# Appendix P3
Sewer Study

DUDEK

# Carlton Oaks PA-1, PA-2 and PA-3 Sewer Study

PDMWD Job No. 220009

*Prepared for:*

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# 1 Introduction

The following section provides a summary of the project background and objectives as well as the organization of this report.

## 1.1 Project Background & Objectives

Carlton Oaks is an existing residential development and golf club located just southwest of the Padre Dam Municipal Water District (District) Customer Service Center and the Santee Lakes Recreational Preserve. While all of the development's existing structures and dwelling units are located within the City of Santee, portions of the existing golf course improvements are located within the limits of the City of San Diego. The existing, first phase of the Carlton Oaks development includes residential properties, a school, a country club and a golf course. The second phase is proposed to include development in three planning areas (PA) —PA-1, PA-2 and PA-3, as shown in **Figure 1.1**. PA-1 is located east of West Hills Parkway, south of Carlton Oaks Drive, and includes 85 multi-family residential dwelling units (DUs). PA-2 is located south of Carlton Oaks Drive at the location of the existing clubhouse and includes 158 DUs. PA-3 Is located in the southwest corner of Carlton Oaks Drive and Fanita Parkway and includes a 27-room hotel, 25 cottages, a restaurant, a club house and a tournament hall. A conceptual map of the development, with lot locations and street layouts, is included in **Appendix A**.

In the vicinity of the PA-2 and PA-3 development, the planned East County Advanced Water Purification (AWP) project proposes a new Regional Brine Pipeline (RBP) and East Mission Gorge Forcemain (EMGFM) to and from, respectively, the East Mission Gorge Pump Station (EMGPS). As shown in **Figure 1.1**, the EMGFM and RBP are projected to be routed through the Carlton Oaks Golf Course and under the San Diego River.

The new PA-1, PA-2 and PA-3 development would require the relocation, and potential upsizing of, an existing 15-inch District sewer line. Additionally, due to the elevation of the proposed lots in PA-1, a new private lift station is proposed to lift flows to existing sewer facilities (Manhole 2574). The existing 15-inch sewer main ties into existing 24- and 30-inch sewer mains approximately 145 feet west of the intersection of Carlton Oaks Dr and Calle Del Verde prior to discharging into the Influent Pump Station (IPS). The IPS, located at the District's Maintenance and Operations Yard site on Carlton Oaks Dr, pumps to the Ray Stoyer Water Recycling Facility located north of Santee Lakes. Due to these existing tributary flows and the additional sewer loading from PA-1, PA-2 and PA-3, there is potential for backup in the 15-inch line.

The District's 2015 Comprehensive Facilities Master Plan (2015 CFMP) indicated that the existing 30-inch sewer main downstream of the existing 15-inch Carlton Oaks tie-in may need to be upsized in the future; however, with recent water conservation, future sewer flows are anticipated to be lower than modeled in 2015. The goal of this sewer study is to confirm the diameter and location of the 15-inch pipeline and tie-in location for the 4-inch private lift station forcemain is adequate for buildout conditions. The hydraulic model created for the 2015 CFMP was used as the base model for this analysis.

*Figure 1.1. PA-1, PA-2 and PA -3 Location Map*


The study includes four primary objectives:

1. Developing an updated sewer hydraulic model (model) that includes the 15-inch sewer main proposed to be relocated during construction of Carlton Oaks PA-2 development and updated sewer loadings.
2. Confirming the sizing of the existing 15-inch sewer main that will convey flows from Carlton Oaks PA-1 and PA-2 developments based on future peak dry and peak wet weather sewer loads.
3. Confirming the wet well sizing and discharge manhole location for the 4-inch forcemain from the private lift station serving PA-1.
4. Providing recommendations for off-site improvements that may be necessary to meet District design and performance standards.

## 1.2 Report Organization

The results of the study are presented in the following sections:

- ***Section 2 - Existing and Proposed Facilities and Sewer Loadings*** – Summarizes key information about relevant facilities and sewer loadings in the collection system.
- ***Section 3 - Hydraulic Analysis*** – Summarizes the infrastructure modifications made to the District's 2015 sewer hydraulic model[1] and the hydraulic analyses performed,
- ***Section 4 - Conclusions and Recommendations*** – Summarizes the results of the analysis and recommendations for any on-site and/or off-site improvements.

[1] District's 2015 hydraulic model was used in the 2015 Comprehensive Facilities Master Plan analyses.

# 2 Existing and Proposed Facilities and Sewer Loadings

This section provides an overview of relevant system facilities and summarizes the demands in the system.

## 2.1 Collection System Overview

Carlton Oaks Golf Course is bordered by Carlton Oaks Drive to the north, Highway 52 to the south, West Hills Parkway to the west and Carlton Hills Blvd to the east. The existing, phase 1 Carlton Oaks development includes residential properties, a Country Club and a school. Sewer flows generated in the first phase of development flow into the District's IPS, located at the District's Maintenance and Operations Yard site at 9120 Carlton Oaks Drive. From here, flows are pumped north to the Ray Stoyer Water Recycling Facility.

