

**Kizell Wetlands, Beaver Pond Wetlands and Beaver Pond
Issues and Stormwater Infrastructure Review**

Faith Blacquiere
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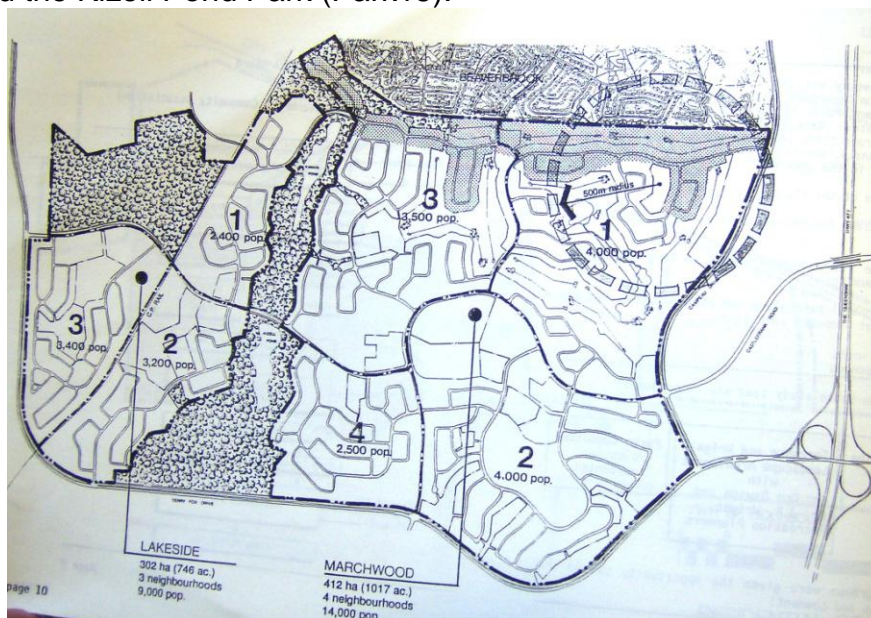
Kizell Wetlands, Beaver Pond Wetlands and Beaver Pond Issues and Stormwater Infrastructure

This is a summary of findings to date based on review of available documents concerning the issues and stormwater infrastructure for the Kizell Wetlands west of Goulbourn Forced Road (GFR) and the Beaver Pond Wetlands and Pond east of Goulbourn Forced Road.

The Kizell Drain at the east end is also referred to as Watts Creek, and has been used in the rest of this document to avoid confusion with the Kizell Wetlands (aka Kizell Drain aka Kizell Pond aka Kizell Cell) west of Goulbourn Forced Road.

MOE's Certificate of Approval Has Errors and Is Not Based on a Class EA

The *Open Space Master Plan Marchwood-Lakeside* by Torrance 4 July 1989 page 10 provides the Marchwood-Lakeside concept plan which includes the Beaver Pond Park (Park 14) and the Kizell Pond Park (Park15):



KNL's Phase 5 development is Area 4 Marchwood; Phase 9 development is Area 1 Lakeside
 Kizell Wetland is between Area 2 Lakeside and 4 Marchwood
 Beaver Pond is between Areas 1 Lakeside and 3 Marchwood

Kizell Pond does not exist, and if created in the protected wetland, will destroy or significantly impact the ecosystem. The *Open Space Plan* page 62 for Kizell Pond Park states:

Park 15 Existing Conditions
 Size park site **46.0 hectares** (113.7 acres)
 Type Natural Environment Area

Current Status

Woods and marshland

No construction activity in vicinity (1988)

Existing Access

340 metre frontage on Goulbourn Forced Road and Park 14

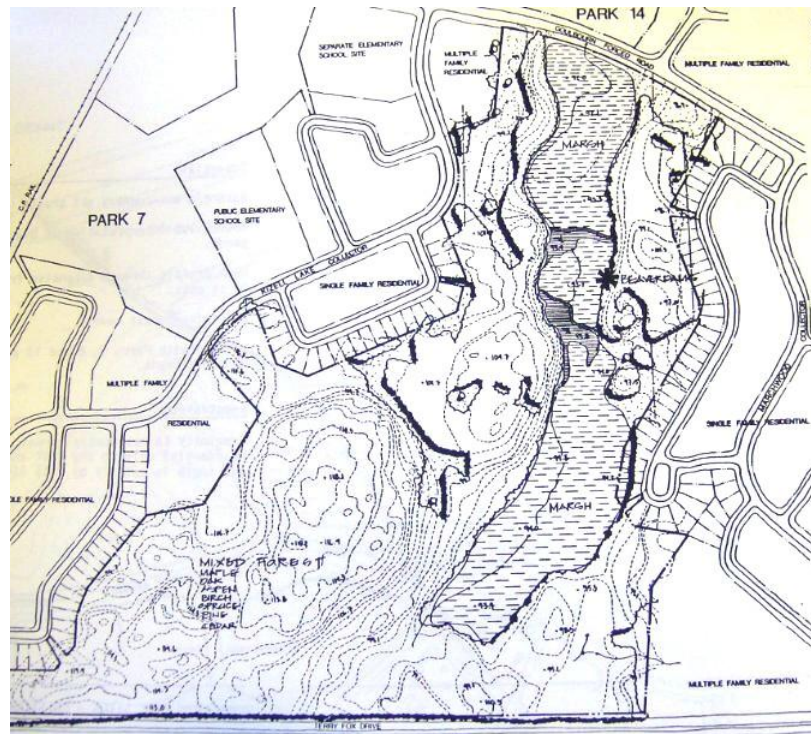
Vegetation

15% marshland [calculates as 6.9 ha]

Topography

Long east-west basin with standing water

The following map from page 63 shows no pond and also shows beaver dams which may constrict the channel



The *Open Space Plan* pg 100 identifies the Concept for Park 15:

“The eastern end of Park 15 is for the most part a continuation of the same eco-system as Park 14. As it exists in its natural state, **it is a broad, wet valley with water levels controlled by a series of beaver dams.** The development plan proposed a **man-made lake similar to the one in park 14, to be called Kizell Pond.** The lake would likewise serve the stormwater management demands as well as provide for water-based recreation.

The Concept Plan was not implemented as the Kizell Pond has very little open water and has no stormwater management controls.



This photo shows the 29 July 2010 amount of open water in the Kizell Wetlands

The MOE Certificate of Approval dated 26 Nov 2008 at <http://www.environet.ene.gov.on.ca/instruments/5246-7KNNBN-14.pdf> describes the non-existent Kizell Pond as the Kizell Cell of the Kanata Lakes Stormwater Management Facility as follows:

“Kizell Cell

a stormwater management wet pond, located west of Goulbourn Forced Road, having a minimum liquid retention volume of approximately 10,271 cubic metres at an elevation of 93.30 metres, and a maximum active retention volume of approximately 89,825 cubic metres at an elevation of 94.28 metres for the 100 year storm event, complete with two (2) energy dissipaters at the storm inlets to the cell, and one (1) outlet berm, discharging at a controlled flow rate of 1.16 cubic metres per second for the 100 year storm event to the downstream Beaver Cell”

The MOE Certificate of Approval included the following supporting documentation:

4. *Kanata Lakes North Serviceability Study* dated June 2006 and prepared by IBI Group
5. *Kanata Lakes, Beaver Pond, Urban Stormwater quality Control*, dated November 1994, prepared by Cumming Cockburn Ltd;
6. *Kanata Lakes Dam & Outlet Structure Operation & Maintenance Manual* dated April 1990, prepared by Oliver, Mangione, McCalla & Associates Limited, Consulting Engineers; and
6. *Kanata Lakes Storm Drainage Report - Campeau Corporation* dated March 1985, prepared by Oliver, Mangione, McCalla & Associates Limited, Consulting Engineers

Generally, serviceability studies address stormwater requirements on the owner’s land, such as minor stormwater infrastructure within a specific Plan of Subdivision. The Kizell Cell which has been approved by MOE is to be constructed in a **protected wetland** owned/to be owned by the City of Ottawa. The construction of the Pond will require dredging of the protected wetlands which will cause significant environmental effects.

The OMB Decision of 6 Feb 2006 at

http://www.omb.gov.on.ca/e-decisions/pl040841_%230368.pdf states:

With respect to the suggestion by the appellants that the Kizell Pond area be reduced, the evidence of Susan Murphy and Bernie Muncaster indicated that the Mississippi Valley Conservation Authority would not allow Kizell Ponds to be filled in and that as a result of its identification as a possible fish habitat, the Federal Department of Fisheries and Oceans regulations would also require that this area be protected. Dredging of the pond is also not an option as it would destroy or lead to the loss of the cattails, which would further reduce the quality of the storm water draining into the pond.

There is no mention of an approved EA design for construction of the Kizell Cell.

The MCEA process, described at

<http://www.municipalengineers.on.ca/classea/manual/manualSimple.asp?section={24053225-117A-478F-AE1F-A12E84F165D5}> requires the following:

Schedule A projects (pre-approved)

17. Construction of stormwater management facilities which are required as a condition of approval on a consent, site plan, plan of subdivision or condominium which will come into effect under the Planning Act prior to the construction of the facility

Schedule B projects

2. Establish new stormwater retention/detention ponds and appurtenances or infiltration systems including outfall to receiving water body

Even if the Kizell Cell had been on the KNL lands, the extensive environmental effects would have required a higher level Class EA schedule. The City does not appear to have initiated a Schedule B project which would support the MOE Certificate of Approval.

The KNL first energy dissipater was completed 31 October 2008, one month before it was approved by MOE in the 26 Nov 2008 CofA. Energy dissipaters for stormwater control are also mentioned in the general Subwatershed Study recommendation concerning valleylands as stated in the following:

Pg 283 "Other considerations to be taken into account in developing the Stormwater Management Plan include:

Pg 284

Due to the erosion sensitive nature of the **valleylands**, every effort should be made to minimize the number of storm sewer outlets. And, all outlets should be designed to minimize outlet velocities to non-erodible levels (*i.e.*, typically <1.0 m/s) and/or provide adequate protection measures for **energy dissipation** such as storm sewer headwalls with chute block aprons, gabion mats, and/or rip-rap"

The first KNL Energy Dissipater currently discharges to the Kizell Wetlands (See further details under Energy Dissipaters below)

The Kizell Cell outlet would cross the Goulbourn Forced Road (GFR) and discharge into the Beaver Pond Wetland (also a protected wetland), upstream of the Beaver Pond.

The MCEA Section C.2.3 Stormwater Management Projects requirement for new stormwater treatment and storage facilities requires:

“When stormwater works are carried out in conjunction with municipal road works, they shall be planned in accordance with the requirements of the schedules for but may be included in documentation prepared for the schedules for municipal road projects.”

The *Goulbourn Forced Road (GFR) EA* (which was in process at the same time as the KNL Plan of Subdivision) *Environmental Study Report (ESR) 2007* appears to make no mention of this stormwater management facility, outlet, outlet berm, or facility road access, and indicates that the culvert size is restricted. (See further details under the heading Goulbourn Forced Road (GFR) Culvert between Kizell Wetlands and Beaver Pond Wetlands).

