CONCEPTUAL WASTEWATER IMPACT DEMAND ANALYSIS

FARRO FIRST ADDITION
LOVELAND, COLORADO

May 23, 2025

AVANT CIVIL GROUP

970.286.7995

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FORT COLLINS, CO 80525

May 23, 2025

City of Loveland
Water and Power Department
200 N. Wilson Ave.
Loveland, Colorado 80537

RE: CONCEPTUAL WASTEWATER IMPACT DEMAND ANALYSIS FOR FARRO FIRST ADDITION
AVANT PROJECT NUMBER: 2312

Dear Staff:

Avant Civil Group is pleased to submit this Conceptual Wastewater Impact Demand Analysis for the proposed Farro First Addition project. This report accompanies the annexation/PUD/comprehensive plan submittal for this project.

This report has been prepared in accordance with City of Loveland Water and Wastewater Development Standards (WWDS) and serves to document the impacts associated with the proposed Farro development. We understand that review by the City is to assure general compliance with standard criteria presented in the WWDS.

If you have any questions as you review this report, please feel free to contact us.

Sincerely,

AVANT CIVIL GROUP

Austin Snow, PE

Project Engineer

Contents

General Location & Description

The Farro project site is located in the vicinity of north-central Loveland. The project site is bordered to the north by private undeveloped land and E 71st Street (CR 30), to the east by undeveloped land and N CR 13, to the south by private land and the Horseshoe View Estates neighborhood, and to the west by the proposed Farro development. The proposed development includes a maximum of approximately 320 single-family units acress 61.4 acres, for a density of approximately 5.21 units/acre. The project site is presented in Figure 1, below:

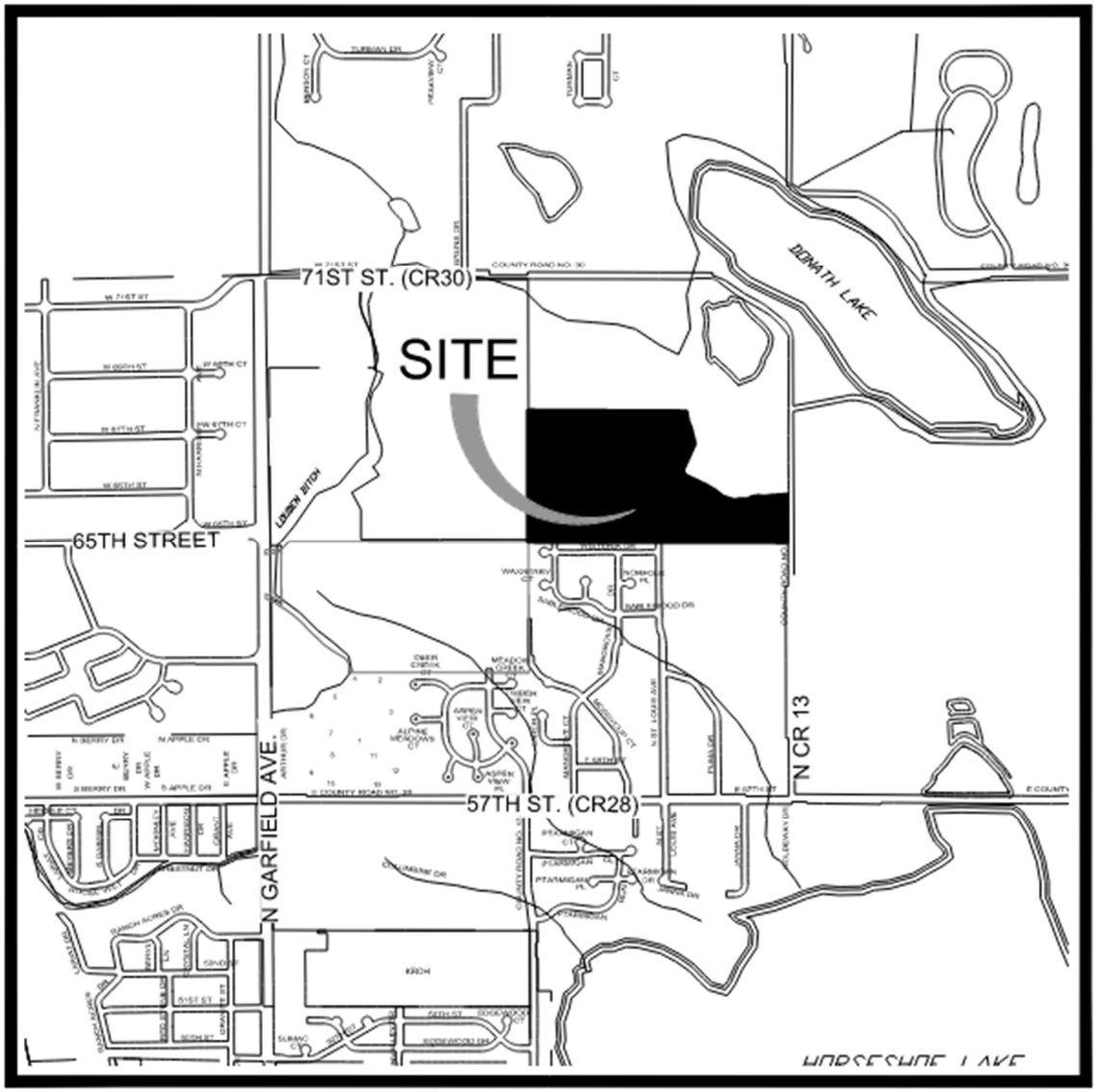


Figure 1 - Project Location

Design Scope

This preliminary analysis has been prepared for the Farro development and is intended to document the methodologies and assumptions that will be used in the sanitary network design, as well as the projected loading from the development to be used in dynamic modeling and the planning of capital projects. The report addresses the following:

- Sanitary System Design Criteria
- Existing Sanitary Infrastructure and Proposed Sanitary Network
- Projected Sanitary Loading

Sanitary Sewer Collection System

Existing Conditions

While the neighborhood's wastewater network has not been laid out yet, the development is slated to connect to existing sanitary infrastructure near the intersection of N. Saint Louis Avenue and Puma Drive, approximately 1350-feet south of the property boundary. The existing infrastructure within N. Saint Louis Ave. consists of 8" clay piping. Utility easements lie between the southern property boundary and the connection point. The connection point is presented in an attachment to this report which shows existing City sanitary infrastructure in the area.

A possible secondary connection point lies at the north terminus Sablewood Drive, where the street is likely to connect to the Farro development. This point is a high point across the property, though, so will likely not be utilized unless design constraints force a change in the concept.

Further, another secondary or tertiary connection point lies within N. Saint Louis Avenue, just south of the intersection with Wisteria Drive. This is newer infrastructure; however, it would be a redundant connection to the main connection point described above, and would add loading to the Horseshoe View Estates sewer infrastructure that could be otherwise routed around the neighborhood.

Wastewater Design Criteria & Assumptions

The sanitary network will be designed to conform with Chapter 5 of the City of Loveland WWDS. The network design will feature, in general, 8" (and possibly 12") PVC mains throughout, as is standard for developments of this size. Demand includes typical single family Average Daily Flow (ADF) of 200 gpd/unit (160 gpd/unit for multifamily), and a Peak Design Flow (PDF) of ADF * PF + I/I, where PF is a peaking factor based on population, and the I/I is an infiltration and inflow allowance. These demand numbers have been taken direction from Section 5.2 of the City's WWDS.

Demands

Projected demands are presented in Table 1, on the following page:

Table 1 - Projected Sanitary Demands from the Farro Development

Maximum Number of Dwelling Units (DUs)	Maximum Number of Users	Average Day Demand Per DU (ADF) (gpd)	Total ADF (gpd)	Peaking Factor (PF) = $1+(14/(4+P^5))$	I/I Allowance (gpd) (0.1 * ADF)	PDF = PF * ADF + I/I (gpd)
320	800	200	64,000	1.43	6,400	98,176

