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**Downtown Lancaster Specific Plan
WATER AND WASTEWATER UTILITY PLAN
TECHNICAL APPENDIX**

Prepared For:

City of Lancaster

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1. INTRODUCTION

The Downtown Lancaster Specific Plan is located in the City of Lancaster, California, bounded by Kettering Street to the north, Newgrove Street to the south, the Union Pacific Railroad to the east and 10th Street to the west. Encompassing roughly 130 acres the Specific Plan is planned for institutional, commercial, and residential expansion and development. This report is prepared as a Technical Appendix in support of the Downtown Lancaster Specific Plan (Specific Plan) providing technical engineering study/evaluation in support of the master planning of water and sewer infrastructure for the Specific Plan. Analysis of existing and proposed systems is provided at a preliminary engineering level based upon available information.

Water service to the Downtown Lancaster Specific Plan area is provided by the transmission and distribution system of the Los Angeles County Public Works Department Waterworks Division 40 (LADPW). Wastewater (sewer) collection is by pipelines owned by the City of Lancaster maintained by the Los Angeles County Sewer Maintenance Division. Regional wastewater conveyance (through trunk sewer pipelines) and treatment is provided by the County Sanitation Districts of Los Angeles County (County Sanitation Districts of Los Angeles County or LACSD). The report will also discuss the potential for recycled water use at ultimate buildout.

2. LAND USE

The Downtown Lancaster Specific Plan area consists of 130 acres in the City of Lancaster bounded by Kettering Street to the north, Newgrove Street to the south, the Union Pacific Railroad to the east and 10th Street West to the west. RBF Consulting and the City of Lancaster Planning Department have worked together to develop a 'Vision Plan' for the Specific Plan to result in new development, business, and housing by identifying preferred uses, zoning and necessary infrastructure improvements.

Comparison of existing and proposed land uses of the Specific Plan serves as a basis for determining the water and sewer infrastructure impacts of the Specific Plan. Land use information has been used to determine pre- and post- Specific Plan water demands and wastewater flows. The proposed land use plan also affects other aspects of infrastructure planning such as consideration of fire protection, areas of potential

recycled water use, and the alignment of right-of-way, which can directly affect the need for utility easements.

The Specific Plan area has also been split into unique Districts to focus on the development objectives for each.

Following is a summary of the existing and proposed land use for the Downtown Lancaster Specific Plan.

2.1. Existing Land Use

Existing land use information was collected in the form of parcel, zoning, and field collected data. As summarized in the following table there are several types of current land use. For the purpose of Specific Plan preparation, and for ease in water demand and wastewater flow calculation, each land use type was classified under one of four general categories.

Category	Land Use Type
Retail / Service	A - Auto Service Business B - Bank PS - Professional Service R - Retail Commercial RES - Restaurant S - Service Commercial
Office / Civic / Public	Cul - Cultural M - Medical Office O - General Office P - Public, Civic, or County REL - Religious SCH - School
Residential	MFR - Multi-family Residential SFR - Single Family Residential
Parking / Vacant	PA - Public Parking PAP - Private Parking V - Vacant

Through the use of Geographic Information Systems (GIS), acreage and building square footage data was gathered and summarized for the Specific Plan. The existing land use data was utilized to develop Table 2-1 summarizing the existing land use of the Specific Plan area by District.

**Table 2-1
Downtown Lancaster Specific Plan
Water and Wastewater Utility Plan**

Existing Land Use - Summary

District	General Land Use	Gross Acreage (ac)	Building Area (sf)
Boulevard	Retail Service	5.3339	158,804
	Office / Civic / Public	2.2745	120,784
	Parking	3.4280	0
	Residential	0	0
	Vacant	1.0837	9,316
Cedar Avenue Arts	Retail Service	3.8175	72,093
	Office / Civic / Public	1.9680	45,436
	Parking	1.5824	0
	Residential	0.1008	1,647
	Vacant	0.8132	3,978
Civic Village	Retail Service	0.1679	8,295
	Office / Civic / Public	17.6005	293,208
	Parking	0.7211	0
	Residential	7.0121	190,415
	Vacant	0.6167	0
Commerce	Retail Service	5.7331	93,120
	Office / Civic / Public	1.8576	30,773
	Parking	2.7156	0
	Residential	0	0
	Vacant	0.4555	1,182
Gateway	Retail Service	3.3403	42,069
	Office / Civic / Public	1.8576	29,877
	Parking	0.2851	0
	Residential	0.8162	8,077
	Vacant	0.5856	3,443
Neighborhood Office	Retail Service	1.6325	23,149
	Office / Civic / Public	7.1614	91,560
	Parking	0.2032	0
	Residential	8.0820	69,641
	Vacant	1.9065	5,966
Transit	Retail Service	5.6906	78,349
	Office / Civic / Public	5.0817	28,384
	Parking	5.0412	0
	Residential	0	0
	Vacant	0.9865	0
TOTAL	-	99.95	1,409,566