## 2.2 Carlton Oaks PA-1, PA-2 and PA-3 Sewer Facilities

The proposed sewer facilities for PA-1, PA-2 and PA-3 will be located south of Carlton Oaks Drive. Sewer flows from PA-1 will be conveyed to a new private lift station south of 9023 Inverness Rd, and from there pumped east through a 4-inch forcemain to the District's 15-inch sewer main that is partly aligned within the back yards of private residences on Inverness Road. Using the portion of the 15-inch sewer main located on the residential properties is not recommended to serve this project because limited access would present a maintenance challenge with the introduction of additional flows and odors from the sewer lift station wet well. It is recommended that either the forcemain be extended to discharge into the 15-inch sewer main downstream of the residences, near PA-2, or the portion of the 15-inch sewer located in the back yards be relocated to along the north side of the golf course property to serve the forcemain south of Massot Avenue.

Sewer flows from PA-2 will be discharged to various locations along the 15-inch sewer, which is currently aligned through the proposed PA-2 development and will be relocated during the project. The sewer flows from PA-1 and PA-2 combine with an existing 8-inch sewer serving the existing Carlton Oaks development from the north. The flows then further combine with an existing 24-inch sewer, serving PA-3. The 15-inch and 24-inch pipelines converge in manhole 3001 before discharging into the 30-inch IPS influent sewer, where it is joined by an existing 27-inch sewer from the east just downstream of manhole 3001. The locations of these facilities are shown in **Figures 2.1** and **2.2**

Within the proposed development, in the vicinity of PA-2 and PA-3, the proposed EMGFM and RBP are projected to be routed through the Carlton Oaks Golf Course and under the San Diego River. The location of the existing EMGPS, and conceptual locations of the EMGFM and RBP, are shown in **Figures 1.1** and **2.1**.

