

Appendix A

Field Survey Data



LEGEND

Culverts

Stormwater Mains

Ditches

Major Creeks

Parcels

Survey Data

Surveyed Culvert Inverts

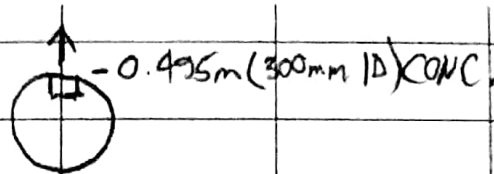
Surveyed Catch Basins

PN	East	North	Elevation	Code	LCode	Attribute	Date	Time	CQ1	CQ2	Coord_Class	Rod	Code
BG2	506763.039	5462956.931	64.142	275	1	0	2017-09-05	11:18:54	0.015	0.025	MEAS	2.000#	Invert Conc 300
BG3	506757.3	5462953.054	63.961	275	2	0	2017-09-05	11:19:42	0.015	0.023	MEAS	2.000#	Invert Conc 300
BG4	506880.411	5463043.608	68.773	275	1	0	2017-09-05	11:30:48	0.016	0.021	MEAS	2.000#	Invert Conc 300
BG5	506885.283	5463046.173	68.715	275	2	0	2017-09-05	11:31:52	0.017	0.022	MEAS	2.000#	Invert Conc 300
BG6	506898.854	5463053.552	68.561	257	1	0	2017-09-05	11:34:25	0.017	0.022	MEAS	2.000#	Invert CSP 300
BG7	506904.761	5463057.032	68.391	257	2	0	2017-09-05	11:36:18	0.011	0.014	MEAS	2.000#	Invert CSP 300
BG8	506924.376	5463068.4	68.304	275	1	0	2017-09-05	11:38:37	0.012	0.016	MEAS	2.000#	Invert Conc 300
BG9	506961.362	5463089.212	67.216	275	2	0	2017-09-05	11:41:01	0.014	0.018	MEAS	2.000#	Invert Conc 300
BG10	506991.422	5463106.706	65.934	275	0	0	2017-09-05	11:45:21	0.011	0.014	MEAS	2.000#	Invert Conc 300
BG11	507047.337	5463137.861	64.296	277	0	0	2017-09-05	11:54:28	0.014	0.021	MEAS	2.000#	Invert Conc 500
BG12	507167.174	5463212.264	62.063	275	1	0	2017-09-05	12:05:16	0.015	0.025	MEAS	2.000#	Invert Conc 300
BG13	507169.529	5463214.105	62.081	275	2	0	2017-09-05	12:06:09	0.008	0.016	MEAS	2.000#	Invert Conc 300
BG14	507172.031	5463215.699	62.029	276	1	450-ID	2017-09-05	12:07:32	0.011	0.018	MEAS	2.000#	Invert Conc 400
BG15	507174.516	5463217.023	62.119	276	2	450-ID	2017-09-05	12:08:25	0.013	0.024	MEAS	2.000#	Invert Conc 400
BG16	507368.111	5463260.919	83.204	275	1	0	2017-09-05	12:14:35	0.012	0.02	MEAS	2.000#	Invert Conc 300
BG17	507375.53	5463259.766	83.377	275	2	0	2017-09-05	12:16:37	0.015	0.024	MEAS	2.000#	Invert Conc 300
BG18	507357.417	5463263.147	83.105	275	1	0	2017-09-05	12:18:34	0.01	0.016	MEAS	2.000#	Invert Conc 300
BG19	507266.1	5463251.546	70.13	275	2	0	2017-09-05	12:21:45	0.01	0.018	MEAS	2.000#	Invert Conc 300
BG20	507231.984	5463244.885	65.468	275	1	0	2017-09-05	12:26:29	0.012	0.026	MEAS	2.000#	Invert Conc 300
BG21	507243.925	5463247.894	66.884	275	2	0	2017-09-05	12:28:45	0.012	0.025	MEAS	2.000#	Invert Conc 300
BG22	507204.926	5463232.833	63.074	275	0	0	2017-09-05	12:33:02	0.014	0.031	MEAS	2.000#	Invert Conc 300
BG23	507170.084	5463215.345	61.611	280	0	0	2017-09-05	12:40:45	0.012	0.032	MEAS	2.000#	Invert Conc 800
BG24	507162.502	5463209.336	61.934	275	1	0	2017-09-05	12:45:48	0.011	0.032	MEAS	2.000#	Invert Conc 300
BG25	507139.238	5463195.565	62.957	275	2	0	2017-09-05	12:49:44	0.009	0.043	MEAS	2.000#	Invert Conc 300
BG26	506930.849	5463207.346	47.093	275	1	0	2017-09-05	13:57:20	0.015	0.02	MEAS	2.000#	Invert Conc 300
BG27	506945.159	5463212.294	47.285	275	2	0	2017-09-05	13:59:08	0.029	0.018	MEAS	2.000#	Invert Conc 300
BG28	507087.874	5463331.485	32.463	275	1	0	2017-09-05	14:06:35	0.016	0.026	MEAS	2.000#	Invert Conc 300
BG29	507093.41	5463337.796	31.978	275	2	0	2017-09-05	14:07:49	0.013	0.021	MEAS	2.000#	Invert Conc 300
BG30	507112.146	5463356.47	30.673	278	0	0	2017-09-05	14:12:28	0.014	0.023	MEAS	2.000#	Invert Conc 600
BG31	507109.079	5463349.439	30.504	278	0	0	2017-09-05	14:13:02	0.012	0.02	MEAS	2.000#	Invert Conc 600
BG32	507101.862	5463346.991	30.736	278	0	0	2017-09-05	14:13:57	0.015	0.024	MEAS	2.000#	Invert Conc 600
BG33	507234.222	5463491.73	40.238	275	0	0	2017-09-05	14:52:33	0.024	0.029	MEAS	2.000#	Invert Conc 300
BG34	507331.045	5463432.294	37.853	260	0	0	2017-09-05	15:05:22	0.013	0.02	MEAS	3.150^#	Invert CSP 600
BG35	507331.31	5463418.131	39.367	375	0	0	2017-09-05	15:11:22	0.017	0.033	MEAS	2.000#	Catch basin
BG36	506896.139	5463381.809	9.732	375	0	0	2017-09-05	15:53:29	0.014	0.02	MEAS	2.000#	Catch basin
BG37	506906.014	5463388.041	9.629	375	0	0	2017-09-05	15:57:35	0.012	0.014	MEAS	2.000#	Catch basin
BG38	506927.603	5463400.631	8.632	275	0	0	2017-09-05	16:00:04	0.011	0.013	MEAS	2.000#	Invert Conc 300
BG39	506930.522	5463402.697	8.639	276	0	0	2017-09-05	0.66875	0.017	0.024	MEAS	2.000#	Invert Conc 400
BG40	506980.042	5463411.482	13.021	275	0	0	2017-09-05	16:07:37	0.013	0.019	MEAS	2.000#	Invert Conc 300
BG41	506977.006	5463427.915	10.528	375	0	0	2017-09-05	16:09:43	0.013	0.02	MEAS	2.000#	Catch basin
BG42	506974.325	5463426.778	9.742	275	0	0	2017-09-05	16:11:56	0.024	0.03	MEAS	2.000#	Invert Conc 300
BG43	506982.913	5463390.725	16.221	284	1	0	2017-09-05	16:17:09	0.01	0.015	MEAS	2.000#	Invert PVC 300
BG44	506981.918	5463396.816	15.425	284	2	0	2017-09-05	16:17:56	0.017	0.023	MEAS	2.000#	Invert PVC 300
BG45	506848.3	5463344.417	10.478	375	0	0	2017-09-05	16:23:15	0.011	0.015	MEAS	2.000#	Catch basin
BG46	506820.209	5463326.46	10.282	375	0	0	2017-09-05	16:36:31	0.014	0.017	MEAS	2.000#	Catch basin
BG47	506737.967	5463058.912	40.707	375	0	0	2017-09-07	10:06:24	0.01	0.02	MEAS	2.000#	Catch basin
BG48	506727.863	5463058.383	40.922	375	0	0	2017-09-07	10:07:20	0.007	0.012	MEAS	2.000#	Catch basin
BG49	506726.574	5463069.595	40.213	375	0	0	2017-09-07	10:08:57	0.013	0.035	MEAS	2.000#	Catch basin
BG50	506756.859	5463076.169	41.273	375	0	0	2017-09-07	10:10:16	0.009	0.016	MEAS	2.000#	Catch basin
BG51	506803.84	5463118.29	42.815	375	0	0	2017-09-07	10:12:07	0.011	0.021	MEAS	2.000#	Catch basin
BG52	506809.102	5463119.383	42.561	275	0	0	2017-09-07	10:13:34	0.013	0.026	MEAS	2.000#	Invert Conc 300
BG53	506845.524	5463151.465	43.293	375	0	0	2017-09-07	10:16:24	0.012	0.021	MEAS	2.000#	Catch basin
BG54	506701.907	5462994.345	47.024	375	0	0	2017-09-07	10:37:32	0.01	0.017	MEAS	2.000#	Catch basin
BG55	506700.962	5462981.112	49.323	375	0	0	2017-09-07	10:43:26	0.011	0.018	MEAS	2.000#	Catch basin
BG56	506691.196	5462972.329	50.506	375	0	0	2017-09-07	10:44:23	0.012	0.017	MEAS	2.000#	Catch basin
BG57	506683.671	5462907.621	58.725	375	0	0	2017-09-07	10:47:52	0.012	0.019	MEAS	2.000#	Catch basin
BG58	506841.239	5463022.08	67.645	275	1	0	2017-09-07	11:01:40	0.013	0.026	MEAS	2.000#	Invert Conc 300
BG59	506845.666	5463025.149	67.742	275	2	0	2017-09-07	11:02:45	0.012	0.02	MEAS	2.000#	Invert Conc 300
BG60	506689.224	5463197.489	7.946	275	1	0	2017-09-07	12:24:20	0.009	0.021	MEAS	2.000#	Invert Conc 300
BG61	506681.05	5463204.38	7.111	275	2	0	2017-09-07	12:27:47	0.009	0.018	MEAS	2.000#	Invert Conc 300
BG62	506608.535	5463083.025	12.042	375	0	0	2017-09-07	12:37:22	0.01	0.025	MEAS	2.000#	Catch basin
BG63	506623.865	5463106.796	11.229	375	0	0	2017-09-07	12:40:01	0.011	0.025	MEAS	2.000#	Catch basin
BG64	506616.526	5463098.45	10.823	375	0	0	2017-09-07	12:41:29	0.014	0.036	MEAS	2.000#	Catch basin
BG65	506599.856	5463065.292	12.057	375	0	0	2017-09-07	12:42:35	0.011	0.027	MEAS	2.000#	Catch basin
BG67	506845.502	5463151.488	43.299	375	0	0	2017-09-07	13:47:17	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG68	506851.449	5463156.359	43.479	375	0	0	2017-09-07	13:47:49	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG69	506861.307	5463161.68	43.495	275	0	0	2017-09-07	13:48:24	0.002	0	TPS	1.600/011/0.023#	Invert Conc 300
BG70	506888.02	5463177.975	44.915	275	1	0	2017-09-07	13:49:17	0.002	0	TPS	1.600/011/0.023#	Invert Conc 300
BG71	506906.326	5463191.908	45.979	275	2	0	2017-09-07	0.576388889	0.002	0.001	TPS	1.600/011/0.023#	Invert Conc 300
BG72	506839.046	5463159.784	41.514	277	0	450	2017-09-07	14:59:15	0.002	0.001	TPS	2.070/011/0.023#	Invert Conc 500
BG73	506833.945	5463161.253	38.846	277	0	0	2017-09-07	15:03:53	0.002	0.001	TPS	1.600/011/0.023#	Invert Conc 500
BG74	506723.632	5462926.505	62.607	277	0	450	2017-09-07	16:02:19	0.002	0	TPS	1.600/011/0.023#	Invert Conc 500
BG75	506721.782	5462922.83	63.079	375	0	0	2017-09-07	16:03:22	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG76	506684.252	5462891.59	60.704	375	0	0	2017-09-07	16:04:19	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG77	506680.802	5462893.679	60.45	375	0	0	2017-09-07	16:04:52	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG78	506660.346	5462866.123	62.183	375	0	0	2017-09-07	16:11:18	0.002	0.001	TPS	1.600/011/0.023#	Catch basin
BG79	506778.157	5462969.098	64.647	275	0	0	2017-09-07	16:38:51	0.002	0	TPS	1.600/011/0.023#	Invert Conc 300
BG80	506790.579	5462978.671	65.298	275	0	0	2017-09-07	16:39:55	0.002	0	TPS	1.600/011/0.023#	Invert Conc 300
BG81	506783.628	5462973.648	65.425	375	0	0	2017-09-07	16:40:41	0.002	0	TPS	1.600/011/0.023#	Catch basin
BG82	506807.155	5462992.886	65.869	275	1	0	2017-09-07	16:41:47	0.002	0.001	TPS	1.600/011/0.023#	Invert Conc 300
BG83	506815.068	5463000.268	66.286	275	2	0	2017-09-07	16:42:42	0.002	0.001	TPS	1.600/011/0.023#	Invert Conc 300
BG200	507085.568	5463327											

