



Report to: General Committee

Report Date: December 12, 2016

SUBJECT: City-Wide Stream Erosion Master Study Implementation Plan

PREPARED BY: Robert Muir, Manager, Stormwater, ext 2894
Alan Manlucu, Project Engineer, ext 2374

RECOMMENDATION:

- 1) THAT the report entitled “City-Wide Stream Erosion Master Study Update Implementation Plan” be received;
- 2) AND THAT Council endorse new Categories D and E into the Guidelines to restore the erosion sites within private properties as set out in the report;
- 3) AND THAT the recommended 5-year implementation plan with the approach for securing of easements, entering into cost sharing agreements, conducting inspection and maintenance of erosion restoration work within private property and cost sharing policy as set out in this report be endorsed;
- 4) AND THAT Council authorize the Mayor and Clerk to execute cost-sharing agreements with private property owners or agencies having jurisdiction, in a form satisfactory to the City Solicitor and the Commissioner of Community and Fire Services, and in accordance with the process and criteria established in this report;
- 5) AND THAT staff advise TRCA of erosion sites that fall outside of the City’s implementation plan that may be considered as part of TRCA’s Erosion Management Program;
- 6) AND THAT staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

To seek Council’s endorsement of the recommended 5-year restoration Implementation Plan to address the erosion along Markham’s watercourses, including the cost sharing policy to restore erosion sites within private property.

BACKGROUND:

The City of Markham is drained by watercourses that can erode due to upstream development, natural processes, extreme weather, and watercourse alteration by the property owner, or a combination of these factors. In 2007, the City completed its first Erosion Restoration Implementation Plan which identified 30 priority erosion restoration sites within the City, including sites on City-owned properties as well as private land. Approximately 278 km of watercourses traverse through the City and 27% is within public ownership. On watercourses under private ownership, the City has easements in limited areas along engineered channels, but generally not along natural watercourses. A total of 458 erosion sites were identified, the majority of which are minor and did not require any restoration at this time.

The Guidelines to Restore Erosion Sites within Private Property outlined in the staff report dated February 20, 2007 provided the following criteria for determining how erosion restoration undertaken by the City would be funded on private lands based on the cause of erosion:

- Category A:** Erosion problems within private property which are the results of altered flow regimes due to upstream development. Funding for addressing erosion exacerbated by development will be funded by the City.
- Category B:** Erosion that is not related to urbanization but is a result of the natural process of river behaviour. Costs for design, construction and maintenance of such erosion control works will be shared between the benefitting property owners and TRCA, as per TRCA's Private Landowner Contribution Policy, carried out on a priority basis and subject to all necessary approvals and available funding.
- Category C:** Erosion of private property due to the alteration to watercourse by property owner and upstream development. Cost sharing between the property owners and the City on a site by site basis should be negotiated.

2007 Class EA Study - Restoration Work

The City has undertaken restoration work at fourteen (14) of the top 30 priority sites identified in 2007 Class EA Study and at five (5) additional sites which were moved to the priority list. Thirteen (13) of the restored sites were within public and/or City property and the remaining six (6) of the sites were within private properties under Category A. The remaining 16 priority sites from the 2007 Class EA Study were not completed, and were considered in the 2013 study and reprioritized.

Due to the fluid nature of erosion, every 5 years the City will update the study and identify a new set of priority sites for implementation. In 2013, the City initiated the City-Wide Stream Erosion Master Study Update to re-examine previously identified erosion concerns and to document new sites. Council approved the 2013 Class EA Study report on September 23/24, 2014, and directed staff to report back on an implementation plan.

OPTIONS/DISCUSSION:

2013 Class EA - Recommended Restoration Plan:

The recommended restoration plan detailed in the 2013 Class EA Report identifies a new set of top 30 priority erosion sites as shown in **Attachment A**.

Cost Sharing Policy on Private Property:

Three Categories A, B & C were endorsed by Council in 2007 for determining how erosion restoration undertaken by the City would be funded on private lands based on the cause of erosion.

Upon further review of variety of situations, staff is recommending to add two new categories to address municipal infrastructure that is at risk and when cause of erosion cannot be determined:

- Category D:** Erosion of private property, where municipal infrastructure is located, is to be 100% funded by the City.

