Benefit Analysis Report

Prepared for:

Millcroft Greens Corporation

City of Burlington
Region of Halton

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1.0 Introduction

Millcroft Greens has submitted an Official Plan Amendment (OPA), Zoning By-Law Amendment (ZBLA) and Draft Plan of Subdivision to the City of Burlington (Files: 505-07/20, 520-07/20 and 510-02/20, respectively) to permit the following development at 2155 Country Club Drive and 4274 Dundas Street, on lands that are currently part of the Millcroft Golf Course:

- Area A – 29 single detached dwellings
- Area B – 40 single detached dwellings
- Area C – 14 single detached dwellings and a parkette
- Area D – 7 single detached dwellings
- Area E – 6-storey condominium building

This proposed residential development will involve modifications to the current golf course layout to accommodate the homes proposed within Areas A – D inclusive. Area E is located within a parcel of land currently occupied by the golf course maintenance building. As such, no modifications to the golf course are required to accommodate the development of Area E. The five areas are shown on **Figure 1**.

The proposed development within Area A involves an alteration to the existing Regional Storm flood plain which will require a Permit from Conservation Halton (CH) pursuant to Ontario Regulation 162/06. This Benefit Analysis Report has been prepared to address a component of CH's permitting requirements related to the proposed flood plain alteration.

2.0 Conservation Halton Regulated Areas

2.1 Conservation Halton Regulation and Policies

Section 28(1) of the *Conservation Authorities Act* enables Conservation Authorities (CAs), subject to the approval of the Minister, to make regulations in the area under its jurisdiction as follows:

a) restricting and regulating the use of water in or from rivers, streams, inland lakes, ponds, wetlands and natural or artificially constructed depressions in rivers or streams;
b) prohibiting, regulating or requiring the permission of the authority for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland;
c) prohibiting, regulating or requiring the permission of the authority for development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development

Section 28(5) outlines the areas under CA jurisdiction as follows:

a) *adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to inland lakes that may be affected by flooding, erosion or dynamic beach hazards;*
b) *river or stream valleys;*
c) *hazardous lands;*
d) *wetlands; or*
e) *other areas where, in the opinion of the Minister, development should be prohibited or regulated or should require the permission of the authority.*

CH's regulation, made pursuant to Section 28 of the *Conservation Authorities Act,* is Ontario Regulation 162/06. The document entitled '*Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document*' (last amended November 2020) sets out the policies by which CH staff and the CH Board of Directors review permit applications made pursuant to Ontario Regulation 162/06.

Within Area A, there are four hazards/features that are regulated by CH:

- Regional Storm flood plain (flooding hazard)
- Meander belt (erosion hazard)
- Wetland (non-Provincially Significant and less than 2 ha in size)
- Appleby Creek (watercourse)

Also, within Area A, there is a large online pond, immediately north of Upper Middle Road, that was created to supply the golf course with its irrigation needs. There is an existing weir immediately upstream of Upper Middle Road that impounds water, creating the irrigation pond. In addition to the flows from Appleby Creek, this pond receives untreated stormwater flows from the adjacent Millcroft subdivision. As such, the online irrigation pond may be providing some level of stormwater treatment however, it is the Study Team's understanding that it was not designed for such purposes.

As noted in **Section 1.0**, the Millcroft Greens application proposes a flood plain alteration within Area A, which triggers the following CH policies:

2.19 Alteration to Watercourses and Flood Plains

2.19.1 Major flood plain alterations (including placement of fill to create, or enlarge, a building lot) and major watercourse alterations (including enclosures and diversions from one watershed to another) are generally not permitted. Such alterations may be considered where justification is provided through a subwatershed study, an Environmental Assessment or similar comprehensive study and are subject to conformity with municipal planning documents. The applicable study or assessment must be current (generally within 5 years) and must be supported by Conservation Halton.

2.19.2 Flood plain and watercourse alterations, that are minor in nature or have been justified under Policy 2.19.1 will be evaluated on an individual basis having consideration for the following:

a) Maintenance of the natural topography of the watercourse system, flood conveyance (no increase in off-site flood elevations and on-site increases will only be permitted where it has been shown that it will not result in an increased risk to life or property) and flood storage (maintenance of stage – storage-discharge relationships for a range of rainfall conditions);
b) No adverse impacts on fluvial processes (including the 1:100 year meander belt width)
c) No adverse impacts on groundwater recharge/discharge;
d) Geotechnical (i.e., slope stability) issues are adequately addressed; and
e) Implementation of recommendations within Conservation Halton approved watershed and subwatershed studies or Environmental Assessment.

Certain words within the above policies are defined in CH's policy document. Specifically, 'flood plain alterations' and 'comprehensive study' are defined as follows:

Flood plain alteration *means activities, such as filling, grading and excavation, that would change the landform and natural vegetative characteristics of a site located within the flood plain.*

Comprehensive study *means a detailed study that fully assesses existing conditions and the potential impacts of proposed development with respect to, at a minimum, hydrology, hydraulics, hydrogeology, fluvial processes, erosion, slope stability and the natural environment (including, but not limited to, ecological functions).*

The proposed site alteration will involve excavation and grading within the flood plain and, as such, meets the definition of 'flood plain alteration'. The proposed works within the Appleby Creek corridor, associated with the flood plain alteration, will involve the following:

- Removal of the existing weir structure;
- Re-grading and relocation of the irrigation pond to remove from the creek;
- Creation of a re-instated low flow channel, upstream of Upper Middle Road, within the area that is currently occupied by the online irrigation pond;
- Re-grading of the flood plain between the re-created irrigation pond and Millcroft Park Drive; and,
- Restoration of the watercourse corridor through the creation of wetland habitat and native plantings throughout the area that is currently occupied by Golf Hole 6.

In addition to the flood plain alterations associated with the proposed Area A development, the following works will also be required within CH's regulated area:

- Creation of a storm sewer outlet for Area A;
- Installation of new or re-routed storm sewer infrastructure; and,

- Re-routing / new infrastructure to maintain the irrigation function of the pond.

The proposed flood plain alteration within Area A was not identified in a subwatershed study (SWS) or Environmental Assessment (EA). Accordingly, to comply with CH Policy 2.19.1, a comprehensive study is required to justify the flood plain alteration. Based on the definition provided in CH's policy document, the comprehensive study must fully assess existing conditions and the potential impacts of the proposed development with respect to, at a minimum, hydrology, hydraulics, hydrogeology, fluvial processes, erosion, slope stability and the natural environment (including, but not limited to, ecological functions). It is the Study Team's position that all of this information has been provided within the planning application submission package that includes the following reports:

- Environmental Evaluation Report (EER) prepared by Beacon;
- Functional Servicing Report (FSR) prepared by Urbantech; and,
- Hydrogeological Assessment prepared by R.J. Burnside.

This Benefit Analysis Report summarizes the information provided in those reports to demonstrate that sufficient justification for the flood plain alterations has been provided and that the existing conditions and potential impacts of the proposed flood plain alteration has been fully assessed.

2.2 Existing Regulated Areas – Area A

2.2.1 Flooding Hazard

Appleby Creek flows through the Millcroft Golf Course in a southeasterly direction and many of the golf holes have been constructed within its flood plain, including Hole 6 in the vicinity of Area A. **Figures 2 and 4A** shows the existing flood plain along Hole 6, south of Millcroft Park Drive and north of Upper Middle Road. This existing flood plain is based on CH's HEC-RAS model with updated existing field information by Urbantech, as documented in the Functional Servicing Report (Urbantech, 2022).

In accordance with CH's regulation, both the flood plain, as well as a 7.5 m regulatory allowance adjacent to the flood plain, is regulated by CH. The 7.5m regulatory allowance is also shown on **Figures 2 and 4A.**

2.2.2 Erosion Hazard

In addition to the flooding hazard, erosion hazards also exist along Appleby Creek in the vicinity of Area A. CH staked a top of bank feature along the western side of the creek, between Millcroft Park Drive and Upper Middle Road however, they have confirmed that the eastern side of the creek is considered unconfined (i.e., no top of bank present). No alterations are proposed on the west side of the creek and, as such, no additional work has been undertaken, nor was it required as part of the planning application, as it relates to the slope stability of the western valley wall.

A meander belt assessment was completed by Beacon (EER, November 2020) which determined a meander belt width of 35m. The meander belt was further refined in a memo prepared by Beacon (Beacon Updated Technical Review, January 2022) and is shown on **Figure 2**.

In accordance with CH's regulation, both the meander belt, as well as a 7.5 m regulatory allowance adjacent to the meander belt, is regulated by CH. The 7.5m regulatory allowance is also shown on **Figure 2**.