The MOE Certificate of Approval dated 26 Nov 2008 at

<http://www.environet.ene.gov.on.ca/instruments/5246-7KNNBN-14.pdf>

describes the Beaver Pond, which was constructed in 1988 and is also a **protected wetland**, as the Beaver Cell of the Kanata Lakes Stormwater Management Facility as follows:

“a stormwater management wet pond, located east of Goulbourn Forced Road, having a minimum liquid retention volume of approximately 41,042 cubic metres at an elevation of 90.47 metres, and a maximum active volume of approximately 236,696 cubic metres at an elevation of 92.60 metres for the 100 year storm event, complete with three (3) storm inlets to the cell, two (2) with energy dissipaters, and one (1) **outlet structure consists of a 600 millimetre diameter orifice** at an invert elevation of 90.47 metres and an overflow weir set at an invert elevation of 92.60 metres, discharging at a controlled flow rate of 0.96 cubic metre per second for the 100 year storm event via an **80 metre long 1200 millimetre diameter culvert to Kizell Drain**”

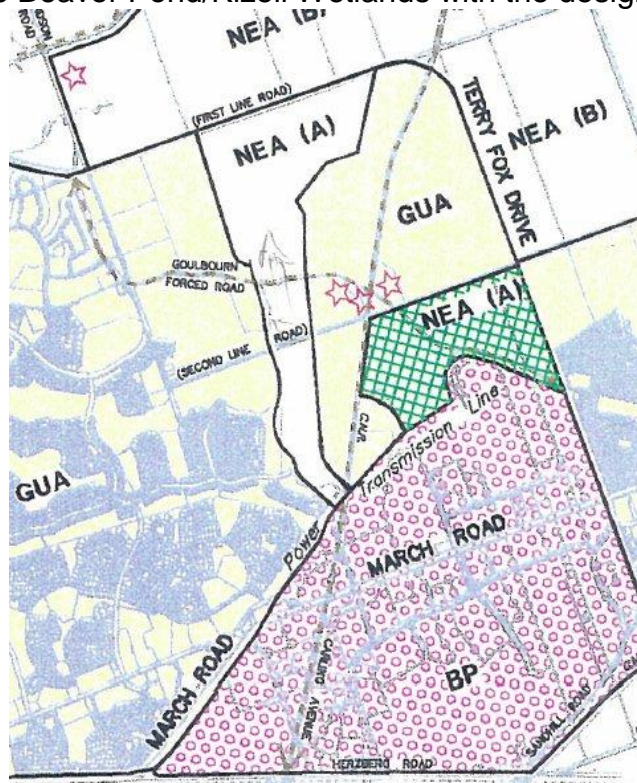
It is difficult to match this description to what exists at the Beaver Pond.

- The area of the Pond is very large, much of it has no firm boundaries, and it would not likely have a minimum liquid retention volume of only 41,042 m³
- There are 6 storm inlets to the Pond, including the outlet from the Kizell Wetlands
- Only one energy dissipater was found at the storm inlet between Ironside Court and Cecil Walden Court; it seems to have been constructed prior to 2002
- The 1200 mm culvert appears to be the inlet, not the outlet
- The 80 metre long culvert which drains to Watts Creek appears to be connected to a smaller submerged outlet at the east end of the Pond
- The Watts Creek (aka Kizell Drain north) culvert is not 1200 mm
- There is no reference to the Shirley’s Brook/Watts Creek Subwatershed Study
- The previous Certificate of Approval is not referenced as being revoked

The MOE Certificate should be revoked, and if a SWMF has to be constructed in the protected area, an appropriate Class EA should be undertaken

Natural Protected Wetlands or Stormwater Management Ponds?

The Terry Fox Drive Extension (TFDE) ESR Oct 2000 pg 16 by Dillon has the following map which shows the Beaver Pond/Kizell Wetlands with the designation NEA (A)



The Natural Environment Area Boundary in South March Highlands Special Study Area Final Report by Brunton June 2004 states:

Pg 19-20

“The mature maple **swamp forest draining into the Carp River** through Lot 7 constituting much of the 14.4 ha ‘Compensation Lands’ area established as part of the mitigation for illegal forest clearing in parts of the KNL lands, is a Locally Significant, Class 4 Evaluated Wetland. **This Kizell Drain Wetland** was evaluated as scoring 585 of the required minimum of 600 points required to be considered a Provincially Significant Wetland (Ontario 1994; S. Murphy, pers. comm.). A review of this classification may or may not determine that PSW scores are achieved in this wetland, although it clearly is very closely to achieving that status. Protection of Locally Significant Wetlands is stated as a goal in the City of Ottawa’s Official Plan.

Pg 24-25

Pg 24-25

The KNL residential development area is transected by Kizell Pond Urban Natural Feature along Watts Creek

The KNL development plan dramatically reduces the existing area of ecological connectivity between the SSA and other significant natural areas of the South March Highlands (Brunton 1992a; 1992b; 2000). The remaining UNF west of Goulbourn Forced Road constitutes about 100 ac (40 ha) of upland and wetland habitat (S. Murphy, pers. comm.)”

The Beaver Pond/Kizell Pond situation is very comparable to the problems which MVCA has caused in Glen Cairn by placing the Glen Cairn SWMP on-line to the river. When a stormwater management pond is built on-line to a river, it basically disconnects the upstream part of the river from functioning as a river. This is partly why the Carp River Restoration Plan (CRRP) and Shirley's Bay Watts Creek Subwatershed Study only looked at the outlet of the ponds and did not address the upstream portion. By placing controls on the Beaver Pond outlet, the City is now unable to increase the size of the culverts without implementing mitigative alternatives to prevent flooding downstream. The Goulbourn Forced Road (GFR) ESR indicated that the culvert size couldn't be changed. What is happening to the stream and wetlands upstream of the Beaver Pond, is that they are being segmented into a series of ponds, helped by beavers. If additional capacity is required, the only solutions are to deepen the pond, widen the pond, or build an off-line pond in the vicinity. The first two will destroy part of the eco-system which is supposed to be protected, and there is not likely space in the vicinity.

It is unknown whether the City's Official Plan designations to protect the Kizell Wetlands and Beaver Pond for environmental reasons were added after the Beaver Pond had been constructed to serve as a stormwater management pond. Stormwater management ponds can be implemented as constructed wetlands, however, this destroys the original eco-system, as was done for the Monahan Drain south of Glen Cairn. The south portion of that wetlands was constructed, leaving the upstream remnants with a limited outlet, and causing flow to go north via an old railway culvert into the Glen Cairn area.

Stormwater ponds need maintenance and need sediment to be removed, again destroying the eco-system. How can this be done in a protected wetland? Stormwater routed to natural wetlands impacts the eco-system. **A natural wetland eco-system cannot exist and still meet development stormwater requirements**, particularly when the Kizell Wetland stream is subject to diversion by beavers. The Glen Cairn Pond, which also has beavers, was designed as a "dry pond" even though it has standing water and reeds. The Glen Cairn Pond stinks between sundown and sunset due to rotting vegetation, making life unbearable for area residents. The residents who are buying expensive homes from KNL to be near natural beauty are not going to be happy when the Beaver Pond/Beaver Pond Wetlands/Kizell Wetlands stink.

The City should have reviewed the Beaver Pond functioning as a stormwater management pond when the area was designated for protection in the Official Plan.

The issue of "natural protected wetlands" versus "stormwater management pond" needs to be reviewed and resolved.

The Flooding Event of 24 July 2009 Questions the Adequacy of the Beaver Pond as a SWMP Facility

The following comments and photos from Jennifer Bygrave indicate that the Beaver Pond flooded during the 24 July 2009 rainfall event:

Email by Jennifer Bygrave 20100719 (2 messages)

“Was the West End Flooding Committee aware that the Beaver Pond also flooded?”

[I replied that this had not been mentioned]

“The city must have known as they came and put up barriers as the water was so deep and it lasted for such a long time.

Also, this spring the city had to rebuild the sidewalks due to the damage”

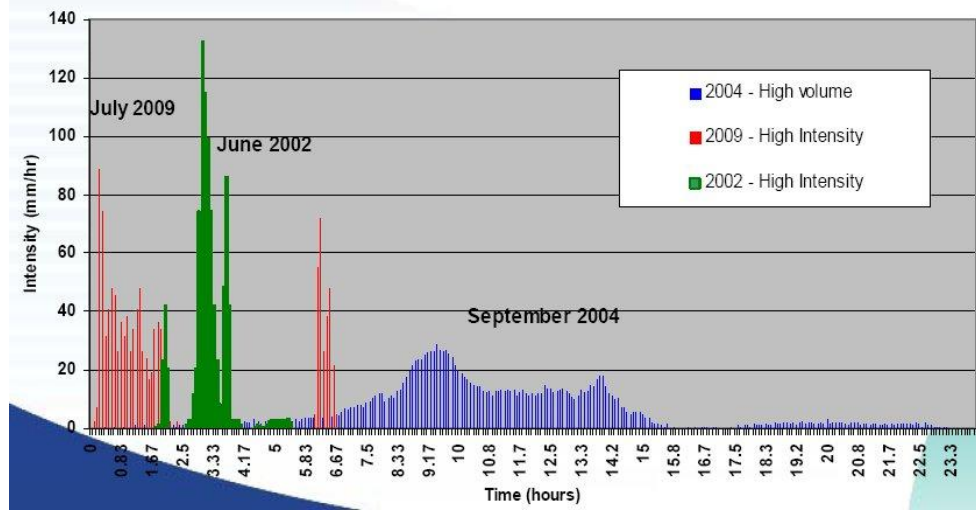
The photos are dated 25 July 2009 from 2:18 to 2:20 pm, **the day after the storm** which occurred between 4:30 and 7 pm on the 24th July.