The municipal infrastructure may be a storm sewer or sanitary sewer traverse through a private property. Due to erosion, these municipal infrastructures are at a risk of failure, which will have a larger impact to the community. For example, restoration on the East Don tributary near Steele Valley Road protected the manhole of a City trunk sanitary sewer that is located on a creek bank, on private property, and at risk of

washing out due to its location on an eroded creek bank. The restoration works to stabilize the municipal infrastructure does not provide direct benefits to the private owners, as it conveys municipal stormwater or sanitary sewage. Therefore, it is recommended that where there is a municipal infrastructure at risk regardless if it is located on a private property only, or on both private and City properties, it is 100% funded by the City.

Category E: Erosion problem on both private and City properties, where the cause of erosion cannot be determined is to be funded by the City.

Where the erosion site is located on both private and City properties, it is difficult to apportion the responsibilities and determine the true cause of erosion. Therefore, it is recommended that the restoration is 100% funded by the City.

2013 Class EA - Implementation Plan:

The following fifteen (15) erosion sites (ID #1, 3, 5, 6, 7, 8, 9, 12, 13, 15, 17, 18, 19, 20 & 21 – refer to **Attachment B**) will be restored by end of 2019 at an estimated cost of \$2.2M funded by Life Cycle Replacement and Capital Reserves and Development Charges:

- 9 sites - within City (public) property
- 2 sites - within private property; Category A: Results of altered flow regimes due to upstream development
- 3 sites - within private property; Category D – City’s infrastructure at risk
- 1 site - within private property; Category E – Cause of erosion cannot be determined

At the detailed design stage, project capital cost estimates will be re-evaluated based on updated quantities and site specific considerations. Balance fifteen (15) sites will be re-prioritized when staff conducts the next update in 2018 (5 years from this current 2013 EA).

The purpose of providing the above cost sharing policy is to propose how the erosion restoration work is to be funded in order to move forward on implementation. It is not being provided as an admission of the City’s liability or responsibility with respect to conducting any erosion restoration work.

Implementation priority will be given to full City-funded sites and sites with infrastructure at risk. With respect to privately-funded sites, staff recommends that TRCA be informed of these sites to consider in TRCA’s Erosion Management Program, which contemplates shared funding of the work with private property owners.

Prior to initiation of design and approval of Shared Funding Sites with the private property owners, the following steps will be undertaken:

(a) Landowner Contact:

- Discussion with landowner to explain what the problem is, and why restorative measures are required

(b) Funding Resolution

(c) Agreement to undertake work within a private property will include:

- Cost Sharing
- Permission to Enter

- The City is not admitting any liability
 - The property owner will indemnify the City
 - The City does not guarantee the effectiveness of the work to prevent additional erosion
 - The need for a permanent easement (in cases where public infrastructure is at risk on private property) and/or a temporary easement for construction access
- (d) Construction of proposed works
- (e) Inspection of final works including obtaining signoff on the items listed under the construction contract

Easement Requirements

The need for permanent easements will be assessed for each private site based on whether it is important to obtain a continuing covenant from the private owner not to interfere with the erosion restoration work completed and /or whether future access to the site by the City is required.

A preliminary assessment of easement requirements is included in **Attachment B**. Each site and project will be assessed individually to determine the property requirements at the detailed design stage. The Real Property Department and the Legal Department will be involved in determining the property requirements and acquiring any property interests. Additional costs for obtaining easements will be factored into the project costs.

Inspection and Maintenance

Visual inspection and post construction maintenance of restored erosion sites will be carried through a City program, incorporated as part of the design and construction process. Inspection of plant material placed as part of restoration works will be conducted following completion. Once the restoration is complete and warranty period is expired, there will be not be further maintenance activities by the City at these erosion sites.

Every 5 years, City will update the City-Wide Stream Erosion Master Study which includes a field inventory. A new set of erosion sites will be identified and prioritized regardless if previous restoration work was completed or not. To date, completed erosion restoration sites have been demonstrated to be stable with only minor but acceptable progression in erosion - no previously restored sites have required further capital works.