2.2.3 Wetland

A small/narrow (0.15 ha) riparian wetland exists along Appleby Creek within Area A as shown on **Figure 2**. The limit of this wetland has been staked and surveyed with CH. Given that the wetland is less than 2 ha and is not a Provincially Significant Wetland (PSW), in accordance with Ontario Regulation 162/06, the wetland, plus an additional 30 m regulatory allowance, is regulated by CH. Although CH regulates an additional 30m adjacent to this wetland, **Figure 2** shows a 15m buffer, as per CH Policy 2.40.3 which does not permit new development within 15m of a wetland less than 2 ha in size.

This wetland is primarily fed by surface water flow as a result of the Appleby Creek overtopping its banks. Limited surface water from the adjacent golf course lands would also contribute to the wetland hydrology. **Figure 3** shows a comparison of existing (2.66 ha) and proposed local catchment areas (1.57 ha) for the wetland which are very minor in comparison to the upstream catchment area to this wetland of 432 ha (i.e., upstream of Millcroft Park Drive). This suggests that the majority of the wetland's hydrology is likely supported by flows within the creek.

The riparian wetland has limited ecological function and does not support amphibian breeding; its primary function relates to provision of erosion control, water quality and allochthonous inputs to Appleby Creek. The presence of the golf course and associated ongoing maintenance (e.g., grass cutting) further restricts the ecological function of the wetland.

2.2.4 Watercourse

Appleby Creek is a drainage feature that meets the definition of 'watercourse' within the *Conservation Authorities Act* and, as such, is regulated by CH. Appleby Creek is shown on **Figure 2** in its existing location along the majority of its length with the exception of approximately 180 m of the creek, upstream of Upper Middle Road, that is proposed for re-instatement through the removal of the online irrigation pond.

2.3 Proposed Alterations within CH Regulated Area – Area A

As outlined in **Section 2.1**, the following CH policies must be met in order to permit flood plain alterations:

2.19 Alteration to Watercourses and Flood Plains

2.19.1 Major flood plain alterations (including placement of fill to create, or enlarge, a building lot) and major watercourse alterations (including enclosures and diversions from one

watershed to another) are generally not permitted. Such alterations may be considered where justification is provided through a subwatershed study, an Environmental Assessment or similar comprehensive study and are subject to conformity with municipal planning documents. The applicable study or assessment must be current (generally within 5 years) and must be supported by Conservation Halton.

2.19.2 Flood plain and watercourse alterations, that are minor in nature or have been justified under Policy 2.19.1 will be evaluated on an individual basis having consideration for the following:

a) Maintenance of the natural topography of the watercourse system, flood conveyance (no increase in off-site flood elevations and on-site increases will only be permitted where it has been shown that it will not result in an increased risk to life or property) and flood storage (maintenance of stage – storage-discharge relationships for a range of rainfall conditions);
b) No adverse impacts on fluvial processes (including the 1:100 year meander belt width)
c) No adverse impacts on groundwater recharge/discharge;
d) Geotechnical (i.e., slope stability) issues are adequately addressed; and
e) Implementation of recommendations within Conservation Halton approved watershed and subwatershed studies or Environmental Assessment.

The following subsections provide a detailed description of how each of the CH policy requirements have been addressed. As noted previously, with respect to the requirement in Policy 2.19.1 to provide a 'similar comprehensive study', it is the Study Team's opinion that the studies submitted to date (i.e., EER, FSR and Hydrogeological Assessment) provide all of the detail that is required by the CH definition of 'comprehensive study' however, at the request of CH, this Benefit Analysis Report has been prepared to summarize the findings of those studies and to clearly demonstrate that the existing conditions and the potential impacts of the flood plain alteration have been fully assessed. In addition, although the Study Team is of the opinion that CH's policy does not specifically require this, the Benefit Analysis Report also identifies the benefit of the proposed development to the overall Appleby Creek system, as requested by CH.

2.3.1 Flooding Hazard

To accommodate a portion of the Area A development, alterations are proposed to the Regional Storm flood plain as documented in the FSR and EER (Urbantech, 2022; Beacon, 2022). This involves regrading the lands on the east side of Appleby Creek between Upper Middle Road and Millcroft Park Drive. Additionally, the irrigation pond will be reconfigured, and the low flow channel of Appleby Creek will be reinstated by the removal of the on-line weir. The pre and post development flood plain limits in the vicinity of Area A are shown on **Figures 4A and 4B** as FSR FP-1 and FSR FP-2, respectively.

The definition of comprehensive study refers to the requirement to provide '*a detailed study that fully assesses existing conditions and the potential impacts of proposed development with respect to, at a minimum, hydrology, hydraulics, hydrogeology, fluvial processes, erosion, slope stability and the natural environment (including, but not limited to, ecological functions)'.* The existing flood hazards have been

documented in the FSR and the potential impacts of the proposed flood plain alterations, from a hydrologic and hydraulic perspective, have also been assessed. The FSR demonstrates, through a flood plain analysis, that there will be no negative impact to the flooding hazard as a result of the proposed flood plain alteration.

In addition, Policy 2.19.2(a) requires that, for flood plain alterations that have been justified under Policy 2.19.1, that they must also be evaluated having consideration for several other factors. Subsection (a) indicates that the proposal will be evaluated having consideration for '*the maintenance of the natural topography of the watercourse system, flood conveyance (no increase in off-site flood elevations and on-site increases will only be permitted where it has been shown that it will not result in an increased risk to life or property) and flood storage (maintenance of stage-storage-discharge relationships for a range of rainfall conditions)'*. The fact that flood plain alterations are proposed necessarily means that there will be modifications to the natural topography of the watercourse system (i.e., within the flood plain) however, as noted earlier, the topography on the east side of Appleby Creek in this area should not be considered the natural topography of the watercourse system. The lands to the east of the creek were historically graded to accommodate the existing golf hole and have been in this modified, sodded and maintained state for several decades. As detailed in FSR (Section 4.5.5 and Table 4-9A), the proposed development does not have a negative impact on riparian storage volumes for the reach proposed to be modified. In fact, the proposed works are expected to increase the riparian storage on-site. There are minor anticipated reductions in the riparian storage in the 2-year and 5-year storms which is likely attributed to improvements / reductions in water levels within the Subject Lands causing reduction in water levels upstream, which reduces the flood storage slightly. For the larger storms, there is a general increase in flood plain storage resulting from the proposed grading.

The FSR (Urbantech, 2022) demonstrates that the proposed flood plain alteration does not result in any increased flood risk upstream, downstream or on the adjacent lands. This is shown on **Figure 5** which compares the existing and proposed flood lines in cross-section view. In addition, the cut within the flood plain will provide a better connection between the watercourse and its flood plain under certain storm events and will assist in providing water to wetlands that are proposed to be created on the east side of the creek, west of the relocated irrigation pond. As a result, the policy requirements within Policies 2.19.1 and 2.19.2, as they pertain to flooding hazards have been addressed.

2.3.2 Erosion Hazard

Grading within the meander belt is proposed, as shown on **Figure 5**.

As noted in **Section 2.3.1**, the definition of *comprehensive study* requires that a detailed study fully assess existing conditions and potential impacts of the proposed flood plain alterations on, among other factors, fluvial processes, erosion and slope stability. The EER and Meander Belt Review Memo (Beacon 2022) provides a detailed assessment of the existing conditions and meander belt width. The existing meander belt extends onto the manicured golf course lands and, within a portion of the site, overlaps with the existing online irrigation pond.

Under the proposed conditions, the online irrigation pond will be taken entirely offline, the low flow channel re-instated and the meander belt along the eastern side of the creek will be returned to a natural condition (refer to **Figure 5** – Section 4-4 for cross-section view**; Figure 2 –** Section 4-4 for plan

view). This represents a significant improvement over existing conditions from a fluvial processes perspective. The creation of an entirely offline pond is being proposed as part of the draft plan of subdivision application, in contrast to the by-pass pond that was previously being considered as part of the Permit to Take Water (PTTW) process. Through the PTTW process, the berm associated with the by-pass pond was proposed immediately adjacent to the proposed low-flow channel (i.e., within the meander belt allowance) (**Figure 6**). Again, the proposed offline pond represents a significant improvement / benefit to the system as compared to the PTTW by-pass pond that was advancing through agency reviews prior to the submission of the planning application.

The above also satisfies Policy 2.19.2 (b) which requires a demonstration of no adverse impacts on fluvial processes (including the 1:100 year meander belt width).

The grading within the meander belt is generally associated with a cut on the east side of the creek and, as such, would not hinder the fluvial processes of Appleby Creek. In fact, the area that is being cut is within lands currently occupied by the golf course, and area that was previously graded/sculpted to create the topography associated with the golf hole. As stated earlier, the existing topography is not the natural topography that existed pre-golf course and the proposed cut will improve the connection between the creek and its flood plain under certain storm events, as compared to the existing / modified conditions. As such, no negative impacts to the fluvial processes of Appleby Creek are anticipated within Area A as a result of the flood plain alteration. Finally, the removal of the online irrigation pond, and reinstatement of a naturalized channel and functional flood plain, will result in significant improvements to the fluvial processes through this reach of Appleby Creek.

