

Hallmark-Barham Specific Plan EIR
Technical Appendices

Appendix N.1
VWD Water/Sewer Study

VALLECITOS WATER DISTRICT
HALLMARK-BARHAM WATER AND SEWER STUDY
WORK ORDER # 234061

FINAL TECHNICAL MEMORANDUM

October 23, 2020

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INTRODUCTION

The proposed Hallmark-Barham Development (Project) is a 151-unit multi-family residential development located on 10 acres on Barham Drive between Woodland Parkway and La Moree Road in the City of San Marcos (APN 228-310-01).

The Project property is located outside of the Vallecitos Water District (VWD) boundary. The Project is within the Rincon Del Diablo Water District.

The Project property is located in VWD's Sewer Improvement District "A" for sewer service only. Sewer service is proposed to be provided by VWD.

All new projects undergo evaluation by VWD to determine if the current water and sewer infrastructure is sufficient to accommodate the proposed water demands and sewage generation.

This study projects water demand and sewage generation increases due to the Project densification. It analyzes the following aspects of VWD's infrastructure and makes recommendations for capital improvements for impacts that are created due to the land use change:

- Water distribution system, including the need to upsize pipelines, install new pipelines, or install flow control facilities
- Water storage, including the need for additional storage and the adequacy of existing storage tanks and reservoirs to serve the proposed development
- Water pump stations, including the need to install new pump stations or upsize existing pump stations to serve the proposed development
- Wastewater collection system, including the need to upsize pipelines and manholes, or the need to install new pipelines and manholes
- Wastewater lift stations, including the need to install new lift stations or upsize existing lift stations to serve the proposed development
- Wastewater land outfall, including the need to construct a parallel land outfall to serve this and other proposed developments
- Wastewater treatment facilities, including the need for obtaining additional capacity at the Encina Water Pollution Control Facility (EWPCF) or for expanding the Meadowlark Water Reclamation Facility (MRF)

WATER SYSTEM ANALYSIS

Since the Project is within the Rincon Del Diablo Water District, VWD will not evaluate the water systems in this study.

WASTEWATER SYSTEM ANALYSIS

The proposed 10-acre Project lies completely within VWD sewer shed 26C. Figures 1 through 5 show the development’s location in relation to sewer shed boundaries, identify wastewater infrastructure within the vicinity of the development, and identify the downstream collection infrastructure that will be impacted by the development.

Wastewater Flow Projections

The Project property’s City of San Marcos 2008 General Plan land use designation was Low Density Residential (Residential 4-8 du/ac). VWD’s 2018 Master Plan based its ultimate wastewater generation planning on this approved land use. The Project is proposing a density increase with the proposed 151 multi-family residential units (Residential 15-20 du/ac).

Table 1 provides the average wastewater flow generated both under the density planned for in the 2018 Master Plan and with the proposed Project. The table shows that the Project will increase the projected average wastewater generation by 20,000 gallons per day.

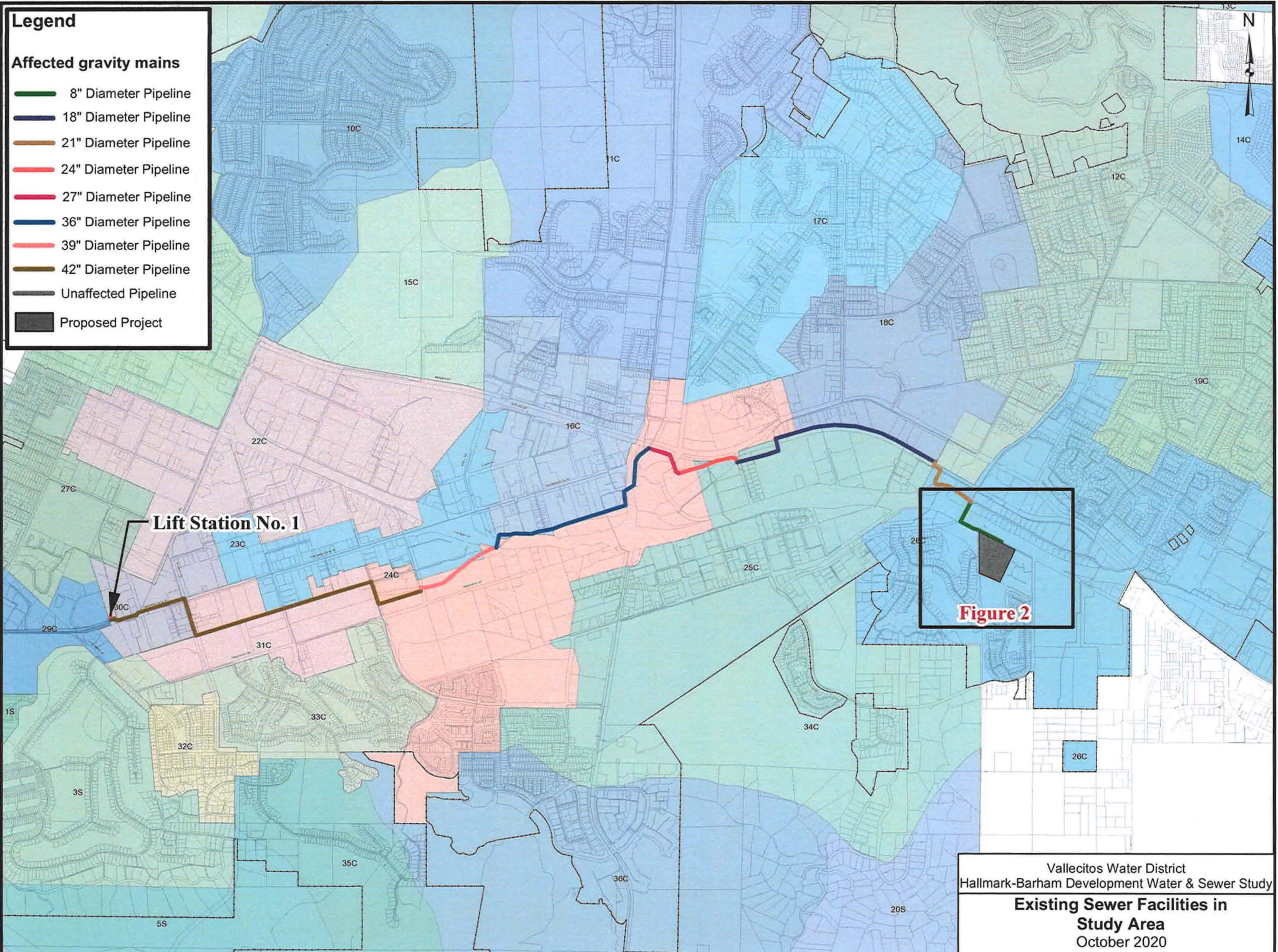
Table 1 – Project Estimated Wastewater Flows

