

FOD (Deciduous Woodland). A more detailed ecotype could not be provided due to the variability of the vegetative cover, likely due to the narrow width of this type, resulting in a significant edge component. A dominant tree cover was not observed, but tree cover included green ash, white ash, black walnut, Manitoba maple, willow, sugar maple, and American elm. The understory is very dense, primarily occupied by European buckthorn, but also including tree saplings, raspberries, and gooseberry. The ground cover is dominated by the invasive garlic mustard, but also includes a variable mix of species such as goldenrod, bedstraw, and poison ivy.

MAS2-1(Cattail Mineral Shallow Marsh Type). The ecotype is the one that will be most impacted by the proposed road route. It is primarily a monoculture of two species. The portion closest to the lake is dominated by cattails that grades into the invasive non-native canary reed grass with distance from the lake, which then grades into an upland meadow.

Wetland Compensation Area

As discussed above, the potential compensation area could range from 0.13 to 0.2 ha., and there are two locations where new wetland can be created. Since Lake Ontario water levels dictate the presence of wetland here by providing the necessary hydric conditions, it should be a relatively simple matter of excavating out adjacent upland areas to a similar lower grade as the existing wetland areas.



Colonization by adjacent wetland plants will naturally occur in these excavated areas. The A and B upland areas are relatively weedy sites dominated by common robust species and do not contain rare or sensitive species. We estimate that the A and B areas shown in the adjacent image can provide a total compensation area of over 0.7 ha., and each on its own is large enough to accommodate the maximum amount of compensation needed of 0.2 ha. As such, compensation could occur entirely in each area, or in parts of each area.

Area B has a lower ecological value than site A but splitting the compensation area between the A and B sites with a focus on the meadow and trail portions of these sites spreads out the ecological risk and increases the chances of a greater overall positive benefit.

References

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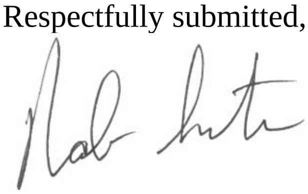
Respectfully submitted,



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