Finally, Policy 2.19.2(d) requires a demonstration that geotechnical (i.e., slope stability) issues are adequately addressed. As previously mentioned, the only location where a top of bank exists is along the western side of Appleby Creek. No flood plain alterations are proposed on the west side of the creek and, as such, Policy 2.19.2(d) is not applicable and does not need to be addressed in this report.

2.3.3 Wetland

No changes are proposed to the existing riparian wetland along Appleby Creek. Grading within 30 m of the riparian wetland is proposed within the existing artificially sculpted golf course lands as shown on **Figures and 4B**. As outlined in **Section 2.2.3**, the majority of the catchment area to this riparian wetland is from the upstream watercourse, rather than the adjacent tableland. The local tableland drainage area to the wetland is reduced by 1.09 ha (**Figure 3**) as a result of the proposed flood plain alterations (**Figure 5**). Given the fact that the wetland is primarily supported by upstream flows from Appleby Creek, and that wetland vegetation is considered tolerant to disturbance and minor changes in hydrology, no negative impacts to the existing riparian wetland are anticipated as a result of the proposed flood plain alteration.

As agreed to with CH's ecologist (L. Jennings), a constructed wetland is proposed within Area A to compensate for the loss of small, unregulated wetlands dominated by exotic invasive species within Area E. The proposed wetland will replace wetlands in Area E at a greater ratio than requested by CH (i.e., greater than 1:1:) and will result in increased habitat opportunities for wildlife, increased habitat diversity within the Appleby Creek corridor, provision of allochthonous inputs to Appleby Creek, flood and storm water attenuation, and increased infiltration. A conceptual design (i.e., extent and location)

for the constructed wetland has been prepared by NAK. Detailed design of the wetland will be concurrent with the design for the reinstated watercourse, detailed below.

2.3.4 Watercourse

The existing online irrigation pond is proposed to be taken entirely offline as part of the proposed development. This will result in beneficial alterations to the watercourse (i.e., reinstatement of a low flow channel) as well as flood plain alterations (i.e., construction of the offline pond and sculpting of those lands currently occupied by the online pond, part of which will result in the construction of a wetland adjacent to Appleby Creek).

For clarity, through a separate process associated with the golf course's PTTW, the golf course had been working cooperatively with the Ministry of Environment, Conservation and Parks (MECP) and CH to re-design the current online pond to a by-pass pond. The original proposal, that was advanced through the PTTW process and submitted to CH through Permit application file A/15/B/49, was to create a by-pass pond that would direct excess creek flows to the pond under certain flow conditions. As such, as part of the PTTW process, the pond was not proposed to be taken entirely offline and would still have relied on water from the creek for irrigation purposes. However, as part of the current development proposal, the pond is now proposed to be taken entirely offline, an improvement over the previous by-pass pond proposal that was associated strictly with the PTTW process. This relocation and re-design of the pond would be considered part of the proposed flood plain alterations.

The removal of the online pond will result in the following significant benefits to the Appleby Creek system:

- the re-instatement of approximately 180 m of low flow channel for Appleby Creek;
- no reliance on the watercourse for irrigation purposes;
- improved fish passage through the removal of the downstream weir;
- improved sediment transport;
- wetland creation;
- provision of riparian vegetation along the entire length of the creek; and,
- reduced thermal loadings to the creek.

The removal of this online pond is a significant benefit to the Appleby Creek watershed and could improve the extent of fish habitat in the watershed through the reinstatement of fish passage. It will also assist with decreasing watercourse temperatures downstream, restore sediment transport processes and return a portion of the creek to a more natural/pre-development condition through the use of natural channel design. In addition, the offline pond has been designed such that the meander belt on the eastern side of the watercourse is unencumbered by the pond (**Figure 5 –** Section 4-4) (as compared to the PTTW proposal whereby the berm of the proposed pond was immediately adjacent to the low flow channel) (**Figure 6**).

The removal of the by-pass component, and creation of an entirely offline irrigation pond, comes at a cost to the golf course, that would otherwise not have been required if a by-pass pond was created.

Through the removal of any reliance on the creek for irrigation purposes, the golf course will have to rely on municipal water supply, during those times when the offline pond does not have sufficient water to sustain the course's irrigation needs. This will result in costs both to build the infrastructure to connect to the municipal system as well as the cost of using municipal water for irrigation purposes.

2.3.5 Regulated Allowances

There is no requirement within Policies 2.19.1 or 2.19.2 to address regulated allowances as part of the comprehensive study or the additional work required once a project is justified through a comprehensive study. The following analysis is provided for information purposes only, to provide a full analysis of the impact of the proposed flood plain alteration from a CH policy perspective.

2.3.5.1 Development within 7.5m of the Regional Storm Flood Plain

As shown on **Figures 4A and 4B**, grading is proposed at a combination of 3:1 and 10% slopes within the 7.5 m regulatory allowance to the Regional Storm flood plain. CH Policy 2.27.2 (New Development within 7.5 metres of Flood Plain) states the following:

> *Non-structural development, such as grading works, may be permitted if all general policies have been met. Minor grading works may only require the issuance of a clearance letter but major grading works would require that a permit be obtained.*

Based on the above, grading within the 7.5 m flood plain regulatory allowance is contemplated in CH policy and the proposed grading would be eligible for a Permit from CH subject to the submission of all required information.

2.3.5.2 Development within 7.5m of the Meander Belt

As shown on **Figures 4B** and **5**, the proposed development will result in grading within the 7.5 m regulatory allowance associated with the meander belt. CH Policy 2.28.2.3 would be applicable and reads:

> *Non-structural development such as grading works, may be permitted if all general policies have been met. Minor grading works may only require the issuance of a clearance letter but major grading works would require that a Permit be obtained.*

Based on the above, grading within the 7.5m meander belt regulatory allowance is contemplated in CH policy and the proposed grading would be eligible for a Permit from CH subject to the submission of all required information.

2.3.5.3 Development within 30m of a non-Provincially Significant Wetland less than 2 Hectares in Size

As shown on **Figures 4A** and **4B**, the grades adjacent to the existing riparian wetland are proposed to be lowered. This will remove some of the artificial grading associated with the existing golf hole and re-instate a more natural connection between the watercourse and its flood plain. As noted previously, this grading will not impact the hydrology of the wetland as the vast majority of this wetland's catchment area is from the upstream watercourse. CH Policy 2.40.3 would be applicable:

Except as provided for in Policies 2.40.1 and 2.40.2, no new development is permitted within 15m of a wetland less than 2 hectares in size.

While the proposed grading does not meet Policy 2.40.3, as there is no exception in Policies 2.40.1 or 2.40.2 that would permit it, the Study Team respectfully recommends that the proposed grading is within an area that was already historically modified through the golf course grading and does not represent the natural / original topography in this area. The proposed grading will not negatively impact the wetland and, in fact, in some locations creates the opportunity to construct wetlands within the flood plain to further enhance the natural environment in this area as part of the proposed development.

2.3.6 Other Conservation Halton Regulatory Policies

In addition to those policies that are specific to flood plain alterations, there are several other Specific and General policies within CH's regulatory policy document that would apply to the proposed development. An analysis of these policies is included in this Benefit Analysis Report to provide a fulsome overview of all CH regulatory requirements and to demonstrate that, in providing a benefit to the system, the applicant is also conforming to all other CH permit requirements.

2.3.6.1 Conservation Halton Specific Policies

2.3.6.1.1 Ponds

CH Policy 2.24.6 provides several policies related to ponds. The following are applicable to this proposed development:

2.24.6.2 *Dugout Ponds and Off-Line Bypass Ponds may be permitted within the flood plain if it can be shown that the following general and type specific criteria/requirements can be satisfied:*

a) All fill, including dredged material, is removed from the flood plain;
b) No negative impacts on water quality, including thermal pollution, will result from the works;
c) The pond will not affect the fluvial processes in the flood plain;
d) The pond will not affect downstream wetlands;
e) The pond is designed with appropriate side slopes for stability and safety purposes; and,
f) For off-line bypass ponds, the water intake is designed in accordance with Policy 2.21.

