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STORMWATER MANAGEMENT SYSTEM

Significant reference information was provided by the City of Red Deer for use on this project, including:

1. City of Red Deer 2013 Design Guidelines
2. City of Red Deer 2015 Contract Specifications
3. East Hill Major Area Structure Plan, City of Red Deer, 2013
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6. Contour Data
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9. EVRAS comments regarding MASP
10. Red Deer County comments regarding MASP
11. 2015 North MASP Engineering Study Ecological Features
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Associated Engineering gratefully acknowledges the assistance provided by the City's Engineering Department during the preparation of this report.

Appendix A - Westhoff Model Results

16/09/2005

Table 2: Post development SWMHYMO modelling using a 1:100 year 24 hour Chicago Storm

Unnamed South

Catchment	Catchment area	Release rate	Active Storage required		Wetland surface area		Elevetion at NWL	Depth of active stoarege	Elevetion at HWL
ID	(ha)	(L/s/ha)	Per ha (m3)	Total catchment(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
SC-1	522	0	938	489561	20.00	26.22	914.00	2.3	916.30
SC-1	522	1	895	467205	20.00	26.00	914.00	2.22	916.22
SC-1	522	2	853	445039	20.00	25.70	914.00	2.12	916.12
SC-1	522	3	810	422880	20.00	25.42	914.00	2.01	916.01
SC-1	522	4	768	400848	20.00	25.15	914.00	1.91	915.91
SC-1	522	5	726	378765	20.00	24.86	914.00	1.8	915.80
SC-1	522	10	419	218694	20.00	22.78	914.00	1.04	915.04

Cameo Lake

Catchment	Catchment area	Release rate	Active Storage required		Wetland surface area		Elevation at NWL	Depth of active storage	Elevation at HWL
ID	(ha)	(L/s/ha)	Per ha (m3)	Total catchment(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
SC-2	129	0	938	120983	21.16	22.33	903.50	0.56	904.06
SC-2	129	1	895	115459	21.16	22.26	903.50	0.53	904.03
SC-2	129	2	853	109981	21.16	22.21	903.50	0.51	904.01
SC-2	129	3	810	104505	21.16	22.14	903.50	0.48	903.98
SC-2	129	4	769	99229	21.16	22.10	903.50	0.46	903.96
SC-2	129	5	726	93603	21.16	22.03	903.50	0.43	903.93
SC-2	129	10	419	54045	21.16	21.61	903.50	0.25	903.75

Hazlett Lake

Catchment	Catchment area	Release rate	Active Storage required		Wetland surface area		Elevation at NWL	Depth of active storage	Elevation at HWL
ID	(ha)	(L/s/ha)	Per ha (m3)	Total catchment(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
SC-3	268	0	938	251345	55.40	57.03	877.30	0.40	877.70
SC-3	268	1	895	239868	55.40	56.95	877.30	0.38	877.68
SC-3	268	2	853	228488	55.40	56.87	877.30	0.36	877.66
SC-3	268	3	810	217111	55.40	56.82	877.30	0.35	877.65
SC-3	268	4	768	205800	55.40	56.74	877.30	0.33	877.63
SC-3	268	5	726	194461	55.40	56.65	877.30	0.31	877.61
SC-3	268	10	419	112279	55.40	56.11	877.30	0.18	877.48

Hazlett Lake

Catchment	Catchment area	Release rate	Active Storage required		Wetland surface area		Elevation at NWL	Depth of active storage	Elevation at HWL
ID	(ha)	(L/s/ha)	Per ha (m3)	Total catchment(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
SC-3 + SC-4B	359	0	938	336690	55.40	57.54	877.30	0.52	877.82
SC-3 + SC-4B	359	1	895	321315	55.40	57.45	877.30	0.50	877.80
SC-3 + SC-4B	359	2	853	306071	55.40	57.32	877.30	0.47	877.77
SC-3 + SC-4B	359	3	810	290831	55.40	57.24	877.30	0.45	877.75
SC-3 + SC-4B	359	4	768	275679	55.40	57.2	877.30	0.44	877.74
SC-3 + SC-4B	359	5	726	260491	55.40	57.11	877.30	0.42	877.72
SC-3 + SC-4B	359	10	419	150404	55.40	56.41	877.30	0.25	877.55

Unnamed North

Catchment	Catchment area	Release rate	Active Storage required		Wetland surface area		Elevation at NWL	Depth of active storage	Elevation at HWL
ID	(ha)	(L/s/ha)	Per ha (m3)	Total catchment(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
SC-4A	536	0	938	502691	22.00	31.00	906.00	1.84	907.84
SC-4A	536	1	895	479735	22.00	30.64	906.00	1.75	907.75
SC-4A	536	2	853	456975	22.00	30.25	906.00	1.66	907.66
SC-4A	536	3	810	434221	22.00	29.90	906.00	1.58	907.58
SC-4A	536	4	768	411599	22.00	29.55	906.00	1.50	907.50
SC-4A	536	5	726	388923	22.00	29.20	906.00	1.42	907.42
SC-4A	536	10	419	224559	22.00	27.00	906.00	0.91	906.91

16/09/2005

Table 3: Pre development wetland elevations for representative dry and wet years

DRY YEAR 1979

Wetland	Contributing	Catchment area	Max volume Wetland	Annual spill Volume	Wetland surface area		Elevetion at NWL	Depth of active stoarege	Elevetion at HWL
ID	Catchments	(ha)	(m3)	(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
Unnamed South	SC-1	522	14627	0	20.00	20.19	914.00	0.072	914.072
Cameo Lake	SC-2	129	108917	483316	21.60	22.41	903.50	0.500	904.00
Hazlett Lake	SC-3	268	6373	0	55.40	55.77	877.30	0.011	877.31
Hazlett Lake	SC-3+SC-4B	359	477533	100933	55.40	81.10	877.30	0.700	878.00
Unnamed North	SC-4A	536	11791	0	22.00	22.11	906.00	0.053	906.05

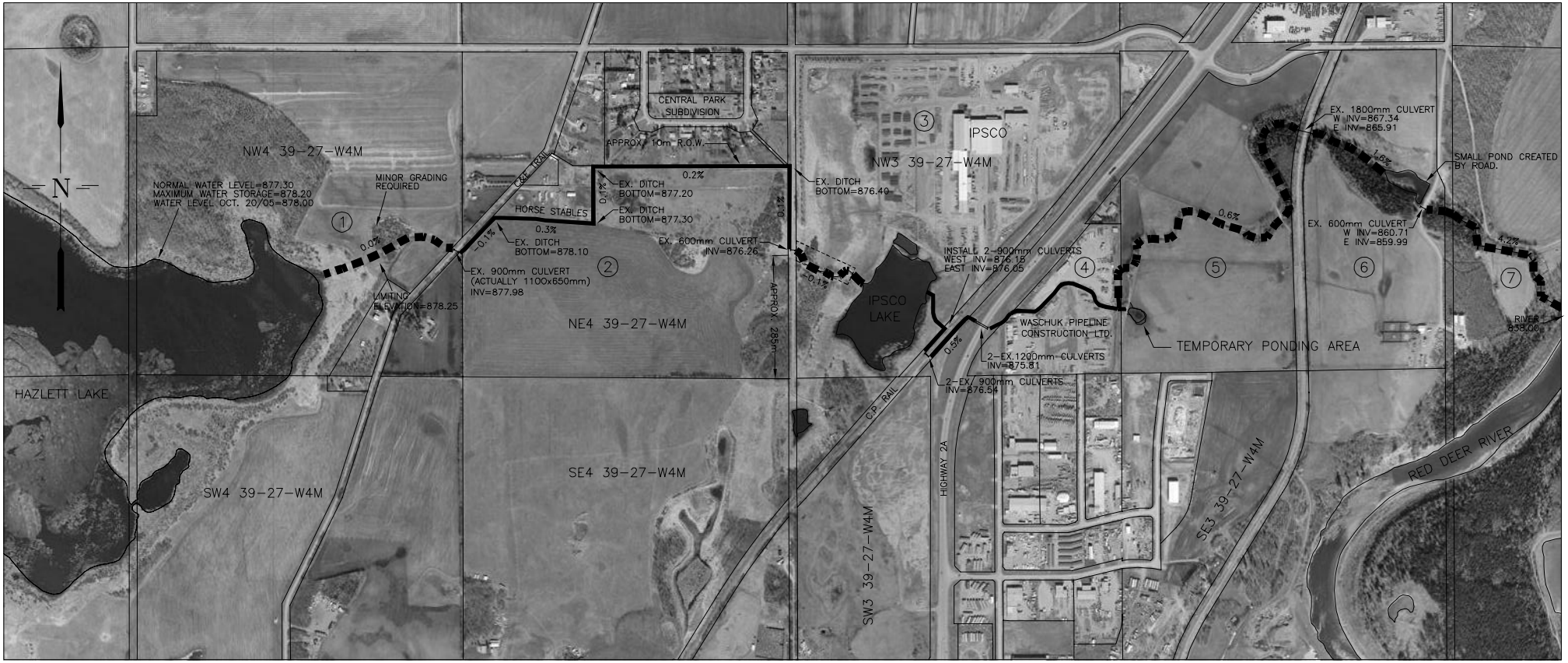
In case of spill, max elevation = assumed spillover elevation

WET YEAR 1999

Wetland	Contributing	Catchment area	Max volume Wetland	Annual spill Volume	Wetland surface area		Elevetion at NWL	Depth of active stoarege	Elevetion at HWL
ID	Catchments	(ha)	(m3)	(m3)	NWL (ha)	HWL (ha)	(m)	(m)	(m)
Unnamed South	SC-1	522	212994	487867	20.00	22.60	914.00	1.000	915.00
Cameo Lake	SC-2	129	108917	537844	21.60	22.41	903.50	0.500	904.00
Hazlett Lake	SC-3	268	132353	0	55.40	63.53	877.30	0.222	877.52
Hazlett Lake	SC-3+SC-4B	359	640181	454947	55.40	82.00	877.30	0.900	878.20
Unnamed North	SC-4A	536	90798	607698	22.00	23.40	906.00	0.400	906.40

In case of spill, max elevation = assumed spillover elevation

Appendix B - "Existing Overland Drainage Route for Hazlett Lake with Proposed Easements" Drawings - Al Terra Engineering



AREA	LEGAL	CURRENT REFERENCE TO DRAINAGE	NOTES	EASEMENT AREA REQUIRED (BASED ON 20m WIDTH)	EASEMENT COST (BASED ON $20,000/ac)
①	NW4 39-27-W4M	REGISTERED TO PLAN 2105BM-3	REFERS TO EXISTING DRAINAGE PATTERN TO BE MAINTAINED	1.710ac (0.692 ha)	$34,200
②	NE4 39-27-W4M	REGISTERED TO PLAN 2105BM-3	REFERS TO EXISTING DRAINAGE PATTERN TO BE MAINTAINED	5.970ac (2.416 ha)	$119,400
③	NW3 39-27-W4M (NW OF HWY 2A)	REGISTERED TO DOCUMENT NUMBERED 94236769 SHOWS EASEMENT IN PLACE	WRITTEN EASEMENT IN PLACE TO MAINTAIN EXISTING DRAINAGE DITCH	0.531ac (0.215 ha)	$10,620
④	NW3 39-27-W4M (SE OF HWY 2A)	REGISTERED TO DOCUMENT NUMBERED 982098000 SHOWS EXISTING DRAINAGE TO BE MAINTAINED	REFERS TO EXISTING DRAINAGE PATTERN TO BE MAINTAINED	1.742ac (0.705 ha)	$87,100 ($50,000/ac)
⑤	NE3 39-27-W4M (W OF CN RAIL)	REGISTERED TO DOCUMENT NUMBERED 982097999 SHOWS EXISTING DRAINAGE TO BE MAINTAINED	REFERS TO EXISTING DRAINAGE PATTERN TO BE MAINTAINED	4.040ac (1.635 ha)	$80,800
⑥	NE3 39-27-W4M (E OF CN RAIL)	REGISTERED TO DOCUMENT NUMBERED 982097999 SHOWS EXISTING DRAINAGE TO BE MAINTAINED	REFERS TO EXISTING DRAINAGE PATTERN TO BE MAINTAINED	1.243ac (0.503 ha)	$24,860
⑦	NW2 39-27-W4M	NONE	APPEARS THAT REGISTERED PROPERTY LINE IS ALONG VISIBLE DRAINAGE ROUTE	2.036ac (0.824 ha)	$40,720
				TOTAL = 17.272ac (6.990 ha)	TOTAL = $397,700

LEGEND:

NATURAL DRAINAGE ROUTE . . . . .

GRADED DRAINAGE ROUTE . . . . .

ULTIMATE DRAINAGE ROUTE . . . . .

AL-TERRA ENGINEERING LTD.

EDMONTON RED DEER

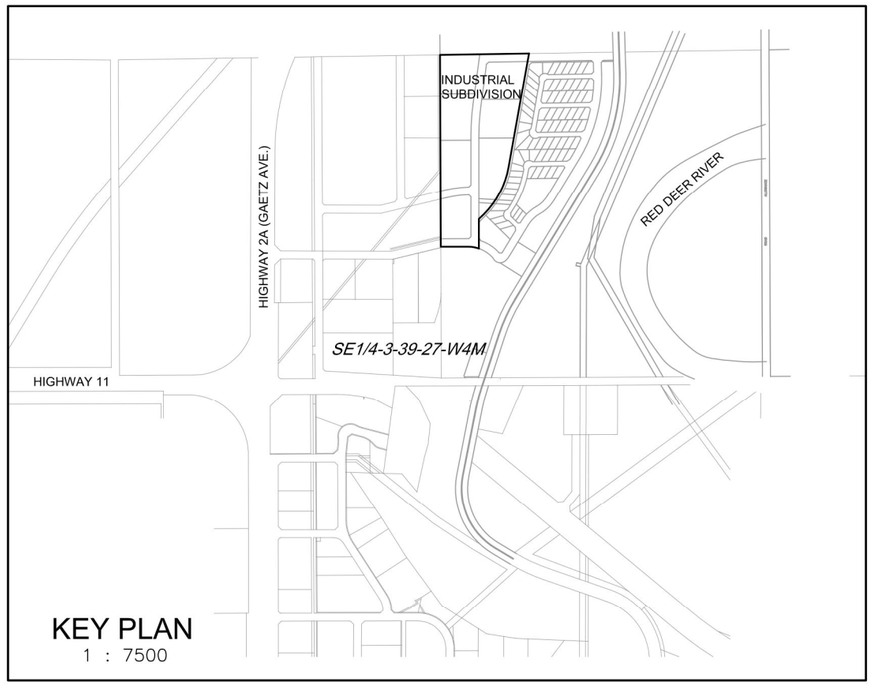
THE CITY OF RED DEER

2005 INDUSTRIAL LANDS SANITARY AND STORM TRUNK PROJECT EXISTING OVERLAND DRAINAGE ROUTE FOR HAZLETT LAKE WITH PROPOSED EASEMENTS

DRAWN: TDG	JOB No.: 260-G
DESIGN: MAB	SHEET No.: 1/1
APPROVED: MAB	DATE ORIGINAL DRAWN: SEPT 2005
ACAD: F:\PROJ\260-2005 Industrial Lands\Overland Drainage\Hazlett Lake Drainage&Ease.dwg	DATE PRN.:
SCALE: A1 SIZE 1:5000 11x17 SIZE 1:10000	DRAWING: D1

Appendix C - Chiles Industrial Park Subdivision - ISL As-Built Drawings

CHILES DEVELOPMENT CORPORATION LTD.



