

APPENDIX O
Sewer System Analysis

DEXTER WILSON ENGINEERING, INC.

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CONSULTING ENGINEERS

SEWER SERVICE ANALYSIS FOR THE NORTH RIVER FARMS PROJECT IN THE CITY OF OCEANSIDE

July 19, 2018

**SEWER SERVICE ANALYSIS FOR THE
NORTH RIVER FARMS PROJECT
IN THE CITY OF OCEANSIDE**

July 19, 2018



Prepared by:
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Job No. 930-008

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July 19, 2018

930-008

Integral Communities
2235 Encinitas Blvd, Suite 216
Encinitas, CA 92024

Attention: Ninia Hammond, Project Manager

Subject: Sewer Service Analysis for the North River Farms Project in the City of
Oceanside

Introduction

This report provides an analysis of sewer service for the North River Farms project in the City of Oceanside and was originally dated November 10, 2017. City of Oceanside Water Utilities Department comments are dated March 26, 2018, and along with comment responses are provided in Appendix A for reference.

An additional concern was expressed by the Water Utilities Department in a meeting on July 12, 2018. For the gravity sewer in the southwest area of the proposed project, the Water Utilities Department would not accept sewer slopes less than 0.5 percent. This report shows that the project design complies with this requirement.

The North River Farms project is comprised of multiple land uses including agriculture, parks, commercial, hotel, and residential areas on approximately 176.6 acres. The project proposes a mix of residential dwelling unit densities totaling 689 dwelling units.

Access to the project will be from North River Road. Public and private streets and drives will provide access throughout the project. Proposed elevations within the project range from approximately 100 feet to 225 feet; topography slopes generally from north to south toward the San Luis Rey River. Figure 1 presents a vicinity map for the North River Farms project. Figure 2 presents the proposed land use map.

\\ARTIC\DWG\930008\FIGURES\NRFP_FIGURE 1-VICMAP.DWG 04-21-18 08:05:44 LAYOUT: LAYOUT1

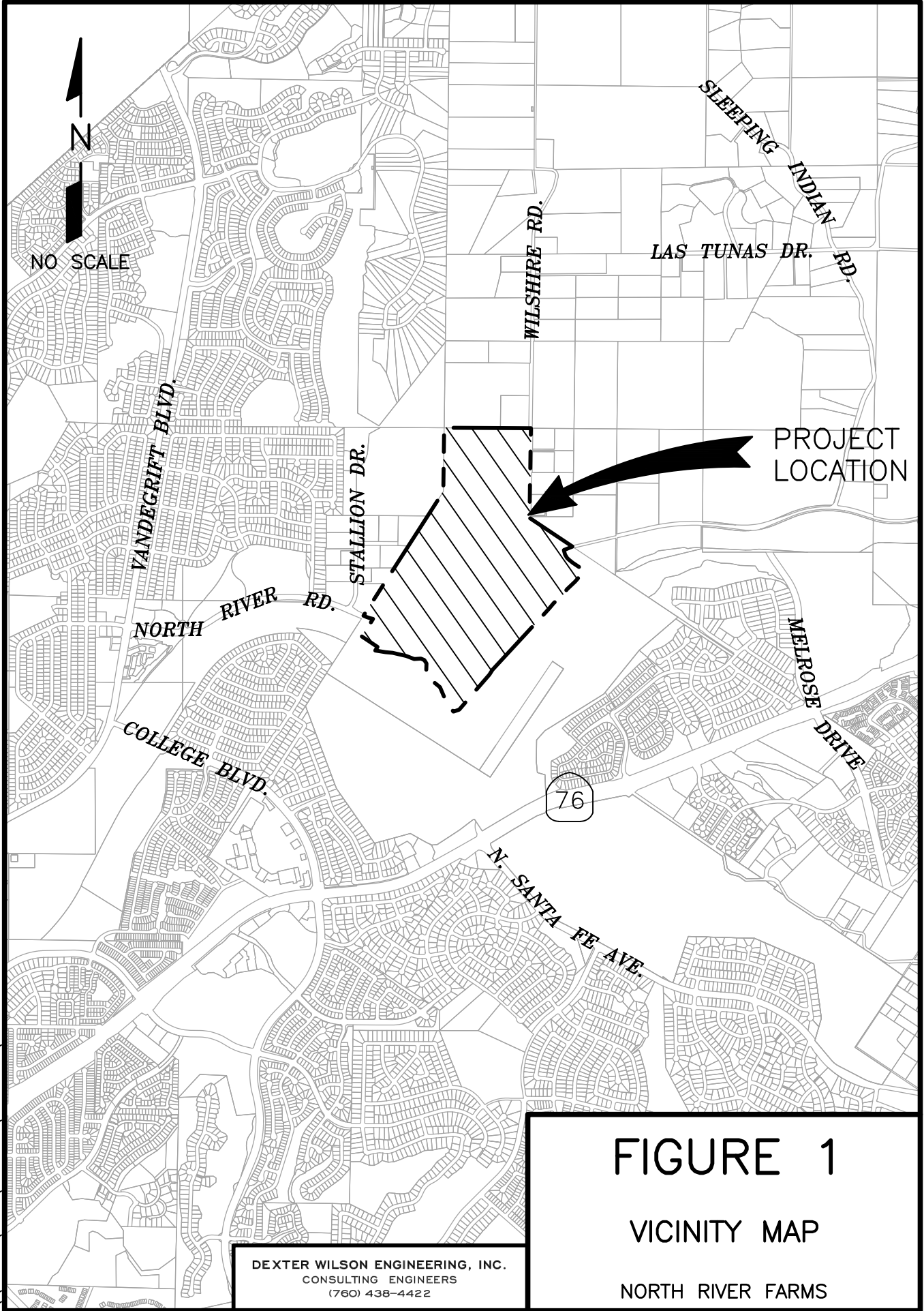
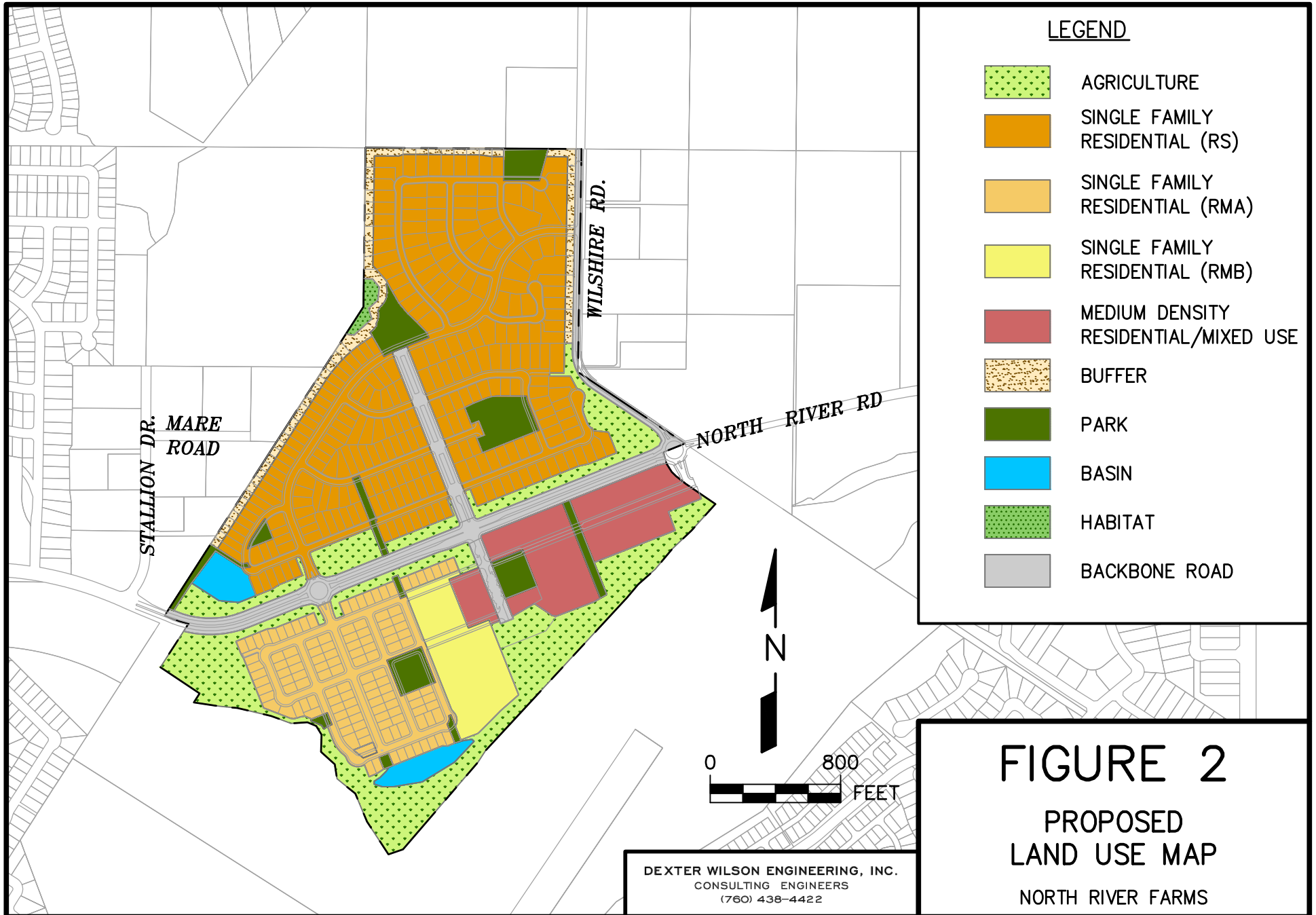


FIGURE 1

VICINITY MAP

NORTH RIVER FARMS

DEXTER WILSON ENGINEERING, INC.
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 (760) 438-4422



Sewer System Design Criteria

Sewer service to the North River Farms project will be provided by the City of Oceanside. The design criteria used for the evaluation of the sewer system serving the North River Farms project is based on Section 3 of the City of Oceanside Design and Construction Manual, revised August 1, 2017. Based on this Manual, sewage generation is estimated based on land use; the flow generation factors in the Manual are consistent with the Wastewater Master Plan, October 2015, Table 3-3. The rates are presented in Table 1.

Land Use	Generation Rate
Low Density Residential	170 gpd/EDU
Mid Density Residential	140 gpd/EDU
Industrial	1,000 gpd/acre
Commercial	1,000 gpd/acre
Hotels	100 gpd/room

Peaking Factors. The peaking factor is identified in the City of Oceanside Design & Construction Manual. For primarily residential developments, to convert average dry weather flows to peak wet weather flows, the peaking factors in Table 2 are used.

Population	Peak Factor
< 500	3.5
500-1,000	2.75
1,000-5,000	2.50
> 5,000	2.00

Manning's "n". The gravity sewer analyses are made using a computer spreadsheet which uses the Manning Equation for all of its calculations. The Manning's "n" used by the computer spreadsheet is held as a constant for all depths in a circular conduit. The value of Manning's "n" used for this study is 0.013.

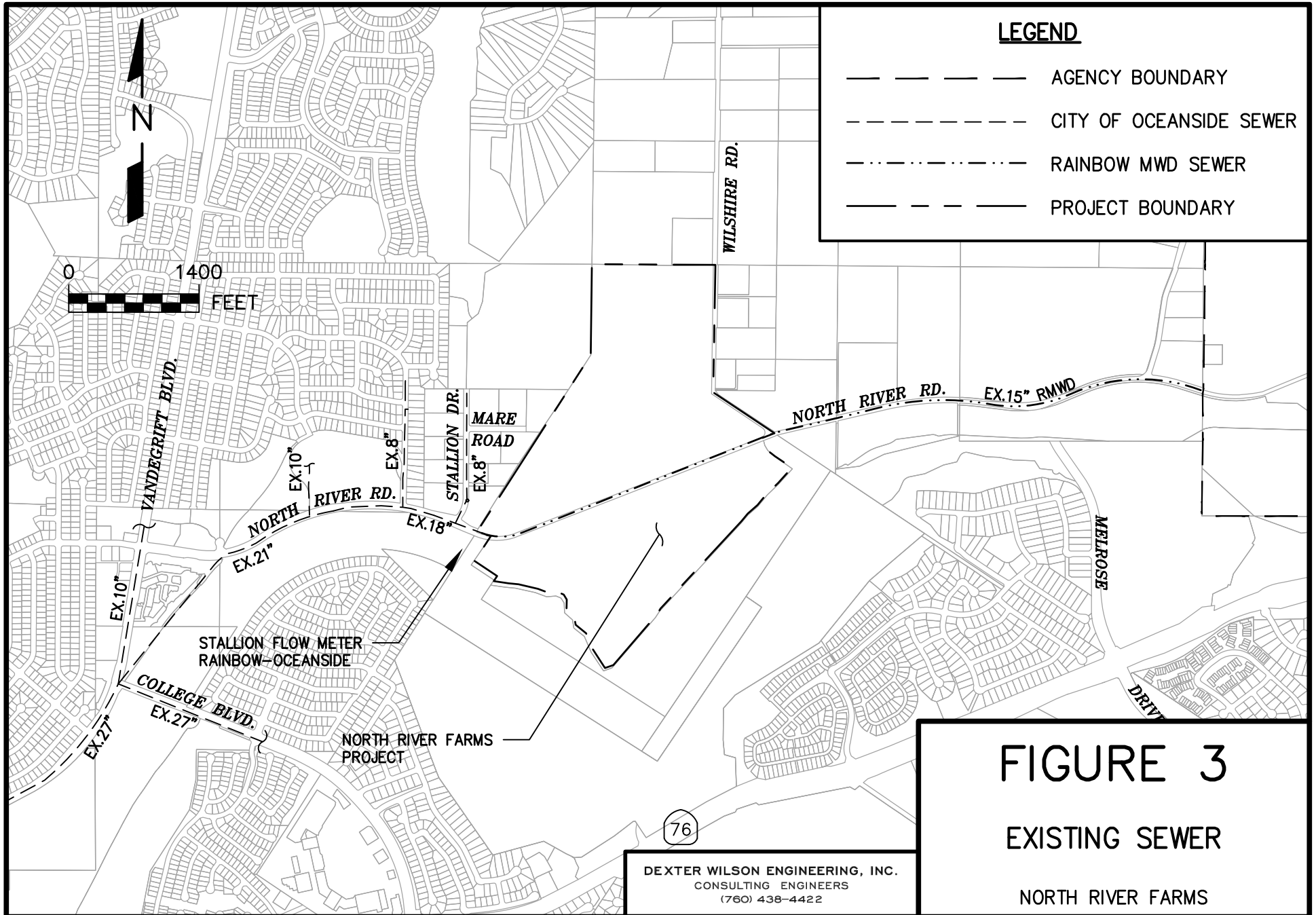
Depth and Velocity of Flow in Gravity Sewers. Gravity sewer lines are designed to convey peak wet weather flow. Pipes that are 10-inches in diameter and smaller are designed to convey this flow with a maximum depth-to-diameter (d/D) ratio of 0.50. Pipes that are 12-inches and larger in diameter are designed for a maximum d/D ratio of 0.67.

Gravity sewer lines are designed to maintain a minimum velocity of 2.0 feet per second at peak flow to prevent the deposition of solids. Where a minimum velocity of 2.0 fps cannot be achieved due to low flows, the minimum sewer slope will be increased to 1.6 percent. Minimum sewer slope is 0.5 percent for local gravity collector sewers. If the minimum slope and minimum velocity cannot be achieved, a deviation will be requested.

Existing Sewer System

Figure 3 presents the existing sewer facilities in the vicinity of the North River Farms project. The existing public sewer system includes the 18-inch through 30-inch North River Road Trunk Sewer which extends east to Stallion Drive. The existing 8-inch collector sewer extending north of North River Road in Stallion Drive is the eastern-most part of the City of Oceanside sewer service area at this time. Sewage collected by the North River Road Trunk Sewer flows west and ultimately flows to the North Valley Lift Station near the intersection of Plumosa Street and North River Road. This lift station conveys the sewage flow in the trunk sewer to the San Luis Rey Wastewater Treatment Plant for treatment and disposal.

At Stallion Drive and North River Road there is a sewer meter (Stallion Meter) for the flows entering the City of Oceanside sewer system from Rainbow Municipal Water District. Rainbow MWD owns a 15-inch gravity sewer in North River Road east of Stallion Drive. This Rainbow MWD 15-inch gravity sewer in North River Road runs through the middle of the North River Farms project area from east to west.



Sewage Generation

Based on the sewage generation factors presented in the City’s Design and Construction Manual and the proposed development plan for the North River Farms project, the estimated sewage generation for the project is calculated using the proposed number of dwelling units combined with the other small miscellaneous land uses. The total estimated average sewage generation for the North River Farms project is calculated below in Table 3.