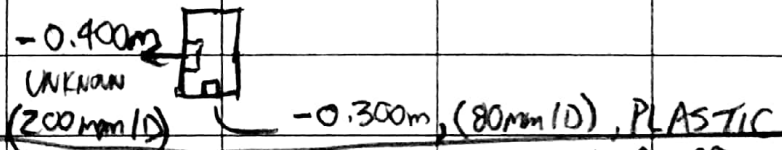
Table A-2 Catch Basins Field Sketches

R.D. PENHALL LTD. MADE IN VANCOUVER, CANADA
DUKSBK WATERPROOF

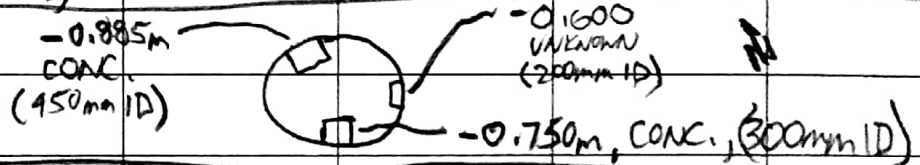
BG78



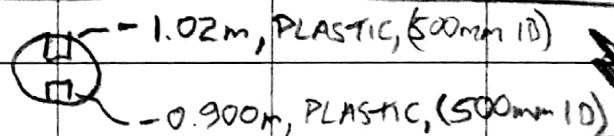
BG76



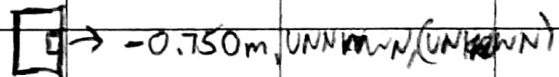
BG77



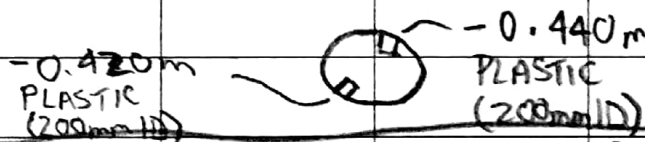
BG57



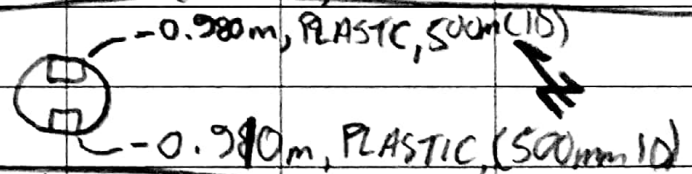
BG56



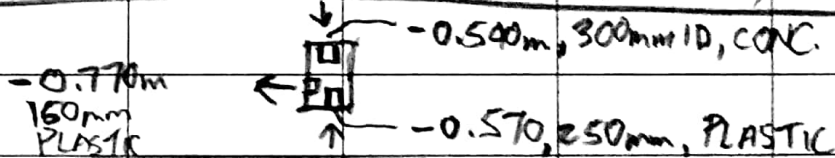
BG55



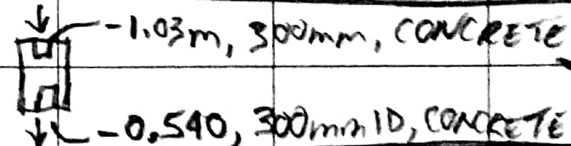
BG54



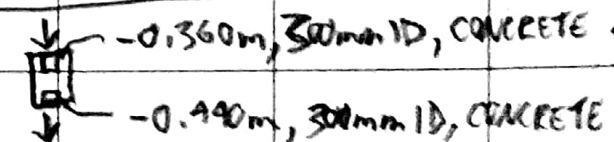
BG67



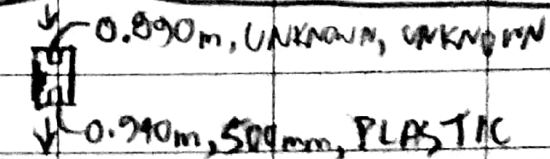
BG51



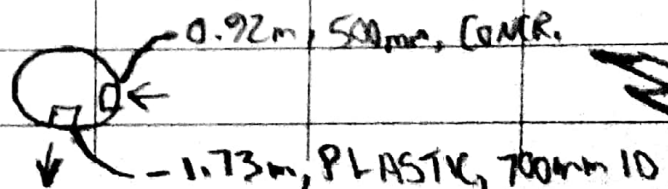
BG50



BG47



BG49



LEVEL

BG48

-0.530
PLASTIC
150mm ID



BG41

* FILLED WITH
SEDIMENT.
DIFFICULT TO MEASURE

-0.580m, CONC.
-0.65m, CONC.



BG37

-0.620, 300mm ID, CONC.
-0.590, 300mm ID, CONC.



BG36

-0.490m, 300mm, CONC.



BG46

-0.560m, 300mm ID, CONC.



BG65

-0.620
300mm
CONC.
-0.510, 200mm, PLASTIC



BG63

-0.690m
300mm
CONC.
-0.610m, 300mm, CONC.
-0.66m, 300mm CONC.



BG201

-0.480m, 300mm CONC.
-0.510m, 300mm CONC.



BG20

-1.00m, UNKNOWN, UNKNOWN
-1.03m, UNKNOWN, UNKNOWN



BG209

-0.590m, 200mm, PLASTIC



Figure A-2 Village Staff Field Observation Results Clarifying Flow Paths (Item #1)

#1

Please confirm flow path downstream of culvert "MN-06". Assumed red line as indicated??

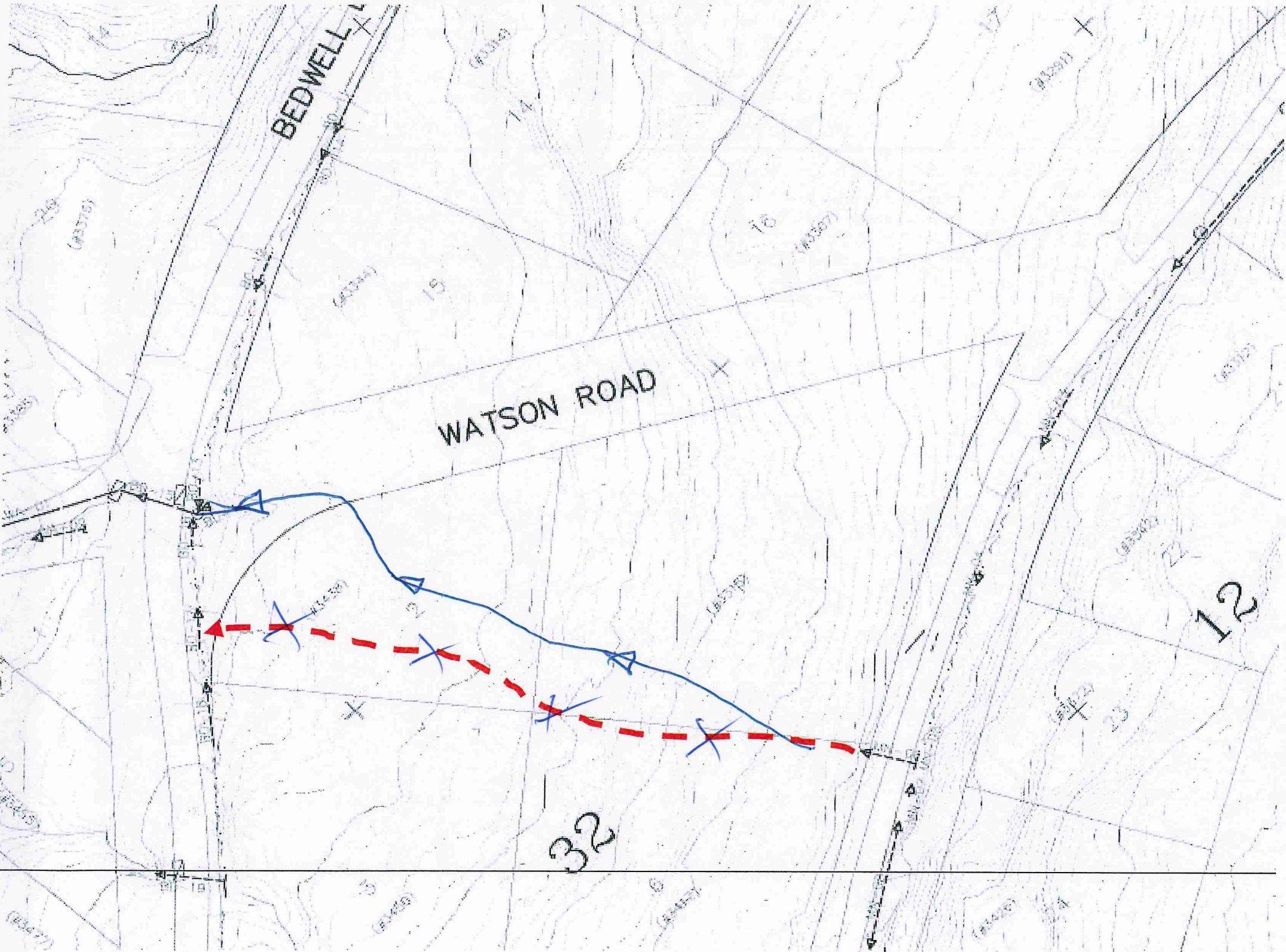


Figure A-3 Village Staff Field Observation Results Clarifying Flow Paths (Item #2)

#2

Please confirm flow path downstream of culvert "BD-27". Assumed red line as indicated??

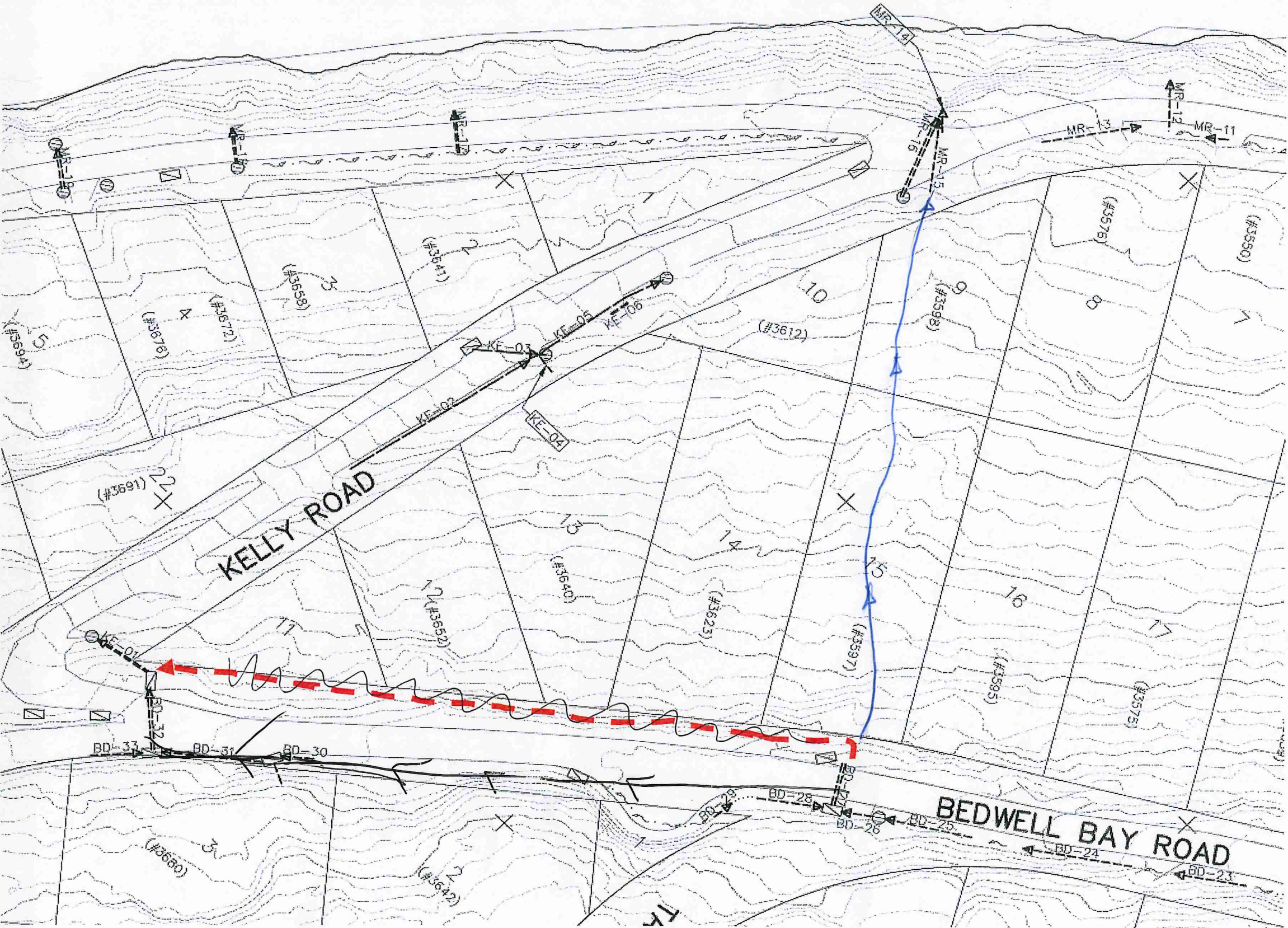


Figure A-4 Village Staff Field Observation Results Clarifying Flow Paths (Item #3)

#3

Please confirm flow path downstream of culvert "BD-37". Assumed red line as indicated??