SUBMISSION DRAWINGS FOR

S.E. 1/4 3-39-27-4 INDUSTRIAL SUBDIVISION

COUNTY OF RED DEER, ALBERTA

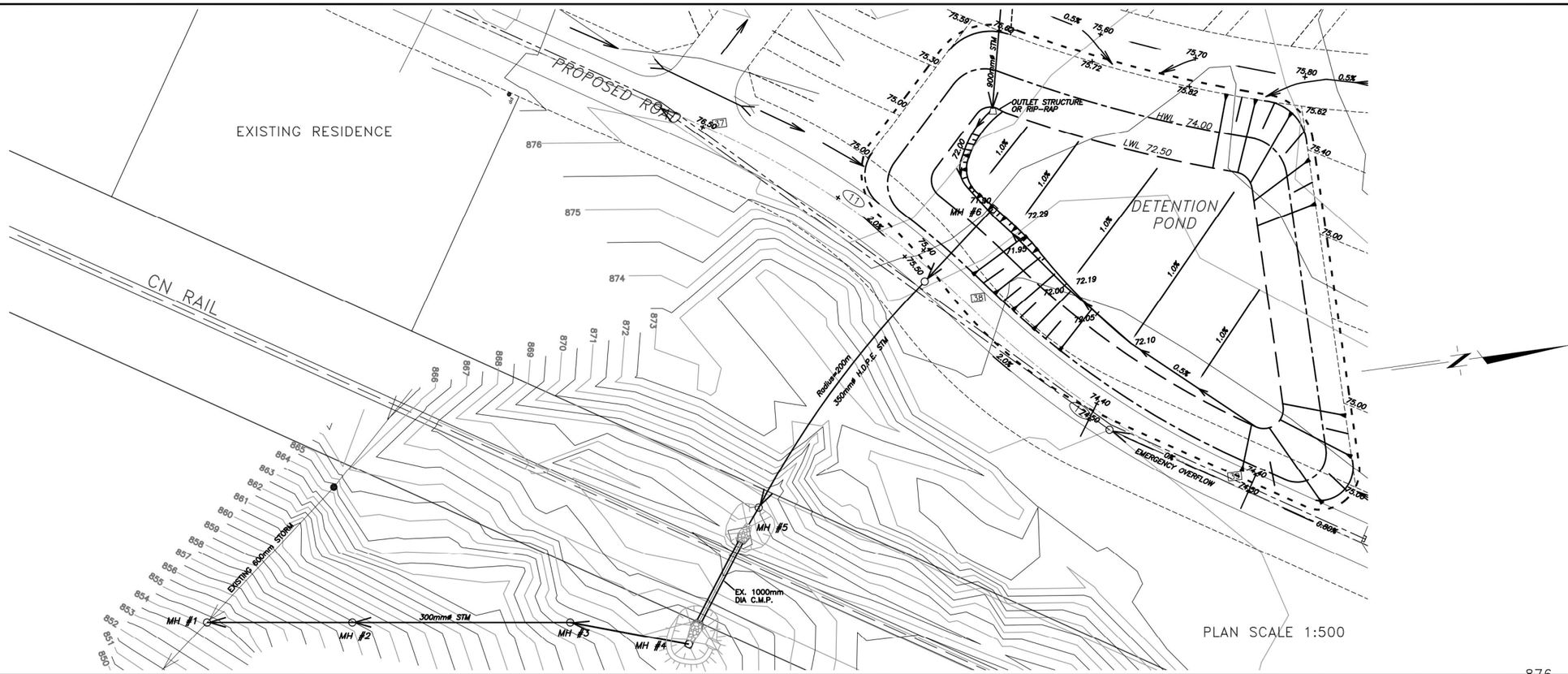
JULY, 2000

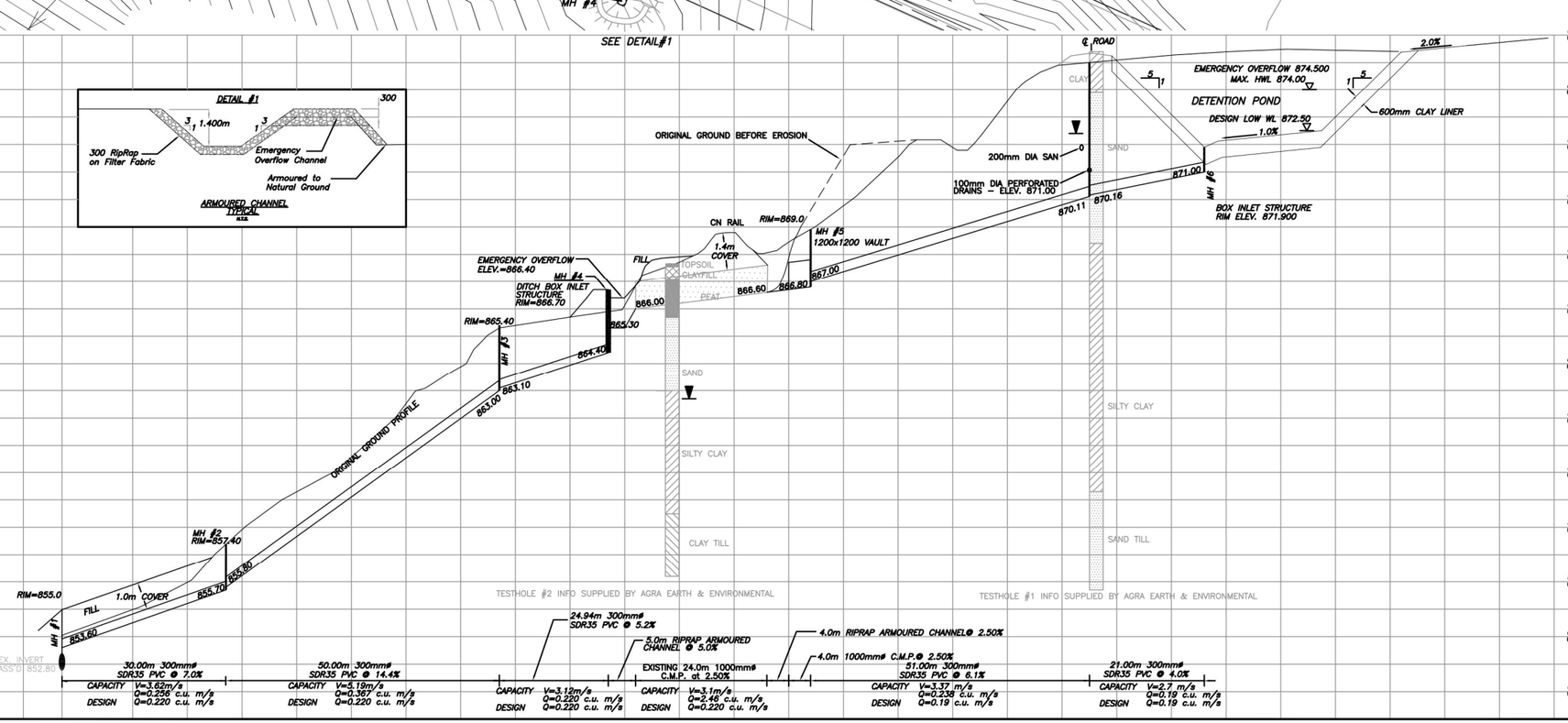
Infrastructure Systems Ltd.
ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

LIST OF DRAWINGS

DRAWING No.	DESCRIPTION
3684GR	OVERALL GRADING PLAN AND DRAINAGE PLAN
3684ST02	DRY DETENTION POND / STORM SEWER
3685SD01	STANDARD DETAILS

SET No.____





NOTES:

1. DETENTION POND AND STORM SEWER SIZED BY STORM DRAINAGE DESIGN REPORT FOR SE3-39-27-W4M BY ISL ENGINEERING MARCH 9, 2000.
2. DETENTION POND AND STORM SEWER TO BE CONSTRUCTED WITH THE INDUSTRIAL SUBDIVISION IN SE3-39-27-W4M.

NOTE:
THE LOCATION OF THE EXISTING UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL ALSO VERIFY THE EXACT LOCATION AND INVERT ELEVATION BY HAND EXCAVATION BEFORE CONSTRUCTION OF THE UTILITY CROSSING AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

UTILITIES	CONTRACTOR	DATES	
SANITARY			
WATER			
STORM			
SURFACE			
SIDEWALK			

PROFESSIONAL ENGINEER R.R. HARGROVE ALBERTA

P.ENG.

PERMIT TO PRACTICE
Infrastructure Systems Ltd.
Signature _____
Date _____
PERMIT NUMBER: P 4741
The Association of Professional Engineers, Geologists and Geophysicists of Alberta
PERMIT

NO.	REVISION	DATE	BY	CHECKED
1	ISSUE FOR PERMITS	JULY '00	RPH	RH
2	ADD NOTES, CHANGE PIPE MATERIAL / SIZE	JULY '01	RPH	RH
3				
4				
5				
6				

Infrastructure Systems Ltd.
ENGINEERS & PLANNERS

CHILES DEVELOPMENT CORPORATION LTD

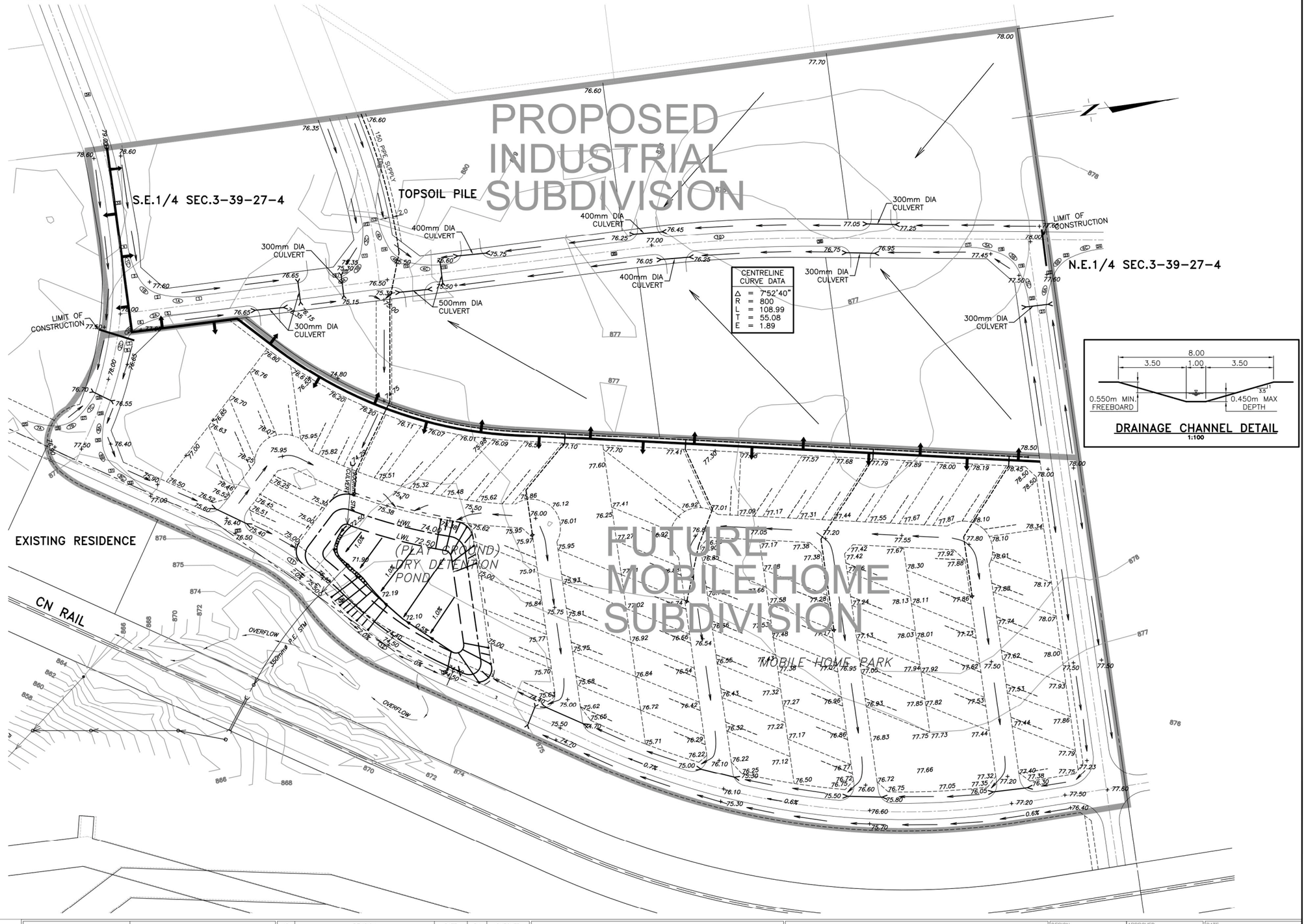
CHILES INDUSTRIAL SUBDIVISION
COUNTY OF RED DEER, ALBERTA

DRY DETENTION POND/
STORM SEWER

DESIGN:	APPROVED:	DATE:
R. HARGROVE		FEBRUARY, 2000
DRAWN:	CHECKED:	ISL PROJECT No.:
PED		3685
SCALE:		DRAWING NUMBER:
HORZ 0 5 10 15 20		3684ST02
VERT		

NAME-MONTH-DAY-YEAR-DWGNAME.DWG

COORDINATE LIST								
PT. NO.	PT. DES.	STATION	COORDINATES NORTH	COORDINATES EAST	NO.	CURVE DATA ⟨A⟩	CURVE DATA ⟨B⟩	CURVE DATA ⟨C⟩
1	B.C.		5 798 499.798	13 222.594	R	50.000	17.500	50.000
	C.C.	C 1A	5 798 499.798	13 172.594	Δ	20°12'18.0"	48°10'57.0"	173°47'46.8"
	P.I.C.	C 1A	5 798 490.890	13 222.594	T	8.909	7.825	7.903
2			5 798 482.529	13 219.517	L	17.632	14.717	15.676
	C.C.	C 1B	5 798 488.573	13 203.094	NO.	⟨A⟩	⟨B⟩	⟨C⟩
	P.I.C.	C 1B	5 798 475.186	13 216.815	R	50.000	17.500	50.000
3			5 798 472.304	13 209.540	Δ	18°06'47.4"	48°10'57.0"	1°24'12.1"
	C.C.	C 1C	5 798 518.788	13 191.124	T	7.970	7.825	0.612
	P.I.C.	C 1C	5 798 469.393	13 202.193	L	15.807	14.717	1.225
4	F.C.		5 798 468.890	13 194.506	NO.	⟨A⟩	⟨B⟩	⟨C⟩
5	B.C.		5 798 486.968	13 230.994	R	50.000	17.500	50.000
	C.C.	C 2A	5 798 486.968	13 280.994	Δ	2°34'13.2"	48°10'57.0"	16°17'16.1"
	P.I.C.	C 2A	5 798 478.998	13 230.994	T	1.122	7.825	7.155
6			5 798 471.423	13 233.472	L	2.243	14.717	14.214
	C.C.	C 2B	5 798 476.863	13 250.104	NO.	⟨A⟩	⟨B⟩	⟨C⟩
	P.I.C.	C 2B	5 798 463.986	13 235.904	R	50.000	17.500	50.000
7			5 798 460.840	13 243.069	Δ	15°48'54.3"	48°10'57.0"	20°12'18.6"
	C.C.	C 2C	5 798 506.621	13 263.170	T	6.945	7.825	8.909
	P.I.C.	C 2C	5 798 460.594	13 243.630	L	13.801	14.717	17.632
8	E.C.		5 798 460.840	13 243.069	NO.	⟨A⟩	⟨B⟩	⟨C⟩
9	B.C.		5 798 575.317	13 222.593	R	50.000	17.500	50.000
	C.C.	C 3A	5 798 559.003	13 175.329	Δ	17°20'24.6"	41°05'22.2"	20°12'18.0"
	P.I.C.	C 3A	5 798 576.377	13 222.227	T	7.624	6.559	8.909
10			5 798 577.420	13 221.813	L	15.132	12.550	17.632
	C.C.	C 3B	5 798 570.974	13 205.544	NO.	⟨A⟩	⟨B⟩	⟨C⟩
	P.I.C.	C 3B	5 798 584.695	13 218.931	R	50.000	17.500	50.000
11			5 798 587.397	13 211.588	Δ	20°12'18.0"	41°05'22.2"	20°12'18.0"
	C.C.	C 3C	5 798 540.474	13 194.319	T	8.909	6.559	8.909
	P.I.C.	C 3C	5 798 589.868	13 204.873	L	17.632	12.550	17.632
12	E.C.		5 798 590.357	13 197.735	NO.	⟨A⟩	⟨B⟩	⟨C⟩
13	B.C.		5 798 598.668	13 196.174	R	50.000	17.500	50.000
	C.C.	C 4A	5 798 648.412	13 191.124	Δ	15°48'54.3"	48°10'57.0"	14°59'00.3"
	P.I.C.	C 4A	5 798 599.369	13 203.084	T	6.945	7.825	6.575
14			5 798 601.927	13 209.540	L	13.801	14.717	13.075
	C.C.	C 4B	5 798 618.197	13 203.094	NO.	⟨A⟩	⟨B⟩	⟨C⟩
	P.I.C.	C 4B	5 798 604.809	13 216.815	R	50.000	17.500	50.000
15			5 798 612.153	13 219.518	Δ	16°11'06.7"	48°10'57.0"	13°16'05.8"
	C.C.	C 4C	5 798 629.422	13 172.594	T	7.109	7.825	5.815
	P.I.C.	C 4C	5 798 620.513	13 222.594	L	14.124	14.717	11.579
16	E.C.		5 798 629.422	13 222.594	NO.	⟨A⟩	⟨B⟩	⟨C⟩
17	B.C.		5 798 900.329	13 248.150	R	185.000	800.000	185.000
	C.C.	C 5A	5 798 891.226	13 297.315	Δ	17°18'02.7"	7°37'26.8"	20°14'45.2"
	P.I.C.	C 5A	5 798 907.826	13 249.538	T	28.145	53.305	33.030
18			5 798 914.568	13 253.097	L	55.862	106.453	65.371
	C.C.	C 5B	5 798 906.399	13 268.573	NO.	⟨A⟩		
	P.I.C.	C 5B	5 798 920.368	13 256.158	R	185.000		
19			5 798 922.728	13 262.278	Δ	20°14'45.2"		
	C.C.	C 5C	5 798 876.074	13 280.263	T	33.030		
	P.I.C.	C 5C	5 798 925.932	13 270.591	L	65.371		
20	E.C.		5 798 926.068	13 279.499				
21	B.C.		5 798 934.537	13 283.941				
	C.C.	C 6A	5 798 983.677	13 293.175				
	P.I.C.	C 6A	5 798 936.182	13 275.185				
22			5 798 940.750	13 267.537				
	C.C.	C 6B	5 798 955.775	13 276.510				
	P.I.C.	C 6B	5 798 944.113	13 281.906				
23			5 798 950.349	13 259.873				
	C.C.	C 6C	5 798 965.852	13 307.409				
	P.I.C.	C 6C	5 798 958.818	13 257.111				
24	E.C.		5 798 967.721	13 257.444				
25	B.C.		5 798 406.167	13 275.455				
	C.C.	C 7A	5 798 427.732	13 230.345				
	P.I.C.	C 7A	5 798 412.432	13 278.451				
26			5 798 419.277	13 279.625				
	C.C.	C 7B	5 798 422.236	13 262.377				
	P.I.C.	C 7B	5 798 426.989	13 280.948				
27			5 798 433.117	13 276.082				
	C.C.	C 7C	5 798 402.027	13 236.923				
	P.I.C.	C 7C	5 798 438.267	13 271.994				
28	E.C.		5 798 442.184	13 266.713				
29	B.C.		5 798 446.162	13 277.782				
	C.C.	C 8A	5 798 492.980	13 295.334				
	P.I.C.	C 8A	5 798 443.666	13 284.440				
30			5 798 443.125	13 291.528				
	C.C.	C 8B	5 798 460.574	13 292.860				
	P.I.C.	C 8B	5 798 442.529	13 299.331				
31			5 798 447.947	13 304.977				
	C.C.	C 8C	5 798 484.025	13 270.358				
	P.I.C.	C 8C	5 798 451.974	13 309.172				
32	E.C.		5 798 456.856	13 312.332				
33	B.C.		5 798 466.729	13 168.735				
	C.C.	O 9	5 790 279.731	13 169.506				
	P.I.C.	C 9	5 798 464.612	13 140.590				
34	E.C.		5 798 456.130	13 113.754				
35	B.C.		5 798 719.136	13 226.794				
	C.C.	C 10	5 798 719.136	14 026.794				
	P.I.C.	C 10	5 798 772.441	13 226.794				
36	E.C.		5 798 825.274	13 233.866				
37	B.C.		5 798 504.460	13 346.317				
	C.C.	C 11	5 798 408.058	13 504.215				
	P.I.C.	C 11	5 798 532.651	13 363.529				
38			5 798 553.144	13 389.433				
	C.C.	C 12	5 798 698.230	13 274.650				
	P.I.C.	C 12	5 798 573.637	13 415.336				
39	E.C.		5 798 601.828	13 432.548				



NOTE:
THE LOCATION OF THE EXISTING UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL ALSO VERIFY THE EXACT LOCATION AND INVERT ELEVATION BY HAND EXCAVATION BEFORE CONSTRUCTION OF THE UTILITY CROSSING AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

PROFESSIONAL ENGINEER ALBERTA R.P. HARGROVE
P.ENG.

PERMIT TO PRACTICE
Infrastructure Systems Ltd.
Signature _____
Date _____
PERMIT NUMBER: P 4741
The Association of Professional Engineers, Geologists and Geophysicists of Alberta
PERMIT

NO.	REVISION	DATE	BY	CHECKED
1	ISSUE FOR PEMITS	JULY '00	RPH	RH
2	CULVERT SIZES, 3 CENTRE CURVES	JULY '01	RH	RH
3				
4				
5				
6				

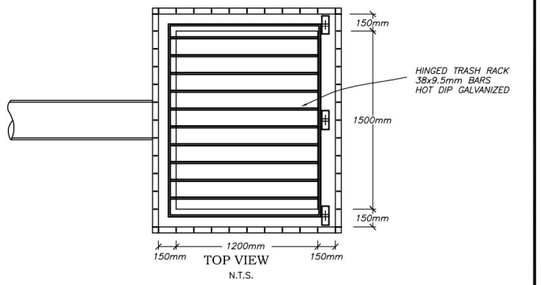
Infrastructure Systems Ltd.
ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

CHILES DEVELOPMENT CORPORATION LTD

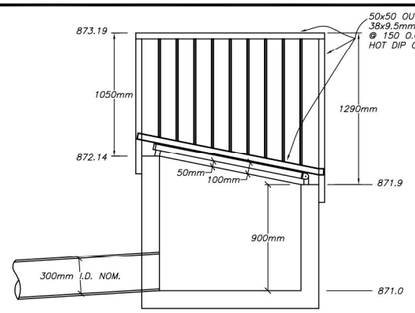
CHILES INDUSTRIAL SUBDIVISION
COUNTY OF RED DEER, ALBERTA

OVERALL GRADING AND DRAINAGE PLAN

DESIGN: R. HARGROVE	APPROVED:	DATE: MARCH, 2000
DRAWN: PED	CHECKED:	ISL PROJECT No.: 10002
SCALE: 0 10 20 30 40		DRAWING NUMBER: 3684GR

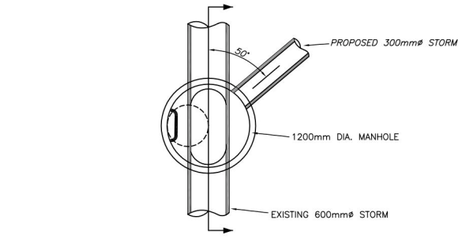


TOP VIEW
N.T.S.

