

**RESOLUTION NO. R22-63**

**RESOLUTION OF THE CITY OF LAUREL CITY COUNCIL GRANTING A VARIANCE FOR GOLDBERG SPORTING ESTATES SUBDIVISION, FIRST FILING, FOR THE USE OF A LOW-PRESSURE SEWER SYSTEM**

WHEREAS, the Developer of Goldberg Sporting Estates Subdivision, First Filing (hereinafter “the Development”), is requesting a Variance from the City of Laurel for the use of a Low-Pressure Sewer System (hereinafter “LPSS”) to collect wastewater within the Development;

WHEREAS, the proposed scope, effect, and operations of the LPSS are fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein;

WHEREAS, the Developer retained a Design Engineer to analyze the downstream collection system to determine the effects of the proposed Variance, and the Findings of the Developer’s Design Engineer’s Report are attached hereto and fully incorporated herein;

WHEREAS, the Developer has proposed additional benefits to the City of Laurel, as fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein;

WHEREAS, in order for the Developer to use the LPSS, the City of Laurel is required to grant a Variance, for the reasons fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein;

WHEREAS, the City Council of the City of Laurel may conditionally approve the installation and use of the LPSS, subject to the conditions recommended and fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein;

WHEREAS, the City Council of the City of Laurel may conditionally approve the installation and use of the LPSS, subject to agreement from the Developer and the Development’s HOA to fully indemnify and hold harmless the City from any harm resulting from use of the LPSS; and

WHEREAS, the City Council of the City of Laurel hereby adopts the conditions for approval of the installation of the LPSS, and further the City Council finds it is in the best interests of the residents of the City of Laurel to allow the variance, based upon the conditions fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein, and an agreement from the Developer and the Development’s HOA to fully indemnify and hold harmless the City from any harm resulting from use of the LPSS, since:

1. allowing the variance in this case relates only to a special condition that is specific to the applicant;
2. the current hardship was not created by the applicant;
3. the variance requested appears to be within the spirit, intent and purpose of the Laurel Municipal Code; and
4. granting the variance will not injure or result in an injustice to others.

NOW THEREFORE, BE IT RESOLVED that the Variance for Goldberg Sporting Estates Subdivision, First Filing, for the use of a low-pressure sewer system is hereby granted, subject to all of the conditions fully-described in the August 31, 2022 Report from KLJ Engineering, a copy attached hereto and fully incorporated herein, and an agreement from the Developer and the Development's HOA to fully indemnify and hold harmless the City from any harm resulting from use of the LPSS; and

BE IT FURTHER RESOLVED, that the variance is site specific to the Development.

Introduced at a regular meeting of the City Council on the 13<sup>th</sup> day of September 2022 by Council Member Sparks.

PASSED and APPROVED by the City Council of the City of Laurel, Montana on the 13<sup>th</sup> day of September 2022.

APPROVED by the Mayor on the 13<sup>th</sup> day of September 2022.

CITY OF LAUREL

\_\_\_\_\_  
Dave Waggoner, Mayor

ATTEST:

\_\_\_\_\_  
Kelly Strecker, Clerk-Treasurer

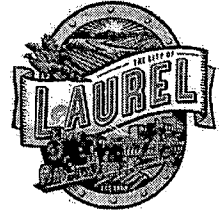
APPROVED AS TO FORM:

\_\_\_\_\_  
Michele L. Braukmann, Civil City Attorney

**CITY HALL**  
115 W. 1st. St.  
**PUB WORKS: 628-4796**  
PWD FAX: 628-2241  
**WATER OFFICE: 628-7431**  
WTR FAX: 628-2289  
**MAYOR: 628-8456**

# City of Laurel

P.O. Box 10  
Laurel, Montana 59044



DEPARTMENT

## REQUEST FOR CONSIDERATION OF AGENDA ITEM BY CITY OF LAUREL CITY COUNCIL

To: City of Laurel  
Attn: City Mayor  
Civil City Attorney  
City Clerk/Treasurer Executive Assistant

From: \_\_\_\_\_ Kurt Markegard \_\_\_\_\_

Date: \_\_\_\_\_ September \_\_\_\_\_

**Action Item Being Requested of City Council:** *Please clearly specify what you are requesting from City Council.*

\_\_\_\_\_ Variances From Public Works Standards- See Ryan's report from  
KLJ \_\_\_\_\_

**Date of Proposed Consideration by City Council:**

\_\_\_\_\_ September 13<sup>th</sup> Vote \_\_\_\_\_

**Checklist of Items in Advance of Submission to City Council:**

If applicable, have all meeting minutes and supporting documents been submitted to the City for review and approval?

Yes  No

If applicable, have all Department Heads and relevant personnel been consulted and approve of this item to be placed in front of City Council for consideration?

Yes  No

Has the Civil City Attorney reviewed all proposed legal documents to be executed by the City and/or prepared all relevant documents?

Yes  No

Are all proposed legal documents to be executed by the City signed by opposing parties and ready to be presented as accepted to City Council?

Yes  No ?

If it is a land use issue, has the County approved and accepted all relevant documents?

Yes  No

Have you received approval from the Mayor for your proposed action item, and have you submitted all supporting documentation for it?

Yes  No

Have you clearly indicated to City Council the proposed action item that you seek from City Council?

Yes  No

Have you clearly indicated to the City when you request that the proposed action item be put on City Council agenda?

Yes  No

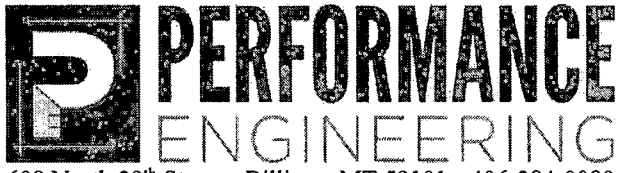
Have you clearly indicated to the City if the matter is required to be set for public hearing?

Yes \_\_\_\_\_ No

Have all supporting documents intended to be included in the City Council packet been included with this submission?

Yes  No \_\_\_\_\_

*Please include/attach all supporting documents, including Agenda, Minutes, Voting Affirmation/Declination, Supporting Legal Documents, and Proposed Memoranda on Additional Issues for City Attorney and/or City Council Consideration.*



608 North 29<sup>th</sup> Street • Billings, MT 59101 • 406-384-0080

---

August 29, 2022

City of Laurel Planning Department  
City of Laurel Public Works Department  
City of Laurel Council  
P.O. Box 10  
Laurel, MT 59044

To Whom it May Concern:

The Developer of Goldberg Sporting Estates, First Filing, a 73-lot proposed residential development and 15 lot proposed commercial development, is submitting this written petition respectfully requesting allowance for use of a Low-Pressure Sewer System (LPSS) for collection wastewater within the development. It was noted in the comment letter from Planning on January 16, 2020 that "...Public Works cannot consider a LPSS system until authorized by City Council."

Since that point we have met with the Public Works Director and consultant KLJ two times to review the system proposed. This has included providing all materials requested by the Director and coordinating a meeting with the LPSS system representative (Ben Lewis of Ambiente H2O, Inc. located in Billings) to answer questions and discuss operation and maintenance of both the on-lot pumps and the main collection force main proposed in the public rights-of-way. The applicant has provided manuals and study information to the Public Works Department to develop a comfort level with the proposed system, which is used in multiple large developments within the City of Billings, showing it is reliable and sustainable. The applicant, through the creation of an HOA, has put a structure in place to ensure that the HOA controls all on-lot components through a direct contract with the system supplier (Ambiente H2O, Inc.) to ensure continuity and continued maintenance of all on-lot components. All information has been presented and documented to both the Planning and Public Works Departments to this point.



Following those discussions it was requested that the applicant complete a study of the system's potential impacts on the downstream gravity sewer collection system it would tie into as well as the Elm Lift Station. A complete Elm Lift Station Analysis memo was completed with numerous iterations of review through the City's consultant KLJ. The analysis shows that the 8-inch existing gravity sewer main from MH 332 to MH 335 will be required to be upgraded to 10-inch gravity as a result of the project, which the applicant is agreeing to do as part of the development work at their cost. Additionally, the analysis shows that by using the LPSS no further upgrades would be required at the Elm Lift Station. On the contrary, if the LPSS is denied the Elm Lift Station would be undersized for contributions of the Goldberg Estates development and neighboring properties if a traditional gravity collection system and municipal lift station were installed as part of the proposed project. The analysis shows that those cost can be avoided if a LPSS is approved for use by the Council.