FINANCIAL CONSIDERATIONS AND TEMPLATE: (external link)

City funded erosion sites are currently funded by Development Charges and Life Cycle Replacement and Capital Reserves based on the 2007 Council endorsed guidelines. The Development Charges Background Study (2018) and the Life Cycle Replacement and Capital Reserve will need to be updated with new funding estimates.

The prioritized fifteen (15) erosion sites will be restored by end of 2019 at an estimated cost of \$2.2M funded by Life Cycle Replacement and Capital Reserves (\$1.5M) and Development Charges (\$0.7M). The 2016 Life Cycle Reserve has already included \$13.9M of funding over a 25 year lifespan to address erosion restoration (75 sites) up to 2041. The 2013 Development Charges Background Study identified \$6.7M to be collected for erosion control up to 2031. The funding for erosion restoration will be requested as part of annual budget process.

HUMAN RESOURCES CONSIDERATIONS:

Not applicable.

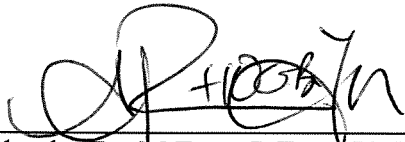
ALIGNMENT WITH STRATEGIC PRIORITIES:

The City-wide Stream Erosion Master Study Update provides an implementation plan of restoring erosion of watercourses within the City, which would enhance and protect the quality of the watercourse. As such, this study aligns with the City's strategic priorities.

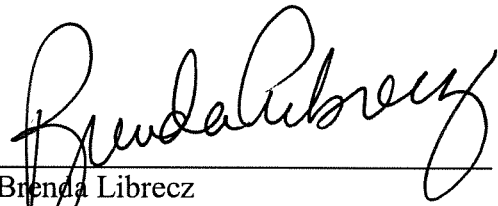
BUSINESS UNITS CONSULTED AND AFFECTED:

The Finance, Engineering and Legal Departments have reviewed this report and their comments have been incorporated.

RECOMMENDED BY:



Phoebe Fu, M.Eng., P.Eng., PMP
Director, Asset Management



Brenda Librecz
Commissioner, Community & Fire Services

ATTACHMENTS:

Attachment A - Top Thirty (30) Priority Erosion Sites - Summary

Attachment B - Top Thirty (30) Priority Erosion Sites - Implementation Cost, Schedule and Easement Requirements

