

**TERAKEE FARM CLUSTER SUBD
APPROX 550 NORTH 3600 WEST
UNINCORPORATED WEBER COUNTY, UTAH 84401
STORM WATER STUDY**

Project No. 16N704

2-15-2022

General Site Information:

The proposed Terakee Farm Cluster Subdivision site is located on the southwest side of the Weber River, just over 2 miles due west of the 400 North exit on I-15. The site lies in Weber County. It is near, but outside the corporate limits of Marriot-Slaterville City, Utah. Construction will consist of development of a new 206 Lot residential subdivision along with interior roadways, sidewalks, curb and gutter, underground utilities stubbed to serve each lot, and a drainage system to accommodate stormwater when completed.

Storm water from the site will be collected in inlet boxes and catch basins and will continue via storm drain to one of two detention ponds: one near the north end and one near the south end of the site. In areas where LID retention is feasible, the State of Utah requires full retention of the 80th percentile storm. Weber County dictates that locations west of I-15 have poor soils and/or high ground water, which makes LID infeasible at this site. The site is allowed a unit-release of 0.1 cfs per acre for the 100-yr storm into the adjacent Weber River and will continue to meander westerly in a historical fashion. The attached figure shows the project site and location of the storm water outfall points. Detention calculations have been provided for the site. (See attached figure and calculations).

The study area is broken up into 9 drainage areas (labeled A-1 through A-9). A runoff coefficient of 0.15 is used for natural ground and landscaped areas. A runoff coefficient of 0.90 is used for asphalt, concrete, and other hard surfaced areas. Average runoff coefficients vary from about 0.35 to about 0.54 for the nine drainage areas. This yields a coefficient of 0.42 for the overall study area.

Times of concentration are calculated using the FAA method assuming flow resistance coefficients of $K=0.35$ for landscape and $K=0.91$ for hardscape for each of the areas. The times of concentration range from about 14 to about 22 minutes for areas A-1 through A-8. A time of concentration for A-9 was not calculated, as the anticipated storm drainage layout may change significantly for that future development area. These times are based on the hydraulically longest drainage path inside each respective drainage area over grass or other vegetation, asphalt, concrete, and/or through a pipeline as applicable. Times calculated to be less than 5 minutes are rounded to 5 minutes (as applicable) when using this method. Rainfall Intensities were taken from NOAA Atlas 14 for pipe sizing and detention requirements. The values obtained were interpolated as necessary. A copy of these data is attached.

Data showing area information, runoff coefficient, time of concentration, peak flows, and detention storage requirements for the site are also provided and can be found in the attached calculations.

Design Requirements:

The design storms and allowable stormwater release rate were found on 2/15/2022 at https://www.webercountyutah.gov/Engineering/design_standards.php. For conveyance, the requirement is listed as the 10 year storm. However, to ensure all the drainage makes it to the detention facilities, the piping will be sized for the 100 year storm. For detention pond sizing, the requirement listed is the 100 year storm with 0.1 cfs/ac allowable release.

Pipe Sizes:

Storm water pipes in areas A-1 through A-8 are analyzed in this report. They are proposed to be polyvinylchloride pipes (PVC), concrete pipe (CP), and/or reinforced concrete pipe (RCP). All pipes in the project are sloped to provide the design capacity while maintaining a minimum scour speed of at least 2 feet per second when the pipes are flowing at least half full. The pipes and inlet boxes have enough capacity to convey the 100-year storm (as mentioned above) without surcharging.

Orifice Plate:

An orifice plate will be used at each detention facility to control the rate that storm water flows from the project. The orifice serving area A-9 will be located at the future outlet structure to serve the North Pond. The orifice serving areas A-1 through A-8 will be in the South Pond at the Structure at node 64 (See attached figure). That orifice opening is given a designation of Node 101 for convenience in modeling the reduced flow through the restriction. The orifice plate opening will be sized for the detention facility to utilize its capacity during a 100-yr storm with a release rate of 0.1 cfs/ac. The orifice plates will allow small flows to pass through without detention. As the rate of storm water into the pipes and detention facilities increases, the orifice plates will restrict the flow. The maximum flow through the plates will occur when the detention basins reach their maximum design depths. A detail of an orifice plate can be found in the construction documents for this project.

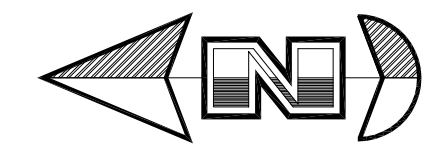
Required Detention:

The required detention for the 100-year storm with a release rate of 0.1 cfs/acre is 110,073 cf for areas A-1 through A-8, which drain to the South Pond. Likewise, the required detention for area A-9 will be 107,651, pending any significant site layout changes. Storage volume will be provided in each detention facility to meet the respective requirements. In the event either detention facility experiences a storm larger than the design storm water will then spill out into the Weber River and continue toward the Great Salt Lake in a historical fashion.

Great Basin Engineering, Inc.