As part of the Elm Lift Station review consideration was given to neighboring properties and for allowing connection into the same LPSS system. Land to the east and south along Eleanor Roosevelt/East 8<sup>th</sup> Street were included in the sizing and planning of the proposed system so as not to isolate any neighboring properties. The potential land uses of those parcels were planned for what could be the maximum density use to be conservative and still show that the LPSS system is viable for both the Goldberg Sporting Estates development and still allow the neighboring properties the opportunity to develop and connect to the system. That report and associated documentation was presented in its final version to Public Works and KLJ on August 3, 2022.

As noted previously, the HOA will own and maintain, through an annual service term agreement with Ambiente H2O, the on-lot tank and pumping systems to assure continuity with the systems and annual maintenance and upkeep. Ambiente installs a remote monitoring system on each unit installed on lots that alarms them to any discrepancies in the pump operations or if something has failed so they can replace/repair immediately. That responsibility will be the sole responsibility of the HOA which will be established. During the meetings in 2020 the applicant was notified that any main lines installed in City of Laurel public right-of-way would have to be owned and operated by the City of Laurel. As such, the system is proposed to be installed in the road rights-of-way and the main lines, up to lot lines on services, is proposed to be owned, operated and maintained by the City of Laurel. Should the City have concerns about that arrangement the Developer would happily take owner, maintenance, and operation responsibility for those main lines in public right-of-way



and work with the City on whatever agreement would be required to facilitate that arrangement. At this time it is proposed that the City of Laurel own, operate, and maintain all force main lines within the public rights-of-way.

As a result of this proposal the Developer is proposing to leave the Elm Lift Station as it is currently configured and operating. The Developer is committing to upgrade the gravity sewer main between MH 332 to MH 335 to a 10-inch diameter gravity main. The entire collection and force main system to support the development and neighboring properties would be installed by the Developer as part of the development project as outlined in the information submitted to Planning, Public Works, and KLJ.

The true benefit of this project to the City of Laurel is that we are avoiding installation of another public central lift station that would be owned and operated by the City. During our initial pre-application meeting in 2019 the Public Works department stated that they did not want to have another public lift station installed in this area to maintain and operate which was the impetus for proposing the LPSS system. Our proposal allows the City to put the burden of lift station operation and long-term maintenance on the lot owners and not the existing residents and rate payers of Laurel. We've shown thoroughly that this system can work and will allow for growth and development of neighboring properties as well. The Developer would take responsibility and ownership of the main force mains and service lines as well if Public Works or the City is uncomfortable with that responsibility.

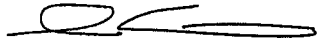
The applicant is respectfully requesting acceptance of the proposed system by the Laurel City Council as stated was required by the Planning Department in their comment letter dated January 16, 2020. All supporting information has been provided to both agencies, primarily the Public Works Department and consultant KLJ. Any questions or concerns will be happily discussed during the City Council hearing or before/after to assure that all parties are comfortable with the information provided to make an educated decision. We appreciate your review and scheduling for hearing of this matter and await your response.

Feel free to contact PE Project Manager Scott Aspenlieder with any questions or concerns at (406) 384-0080 or [scott@performance-ec.com](mailto:scott@performance-ec.com).





Sincerely,



Scott Aspenlieder, PE  
Project Manager





# MEMO

To: Kurt Markegard, City of Laurel Public Works Director

From: Scott Aspenlieder, PE *SA*

Date: August 3, 2022

Re: Goldberg Sporting Estates - Sewer Impact Analysis - Revision 6

---

This memo is intended to clarify questions raised by the City of Laurel and contract engineer KLJ during review of the proposed development in consideration of allow a Low-Pressure Sewer System (LPSS) for the Goldberg Sporting Estates Subdivision. Information presented in this memo is focused on sewer system impacts only, water system impacts will be considered in a standard design report during permitting of water infrastructure.

The proposed subdivision includes seventy-three (73) residential lots that are assumed to be quadplex multi-family units, and fifteen (15) commercial lots that could range from a healthcare clinic, daycare, gas station, and offices based on market demand at the time of development. Based on the zoning in place, this analysis assumes that every residential lot within the proposed development will have a quadplex building for multi-family development to evaluate the maximum potential impact the development may have on the existing system. There is no plan to develop the property in that manner, nor do some lots have the room to allow for that type of construction, but it is evaluated in this manner at the request for the City of Laurel. Commercial flows were developed assume higher density businesses to account for what could potentially be included in the property. The commercial projected businesses are projections only, there is no guarantee or warrantee implied that the parcel will be developed out in that manner, by their use for this memo.

The City also requested the existing collection system to be evaluated at and downstream of the desired connection point for the LPSS to the existing system. As such, there are thirty-two (32) existing residential lots southwest of the proposed project area tied into the sewer line(s) that the proposed subdivision will contribute to. No flow measurements were taken on the gravity collection system, instead DEQ - Circular 4 guidance was used for design flows that would have been used to size the original system. These design flows are conservative in nature and higher than actual flows in the existing system.

The City additionally requested that consideration be given for the five (5) residential lots and one (1) commercial lot southeast of the proposed subdivision that may tied into the same existing gravity sewer line that the proposed subdivision will contribute to sometime in the future. Assumptions have been made based off the wastewater design flow rates as outlined in DEQ - Circular 4, which is more conservative that City of Laurel guidelines. The assumptions used to determine the base and peak demand flows for the proposed subdivision are described below:

## General

### Notes/Assumptions

1. Lot 1 of Block 1, Lot 1 of Block 5, and Lots 1 & 17 of Block 6 will be used as utility areas. No sewer demands
2. The Public Park along the north within Block 4 will be used as parkland. No sewer demands.

### Residential Zoning Assumptions:

1. Per Circular DEQ 4 Section 3.1.2B - 100 gpd per person & an average of 2.5 persons per living unit.

### Phase 1 - GSE Residential

1. Assume seventeen (17) quadplex lots equating to 68 living units, 2.5 persons per living unit.

### Phase 2 - GSE Residential

1. Assume twenty-two (22) quadplex lots equating to 88 living units, 2.5 persons per living unit.

### Phase 3 - GSE Residential

1. Assume thirty-four (34) quadplex lots equating to 136 living units, 2.5 persons per living unit.

### Phase 4 - Commercial Lots

1. Assume twelve (12) of the 15 lots are office buildings with 20 employees, 13 gpd per employee.
2. Assume 1 of the 15 lots is a health clinic, 25 beds, 165 gpd per bed & 15 employees, 10 gpd per employee.
3. Assume 1 of the 15 lots is a daycare, 30 kids, 25 gpd per kid & 20 employees, 15 gpd per employee.
4. Assume 1 of the 15 lots is a gas station, 600 vehicles, 10 gpd per vehicle & 15 employees, 12 gpd per employee.

### Existing Residential - Locust, Juniper, & Mullberry

Assume thirty-two (32) single-family lots equating to 32 living units, 2.5 persons per living unit.

### Future Residential - South of E 8<sup>th</sup> St.

Assume five (5) single-family lots equating to 5 living units, 2.5 persons per living unit.

### Existing Commercial - South of E 8<sup>th</sup> St.

Assume 1 of the 6 lots is an office building with 20 employees, 13 gpd per employee.

The LPSS system proposed includes the use of a 4-inch force main connecting to the existing gravity sewer collection system. The hydraulic capacity of that 4-inch force main is 88 gpm which will be used in the analysis to follow in determining impacts to the gravity collection system and Elm Lift Station to follow. System curve information used to determine the capacity of the 4-inch force main

is attached to this memo. At the request of KLJ the system was re-analyzed to assume that every pump represents a flow rate of 1,000 gpm (the potential flow rate based on zoning of the lots). The modified system analysis is provided in the attachments. The analysis shows that the system will require a 4-inch force main with a hydraulic capacity of 88 gpm, which is used in this analysis. This does result in higher retention times if that flow rate is not reached, and that odor control should be incorporated in the on-site systems. This could lead to an over-sizing of the system and is not advised but for maximum system impact analysis on the Elm Lift Station it is included at the behest of the City of Laurel and KLJ. Additional information was requested on the system operation by KLJ and the City of Laurel, particularly around how the system responds during power outages and power restoration. A full scenario explanation from E/One is provided as an attachment to this document for review.

Tables 1-7, included in the attachments show the contributing flows from all four phases of the GSE development; existing neighborhoods on Locust, Juniper, and Mulberry between E 8<sup>th</sup> St. and East Main St.; and the existing residential and commercial development which is not publicly sewered but could be at a time in the future.

