Appendix Q – Sanitary Sewer Study

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MEMORANDUM

Date: October 5, 2020 **BKF Job Number: 20191093**

Deliver To: Spieker Senior Development Partners

From: Michael Steele, BKF Engineers

Subject: Spieker Senior Continuing Care Community Sanitary Demand

This memorandum has been prepared for the Spieker Senior Development Partners to document the anticipated sanitary sewer demand produced from the Spieker Senior Continuing Care Community located at 850 Seven Hills Ranch Road in Walnut Creek, California (See Appendix A). A comparison between the Central Contra Costa Sanitary District and Spieker Senior Development Partners design wastewater flows is detailed below.

Existing Condition

It is BKF's understanding that the existing site consists of one (1) dwelling unit that does not connect into any public or private sanitary sewer main. The site in its existing condition does not contribute to the capacity of the surrounding infrastructure.

Project Description

The Spieker Senior Continuing Care Community project is a development of a self-contained continuing care retirement community (CCRC) offering continuing care contracts that provide housing, resident services, and long-term care. The project site contains approximately 30.4 total acres, situated in unincorporated Contra Costa County at the easterly end of Seven Hills Ranch Road. The parcel will ultimately be zoned as P-1 (Planned Unit).

The CCRC consists of fifty-five (55) cottage style Independent Living CCRC Units, 305 apartment style Independent Living CCRC Units, and a Health Care Center. The Health Care Center includes thirty-three (33) skilled nursing units, twenty-three (23) memory care units, and forty-four (44) assisted living units for a total of one hundred (100) Health Care Units. Support staff for the entire CCRC is expected to represent approximately 225 full-time equivalent employees.

Proposed Condition

The site includes a United States Army Corps of Engineers (USACE) jurisdictional wetland bisecting the site from east to west. The wetland and associated topography creates a natural break for any gravity driven system. Due to this natural break the proposed utility design connects the portion of the site north and east of the wetland to an existing eight (8) inch vitrified clay pipe (VCP) at a manhole in North San Carlos Drive. The portion of the site south and west of the wetland is proposed to connect to an eight (8) inch ductile iron pipe (DIP) at a manhole in Seven Hills Ranch Road (See Appendix B).

Dexter Wilson Engineering, Inc. conducted a proposed wastewater flow analysis for a similar CCRC project located in the City of San Juan Capistrano in January of 2014. The wastewater factors in that report were applied to this CCRC proposed development and the results are shown in Table 1 and 2 below.

Proposed Wastewater Flow to N San Carlos Drive 8" VCP					
	Unit of Measurement (Acres)	Wastewater Factor (gpd/acre)	Average Daily Wastewater (gpd)	Peaking Factor[2]	Design Peak Wastewater Flow (gpd)
Apartments Style Units[1]	0.00	4,260	0	4	0
Cottage Units[1]	10.39	1,730	17,977	4	71,909
Health Care Center[1]	4.83	1,730	8,358	4	33,431
Inflow (GWI)[2]	15.22	170	2,588	1	2,588
Total	**15.22**	N/A	**28,923**	N/A	**107,928**
[1]Source: Overview of Sewer Service for the Spieker CCRC Project, Dexter Wilson Engineering, Inc. (January 2014) [2]Source: Central Contra Costa County Sanitary District Standard Specifications Part III, Section 8-04					

Table 1. Proposed Wastewater Flow to Connection in N. San Carlos Drive

Proposed Wastewater Flow to Seven Hills Ranch Road 8" DIP					
	Unit of Measurement (Acres)	Wastewater Factor (gpd/acre)	Average Daily Wastewater (gpd)	Peaking Factor[2]	Design Peak Wastewater Flow (gpd)
Apartments Style Units[1]	5.55	4,260	23,625	4	94,500
Cottage Units[1]	9.63	1,730	16,657	4	66,629
Health Care Center[1]	0.00	1,730	0	4	0
Inflow (GWI)[2]	15.17	170	2,580	1	2,580
Total	**15.17**	N/A	**42,862**	**13**	**163,709**
[1] Source: Overview of Sewer Service for the Spieker CCRC Project, Dexter Wilson Engineering, Inc. (January 2014) [2]Source: Central Contra Costa County Sanitary District Standard Specifications Part III, Section 8-04 B. 2c					