Previous Studies/Reports

The property lies within the Old Boyd Sanitary Sewer Basin, as outlined in the 2010 Loveland Wastewater Utility Plan. Further, the South Horseshoe Lift Station Expansion Project Engineering Report, completed (by Stantec) in 2012, outlines anticipated flows to the South Horseshoe Lift Station (via the North Horseshoe Lift Station) from the property. The site is part of Basin N525A as described in the Stantec report; a portion (roughly ½) of the basin lies in the proposed Sugar Creek development. Therefore, the projections presented herein are compared against ½ of the loading assuming from basin N525A in the Stantec report. It should be noted that the Stantec Report assumes a higher loading per unit – 80 gppd, 3.5 persons per lot, or 280 gpd per lot/unit, as well as a different peaking factor equation (resulting in a significantly higher peaking factor) than what is presented in the current City design standards. Further, the Stantec report assumes 362 units in total across Basin N525A; in reality, ½ of the basin contains 370 single family units that are part of the Sugar Creek development; however, flows from the Sugar Creek development are conveyed directly to the South Horseshoe Lift Station.

The Stantec report lists a total peak flow of 358 gpm and 0.515 MGD from ½ of basin N525A. As mentioned above, the projected loading from Farro will be compared against ½ these totals, or 179 gpm/0.258 MGD.

Further, the area is described in the City's Wastewater Master Plan Update, completed in 2021 by HDR. The HDR report shows the area encompassed by basins named "Sablewood Drive" and "North Saint Louis Street". The report allocates a peak flow from both basins of 19 gpm and 133 gpm, respectively, for a total peak flow of 152 gpm.

Results

As shown in the Demands section above, the Farro development is projected to add approximately 64K gpd/0.064 MGD (65,400 gpd including I/I) average daily flow to the loading of immediate downstream infrastructure. This loading peaks to just over 98K gpd/0.098 MGD when incorporating a peaking factor. These flow rates convert to approximately 45.4 and 68 gallons per minute, respectively. See Table 2, below:

Table 2 - Comparison of Peak Flow

Peak Daily Flow (inc. I/I)	*Units*	*GPM*	*MGD*
2012 Stantec Report (1/2 of basin N525A)	181	179	0.258
Projected Farro Loading	320	68	0.098

Conclusions

The sanitary network loading calculations have been provided in this preliminary report, and both will be designed to comply with criteria and specifications that are described in the City of Loveland's WWDS.

The projected loading presented herein can be used by the City for master planning and capital project planning and will be the basis for additional planning of the proposed Farro development as the project progresses.

If you have any questions, please feel free to contact me at your earliest convenience.

Sincerely,

AVANT CIVIL GROUP, LLC.