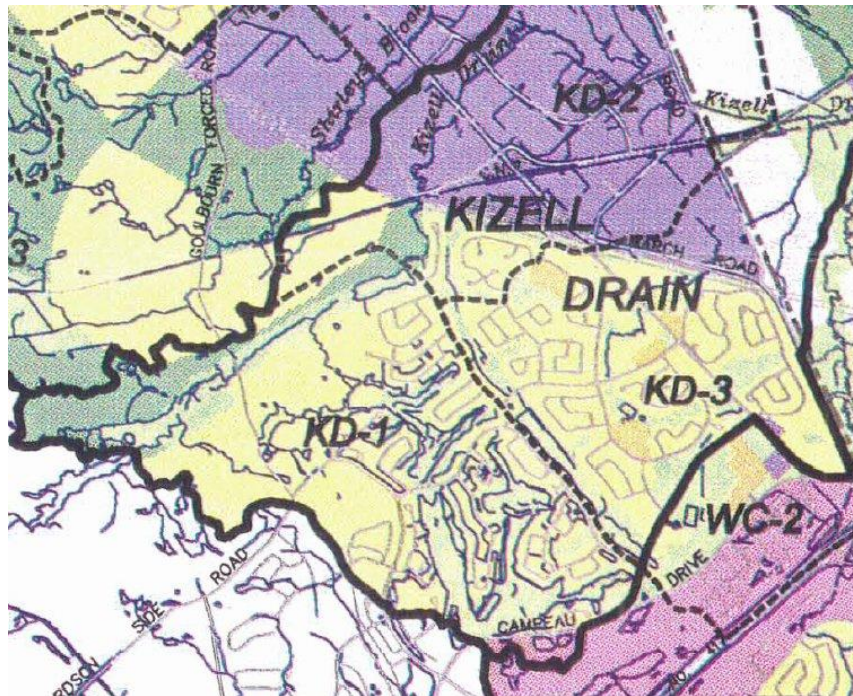


Whether the Beaver Pond was designed to handle all of the development is unknown, but the fact that it flooded on the 24 July 2009, suggests that it wasn't. Either that, or sediment has raised the pond bottom.

The following chart from the Glen Cairn Flood Investigation (GCFI) 19 May Public Open House shows the rainfall level and intensity of the 24 July 2009 storm event:



The following Subwatershed Study map on pg 146 shows that the Beaver Pond/Kizell Wetland drainage area within Marchwood-Lakeside will have achieved its full land use target when the KNL Phase 5 development is complete. The KNL Phase 9 and later lands are north of the Beaver Pond/Kizell Wetland and are supposed to drain to the KD-2 and SB-3 and drainage areas. KNL's Phase 9 will not be able to outlet directly into Watts Creek as this will increase flow downstream and may increase flooding. Rather, KNL will require a new stormwater facility on its Phase 9 lands which can restrict or delay the flow downstream.



Yellow represents urbanized areas, green the natural environment areas.

There is concern, however, that only a small portion of the KNL Phase 5 development had been completed when the Beaver Pond flooded on 24 July 2009

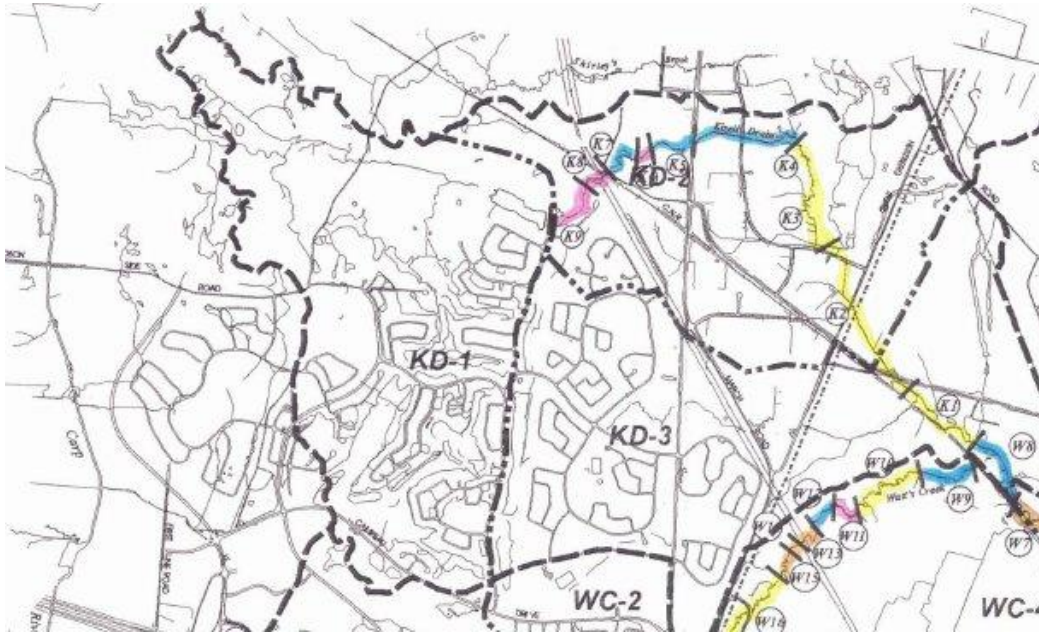
The Subwatershed Study has provided baseflow targets for the Beaver Pond, but has focused on Watts Creek (called Kizell Drain) in the KD-2 drainage area, and does not appear to have modelled the KD-1 drainage area. The Kizell Wetland area west of the KD-1 drainage boundary was not included, contributes flow, and is highly subject to interference by beavers. If the Kizell Wetland west area was blocked or partially blocked on 24 July 2009, less flow would be attributable to it. If the area was then unblocked, the next major storm could result in more extreme flooding of the Kizell Wetland and Beaver Pond areas.

The size of the Beaver Pond outlet culvert raises major concerns as to whether much of the Beaver Pond flow could get downstream to Watts Creek. It appears that it has been designed to retain water in the Beaver Pond, and thus the upstream Beaver Pond Wetlands and Kizell Wetlands. This will have a major effect on the upstream ecosystem, and caused the flooding of the pathways on 24 July 2009.

The Beaver Pond needs to be re-evaluated in light of the flooding which occurred on 24 July, 2009 to determine whether it is capable of functioning a stormwater management pond in relation to existing development and to the KNL Phase 5 development activity which is currently underway. A development halt of KNL's Phase 5 and Phase 9 should be undertaken until this can be determined.

The Kizell and Beaver Wetlands and Beaver Pond Area Are Not Included in the Shirley's Brook Watts Creek 1999 Subwatershed Study or 1985 MVCA Floodplain Mapping for these Subwatersheds

The *Shirley's Brook Watts Creek Subwatershed Study* Sep 1999 studied the Kizell Drain (aka Watts Creek Main Tributary) Subwatershed and identified three catchment areas KD-1 (which includes the Beaver Pond, Beaver Pond Wetlands, Kizell Wetlands, and most of the KNL lands), KD-2 (most of KNL Phase 9), and KD-3, the latter 2 being located downstream of the Beaver Pond. The following map shows that the KD-1 area was not included in the meander width recommendations, and very little development in the Beaver Pond area.



The Subwatershed study focused on the north tributary which flows through catchment areas KD-2 and KD-3, and floods areas in and downstream of the Kanata North Business Park. The Subwatershed analysis starts at the outlet from the Beaver Pond. **It appears that no analysis was done of the Beaver Pond or the area west of the Beaver Pond outlet. No modelling is included, no Regulatory Flood Level is mentioned, no meander belt width is shown on the pg 246 map, and no recommendations have been made for floodplain mapping of this area.**

The following statement from the Subwatershed Study pg 3-30 illustrates that the consultant did not consider the Kizell Wetlands area west of the Beaver Pond to be included in what they call Kizell Drain:

Pg 3-30

“Kizell Drain continuous baseflow was observed in the entire length of the Kizell Drain extending from the outlet of the Beaver Pond to its confluence with Watts Creek.. Based on the collected data, average daily baseflow at the Carling Avenue location is approximately 20 L/s. At this location, sources of baseflow is from groundwater seepage and the slow release rate of surface water temporarily detained in the **Beaver Pond, which in turn discharges into the upstream end of the Kizell Drain.**

The Subwatershed Study pg 284 identifies the requirements for Stormwater Management Plans:

- Concurrent with the preparation of individual Storm Water Management Plans is the preparation of an erosion and sedimentation control strategy for the construction phase of each development. Any site specific erosion problems should be identified in the storm water management report, together with appropriate remedial works. Appendix I of this Report presents and describes several suitable measures which can be drawn from to formulate a control plan.

- As part of the Environmental Management Plan and Servicing study, the consultant shall provide information on existing environmental conditions and **prepare constraint mapping to delineate the Regulatory Flood Plain**, valley slopes, land uses, hydrologic features, vegetation communities, habitat linkages and aquatic conditions.

There is no indication that KNL has met these requirements.

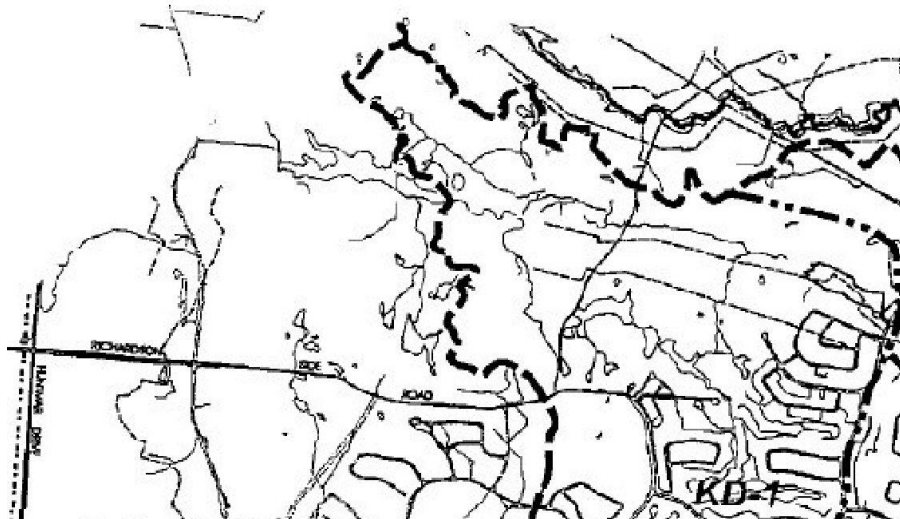
The Subwatershed Study section 3.8.8 Floodplain Mapping states:

“Floodplain mapping delineating the 100 year regulatory floodplain along portions of Shirley’s Brook and Kizell Drain have been prepared in 1985 by the MVCA (A.J. Robinson & Associates, 1985) as well as Watts Creek (Chrysler & Lathem Ltd). **The mapping extends along Shirley’s Brook from upstream of Goulbourn Forced Road to it’s outlet into the Ottawa River; Kizell Drain from upstream of the Beaver Pond to it’s confluence with Watts Creek;** and Watts Creek from upstream of Highway 417 to the Ottawa River. In 1989, the previous hydrologic and hydraulic computer models were updated and the flood levels were recomputed to reflect the anticipated urbanization and the planned stormwater management facilities within the Subwatershed. New floodplain mapping along Shirley’s Brook and portions of Watts Creek is anticipated to be conducted in 1999 ... Based on the background review, several flood susceptible areas were identified ...”

The area west of the Beaver Pond outlet has not been included as part of the Kizell Drain, and has not been identified as requiring analysis or floodplain mapping. This should be done prior to any further development proceeding.

The Kizell Wetlands/Kizell Drain Subwatershed Boundary Extends Further West and Connects to a Carp River Tributary

This map show the Beaver Pond/Kizell Wetland areas at the top of the KD-1 drainage area. **The entire Kizell Wetland area is not inside the KD-1 boundary.**



The Kizell Wetland area west of the boundary is shown with additional tributaries to the south and with a connection to the Carp River. Other maps exist which also show this connection. The Carp River tributary discharges to culvert CV3 under Terry Fox Drive. The *Open Space Master Plan Marchwood-Lakeside* ends at Goulbourn Forced Road, but shows that beaver dams exist. Beaver activity in this area could significantly change the flow and flow direction. The connection has not been accounted for in the Carp River models.