Table 2. Proposed Wastewater Flow to Connection in Seven Hills Ranch Road

Central San also conducted a preliminary analysis of the wastewater flows associated with the proposed development according to the description above. The findings from their September 16, 2020 study are as follows:

- *55 SFR 55 units x 1 Residential Unit Equivalent (RUE)/unit = 55 RUE*
- *305 MFR 305 units x 0.847 RUE/unit = 258.3 RUE*
- *47,600 SF skilled nursing 47.6 KSF x 2.34 RUE/KSF = 111.4 RUE*
- *37,400 SF assisted living 37.4 KSF x 0.987 RUE/KSF = 36.9 RUE*

Using Central San's Design Capacity standards (See Appendix C) the Residential Unit Equivalent (RUE) values above were converted into wastewater flow in gallons per day (gpd). The results for each connection point are shown below in Table 3 and 4.

Proposed Wastewater Flow to N San Carlos Drive 8" VCP (Central San)						
	Units (RUE or Acres)		Wastewater Factor (gpd/unit)	Average Daily Wastewater (gpd)	Peaking Factor	Design Peak Wastewater Flow (gpd)
Single Family Residential (SFR)	26	RUE	200	5,200	4	20,800
Multi Family Residential (MFR)	0	RUE	200	0	4	0
Nursing	111.4	RUE	200	22,280	4	89,120
Assisted Living	36.9	RUE	200	7,380	4	29,520
Inflow (GWI)	15.22	Acres	170	2,587	1	2,587
Total	N/A	N/A	N/A	**37,447**	N/A	**142,027**

Table 3. Proposed Wastewater Flow to Connection in N. San Carlos Drive (Using CCSD Assumptions)

Proposed Wastewater Flow to Seven Hills Ranch Road 8" DIP (Central San)						
	Units (RUE or Acres)		Wastewater Factor (gpd/unit)	Average Daily Wastewater (gpd)	Peaking Factor	Design Peak Wastewater Flow (gpd)
Single Family Residential (SFR)	29	RUE	200	5,800	4	23,200
Multi Family Residential (MFR)	258.3	RUE	200	51,660	4	206,640
Nursing	0	RUE	200	0	4	0
Assisted Living	0	RUE	200	0	4	0
Inflow (GWI)	15.17	Acres	170	2,579	1	2,579
Total	N/A	N/A	N/A	**60,039**	N/A	**232,419**

Table 4. Proposed Wastewater Flow to Connection in Seven Hills Ranch Road (Using CCCSD Assumptions)

Conclusion

In Central San's September 16th analysis of the Spiker Senior Continuing Care Community it was determined that the existing infrastructure was adequate for the proposed wastewater flows expected from this development (See Appendix D). The analysis provided in this memo details the design wastewater flow at each connection as less than that determined by Central San. Therefore, it is reasonable to assume that the potential impacts associated with the projects additional wastewater flow are not significant, and no mitigation is required in accordance with Central San's analysis. A summary is provided in Table 5 below.

Summary of Proposed Average Daily Wastewater Flows			
	Central San Design Wastewater Flow (gpd)	Spieker Design Wastewater Flow (gpd)	Percentage of Central San Flow
Total (N. San Carlos Drive)	**37,447**	**28,923**	**77%**
Total (Seven Hills Ranch Road)	**60,039**	**42,862**	**71%**

Table 5. Summary of Proposed Average Daily Wastewater Flows

Appendices

- Appendix A – Site Vicinity Map
- Appendix B – Preliminary Utility Plan
- Appendix C – Central Contra Costa Sanitary District Definitions, Tables, & Figures
- Appendix D – Central Contra Costa Sanitary District Wastewater Flow Correspondence
- Appendix E – Central Contra Costa Sanitary District Service Maps

