

Section P: WATER AND SANITATION REPORT

- ✓ Water and Sanitation Report (2 pages)
- ✓ Projected Demand Calculations (3 Pages)
- ✓ Will Serve Letters from City of Missoula (2 pages)

Water and Sanitation Report

for

Remington Flats Subdivision

Located at
2702 Roundup Drive, Missoula, MT
Section 12, T13N, R20W, PMM
Missoula County, Montana

December 2019

Prepared For:

Denali Development, LLC
2336 Aspen Grove Loop
Missoula, MT 59801

Prepared By:

406 Engineering, Inc.
1201 South 6th Street West, Suite 102
Missoula, MT 59801

GENERAL

The Remington Flats Subdivision is a proposed multi-phased, 152-lot major subdivision in the City of Missoula. Each lot will be a single-family residence, but up to 3 lots may share a common wall creating a tri-plex. The Project is located adjacent to the 44 Ranch Subdivision. The new development will be served by a City of Missoula sewer main extension, as well as a new Missoula Water main that will extend into the site. Each Phase of the subdivision will require its own main extensions for both sewer and water. The project will be completed in 7 phases with most phases starting about 2 years after the other. Currently, the site is vacant with no improvements.

WATER

As stated above, the site is currently vacant with no utilities onsite. Remington Flats is proposing two connection points to the Missoula Water infrastructure in the 44 Ranch Subdivision south of the project. The first water tie-in will be at the 8" D.I.P. stub located at the end of Riata Road. The second connection point will be at the existing 3" blow-off in the future intersection of Horn Road and Chuck Wagon Way.

The new water mains will be extended from the existing stubs discussed above. The proposed water mains will run through all streets in Remington Flats fronting the proposed homes. All water mains in Remington Flats will be constructed with 8" ductile iron pipe other than the main located under Chuck Wagon Drive. A 16" ductile iron main will be constructed under Chuck Wagon Drive extending to the northern property boundary to facilitate future growth. Construction of the proposed water mains will be constructed in 7 phases providing efficient distribution for domestic and fire supply to the new buildings and fire hydrants. See the Utility Plan in Section A for exact main locations and tie in points.

The projected average daily demand for the fully developed site is estimated to be 63,000 gpd. This figure accounts for domestic and irrigation flows. Maximum daily demand is projected to be 2 times the average daily domestic. See calculations attached with this report for projected water demands. Additionally, attached with this report is a letter from Missoula Water stating there is adequate water and pressure available for this subdivision.

SEWER

As stated in the general section of this report, the property is currently vacant with no utilities onsite. Remington flats is proposing to connect into existing manhole #P06-16-A19. The existing manhole is located southwest of the project site where the future intersection of Horn Road and Chuck Wagon Way will be located.

Connection at the existing manhole will run north to the intersection of Chuck Wagon Drive and Remington Road with an upsized 18" sewer main. The 18" main will then head east the entire length of Remington Road to facilitate future growth to the east of the project site. From the above referenced intersection, an upsized 12" gravity sewer main will run north the full length of Chuck Wagon Drive. Sewer will be provided to all remaining lots by new 8" gravity mains. The proposed 8" sewer mains will run through all streets in Remington Flats fronting the proposed homes. Construction of the proposed sewer mains will be constructed in 7 phases providing services for each single-family home. See the utility plan in Section A for exact main locations and tie in point.

Using the Missoula County census estimate that the average population per household is 2.5 persons, a total of 382 people are assumed to be eventually connected to the system. In accordance with DEQ Circular 2, 11.243, assuming 100 gpcd for an average daily flow, a total of 38,200 gallons per day will be contributed to the City sewer system. Taking 2 times the average daily flow, a projected maximum daily rate of 76,400 gallons will be contributed to the system. See calculations attached with this report for projected sewer demands. Additionally, attached with this report is a letter from the City of Missoula stating there is adequate capacity available for this subdivision.

SUMMARY OF AREA
PROJECT: REMINGTON FLATS SUBDIVISION
PREPARED BY: 406 Engineering, Inc
December 1, 2019

	Phases:							Total	Units	Equations:
	1	2	3	4	5	6	7			
Lotted Area, AL:	2.310	1.918	1.784	1.913	1.948	1.157	1.980	13.01	acres	Does not include ROW
Assumed Impervious Area per Lot, ALi:	1700	1700	1700	1700	1700	1700	1700	1700	sq ft	Assumed Ave. of Unit and Drive
Additional Un-Irrigated Portion of Lots, ALui:	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.321	acres	Gravel areas, etc
Number of Lots/Units, NL:	27	22	20	20	21	17	25	152	lots/units	Lots not inc. below for Comm.
Total Impervious/Un-irrigated Area Ai:	1.10	0.90	0.83	0.83	0.87	0.71	1.02	6.25	acres	= ALi X NL + ALui
Total Road Right-of-Way Area, Arw:	2.267	0.614	0.608	0.613	0.793	1.047	1.231	7.17	acre	
Impervious Road Area, Ari:	1.93	0.52	0.52	0.52	0.67	0.89	1.05	6.10	acre	Use 85% of Arw
Park Area, Ap:	0	0	0	0	0	0	0	0.00	acres	
Un-irrigated Park Area (ie. other source), App:	0	0	0	0	0	0	0	0.00	acres	
Total Irrigated Area, A:	1.55	1.11	1.05	1.18	1.20	0.60	1.14	7.83	acres	= (AL - Ai) + (Arw - Ari)