TABLE 3			
SEWAGE GENERATION FOR NORTH RIVER FARMS			
Land Use	Sewage Generation Factor	Units	Average Sewage Flow, gpd
Low Density Residential	170 gpd/EDU	437	74,290
Mid Density Residential	140 gpd/EDU	252	35,280
Agricultural Acres	0	31.6	0
Parks and Slope Acres	0	19.3	0
Commercial Acres	1,000 gpd/acre	0.7	700
Hotel	100 gpd/room	100	10,000
Backbone Roads	--	13.1	0
Habitat	--	0.6	0
TOTAL			120,270

From Section 3 of the City of Oceanside Design and Construction Manual, revised August 1, 2017, the peaking factor for primarily residential development is based on population. The low density dwelling units are estimated at 3.4 persons per dwelling unit; for the mid density dwelling units, the population density used is 2.8 persons per dwelling unit. The total estimated population is around 2,190 persons. Thus, the peaking factor for total sewage flow from the North River Farms project per Table 2 in this report is 2.5.

The estimated sewage generation for the North River Farms project is calculated below:

Average Day Flow = 120,270 gpd (84 gpm)

Peak Wet Weather Flow = 120,270 gpd x 2.5 = 300,675 gpd (209 gpm)

Overview of Proposed Sewer Facilities

Onsite sewer facilities for the North River Farms project are proposed to include a backbone public gravity sewer collection system. For higher density residential areas there is a potential that local private sewer collection facilities may be used; at this stage of the North River Farms project development planning, such detailed information is not available.

Generally, the sewer collection system for the North River Farms project will direct sewage flow toward North River Road. A sewer collector in North River Road will convey sewage west to tie into the North River Road Trunk Sewer in the intersection of North River Road and Stallion Drive west of the North River Farms project. Figure 4 presents the proposed backbone sewer collection system for the North River Farms development.

The existing 15-inch Rainbow MWD gravity sewer in North River Road is proposed to remain in place up to the western-most intersection within the North River Farms project, Private Drive 'A'. The onsite North River Farms gravity sewer has been designed to connect to North River Road only at Private Drive 'A'. West of this intersection a new gravity sewer line will be constructed to accommodate Rainbow MWD sewer flows plus North River Farms sewer flows.

Onsite Sewer System Analysis

The onsite sewer analysis calculates the depth of flow and flow velocities in the proposed sewer collection system for North River Farms. Onsite sewer line slopes are based on a preliminary design of the sewer system using sewer design guidelines and tentative map finish grades. The tentative map for the North River Farms project (submitted separately from this sewer study) includes manhole rim elevations, inlet and outlet invert elevations, and sewer depth information. This sewer design data includes the requisite 0.2-foot drop through each manhole.

Peak sewage flow from the North River Farms project is 300,675 gpd. Peak sewage flow was used to size the onsite system. The analysis of the onsite sewer system also includes an average sewage flow calculation as desired by the City of Oceanside Utilities Department. These analyses will be discussed in greater detail in the following paragraphs.

New Gravity Sewer in North River Road. The proposed onsite sewer system includes a new gravity sewer in the western portion of North River Road and an extension of this new sewer in North River Road west of the North River Farms project boundary. Instead of connecting directly to the existing 15-inch Rainbow MWD gravity sewer in North River Road, the North River Farms project is proposing to route its onsite sewer system to connect to North River Road only at the western-most intersection (Private Drive 'A') within North River Farms.

The main reason for doing this is to make use of the onsite sewer flows to achieve cleansing velocities in the onsite sewer lines and be able to minimize the slopes of the main sewer lines to retain as much depth for the sewers as possible. The purpose of this approach is to avoid the need for a sewer lift station in the southwest quadrant of the project as will be discussed in the next section of this report.

Thus, east of the intersection of Private Drive 'A' and North River Road, the existing 15-inch Rainbow MWD sewer line will be left in place to convey Rainbow MWD flows. To the west, a new trunk sewer main will be constructed for existing Oceanside flow, existing Rainbow MWD flow, plus North River Farms flow. This new 21-inch sewer is proposed to extend to the existing 21-inch sewer in North River Road which is located approximately 1,500 feet west of Stallion Drive.

No Onsite Sewer Lift Station. Early concept designs of the North River Farms development project showed a sewer lift station in the southwest quadrant of the project. The current onsite sewer system eliminates the need for a sewer lift station by extending a new 21-inch gravity sewer in North River Road from Stallion Drive east to Private Drive 'A' (the western-most intersection) within North River Farms. By setting a sewer slope of 0.2% for the 21-inch sewer, and using a slope of 0.5 percent for the proposed 10-inch gravity sewer south on Private Drive 'A', the gravity sewer depth at the southwest quadrant of the North River Farms project will be deep enough to gravity sewer the area; thus a sewer lift station can be avoided.

In order to avoid a sewer lift station, some sewer system design criteria deviations are being requested. The following is a list of the deviations which are proposed.

1. Minimum sewer slope for a 21-inch line is proposed to be 0.2% instead of the design guide of 0.40%. This is consistent with portions of the existing 21-inch North River Road Trunk Sewer.
2. The drop through the manholes on the 21-inch trunk sewer main in North River Road will be 0.05 feet (1 percent slope) instead of 0.20 feet per the design guide. This is consistent with the design of the existing 21-inch North River Road Trunk Sewer.

Some gravity sewer lines in this southwest quadrant of the North River Farms project as well as in other areas of the project will not achieve 2 fps velocity at peak flow. However, these sewer segments are designed at 1.6 percent slope or greater.

Onsite Analysis Results. Appendix B presents the results of the peak flow onsite gravity sewer analysis; Appendix C presents the results of the average sewage flow calculations in the proposed onsite gravity sewer system. The corresponding Manhole Numbering Diagram is presented as Exhibit A.

Depth of flow in the proposed 8-inch and 10-inch onsite gravity sewers under peak flow does not exceed 0.34 d/D. Flow velocities for the onsite sewers under peak flow range from a maximum of 3.18 fps to a low of 0.81 fps. Low flow velocities are associated with the sewer lines whose slope is at least 1.6 percent. In the case of the sewer showing the lowest flow velocity (MH 457 to MH 453), the sewer is at 2% slope.

The spreadsheet calculation in Appendix B for peak sewage flow highlights in green all the flow velocities which are less than 2 fps but have sewer slopes greater than or equal to 1.6 percent.

Note that the sewer slopes estimated for the southwest quadrant include the requisite 0.2-foot drop through each manhole. The sewer inverts, rim elevations, and depths are shown on the Tentative Map for the North River Farms project.

As noted earlier in this section, Appendix C provides the calculation for the onsite sewer system under Average Day flows.

Offsite Sewer System Analysis

The offsite sewer system analysis encompasses the North River Road Trunk Sewer along North River Road from Stallion Drive to the North Valley Lift Station. In order to determine current flows within the North River Road Trunk Sewer, sewer computer model output data was requested from the City of Oceanside Water Utilities Department. The City prepared a computer model run that models the existing trunk sewer under peak wet weather flows (PWWF). Appendix D presents the model output data. Corresponding Manhole Numbering exhibit is also included in Appendix D.

This City sewer model output data was used to evaluate the impact of the North River Farms project on the existing North River Road Trunk Sewer.

Existing peak wet weather flows for the North River Road Trunk Sewer were taken from the City model output data. There are discrepancies in sewer pipe slopes between the As-Built drawings for segments of the existing North River Road Trunk Sewer and the City's sewer model input data. The pipe sizes are the same in both data sets throughout the trunk sewer. The offsite sewer analysis provided in this report is based on the As-Built sewer slopes and the City model output data peak wet weather flows.

Existing Flows Plus North River Farms Project Buildout. The City model data in Appendix E presents the existing PWWF in the North River Road Trunk Sewer. This analysis indicates that one reach of 18-inch sewer in North River Road is at the design guide maximum allowable depth-to-diameter ratio, 0.67 d/D.

Next, the build-out peak wet weather flow for the North River Farms project was added to the existing peak wet weather flow. This analysis provides an understanding of the impact of the North River Farms project on the capacity of the existing North River Road Trunk Sewer.

Appendix F presents the results of the North River Road Trunk Sewer flow analysis based on City As-Built slopes, City model peak wet weather flows, and build-out flow from North River Farms. The sewer system analysis indicates that the existing 18-inch segments of the North River Road Trunk Sewer do not have sufficient flow capacity to accommodate the North River Farms project. These 18-inch sewer segments in North River Road extend from Stallion Drive west to the west end of Melba Bishop Park; total length of 18-inch sewer which needs upsizing is approximately 1,500 linear feet.

Appendix G presents the same flow analysis with the existing 18-inch North River Road Trunk Sewer segments replaced with 21-inch sewer; the results show that a 21-inch replacement at a slope of 0.20 percent will provide the needed flow capacity for the North River Farms project. Maximum d/D for any reach of the North River Road Trunk Sewer under PWWF plus build-out PWWF for North River Farms with the 21-inch improvement is 0.57 d/D.

North Valley Sewer Lift Station. The North Valley Sewer Lift Station receives all the flow from the North River Road Trunk Sewer and pumps it to the San Luis Rey Water Reclamation Plant. Other parts of the City of Oceanside also flow to the North Valley Sewer Lift Station.

The City's Sewer Master Plan, October 2015, Chapter 8, discusses the City's lift stations and force mains. Table 8.1 on page 8-2 of the Sewer Master Plan summarizes future sewer lift station capacities for the City's lift stations and is provided in Appendix H for reference. For the North Valley Sewer Lift Station, Table 8.1 shows a firm pumping capacity of 8.52 mgd and an existing peak wet weather flow to the lift station of 6.69 mgd. The long term peak wet weather flow to the North Valley Sewer Lift Station is 7.34 mgd.

The peak flow from the North River Farms project is 0.3 mgd. Thus, when adding the North River Farms project to the estimated long term flows to the North Valley Sewer Lift Station, the total flow is 7.64 mgd which is less than the firm pumping capacity of 8.52 mgd.

Therefore, the North Valley Sewer Lift Station has available capacity for the North River Farms project.

Proposed Offsite Sewer Upgrades

The North River Farms project flows can be accommodated by the existing North River Road Trunk Sewer system when added to existing PWWF except for several reaches of existing 18-inch gravity sewer at the easternmost end of the North River Road Trunk Sewer. The North River Farms project will have to upsize to 21-inch diameter these segments of the existing North River Road Trunk Sewer facilities downstream of its project as part of the sewer system improvements for the proposed development of North River Farms. This upsizing extends in North River Road from Stallion Drive west to the west side of Melba Bishop Park. Total length of sewer line upgrade is approximately 1,500 linear feet.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the sewer system analysis prepared for the proposed North River Farms development project in the City of Oceanside.

1. The North River Farms project, consisting of a mix of residential dwelling unit densities totaling 689 dwelling units, some commercial space, a hotel, and parks will obtain sewer service from the City of Oceanside.
2. Sewer generated by the North River Farms project will gravity flow to the existing North River Road Trunk Sewer in North River Road at Stallion Drive.
3. The North River Farms project will construct a new 21-inch gravity sewer in North River Road from its western-most onsite intersection (Private Drive 'A') past Stallion Drive to the existing 21-inch City of Oceanside North River Road Trunk Sewer approximately 1,500 feet west of Stallion Drive.
4. Onsite gravity sewer mains within the North River Farms project are 8-inch and 10-inch diameter.
5. The southwest quadrant of the North River Farms project can be served by gravity sewers with minimum slope of 0.5 percent. This approach will avoid the need for a sewer lift station in the southwest area of North River Farms.
6. The easternmost segments of existing 18-inch North River Road Trunk Sewer do not have available capacity for the build-out of the North River Farms project based on existing PWWF sewer flows. Approximately 1,500 linear feet of new 21-inch gravity sewer will be necessary to replace the existing 18-inch sewer to provide sufficient capacity for the North River Farms project plus existing flows including Rainbow MWD flows.

Ninia Hammond
July 19, 2018
North River Farms Sewer Study

7. The North Valley Sewer Lift Station which receives the flow from the North River Road Trunk Sewer has sufficient pumping capacity for future flow estimates plus peak flow from the North River Farms project.

Thank you for the opportunity to provide sewer system planning services for this project. Please feel free to contact us to further discuss any aspect of the information presented in this sewer service analysis for the North River Farms project.

Dexter Wilson Engineering, Inc.



Andrew Owen, P.E.

AO:sg

Attachments

APPENDIX A

**WATER UTILITIES REPORT REVIEW COMMENTS
AND COMMENT RESPONSES**

DEXTER S. WILSON, P.E.
ANDREW M. OVEN, P.E.
STEPHEN M. NIELSEN, P.E.
NATALIE J. FRASCHETTI, P.E.
STEVEN J. HENDERSON, P.E.

MEMORANDUM

930-008

TO: Greg Keppler, P.E., Principal Engineer, City of Oceanside
Water Utilities Department

FROM: Andrew Oven, P.E., Dexter Wilson Engineering, Inc.

DATE: May 3, 2018

SUBJECT: Response to Comments dated March 26, 2018, on the Sewer
System Analysis for the North River Farms Project

Attached to the memorandum are the Water Utilities Department comments. We will address each comment.

1. The sewer generation rates have been updated to be consistent with the 2015 Wastewater Master Plan and the 2017 Design and Construction Manual.
2. Figure 3 has been updated to match the current tentative map design which is being submitted for City review. The sewer is proposed to be public and all turning radii are satisfied.
3. Figure 3 has been updated to match the current tentative map design. There is no sewer proposed in Wilshire Road.
4. A new gravity sewer is proposed in North River Road beginning at Private Drive 'B' and extending west. The existing 15" Rainbow MWD gravity sewer is proposed to remain in place east of Private Drive 'B'.

5. The onsite gravity sewer slopes in the southwest quadrant of the site have been designed as flat as possible in order to avoid the need for a sewer lift station. Most pipe reaches either achieve 2 fps peak flow velocity (or very close to it) or they are designed with a minimum 1.6 percent slope. The design includes the requisite 0.2-foot drop through each manhole. There are a few reaches where neither the velocity nor the minimum slope is possible. These will need to be reviewed more closely.
6. A discussion of the North Valley Sewer Lift Station has been added to the updated study. Data show that there is sufficient capacity at this lift station for the peak flows from the North River Farms project.
7. Updated calculations are provided in Appendix A for peak sewage flow and Appendix B for average sewage flow.
8. Pipe slope data for the offsite North River Road Trunk Sewer analysis are based on As-Built plans which do not match the City's sewer model slopes. The differences between the As-Built slopes and City model slopes are often significant. Not knowing the source of the City model slopes, we chose to complete the analysis using As-Built slopes.
9. The offsite sewer calculations have been revised to reflect the lower peak sewage flows generated by the proposed North River Farms project. Our calculations are still based on using As-Built slopes.
10. The study includes a discussion on the North Valley Sewer Lift Station.

AO:ps



City of Oceanside

Water Utilities Department

Memorandum

Date: March 26, 2018
To: Greg Keppler, P.E., Principal Engineer
From: Mabel Uyeda, P.E., Senior Civil Engineer
Subject: Sewer Service Analysis for the North River Farms Project
Water Utilities Department Review

BACKGROUND

The report titled, "Sewer Service Analysis for the North River Farms Project" dated November 10, 2017 was submitted to the Water Utilities Department for review and comment.

COMMENTS

The Water Utilities Department has the following comments that will need to be addressed and resubmitted in the sewer service analysis.

1. On page 8, the sewer generation rate shall be in accordance with the 2015 Sewer Master Plan. The peaking factors shall be in accordance with the 2017 Water, Sewer, and Recycled Water Design and Construction Manual. Revise and resubmit average and peak sewer flows.
2. Figure 3, cul-de-sac east of proposed intersection of Street "A" and "D" does not show any proposed sewer. If this sewer is to be public the cul-de-sac must have turning radius large enough for City sewer vactor truck with 48' outside turning radius and 42' long truck. Otherwise it must be private sewer.
3. Figure 3, sewer at Wilshire Road and North River Rd has an acute angle in sewer. This angle is not suitable for sewer flow. It is shown as such in the sewer study, but the Hunsaker & Associates Utility Map does not propose a sewer in the plans. Revise and resubmit sewer study to reflect latest preliminary design layout.
4. Page 11, New Gravity Sewer in North River Road, a parallel sewer dedicated to the development will not be acceptable. The North River Road Trunk Sewer will need to be upsized to accommodate existing and Project flows.
5. Page 11, No Onsite Sewer Lift Station, paragraphs 1, 2, and 3 under this heading; the City would prefer to avoid private sewer lift stations but not at the expense of a proposed gravity sewer system that does not meet the minimum scour velocity of 2 feet per second and shall meet the minimum design slopes. Again, a parallel sewer in North River Road to augment the existing 15" VCP is not acceptable.
6. The North Valley Sewer Lift Station located just southeast of the City's San Luis Rey Water Reclamation Facility is not mentioned at all in the sewer study. The existing sewer lift station is located off of North River Road and east of Plumosa Street. Peak



City of Oceanside

Water Utilities Department

project flows would make its way to this lift station with an approximate potential increase in peak sewer flows of about 0.5 mgd. Upgrades and impacts to this existing sewer lift station must be addressed prior to acceptance of this Project. Revise and resubmit study to include proposed mitigation measures on the potential impacts to the North Valley Lift Station.