**Existing Gravity Sewer Analysis**

Performance Engineering measured and reviewed the sewer capacity leading up to the Elm Lift Station. The controlling reach of sewer main was determined to be MH 332-MH 335 along the alley between Juniper Ave and Locust Ave. City of Laurel Standards for Public Works Improvements require all gravity collection lines under 10-inch diameter to flow at peak under 50% full pipe.

	<b>Total Base Demand (gpd)</b>	<b>Total Base Demand (gpm)</b>	<b>Total Base Demand (cfs)</b>	<b>Total Peak Demand (gpm)</b>	
<b>PROPOSED</b>					→ <i>GOLDBERG DEVELOPMENT CONTRIBUTION</i>
	97,135	67.45	0.1503	269.82	
<b>EXISTING HOUSES</b>					→ <i>CONTRIBUTING TO MH 332-MH 335</i>
	8,000	5.56	0.0124	22.22	
<b>NEIGHBORING DEVELOPMENT</b>					→ <i>FUTURE CONTRIBUTION</i>
	1,510	1.05	0.0023	4.19	
<b>Goldberg Total</b>	98,645	68.50	0.1526	274.01	
<b>Total</b>	106,645	74.05	0.1650	296.24	

The flows from the existing houses, the neighboring development, and the proposed GSE project area were considered as if they were conveyed through gravity collection or via large regional lift station as a worst-case scenario to check capacity. In either a gravity collection or conventional lift station for GSE, the development would contribute a peak discharge of 270 gpm. Should the proposed LPSS be approved, due to the 4-inch diameter force main the maximum capacity for discharge to this existing area would be 77gpm. For capacity analysis purposes the 270 gpm scenario was analyzed below. When combined with the existing flows from the neighborhood we conclude that the combined peak hour flow rate is 296 gpm, which exceeds the 50% capacity requirement noted above. This would require the 8-inch gravity main between MH 332 and MH 335 to be replaced and upgraded to a 10-inch gravity main.

## ELM LIFT STATION ANALYSIS

### Existing Flow Rates

In reviewing the design reports provided by the City of Laurel the Elm Lift Station pump capacity is technically undersized per DEQ regulations. The Village Lift Station has a pump capacity of 300 gpm connected to the Elm Lift Station which has a pump capacity of 600 gpm as well based on the Morrison-Maierle reports provided by the City of Laurel. Table 4-3 presented below was pulled directly from the Morrison-Maierle report without modification. It appears there are rounding errors that occurred in the excel cells however the Peak Hour Flows are within 2-3 gpm, within the accuracy of the projections presented. With that said this memo uses the data as presented in the Morrison-Maierle report as is without modification to minimize confusion and because the data is well within the conservative nature of these estimates. The Elm Lift Station wet well and ancillary equipment was upgraded in 2011 with two Gorman-Rupp 600 gpm pumps installed in 2015. In 2021 a Homa 600 gpm pump was installed to replace one of the 2015 Gorman-Rupp pumps, leaving the replaced pump in storage as a backup for the lift station. From the information provided and pump measurements taken in the field, it appears that the City created the storage capacity in the wet well recommended by Morrison-Maierle along with installing the recommended 600 gpm pumps to fully improve the lift station.

**TABLE 4-3  
FLOW RATES FOR AREAS TRIBUTARY TO EXISTING AND PROPOSED LIFT STATIONS**

Area	Area (acres)	Green- Space (acres)	Devel- opable Area (acres)	Est. Pop. <sup>1</sup>	Per Capita Flow Rate <sup>2</sup> (gpd)	Ave. Day (gpd)	Ave. Day (gpm)	Peaking Factor (MDEQ)	Peak Hour Flow (gpd)	Peak Hour Flow (gpm)
Elm LS Service Area				360	177	63,720	44	4.0	257,660	179
Area North and East of and Tributary to Elm LS	286	57	229	1,143	115	131,458	91	3.8	494,519	343
Village LS Service Area				598	177	105,846	74	3.9	416,290	289
Area North and East of and Tributary to New East LS Service Area	77	15	62	308	115	35,467	25	4.1	144,467	100

1. Elm and Village Lift Station Service Area populations are taken from 2000 census data. Populations for the remaining areas are calculated assuming 0.5 acre lots and 2.5 people per household.

2. From Table 4-7 in the 2003 Wastewater Facilities Plan, new construction is assumed to have no infiltration.

The Village Lift Station and Elm Street Service Area are two variables that contribute to the capacity of the Elm Lift Station, which is currently capable of pumping 600 gpm of wastewater. To be clear the Existing Elm Service Area includes areas west of the station contributing to the facility above and beyond the 22 gpm included in the gravity analysis. The 22 gpm flow outlined in the gravity analysis was pulled only to analyze gravity capacity and is included in the 179 gpm peak outlined in the Morrison-Maierle data. In an effort to be conservative that 22 gpm is counted in both the proposed flows and existing data, providing additional capacity buffer. Again, to be conservative we've used the design flows shown below:

Village Lift Station Flows — 300 gpm

Existing Elm Service Area Flows — 179 gpm

Proposed Development, Including Existing Flows—296 gpm

### Elm Lift Station Data

Based on a review of existing reports and plans, in conjunction with new field measurements, it was determined that the pumps in the Elm Lift Station are sized to pump at 600 gpm. PE performed field measurements on February 7, 2022, in coordination with City staff, at which time the cycles for the facility were times and levels were measured. The field data confirmed that the Elm Station pump are 600 gpm.

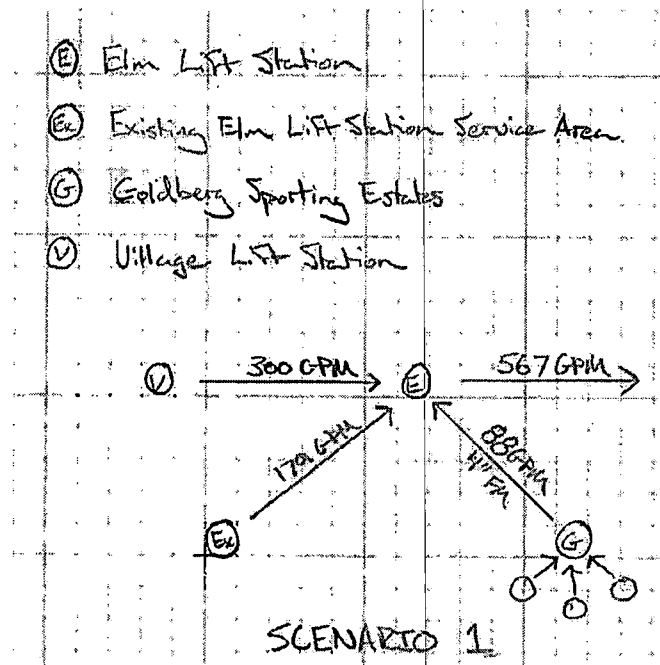
### Our Findings

Based on review of the 2009 Laurel Wastewater Facilities Plan Update, Elm and Village Lift Stations Alternatives Analysis Technical Memorandum, and data initially provided, it appeared that the Elm Lift Station was operating at or below the design criteria outlined in DEQ Circular 2. Additional information provided by Kurt Markegard on November 5, 2021 showed that the pumps had been replaced in 2015 and then another in 2021, all with 600 gpm capacity. Currently, each pump is capable of servicing the total peak demand of the flows seen from Village Lift Station and Elm Service Area when combined.

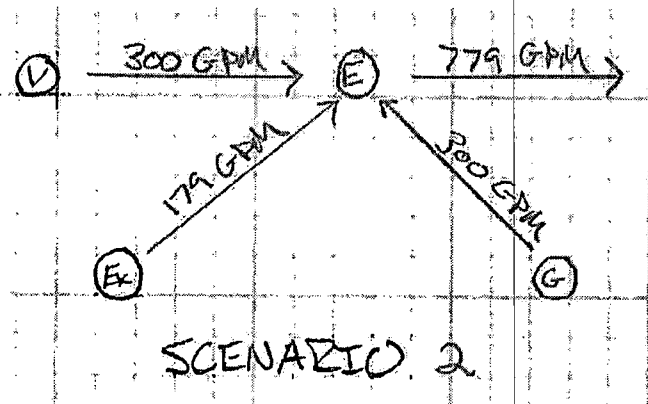
## PROPOSED ALTERNATIVES AND REQUIRED ELM LIFT STATION MODIFICATIONS

### Scenarios

Scenario 1- Proposed development utilizing LPSS with individual pumps having a 4" force main discharging to the existing gravity sewer in the Elm Service Area. Includes replacement of 8-inch gravity main between MH 332-MH 335 with 10-inch gravity main.