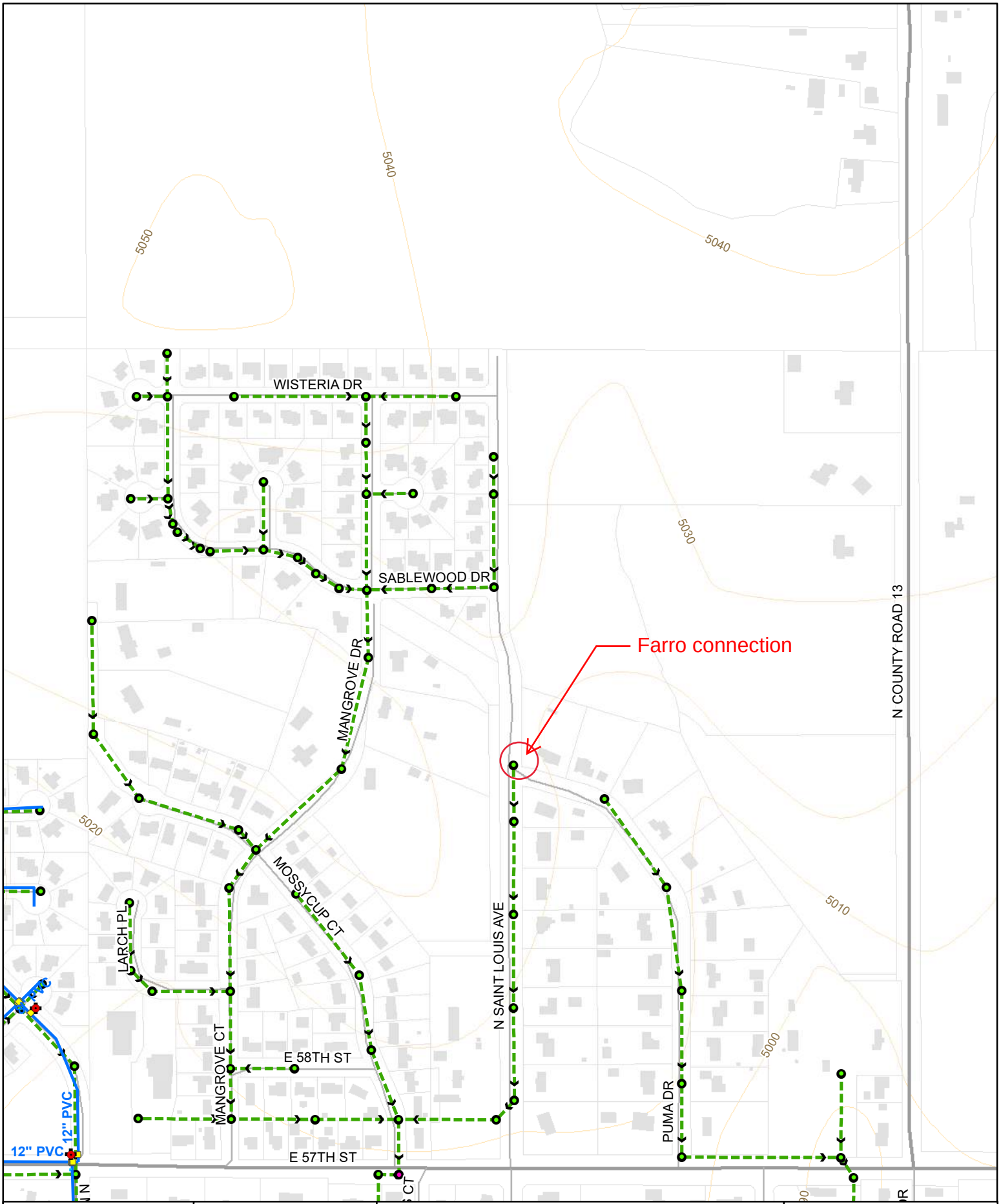
AUSTIN SNOW, PE
Project Engineer

asnow@avantcivilgroup.com

970.286.7995

References

1. Water and Wastewater Development Standards. Loveland Water and Power, 2024 Edition. June 1, 2024.
2. 2021 City of Loveland Wastewater Master Plan. Loveland Water and Power, 2021.
3. South Horseshoe Lift Station Expansion Project Engineering Report. Stantec, 2012.