Land Use Type	Area (acres)	Duty Factor (gpd/acre)	Water Demand (gpd)
2018 Master Plan Land Use Flows			
Residential (4-8 du/ac)	10.00	1,300	13,000
Total	10.00		13,000
Proposed Project Demand			
Residential (15-20 du/ac)	10.00	3,300	33,000
Total	10.00		33,000
Sewer Generation Increase			20,000

Legend

Affected gravity mains

- 8" Diameter Pipeline
- 18" Diameter Pipeline
- 21" Diameter Pipeline
- 24" Diameter Pipeline
- 27" Diameter Pipeline
- 36" Diameter Pipeline
- 39" Diameter Pipeline
- 42" Diameter Pipeline
- Unaffected Pipeline
- Proposed Project

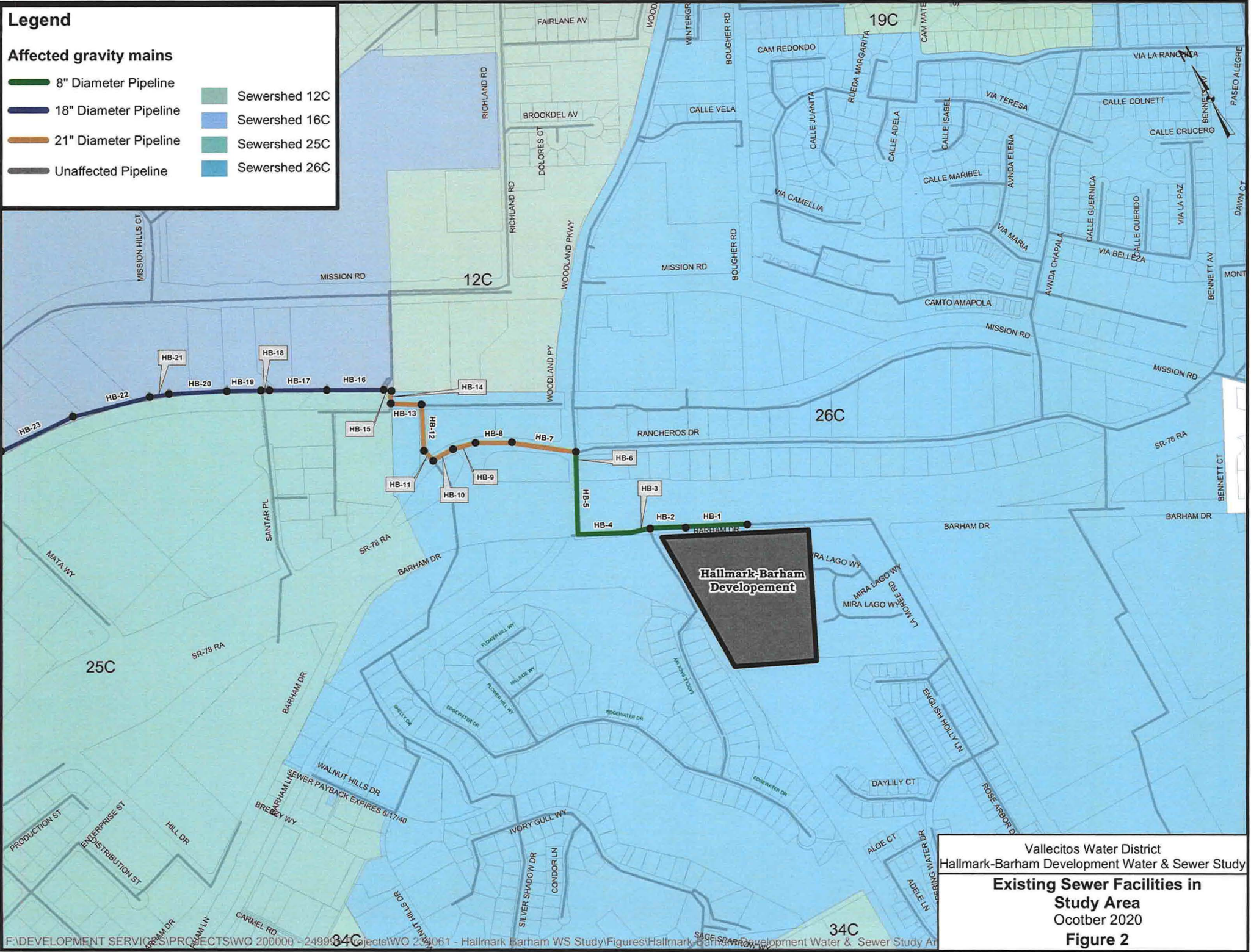


Vallecitos Water District
Hallmark-Barham Development Water & Sewer Study
**Existing Sewer Facilities in
Study Area**
October 2020
Figure 1