7. Appendix B, On-site Sewer Analysis, Average Sewage Flow, revise calculations such that the proposed design meets the City's sewer design criteria. Include calculations for Peak Wet Weather Sewer Flows, as well.
8. Appendix D, E, F, Off-site Sewer Analysis under Existing, Existing + Proposed, and Existing + Proposed with Sewer Upsize; pipe slope data is not consistent with the sewer hydraulic model provided to Dexter Wilson Engineering. Explain why the slope is not consistent.
9. Revise the data as necessary. Additional off-site improvements may be identified as a result of this revision.
10. Include North Valley Sewer Lift Station and force main in sewer study.

Please revise and resubmit the water study for review prior to approval of entitlement package.

APPENDIX B

**ONSITE SEWER ANALYSIS
PEAK SEWAGE FLOW**

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Peak Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
				IN-LINE	TOTAL					M.G.D.	C.F.S.							
FACILITIES NORTH OF NORTH RIVER ROAD (West and Including Private Drive "B")																		
311	309	3.40	4	13.6	13.6	50	680	3.50	2,380	0.002	0.004	8	1.60	0.001116	0.02392	0.036	0.0090	0.92
309	307	3.40	4	13.6	27.2	50	1,360	3.50	4,760	0.005	0.007	8	1.60	0.002232	0.03341	0.050	0.0148	1.12
307	305	3.40	4	13.6	40.8	50	2,040	3.50	7,140	0.007	0.011	8	1.60	0.003348	0.04036	0.061	0.0195	1.28
305	303	3.40	0	0.0	40.8	50	2,040	3.50	7,140	0.007	0.011	8	1.60	0.003348	0.04036	0.061	0.0195	1.28
303	301	3.40	6	20.4	61.2	50	3,060	3.50	10,710	0.011	0.017	8	1.60	0.005022	0.04878	0.073	0.0258	1.44
325	323	3.40	9	30.6	30.6	50	1,530	3.50	5,355	0.005	0.008	8	2.25	0.002117	0.03252	0.049	0.0142	1.31
323	321	3.40	10	34.0	64.6	50	3,230	3.50	11,305	0.011	0.017	8	2.25	0.004470	0.04625	0.069	0.0239	1.65
321	301	3.40	5	17.0	81.6	50	4,080	3.50	14,280	0.014	0.022	8	2.25	0.005646	0.05157	0.077	0.0280	1.77
337	335	3.40	9	30.6	30.6	50	1,530	3.50	5,355	0.005	0.008	8	1.60	0.002511	0.03516	0.053	0.0159	1.17
335	333	3.40	9	30.6	61.2	50	3,060	3.50	10,710	0.011	0.017	8	1.75	0.004801	0.04779	0.072	0.0251	1.49
333	331	3.40	8	27.2	88.4	50	4,420	3.50	15,470	0.015	0.024	8	1.75	0.006935	0.05682	0.085	0.0323	1.67
331	357	3.40	0	0.0	88.4	50	4,420	3.50	15,470	0.015	0.024	8	1.75	0.006935	0.05682	0.085	0.0323	1.67
347	345	3.40	5	17.0	17.0	50	850	3.50	2,975	0.003	0.005	8	2.10	0.001218	0.02497	0.037	0.0096	1.08
345	343	3.40	4	13.6	30.6	50	1,530	3.50	5,355	0.005	0.008	8	3.10	0.001804	0.03003	0.045	0.0126	1.48
343	341	3.40	4	13.6	44.2	50	2,210	3.50	7,735	0.008	0.012	8	3.20	0.002564	0.03550	0.053	0.0162	1.67
341	361	3.40	0	0.0	44.2	50	2,210	3.50	7,735	0.008	0.012	8	3.20	0.002564	0.03550	0.053	0.0162	1.67
365	363	3.40	5	17.0	17.0	50	850	3.50	2,975	0.003	0.005	8	4.00	0.000882	0.02148	0.032	0.0077	1.35
363	361	3.40	5	17.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	5.00	0.001578	0.02824	0.042	0.0115	1.80
361	359	3.40	9	30.6	108.8	50	5,440	3.50	19,040	0.019	0.029	8	2.00	0.007985	0.06081	0.091	0.0357	1.86
359	357	3.40	9	30.6	139.4	50	6,970	3.50	24,395	0.024	0.038	8	2.00	0.010230	0.06842	0.103	0.0425	2.00
357	355	3.40	4	13.6	241.4	50	12,070	3.50	42,245	0.042	0.065	8	2.00	0.017716	0.08909	0.134	0.0625	2.35
355	353	3.40	4	13.6	255.0	50	12,750	3.50	44,625	0.045	0.069	8	2.00	0.018714	0.09146	0.137	0.0649	2.39
353	351	3.40	4	13.6	268.6	50	13,430	3.50	47,005	0.047	0.073	8	2.00	0.019712	0.09380	0.141	0.0673	2.43
351	301	3.40	4	13.6	282.2	50	14,110	3.50	49,385	0.049	0.076	8	2.00	0.020710	0.09602	0.144	0.0697	2.47
301	201	3.40	0	0.0	425.0	50	21,250	3.50	74,375	0.074	0.115	8	2.00	0.031190	0.11720	0.176	0.0929	2.79
Subtotal Units															125.0	Max d/D		0.18

LEGEND

- Pipe Velocity is less than 2.0 fps; however pipe slope is ≥ 1.6%
- Pipe velocity is less than 2.0 fps and pipe slope is less than 1.6%

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Peak Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
				IN-LINE	TOTAL					M.G.D.	C.F.S.							
FACILITIES NORTH OF NORTH RIVER ROAD (East of Private Drive "B")																		
529	527	3.40	3	10.2	10.2	50	510	3.50	1,785	0.002	0.003	8	5.70	0.000443	0.01540	0.023	0.0047	1.32
527	429	3.40	3	10.2	20.4	50	1,020	3.50	3,570	0.004	0.006	8	5.40	0.000911	0.02178	0.033	0.0079	1.58
521	519	3.40	6	20.4	20.4	50	1,020	3.50	3,570	0.004	0.006	8	1.60	0.001674	0.02900	0.043	0.0120	1.04
519	517	3.40	3	10.2	30.6	50	1,530	3.50	5,355	0.005	0.008	8	2.00	0.002246	0.03349	0.050	0.0148	1.26
517	515	3.40	3	10.2	40.8	50	2,040	3.50	7,140	0.007	0.011	8	4.00	0.002117	0.03252	0.049	0.0142	1.75
515	423	3.40	2	6.8	47.6	50	2,380	3.50	8,330	0.008	0.013	8	5.00	0.002209	0.03325	0.050	0.0146	1.98
485	483	3.40	5	17.0	17.0	50	850	3.50	2,975	0.003	0.005	8	2.00	0.001248	0.02529	0.038	0.0098	1.06
483	481	3.40	5	17.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	2.00	0.002495	0.03506	0.053	0.0159	1.31
481	479	3.40	3	10.2	44.2	50	2,210	3.50	7,735	0.008	0.012	8	3.50	0.002452	0.03479	0.052	0.0157	1.72
479	419	3.40	0	0.0	44.2	50	2,210	3.50	7,735	0.008	0.012	8	3.50	0.002452	0.03479	0.052	0.0157	1.72
509	507	3.40	7	23.8	23.8	50	1,190	3.50	4,165	0.004	0.006	8	7.50	0.000902	0.02169	0.033	0.0078	1.86
507	505	3.40	4	13.6	37.4	50	1,870	3.50	6,545	0.007	0.010	8	5.50	0.001655	0.02885	0.043	0.0119	1.92
505	503	3.40	5	17.0	54.4	50	2,720	3.50	9,520	0.010	0.015	8	4.60	0.002632	0.03593	0.054	0.0165	2.01
503	501	3.40	3	10.2	64.6	50	3,230	3.50	11,305	0.011	0.017	8	4.00	0.003352	0.04038	0.061	0.0195	2.02
501	499	3.40	10	34.0	98.6	50	4,930	3.50	17,255	0.017	0.027	8	2.70	0.006228	0.05407	0.081	0.0300	2.00
499	497	3.40	4	13.6	112.2	50	5,610	3.50	19,635	0.020	0.030	8	2.50	0.007365	0.05850	0.088	0.0337	2.03
497	495	3.40	5	17.0	129.2	50	6,460	3.50	22,610	0.023	0.035	8	2.20	0.009041	0.06448	0.097	0.0390	2.02
495	493	3.40	4	13.6	142.8	50	7,140	3.50	24,990	0.025	0.039	8	2.00	0.010480	0.06920	0.104	0.0432	2.01
493	491	3.40	3	10.2	153.0	50	7,650	3.50	26,775	0.027	0.041	8	1.90	0.011520	0.07246	0.109	0.0462	2.02
491	415	3.40	0	0.0	153.0	50	7,650	3.50	26,775	0.027	0.041	8	1.90	0.011520	0.07246	0.109	0.0462	2.02
473	471	3.40	3	10.2	10.2	50	510	3.50	1,785	0.002	0.003	8	1.60	0.000837	0.02101	0.032	0.0074	0.83
471	469	3.40	1	3.4	13.6	50	680	3.50	2,380	0.002	0.004	8	2.00	0.000998	0.02269	0.034	0.0084	0.99
469	467	3.40	6	20.4	34.0	50	1,700	3.50	5,950	0.006	0.009	8	2.00	0.002495	0.03506	0.053	0.0159	1.31
467	465	3.40	9	30.6	64.6	50	3,230	3.50	11,305	0.011	0.017	8	2.00	0.004741	0.04752	0.071	0.0249	1.58
465	409	3.40	4	13.6	78.2	50	3,910	3.50	13,685	0.014	0.021	8	2.30	0.005352	0.05025	0.075	0.0270	1.76
461	407	3.40	6	20.4	20.4	50	1,020	3.50	3,570	0.004	0.006	8	2.60	0.001313	0.02597	0.039	0.0101	1.23
457	453	3.40	2	6.8	6.8	50	340	3.50	1,190	0.001	0.002	8	2.00	0.000499	0.01626	0.024	0.0051	0.81
453	451	3.40	3	10.2	17.0	50	850	3.50	2,975	0.003	0.005	8	6.00	0.000720	0.01969	0.030	0.0068	1.53
451	443	3.40	2	6.8	23.8	50	1,190	3.50	4,165	0.004	0.006	8	10.00	0.000781	0.02043	0.031	0.0071	2.03
447	445	3.40	6	20.4	20.4	50	1,020	3.50	3,570	0.004	0.006	8	2.00	0.001497	0.02760	0.041	0.0111	1.12
445	443	3.40	7	23.8	44.2	50	2,210	3.50	7,735	0.008	0.012	8	2.00	0.003244	0.03977	0.060	0.0190	1.41
443	441	3.40	8	27.2	95.2	50	4,760	3.50	16,660	0.017	0.026	8	1.70	0.007578	0.05933	0.089	0.0344	1.68
441	405	3.40	8	27.2	122.4	50	6,120	3.50	21,420	0.021	0.033	8	1.70	0.009743	0.06690	0.100	0.0411	1.81
Subtotal Units 143.0															Max d/D 0.11			

LEGEND

- Pipe Velocity is less than 2.0 fps; however pipe slope is ≥ 1.6%
- Pipe velocity is less than 2.0 fps and pipe slope is less than 1.6%

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Peak Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 3 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)		
				IN-LINE	TOTAL					M.G.D.	C.F.S.									
433	431	3.40	0	0.0	0.0	50	0	3.50	0	0.000	0.000	8	5.00	0.000000	NA	NA	NA	NA		
431	429	3.40	3	10.2	10.2	50	510	3.50	1,785	0.002	0.003	8	5.00	0.000473	0.01587	0.024	0.0049	1.26		
429	427	3.40	1	3.4	34.0	50	1,700	3.50	5,950	0.006	0.009	8	6.80	0.001353	0.02639	0.040	0.0103	2.00		
427	425	3.40	0	0.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	6.80	0.001353	0.02639	0.040	0.0103	2.00		
425	423	3.40	1	3.4	37.4	50	1,870	3.50	6,545	0.007	0.010	8	6.30	0.001546	0.02799	0.042	0.0113	2.01		
423	421	3.40	1	3.4	88.4	50	4,420	3.50	15,470	0.015	0.024	8	5.00	0.004103	0.04432	0.066	0.0224	2.40		
421	419	3.40	0	0.0	88.4	50	4,420	3.50	15,470	0.015	0.024	8	3.00	0.005297	0.05001	0.075	0.0268	2.01		
419	417	3.40	0	0.0	132.6	50	6,630	3.50	23,205	0.023	0.036	8	3.00	0.007946	0.06068	0.091	0.0356	2.27		
417	415	3.40	3	10.2	142.8	50	7,140	3.50	24,990	0.025	0.039	8	2.00	0.010480	0.06920	0.104	0.0432	2.01		
415	413	3.40	2	6.8	302.6	50	15,130	3.50	52,955	0.053	0.082	8	1.40	0.026543	0.10832	0.162	0.0829	2.22		
413	411	3.40	2	6.8	309.4	50	15,470	3.50	54,145	0.054	0.084	8	2.00	0.022706	0.10043	0.151	0.0744	2.53		
411	409	3.40	0	0.0	309.4	50	15,470	3.50	54,145	0.054	0.084	8	2.00	0.022706	0.10043	0.151	0.0744	2.53		
409	407	3.40	0	0.0	387.6	50	19,380	3.50	67,830	0.068	0.105	8	2.00	0.028445	0.11205	0.168	0.0871	2.71		
407	405	3.40	0	0.0	408.0	50	20,400	3.50	71,400	0.071	0.110	8	3.00	0.024448	0.10406	0.156	0.0783	3.18		
405	403	3.40	0	0.0	530.4	50	26,520	2.75	72,930	0.073	0.113	8	0.90	0.045592	0.14120	0.212	0.1214	2.09		
403	401	3.40	0	0.0	530.4	50	26,520	2.75	72,930	0.073	0.113	8	0.90	0.045592	0.14120	0.212	0.1214	2.09		
401	223	3.40	0	0.0	530.4	50	26,520	2.75	72,930	0.073	0.113	8	0.90	0.045592	0.14120	0.212	0.1214	2.09		
FACILITIES SOUTH OF NORTH RIVER ROAD																				
277	205	3.40	12	40.8	40.8	50	2,040	3.50	7,140	0.007	0.011	8	1.60	0.003348	0.04036	0.061	0.0195	1.28		
291	204	3.40	10	34.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	1.60	0.002790	0.03692	0.055	0.0171	1.21		
205	204	3.40	5	17.0	57.8	50	2,890	3.50	10,115	0.010	0.016	8	1.60	0.004743	0.04753	0.071	0.0249	1.42		
204	203	3.40	5	17.0	108.8	50	5,440	3.50	19,040	0.019	0.029	8	1.60	0.008927	0.06409	0.096	0.0386	1.72		
280	271	3.40	6	20.4	20.4	50	1,020	3.50	3,570	0.004	0.006	8	1.60	0.001674	0.02900	0.043	0.0120	1.04		
274	271	3.40	4	13.6	13.6	50	680	3.50	2,380	0.002	0.004	8	3.30	0.000777	0.02039	0.031	0.0071	1.17		
271	207	3.40	0	0.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	1.60	0.002790	0.03692	0.055	0.0171	1.21		
254	253	3.40	5	17.0	17.0	50	850	3.50	2,975	0.003	0.005	8	2.00	0.001248	0.02529	0.038	0.0098	1.06		
212	211	3.40	4	13.6	13.6	50	680	3.50	2,380	0.002	0.004	8	1.60	0.001116	0.02392	0.036	0.0090	0.92		
211	207	3.40	0	0.0	13.6	50	680	3.50	2,380	0.002	0.004	8	1.60	0.001116	0.02392	0.036	0.0090	0.92		
212	256	3.40	6	20.4	20.4	50	1,020	3.50	3,570	0.004	0.006	8	1.60	0.001674	0.02900	0.043	0.0120	1.04		
Subtotal Units			70.0																Max d/D	0.21

LEGEND

- Pipe Velocity is less than 2.0 fps; however pipe slope is ≥ 1.6%
- Pipe velocity is less than 2.0 fps and pipe slope is less than 1.6%