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N

1 inch = 400 feet

0 220 440 Feet

City of Loveland

City of Loveland

Department of Water & Power

Loveland, Colorado

Utility Map

Created By: gisview

Date Created: 8/19/2020

Pages from South Horseshoe Lift Station Expansion Project Report

Stantec, 2012

Figure 2 SHLS & NHLS Ultimate Build-Out Service Areas

Table D1 North and South Horseshoe Basin Flow Estimates

Current Flow

Parcel ID	Basin	ID # Planning Area	State	Use	Dwelling Units (SF)	Acres (Ac)	fut dev %	Units EX	Units Future	Units Total	Count res	Count emp	GPD/ RES	GPD/ EMP	Res + Emp Avg Daily Flow (MGD)	Inflow and Infiltration Rate (GPD/popk)	Inflow and Infiltration Total I/I (MGD)	Avg San+I/I (MGD)	Domestic Wastewater Equiv Pop	Domestic Wastewater Peaking Factor	Domestic Wastewater Peak Flow (MGD)	Total Peak Flow (GPM)	Total Peak Flow (MGD)
EN504A	North	504	Existing	R-LDR	135634	3.1	100%	10		10	35		80		0.003	50	0.002	0.005	35	5.34	0.015	12	0.017
EN505A	North	505	Existing	R-LDR	3883509	89.2	100%	135		135	473		80		0.038	50	0.024	0.061	473	4.82	0.182	143	0.206
EN526E	North	526	Existing	R-LDR	5166287	118.6	100%	206		206	721		80		0.058	50	0.036	0.094	721	4.68	0.270	212	0.306
	North Total									351	1229				0.098		0.061	0.160	1229	4.47	0.440	348	0.501
ES504B	South	504	Existing	R-LDR			100%	104		104	364		80		0.029	50	0.018	0.047	364	4.90	0.143	112	0.161
ES486	South	509	Existing	R-LDR			100%	661		661	2314		80		0.185	50	0.116	0.301	2314	4.19	0.775	618	0.891
ES526A	South	510	Existing	R-LDR			100%	218		218	763		80		0.061	50	0.038	0.099	763	4.66	0.284	224	0.322
ES491	South	511	Existing	R-LDR			100%	356		356	1246		80		0.100	50	0.062	0.162	1246	4.47	0.445	352	0.507
	South Total									1339	4687				0.375		0.234	0.609	4687	3.82	1.434	1158	1.67

Lago Vista Current Flow

ID	Basin	Planning Area	State	Use	Units (SF)	Acres (Ac)	fut dev %	Units EX	Units Future	Units Total	Count res	Count emp	GPD/ RES	GPD/ EMP	Res + Emp Avg Daily Flow (MGD)	Inflow and Infiltration Rate (GPD/popk)	Inflow and Infiltration Total I/I (MGD)	Avg San+I/I (MGD)	Domestic Wastewater Equiv Pop	Domestic Wastewater Peaking Factor	Domestic Wastewater Peak Flow (MGD)	Total Peak Flow (GPM)	Total Peak Flow (MGD)
ES485A	South	485	Existing	R-HDR			100%	300		300	1050		80		0.084	50	0.053	0.137	1050	4.54	0.381	301	0.434
	Total									300	1050				0.084		0.053	0.137	1050	4.54	0.381	301	0.43

Future Build-Out flow