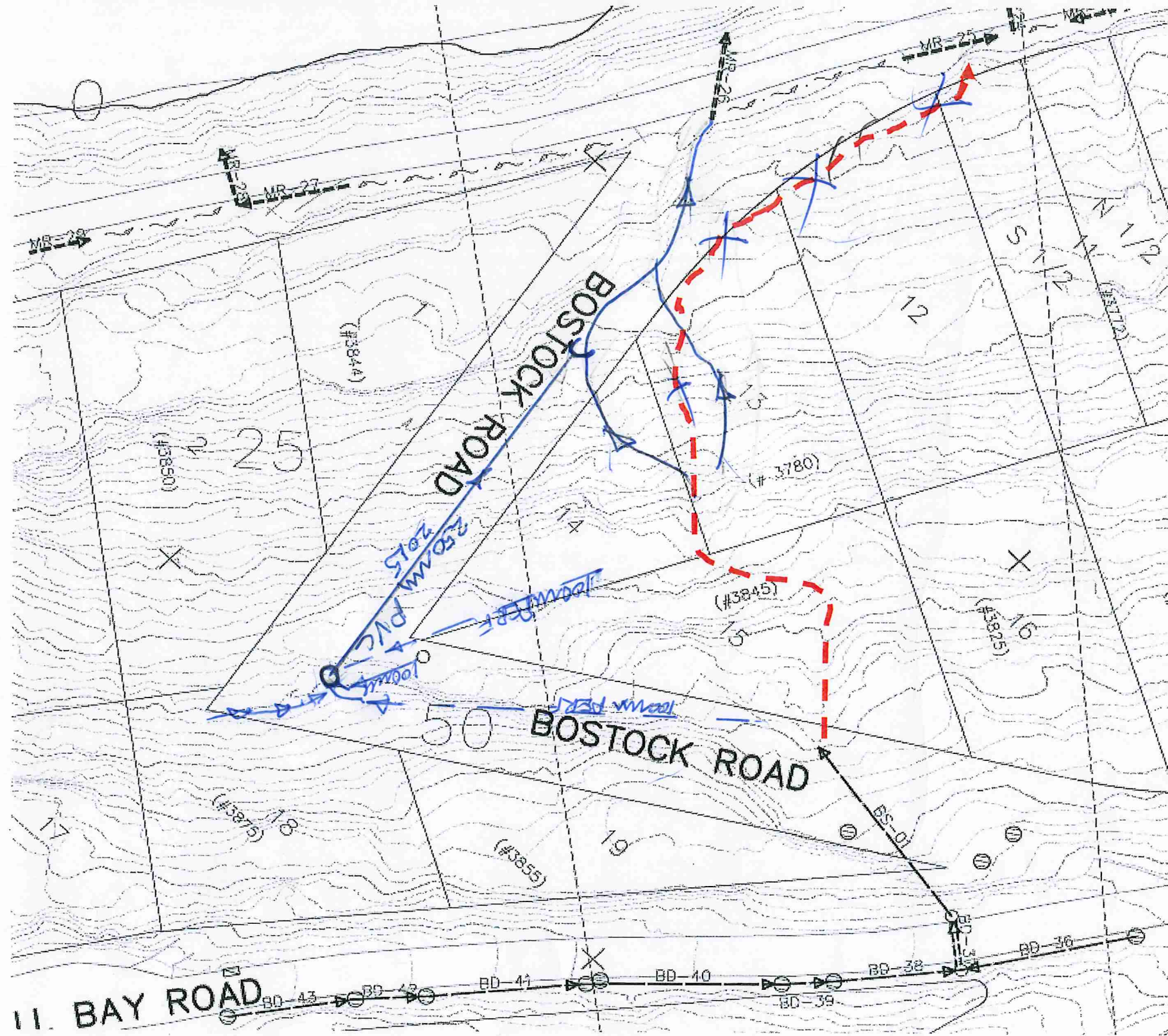


Figure A-5 Village Staff Field Observation Results Clarifying Flow Paths (Item #4)

#4

Please confirm connectivity / stormwater pipes on Kelly Road? According to 1984 Study, stormwater pipes were recommended for this area. Please confi

Please confirm existence of culverts (3 of them) at Marine and Kelly. Have they been converted to pipes with single outfall?



Figure A-6 Village Staff Field Observation Results Clarifying Flow Paths (Item #5)

#5

Please confirm flow path downstream of culvert "BD-59". Assumed red line as indicated??

Please confirm flow path downstream of culvert "BD-64". Assumed red or green line as primary flow path??

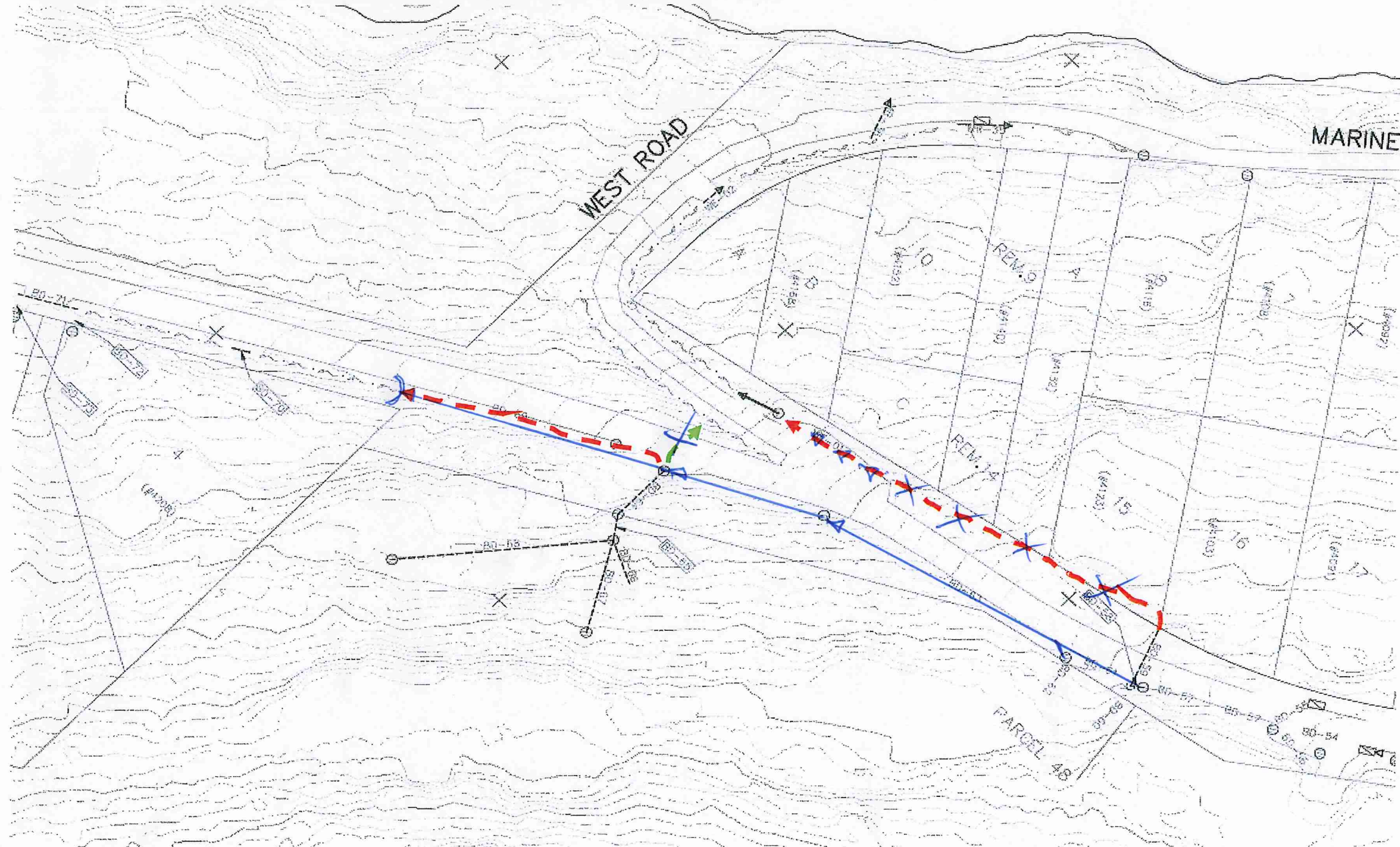
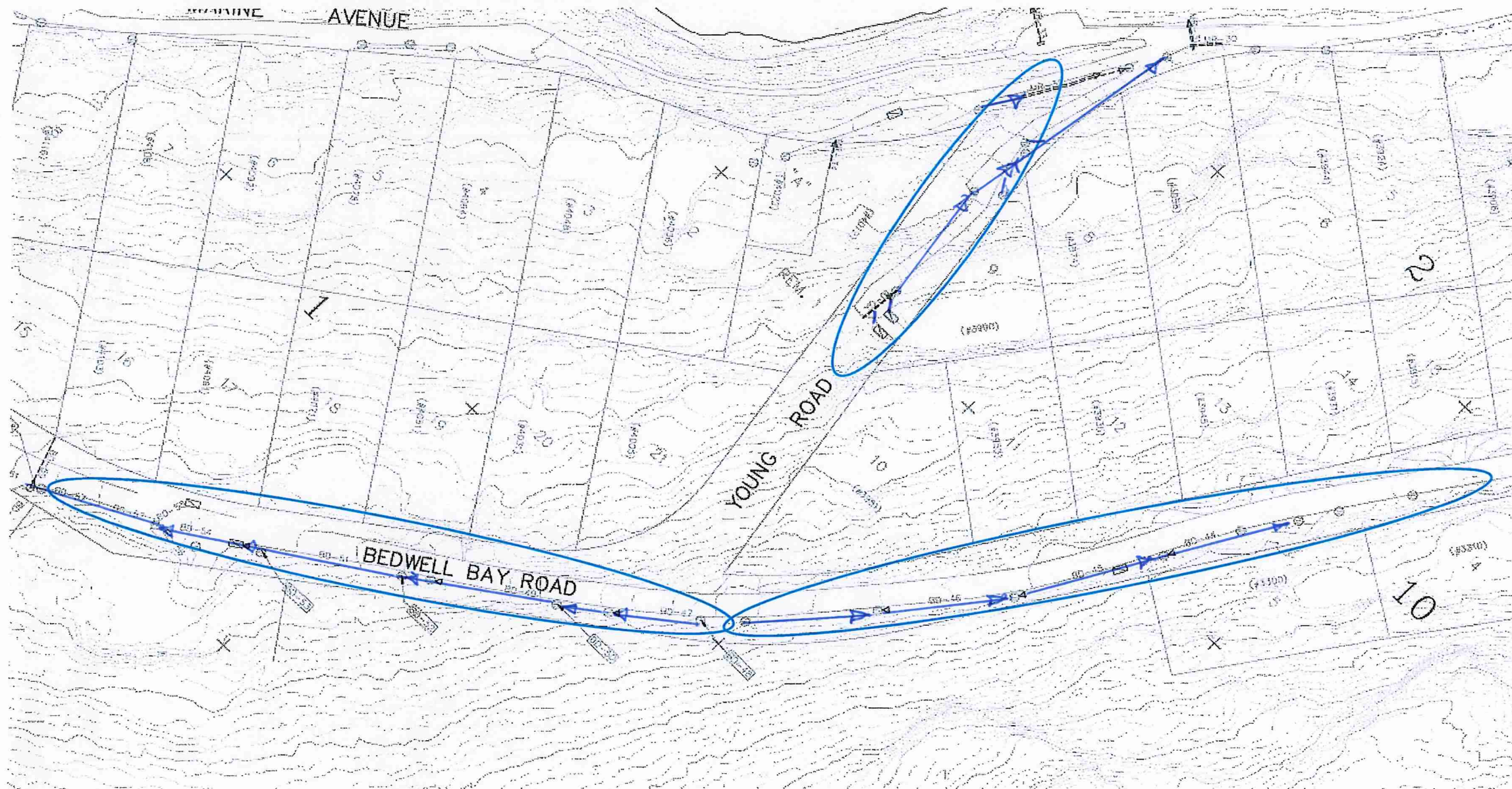


Figure A-7 Village Staff Field Observation Results Clarifying Flow Paths (Item #6)

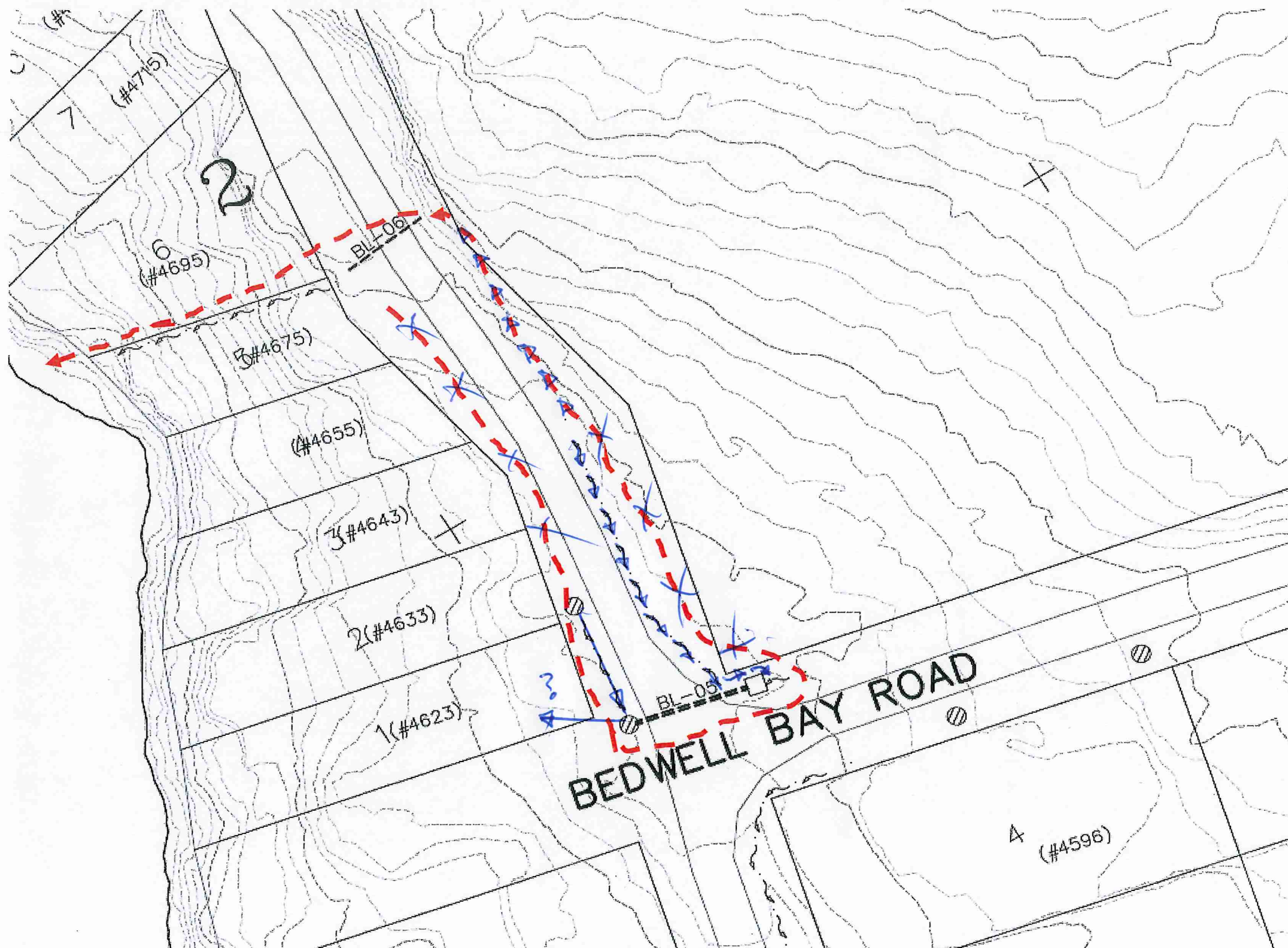
#6

Please confirm the extent of stormwater piping along Bedwell Bay Road and Young Road.
This is to ensure we don't assess culverts that have already been abandoned or removed (BD-44 to BD-57).