APPENDIX A

Site Vicinity Map

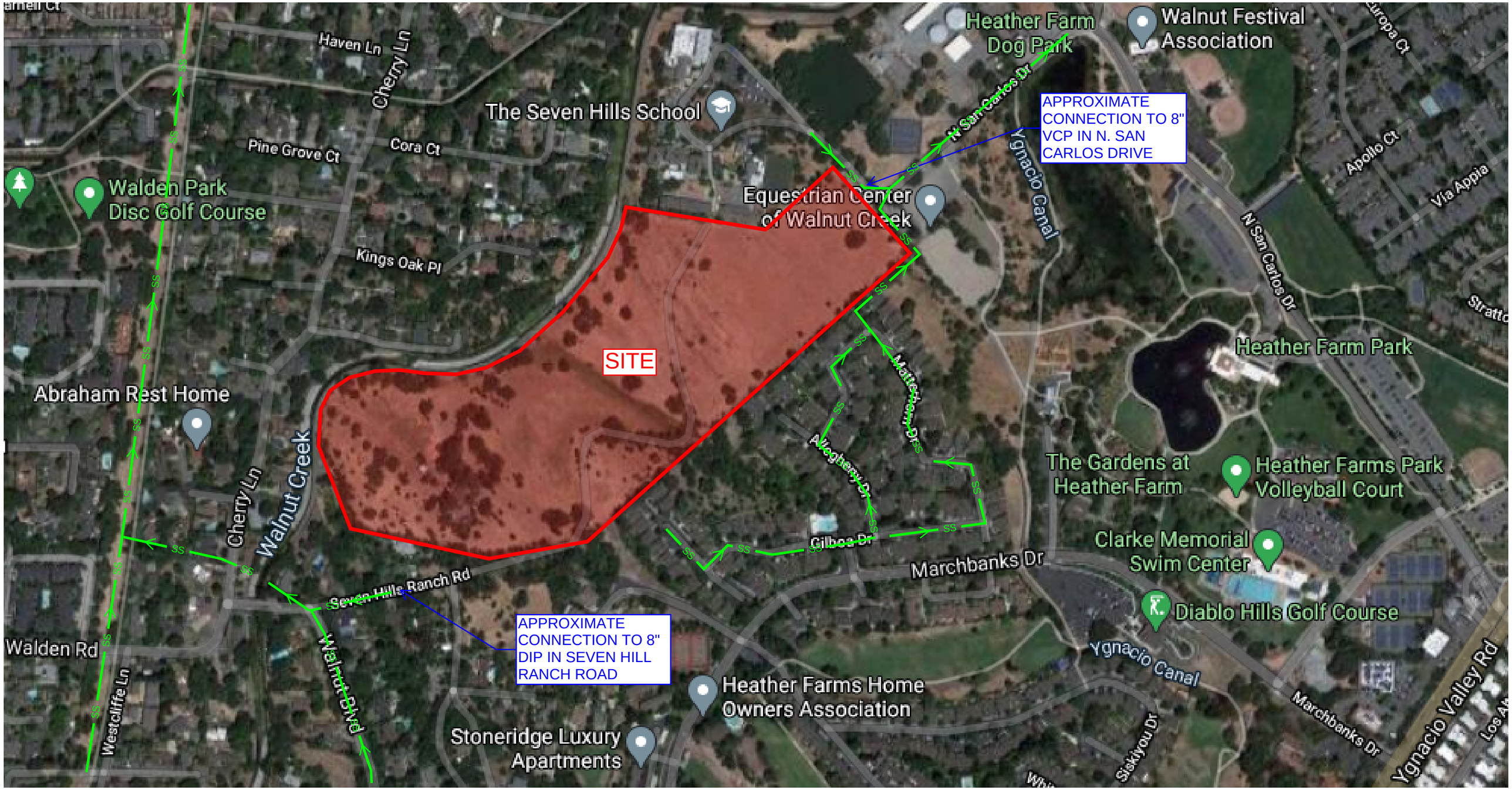

EXHIBIT – SITE VICINITY MAP

SPIEKER SENIOR CONTINUING CARE COMMUNITY 09/23/2020 00X_[NAME].DWG

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APPENDIX B

Preliminary Utility Plan

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Spieker Senior Development Partners

SPIEKER SENIOR CONTINUING CARE COMMUNITY
CONTRA COSTA COUNTY, CA # 2019-1168

TENTATIVE PARCEL MAP
JULY 27TH, 2020

GRAPHIC SCALE
0 100 200

UTILITY PLAN

C5.0

APPENDIX C

Central Contra Costa Sanitary District
Definitions, Tables, & Figures

a capacity study report when Plans are submitted for preliminary review. The capacity study report shall include a table that presents the: proposed pipe diameter, slope, length, Manning's roughness coefficient, full pipe capacity, design capacity and the percentage of design capacity utilized for each proposed sewer reach. The percentage of design capacity utilized shall be calculated by dividing the design flow by the design capacity and multiplying by one hundred (100).

