



PRELIMINARY STORMWATER MANAGEMENT NARRATIVE

For McGhee Subdivision

July 13, 2022

SITE INFORMATION

The subject property, McGhee Subdivision, is located in a portion of the southeast quarter of Section 2, Township 57 North, Range 2 West, of the Boise Meridian in Bonner County, Idaho. The project consists of constructing a residential subdivision consisting of 60 lots on parcel number RPP00000027801A. The accompanying grading and drainage plan has been prepared to provide preliminary stormwater management for the proposed site improvements.

In general, the property drains in a southerly direction. The Natural Resource Conservation Service (NRCS) Web Soil Survey maps and soil descriptions indicate that the soils in the site area consist mainly of Mission silt loam and Odenson silt loam. The Mission soils are described as poorly drained soils consisting of a silt loam surface and subsurface and a fine sand base. The Odenson soils are described as poorly drained soils with a silt loam surface and a silty clay loam to silty clay subsurface. Ground water is anticipated at a minimum depth of 6-18 inches. Cut and fill slopes will not exceed a 2:1 slope.

The proposed site improvements consist of roads with a 60-foot right-of-way section that includes asphalt pavement, rolled curb, and an asphalt path on one side of the main road. Runoff from roadway surfaces will be mitigated by combination detention and treatment ponds. Total disturbed area for the proposed site improvements is approximately 46.7 acres, all of which is to be routed to the ponds.

HYDROLOGIC ANALYSIS

The hydrologic method used to describe the runoff characteristics of the site is the Rational Method. Rainfall intensity is obtained from Idaho Transportation Department Intensity-Duration-Frequency charts from Zone C, which covers this portion of Bonner County. Rainfall intensity is based on the 25-year storm frequency and time of concentration. Runoff ground cover coefficients used are from published coefficients derived for the Rational Method.

The east basin contains the majority of the proposed development site. This basin catches much of the northerly off-site runoff through a conveyance ditch running along the back of the lots north of the road, then piped under the road to a treatment and detention pond, which will detain and convey the stormwater to existing off-site culverts in such a way as to prevent flooding.

The west basin consists of the northwest quarter of the post-development site, that is unable to be routed into the east basin due to grading considerations and contains a much smaller treatment and detention pond. This basin is not included in the hydrologic analysis for off-site drainage due to the conveyance ditch described above that will catch the northerly off-site water and route it through the east basin pond.



Treatment Capacity:

The ponds have been designed to hold the greater volume of water calculated from either the Bowstring Method or the first ½ inch of runoff from impervious surfaces (assumed to be all asphalt, concrete, gravel, and roofs). As the outflow of each basin was assumed to be equivalent to the pre-development flows because of negligible infiltration, the Bowstring Method yields lower volumes and the first ½ inch of runoff was the design volume for all basins.

Volume Capacity:

The detention volume of the east pond was calculated by using the determined 100-year storm, as described in the Hydraulic Analysis under separate cover. The proposed detention pond has been sized to detain flows exceeding the capacity of the existing culverts beneath the railroad during the 100-year storm event. Treatment volume for stormwater from the East basin is also included in this pond. Sizing of the proposed culverts in Jim Berry Way is included in the Hydraulic Analysis.

Overflow Path:

The water on this site collects along the southern property line and flows through two existing culverts. The main treatment/detention pond will have two outlet control structures designed to limit the post-development flow to these culverts to prevent flooding on site and on neighboring properties.



