	Red Hill Valley Project (RHVP) Integrated Environmental Monitoring Project (IMP) Recommendations	Lead Division/ Name	To be Implemented Yes/No/TBD	Comments from: (HW) Hamilton Water, (RT) Roads & Traffic, (PL) Development Planning, (PK) Parks Operations
Ground Water				
1	Existing groundwater monitoring wells should be left in place for any future more regional monitoring program. The Hamilton Conservation Authority (HCA) or other governmental agencies should be contacted to confirm whether they would be interested in taking over the monitoring of these wells, potentially as part of the Ontario Groundwater Monitoring Network.	Hamilton Water /Source Water Protection	TBD	(HW) Groundwater wells are managed by the Water & Wastewater Systems Planning Section of Hamilton Water. Info has been requested from consultant so that a budget impact of taking over the wells can be identified. There would be ongoing maintenance costs in addition to costs of future sampling & analysis. The depth, construction, condition, and location of these wells will need to be assessed by Systems Planning before an implementation decision can be made.
Surface Water				
2	The Davis Creek Flood Control Facility monitoring program, which commenced in 2014, should continue with the anticipation that the facility will become commissioned soon. The program is scheduled to last 5 years, consistent with the balance of the RHVP IMP monitoring activities.	Roads & Traffic	Yes	(RT) It is anticipated that the facility will be commissioned in 2019. Some materials that were stolen during construction will be reinstalled next year. This facility will be recognized by the Province as a dam structure. It will be operated per the requirements of the Province. After review of the scope of work required refurbishing the structure, an additional $300k for capital costs has been requested in 2019 Capital Budget. Original request was for $250k. Future operating costs of the structure will be identified once the operation and maintenance manual has been developed by the consultant

				preparing the design to refurbish the structure.
3	The City of Hamilton may wish to further monitor and assess localized flooding locations identified within this summary (as well as the 2010 Annual Monitoring Report), and consider the preliminary list of proposed remedial measures.	Roads & Traffic	Yes	(RT) Known flooding areas are actively monitored by the City. They are inspected before, during and after major storm events. The effort of this work is reflected in the current budget planning; no additional monies are required.
4	The City of Hamilton and the Ministry of Transportation (MTO) may wish to undertake a climate change assessment, to better understand the potential vulnerabilities along the RHVP, and develop appropriate resiliency plans.	Out of Scope	TBD	TBD This is an out of scope issue, there may be potential to include as part of liaison meetings between the City (Engineering) and MTO.
Water Quality				
5	The City of Hamilton should continue to monitor combined sewer overflow (CSO) discharges to the Red Hill Valley over time to verify the effectiveness of the Red Hill Valley Storage Pipe, and whether any additional measures are warranted.	Hamilton Water	Yes	(HW) This is done by Hamilton Water on a permanent basis to satisfy other operational and regulatory needs.
6	The City of Hamilton may wish to consider future continuous stormwater quality sampling of stormwater management facilities using an auto-sampler in order to better assess their performance. The City may also wish to consider further grab sampling or continuous sampling of Red Hill	Roads & Traffic	Yes	(RT) A plan to monitor the effectiveness of the City's stormwater management facilities is under development.

	Creek during wet weather events given the high observed contaminant levels. This monitoring effort could be used to determine which areas of the watershed have relatively higher contaminant level contributions, and, should be targeted for potential future remedial stormwater quality controls.			
7	The City of Hamilton should consider undertaking repeat bathymetric surveys of stormwater quality management facilities in the next 5 to 10 years to better assess sediment accumulation rates and forecast future clean-out scheduling.	Roads & Traffic	Yes	(RT) The City has implemented a (City-wide) plan to monitor sediment levels with City owned stormwater management facilities. It should be noted that 5 of 8 stormwater management facilities along the RHVP have been dredged of sediment (works performed in 2015). The tendered value of the work was $1.39 Million.
8	The City of Hamilton (and the MTO) should continue annual inspections of all stormwater management facilities in order to assess and proactively respond to any identified issues. The RHVP SWM Facility Operations and Maintenance Manual (to be completed later in 2015 by Amec Foster Wheeler) should assist in this regard.	Roads & Traffic	Yes	(RT) The City's SWM Pond Assets are inspected at least once a year by City Staff. Asset deficiencies are reported to the Capital Rehabilitation & Technical Operations Section for resolution.
H3	Testing for pharmaceuticals in the surface water, downstream of Municipal sewer overflows is recommended. Pharmaceuticals can negatively effecting fish and aquatic life.	Out of Scope	No	(HW) Stream quality monitoring is outside of Hamilton Water's mandate and scope of responsibility.

H4	Options to not introduce Municipal sewer water in the valley creeks should be studied.	Hamilton Water	Yes	(HW) This is already an objective of Hamilton Water on an ongoing basis. Introduction of wastewater overflows to the environment is reduced or avoided where feasible. Hamilton Water will continue its efforts to reduce discharges of sanitary sewer overflows to the environment through our existing infrastructure planning programs.
Creek Morphology				
9	The City of Hamilton may wish to continue monitoring erosion along the Red Hill Creek corridor and continue to assess the bank full meander migration of the channel over time. Recent channel works (2014/2015) within the King's Forest Golf Course in particular are recommended to be monitored for at least 5 years.	Roads & Traffic	Yes	(RT) Responsibility for ongoing City owned watercourse maintenance is being reviewed at the City. A visual review of all City owned watercourses was undertaken in 2016. Evidence of erosion, sedimentation, debris build-up was logged as part of this activity. Another visual watercourse review is scheduled for 2021 (5-Year cycle). (HW) Hamilton Water's mandate/scope in regard to erosion in natural channels needs clarification and additional budgetary resources.
10	Maintenance of the Red Hill Creek corridor will continue to be required, particularly after large magnitude flood events. The corridor should be viewed as part of the City's "natural infrastructure", with associated ongoing maintenance requirements.	Roads & Traffic	Yes	(RT) This recommendation is addressed in the comments provided under items 3 and 9 above.