2.24.6.3 *The conversion of on-line ponds to off-line ponds is encouraged by Conservation Halton because generally there is a net benefit to the environment (i.e., reduction in sedimentation rates, removal of fish barriers, reduction in stream temperatures, etc.).*

When assessing the proposed offline pond within the flood plain, it is important to acknowledge that there is already an existing online pond within the flood plain and that any efforts to convert this online pond to an offline pond should be viewed in a positive light, as outlined in CH Policy 2.24.6.3. As required by CH Policy 2.24.6.2, all fill, including dredged material, will be removed from the flood plain however, a berm around the pond will be required, similar to the berm that exists around the current online pond.

The removal of the online pond will have a positive impact on water quality and will reduce thermal pollution, thereby meeting the requirements of Policy 2.24.6.2(b). The pond has been proposed outside of the meander belt, thereby ensuring no negative impacts on the fluvial processes within the flood plain, achieving Policy 2.24.6.2(c). The offline pond will not affect downstream wetlands and, in fact, provides area adjacent to the re-instated low flow channel to create new wetland habitat, thereby meeting Policy 2.24.6.2(d). Finally, the pond has been designed with appropriate side slopes for stability and safety purposes, satisfying subsection (e). The pond is proposed to be taken fully offline and, as such, subsection (f) is not applicable.

Based on the above, the requirements of CH Policies 2.24.6.2 and 2.24.6.3 are satisfied.

2.3.6.2 Conservation Halton General Policies

In addition to CH's Specific Policies within their policy document, there are also General Policies that apply to all development within their regulated area. The following is an analysis of those General Policies that would be applicable and how they have been addressed through the proposed flood plain alteration.

2.3.6.2.1 Riparian Buffers and Fish Habitat

As described in the EER (Beacon, 2022), the majority of the fish that were observed within this reach of Appleby Creek are typical of a warmwater regime. CH Policy 2.6 (Riparian Buffers and Fish Habitat) outlines what fish habitat consists of and that changes to riparian vegetation can alter watercourse temperatures. In addition, this policy notes that the introduction of sediment, pesticides and other deleterious substances degrade water quality and that the provision of a vegetated buffer adjacent to watercourses can assist in removing some of these substances prior to entering the watercourse. The policy goes on to state that the provision of adequate vegetated buffers is essential to the maintenance and enhancement of fish habitat.

While fish habitat is not regulated by CH under Ontario Regulation 162/06, the following policies are included in their policy document:

> ***2.6.1*** *Any development, permitted in accordance with Policies 2.4 – 2.50, with the exception of watercourse alterations, will maintain a minimum setback of 30 metres from the bankfull channel of any coldwater/coolwater watercourse and warmwater sportfish watercourse and 15 metres from the bankfull channel of any warmwater baitfish watercourse. In addition to the setback, an additional allowance may be*

required from the long-term migration of the watercourse (i.e., erosion or meander belt allowance) further to Policy 2.5.

2.6.2 *Exceptions to Policy 2.6.1 may be considered on a site-specific basis in areas of existing development, where the works will not encroach into the setback any further than the existing building/structure and where no other reasonable alternative exists.*

2.6.3 *Additional setbacks may be required as per Ontario Ministry of Natural Resources and Forestry and Fisheries and Oceans Canada guidelines, the Greenbelt Plan and/or where endangered, threatened or special concern species habitat is involved.*

Given that this reach of Appleby Creek supports warmwater baitfish, Policy 2.6.1 outlines the requirement for a minimum 15 m setback from the bankfull channel. Policy 2.6.2 does allow for exceptions to the setbacks outlined in Policy 2.6.1, in areas of existing development where the works will not encroach any closer than an existing building or structure. Reference to 'building or structure' in Policy 2.6.2 suggests that these recommended setbacks are geared towards structural development, rather than grading, although it is acknowledged that the definition of 'development' in the *Conservation Authorities Act* includes site alteration.

Conservation Halton often permits grading within 15 m of a watercourse to accommodate flood plain alterations within areas of new development (i.e., Milton Phases 1-3, North Oakville, Alton Community, etc.). As such, it is respectfully submitted that this policy is not normally applied to grading associated with flood plain alterations. Regardless, the proposed grading will not disturb the existing riparian vegetation and the proposed development will result in the naturalization of the entire corridor associated with this reach of Appleby Creek, thereby significantly improving riparian habitat and shading. Further, the removal of a golf hole, immediately adjacent to this watercourse, will reduce pesticide and fertilizer input and the removal of the online pond will improve the thermal regime, all of which are benefits and improvements to fish habitat. As such, the intent of Policy 2.6 is fulfilled.

2.3.6.2.2 Conservation of Land and Pollution

CH Policy 2.10 states the following:

> *Where development is proposed within an area regulated pursuant to Ontario Regulation 162/06, it will be assessed based on whether the development will affect the conservation of land and/or pollution. Applications will be assessed to ensure no adverse environmental impacts to existing natural features and/or ecological functions as a result of the proposed development. A net environmental benefit will be encouraged. In addition, applications will be reviewed to determine whether there is any potential for a deleterious physical substance or other contaminant to be generated by the development.*

As confirmed through the EER (Beacon 2022), there are no adverse environmental impacts to the existing natural features and/or ecological functions as a result of the proposed flood plain alteration. In fact, numerous positive impacts to the natural features and ecological functions have been demonstrated as a result of the proposed development including:

- removal of the existing manicured lawn associated with Golf Hole 6, replaced with naturalized plantings throughout the watercourse corridor between Millcroft Park Drive and Upper Middle Road;
- removal of the existing online pond resulting in improved fish passage, sediment transport, connectivity, reduced thermal impacts and reinstatement of a natural low flow channel; and,
- creation of additional wetland habitat within the reconfigured flood plain.

Based on the above, a net environmental benefit has been achieved, as encouraged by Policy 2.10. The proposed transition of this area from a manicured golf course to a naturalized watercourse corridor will not result in the potential for any deleterious physical substance or other contaminant to be released to the environment and will likely reduce the potential for pesticide and/or fertilizer impacts along this reach. As such, Policy 2.10 is fulfilled.

2.3.6.2.3 Vegetation Protection Zone

CH Policy 2.11 states the following:

> *Conservation Halton endeavours to set back development from natural features and hazardous lands such as watercourses, valleylands, wetlands, shorelines, etc. Ideally a vegetation protection zone should be established within these setbacks. It is intended that the vegetation protection zone should utilize vegetation native to the watershed and be established to achieve and be maintained as natural self-sustaining vegetation, wherever possible. Invasive species will not be permitted on any plans. In some cases, (i.e., Greenbelt Plan Area) vegetation protection zones are required as per the policies of that Plan.*

The wording in this policy is that of encouragement (i.e., 'endeavours', 'ideally', 'should', 'wherever possible') and is not necessarily suggesting that setbacks must provide for a vegetation protection zone. Notwithstanding this, the proposed development does provide for naturalized, vegetated buffers adjacent to all of CH's regulated areas (i.e., within 7.5 m of the greater of the flood plain or meander belt; within 15m of the riparian wetland). As such, Policy 2.11 is fulfilled.

3.0 Comprehensive Study Analysis

As noted in **Section 2.1**, when major flood plain alterations are proposed in the absence of a subwatershed study or EA, CH Policy 2.19.1 requires that a comprehensive study fully assess existing conditions and the potential impacts of proposed development with respect to, at a minimum, hydrology, hydraulics, hydrogeology, fluvial processes, erosion, slope stability and the natural environment (including, but not limited to, ecological functions). The existing conditions within Area A are outlined above in **Section 2.2** and the proposed conditions are outlined in **Section 2.3**. The existing and proposed conditions are more fully explored and explained within the following updated reports in support of the OPA, ZBLA and draft plan applications:

- Environmental Evaluation Report, Beacon Environmental (March 2022)
- Arborist Report, Beacon Environmental (March 2022)
- Functional Servicing Report, Urbantech Consulting (March 2022)

- Phase 1 and 2 Environmental Site Assessment, DS Consultants (March 2022)
- Geotechnical Investigation, DS Consultants (March 2022)
- Hydrogeological Assessment, R. J. Burnside and Associates (October 2020)
- Revised Water Balance Calculations, R. J. Burnside and Associates (March 2022)

The above reports document the existing conditions within Area A related to hydrology, hydraulics, hydrogeology, fluvial processes, erosion and the natural environment. In addition, the above reports document the proposed alterations within Area A and the associated impact of such alterations on these same features, functions and processes.

For ease of review, each feature/function listed in CH's comprehensive study requirements is summarized separately below from both an existing condition as well as a proposed condition perspective:

3.1 Hydrology

The Appleby Creek watershed, upstream of Upper Middle Road, is approximately 450 ha. The ~ 12ha of land to be redeveloped for Areas A through E equates to ~2.7% of the watershed area. The redevelopment proposals contemplate stormwater controls to pre-development or less than pre-development flow levels. The redevelopment proposal will have an immeasurable impact on watershed flows used to test flood plain hydraulics.