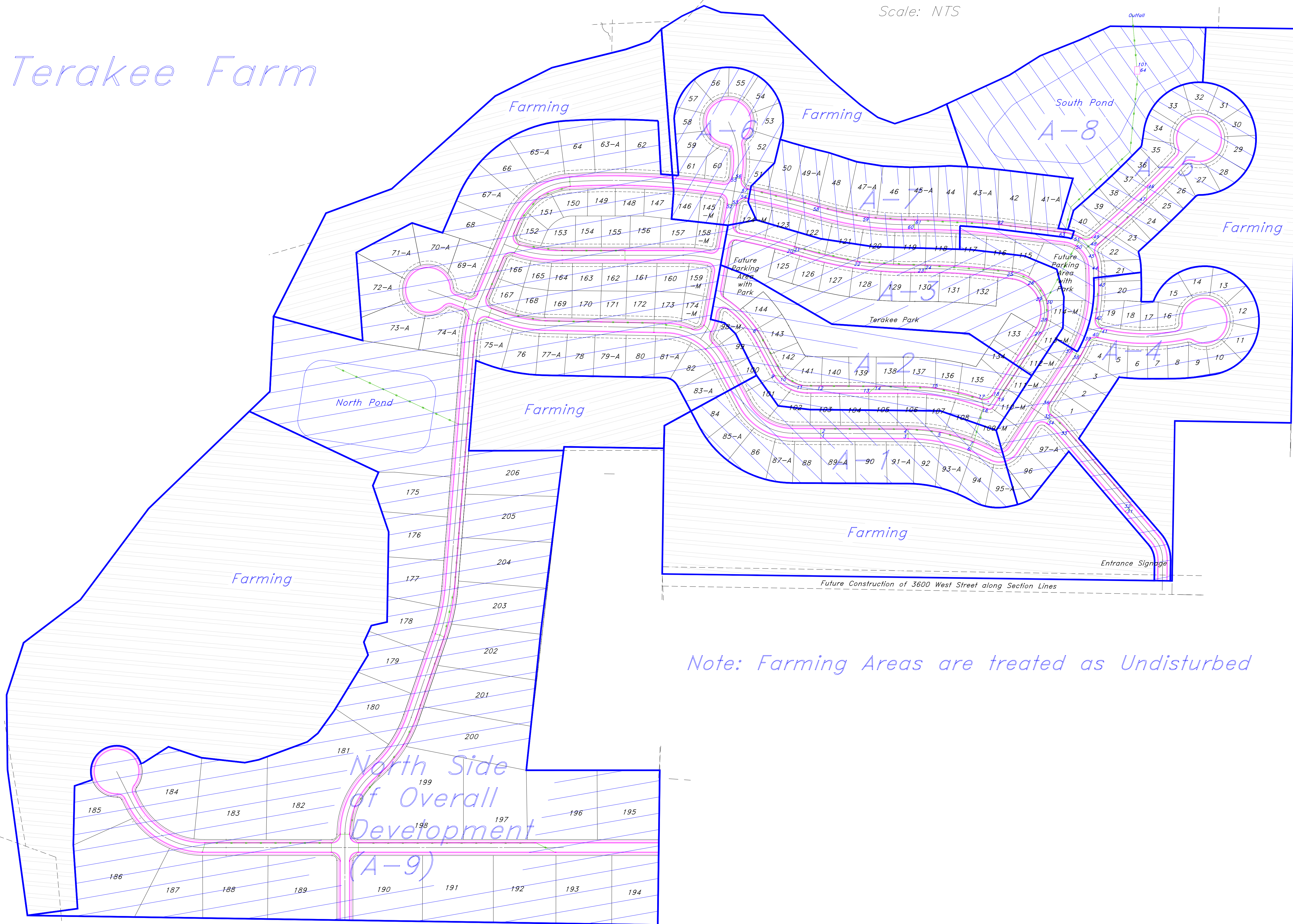
Prepared by Ryan Bingham, P.E.





Scale: NTS

Terakee Farm



Note: Farming Areas are treated as Undisturbed

Storm Water Calculations
 TERAKEE FARM Cluster Subd
 Approx. 550 North 3600 West, Weber County, UT 84401
 16N704 - Phase 1 - Prelim SWS Exhib.dwg

2/15/2022

9 Detained Areas

Hardscape C =	0.90
Landscape C =	0.15

	Zone 1 (ft ²)	Zone 2 (ft ²)
Avg. lot size	9400	38945
Avg. home size	2000	3500
Avg. patio/driveway size	1500	2200
C =	0.429	0.260

Drainage Areas	Total Area (acres)	Category Runoff Coefficients		Common Area (acres)	Zone 1 Area (acres)	Zone 2 Area (acres)	C
		0.750 50' Road Area (acres)	0.900 24' Road Area (acres)				
Σ Det. Areas	96.954	14.848	1.307	14.638	37.550	28.610	0.423
Σ All Areas	96.954	14.848	1.307	14.638	37.550	28.610	0.423
A-1	5.126	1.051	0.000	0.000	4.076	0.000	0.495
A-2	5.667	0.095	0.623	1.675	3.273	0.000	0.463
A-3	6.073	0.074	0.684	2.059	3.256	0.000	0.459
A-4	6.385	2.138	0.000	0.000	4.247	0.000	0.537
A-5	5.336	1.414	0.000	0.000	3.922	0.000	0.514
A-6	3.076	0.972	0.000	0.000	2.104	0.000	0.531
A-7	5.115	0.968	0.000	0.000	4.148	0.000	0.490
A-8	5.902	0.000	0.000	5.902	0.000	0.000	0.350
A-9	54.273	8.136	0.000	5.002	12.525	28.610	0.381

Time of Concentration--use FAA Method

For FAA Method, use K's of..