B. Design Flow

1. Equations:

$$\text{Design Flow} = (\text{ABWF} * \text{PF}) + (\text{GWI} * \text{Acres})$$

$$\%\ \text{Design Capacity Utilized} = \text{Design Flow} / \text{Design Capacity} * 100$$

2. Definitions:

a) Peaking Factor (PF) - The peaking factor for the above equation shall be obtained from *Figure 1*, which was derived from the maximum peak flows observed (based on 15-minute flow readings) during a two-week dry period in late January and early February 1985.

b) Average Base Wastewater - see unit flow factors in *Table 4* below

Table 4. Average Base Wastewater Unit Flow Factors

Land Use Category	Units	Unit Flow Factor (gpd/Unit)
Residential, Single Family	Residential Unit	195
Residential, Multiple Family	Residential Unit	105
Commercial, Industrial, Institutional (Government, Schools, Churches, etc.)	1,000 square feet	100

c) Groundwater Infiltration (GWI) - The GWI rate for use in the above “Design Flow” equation shall be 170 gpd/acre, unless Central San provides the Job Engineer with an area-specific rate. This rate is an average for summertime GWI following wet weather seasons with higher-than-average rainfall in sewers constructed in Central San after 1985.

C. Design Criteria for Gravity Sewers

1. Design Capacity - Main and trunk sewers shall be designed per *Figure 1* with the design capacity based on pipes flowing for:

a) main sewers is 2/3 full ($d/D \leq 0.67$); and

b) trunk sewers is full without surcharging ($d/D \leq 1.0$).