Scenario 2- Proposed development utilizing gravity sewer and a single large lift station at 300 gpm discharging to the existing gravity sewer in the Elm Service Area. Includes replacement of 8-inch gravity main between MH 332-MH 335 with 10-inch gravity main.



### Conclusion

Based on the two scenarios visually presented above the Elm Lift Station, with the pump replacements in 2015 and 2021 to provide 600 gpm capacity as recommended in the Morrison-Maierle report can support Scenario 1 without modification. That would leave the existing wet well, pumps and ancillary equipment in place and sized properly to service the existing neighborhoods along with the new GSE development and all potential future development along East 8<sup>th</sup> Street. Under this scenario it may be beneficial to replace the last Gorman-Rupp pump with a matching Homa pump as was installed in 2021. This would provide matching equipment for the facility and extend the useful life of the pumping equipment impacted by the proposed GSE development.

Should the City decide that a conventional lift station be used for the GSE the facility would be sized to accommodate 300 gpm peak flows. Under Scenario 2 you can see it would require the entirety of the Elm Lift Station, wet well and ancillary equipment included, to be upgraded and replaced to accommodate a design flow of 779 gpm at peak. It is our opinion that this is an unnecessary upgrade when flows can be controlled through a LPSS servicing the GSE development area.

## Goldberg Sporting Estates - GSE Demands

Task: Sewer Demands  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:

- 4 Peak Factor
- 2.5 Persons/Residential Living Units
- 100 gpd/Person in Residential Units
- 165 gpd/Bed in Health Clinic
- 10 gpd/Employee in a Health Clinic
- 13 gpd/Employee in an Office
- 25 gpd/Child in a Daycare
- 15 gpd/Employee in a Daycare
- 10 gpd/Vehicle Served
- 12 gpd/Employee in a Gas Station

	No. of Lots	Estimated Usage					Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)	
		No. of Residential Living Units									
Block 1	Lots 2-7	6	4	Per Each Lot			6,000	4.17	0.0093	16.67	
							Block 1 Subtotal	<b>6,000</b>	<b>4.17</b>	<b>0.0093</b>	<b>16.67</b>
Block 2	Lots 1-13	13	4	Per Each Lot			13,000	9.03	0.0201	36.11	
							Block 2 Subtotal	<b>13,000</b>	<b>9.03</b>	<b>0.0201</b>	<b>36.11</b>
Block 3	Lots 1-30	30	4	Per Each Lot			30,000	20.83	0.0464	83.33	
							Block 3 Subtotal	<b>30,000</b>	<b>20.83</b>	<b>0.0464</b>	<b>83.33</b>
Block 4	Lots 1-20	20	4	Per Each Lot			20,000	13.89	0.0309	55.56	
							Block 4 Subtotal	<b>20,000</b>	<b>13.89</b>	<b>0.0309</b>	<b>55.56</b>
Block 5	Lots 2-5	4	4	Per Each Lot			4,000	2.78	0.0062	11.11	
							Block 5 Subtotal	<b>4,000</b>	<b>2.78</b>	<b>0.0062</b>	<b>11.11</b>
<b>Lot Total</b>	<b>73</b>	<b>Total</b>					<b>73,000</b>	<b>50.69</b>	<b>0.1129</b>	<b>202.78</b>	
	No. of Lots	Estimated Usage					Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)	
		No. of Residential Living Units	No. of Employees	No. of Beds in Health Clinic	No. of Children	No. of Vehicles Served					
Block 6	Office: Lots 2-13	12	20	25	30	600	3,120	2.17	0.0048	8.67	
	Clinic: Lot 14	1	15				4,275	2.97	0.0066	11.88	
	Daycare: Lot 15	1	20				1,050	0.73	0.0016	2.92	
	Gas Station: Lot 16	1	15				6,180	4.29	0.0096	17.17	
							Block 6 Subtotal	<b>14,625</b>	<b>10.16</b>	<b>0.0226</b>	<b>40.63</b>
<b>Lot Total</b>	<b>15</b>	<b>Total</b>					<b>14,625</b>	<b>10.16</b>	<b>0.0226</b>	<b>40.63</b>	
<b>Total Overall</b>							<b>87,625</b>	<b>60.85</b>	<b>0.1356</b>	<b>243.40</b>	



## Goldberg Sporting Estates - Phase 1

Task: Sewer Demands, Phase 1  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:  
 4 Peak Factor  
 2.5 Persons/Residential Living Units  
 100 gpd/Person in Residential Units

	No. of Lots	Estimated Usage		Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)	
		No. of Residential Living Units						
Block 1	Lots 2-7	6	4	Per Each Lot	6,000	4.17	0.0093	16.67
Block 1 Subtotal					<b>6,000</b>	<b>4.17</b>	<b>0.0093</b>	<b>16.67</b>
Block 2	Lots 1-6	6	4	Per Each Lot	6,000	4.17	0.0093	16.67
Block 2 Subtotal					<b>6,000</b>	<b>4.17</b>	<b>0.0093</b>	<b>16.67</b>
Block 3	Lots 1-2	2	4	Per Each Lot	2,000	1.39	0.0031	5.56
Block 3 Subtotal					<b>2,000</b>	<b>1.39</b>	<b>0.0031</b>	<b>5.56</b>
Block 4	Lots 1-2	2	4	Per Each Lot	2,000	1.39	0.0031	5.56
Block 4 Subtotal					<b>2,000</b>	<b>1.39</b>	<b>0.0031</b>	<b>5.56</b>
Block 5	Lot 2	1	4	Per Each Lot	1,000	0.69	0.0015	2.78
Block 5 Subtotal					<b>1,000</b>	<b>0.69</b>	<b>0.0015</b>	<b>2.78</b>
<b>Lot Total</b>	<b>17</b>			<b>Phase 1 Total</b>	<b>17,000</b>	<b>11.81</b>	<b>0.0263</b>	<b>47.22</b>

# Goldberg Sporting Estates - Phase 2

Task: Sewer Demands, Phase 2  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:  
 4 Peak Factor  
 2.5 Persons/Residential Living Units  
 100 gpd/Person in Residential Units

	No. of Lots	Estimated Usage		Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
		No. of Residential Living Units					
Block 2 Lots 7-13	7	4	Per Each Lot	7,000	4.86	0.0108	19.44
Block 2 Subtotal				<b>7,000</b>	<b>4.86</b>	<b>0.0108</b>	<b>19.44</b>
Block 3 Lots 3-15	13	4	Per Each Lot	13,000	9.03	0.0201	36.11
Block 3 Subtotal				<b>13,000</b>	<b>9.03</b>	<b>0.0201</b>	<b>36.11</b>
Block 4 Lots 2-3	2	4	Per Each Lot	2,000	1.39	0.0031	5.56
Block 4 Subtotal				<b>2,000</b>	<b>1.39</b>	<b>0.0031</b>	<b>5.56</b>
<b>Lot Total</b>	<b>22</b>		<b>Phase 2 Total</b>	<b>22,000</b>	<b>15.28</b>	<b>0.0340</b>	<b>61.11</b>

# Goldberg Sporting Estates - Phase 3

Task: Sewer Demands, Phase 3  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:  
 4 Peak Factor  
 2.5 Persons/Residential Living Units  
 100 gpd/Person in Residential Units

	No. of Lots	Estimated Usage		Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
		No. of Residential Living Units					
Block 3 Lots 16-30	15	4	Per Each Lot	15,000	10.42	0.0232	41.67
Block 3 Subtotal				<b>15,000</b>	<b>10.42</b>	<b>0.0232</b>	<b>41.67</b>
Block 4 Lots 5-20	16	4	Per Each Lot	16,000	11.11	0.0248	44.44
Block 4 Subtotal				<b>16,000</b>	<b>11.11</b>	<b>0.0248</b>	<b>44.44</b>
Block 5 Lot 3-5	3	4	Per Each Lot	3,000	2.08	0.0046	8.33
Block 5 Subtotal				<b>3,000</b>	<b>2.08</b>	<b>0.0046</b>	<b>8.33</b>
<b>Lot Total</b>	<b>34</b>	<b>Phase 3 Total</b>		<b>34,000</b>	<b>23.61</b>	<b>0.0526</b>	<b>94.44</b>

## Goldberg Sporting Estates - Phase 4

Task: Sewer Demands, Phase 4  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:

- 4 Peak Factor
- 165 gpd/Bed in Health Clinic
- 10 gpd/Employee in a Health Clinic
- 13 gpd/Employee in an Office
- 25 gpd/Child in a Daycare
- 15 gpd/Employee in a Daycare
- 10 gpd/Vehicle Served
- 12 gpd/Employee in a Gas Station

	No. of Lots	Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
		No. of Residential Living Units	No. of Employees	No. of Beds in Health Clinic	No. of Children				
Block 6									
Office: Lots 2-13	12		20			3,120	2.17	0.0048	8.67
Clinic: Lot 14	1		15	25		4,275	2.97	0.0066	11.88
Daycare: Lot 15	1		20		30	1,050	0.73	0.0016	2.92
Gas Station: Lot 16	1		15			6,180	4.29	0.0096	17.17
					Block 6 Subtotal	<b>14,625</b>	<b>10.16</b>	<b>0.0226</b>	<b>40.63</b>
<b>Lot Total</b>	<b>15</b>				<b>Total</b>	<b>14,625</b>	<b>10.16</b>	<b>0.0226</b>	<b>40.63</b>

## Goldberg Sporting Estates - Existing Houses

Task: Sewer Demands, Existing Houses  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:  
 4 Peak Factor  
 2.5 Persons/Residential Living Units  
 100 gpd/Person in Residential Units

			No. of Lots	Estimated Usage		Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
				No. of Residential Living Units					
MH 333-MH 334			10						
	Mulberry Ave	Lot 702	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Mulberry Ave	Lot 706	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Mulberry Ave	Lot 708	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Mulberry Ave	Lot 1612	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 703	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 707	1	1	Per Each Lot	250	0.17	0.0004	0.69
Locust Ave	Lot 711		1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 715	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 719	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 1602	1	1	Per Each Lot	250	0.17	0.0004	0.69
<b>Block 1 Subtotal</b>						<b>2,500</b>	<b>1.74</b>	<b>0.0039</b>	<b>6.94</b>
MH 331-MH 332			12						
	Locust Ave	Lot 702	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 706	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 710	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 714	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 718	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 722	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 703	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 707	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 711	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 715	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 719	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 723	1	1	Per Each Lot	250	0.17	0.0004	0.69
<b>Block 2 Subtotal</b>						<b>3,000</b>	<b>2.08</b>	<b>0.0046</b>	<b>8.33</b>
MH 332-MH 335			10						
	Juniper Ave	Lot 519	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 523	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 605	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 615	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Juniper Ave	Lot 619	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 616	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 618	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 622	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 628	1	1	Per Each Lot	250	0.17	0.0004	0.69
	Locust Ave	Lot 1515	1	1	Per Each Lot	250	0.17	0.0004	0.69
<b>Block 3 Subtotal</b>						<b>2,500</b>	<b>1.74</b>	<b>0.0039</b>	<b>6.94</b>
<b>Lot Total</b>			<b>32</b>	<b>Total</b>		<b>8,000</b>	<b>5.56</b>	<b>0.0124</b>	<b>22.22</b>

## Goldberg Sporting Estates - Neighboring Contributions

Task: Sewer Demands, Neighboring Development Connections  
 By: SA  
 Date: 6/20/2022

DEQ Circular 4 Demands:

- 4 Peak Factor
- 2.5 Persons/Residential Living Units
- 100 gpd/Person in Residential Units
- 13 gpd/Employee in an Office

	No. of Lots	Estimated Usage				Total Base Demand	Total Base	Total Base Demand	Total Peak Demand	
		No. of Residential Living Units								
EAST 8TH ST, MAIN ST	5									
E 8th St	Lot D02662	1	1		Per Each Lot	250	0.17	0.0004	0.69	
E 8th St	Lot D02661	1	1		Per Each Lot	250	0.17	0.0004	0.69	
E Main St	Lot D02660	1	1		Per Each Lot	250	0.17	0.0004	0.69	
E 8th St	Lot B01692	1	1		Per Each Lot	250	0.17	0.0004	0.69	
E 8th St	Lot B01690	1	1		Per Each Lot	250	0.17	0.0004	0.69	
<b>Block 1 Subtotal</b>						<b>1,250</b>	<b>0.87</b>	<b>0.0019</b>	<b>3.47</b>	
<b>Lot Total</b>	<b>5</b>	<b>Total</b>				<b>1,250</b>	<b>0.87</b>	<b>0.0019</b>	<b>3.47</b>	
	No. of Lots	Estimated Usage					Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
		No. of Residential Living Units	No. of Employees	No. of Beds in Health Clinic	No. of Children	No. of Vehicles Served				
E 8TH ST	Office: Lot D02662A	1	20				260	0.18	0.0004	0.72
<b>Block 6 Subtotal</b>						<b>260</b>	<b>0.18</b>	<b>0.0004</b>	<b>0.72</b>	
<b>Phase 4 Total</b>						<b>1,510</b>	<b>1.05</b>	<b>0.0023</b>	<b>4.19</b>	

## Goldberg Sporting Estates - Full Contribution

Task: Sewer Demands Summary  
 By: SA  
 Date: 6/20/2022

**DEQ Circular 4 Demands:**

- 4 Peak Factor
- 2.5 Persons/Residential Living Units
- 100 gpd/Person in Residential Units
- 165 gpd/Bed in Health Clinic
- 10 gpd/Employee in a Health Clinic
- 13 gpd/Employee in an Office
- 25 gpd/Child in a Daycare
- 15 gpd/Employee in a Daycare
- 10 gpd/Vehicle Served
- 12 gpd/Employee in a Gas Station

PROPOSED PROJECT CONTRIBUTION							
Residential Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
No. of Lots							
Phase 1	17	4	Per Each Lot	17,000	11.81	0.0263	47.22
Phase 2	22	4	Per Each Lot	22,000	15.28	0.0340	61.11
Phase 3	34	4	Per Each Lot	34,000	23.61	0.0526	94.44
<b>Total</b>	<b>73</b>			<b>Total 73,000</b>	<b>50.69</b>	<b>0.1129</b>	<b>202.78</b>

Commercial Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
No. of Lots							
Phase 4	15		Varies	14,625	10.16	0.0226	40.63
<b>Total</b>	<b>15</b>			<b>Total 14,625</b>	<b>10.16</b>	<b>0.0226</b>	<b>40.63</b>

	<b>Phase Total</b>	<b>87,625</b>	<b>60.85</b>	<b>0.1356</b>	<b>243.40</b>
--	--------------------	---------------	--------------	---------------	---------------

EXISTING HOUSES CONTRIBUTION							
Residential Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
No. of Lots							
Existing Residential Connec.	32	1	Per Each Lot	8,000	5.56	0.0124	22.22
<b>Total</b>	<b>32</b>			<b>Total 8,000</b>	<b>5.56</b>	<b>0.0124</b>	<b>22.22</b>

NEIGHBORING DEVELOPMENT CONNEC. CONTRIBUTION							
Residential Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
No. of Lots							
Future Service Connections	5	1	Per Each Lot	1,250	0.87	0.0019	3.47
<b>Total</b>	<b>5</b>			<b>Total 1,250</b>	<b>0.87</b>	<b>0.0019</b>	<b>3.47</b>