K = 0.35 for landscape
 K = 0.91 for hardscape

$$t_c = \frac{1.8(1.1 - K)\sqrt{L}}{\sqrt[3]{S}}$$

Assume Pipe Flow is at 2 ft/s Scour Speed

**Note: S is in percent, 5 min is smallest allowed Tc

Area	Length on Landscape (ft)	Slope of Landscape (%)	Time on Landscape (min.)	Length on Hardscape (ft)	Slope of Hardscape (%)	Time on Hardscape (min.)	Length in Pipe (ft)	Time in Pipe (min.)	TC for entire Area (min.)
A-1	98.00	2.00	10.61	330.00	1.00	6.21	561.00	4.68	21.50
A-2	47.00	2.00	7.35	224.00	1.00	5.12	970.00	8.08	20.55
A-3	45.00	2.00	7.19	255.00	1.00	5.46	932.00	7.77	20.42
A-4	43.00	2.00	7.03	362.00	1.00	6.51	309.00	2.58	16.11
A-5	66.00	2.00	8.70	363.00	1.00	6.52	297.00	2.48	17.70
A-6	70.00	2.00	8.96	287.00	1.00	5.79	76.00	0.63	15.39
A-7	122.00	2.00	11.84	142.00	1.00	4.08	783.00	6.53	22.44
A-8	500.00	10.00	14.01	0.00	1.00	0.00	0.00	0.00	14.01

Rainfall Intensities
Data From NOAA

100-Year Storm Intensities

The equations used for the 100-Year Storm Intensities were found using the attached Rainfall data as well as Interpolated data where applicable.

Storm Intensities		
AREA	Tc (minutes)	I (100-yr.) (in./hr.)
A-1	21.5	3.38
A-2	20.5	3.45
A-3	20.4	3.47
A-4	16.1	3.97
A-5	17.7	3.78
A-6	15.4	4.06
A-7	22.4	3.30
A-8	14.0	4.28

Peak Flow Information
 Use Rational Method
 100-Year Storm Intensities

$Q=CIA$

AREA	C	I100 (in./hr.)
A-1	0.495	3.376
A-2	0.463	3.455
A-3	0.459	3.466
A-4	0.537	3.975
A-5	0.514	3.781
A-6	0.531	4.062
A-7	0.490	3.297
A-8	0.350	4.280

Peak Flows	
Σ detained =	75.03
A (acres)	Q (100-yr.) (cfs)
5.13	8.57
5.67	9.06
6.07	9.67
6.38	13.62
5.34	10.38
3.08	6.63
5.12	8.26
5.90	8.84

Node Inlet Requirements

Size pipes for		100	year storm
Area	Node #	% of Total	Q (cfs)
A-1	1	30.0%	2.57
A-1	2	10.0%	0.86
A-1	3	20.0%	1.71
A-1	4	10.0%	0.86
A-1	5	5.0%	0.43
A-1	6	20.0%	1.71
A-1	7	5.0%	0.43
A-2	8	11.0%	1.00
A-2	9	9.0%	0.82
A-2	10	11.0%	1.00
A-2	11	4.0%	0.36
A-2	12	4.0%	0.36
A-2	13	9.0%	0.82
A-2	14	10.0%	0.91
A-2	15	10.0%	0.91
A-2	16	7.0%	0.63
A-2	17	10.0%	0.91
A-2	18	10.0%	0.91
A-2	19	5.0%	0.45
A-3	20	23.0%	2.22
A-3	21	5.0%	0.48
A-3	22	5.0%	0.48
A-3	23	23.0%	2.22
A-3	24	5.0%	0.48
A-3	25	4.0%	0.39
A-3	26	3.0%	0.29
A-3	27	4.0%	0.39
A-3	28	2.0%	0.19
A-3	29	23.0%	2.22
A-3	30	3.0%	0.29
A-4	31	5.0%	0.68
A-4	32	5.0%	0.68
A-4	33	5.0%	0.68
A-4	34	12.0%	1.63
A-4	35	3.0%	0.41
A-4	36	2.0%	0.27
A-4	37	12.0%	1.63
A-4	38	12.0%	1.63
A-4	39	4.0%	0.54
A-4	40	17.0%	2.32
A-4	41	17.0%	2.32

A-4	42	2.0%	0.27
A-4	43	4.0%	0.54
A-5	44	2.0%	0.21
A-5	45	3.0%	0.31
A-5	46	25.0%	2.59
A-5	47	25.0%	2.59
A-5	48	10.0%	1.04
A-5	49	10.0%	1.04
A-5	50	24.0%	2.49
A-5	51	1.0%	0.10
A-6	52	22.0%	1.46
A-6	53	3.0%	0.20
A-6	54	3.0%	0.20
A-6	55	35.0%	2.32
A-6	56	35.0%	2.32
A-6	57	2.0%	0.13
A-7	58	18.0%	1.49
A-7	59	18.0%	1.49
A-7	60	18.0%	1.49
A-7	61	18.0%	1.49
A-7	62	14.0%	1.16
A-7	63	14.0%	1.16
A-8	64	100.0%	8.84
A-8	101		4.27