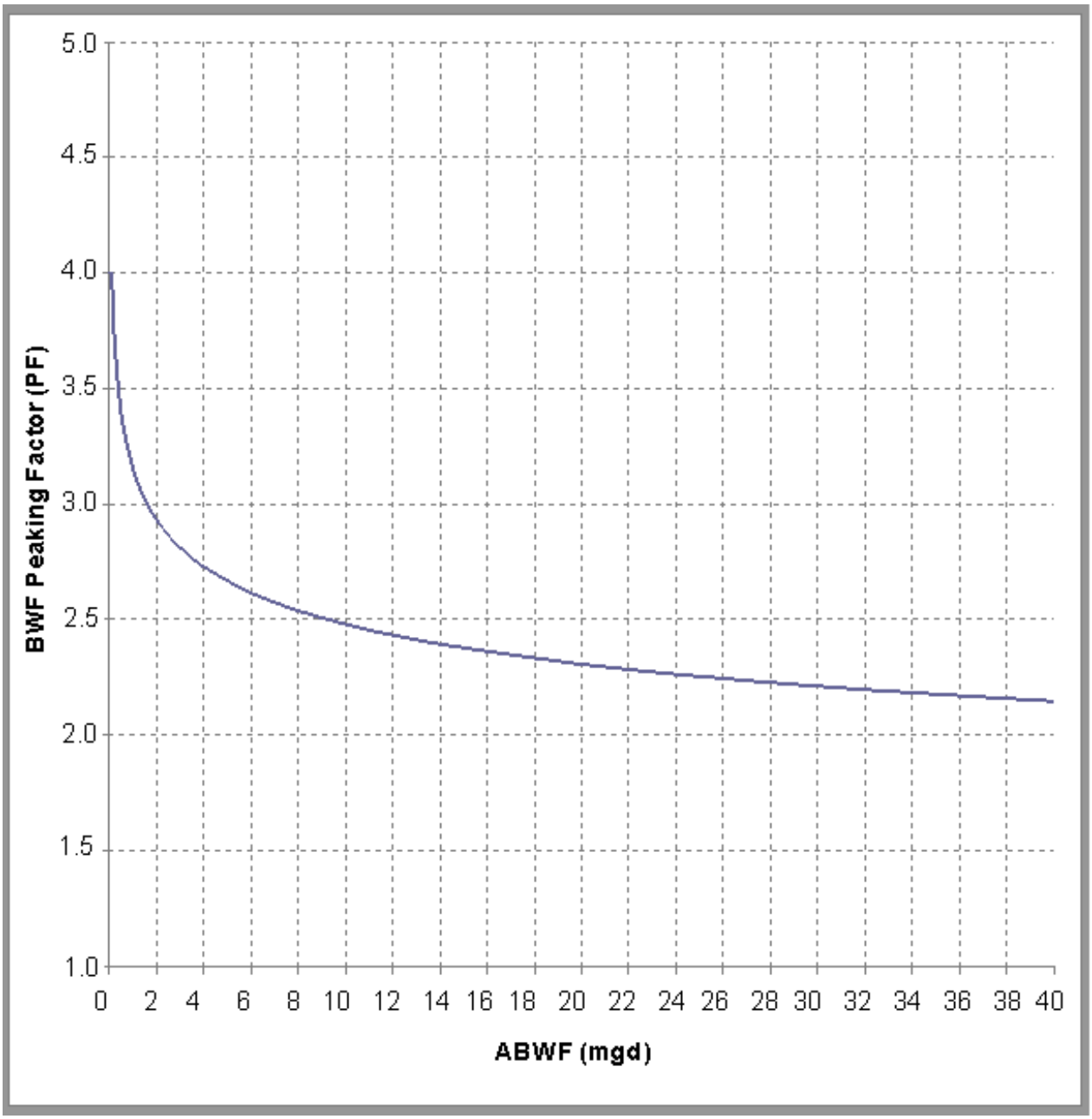

Figure 1. Peak Flow Curve

2. Velocity and Slope: The minimum acceptable slope for sewer pipe is based upon a velocity when flowing full for:

   a) main sewers is 3 ft/s; and

   b) trunk sewers is 2 ft/s.

   The minimum and maximum design flows for each pipe size at the minimum acceptable slope is provided in *Subsection 8-03*. However, Central San may allow a lesser slope and/or a larger pipe size on a case-by-case basis where the elevation of the existing system constrains the available elevation drop.

APPENDIX D

Central Contra Costa Sanitary District
Wastewater Flow Correspondence

From: Russ Leavitt
To: Michael Steele; Sean Tully
Cc: Mark Harris; Norman Dyer; mainline_review; Melody LaBella; Richard Foss
Subject: RE: Sewer Capacity Analysis, GP20-0001: 460 Unit Spieker Senior Continuing Care Community
Date: Wednesday, September 16, 2020 11:53:00 AM

Based on a recently prepared capacity analysis, the sewer system to be used by the project is adequate for the additional wastewater which could be generated by the planned uses. This analysis consisted of a review of Central San's records for capacity and demand projections and took into account the loss of existing wastewater flow generated from the existing single-family residence on site that would be demolished. This analysis is limited, based on its assumption of connection point(s) and split of flow. Please contact our Mainline Review group at mainline_review@centralsan.org to begin coordinating the project's mainline design. Thanks!

RUSSELL B. LEAVITT
Engineering Assistant III
v: (925) 229-7255 f: (925) 228-4624
RLEAVITT@centralsan.org

Central Contra Costa Sanitary District
5019 Imhoff Place, Martinez, California 94553-4392

From: Russ Leavitt <RLeavitt@centralsan.org>
Sent: Thursday, September 17, 2020 7:56 PM
To: Michael Steele
Subject: RE: Sewer Capacity Analysis, GP20-0001: 460 Unit Spieker Senior Continuing Care Community

Here are the land use assumptions that went into our flow modeling program. The program has system pipe sizes, slopes and land use information foe existing and anticipated future growth.

The existing use is one ranch house/barn (assume 1 RUE).

The proposed unit count is:

55 SFR 55 units x 1 Residential Unit Equivalent (RUE)/unit = 55 RUE
305 MFR 305 units x 0.847 RUE/unit = 258.3 RU
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Russ

APPENDIX E

Central Contra Costa Sanitary District
Service Maps

Notes

Major Map Grid
Map Grid
Meter
Recycled Water Material Chang
Recycled Water Main
Active
Inactive (Water only)
Abandoned
Recycled Water Lateral
Active
Inactive (Water only)
Abandoned
Retired
Recycled Water Material Chang
Casing
Material/Lining Change Point
Valve
Junction Structure
Manholes
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Drop Manhole, Tentative
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Manhole, Abandonment Scheduled
Manhole, Renovation Scheduled
Manhole, Tentative
Manhole, Unlocated
Metering Manhole
Shallow Manhole
Shallow Manhole, Tentative
Split Manhole
Sewer Fittings
Bend
Cap
Coupling
Reducer
Wye
Network Structures
Influent Structure
Lift Station
Metering Station
Open Inlet (Holding Basins Only)
Pump Station
Valve Structure
Cleanouts
Cleanout
Flushing Structure