ID	Basin	Planning Area	State	Use	Units (SF)	Acres (Ac)	fut dev %	Units EX	Units Future	Units Total	Count res	Count emp	GPD/ RES	GPD/ EMP	Res + Emp Avg Daily Flow (MGD)	Inflow and Infiltration Rate (GPD/popk)	Inflow and Infiltration Total I/I (MGD)	Avg San+I/I (MGD)	Domestic Wastewater Equiv Pop	Domestic Wastewater Peaking Factor	Domestic Wastewater Peak Flow (MGD)	Total Peak Flow (GPM)	Total Peak Flow (MGD)
N505B	North	505	Future	R-LDR	311835	7.2	100%		13	13	44		80		0.004	50	0.002	0.006	44	5.31	0.019	14	0.021
N506A	North	506	Future	R-LDR	2113099	48.5	100%		85	85	297		80		0.024	50	0.015	0.039	297	4.96	0.118	92	0.133
N507A	North	507	Future	R-LDR	3413110	78.4	100%		137	137	480		80		0.038	50	0.024	0.062	480	4.82	0.185	145	0.209
N526D	North	526	Future	R-LDR	1846510	42.4	100%		74	74	260		80		0.021	50	0.013	0.034	260	4.99	0.104	81	0.117
N526F	North	526	Future	R-LDR	1962448	45.1	100%		79	79	276		80		0.022	50	0.014	0.036	276	4.97	0.110	86	0.124
N525A	North	525	Future	R-LDR	9001293	206.6	100%		362	362	1266		80		0.101	50	0.063	0.165	1266	4.46	0.452	358	0.515
N525B	North	525	Future	C-CC		0.0	100%		37	37		333		35	0.012	50	0.007	0.019	145	5.12	0.059	46	0.067
	North Total								786	786	2622	333			0.221		0.138	0.360	2767	4.10	0.907	726	1.05
S486	South	486	Future	R-LDR	214847.0	4.9	100%		14	14	49		80		0.004	50	0.002	0.006	49	5.30	0.021	16	0.023
S486A	South	486	Future	C-CC	203461.0	4.7	100%		14	14		126		35	0.004	50	0.003	0.007	55	5.28	0.023	18	0.026
S486B	South	486	Future	C-CC	130680.0	3.0	100%		9	9		81		35	0.003	50	0.002	0.005	35	5.34	0.015	12	0.017
S486C	South	486	Future	C-CC	87120.0	2.0	100%		6	6		54		35	0.002	50	0.001	0.003	23	5.38	0.010	8	0.011
S500A	South	500	Future	R-LDR	636002.0	14.6	100%		44	44	153		80		0.012	50	0.008	0.020	153	5.11	0.063	49	0.070
S500B	South	500	Future	R-LDR	1328750.0	30.5	100%		92	92	320		80		0.026	50	0.016	0.042	320	4.94	0.126	99	0.142
S504A	South	504	Future	R-LDR	1184396.0	27.2	100%		82	82	285		80		0.023	50	0.014	0.037	285	4.97	0.113	89	0.128
S515A	South	515	Future	R-LDR	946893.0	21.7	100%		65	65	228		80		0.018	50	0.011	0.030	228	5.02	0.092	72	0.103
S526B	South	526	Future	C-CC	304920.0	7.0	100%		12	12		110		35	0.004	50	0.002	0.006	48	5.30	0.020	16	0.023
S526C	South	526	Future	R-HDR	1089000.0	25.0	100%		44	44	153		80		0.012	50	0.008	0.020	153	5.11	0.063	49	0.070
S526D	South	526	Future	R-HDR	270000.0	6.2	100%		50	50	174		80		0.014	50	0.009	0.023	174	5.09	0.071	55	0.079
	South Total								431	431	1363	371			0.122		0.076	0.198	1525	4.38	0.534	424	0.61
	Grand Total									1217	3985	704			0.343	50	0.215	0.558	4292	3.87	1.33	1072	1.54