#7

NOT AS POSITIVE AS OUTLET WAS NOT FOUND.

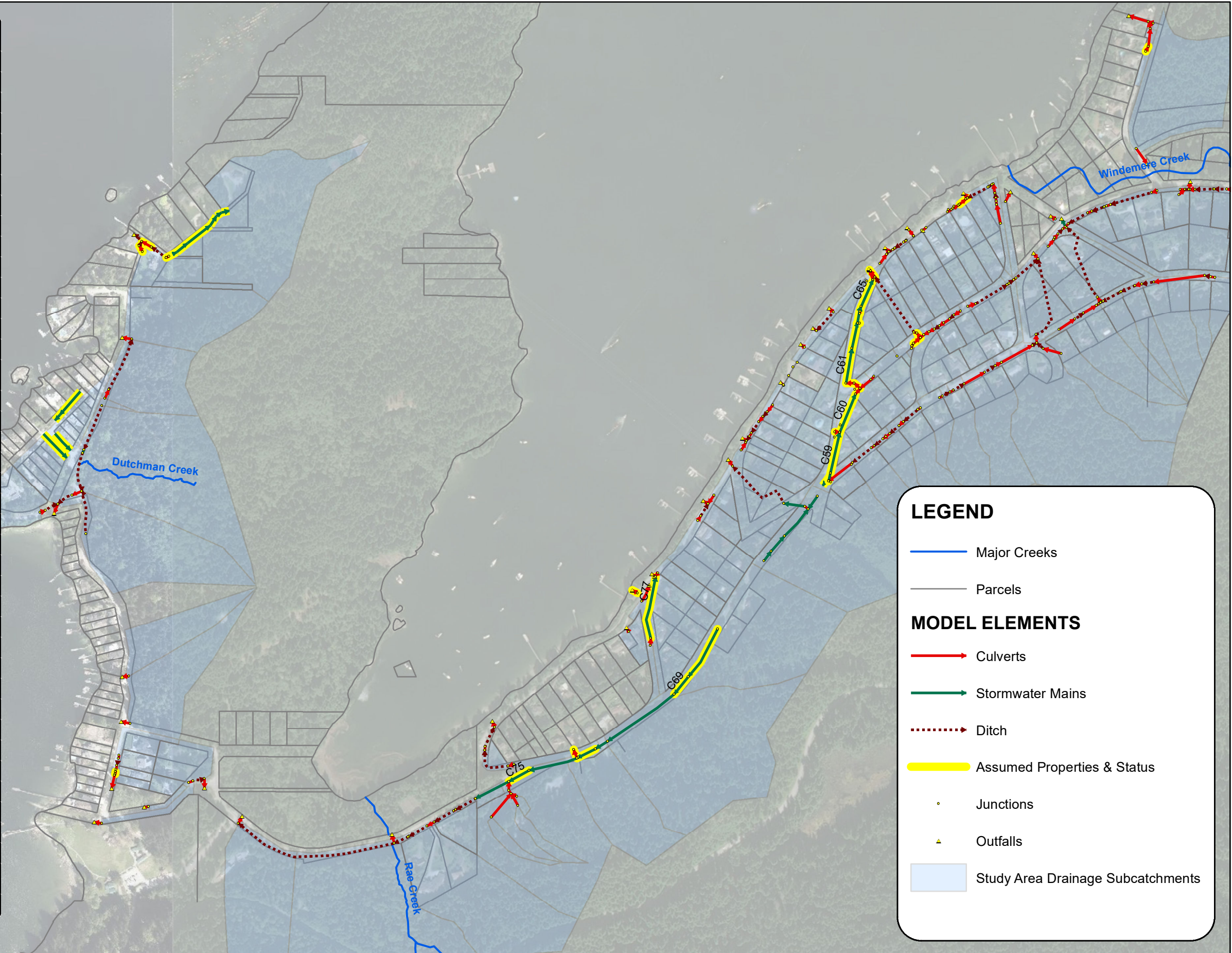




Appendix B

List of Assets with Assumed Properties & Status

Road Name	Pipe ID	Asset Type	Comment
Bedwell Bay Rd	BD-27	Culvert	Assumed diameter
	BD-28	Culvert	Assumed diameter
	BD-32	Culvert	Assumed diameter
	BD-34	Culvert	Assumed diameter
	BD-58	Culvert	Assumed abandoned/replaced
	BD-59	Culvert	Assumed abandoned/replaced
	BD-35	Storm pipe	Assumed diameter
	BD-46	Storm pipe	Assumed diameter
	BD-45	Storm pipe	Assumed diameter
	BD-44	Storm pipe	Assumed diameter
	BD-57	Storm pipe	Assumed diameter
	C59	Storm pipe	Assumed diameter
	C60	Storm pipe	Assumed diameter
	C69	Storm pipe	Assumed diameter
	C75	Storm pipe	Assumed diameter
Belcarra Bay Rd	BL-2	Culvert	Assumed diameter
Coombe Ln	CO-01	Culvert	Assumed diameter
	CO-02	Culvert	Assumed diameter
	CO-03	Culvert	Assumed diameter
	CO-04	Storm pipe	Assumed diameter
	CO-05	Storm pipe	Assumed diameter
	CO-06	Storm pipe	Assumed diameter
	CO-07	Storm pipe	Assumed diameter
	CO-08	Storm pipe	Assumed diameter
	CO-09	Storm pipe	Assumed diameter
Kelly Rd	KE-01	Culvert	Assumed diameter
	KE-04	Culvert	Assumed abandoned/replaced
	KE-06	Culvert	Assumed abandoned/replaced
	KE-02	Storm pipe	Assumed diameter
	KE-05	Storm pipe	Assumed diameter
	C61	Storm pipe	Assumed diameter
	C65	Storm pipe	Assumed diameter
Marine Ave	MR-04	Culvert	Assumed diameter
	MR-15	Culvert	Assumed diameter
	MR-33	Culvert	Assumed diameter
Robson Rd	RO-04	Storm pipe	Assumed diameter
	RO-03	Storm pipe	Assumed diameter
Salish Rd	SA-01	Storm pipe	Assumed diameter
	SA-03	Storm pipe	Assumed diameter
Senkler Rd	SE-02	Culvert	Assumed diameter
Young Rd	C77	Storm pipe	Assumed diameter



LEGEND

- Major Creeks
- Parcels
- Culverts
- Stormwater Mains
- Ditch
- Assumed Properties & Status
- Junctions
- Outfalls
- Study Area Drainage Subcatchments

MODEL ELEMENTS

DRAINAGE ASSETS WITH ASSUMED PROPERTIES & STATUS

Appendix C

IDF Curves

Environment Canada/Environnement Canada

Short Duration Rainfall Intensity-Duration-Frequency Data
Données sur l'intensité, la durée et la fréquence des chutes
de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2014/12/21

N VANCOUVER LYNN CREEK

BC

1105660

Latitude: 49 22'N Longitude: 123 2'W Elevation/Altitude: 190 m

Years/Années : 1964 - 1983 # Years/Années : 19

Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

Year Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1964	4.1	6.6	7.6	9.1	15.0	25.1	59.9	95.0	169.4
1965	3.6	5.3	6.1	10.4	19.3	26.4	45.5	84.3	122.4
1966	3.0	4.3	5.6	6.3	10.9	20.8	52.3	90.2	125.0
1967	3.8	4.1	5.8	8.1	13.0	23.9	48.3	58.7	109.0
1968	4.3	5.6	6.9	11.2	17.8	32.3	79.5	114.8	166.4
1969	3.8	6.9	8.9	12.2	17.3	20.3	40.6	56.6	98.8
1970	9.4	9.4	9.4	9.7	10.4	16.8	39.9	62.7	71.4
1971	3.6	6.1	7.9	11.7	12.7	22.4	48.0	83.6	127.8
1972	5.8	6.9	8.1	9.9	14.0	22.6	50.8	93.0	149.6
1973	3.6	5.1	5.3	7.6	8.9	16.3	41.1	66.8	86.9
1974	4.6	6.9	8.6	13.0	15.5	20.6	49.3	74.7	124.5
1975	4.1	6.1	8.9	13.7	20.1	23.9	51.3	94.7	163.3
1976	2.5	3.6	4.3	7.6	14.2	22.6	43.2	64.3	96.8
1977	2.8	3.8	5.9	8.4	13.2	20.8	42.2	71.4	97.0
1978	5.1	6.3	7.5	12.8	15.3	21.8	54.2	64.2	86.0
1980	3.5	4.5	4.9	7.1	13.1	24.6	63.5	89.6	120.4
1981	4.2	7.0	7.8	11.0	19.7	34.7	94.9	167.8	251.3
1982	2.2	3.1	4.4	7.9	13.2	23.7	48.6	73.8	110.1
1983	5.1	7.6	9.9	14.5	21.8	38.6	76.1	109.6	135.3
# Yrs. Années	19	19	19	19	19	19	19	19	19
Mean Moyenne	4.2	5.7	7.0	10.1	15.0	24.1	54.2	85.0	126.9

Std. Dev.	1.6	1.6	1.7	2.4	3.5	5.6	14.8	26.1	41.1
Écart-type									
Skew.	2.19	0.26	-0.07	0.21	0.31	1.29	1.59	1.85	1.55
Dissymétrie									
Kurtosis	9.93	3.35	2.25	2.36	2.85	4.99	5.44	7.95	6.85

*-99.9 Indicates Missing Data/Données manquantes

Warning: annual maximum amount greater than 100-yr return period amount

Avertissement : la quantité maximale annuelle excède la quantité
pour une période de retour de 100 ans

Year/Année	Duration/Durée	Data/Données	100-yr/ans
1970	5 min	9.4	9.0
1981	12 h	167.8	166.9

Table 2a : Return Period Rainfall Amounts (mm)
Quantité de pluie (mm) par période de retour

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	3.9	5.3	6.2	7.3	8.2	9.0	19
10 min	5.5	6.9	7.8	9.0	9.9	10.8	19
15 min	6.8	8.3	9.3	10.6	11.5	12.5	19
30 min	9.7	11.9	13.3	15.1	16.4	17.7	19
1 h	14.4	17.6	19.6	22.2	24.1	26.0	19
2 h	23.2	28.2	31.5	35.6	38.7	41.8	19
6 h	51.7	64.8	73.5	84.4	92.6	100.6	19
12 h	80.8	103.8	119.1	138.4	152.7	166.9	19
24 h	120.2	156.5	180.5	210.9	233.4	255.8	19

Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits

Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	46.9	63.4	74.3	88.1	98.4	108.5	19
	+/- 7.7	+/- 13.0	+/- 17.5	+/- 23.6	+/- 28.3	+/- 32.9	19
10 min	32.9	41.4	47.0	54.1	59.4	64.6	19
	+/- 4.0	+/- 6.7	+/- 9.0	+/- 12.1	+/- 14.5	+/- 16.9	19
15 min	27.0	33.2	37.2	42.3	46.1	49.9	19
	+/- 2.9	+/- 4.8	+/- 6.5	+/- 8.8	+/- 10.5	+/- 12.2	19
30 min	19.4	23.7	26.6	30.1	32.8	35.5	19

	+/-	2.0	+/-	3.4	+/-	4.6	+/-	6.1	+/-	7.4	+/-	8.6	19
1 h		14.4		17.6		19.6		22.2		24.1		26.0	19
	+/-	1.5	+/-	2.4	+/-	3.3	+/-	4.5	+/-	5.3	+/-	6.2	19
2 h		11.6		14.1		15.7		17.8		19.4		20.9	19
	+/-	1.2	+/-	2.0	+/-	2.6	+/-	3.6	+/-	4.3	+/-	5.0	19
6 h		8.6		10.8		12.2		14.1		15.4		16.8	19
	+/-	1.0	+/-	1.7	+/-	2.3	+/-	3.1	+/-	3.7	+/-	4.4	19
12 h		6.7		8.7		9.9		11.5		12.7		13.9	19
	+/-	0.9	+/-	1.5	+/-	2.0	+/-	2.8	+/-	3.3	+/-	3.8	19
24 h		5.0		6.5		7.5		8.8		9.7		10.7	19
	+/-	0.7	+/-	1.2	+/-	1.6	+/-	2.2	+/-	2.6	+/-	3.0	19