2.2. Proposed Land Use

Through a collaborative effort between the City of Lancaster and RBF Consulting a proposed land use ('Vision') plan was developed. To establish development objectives for sub-areas of the entire Specific Plan area seven districts were created. The districts as shown on Exhibit 2-1 are:

- Boulevard District
- Cedar Avenue Arts District
- Commerce District
- Civic Village District
- Neighborhood Office District
- Transit District
- Gateway District

The planned development and redevelopment of the Specific Plan will bring new land uses consisting of residential, commercial, mixed-use, civic/public and proposed parking. As the Specific Plan is strictly a planning document the proposed land use plan is based on assumed land use types and building square footage. Thus, the types of land use are general to allow for various types of future residential and business use. As with the existing land use information, the proposed land use projections have been classified under the following four (4) general categories.

- 1) Retail / Service
- 2) Office / Civic / Public
- 3) Residential
- 4) Parking / Vacant

Table 2-2 summarizes the proposed land use ('Vision') plan of the Downtown Lancaster Specific Plan. In addition, land use information for the General Plan 2020 and City of Lancaster Zoning Ordinance was provided for comparison against the buildout projections. The information is summarized in Tables 2-3 and 2-4.

Exhibit 2-1 – Land Use Districts

**Table 2-2
Downtown Lancaster Specific Plan
Water and Wastewater Utility Plan**

Specific Plan Buildout

District	Land Use	Gross Acreage	Building Area	Residential Units
	General Type			
		(ac)	(sf)	(du)
Boulevard	Retail Service Office / Civic / Public Residential		254,333 146,093	599
<i>Subtotal</i>		12.12		
Cedar Avenue Arts	Retail Service Office / Civic / Public Residential		115,606 73,047	176
<i>Subtotal</i>		8.28		
Civic Village	Retail Service Office / Civic / Public Residential		115,606 292,187	970
<i>Subtotal</i>		26.12		
Commerce	Retail Service Office / Civic / Public Residential		138,727 170,442	441
<i>Subtotal</i>		10.76		
Gateway	Retail Service Office / Civic / Public Residential		69,364 48,698	264
<i>Subtotal</i>		6.67		
Neighborhood Office	Retail Service Office / Civic / Public Residential		23,121 73,047	264
<i>Subtotal</i>		18.99		
Transit	Retail Service Office / Civic / Public Residential		208,091 170,442	811
<i>Subtotal</i>		16.80		

**Table 2-3
Downtown Lancaster Specific Plan
Water and Wastewater Utility Plan**

General Plan Land Use

Designation	Land Use	Acreage (ac)
UR	Urban Residential	0.34
MR2	High Density Residential	5.09
C	Commercial	86.47
P	Public	4.19
LI	Light Industrial	3.76

**Table 2-4
Downtown Lancaster Specific Plan
Water and Wastewater Utility Plan**

City Zoning Ordinance

Zone	Land Use	Existing Acres (ac)
C	General Commercial	10.2177
CBD	Central Business District	75.1289
CPD	Commercial Planned Development	1.0808
HDR	High Density Residential	5.0945
OP	Office Professional	3.7556
P	Public	4.1875
R-7,000	Low Density Residential	0.3398

3. DOMESTIC WATER SYSTEM

Domestic water service to the Specific Plan area is provided by the Los Angeles County Department of Public Works (LADPW) – Waterworks Division. LADPW Waterworks Division 40 operates and maintains the public water distribution system meeting domestic demands and providing fire protection to this area of the City of Lancaster. The following section includes description of the existing domestic water distribution system, estimation of pre- and post-Specific Plan water demand, and discussion of the recommended infrastructure improvements for service at Specific Plan buildout.

3.1. Existing System

Los Angeles County Department of Public Works operates a system of pipelines ranging from 4- to 12-inch in diameter to serve demands within the Specific Plan area. The distribution system is within the 2555 pressure zone of the LADPW system and supplied from two existing above ground storage tanks (located at: M Street and West 7th Street and M Street and East 5th Street). On the majority domestic water service connections are to existing 4- or 6-inch pipelines and fire hydrants to existing 8-, 10- , or 12-inch pipelines. The pipelines range widely in year of construction - with some being constructed as early as 1922. Exhibit 3-1 depicts the existing domestic water distribution system and identifies pipelines which were constructed on or before 1940 for later consideration of pipeline replacement.