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Peak Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 4 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
				IN-LINE	TOTAL					M.G.D.	C.F.S.							
214	208	2.80	30	84.0	84.0	50	4,200	3.50	14,700	0.015	0.023	8	1.60	0.006892	0.05666	0.085	0.0322	1.59
210	209	3.40	10	34.0	34.0	50	1,700	3.50	5,950	0.006	0.009	8	1.60	0.002790	0.03692	0.055	0.0171	1.21
215	208	3.40	7	23.8	23.8	50	1,190	3.50	4,165	0.004	0.006	8	1.60	0.001953	0.03121	0.047	0.0134	1.09
208	209	3.40	4	13.6	121.4	50	6,070	3.50	21,245	0.021	0.033	8	1.60	0.009961	0.06758	0.101	0.0417	1.77
209	203	3.40	3	10.2	165.6	50	8,280	3.50	28,980	0.029	0.045	8	2.20	0.011588	0.07267	0.109	0.0464	2.17
235	232	2.80	41	114.8	114.8	50	5,740	3.50	20,090	0.020	0.031	8	1.60	0.009419	0.06580	0.099	0.0401	1.74
232	229	2.80	50	140.0	254.8	50	12,740	3.50	44,590	0.045	0.069	8	1.60	0.020907	0.09646	0.145	0.0701	2.21
229	226	2.80	46.5	130.2	385.0	50	19,250	3.50	67,375	0.067	0.104	8	1.20	0.036476	0.12646	0.190	0.1037	2.26
226	223	2.80	60	168.0	553.0	50	27,650	2.75	76,038	0.076	0.118	8	0.80	0.050418	0.14847	0.223	0.1304	2.03
223	220	3.40	28	95.2	1178.6	50	58,930	2.50	147,325	0.147	0.228	10	0.50	0.068151	0.21595	0.259	0.1615	2.03
220	217	2.80	15	42.0	1220.6	50	61,030	2.50	152,575	0.153	0.236	10	0.50	0.070579	0.21984	0.264	0.1656	2.05
217	213	3.40	0	0.0	1220.6	50	61,030	2.50	152,575	0.153	0.236	10	0.50	0.070579	0.21984	0.264	0.1656	2.05
213	262	3.40	0	0.0	1220.6	50	61,030	2.50	152,575	0.153	0.236	10	0.50	0.070579	0.21984	0.264	0.1656	2.05
262	259	3.40	3	10.2	1230.8	50	61,540	2.50	153,850	0.154	0.238	10	0.50	0.071169	0.22078	0.265	0.1666	2.06
259	256	2.80	92	257.6	1488.4	50	74,420	2.50	186,050	0.186	0.288	10	0.50	0.086064	0.24334	0.292	0.1908	2.17
256	253	3.40	14	47.6	1556.4	50	77,820	2.50	194,550	0.195	0.301	10	0.50	0.089996	0.24899	0.299	0.1971	2.20
253	250	3.40	7	23.8	1597.2	50	79,860	2.50	199,650	0.200	0.309	10	0.50	0.092355	0.25234	0.303	0.2008	2.22
250	207	3.40	8	27.2	1624.4	50	81,220	2.50	203,050	0.203	0.314	10	0.50	0.093928	0.25456	0.305	0.2032	2.23
207	203	3.40	10	34.0	1706.0	50	85,300	2.50	213,250	0.213	0.330	10	0.50	0.098647	0.26113	0.313	0.2105	2.26
203	201	3.40	0	0.0	1980.4	50	99,020	2.50	247,550	0.248	0.383	10	0.50	0.114513	0.28231	0.339	0.2343	2.35

Subtotal Units 428.5

Max d/D 0.34

TOTAL UNITS 766.5

NORTH RIVER ROAD TO STALLION DRIVE																		
101	201						1,500,000	1.59	2,385,000	2.385	3.690	15	6.00	0.108022	0.41073	0.329	0.2247	10.51
201	151						1,620,270	2.00	2,706,925	2.707	4.189	21	0.20	0.273771	0.96856	0.553	0.4465	3.06
															Max d/D	0.55		

LEGEND

- Pipe Velocity is less than 2.0 fps; however pipe slope is ≥ 1.6%
- Pipe velocity is less than 2.0 fps and pipe slope is less than 1.6%

APPENDIX C

**ONSITE SEWER ANALYSIS
AVERAGE SEWAGE FLOW**

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Average Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW* (gpd)	PEAK FLOW* (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
				IN-LINE	TOTAL					M.G.D.	C.F.S.							
FACILITIES NORTH OF NORTH RIVER ROAD (West and Including Private Drive "B")																		
311	309	3.40	4	13.6	13.6	50	680	1.00	680	0.001	0.001	8	1.60	0.000319	0.01347	0.020	0.0038	0.63
309	307	3.40	4	13.6	27.2	50	1,360	1.00	1,360	0.001	0.002	8	1.60	0.000638	0.01841	0.028	0.0061	0.77
307	305	3.40	4	13.6	40.8	50	2,040	1.00	2,040	0.002	0.003	8	1.60	0.000956	0.02225	0.033	0.0081	0.87
305	303	3.40	0	0.0	40.8	50	2,040	1.00	2,040	0.002	0.003	8	1.60	0.000956	0.02225	0.033	0.0081	0.87
303	301	3.40	6	20.4	61.2	50	3,060	1.00	3,060	0.003	0.005	8	1.60	0.001435	0.02710	0.041	0.0108	0.99
325	323	3.40	9	30.6	30.6	50	1,530	1.00	1,530	0.002	0.002	8	2.25	0.000605	0.01791	0.027	0.0059	0.90
323	321	3.40	10	34.0	64.6	50	3,230	1.00	3,230	0.003	0.005	8	2.25	0.001277	0.02559	0.038	0.0099	1.13
321	301	3.40	5	17.0	81.6	50	4,080	1.00	4,080	0.004	0.006	8	2.25	0.001613	0.02852	0.043	0.0117	1.22
337	335	3.40	9	30.6	30.6	50	1,530	1.00	1,530	0.002	0.002	8	1.60	0.000717	0.01965	0.029	0.0067	0.79
335	333	3.40	9	30.6	61.2	50	3,060	1.00	3,060	0.003	0.005	8	1.75	0.001372	0.02658	0.040	0.0105	1.02
333	331	3.40	8	27.2	88.4	50	4,420	1.00	4,420	0.004	0.007	8	1.75	0.001982	0.03144	0.047	0.0135	1.14
331	357	3.40	0	0.0	88.4	50	4,420	1.00	4,420	0.004	0.007	8	1.75	0.001982	0.03144	0.047	0.0135	1.14
347	345	3.40	5	17.0	17.0	50	850	1.00	850	0.001	0.001	8	2.10	0.000348	0.01392	0.021	0.0040	0.74
345	343	3.40	4	13.6	30.6	50	1,530	1.00	1,530	0.002	0.002	8	3.10	0.000515	0.01652	0.025	0.0052	1.02
343	341	3.40	4	13.6	44.2	50	2,210	1.00	2,210	0.002	0.003	8	3.20	0.000733	0.01989	0.030	0.0068	1.12
341	361	3.40	0	0.0	44.2	50	2,210	1.00	2,210	0.002	0.003	8	3.20	0.000733	0.01989	0.030	0.0068	1.12
365	363	3.40	5	17.0	17.0	50	850	1.00	850	0.001	0.001	8	4.00	0.000252	0.01172	0.018	0.0031	0.95
363	361	3.40	5	17.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	5.00	0.000451	0.01552	0.023	0.0047	1.25
361	359	3.40	9	30.6	108.8	50	5,440	1.00	5,440	0.005	0.008	8	2.00	0.002281	0.03372	0.051	0.0150	1.27
359	357	3.40	9	30.6	139.4	50	6,970	1.00	6,970	0.007	0.011	8	2.00	0.002923	0.03775	0.057	0.0177	1.37
357	355	3.40	4	13.6	241.4	50	12,070	1.00	12,070	0.012	0.019	8	2.00	0.005062	0.04896	0.073	0.0260	1.62
355	353	3.40	4	13.6	255.0	50	12,750	1.00	12,750	0.013	0.020	8	2.00	0.005347	0.05023	0.075	0.0270	1.65
353	351	3.40	4	13.6	268.6	50	13,430	1.00	13,430	0.013	0.021	8	2.00	0.005632	0.05151	0.077	0.0280	1.67
351	301	3.40	4	13.6	282.2	50	14,110	1.00	14,110	0.014	0.022	8	2.00	0.005917	0.05278	0.079	0.0290	1.70
301	201	3.40	0	0.0	425.0	50	21,250	1.00	21,250	0.021	0.033	8	2.00	0.008911	0.06403	0.096	0.0386	1.92
Subtotal Units															125.0	Max d/D		0.10

*Note: Columns labeled with PEAK FLOW are equivalent to AVERAGE FLOW as the peaking factor has been set to 1

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Average Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW* (gpd)	PEAK FLOW* (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)		
				IN-LINE	TOTAL					M.G.D.	C.F.S.									
FACILITIES NORTH OF NORTH RIVER ROAD (East of Private Drive "B")																				
529	527	3.40	3	10.2	10.2	50	510	1.00	510	0.001	0.001	8	5.70	0.000127	0.00824	0.012	0.0019	0.95		
527	429	3.40	3	10.2	20.4	50	1,020	1.00	1,020	0.001	0.002	8	5.40	0.000260	0.01195	0.018	0.0032	1.11		
521	519	3.40	6	20.4	20.4	50	1,020	1.00	1,020	0.001	0.002	8	1.60	0.000478	0.01594	0.024	0.0050	0.72		
519	517	3.40	3	10.2	30.6	50	1,530	1.00	1,530	0.002	0.002	8	2.00	0.000642	0.01847	0.028	0.0062	0.86		
517	515	3.40	3	10.2	40.8	50	2,040	1.00	2,040	0.002	0.003	8	4.00	0.000605	0.01791	0.027	0.0059	1.20		
515	423	3.40	2	6.8	47.6	50	2,380	1.00	2,380	0.002	0.004	8	5.00	0.000631	0.01831	0.027	0.0061	1.36		
485	483	3.40	5	17.0	17.0	50	850	1.00	850	0.001	0.001	8	2.00	0.000356	0.01405	0.021	0.0040	0.73		
483	481	3.40	5	17.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	2.00	0.000713	0.01958	0.029	0.0067	0.88		
481	479	3.40	3	10.2	44.2	50	2,210	1.00	2,210	0.002	0.003	8	3.50	0.000701	0.01939	0.029	0.0066	1.16		
479	419	3.40	0	0.0	44.2	50	2,210	1.00	2,210	0.002	0.003	8	3.50	0.000701	0.01939	0.029	0.0066	1.16		
509	507	3.40	7	23.8	23.8	50	1,190	1.00	1,190	0.001	0.002	8	7.50	0.000258	0.01188	0.018	0.0032	1.30		
507	505	3.40	4	13.6	37.4	50	1,870	1.00	1,870	0.002	0.003	8	5.50	0.000473	0.01586	0.024	0.0049	1.33		
505	503	3.40	5	17.0	54.4	50	2,720	1.00	2,720	0.003	0.004	8	4.60	0.000752	0.02013	0.030	0.0070	1.36		
503	501	3.40	3	10.2	64.6	50	3,230	1.00	3,230	0.003	0.005	8	4.00	0.000958	0.02227	0.033	0.0081	1.38		
501	499	3.40	10	34.0	98.6	50	4,930	1.00	4,930	0.005	0.008	8	2.70	0.001779	0.02984	0.045	0.0125	1.37		
499	497	3.40	4	13.6	112.2	50	5,610	1.00	5,610	0.006	0.009	8	2.50	0.002104	0.03241	0.049	0.0141	1.38		
497	495	3.40	5	17.0	129.2	50	6,460	1.00	6,460	0.006	0.010	8	2.20	0.002583	0.03562	0.053	0.0162	1.38		
495	493	3.40	4	13.6	142.8	50	7,140	1.00	7,140	0.007	0.011	8	2.00	0.002994	0.03820	0.057	0.0180	1.38		
493	491	3.40	3	10.2	153.0	50	7,650	1.00	7,650	0.008	0.012	8	1.90	0.003291	0.04006	0.060	0.0192	1.38		
491	415	3.40	0	0.0	153.0	50	7,650	1.00	7,650	0.008	0.012	8	1.90	0.003291	0.04006	0.060	0.0192	1.38		
473	471	3.40	3	10.2	10.2	50	510	1.00	510	0.001	0.001	8	1.60	0.000239	0.01136	0.017	0.0030	0.59		
471	469	3.40	1	3.4	13.6	50	680	1.00	680	0.001	0.001	8	2.00	0.000285	0.01264	0.019	0.0035	0.69		
469	467	3.40	6	20.4	34.0	50	1,700	1.00	1,700	0.002	0.003	8	2.00	0.000713	0.01958	0.029	0.0067	0.88		
467	465	3.40	9	30.6	64.6	50	3,230	1.00	3,230	0.003	0.005	8	2.00	0.001355	0.02640	0.040	0.0104	1.09		
465	409	3.40	4	13.6	78.2	50	3,910	1.00	3,910	0.004	0.006	8	2.30	0.001529	0.02785	0.042	0.0112	1.21		
461	407	3.40	6	20.4	20.4	50	1,020	1.00	1,020	0.001	0.002	8	2.60	0.000375	0.01434	0.022	0.0042	0.85		
457	453	3.40	2	6.8	6.8	50	340	1.00	340	0.000	0.001	8	2.00	0.000143	0.00868	0.013	0.0020	0.58		
453	451	3.40	3	10.2	17.0	50	850	1.00	850	0.001	0.001	8	6.00	0.000206	0.01044	0.016	0.0027	1.11		
451	443	3.40	2	6.8	23.8	50	1,190	1.00	1,190	0.001	0.002	8	10.00	0.000223	0.01092	0.016	0.0028	1.46		
447	445	3.40	6	20.4	20.4	50	1,020	1.00	1,020	0.001	0.002	8	2.00	0.000428	0.01516	0.023	0.0046	0.78		
445	443	3.40	7	23.8	44.2	50	2,210	1.00	2,210	0.002	0.003	8	2.00	0.000927	0.02195	0.033	0.0080	0.97		
443	441	3.40	8	27.2	95.2	50	4,760	1.00	4,760	0.005	0.007	8	1.70	0.002165	0.03290	0.049	0.0144	1.15		
441	405	3.40	8	27.2	122.4	50	6,120	1.00	6,120	0.006	0.009	8	1.70	0.002784	0.03688	0.055	0.0171	1.25		
Subtotal Units															143.0	Max d/D		0.06		

*Note: Columns labeled with PEAK FLOW are equivalent to AVERAGE FLOW as the peaking factor has been set to 1