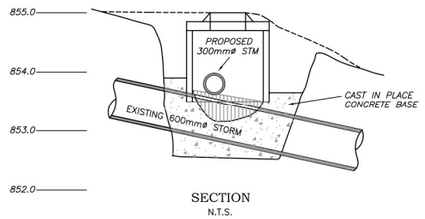


SECTION
N.T.S.

STORM MANHOLE #5 & #6 DETAIL
(STM. MH #6 FOR POND OUTLET)

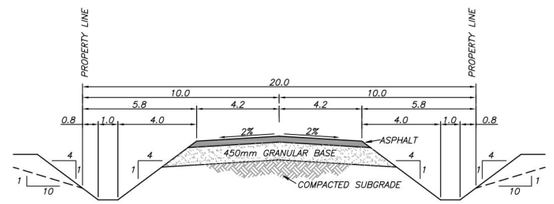


PLAN VIEW
N.T.S.



SECTION
N.T.S.

STORM MANHOLE #1 DETAIL



COLLECTOR/INDUSTRIAL
SCALE: H 1:150
V 1:50

NOTES:

1. ROADWAY SURFACE WIDTH TO RLU 80 WITH 0.2m ASPHALT ADDED EACH SIDE TO MATCH ROAD WIDTHS IN CONNECTING SUBDIVISION.
2. DITCH SIDESLOPE AND BACKSLOPE TO COUNTY OF RED DEER STANDARD 4:1.
3. ROADWAYS TO HAVE NO PARKING WITH SIGNS TO COUNTY OF RED DEER STANDARD AND SPACING.
4. PAVEMENT STRUCTURE TO PARKLAND GEOTECHNICAL CONSULTING LETTER REPORT OF JUNE 25, 2001.

TYPICAL ROAD DETAILS

PROFESSIONAL ENGINEER R.P. HARGROVE ALBERTA
P.ENG.

PERMIT TO PRACTICE
Infrastructure Systems Ltd.
Signature _____
Date _____
PERMIT NUMBER: P 4741
The Association of Professional Engineers, Geologists and Geophysicists of Alberta
PERMIT

NO.	REVISION	DATE	BY	CHECKED
1	ISSUE FOR PERMITS	JULY '00	RH	RPH
2	REVISE ROAD DETAIL AND NOTES	JULY '01	RH	RPH
3				
4				
5				
6				

Infrastructure Systems Ltd.
ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

CHILES DEVELOPMENT CORPORATION LTD
CHILES INDUSTRIAL SUBDIVISION
COUNTY OF RED DEER, ALBERTA
TRUNK
SANITARY SEWER
STANDARD DETAILS

DESIGN: R. HARGROVE	APPROVED: RH	DATE: FEBRUARY, 1999
DRAWN: KJ	CHECKED: RPH	ISL PROJECT No.: 3685
SCALE: AS SHOWN		DRAWING NUMBER: 3684SD01

Appendix D - Stormwater Management Facilities - Detailed Calculations

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND1**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial	4.4	0.9	
Industrial		0.8	
Residential	103.512	0.6	
Pond		1	
Parks		0.3	
Total area =	107.912	ha	
Cv =	0.61		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	86.7	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	215.824	l/s
Storage volume	63620	m^3
Critical storm event	24	hours
Time to drain	164	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND2**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.8	
Residential	17.73	0.6	
Pond		1	
Parks		0.3	
Total area =	17.73	ha	
Cv =	0.60		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	35.46	l/s
Storage volume	10210	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND3**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	48.52	0.9
Industrial		0.8
Residential	11.5	0.6
Pond		1
Parks		0.3
Total area =	60.02 ha	
Cv =	0.84	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	119.3	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	120.04	l/s
Storage volume	50650	m^3
Critical storm event	24	hours
Time to drain	234	hours
	10	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND4**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	38	0.9
Industrial		0.8
Residential	17	0.6
Pond		1
Parks	13.4	0.3
Total area =	68.4 ha	
Cv =	0.71	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	100.3	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	136.8	l/s
Storage volume	47550	m^3
Critical storm event	24	hours
Time to drain	193	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND5**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	44.44	0.9
Industrial		0.8
Residential		0.6
Pond		1
Parks		0.3
Total area =	44.44 ha	
Cv =	0.90	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	127.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	88.88	l/s
Storage volume	40320	m^3
Critical storm event	24	hours
Time to drain	252	hours
	11	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND6**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	26.77	0.9
Industrial	7.07	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	33.84 ha	
Cv =	0.86	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	121.6	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	67.68	l/s
Storage volume	29140	m^3
Critical storm event	24	hours
Time to drain	239	hours
	10	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND7**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	26.92	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	26.92 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	53.84	l/s
Storage volume	18480	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND8**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	19.3	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	19.3 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	38.6	l/s
Storage volume	13250	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND9**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	19.38	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	19.38 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	38.76	l/s
Storage volume	13300	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND10**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve	Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial	34.18	0.7	
Residential		0.6	
Pond		1	
Parks		0.3	
Total area =	34.18	ha	
Cv =	0.70		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	68.36	l/s
Storage volume	23460	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND11**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		
Residential	35.1	0.6
Pond		1
Parks		0.3
Total area =	35.1 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	70.2	l/s
Storage volume	20220	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND12**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	12.1	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	12.1 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	24.2	l/s
Storage volume	8310	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND13**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	73.7	0.6
Pond		1
Parks	34.4	0.3
Total area =	108.1 ha	
Cv =	0.50	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	71.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	216.2	l/s
Storage volume	50880	m^3
Critical storm event	24	hours
Time to drain	131	hours
	5	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND14**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	38.7	0.6
Pond		1
Parks	12	0.3
Total area =	50.7 ha	
Cv =	0.53	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	74.9	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	101.4	l/s
Storage volume	25230	m^3
Critical storm event	24	hours
Time to drain	138	hours
	6	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND15**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

Red Deer (2-24 hours)

IDF Curve	Red Deer (2-24 hours)	
	Area (ha)	**Cv**
Commercial		0.9
Industrial		0.7
Residential	27.3	0.6
Pond		1
Parks	16.6	0.3
Total area =	43.9	ha
Cv =	0.49	
Return period	100	years
Peak outflow rate	2	l/s/ha

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	68.9	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	87.8	l/s
Storage volume	19790	m^3
Critical storm event	24	hours
Time to drain	125	hours
	5	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND16**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	22.8	0.9
Industrial		0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	22.8 ha	
Cv =	0.90	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	127.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	45.6	l/s
Storage volume	20690	m^3
Critical storm event	24	hours
Time to drain	252	hours
	11	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND17**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	111.6	0.6
Pond		1
Parks		0.3
Total area =	111.6 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	223.2	l/s
Storage volume	64290	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND18**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.7	
Residential	27.2	0.6	
Pond		1	
Parks		0.3	
Total area =	27.2	ha	
Cv =	0.60		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	54.4	l/s
Storage volume	15670	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND19**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	31.8	0.6
Pond		1
Parks		0.3
Total area =	31.8 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	63.6	l/s
Storage volume	18320	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND20**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	80.8	0.6
Pond		1
Parks		0.3
Total area =	80.8 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	161.6	l/s
Storage volume	46550	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND21**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	47.8	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	47.8 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	95.6	l/s
Storage volume	32810	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND22**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	14.57	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	14.57 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	29.14	l/s
Storage volume	10000	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND23**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	28.01	0.7
Residential	1.09	0.6
Pond		1
Parks	11.7	0.3
Total area =	40.8 ha	
Cv =	0.58	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	82.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	81.6	l/s
Storage volume	22720	m^3
Critical storm event	24	hours
Time to drain	155	hours
	6	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND24**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	17.3	0.7
Residential	11.74	0.6
Pond		1
Parks	9.66	0.3
Total area =	38.7 ha	
Cv =	0.57	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	80.7	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	77.4	l/s
Storage volume	21000	m^3
Critical storm event	24	hours
Time to drain	151	hours
	6	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND25**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	51.48	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	51.48 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	102.96	l/s
Storage volume	35340	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND26**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	45.32	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	45.32 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	90.64	l/s
Storage volume	31110	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND27**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	28.7	0.7
Residential	31.8	0.6
Pond		1
Parks	5.3	0.3
Total area =	65.8 ha	
Cv =	0.62	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	87.7	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	131.6	l/s
Storage volume	39320	m^3
Critical storm event	24	hours
Time to drain	166	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND28**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	40.38	0.6
Pond		1
Parks		0.3
Total area =	40.38 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	80.76	l/s
Storage volume	23260	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
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Location:	**POND29**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	59.4	0.6
Pond		1
Parks	19.2	0.3
Total area =	78.6 ha	
Cv =	0.53	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	74.6	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	157.2	l/s
Storage volume	38920	m^3
Critical storm event	24	hours
Time to drain	138	hours
	6	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND30**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	9	0.9
Industrial		0.7
Residential	50.3	0.6
Pond		1
Parks		0.3
Total area =	59.3 ha	
Cv =	0.65	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	91.4	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	118.6	l/s
Storage volume	37140	m^3
Critical storm event	24	hours
Time to drain	174	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND31**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	7	0.9
Industrial		0.7
Residential	42.5	0.6
Pond		1
Parks		0.3
Total area =	49.5 ha	
Cv =	0.64	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	91.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	99	l/s
Storage volume	30830	m^3
Critical storm event	24	hours
Time to drain	173	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND32**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial	20.4	0.9
Industrial		0.7
Residential		0.6
Pond		1
Parks	3.14	0.3
Total area =	23.54 ha	
Cv =	0.82	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	116.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	47.08	l/s
Storage volume	19280	m^3
Critical storm event	24	hours
Time to drain	227	hours
	9	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND33**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	43.2	0.6
Pond		1
Parks		0.3
Total area =	43.2 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	86.4	l/s
Storage volume	24890	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND34**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	45.2	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	45.2 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	90.4	l/s
Storage volume	31030	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND35**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	11.6	0.6
Pond		1
Parks	9.4	0.3
Total area =	21 ha	
Cv =	0.47	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	66.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	42	l/s
Storage volume	8980	m^3
Critical storm event	24	hours
Time to drain	119	hours
	5	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
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For storm durations 1 to 24 hours

Location:	**POND36**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	5.2	0.7
Residential	42.2	0.6
Pond		1
Parks		0.3
Total area =	47.4 ha	
Cv =	0.61	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	86.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	94.8	l/s
Storage volume	27880	m^3
Critical storm event	24	hours
Time to drain	163	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
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For storm durations 1 to 24 hours

Location:	**POND37**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	19	0.6
Pond		1
Parks	7.1	0.3
Total area =	26.1 ha	
Cv =	0.52	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	73.4	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	52.2	l/s
Storage volume	12680	m^3
Critical storm event	24	hours
Time to drain	135	hours
	6	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND38**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve	Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.7	
Residential	3.6	0.6	
Pond		1	
Parks	39.2	0.3	
Total area =	42.8	ha	
Cv =	0.33		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	46.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	85.6	l/s
Storage volume	11670	m^3
Critical storm event	24	hours
Time to drain	76	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
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For storm durations 1 to 24 hours

Location:	**POND39**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential	39.5	0.6
Pond		1
Parks		0.3
Total area =	39.5 ha	
Cv =	0.60	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	85.0	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	79	l/s
Storage volume	22750	m^3
Critical storm event	24	hours
Time to drain	160	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
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For storm durations 1 to 24 hours

Location:	**POND40**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve	Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.7	
Residential	5.32	0.6	
Pond		1	
Parks	45.78	0.3	
Total area =	51.1	ha	
Cv =	0.33		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	46.9	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	102.2	l/s
Storage volume	14270	m^3
Critical storm event	24	hours
Time to drain	78	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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Location:	**POND41**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	3	0.7
Residential		0.6
Pond		1
Parks	9.4	0.3
Total area =	12.4 ha	
Cv =	0.40	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	56.2	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	24.8	l/s
Storage volume	4360	m^3
Critical storm event	24	hours
Time to drain	98	hours
	4	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND42**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	13.5	0.7
Residential		0.6
Pond		1
Parks	5.3	0.3
Total area =	18.8 ha	
Cv =	0.59	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	83.2	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	37.6	l/s
Storage volume	10560	m^3
Critical storm event	24	hours
Time to drain	156	hours
	7	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND43**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve	Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.7	
Residential		0.6	
Pond		1	
Parks	21.3	0.3	
Total area =	21.3	ha	
Cv =	0.30		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	42.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	42.6	l/s
Storage volume	5210	m^3
Critical storm event	24	hours
Time to drain	68	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND44**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential		0.6
Pond		1
Parks	30.4	0.3
Total area =	30.4 ha	
Cv =	0.30	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	42.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	60.8	l/s
Storage volume	7440	m^3
Critical storm event	24	hours
Time to drain	68	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND45**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.7
Residential		0.6
Pond		1
Parks	20.4	0.3
Total area =	20.4 ha	
Cv =	0.30	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	42.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	40.8	l/s
Storage volume	4990	m^3
Critical storm event	24	hours
Time to drain	68	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

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For storm durations 1 to 24 hours

Location:	**POND46**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve	Red Deer (2-24 hours)

	Area (ha)	Cv	
Commercial		0.9	
Industrial		0.7	
Residential		0.6	
Pond		1	
Parks	53.1	0.3	
Total area =	53.1	ha	
Cv =	0.30		
Return period	100	years	
Peak outflow rate	2	l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	42.5	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	106.2	l/s
Storage volume	13000	m^3
Critical storm event	24	hours
Time to drain	68	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24 hours)	
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND47**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

IDF Curve Red Deer (2-24 hours)

	Area (ha)	Cv
Commercial		0.9
Industrial	85.2	0.7
Residential		0.6
Pond		1
Parks		0.3
Total area =	85.2 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	99.1	l/s/ha

Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	170.4	l/s
Storage volume	58490	m^3
Critical storm event	24	hours
Time to drain	191	hours
	8	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location:	**POND48**			Project Number:	
Project #	**2015-3382**	Date:	03/23/16	Computed by:	**LM**

Red Deer (2-24 hours)

IDF Curve	Red Deer (2-24 hours)	
	Area (ha)	**Cv**
Commercial		0.9
Industrial		0.7
Residential		0.6
Pond		1
Parks	28.8	0.3
Total area =	28.8 ha	
Cv =	0.30	
Return period	100 years	
Peak outflow rate	2 l/s/ha	

Pipe Design:		
Return Period	5	years
Tc	10	minutes
Q	42.5	l/s/ha

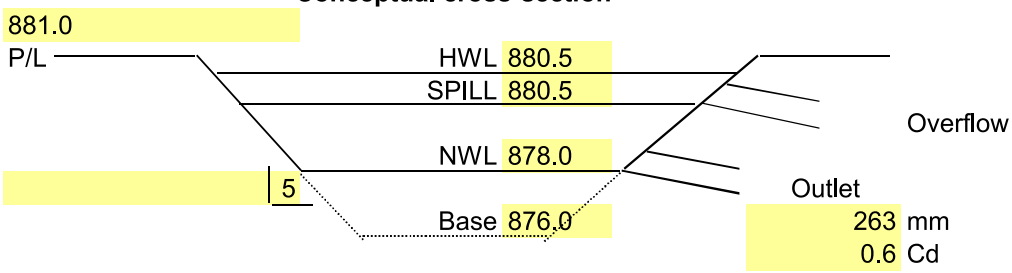
Storage Parameters		
Peak inflow	#NUM!	m^3/s
Peak outflow	57.6	l/s
Storage volume	7050	m^3
Critical storm event	24	hours
Time to drain	68	hours
	3	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	21	
a	23.78983037	(t in hours)
b	-0.52	
c	-0.433333333	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Red Deer (2-24	hours)
IDF Curve Number	2	
a	17.40224536	(t in hours)
b	-0.6	
c	0	hours

RED DEER
Stormwater Pond Conceptual Design
Pond 1

Conceptual cross-section

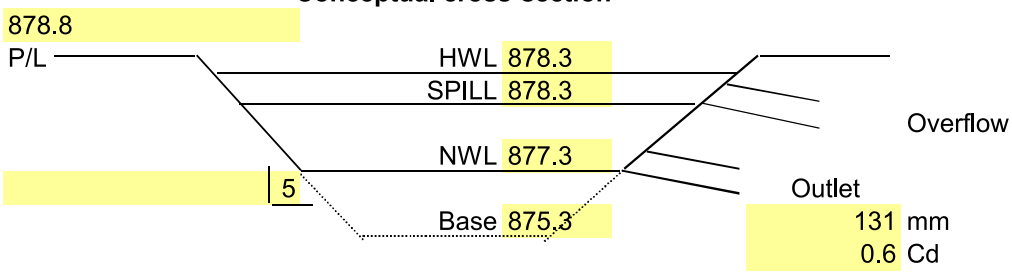


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	881.0	3.1	11.6	78865	0.244	5.0
HWL	880.5	2.9	10.1	**63701**	0.222	4.5
Overflow Elev	880.5	2.9	10.1	63701	0.222	4.5
Normal water level	878.0	2.2	3.8	0	0.000	2.0
Base of pond	876.0	1.6	0.0		0.000	0.0
Storage capacity				63701		
Average existing ground	881.0	3.1	11.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 2

Conceptual cross-section

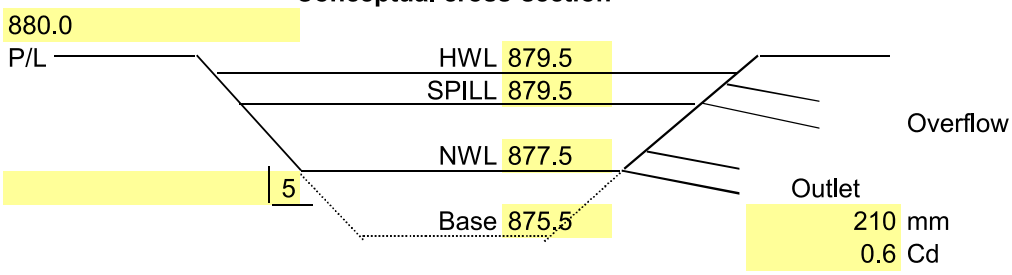


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	878.8	1.3	3.3	17066	0.043	3.5
HWL	878.3	1.2	2.7	**10845**	0.035	3.0
Overflow Elev	878.3	1.2	2.7	10845	0.035	3.0
Normal water level	877.3	1.0	1.6	0	0.000	2.0
Base of pond	875.3	0.6	0.0		0.000	0.0
Storage capacity				10845		
Average existing ground	878.8	1.3	3.3			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 3