Legend

Affected gravity mains

- 8" Diameter Pipeline
- 18" Diameter Pipeline
- 21" Diameter Pipeline
- Unaffected Pipeline
- Sewershed 12C
- Sewershed 16C
- Sewershed 25C
- Sewershed 26C

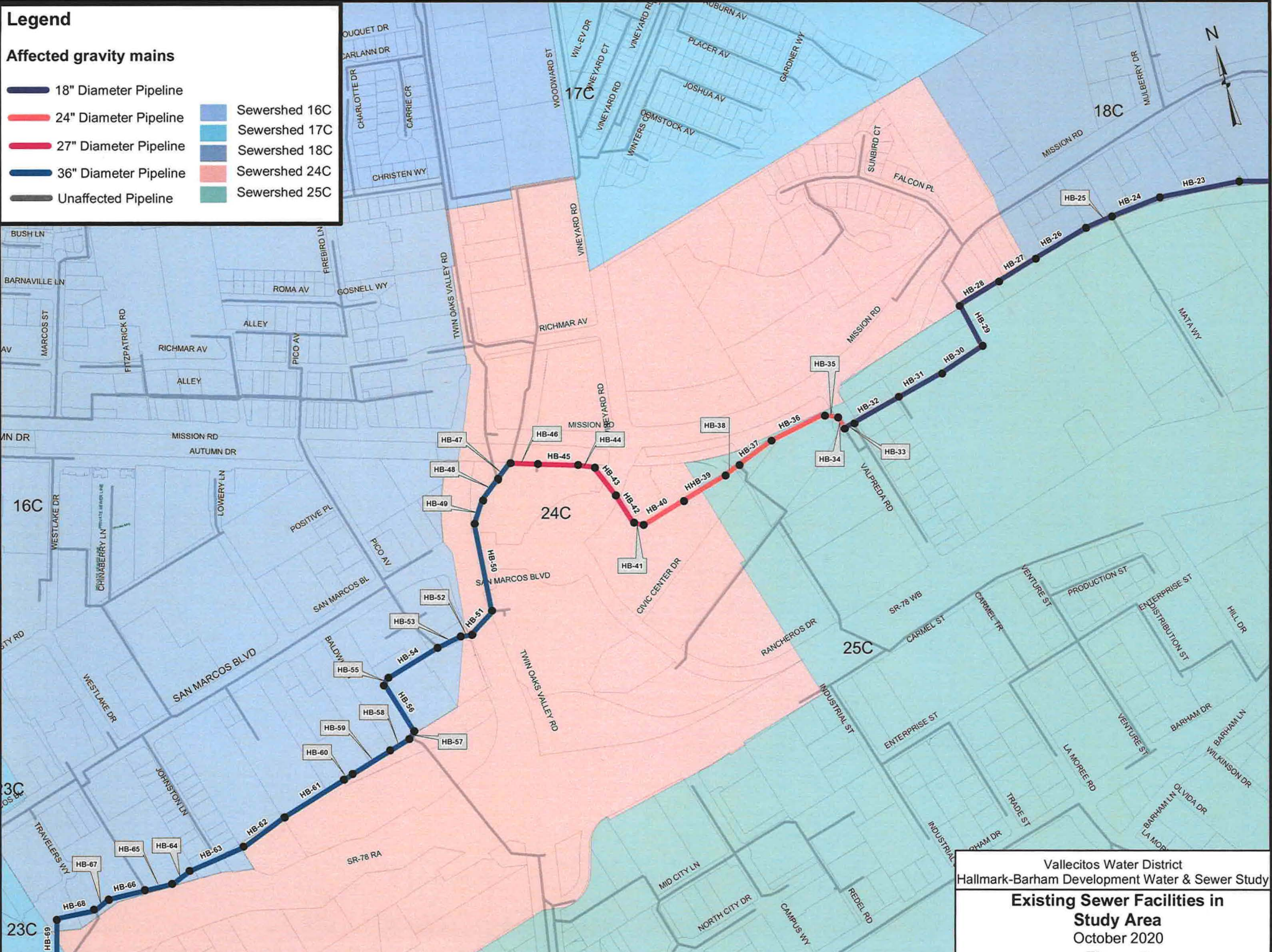


Vallecitos Water District
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Existing Sewer Facilities in Study Area
 October 2020
Figure 2

Legend

Affected gravity mains


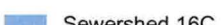



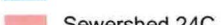

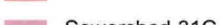
- 18" Diameter Pipeline
 - 24" Diameter Pipeline
 - 27" Diameter Pipeline
 - 36" Diameter Pipeline
 - Unaffected Pipeline
- Sewershed 16C
 - Sewershed 17C
 - Sewershed 18C
 - Sewershed 24C
 - Sewershed 25C