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Average Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 3 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW* (gpd)	PEAK FLOW* (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)		
				IN-LINE	TOTAL					M.G.D.	C.F.S.									
433	431	3.40	0	0.0	0.0	50	0	1.00	0	0.000	0.000	8	5.00	0.000000	NA	NA	NA	NA		
431	429	3.40	3	10.2	10.2	50	510	1.00	510	0.001	0.001	8	5.00	0.000135	0.00848	0.013	0.0020	0.91		
429	427	3.40	1	3.4	34.0	50	1,700	1.00	1,700	0.002	0.003	8	6.80	0.000387	0.01452	0.022	0.0043	1.39		
427	425	3.40	0	0.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	6.80	0.000387	0.01452	0.022	0.0043	1.39		
425	423	3.40	1	3.4	37.4	50	1,870	1.00	1,870	0.002	0.003	8	6.30	0.000442	0.01538	0.023	0.0047	1.39		
423	421	3.40	1	3.4	88.4	50	4,420	1.00	4,420	0.004	0.007	8	5.00	0.001172	0.02450	0.037	0.0093	1.65		
421	419	3.40	0	0.0	88.4	50	4,420	1.00	4,420	0.004	0.007	8	3.00	0.001513	0.02773	0.042	0.0112	1.38		
419	417	3.40	0	0.0	132.6	50	6,630	1.00	6,630	0.007	0.010	8	3.00	0.002270	0.03365	0.050	0.0149	1.55		
417	415	3.40	3	10.2	142.8	50	7,140	1.00	7,140	0.007	0.011	8	2.00	0.002994	0.03820	0.057	0.0180	1.38		
415	413	3.40	2	6.8	302.6	50	15,130	1.00	15,130	0.015	0.023	8	1.40	0.007584	0.05935	0.089	0.0345	1.53		
413	411	3.40	2	6.8	309.4	50	15,470	1.00	15,470	0.015	0.024	8	2.00	0.006488	0.05508	0.083	0.0309	1.74		
411	409	3.40	0	0.0	309.4	50	15,470	1.00	15,470	0.015	0.024	8	2.00	0.006488	0.05508	0.083	0.0309	1.74		
409	407	3.40	0	0.0	387.6	50	19,380	1.00	19,380	0.019	0.030	8	2.00	0.008127	0.06131	0.092	0.0362	1.87		
407	405	3.40	0	0.0	408.0	50	20,400	1.00	20,400	0.020	0.032	8	3.00	0.006985	0.05702	0.086	0.0325	2.19		
405	403	3.40	0	0.0	530.4	50	26,520	1.00	26,520	0.027	0.041	8	0.90	0.016579	0.08634	0.130	0.0597	1.55		
403	401	3.40	0	0.0	530.4	50	26,520	1.00	26,520	0.027	0.041	8	0.90	0.016579	0.08634	0.130	0.0597	1.55		
401	223	3.40	0	0.0	530.4	50	26,520	1.00	26,520	0.027	0.041	8	0.90	0.016579	0.08634	0.130	0.0597	1.55		
FACILITIES SOUTH OF NORTH RIVER ROAD																				
277	205	3.40	12	40.8	40.8	50	2,040	1.00	2,040	0.002	0.003	8	1.60	0.000956	0.02225	0.033	0.0081	0.87		
291	204	3.40	10	34.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	1.60	0.000797	0.02059	0.031	0.0072	0.82		
205	204	3.40	5	17.0	57.8	50	2,890	1.00	2,890	0.003	0.004	8	1.60	0.001355	0.02641	0.040	0.0104	0.97		
204	203	3.40	5	17.0	108.8	50	5,440	1.00	5,440	0.005	0.008	8	1.60	0.002551	0.03541	0.053	0.0161	1.18		
280	271	3.40	6	20.4	20.4	50	1,020	1.00	1,020	0.001	0.002	8	1.60	0.000478	0.01594	0.024	0.0050	0.72		
274	271	3.40	4	13.6	13.6	50	680	1.00	680	0.001	0.001	8	3.30	0.000222	0.01089	0.016	0.0028	0.84		
271	207	3.40	0	0.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	1.60	0.000797	0.02059	0.031	0.0072	0.82		
254	253	3.40	5	17.0	17.0	50	850	1.00	850	0.001	0.001	8	2.00	0.000356	0.01405	0.021	0.0040	0.73		
212	211	3.40	4	13.6	13.6	50	680	1.00	680	0.001	0.001	8	1.60	0.000319	0.01347	0.020	0.0038	0.63		
211	207	3.40	0	0.0	13.6	50	680	1.00	680	0.001	0.001	8	1.60	0.000319	0.01347	0.020	0.0038	0.63		
212	256	3.40	6	20.4	20.4	50	1,020	1.00	1,020	0.001	0.002	8	1.60	0.000478	0.01594	0.024	0.0050	0.72		
Subtotal Units			70.0																Max d/D	0.13

*Note: Columns labeled with PEAK FLOW are equivalent to AVERAGE FLOW as the peaking factor has been set to 1

DATE: 7/19/2018

SEWER STUDY SUMMARY

FOR: North River Farms Average Project Flows Only
 BY: Dexter Wilson Engineering, Inc.

SHT 4 OF 4

JOB NUMBER: 930-008

FROM	TO	POP. PER D.U.	IN-LINE EDUs	POPULATION SERVED		SEWAGE PER CAPITA/D	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK FLOW* (gpd)	PEAK FLOW* (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
				IN-LINE	TOTAL					M.G.D.	C.F.S.							
214	208	2.80	30	84.0	84.0	50	4,200	1.00	4,200	0.004	0.006	8	1.60	0.001969	0.03134	0.047	0.0134	1.09
210	209	3.40	10	34.0	34.0	50	1,700	1.00	1,700	0.002	0.003	8	1.60	0.000797	0.02059	0.031	0.0072	0.82
215	208	3.40	7	23.8	23.8	50	1,190	1.00	1,190	0.001	0.002	8	1.60	0.000558	0.01718	0.026	0.0055	0.75
208	209	3.40	4	13.6	121.4	50	6,070	1.00	6,070	0.006	0.009	8	1.60	0.002846	0.03727	0.056	0.0174	1.22
209	203	3.40	3	10.2	165.6	50	8,280	1.00	8,280	0.008	0.013	8	2.20	0.003311	0.04016	0.060	0.0193	1.49
235	232	2.80	41	114.8	114.8	50	5,740	1.00	5,740	0.006	0.009	8	1.60	0.002691	0.03630	0.054	0.0167	1.20
232	229	2.80	50	140.0	254.8	50	12,740	1.00	12,740	0.013	0.020	8	1.60	0.005973	0.05303	0.080	0.0292	1.52
229	226	2.80	46.5	130.2	385.0	50	19,250	1.00	19,250	0.019	0.030	8	1.20	0.010422	0.06902	0.104	0.0431	1.56
226	223	2.80	60	168.0	553.0	50	27,650	1.00	27,650	0.028	0.043	8	0.80	0.018334	0.09056	0.136	0.0640	1.50
223	220	3.40	28	95.2	1178.6	50	58,930	1.00	58,930	0.059	0.091	10	0.50	0.027260	0.13716	0.165	0.0845	1.55
220	217	2.80	15	42.0	1220.6	50	61,030	1.00	61,030	0.061	0.094	10	0.50	0.028232	0.13954	0.167	0.0866	1.57
217	213	3.40	0	0.0	1220.6	50	61,030	1.00	61,030	0.061	0.094	10	0.50	0.028232	0.13954	0.167	0.0866	1.57
213	262	3.40	0	0.0	1220.6	50	61,030	1.00	61,030	0.061	0.094	10	0.50	0.028232	0.13954	0.167	0.0866	1.57
262	259	3.40	3	10.2	1230.8	50	61,540	1.00	61,540	0.062	0.095	10	0.50	0.028468	0.14012	0.168	0.0871	1.57
259	256	2.80	92	257.6	1488.4	50	74,420	1.00	74,420	0.074	0.115	10	0.50	0.034426	0.15369	0.184	0.0996	1.67
256	253	3.40	14	47.6	1556.4	50	77,820	1.00	77,820	0.078	0.120	10	0.50	0.035998	0.15705	0.188	0.1027	1.69
253	250	3.40	7	23.8	1597.2	50	79,860	1.00	79,860	0.080	0.124	10	0.50	0.036942	0.15905	0.191	0.1046	1.70
250	207	3.40	8	27.2	1624.4	50	81,220	1.00	81,220	0.081	0.126	10	0.50	0.037571	0.16036	0.192	0.1058	1.71
207	203	3.40	10	34.0	1706.0	50	85,300	1.00	85,300	0.085	0.132	10	0.50	0.039459	0.16429	0.197	0.1095	1.74
203	201	3.40	0	0.0	1980.4	50	99,020	1.00	99,020	0.099	0.153	10	0.50	0.045805	0.17690	0.212	0.1218	1.81

Subtotal Units 428.5

Max d/D 0.21

TOTAL UNITS 766.5

NORTH RIVER ROAD TO STALLION DRIVE																		
101	201						1,500,000	1.00	1,500,000	1.500	2.321	15	6.00	0.067939	0.32341	0.259	0.1612	9.22
201	151						1,620,270	1.00	1,620,270	1.620	2.507	21	0.20	0.163870	0.71888	0.411	0.3040	2.69
															Max d/D	0.41		

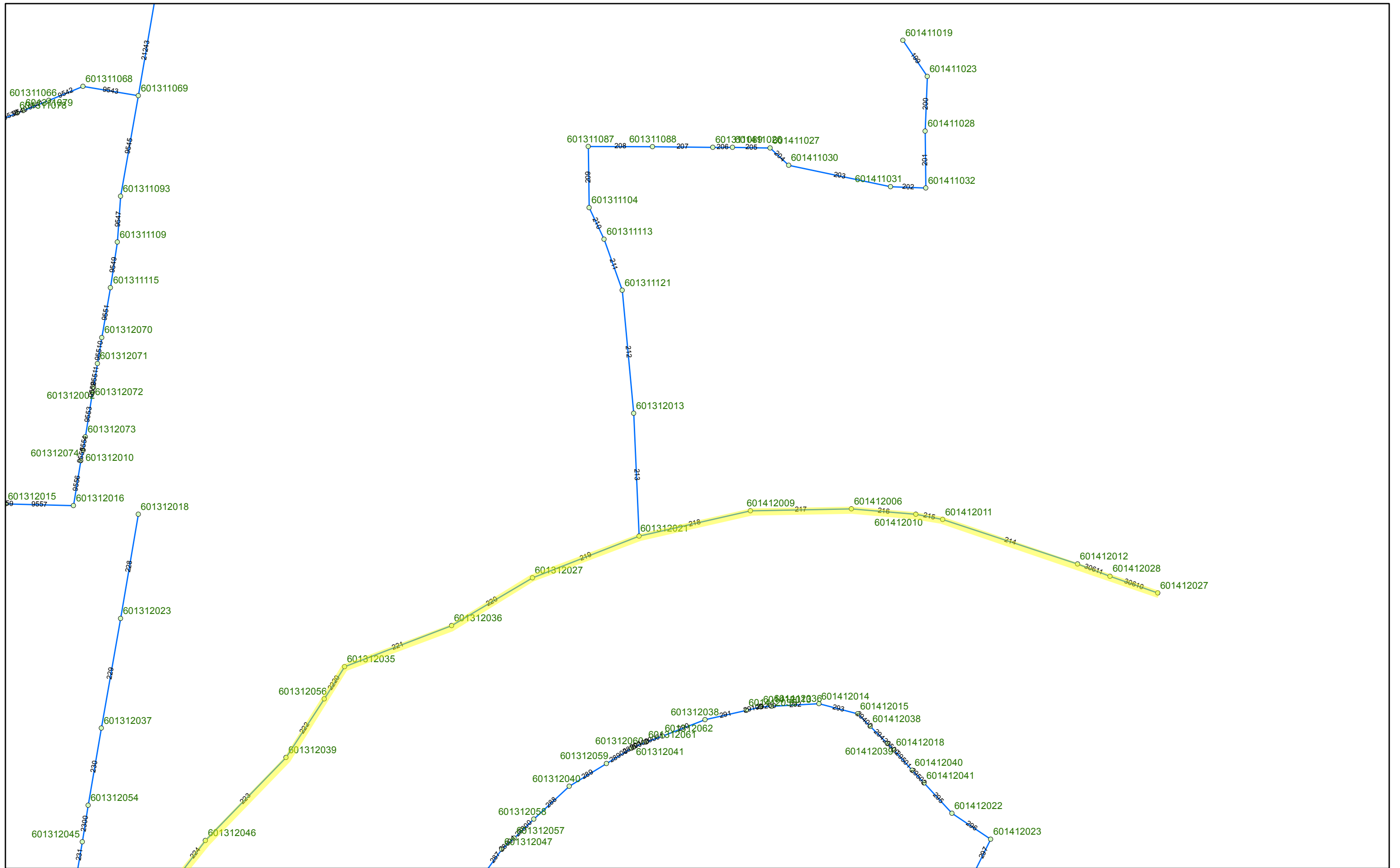
*Note: Columns labeled with PEAK FLOW are equivalent to AVERAGE FLOW as the peaking factor has been set to 1

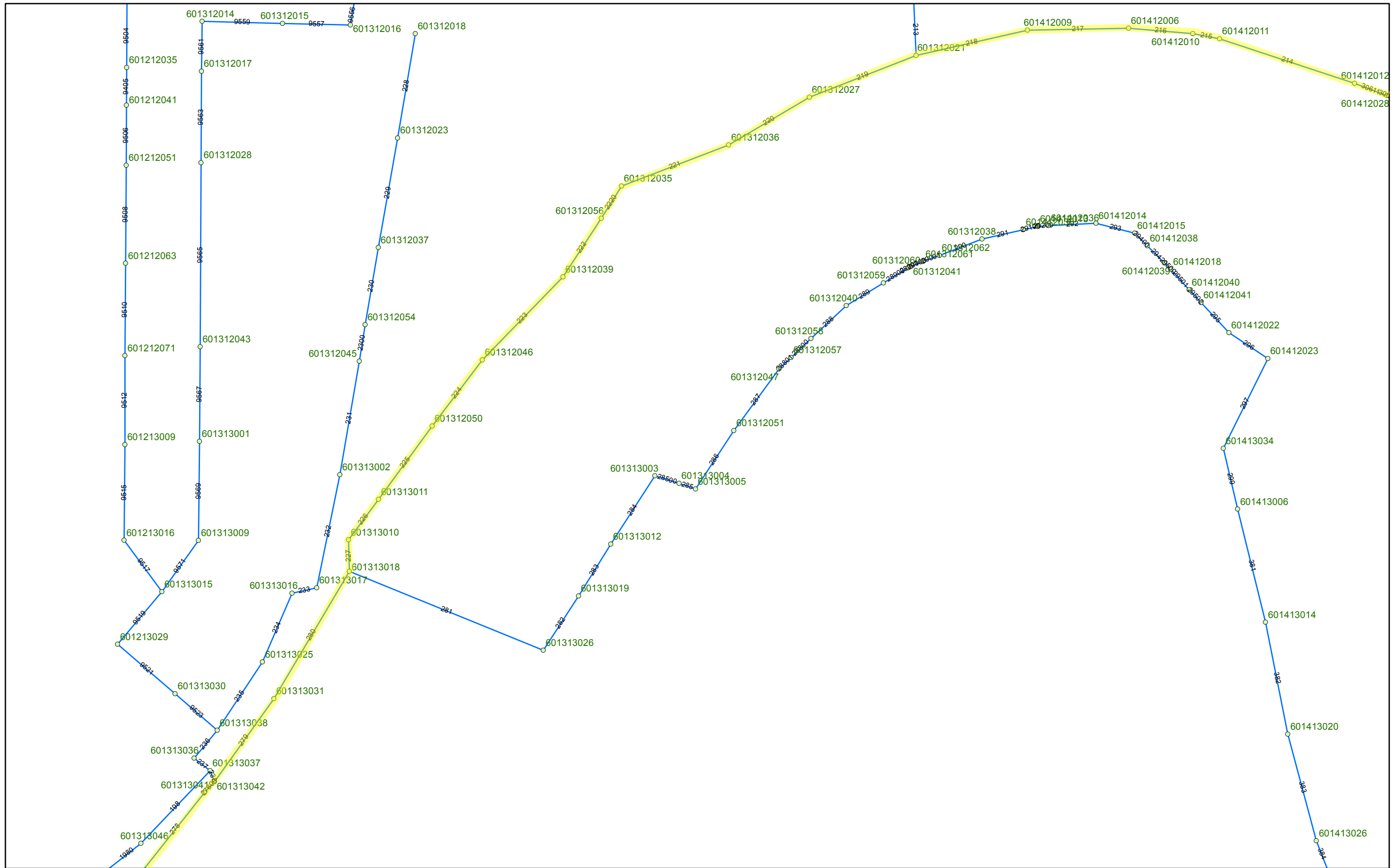
APPENDIX D

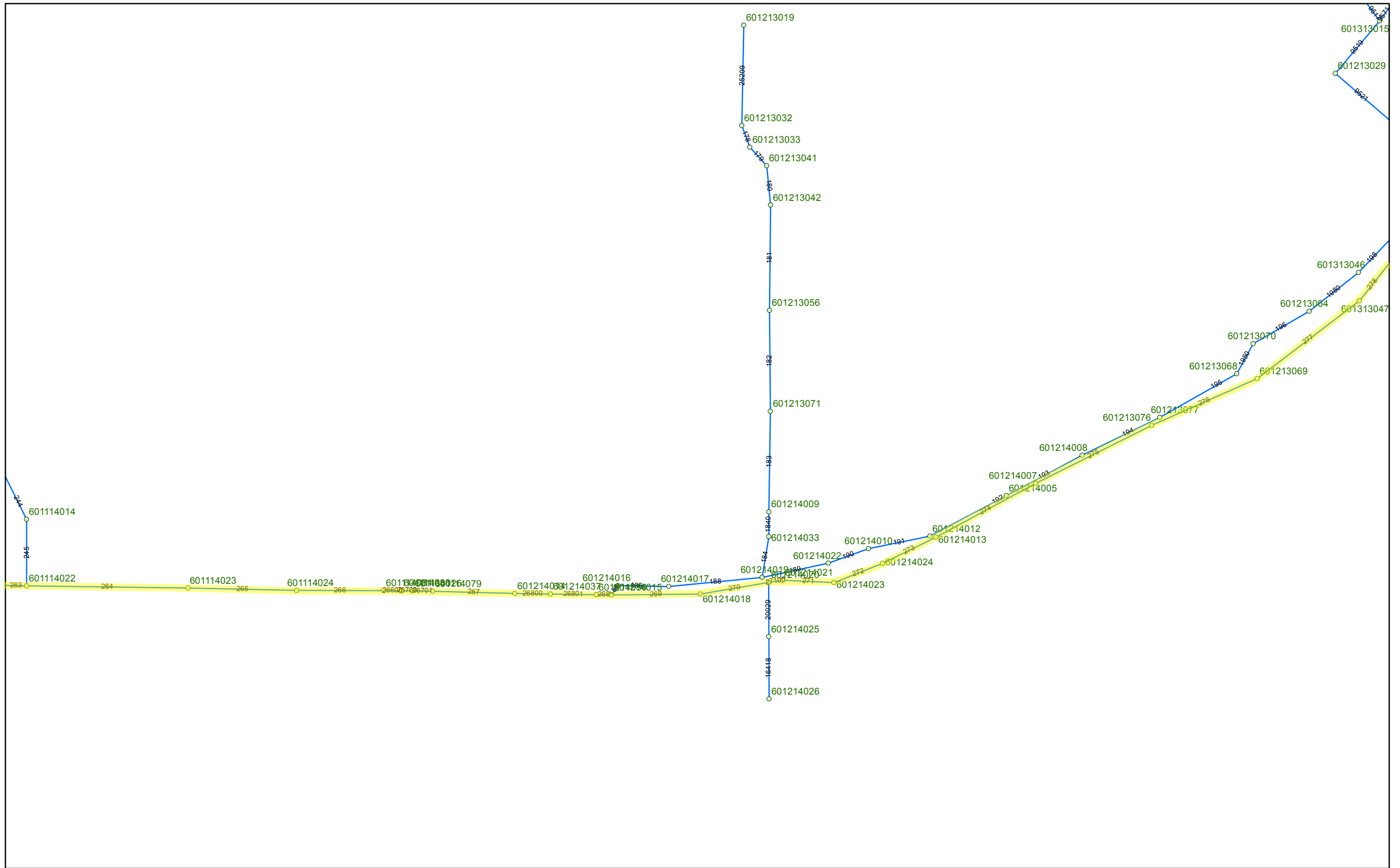
**NORTH RIVER ROAD TRUNK SEWER
OFFSITE SEWER ANALYSIS
CITY OF OCEANSIDE SEWER MODEL OUTPUT DATA**