PIPE FLOWS

Upstream Node	Downstream node	Pipe Flow (cfs)
1	2	2.57
2	4	3.43
3	4	1.71
4	5	6.00
5	7	6.42
6	7	1.71
7	16	8.57
8	10	1.00
9	10	0.82
10	11	2.81
11	12	3.17
12	14	3.54
13	14	0.82
14	15	5.26
15	17	6.16
16	17	9.20
17	18	16.27
18	19	17.18
19	27	17.63
20	21	2.22
21	22	2.71
22	24	3.19
23	24	2.22
24	25	5.90
25	26	6.28
26	30	6.57
27	28	18.02
28	30	18.21
29	30	2.22
30	50	27.30
31	32	0.68
32	33	1.36
33	35	2.04
34	35	1.63
35	36	4.09
36	38	4.36
37	38	1.63
38	39	7.63
39	40	8.17
40	41	10.49
41	42	12.80

42	43	13.07
43	44	13.62
44	45	13.83
45	51	14.14
46	47	2.59
47	48	5.19
48	49	6.23
49	51	7.26
50	51	29.79
51	63	51.30
52	53	1.46
53	54	1.66
54	57	1.86
55	56	2.32
56	57	4.64
57	58	6.63
58	59	8.12
59	61	9.61
60	61	1.49
61	62	12.58
62	63	13.74
63	64	66.19
64	101	75.03
101	Outfall	79.30

Options for Pipe Sizes Between the Specified Nodes

Up Stream Node	Dn Stream Node	Q (cfs)	Pipe Size (in)	Design Min Slope (%)	Area (ft^2)	Rh (ft)	Manning's n	Scour Min. Slope (%)	First Trial Pipe Size
1	2	2.57	15	0.158%	1.227	0.313	0.013	0.145%	15
		2.57	18	0.060%	1.767	0.375	0.013	0.114%	
		2.57	24	0.013%	3.142	0.500	0.013	0.078%	
2	4	3.43	15	0.281%	1.227	0.313	0.013	0.145%	15
		3.43	18	0.106%	1.767	0.375	0.013	0.114%	
		3.43	24	0.023%	3.142	0.500	0.013	0.078%	
3	4	1.71	15	0.070%	1.227	0.313	0.013	0.145%	15
		1.71	18	0.027%	1.767	0.375	0.013	0.114%	
		1.71	24	0.006%	3.142	0.500	0.013	0.078%	
4	5	6.00	15	0.862%	1.227	0.313	0.013	0.145%	18
		6.00	18	0.326%	1.767	0.375	0.013	0.114%	
		6.00	24	0.070%	3.142	0.500	0.013	0.078%	
5	7	6.42	15	0.989%	1.227	0.313	0.013	0.145%	18
		6.42	18	0.374%	1.767	0.375	0.013	0.114%	
		6.42	24	0.081%	3.142	0.500	0.013	0.078%	
6	7	1.71	15	0.070%	1.227	0.313	0.013	0.145%	15
		1.71	18	0.027%	1.767	0.375	0.013	0.114%	
		1.71	24	0.006%	3.142	0.500	0.013	0.078%	
7	16	8.57	15	1.758%	1.227	0.313	0.013	0.145%	24
		8.57	18	0.665%	1.767	0.375	0.013	0.114%	
		8.57	24	0.143%	3.142	0.500	0.013	0.078%	
8	10	1.00	15	0.024%	1.227	0.313	0.013	0.145%	15
		1.00	18	0.009%	1.767	0.375	0.013	0.114%	
		1.00	24	0.002%	3.142	0.500	0.013	0.078%	
9	10	0.82	15	0.016%	1.227	0.313	0.013	0.145%	15
		0.82	18	0.006%	1.767	0.375	0.013	0.114%	
		0.82	24	0.001%	3.142	0.500	0.013	0.078%	
10	11	2.81	15	0.189%	1.227	0.313	0.013	0.145%	15
		2.81	18	0.072%	1.767	0.375	0.013	0.114%	
		2.81	24	0.015%	3.142	0.500	0.013	0.078%	
11	12	3.17	15	0.241%	1.227	0.313	0.013	0.145%	15
		3.17	18	0.091%	1.767	0.375	0.013	0.114%	
		3.17	24	0.020%	3.142	0.500	0.013	0.078%	
12	14	3.54	15	0.299%	1.227	0.313	0.013	0.145%	15
		3.54	18	0.113%	1.767	0.375	0.013	0.114%	
		3.54	24	0.024%	3.142	0.500	0.013	0.078%	
13	14	0.82	15	0.016%	1.227	0.313	0.013	0.145%	15
		0.82	18	0.006%	1.767	0.375	0.013	0.114%	
		0.82	24	0.001%	3.142	0.500	0.013	0.078%	