Attachment A – Top Thirty (30) Priority Erosion Sites - Summary

2013 System Rank	Watercourse	Reach	Site ID 2013	Site ID 2007	Description of Erosion	Located on Private or Public Land (or Both)	Length of Observed Erosion	Bank Height	Description of Proposed Remediation	EA Requirements	Approval Requirements
1	Berczy	14	BZ-ES-03	BZ-EZ-02	Key Mode of Adjustment: Widening Description of Erosion: Actively eroding scour along outer meander. Large woody debris blocking channel at midpoint of scour. Undercutting and exposed tree roots adjacent to private property.	Public	60	2	1. Remove large woody debris from within channel 2. Construct by-pass channel for high flows 3. Construct timber crib wall along erosion area (outside of channel bend) with rock toe protection and flow deflectors	Schedule B	Markham TRCA MNR
2	Berczy	9	BZ-ES-22	BZ-EZ-14	Key Mode of Adjustment: Planimetric Form Adjustment and Aggradation Description of Erosion: Undercutting and scouring. Fallen trees across channel due to bank failure.	Private	35	2.5	1. Remove large woody debris from within channel 2. Install grade control structure to dissipate energy 3. Install rock toe protection along outside bend 4. Bank reshaping and plantings principals	Schedule B	Markham TRCA MNR
3	Robinson	1	ROB-ES-06		Key Mode of Adjustment: Degredation and Widening Description of Erosion: Sewer pipe crosses channel at location of scouring. Groundwater seep occuring at midpoint of scouring. Undercutting throughout site extent.	Both	30	2.5	1. Remove large woody debris from within channel 2. Install grade control structure to dissipate energy 3. Install rock toe protection along outside bend 4. Bank reshaping and plantings 5. Potential channel re-alignment using natural channel design principals	Schedule B	Markham TRCA MNR
4	Berczy	9	BZ-ES-25	BZ-EZ-15	Key Mode of Adjustment: Planimetric Form Adjustment and Aggradation Description of Erosion: Scouring and undercutting occuring adjacent to private property. Failing trees located throughout scour. Failed rip rap bank treatment.	Private	105	1.5	1. Remove debris from in channel 2. Install rock toe protection along outside bend 3. Bank reshaping and plantings 4. Create longer better defined thalweg using rock shoals.	Schedule B	Markham TRCA MNR
5	Rouge	8	R-ES-40		Key Mode of Adjustment: Widening Description of Erosion: High flows from tributary are eroding the left bank at the confluence point. Rip rap and poured concrete bank treatment (R-RR-34) are failing at location of scour. No evidence of exposed sewer pipe in channel bed.	Public	15	2	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Remove failed riprap/concrete if sewer is at risk 3. Build grade control/sewer protection using armour stone (if required) 4. Install rock deflectors 5. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
6	Robinson	4	ROB-ES-13		Key Mode of Adjustment: Planimetric Form Adjustment Description of Erosion: Large beaver dam obstructing channel and causing upstream flooding. Flooded area encompasses sewer pipe alignment and is in close proximity to manhole.	Public	50	1	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Remove beaver dam - if flooded manhole is of concern 3. Reinstate natural channel	Schedule B	Markham TRCA MNR
7	Bruce	trib a	BRUT-ES-01		Key Mode of Adjustment: Widening Description of Erosion: Scouring and undercutting adjacent to private property. Woody debris located adjacent to right bank at midpoint of site. Exposed tree roots at upstream limit. Concrete box culvert immediately upstream of erosion site.	Private	35	1.3	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
8	Bruce	4	BRU-ES-12		Key Mode of Adjustment: Degredation and widening Description of Erosion: Scouring and undercutting occurring adjacent to Angus Glen Golf Club. Exposed weeping tile pipe across channel at location of scour. Construction of Angus Glen Blvd bridge partially complete downstream.	Both	24	1	1. Discuss weeping tile with property owner 2. Install rock toe protection 3. Bank reshaping and plantings	Schedule B	Markham TRCA MNR

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9	Robinson	1	ROB-ES-08		Key Mode of Adjustment: Degredation Description of Erosion: Undercutting and scouring of outer meander at location of sewer pipe crossing. Failing concrete rubble (bank treatment site ROB-O-05) upstream and downstream of scour. No evidence of exposed sewer pipe in channel bed.	Both	14	2	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Grade control structures - use as sewer protection (if required)	Schedule B	Markham TRCA MNR
10	Berczy	13	BZ-ES-12		Key Mode of Adjustment: Widening Description of Erosion: Undercutting and scouring on the outer meander, upstream of a golf course crossing.	Private	14	1.6	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Discuss erosion with property owner 3. Install rock toe protection 4. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
11	Berczy	9	BZ-ES-24		Key Mode of Adjustment: Planimetric Form Adjustment Description of Erosion: Undercutting and scouring adjacent to chain link fence.	Private	33	1.5	1. Live cribwall 2. Create better defined thalweg using rock shoals	Schedule B	Markham TRCA MNR
12	Rouge	8	R-ES-61	R-ES-56	Key Mode of Adjustment: Widening Description of Erosion: Sewer pipe crosses channel at location of undercut and scouring. Channel bed could not be assessed due to high turbidity and water levels. Large woody debris is partially blocking channel and diverting flow to left bank.	Both	18	1.4	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Potentially remove debris if sewer is at risk 3. Potentially build grade control drop structure combined with sewer protection (if required)	Schedule B	Markham TRCA MNR
13	Robinson	1	ROB-ES-03	ROB-ES-02	Key Mode of Adjustment: Degredation and widening Description of Erosion: Sewer pipe crosses channel at location of undercutting and scouring. No evidence of exposed sewer pipe in channel bed.	Public	16	1	1. Further investigate sewer proximity and assess potential impact 2. Install rock toe protection along outside bend	Schedule B	Markham TRCA MNR
14	Berczy	9	BZ-ES-23		Key Mode of Adjustment: Planimetric Form Adjustment Description of Erosion: Rip rap bank treatment has failed (bank treatment site BZ-RR-22). Undercutting and scouring adjacent to chain link fence.	Private	35	1.5	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
15	Bruce	1	BRU-ES-01		Key Mode of Adjustment: Widening Description of Erosion: Sewer pipe parallel to channel and may intersect channel at location of scour.	Private	50	1.8	1. Further investigate sewer proximity and assess potential impact of erosion on sewer	Schedule B	Markham TRCA MNR
16	Mount Joy	1	MJ-ES-05		Key Mode of Adjustment: Degradation and Aggradation Description of Erosion: Undercutting and scouring adjacent to private property and sewer pipe (10 m from channel). Large woody debris downstream of scour potentially causing backwater and scouring during high flows.	Private	40	1.5	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Grade control structures - use as sewer protection (if required) 3. Remove debris from within channel 4. Install rock toe protection along outside bend	Schedule B	Markham TRCA MNR
17	Rouge	2	R-ES-07	R-ES-12	Key Mode of Adjustment: Aggradation Description of Erosion: Exposed till, undercutting, and scouring adjacent to Markham Green Golf Club. Gabion baskets adjacent to golf course bridge abutment at upstream limit are in good condition.	Private	160	1.8	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR

2013 System Rank	Watercourse	Reach	Site ID 2013	Site ID 2007	Description of Erosion	Located on Private or Public Land (or Both)	Length of Observed Erosion	Bank Height	Description of Proposed Remediation	EA Requirements	Approval Requirements
18	East Don	3	ED-ES-23	ED-ES-31	Key Mode of Adjustment: Aggradation Description of Erosion: Undercutting and scouring adjacent to sewer pipe. Multiple undercut trees may fail and lead to further erosion and bank instability.	Public	50	1.5	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Install armourstone (to protect sewer) 3. Remove nearly fallen trees/debris from within channel 4. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
19	Bruce	1	BRU-ES-04	BRU-ES-03	Key Mode of Adjustment: Widening Description of Erosion: Scouring and exposed till adjacent to sewer pipe, and private property in use. Failing tree at location of scour, and large woody debris downstream of the site.	Public	35	1.7	1. Remove debris from within channel 2. Install rock toe protection along outside bend	Schedule B	Markham TRCA MNR
20	Eckhardt	1	ECK-ES-01		Key Mode of Adjustment: Planimetric Form Adjustment and widening Description of Erosion: Channel has moved across property line into private property. Private property in vicinity of the watercourse is not in use. Property line runs parallel to the left bank. Right bank is undercut and scoured.	Both	24	0.8	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
21	Rouge	3	R-ES-09		Key Mode of Adjustment: Widening Description of Erosion: Undercutting and slumping along outer meander adjacent to Markham Green Golf Club.	Private	50	1.2	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
22	Rouge	8	R-ES-37	R-ES-39	Key Mode of Adjustment: Widening Description of Erosion: Undercut bank and scour adjacent to private property in use. The erosion site is encroaching on manicured lawn and camping area.	Public	65	1.4	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Install rock toe protection along outside bend 3. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
23	Rouge	8	R-ES-45	R-ES-43	Key Mode of Adjustment: Widening and Planimetric Form Adjustment Description of Erosion: Undercutting, scouring, and exposed tree roots. A shed is located the top of bank adjacent to the exposed till and tree roots.	Both	32	2.2	1. Install armourstone 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
24	Berczy	13	BZ-ES-14		Key Mode of Adjustment: Widening Description of Erosion: Undercutting and scouring adjacent to York Downs Golf and Country Club. Corrugated steel drainage pipe exposed at midpoint of site. Failing trees at downstream limit.	Private	10	1.1	1. Cut back pipe and add stone protection around pipe 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
25	East Don Trib	1	EDT-ES-09		Key Mode of Adjustment: Widening Description of Erosion: A failed metal fence is blocking a portion of the channel, and a debris jam has formed. Undercutting, scouring, and exposed tree roots adjacent to the debris jam. Failed armourstone and gabion bank treatments (EDT-AS-18 and EDT-GAB-19) at the location of the erosion site.	Private	15	7	1. Further investigate sewer proximity and assess potential impact of erosion on sewer 2. Remove fence and debris from within channel 3. Bank reshaping and plantings 4. Install armourstone toe protection	Schedule B	Markham TRCA MNR
26	Bruce	trib a	BRUT-ES-02		Key Mode of Adjustment: Widening Description of Erosion: Undercutting of bank and less than 3 m of mature wood lot vegetation buffer	Private	9	1	1. Install rock toe protection along outside bend 2. Bank reshaping and plantings	Schedule B	Markham TRCA MNR
27	Eckhardt	2	ECK-ES-04		Key Mode of Adjustment: Planimetric Form Adjustment Description of Erosion: Major beaver dam and large woody debris fully blocking channel, and cause upstream flooding. Multiple diversion channels on the left and right banks.	Public	80	1	1. Further investigate flooding impacts 2. Remove debris from within channel if necessary	Schedule B	Markham TRCA MNR