3.2 Hydraulics

The flood plain hydraulics upstream of Upper Middle Road and south of Millcroft Park Drive will be affected by the proposed channel regrading, weir removal and removal of the online pond from the watercourse. The FSR compares pre and post development flood elevations for the reach and shows matching or lowering of the anticipated flood elevations from existing conditions.

3.3 Hydrogeology

The results of the drilling program completed across Area A suggest that a thin veneer of topsoil blankets the site (0.1 to 0.4 m thick), which is underlain by a layer of clayey silt fill that ranges in thickness from about 0.7 to 1.7 m and is likely re-worked material from previous earthworks at the site (i.e., grading to accommodate the golf course). Underlying the fill are native deposits of low-permeable clayey silt till and sandy silt till ranging in thickness from about 0.7 m to 3 m overlying bedrock. The sandy silt till layers were limited to the western portion of Area A (i.e., BH18-8 and BH18-9). The total thickness of the overburden across Area A ranges from about 1.5 m (BH18-6) to 4.7 m (BH18-1).

The development of Area A will result in grading of the existing lands and the addition of fill material, increased topsoil thickness and naturalized plantings. No negative impacts to the hydrogeology of the area are anticipated as a result of the proposed development. It is anticipated that these measures will aid in the reduction of runoff and increase infiltration in post-development, as compared to existing conditions.

3.4 Fluvial Processes/Erosion

As noted in **Section 2.2.2**, Appleby Creek, between Millcroft Park Drive and Upper Middle Road consists of a confined valley feature along the west side of the creek (i.e., a top of bank is present) and an unconfined valley feature along the east side of the creek (i.e., no top of bank present). This was confirmed through a top of bank staking exercise with CH on September 10, 2020.

A meander belt width of 35 m was determined for this reach of Appleby Creek within the EER (Beacon 2022). As noted in **Section 2.3.2**, grading (excavation of material) is proposed within the meander belt with only some minor localized fill placement in the immediate vicinity of Millcroft Park Drive and a portion of the offline pond berm. As further outlined in **Section 2.3.2**, no impacts to the fluvial processes/erosion are anticipated as a result of the flood plain alteration and the proposed grading within the meander belt (i.e., excavation) may serve to improve fluvial functions under certain storm events through the re-connection of the watercourse to its flood plain.

3.5 Natural Environment (including, but not limited to, Ecological Functions)

The area of proposed grading (fill removal and fill placement) is mainly manicured fairway associated with Hole 6 with ornamental trees (250 trees) that were planted as part of the golf course landscaping. As such, the ecological functions within the area of flood plain alteration are extremely limited. The location of the proposed grading is such that trees within adjacent residential yards will not be affected. As documented in the EER (Beacon 2022), there are no significant natural heritage features or functions within the area proposed for flood plain alteration. With the exception of the beneficial removal of the online pond and re-instatement of the low flow channel, no physical alterations to the watercourse or riparian wetland are proposed. The proposed flood plain alteration will result in a small change to the wetland tableland catchment area (1.57 ha as compared to 2.66 ha under existing conditions) however, as previously mentioned, this riparian wetland is primarily supported by flows from the Appleby Creek and contains tolerant species. As such, no negative impacts are anticipated as a result of this minor drainage area change. The environmental impact associated with the flood plain alteration is limited to the removal of 27 trees (note that an additional 11 trees within the flood plain are proposed to be removed due to condition and 9 are proposed for removal due to proposed works associated with the removal of the online pond). Overall, and per Table 10 in the Arborist Report (Beacon, 2022), within Area A 142 trees are proposed for removal due to conflicts with the proposed development, 19 are proposed for removal due to condition, and 89 are proposed for preservation. These numbers include the trees that would be removed to accommodate the flood plain alterations. As such, a total of approximately 26% of all trees proposed for removal result from proposed works associated with the reconfiguration of the online pond and the flood plain alteration.

Replacement tree planting is proposed to mitigate for the removal of golf course landscape trees and one regionally owned tree as part of the proposed development plan. Within Area A specifically, this will result in the planting of the caliper equivalent of 4,737 cm worth of trees to compensate for the removal of privately-owned trees and five 6 cm caliper-sized trees to compensate for the removal of a single regionally owned tree. Notably, Beacon will be working with NAK Design Strategies to incorporate climate-change resilient plantings in all development areas, including Area A.

In summary, lands within the area of proposed flood plain alteration currently consist of an active golf course, approximately half of which contains scattered plantings of trees. Area A, like much of the golf course, has limited ecological function and supports common urban-adapted wildlife such as American Robin (*Turdus migratorius*) and European Starling (*Sturnus vulgaris*) (see Section 4.2.1 of the EER for detailed wildlife observations in Area A). Standard best management practices (e.g., sediment and erosion control, timing of vegetation removals to avoid the bird nesting season, etc.) will be implemented during construction. The primary impacts to Area A resulting from the proposed flood plain alterations is a temporary disruption of habitat use during construction and removal of trees. As there is ample suitable habitat available to wildlife using the flood plain cut and fill area elsewhere on the landscape and given that the area will be subject to an extensive planting plan, these temporary minor impacts will not be detrimental to wildlife carrying out their life processes. Furthermore, proposed plantings and ceasing of golf course turf maintenance within the flood plain will expand and enhance opportunities for wildlife, increase urban forest canopy cover and increase water quality in Appleby Creek. As such, there will be no negative impacts to the ecological form and function of Area A resulting from the proposed flood plain alterations. In fact, as outlined within this report and the EER, numerous positive impacts to the ecological form and function within Area A are anticipated as a result of the proposed development.

3.6 Summary of Comprehensive Study Analysis

Based on **Sections 3.1 – 3.5**, the studies that have been completed in support of the OPA, ZBLA and Draft Plan of Subdivision have fully assessed existing conditions and the potential impacts of the proposed development within Area A with respect to, at a minimum, hydrology, hydraulics, hydrogeology, fluvial processes, erosion, slope stability and the natural environment (including, but not limited to, ecological functions). That assessment has demonstrated that the proposed flood plain alteration will not have a negative impact on any of these features or functions and, more specifically that the proposed flood plain alteration:

- will not result in increased flood plain elevations upstream, downstream or on adjacent properties;
- will not result in increased erosion on-site or downstream;
- will not impact the fluvial processes of Appleby Creek on-site or downstream;
- will not impact the groundwater recharge or discharge; and,
- will not impact significant natural heritage features as identified in the Provincial Policy Statement, Region of Halton Official Plan and City of Burlington Official Plan.

The comprehensive analysis has also confirmed that, in addition to the requirements of CH Policies 2.19.1 and 2.19.2, all other CH regulatory policies are met through the proposed development within Area A.

Based on the above, the Study Team respectfully submits that the EER, FSR and Hydrogeological Assessment, and as summarized in this report, address CH's Policy 2.19.1 and 2.19.2 requirements to undertake a comprehensive study, in the absence of a subwatershed study or EA. Further, that the

details summarized in this report, and contained within the supporting planning materials, have demonstrated that there will be no negative impacts to hydrologic, hydraulic, hydrogeologic, fluvial, erosive or natural environment processes as a result of the proposed flood plain alteration in Area A.

3.7 Additional CH Requirements

In addition to the requirements specified by policy and definition within CH's policy document, CH staff have advised that the comprehensive study must also demonstrate a benefit to upstream or downstream users, the overall system and/or that the proposed flood plain alteration is in the public interest. This expectation was detailed in an email from CH (K. McCormack: J. Lawrence) dated July 29, 2020, and states the following:

> *As you've noted below, CH Policy 3.19.1 outlines the conditions under which CH would permit major flood plain alterations. In general, "comprehensive studies" that precede major floodplain or watercourse alterations are often undertaken by municipalities and the rationale for any major alteration is that it will yield some sort of benefit to upstream or downstream users (i.e., minimize risk to life or property), that it will provide a benefit to the overall system and/or that it is in the public interest.*
>
> *Although the term "net benefit" may have been stated in the meeting, the intention was simply that we need the study to demonstrate/articulate that the proposed alteration is not only to facilitate more developable land but that it also provides additional upstream/downstream benefits and that it is in the public interest. This is something that we will be looking for the study to speak to.*

The Study Team has raised concerns with the above interpretation of the policy, given that the CH Board approved definition of '*comprehensive study*' is clear and detailed and does not mention the requirement to yield upstream or downstream benefits, provide a benefit to the overall system and/or to demonstrate that it is in the public interest. In addition, flood plain alterations that have recently been supported through subwatershed studies within new areas of development in CH's watershed have generally not resulted in a benefit to upstream or downstream users (i.e., the flood plain alterations generally have not decreased flooding upstream or downstream) nor do the alterations, in and of themselves, result in an overall benefit to the system. The flood plain alterations within new areas of development (for example, recent flood plain alterations to create watercourse corridors in Milton and North Oakville) often result in the creation of man-made valley features that are required to be landscaped, thereby creating additional natural areas where agricultural land used to exist however, even if flood plain alterations are not required within an area of new development, landscaping is still required within flood plains associated with new development areas. As a result, the flood plain alteration is not in and of itself the driver that results in a benefit to the overall system.