14	15	5.26	15	0.662%	1.227	0.313	0.013	0.145%	18
		5.26	18	0.250%	1.767	0.375	0.013	0.114%	
		5.26	24	0.054%	3.142	0.500	0.013	0.078%	
15	17	6.16	15	0.910%	1.227	0.313	0.013	0.145%	18
		6.16	18	0.344%	1.767	0.375	0.013	0.114%	
		6.16	24	0.074%	3.142	0.500	0.013	0.078%	
16	17	9.20	15	2.028%	1.227	0.313	0.013	0.145%	24
		9.20	18	0.767%	1.767	0.375	0.013	0.114%	
		9.20	24	0.165%	3.142	0.500	0.013	0.078%	
17	18	16.27	18	2.399%	1.767	0.375	0.013	0.114%	30
		16.27	24	0.517%	3.142	0.500	0.013	0.078%	
		16.27	30	0.157%	4.909	0.625	0.013	0.058%	
18	19	17.18	18	2.674%	1.767	0.375	0.013	0.114%	30
		17.18	24	0.576%	3.142	0.500	0.013	0.078%	
		17.18	30	0.175%	4.909	0.625	0.013	0.058%	
19	27	17.63	18	2.817%	1.767	0.375	0.013	0.114%	30
		17.63	24	0.607%	3.142	0.500	0.013	0.078%	
		17.63	30	0.185%	4.909	0.625	0.013	0.058%	
20	21	2.22	15	0.118%	1.227	0.313	0.013	0.145%	15
		2.22	18	0.045%	1.767	0.375	0.013	0.114%	
		2.22	24	0.010%	3.142	0.500	0.013	0.078%	
21	22	2.71	15	0.176%	1.227	0.313	0.013	0.145%	15
		2.71	18	0.066%	1.767	0.375	0.013	0.114%	
		2.71	24	0.014%	3.142	0.500	0.013	0.078%	
22	24	3.19	15	0.244%	1.227	0.313	0.013	0.145%	15
		3.19	18	0.092%	1.767	0.375	0.013	0.114%	
		3.19	24	0.020%	3.142	0.500	0.013	0.078%	
23	24	2.22	15	0.118%	1.227	0.313	0.013	0.145%	15
		2.22	18	0.045%	1.767	0.375	0.013	0.114%	
		2.22	24	0.010%	3.142	0.500	0.013	0.078%	
24	25	5.90	15	0.833%	1.227	0.313	0.013	0.145%	18
		5.90	18	0.315%	1.767	0.375	0.013	0.114%	
		5.90	24	0.068%	3.142	0.500	0.013	0.078%	
25	26	6.28	15	0.946%	1.227	0.313	0.013	0.145%	18
		6.28	18	0.358%	1.767	0.375	0.013	0.114%	
		6.28	24	0.077%	3.142	0.500	0.013	0.078%	
26	30	6.57	15	1.035%	1.227	0.313	0.013	0.145%	18
		6.57	18	0.392%	1.767	0.375	0.013	0.114%	
		6.57	24	0.084%	3.142	0.500	0.013	0.078%	
27	28	18.02	18	2.942%	1.767	0.375	0.013	0.114%	30
		18.02	24	0.634%	3.142	0.500	0.013	0.078%	
		18.02	30	0.193%	4.909	0.625	0.013	0.058%	

28	30	18.21	18	3.005%	1.767	0.375	0.013	0.114%	30
		18.21	24	0.648%	3.142	0.500	0.013	0.078%	
		18.21	30	0.197%	4.909	0.625	0.013	0.058%	
29	30	2.22	15	0.118%	1.227	0.313	0.013	0.145%	15
		2.22	18	0.045%	1.767	0.375	0.013	0.114%	
		2.22	24	0.010%	3.142	0.500	0.013	0.078%	
30	50	27.30	24	1.456%	3.142	0.500	0.013	0.078%	30
		27.30	30	0.443%	4.909	0.625	0.013	0.058%	
		27.30	36	0.167%	7.069	0.750	0.013	0.045%	
31	32	0.68	15	0.011%	1.227	0.313	0.013	0.145%	15
		0.68	18	0.004%	1.767	0.375	0.013	0.114%	
		0.68	24	0.001%	3.142	0.500	0.013	0.078%	
32	33	1.36	15	0.044%	1.227	0.313	0.013	0.145%	15
		1.36	18	0.017%	1.767	0.375	0.013	0.114%	
		1.36	24	0.004%	3.142	0.500	0.013	0.078%	
33	35	2.04	15	0.100%	1.227	0.313	0.013	0.145%	15
		2.04	18	0.038%	1.767	0.375	0.013	0.114%	
		2.04	24	0.008%	3.142	0.500	0.013	0.078%	
34	35	1.63	15	0.064%	1.227	0.313	0.013	0.145%	15
		1.63	18	0.024%	1.767	0.375	0.013	0.114%	
		1.63	24	0.005%	3.142	0.500	0.013	0.078%	
35	36	4.09	15	0.400%	1.227	0.313	0.013	0.145%	15
		4.09	18	0.151%	1.767	0.375	0.013	0.114%	
		4.09	24	0.033%	3.142	0.500	0.013	0.078%	
36	38	4.36	15	0.455%	1.227	0.313	0.013	0.145%	15
		4.36	18	0.172%	1.767	0.375	0.013	0.114%	
		4.36	24	0.037%	3.142	0.500	0.013	0.078%	
37	38	1.63	15	0.064%	1.227	0.313	0.013	0.145%	15
		1.63	18	0.024%	1.767	0.375	0.013	0.114%	
		1.63	24	0.005%	3.142	0.500	0.013	0.078%	
38	39	7.63	15	1.394%	1.227	0.313	0.013	0.145%	24
		7.63	18	0.527%	1.767	0.375	0.013	0.114%	
		7.63	24	0.114%	3.142	0.500	0.013	0.078%	
39	40	8.17	15	1.600%	1.227	0.313	0.013	0.145%	24
		8.17	18	0.605%	1.767	0.375	0.013	0.114%	
		8.17	24	0.130%	3.142	0.500	0.013	0.078%	
40	41	10.49	15	2.635%	1.227	0.313	0.013	0.145%	24
		10.49	18	0.997%	1.767	0.375	0.013	0.114%	
		10.49	24	0.215%	3.142	0.500	0.013	0.078%	
41	42	12.80	15	3.927%	1.227	0.313	0.013	0.145%	24
		12.80	18	1.485%	1.767	0.375	0.013	0.114%	
		12.80	24	0.320%	3.142	0.500	0.013	0.078%	

