

2-Year Expected Value Storm Event Lag Time Estimation

2-year EV flow rate at La Novia based on frequency analysis is:
479 cfs

Total drainage area is:
69532 acres

Unit Yield 0.006889 (cfs/acre)

Nodes upstream of Node 118c (Natural Area)

U/S Node	D/S Node	U/S Area (acre)	D/S Area (acre)	Flowrate based on Unit Yield			Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	U/S Lag Time (hour)
				U/S Q per Yield (cfs)	D/S Q per Yield (cfs)	Average Q (cfs)											
10104	101u	171	2134	1	15	8	27803	2963	1926	0.0373	0.06	3	0.96	2.85	162.78	29.39	0.39
101c	103	3975	6836	27	47	37	1476	1926	1740	0.1259	0.06	3	1.37	6.61	3.72	192.17	2.56
103	104	6836	9226	47	64	55	2239	1740	1688	0.0231	0.06	3	2.19	3.86	9.66	195.89	2.61
104	106	9226	12502	64	86	75	10043	1688	1320	0.0366	0.06	3	2.24	4.96	33.78	205.55	2.74
106	108	12502	16599	86	114	100	12951	1320	961	0.0277	0.06	3	2.64	4.80	44.95	239.33	3.19
108	113	16599	23614	114	163	139	10867	961	679	0.0260	0.05	3	2.82	5.82	31.10	284.28	3.79
113	114	23614	25186	163	174	168	2070	679	652	0.0132	0.05	3	3.44	4.74	7.28	315.38	4.21
114	115	25186	31889	174	220	197	17899	652	436	0.0120	0.04	3	3.41	5.63	52.96	322.66	4.30
115	118u	31889	32917	220	227	223	8745	436	347	0.0101	0.04	3	3.69	5.45	26.72	375.63	5.01
118c																402.35	5.365

For natural area upstream of Node 118c, Unit Yield method is used to estimate lag time.
The procedures include the following steps.

1. Flow rates based on unit yield are estimated for upstream and downstream nodes
2. Average flow rate is calculated from upstream and downstream nodes flow rates.
3. Average flow rate is used to estimate the travel time between upstream and downstream nodes.
4. Travel time is added to upstream Tc to get the downstream Tc.

Notes:

Node 10104 is the rational method node. The rational method model doesn't apply to the nodes downstream of Node 10104 because the rainfall intensity is lower than the infiltration rate.
Travel time based on unit yield is added to the Tc of node 10104 to get downstream node Tc.

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U/S Node	D/S Node	U/S Drainage Area (acre)	D/S Drainage Area (acre)	U/S Lag Time	U/S Q (cfs)	Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)	Q average (cfs)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	D/S Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)
																						402.35		
118c	119/118C	48826	49496	5.365	540	532	347.47	341.63	0.01097	0.04	3	5.07	7.00	1.27	403.62	5.382	525	540	5.07	7.00	1.27	403.62	5.382	525
119	126	49496	50406	5.382	525	6204	341.63	286	0.00897	0.03	3	4.68	8.00	12.92	416.54	5.554	525	525	4.68	8.00	12.92	416.54	5.554	525
126	127	50406	53500	5.554	525	7191	286	240	0.0064	0.03	3	4.98	7.05	17.00	433.54	5.781	598	562	5.11	7.17	16.72	433.26	5.777	598
127	133u	53500	54352	5.777	598	4905	240	212	0.00571	0.03	3	5.35	6.98	11.72	444.98	5.933	595	598	5.35	6.98	11.72	444.98	5.933	595
133u	133c	54352	60993	5.933	595	0	212	212	0.01	0.03	3	4.80	8.60	0.00	444.98	5.933	744	670	5.02	8.86	0.00	444.98	5.933	744
133c	134u	60993	62698	5.933	744	6461	212	173	0.00604	0.03	3	5.74	7.53	14.31	459.29	6.124	765	755	5.77	7.55	14.26	459.24	6.123	765
134u	134c	62698	66558	6.123	765	0	173	173	0.01	0.03	3	5.28	9.16	0.00	459.24	6.123	799	782	5.32	9.21	0.00	459.24	6.123	799
134c	137	66558	67798	6.123	799	6064	173	133	0.0066	0.03	3	5.80	7.92	12.76	472.00	6.293	826	812	5.84	7.95	12.71	471.95	6.293	826
137	138	67798	69102	6.293	826	4644	133	119.7	0.00286	0.03	3	6.87	5.84	13.25	485.20	6.469	834	830	6.88	5.85	13.24	485.18	6.469	834
138	139	69102	69530	6.469	834	3108	119.7	100	0.00634	0.03	3	5.94	7.89	6.57	491.75	6.557	848	841	5.96	7.90	6.55	491.74	6.557	848
139		69530			848																			