Further analysis is required to map the area to determine the flow characteristics and direction, and beaver mitigation requirements.

Goulbourn Forced Road (GFR) Stormwater Management Requirements Were Not Addressed in the Class EA

The Goulbourn Forced Road ESR did not indicate what would be done with the existing GFR Ditch System drainage which is considerable due to the valley slope, or the impact of changing the road width on The Rockeries drainage system.

The GFR ESR did not mention the Kizell Cell outlet to the Beaver Pond Wetlands and was not coordinated with the proposed construction of the Kizell Cell

There also are conflicting statements concerning culvert size. The GFR ESR pg 18 indicates that the centreline profile and culvert size cannot be changed:

“Grade separated pedestrian crossing of the pond complex. Consider an option for an enlarged culvert suitable for cyclists, pedestrians (and possibly wild life) at the pond crossing

This option was discussed at the July 4, 2007 Transportation Committee, where it was indicated that the third option (which was described as two culverts – one for hydraulic flow of water and one for pedestrian cyclists’ wildlife passage) **would drive an increase in the elevation of the centreline profile of GFR and, therefore, would increase the footprint of GFR through the pond and across the front of the Rockeries**, causing property impacts on condominium. **The culvert cannot be enlarged, as strict controls are required on the flow of water between the ponds, and these are maintained by a smaller culvert.** A second multi-purpose culvert beside the pond complex would have to be designed to City of Ottawa design practices – minimum 3m high by 5m wide – to ensure adequate maintenance access and personal security for users. As well, an at-grade pedestrian crossing would have to be maintained for users unwilling to use a pedestrian underpass. Based on this analysis, the two-culvert option was not preferred to the one-culvert option

Yet, on page 52, under the Causeway/Culvert and Pedestrian Underpass Option, the ESR states:

“As is the case with the Causeway/Culvert Option, there are as many as three design options for the culvert that will convey the design flow based on the established design criteria

Option A - 3000 x 1200 mm box culvert

Option B – 1800 x 900 mm box culverts

Option C – 1200 mm CSPs with mitred ends

There are no differences in the plan and profile implications on GFR associated with the three alternatives; selection of the preferred configuration could be made during detailed design”

The Goulbourn Forced Road EA needs to be revisited and coordinated with any SWMP outlet structures between the Kizell and Beaver Pond Wetlands. If the Kizell Cell is to be constructed, additional facility road access will be required from GFR.

Floodplain Compensation Has Not Been Addressed

The Report to the Transportation Committee on 6 June 2007 concerning Goulbourn Forced Road (GFR) stated:

“The Culvert Option will remove 0.5 ha of Terrestrial Habitat and 0.7 ha of Wetlands within UNF lands. The areas of loss are considered to be equivalent”

The increase in road width to 26.0 m to accommodate bicycle lanes and sidewalks will require that land be removed from the Pond Complex, reducing the storage capacity. Generally, when fill is added to a floodplain, a corresponding amount is removed as compensation for loss of floodplain land. The ESR report does not identify whether the 0.5 ha of Terrestrial habitat is in the floodplain, and does not mention floodplain compensation. In addition, two properties of The Rockeries condominium development are affected with changes being retaining walls or grading. If these affect the floodplain, there should be additional compensation. With severely restricted culverts, the ponds are going to need every amount of capacity they can get.

When The Rockeries was constructed adjacent to the Beaver Pond Wetlands, it appears that the pathway along the Beaver Pond **was built in the Beaver Pond** so that a parallel channel could remain and function as a holding area for the drainage from the private SWMPs and the considerable amount of overland flow which comes from the elevated rocky treed land. The pathway and lookout system may not have had floodplain compensation measures undertaken.

The floodplain impact and impact of storage loss on the Beaver Pond needs to be addressed.

DESCRIPTION OF KIZELL WETLANDS/BEAVER POND WETLANDS AND BEAVER POND STORMWATER INFRASTRUCTURE

Beaver Pond Stormwater Management Facility

The *Environmental Study of the Marchwood area of Kanata* prepared by students of Sir Robert Borden High School under the direction of Mr. Hugh Gibson Feb 1976 states:

The area was bounded as follows:

North the extensive west-east running beaver pond behind (west of) Lismer Crescent and Holgate Court of the Beaverbrook Community

Marchwood – A General Environmental Picture

The northern third ... Its northern limit, the **extensive beaver pond, has been severely disturbed in recent years by coarse rock dumping by the developer and by a man-controlled dam.** The area of dumping has been unused now for a few years. Forest regeneration and coarse weeds have come very close to obscuring this illconceived activity.

Sub-areas of Special Environmental Significance

Area 1.

This is the extensive beaver pond, that marks the northern limit of the Marchwood study area. The pond is very shallow and plant litter filled. Water depth only rarely exceeds 4 feet and over the majority of the area is less than 2 ½ feet deep. The pond bottom is composed of nutrient-rich organic sediment of considerable depth. The base rock of the pond area is Precambrian and supplies an impermeable bowl for this natural reservoir. If it is anticipated that this 12 acre pond is to be retained as a feature of future development, very careful study of water input/output and pond bottom examination must be considered. The pond presently has a beaver colony despite trapping efforts. Even if this colony is eliminated, it will be re-established within one season by a flourishing colony on area 2.

Area 2

If one refers to the drainage patterns included in the map display, it can be seen that a shallow lateral drainage valley feeds into the major northern beaver pond (area 1) from the south. At present, this drainage pattern bears two open water areas that exist because of beaver dams and a third (the one closes to area 1) that, in the past, has been a beaver pond but presently is a willow swamp. The uppermost pond is beaver colonized. The small pond is not colonized – simply dammed to increase the safe habitat area of the beaver colony. It is from this colony and one just west of the Goulborn forced road that area 1 can be recognized continuously. The ponds and swamp of area 2 are organic litter filled. The ponds are very shallow (to 4 feet) and formed in a manner similar biologically and geologically to area 1. There is no clearly defined creek input or output from these reservoirs. The drainage is too generalized and insufficient to create a stream bed naturally. The Precambrian shores of these three water interest possibilities are abrupt and well forested

Priority 2

- 20 **willow and cattail swamp bearing drainage from west to the extensive beaver pond (note – there is an active beaver pond immediately west of the road at this point**
[this is Kizell Wetlands]

The Open Space Master Plan Marchwood-Lakeside 4 July **1989** provides a description of the Beaver Pond (Park 14):

Pg 60 Park 14 Existing Conditions [= Beaver Pond]

Size: park site **24.0 hectares** (59.3) acres

Type: Natural Environment Area

Current status:

Woods and marshland

Recent construction of man-made lake at east end along with adjacent roads and houses (1988)

Existing facilities:

Man-made lake and drainage structures

Established footpaths along each side of marsh

Existing Access

500 metre frontage on Walden Drive and Park 13

200 metre frontage on Goulbourn Forced Road and Park 15

Vegetation

60% tree cover

30% marshland [calculates as 7.2 ha]

Topography

Long east-west basin with standing water rising to high rocky ridge along north boundary. South edge is lower and wetter

Constraints

Site has large area of wet, non-traversable terrain

Pg 98 Park 14 Development Plan

Concept

The eastern end of Park 14 has recently been subjected to much construction activity. **What was once a beaver pond is now a man-made lake and forms part of a large stormwater management scheme. The new lake features boulders around its banks for erosion control. Water levels are controlled by wiers and large inflow and outflow structures.** The lake will be used for canoeing and boating activities in the summer and skating during the winter.

Much of the land surrounding the lake has been greatly disturbed by the construction activity. Care should be taken to ensure that the existing stands of forest to the north along Walden Drive are protected.

The development plan calls for much of the western end of the park to be preserved as it is. There are existing trails running along both sides of the park, which may be developed as paved recreational paths or as wood chip nature trails. A boardwalk has also been proposed to give access across the swamp and to provide interpretive opportunities.

It is anticipated that the development scheduled to occur around the park will have a high impact on its natural state. Measures should be taken to assure that

existing woods are protected, particularly those on the north side of the site which are of high quality.

The Terry Fox Drive Extension (TFDE) ESR by Dillon Oct 2000 page 8 quotes the **1994 CCL** report:

Beaver Pond (Kizell Drain)

The Beaver Pond **functions as a stormwater quality control facility** for the Kanata lakes community

Broadleaf cattails were abundant at the north end of the pond ... The eastern side was lined with armourstone

Recent dredging and the creation of a sediment forebay have improved the water quality of the pond. However, ... field investigations occurred immediately following heavy rain, and therefore, the water was quite turbid. An unnamed wetland located at Goulbourn Forced Road, upstream of the Beaver Pond was also observed but access was not possible because of deep muck around the periphery.

The following map from 2002 shows the Beaver Pond stormwater structures:



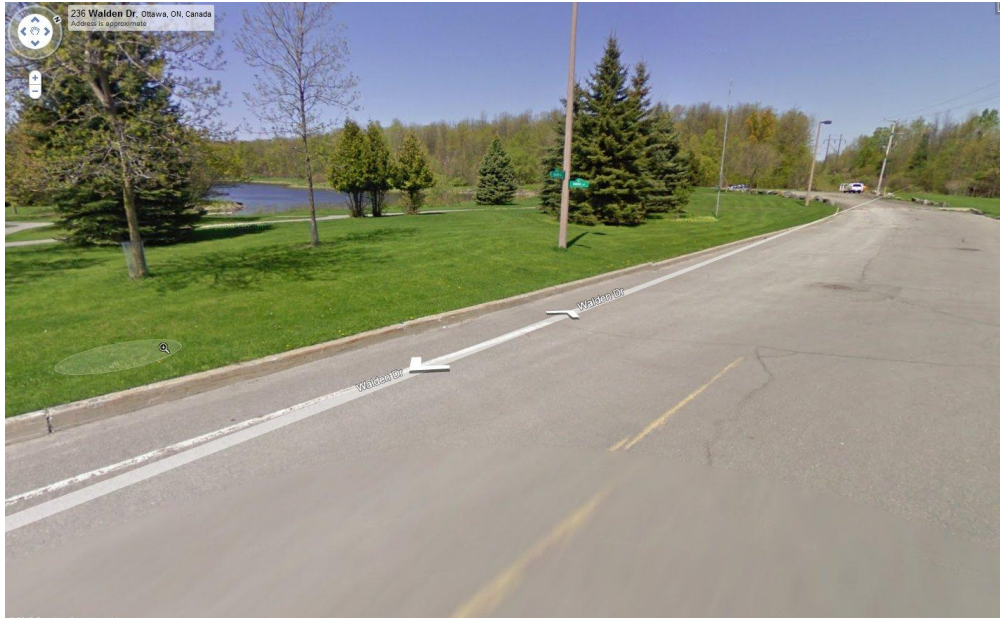
The Pond with a storm inlet on the south side and considerable riprap around the edges. The small white square at the east end is an access structure to a culvert which is just below the angled path at the east end. This outlet culvert goes under Walden Drive and flows to the culvert (the white rectangle at the top right, west of the second house) to Watts Creek which flows north to the railway line. It is possible that the “toe” of the Pond was created to function as a forebay, but there was no sign of a berm to separate it from the main Pond.