Conceptual cross-section

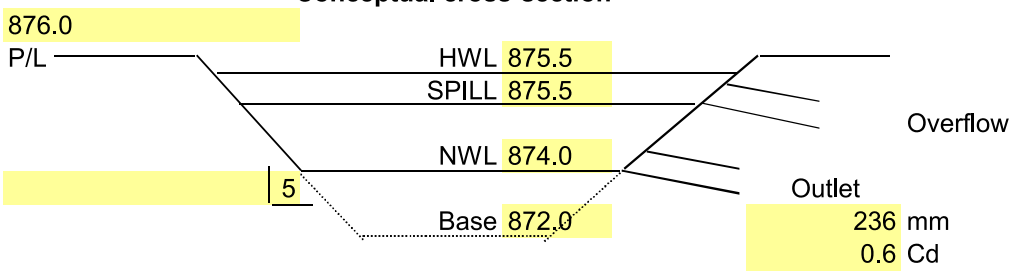


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	880.0	3.0	10.4	65411	0.142	4.5
HWL	879.5	2.9	9.0	**50714**	0.127	4.0
Overflow Elev	879.5	2.9	9.0	50714	0.127	4.0
Normal water level	877.5	2.2	3.9	0	0.000	2.0
Base of pond	875.5	1.7	0.0		0.000	0.0
Storage capacity				50714		
Average existing ground	880.0	3.0	10.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 4

Conceptual cross-section

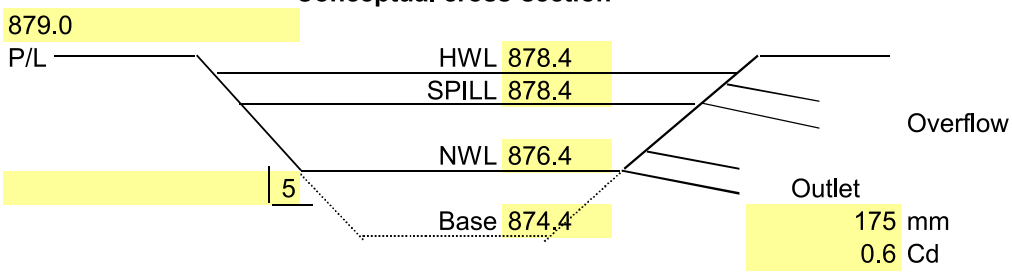


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.0	3.62	11.7	65204	0.159	4.0
HWL	875.5	3.44	9.9	**47550**	0.137	3.5
Overflow Elev	875.5	3.44	9.9	47550	0.137	3.5
Normal water level	874.0	2.90	5.2	0	0.000	2.0
Base of pond	872.0	2.26	0.0		0.000	0.0
Storage capacity				47550		
Average existing ground	876.0	3.6	11.7			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 5

Conceptual cross-section

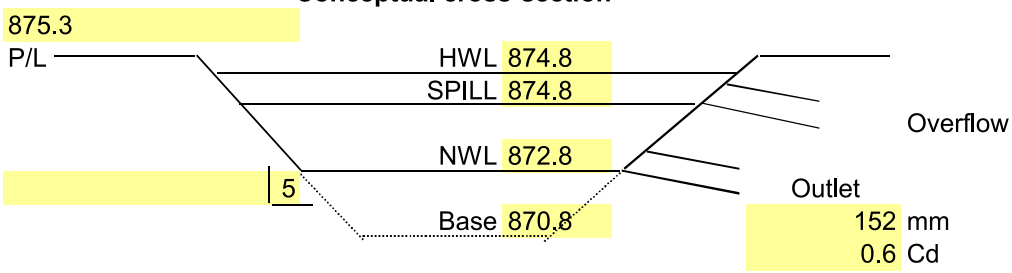


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	879.0	2.48	8.4	54672	0.101	4.6
HWL	878.4	2.30	7.0	**40320**	0.088	4.0
Overflow Elev	878.4	2.30	7.0	40320	0.088	4.0
Normal water level	876.4	1.73	3.0	0	0.000	2.0
Base of pond	874.4	1.25	0.0		0.000	0.0
Storage capacity				40320		
Average existing ground	879.0	2.5	8.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 6

Conceptual cross-section

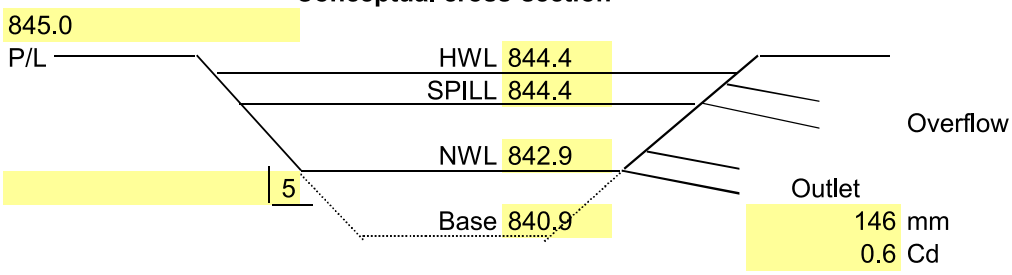


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	875.3	1.83	5.8	37960	0.075	4.5
HWL	874.8	1.70	4.9	**29140**	0.067	4.0
Overflow Elev	874.8	1.70	4.9	29140	0.067	4.0
Normal water level	872.8	1.22	2.0	0	0.000	2.0
Base of pond	870.8	0.82	0.0		0.000	0.0
Storage capacity				29140		
Average existing ground	875.3	1.8	5.8			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 7

Conceptual cross-section

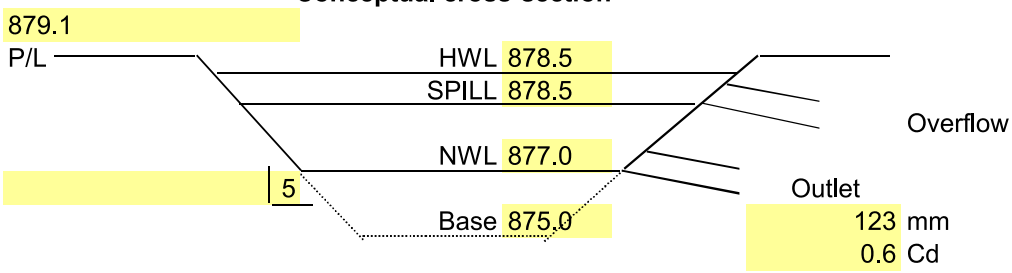


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	845.0	1.54	4.5	27305	0.063	4.1
HWL	844.4	1.40	3.6	**18480**	0.053	3.5
Overflow Elev	844.4	1.40	3.6	18480	0.053	3.5
Normal water level	842.9	1.07	1.8	0	0.000	2.0
Base of pond	840.9	0.69	0.0		0.000	0.0
Storage capacity				18480		
Average existing ground	845.0	1.5	4.5			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 8

Conceptual cross-section

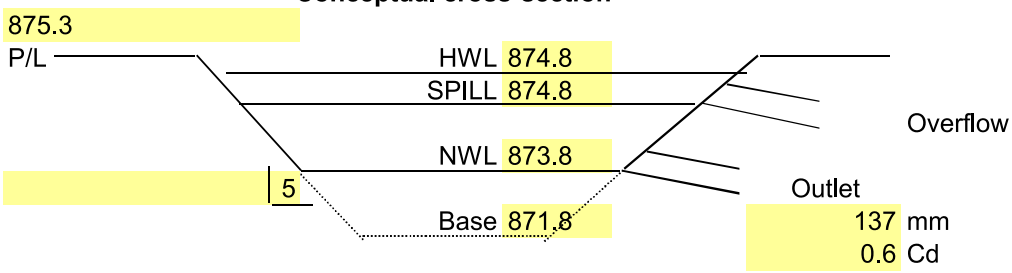


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	879.1	1.15	3.2	19769	0.045	4.1
HWL	878.5	1.02	2.5	**13250**	0.038	3.5
Overflow Elev	878.5	1.02	2.5	13250	0.038	3.5
Normal water level	877.0	0.74	1.2	0	0.000	2.0
Base of pond	875.0	0.44	0.0		0.000	0.0
Storage capacity				13250		
Average existing ground	879.1	1.1	3.2			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 9

Conceptual cross-section

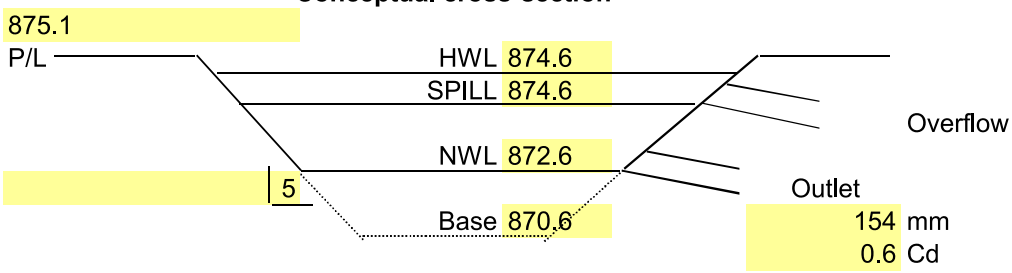


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	875.3	1.57	4.1	20832	0.047	3.5
HWL	874.8	1.45	3.4	**13300**	0.038	3.0
Overflow Elev	874.8	1.45	3.4	13300	0.038	3.0
Normal water level	873.8	1.21	2.0	0	0.000	2.0
Base of pond	871.8	0.81	0.0		0.000	0.0
Storage capacity				13300		
Average existing ground	875.3	1.6	4.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 10

Conceptual cross-section

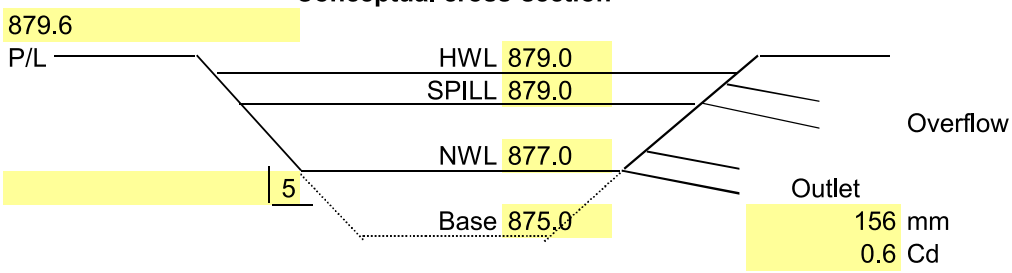


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	875.1	1.51	4.6	30704	0.077	4.5
HWL	874.6	1.39	3.9	**23460**	0.069	4.0
Overflow Elev	874.6	1.39	3.9	23460	0.069	4.0
Normal water level	872.6	0.96	1.6	0	0.000	2.0
Base of pond	870.6	0.61	0.0		0.000	0.0
Storage capacity				23460		
Average existing ground	875.0	1.5	4.5			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 11

Conceptual cross-section

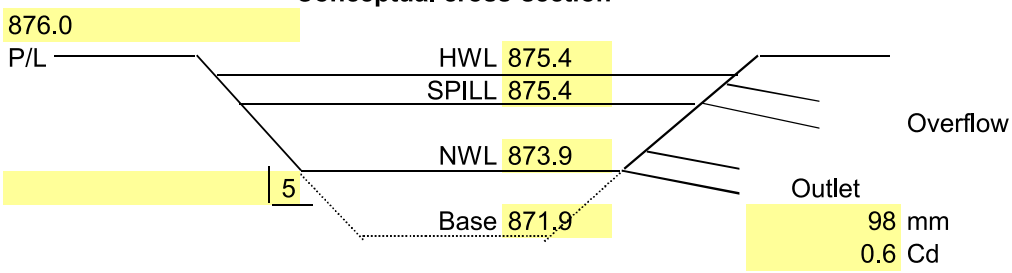


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	879.6	1.35	4.1	27893	0.081	4.6
HWL	879.0	1.21	3.3	**20220**	0.070	4.0
Overflow Elev	879.0	1.21	3.3	20220	0.070	4.0
Normal water level	877.0	0.81	1.3	0	0.000	2.0
Base of pond	875.0	0.49	0.0		0.000	0.0
Storage capacity				20220		
Average existing ground	879.6	1.3	4.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 12

Conceptual cross-section

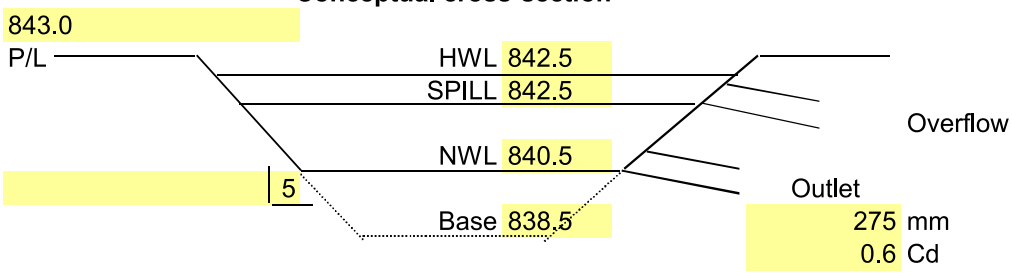


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.0	0.77	1.9	12604	0.029	4.1
HWL	875.4	0.67	1.5	**8310**	0.024	3.5
Overflow Elev	875.4	0.67	1.5	8310	0.024	3.5
Normal water level	873.9	0.44	0.7	0	0.000	2.0
Base of pond	871.9	0.22	0.0		0.000	0.0
Storage capacity				8310		
Average existing ground	876.0	0.8	1.9			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 13

Conceptual cross-section

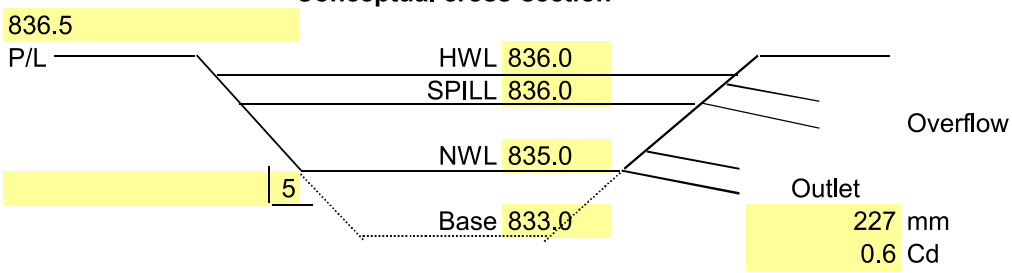


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	843.0	3.03	10.5	65621	0.243	4.5
HWL	842.5	2.86	9.0	**50880**	0.215	4.0
Overflow Elev	842.5	2.86	9.0	50880	0.215	4.0
Normal water level	840.5	2.23	3.9	0	0.000	2.0
Base of pond	838.5	1.67	0.0		0.000	0.0
Storage capacity				50880		
Average existing ground	843.0	3.0	10.5			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 14

Conceptual cross-section

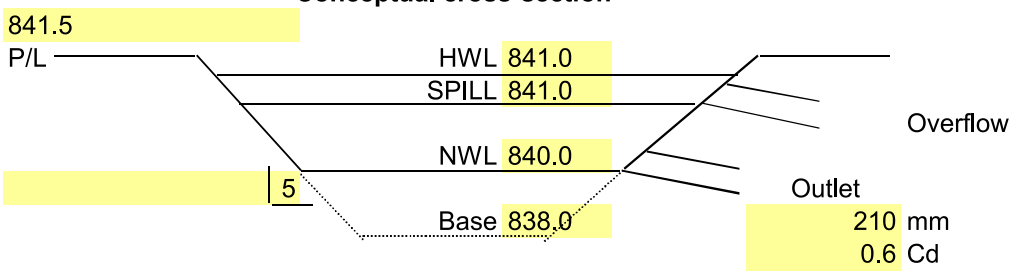


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	836.5	2.85	8.1	39054	0.127	3.5
HWL	836.0	2.68	6.7	**25230**	0.101	3.0
Overflow Elev	836.0	2.68	6.7	25230	0.101	3.0
Normal water level	835.0	2.36	4.2	0	0.000	2.0
Base of pond	833.0	1.79	0.0		0.000	0.0
Storage capacity				25230		
Average existing ground	836.5	2.8	8.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 15

Conceptual cross-section

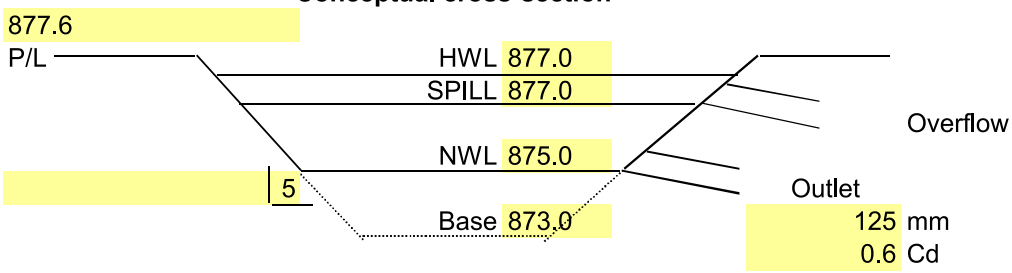


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	841.5	2.27	6.3	30759	0.109	3.5
HWL	841.0	2.12	5.2	**19790**	0.087	3.0
Overflow Elev	841.0	2.12	5.2	19790	0.087	3.0
Normal water level	840.0	1.84	3.2	0	0.000	2.0
Base of pond	838.0	1.34	0.0		0.000	0.0
Storage capacity				19790		
Average existing ground	841.5	2.3	6.3			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 16

Conceptual cross-section

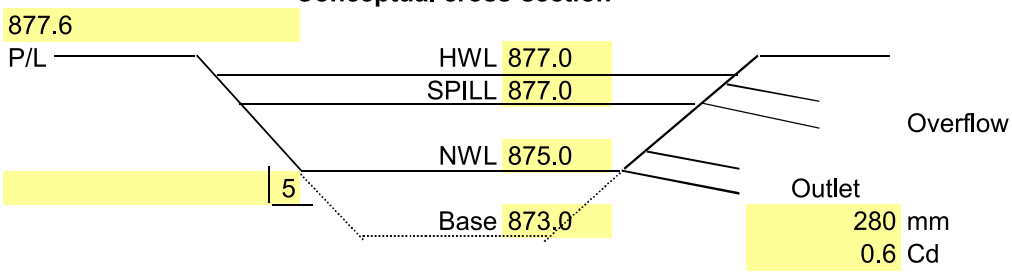


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	877.6	1.37	4.2	28523	0.052	4.6
HWL	877.0	1.24	3.4	**20690**	0.045	4.0
Overflow Elev	877.0	1.24	3.4	20690	0.045	4.0
Normal water level	875.0	0.83	1.3	0	0.000	2.0
Base of pond	873.0	0.51	0.0		0.000	0.0
Storage capacity				20690		
Average existing ground	877.6	1.4	4.2			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 17

Conceptual cross-section

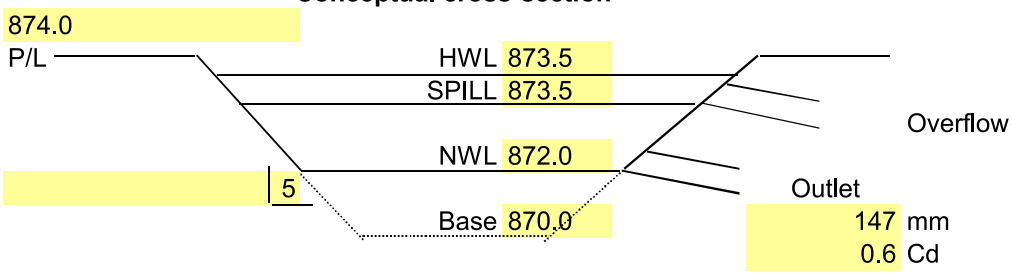


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	877.6	3.80	13.7	86416	0.257	4.6
HWL	877.0	3.57	11.5	**64290**	0.223	4.0
Overflow Elev	877.0	3.57	11.5	64290	0.223	4.0
Normal water level	875.0	2.86	5.1	0	0.000	2.0
Base of pond	873.0	2.22	0.0		0.000	0.0
Storage capacity				64290		
Average existing ground	877.6	3.80	13.7			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 18