Table 3 : Interpolation Equation / Équation d'interpolation: $R = A \cdot T^B$

R = Interpolated Rainfall rate (mm/h)/Intensité interpolée de la pluie (mm/h)

RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)

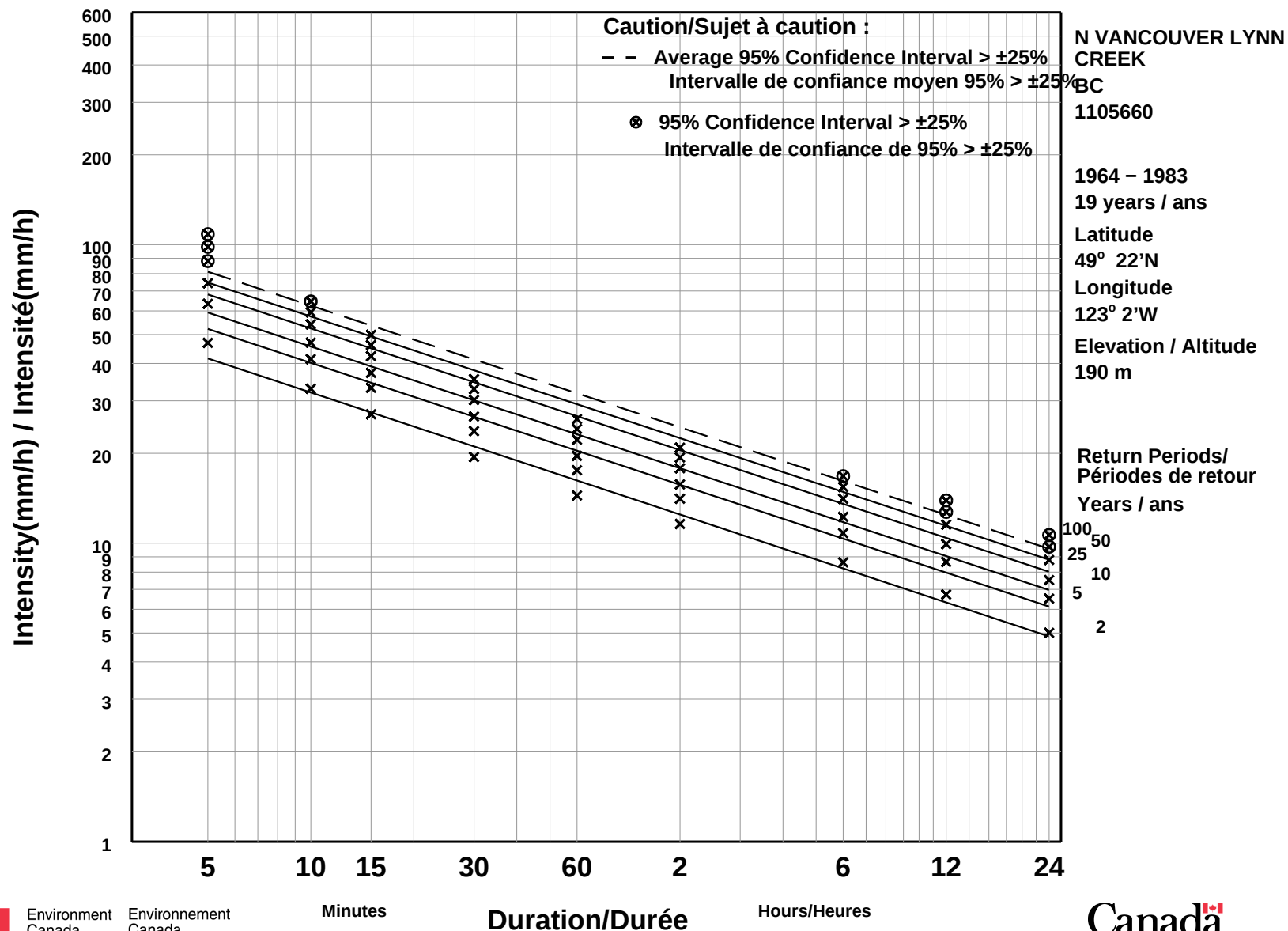
T = Rainfall duration (h) / Durée de la pluie (h)

Statistics/Statistiques	2	5	10	25	50	100
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans
Mean of RR/Moyenne de RR	19.2	24.4	27.8	32.1	35.3	38.5
Std. Dev. /Écart-type (RR)	14.0	18.7	21.8	25.8	28.8	31.7
Std. Error/Erreur-type	2.3	4.6	6.1	8.1	9.6	11.0
Coefficient (A)	16.2	20.4	23.2	26.6	29.2	31.8
Exponent/Exposant (B)	-0.379	-0.378	-0.378	-0.378	-0.378	-0.377
Mean % Error/% erreur moyenne	6.4	9.1	10.4	11.6	12.3	12.9

Short Duration Rainfall Intensity–Duration–Frequency Data

2014/12/21

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requested), cost estimates, operation and maintenance responsibilities for drainage systems, and schedule for implementation.

Summary reports of studies carried out in Phase 2 will be required with the submission of detailed engineering plans.

4.2.3 Drainage Management Criteria

.1 Rainfall and drainage management zones

Figure 4a should be used to determine rainfall and drainage management zones.

Figure 4a – Rainfall and Drainage Management Zones



“An approved parcel grading plan is required prior to the issuance of a building permit.

Grading is to comply with the BC Building Code and the following:

- Each parcel must be graded to drain into a District drainage system or a natural drainage path. Minimum parcel grades must be 2% (which supersedes the MMCD requirement). Parcel grading must be uniform and consistent, and can be reduced to 1% if an individual 600 mm diameter lawn basin is placed at the low side of the parcel.
- Areas around buildings (or proposed building sites) must be graded away from the (proposed) foundations to prevent flooding.
- Parcels lower than adjacent roadways must be designed using acceptable storm water management techniques to direct the runoff to an existing or proposed drainage system. Flood-proofing is required at the low points of roadways.
- Buildings must be sited above the hydraulic grade line of the Major Drainage System or Creek System.
- Other than sheet flow, individual parcels must not direct storm runoff into any natural creek, park or greenbelt areas.
- A 600 mm lawn basin is to be placed at the end of every on-site swale.
- To optimize rainfall capture and infiltration, soil composition and depth for pervious areas should be selected to meet rainfall capture targets.”

4.6 Minimum Building Elevations (MBE) – is amended by:

Deleting the second paragraph and replacing it with the following:

“The MBE is to be at least 0.6m above the storm sewer service connection invert and at least 0.6m above the major drainage system hydraulic grade (HGL).”

Delete sections 4.6.1 and 4.6.2.

4.7 Rational Method – not amended, refer to MMCD Design Guidelines (2014).

4.7.1 Runoff Coefficients – is replaced with the following:

“Actual runoff coefficients must be used for the design of source controls. Drainage systems must use the runoff coefficients in Table 4e.

Table 4e – Runoff Coefficients

Land Use	Percent Impervious	2 and 10 Year Runoff Coefficient	100 Year Runoff Coefficient
Park (alpine,	5	0.1	0.3

regional)			
Park (urban)	20	0.2	0.3
Road Right of way	90	0.8	0.85
Single Family Residential	70	0.65	0.7
Multi-Family Residential	90	0.8	0.85
Commercial / Industrial	95	0.85	0.95
Institutional	80	0.75	0.8

“

4.7.2 Runoff Coefficient Adjustment Factor – not amended, refer to MMCD Design Guidelines (2014).

4.7.3 Rainfall Intensity – is replaced with the following:

“Rainfall intensity must be determined from a rainfall Intensity-Duration-Frequency (IDF) curve based on the calculated time of concentration. The District has developed IDF curves that incorporate future climate change scenarios to the year 2100.

The appropriate IDF curve shall be selected based on geographic area as shown in Figure 4a – Rainfall and Drainage Management Zones. Three zones are identified: Upper, Mid and Lower and the IDF curves are based on data from the District’s rainfall gauging stations.

Lower Zone – Rainfall Intensity (mm/hr)

Storm Duration	Return Period					
	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
5 min	61.9	86.0	104.8	129.3	148.2	167.9
15 min	36.3	48.5	57.8	70.0	79.5	89.0
30 min	24.4	31.9	37.6	45.1	50.9	56.9
1 hour	16.6	21.0	24.4	28.9	32.3	36.0
2 hour	12.5	15.6	17.8	20.6	22.7	24.7
6 hour	8.9	11.0	12.7	14.6	16.1	17.5
12 hour	6.8	8.6	9.8	11.2	12.2	13.2
24 hour	4.8	6.1	7.0	8.2	9.0	9.8

Lower Zone –Total Rainfall (mm)

Storm Duration	Return Period					
	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
5 min	5.2	7.2	8.7	10.8	12.4	14.0
15 min	9.1	12.1	14.5	17.5	19.9	22.3
30 min	12.2	15.9	18.8	22.5	25.5	28.5
1 hour	16.6	21.0	24.4	28.9	32.3	36.0
2 hour	25.1	31.3	35.7	41.2	45.3	49.5
6 hour	53.1	66.2	75.9	87.6	96.6	104.9

Appendix D

Rational Method Calculations

Table D-1 Runoff Coefficients and Adjustment Factors (from Bylaw)

Land Use	Runoff Coefficient (C)	Adjustment Factor (A)	R = C x A
Commercial / Paved	0.9	0.7	0.63
Industrial	0.9	0.7	0.63
Residential / Roofs	0.76	0.75	0.57
Parks / Woods	0.5	0.85	0.425
Institution	0.8	0.73	0.584

Table D-2 Concentration Coefficients (from Bylaw)

Type of Flow	Ct
Natural watercourses	0.5
Overland flow	1.4
Storm sewer flow	0.5

Table D-3 Friction Factors (from Bylaw)

Conduit Type	n
Natural Channels	0.05
Excavated ditches	0.03
Overland flow (paved)	0.016
Overland flow (natural)	0.4
pipe	0.013

Table D-4 Rainfall Intensities with Climate Change to 2100 for "Lower Zone" in North Vancouver (DNV Bylaw 8145*)

	Intensity (mm/hr)					
Duration	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
0.083	61.9	86	104.8	129.3	148.2	167.9
0.25	36.3	48.5	57.8	70	79.5	89
0.5	24.4	31.9	37.6	45.1	50.9	56.9
1	16.6	21	24.4	28.9	32.3	36
2	12.5	15.6	17.8	20.6	22.7	24.7
6	8.9	11	12.7	14.6	16.1	17.5
12	6.8	8.6	9.8	11.2	12.2	13.2
24	4.8	6.1	7	8.2	9	9.8

**District of North Vancouver Development Servicing Bylaw 8145, 2017*

Table D-4a IDF Interpolation Equation Parameters

Return Period	2	5	10	25	50	100
A	18.856	24.478	28.689	34.061	38.121	42.231
B	-0.44	-0.456	-0.467	-0.479	-0.488	-0.496

$$I = A * T^B$$

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
BD-01	2.458	Commercial / Paved	1%	0.63	0.427
		Parks / Woods	99%	0.425	
		Residential / Roofs		0.57	
BD-02	0.042	Commercial / Paved	100%	0.63	0.630
		Parks / Woods			
		Residential / Roofs			
BD-03	0.290	Commercial / Paved	20%	0.63	0.488
		Parks / Woods	65%	0.425	
		Residential / Roofs	15%	0.57	
BD-04	0.887	Commercial / Paved	5%	0.63	0.450
		Parks / Woods	85%	0.425	
		Residential / Roofs	10%	0.57	
BD-05	0.009	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-05A	0.258	Commercial / Paved	20%	0.63	0.481
		Parks / Woods	70%	0.425	
		Residential / Roofs	10%	0.57	
BD-06	0.827	Commercial / Paved	5%	0.63	0.450
		Parks / Woods	85%	0.425	
		Residential / Roofs	10%	0.57	
BD-08	0.016	Commercial / Paved	100%	0.63	0.630
		Parks / Woods			
		Residential / Roofs			
BD-09	0.309	Commercial / Paved	5%	0.63	0.457
		Parks / Woods	80%	0.425	
		Residential / Roofs	15%	0.57	
BD-10	0.039	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
BD-11	1.287	Commercial / Paved	10%	0.63	0.475
		Parks / Woods	70%	0.425	
		Residential / Roofs	20%	0.57	
BD-11A	0.009	Commercial / Paved	100%	0.63	0.630
		Parks / Woods			
		Residential / Roofs			
BD-12	0.415	Commercial / Paved	5%	0.63	0.479
		Parks / Woods	65%	0.425	
		Residential / Roofs	30%	0.57	
BD-13	0.451	Commercial / Paved	10%	0.63	0.489
		Parks / Woods	60%	0.425	
		Residential / Roofs	30%	0.57	
BD-14	0.240	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
BD-16	0.042	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
BD-17	0.799	Commercial / Paved	5%	0.63	0.450
		Parks / Woods	85%	0.425	
		Residential / Roofs	10%	0.57	
BD-18	0.757	Commercial / Paved	2%	0.63	0.451
		Parks / Woods	83%	0.425	
		Residential / Roofs	15%	0.57	
BD-19	0.938	Commercial / Paved	10%	0.63	0.460
		Parks / Woods	80%	0.425	
		Residential / Roofs	10%	0.57	
BD-20	0.150	Commercial / Paved	2%	0.63	0.429
		Parks / Woods	98%	0.425	
		Residential / Roofs			
BD-21	0.703	Commercial / Paved	5%	0.63	0.457
		Parks / Woods	80%	0.425	
		Residential / Roofs	15%	0.57	
BD-22	0.516	Commercial / Paved	7%	0.63	0.473
		Parks / Woods	70%	0.425	
		Residential / Roofs	23%	0.57	
BD-24	0.051	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
BD-25	0.246	Commercial / Paved	15%	0.63	0.492
		Parks / Woods	60%	0.425	
		Residential / Roofs	25%	0.57	
BD-27	0.775	Commercial / Paved	2%	0.63	0.451
		Parks / Woods	83%	0.425	
		Residential / Roofs	15%	0.57	
BD-28	0.002	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-29	0.013	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-30	0.116	Commercial / Paved	65%	0.63	0.558
		Parks / Woods	35%	0.425	
		Residential / Roofs			
BD-31	0.480	Commercial / Paved	5%	0.63	0.457
		Parks / Woods	80%	0.425	
		Residential / Roofs	15%	0.57	
BD-32	0.439	Commercial / Paved	3%	0.63	0.453
		Parks / Woods	82%	0.425	
		Residential / Roofs	15%	0.57	
BD-33	0.548	Commercial / Paved	10%	0.63	0.511
		Parks / Woods	45%	0.425	
		Residential / Roofs	45%	0.57	
BD-34	0.523	Commercial / Paved	30%	0.63	0.508
		Parks / Woods	55%	0.425	
		Residential / Roofs	15%	0.57	