Ultimate Build-Out Flows

	Count res	Count emp	GPD/ RES	GPD/ EMP	Res + Emp Avg Daily Flow (MGD)	Inflow and Infiltration Rate (GPD/popk)	Inflow and Infiltration Total I/I (MGD)	Avg San+I/I (MGD)	Domestic Wastewater Equiv Pop	Domestic Wastewater Peaking Factor	Domestic Wastewater Peak Flow (MGD)	Total Peak Flow (GPM)	Total Peak Flow (MGD)
North	3851	333			0.320	50	0.200	0.519	3996	3.91	1.25	1074	1.45
South	6050	371			0.497	50	0.311	0.807	6211	3.67	1.82	1582	2.13
Lago Vista	1050				0.084	50	0.053	0.137	1050	4.54	0.38	301	0.43
Total (Based on Attenuated Flow)	10950	704			0.90		0.56	1.46	11257	3.33	3.00	2473	3.56

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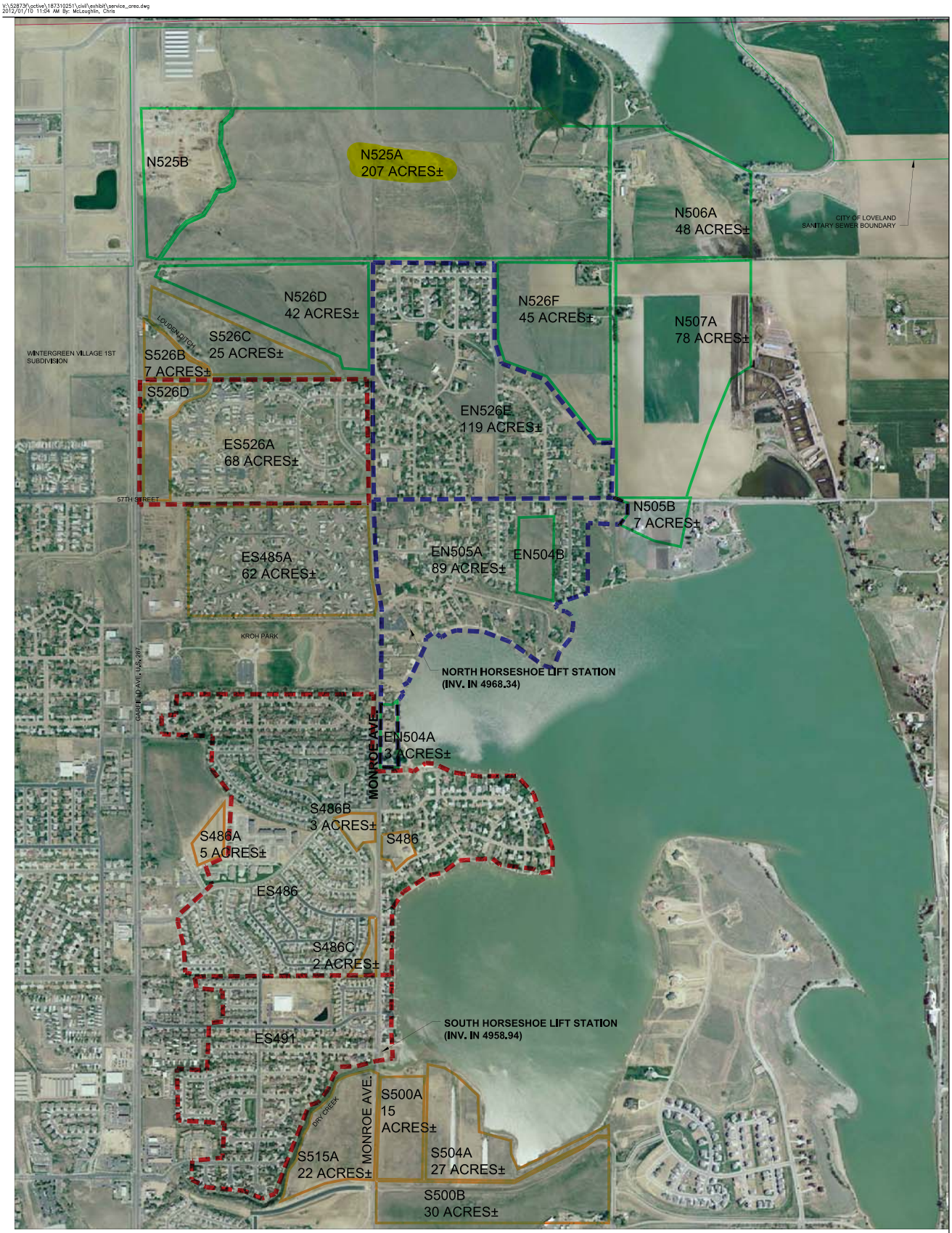

NORTH HORSESHOE LIFT STATION CURRENT SERVICE AREA

NEW PARCELS ADDED TO NORTH HORSESHOE SERVICE AREA

SOUTH HORSESHOE LIFT STATION CURRENT SERVICE AREA

NEW PARCELS ADDED TO SOUTH HORSESHOE SERVICE AREA

0 500 1000 1500

SCALE IN FEET

N

Perm/Seal

NOT FOR CONSTRUCTION

Client/Project
CITY OF LOVELAND

SOUTH HORSESHOE LIFT STATION

Loveland, CO

Title
SOUTH HORSESHOE LIFT STATION AND
NORTH HORSESHOE LIFT STATION SERVICE AREAS

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

Project Number: 187310253
File Name: service_area

Drawing No. EXHIBIT
Sheet 1 of 1
Revision 0

	Dsn.	Dwn.	Chkd.	Dept.
	CAM	DPS		YY.MM.DD
				2012.01.03

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Pages from City of Loveland Wastewater Master Plan Update

HDR, 2021

Allocation Area	Extension Vs. Existing System	Development Area (acres)	Total ADWF Projection (gpm)	Total Infiltration (gpm)	Peaking Factor	Preliminary PHWWF (gpm)
Mountain Pacific - R3	Existing	35	38	4	4	157
Mountain Pacific - S	Existing	85	24	9	4	103
North Saint Luis St	Existing	109	30	12	4	133
Ptarmigan Run	Existing	10	4	1	4	17
Sablewood Dr	Existing	16	4	2	4	19
Currently Developed - Not Allocated to System	Existing	194				
Park/Open Space	Existing	187				
Total		**956**	**297**	**61**		