CENTRAL SAN
CENTRAL CONTRA COSTA SANITARY DISTRICT

0 100 200 Feet

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Map Created On: 1/14/2020 Map Projection: WGS84

Central San Map

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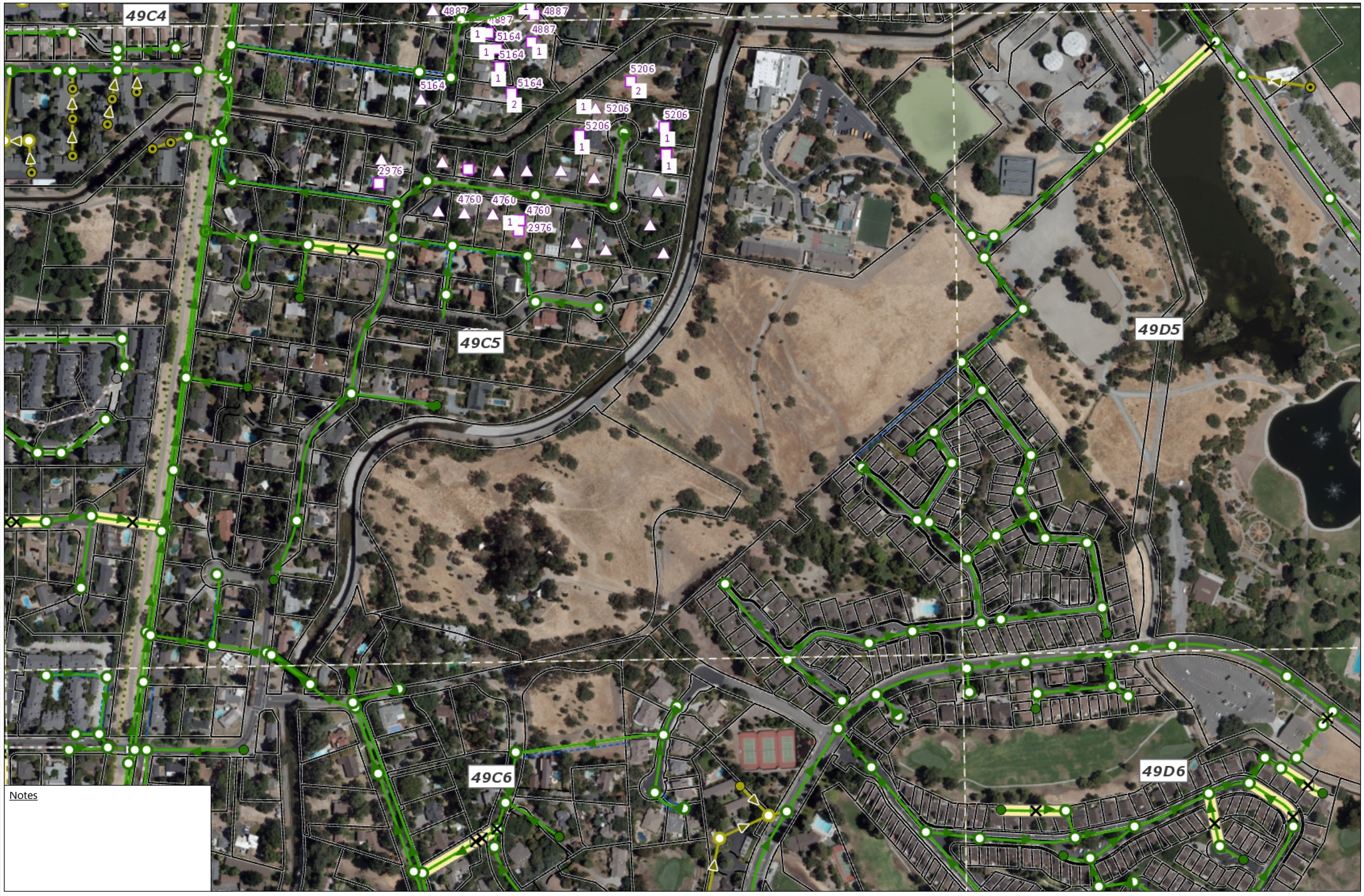