STORMWATER CALCULATIONS - BASIN W

PROJECT MCGHEE SUBDIVISION
 DATE 7/12/2022
 AUTHOR JEL

25-YEAR DESIGN STORM

CONTRIBUTING AREAS

NUMBER OF LOTS 15
 ESTIMATED BUILDING FOOTPRINT (SQ FT) 3000
 ESTIMATED DRIVEWAY AREA (SQ FT) 1000

SITE	RUNOFF COEFFICIENT	PRE-DEVELOPMENT		POST-DEVELOPMENT	
		(SF)	(ACRES)	(SF)	(ACRES)
ASPHALT	0.90	0	0.00	46262	1.06
CONCRETE	0.90	0	0.00	15000	0.34
ROOF	0.95	0	0.00	45000	1.03
GRAVEL	0.55	0	0.00	0	0.00
GRASS	0.30	225401	5.17	119139	2.74
UNIMPROVED	0.30	0	0.00	0	0.00
OTHER	0.30	0	0.00	0	0.00
TOTALS		225401	5.17	225401	5.17

TIME OF CONCENTRATION

	LENGTH (FT)	ELEVATION (FT)	SLOPE	K	T _c (MIN)
PRE-DEVELOPMENT	130	2.60	0.02	420	2.19
	500	5.26	0.01	420	11.61
	50	1.00	0.02	420	0.84
AVERAGE	227	2.95	0.02	TOTAL	14.64
POST-DEVELOPMENT	130	2.60	0.02	420	2.19
	500	5.26	0.01	1500	3.25
	50	1.00	0.02	1100	0.32
AVERAGE	227	2.95	0.02	TOTAL	5.76

RATIONAL METHOD PEAK FLOW RATES

	WEIGHTED C	AREA (ACRES)	A*C	INTENSITY (IN/HR)	FLOW (CFS)
PRE-DEVELOPMENT	0.30	5.17	1.55	2.80	4.35
POST-DEVELOPMENT	0.59	5.17	3.07	2.80	8.59

BOWSTRING METHOD

TIME		INTENSITY	Q _{IN}	V _{IN}	Q _{OUT}	V _{OUT}	STORAGE
(MIN)	(SEC)	(IN/HR)	(CFS)	(CU FT)	(CFS)	(CU FT)	(CU FT)
5	300	2.80	8.59	3452.96	4.35	1747.32	1705.64
10	600	2.17	6.66	4776.30	4.35	3494.65	1281.66
15	900	1.83	5.61	5712.09	4.35	5209.81	502.28
20	1200	1.65	5.06	6668.74	4.35	6513.78	154.96
25	1500	1.45	4.45	7194.84	4.35	7817.75	-622.91
30	1800	1.27	3.90	7470.47	4.35	9121.72	-1651.26
35	2100	1.19	3.65	8095.05	4.35	10425.70	-2330.65
40	2400	1.11	3.41	8572.37	4.35	11729.67	-3157.30
45	2700	1.04	3.19	8988.88	4.35	13033.64	-4044.76
50	3000	0.96	2.94	9180.92	4.35	14337.62	-5156.70
55	3300	0.88	2.70	9225.71	4.35	15641.59	-6415.88
60	3600	0.80	2.45	9123.25	4.35	16945.56	-7822.32
65	3900	0.78	2.39	9613.00	4.35	18249.53	-8636.54
70	4200	0.75	2.30	9933.49	4.35	19553.51	-9620.01
75	4500	0.72	2.21	10198.77	4.35	20857.48	-10658.71
80	4800	0.70	2.15	10559.68	4.35	22161.45	-11601.77
85	5100	0.67	2.06	10723.72	4.35	23465.42	-12741.70
90	5400	0.65	1.99	11001.81	4.35	24769.40	-13767.59
95	5700	0.63	1.93	11243.08	4.35	26073.37	-14830.29
100	6000	0.61	1.87	11447.54	4.35	27377.34	-15929.81
110	6600	0.57	1.75	11746.02	4.35	29985.29	-18239.27
120	7200	0.53	1.63	11897.26	4.35	32593.23	-20695.98
130	7800	0.49	1.50	11901.24	4.35	35201.18	-23299.94
135	8100	0.47	1.44	11848.02	4.35	36505.15	-24657.13
150	9000	0.43	1.32	12026.86	4.35	40417.07	-28390.21
165	9900	0.40	1.23	12292.14	4.35	44328.99	-32036.85
180	10800	0.38	1.17	12726.67	4.35	48240.91	-35514.23
195	11700	0.37	1.14	13413.29	4.35	52152.82	-38739.53
210	12600	0.36	1.10	14044.70	4.35	56064.74	-42020.05
225	13500	0.34	1.04	14203.14	4.35	59976.66	-45773.52
240	14400	0.33	1.01	14696.50	4.35	63888.58	-49192.08
300	18000	0.29	0.89	16117.75	4.35	79536.25	-63418.51
1080	64800	0.14	0.43	27880.32	4.35	282956.00	-255075.67
1440	86400	0.11	0.34	29194.74	4.35	376842.03	-347647.29
1800	108000	0.11	0.34	36483.51	4.35	470728.07	-434244.56