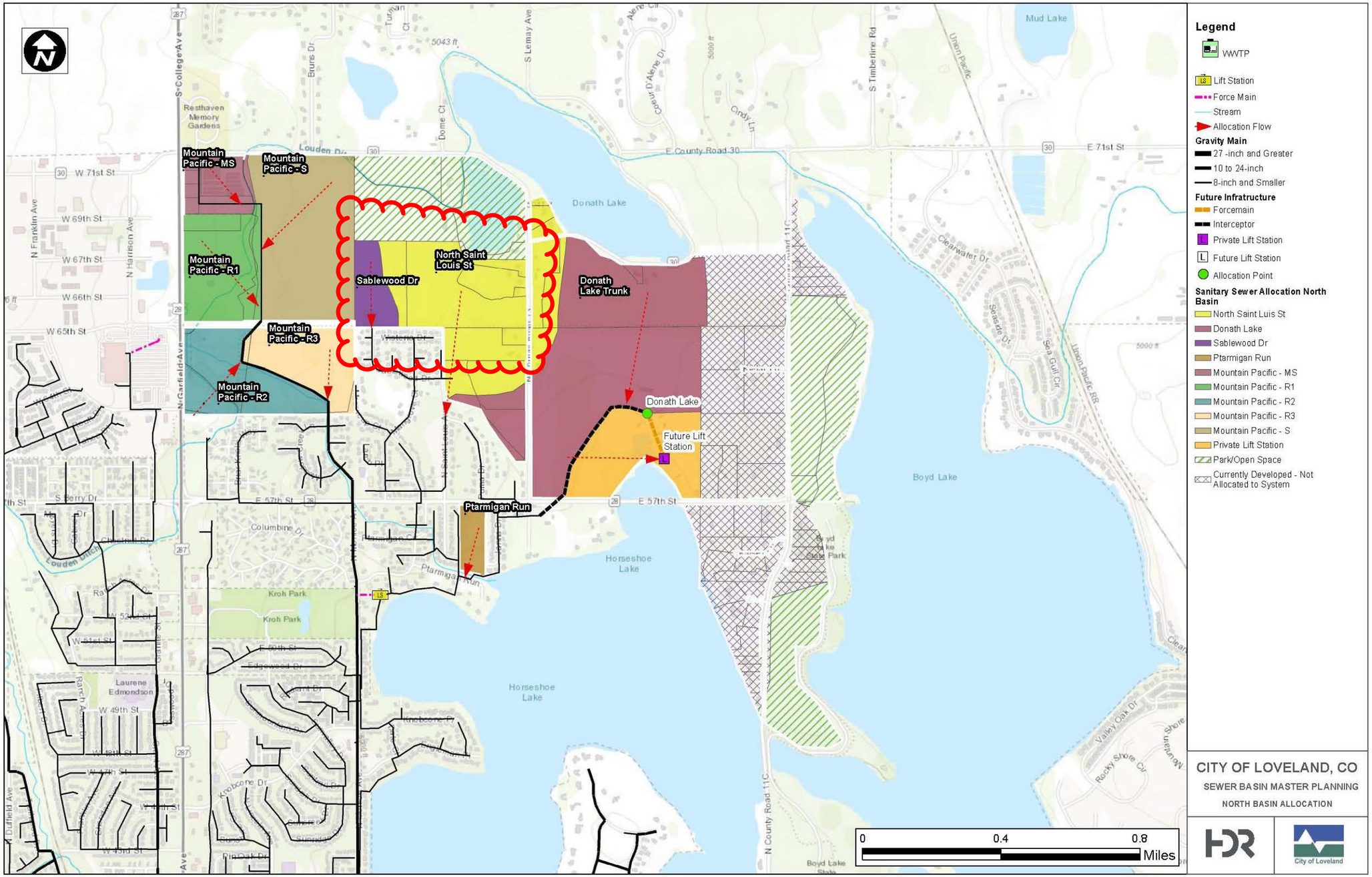

Figure 3-5: North Basin Allocation