11	The City of Hamilton and its partners (such as the Hamilton Conservation Authority) should continue efforts to clean up anthropogenic material within Red Hill Creek (such as shopping carts) through annual creek clean-up days. The City (and potentially the HCA) should likewise continue to monitor and remove any potential debris jams at culverts and other hydraulics structures.	Roads & Traffic	Yes	(RT) Any anthropogenic material noted in the inspection of the watercourse will be removed by the City. The City will continue to work with any partners in this regard. Debris jams at culverts and other structures will be removed by the City. Such debris may be identified through the watercourse or culvert inspection program or may be identified through the "hot spot" inspection prior to a major storm.
12	The ongoing erosion and sediment contribution upstream of the Buttermilk Falls tributary should be addressed in order to maintain downstream channel stability within Red Hill Creek. The rehabilitated channel reach was never designed to handle/receive the bed material load that is currently being generated by the upstream reach destabilized in the July 2009 flood. Measures should be taken to mitigate erosion in this reach and provide enhanced geotechnical slope stability.	Out of Scope	No	This type of work is not currently identified as part of any city mandate
H2	Testing and a management plan of areas where road salt is present in soil and surface water is recommended. Road salt can change the chemistry in surface water and can negatively affect fish and aquatic life downstream and in the lake.	Roads & Traffic	Yes	(RT) Winter de-icing material storage and loading/handling practices at our Operation Yards are addressed by our Council approved Salt Management Plan.

Fisheries				
13	The City of Hamilton, and affected regulatory agencies (Hamilton Conservation Authority, Ministry of Natural Resources and Forestry, Department of Fisheries and Oceans, Royal Botanical Gardens, Bay Area Restoration Council) may wish to consider transplanting suitable native stream fishes from other area watercourses, if a more diverse fish community in Red Hill Creek is desired. Further discussion would however be required on this subject.	Out of Scope	No	
14	The City of Hamilton and affected regulatory agencies should consider implementing carp control within the lower reaches of Red Hill Creek (as has been done in Windemere Basin). Key opportunities for carp exclusion exist in compensation wetlands Comp1 and Comp2, as well as new backwater channels created within ENH5 (Red Hill Marsh), and the north Van Wagner's Pond along with connecting waterways. Further discussion would again be required on this subject.	Out of Scope	No	
15	Benthic invertebrate sampling should be considered in the future, potentially within the next 5 years +\-, in order to assess potentially positive impacts of the Red Hill Valley Storage Pipe. This feature, which should reduce the number of combined	Out of scope	No	

	sewer overflow discharges to Red Hill Creek, did not begin operating until December 2011; as such the monitoring data (ending in 2012) would not reflect the benefit of implementing this feature.			
Terrestrial Ecology				
16	Future terrestrial ecology monitoring of the riparian zone is recommended at 5 to 10 year intervals in order to evaluate long-term changes. Additional restoration efforts for high disturbance areas of the riparian zone (i.e. upper reaches) would also be beneficial and should be considered.	Planning	Yes	(PL) Planning has completed biophysical inventories of Core Areas every 10 years. However, this program may not continue in the future. Planning does not have the staff required to conduct the inventories, and would require funding to hire a consultant to do the work. Could partner with McMaster students or organize citizen science program to gather data.
17	It is recommended that the City of Hamilton consider future monitoring and management of invasive species within the Red Hill Valley in order to eradicate them or prevent any further spread.	Parks	Yes	(PK) Planning and implementation to be reviewed, budget impacts anticipated.
18	It is recommended that the City of Hamilton undertake additional monitoring of the wetland enhancement areas (ENH5), given that only 2 years of data have been collected thus far.	Out of Scope	No	
19	It is recommended that turtle population status within the Red Hill Marsh and Van Wagner's Ponds, as well as habitat enhancement areas, be updated.	Out of Scope	No	

20	The City of Hamilton should consider undertaking repeat monitoring of permanent vegetation plots within the valley.	Out of Scope	No	NEC does EMAN monitoring plots on the escarpment.
21	The City of Hamilton should consider periodically updating Environmental Land Classification (ELC) cover databases as part of any future watershed updates or new projects.	Planning	Yes	(PL) Planning has updated its ELC on all core areas periodically (every 10 years). However, this program may not continue in the future. This recommendation refers to “future watershed updates of new projects”, so it does not appear to be referring to regular updates in any particular timeframe. This could therefore be the role of either Planning (Secondary plan) or Public Works (new infrastructure), depending on the “new project”.
22	The City of Hamilton should consider completing a separate stand-alone report to summarize and address the full scope of the restoration works undertaken by Kayanase.	Out of Scope	No	
H1	A follow-up Haudenosaunee Medicinal Plant survey is recommended.	Out of Scope	No	
H5	Request a copy of the proposed Kayanase restoration work report when completed.	Out of Scope	No	The City will continue to liaise with the Joint Stewardship Board regarding this recommendation through the Joint Stewardship Board (a stakeholder/partner group established during the design and construction of the Red Hill Valley Parkway).
H6	If not already considered, a study of the entomological world (Insects) in the affected valley areas should be undertaken.	Out of Scope	No	(PL) Planning periodically updates its species occurrence data in core areas, which includes dragonflies and damselflies, butterflies and moths, bees. However, this program may not continue in the future.
H7	All the recommendations presented in the 5-	See above	No	

	Year 2015 Summary report should be approved and implemented, as listed in Appendix A: Summary of Recommendations Supported by Haudenosaunee.			

Note: H comments derived from the HDI review 2015