Summary of Stormwater Design Alternatives in Keating Channel Precinct

Evaluation Criteria	**Alternative 1** All land uses (development blocks, open space/parks and roads) have individual systems for treating stormwater including Total Suspended Solid (TSS) removal and disinfection.	**Alternative 2** All land uses have individual site systems for TSS removal but there is a common facility used for disinfection.	**Alternative 3A** All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are optimized to meet the required water quality targets.	**Alternative 3B** All land uses share a common facility for all stormwater treatment (i.e., TSS removal and disinfection), but the facilities are only designed to service Keating Channel Precinct. Facilities are sized based on available space.	**Alternative 4A** All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities for adjacent neighbourhoods (i.e., EBF and WDL). Facilities are optimized to meet the required water quality targets.	**Alternative 4B** All land uses share common TSS removal and disinfection systems and the facilities are designed to be integrated with facilities in adjacent neighbourhoods. The facilities are optimized to meet the required water quality targets. Facilities are sized based on available space.
Natural Environment ▪ Don Mouth Naturalization ▪ New Natural Area – (Wetlands)	No difference to Don Mouth Naturalization because Keating Channel Precinct (i.e., proposed improvements) are north of Villiers/Commissioners Street					
Social Environment ▪ Vibrant, mixed use community ▪ Access to water	- The most amount of land is lost within each land use, to provide individual systems.	- Some land is lost within each land use to provide individual systems for TSS removal.	Is a viable option for Keating Channel Precinct but requires more land in "larger picture" of adjacent neighbourhoods, – creates some redundancy and limits total space available for mixed use, vibrant communities. + Good water quality targets	Is a viable option for Keating Channel Precinct but requires more land in "larger picture" of adjacent neighbourhoods, – creates some redundancy and limits total space available for mixed use, vibrant communities. - Water quality targets are lower.	+ This alternative maximizes use of space and provides good water quality targets - Keating Channel Precinct stormwater functioning is dependent on work of others in adjacent studies.	+ This alternative ensures that Keating Channel Precinct stormwater is dealt with appropriately, regardless of outcome of adjacent studies and supports mixed use, vibrant community.
Economic Environment ▪ Economically viable blocks ▪ Cost-effective to build	- Least cost-effective to build multiple systems for each land use for TSS removal and disinfection.	- Not cost-effective to build multiple systems for each land use for TSS removal.	Is acceptable for Keating Channel Precinct but not most cost-effective way to manage stormwater (i.e., each neighbourhood has their own system).	Is acceptable for Keating Channel Precinct but not most cost-effective way to manage stormwater (i.e., each neighbourhood has their own system).	Is most cost-effective to build but has a higher level of risk when Keating Channel stormwater approvals are dependant on outcome of adjacent studies.	+ This alternative is cost-effective to build because it is integrated with stormwater treatment in adjacent neighbourhoods, includes natural processes and confirms appropriate water quality targets, independent of adjacent studies.
Cultural Environment ▪ Aboriginal people ▪ Heritage structures ▪ Archaeology	No difference between alternatives to cultural environment – no impacts.					
Sustainability ▪ WT Sustainability Framework ▪ City sustainability standards ▪ Impervious surfaces ▪ Water Quality Improvement	Will meet partial sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. - Will not achieve technical sustainability and other engineering aspects due to having separate UV treatment facilities for disinfection.	Will meet partial sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. Will achieve partial technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. + Will achieve technical sustainability and other engineering aspects with common facility for UV treatment.	Will meet sustainability targets by improving water quality, reducing impervious surfaces and addressing both City and WT sustainability standards and framework. + Will achieve technical sustainability and other engineering aspects with common facility for UV treatment.
Land Use and Property ▪ New land uses ▪ Public realm goals ▪ Property	- Has the greatest property impacts within each land use.	- Has property impacts within each land use.	Has minor property impacts.	Has minor property impacts.	Has minor property impacts.	Has minor property impacts.
Transportation ▪ Walkability ▪ Transit priority ▪ Zero-growth traffic ▪ Parking	N/A					
Municipal Services Utilities	No difference - All alternatives are capable of servicing the Keating Channel Precinct adequately and all utility impacts can be mitigated					
Summary	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	NOT PREFERRED	**PREFERRED**

Alternative 4B is the Preferred Stormwater Design because it maximizes efficiencies with adjacent stormwater treatment facilities and land uses, is most compatible with the City of Toronto's goals for stormwater management in the waterfront area, it uses less land in each separate neighborhood because integrated facilities' are used. The Preferred Stormwater Design includes:

- Tying into the proposed tank in East Bayfront EA to service lands west of Cherry Street;
- Locating LDL tanks adjacent to the West Don Lands tanks (at the rail berm north of Lake Shore Boulevard), to service lands east of Cherry Street (north of the Keating Channel); and sharing pumping and UV treatment facilities; and
- Using either a new tank (permanently) to service lands north of Villiers Street (south of Keating Channel) or servicing this part of Keating North (temporarily) with oil grit separators until designs are confirmed for lands south of Villiers Street, in the Lower Don Lands study area. The decision to build something permanent or temporary for lands on the north side of Villiers Street (in Keating Channel Precinct) will be made through discussions with the City prior to implementation.