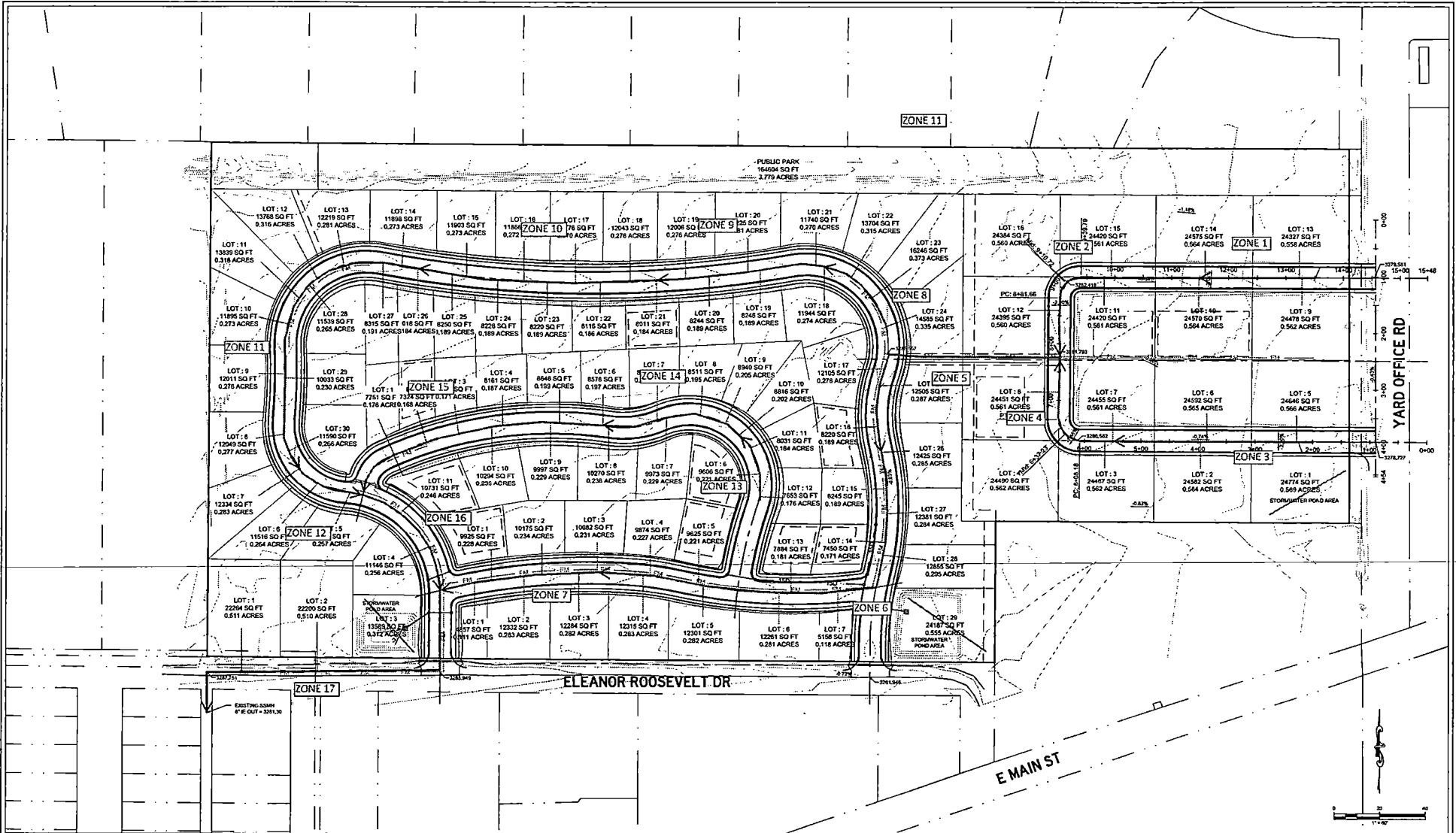
  

Commercial Estimated Usage				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
No. of Lots							
D02662A	1		20	260	0.18	0.0004	0.72
<b>Total</b>	<b>1</b>			<b>Total 260</b>	<b>0.18</b>	<b>0.0004</b>	<b>0.72</b>

	<b>Neighboring Development Total</b>	<b>1,510</b>	<b>1.05</b>	<b>0.0023</b>	<b>4.19</b>
--	--------------------------------------	--------------	-------------	---------------	-------------

TOTAL OF ALL CONTRIBUTIONS				Total Base Demand (gpd)	Total Base Demand (gpm)	Total Base Demand (cfs)	Total Peak Demand (gpm)
				<b>97,135</b>	<b>67.45</b>	<b>0.1503</b>	<b>269.82</b>



REVISIONS				
NO.	DESCRIPTION	DATE	BY	CHECKED BY
1				
2				
3				
4				
5				
6				

**PERFORMANCE ENGINEERING**  
 608 NORTH 29TH STREET (406) 384-0080  
 BILLINGS, MT 59101 performance-ec.com

**PRELIMINARY  
 NOT FOR  
 CONSTRUCTION**

**GOLDBERG SPORTING ESTATES**  
 LAUREL, MT

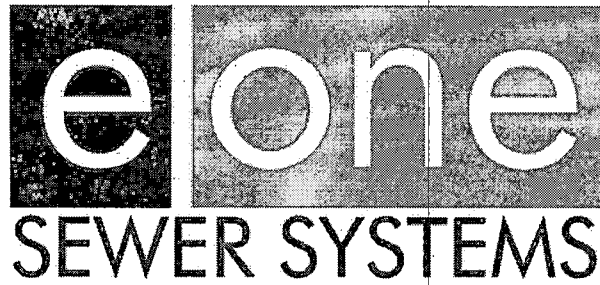
PROJECT NUMBER  
 2018-017  
 SHEET NUMBER  
 1 OF 1  
 DRAWING NUMBER  
**EX 1**

LOT LAYOUT

DESIGN BY: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 QUALITY ASSURANCE: \_\_\_\_\_  
 CHECK BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

Copyright 2018





Environment One Corporation

**Pressure Sewer Preliminary  
Cost and Design Analysis**

**For**

**Yard Office Rd-rev4  
Laurel, Montana**

**Prepared For:**  
**Performance Engineering**  
**608 North 29th Street**  
**Billings MT 59101 USA**  
**Tel: 406-384-0080**  
**Fax:**  
**Prepared By: M. Crowley/D. Benson**  
**July 6, 2022**

**Yard Office Rd-rev4  
Laurel, Montana**

**Prepared by :** M. Crowley/D. Benson

**On:** July 6, 2022

**Notes :**

Analysis based upon drawings and data provided. Station recommendations are preliminary.

GPD values impact retention times only, not line sizing or hydraulics. GP laterals to be 1.25".

General recommendations for valve placement are: clean out valves at intervals of approximately 1,000 ft and at branch ends and junctions; isolation valves at branch junctions; and air release valves at peaks of 25 ft or more and/or at intervals of 2,000 to 2,500 ft. Lateral kits comprised of a ball and check valve are required to be installed between the pump discharge and street main on all installations. Laterals should be located as close to the public right of way as possible.

Flow has been modified to 1000 GPD for all units per request of engineer and municipality.

Normal residential flow is 200 GPD. Altering GPD will only affect force main retention times. Retention times will increase substantially if the 1000 GPD is not met.

Odor control recommended if retention time exceeds 10 hours.

Larger station size recommended to account for 1000 GPD.

<<<< END OF NOTES >>>>



PRELIMINARY PRESSURE SEWER- PIPE SIZING AND BRANCH ANALYSIS

Prepared By:  
M. Crowley/D. Benson

Yard Office Rd-rev4  
Laurel, Montana

July 6, 2022

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE																	
Friction loss calculations were based on a Constant for inside roughness "C" of: 150																	
1.00	2.00	3	3	1000	11.00	2	22.00	2.00	2.38	200.00	1.19	2.38	30.36	3,286.00	3,278.00	8.00	38.36
2.00	5.00	5	8	1000	11.00	3	33.00	2.00	3.57	376.00	2.52	9.47	27.98	3,286.00	3,280.00	6.00	33.98
3.00	4.00	3	3	1000	11.00	2	22.00	2.00	2.38	348.00	1.19	4.14	28.37	3,286.00	3,277.00	9.00	37.37
4.00	5.00	4	7	1000	11.00	3	33.00	2.00	3.57	227.00	2.52	5.72	24.23	3,286.00	3,279.00	7.00	31.23
5.00	6.00	3	18	1000	11.00	4	44.00	3.00	2.19	475.00	0.65	3.09	18.51	3,286.00	3,284.00	2.00	20.51
6.00	7.00	12	30	1000	11.00	5	55.00	3.00	2.74	730.00	0.98	7.17	15.42	3,286.00	3,282.00	4.00	19.42
7.00	17.00	6	36	1000	11.00	6	66.00	3.00	3.29	282.00	1.38	3.88	8.25	3,286.00	3,285.00	1.00	9.25
8.00	9.00	3	3	1000	11.00	2	22.00	2.00	2.38	168.00	1.19	2.00	28.13	3,294.00	3,286.00	8.00	36.13
9.00	10.00	6	9	1000	11.00	3	33.00	2.00	3.57	298.00	2.52	7.51	26.13	3,294.00	3,288.00	6.00	32.13
10.00	11.00	9	18	1000	11.00	4	44.00	3.00	2.19	433.00	0.65	2.81	18.62	3,294.00	3,289.00	5.00	23.62
11.00	12.00	12	30	1000	11.00	5	55.00	3.00	2.74	551.00	0.98	5.41	15.81	3,294.00	3,291.00	3.00	18.81
12.00	16.00	3	33	1000	11.00	6	66.00	3.00	3.29	129.00	1.38	1.78	10.40	3,289.00	3,289.00	0.00	10.40
13.00	14.00	3	3	1000	11.00	2	22.00	2.00	2.38	124.00	1.19	1.47	19.62	3,289.00	3,289.00	0.00	19.62
14.00	15.00	6	9	1000	11.00	3	33.00	2.00	3.57	256.00	2.52	6.45	18.15	3,289.00	3,285.00	4.00	22.15
15.00	16.00	8	17	1000	11.00	4	44.00	3.00	2.19	474.00	0.65	3.08	11.70	3,289.00	3,288.00	1.00	12.70
16.00	17.00	2	52	1000	11.00	7	77.00	3.00	3.83	232.00	1.83	4.25	8.62	3,286.00	3,286.00	0.00	8.62
17.00	17.00	2	90	1000	11.00	8	88.00	4.00	2.65	632.00	0.69	4.37	4.37	3,286.00	3,286.00	0.00	4.37