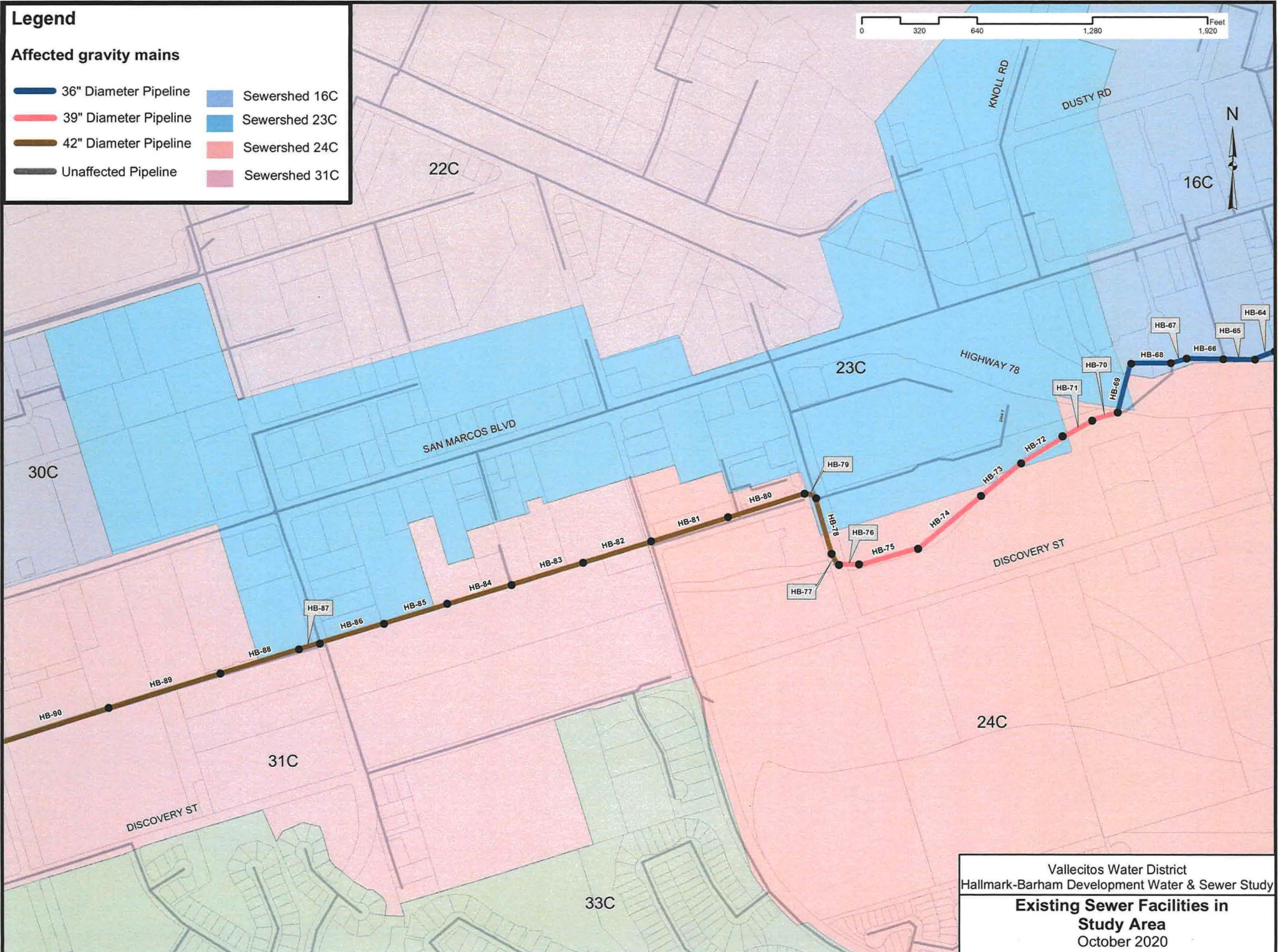


Vallecitos Water District
 Hallmark-Barham Development Water & Sewer Study
**Existing Sewer Facilities in
 Study Area**
 October 2020
Figure 3

Legend

Affected gravity mains


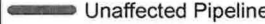
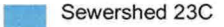



- | | | | |
|--|-----------------------|---|---------------|
|  | 36" Diameter Pipeline |  | Sewershed 16C |
|  | 39" Diameter Pipeline |  | Sewershed 23C |
|  | 42" Diameter Pipeline |  | Sewershed 24C |
|  | Unaffected Pipeline |  | Sewershed 31C |