Generally, flood plain alterations within new development areas, that have been supported through a subwatershed study, are strictly for the purpose of containing large expanses of flood plain into more manageable man-made valleylands for the purpose of making the most efficient use of land. This could

be interpreted as being in the public interest given that Policy 1.1.1a) of the Provincial Policy Statement (PPS) indicates that healthy, liveable and safe communities are sustained by:

a) *promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term.*

If containing flood plains within greenfield areas to make a more efficient use of land is considered to be in the public interest, so too would the fill placement within the Millcroft Greens development proposal since both scenarios allow for flood plain alterations in order to make the most efficient use of land, while still demonstrating no negative impacts to the system. Based on this, it is the Study Team's recommendation that the proposed flood plain alterations are consistent with PPS Policy 1.1.1a) and in the public interest.

With respect to the request to demonstrate an overall benefit to the system, the Study Team is of the opinion that the naturalization of the valley system, from Millcroft Park Drive to Upper Middle Road, in an area that is currently manicured and actively maintained turf grass, as well as taking the existing online irrigation pond entirely offline are significant benefits to the overall system, that otherwise would not have occurred if not for the proposed development. In the absence of the proposed development, these lands will remain a golf course hole with minimal riparian / watercourse corridor vegetation, actively managed turf to the edge of the riparian wetland and an irrigation pond that removes flows from the creek to sustain pond water levels.

The proposed development will result in approximately 1.66 ha of manicured, actively maintained turf grass as well as an online pond being replaced by approximately 2.1 ha of natural vegetation including trees, shrubs and native grasses providing both woodland and wetland habitats. These lands, between Millcroft Park Drive and Upper Middle Road, that are currently in private ownership, would be dedicated to the City through the planning process, thereby protecting this natural area in perpetuity. Although outside of the flood plain alteration area, additional naturalization within the 6m landscape buffer within the new residential lots will also provide increased urban tree canopy cover and opportunities for urban-adapted wildlife.

In addition, as outlined within this report, the creation of an entirely offline pond will result in the pond having insufficient water, on an annual basis, to satisfy the golf course's irrigation requirements. This will require the golf course to rely on municipal water for irrigation purposes at different times throughout the season in order to supplement their water supply. Utilizing municipal water will entail additional costs associated with building infrastructure to connect to the existing irrigation system to the municipal water supply as well as the cost of the water itself. These additional costs are only being contemplated as part of the proposed re-development proposal. As such, the proposed offline irrigation pond, with no dependence on Appleby Creek, is directly tied to the proposed development and would otherwise be a by-pass pond, as previously proposed through the PTTW process (**Figures 6A-6C**).

The removal of the online pond, with no further reliance on Appleby Creek for irrigation, results in the following overall benefits to the system:

- the re-instatement of approximately 180 m of low flow channel along Appleby Creek;
- unencumbered meander belt on the east side of Appleby Creek through the placement of the offline pond outside of the meander belt;
- no loss of water from Appleby Creek for irrigation purposes;
- improved sediment transport through this reach of Appleby Creek and downstream;
- improved fish passage through the removal of the downstream weir;
- wetland creation; and,
- reduced thermal loadings to the creek.

In addition to the benefits that will be realized solely as the result of removing the online pond, the following additional benefits to the overall system will be realized as a result of the proposed development in Area A:

- removal of 1.66 ha of the existing manicured turf grass as well as the online pond associated with Golf Hole 6, replaced with 2.1 ha naturalized plantings to create woodland and wetland habitat throughout the valley system between Millcroft Park Drive and Upper Middle Road; and,
- potential to provide publicly owned pedestrian connectivity through this natural area between Millcroft Park Drive and Upper Middle Road, pending confirmation from agency staff.

4.0 Summary and Conclusions

Development within Area A requires alterations to the Regional Storm flood plain, an area regulated by CH pursuant to Ontario Regulation 162/06. As a result, a Permit, or Permits, will be required from CH in order to complete the development in Area A. This Benefit Analysis Report provides a summary of the findings and conclusions that are presented in the EER, FSR and Hydrogeological Assessment, submitted in support of the planning application and has demonstrated that the proposed flood plain alteration has been designed to address all of CH's Board approved regulatory policies. In addition to the policy requirements, this report (and the supporting EER, FSR and Hydrogeological Assessment) has further demonstrated that the restoration of the valley system, between Millcroft Park Drive and Upper Middle Road, with plantings and habitat creation, as well as the removal of the online pond and creation of an entirely offline pond, with no reliance on Appleby Creek for irrigation water, will result in significant benefits to the Appleby Creek system.

The proposed flood plain alterations also represent an efficient use of land that would be in the public interest, similar to flood plain alterations that are permitted elsewhere in CH's watershed to maximize developable land while also ensuring that natural heritage and natural hazard management is properly addressed.

Based on the above, this report has demonstrated that, in addition to CH's policy requirements, the proposed flood plain alteration:

- will not increase the risk to life or property upstream or downstream;
- provides a benefit to the overall system; and,
- is in the public interest.

Figure 1



- All Units In Metric Unless Otherwise Noted.
- Base Information Obtained From Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification by Appropriate Agency.
- Aerial Photo: Google Earth, Approx. Spring 2015

GERRARD DESIGN

Millcroft Greens Corporation | Burlington, Ontario

PRELIMINARY DEVELOPMENT CONCEPT

PROJECT 1516
DATE FEB 15, 2022
SCALE NTS

SK-73



Existing Constraints to Development Area A

Figure 2

Millcroft Greens Benefit Analysis

Legend

- Subject Property, Areas A & B
- Study Area

CH Approximate Regulation Limit

- Existing CH ARL

Hazards & Associated Setbacks

Hazards

- Floodplain (Urbantech Existing)
- Meander Belt (35 m)

Hazard Setbacks

- Floodplain (Urbantech Existing) + 7.5 m
- Meander Belt + 7.5 m

Natural Heritage Features & Assoc. Buffers

Natural Heritage Features

- Wetland (Beacon)
- Wetland (Staked by CH June 2021)
- Fish Habitat
- Watercourse (Beacon 2018)

Natural Heritage Buffers

- Wetland (Beacon) +15 m
- Wetland (Staked by CH June 2021) + 15 m
- Fish Habitat + 15 m

Development Constraint

- Existing Development Constraint Limit

BEACON ENVIRONMENTAL

Project: 216081.3
Last Revised: March, 2022

Client: Millcroft Greens Corporation

Prepared by: SZ
Checked by: SG

N

1:2,000

0 25 50 m

Contains information licensed under the Open Government License–Ontario Orthoimagery Baselayer: FBS Halton Region 2019

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LEGEND

- EXISTING PROPERTY LIMIT
- EXISTING CONTOUR AND ELEVATION
- EXISTING OVERLAND FLOW DIRECTION
- POST DEVELOPMENT OVERLAND FLOW DIRECTION
- TOTAL EXISTING DRAINAGE AREA CONTRIBUTING TO WETLAND SOUTH OF MILLCROFT PARK DRIVE
- EXISTING ROOF + REAR YARD DRAINAGE AREA CONTRIBUTING TO WETLAND
- 2.77ha / 0.32 — TOTAL PRE-DEVELOPMENT DRAINAGE AREA IN HECTARES / AVERAGE RUNOFF COEFFICIENT
- TOTAL POST-DEVELOPMENT DRAINAGE AREA CONTRIBUTING TO WETLAND
- STAKED WETLAND LIMIT (CH)
- STAKED WETLAND (2021) + 15.0m BUFFER
- 2.19ha / 0.36 — TOTAL POST-DEVELOPMENT DRAINAGE AREA IN HECTARES / AVERAGE RUNOFF COEFFICIENT
- 202B / 418.0 ha — CH DRAINAGE POINT (UPSTREAM AREA)

RIPARIAN WETLAND CATCHMENT AREAS

	AREA ID	AREA (ha)
EXISTING	UPSTREAM MILLCROFT PARK DRIVE (ID 202B & ID 203A)	432
	APPLEBY CREEK @ AREA A	2.01
	LOTS (Roof+Backyard) NORTH	0.31
	LOTS (Roof+Backyard) SOUTH	0.34
	EXISTING TOTAL (EXCLUDING 202B & 203A)	2.66
	EXISTING TOTAL (INCLUDING 202B & 203A)	434.66
PROPOSED	UPSTREAM MILLCROFT PARK DRIVE (ID 202B & ID 203A)	432
	APPLEBY CREEK @ AREA A	1.23
	LOTS (Roof+Backyard)EX./PR. SOUTH	0.34
	PROPOSED TOTAL (EXCLUDING 202B & 203A)	1.57
	PROPOSED TOTAL (INCLUDING 202B & 203A)	433.57

DELTA CHANGE = 434.66ha - 433.57ha
= 1.09ha
= 0.25%

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CITY OF BURLINGTON VERTICAL BENCHMARK NUMBER 414 HAVING AN ORTHOMETRIC ELEVATION OF 139.893 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978). BRASS PLAQUE SET ON SOUTHWEST CORNER OF WING WALL OF CULVERT 0.50m FROM SOUTH END AND 0.13m BELOW TOP OF WALL ON MILLCROFT PARK DRIVE AND APPROXIMATELY 40m EAST OF COUNTRY CLUB DRIVE ON THE SOUTH SIDE OF THE ROAD.