3.2. Domestic Water Demand

Domestic water demand factors utilized for this report are based on the standard values utilized by LADPW. The usage factors were provided in the form of maximum day demand factors, and thereby represent the highest daily (driest summer day) demand for the year. Following are the maximum day demand factors used as the basis for demand calculation:

- Residential (Single Family) – 1,500 gpd / dwelling unit (du)
- Residential (Multi-Family) – 1,000 gpd/du
- Light Commercial / Retail – 4,000 gpd /ac
- Institutional / Public Facilities – 4,000 gpd / ac



LEGEND

X" PIPE DIAMETER

— DW PIPE - POST 1940 CONSTRUCTION

— DW PIPE - 1940 OR EARLIER CONSTRUCTION

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CITY OF LANCASTER – DOWNTOWN SPECIFIC PLAN

EXISTING DOMESTIC WATER SYSTEM

EXHIBIT

3-1

The domestic water peaking factors of the Los Angeles County Department of Public Works are used for demand calculation and analysis are:

- Average Day Demand = 0.5 x Maximum Day Demand
- Peak Hour Demand = 2.0 x Maximum Day Demand

Water demand calculations were prepared using the LADPW (demand and peaking) factors and land use information. To compare the change in water demand under the Specific Plan from existing conditions and the land use plan for the area under the General Plan and City Zoning Code four sets of calculations were prepared. The calculations are based on:

1. Existing Land Use Data (Table 3-2)
2. Proposed Specific Plan Land Use Data (Table 3-3)
3. General Plan Land Use Data (Table 3-4)
4. City Zoning Land Use Data (Table 3-5)

Table 3-1 summarizes the average day, maximum day and peak hour demand of each of the four tables.

**Table 3-1
Water Demand Calculation Summary**

Land Use Data	Avg Day (gpd)	Maximum Day (gpd)	Peak Hour (gpm)
Existing	220,634	441,268	613
Proposed (Specific Plan)	1,296,078	2,592,156	3,600
General Plan [1]	313,823	627,647	872
Zoning [2]	336,930	673,860	936

[1] Based on General Plan 2020 General Plan

[2] Per City of Lancaster Zoning Ordinance

Table 3-2
Estimate of Existing Total Water Demand
Downtown Specific Plan - City of Lancaster
Water and Wastewater Utility Plan

