



September 17, 2015

Ms. April Nix
City of Guelph
1 Carden Street
Guelph, ON N1H 3A1

Dear Ms. Nix

**Re: Guelph Lake Subdivision
Addendum Environmental Impact Study (EIS)**

This letter-report is prepared and submitted to address a number of aspects of modifications to the Guelph Lake Subdivision stormwater management proposed by GMBLuePlan (GMBP) subsequent to the submission of the July 2015 EIS prepared by NRSI. This letter is submitted to address the comments discussed during our August 25, and September 17, 2015 telephone conversations. This letter supercedes an early version provided to you, dated September 1, 2015.

The analysis provided in this letter-report builds on the detailed characterization of natural features and functions on the subject property and neighbouring lands contained in the July EIS. The analysis is based on technical details prepared by GMBP related to the design, function and hydrogeological aspects of the proposed revisions to the stormwater management. These details are included on plans and cross sections dated September 2015. The proposed stormwater management infiltration facility supplements proposed facilities in the previous servicing report, but only replaces a number of lot-level facilities previously proposed for private lots along the southwest side of Longfellow Drive. The proposed infiltration facility consists of a 900mm diameter perforated pipe covered in filter fabric within a 1.2m wide and 1.2m deep gallery filled with clear stone. The pipe is proposed to be installed along the northeast side of Longfellow Drive, just beyond the multi-use trail. The pipe will run approximately 190m from the stormwater management pond into the park. The location of the pipe ranges from approximately 16m to over 30m from the southwest boundary of Wetland D. This is in comparison to the previously proposed lot-level infiltration features that were proposed

for the lots across the road, approximately 50m from the wetland boundary.

The pipe will be located at depths of 1.5 to 2.0m below the proposed grade of the trail, but above the water table.

This letter-report provides:

- a summary of the analysis of the proposed infiltration in terms of stormwater function, including the water budget, prepared by GMBP and summarized in a technical memo dated September 2015,
- a summary of a hydrogeological review of the infiltration performance and influence on groundwater relationship between the proposed facility and the nearby wetlands, as well as the potential for seepage/break-outs along the slope, also summarized in the above-noted technical memo,
- an analysis of the proposal in terms of wetland ecology (water budget, etc.), including implications to recommendations contained in the July 2015 EIS.

Function of the Infiltration Facility

The design of the proposed infiltration facility is described by GMBP as providing an equivalent performance as the lot-level infiltration facilities previously proposed along Longfellow Drive. The water budget analysis prepared by GMBP shows that post-development recharge will be slightly lower than pre-development as indicated in the conclusion below. This difference is considered minimal to non-existent given the calculation procedures and assumptions in these calculations. At detailed design, final adjustments will be made to provide a post to pre recharge balance for the site in accordance with the conditions of Draft Plan Approval.

GMBP (September 2015) concludes:

“The water budget review shows that overall the water budget will be within approximately 2% of the pre-development conditions. As such, it is reasonable to expect baseflow conditions will be maintained within the channel. In particular, the infiltration system congruent with the Wetland ‘D’ area and the stormwater pond directly upgradient will provide for recharge conditions, supporting a high groundwater table and groundwater discharge to the wetland and associated channel.”

In terms of the location of the proposed infiltration facility compared to previously proposed lot-level facilities, the infiltration structure would be approximately 30 to 40m closer to Wetland D than the lot-level structures, but would still be 15 to 20m from the wetland boundary. The lot-level structures would have been in a rough line in the rear of the lots along Longfellow Drive. In effect, these have been replaced by a linear facility on the other side of the road. The infiltration structures on these lots would have required considerable design and cost to ensure that the subsurface utilities etc. under Longfellow Drive would not influence the flow paths of infiltrated water to the wetland (e.g. use of extensive cut-off collars to prevent preferential flows into the more permeable fill soils compared to the less permeable neighbouring soils). The proposed infiltration on the wetland side of Longfellow Drive negates the potential for this interference.

The proposal does not influence any infiltration or other stormwater management that is proposed for the remainder of the subject property.,

Seepage/Break-outs from the Proposed Slope

In their September 2015 technical memo, GMBP concludes the following:

“The system has been designed to promote infiltration and protect against preferential flow along native soil interface and/or mounding that would allow for breakout at base of slope. A typical cross-section of the system in relation to the slope is enclosed and provided as Figure 9.

The separation from base of slope is beyond the 1:1 slope expected for unsaturated flow conditions. To promote infiltration, a sandy soil will be used within the 1:1 slope. At the base of the sand media, the ground surface will be stripped and “ruffed” with a toothed bucket to maximize surface area and access to underlying weathered soil (as often employed during installation of tile bed systems in low permeability silt or clayey soils). To prevent break-out along the toe of the slope, the surface soils will be over excavated with low-permeability backfill used to “key” into underlying soils to prevent short-circuiting of the groundwater flows. Lastly, break-out will be prevented by an overflow system that directs water to the stormwater management facility of the hydraulic head rises to the top of the infiltrator system.”

As such, it is not anticipated that the proposal will result in potential seepage from the slope or break-outs of seepage from the slope. Based on their analyses, GMBP concluded that the discharge from the proposed facility to the wetlands (especially Wetland D), would be located in the same pattern as occurs currently and was predicted to occur under the lot-level infiltration scenario.