Legend
+ Advantage - Disadvantage

STORMWATER MANAGEMENT BMP SELECTION MATRIX FOR LOWER DON LANDS CLASS EA - OPPORTUNITIES AND CONSTRAINTS

UPSTREAM → **DOWNSTREAM**

Development Blocks (Privately Controlled)

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaninated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quality treatment)		Liner required to prevent infiltration to contaninated soil conditions
Street Trees (Silva Cells)		Roof water could be routed through these systems prior to discharge to the street tree silva cells
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

End of Pipe Controls

Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Feasible for block areas less than 5.0 ha
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		No specific need for this application identified

Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective
Disinfection: b) Sand Filtration		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Development Blocks (WATERFRONTornto)

Source Controls

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

Conveyance Controls

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaninated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Liner required to prevent infiltration to contaninated soil conditions
Street Trees (Silva Cells)		Roof water could be routed through these systems prior to discharge to the street tree silva cells
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

End of Pipe Controls

Sedimentation

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Feasible for block areas less than 5.0 ha
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		No specific need for this application identified

Pre-Disinfection Filtration

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Disinfection

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective
Disinfection: b) Sand Filtration		Individually operated disinfection systems not desirable from cost/ qualitiy control perspective

Public Park Land and Open Space

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaninated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Cost benefit quistionable given opportunities to achieve drainage objectives with other bmps
Street Trees (Silva Cells)		
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		Generally other bmps would be more cost effective. Maybe considered for spill control
Infiltration Basins		My be feasible for areas next to lake or river if engineered soils imported
Dry Ponds		
Wet Ponds		
Constructed Wetlands		
Screening Facilities		Source of conveyance controls provide this function
In-line or Off-line Shallow Underground Tanks		End of pipe integrated solution with EBF and WDL provides this function
In-line or Off-line Deep Underground Tanks/Tunnels		End of pipe integrated solution with EBF and WDL provides this function
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		No specific need for this application identified
Real Time Monitoring		Consider need if disinfection systems are warranted

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		Designs should provide ability to implement if UV treatment is proposed

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		
Disinfection: b) Sand Filtration		May be feasible for management of surfaces draining to lake/ river

Public Road

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		Not Generally Applicable
Rainwater Harvesting for Toilet Flushing Demands		Not Generally Applicable
Rainwater Harvesting for Street Tree Irrigation Needs		Roadway runoff quility not deemed suitable for irrigation
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Structural measures may be required to limit width and impact on Road Allowance width
Filter Strips		Application will increase the width of the Road Allowance
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		Roadway runoff quility not deemed suitable for irrigation

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		Structural measure may be required to limit width and impact on Road Allowance width
Catchbasin Filters		Infiltration not feasible given soil contamination issues
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaninated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Liner required to prevent infiltration to contaninated soil conditions
Street Trees (Silva Cells)		Located in boulevard but receives irrigation supply from roof areas from adjacent developments
OGS - Oil Grit Separator		Locate such that contributing drainage are is less than 5.0 ha

GO TO END OF PIPE CONTROLS FOR STORMWATER MANAGEMENT FACILITY

Stormwater Management Facility

BMP	Potential	Opportunity / Constraint
Retention - Green Roof		
Rainwater Harvesting for Toilet Flushing Demands		
Rainwater Harvesting for Street Tree Irrigation Needs		
Control of Fertilizers		
Retention - Absorbent Landscaping (rain gardens, bio filters)		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Filter Strips		
Sand Filtration Systems		Liners may be required to mitigate potential impacts on infiltration to contaminated soils
Soak Away Pits		Infiltration not feasible given soil contamination issues
Pervious Pavements		
Retention for Site Irrigation		

BMP	Potential	Opportunity / Constraint
Swales (grassed, bio-filtration)		
Catchbasin Filters		
Pervious Catchbasins		Infiltration not feasible given soil contamination issues
Pervious Pipes		Liner required to prevent infiltration to contaninated soil conditions
Storm Sewers		
Sand Filters (use roadway fill materials as filter medium for water quility treatment)		Cost benefit quistionable given opportunities to achieve drainage objectives with other bmps
Street Trees (Silva Cells)		
OGS - Oil Grit Separator		Considerd end of pipe solution for this application

BMP	Potential	Opportunity / Constraint
Oil Grit Separators		End of pipe contributing areas are greater than 5.0 ha. OGS considered o
Infiltration Basins		Infiltration not feasible given soil contamination issues
Dry Ponds		Land area requirements unacceptable
Wet Ponds		Land area requirements unacceptable
Constructed Wetlands		Land area requirements unacceptable
Screening Facilities		Consider for design of major storm inlets and storm pumping station
In-line or Off-line Shallow Underground Tanks		
In-line or Off-line Deep Underground Tanks/Tunnels		
High Rate Treatment Devices/Storage in Receiving Waters by Displacement		
Real Time Monitoring		

BMP	Potential	Opportunity / Constraint
Provisional Filtration Systems for Optimizing Operation of UV Treatment Facility		

BMP	Potential	Opportunity / Constraint
Disinfection: a) UV Treatment		
Disinfection: b) Sand Filtration		

Legend

- Potential component of SWM treatment train
- Conditional component of SWM treatment train process
- No potential as component of SWM treatment train process

AECOM

(Rev 0)

Project No: 109446

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