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
BD-37	4.394	Commercial / Paved	2%	0.63	0.431
		Parks / Woods	97%	0.425	
		Residential / Roofs	1%	0.57	
BD-66	0.050	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-67	0.267	Commercial / Paved	8%	0.63	0.444
		Parks / Woods	90%	0.425	
		Residential / Roofs	2%	0.57	
BD-68	0.215	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-70	3.981	Commercial / Paved	5%	0.63	0.438
		Parks / Woods	93%	0.425	
		Residential / Roofs	2%	0.57	
BD-70A	4.059	Commercial / Paved	10%	0.63	0.453
		Parks / Woods	85%	0.425	
		Residential / Roofs	5%	0.57	
BD-70B	5.857	Commercial / Paved	3%	0.63	0.431
		Parks / Woods	97%	0.425	
		Residential / Roofs			
BD-70C	2.029	Commercial / Paved	3%	0.63	0.436
		Parks / Woods	94%	0.425	
		Residential / Roofs	3%	0.57	
BD-70D	0.148	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BD-71	0.445	Commercial / Paved	20%	0.63	0.495
		Parks / Woods	60%	0.425	
		Residential / Roofs	20%	0.57	
BD-74	3.893	Commercial / Paved	4%	0.63	0.445
		Parks / Woods	88%	0.425	
		Residential / Roofs	8%	0.57	
BD-75	21.535	Commercial / Paved	1%	0.63	0.427
		Parks / Woods	99%	0.425	
		Residential / Roofs			
BD-76	5.654	Commercial / Paved	2%	0.63	0.429
		Parks / Woods	98%	0.425	
		Residential / Roofs			
BL-01	0.102	Commercial / Paved	10%	0.63	0.518
		Parks / Woods	40%	0.425	
		Residential / Roofs	50%	0.57	
BL-03	0.210	Commercial / Paved	10%	0.63	0.489
		Parks / Woods	60%	0.425	
		Residential / Roofs	30%	0.57	
BL-04	0.332	Commercial / Paved	20%	0.63	0.524
		Parks / Woods	40%	0.425	
		Residential / Roofs	40%	0.57	

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
BL-05	1.949	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BL-06	1.206	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BL-13	5.049	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BL-13A	3.128	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BL-14C	2.228	Commercial / Paved	5%	0.63	0.435
		Parks / Woods	95%	0.425	
		Residential / Roofs			
BL-14CA	1.715	Commercial / Paved	5%	0.63	0.435
		Parks / Woods	95%	0.425	
		Residential / Roofs			
BL-18	0.056	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
BL-2	0.106	Commercial / Paved	15%	0.63	0.528
		Parks / Woods	35%	0.425	
		Residential / Roofs	50%	0.57	
CO-01	0.865	Commercial / Paved	5%	0.63	0.464
		Parks / Woods	75%	0.425	
		Residential / Roofs	20%	0.57	
CO-03	4.464	Commercial / Paved	2%	0.63	0.433
		Parks / Woods	95%	0.425	
		Residential / Roofs	3%	0.57	
KE-01	0.048	Commercial / Paved	60%	0.63	0.548
		Parks / Woods	40%	0.425	
		Residential / Roofs			
MD-01	0.648	Commercial / Paved	10%	0.63	0.482
		Parks / Woods	65%	0.425	
		Residential / Roofs	25%	0.57	
MD-02	0.164	Commercial / Paved	2%	0.63	0.465
		Parks / Woods	73%	0.425	
		Residential / Roofs	25%	0.57	
MD-03	0.072	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
MD-04	0.208	Commercial / Paved	25%	0.63	0.476
		Parks / Woods	75%	0.425	
		Residential / Roofs			
MN-01	0.391	Commercial / Paved	5%	0.63	0.464
		Parks / Woods	75%	0.425	
		Residential / Roofs	20%	0.57	

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
MN-02	0.450	Commercial / Paved	5%	0.63	0.464
		Parks / Woods	75%	0.425	
		Residential / Roofs	20%	0.57	
MN-03	1.306	Commercial / Paved	3%	0.63	0.443
		Parks / Woods	89%	0.425	
		Residential / Roofs	8%	0.57	
MN-04	0.616	Commercial / Paved	3%	0.63	0.441
		Parks / Woods	90%	0.425	
		Residential / Roofs	7%	0.57	
MN-05	0.568	Commercial / Paved	3%	0.63	0.441
		Parks / Woods	90%	0.425	
		Residential / Roofs	7%	0.57	
MN-07	0.007	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
MN-08	1.408	Commercial / Paved	3%	0.63	0.438
		Parks / Woods	92%	0.425	
		Residential / Roofs	5%	0.57	
MN-09	0.020	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
MN-10	6.127	Commercial / Paved	2%	0.63	0.436
		Parks / Woods	93%	0.425	
		Residential / Roofs	5%	0.57	
MN-12	1.659	Commercial / Paved	3%	0.63	0.438
		Parks / Woods	92%	0.425	
		Residential / Roofs	5%	0.57	
MN-13	0.060	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
MN-14	1.029	Commercial / Paved	2%	0.63	0.433
		Parks / Woods	95%	0.425	
		Residential / Roofs	3%	0.57	
MN-16	0.465	Commercial / Paved	5%	0.63	0.450
		Parks / Woods	85%	0.425	
		Residential / Roofs	10%	0.57	
MN-17	1.112	Commercial / Paved	2%	0.63	0.435
		Parks / Woods	94%	0.425	
		Residential / Roofs	4%	0.57	
MN-18	0.531	Commercial / Paved	5%	0.63	0.443
		Parks / Woods	90%	0.425	
		Residential / Roofs	5%	0.57	
MN-19	0.071	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
MN-20	1.089	Commercial / Paved	5%	0.63	0.443
		Parks / Woods	90%	0.425	
		Residential / Roofs	5%	0.57	

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
MR-02	0.036	Commercial / Paved	60%	0.63	0.548
		Parks / Woods	40%	0.425	
		Residential / Roofs			
MR-03	0.499	Commercial / Paved	3%	0.63	0.456
		Parks / Woods	80%	0.425	
		Residential / Roofs	17%	0.57	
MR-05	0.448	Commercial / Paved	2%	0.63	0.465
		Parks / Woods	73%	0.425	
		Residential / Roofs	25%	0.57	
MR-06	0.452	Commercial / Paved	2%	0.63	0.473
		Parks / Woods	68%	0.425	
		Residential / Roofs	30%	0.57	
MR-07	0.452	Commercial / Paved	2%	0.63	0.480
		Parks / Woods	63%	0.425	
		Residential / Roofs	35%	0.57	
MR-08	0.441	Commercial / Paved	2%	0.63	0.465
		Parks / Woods	73%	0.425	
		Residential / Roofs	25%	0.57	
MR-10	0.005	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
MR-11	0.441	Commercial / Paved	2%	0.63	0.465
		Parks / Woods	73%	0.425	
		Residential / Roofs	25%	0.57	
MR-12	0.436	Commercial / Paved	4%	0.63	0.491
		Parks / Woods	56%	0.425	
		Residential / Roofs	40%	0.57	
MR-13	0.028	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
MR-14	0.031	Commercial / Paved	25%	0.63	0.476
		Parks / Woods	75%	0.425	
		Residential / Roofs			
MR-15	0.410	Commercial / Paved	10%	0.63	0.475
		Parks / Woods	70%	0.425	
		Residential / Roofs	20%	0.57	
MR-16	1.226	Commercial / Paved	5%	0.63	0.501
		Parks / Woods	50%	0.425	
		Residential / Roofs	45%	0.57	
MR-17	0.278	Commercial / Paved	35%	0.63	0.497
		Parks / Woods	65%	0.425	
		Residential / Roofs			
MR-18	0.482	Commercial / Paved	10%	0.63	0.482
		Parks / Woods	65%	0.425	
		Residential / Roofs	25%	0.57	
MR-19	0.323	Commercial / Paved	20%	0.63	0.539
		Parks / Woods	30%	0.425	
		Residential / Roofs	50%	0.57	

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
MR-20	0.410	Commercial / Paved	15%	0.63	0.492
		Parks / Woods	60%	0.425	
		Residential / Roofs	25%	0.57	
MR-21	0.350	Commercial / Paved	5%	0.63	0.479
		Parks / Woods	65%	0.425	
		Residential / Roofs	30%	0.57	
MR-22	0.445	Commercial / Paved	10%	0.63	0.504
		Parks / Woods	50%	0.425	
		Residential / Roofs	40%	0.57	
MR-23	0.452	Commercial / Paved	5%	0.63	0.457
		Parks / Woods	80%	0.425	
		Residential / Roofs	15%	0.57	
MR-24	0.456	Commercial / Paved	3%	0.63	0.475
		Parks / Woods	67%	0.425	
		Residential / Roofs	30%	0.57	
MR-25	0.422	Commercial / Paved	5%	0.63	0.464
		Parks / Woods	75%	0.425	
		Residential / Roofs	20%	0.57	
MR-26	1.238	Commercial / Paved	3%	0.63	0.460
		Parks / Woods	77%	0.425	
		Residential / Roofs	20%	0.57	
MR-27	0.239	Commercial / Paved	20%	0.63	0.495
		Parks / Woods	60%	0.425	
		Residential / Roofs	20%	0.57	
MR-28	0.334	Commercial / Paved	10%	0.63	0.475
		Parks / Woods	70%	0.425	
		Residential / Roofs	20%	0.57	
MR-29	1.185	Commercial / Paved	10%	0.63	0.482
		Parks / Woods	65%	0.425	
		Residential / Roofs	25%	0.57	
MR-30	0.413	Commercial / Paved	5%	0.63	0.450
		Parks / Woods	85%	0.425	
		Residential / Roofs	10%	0.57	
MR-31	1.519	Commercial / Paved	5%	0.63	0.472
		Parks / Woods	70%	0.425	
		Residential / Roofs	25%	0.57	
MR-32	0.143	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
MR-34	0.262	Commercial / Paved	5%	0.63	0.486
		Parks / Woods	60%	0.425	
		Residential / Roofs	35%	0.57	
SE-01	2.955	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
SE-02	0.071	Commercial / Paved	95%	0.63	0.620
		Parks / Woods	5%	0.425	
		Residential / Roofs			

Table D-5 Weighted Runoff Coefficients with Adjustment Factors

Catchment	Area (ha)	Land Use	% of Total A	R	Weighted R
SE-03	0.011	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
SE-04	0.047	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
SE-05	0.011	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
SE-06	0.012	Commercial / Paved	100%	0.63	0.630
		Parks / Woods			
		Residential / Roofs			
TT-02	1.437	Commercial / Paved			0.432
		Parks / Woods	95%	0.425	
		Residential / Roofs	5%	0.57	
TT-03	0.080	Commercial / Paved	50%	0.63	0.528
		Parks / Woods	50%	0.425	
		Residential / Roofs			
TT-04	0.053	Commercial / Paved	10%	0.63	0.446
		Parks / Woods	90%	0.425	
		Residential / Roofs			
TT-05	0.154	Commercial / Paved	10%	0.63	0.446
		Parks / Woods	90%	0.425	
		Residential / Roofs			
TU-01	1.616	Commercial / Paved	15%	0.63	0.521
		Parks / Woods	40%	0.425	
		Residential / Roofs	45%	0.57	
TU-02	0.999	Commercial / Paved	10%	0.63	0.453
		Parks / Woods	85%	0.425	
		Residential / Roofs	5%	0.57	
TU-03	0.551	Commercial / Paved	45%	0.63	0.517
		Parks / Woods	55%	0.425	
		Residential / Roofs			
TU-04	0.194	Commercial / Paved	40%	0.63	0.507
		Parks / Woods	60%	0.425	
		Residential / Roofs			
WA-02	0.007	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			
WE-01	0.196	Commercial / Paved	75%	0.63	0.579
		Parks / Woods	25%	0.425	
		Residential / Roofs			
WE-02	0.172	Commercial / Paved	30%	0.63	0.523
		Parks / Woods	45%	0.425	
		Residential / Roofs	25%	0.57	
YO-01	0.112	Commercial / Paved			0.425
		Parks / Woods	100%	0.425	
		Residential / Roofs			