42	43	13.07	15	4.096%	1.227	0.313	0.013	0.145%	24
		13.07	18	1.549%	1.767	0.375	0.013	0.114%	
		13.07	24	0.334%	3.142	0.500	0.013	0.078%	
43	44	13.62	15	4.445%	1.227	0.313	0.013	0.145%	24
		13.62	18	1.681%	1.767	0.375	0.013	0.114%	
		13.62	24	0.362%	3.142	0.500	0.013	0.078%	
44	45	13.83	15	4.581%	1.227	0.313	0.013	0.145%	24
		13.83	18	1.732%	1.767	0.375	0.013	0.114%	
		13.83	24	0.374%	3.142	0.500	0.013	0.078%	
45	51	14.14	15	4.790%	1.227	0.313	0.013	0.145%	24
		14.14	18	1.811%	1.767	0.375	0.013	0.114%	
		14.14	24	0.391%	3.142	0.500	0.013	0.078%	
46	47	2.59	15	0.161%	1.227	0.313	0.013	0.145%	15
		2.59	18	0.061%	1.767	0.375	0.013	0.114%	
		2.59	24	0.013%	3.142	0.500	0.013	0.078%	
47	48	5.19	15	0.645%	1.227	0.313	0.013	0.145%	18
		5.19	18	0.244%	1.767	0.375	0.013	0.114%	
		5.19	24	0.053%	3.142	0.500	0.013	0.078%	
48	49	6.23	15	0.929%	1.227	0.313	0.013	0.145%	18
		6.23	18	0.351%	1.767	0.375	0.013	0.114%	
		6.23	24	0.076%	3.142	0.500	0.013	0.078%	
49	51	7.26	15	1.264%	1.227	0.313	0.013	0.145%	18
		7.26	18	0.478%	1.767	0.375	0.013	0.114%	
		7.26	24	0.103%	3.142	0.500	0.013	0.078%	
50	51	29.79	24	1.734%	3.142	0.500	0.013	0.078%	36
		29.79	30	0.527%	4.909	0.625	0.013	0.058%	
		29.79	36	0.199%	7.069	0.750	0.013	0.045%	
51	63	51.30	30	1.564%	4.909	0.625	0.013	0.058%	42
		51.30	36	0.591%	7.069	0.750	0.013	0.045%	
		51.30	42	0.260%	9.621	0.875	0.013	0.037%	
52	53	1.46	15	0.051%	1.227	0.313	0.013	0.145%	15
		1.46	18	0.019%	1.767	0.375	0.013	0.114%	
		1.46	24	0.004%	3.142	0.500	0.013	0.078%	
53	54	1.66	15	0.066%	1.227	0.313	0.013	0.145%	15
		1.66	18	0.025%	1.767	0.375	0.013	0.114%	
		1.66	24	0.005%	3.142	0.500	0.013	0.078%	
54	57	1.86	15	0.083%	1.227	0.313	0.013	0.145%	15
		1.86	18	0.031%	1.767	0.375	0.013	0.114%	
		1.86	24	0.007%	3.142	0.500	0.013	0.078%	
55	56	2.32	15	0.129%	1.227	0.313	0.013	0.145%	15
		2.32	18	0.049%	1.767	0.375	0.013	0.114%	
		2.32	24	0.011%	3.142	0.500	0.013	0.078%	