The tree clump (yellow/green) at the bottom is in a depressed ponding area and drains via a small CSP culvert into the Pond.

The angle of the inlet culvert is aligned with the area southeast east of Walden and drains the area south of Walden (see drainage area map earlier in this document). The area west of Walden was built around 2001, but no MOE Certificate of Approval was located (the earliest in the database is 1999), and the new CofA issued in 2008 does not mention an earlier certificate.

Beaver Pond Water Levels

The following series of photos show the water levels in the Pond at various times of the year.



Source: Google Streetview Spring 2009

The road and parking lot are much higher than the Creek and the Pond and would stop flow going overland from the Pond to the Creek. The pathway system and grading along the south side of the Pond would sheet drain to the Pond.



Source: City of Ottawa eMAP 2008
The 2005 and 2007 eMAPs showed the water as black



Source: Jessica Alleyn Facebook Group I Want to Save the Beaver Pond # 110
Apr 2010



Source: Victoria Fisher Facebook Group I Want to Save the Beaver Pond # 209
Apr 2010 Water level with ice



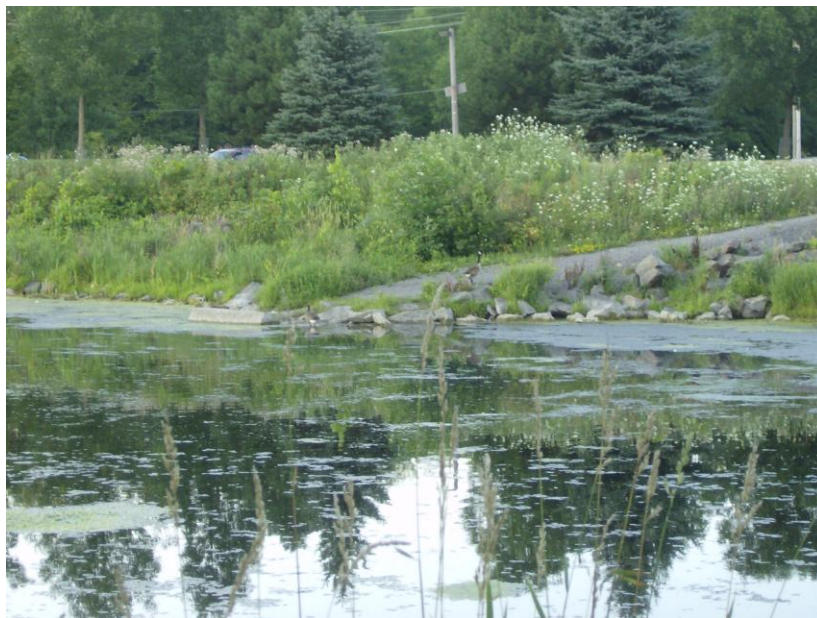
Source: Victoria Fisher Facebook Group I Want to Save the Beaver Pond # 25
Posted 19 June 2010

Beaver Pond Stormwater Infrastructure

The next series of photos of the Pond infrastructure were taken on 24 July 2010:



Based on the alignment with Walden Drive south, this appears to be the storm sewer inlet to the Pond. There was no flow into the Pond on 24 July 2010, and water was stagnating. The wet weather capacity is reduced due to the dry weather water level in the culvert. The small CSP culvert drains a low ponding area in the tree clump south of the pond, and goes under the pathway before entering the Pond.



Due to its alignment with Watts Creek, this appears to be the outlet from the Pond to Watts Creek. The culvert is underground with a small portion of the concrete appearing just left of the east-end path. There is an access structure at the top of the path which is also in alignment with the Watts Creek outlet some distance east across the Walden/parking lot.



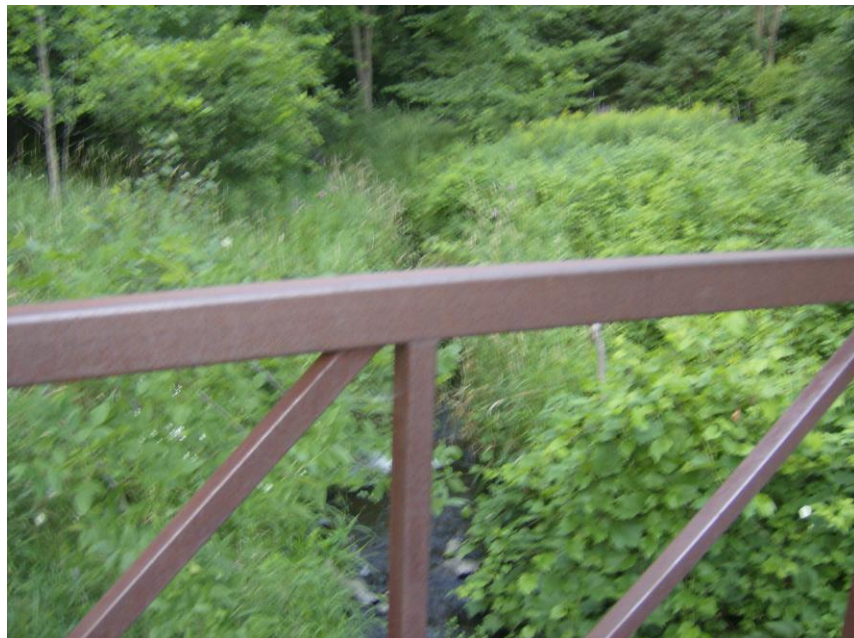
This access structure is at the top of the east-end path. There is a shallow grassed swale aligned with this towards the parking lot, which may be due to settling of the earth when the culvert was installed.



This is Beaver Pond outlet in the north Watts Creek channel



This is taken from the south side of the footbridge looking towards Walden Drive. The culvert and creek are in a depressed area and **could form a natural stormwater pond in extreme wet weather**, with the water going up onto rear yards of the adjacent Kimmins Court homes at the left.



This is from the north side of the footbridge. The creek area here is also in a depressed area. This channel goes north to the railway line. KNL's Phase 9 development is shown in this KD-2 Drainage Area in the Shirley's Brook Watts Creek Subwatershed Study Sep 1999 (see map later in this document).

The south side of the Pond may receive overland flow via the pathway system from Walden.



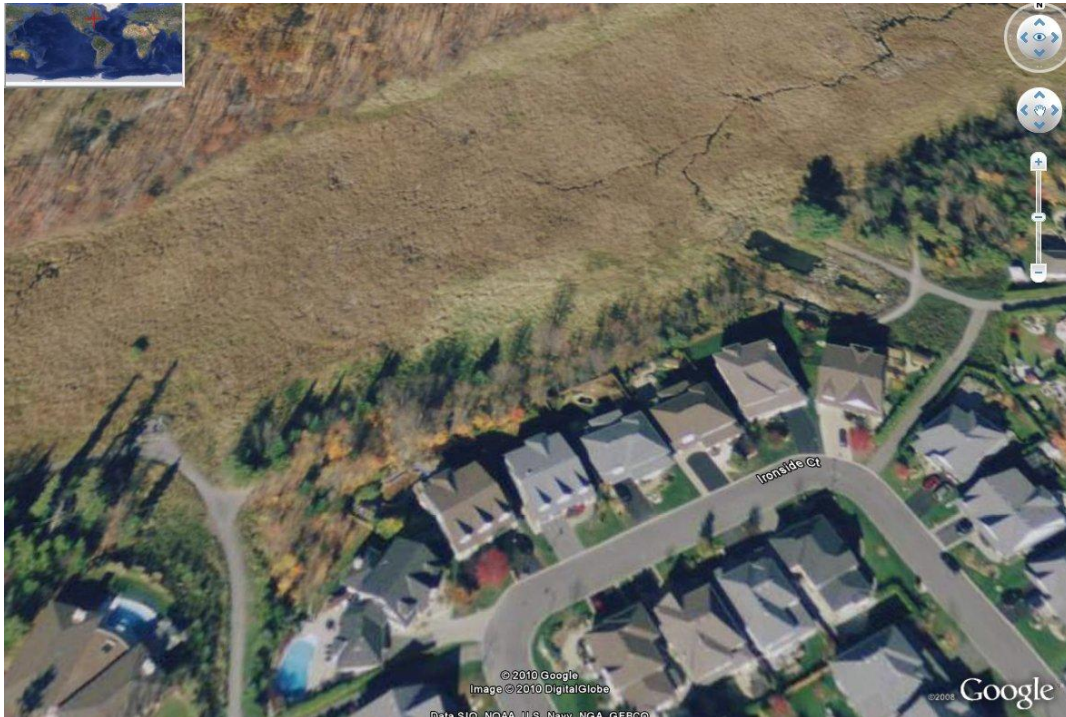
The curbs at the end of Walden where it joins the parking lot are very high and would collect overland flow coming from Walden.

Energy Dissipaters

So far, two of the energy dissipaters have been located, but only the first one described outlets to the Beaver Pond. The second was constructed for KNL's Phase 5 and outlets to Kizell Cell west of Goulbourn Forced Road

Energy Dissipater # 1 Outlets to Beaver Pond Wetland

The first is located on the south shore of the Beaver Pond between Ironside Court and Cecil Walden Court.



The energy dissipater is the 2 black areas at the bottom of the path at the right side. Note the flow line going out from it through the Pond. The map is from Fall 2008 Google Earth and there is water in two of the three parts of the dissipater, so it was probably taken after it had rained, but before the forebay overflowed to the third part. The path at the left leads to a raised lookout which has a bench and a sewer manhole which has no holes. It is difficult to determine whether this is a storm or sanitary sewer manhole. The path up to Charlesworth and the Charlesworth cul-de-sac have storm and sanitary sewers, but it is hard to determine which is which because they have 8 holes. The sanitary manhole covers should be replaced with fewer or no holes. Charlesworth also has a fishbone storm catchbasin at the north low end of the cul-de-sac. At the east side of the Charlesworth path there is a treed area and a dirt path running parallel, where water can be heard flowing, but no outlet to the Beaver Pond could be found.