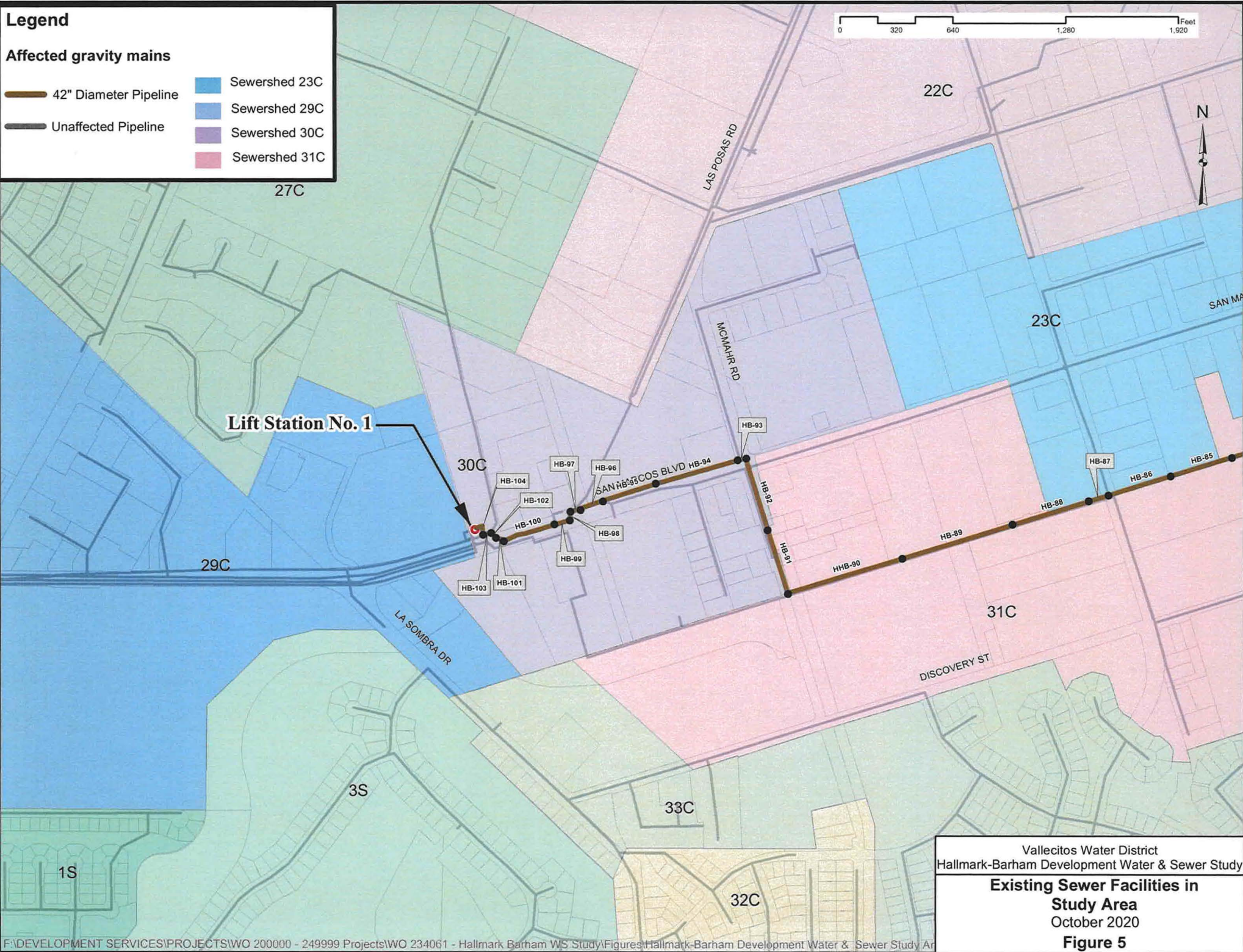


Vallecitos Water District
Hallmark-Barham Development Water & Sewer Study
**Existing Sewer Facilities in
Study Area**
October 2020
Figure 4

Legend

Affected gravity mains

-  42" Diameter Pipeline
-  Unaffected Pipeline
-  Sewershed 23C
-  Sewershed 29C
-  Sewershed 30C
-  Sewershed 31C



Vallecitos Water District
Hallmark-Barham Development Water & Sewer Study
**Existing Sewer Facilities in
Study Area**
October 2020
Figure 5

Wastewater Collection System Analysis

The 2018 Master Plan outlines VWD's wastewater system design criteria which are as follows:

Wastewater Collection Infrastructure Criteria

The wastewater pipeline criteria to be met both within and downstream of the development are as follows:

- Pipes 12 inches in diameter and smaller: ½ full maximum at peak flow
- Pipes over 12 inches in diameter: ¾ full maximum at peak flow
- Minimum velocity: 2 feet per second
- Maximum velocity: 10 feet per second
- Manning's n for gravity pipes: .013
- Hazen-Williams C-factor for force mains/siphons: 120
- Slope for pipes 8 inches in diameter and smaller: 0.4% minimum
- Slope for pipes over 8 inches in diameter: to be determined by VWD

When flow depth in gravity pipes exceeds maximum levels as stated above, a pipe upsize will be specified.

Wastewater Model Scenarios

The following scenarios were modeled to identify system impacts that may be created by the proposed sewer generation, and to recommend any improvements required to provide service to the Project:

- Average Dry Weather Flow with existing flows at the Project site
- Average Dry Weather Flow with the proposed Project
- Peak Dry Weather Flow with existing flows at the Project site
- Peak Dry Weather Flow with the proposed Project
- Peak Wet Weather Flow with existing flows at the Project site
- Peak Wet Weather Flow with the proposed Project

The peak dry weather curve is:

$$\text{Peak Dry Weather Factor} = 2.16 \times (\text{Average Dry Weather Flow Rate})^{-0.1618}$$

The wet weather peak curve is:

$$\text{Peak Wet Weather Factor} = 2.78 \times (\text{Average Dry Weather Flow Rate})^{-0.087}$$

Wastewater Model Results

Modeling focused not only on the sewer collection infrastructure in the direct vicinity of the Project, but also on all downstream infrastructure from the development to Lift Station No. 1 on San Marcos Boulevard that would be impacted by the Project flows (see Figures 1 through 5).

The modeling results showed that there are existing system deficiencies in pipe segments HB-29 through HB-31 under the peak wet weather flows during ultimate build-out conditions as shown in Table 5. The wastewater flow from the proposed Project increases those deficiencies. Table 5 presents a summary of the modeling results from this analysis.

VWD's 2018 Master Plan has identified pipe segments HB-29 through HB-31 for upsizing from 18-inch and 24-inch as CIP #SP-25, a Phase 3 project. Phase 3 projects are planned for construction in the 2026-2030 timeframe.

Master Plan projects address and accommodate the pipeline deficiencies identified herein. Wastewater Capital Facility Fees paid by this Project will be used towards the construction of these pipelines.