Existing PWWF Results

ID	Full Depth (ft)	Full Flow (mgd)	Percent Slope (%)	Maximum Flow (mgd)	Maximum Flow Class	Max.Flow Day-Time (day-time)	Velocity at Maximum Flow (ft/s)	Maximum Velocity (ft/s)	Max.Flow/Full Flow	Max.Depth/Full Depth	Reserve Capacity (mgd)	Total Flow Volume (MG)	Maximum Top Width (ft)	Both End Surge Time (hrs)	Upstream Surge Time (hrs)	Downstream Surge Time (hrs)	Above Full-Flow Time (hrs)	Capacity Limited Time (hrs)	Instability Index
30610	1.25	4.60268	1.215315	2.026497	Free Surface	1-20:00 hrs	5.622602	7.030957	0.440286	0.464228	2.576183	5.187956	1.246624	0.01	0.01	0.01	0.01	0.01	0
30611	1.25	4.610617	1.21951	2.025311	Free Surface	1-20:00 hrs	3.255893	6.175678	0.439271	0.731946	2.585307	5.187989	1.239271	0.01	0.01	63.428993	0.01	0.01	0
214	1.5	0.305882	0.00203	2.039188	Free Surface	1-20:15 hrs	2.74438	2.74438	6.666574	0.619444	-1.733306	5.216013	1.499925	0.01	0.01	0.01	77.957893	0.01	0
215	1.5	15.981886	5.54145	2.039188	Free Surface	1-20:15 hrs	5.089314	5.985499	0.127594	0.381669	13.942698	5.216013	1.457327	0.01	0.01	0.01	0.01	0.01	0
216	1.5	3.797403	0.312853	2.041094	Free Surface	1-20:15 hrs	3.324504	3.403333	0.529474	0.529474	1.756309	5.223403	1.499989	0.01	0.01	0.01	0.01	0.01	0
217	1.5	3.626036	0.285254	2.041092	Free Surface	1-20:15 hrs	3.041194	3.460225	0.562899	0.569042	1.584944	5.223404	1.49999	0.01	0.01	0.01	0.01	0.01	0
218	1.5	3.126432	0.212063	2.04099	Free Surface	1-20:14 hrs	3.009247	3.397008	0.652818	0.574003	1.085441	5.22332	1.499997	0.01	0.01	0.01	0.01	0.01	0
219	1.75	4.709572	0.211486	2.105173	Free Surface	1-20:14 hrs	2.945054	2.945343	0.446999	0.468458	2.604398	5.450453	1.746176	0.01	0.01	0.01	0.01	0.01	0
220	1.75	4.713396	0.211829	2.104866	Free Surface	1-20:15 hrs	2.810946	2.811402	0.446571	0.485644	2.60853	5.450467	1.748987	0.01	0.01	0.01	0.01	0.01	0
221	1.75	4.70556	0.211125	2.111567	Free Surface	1-20:17 hrs	3.403946	3.403957	0.448739	0.420203	2.593993	5.475278	1.727417	0.01	0.01	0.01	0.01	0.01	0
2220	1.75	8.634861	0.710933	2.118407	Free Surface	1-20:19 hrs	2.722743	2.722831	0.245332	0.500383	6.516455	5.5018	1.749996	0.01	0.01	0.01	0.01	0.01	0
222	1.75	0.207881	0.000412	2.118316	Free Surface	1-20:20 hrs	2.385028	2.385104	10.190056	0.556084	-1.910436	5.501586	1.749995	0.01	0.01	0.01	77.697716	0.01	0
223	1.75	5.111063	0.249081	2.118157	Free Surface	1-20:22 hrs	2.657175	3.014459	0.414426	0.510029	2.992906	5.501267	1.749924	0.01	0.01	0.01	0.01	0.01	0
224	1.75	3.305097	0.104156	2.117913	Free Surface	1-20:22 hrs	2.671089	2.671135	0.640802	0.507879	1.187184	5.501016	1.749856	0.01	0.01	0.01	0.01	0.01	0
225	1.75	6.293184	0.377623	2.117793	Free Surface	1-20:24 hrs	4.592634	4.592634	0.336522	0.337307	4.175391	5.500997	1.654369	0.01	0.01	0.01	0.01	0.01	0
226	1.75	18.360217	3.214204	2.117788	Free Surface	1-20:24 hrs	7.899725	7.899728	0.115347	0.28736	16.242429	5.501003	1.469339	0.01	0.01	0.01	0.01	0.01	0
227	1.75	18.675867	3.325672	2.117783	Free Surface	1-20:24 hrs	4.506646	7.193479	0.113397	0.34434	16.558084	5.501019	1.662712	0.01	0.01	0.01	0.01	0.01	0
280	2.25	13.394551	0.447786	3.926078	Free Surface	2-18:38 hrs	4.311006	4.311016	0.29311	0.384543	9.468472	10.164219	2.188878	0.01	0.01	0.01	0.01	0.01	0
279	2.25	11.744846	0.344278	3.926055	Free Surface	2-18:39 hrs	3.563764	3.563767	0.334279	0.443935	7.818791	10.166209	2.235565	0.01	0.01	0.01	0.01	0.01	0
27800	2.25	0.890603	0.00198	3.926358	Free Surface	2-18:40 hrs	3.575402	3.575404	4.408653	0.442861	-3.035756	10.168516	2.235084	0.01	0.01	0.01	77.422256	0.01	0
278	2.25	11.863071	0.351243	3.926353	Free Surface	2-18:42 hrs	4.050026	4.050035	0.330973	0.402899	7.936718	10.169447	2.206928	0.01	0.01	0.01	0.01	0.01	0
277	2.25	11.149114	0.310238	3.926332	Free Surface	2-18:43 hrs	3.957432	3.957442	0.352165	0.409908	7.222782	10.171175	2.212687	0.01	0.01	0.01	0.01	0.01	0
276	2.25	11.130832	0.309221	3.926307	Free Surface	2-18:44 hrs	3.933355	3.93336	0.352742	0.411783	7.204524	10.172774	2.214227	0.01	0.01	0.01	0.01	0.01	0
275	2.25	10.966365	0.300151	3.9263	Free Surface	2-18:45 hrs	3.9125	3.912503	0.358031	0.413427	7.040065	10.174294	2.215576	0.01	0.01	0.01	0.01	0.01	0
274	2.25	10.969734	0.300335	3.926275	Free Surface	2-18:46 hrs	3.891995	3.891998	0.357919	0.41506	7.043458	10.175663	2.216912	0.01	0.01	0.01	0.01	0.01	0
273	2.25	10.888721	0.295916	3.926268	Free Surface	2-18:47 hrs	3.936933	3.936934	0.360581	0.4115	6.962453	10.176609	2.213986	0.01	0.01	0.01	0.01	0.01	0
272	2.25	11.323174	0.32	3.926263	Free Surface	2-18:47 hrs	3.867938	3.867939	0.346746	0.416998	7.396912	10.177206	2.218497	0.01	0.01	0.01	0.01	0.01	0
271	2.25	11.11911	0.30857	3.92626	Free Surface	2-18:49 hrs	4.611421	4.611421	0.353109	0.365799	7.192849	10.177773	2.167027	0.01	0.01	0.01	0.01	0.01	0
27100	2.25	19.558563	0.954746	3.926259	Free Surface	2-18:49 hrs	5.802205	5.802207	0.200744	0.309312	15.632305	10.178123	2.079381	0.01	0.01	0.01	0.01	0.01	0
270	2.25	18.289593	0.834876	3.929005	Free Surface	2-18:50 hrs	4.200332	4.304409	0.214822	0.392273	14.360589	10.205297	2.196703	0.01	0.01	0.01	0.01	0.01	0
269	2.5	11.00944	0.172466	3.929002	Free Surface	2-18:51 hrs	3.551924	3.71629	0.356876	0.379935	7.080438	10.206297	2.426851	0.01	0.01	0.01	0.01	0.01	0
268	2.5	25.354618	0.91472	4.389966	Free Surface	2-18:51 hrs	3.082066	3.187639	0.173143	0.459911	20.964652	11.197102	2.491928	0.01	0.01	0.01	0.01	0.01	0
26801	2.5	0.666205	0.000632	4.389949	Free Surface	2-18:51 hrs	2.438738	2.438742	6.589486	0.552971	-3.723744	11.198277	2.499987	0.01	0.01	0.01	77.106895	0.01	0
26800	2.5	0.753414	0.000808	4.389938	Free Surface	2-18:52 hrs	2.913043	2.913053	5.826725	0.480393	-3.636524	11.199014	2.498034	0.01	0.01	0.01	77.084564	0.01	0
267	2.5	11.420486	0.185585	4.389925	Free Surface	2-18:52 hrs	2.843744	2.843751	0.38439	0.48947	7.030561	11.200097	2.498944	0.01	0.01	0.01	0.01	0.01	0
26701	2.5	1.00899	0.001449	4.41667	Free Surface	2-18:53 hrs	2.617587	2.61759	4.377317	0.524982	-3.40768	11.260459	2.49994	0.01	0.01	0.01	77.031425	0.01	0
26700	2.5	1.347014	0.002582	4.416664	Free Surface	2-18:53 hrs	2.806515	2.806515	3.278855	0.496888	-3.06965	11.260954	2.499686	0.01	0.01	0.01	76.996773	0.01	0
26600	2.5	1.061288	0.001603	4.41666	Free Surface	2-18:53 hrs	3.124768	3.124771	4.161603	0.457195	-3.355372	11.261421	2.490587	0.01	0.01	0.01	77.007607	0.01	0
266	2.5	11.533656	0.189281	4.416654	Free Surface	2-18:54 hrs	3.315234	3.315241	0.382936	0.436963	7.117002	11.262156	2.479826	0.01	0.01	0.01	0.01	0.01	0
265	2.5	10.833216	0.166989	4.416633	Free Surface	2-18:55 hrs	2.862945	2.862954	0.407694	0.489217	6.416583	11.263526	2.498921	0.01	0.01	0.01	0.01	0.01	0
264	2.5	8.002814	0.09113	4.416598	Free Surface	2-18:58 hrs	2.930196	2.930202	0.551881	0.480461	3.586217	11.265995	2.498046	0.01	0.01	0.01	0.01	0.01	0
263	2.5	11.869956	0.200481	4.506734	Free Surface	2-19:00 hrs	2.97668	2.976686	0.379676	0.482129	7.363222	11.466703	2.498213	0.01	0.01	0.01	0.01	0.01	0
262	2.5	7.722488	0.084857	4.506638	Free Surface	2-19:01 hrs	3.334076	3.334075	0.583573	0.441879	3.21585	11.468781	2.482939	0.01	0.01	0.01	0.01	0.01	0
261	2.5	17.70406	0.445985	4.572369	Free Surface	2-19:00 hrs	4.680176	4.680176	0.258267	0.346642	13.131692	11.624046	2.45431	0.01	0.01	0.01	0.01	0.01	0
260	2.5	11.262031	0.180471	4.57233	Free Surface	2-19:00 hrs	2.875112	2.943075	0.405995	0.50099	6.689701	11.624595	2.499965	0.01	0.01	0.01	0.01	0.01	0
259	2.5	9.465964	0.127498	4.578588	Free Surface	2-19:00 hrs	2.406673	2.516525	0.48369	0.578642	4.887376	11.646829	2.499978	0.01	0.01	0.01	0.01	0.01	0
258	2.5	4.731401	0.031853	5.493578	Free Surface	2-19:00 hrs	2.711613	2.711616	1.161089	0.609808	-0.762177	13.79164	2.499961	0.01	0.01	0.01	17.386618	0.01	0
25800	2.5	1.279566	0.00233	5.493599	Free Surface	2-19:00 hrs	2.822911	2.822911	4.29333	0.589643	-4.214033	13.792253	2.49995	0.01	0.01	0.01	76.672256	0.01	0
257	2.5	8.548865	0.10399	5.539906	Free Surface	2-19:00 hrs	3.481724	3.481724	0.648028	0.501194	3.008958	13.902893	2.499998	0.01	0.01	0.01	0.01	0.01	0
256	2.5	14.813267	0.312231	5.539828	Free Surface	2-19:00 hrs	3.708594	3.708609	0.373977	0.47712	9.27344	13.904407	2.497136	0.01	0.01	0.01	0.01	0.01	0
255	2.5	10.123343	0.145822	5.558467	Free Surface	2-19:00 hrs	3.227813	3.227814	0.549074	0.533596	4.564876	13.948565	2.499908	0.01	0.01	0.01	0.01	0.01	0
254	2.5	9.926164	0.140196	5.5583	Free Surface	2-19:00 hrs	3.106146	3.106146	0.559965	0.550328	4.367864	13.950774	2.499991	0.01	0.01	0.01	0.01	0.01	0
253	2.5	8.283542	0.097635	5.558496	Free Surface	2-19:00 hrs	3.094117	3.094117	0.671029	0.552083	2.725046	13.952654	2.499995	0.01	0.01	0.01	0.01	0.01	0
252	2.5	8.757788	0.109135	5.6															







APPENDIX E

**NORTH RIVER ROAD TRUNK SEWER
OFFSITE SEWER ANALYSIS
EXISTING FLOW CONDITION**

SEWER STUDY SUMMARY

DATE: November 10, 2017
 JOB NUMBER: 930-008

FOR: Existing Sewer Flow (No Project) in North River Road Trunk Sewer, City of Oceanside
 BY: Dexter Wilson Engineering