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

\\Eoneis1\data\Common\SSB\SSB Engineering Data\AE Projects\Yard Office Rd, MT\Yard Office Rd, MT-rev4.EOne

PRELIMINARY PRESSURE SEWER- ACCUMULATED RETENTION TIME(HR)

Prepared By:  
M. Crowley/D. Benson

Yard Office Rd-rev4  
Laurel, Montana

July 6, 2022

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE								Gals per Day per Dwelling		1,000
1.00	2.00	3	2.00	15.40	200.00	30.81	3,000	97.38	0.25	0.98
2.00	5.00	8	2.00	15.40	376.00	57.91	8,000	138.13	0.17	0.74
3.00	4.00	3	2.00	15.40	348.00	53.60	3,000	55.97	0.43	1.11
4.00	5.00	7	2.00	15.40	227.00	34.96	7,000	200.20	0.12	0.68
5.00	6.00	18	3.00	33.47	475.00	158.97	18,000	113.23	0.21	0.56
6.00	7.00	30	3.00	33.47	730.00	244.31	30,000	122.80	0.20	0.35
7.00	17.00	36	3.00	33.47	282.00	94.38	36,000	381.46	0.06	0.16
8.00	9.00	3	2.00	15.40	168.00	25.88	3,000	115.93	0.21	0.83
9.00	10.00	9	2.00	15.40	298.00	45.90	9,000	196.08	0.12	0.62
10.00	11.00	18	3.00	33.47	433.00	144.91	18,000	124.22	0.19	0.50
11.00	12.00	30	3.00	33.47	551.00	184.40	30,000	162.69	0.15	0.31
12.00	16.00	33	3.00	33.47	129.00	43.17	33,000	764.39	0.03	0.16
13.00	14.00	3	2.00	15.40	124.00	19.10	3,000	157.07	0.15	0.61
14.00	15.00	9	2.00	15.40	256.00	39.43	9,000	228.25	0.11	0.46
15.00	16.00	17	3.00	33.47	474.00	158.63	17,000	107.17	0.22	0.35
16.00	17.00	52	3.00	33.47	232.00	77.64	52,000	669.74	0.04	0.13
17.00	17.00	90	4.00	55.31	632.00	349.58	90,000	257.45	0.09	0.09

## Scott Aspenlieder

---

**From:** blewis@ambienteh2o.com  
**Sent:** Thursday, June 9, 2022 10:41 AM  
**To:** Scott Aspenlieder  
**Cc:** Craig Dalton  
**Subject:** RE: Goldberg Sporting Estates - Laurel

Scott,

What happens when more pumps are running than designed/expected?

This is most likely to occur after a prolonged power outage where there may be many stations at or above the ON level.

There are three different or simultaneous scenarios that may occur depending on product configuration or user settings.

- 1.) E/One grinder pumps feature a semi positive displacement / progressive cavity pump design. This pump design has inherent "reserve hydraulic capacity" beyond the design limit of the pump. This reserve hydraulic capacity allows the grinder pumps to operate periodically above the design parameters. Depending on the size of the pressure sewer network, the duration of the power outage, and the number of grinder pump stations above the ON level, after power returns the system may operate above the calculated design pressure. These scenarios are typically infrequent and short in duration. In most cases, there is no detriment to the grinder pump service interval when the pump operates briefly above the design limit and the system recovery from a prolonged power outage is practically transparent to the users and system operator. The only indication may be nuisance high level alarms at certain stations if they are above the ALARM level when the power returns. In most cases, users are instructed to silence the audible alarm with the push button switch on the exterior of the alarm panel enclosure. Depending on the type of station, the unit may take 10-30 minutes to recover at which point the light on the alarm panel will turn off. If after 30+ minutes, the light is still on, the user should contact the appropriate party for investigation or service.
- 2.) All E/One grinder pumps have an integrated "smart" motor control unit. This motor control unit is responsible for normal start/stop operation of the motor/pump. The motor controller also has pump protection features including thermal protection and overpressure (high amperage) protection. In the event more pumps are operating than expected, the network pressure will be greater than expected. If the pressure exceeds the design capabilities of the E/One grinder pump (80 psi or 185 ft TDH), the motor will begin to generate more heat. Eventually, the excess heat will trigger a temperature actuated safety switch on the electric motor within the pump. Prior to that occurring, amperage monitoring on the motor controller unit may detect that the pump is doing more work than expected and therefore drawing higher amps. The motor controller unit will disable the pump and enter a 5 minute rest period. During this time, other pumps in the network (specifically those pumps closer to the discharge point) will continue to operate and recovery from the power outage. After the 5 minute rest period, the unit will automatically restart. If the pressure has reduced, the system will operate normally. If the high amperage condition remains, another 5 minute rest period will begin. That cycle will continue until the issue is self corrected.
- 3.) Certain E/One alarm panels have features that can help system users and operators mitigate operational risks – including after a prolonged power outage. The E/One Protect Plus alarm panel features overpressure protection which operates similar to the amperage protection described in #2 but uses operating wattage as opposed to amperage. The wattage based overpressure protection is more sensitive and generally responds quicker. Additionally, the Protect Plus alarm panel has a feature called "Power On Delay". This feature is specifically designed to mitigate the risks of too many grinder pumps turning on immediate after a power outage. With this feature, grinder pumps can be configured to delay start-up when power is first applied to the station. This is a user programmable setting with the factory default of 0 minutes. When this feature is used, typically those

stations closest to the discharge point of the network (therefore, those with the least amount of system pressure) will have a 0 minute delay and will operate immediate when the power returns. Moving upstream, the next group of units can have a 5-7 minute power on delay. During this time, the downstream units will be emptying their contents and shut off. Moving further upstream, the next group of units can have a 7-10 minute delay...and so on. The size of each group usually depends on the size of the total project. There is no set method to determine the size of the group or the duration of the delay but the delay time should increase as you move away from the discharge point.

If power outages are a frequent occurrence or concern, E/One recommends users select the Sentry Protect Plus alarm panel so they have the wattage based overpressure protection and can utilize, if they so choose to configure, the power on delay. Regardless, all E/One users will receive the benefits of the resilient nature of the progressive cavity pump design and the unique integrated pump protection features of the E/One motor controller unit.

Hope this helps!

Ben Lewis



525 St. Johns Ave. STE D  
Billings, MT 59102

[blewis@ambienteh2o.com](mailto:blewis@ambienteh2o.com)

Direct: 406-850-0030

Office: 406-969-2022

Fax: 303-380-0664

CONFIDENTIALITY NOTICE: The information contained in this e-mail communication and any attached documentation may be privileged, confidential or otherwise protected from disclosure and is intended only for the use of the designated recipients. It is not intended for transmission to, or receipt by, any unauthorized person. The use, distribution, transmittal or re-transmittal by an unintended recipient of this communication is strictly prohibited without our express approval in writing or by e-mail. If you are not the intended recipient of this e-mail, please delete it from your system without copying it and notify the above sender so that our e-mail address may be corrected. Receipt by anyone other than the intended recipient is not a waiver of any attorney-client or work-product privilege.







2611 Gabel Road  
Billings, MT 59102-7329  
406 245 5499  
KLJENG.COM

August 31, 2022

Kurt Markegard  
Public Works Director  
City of Laurel – Public Works Department  
PO Box 10  
Laurel, Montana 59044

Re: Petition for Variance from City Code for Goldberg Sporting Estates – Low Pressure Sewer System

Dear Mr. Markegard:

The Developer of Goldberg Sporting Estates, First Filing is requesting a Variance from the City of Laurel Standards for the use of a Low-Pressure Sewer System (LPSS) to collect wastewater within the development. As a non-standard collection system this type of system requires approval by City Council prior to acceptance.