5-Year Expected Value Storm Event Lag Time Estimation

5-year EV flow rate at La Novia based on frequency analysis is:
2940 cfs

Total drainage area is:
69532 acres

Unit Yield 0.04228269 (cfs/acre)

Nodes upstream of Node 118c (Natural Area)

U/S Node	D/S Node	Flowrate based on Unit Yield					Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	U/S Lag Time (hour)
		U/S Area (acre)	D/S Area (acre)	U/S Q per Yield (cfs)	D/S Q per Yield (cfs)	Average Q ograph Method											
101u																113.17	1.51
101c																113.17	1.51
103																115.44	1.54
104																121.18	1.62
10640	106	10443.6	12502	442	529	485	2254	1444	1320	0.0550	0.06	3	4.19	9.21	4.08	139.58	1.86
106	108	12502	16599	529	702	615	12951	1320	961	0.0277	0.06	3	5.21	7.56	28.56	143.66	1.92
108	113	16599	23614	702	998	850	10867	961	679	0.0260	0.05	3	5.56	9.17	19.76	172.22	2.30
113	114	23614	25186	998	1065	1032	2070	679	652	0.0132	0.05	3	6.79	7.46	4.63	191.98	2.56
114	115	25186	31889	1065	1348	1207	17899	652	436	0.0120	0.04	3	6.74	8.87	33.65	196.60	2.62
115	118u	31889	32917	1348	1392	1370	8745	436	347	0.0101	0.04	3	7.29	8.58	16.98	230.25	3.07
118c																247.23	3.30

For natural area upstream of Node 118c, Unit Yield method is used to estimate lag time.
The procedures include the following steps.

1. Flow rates based on unit yield are estimated for upstream and downstream nodes
2. Average flow rate is calculated from upstream and downstream nodes flow rates.
3. Average flow rate is used to estimate the travel time between upstream and downstream nodes.
4. Travel time is added to upstream Tc to get the downstream Tc.

Notes:

Node 10640 is the rational method node. The rational method model doesn't apply to the nodes downstream of Node 10640 because the rainfall intensity is lower than the infiltration rate.
Travel time based on unit yield is added to the Tc of node 10640 to get downstream node Tc.
The lag time for Node 101u, 101c, 103, and 104 are based on rational method model.

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U/S Node	D/S Node	U/S Drainage Area (acre)	D/S Drainage Area (acre)	U/S Lag Time	U/S Q (cfs)	Flow Length (feet)	U/S Elev. (feet)	D/S Elev. (feet)	Slope	Manning's N	Side Slope	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	Tc (minutes)	D/S Lag Time (hour)	D/S Q (cfs)	Q average (cfs)	Flow Depth (feet)	Velocity (fps)	Travel Time (minutes)	D/S Tc (minutes)	D/S Lag Time (hour)
																						247.23	
118c	119/118C	48826	49496	3.30	2414	532	347.47	341.63	0.010969608	0.04	3	8.89	10.18	0.87	248.10	3.308	2407	2414	8.89	10.18	0.87	248.10	3.308
119	126	49496	50406	3.31	2407	6204	341.63	286	0.008966796	0.03	3	8.28	11.71	8.83	256.93	3.426	2380	2407	8.28	11.71	8.83	256.93	3.426
126	127	50405.8	53500	3.43	2380	7191	286	240	0.006396885	0.03	3	8.78	10.29	11.65	268.59	3.581	2491	2435	8.86	10.34	11.59	268.52	3.580
127	133U	53500.2	54352	3.58	2491	4905	240	212	0.005707972	0.03	3	9.13	9.97	8.20	276.72	3.690	2459	2491	9.13	9.97	8.20	276.72	3.690
133U	133c	54352	60993	3.69	2459	0	212	212	0.01	0.03	3	8.18	12.26	0.00	276.72	3.690	2700	2580	8.32	12.41	0.00	276.72	3.690
133c	134u	60993	62698	3.69	2700	6461	212	173	0.006035928	0.03	3	9.31	10.39	10.37	287.09	3.828	2762	2731	9.35	10.42	10.34	287.06	3.828
134u	134c	62698	66558	3.83	2762	0	173	173	0.01	0.03	3	8.54	12.62	0.00	287.06	3.828	2843	2803	8.59	12.67	0.00	287.06	3.828
134c	137	66558	67798	3.83	2843	6064	173	133	0.006596306	0.03	3	9.33	10.88	9.29	296.35	3.951	2852	2848	9.34	10.88	9.29	296.35	3.951
137	138	67798	69102	3.95	2852	4644	133	119.7	0.00286391	0.03	3	10.93	7.96	9.72	306.07	4.081	2852	2852	10.93	7.96	9.72	306.07	4.081
138	139	69102	69530	4.08	2852	3108	119.7	100	0.00633893	0.03	3	9.41	10.72	4.83	310.90	4.145	2870	2861	9.43	10.73	4.83	310.90	4.145
139		69530			2870																		