PROJECTED WATER DEMAND

PROJECT: Denail Development - Remington Flats
 PREPARED BY: 406 Engineering, Inc
 December 1, 2019

USE TYPE	Value	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Totals	Units	Equations and Notes
DOMESTIC FLOWS:											
Ave. Annual Daily Demand per Capita, Qr:	100	100	100	100	100	100	100	100	100.0	gpccd	Per Montana DEQ Standard
No. of Persons per Home (2000 census/residential):	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		persons	
Wastewater Flow (Commercial or other), Qc:	0	0	0	0	0	0	0	0	0.0	gpd	
Number of Connections, Nc:		27	22	20	20	21	17	25	152	connec.	152 Lots
Calculated Population:		67.5	55.0	50.0	50	52.5	42.5	62.5	380.0	people	Calculated
Assume a Population, P, of:		68	55	50	50	53	43	63	382	people	Manual Input
Design: Total Ave. Annual Daily Demand, Q:		6,800	5,500	5,000	5,000	5,300	4,300	6,300	38,200.0	gpd	= P X Qr or = Nc X Qc
Water Rights: Ave Annual Daily Demand, Qwr:		6,800	5,500	5,000	5,000	5,300	4,300	6,300	38,200.0	gpd	= Q
IRRIGATION FLOWS:											
Acres to be Irrigated, A:	0.00	1.55	1.11	1.05	1.18	1.20	0.60	1.14	7.8	acres	Irrigation to be provided from Domestic Water'
Mild Season: Water Application Required, a:	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25		inch/ac/wk	(For April 17 thru July 2 & Sept.1 thru Oct. 13)
Mild Season: Length of Irrigation Season, Tim:	120	120	120	120	120	120	120	120		days	
Mild Season: Summer Daily Demand, Qim:	0	7,516	5,359	5,088	5,717	5,824	2,932	5,545	37,981	gpd	= a/(12 in/ft)/(7 days/wk)XAX(43560 ft ² /ac)X(7.48 gal/ft ³)
Hot Season: Water Application Required, a:	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		inch/ac/wk	(For July 3 thru August 31)
Hot Season: Length of Irrigation Season, Tih:	60	60	60	60	60	60	60	60		days	
Hot Season: Summer Daily Demand, Qih:	0	15,032	10,719	10,175	11,432	11,648	5,864	11,089	75,959	gpd	= a/(12 in/ft)/(7 days/wk)XAX(43560 ft ² /ac)X(7.48 gal/ft ³)
Design: Ave. Annual Daily Irrigation Demand, Qid:	0	4,942	3,524	3,345	3,759	3,829	1,928	3,646	24,973	gpd	= ((Qim X Tim)+(Qih X Tih))/365
Water Rights: See Qim & Qih above for the mild & hot month ave daily flows. These are only appropriate for water rights and sizing storage tanks											
FIRE FLOWS:											
Fire Demand, Qf:	1500	1500	1500	1500	1500	1500	1500	1500	1,500	gpm	per ICC regulations
SUMMARY:											
Design:											
Average Annual Daily Domestic Demand, Q:		6,800	5,500	5,000	5,000	5,300	4,300	6,300	38,200	gpd	
Average Annual Daily Irrigation Demand, Qid:		4,942	3,524	3,345	3,759	3,829	1,928	3,646	24,973	gpd	
Total Ave. Annual Daily Demand, Qave:		11,742	9,024	8,345	8,759	9,129	6,228	9,946	63,173	gpd	= Combination of irrigation & domestic
Total Ave. Annual Daily Demand, Qadd:		8.2	6.3	5.8	6.1	6.3	4.3	6.9	43.9	gpm	= Qave/1440 minutes
Maximum Day Demand, Qmax-day:		25,232	18,969	17,675	18,932	19,598	12,314	20,539	133,259	gpd	= 150% Qave + Qih
Maximum Day Demand, Qmax:		17.5	13.2	12.3	13.1	13.6	8.6	14.3	92.5	gpm	= Qmax-day/1440 minutes
Peaking Factor (PF):		4.5	4.5	4.5	4.5	4.5	4.5	4.5			= 110% of Sewer PF
Peak Instantaneous Demand, Qp:		36.69	28.20	26.08	27.37	28.53	19.46	31.08	197.4	gpm	= Qave/(1440 min/day) X PF
Fire Supply Demand:	1500	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1,500	gpm	
Total Peak Demand, Qpi:		1536.69	1528.20	1526.08	1527.37	1528.53	1519.46	1531.08	1,697	gpm	= Peak Instantaneous Flow with fire flows