The following photos were taken on 24 July 2010 in the evening. There is a lot of vegetation so it is difficult to show all the features



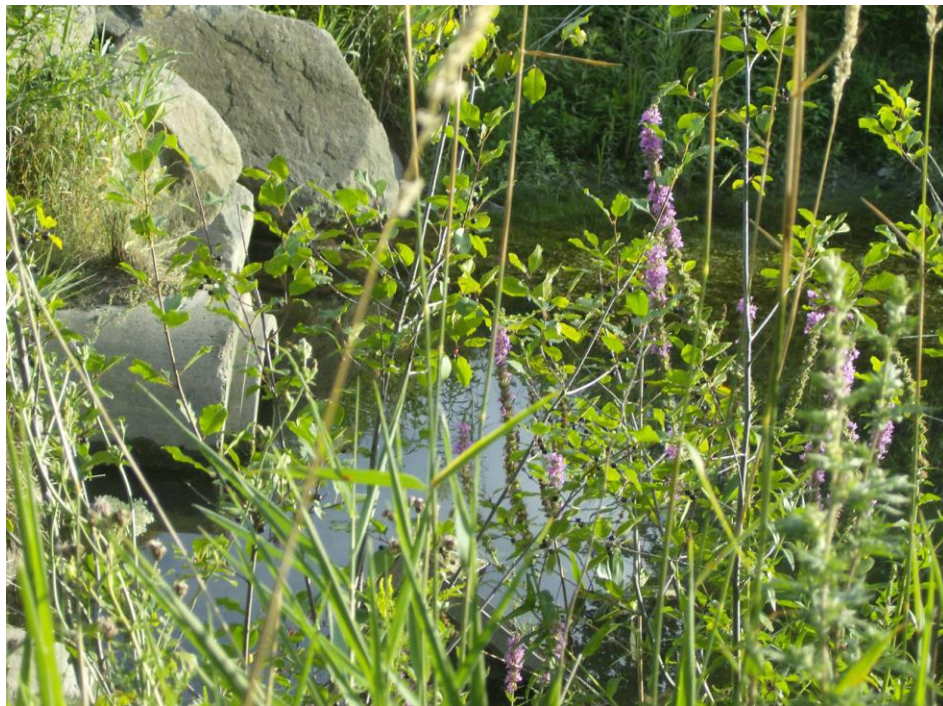
This is the main storm sewer culvert which is at the inlet to the dissipater. This culvert outlets to a small forebay.



This shows the forebay outlet culvert which goes through the rock wall at the north end of the forebay, taken from the top of the forebay at the south end. Notice the water level in the culvert is very high in dry weather.



This is taken from the Beaver Pond side of the rock wall and shows the forebay outlet culvert which allows the stormwater to flow to the Beaver Pond



A closer view of the forebay's outlet culvert. This culvert has been built on a slope because the water level here is lower than the water level at the other end of it. Because water is in this end in dry weather, the culvert capacity is reduced.



This is taken from the east side of the forebay between the main forebay culvert and the rock wall, and shows the water in the small channel which is on the Beaver Pond side of the rock wall. The water was stagnating when the photo was taken



On the west side of the forebay there is an overflow area with no apparent outlet. There is a partial rock wall separating it from the forebay, where the weed line goes across in the photo. The rock wall is lower at the south end and water would spill over into it if the forebay fills too high. **If the forebay fills high enough to overflow the wall, the forebay culvert may have already been submerged, and may cause the storm sewers to surcharge.**



Reeds and stagnant water were in this overflow area which was very stinky in the early evening. Apparently, residents have already been having problems with odours in the area of the Pond.

It would probably be better to photograph this structure in the fall after the vegetation has died.

This structure may have been built in 2001 when the sanitary sewers were constructed as indicated in Environet

14 May 2001 KNL

<http://www.environet.ene.gov.on.ca/instruments/7732-4WBSXT-14.pdf>

Site Location: Lot 6, Concession 2 and 3

City of Ottawa (Former City of Kanata), Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

sanitary sewers to be constructed in the City of Ottawa, on **Walden Drive, Charlesworth Lane**, Easement between Lots 54 and 55 and Easement between Lots 16 and 17, all in accordance with the application from KNL Developments Inc., dated February 8, 2001, including final plans and specifications prepared by Cumming Cockburn Limited, Consulting Engineers.

Maintenance of this structure would be very difficult. Machines would not be able to go into it without removing part of the rip rap which lines the entire structure

Energy Dissipater # 2 Outlets to Kizell Wetland

Phase 5 construction of Urbandale's ½ of the KNL Phase 5 development seems to have started in 2007 as indicated by the MOE Certificates of Approval.

18 Sep 2007 KNL

<http://www.environet.ene.gov.on.ca/instruments/7677-772NMQ-14.pdf>

Site Location: Kanata Lakes Subdivision

Part of 2 and 3, Concessions 2 and 3, Township of March, now Ward 4

Coty of Ottawa

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

storm and sanitary sewers to be constructed on **Keyrock Drive, Laughlin Circle, Panisset Avenue, Katnick Way, Miro Drive, Doyon Avenue, Lamontagne Court, Overend Crescent, Ottenbrite Crescent, Keora Circle, Goulbourn Forced Road**, Blocks 255, 278, 288, 290 and 291, in the City of Ottawa;

all in accordance with the application from KNL Developments Inc., dated July 16, 2007, including final plans and specifications prepared by IBI Group.

28 Aug 2008 KNL

<http://www.environet.ene.gov.on.ca/instruments/6383-7E9PP7-14.pdf>

Site Location: Kanata Lakes Subdivision - Phase 5

Former Township of March

Lot 2 and 3, Concession 2 and 3

Ottawa City,

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- **storm** and **sanitary sewers** to be constructed on **Keyrock Drive, Laughlin Circle, Panisset Avenue, Katnick Way, Miro Drive, Doyon Avenue, Mancuso Court** formerly Lamontagne Court, **Nettleship Court** formerly Overend Crescent, **Ottenbrite Crescent, Tischart Crescent** formerly Keora Circle, **Goulbourn Forced Road**, Blocks 255, 240 formerly 278, 249 formerly 288, 251 formerly 290 and 252 formerly 291, as part of Kanata Lakes Subdivision Phase 5 in the City of Ottawa;

all in accordance with the following:

1. Application from KNL Developments Inc., dated July 16, 2007, including final plans and specifications prepared by IBI Group; and
2. Application dated April 30, 2008 and received May 02, 2008, including final plans and specifications prepared by IBI Group, Ontario.

This work was substantially completed in 2008, and included the **energy dissipater**, as indicated by the Daily Commercial News Certificates of Substantial Performance

31 Oct 2008

<http://www.dailycommercialnews.com/csp/96802>

Kanata Lakes North, KNL 5, Keyrock Drive, Nettleship Court, Mancuso Court, Katnick Way, Tischart Crescent, Doyon Avenue, Miro Way, **Energy Dissipater** Phase 1 Parts A, B, C, D, E, F, G & H

This is to certify that the contract for the following improvement: Supply and Place Watermains, Storm and Sanitary Sewers, House Services, Roads to Granular Base, Energy Dissipater, Site Grading and Blasting
To the above premises was substantially performed on: October 31, 2008
Date Certificate Signed: November 6, 2008
Name of Owner: KNL Developments

A month later, MOE approved the energy dissipater which had been constructed:
26 Nov 2008

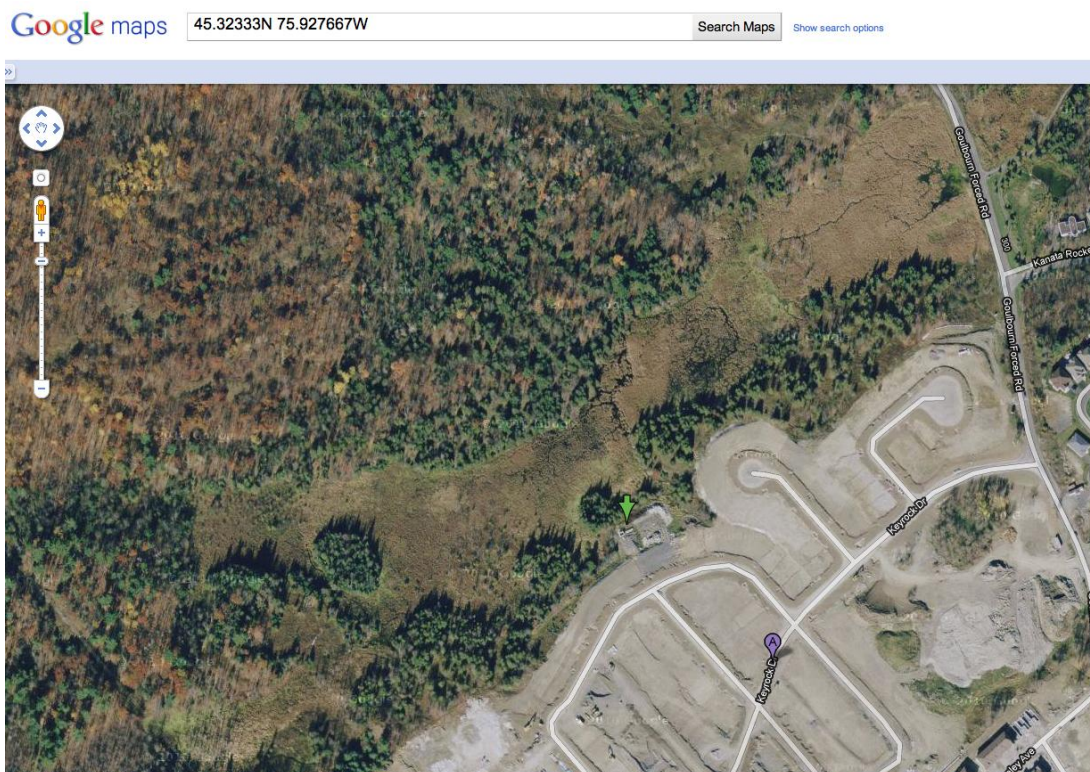
<http://www.environet.ene.gov.on.ca/instruments/5246-7KNNBN-14.pdf>

Site Location: Kanata Lakes Stormwater Management Facility

Kizell Cell

a stormwater management wet pond, located west of Goulbourn Forced Road, having a minimum liquid retention volume of approximately 10,271 cubic metres at an elevation of **93.30 metres**, and a maximum active retention volume of approximately 89,825 cubic metres at an elevation of 94.28 metres for the 100 year storm event, complete with two **(2) energy dissipaters** at the storm inlets to the cell, and one (1) outlet berm, discharging at a controlled flow rate of 1.16 cubic metres per second for the 100 year storm event to the downstream Beaver Cell

Gordon Henderson's photos, reproduced here, are for the second energy dissipater.