District	Land Use Category	Gross Area (ac)	Building Area (sf)	Dwelling Units	Demand Factor [1] [4]	Avg Day		Max Day [2]		Peak Hour [3]	
						(gpd)	(cfs)	(gpd)	(cfs)	(cfs)	(gpm)
Boulevard	Retail / Service	5.33	158,804		2000 gpd/ac	10,668	0.02	21,336	0.03	0.07	30
	Office / Civic / Public	2.27	120,784		2000 gpd/ac	4,549	0.01	9,098	0.01	0.03	13
	Parking	3.43	0		-						
	Residential	0.00	0	0	750 gpd/du	0	0.00	0	0.00	0.00	0
	Vacant	1.08	9,316		-						
Subtotal		12.12	288,904	0		15,217	0.02	30,434	0.05	0.09	42
Cedar Avenue Arts	Retail / Service	3.82	72,093		2000 gpd/ac	7,635	0.01	15,270	0.02	0.05	21
	Office / Civic / Public	1.97	45,436		2000 gpd/ac	3,936	0.01	7,872	0.01	0.02	11
	Parking	1.58	0		-						
	Residential	0.10	1,647	1	750 gpd/du	750	0.00	1,500	0.00	0.00	2
	Vacant	0.81	3,978		-						
Subtotal		8.28	123,154	1		12,321	0.02	24,642	0.04	0.08	34
Civic Village	Retail / Service	0.17	8,295		2000 gpd/ac	336	0.00	672	0.00	0.00	1
	Office / Civic / Public	17.60	293,208		2000 gpd/ac	35,201	0.05	70,402	0.11	0.22	98
	Parking	0.72	0		-						
	Residential	7.01	190,415	212	300 gpd/du	63,600	0.10	127,200	0.20	0.39	177
	Vacant	0.62	0		-						
Subtotal		26.12	491,918	212		99,137	0.15	198,274	0.31	0.61	275
Commerce	Retail / Service	5.73	93,120		2000 gpd/ac	11,466	0.02	22,932	0.04	0.07	32
	Office / Civic / Public	1.86	30,773		2000 gpd/ac	3,715	0.01	7,430	0.01	0.02	10
	Parking	2.72	0		-						
	Residential	0.00	0	0	750 gpd/du	0	0.00	0	0.00	0.00	0
	Vacant	0.46	1,182		-						
Subtotal		10.76	125,075	0		15,181	0.02	30,363	0.05	0.09	42
Gateway	Retail / Service	3.34	42,069		2000 gpd/ac	6,681	0.01	13,361	0.02	0.04	19
	Office / Civic / Public	1.86	29,877		2000 gpd/ac	3,715	0.01	7,430	0.01	0.02	10
	Parking	0.29	0		-						
	Residential	0.82	8,077	2	750 gpd/du	1,500	0.00	3,000	0.00	0.01	4
	Vacant	0.59	3,443		-						
Subtotal		6.88	83,466	2		11,896	0.02	23,792	0.04	0.07	33
Neighborhood Office	Retail / Service	1.63	23,149		2000 gpd/ac	3,265	0.01	6,530	0.01	0.02	9
	Office / Civic / Public	7.16	91,560		2000 gpd/ac	14,323	0.02	28,646	0.04	0.09	40
	Parking	0.20	0		-						
	Residential	8.08	69,641	37	750 gpd/du	27,750	0.04	55,500	0.09	0.17	77
	Vacant	1.91	5,966		-						
Subtotal		18.99	190,316	37		45,338	0.07	90,676	0.14	0.28	126
Transit	Retail / Service	5.69	78,349		2000 gpd/ac	11,381	0.02	22,762	0.04	0.07	32
	Office / Civic / Public	5.08	28,384		2000 gpd/ac	10,163	0.02	20,327	0.03	0.06	28
	Parking	5.04	0		-						
	Residential	0.00	0	0	750 gpd/du	0	0.00	0	0.00	0.00	0
	Vacant	0.99	0		-						
Subtotal		16.80	106,733	0		21,545	0.03	43,089	0.07	0.13	60
TOTAL		99.95	1,409,566	252		220,634	0.34	441,268	0.68	1.37	613
						gpd	cfs	gpd	cfs	cfs	gpm

[1] Demand factors based on commercial and residential demand factors of Los Angeles Department of Public Works - Waterworks Division.

[2] 2.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[3] 4.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

Table 3-3
Estimate of Proposed Total Water Demand
Downtown Specific Plan - City of Lancaster
Water and Wastewater Utility Plan

District	Land Use Category	Gross Area (ac)	Building Area (sf)	Dwelling Units	Demand Factor [1] [4] [5]	Avg Day		Max Day [2]		Peak Hour [3]	
						(gpd)	(cfs)	(gpd)	(cfs)	(cfs)	(gpm)
Boulevard	Retail / Service		254,333		100 gpd/ksf	25,433	0.04	50,867	0.08	0.16	71
	Office / Civic / Public		146,093		150 gpd/ksf	21,914	0.03	43,828	0.07	0.14	61
	Residential			599	300 gpd/du	179,700	0.28	359,400	0.56	1.11	499
<i>Subtotal</i>		12.12	400,426	599		227,047	0.35	454,095	0.70	1.41	631
Cedar Avenue Arts	Retail / Service		115,606		100 gpd/ksf	11,561	0.02	23,121	0.04	0.07	32
	Office / Civic / Public		73,047		150 gpd/ksf	10,957	0.02	21,914	0.03	0.07	30
	Residential			176	300 gpd/du	52,800	0.08	105,600	0.16	0.33	147
<i>Subtotal</i>		8.28	188,653	176		75,318	0.12	150,635	0.23	0.47	209
Civic Village	Retail / Service		115,606		100 gpd/ksf	11,561	0.02	23,121	0.04	0.07	32
	Office / Civic / Public		292,187		150 gpd/ksf	43,828	0.07	87,656	0.14	0.27	122
	Residential			970	300 gpd/du	291,000	0.45	582,000	0.90	1.80	808
<i>Subtotal</i>		26.12	407,793	970		346,389	0.54	692,777	1.07	2.14	962
Commerce	Retail / Service		138,727		100 gpd/ksf	13,873	0.02	27,745	0.04	0.09	39
	Office / Civic / Public		170,442		150 gpd/ksf	25,566	0.04	51,133	0.08	0.16	71
	Residential			441	300 gpd/du	132,300	0.20	264,600	0.41	0.82	368
<i>Subtotal</i>		10.76	309,169	441		171,739	0.27	343,478	0.53	1.06	477
Gateway	Retail / Service		69,364		100 gpd/ksf	6,936	0.01	13,873	0.02	0.04	19
	Office / Civic / Public		48,698		150 gpd/ksf	7,305	0.01	14,609	0.02	0.05	20
	Residential			264	300 gpd/du	79,200	0.12	158,400	0.25	0.49	220
<i>Subtotal</i>		6.67	118,062	264		93,441	0.14	186,882	0.29	0.58	260
Neighborhood Office	Retail / Service		23,121		100 gpd/ksf	2,312	0.00	4,624	0.01	0.01	6
	Office / Civic / Public		73,047		150 gpd/ksf	10,957	0.02	21,914	0.03	0.07	30
	Residential			264	300 gpd/du	79,200	0.12	158,400	0.25	0.49	220
<i>Subtotal</i>		18.99	96,168	264		92,469	0.14	184,938	0.29	0.57	257
Transit	Retail / Service		208,091		100 gpd/ksf	20,809	0.03	41,618	0.06	0.13	58
	Office / Civic / Public		170,442		150 gpd/ksf	25,566	0.04	51,133	0.08	0.16	71
	Residential			811	300 gpd/du	243,300	0.38	486,600	0.75	1.51	676
<i>Subtotal</i>		16.80	378,533	811		289,675	0.45	579,351	0.90	1.79	805
TOTAL		99.74	1,898,804	3,525	-	1,296,078	2.01	2,592,156	4.01	8.02	3,600
						gpd	cfs	gpd	cfs	cfs	gpm