MAXIMUM STORAGE REQUIRED BY BOWSTRING (CU FT)

1705.64

TREATMENT VOLUME DETERMINATION

IMPERVIOUS AREA (SQ FT)	106262
RUNOFF VOLUME (1/2" RAINFALL) (CU FT)	4427.58
BOWSTRING VOLUME (CU FT)	1705.64
VOLUME NEEDED (CU FT)	4427.58
TREATMENT DEPTH (FT)	1
BOTTOM AREA PROVIDED (SQ FT)	4613
VOLUME PROVIDED AT DEPTH (CU FT)	4613
STORAGE VOLUME	ADEQUATE

STORMWATER CALCULATIONS - BASIN W

PROJECT MCGHEE SUBDIVISION
 DATE 7/12/2022
 AUTHOR JEL

25-YEAR DESIGN STORM

CONTRIBUTING AREAS

NUMBER OF LOTS 45
 ESTIMATED BUILDING FOOTPRINT (SQ FT) 3000
 ESTIMATED DRIVEWAY AREA (SQ FT) 1000

SITE	RUNOFF COEFFICIENT	PRE-DEVELOPMENT		POST-DEVELOPMENT	
		(SF)	(ACRES)	(SF)	(ACRES)
ASPHALT	0.90	0	0.00	99517	2.28
CONCRETE	0.90	0	0.00	45000	1.03
ROOF	0.95	0	0.00	135000	3.10
GRAVEL	0.55	0	0.00	0	0.00
GRASS	0.30	960175	22.04	680658	15.63
UNIMPROVED	0.30	0	0.00	0	0.00
OTHER	0.30	0	0.00	0	0.00
TOTALS		960175	22.04	960175	22.04

TIME OF CONCENTRATION

	LENGTH (FT)	ELEVATION (FT)	SLOPE	K	T _c (MIN)
PRE-DEVELOPMENT	150	3.00	0.02	420	2.53
	500	4.20	0.01	420	12.99
	150	3.00	0.02	420	2.53
AVERAGE	267	3.40	0.02	TOTAL	18.04
POST-DEVELOPMENT	150	3.00	0.02	420	2.53
	500	4.20	0.01	1500	3.64
	150	3.00	0.02	1100	0.96
AVERAGE	267	3.40	0.02	TOTAL	7.13

RATIONAL METHOD PEAK FLOW RATES

	WEIGHTED C	AREA (ACRES)	A*C	INTENSITY (IN/HR)	FLOW (CFS)
PRE-DEVELOPMENT	0.30	22.04	6.61	2.80	18.52
POST-DEVELOPMENT	0.48	22.04	10.62	2.80	29.73