PROJECTED SEWER DEMAND

PROJECT: Denail Development - Remington Flats

PREPARED BY: 406 Engineering, Inc

December 1, 2019

USE TYPE	Value	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Totals	Units	Equations and Notes
DOMESTIC FLOWS:											
Ave. Annual Daily Demand per Capita, Qr:	100	100	100	100	100	100	100	100	100.0	gpcd	Per Montana DEQ Standard
No. of Persons per Home (2000 census/residential):	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		persons	
Additional Wastewater Flow (Commercial or other), Qc:	0	0	0	0	0	0	0	0	0.0	gpd	
Number of Connections, Nc:		27	22	20	20	21	17	25	152	connec.	152 Lots
Calculated Population:		67.5	55.0	50.0	50	52.5	42.5	62.5	380.0	people	Calculated
Assume a Population, P, of:		68	55	50	50	53	43	63	382	people	Manual Input
Design: Total Ave. Annual Daily Demand, Q:		6,800	5,500	5,000	5,000	5,300	4,300	6,300	38,200.0	gpd	= P X Qr or = Nc X Qc
WasteWater Flows:											
Average Annual Daily Domestic Demand, Qave:		6,800	5,500	5,000	5,000	5,300	4,300	6,300	38,200	gpd	
Total Ave. Annual Daily Demand, Qadd:		4.7	3.8	3.5	3.5	3.7	3.0	4.4	27	gpm	= Qave/1440 minutes
Maximum Day Demand, Qmax-day:		13,600	11,000	10,000	10,000	10,600	8,600	12,600	76,400	gpd	= 200% Qave DEQ Cir 2
Maximum Day Demand, Qmax:		9.4	7.6	6.9	6.9	7.4	6.0	8.8	53	gpm	= Qmax-day/1440 minutes
Peaking Factor (PF):		4.29	4.31	4.31	4.31	4.31	4.33	4.29	4.03		= $(18 + (P/1000)^{0.5}) / (4 + (P/1000)^{0.5})$ DEQ Cir 2
Peak Instantaneous Demand, Qp:		20.24	16.45	14.98	14.98	15.86	12.92	18.78	106.95	gpm	= Qave/(1440 min/day) X PF



DEVELOPMENT SERVICES – ENGINEERING DIVISION

435 RYMAN • MISSOULA, MT 59802 - 4297 • (406) 552-6630 • FAX: (406) 552-6053

CORR 2019-0180

27 December 2019

Brian Throckmorton, PE
briant@406eng.com
406 Engineering, Inc.
1201 S. 6th St. W. Suite 102
Missoula, MT 59801

RE: Sewer & Water Availability Letter – Riata Road (Remington Flats) Subdivision
Project#2019-041

Brian,

City of Missoula public water and sanitary sewer are available to the property commonly known as 2702 Roundup, and is legally described as Parcel 9 in COS 3176, S12, T13N, R20W. The water and sewer lines will be connecting to adjacent public facilities at 44 Ranch Phases 1 and 2, and sewer connecting to MH P-06-16-A19.

The City of Missoula will agree to provide water to the above development according to the rules and regulations of the Montana Department of Natural Resources and Conservation and the Montana Department of Environmental Quality. With respect to its water system, the City certifies that it has adequate capacity to meet the needs of the extension; the connections are authorized; the system is in compliance with ARM Title 17, Chapter 38, and all other applicable department regulations; and the appropriate water rights exist for this connection.

This property is within the City of Missoula Wastewater Facilities Service Area Boundary and therefore, sanitary sewer capacity is available (including main size, lift station size, and plant capacity). The sanitary sewer system has adequate capacity to accommodate the connection.

The City will review and approve stormwater facilities for this property during the building permit approval process and/or accept the increased stormwater runoff from the site as adequate public stormwater facilities are nearby to accept this additional runoff. Missoula Municipal Code (Chapter 15.65 Grading, Drainage, Erosion Control and Storm Water Pollution Prevention Plan) documents the grading and drainage requirements for properties inside the City Limits.

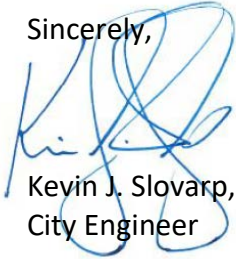
When ready to proceed with water and sanitary sewer installation, please arrange the following:

1. Please include the City file number noted above on all future correspondence for this project (2019-041).

2. Obtain State Department of Environmental Quality approval of the proposed water and/or sewer system if a public water and/or sewer main extension is proposed.
3. Obtain City approval of plans and specifications from Development Services if a water and/or sewer main extension is proposed.
4. Prior to connection to either system, the property owner must pay the necessary public utility connection fees and sign the appropriate legal documents (if applicable).
5. Arrange for a City licensed and bonded contractor to obtain the necessary excavation permits (City required and County if applicable) and perform the installation of utility line(s).
6. Prior to construction startup, verify information regarding depth and location of the water and/or sewer lines with this office.

This letter is valid for 180 days after the date above unless changes to sanitary sewer policy occur at the legislature.

Sincerely,



Kevin J. Slovarp, P.E.
City Engineer

KJS/ils

cc: Logan McInnis
Troy Monroe
Ross Mollenhauer
Pat Brook
Mickey Morin
Brad Riley
Dennis Bowman