[1] Demand factors based on commercial and residential demand factors of Los Angeles Department of Public Works - Waterworks Division.

[2] 2.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[3] 4.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[4] Per LACSD Sewer Generation Factors (Table 1) - Store / Retail = 100 gpd/ksf, Office / Civic = 150 gpd/ksf

Table 3-4
Estimate of General Plan* Total Water Demand
Downtown Specific Plan - City of Lancaster
Water and Wastewater Utility Plan

Land Use Category	Gross Area (ac)	Demand Factor [1] [4] [5]	Avg Day		Max Day [2]		Peak Hour [3]	
			(gpd)	(cfs)	(gpd)	(cfs)	(cfs)	(gpm)
UR - Urban Residential	0.34	4,875 gpd/ac	1,657	0.00	3,313	0.01	0.01	5
MR2 - High Density Residential	5.09	15,000 gpd/ac	76,350	0.12	152,700	0.24	0.47	212
C - Commercial [6]	86.47	2,500 gpd/ac	216,175	0.33	432,350	0.67	1.34	600
P - Public	4.19	2,000 gpd/ac	8,375	0.01	16,750	0.03	0.05	23
LI - Light Industrial	3.76	3,000 gpd/ac	11,267	0.02	22,534	0.03	0.07	31
TOTAL	99.84	-	313,823	0.49	627,647	0.97	1.94	872

* Based on Table VIII-1 of 2020 General Plan

gpd cfs gpd cfs cfs gpm

[1] Demand factors based on commercial and residential demand factors of Los Angeles Department of Public Works - Waterworks Division

[2] 2.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[3] 4.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[4] Urban Residential Demand is based on 6.5 dwelling units per acre - 6.5 x 750 gpd/du = 4,875 gpd/ac

[5] High Density Residential Demand is based on 30 dwelling units per acre - 30 x 500 gpd/du = 15,000 gpd/ac

[6] To account for light and heavy commercial uses a value of 2,500 gpd/ac was utilized.

Table 3-5
Estimate of Zoning* Total Water Demand
Downtown Specific Plan - City of Lancaster
Water and Wastewater Utility Plan

Land Use		Gross Area (ac)	Demand			Avg Day		Max Day [2]		Peak Hour [3]		
Zone	Description		Factor [1]	[4]	[5]	[7]	(gpd)	(cfs)	(gpd)	(cfs)	(cfs)	(gpm)
C	General Commercial	10.22	2,500			gpd/ac	25,550	0.04	51,100	0.08	0.16	71
CBD	Central Business District	75.13	2,500			gpd/ac	187,825	0.29	375,650	0.58	1.16	522
CPD	Commercial Planned Development	1.08	2,500			gpd/ac	2,700	0.00	5,400	0.01	0.02	8
HDR	High Density Residential	5.09	20,000			gpd/ac	101,800	0.16	203,600	0.32	0.63	283
R-7,000	Low Density Residential	0.34	3,750			gpd/ac	1,275	0.00	2,550	0.00	0.01	4
OP	Office Professional	3.76	2,500			gpd/ac	9,400	0.01	18,800	0.03	0.06	26
P	Public	4.19	2,000			gpd/ac	8,380	0.01	16,760	0.03	0.05	23
TOTAL		99.81	-				336,930	0.52	673,860	1.04	2.09	936