The proposed sanitary sewer will have a standard 4-6" sewer service exit the building and discharge into an on-lot sewage collection tank with a sewage pump. This tank/pump station will discharge to a small diameter force main that will eventually discharge into the City gravity sewer collection system. The proposed system would consist of 1.25" discharges from each tank with the primary subdivision internal force main ranging from 2-3" in diameter. Prior to leaving the subdivision the force main will increase to a 4" force main, then flow west along Eleanor Roosevelt Drive for approximately 190', then south in the alley between Locust Ave and Mulberry Ave for approximately 65' where it will discharge into existing MH 333.

The Developer's Design Engineer was requested to analyze the downstream collection system to determine the effects of this subdivision development. The findings of the Design Engineer's Report are the following:

1. The existing 8" sanitary sewer main between MH 332 and MH 335 will be a limiting line and be required to be upsized to a 10" gravity line.
2. The LPSS requires no upgrades to occur at the downstream Elm Lift Station.
3. A traditional gravity collection system or single lift station from Goldberg Sporting Estates to MH 333 would require upgrades to the Elm Lift Station.

As additional benefits to the City of Laurel, the Developer is proposing:

1. Creation of a Homeowner's Association (HOA) to control and maintain the on-lot components through a direct contract with the system supplier.
2. To replace the 8" sewer main between MH 332 and MH 335 with a 10" sewer main.
3. Lands to the east and south along Eleanor Roosevelt Drive were included in the sizing and planning of the proposed LPSS.



4. Force Mains in the Public Right-Of-Way are typically Owned by the City of Laurel, however, Developer is willing to maintain its ownership in the HOA to discharge at MH 333.
5. Installation of the entire force main and collection system to be paid for by the Developer.

There are several items in the City Rules and Regulations Governing Utility Services that contradict the installation of an LPSS. These are items that would either need to be agreed to by the Developer or waived by the City of Laurel. They are:

1. Section 2.11 MISCELLANEOUS DEVICES  
The utility may also require the customer to submit semi-annual test results on such devices certifying that the devices have been checked by an authorized service representative and are in good working order.
2. Section 2.14 LIABILITY OF UTILITY  
The utility is responsible for wastewater facilities up to the service wye or tee. All facilities from the building up to and including the service wye or tee are the responsibility of the property owner. The City of Laurel shall determine whether a line is a service line or a public main if a discrepancy occurs.
3. Section 12.1 DISCHARGING CERTAIN MATTER INTO SEWER PROHIBITED  
Except as hereinafter provided, no person shall discharge or cause to be discharged any of the following described waters or wastes into any public sanitary sewer:  
12.1.9 Any noxious or malodorous gas or substance capable of creating a public nuisance.  
***This LPSS has the potential to create odor problems at downstream facilities as mentioned in the E-One sewer system analysis.***
4. Section 12.5 PRELIMINARY TREATMENT FACILITIES  
The Owner shall provide facilities meeting the requirements set forth in these rules and regulations as his/her own expense where it is necessary, in the opinion of the Public Works Director, to provide preliminary treatment of any water or wastes to:  
12.5.3 Reduce objectionable characteristics or constituents in such water or wastes to with the maximum limits provided by this section.  
***This could include odor elimination practices at the Elm Street Lift Station.***
5. Section 14.6.1.3 APPLICATION REVIEWS AND RECOMMENDATIONS  
Make commitment to construct all the necessary water and/or wastewater system facilities and to begin development of the entire parcel of property to be included in the water and/or wastewater service area within 2 years from the date of the City Council's approval of the enlargement application. In the event the applicant fails to comply with this commitment, the property in question shall automatically be excluded from the service area.  
***Would the two year commitment include the installation of all pump stations?***
6. Section 15.11 OWNERSHIP OF EXTENSIONS  
The ownership of all extensions of the municipal water and/or wastewater system constructed within the corporate City limits shall be vested in the City whether same are



constructed by special improvement district or by private contract.

An applicant constructing an extension within the corporate City limits by means of a private contract or special improvement district shall be deemed to have conveyed the ownership of such an extension to the City upon acceptance of the extension by the City. In addition, the City shall at that time have assumed complete control over the facilities so extended, including the right to connect additional customers to the extended facilities as well as the right to further extend said facilities.

***The City will have to agree to waive the ownership of the force main to MH 333 or agree to operate and maintain the force mains within the subdivision.***

7. Section 15.12 MAINTENANCE OF EXTENSIONS

The City shall be responsible for the maintenance of extensions only when the ownership and control of said extensions are vested in the City. The responsibility for installation, operation, maintenance, repair, enlargement, or replacement of facilities that are privately owned and/or controlled by persons other than the City shall rest solely with the owners of facilities.

8. Section 15.19 SUBDIVISION EXTENSIONS OF WATER SUPPLY/WASTEWATER FACILITIES

All public water supply, necessary off-site public water and sewer mains, and wastewater system facilities required to serve a subdivision, including connecting and cross-tie water mains, as well as the water and sewer mains in, to, around, and through said subdivision, shall be installed by and at the expense of the applicants requesting an extension of the municipal water supply and wastewater system to serve the subdivision in question. Said applicants shall also extend the municipal water supply and wastewater system to the farthest point or points of their subdivision at their expense.

9. Section 15.33 MINIMUM CAPACITY, SIZE, ARRANGEMENT, AND SPACING CRITERIA FOR WASTEWATER SYSTEMS

15.33.5 Arrangement of Sewers. Public sanitary sewers shall be arranged in such a manner and in such a way so as to serve by gravity flow the total tributary area of the wastewater extension project in question. The use of wastewater pumping stations to provide wastewater service for said area, or portions thereof, shall be avoided whenever it can be feasibly accomplished.

15.33.11 Wastewater Pumping Stations and Force Mains. Wastewater pumping stations and force mains installed during the construction of wastewater extensions shall be as specified by the City.

The following are items that in contrast with the Standards for Public Works Improvements:

1. Section 5 MEETING REGIONAL NEEDS

5.1 All public improvements shall be designed as a logical part of the development of the surrounding area. Storm sewer and sanitary sewer shall be sized to accommodate the entire drainage basin which they will ultimately serve. Water mains shall be designed to provide distribution and looping to adjoining systems.



Arterial streets will be developed to the extra width for "Streets". Utilities and street improvements will be extended to the boundaries of the development for future extensions to adjoining areas. The Public Utilities Director (PUD) may require oversizing of utility lines to accommodate future growth of the City.

5.2 Where existing City utility lines do not adjoin the proposed development, the developer will be required to extend the lines to the development as necessary. Where the existing roadway improvements do not extend to the proposed developments, the developer may be required to improve the roadway to the development. Except as provided below, these extension will be at no cost to the City.

2. Chapter 6. Section 29.3 Design Standards for Pump Stations for Alternative Collection Systems. The minimum pipe diameter for force mains shall be 1.5 inches.

The following items are issues that the MT Department of Environmental Quality may require as part of their review and approval process.

- MDEQ may require a plan from the City to increase the size of the gravity sewer system from MH 332 to the Elm Lift Station
- The Elm lift station currently has odor issues. The use of an LPSS may increase the odor issue.

The Council has three options for a response to the Developer on this variance request.

1. They can deny the request to install a low pressure sewer system.
2. They can approve the request to install the low pressure sewer system as planned.
3. Or, They can conditionally approve the installation of a low pressure sewer system.

If the Council wishes to conditionally approve the low pressure sewer system; we recommend the following conditions.

- The company contracted to inspect the collection/pumping units perform their analysis on a semi-annual basis and the HOA provide copies of those reports to the City.
- The Developer install facilities at the force main discharge point to minimize the odor problems that are expected to occur there.
- The City take Ownership of the sewer force mains within the ROW. Individual properties will own the service up to the wye or tee connection in the street.
- As part of the sewer force main installation in the ROW, the Developer shall install tracer wire and access points for connection.
- Establish an SID on the lots within the subdivision to pay for capital improvements to cover force main maintenance.
- Developer provide an extension down Eleanor Roosevelt Dr for potential connection by all lots included in the sewer impact analysis.



- Developer be required to upsize the direct sewer line from MH 332 to the Elm Street Lift Station connection with a 10" PVC line.

If there are any questions, please feel free to give me a call at 406.245.5499.

Sincerely,

KLJ

A handwritten signature in black ink, appearing to read 'Ryan E. Welsh', written in a cursive style.

Ryan E. Welsh, P.E.  
Project Engineer