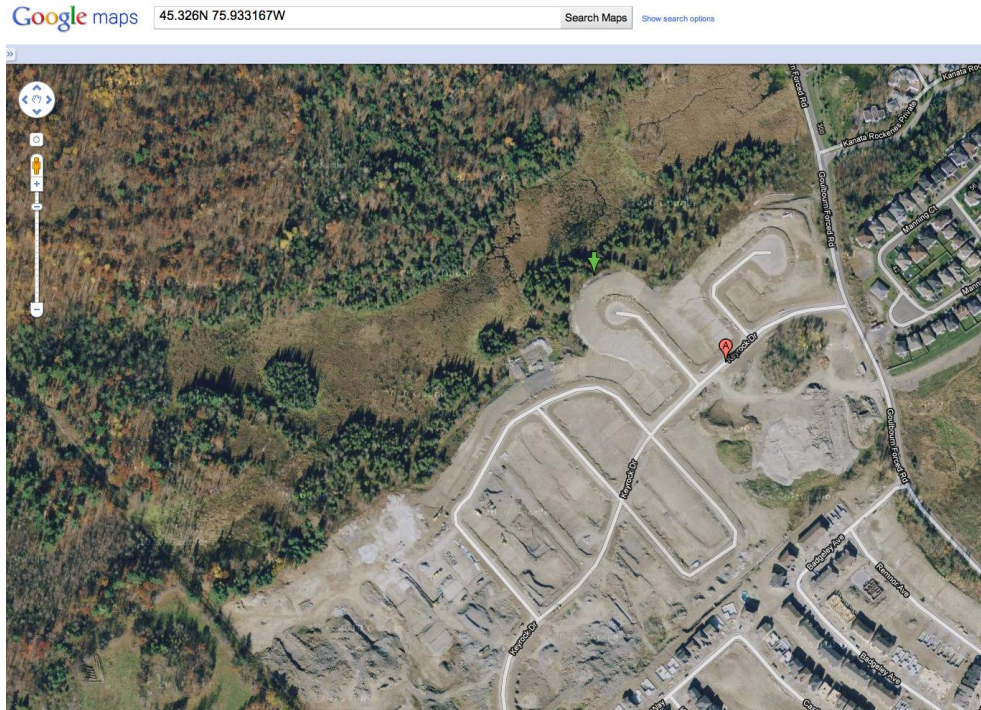
This is the Urbandale ½ of the Phase 5 KNL development The green arrow indicates where the following photos were taken.



Note the sediment buildup already forming in the basin. Maintenance will be difficult due to the large riprap. It appears as if it would not take much stormwater to submerge the culvert and possibly surcharge the storm sewer. Section 4.5 Energy Dissipation Design at <http://www.georgiastormwater.com/vol2/4-5.pdf> Indicates that the outlet basins need to be deepened.

Unknown Structure Outlets to Kizell Wetland

There is also water flow/seepage in the following area, the green area showing the location:





The Rockeries Stormwater Management Ponds (SWMPs) and Drainage Channel

There are at least 4 private SWMPs in the Rockeries. Only one of these is visible from the pathway system. On 29 July 2010, the water level was low and stagnating. The following Google Earth and eMAP photos show some of them.



Source: eMAP 2002

This one has what appears to be a drainage channel

This is a zoom photo of the SWMP taken from the pathway



There was no apparent outlet to this pool. The only thing found was a grassed swale which had a pile of hay/grass blocking most of it.



Another SWMP from eMAP – the long green area on the right side



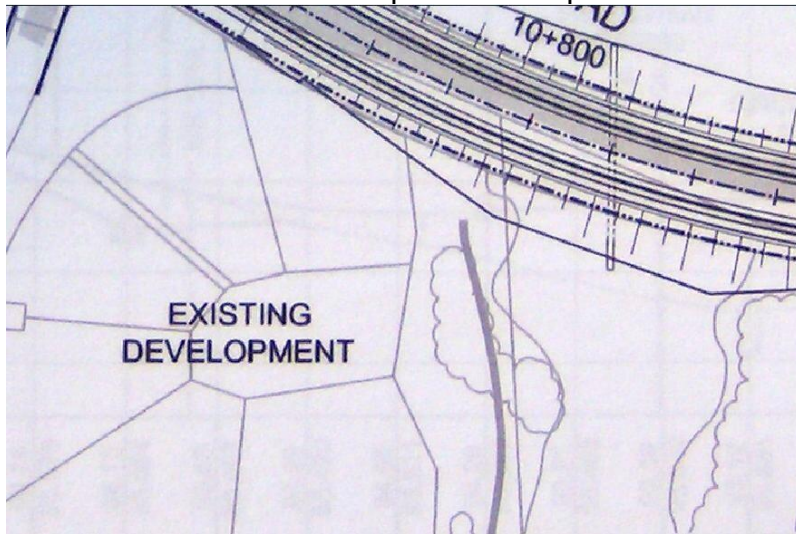
Source: eMAP 2002

The Rockeries Parallel Channel begins just past the first cluster of old growth trees beside the pathway not far from Goulbourn Forced Road, and seems to end just past where The Rockeries property ends. This parallel channel varies in width with the widest part being about 3 feet, however, there are several pools along it where the width increases to roughly 5 to 8 feet.

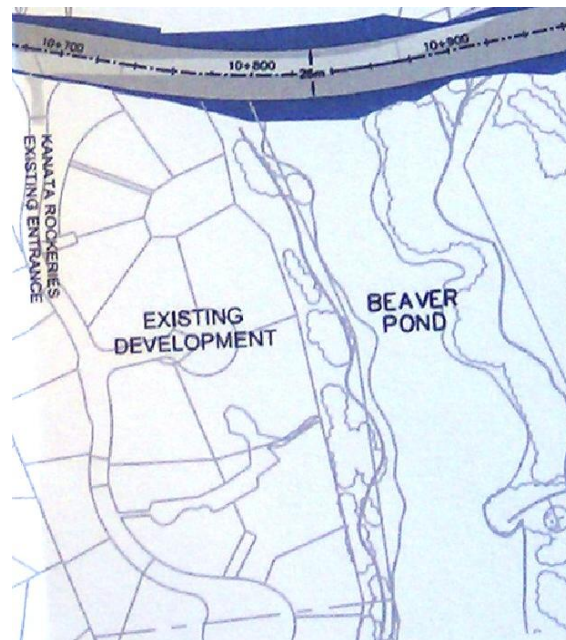
The following extract from Figure 27 Recommended Alignment Key Plan of the GFR ESR Oct 2007 shows the Rockeries. The map does not have topographical lines on the development areas. It is unclear what the lines and shapes along the Beaver Pond represent, but ponds do exist in this location.



Figure 29 shows the tree cluster with the top of the first pool



Yet, the GFR ESR Fig 35 showing trees, not ponds?



The following photo shows one of the larger pools. The water in the channel and ponds was stagnating on 29 July 2010.



One small CSP culvert (at the lower right corner) was located about mid-way which outlets under the pathway into the Beaver Pond. It is very difficult to see whether there are any more outlets to this channel due to the quantity of vegetation. A fall visit after the vegetation has decreased might reveal more.



Because the pathway is fairly low most of the time, the parallel channel and pools could overflow the pathway, or the Beaver Pond could backflow to them.

There are a number of lookouts along the south side of the Beaver Pond which have benches and sewer manholes. The sewer manholes have no-hole covers and bolts, and are dated 2001. Whether they are sanitary or storm sewers is unknown, but descriptions of the sanitary sewer do not indicate that sanitary sewers are located here.



All of the lookouts containing these sewer manholes have been raised considerably above the path level, which indicates that flooding might be expected in the area.



Goulbourn Forced Road (GFR) Drainage System

The Beaver Pond Wetlands and Kizell Wetlands are in a valley with slopes to the north and south. There are two sources of stormwater drainage – from a roadside ditch on the east side of GFR to small culverts which drain into the Beaver Pond, and from the road surface sheet drainage directly into the ponds. This latter drainage is considerably more than the average road due to the stormwater coming down the valley slopes. The GFR ESR did not appear to mention this drainage system, or the requirement for stormwater treatment for this high-traffic road.



GFR Hill to the north with sloped road shoulders



GFR hill to the north; sloped road shoulders drain to Beaver Pond



Culvert in GFR east-side ditch goes under the private road



GFR east side ditch adjacent to The Rockeries. Flow is coming down the ditch system from the top of the south GFR hill



Twin CSP culverts at the pathway receive stormwater from the east side GFR ditch. Ponding would occur here in extreme events.



Twin culverts (the one on the right is hidden) on the Beaver Pond side receive flow from the GFR east side ditch

The pathway system along GFR and along the Beaver Pond also drains to the Beaver Pond

Goulbourn Forced Road (GFR) Culvert Between Kizell Wetland and Beaver Pond Wetland

There appears to be just one small culvert which passes under GFR between the Kizell Wetland and Beaver Pond Wetland, just north of the pathway. The Kizell Wetland side has more open water in this area than the Beaver Pond Wetland side.

The GFR ESR pg 48 indicates:

“Approximate Size of Culvert in Upstream Cell Berm 600 mm Source IBI/CCL

The following photo shows the existing GFR culvert, which is the main outlet for Kizell Wetland.



The water level was very low on 29 July 2010, however water marks on the insides indicated that the water level would normally be a few inches higher, reducing the culvert's capacity for extreme wet weather flow. It is not known whether the culvert was laid flat to be able to use its full capacity. This is an extremely small culvert considering the amount of water upstream, and it drastically restricts the flow between the two wetlands.

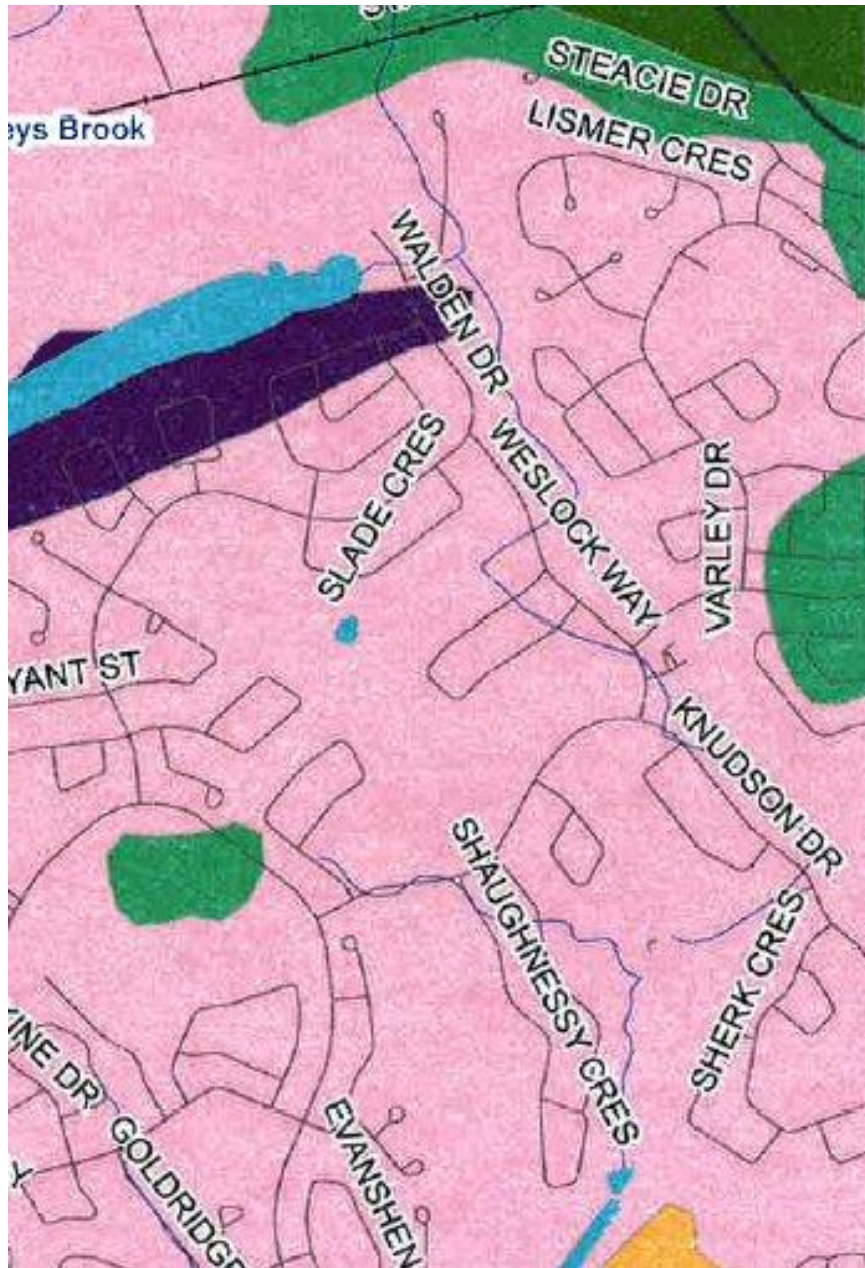
There is not much difference between the wetland water levels and the GFR roadway, making it highly possible that Kizell Wetland could overflow the road to the Beaver Wetland, or that the Beaver Pond Wetland could backflow to the Kizell Wetland.