Table 2 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Project Site				Wastewater Flows with Proposed Project Development			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
HB-1	248	8	0.036	83	0.20			132	0.25		
HB-2	245	8	0.008	83	0.29			132	0.36		
HB-3	105	8	0.008	103	0.31			152	..39		
HB-4	300	8	0.011	104	0.29			153	0.36		
HB-5	340	8	0.029	111	0.24			160	0.29		
HB-6	94	8	0.064	112	0.20			161	0.24		
HB-7	401	21	0.003	1206	0.39			1255	0.40		
HB-8	150	21	0.004	1210	0.36			1259	0.37		
HB-9	148	21	0.003	1211	0.39			1260	0.40		
HB-10	100	21	0.005	1212	0.34			1261	0.35		
HB-11	79	21	0.004	1343	0.38			1392	0.39		
HB-12	250	21	0.004	1344	0.38			1393	0.39		
HB-13	170	21	0.004	1355	0.38			1404	0.39		
HB-14	112	21	0.006	1366	0.34			1415	0.35		
HB-15	10	18	0.010	1368	0.37			1417	0.38		
HB-16	348	18	0.010	2901	0.57			2950	0.58		
HB-17	335	18	0.010	2910	0.57			2959	0.58		
HB-18	55	18	0.010	2913	0.57			2962	0.58		
HB-19	185	18	0.010	2955	0.58			3004	0.58		
HB-20	340	18	0.011	2958	0.56			3007	0.57		
HB-21	109	18	0.011	2961	0.56			3010	0.57		
HB-22	453	18	0.010	2966	0.58			3015	0.59		
HB-23	446	18	0.011	2985	0.57			3034	0.57		
HB-24	319	18	0.009	2989	0.60			3038	0.61		
HB-25	130	18	0.015	3017	0.52			3066	0.52		
HB-26	330	18	0.010	3019	0.59			3068	0.59		

Table 2 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Project Site				Wastewater Flows with Proposed Project Development			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
HB-27	246	18	0.011	3022	0.57			3071	0.58		
HB-28	256	18	0.008	3026	0.63			3075	0.64		
HB-29	247	18	0.005	3473	0.87	24	0.50	3522	0.89	24	0.50
HB-30	278	18	0.006	3474	0.78	24	0.47	3523	0.79	24	0.47
HB-31	280	18	0.004	3476	>1.0	24	0.53	3525	>1.0	24	0.53
HB-32	280	18	0.014	3507	0.58	24	0.37	3556	0.58	24	0.38
HB-33	30	18	0.147	3526	0.30	24	0.21	3575	0.31	24	0.21
HB-34	104	24	0.010	3530	0.41			3579	0.41		
HB-35	57	24	0.004	3532	0.53			3581	0.54		
HB-36	335	24	0.006	3532	0.47			3581	0.48		
HB-37	197	24	0.006	3547	0.48			3596	0.48		
HB-38	85	24	0.014	3684	0.38			3733	0.39		
HB-39	304	24	0.002	3684	0.69			3733	0.70		
HB-40	292	24	0.003	3684	0.60			3733	0.60		
HB-41	20	27	0.015	3685	0.32			3734	0.32		
HB-42	204	27	0.003	3685	0.50			3734	0.50		
HB-43	200	27	0.002	3711	0.56			3760	0.57		
HB-44	85	27	0.006	3711	0.41			3760	0.41		
HB-45	230	27	0.004	3712	0.46			3761	0.46		
HB-46	170	27	0.006	3721	0.41			3770	0.41		
HB-47	135	36	0.003	6240	0.43			6289	0.43		
HB-48	128	36	0.005	6266	0.38			6315	0.38		
HB-49	140	36	0.007	6267	0.35			6316	0.35		
HB-50	470	36	0.004	6269	0.40			6318	0.40		
HB-51	184	36	0.003	6284	0.43			6333	0.44		
HB-52	36	36	0.004	6286	0.40			6335	0.40		

CIP- 25 = T-29 - 31 Phase 3

Table 2 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at Project				Wastewater Flows with Proposed Project			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
HB-53	146	36	0.004	6286	0.40			6335	0.40		
HB-54	318	36	0.004	6649	0.41			6698	0.42		
HB-55	39	36	0.004	6649	0.41			6698	0.42		
HB-56	319	36	0.004	6650	0.41			6699	0.42		
HB-57	38	36	0.004	6650	0.41			6699	0.42		
HB-58	139	36	0.004	8917	0.49			8966	0.49		
HB-59	294	36	0.004	8919	0.49			8968	0.49		
HB-60	12	36	0.017	8919	0.33			8968	0.33		
HB-61	438	36	0.005	8922	0.46			8971	0.46		
HB-62	229	36	0.005	8924	0.46			8973	0.46		
HB-63	371	36	0.006	8927	0.44			8976	0.44		
HB-64	124	36	0.005	8930	0.46			8979	0.46		
HB-65	167	36	0.005	8932	0.46			8981	0.46		
HB-66	201	36	0.004	9228	0.50			9277	0.50		
HB-67	91	36	0.005	9231	0.47			9280	0.47		
HB-68	220	36	0.005	9234	0.47			9283	0.47		
HB-69	286	36	0.005	9237	0.48			9286	0.47		
HB-70	210	39	0.004	9332	0.44			9381	0.44		
HB-71	176	39	0.003	9334	0.48			9383	0.48		
HB-72	271	39	0.002	9336	0.54			9385	0.54		
HB-73	297	39	0.002	9339	0.54			9388	0.54		
HB-74	452	39	0.002	9341	0.54			9390	0.54		
HB-75	337	39	0.002	9344	0.54			9393	0.54		
HB-76	123	39	0.008	9537	0.37			9586	0.37		
HB-77	58	42	0.004	9539	0.40			9588	0.40		
HB-78	308	42	0.003	9541	0.44			9590	0.44		