Conceptual cross-section

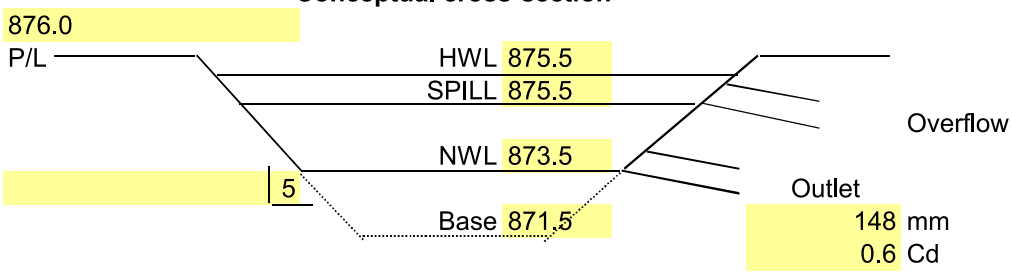


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	874.0	1.31	3.6	21938	0.063	4.0
HWL	873.5	1.20	3.0	**15670**	0.054	3.5
Overflow Elev	873.5	1.20	3.0	15670	0.054	3.5
Normal water level	872.0	0.89	1.4	0	0.000	2.0
Base of pond	870.0	0.55	0.0		0.000	0.0
Storage capacity				15670		
Average existing ground	874.0	1.3	3.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 19

Conceptual cross-section

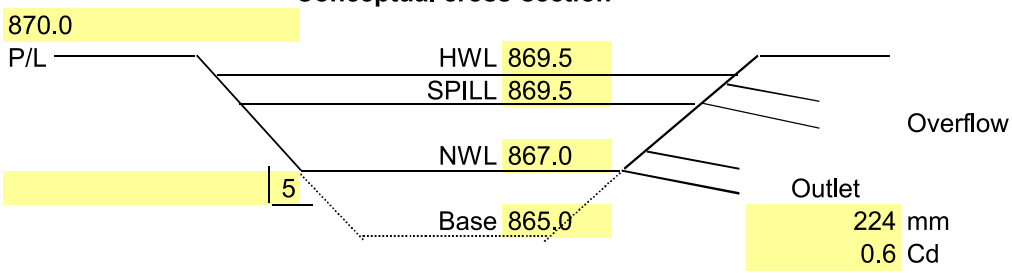


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.0	1.21	3.6	24121	0.071	4.5
HWL	875.5	1.11	3.0	**18320**	0.063	4.0
Overflow Elev	875.5	1.11	3.0	18320	0.063	4.0
Normal water level	873.5	0.73	1.2	0	0.000	2.0
Base of pond	871.5	0.42	0.0		0.000	0.0
Storage capacity				18320		
Average existing ground	876.0	1.2	3.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 20

Conceptual cross-section

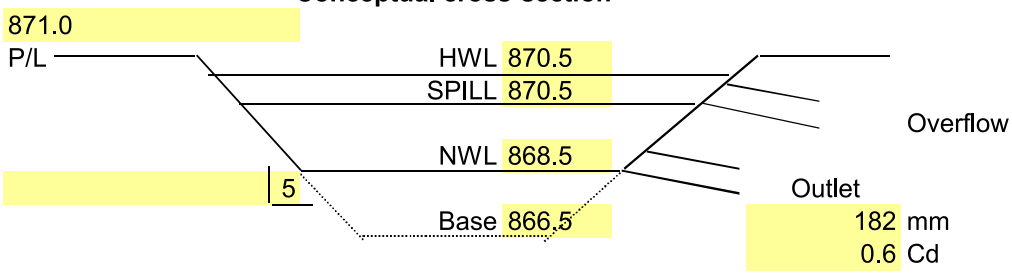


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	870.0	2.35	8.4	57936	0.177	5.0
HWL	869.5	2.20	7.2	**46550**	0.161	4.5
Overflow Elev	869.5	2.20	7.2	46550	0.161	4.5
Normal water level	867.0	1.52	2.6	0	0.000	2.0
Base of pond	865.0	1.07	0.0		0.000	0.0
Storage capacity				46550		
Average existing ground	870.0	2.4	8.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 21

Conceptual cross-section

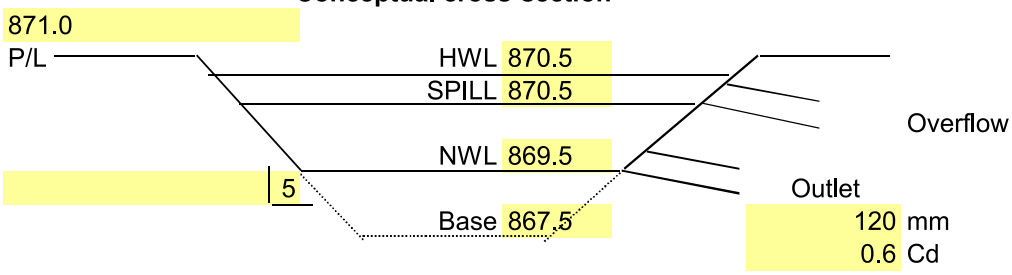


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	871.0	2.04	6.6	42641	0.107	4.5
HWL	870.5	1.90	5.6	**32810**	0.095	4.0
Overflow Elev	870.5	1.90	5.6	32810	0.095	4.0
Normal water level	868.5	1.39	2.3	0	0.000	2.0
Base of pond	866.5	0.95	0.0		0.000	0.0
Storage capacity				32810		
Average existing ground	871.0	2.0	6.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 22

Conceptual cross-section

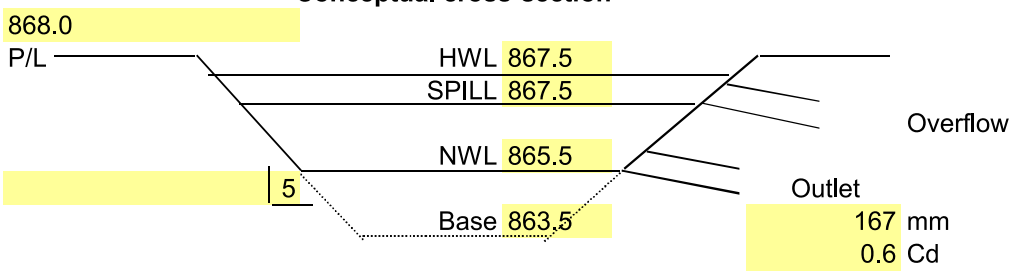


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	871.0	1.21	3.0	15767	0.036	3.5
HWL	870.5	1.10	2.5	**10000**	0.029	3.0
Overflow Elev	870.5	1.10	2.5	10000	0.029	3.0
Normal water level	869.5	0.90	1.5	0	0.000	2.0
Base of pond	867.5	0.56	0.0		0.000	0.0
Storage capacity				10000		
Average existing ground	871.0	1.2	3.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 23

Conceptual cross-section

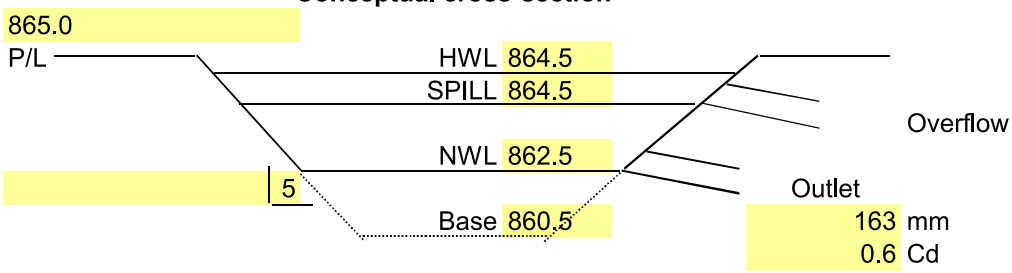


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	868.0	1.47	4.5	29758	0.090	4.5
HWL	867.5	1.35	3.8	**22720**	0.081	4.0
Overflow Elev	867.5	1.35	3.8	22720	0.081	4.0
Normal water level	865.5	0.92	1.5	0	0.000	2.0
Base of pond	863.5	0.58	0.0		0.000	0.0
Storage capacity				22720		
Average existing ground	870.0	2.0	7.9			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 24

Conceptual cross-section

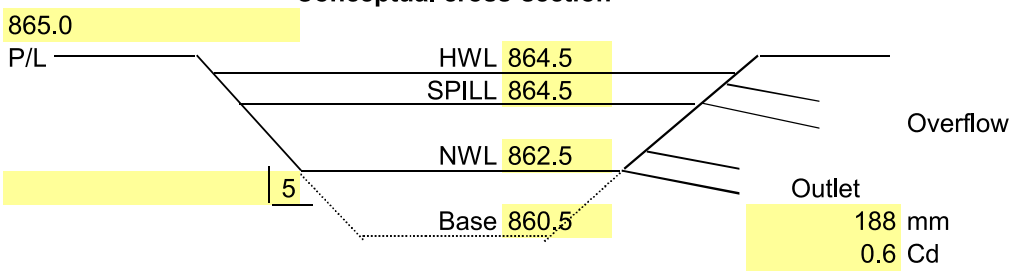


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	865.0	1.37	4.1	27556	0.086	4.5
HWL	864.5	1.25	3.5	**21000**	0.077	4.0
Overflow Elev	864.5	1.25	3.5	21000	0.077	4.0
Normal water level	862.5	0.85	1.4	0	0.000	2.0
Base of pond	860.5	0.52	0.0		0.000	0.0
Storage capacity				21000		
Average existing ground	865.0	1.4	4.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 25

Conceptual cross-section

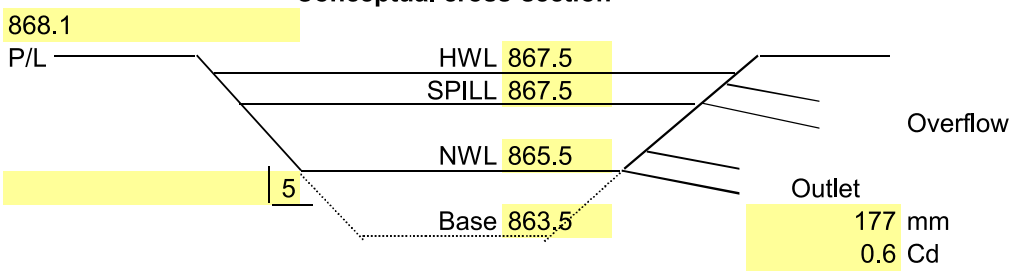


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	865.0	2.18	7.1	45863	0.114	4.5
HWL	864.5	2.03	6.1	**35340**	0.102	4.0
Overflow Elev	864.5	2.03	6.1	35340	0.102	4.0
Normal water level	862.5	1.50	2.6	0	0.000	2.0
Base of pond	860.5	1.05	0.0		0.000	0.0
Storage capacity				35340		
Average existing ground	865.0	2.2	7.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 26

Conceptual cross-section

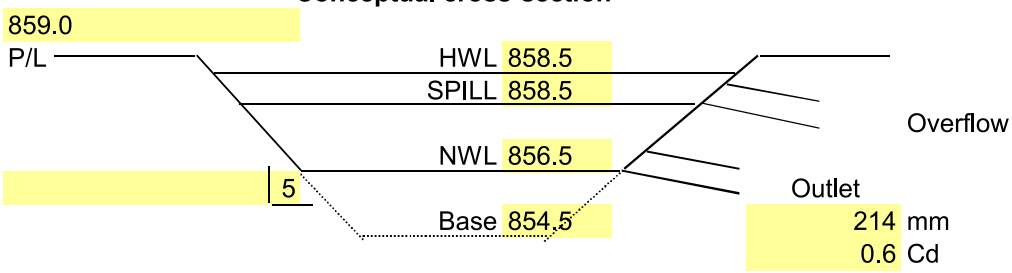


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	868.1	1.97	6.4	42429	0.104	4.6
HWL	867.5	1.80	5.3	**31110**	0.090	4.0
Overflow Elev	867.5	1.80	5.3	31110	0.090	4.0
Normal water level	865.5	1.31	2.2	0	0.000	2.0
Base of pond	863.5	0.89	0.0		0.000	0.0
Storage capacity				31110		
Average existing ground	868.1	2.0	6.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 27

Conceptual cross-section

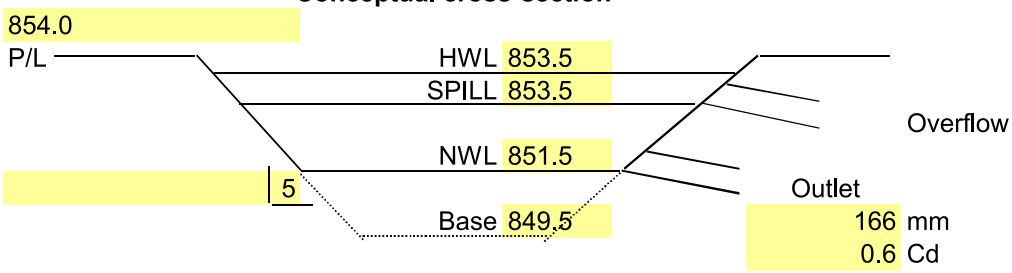


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	859.0	2.40	8.0	50929	0.148	4.5
HWL	858.5	2.25	6.8	**39320**	0.131	4.0
Overflow Elev	858.5	2.25	6.8	39320	0.131	4.0
Normal water level	856.5	1.69	2.9	0	0.000	2.0
Base of pond	854.5	1.21	0.0		0.000	0.0
Storage capacity				39320		
Average existing ground	859.0	2.4	8.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 28

Conceptual cross-section

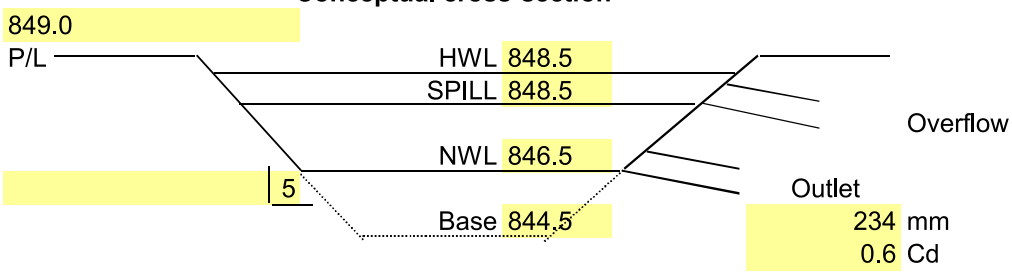


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	854.0	1.50	4.6	30448	0.089	4.5
HWL	853.5	1.38	3.9	**23260**	0.080	4.0
Overflow Elev	853.5	1.38	3.9	23260	0.080	4.0
Normal water level	851.5	0.95	1.5	0	0.000	2.0
Base of pond	849.5	0.60	0.0		0.000	0.0
Storage capacity				23260		
Average existing ground	854.0	1.5	4.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 29

Conceptual cross-section

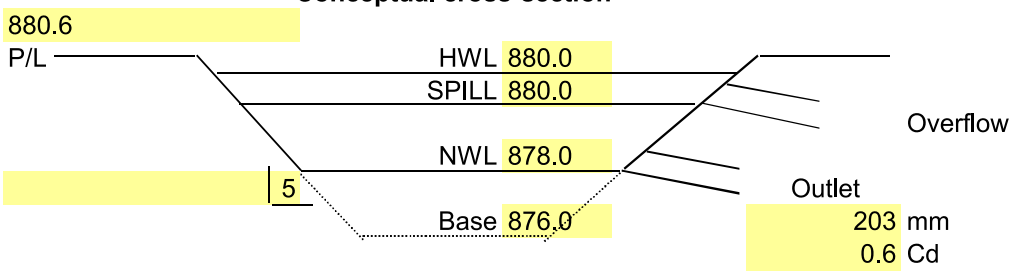


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	849.0	2.38	7.9	50420	0.176	4.5
HWL	848.5	2.22	6.8	**38920**	0.157	4.0
Overflow Elev	848.5	2.22	6.8	38920	0.157	4.0
Normal water level	846.5	1.67	2.9	0	0.000	2.0
Base of pond	844.5	1.19	0.0		0.000	0.0
Storage capacity				38920		
Average existing ground	849.0	2.4	7.9			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 30

Conceptual cross-section

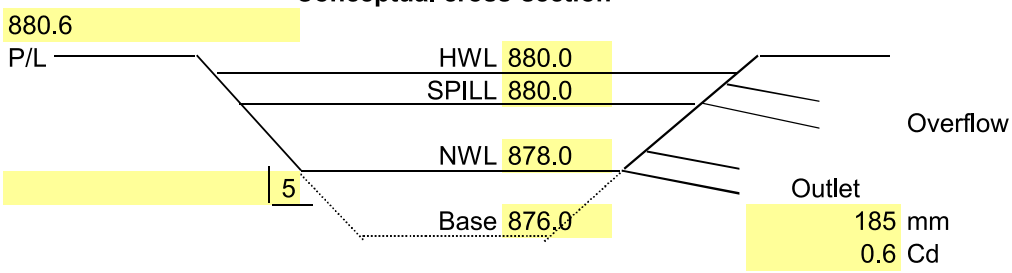


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	880.6	2.31	7.8	50449	0.136	4.6
HWL	880.0	2.13	6.4	**37140**	0.118	4.0
Overflow Elev	880.0	2.13	6.4	37140	0.118	4.0
Normal water level	878.0	1.59	2.7	0	0.000	2.0
Base of pond	876.0	1.12	0.0		0.000	0.0
Storage capacity				37140		
Average existing ground	880.6	2.3	7.8			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 31

Conceptual cross-section

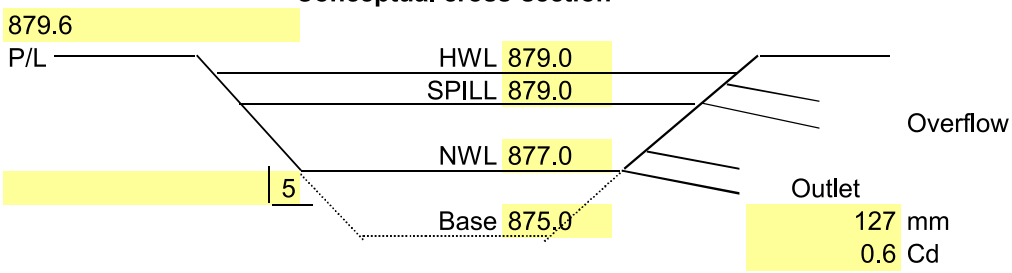


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	880.6	1.95	6.4	42056	0.113	4.6
HWL	880.0	1.79	5.3	**30830**	0.099	4.0
Overflow Elev	880.0	1.79	5.3	30830	0.099	4.0
Normal water level	878.0	1.29	2.2	0	0.000	2.0
Base of pond	876.0	0.88	0.0		0.000	0.0
Storage capacity				30830		
Average existing ground	880.6	2.0	6.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 32