Table D-6 Time of Concentration, Rainfall Intensity, and Flow Calculations

Culvert	Catchment	Area (ha)	Tc					I (mm/hr)						Q (L/s)					
			Ct	L (m)	s (m/m)	n	Tc (hr)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
BD-01	BD-01	2.4581461	1.4	143.0	0.17682	0.4	0.264	33.9	44.9	53.4	64.4	73.0	81.7	98.8	131.0	155.8	188.0	212.9	238.4
BD-02	BD-02	0.0423360	1.4	46.3	0.07927	0.03	0.010	145.7	203.7	251.3	315.5	368.2	423.3	10.8	15.1	18.6	23.4	27.3	31.4
BD-03	BD-03	0.2897955	1	68.3	0.15629	0.2	0.048	71.7	97.8	118.5	145.9	167.8	190.5	28.2	38.4	46.6	57.3	65.9	74.8
BD-04	BD-04	0.8873100	1	159.9	0.23582	0.4	0.183	39.8	53.1	63.4	76.9	87.3	98.1	44.2	58.9	70.4	85.3	96.9	108.8
BD-05	BD-05	0.0086811	1.4	12.1	0.27554	0.4	0.018	110.8	153.4	188.0	234.2	271.8	311.0	1.1	1.6	1.9	2.4	2.8	3.2
BD-05A	BD-05A	0.2575217	1	68.3	0.14462	0.15	0.037	80.0	109.5	133.1	164.4	189.5	215.5	27.5	37.7	45.8	56.5	65.2	74.1
BD-06	BD-06	0.8267766	1	159.9	0.20851	0.2	0.097	52.6	70.8	85.2	104.0	118.9	134.2	54.3	73.2	88.1	107.5	122.9	138.7
BD-08	BD-08	0.0161046	0.5	12.1	0.26756	0.05	0.001	432.5	629.1	797.4	1031.2	1230.5	1443.1	12.2	17.7	22.5	29.1	34.7	40.7
BD-09	BD-09	0.3085832	1.4	68.3	0.19084	0.35	0.106	50.5	68.0	81.7	99.6	113.8	128.3	19.8	26.7	32.0	39.1	44.6	50.3
BD-10	BD-10	0.0388847	0.5	41.4	0.36966	0.05	0.002	269.8	385.8	483.2	616.9	729.1	847.7	15.4	22.0	27.6	35.2	41.6	48.3
BD-11	BD-11	1.2870135	1	159.9	0.20408	0.15	0.074	59.4	80.4	96.9	118.8	136.1	153.9	100.8	136.5	164.6	201.6	231.0	261.3
BD-11	BD-11A	0.0088964	1.4	13.4	0.27916	0.016	0.001	437.8	637.2	807.9	1045.1	1247.3	1463.1	6.8	9.9	12.6	16.3	19.4	22.8
BD-12	BD-12	0.4145992	1	137.9	0.19478	0.2	0.087	55.3	74.6	89.8	109.8	125.6	141.9	30.5	41.2	49.6	60.6	69.3	78.3
BD-13	BD-13	0.4507372	1.2	361.6	0.1977	0.2	0.271	33.5	44.4	52.8	63.6	72.1	80.7	20.5	27.2	32.3	39.0	44.2	49.4
BD-14	BD-14	0.2404020	1.4	245.5	0.23923	0.2	0.195	38.7	51.6	61.5	74.5	84.6	95.0	13.1	17.5	20.8	25.2	28.7	32.2
BD-16	BD-16	0.0423608	1	26.8	0.214	0.02	0.002	319.8	460.1	578.8	742.4	880.4	1026.8	19.9	28.6	36.0	46.1	54.7	63.8
BD-17	BD-17	0.7991585	1.2	132.8	0.24429	0.3	0.134	45.6	61.1	73.3	89.1	101.5	114.3	45.6	61.1	73.2	89.0	101.4	114.2
BD-18	BD-18	0.7574653	1.2	132.8	0.20657	0.2	0.097	52.5	70.8	85.1	103.9	118.8	134.1	49.9	67.2	80.8	98.7	112.8	127.3
BD-19	BD-19	0.9379961	1	132.8	0.20871	0.3	0.121	47.7	64.1	76.9	93.6	106.8	120.3	57.3	76.9	92.2	112.3	128.1	144.3
BD-20	BD-20	0.1496291	1.2	132.8	0.19724	0.35	0.174	40.7	54.3	64.8	78.6	89.4	100.4	7.3	9.7	11.6	14.0	16.0	17.9
BD-21	BD-21	0.7031105	1	132.8	0.22319	0.15	0.059	65.7	89.3	108.0	132.6	152.3	172.5	58.7	79.8	96.4	118.5	136.0	154.1
BD-22	BD-22	0.5159658	1.4	132.8	0.20047	0.2	0.115	48.8	65.5	78.7	95.8	109.4	123.3	33.1	44.4	53.3	65.0	74.2	83.6
BD-24	BD-24	0.0505653	0.5	29.9	0.35952	0.3	0.010	140.8	196.6	242.3	303.9	354.3	407.2	10.0	14.0	17.3	21.7	25.3	29.0
BD-25	BD-25	0.2456505	1	65.5	0.30771	0.15	0.025	96.3	132.6	161.8	200.9	232.5	265.3	32.3	44.5	54.4	67.5	78.1	89.1
BD-27	BD-27	0.7754467	1.4	116.6	0.28271	0.4	0.171	41.1	54.8	65.5	79.5	90.4	101.5	39.9	53.3	63.7	77.2	87.8	98.7
BD-28	BD-28	0.0017461	0.5	6.3	0.5997	0.05	0.000	689.4	1020.1	1308.2	1713.3	2064.0	2441.2	1.4	2.1	2.7	3.5	4.3	5.0
BD-29	BD-29	0.0131898	0.5	17.5	0.36533	0.05	0.001	392.6	569.1	719.6	928.1	1105.3	1294.0	6.1	8.9	11.2	14.5	17.2	20.2
BD-30	BD-30	0.1156849	1	48.3	0.46702	0.15	0.015	120.6	167.5	205.6	256.8	298.5	342.0	21.7	30.1	36.9	46.1	53.6	61.4
BD-31	BD-31	0.4801017	1.4	116.6	0.23077	0.35	0.165	41.6	55.6	66.5	80.7	91.8	103.2	25.4	33.9	40.6	49.2	56.0	62.9
BD-32	BD-32	0.4393905	1.4	80.5	0.21672	0.4	0.134	45.6	61.1	73.2	89.0	101.5	114.2	25.2	33.8	40.5	49.3	56.1	63.2
BD-33	BD-33	0.5475857	1.4	123.3	0.30123	0.3	0.131	46.1	61.8	74.1	90.1	102.8	115.7	35.8	48.1	57.6	70.1	79.9	90.0
BD-34	BD-34	0.5229021	1.2	143.1	0.3063	0.15	0.065	62.9	85.3	103.1	126.5	145.1	164.3	46.5	63.1	76.2	93.4	107.2	121.4
BD-37	BD-37	4.3937381	1.3	225.5	0.34407	0.39	0.269	33.6	44.5	52.9	63.8	72.3	80.9	176.6	234.1	278.3	335.7	380.2	425.6
BD-66	BD-66	0.0499918	1.4	35.2	0.26767	0.40	0.053	68.7	93.4	113.1	139.1	159.9	181.3	4.1	5.5	6.7	8.2	9.4	10.7
BD-67	BD-67	0.2670712	1.4	163.0	0.25448	0.36	0.227	36.2	48.1	57.3	69.3	78.6	88.1	11.9	15.9	18.9	22.9	25.9	29.1
BD-68	BD-68	0.2146087	1.4	163.0	0.28048	0.40	0.239	35.4	47.0	55.9	67.6	76.6	85.8	9.0	11.9	14.2	17.1	19.4	21.8
BD-70	BD-70	3.9812325	1.4	163.0	0.29237	0.20	0.117	48.4	65.1	78.1	95.1	108.5	122.3	234.9	315.5	378.6	461.2	526.3	593.1
BD-70	BD-70A	4.0592573	1	369.1	0.36059	0.15	0.128	46.6	62.5	74.9	91.2	103.9	117.0	238.0	319.3	382.7	465.8	531.0	598.0
BD-70	BD-70B	5.8568614	1	350.0	0.24268	0.20	0.197	38.5	51.3	61.2	74.1	84.2	94.4	270.3	360.1	429.7	520.2	590.8	663.0
BD-70	BD-70C	2.0288884	1.4	350.0	0.24731	0.38	0.515	25.2	33.1	39.1	46.8	52.7	58.7	62.0	81.4	96.1	114.9	129.4	144.1
BD-70	BD-70D	0.1477719	0.5	89.2	0.34755	0.03	0.003	237.7	338.4	422.6	537.6	633.7	735.2	41.5	59.1	73.8	93.9	110.6	128.4
BD-71	BD-71	0.4448945	1.2	83.0	0.17482	0.15	0.050	70.7	96.3	116.7	143.6	165.1	187.4	43.3	59.0	71.4	87.9	101.1	114.7
BD-74	BD-74	3.8929794	1.4	345.5	0.2537	0.35	0.470	26.3	34.5	40.8	48.9	55.1	61.4	126.5	166.2	196.4	235.3	265.2	295.6
BD-75	BD-75	21.5351194	1.4	738.2	0.26554	0.40	1.103	18.1	23.4	27.4	32.5	36.3	40.2	461.6	598.3	700.5	830.7	928.9	1028.2
BD-76	BD-76	5.6535261	1.4	590.5	0.24879	0.39	0.903	19.7	25.6	30.1	35.8	40.1	44.4	133.0	172.9	202.9	241.2	270.2	299.6
BL-01	BL-01	0.1016616	1.4	63.4	0.11271	0.16	0.059	65.3	88.7	107.3	131.7	151.2	171.4	9.6	13.0	15.7	19.3	22.1	25.1
BL-03	BL-03	0.2095931	1.4	63.4	0.16038	0.20	0.062	64.3	87.2	105.4	129.4	148.5	168.3	18.3	24.9	30.0	36.9	42.3	47.9
BL-04	BL-04	0.3319019	0.8	63.4	0.16228	0.10	0.017	111.8	154.9	189.8	236.5	274.5	314.2	54.1	74.9	91.8	114.4	132.7	151.9
BL-05	BL-05	1.9491246	1.4	335.1	0.22498	0.40	0.549	24.5	32.2	37.9	45.4	51.1	56.8	56.5	74.1	87.4	104.5	117.6	130.9