SHT 1 OF 2
 REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
214	601412012	601412011	493	2,385,719	2.386	3.692	18	1.09	0.155904	0.59959	0.400	0.2931	5.60
215	601412011	601412010	95	2,385,719	2.386	3.692	18	0.24	0.332250	0.93984	0.627	0.5179	3.17
216	601412010	601412006	224	2,387,625	2.388	3.694	18	0.24	0.332515	0.94034	0.627	0.5182	3.17
217	601412006	601412009	351	2,387,623	2.388	3.694	18	0.24	0.332515	0.94034	0.627	0.5182	3.17
218	601412009	601312021	396	2,387,521	2.388	3.694	18	0.20	0.364237	1.00169	0.668	0.5570	2.95
219	601312021	601312027	397	2,468,998	2.469	3.820	21	0.20	0.249708	0.91592	0.523	0.4164	3.00
220	601312027	601312036	326	2,468,691	2.469	3.820	21	0.20	0.249677	0.91586	0.523	0.4163	3.00
221	601312036	601312035	398	2,475,392	2.475	3.830	21	0.20	0.250355	0.91734	0.524	0.4172	3.00
2220	601312035	601312056	132	2,482,232	2.482	3.841	21	0.62	0.142585	0.66646	0.381	0.2747	4.57
222	601312056	601312039	243	2,482,141	2.482	3.841	21	0.21	0.244987	0.90560	0.517	0.4105	3.06
223	601312039	601312046	401	2,481,982	2.482	3.840	21	0.24	0.229150	0.86892	0.497	0.3894	3.22
224	601312046	601312050	288	2,481,738	2.482	3.840	21	0.24	0.229127	0.86887	0.496	0.3894	3.22
225	601312050	601313011	315	2,481,618	2.482	3.840	21	0.24	0.229116	0.86885	0.496	0.3894	3.22
226	601313011	601313010	174	2,481,613	2.482	3.840	21	3.10	0.063750	0.43868	0.251	0.1541	8.14
227	601313010	601313018	110	2,481,608	2.482	3.840	21	2.92	0.065685	0.44519	0.254	0.1574	7.97
280	601313018	601313031	514	4,289,903	4.290	6.638	27	0.45	0.147984	0.87424	0.389	0.2822	4.65
279	601313031	601313042	354	4,289,880	4.290	6.638	27	0.30	0.181242	0.97753	0.434	0.3273	4.01
27800	601313042	601313041	51	4,290,183	4.290	6.638	27	0.295	0.182785	0.98215	0.437	0.3293	3.98
278	601313041	601313047	350	4,290,178	4.290	6.638	27	0.295	0.182784	0.98215	0.437	0.3293	3.98
277	601313047	601213069	445	4,290,157	4.290	6.638	27	0.3	0.181254	0.97756	0.434	0.3273	4.01
276	601213069	601213076	401	4,290,132	4.290	6.638	27	0.3	0.181253	0.97756	0.434	0.3273	4.01
275	601213076	601214007	450	4,290,125	4.290	6.638	27	0.3	0.181252	0.97756	0.434	0.3273	4.01
274	601214007	601214013	393	4,290,100	4.290	6.638	27	0.3	0.181251	0.97755	0.434	0.3273	4.01
273	601214013	601214024	206	4,290,093	4.290	6.638	27	0.3	0.181251	0.97755	0.434	0.3273	4.01
272	601214024	601214023	181	4,290,088	4.290	6.638	27	0.3	0.181251	0.97755	0.434	0.3273	4.01
271	601214023	601214021	178	4,290,085	4.290	6.638	27	0.3	0.181251	0.97755	0.434	0.3273	4.01
27100	601214021	601214020	49	4,290,084	4.290	6.638	27	0.84	0.108318	0.74039	0.329	0.2251	5.82
270	601214020	601214018	241	4,292,830	4.293	6.642	27	0.84	0.108387	0.74064	0.329	0.2252	5.83
269	601214018	601214015	307	4,292,827	4.293	6.642	30	0.15	0.193666	1.12752	0.451	0.3438	3.09
268	601214015	601214036	54	4,753,791	4.754	7.356	30	0.15	0.214461	1.19507	0.478	0.3707	3.17
26801	601214036	601214037	158	4,753,774	4.754	7.356	30	0.15	0.214461	1.19507	0.478	0.3707	3.17
26800	601214037	601214014	124	4,753,763	4.754	7.356	30	0.15	0.214460	1.19506	0.478	0.3707	3.17
267	601214014	601114079	286	4,753,750	4.754	7.356	30	0.15	0.214460	1.19506	0.478	0.3707	3.17
26701	601114079	601114026	69	4,780,495	4.780	7.397	30	0.15	0.215666	1.19893	0.480	0.3723	3.18
26700	601114026	601114080	39	4,780,489	4.780	7.397	30	0.15	0.215666	1.19893	0.480	0.3723	3.18
26600	601114080	601114081	62	4,780,485	4.780	7.397	30	0.15	0.215666	1.19893	0.480	0.3723	3.18

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows)

SEWER STUDY SUMMARY

DATE: November 10, 2017
 JOB NUMBER: 930-008

FOR: Existing Sewer Flow (No Project) in North River Road Trunk Sewer, City of Oceanside
 BY: Dexter Wilson Engineering

SHT 1 OF 2
 REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
266	601114081	601114024	301	4,780,479	4.780	7.397	30	0.15	0.215665	1.19893	0.480	0.3723	3.18
265	601114024	601114023	377	4,780,458	4.780	7.397	30	0.15	0.215664	1.19892	0.480	0.3723	3.18
264	601114023	601114022	560	4,780,423	4.780	7.397	30	0.15	0.215663	1.19892	0.480	0.3723	3.18
263	601114022	601114021	509	4,870,559	4.871	7.536	30	0.15	0.219729	1.21195	0.485	0.3775	3.19
262	601114021	601114020	412	4,870,463	4.870	7.536	30	0.15	0.219725	1.21194	0.485	0.3775	3.19
261	601114020	601114019	168	4,936,194	4.936	7.638	30	0.15	0.222690	1.22144	0.489	0.3813	3.21
260	601114019	601114018	222	4,936,155	4.936	7.638	30	0.15	0.222689	1.22144	0.489	0.3813	3.21
259	601114018	601014039	322	4,942,413	4.942	7.648	30	0.15	0.222971	1.22234	0.489	0.3816	3.21
258	601014039	601014038	31	5,857,403	5.857	9.063	30	0.15	0.264249	1.35390	0.542	0.4346	3.34
25800	601014038	601014037	43	5,857,424	5.857	9.063	30	0.15	0.264250	1.35391	0.542	0.4346	3.34
257	601014037	601014035	433	5,903,731	5.904	9.135	30	0.15	0.266340	1.36044	0.544	0.4372	3.34
256	601014035	601014031	215	5,903,653	5.904	9.135	30	0.15	0.266336	1.36042	0.544	0.4372	3.34
255	601014031	601014029	247	5,922,292	5.922	9.164	30	0.15	0.267177	1.36305	0.545	0.4382	3.35
254	601014029	601014028	421	5,922,125	5.922	9.164	30	0.15	0.267169	1.36303	0.545	0.4382	3.35
253	601014028	601014026	154	5,922,321	5.922	9.164	30	0.15	0.267178	1.36306	0.545	0.4382	3.35
252	601014026	601014024	247	5,965,608	5.966	9.231	30	0.15	0.269131	1.36916	0.548	0.4407	3.35
251	601014024	WW1698	428	6,018,338	6.018	9.312	30	0.15	0.271510	1.37659	0.551	0.4436	3.36

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows)

APPENDIX F

**NORTH RIVER ROAD TRUNK SEWER
OFFSITE SEWER ANALYSIS
EXISTING FLOW PLUS NORTH RIVER FARMS FLOW CONDITION**

SEWER STUDY SUMMARY

DATE: 4-27-2018
JOB NUMBER: 930-008

FOR: Existing Sewer Flow (With Project) in North River Road Trunk Sewer, City of Oceanside
BY: Dexter Wilson Engineering

SHT 1 OF 2
REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
214	601412012	601412011	493	2,686,394	2.686	4.157	18	1.09	0.175553	0.64024	0.427	0.3198	5.78
215	601412011	601412010	95	2,686,394	2.686	4.157	18	0.24	0.374124	1.02241	0.682	0.5704	3.24
216	601412010	601412006	224	2,688,300	2.688	4.160	18	0.24	0.374389	1.02298	0.682	0.5708	3.24
217	601412006	601412009	351	2,688,298	2.688	4.160	18	0.24	0.374389	1.02298	0.682	0.5708	3.24
218	601412009	601312021	396	2,688,196	2.688	4.160	18	0.20	0.410107	1.09737	0.732	0.6154	3.00
219	601312021	601312027	397	2,769,673	2.770	4.286	21	0.20	0.280117	0.98244	0.561	0.4543	3.08
220	601312027	601312036	326	2,769,366	2.769	4.285	21	0.20	0.280086	0.98238	0.561	0.4542	3.08
221	601312036	601312035	398	2,776,067	2.776	4.296	21	0.20	0.280764	0.98386	0.562	0.4550	3.08
2220	601312035	601312056	132	2,782,907	2.783	4.306	21	0.62	0.159856	0.70913	0.405	0.2985	4.71
222	601312056	601312039	243	2,782,816	2.783	4.306	21	0.21	0.274664	0.97051	0.555	0.4476	3.14
223	601312039	601312046	401	2,782,657	2.783	4.306	21	0.24	0.256910	0.93168	0.532	0.4254	3.31
224	601312046	601312050	288	2,782,413	2.782	4.305	21	0.24	0.256887	0.93163	0.532	0.4254	3.31
225	601312050	601313011	315	2,782,293	2.782	4.305	21	0.24	0.256876	0.93160	0.532	0.4253	3.30
226	601313011	601313010	174	2,782,288	2.782	4.305	21	3.10	0.071474	0.46467	0.266	0.1672	8.41
227	601313010	601313018	110	2,782,283	2.782	4.305	21	2.92	0.073644	0.47197	0.270	0.1708	8.23
280	601313018	601313031	514	4,590,578	4.591	7.103	27	0.45	0.158356	0.90705	0.403	0.2965	4.73
279	601313031	601313042	354	4,590,555	4.591	7.103	27	0.30	0.193945	1.01559	0.451	0.3442	4.08
27800	601313042	601313041	51	4,590,858	4.591	7.104	27	0.295	0.195595	1.02048	0.454	0.3463	4.05
278	601313041	601313047	350	4,590,853	4.591	7.104	27	0.295	0.195595	1.02048	0.454	0.3463	4.05
277	601313047	601213069	445	4,590,832	4.591	7.104	27	0.3	0.193957	1.01563	0.451	0.3442	4.08
276	601213069	601213076	401	4,590,807	4.591	7.104	27	0.3	0.193956	1.01563	0.451	0.3442	4.08
275	601213076	601214007	450	4,590,800	4.591	7.104	27	0.3	0.193956	1.01563	0.451	0.3442	4.08
274	601214007	601214013	393	4,590,775	4.591	7.103	27	0.3	0.193955	1.01562	0.451	0.3442	4.08
273	601214013	601214024	206	4,590,768	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
272	601214024	601214023	181	4,590,763	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
271	601214023	601214021	178	4,590,760	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
27100	601214021	601214020	49	4,590,759	4.591	7.103	27	0.84	0.115910	0.76711	0.341	0.2364	5.94
270	601214020	601214018	241	4,593,505	4.594	7.108	27	0.84	0.115979	0.76735	0.341	0.2365	5.94
269	601214018	601214015	307	4,593,502	4.594	7.108	30	0.15	0.207230	1.17185	0.469	0.3614	3.15
268	601214015	601214036	54	5,054,466	5.054	7.821	30	0.15	0.228026	1.23788	0.495	0.3880	3.23
26801	601214036	601214037	158	5,054,449	5.054	7.821	30	0.15	0.228025	1.23788	0.495	0.3880	3.23
26800	601214037	601214014	124	5,054,438	5.054	7.821	30	0.15	0.228025	1.23788	0.495	0.3880	3.23
267	601214014	601114079	286	5,054,425	5.054	7.821	30	0.15	0.228024	1.23788	0.495	0.3880	3.23

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows) plus Project Peak Flow (454,125 gpd)

SEWER STUDY SUMMARY

DATE: November 10, 2017
 JOB NUMBER: 930-008

FOR: Existing Sewer Flow (With Project) in North River Road Trunk Sewer, City of Oceanside
 BY: Dexter Wilson Engineering

SHT 2 OF 2
 REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
26701	601114079	601114026	69	5,081,170	5.081	7.862	30	0.15	0.229231	1.24156	0.497	0.3895	3.23
26700	601114026	601114080	39	5,081,164	5.081	7.862	30	0.15	0.229230	1.24156	0.497	0.3895	3.23
26600	601114080	601114081	62	5,081,160	5.081	7.862	30	0.15	0.229230	1.24156	0.497	0.3895	3.23
266	601114081	601114024	301	5,081,154	5.081	7.862	30	0.15	0.229230	1.24155	0.497	0.3895	3.23
265	601114024	601114023	377	5,081,133	5.081	7.862	30	0.15	0.229229	1.24155	0.497	0.3895	3.23
264	601114023	601114022	560	5,081,098	5.081	7.862	30	0.15	0.229227	1.24155	0.497	0.3895	3.23
263	601114022	601114021	509	5,171,234	5.171	8.002	30	0.15	0.233294	1.25462	0.502	0.3948	3.24
262	601114021	601114020	412	5,171,138	5.171	8.001	30	0.15	0.233289	1.25461	0.502	0.3948	3.24
261	601114020	601114019	168	5,236,869	5.237	8.103	30	0.15	0.236255	1.26520	0.506	0.3991	3.25
260	601114019	601114018	222	5,236,830	5.237	8.103	30	0.15	0.236253	1.26519	0.506	0.3991	3.25
259	601114018	601014039	322	5,243,088	5.243	8.113	30	0.15	0.236535	1.26620	0.506	0.3995	3.25
258	601014039	601014038	31	6,158,078	6.158	9.529	30	0.15	0.277814	1.39629	0.559	0.4515	3.38
25800	601014038	601014037	43	6,158,099	6.158	9.529	30	0.15	0.277815	1.39630	0.559	0.4515	3.38
257	601014037	601014035	433	6,204,406	6.204	9.600	30	0.15	0.279904	1.40283	0.561	0.4540	3.38
256	601014035	601014031	215	6,204,328	6.204	9.600	30	0.15	0.279901	1.40281	0.561	0.4540	3.38
255	601014031	601014029	247	6,222,967	6.223	9.629	30	0.15	0.280741	1.40544	0.562	0.4550	3.39
254	601014029	601014028	421	6,222,800	6.223	9.629	30	0.15	0.280734	1.40542	0.562	0.4550	3.39
253	601014028	601014026	154	6,222,996	6.223	9.629	30	0.15	0.280743	1.40545	0.562	0.4550	3.39
252	601014026	601014024	247	6,266,283	6.266	9.696	30	0.15	0.282696	1.41155	0.565	0.4572	3.39
251	601014024	WW1698	428	6,319,013	6.319	9.778	30	0.15	0.285074	1.41898	0.568	0.4598	3.40

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows) plus Project Peak Flow (454,125 gpd)

APPENDIX G

**NORTH RIVER ROAD TRUNK SEWER
OFFSITE SEWER ANALYSIS
EXISTING FLOW PLUS NORTH RIVER FARMS FLOW CONDITION
WITH NECESSARY PIPE UPGRADES**

SEWER STUDY SUMMARY

DATE: 7-19-2018
JOB NUMBER: 930-008

FOR: Existing Sewer Flow (With Project and Upsizing) in North River Road Trunk Sewer, City of Oceanside
BY: Dexter Wilson Engineering

SHT 1 OF 2
REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
214	601412012	601412011	493	2,686,394	2.686	4.157	18	1.09	0.175553	0.64024	0.427	0.3198	5.78
215	601412011	601412010	95	2,686,394	2.686	4.157	21	0.20	0.271695	0.96402	0.551	0.4439	3.06
216	601412010	601412006	224	2,688,300	2.688	4.160	21	0.20	0.271888	0.96444	0.551	0.4441	3.06
217	601412006	601412009	351	2,688,298	2.688	4.160	21	0.20	0.271887	0.96444	0.551	0.4441	3.06
218	601412009	601312021	396	2,688,196	2.688	4.160	21	0.20	0.271877	0.96442	0.551	0.4441	3.06
219	601312021	601312027	397	2,769,673	2.770	4.286	21	0.20	0.280117	0.98244	0.561	0.4543	3.08
220	601312027	601312036	326	2,769,366	2.769	4.285	21	0.20	0.280086	0.98238	0.561	0.4542	3.08
221	601312036	601312035	398	2,776,067	2.776	4.296	21	0.20	0.280764	0.98386	0.562	0.4550	3.08
2220	601312035	601312056	132	2,782,907	2.783	4.306	21	0.62	0.159856	0.70913	0.405	0.2985	4.71
222	601312056	601312039	243	2,782,816	2.783	4.306	21	0.21	0.274664	0.97051	0.555	0.4476	3.14
223	601312039	601312046	401	2,782,657	2.783	4.306	21	0.24	0.256910	0.93168	0.532	0.4254	3.31
224	601312046	601312050	288	2,782,413	2.782	4.305	21	0.24	0.256887	0.93163	0.532	0.4254	3.31
225	601312050	601313011	315	2,782,293	2.782	4.305	21	0.24	0.256876	0.93160	0.532	0.4253	3.30
226	601313011	601313010	174	2,782,288	2.782	4.305	21	3.10	0.071474	0.46467	0.266	0.1672	8.41
227	601313010	601313018	110	2,782,283	2.782	4.305	21	2.92	0.073644	0.47197	0.270	0.1708	8.23
280	601313018	601313031	514	4,590,578	4.591	7.103	27	0.45	0.158356	0.90705	0.403	0.2965	4.73
279	601313031	601313042	354	4,590,555	4.591	7.103	27	0.30	0.193945	1.01559	0.451	0.3442	4.08
27800	601313042	601313041	51	4,590,858	4.591	7.104	27	0.295	0.195595	1.02048	0.454	0.3463	4.05
278	601313041	601313047	350	4,590,853	4.591	7.104	27	0.295	0.195595	1.02048	0.454	0.3463	4.05
277	601313047	601213069	445	4,590,832	4.591	7.104	27	0.3	0.193957	1.01563	0.451	0.3442	4.08
276	601213069	601213076	401	4,590,807	4.591	7.104	27	0.3	0.193956	1.01563	0.451	0.3442	4.08
275	601213076	601214007	450	4,590,800	4.591	7.104	27	0.3	0.193956	1.01563	0.451	0.3442	4.08
274	601214007	601214013	393	4,590,775	4.591	7.103	27	0.3	0.193955	1.01562	0.451	0.3442	4.08
273	601214013	601214024	206	4,590,768	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
272	601214024	601214023	181	4,590,763	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
271	601214023	601214021	178	4,590,760	4.591	7.103	27	0.3	0.193954	1.01562	0.451	0.3442	4.08
27100	601214021	601214020	49	4,590,759	4.591	7.103	27	0.84	0.115910	0.76711	0.341	0.2364	5.94
270	601214020	601214018	241	4,593,505	4.594	7.108	27	0.84	0.115979	0.76735	0.341	0.2365	5.94
269	601214018	601214015	307	4,593,502	4.594	7.108	30	0.15	0.207230	1.17185	0.469	0.3614	3.15
268	601214015	601214036	54	5,054,466	5.054	7.821	30	0.15	0.228026	1.23788	0.495	0.3880	3.23
26801	601214036	601214037	158	5,054,449	5.054	7.821	30	0.15	0.228025	1.23788	0.495	0.3880	3.23
26800	601214037	601214014	124	5,054,438	5.054	7.821	30	0.15	0.228025	1.23788	0.495	0.3880	3.23
267	601214014	601114079	286	5,054,425	5.054	7.821	30	0.15	0.228024	1.23788	0.495	0.3880	3.23
26701	601114079	601114026	69	5,081,170	5.081	7.862	30	0.15	0.229231	1.24156	0.497	0.3895	3.23
26700	601114026	601114080	39	5,081,164	5.081	7.862	30	0.15	0.229230	1.24156	0.497	0.3895	3.23