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TEL 905.946.9461 - urbantech.com

MILLCROFT GREEN
CITY OF BURLINGTON

RIPARIAN WETLAND CATCHMENT AREA

PROJECT No.	DATE	SCALE	DWG No.
17-526	FEB. 2022	1:750	FIG 3

File: F:\PROJECTS\17-526 (MILLCROFT)\03_DRAWINGS\FIGURES\MISC\21-04-09 WETLAND DRAINAGE AREA ANALYSIS\UNEVALUATED WETLAND DRAINAGE AREA ANALYSIS.DWG - REVISED BY:<xgrimes> : 16, February 16, 2022 12:41 PM

LEGEND:

- Property Limit
- Existing Floodplain
- Existing Creek
- HEC-RAS Station
- Existing Regional Floodplain Elevation

MILLCROFT PARK DRIVE

HADFIELD COURT

EXISTING RESIDENTIAL

COUNTRY CLUB DRIVE

UPPER MIDDLE ROAD

SPILL POINT

Ex. Culvert 2.10x2.10@2 INV=137.99

Ex. Culvert 2.10x2.10@2 INV=137.72

Ex. Weir INV=136.30

Ex. Culvert x2 1.92x4.7m INV=135.70

Ex. Culvert x2 1.92x4.7m INV=135.55

297	140.69
296	140.58
295	140.15
294	140.20
293	139.84
292	139.60
291	139.15
290	139.94
289	138.83
288	138.32
287	138.12
286	138.13
285	138.14
284	138.13
283	138.10
282	138.00
281	137.98
278	137.53
277	137.26
276	137.21
275	137.25

BENCHMARK

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MILLCROFT GREEN
CITY OF BURLINGTON

EXISTING APPLEBY CREEK FLOODPLAIN

PROJECT No.	DATE	SCALE	DWG No.
17-526	FEB. 2022	1:750	4A

LEGEND:

- Property Limit
- Proposed Floodplain
- Proposed Floodplain +7.5m
- 0 / 0 — HEC-RAS Station / Proposed Regional Floodplain Elevation
- MEANDER BELT (35.0m)
- MEANDER BELT (35.0m) + 7.5m BUFFER
- STAKED WETLAND (2021) + 15.0m BUFFER
- PROPOSED GRADING LIMIT
- BOTTOM OF CHANNEL (BEACON)
- STAKED WETLAND LIMIT (CH)

CANADIAN NATIONAL RAILWAY

MILLCROFT PARK DRIVE

EXISTING RESIDENTIAL

HADFIELD COURT

COUNTRY CLUB DRIVE

UPPER MIDDLE ROAD

297 140.50

296 140.3

295 139.33

293 139.37

292 139.23

291 138.92

294 139.42

290 138.73

289 138.57

288 138.04

287 138.13

286 138.14

285 138.1

284 138.09

283 138.05

282 137.94

281 137.97

278 137.45

277 137.26

276 137.21

275 137.25

Ex. Culvert 2.10x2.10@2 INV=137.99

Ex. Culvert 2.10x2.10@2 INV=137.72

Ex. Culvert x2 1.92x4.7m INV=135.70

Ex. Culvert x2 1.92x4.7m INV=135.55

IRRIGATION POND

SPILL POINT

INTAKE

PROP. FLOODLINE

BLOCK 100

BLOCK 101

BLOCK 91

BLOCK 99

30m C.N.R. SETBACK

BENCHMARK

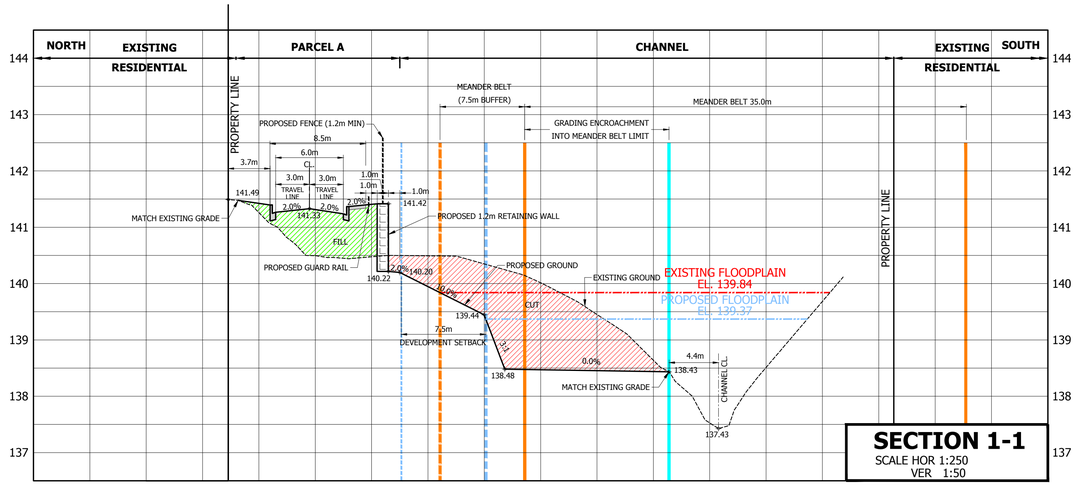
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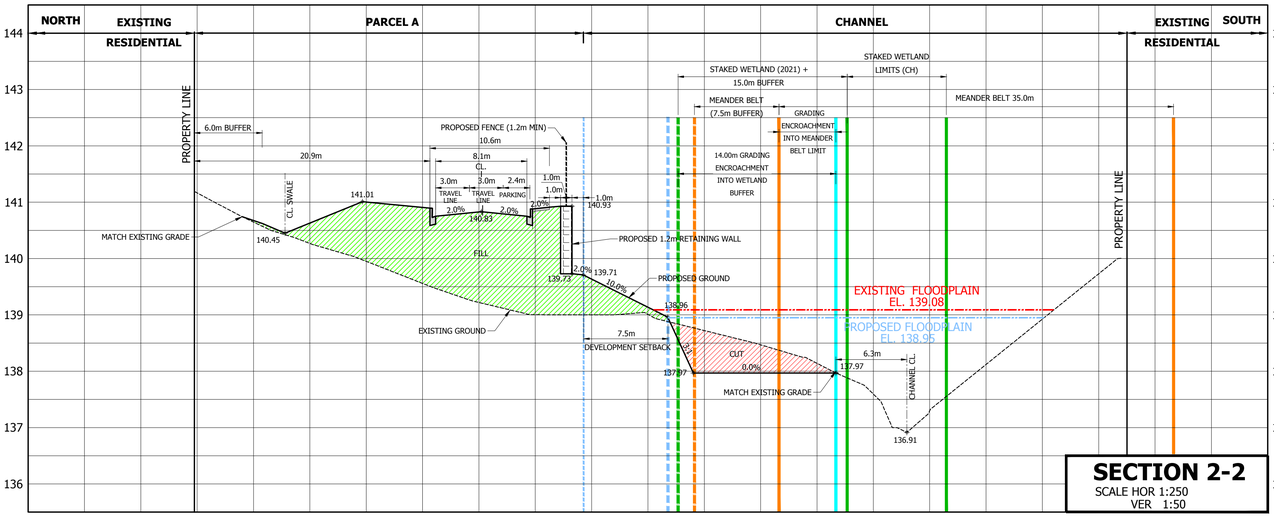
MILLCROFT GREEN
CITY OF BURLINGTON

