APPENDIX E: LOW IMPACT DEVELOPMENT (LID'S) CALCULATIONS

C.C. Tatham & Associates Ltd.
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PROJECT:	Sophia Creek Watershed & Mulcaster Drainage Area EA Update
FILE NUMBER:	115172
DATE:	September 2016
DESIGNED BY:	Nick Milligton
CHECKED BY:	Daniel Twigger
SUBJECT:	Low Impact Development (LID's) Calculations

LOW IMPACT DEVELOPMENT (LID's) CALCULATIONS

Achievable Volume Reductions for Parkland LID's

Upper Limit - Soil Infiltration Rates

Park	Drainage Area (ha)	LID Footprint (m^2)	Soil Type	Infiltration Rate (mm/hr)	LID Depth (mm)	Porosity	Storage Volume (m^3)	Eq. Runoff Depth (mm)
College Heights	11.2	1,000	Vasl	30	3600	0.4	1,440	12.9
Archie Goodall	10.1	1,800	Shsc	10	1200	0.4	864	8.6
Steel Street	10.9	600	Shsc	10	1200	0.4	288	2.6
HG Robertson	13.4	2,900	Shsc	10	1200	0.4	1,392	10.4
Ferris Park	9.6	6,500	Shsc	10	1200	0.4	3,120	32.5
Total	**55.2**	**12,800**	**-**	**-**	**-**	**0.4**	**7,104**	**13.4**

Lower Limit - Soil Infiltration Rates

Park	Drainage Area (ha)	LID Footprint (m^2)	Soil Type	Infiltration Rate (mm/hr)	LID Depth (mm)	Porosity	Storage Volume (m^3)	Eq. Runoff Depth (mm)
College Heights	11.2	1,000	Vasl	20	2400	0.4	960	8.6
Archie Goodall	10.1	1,800	Shsc	1	120	0.4	86	0.9
Steel Street	10.9	600	Shsc	1	120	0.4	29	0.3
HG Robertson	13.4	2,900	Shsc	1	120	0.4	139	1.0
Ferris Park	9.6	6,500	Shsc	1	120	0.4	312	3.3
Total	**55.2**	**12,800**	**-**	**-**	**-**	**0.4**	**1,526**	**2.8**

Average - Soil Infiltration Rates

Park	Drainage Area (ha)	LID Footprint (m^2)	Soil Type	Infiltration Rate (mm/hr)	LID Depth (mm)	Porosity	Storage Volume (m^3)	Eq. Runoff Depth (mm)
College Heights	11.2	1,000	Vasl	25	3000	0.4	1,200	10.7
Archie Goodall	10.1	1,800	Shsc	5	600	0.4	432	4.3
Steel Street	10.9	600	Shsc	5	600	0.4	144	1.3
HG Robertson	13.4	2,900	Shsc	5	600	0.4	696	5.2
Ferris Park	9.6	6,500	Shsc	5	600	0.4	1,560	16.3
Total	**55.2**	**12,800**	**-**	**-**	**-**	**0.4**	**4,032**	**7.6**

Notes:
1) Vasl - Vasey Loamy Sand (A)
2) Shsc - Schomberg Silty Clay Loam (C)
3) LID Depth based on 48 hour drawdown time

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LOW IMPACT DEVELOPMENT (LID's) CALCULATIONS

Achievable Volume Reductions for Road Reconstruction Projects

Sophia Creek Watershed (outside Wellhead Protection Area)

Area of Paved Roads (ha)	42.5
Area of Road Allowance (ha)	100
Drainage Area (ha)	363.3
Typical Road Allowance Width (m)	20

Perforated Pipe Design - Based on Low Impact Development SWM Planning and Design Guide

Perforated Pipe System - Lower Limit		Pervious Pipe System - Upper Limit	
Trench Width (m)	0.6	Trench Width (m)	2.4
LID Surface Area (m^2)	30,000	LID Surface Area (m^2)	120,000
Trench Depth Below Storm Sewer (m)	0.5	Trench Depth Below Storm Sewer (m)	0.9
Trench Porosity	0.4	Trench Porosity	0.4
Trench Storage Volume (m^3)	6,000	Trench Storage Volume (m^3)	43,200
Intercepted Runoff Volume (m)	0.0017	Intercepted Runoff Volume (m)	0.0119
Intercepted Runoff Volume (mm)	**1.7**	**Intercepted Runoff Volume (mm)**	**11.9**
Equivalent Infiltration Rate (mm/hr)	4.2	Equivalent Infiltration Rate (mm/hr)	7.5

Intercepted Runoff Volume (mm) - Average **6.8** (Average intercepted runoff volume based on site constraints)

Perforated Pipe Design - Based on Soil Infiltration Rates

Silty Clay Loam

Trench Width (m)	0.6	Trench Width (m)	2.4
LID Surface Area (m^2)	30,000	LID Surface Area (m^2)	120,000
Infiltration Rate (mm/hr)	5	Infiltration Rate (mm/hr)	5
Trench Depth Below Storm Sewer (m)	0.6	Trench Depth Below Storm Sewer (m)	0.6
Trench Porosity	0.4	Trench Porosity	0.4
Trench Storage Volume (m^3)	7,200	Trench Storage Volume (m^3)	28,800
Intercepted Runoff Volume (m)	0.0020	Intercepted Runoff Volume (m)	0.0079
Intercepted Runoff Volume (mm)	**2.0**	**Intercepted Runoff Volume (mm)**	**7.9**

Intercepted Runoff Volume (mm) - Average **5.0** (Average intercepted runoff volume based on soil conditions)

Trench design to achieve minimum 5.0 mm Intercepted Runoff Volume

Trench Width (m)	1.5
Trench Depth Below Storm Sewer (m)	0.6
Trench Porosity	0.4
Storage Volume (m^3/m)	0.4

Note: 1) LID Depth based on 48 hour drawdown time