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows) plus Project Peak Flow (454,125 gpd)

SEWER STUDY SUMMARY

DATE: November 10, 2017
 JOB NUMBER: 930-008

FOR: Existing Sewer Flow (With Project and Upsizing) in North River Road Trunk Sewer, City of Oceanside
 BY: Dexter Wilson Engineering

SHT 2 OF 2
 REFER TO PLAN SHEET: NA

LINE	FROM	TO	LENGTH (ft)	PEAK FLOW ⁽⁴⁾ (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	VELOCITY (f.p.s.)
					M.G.D.	C.F.S.							
26600	601114080	601114081	62	5,081,160	5.081	7.862	30	0.15	0.229230	1.24156	0.497	0.3895	3.23
266	601114081	601114024	301	5,081,154	5.081	7.862	30	0.15	0.229230	1.24155	0.497	0.3895	3.23
265	601114024	601114023	377	5,081,133	5.081	7.862	30	0.15	0.229229	1.24155	0.497	0.3895	3.23
264	601114023	601114022	560	5,081,098	5.081	7.862	30	0.15	0.229227	1.24155	0.497	0.3895	3.23
263	601114022	601114021	509	5,171,234	5.171	8.002	30	0.15	0.233294	1.25462	0.502	0.3948	3.24
262	601114021	601114020	412	5,171,138	5.171	8.001	30	0.15	0.233289	1.25461	0.502	0.3948	3.24
261	601114020	601114019	168	5,236,869	5.237	8.103	30	0.15	0.236255	1.26520	0.506	0.3991	3.25
260	601114019	601114018	222	5,236,830	5.237	8.103	30	0.15	0.236253	1.26519	0.506	0.3991	3.25
259	601114018	601014039	322	5,243,088	5.243	8.113	30	0.15	0.236535	1.26620	0.506	0.3995	3.25
258	601014039	601014038	31	6,158,078	6.158	9.529	30	0.15	0.277814	1.39629	0.559	0.4515	3.38
25800	601014038	601014037	43	6,158,099	6.158	9.529	30	0.15	0.277815	1.39630	0.559	0.4515	3.38
257	601014037	601014035	433	6,204,406	6.204	9.600	30	0.15	0.279904	1.40283	0.561	0.4540	3.38
256	601014035	601014031	215	6,204,328	6.204	9.600	30	0.15	0.279901	1.40281	0.561	0.4540	3.38
255	601014031	601014029	247	6,222,967	6.223	9.629	30	0.15	0.280741	1.40544	0.562	0.4550	3.39
254	601014029	601014028	421	6,222,800	6.223	9.629	30	0.15	0.280734	1.40542	0.562	0.4550	3.39
253	601014028	601014026	154	6,222,996	6.223	9.629	30	0.15	0.280743	1.40545	0.562	0.4550	3.39
252	601014026	601014024	247	6,266,283	6.266	9.696	30	0.15	0.282696	1.41155	0.565	0.4572	3.39
251	601014024	WW1698	428	6,319,013	6.319	9.778	30	0.15	0.285074	1.41898	0.568	0.4598	3.40

1 K' based on n = 0.013

2 dn/D using K' in Brater King Table 7-14

3 From Brater King Table 7-4 based on dn/D

4 City of Oceanside Model Output (Peak Flows) plus Project Peak Flow (454,125 gpd)

APPENDIX H

**OCTOBER 2015 SEWER MASTER PLAN EXCERPT
CAPACITY DATA FOR THE
NORTH VALLEY SEWER LIFT STATION**



CITY OF OCEANSIDE 2015 INTEGRATED MASTER PLANS

SEWER MASTER PLAN

October 2015

FINAL REPORT



FUTURE SYSTEM EVALUATION

This chapter outlines the evaluation of the City's wastewater collection system under future peak flow conditions. This section provides recommendations for improvement projects to address future deficiencies and serve future growth.

8.1 CAPACITY EVALUATION

Similar to Chapter 7, future system capacity analysis evaluated the sewer collection system following dry and wet weather calibration. The assessments included gravity pipelines, lift stations, and associated force mains. This section identifies the wastewater collection system infrastructure required to serve future growth within the City's service area for both near-term (2020) and long-term (2050) peak flow conditions.

8.1.1 Gravity Collection System Analysis

The future system analysis of the gravity collection system was performed in a manner similar to the existing system analysis (see Chapter 7). In accordance with the established flow depth criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 1.0 were identified for both the near-term scenario and the long-term scenario. In addition, pipeline improvements that were sized to mitigate existing capacity deficiencies were checked under both near term and long term peak wet weather flow (PWWF) conditions to confirm that the proposed size (diameter) is appropriate to accommodate future growth.

Figure 8.1 shows the locations of the capacity deficiencies under future peak flow conditions. As shown on Figure 8.1, two additional capacity deficient pipeline segments were identified as part of this analysis, one under near term PWWF conditions, and one under long term PWWF conditions.

8.1.2 Lift Station and Force Main Analysis

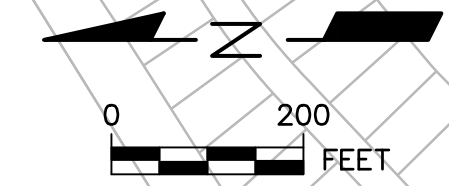
As with the existing system analysis (Chapter 7), the City's modeled lift stations were checked against the near term and long term PWWF conditions. No additional modeled lift stations were flagged as deficient. Table 8.1 summarizes the future system lift station capacity evaluation.

Table 8.1 Future Lift Station Capacity Evaluation
Sewer Master Plan
City of Oceanside

Station Name	Address	Modeled Pump Station Information						Peak Wet Weather Flow			Capacity Deficiency? ⁽²⁾			
		Year Constructed	Wastewater Basin	Flow per pump (gpm) (mgd)		# of Pumps	Firm Capacity ⁽¹⁾ (gpm) (mgd)		Exist. (mgd)	Near Term (mgd)	Long Term (mgd)	Exist.	Near Term	Long Term
Bandstand	250 North Strand	1999	La Salina WWTP	300	0.43	2	300	0.43	0.05	0.05	0.05			
Buena Vista	2501 Haymar Drive	1979	San Luis Rey WWTP	2,600	n/a	4	7,800	11.23	6.76	7.11	7.72			
Calaveras	3636 Sky Haven Lane		San Luis Rey WWTP	850	1.22	3	1,700	2.45	1.17	1.42	1.43			
Harbor #1	200 North Harbor Drive	1961	La Salina WWTP	150	0.22	2	150	0.22	0.01	0.01	0.01			
Harbor #2	1830 North Harbor Drive	1961	La Salina WWTP	175	0.25	2	175	0.25	0.03	0.03	0.03			
Harbor #3	1325 North Harbor Drive	1961	La Salina WWTP	250	0.36	2	250	0.36	0.04	0.04	0.04			
Harbor #4	284 North Harbor Drive	1961	La Salina WWTP	500	0.72	2	500	0.72	0.05	0.05	0.05			
Harbor #5	North Pacific Street	1961	La Salina WWTP	150	0.22	2	150	0.22	0.02	0.02	0.02			
Lake Blvd	4700 1/2 Lake Boulevard	1993	San Luis Rey WWTP	1,000	1.44	4	3,000	4.32	1.41	1.41	1.60			
Leisure Village #1	4706 Cannon Road	1984	San Luis Rey WWTP	800	1.15	3	1,600	2.30	0.38	0.38	0.50			
Leisure Village #2	4300 Leisure Village Way	1986	San Luis Rey WWTP	500	0.72	2	500	0.72	0.14	0.14	0.15			
Loretta	1261 Loretta Street	1953	La Salina WWTP	400	0.58	2	400	0.58	0.15	0.15	0.16			
Mar Lado	401 North Foussat Road	1986	San Luis Rey WWTP	600	0.86	3	1,200	1.73	1.29	1.30	1.32			
Mission Avenue	3476 Mission Avenue	2002	San Luis Rey WWTP	2,900	4.18	4	8,700	12.53	9.50	10.05	11.85			
North Bridge	304 South Harbor Drive	1988	La Salina WWTP	1,200	1.73	2	1,200	1.73	0.76	0.76	0.83			
Ninth Street	997 North Pacific Road	1975	La Salina WWTP	500	0.72	2	500	0.72	0.08	0.08	0.11			
North Valley	3930 North River Road	1971	San Luis Rey WWTP	2,960	4.26	3	5,920	8.52	6.69	6.89	7.34			
Oceanside Blvd	1664 Oceanside Boulevard	1975	La Salina WWTP	1,700	2.45	3	3,400	4.90	2.92	2.92	3.24			
Pacifica School	4991 Marcario Road	1971	San Luis Rey WWTP	400	0.58	2	400	0.58	0.10	0.10	0.10			
Pilgrim Creek	855 Douglas Drive	1976	San Luis Rey WWTP	2,000	2.88	2	2,000	2.88	1.41	1.62	1.66			
Roja	703 Roja Street	1975	San Luis Rey WWTP	250	0.36	2	250	0.36	0.05	0.05	0.05			
Roymar	110 Jones Road	1957	San Luis Rey WWTP	1,600	2.30	4	4,800	6.91	1.92	2.00	2.31			
St. Malo	52 St. Malo Beach		La Salina WWTP	200	0.29	2	200	0.29	0.05	0.05	0.06			
Sky Haven	3521A Sky Haven Lane	1973	San Luis Rey WWTP	150	0.22	2	150	0.22	0.00	0.00	0.01			
South Pacific	1330 South Tait Street	1955	La Salina WWTP	700	1.01	2	700	1.01	1.87	1.87	2.15	Yes	Yes	Yes
South Ridge Trails	4900 Cannon Road		San Luis Rey WWTP	600	0.86	2	600	0.86	0.11	0.11	0.11			
Wisconsin	Wisconsin and Pacific Streets		La Salina WWTP	300	0.43	2	300	0.43	0.09	0.09	0.11			

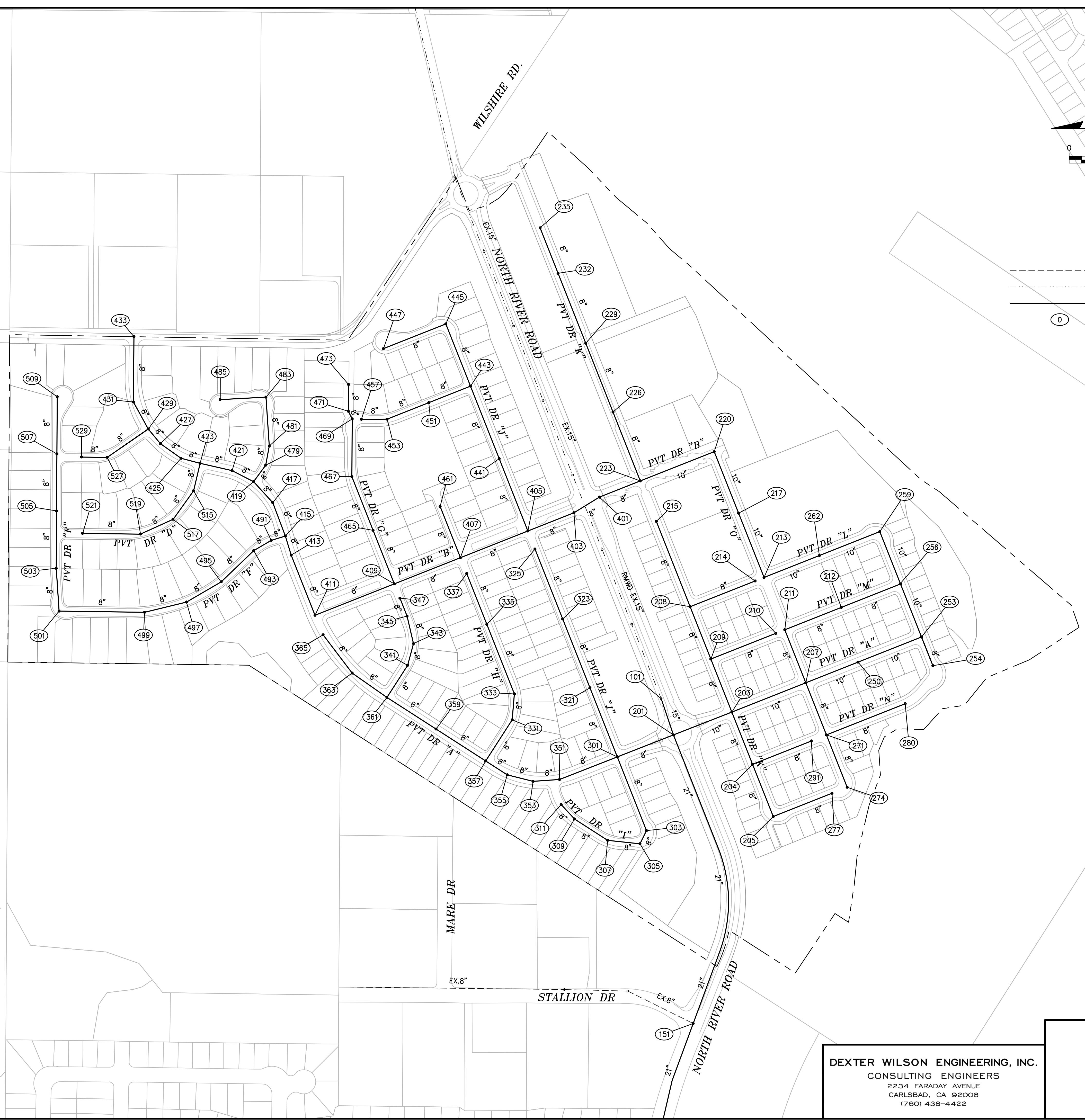
Notes:

1. Firm capacity is estimated as the total pump capacity with one pump out of service (Flow per pump x [# of pumps-1]).
2. Lift stations are called out as capacity deficiencies if the peak wet weather flow exceeds the pumping capacity of the lift station.



LEGEND

- PROJECT BOUNDARY
- - - - - EXISTING CITY OF OCEANSIDE GRAVITY SEWER LINE
- - - - - EXISTING RAINBOW MWD GRAVITY SEWER LINE
- PROPOSED GRAVITY SEWER LINE
- () COMPUTER MODEL NODE NUMBER



DEXTER WILSON ENGINEERING, INC.
 CONSULTING ENGINEERS
 2234 FARADAY AVENUE
 CARLSBAD, CA 92008
 (760) 438-4422

EXHIBIT A
MANHOLE NUMBERING
DIAGRAM
 NORTH RIVER FARMS

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