BOWSTRING METHOD

TIME		INTENSITY	Q _{IN}	V _{IN}	Q _{OUT}	V _{OUT}	STORAGE
(MIN)	(SEC)	(IN/HR)	(CFS)	(CU FT)	(CFS)	(CU FT)	(CU FT)
5	300	2.80	29.73	11951.43	18.52	7443.34	4508.09
10	600	2.17	23.04	17174.12	18.52	14886.68	2287.44
15	900	1.83	19.43	20312.44	18.52	22330.02	-2017.58
20	1200	1.65	17.52	23570.32	18.52	29033.00	-5462.68
25	1500	1.45	15.40	25332.07	18.52	34587.73	-9255.66
30	1800	1.27	13.48	26232.79	18.52	40142.46	-13909.67
35	2100	1.19	12.64	28370.90	18.52	45697.19	-17326.30
40	2400	1.11	11.79	29999.35	18.52	51251.92	-21252.58
45	2700	1.04	11.04	31420.26	18.52	56806.65	-25386.40
50	3000	0.96	10.19	32061.25	18.52	62361.39	-30300.13
55	3300	0.88	9.34	32192.59	18.52	67916.12	-35723.53
60	3600	0.80	8.49	31814.27	18.52	73470.85	-41656.58
65	3900	0.78	8.28	33503.48	18.52	79025.58	-45522.10
70	4200	0.75	7.96	34603.90	18.52	84580.31	-49976.41
75	4500	0.72	7.64	35513.20	18.52	90135.04	-54621.85
80	4800	0.70	7.43	36756.46	18.52	95689.77	-58933.31
85	5100	0.67	7.11	37315.37	18.52	101244.50	-63929.14
90	5400	0.65	6.90	38271.95	18.52	106799.24	-68527.28
95	5700	0.63	6.69	39101.13	18.52	112353.97	-73252.84
100	6000	0.61	6.48	39802.88	18.52	117908.70	-78105.82
110	6600	0.57	6.05	40824.16	18.52	129018.16	-88194.01
120	7200	0.53	5.63	41335.77	18.52	140127.62	-98791.85
130	7800	0.49	5.20	41337.73	18.52	151237.09	-109899.35
135	8100	0.47	4.99	41147.59	18.52	156791.82	-115644.22
150	9000	0.43	4.57	41754.77	18.52	173456.01	-131701.24
165	9900	0.40	4.25	42664.07	18.52	190120.21	-147456.14
180	10800	0.38	4.03	44162.16	18.52	206784.40	-162622.24
195	11700	0.37	3.93	46535.74	18.52	223448.60	-176912.86
210	12600	0.36	3.82	48718.19	18.52	240112.79	-191394.60
225	13500	0.34	3.61	49260.68	18.52	256776.98	-207516.30
240	14400	0.33	3.50	50965.33	18.52	273441.18	-222475.84
300	18000	0.29	3.08	55872.73	18.52	340097.96	-284225.22
1080	64800	0.14	1.49	96541.07	18.52	1206636.05	-1110094.99
1440	86400	0.11	1.17	101081.66	18.52	1606576.72	-1505495.05
1800	108000	0.11	1.17	126309.63	18.52	2006517.38	-1880207.75

MAXIMUM STORAGE REQUIRED BY BOWSTRING (CU FT)

4508.09

TREATMENT VOLUME DETERMINATION

IMPERVIOUS AREA (SQ FT)	279517
RUNOFF VOLUME (1/2" RAINFALL) (CU FT)	11647
BOWSTRING VOLUME (CU FT)	4508
VOLUME NEEDED (CU FT)	11647
TREATMENT DEPTH (FT)	1
BOTTOM AREA PROVIDED (SQ FT)	152170
VOLUME PROVIDED AT DEPTH (CU FT)	152170
STORAGE VOLUME	ADEQUATE

VOLUME CALCULATIONS - 100 YEAR STORM, WET CONDITIONS

STORAGE VOLUME REQUIRED (AC*FT)	6.7 *DETERMINED FROM HYDRAULIC ANALYSIS
TOTAL DEPTH (FT)	2
BOTTOM AREA PROVIDED (SQ FT)	152170
VOLUME PROVIDED AT DEPTH (CU FT)	304340
VOLUME PROVIDED AT DEPTH (AC*FT)	6.99
STORAGE VOLUME	ADEQUATE