Table D-6 Time of Concentration, Rainfall Intensity, and Flow Calculations

Culvert	Catchment	Area (ha)	Tc					I (mm/hr)						Q (L/s)					
			Ct	L (m)	s (m/m)	n	Tc (hr)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
BL-06	BL-06	1.2062297	1.4	254.3	0.32726	0.40	0.346	30.1	39.7	47.1	56.7	64.0	71.5	42.9	56.6	67.1	80.7	91.2	101.9
BL-13	BL-13	5.0489672	1.4	392.2	0.1904	0.40	0.699	22.1	28.8	33.9	40.4	45.4	50.4	131.7	171.9	202.3	241.2	270.8	300.9
BL-13	BL-13A	3.1280217	1	329.3	0.28255	0.40	0.344	30.1	39.8	47.2	56.8	64.2	71.7	111.4	147.1	174.5	209.8	237.1	264.9
BL-14C	BL-14C	2.2283885	1.4	208.0	0.35996	0.30	0.202	38.1	50.7	60.5	73.2	83.2	93.3	102.7	136.8	163.2	197.5	224.2	251.6
BL-14C	BL-14CA	1.7148243	1	159.8	0.3613	0.25	0.092	53.8	72.5	87.3	106.6	121.9	137.7	111.6	150.5	181.1	221.3	253.0	285.7
BL-18	BL-18	0.0555146	1.2	49.8	0.28597	0.30	0.047	72.7	99.1	120.2	148.0	170.3	193.4	4.8	6.5	7.9	9.7	11.2	12.7
BL-2	BL-2	0.1063622	1.4	64.0	0.12318	0.10	0.035	82.0	112.3	136.5	168.7	194.5	221.3	12.8	17.5	21.3	26.3	30.4	34.6
CO-01	CO-01	0.8648690	1.4	218.4	0.20334	0.30	0.283	32.8	43.5	51.7	62.3	70.6	78.9	36.7	48.6	57.7	69.6	78.7	88.1
CO-03	CO-03	4.4643534	1.4	406.7	0.29006	0.25	0.367	29.3	38.7	45.8	55.1	62.2	69.4	157.7	208.0	246.5	296.1	334.4	373.5
KE-01	KE-01	0.0479325	0.8	29.1	0.30911	0.10	0.006	181.6	256.0	317.5	400.9	470.0	542.5	13.3	18.7	23.2	29.3	34.3	39.6
MD-01	MD-01	0.6477149	1	118.8	0.10207	0.20	0.103	51.2	68.9	82.8	101.0	115.4	130.2	44.4	59.8	71.8	87.6	100.1	112.9
MD-02	MD-02	0.1642643	1.4	72.1	0.08912	0.29	0.137	45.2	60.5	72.5	88.2	100.5	113.1	9.6	12.9	15.4	18.7	21.3	24.0
MD-03	MD-03	0.0718804	1.4	86.7	0.06826	0.15	0.097	52.7	71.0	85.4	104.3	119.2	134.5	5.6	7.5	9.0	11.0	12.6	14.2
MD-04	MD-04	0.2077952	1.3	179.9	0.09765	0.25	0.260	34.1	45.2	53.8	64.9	73.6	82.4	9.4	12.4	14.8	17.9	20.2	22.7
MN-01	MN-01	0.3914741	1.4	116.3	0.29959	0.30	0.124	47.2	63.4	76.0	92.5	105.5	118.8	23.9	32.0	38.4	46.7	53.3	60.0
MN-02	MN-02	0.4500158	1.4	160.5	0.34496	0.30	0.160	42.3	56.5	67.6	82.0	93.3	104.9	24.5	32.8	39.2	47.6	54.2	60.9
MN-03	MN-03	1.3064448	1.4	217.6	0.30035	0.30	0.232	35.9	47.7	56.8	68.6	77.8	87.2	57.7	76.7	91.3	110.4	125.1	140.3
MN-04	MN-04	0.6162114	1.4	217.6	0.25999	0.36	0.299	32.1	42.4	50.4	60.7	68.7	76.8	24.2	32.1	38.1	45.9	51.9	58.1
MN-05	MN-05	0.5676404	1.4	217.6	0.23328	0.36	0.316	31.3	41.4	49.1	59.2	66.9	74.8	21.8	28.8	34.2	41.2	46.6	52.1
MN-07	MN-07	0.0066734	1.4	10.4	0.25173	0.40	0.016	116.2	161.1	197.6	246.5	286.3	327.9	0.9	1.3	1.6	1.9	2.3	2.6
MN-08	MN-08	1.4080394	1.4	246.8	0.24736	0.37	0.356	29.7	39.2	46.5	55.9	63.1	70.5	51.0	67.3	79.8	95.9	108.4	121.0
MN-09	MN-09	0.0198844	0.5	32.3	0.12515	0.10	0.006	174.7	245.9	304.7	384.4	450.3	519.5	4.1	5.8	7.2	9.0	10.6	12.2
MN-10	MN-10	6.1265235	1.3	434.6	0.21398	0.20	0.339	30.3	40.1	47.5	57.2	64.6	72.2	225.5	297.8	353.2	424.9	480.1	536.5
MN-12	MN-12	1.6594396	1.4	219.0	0.20405	0.30	0.283	32.9	43.5	51.7	62.4	70.6	79.0	66.5	88.1	104.7	126.2	142.8	159.8
MN-13	MN-13	0.0600466	0.5	28.6	0.1188	0.10	0.006	182.3	257.0	318.9	402.7	472.1	545.1	16.1	22.6	28.1	35.5	41.6	48.0
MN-14	MN-14	1.0291297	1.4	219.0	0.18953	0.38	0.372	29.1	38.4	45.5	54.7	61.8	69.0	36.1	47.7	56.5	67.8	76.6	85.5
MN-16	MN-16	0.4646276	1.4	126.1	0.165	0.30	0.181	40.0	53.3	63.7	77.2	87.8	98.6	23.2	31.0	37.0	44.9	51.0	57.3
MN-17	MN-17	1.1124954	1.4	219.0	0.32281	0.35	0.262	34.0	45.1	53.6	64.7	73.3	82.0	45.7	60.6	72.1	87.0	98.5	110.3
MN-18	MN-18	0.5308621	1.4	141.5	0.24503	0.30	0.167	41.5	55.4	66.2	80.3	91.4	102.7	27.1	36.2	43.3	52.5	59.7	67.1
MN-19	MN-19	0.0708476	0.5	38.3	0.3094	0.10	0.005	197.9	279.9	347.9	440.4	517.1	597.9	20.6	29.1	36.1	45.8	53.7	62.1
MN-20	MN-20	1.0892830	1.4	219.0	0.31638	0.35	0.265	33.8	44.9	53.3	64.4	72.9	81.6	45.3	60.1	71.5	86.2	97.7	109.4
MR-02	MR-02	0.0364246	0.5	33.4	0.5006	0.05	0.002	316.8	455.7	573.1	734.8	871.2	1016.0	17.6	25.3	31.8	40.8	48.3	56.4
MR-03	MR-03	0.4987945	1.4	146.2	0.22986	0.30	0.178	40.3	53.8	64.2	77.9	88.5	99.4	25.5	34.0	40.6	49.2	56.0	62.8
MR-05	MR-05	0.4476793	1.4	146.9	0.20682	0.29	0.184	39.8	53.0	63.3	76.7	87.2	97.9	23.0	30.7	36.7	44.4	50.5	56.7
MR-06	MR-06	0.4524079	1.4	146.9	0.21574	0.27	0.167	41.4	55.3	66.1	80.2	91.2	102.5	24.6	32.9	39.3	47.7	54.2	60.9
MR-07	MR-07	0.4523838	1.4	146.9	0.2611	0.25	0.141	44.6	59.8	71.6	87.0	99.2	111.6	26.9	36.1	43.2	52.5	59.8	67.3
MR-08	MR-08	0.4405059	1.4	146.9	0.26816	0.29	0.161	42.1	56.3	67.3	81.6	92.9	104.4	24.0	32.1	38.3	46.5	52.9	59.5
MR-10	MR-10	0.0053377	1.4	15.1	0.52893	0.40	0.016	115.9	160.8	197.2	246.0	285.8	327.2	0.7	1.0	1.2	1.6	1.8	2.1
MR-11	MR-11	0.4405502	1.4	146.9	0.26635	0.29	0.162	42.0	56.2	67.2	81.5	92.7	104.2	24.0	32.0	38.3	46.5	52.8	59.4
MR-12	MR-12	0.4362703	1.4	146.9	0.28152	0.22	0.121	47.8	64.1	76.9	93.7	106.9	120.4	28.5	38.2	45.8	55.8	63.7	71.7
MR-13	MR-13	0.0284426	1.4	23.1	0.51324	0.25	0.015	118.2	164.0	201.2	251.1	291.8	334.2	4.7	6.6	8.1	10.1	11.7	13.4
MR-14	MR-14	0.0312391	1.4	24.3	0.54607	0.10	0.006	174.1	245.1	303.7	383.1	448.7	517.6	7.2	10.1	12.6	15.8	18.6	21.4
MR-15	MR-15	0.4104618	1.4	146.9	0.20351	0.28	0.178	40.3	53.7	64.2	77.8	88.4	99.3	21.8	29.1	34.8	42.1	47.9	53.8
MR-16	MR-16	1.2255177	1	279.3	0.25946	0.10	0.076	58.5	79.2	95.5	116.9	133.9	151.5	99.8	135.0	162.8	199.4	228.4	258.3
MR-17	MR-17	0.2781480	0.8	80.9	0.46056	0.05	0.007	171.5	241.2	298.8	376.7	441.1	508.7	65.9	92.7	114.8	144.7	169.4	195.4
MR-18	MR-18	0.4816070	1	74.2	0.34499	0.15	0.026	93.4	128.6	156.9	194.5	225.0	256.6	60.3	82.9	101.2	125.5	145.1	165.5
MR-19	MR-19	0.3229948	1.4	88.4	0.23824	0.10	0.035	82.2	112.6	136.9	169.2	195.2	222.1	39.8	54.4	66.2	81.8	94.4	107.4
MR-20	MR-20	0.4102836	1.4	106.4	0.26202	0.24	0.098	52.4	70.6	84.9	103.7	118.5	133.7	29.4	39.6	47.6	58.2	66.5	75.0
MR-21	MR-21	0.3496295	1.4	106.4	0.27141	0.26	0.104	51.1	68.9	82.7	100.9	115.3	130.1	23.8	32.0	38.5	47.0	53.7	60.5

Table D-6 Time of Concentration, Rainfall Intensity, and Flow Calculations

Culvert	Catchment	Area (ha)	Tc					I (mm/hr)						Q (L/s)					
			Ct	L (m)	s (m/m)	n	Tc (hr)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
MR-22	MR-22	0.4449560	1.4	106.4	0.35799	0.20	0.070	60.9	82.5	99.5	122.0	139.9	158.3	37.9	51.4	62.0	76.0	87.1	98.6
MR-23	MR-23	0.4517228	1.4	138.9	0.2963	0.25	0.124	47.2	63.4	76.0	92.6	105.5	118.9	27.1	36.4	43.6	53.1	60.6	68.2
MR-24	MR-24	0.4557044	1.4	138.9	0.30678	0.25	0.122	47.6	63.9	76.6	93.3	106.4	119.9	28.6	38.4	46.1	56.1	64.0	72.1
MR-25	MR-25	0.4218376	1.4	138.9	0.31098	0.25	0.121	47.7	64.1	76.9	93.6	106.8	120.3	26.0	34.9	41.9	51.0	58.1	65.5
MR-26	MR-26	1.2384266	1.4	155.2	0.40686	0.30	0.142	44.5	59.6	71.4	86.8	98.8	111.2	70.5	94.5	113.1	137.5	156.6	176.2
MR-27	MR-27	0.2393995	1	61.5	0.39782	0.10	0.014	125.1	174.0	213.8	267.3	311.0	356.6	41.2	57.3	70.4	88.1	102.4	117.5
MR-28	MR-28	0.3337562	1.4	90.0	0.36963	0.15	0.043	75.1	102.6	124.4	153.4	176.6	200.7	33.1	45.2	54.8	67.5	77.8	88.3
MR-29	MR-29	1.1850473	1.3	155.2	0.4493	0.20	0.084	56.2	75.9	91.4	111.8	128.0	144.6	89.2	120.5	145.1	177.5	203.1	229.5
MR-30	MR-30	0.4132006	1.4	155.2	0.42154	0.34	0.158	42.4	56.7	67.8	82.3	93.7	105.3	21.9	29.3	35.0	42.5	48.4	54.4
MR-31	MR-31	1.5193062	1.4	206.8	0.34594	0.28	0.192	39.0	52.0	62.0	75.1	85.3	95.8	77.6	103.5	123.5	149.6	169.9	190.7
MR-32	MR-32	0.1430067	1.4	80.9	0.31145	0.15	0.042	75.8	103.6	125.7	155.0	178.5	202.8	15.9	21.7	26.4	32.5	37.4	42.5
MR-34	MR-34	0.2623945	1.4	68.3	0.29718	0.20	0.049	71.2	97.1	117.6	144.8	166.5	189.0	25.3	34.4	41.7	51.3	59.0	67.0
SE-01	SE-01	2.9551072	1	213.5	0.2403	0.30	0.181	40.0	53.3	63.7	77.1	87.7	98.5	139.5	186.1	222.3	269.3	306.1	343.8
SE-02	SE-02	0.0708585	0.8	59.6	0.42708	0.04	0.004	225.2	319.9	398.9	506.8	596.7	691.5	27.5	39.1	48.7	61.9	72.8	84.4
SE-03	SE-03	0.0110074	1	10.1	0.62342	0.10	0.002	306.5	440.4	553.4	708.9	840.0	979.0	4.8	6.8	8.6	11.0	13.0	15.2
SE-04	SE-04	0.0467054	1	29.5	0.66919	0.015	0.001	446.7	650.6	825.3	1068.1	1275.4	1496.6	29.4	42.8	54.3	70.3	84.0	98.5
SE-05	SE-05	0.0114584	0.5	13.1	0.56411	0.40	0.005	196.9	278.4	346.0	438.0	514.3	594.6	2.7	3.8	4.7	5.9	7.0	8.0
SE-06	SE-06	0.0117926	0.5	12.0	0.56344	0.015	0.000	867.8	1294.8	1670.0	2201.0	2664.0	3164.0	17.9	26.7	34.5	45.5	55.0	65.3
TT-02	TT-02	1.4367134	1.4	246.8	0.24685	0.38	0.367	29.3	38.7	45.8	55.1	62.2	69.4	50.6	66.7	79.1	95.0	107.3	119.9
TT-03	TT-03	0.0804833	1.4	95.1	0.23968	0.21	0.079	57.7	78.1	94.1	115.2	131.9	149.1	6.8	9.2	11.1	13.6	15.6	17.6
TT-04	TT-04	0.0526549	0.5	53.2	0.11866	0.015	0.002	319.7	460.0	578.7	742.2	880.1	1026.5	20.8	30.0	37.7	48.4	57.4	66.9
TT-05	TT-05	0.1542947	1	134.6	0.23001	0.15	0.058	65.8	89.3	108.0	132.7	152.4	172.7	12.6	17.1	20.6	25.4	29.1	33.0
TU-01	TU-01	1.6162374	1	280.6	0.14931	0.10	0.101	51.7	69.7	83.8	102.2	116.8	131.8	121.1	163.1	196.1	239.3	273.4	308.5
TU-02	TU-02	0.9990889	0.5	123.4	0.49012	0.05	0.006	177.5	250.0	310.0	391.2	458.4	528.9	223.2	314.4	389.8	491.9	576.4	665.1
TU-03	TU-03	0.5505844	1.4	139.5	0.11868	0.20	0.157	42.5	56.9	68.0	82.6	94.0	105.6	33.7	45.0	53.9	65.4	74.4	83.6
TU-04	TU-04	0.1941791	1	28.7	0.13949	0.20	0.021	102.4	141.4	172.9	214.9	249.0	284.5	28.0	38.7	47.3	58.8	68.2	77.9
WA-02	WA-02	0.0068716	1.4	9.4	0.23986	0.40	0.015	119.8	166.4	204.2	255.0	296.4	339.6	1.0	1.4	1.7	2.1	2.4	2.8
WE-01	WE-01	0.1961176	1.4	150.1	0.30219	0.11	0.059	65.3	88.7	107.2	131.6	151.1	171.2	20.6	28.0	33.8	41.5	47.7	54.0
WE-02	WE-02	0.1720323	0.5	78.2	0.28755	0.05	0.005	192.9	272.5	338.5	428.3	502.7	580.9	48.2	68.1	84.6	107.1	125.7	145.2
YO-01	YO-01	0.1115898	1.4	119.2	0.2502	0.40	0.185	39.6	52.8	63.0	76.4	86.8	97.4	5.2	7.0	8.3	10.1	11.4	12.8