Ecological Assessment of the Proposed Infiltration

The July 2015 EIS described the water regime in Wetland D as being a combination of surface and groundwater inputs. The surface water aspect of the water budget of Wetland D is not affected by the revised stormwater infiltration facility. The regional component of the groundwater regime will also not be affected by the proposal. With respect to groundwater, the July 2015 EIS stated that Wetland D is:

“to a degree maintained by a shallow groundwater table and periodic groundwater discharge which provides moist soils and suitable conditions for hydrophytic vegetation. Because the shallow groundwater table is influenced on a regional catchment area and the contributions from local groundwater will be maintained, it is anticipated that this groundwater discharge will continue to provide a suitable moisture regime following construction.”

The revised stormwater infiltration facility has been designed to emulate current groundwater conditions. As noted above, the design sees discharge over a broad front that would travel through the soils to the wetland boundary. This broad front of groundwater movement represents a very dispersed input to the wetland (greater than currently with tile drains). As noted in the EIS, there are a range of enhancements proposed for the lands between the wetland and Longfellow Drive (see below), that would serve to enhance evapotranspiration, plant uptake, soil pore space, etc. in such a way as to enhance flows to the wetlands. The proposed scheme includes matching flow patterns/volumes to the wetland.

We have documented that the wetland currently experiences variable inputs that have resulted in the establishment of vegetation species in the wetland that are typically tolerant to fluctuations from season to season and year to year (e.g. it was found that current month to month variations are greater than pre to post predictions for the same months). As such, there is a tolerance of the vegetation to some fluctuations in input. Regardless, the proposal is designed to match pre versus post. For an ecological perspective, the location of the groundwater exiting the facility is not substantially different than current conditions or in the lot-level scheme.

In summary, the conclusions of the July 2015 EIS (Section 6.2.2.6) continue to apply with the revised infiltration, namely that Wetland D:

“will continue to experience stormwater flows and periodic inundation similar to

existing conditions. These wetlands represent a flow through system, whereby water moves through as a wave, attenuated based on the design (24hrs). Very little settling occurs, due to the close association with the SWM facility and SWM conveyance channel which conveys water through Wetland D and into Wetland C via W3”

Based on the revised analysis completed by GMBP, the conclusions in the July 2015 EIS, are still anticipated:

“Water levels post construction are not anticipated to change substantively and are not anticipated to result in a negative impact on the wetland communities present”.

Buffer Enhancement

The July 2015 EIS (Section 6.2.2.5) recommended the following for the buffer area between Longfellow Drive and Wetland D:

“In areas where proposed facilities are located in proximity to wetlands or woodlands, the use of minor grading to direct surface runoff away from the feature(s) is recommended. This generally consists of a permanent, very shallow swale created by a low ridge of topsoil. The vegetated swale is configured to direct surface runoff along the swale back away from the natural feature. If these guidelines are followed, impacts as a result of erosion and runoff are anticipated to be low in magnitude and short in duration, primarily related to the construction phase.”

A mixture of woody shrub plantings within the buffer, in conjunction with shallow spreader swales along the base of the slope were recommended. The proposed infiltration facility is at sufficient depth that no impacts to shrub plantings, or installation of spreader swales would result.

As such, the conclusions related to this buffer area included in Section 6.2.2.5 in the July 2015 EIS are still valid, namely:

“Given the cultural nature of the existing conditions surrounding these wetlands (i.e. trails, mowed lawn, agriculture) it is not anticipated that disturbances related to grading, lots and roadways will negatively impact these wetlands provided these existing buffers are respected. The buffers will enhance the overall condition of Wetland D through naturalization plantings of surrounding lands and old trails.

The buffer segment between Wetland D and Longfellow Road (approximately 19m) will function to limit impacts such as erosion, sediment filtration, road run off and salt impacts. It will also act to reduce human movement off of the preferred trail alignment adjacent to Longfellow Drive. During road construction, works will

occur within the outer portion of the buffer, and in limited areas will be up to 8.3m from the wetland.”

Conclusions

GMBP provides a description of the proposed infiltration pipe associated with the Guelph Lake Subdivision in a technical memo and associated plans (September 2015). I have reviewed these documents and discussed the proposal with staff of GMBP. Based on this material, the ecological aspects of the revised stormwater infiltration have been assessed. Based on this, it is concluded that the proposed infiltration facility will achieve the goals of the July 2015 servicing strategy and will provide conditions equivalent to those assessed in the July 2015 EIS. As well, the proposed infiltration pipe will not impede the incorporation of enhancement measures into the Wetland D buffer which were proposed in the July 2015 EIS. From an ecological perspective, the proposed infiltration facility creates a broad and diffuse groundwater input to Wetland D. In some respects this input pattern enhances inputs to the wetland, such as replacing the current tile drains, but otherwise matches pre development input. Considering the ecological characteristics of Wetland D, including tolerant plant species and current water regime, our conclusions remain that the proposed development will not have a negative impact on Wetland D.

If you have any questions about this proposal, please contact the undersigned.

Sincerely,
Natural Resource Solutions Inc.

A handwritten signature in black ink, appearing to read "D. Stephenson", with a long horizontal flourish extending to the right.

David Stephenson, M.Sc.
Senior Biologist/Certified Arborist