PROPOSED APPLEBY CREEK FLOODPLAIN

PROJECT No.	DATE	SCALE	DWG No.
17-526	FEB. 2022	1:750	4B

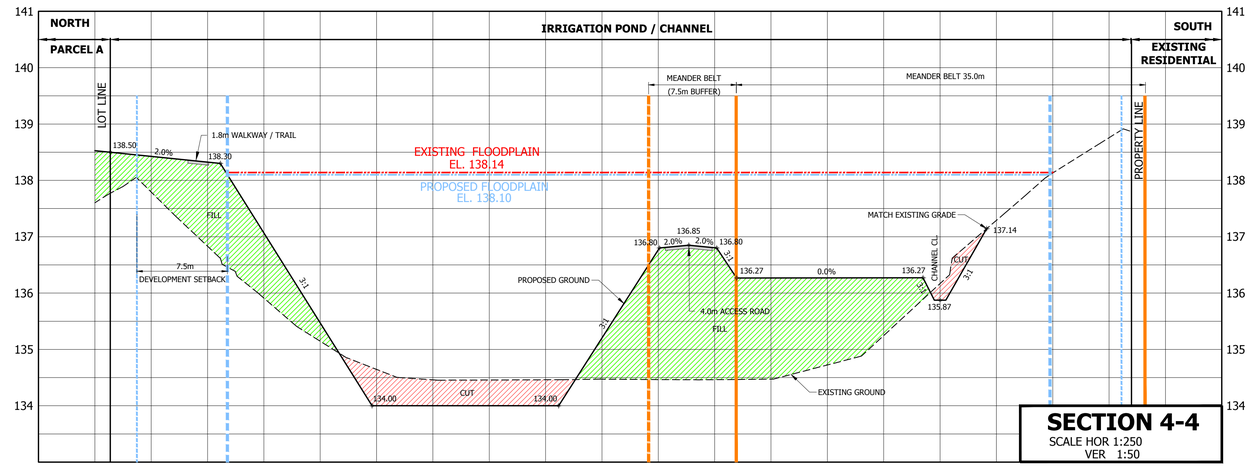


SECTION 1-1
SCALE HOR 1:250
VER 1:50



SECTION 2-2
SCALE HOR 1:250
VER 1:50

SECTION 3-3
SCALE HOR 1:250
VER 1:50



SECTION 4-4
SCALE HOR 1:250
VER 1:50

LEGEND

- MEANDER BELT (35.0m)
- MEANDER BELT (35.0m) + 7.5m BUFFER
- STAKED WETLAND LIMIT (CH)
- STAKED WETLAND (2021) + 15.0m BUFFER
- PROPOSED FLOODLINE
- PROPOSED FLOODLINE + 7.5m BUFFER
- PROPOSED GRADING LIMIT

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CITY OF BURLINGTON VERTICAL BENCHMARK NUMBER 414 HAVING AN ORTHOMETRIC ELEVATION OF 139.893 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978). BRASS PLAQUE SET ON SOUTHWEST CORNER OF WING WALL OF CULVERT 0.50m FROM SOUTH END AND 0.13m BELOW TOP OF WALL ON MILLCROFT PARK DRIVE AND APPROXIMATELY 40m EAST OF COUNTRY CLUB DRIVE ON THE SOUTH SIDE OF THE ROAD.

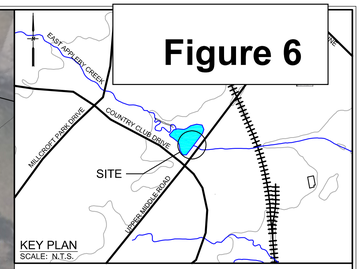
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MILLCROFT GREEN
CITY OF BURLINGTON

SECTIONS

PROJECT No.	DATE	SCALE	DWG No.
17-526	FEB. 2022	AS SHOWN	5

Figure 6



KEY PLAN
SCALE: N.T.S.

EAST BRANCH OF THE APPLEBY CREEK

PROPOSED 50:50 FLOW SPLIT STRUCTURE. SEE DETAILS ON DWG CH2

EXISTING PROPERTY LINE

TOP OF RIFFLE TO TIE INTO EXISTING CHANNEL BED, APPROX ELEV. 98.4m

PROPOSED POOL SECTION SEE TYP. DETAIL ON DWG D1

PROPOSED RIFFLE SECTION SEE TYP. DETAIL ON DWG D1

EXISTING GOLF COURSE IRRIGATION MAINLINE IRRIGATION PIPE, 150mmø PVC

PROPOSED 150m BYPASS CHANNEL TO SEPARATE THE EAST BRANCH OF THE APPLEBY CREEK FROM THE EXISTING STORM WATER POND. SEE PLAN/PROFILE DETAILS ON PP1.

PROPOSED TOB 99.0m, INTERIOR POND SLOPES 4:1

PROPOSED ENHANCED BANK PROTECTION SEE TYP. SECTION DETAILS ON DWG D1

EXISTING HEADWALL TOP 98.89m INV. 97.69m

CONC. PIPE 0.90mø

EXISTING IRRIGATION PUMPHOUSE (MILL BUILDING) TO REMAIN

PROPOSED ENHANCED BANK PROTECTION AT EX. STORM OUTFALL SEE SECTION DETAILS ON DWG D1

EXISTING GOLF COURSE INTAKE TO BE EXTENDED AS REQUIRED. PIPE DIAMETER TO BE CONFIRMED. SEE DETAIL ON DWG D1

PROPOSED ENHANCED BANK PROTECTION SEE TYP. SECTION DETAILS ON DWG D1

EXISTING CONCRETE HORIZONTAL WEIR, TOP ELEV 98.11m. TO BE MODIFIED. SEE DETAIL ON DWG CH1

PROPOSED ENHANCED BANK PROTECTION SEE TYP. SECTION DETAILS ON DWG D1

EXISTING DOUBLE CELL BOX CULVERT UNDER UPPER MIDDLE ROAD. BOTTOM OF SLAB 99.37m

UPPER MIDDLE ROAD

EXISTING STORM WATER POND HWL APPROX. 98.15m

CONC. PIPE 0.90mø

EXISTING HOLE #6

EXISTING HEADWALL TOP 98.90m INV. 97.63m

EXISTING 0.15mø TREE TO BE REMOVED (1)

EXISTING 0.1mø TREE TO BE REMOVED (1)

EXISTING 0.1mø TREES TO BE REMOVED (3)

PROPOSED POND EXPANSION TO GENERATE FILL MATERIAL FOR CHANNEL BYPASS BERM. INTERIOR POND SLOPE 4:1

HWL 98.15

EXISTING PROPERTY LINE

EXISTING FENCE

COUNTRY CLUB DRIVE

071820251

071820252

071820253

NOTES:

1. ALL ASSOCIATED DISTURBED AREAS OUTSIDE OF CREEK WORKS TO BE RESTORED UNDER THE DIRECTION AND TO THE SATISFACTION OF THE GOLF COURSE STAFF PER APPLICABLE CART PATH SURFACING, FAIRWAY TREATMENT.
2. ALL WORK TO BE COMPLETED IN THE WARMWATER FISHERIES WINDOW FROM JULY 1 TO THE FOLLOWING MARCH 31.
3. ALL CREEK WORKS TO BE DONE IN DRY DEWATERED CONDITIONS USING COFFER DAMMING PER AND DAM AND PUMP PER THE INTENT OF OPSD-221.020
4. FISH RESCUE FROM BEHIND COFFER DAMS AND TRANSFER TO OPEN CREEK AREAS TO BE DONE AS NEEDED
5. THE PROPOSED RESTORATION TREATMENTS WILL BE INSTALLED WITHIN THE WARMWATER FISHERIES TIMING WINDOW DURING DRY WEATHER LOW FLOW CONDITIONS USING LOCALIZED DAM AND PUMP CONTROLS

NOTE:

ELEVATIONS ARE BASED ON A LOCAL BENCHMARK OF 100.00 m ESTABLISHED ON TOP CENTER OF THE DOUBLE CELL BOX CULVERT

DATE OF SURVEY:
FEBRUARY 6, 2015

COMPLETED BY:
GEOSURVEY INC.

AERIAL PHOTO:
FIRSTBASE SOLUTIONS, SPRING 2015

Notes
1. This drawing is the exclusive property of R. J. Burnside & Associates Limited. The reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.
1	CLIENT REVIEW AND APPROVAL	4/27/2016	SK
2	CH FIRST SUBMISSION	6/10/2016	SK
#	#	#	#
#	#	#	#
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#	#	#	#
#	#	#	#

LICENSED PROFESSIONAL ENGINEER
S.A. KAJAN
100175814
PROVINCE OF ONTARIO

AquaLogic

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Client
MILLCROFT GOLF CLUB
2155 COUNTRY CLUB DRIVE
BURLINGTON ON
L7M 4A8

Drawing Title
EAST BRANCH OF THE APPLEBY CREEK -
GENERAL PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
JM	SK	BD	SK	16/04/26	G1
Project No. PGD020649		Contract No.		Revision No. 0	
Scale 1:300	0	6.0	12.0	18.0m	