56	57	4.64	15	0.516%	1.227	0.313	0.013	0.145%	18
		4.64	18	0.195%	1.767	0.375	0.013	0.114%	
		4.64	24	0.042%	3.142	0.500	0.013	0.078%	
57	58	6.63	15	1.053%	1.227	0.313	0.013	0.145%	18
		6.63	18	0.398%	1.767	0.375	0.013	0.114%	
		6.63	24	0.086%	3.142	0.500	0.013	0.078%	
58	59	8.12	15	1.579%	1.227	0.313	0.013	0.145%	24
		8.12	18	0.597%	1.767	0.375	0.013	0.114%	
		8.12	24	0.129%	3.142	0.500	0.013	0.078%	
59	61	9.61	15	2.211%	1.227	0.313	0.013	0.145%	24
		9.61	18	0.836%	1.767	0.375	0.013	0.114%	
		9.61	24	0.180%	3.142	0.500	0.013	0.078%	
60	61	1.49	15	0.053%	1.227	0.313	0.013	0.145%	15
		1.49	18	0.020%	1.767	0.375	0.013	0.114%	
		1.49	24	0.004%	3.142	0.500	0.013	0.078%	
61	62	12.58	15	3.792%	1.227	0.313	0.013	0.145%	24
		12.58	18	1.434%	1.767	0.375	0.013	0.114%	
		12.58	24	0.309%	3.142	0.500	0.013	0.078%	
62	63	13.74	15	4.521%	1.227	0.313	0.013	0.145%	24
		13.74	18	1.710%	1.767	0.375	0.013	0.114%	
		13.74	24	0.369%	3.142	0.500	0.013	0.078%	
63	64	66.19	36	0.985%	7.069	0.750	0.013	0.045%	42
		66.19	42	0.433%	9.621	0.875	0.013	0.037%	
		66.19	48	0.212%	12.566	1.000	0.013	0.031%	
64	101	75.03	36	1.265%	7.069	0.750	0.013	0.045%	48
		75.03	42	0.556%	9.621	0.875	0.013	0.037%	
		75.03	48	0.273%	12.566	1.000	0.013	0.031%	
101	Outfall	79.30	36	1.413%	7.069	0.750	0.013	0.045%	48
		79.30	42	0.621%	9.621	0.875	0.013	0.037%	
		79.30	48	0.305%	12.566	1.000	0.013	0.031%	

TERAKEE FARM Cluster Subd

South Detention Facility (Serving A-1 through A-8)

C = **0.48** Remaining Unit Discharge = **0.100** cfs/acre
 Area = **42.68** acres Release through Restriction = **4.268** cfs

Detention Pond Sized For The **100** Year Storm

Time min	Rainfall Intensity in./hr.	Accumulate Volume (CF)	Allowable Release (CF)	Needed Detention (CF)	
5	6.54	39878	1280	38597	
10	4.97	60609	2561	58048	
15	4.11	75182	3841	71341	
20	3.50	85382	5122	80260	
25	3.08	94003	6402	87601	
30	2.77	101341	7683	93658	
35	2.54	108347	8963	99384	
40	2.31	112673	10243	102430	
45	2.12	116330	11524	104806	
50	1.96	119297	12804	106493	
55	1.82	122065	14085	107980	
60	1.71	125121	15365	109756	
90	1.21	133121	23048	110073	<- Det
120	0.93	136682	30730	105952	
180	0.64	139828	46095	93733	
360	0.36	156292	92191	64101	
720	0.22	190535	184382	6153	
1440	0.12	210730	368764	-158033	

Required Storage Volume = **110073** ft³

TERAKEE FARM Cluster Subd

North Detention Facility (Serving future development, A-9)

C = **0.38** Remaining Unit Discharge = **0.100** cfs/acre
 Area = **54.27** acres Release through Restriction = **5.427** cfs

Detention Pond Sized For The **100** Year Storm

Time min	Rainfall Intensity in./hr.	Accumulated Volume (CF)	Allowable Release (CF)	Needed Detention (CF)	
5	6.54	40537	1628	38909	
10	4.97	61611	3256	58355	
15	4.11	76425	4885	71540	
20	3.50	86793	6513	80280	
25	3.08	95557	8141	87416	
30	2.77	103016	9769	93247	
35	2.54	110138	11397	98741	
40	2.31	114536	13025	101510	
45	2.12	118252	14654	103599	
50	1.96	121269	16282	104987	
55	1.82	124082	17910	106172	
60	1.71	127189	19538	107651	<- Det
90	1.21	135321	29307	106014	
120	0.93	138941	39076	99865	
180	0.64	142139	58615	83525	
360	0.36	158875	117229	41646	
720	0.22	193684	234458	-40774	
1440	0.12	214213	468917	-254704	