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CENTRAL CONTRA COSTA SANITARY DISTRICT

0 200 400 Feet

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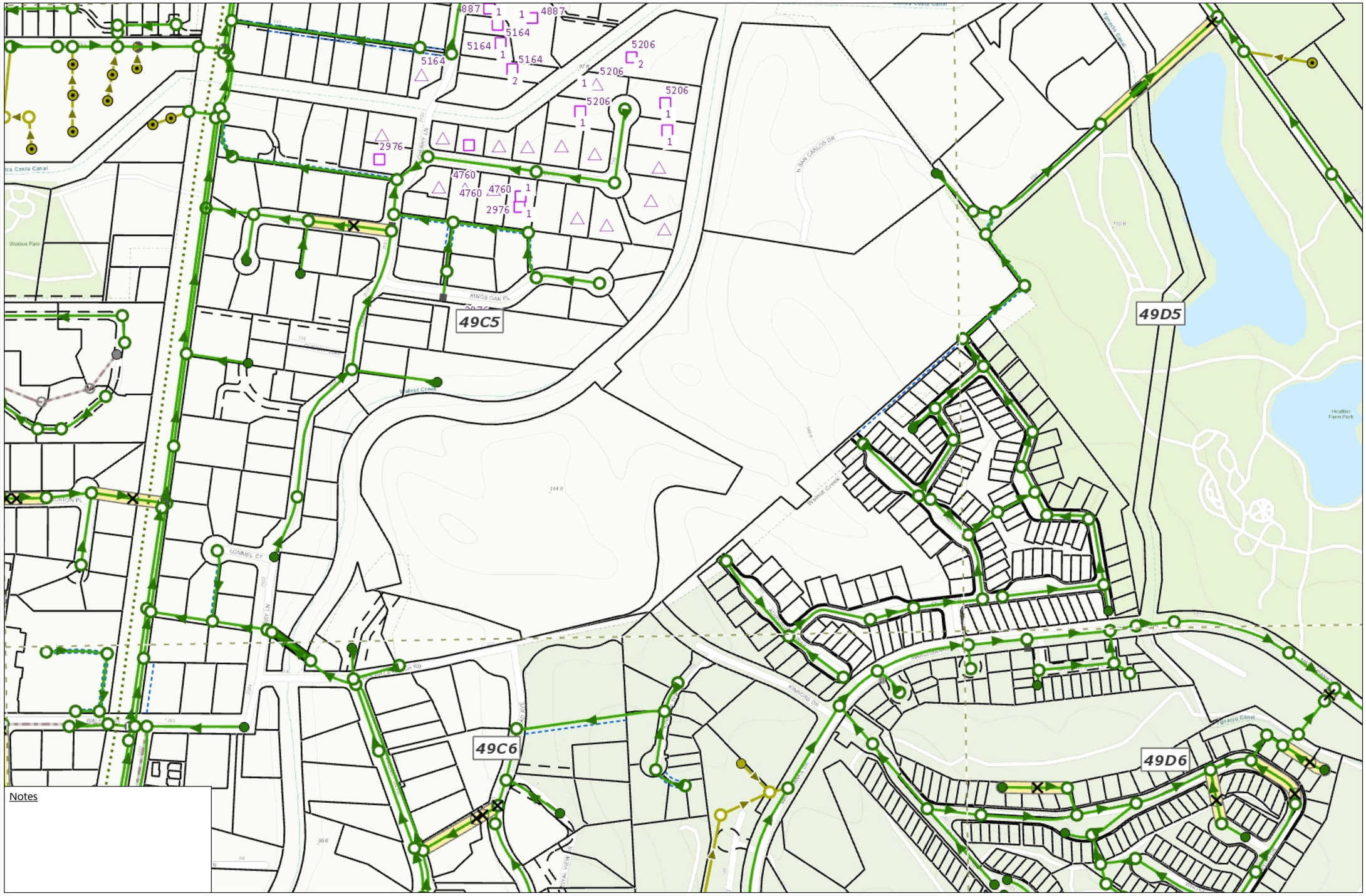
This map is a user generated static output from Central San's Geoportal and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Map Created On: 1/10/2020 Map Projection: WGS84

Central San Map



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