This photo shows the 29 July 2010 water level in the Kizell Wetland in comparison to the GFR road level, and also the amount of open water in Kizell Wetland..

Watts Creek South Tributary

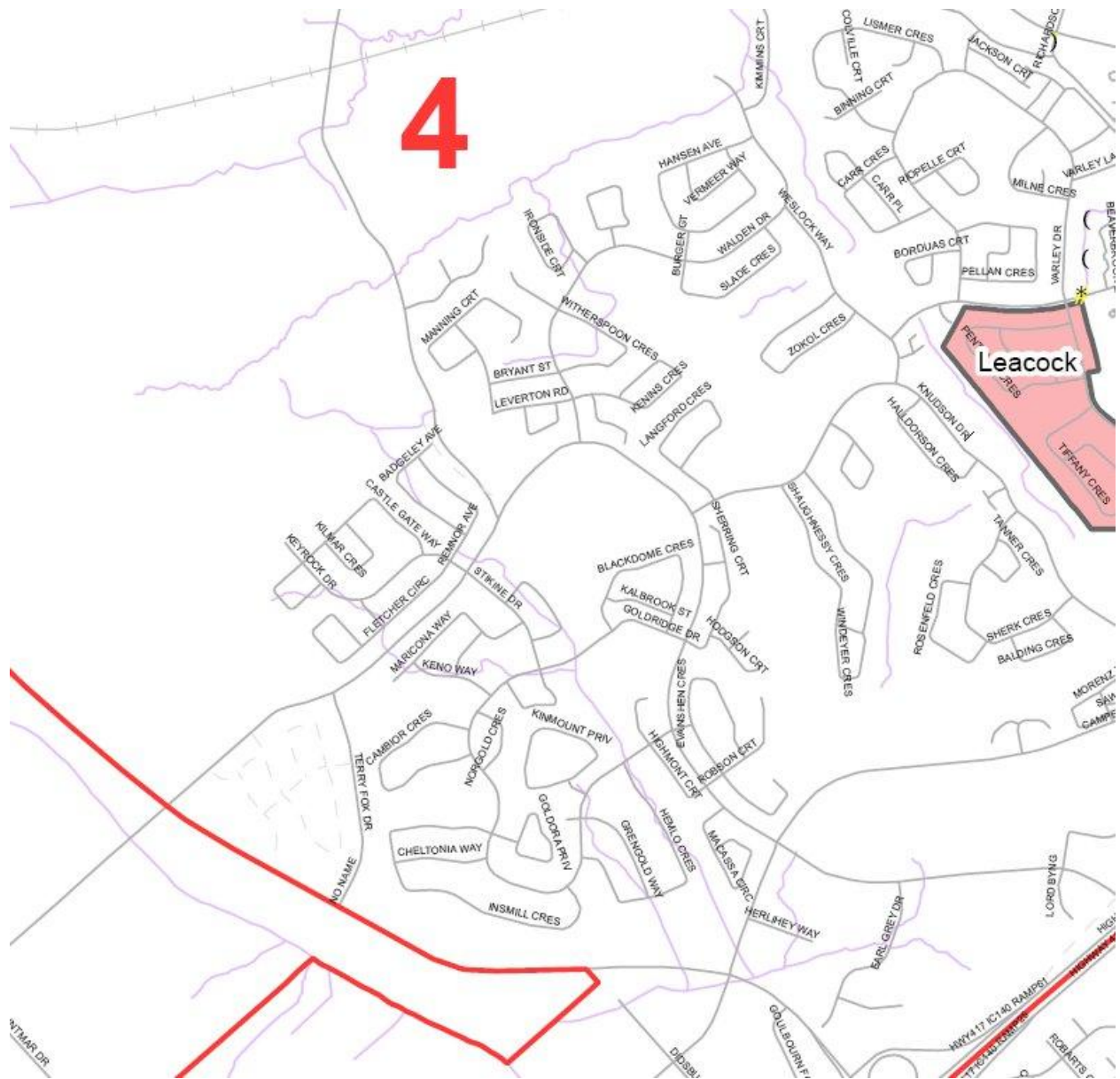
This tributary begins just east of the Beaver Pond and flows south. It was not visible from the intersection of Walden and Kimmins Court as much of the area has been paved. This map on page 73 from the TFDE Permit To Take Water 4 May 2010 by Golder shows the path. The tributary would likely flow north and join the north tributary.



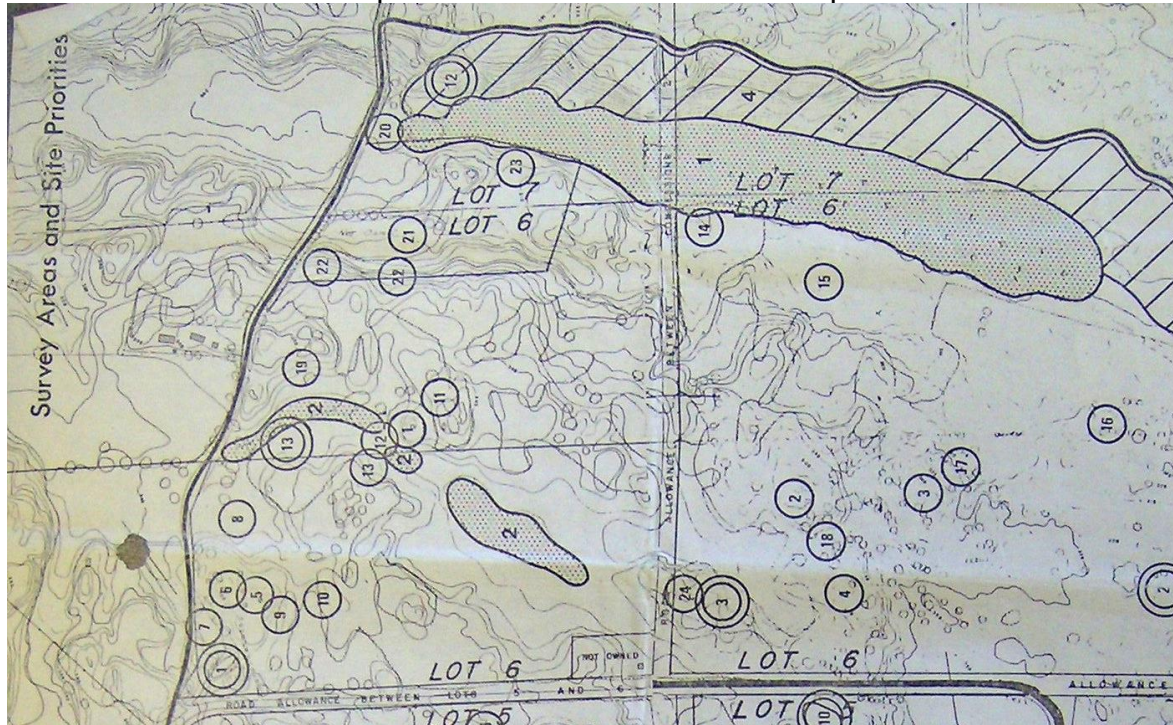
The purple area shows organic deposits muck and peat south of the Beaver Pond where homes were built.

Beaver Pond South Tributary

This extract from the West End Flooding Investigation (WEFI) Appendices Jan 2010 pg 93 shows the Watts Creek/Kizell Drain south tributary from the Kimmins Court area (see above), and the Beaver Pond south tributary from the Ironside Court area.



The following is an extract of a map from *Environmental Study of the Marchwood area of Kanata* prepared by students of Sir Robert Borden High School under the direction of Mr. Hugh Gibson Feb 1976 shows the Beaver Pond (Area 1) with at least two tributaries at the south side. The description of Area 2 which is below the Beaver Pond at the left side is said to be connected to the Beaver Pond. While the area has been developed, there are still remnants of parts of this on other current maps.



“Area 1.

This is the extensive beaver pond, that marks the northern limit of the Marchwood study area. The pond is very shallow and plant litter filled. Water depth only rarely exceeds 4 feet and over the majority of the area is less than 2 ½ feet deep. The pond bottom is composed of nutrient-rich organic sediment of considerable depth. The base rock of the pond area is Precambrian and supplies an impermeable bowl for this natural reservoir. If it is anticipated that this 12 acre pond is to be retained as a feature of future development, very careful study of water input/output and pond bottom examination must be considered. The pond presently has a beaver colony despite trapping efforts. Even if this colony is eliminated, it will be re-established within one season by a flourishing colony on area 2.

Area 2

If one refers to the drainage patterns included in the map display, it can be seen that a shallow lateral drainage valley feeds into the major northern beaver pond (area 1) from the south. At present, this drainage pattern bears two open water areas that exist because of beaver dams and a third (the one closest to area 1) that, in the past, has been a beaver pond but presently is a willow swamp. The uppermost pond is beaver colonized. The small pond is not colonized – simply

dammed to increase the safe habitat area of the beaver colony. It is from this colony and one just west of the Goulborn forced road that area 1 can be recognized continuously. The ponds and swamp of area 2 are organic litter filled. The ponds are very shallow (to 4 feet) and formed in a manner similar biologically and geologically to area 1. There is no clearly defined creek input or output from these reservoirs. The drainage is too generalized and insufficient to create a stream bed naturally. The Precambrian shores of these three water interest possibilities are abrupt and well forested”