Attachment B – Top Thirty (30) Priority Erosion Sites - Implementation Cost, Schedule and Easement Requirements

2013 System Rank	Watercourse	Site ID	Ownership	Private Categorization	Risk	Funding Type	Total Cost *	City Portion		Owner Portion		Permanent Easement Required**	Implementation Schedule
								%	\$	%	\$		
1	Berczy	BZ-ES-03	Public		Private Prop-In Use	Full City	\$568,960	100	\$568,960			YES	Design / Construction in 2015 / 2016
3	Robinson	ROB-ES-06	Both	D	Sewer Pipe	Full City	\$109,855	100	\$109,855			NO	Design / Construction in 2018
5	Rouge	R-ES-40	Public		Sewer Pipe	Full City	\$173,038	100	\$173,038			NO	Design / Construction in 2015 / 2016
6	Robinson	ROB-ES-13	Public		Sewer Pipe	Full City	\$32,385	100	\$32,385			NO	Design / Construction in 2016 / 2017
7	Bruce	BRUT-ES-01	Private	A	Private Prop-In Use	Full City	\$116,523	100	\$116,523			YES	Design / Construction in 2018 / 2019
8	Bruce	BRU-ES-12	Both	E	Private Prop-In Use	Full City	\$87,884	100	\$87,884			NO	Design / Construction in 2018 / 2019
9	Robinson	ROB-ES-08	Both	D	Sewer Pipe	Full City	\$30,099	100	\$30,099			NO	Design / Construction in 2018
12	Rouge	R-ES-61	Both	D	Sewer Pipe	Full City	\$36,703	100	\$36,703			NO	Design / Construction in 2018 / 2019
13	Robinson	ROB-ES-03	Public		Sewer Pipe	Full City	\$50,546	100	\$50,546			NO	Design / Construction in 2018
15	Bruce	BRU-ES-01	Private	A	Sewer Pipe	Full City	\$32,385	100	\$32,385			NO	Design / Construction in 2019 / 2020
17	Rouge	R-ES-07	Public		Private Prop-In Use	Full City	\$441,960	100	\$441,960			NO	Design / Construction in 2016 / 2017
18	East Don	ED-ES-23	Public		Sewer Pipe	Full City	\$197,485	100	\$197,485			NO	Design / Construction in 2019 / 2020
19	Bruce	BRU-ES-04	Public		Sewer Pipe	Full City	\$78,423	100	\$78,423			NO	Design / Construction in 2019 / 2020
20	Eckhardt	ECK-ES-01	Public		Property Line	Full City	\$87,884	100	\$87,884			NO	To be confirmed in next master study update
21	Rouge	R-ES-09	Public		Private Prop-In Use	Full City	\$155,575	100	\$155,575			NO	Design / Construction in 2016 / 2017
TOTAL CITY FUNDING									\$2,199,705				

* Total Cost includes capital costs estimated in the Class EA Report plus 15% allowance for design and contract administration, plus 15% contingency and 12% program management

** Only for sites with footprint within or close proximity to private property. Assumes access routes through private property will be obtained through PTE or Temporary Easements

*** RSS Structure Installed as part of Warden Ave Widening through Region Project Completed in Dec 2014. Removed from implementation list.