Table 2 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at Project				Wastewater Flows with Proposed Project			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
HB-79	69	42	0.001	9544	0.60			9593	0.60		
HB-80	448	42	0.003	9547	0.44			9596	0.44		
HB-81	448	42	0.003	9549	0.44			9598	0.44		
HB-82	404	42	0.006	9903	0.37			9952	0.37		
HB-83	404	42	0.006	9906	0.37			9955	0.37		
HB-84	368	42	0.003	9910	0.45			9959	0.45		
HB-85	368	42	0.003	9913	0.45			9962	0.45		
HB-86	368	42	0.003	9915	0.45			9964	0.45		
HB-87	120	42	0.002	9967	0.50			10016	0.50		
HB-88	457	42	0.004	9969	0.41			10018	0.41		
HB-89	650	42	0.004	9972	0.41			10021	0.41		
HB-90	677	42	0.004	9975	0.41			10024	0.41		
HB-91	373	42	0.004	9981	0.41			10030	0.41		
HB-92	420	42	0.004	9986	0.41			10035	0.41		
HB-93	20	42	0.001	9989	0.62			10038	0.62		
HB-94	486	42	0.004	10014	0.41			10063	0.41		
HB-95	500	42	0.004	10016	0.41			10065	0.41		
HB-96	84	42	0.008	10469	0.35			10518	0.35		
HB-97	20	42	0.013	10471	0.31			10520	0.31		
HB-98	15	42	0.053	14161	0.25			14210	0.25		
HB-99	138	42	0.003	14163	0.55			14212	0.55		
HB-100	347	42	0.002	14172	0.62			14221	0.62		
HB-101	18	42	0.002	14174	0.62			14223	0.62		
HB-102	10	42	0.004	14176	0.50			14225	0.50		
HB-103	10	42	0.010	14370	0.39			14419	0.39		
HB-104	73	42	0.004	14945	0.52			14994	0.52		

Wastewater Lift Station Analysis

Lift stations are sized for peak wet weather flow with manufacturer's recommended cycling times for pumping equipment. Since the proposed Project is not located in a sewer shed that is served by a lift station, there are no lift station upgrade requirements for this project.

Parallel Land Outfall Analysis

VWD's existing land outfall is shown in Figure 6. The outfall is approximately 8 miles in length and consists of 4 gravity pipeline sections and 3 siphon sections varying in diameter from 20 inches to 54 inches. VWD maintains the entire pipeline from Lift Station No. 1 to the Encina Water Pollution Control Facility (EWPCF). From Lift Station No. 1 to El Camino Real, VWD is the sole user of this pipeline. From El Camino Real to the EWPCF, the ownership capacity is as shown in Table 3 below:

Table 3 – Land Outfall Capacity Ownership by Agency

Agency	Ownership Percentage	Capacity (MGD)
Carlsbad	23.98%	5.00
Vista	17.99%	3.75
VWD	58.03%	12.10
Totals	100.00%	20.85

The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

















VWD's 2014 average daily wastewater flow through the land outfall was 7.5 MGD. This corresponds to a peak wet weather flow of 17.5 MGD, which falls within VWD's combined peak wet weather collection capacity.

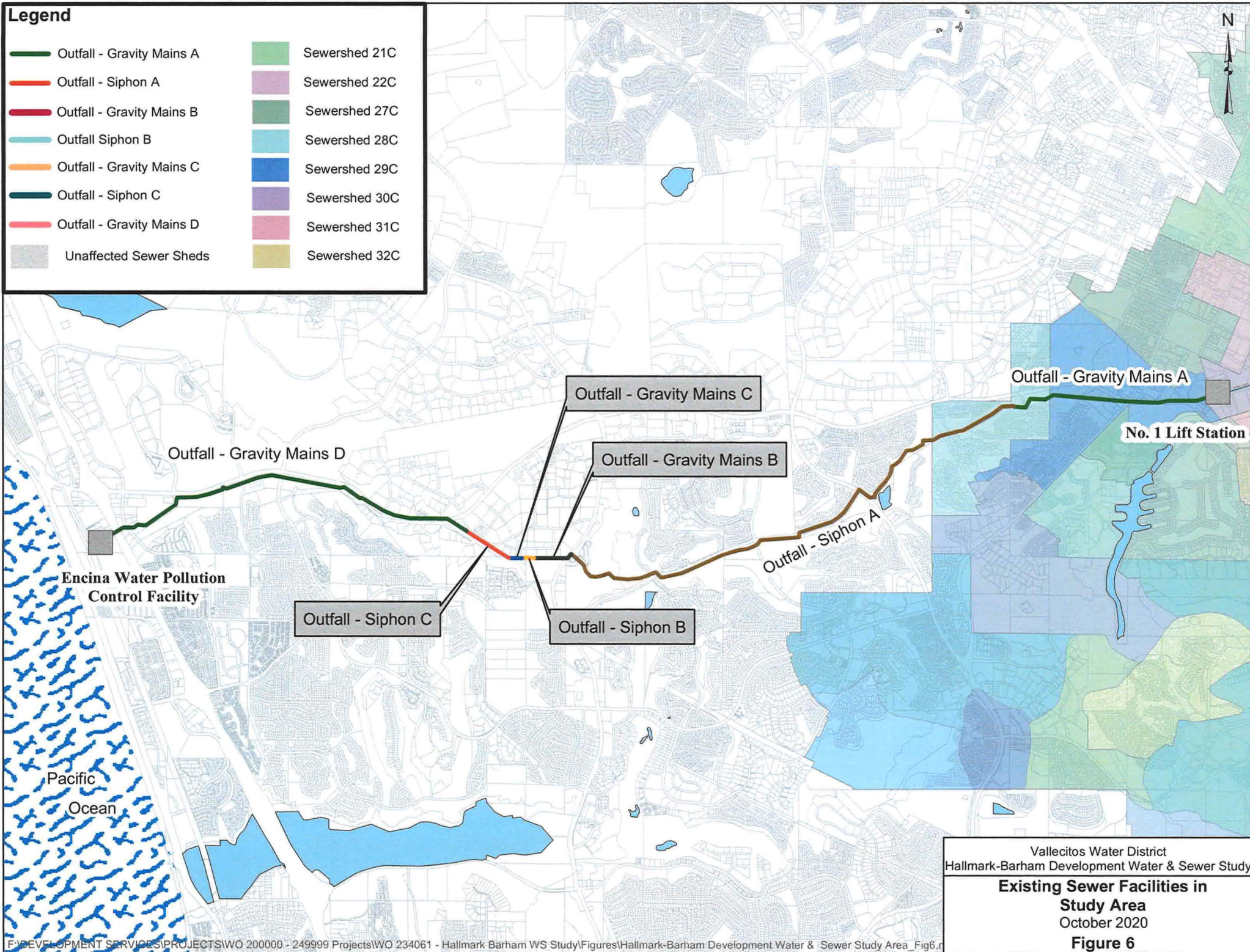
The 2018 Master Plan estimated that, under approved land uses, VWD has an ultimate build-out average dry weather flow of 14.4 MGD. This corresponds to a peak wet weather flow of 31.7 MGD, which exceeds VWD's combined peak wet weather collection capacity. To accommodate additional wastewater flows from planned development, the 2018 Master Plan recommended conveyance of peak flows to the EWPCF through a parallel land outfall.