Conceptual cross-section

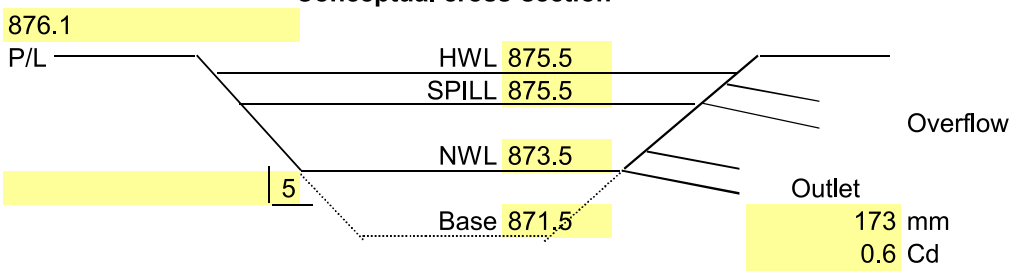


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	879.6	1.29	3.9	26634	0.054	4.6
HWL	879.0	1.16	3.2	**19280**	0.047	4.0
Overflow Elev	879.0	1.16	3.2	19280	0.047	4.0
Normal water level	877.0	0.77	1.2	0	0.000	2.0
Base of pond	875.0	0.46	0.0		0.000	0.0
Storage capacity				19280		
Average existing ground	879.6	1.3	3.9			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 33

Conceptual cross-section

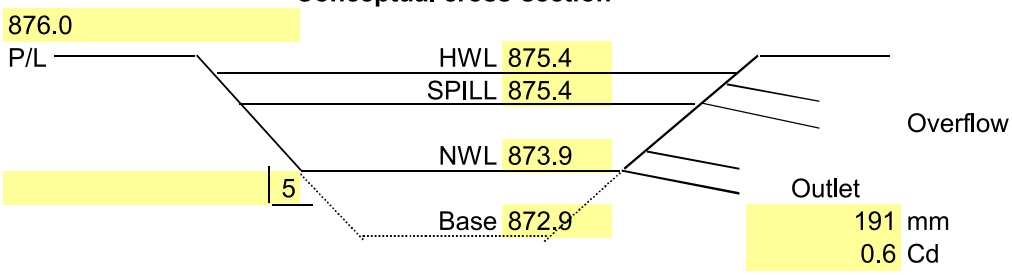


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.1	1.62	5.1	34136	0.099	4.6
HWL	875.5	1.47	4.2	**24890**	0.086	4.0
Overflow Elev	875.5	1.47	4.2	24890	0.086	4.0
Normal water level	873.5	1.02	1.7	0	0.000	2.0
Base of pond	871.5	0.66	0.0		0.000	0.0
Storage capacity				24890		
Average existing ground	876.1	1.6	5.1			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 34

Conceptual cross-section

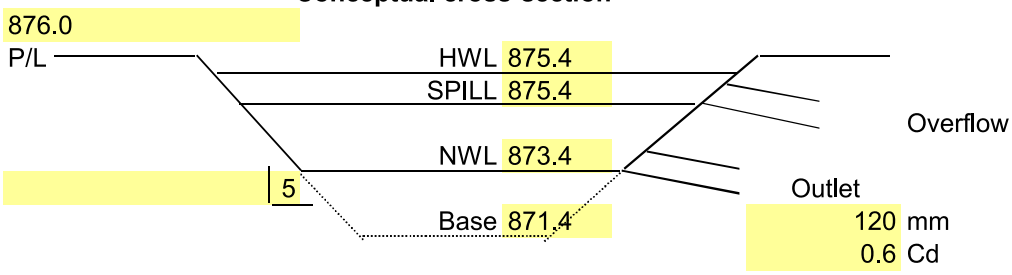


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.0	2.47	6.3	45290	0.108	3.1
HWL	875.4	2.28	4.8	**31030**	0.090	2.5
Overflow Elev	875.4	2.28	4.8	31030	0.090	2.5
Normal water level	873.9	1.85	1.7	0	0.000	1.0
Base of pond	872.9	1.59	0.0		0.000	0.0
Storage capacity				31030		
Average existing ground	876.0	2.5	6.3			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 35

Conceptual cross-section

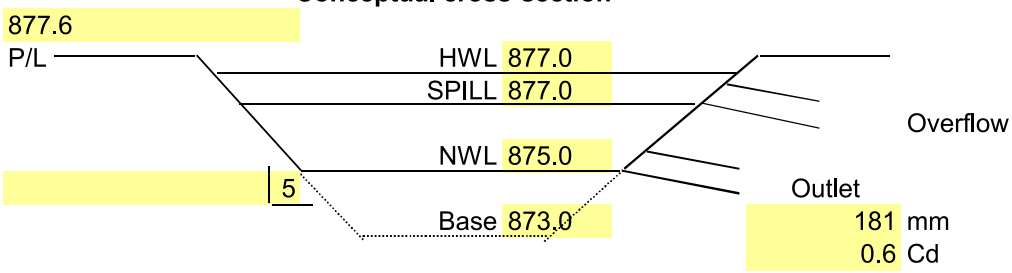


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	876.0	0.68	1.7	12754	0.048	4.6
HWL	875.4	0.58	1.3	**8980**	0.042	4.0
Overflow Elev	875.4	0.58	1.3	8980	0.042	4.0
Normal water level	873.4	0.32	0.4	0	0.000	2.0
Base of pond	871.4	0.13	0.0		0.000	0.0
Storage capacity				8980		
Average existing ground	876.0	0.7	1.7			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 36

Conceptual cross-section

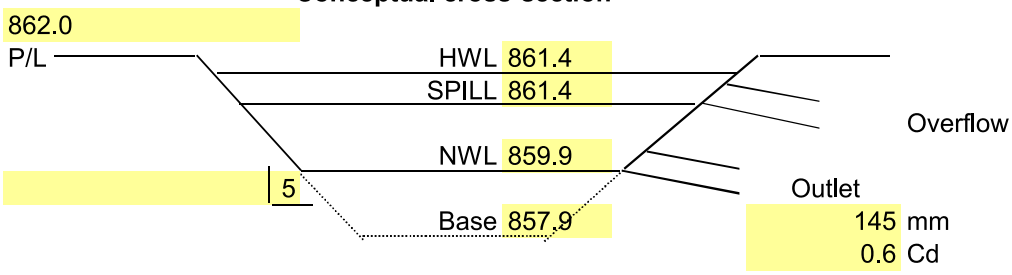


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	877.6	1.79	5.7	38126	0.108	4.6
HWL	877.0	1.63	4.7	**27880**	0.094	4.0
Overflow Elev	877.0	1.63	4.7	27880	0.094	4.0
Normal water level	875.0	1.16	1.9	0	0.000	2.0
Base of pond	873.0	0.77	0.0		0.000	0.0
Storage capacity				27880		
Average existing ground	877.6	1.8	5.7			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 37

Conceptual cross-section

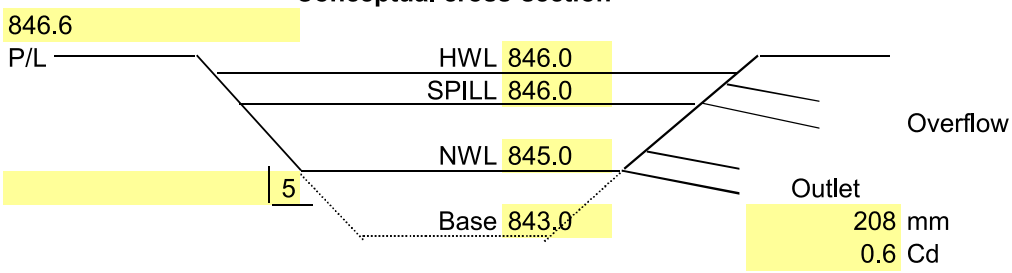


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	862.0	1.11	3.0	18944	0.062	4.1
HWL	861.4	0.98	2.4	**12680**	0.052	3.5
Overflow Elev	861.4	0.98	2.4	12680	0.052	3.5
Normal water level	859.9	0.71	1.1	0	0.000	2.0
Base of pond	857.9	0.41	0.0		0.000	0.0
Storage capacity				12680		
Average existing ground	862.0	1.1	3.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 38

Conceptual cross-section

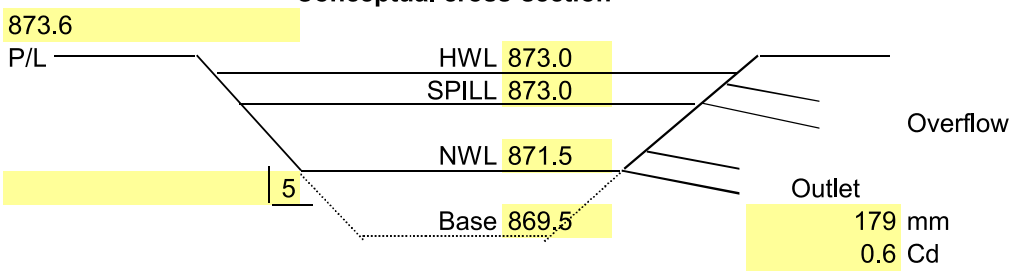


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	846.6	1.41	3.7	19737	0.110	3.6
HWL	846.0	1.27	2.9	**11670**	0.085	3.0
Overflow Elev	846.0	1.27	2.9	11670	0.085	3.0
Normal water level	845.0	1.06	1.7	0	0.000	2.0
Base of pond	843.0	0.69	0.0		0.000	0.0
Storage capacity				11670		
Average existing ground	846.6	1.4	3.7			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 39

Conceptual cross-section

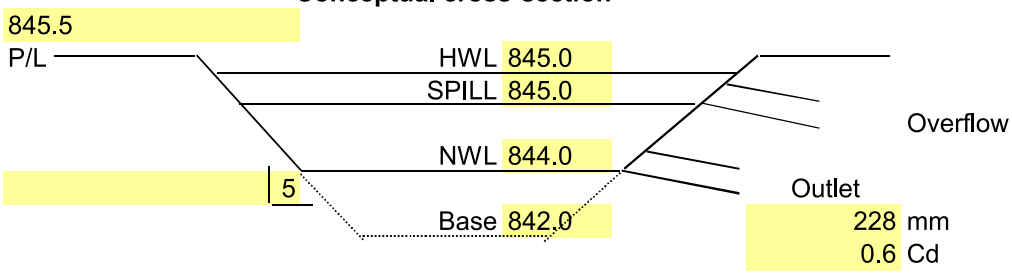


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	873.6	1.86	5.6	33436	0.095	4.1
HWL	873.0	1.70	4.5	**22750**	0.079	3.5
Overflow Elev	873.0	1.70	4.5	22750	0.079	3.5
Normal water level	871.5	1.33	2.2	0	0.000	2.0
Base of pond	869.5	0.91	0.0		0.000	0.0
Storage capacity				22750		
Average existing ground	873.6	1.9	5.6			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 40

Conceptual cross-section

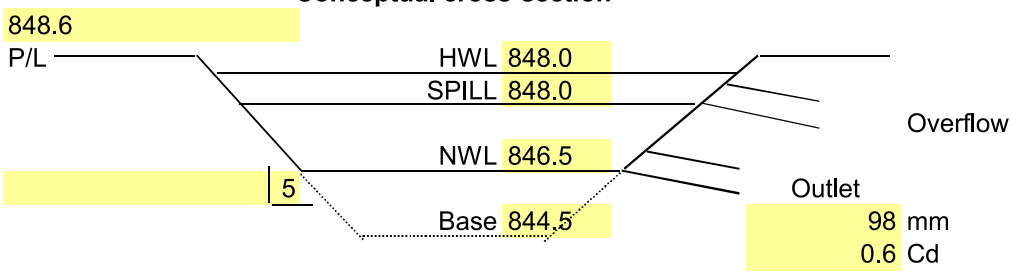


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	845.5	1.67	4.4	22319	0.128	3.5
HWL	845.0	1.55	3.6	**14270**	0.102	3.0
Overflow Elev	845.0	1.55	3.6	14270	0.102	3.0
Normal water level	844.0	1.31	2.2	0	0.000	2.0
Base of pond	842.0	0.89	0.0		0.000	0.0
Storage capacity				14270		
Average existing ground	845.5	1.7	4.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 41

Conceptual cross-section

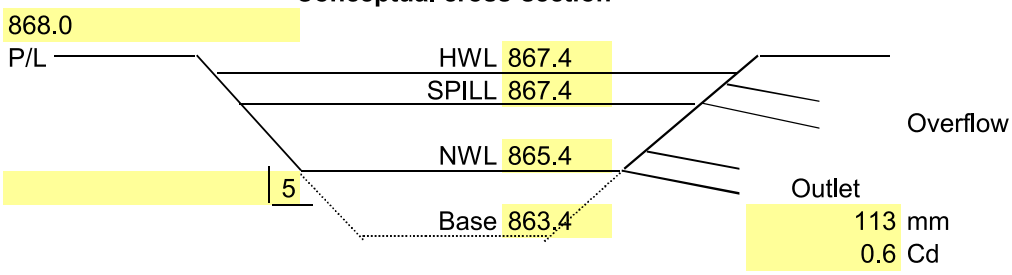


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	848.6	0.45	1.0	6814	0.029	4.1
HWL	848.0	0.37	0.7	**4360**	0.024	3.5
Overflow Elev	848.0	0.37	0.7	4360	0.024	3.5
Normal water level	846.5	0.21	0.3	0	0.000	2.0
Base of pond	844.5	0.07	0.0		0.000	0.0
Storage capacity				4360		
Average existing ground	848.6	0.4	1.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 42

Conceptual cross-section

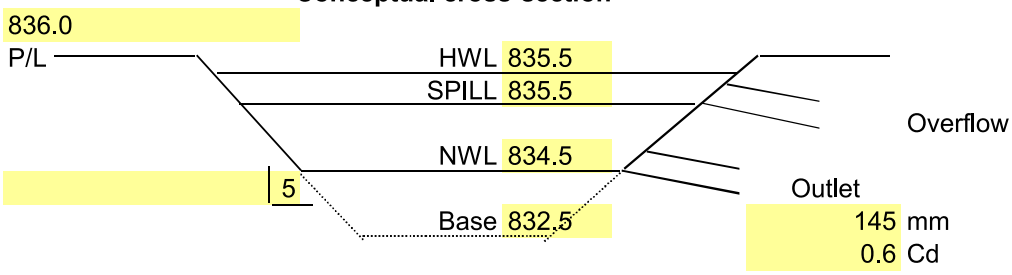


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	868.0	0.77	2.0	14897	0.042	4.6
HWL	867.4	0.67	1.6	**10560**	0.037	4.0
Overflow Elev	867.4	0.67	1.6	10560	0.037	4.0
Normal water level	865.4	0.38	0.6	0	0.000	2.0
Base of pond	863.4	0.18	0.0		0.000	0.0
Storage capacity				10560		
Average existing ground	868.0	0.8	2.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 43

Conceptual cross-section

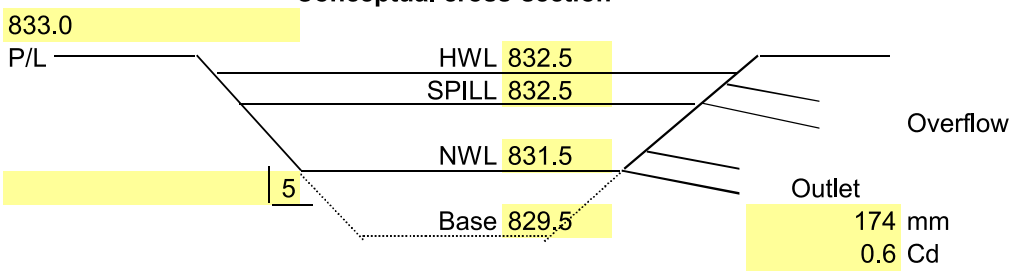


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	836.0	0.67	1.5	8374	0.052	3.5
HWL	835.5	0.59	1.2	**5210**	0.042	3.0
Overflow Elev	835.5	0.59	1.2	5210	0.042	3.0
Normal water level	834.5	0.45	0.7	0	0.000	2.0
Base of pond	832.5	0.22	0.0		0.000	0.0
Storage capacity				5210		
Average existing ground	836.0	0.7	1.5			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 44

Conceptual cross-section

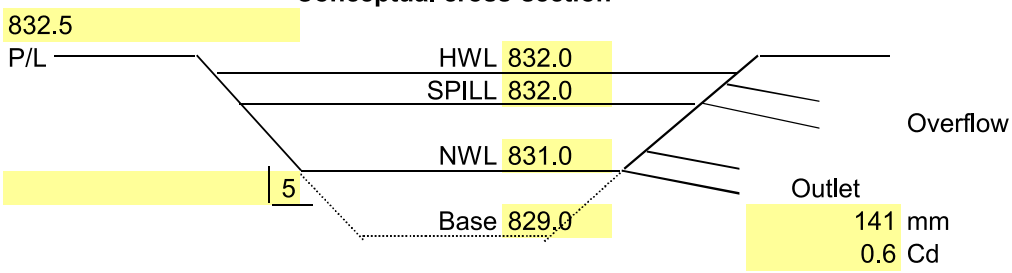


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	833.0	0.92	2.2	11824	0.075	3.5
HWL	832.5	0.83	1.8	**7440**	0.060	3.0
Overflow Elev	832.5	0.83	1.8	7440	0.060	3.0
Normal water level	831.5	0.66	1.0	0	0.000	2.0
Base of pond	829.5	0.37	0.0		0.000	0.0
Storage capacity				7440		
Average existing ground	833.0	0.9	2.2			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 45

Conceptual cross-section

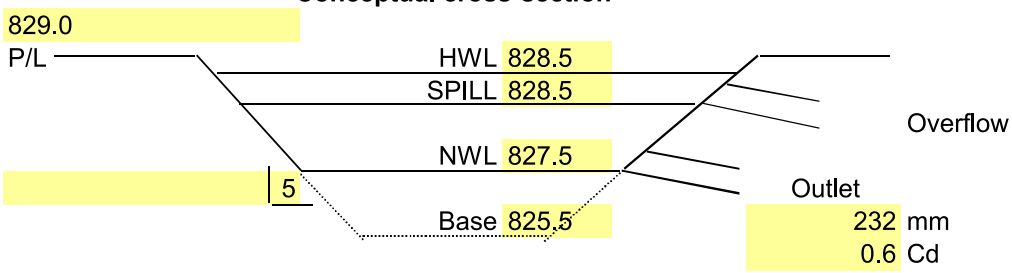


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	832.5	0.65	1.4	8032	0.050	3.5
HWL	832.0	0.57	1.1	**4990**	0.040	3.0
Overflow Elev	832.0	0.57	1.1	4990	0.040	3.0
Normal water level	831.0	0.43	0.6	0	0.000	2.0
Base of pond	829.0	0.21	0.0		0.000	0.0
Storage capacity				4990		
Average existing ground	832.5	0.6	1.4			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 46