* Based on City of Lancaster Zoning Ordinance

gpd cfs gpd cfs cfs gpm

[1] Demand factors based on commercial and residential demand factors of Los Angeles Department of Public Works - Waterworks Division

[2] 2.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[3] 4.0 x ADD, per Los Angeles County Department of Public Works - Waterworks Division

[4] Urban Residential Demand is based on 10 dwelling units per acre - 10 x 750 gpd/du = 7,500 gpd/ac

[5] High Density Residential Demand is based on 40 dwelling units per acre - 40 x 500 gpd/du = 20,000 gpd/ac

[6] To account for light and heavy commercial uses a value of 2,500 gpd/ac was utilized.

[7] Low Density Residential is based on 5 dwelling units per acre - 4 x 750 gpd/du = 3,750 gpd/ac

3.3. Proposed System

In support of the buildout of the Specific Plan improvements to the domestic water distribution system will be necessary to provide reliable service and adequate fire protection. The following sections consider the calculated demand increase (impact), current fire flow standards, and recommended off-site storage to provide service to the area at Specific Plan build-out.

3.3.1. Demand Impact

Due to the projection of land uses at Specific Plan build-out water demand will be increased. The calculated increase in demand (proposed minus existing) is summarized below:

Average Day Demand = 1.08 mgd

Maximum Day Demand = 2.15 mgd

Peak Hour = 2,987 gpm

3.3.2. Fire Flow Conditions

Fire flow standards for the Los Angeles County Fire Department (LACFD) dictate fire protection of 1,250 gpm flow for 2 hour duration for residential and 5,000 gpm flow for a 5 hour duration for commercial, industrial and multi-family residential. The existing system serving the Specific Plan area has been in service for decades. However, with fire flow standards becoming more stringent the system has remained largely unchanged. The result is a distribution system incapable of supplying fire flow based on current-day standards. As supply is provided from off-site reservoirs, resizing the pipelines within the Specific Plan area has limited ability to increase capacity without a transmission system 'over haul'. Therefore, the recommended system for the Downtown Lancaster Specific Plan considers minimum pipeline sizes needed to locally distribute current-day fire flow volumes. The following table summarizes the recommended minimum pipeline area for transmission of 1,250 gpm and 5,000 gpm flows at less than 15 feet per second.

Type of Land Use	Flow		Duration (hr)	Size (sq. ft.)	Acceptable Pipe Combinations [1]	
	(gpm)	(cfs)			Dead-End	Looped
Residential - SFR	1,250	2.79	2	0.19	8" Min.	8" Min.
Residential - MFR Commercial Institutional Industrial	5,000	11.14	5	0.74	6" and 10", or 8" and 8", or 12", or 8" and 10"	10" Min. or Equivalent Size

[1] Based on 15 feet per second maximum and 8-inch minimum pipeline size.

3.3.3. Storage Impact

With the increased demands for the Specific Plan, additional storage may be required for the LADPW supply and distribution system. The need for additional storage will depend on the LADPW's actual operation and planned regional supply and transmission system improvements. However, for the study area to ultimately provide fire flow protection as directed by the Los Angeles County Fire Department, storage for the 5,000 gpm fire flow with a 5 hour duration should be provided. The amount of fire storage necessary is 1.5 million gallons. Prior to construction of an individual project requiring non-residential fire flow LADPW should assess their current storage and transmission facilities to determine the actual flow and pressure provided to the Specific Plan area. In addition, the increase in demand should also be considered to affect operational storage. Based on the increased water demand at ultimate conditions, an additional 2.59 million gallons of storage is recommended to support service of maximum-day demand at ultimate build-out.

3.3.4. Proposed Distribution System

Taking into consideration factors of: 1) Increased Demand, 2) Current-Day Fire Flow Standards, and 3) Age of Existing Pipelines the proposed system was developed. As numerous pipelines within the Specific Plan area are at, or reaching their useful life new pipelines are shown in Exhibit 3-2 representing improvements for capacity and age. See Exhibit 3-2 for the proposed system.



