

APPENDIX B

DETENTION BASIN STORAGE CALCULATIONS

Existing Case

Low Density Urban Dev (Ext)	
Area	0 ha
(using QUDM Table 5.04.2)	
C ₁₀	
F ₁ ×C ₁₀	0.00
C ₁	0.00
Time of conc	mins
Intensity	mm/h
Flow	0.00 m ³ /s
Total Flow	0.29 m ³ /s
Volume	0.0 m ³

Open Space (Int)	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.66
F ₁ ×C ₁₀	0.44
C ₁	0.44
Time of conc	30 mins
Intensity	55 mm/h
Flow	0.29 m ³ /s

Developed Case

Commercial Dev	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.88
F ₁ ×C ₁₀	0.59
C ₁	0.59
Time of conc	16 mins
Intensity	76 mm/h
Flow	0.53 m ³ /s
Total Flow	0.53 m ³ /s
Volume	506.6 m ³

Detention Basin Sizing (preliminary)

Peak inflow	0.53 m ³ /s
Peak outflow	0.29 m ³ /s
Volume	675.53 m ³
r	0.46

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
197.11	308.88	204.10	252.99	308.88

Applying factor of safety 2

Required volume is - 618 m ³ .
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Existing Case

Low Density Urban Dev (Ext)	
Area	0 ha
(using QUDM Table 5.04.2)	
C ₁₀	
F ₅ ×C ₁₀	0.00
C ₅	0.00
Time of conc	mins
Intensity	mm/h
Flow	0.00 m ³ /s
Total Flow	0.62 m ³ /s
Volume	0.0 m ³

Open Space (Int)	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.66
F ₅ ×C ₁₀	0.61
C ₅	0.61
Time of conc	30 mins
Intensity	86 mm/h
Flow	0.62 m ³ /s

Developed Case

Commercial Dev	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.88
F ₅ ×C ₁₀	0.81
C ₅	0.81
Time of conc	16 mins
Intensity	117 mm/h
Flow	1.12 m ³ /s
Total Flow	1.12 m ³ /s
Volume	1071.0 m ³

Detention Basin Sizing (preliminary)

Peak inflow	1.12 m ³ /s
Peak outflow	0.62 m ³ /s
Volume	1428.00 m ³
r	0.45

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
405.27	640.77	419.99	523.02	640.77

Applying factor of safety 2

Required volume is -	1282 m ³ .
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Existing Case

Low Density Urban Dev (Ext)	
Area	0 ha
(using QUDM Table 5.04.2)	
C ₁₀	
F ₁₀ xC ₁₀	0.00
C ₁₀	0.00
Time of conc	mins
Intensity	mm/h
Flow	0.00 m ³ /s
Total Flow	0.75 m ³ /s
Volume	0.0 m ³

Open Space (Int)	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.66
F ₁₀ xC ₁₀	0.66
C ₁₀	0.66
Time of conc	30 mins
Intensity	96 mm/h
Flow	0.75 m ³ /s

Developed Case

Commercial Dev	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.88
F ₁₀ xC ₁₀	0.88
C ₁₀	0.88
Time of conc	16 mins
Intensity	129 mm/h
Flow	1.34 m ³ /s
Total Flow	1.34 m ³ /s
Volume	1283.5 m ³

Detention Basin Sizing (preliminary)

Peak inflow	1.34 m ³ /s
Peak outflow	0.75 m ³ /s
Volume	1711.38 m ³
r	0.44

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
474.82	756.19	492.40	615.50	756.19

Applying factor of safety 2

Required volume is -	1512 m ³ .
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Existing Case

Low Density Urban Dev (Ext)	
Area	0 ha
(using QUDM Table 5.04.2)	
C ₁₀	
F ₂₀ ×C ₁₀	0.00
C ₂₀	0.00
Time of conc	mins
Intensity	mm/h
Flow	0.00 m ³ /s
Total Flow	0.90 m ³ /s
Volume	0.0 m ³

Open Space (Int)	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.66
F ₂₀ ×C ₁₀	0.71
C ₂₀	0.71
Time of conc	30 mins
Intensity	108 mm/h
Flow	0.90 m ³ /s

Developed Case

Commercial Dev	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.88
F ₂₀ ×C ₁₀	0.94
C ₂₀	0.94
Time of conc	16 mins
Intensity	146 mm/h
Flow	1.62 m ³ /s
Total Flow	1.62 m ³ /s
Volume	1554.4 m ³

Detention Basin Sizing (preliminary)

Peak inflow	1.62 m ³ /s
Peak outflow	0.90 m ³ /s
Volume	2072.49 m ³
r	0.45

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
581.42	922.68	602.75	752.05	922.68

Applying factor of safety 2

Required volume is -	1845 m ³ .
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Existing Case

Low Density Urban Dev (Ext)	
Area	0 ha
(using QUDM Table 5.04.2)	
C ₁₀	
F ₅₀ xC ₁₀	0.00
C ₅₀	0.00
Time of conc	mins
Intensity	mm/h
Flow	0.00 m ³ /s
Total Flow	1.13 m ³ /s
Volume	0.0 m ³

Open Space (Int)	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.66
F ₅₀ xC ₁₀	0.77
C ₅₀	0.77
Time of conc	30 mins
Intensity	124 mm/h
Flow	1.13 m ³ /s

Developed Case

Commercial Dev	
Area	4.24 ha
(using QUDM Table 5.04.2)	
C ₁₀	0.88
F ₅₀ xC ₁₀	1.03
C ₅₀	1.00
Time of conc	16 mins
Intensity	167 mm/h
Flow	1.97 m ³ /s
Total Flow	1.97 m ³ /s
Volume	1888.2 m ³

Detention Basin Sizing (preliminary)

Peak inflow	1.97 m ³ /s
Peak outflow	1.13 m ³ /s
Volume	2517.62 m ³
r	0.43

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
663.52	1074.09	689.18	868.81	1074.09

Applying factor of safety 2

Required volume is -	2148 m ³ .
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Existing Case

Low Density Urban Dev (Ext)
 Area 0 ha
 (using QUDM Table 5.04.2)
 C_{10}
 $F_{100} \times C_{10}$ 0.00
 C_{100} 0.00
 Time of conc mins
 Intensity mm/h

Open Space (Int)
 Area 4.24 ha
 (using QUDM Table 5.04.2)
 C_{10} 0.66
 $F_{100} \times C_{10}$ 0.84
 C_{100} 0.84
 Time of conc 30 mins
 Intensity 136 mm/h

Flow 0.00 m³/s
 Total Flow 1.35 m³/s
 Volume 0.0 m³

Flow 1.35 m³/s

Developed Case

Commercial Dev
 Area 4.24 ha
 (using QUDM Table 5.04.2)
 C_{10} 0.88
 $F_{100} \times C_{10}$ 1.13
 C_{100} 1.00
 Time of conc 16 mins
 Intensity 183 mm/h

Flow 2.16 m³/s
 Total Flow 2.16 m³/s
 Volume 2069.1 m³

Detention Basin Sizing (preliminary)

Peak inflow 2.16 m³/s
 Peak outflow 1.35 m³/s
 Volume 2758.83 m³
 r 0.37

Required storage volume				
Culp	Boyd	Carroll	Basha	Maximum
597.00	1026.75	623.86	811.88	1026.75

Applying factor of safety 2

Required volume is -	2054 m ³ .
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