Conceptual cross-section

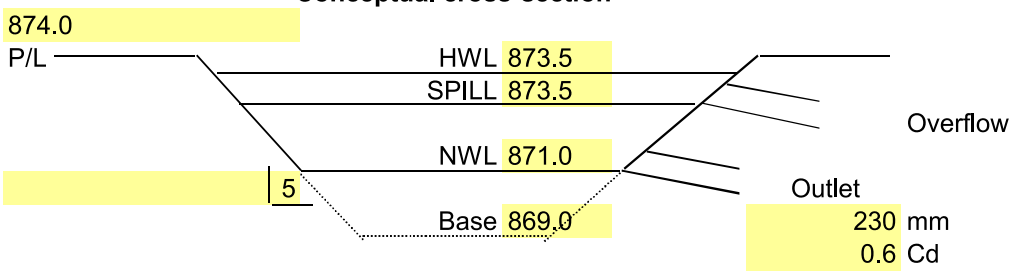


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	829.0	1.54	4.0	20373	0.132	3.5
HWL	828.5	1.41	3.3	**13000**	0.106	3.0
Overflow Elev	828.5	1.41	3.3	13000	0.106	3.0
Normal water level	827.5	1.19	2.0	0	0.000	2.0
Base of pond	825.5	0.79	0.0		0.000	0.0
Storage capacity				13000		
Average existing ground	829.0	1.5	4.0			
Side slope	5.0 H:V					

RED DEER
Stormwater Pond Conceptual Design
Pond 47

Conceptual cross-section

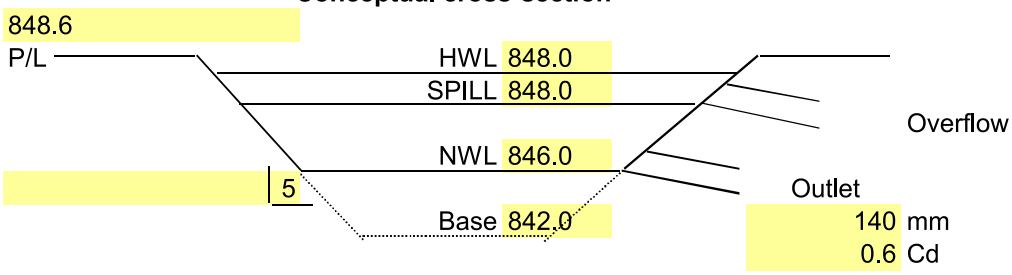


Design Parameters

Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	874.0	2.89	10.6	72512	0.187	5.0
HWL	873.5	2.72	9.2	**58490**	0.170	4.5
Overflow Elev	873.5	2.72	9.2	58490	0.170	4.5
Normal water level	871.0	1.96	3.4	0	0.000	2.0
Base of pond	869.0	1.44	0.0		0.000	0.0
Storage capacity				58490		
Average existing ground	874.0	2.9	10.6			
Side slope	5.0 H:V					

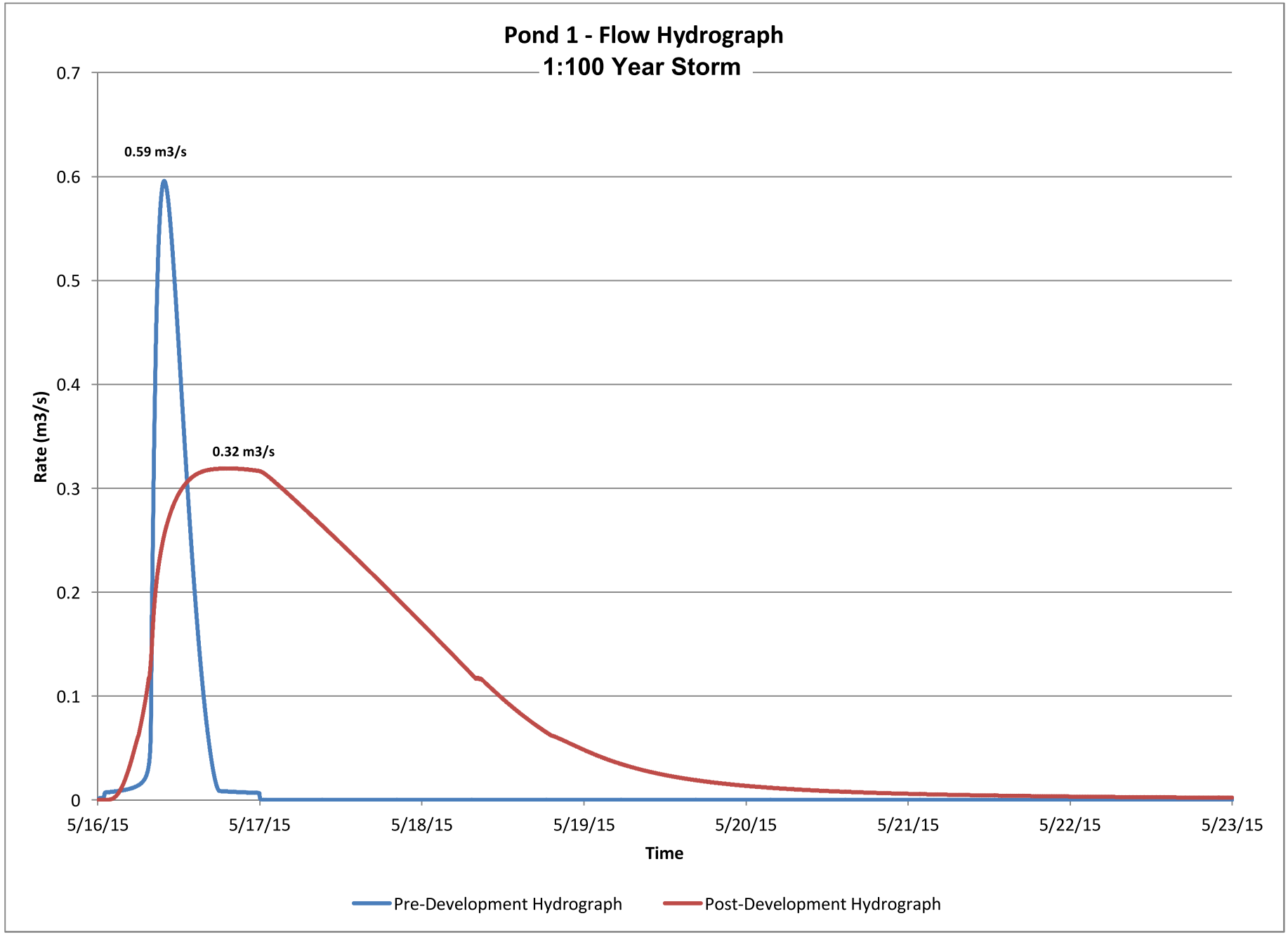
RED DEER
Stormwater Pond Conceptual Design
Pond 48

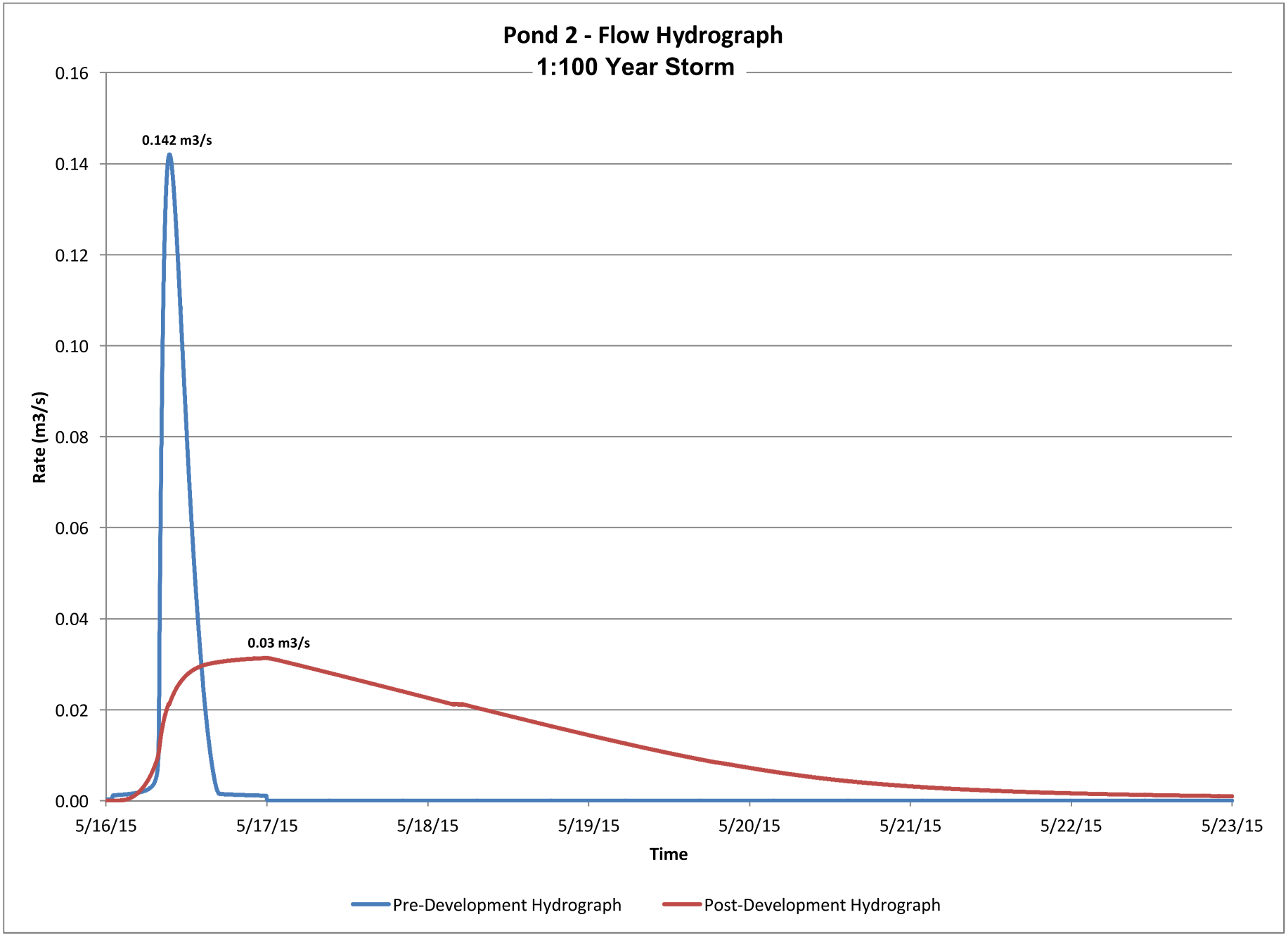
Conceptual cross-section

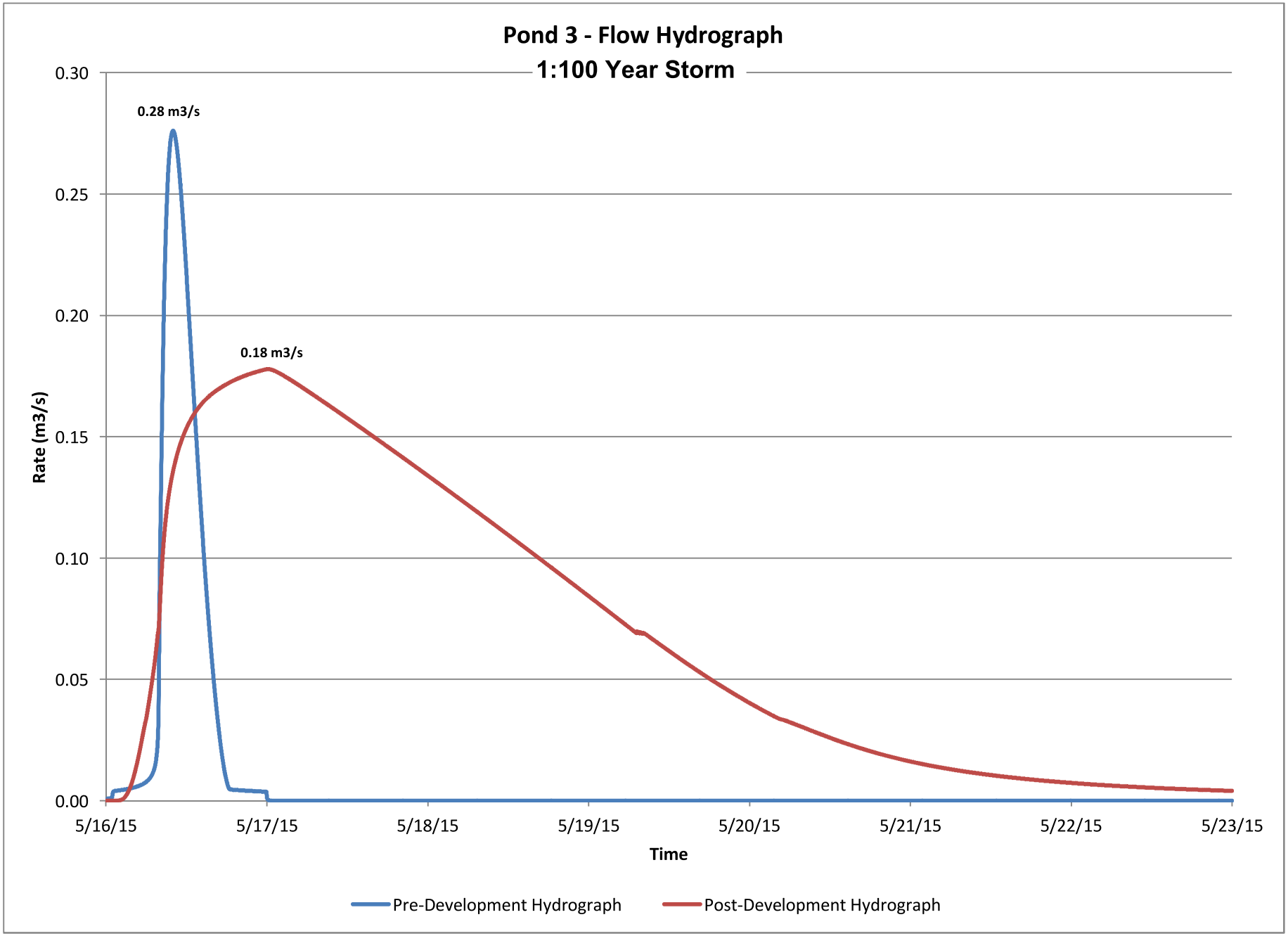


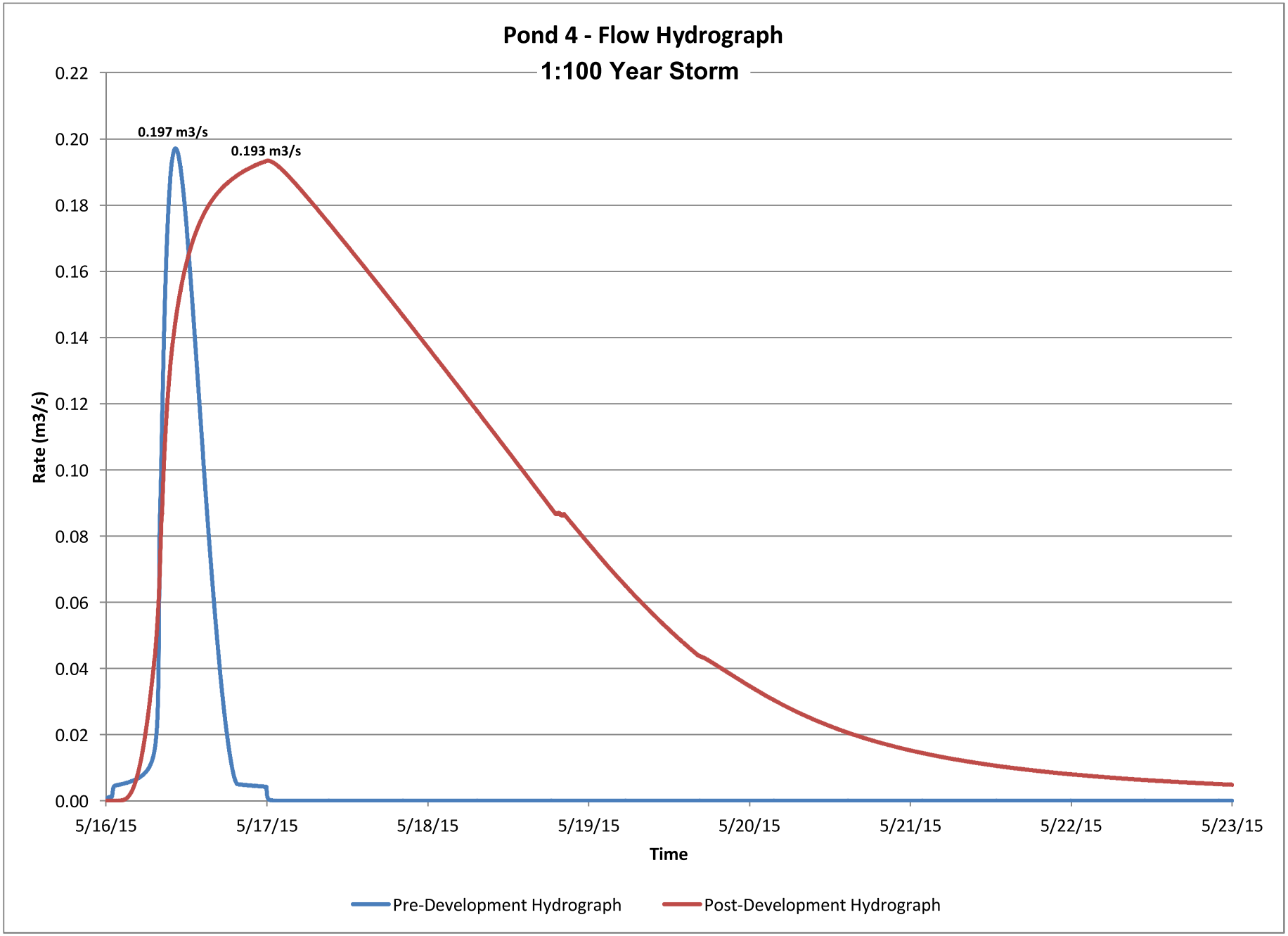
Design Parameters

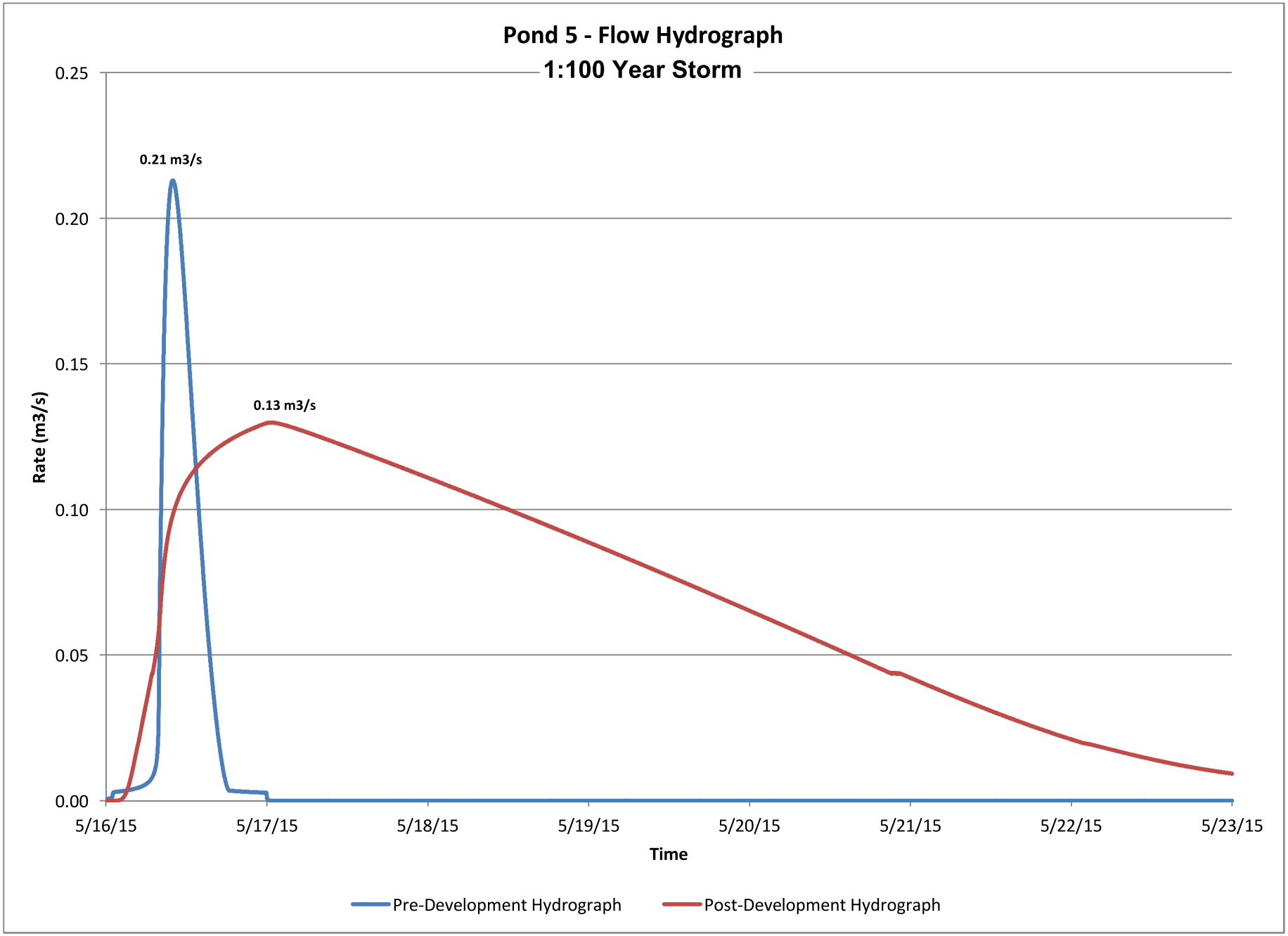
Item	Elevation m	Area ha	Total Volume ha.m.	Storage Volume m3	Discharge m^3/s	Depth m
Minimum property line	848.6	0.56	1.5	10125	0.065	6.6
HWL	848.0	0.47	1.2	**7050**	0.057	6.0
Overflow Elev	848.0	0.47	1.2	7050	0.057	6.0
Normal water level	846.0	0.24	0.5	0	0.000	4.0
Base of pond	842.0	0.01	0.0		0.000	0.0
Storage capacity				7050		
Average existing ground	848.6	0.6	1.5			
Side slope	5.0 H:V					