LEGEND

X" PIPE DIAMETER

— DW PIPE - EXISTING PIPELINES

— DW PIPE - PROPOSED PIPELINES

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CITY OF LANCASTER – DOWNTOWN SPECIFIC PLAN

PROPOSED DOMESTIC WATER SYSTEM

EXHIBIT

3-2

4. WASTEWATER SYSTEM

Gravity sewer pipelines owned by the City of Lancaster and maintained by the Los Angeles County Department of Public Work – Consolidated Sewer Maintenance Division provide sewer service collection. Regional wastewater conveyance is provided by the 10-, 12- and 15-inch trunk sewer pipelines operated and maintained by the County Sanitation Districts of Los Angeles County. The following section describes the existing sewer system, estimates of pre- and post-Specific Plan wastewater flow, and presents proposed sewer system to meet Specific Plan build-out conditions.

4.1. Existing System

The existing sewer system primarily consists of 8-inch pipelines conveying flows in the northwest direction to the Avenue I and Fern Avenue trunk sewer mains. Exhibit 4-1 shows how the existing system conveys flow from the Specific Plan area. Most pipelines are aligned in existing right-of-way. However, there are a few pipelines that are either located in alley-ways or easements (crossing parcels).

The County Sanitation Districts of Los Angeles County was contacted to determine the available capacity in the existing pipelines. The information was:

- the 10-inch Fern Avenue Trunk Sewer has a design capacity of 1.1 million gallons per day and was last measured (in 2006) to convey a peak flow 0.4 million gallons per day (mgd).
- the 12-inch Avenue I Trunk Sewer has a design capacity of 1.3 mgd, and was last measured (in 2006) to convey a peak flow of 0.6 mgd.

4.2. Wastewater Flow Estimate

Wastewater flow factors utilized for this report are based on values provided by the County Sanitation Districts of Los Angeles County. The usage factors were provided in the form of gallons per day per thousand square feet. Wastewater flow calculations were prepared utilizing the LACSD wastewater flow factors and land use information. To compare the change in wastewater flow under the Specific Plan from existing land uses and previous land use planning, four sources of land use

information were analyzed. The four sources (and associated table of calculation) are:

1. Existing Land Use Data (Table 4-2)
2. Proposed Specific Plan Land Use Data (Table 4-3)
3. General Plan Land Use Data (Table 4-4)
4. City Zoning Land Use Data (Table 4-5)

In order to calculate flows for acreages in Tables 4-4 and 4-5 return ratios were utilized to determine the amount of wastewater associated with a given water demand. Table 4-1 serves to summarize the results of wastewater flow calculation.

**Table 4-1
Wastewater Flow Calculation Summary**

Land Use Data	Avg Flow (gpd)	Peak Flow (gpm)
Existing	160,796	279
Proposed (Specific Plan)	788,478	1,369
General Plan [1]	225,569	392
Zoning [2]	227,218	394

[1] Based on General Plan 2020 General Plan

[2] Per City of Lancaster Zoning Ordinance

4.3. Wastewater Flow Impact

Wastewater flow is calculated to increase (proposed minus existing) due to the Specific Plan as summarized below:

Average Day Flow = 0.628 mgd

Peak Flow = 1,090 gpm

Table 4-2 – Existing Sewer Flow

Table 4-3 – Proposed Sewer Flow

Table 4-4 – General Plan Sewer Flow

Table 4-5 – Zoning Sewer Flow

4.4. Proposed System

To determine the required sewer pipeline sizes needed to support Specific Plan development the following table was developed based on City of Lancaster design standards for 8- to 12-inch pipeline and 'common industry' standards for 15-inch and above sewer pipeline construction. Refer to Exhibit 4.2, Proposed Sewer System.

Diameter	Minimum Slope	d/D Ratio	Capacity @ Min. Slope
8-inch	0.0040	0.50	170 gpm
10-inch	0.0032	0.50	278 gpm
12-inch	0.0024	0.50	392 gpm
15-inch	0.0016	0.75	1,057 gpm
18-inch	0.0014	0.75	1,609 gpm
21-inch	0.0012	0.75	2,246 gpm
24-inch	0.0010	0.75	2,928 gpm

Peak flow was taken to be 2.5 times average daily flow.

The natural drainage direction for the Specific Plan area is to the northwest. In developing the proposed system it was assumed that the general sewer drainage pattern would remain the same. The proposed land use information was used to determine the increase in wastewater flow within each District of the Specific Plan, with residential units and building square footage locations the associated wastewater flows were distributed equally within each District.

In addition, consideration for the pipelines proposed in the North Downtown Specific Plan area and existing facilities to the south was made. Due to the North Downtown Specific Plan the number of pipelines conveying flow northwest to Avenue I was reduced due to the proposed park and realignment of Beech Avenue. As a result, the proposed system for this report depicts a backbone sewer system primarily conveying flow to the Fern Avenue Trunk Sewer. In addition, a 10-inch sewer pipeline in Sierra Highway will need to be constructed between Lancaster Boulevard and Avenue I.