The Project propose to generate 20,000 gpd of additional average wastewater flow that was not accounted for in the Land Outfall's capacity studied in the 2018 Master Plan.

The analysis finds that outfall capacity is currently available to serve the Project's proposed wastewater generation. Wastewater Capital Facility Fees paid by this Project will be used toward design and construction of a parallel land outfall to be sized to accommodate ultimate build-out wastewater flows.

Legend

 Outfall - Gravity Mains A	 Sewershed 21C
 Outfall - Siphon A	 Sewershed 22C
 Outfall - Gravity Mains B	 Sewershed 27C
 Outfall Siphon B	 Sewershed 28C
 Outfall - Gravity Mains C	 Sewershed 29C
 Outfall - Siphon C	 Sewershed 30C
 Outfall - Gravity Mains D	 Sewershed 31C
 Unaffected Sewer Sheds	 Sewershed 32C



Vallecitos Water District
Hallmark-Barham Development Water & Sewer Study
Existing Sewer Facilities in Study Area
October 2020
Figure 6

Wastewater Treatment Facility Analysis

VWD utilizes two wastewater treatment facilities to treat wastewater collected within its sewer service area.

- The Meadowlark Reclamation Facility (MRF) has liquids treatment capacity of up to 5.0 MGD with a peak wet weather capacity of 8.0 MGD. MRF does not have solids treatment capacity, and therefore all solids are treated at the Encina Water Pollution Control Facility (EWPCF).
- The EWPCF is located in the City of Carlsbad. This is a regional facility with treatment capacity of up to 40.51 MGD. VWD's current ownership capacity is noted below.

Solids Treatment Capacity

VWD currently owns 10.47 MGD of solids treatment capacity at EWPCF. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate solids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in a projected solids treatment capacity deficiency of 3.93 MGD.

Liquids Treatment Capacity

VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the liquids treatment capacity of 5.0 MGD at MRF for a total of 12.67 MGD of liquids treatment capacity. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate liquids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in a projected liquids treatment capacity deficiency of 1.73 MGD.

Ocean Disposal Capacity

VWD currently owns 10.47 MGD of ocean disposal capacity at the EWPCF. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate ocean disposal capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in an ocean disposal deficiency of 3.93 MGD.

The District has determined that adequate wastewater treatment and disposal capacity exists for the proposed Project at this time subject to the qualifications referenced in the Conclusions and Conditions.

CONCLUSION AND CONDITIONS

The Project is expected to increase wastewater flow by 20,000 gallons per day over ultimate flows projected in the 2018 Master Plan.

The Study concludes that the proposed development will result in the following impacts:

- An increase of 20,000 gpd in solids handling, liquids handling and ocean disposal capacity requirements at the Encina Water Pollution Control Facility.
- An increase of 20,000 gpd in the parallel land outfall's capacity requirement.

The Study also concludes that there are deficiencies in the existing sewer facilities under peak wet weather flows during ultimate build-out conditions without the addition of the Project. The following improvements are needed to mitigate those deficiencies:

- Approximately 805 feet of existing 18-inch sewer main within the Twin Oaks Valley Park residential community (near the NCTD Sprinter right-of-way) must be replaced with 24-inch main (HB-29 through HB-31).

VWD's 2018 Master Plan has identified sewer pipe segments HB-29 through HB-31 for upsizing from 18-inch to 24-inch as CIP # SP-25, a Phase 3 project. Phase 3 projects are planned for construction in the 2026 – 2030 timeframe.

Master Plan projects address and accommodate the pipeline deficiencies identified herein. Wastewater Capital Facility Fees paid by this Project will be used towards the construction of these pipelines.

The following items are required for providing service to the proposed Project:

- Payment of all applicable Water and Wastewater Capital Facility fees in affect at the time service is committed in accordance with District rules and regulations.
- Construction and acceptance of all on-site water and sewer facilities prior to service.

The District currently has water and sewer capacity available to serve the Project as proposed. However, the ability to provide water and sewer service in the future depends upon ultimate build-out of the Project and could change depending upon the timing of the build-out, as well as build-outs of other development projects, continued reliable water supplies from the San Diego County Water Authority, the District's treatment capacity at the EWPCF and other factors affecting growth in the District which may change over time.

This Study is based on the current adopted land use utilized in VWD's 2018 Master Plan. The study addresses the incremental facility impacts of this Project only and does not include or consider any additional projects within VWD's service area that have deviated from adopted Master Plan land uses. Any land use changes upstream and/or downstream of the Study area may necessitate a revision of any onsite and offsite studies. VWD shall determine if and when revisions to the Study are necessary. Costs for revising this Study shall be borne by the Developer.