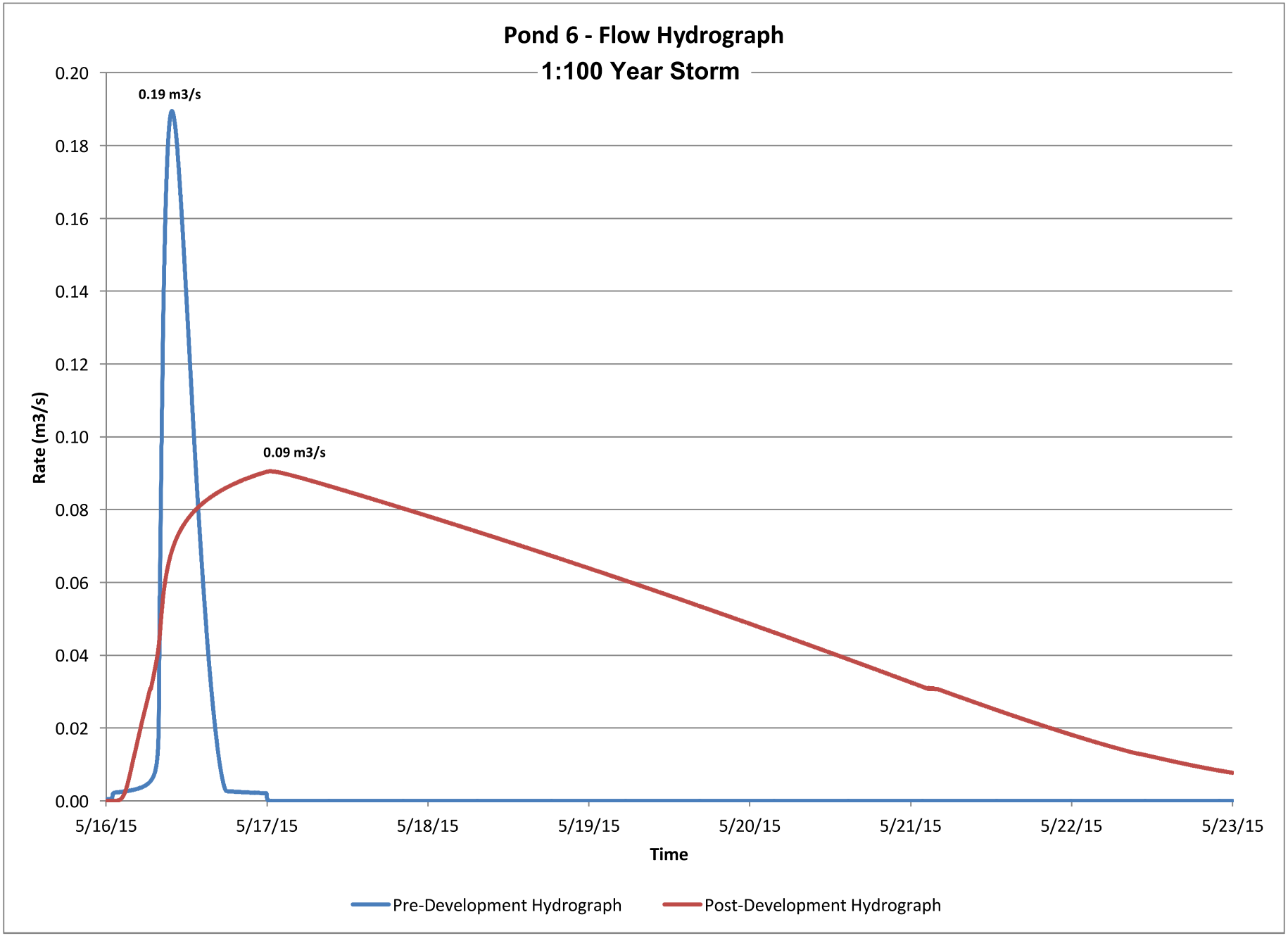

Pond 1 - Flow Hydrograph
1:100 Year Storm
0.59 m3/s
0.32 m3/s
Rate (m3/s)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph

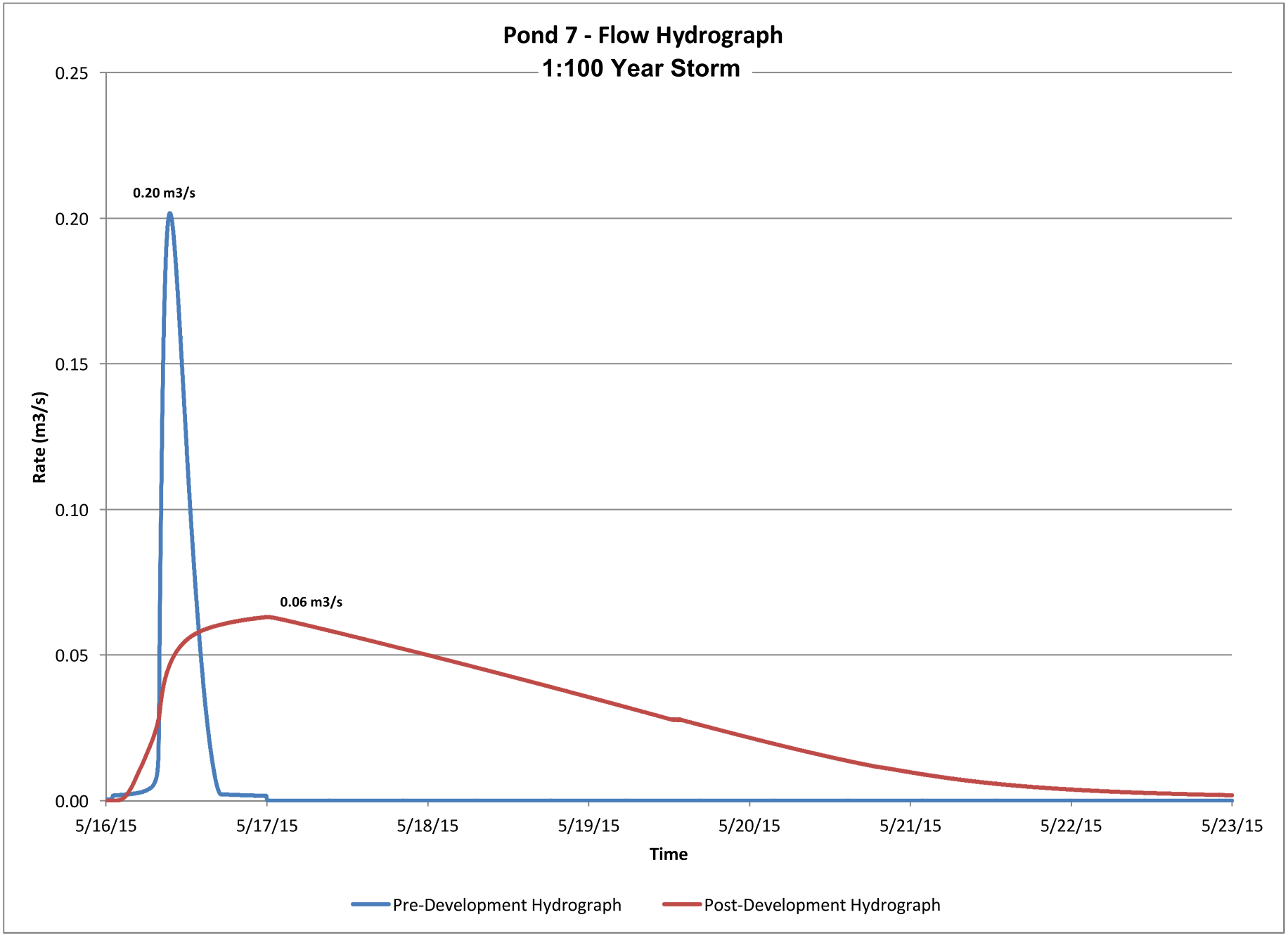

Pond 2 - Flow Hydrograph
1:100 Year Storm
0.142 m3/s
0.03 m3/s
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph

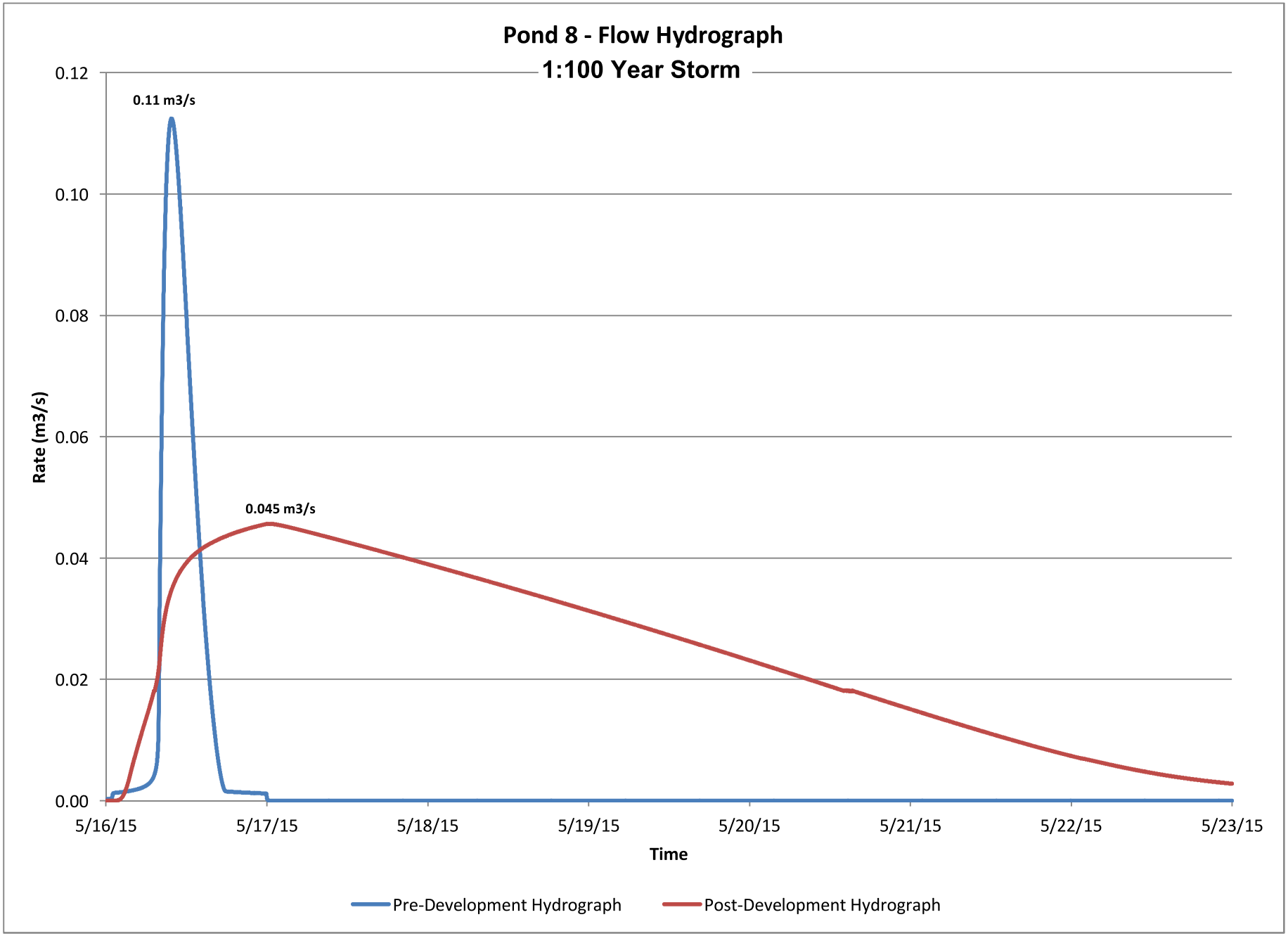

Pond 3 - Flow Hydrograph
1:100 Year Storm
0.28 m3/s
0.18 m3/s
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph

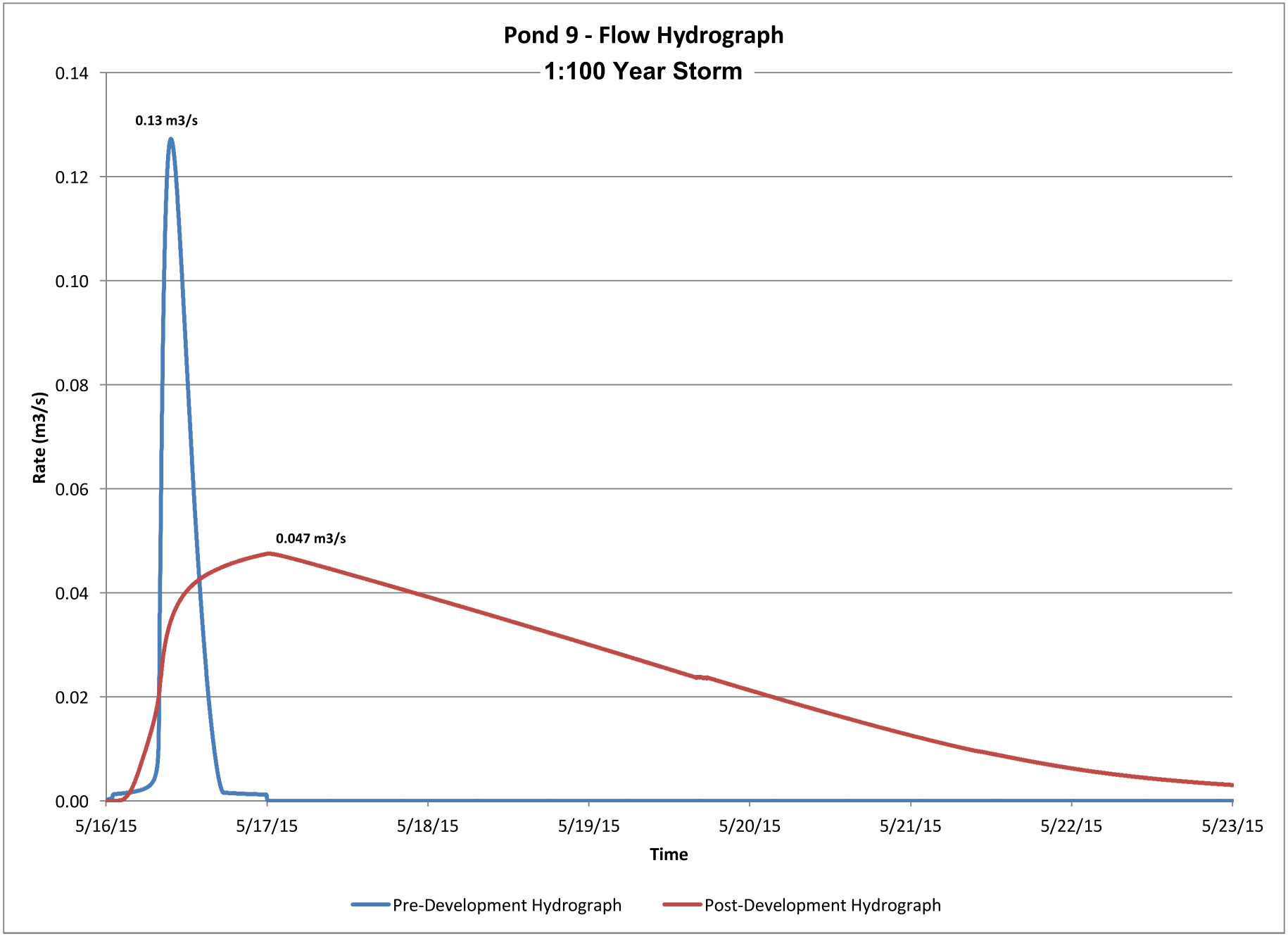

Pond 4 - Flow Hydrograph
1:100 Year Storm
0.197 m3/s
0.193 m3/s
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph


Pond 5 - Flow Hydrograph
1:100 Year Storm
0.25
0.20
0.15
0.10
0.05
0.00
Rate (m3/s)
0.21 m3/s
0.13 m3/s
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph


Pond 6 - Flow Hydrograph
1:100 Year Storm
0.19 m3/s
0.09 m3/s
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph


Pond 7 - Flow Hydrograph
1:100 Year Storm
0.25
0.20
0.15
0.10
0.05
0.00
Rate (m3/s)
0.20 m3/s
0.06 m3/s
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph


Pond 8 - Flow Hydrograph
1:100 Year Storm
0.11 m3/s
0.045 m3/s
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph


Pond 9 - Flow Hydrograph
1:100 Year Storm
0.13 m3/s
0.047 m3/s
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rate (m3/s)
5/16/15
5/17/15
5/18/15
5/19/15
5/20/15
5/21/15
5/22/15
5/23/15
Time
Pre-Development Hydrograph
Post-Development Hydrograph