Required Storage Volume = **107651** ft³



NOAA Atlas 14, Volume 1, Version 5
Location name: Ogden, Utah, USA*
Latitude: 41.2702°, Longitude: -112.0678°
Elevation: 4233.21 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.51 (1.32-1.75)	1.91 (1.68-2.21)	2.60 (2.28-3.02)	3.26 (2.83-3.78)	4.34 (3.68-5.06)	5.34 (4.38-6.31)	6.54 (5.18-7.81)	7.97 (6.07-9.72)	10.3 (7.39-12.9)	12.4 (8.50-16.0)
10-min	1.15 (1.00-1.33)	1.45 (1.28-1.68)	1.99 (1.73-2.30)	2.48 (2.16-2.88)	3.30 (2.80-3.85)	4.06 (3.34-4.81)	4.97 (3.94-5.95)	6.06 (4.63-7.39)	7.81 (5.63-9.83)	9.44 (6.47-12.2)
15-min	0.952 (0.832-1.10)	1.20 (1.06-1.39)	1.64 (1.44-1.90)	2.05 (1.78-2.38)	2.73 (2.31-3.18)	3.36 (2.76-3.97)	4.11 (3.26-4.92)	5.01 (3.82-6.11)	6.46 (4.65-8.12)	7.80 (5.34-10.0)
30-min	0.642 (0.560-0.742)	0.806 (0.712-0.936)	1.10 (0.966-1.28)	1.38 (1.20-1.60)	1.84 (1.56-2.14)	2.26 (1.86-2.67)	2.77 (2.19-3.31)	3.37 (2.57-4.11)	4.35 (3.13-5.47)	5.25 (3.60-6.76)
60-min	0.397 (0.346-0.459)	0.499 (0.440-0.579)	0.683 (0.598-0.790)	0.855 (0.743-0.992)	1.14 (0.964-1.33)	1.40 (1.15-1.65)	1.71 (1.36-2.05)	2.09 (1.59-2.55)	2.69 (1.94-3.39)	3.25 (2.23-4.18)
2-hr	0.250 (0.222-0.286)	0.312 (0.277-0.357)	0.404 (0.356-0.462)	0.492 (0.428-0.564)	0.639 (0.544-0.740)	0.774 (0.643-0.906)	0.934 (0.750-1.11)	1.12 (0.870-1.37)	1.43 (1.04-1.80)	1.72 (1.19-2.21)
3-hr	0.194 (0.175-0.218)	0.239 (0.215-0.270)	0.300 (0.268-0.338)	0.356 (0.317-0.402)	0.447 (0.390-0.509)	0.531 (0.454-0.613)	0.637 (0.530-0.747)	0.763 (0.613-0.914)	0.968 (0.739-1.21)	1.16 (0.847-1.48)
6-hr	0.132 (0.121-0.145)	0.161 (0.147-0.178)	0.195 (0.177-0.215)	0.225 (0.203-0.250)	0.272 (0.242-0.304)	0.311 (0.273-0.351)	0.356 (0.307-0.406)	0.405 (0.342-0.471)	0.509 (0.414-0.613)	0.602 (0.475-0.752)
12-hr	0.084 (0.077-0.091)	0.102 (0.094-0.112)	0.123 (0.113-0.135)	0.142 (0.129-0.155)	0.169 (0.153-0.187)	0.192 (0.171-0.214)	0.217 (0.190-0.245)	0.243 (0.208-0.279)	0.284 (0.236-0.333)	0.317 (0.256-0.380)
24-hr	0.051 (0.047-0.055)	0.062 (0.057-0.068)	0.074 (0.069-0.081)	0.084 (0.078-0.092)	0.098 (0.090-0.107)	0.109 (0.100-0.118)	0.120 (0.109-0.130)	0.131 (0.119-0.142)	0.146 (0.131-0.169)	0.161 (0.140-0.193)
2-day	0.029 (0.027-0.032)	0.036 (0.033-0.039)	0.043 (0.040-0.046)	0.048 (0.045-0.052)	0.056 (0.052-0.060)	0.061 (0.057-0.066)	0.067 (0.062-0.073)	0.073 (0.067-0.079)	0.080 (0.073-0.087)	0.086 (0.077-0.097)
3-day	0.021 (0.020-0.023)	0.026 (0.024-0.028)	0.031 (0.029-0.034)	0.035 (0.033-0.038)	0.041 (0.038-0.044)	0.045 (0.041-0.049)	0.049 (0.045-0.053)	0.054 (0.049-0.058)	0.059 (0.054-0.064)	0.064 (0.057-0.071)
4-day	0.017 (0.016-0.019)	0.021 (0.020-0.023)	0.025 (0.023-0.027)	0.029 (0.026-0.031)	0.033 (0.030-0.036)	0.037 (0.034-0.040)	0.040 (0.037-0.044)	0.044 (0.040-0.048)	0.049 (0.044-0.053)	0.052 (0.047-0.057)
7-day	0.012 (0.011-0.013)	0.014 (0.013-0.015)	0.017 (0.016-0.018)	0.019 (0.018-0.021)	0.022 (0.020-0.024)	0.024 (0.022-0.026)	0.027 (0.024-0.029)	0.029 (0.026-0.031)	0.032 (0.029-0.035)	0.034 (0.031-0.037)
10-day	0.009 (0.008-0.010)	0.011 (0.010-0.012)	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.017 (0.016-0.019)	0.019 (0.017-0.020)	0.020 (0.019-0.022)	0.022 (0.020-0.024)	0.024 (0.022-0.026)	0.025 (0.023-0.027)
20-day	0.006 (0.005-0.006)	0.007 (0.007-0.008)	0.009 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.014)	0.013 (0.012-0.014)	0.014 (0.013-0.015)	0.015 (0.014-0.016)
30-day	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.007)	0.008 (0.007-0.008)	0.009 (0.008-0.009)	0.009 (0.009-0.010)	0.010 (0.009-0.011)	0.010 (0.010-0.011)	0.011 (0.010-0.012)	0.012 (0.011-0.013)
45-day	0.004 (0.004-0.004)	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.007)	0.007 (0.007-0.008)	0.008 (0.007-0.009)	0.008 (0.008-0.009)	0.009 (0.008-0.010)	0.009 (0.009-0.010)
60-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.005)	0.005 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.007)	0.007 (0.007-0.008)	0.007 (0.007-0.008)	0.008 (0.007-0.008)	0.008 (0.008-0.009)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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