It should be noted that no flow monitoring was performed for this report. As a result, the wastewater flow contributed from development to the south is not known. Pipelines are conservatively sized, however verification of available capacity in the Downtown Specific Plan area proposed sewer pipelines if new development takes place to the south must be made through further hydraulic analysis. Exhibit 4-2 shows the proposed sewer system.

4.5. Off-Site Conveyance Impact

The increase in wastewater flow for the Specific Plan area will likely require increased trunk sewer capacity. Both the Fern Avenue and Avenue I Trunk Sewer are anticipated to require upsizing or paralleling in order to support Specific Plan build-out. As these facilities serve a larger region of the City the precise upsizing is not performed for this study. However, for the Fern Avenue Trunk Sewer the proposed land use information was utilized to estimate the necessary upsizing. It should be noted that the amount of flow directed to the Fern Avenue Trunk Sewer will depend heavily on where the most dense land uses are built.

At this point in the master planning process an area based calculation approach was utilized to determine the size needed for the Fern Trunk Sewer. Utilizing minimum slope standards it is anticipated that the 10-inch Fern Avenue Trunk Sewer should be upsized to a 15-inch in the Specific Plan area. The Avenue I Trunk Sewer serves a large region of the City of Lancaster. All Specific Plan area generated sewer flows will be conveyed to the Avenue I Trunk Sewer. Therefore, it is recommended the City of Lancaster and the Sanitation District coordinate, with consideration for the 788,478 gpd average day flow and 3.05 cfs (or 1,369 gpm) peak flow calculated at ultimate buildout to determine the necessary upsizing.

4.6. Treatment Capacity

Flow from the Specific Plan area will be conveyed to the Lancaster Water Reclamation Plant operated by the County Sanitation Districts of Los Angeles County. The treatment plant's current design capacity is 16.0 mgd. In 2006, it processed an average flow of approximately 14.6 mgd. By 2020 the Sanitation District plans to expand the treatment capacity to 26 mgd.

Exhibit 4-2 – Proposed Sewer System

5. RECYCLED WATER SYSTEM

The City of Lancaster has begun planning for recycled water service. Several areas of large irrigation area have been identified throughout the City. The proposed land use plan for the Downtown Specific Plan however, does not include any park, open space or other form of large irrigation area. The only opportunity identified for recycled water service would be landscaped median area. As a result, this master plan does not analyze master planned recycled water facilities.

6. COST ESTIMATE

Cost estimates have been created to reflect the approximate cost (current value) associated with the water and wastewater pipeline construction recommended in this utility study. The cost estimate tables are based on construction costs associated with new ductile iron pipe (domestic water) and vitrified clay pipe (sewer). Cost estimation does not include the associated cost of demolition, as design will dictate which reaches are abandoned and which removed and replaced. In particular, for the sewer system it is recommended that trenchless technology be considered as a means the associated risk to public, impact to traffic and cost for pipe improvements.

INSERT TABLE 6-1 – WATER SYSTEM COST ESTIMATE

INSERT TABLE 6-2 – SEWER SYSTEM COST ESTIMATE

7. RECOMMENDATIONS

Water System

It is recommended that development of the Downtown Specific Plan be utilized to upgrade the domestic water distribution system in Specific Plan area. By constructing the looped distribution system as depicted in Exhibit 3-2, service pressures and fire protection to the Specific Plan area will be improved. It is recommended that coordination with the Los Angeles Department of Public Works Waterworks Division 40 be made to verify transmission capacity and adequate storage is available or planned to support development.

Wastewater

Wastewater flow increase in the Downtown Specific Plan is calculated in excess of the available capacity of the existing pipelines. In addition, several pipelines were aligned in alley-ways of across parcels that should be realigned for ultimate conditions to allow for planned development. By constructing the sewer system depicted on Exhibit 4-2 capacity will be provided for calculated wastewater flows of ultimate build-out. The proposed system utilizes as many existing pipelines as possible. As this report does not cover condition assessment of the existing pipelines, it is recommended that each maintained pipeline be video inspected, and if necessary relined or replaced. It is also recommended that the City of Lancaster coordinate with the County Sanitation Districts of Los Angeles County to: 1) ensure the Fern Avenue and Avenue I Trunk Sewer are properly sized for each phase of new / re-development, and 2) ensure treatment capacity is available.