*Figure 2.1. PA-1, PA-2 and PA-3 Sewer Facilities*

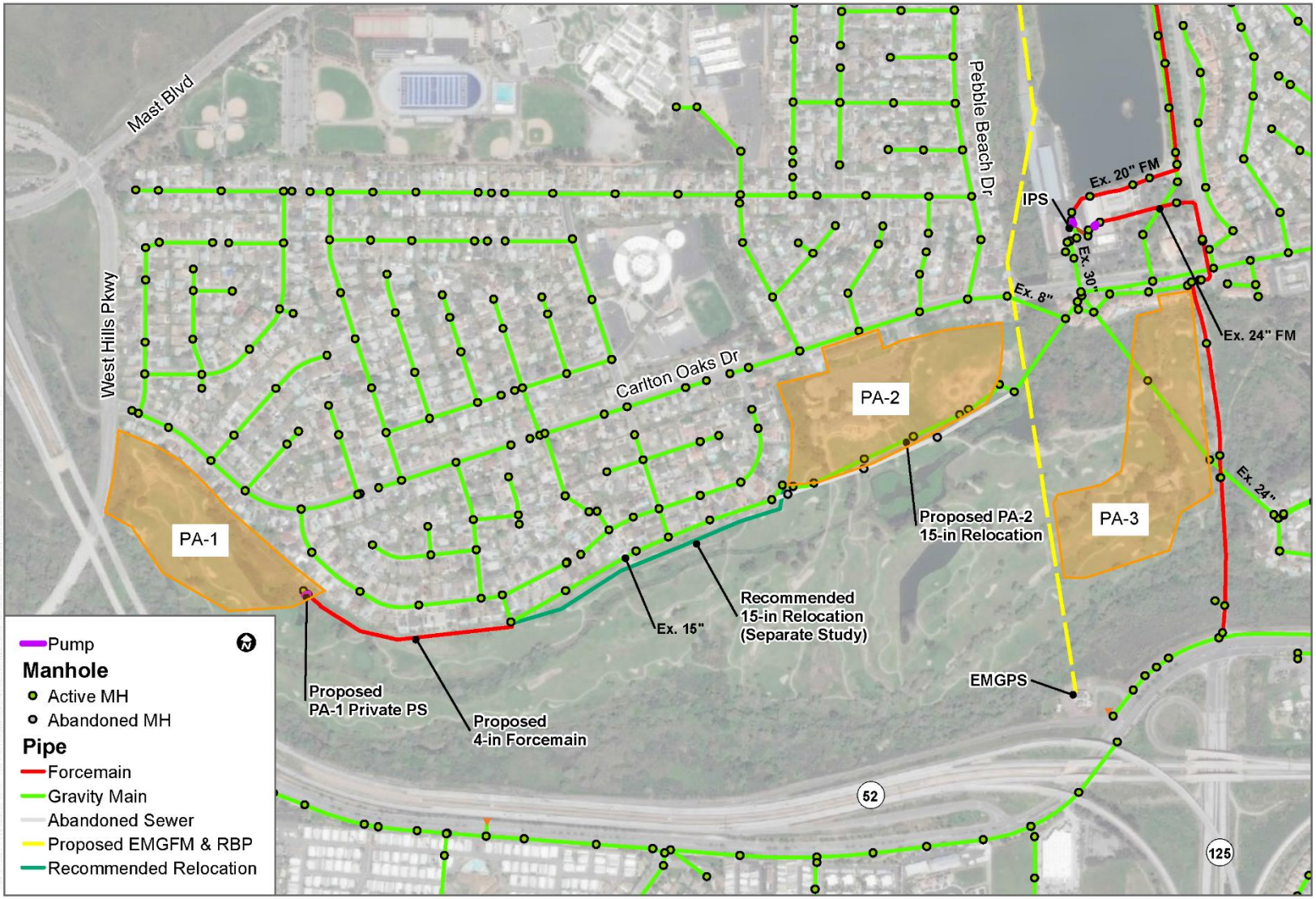


*Figure 2.2. PA-1, PA-2 and PA-3 Sewer Facilities (Near IPS)*

## 2.3 Sewer Load Summary

**Table 2.1** outlines the average dry weather flows (ADWF) for PA-1, PA-2 and PA-3 to be added to the model. Consistent with the 2015 CFMP, loads generated from PA-1, PA-2 and PA-3 will utilize the "M3A_WKDY" and "M3A_WKND" 24-hour diurnal patterns.

### Table 2.1: ADWF for Carlton Oaks PA-1, PA-2 and PA-3

| Area | # Units | Unit | Flow Factor[1] | ADWF (gpd) | ADWF (mgd) |
|---|---|---|---|---|---|
| PA-1 | 85 | DUs | 165 gpd/DU | 14,025 | 0.014 |
| PA-2 | 158 | DUs | 165 gpd/DU | 26,070 | 0.026 |
| PA-3 | 8.43 | Acre | 800 gpd/Ac | 6,744 | 0.007 |
| | | | **Totals** | **46,839** | **0.047** |

Notes:
[1] Flow factors of 165 gpd/DU and 800 gpd/Ac are per the Carlton Oaks Sewer Design Report dated July 25, 2019.

In addition to the Carlton Oaks loadings, an ADWF of 0.093 mgd for the Weston development (previously Castlerock), currently in construction north of Carlton Oaks and west of Santee Lakes, was also added to the model. This ADWF value for Weston is consistent with the July 2007 Castlerock (East Elliott) Water, Sewer and Recycled Water Study by PBS&J. As with the projected Carlton Oaks PA-1, PA-2 and PA-3 flows, the Weston development flows enter the system just upstream of the IPS and therefore impact the same sewer mains that are the subject of this analysis.

# 3 Hydraulic Analysis

This section summarizes the infrastructure modifications made to the District's sewer hydraulic model obtained for this analysis and the hydraulic analyses performed.

## 3.1 Hydraulic Model Infrastructure Updates

The Carlton Oaks subdivision site plan, tract maps, AutoCAD files provided by the developer and existing system as-builts were used as a reference for adding sewer loads and new/modified infrastructure to the District's 2015 CFMP InfoSWMM sewer hydraulic model. The analysis identified several areas downstream of the PA-1, PA-2, PA-3 improvements that had incorrect pipeline and manhole invert data in the hydraulic model, which were updated as part of this study. **Table 3.1** summarizes the information taken from the reference data and utilized in the hydraulic analysis:

### Table 3.1: Reference Data Utilization

| Reference Data | Purpose in Model |
|---|---|
| District Sewer GIS | Location of abandoned lines removed from the model |
| Carlton Oaks Site Plan | Location of PA-1 private LS and forcemain; locations of sewer loads for PA-1, PA-2 and PA-3 |
| Carlton Oaks AutoCAD files | 15-inch relocation through PA-2 |
| Existing system as-builts | Correcting erroneous pipeline inverts and diameters in the existing hydraulic model |

The proposed PA-1 private lift station (PA-1 LS) is not yet designed; as a result, there is no data available on the dimensions, settings or control of the lift station. For the purposes of this analysis, the PA-1 LS was assumed to have constant speed pumps with design characteristics provided in **Table 3.2** to accommodate the maximum flow anticipated from PA-1:

### Table 3.2: PA-1 Lift Station Model Settings

| Model Setting | Setting Value | Setting Unit |
|---|---|---|
| Max Wet Well Depth | 6 | Vertical Feet (VF) |
| Startup Depth | 5 | Feet |
| Shutoff Depth | 2 | Feet |
| Design Head | 35 | Feet |
| Design Flow[1] | 0.022 | mgd |

Notes:
[1] Lift station design flow estimated to equal peak wet weather inflow to the lift station wet well.

# 3.2 Hydraulic Analysis & Results

The following subsections describe each of the analyses performed for this study and the associated results.

## 3.2.1 Existing Peak Dry Weather Flow

For this analysis, the existing 2020 ADWF loading scenario in the model provided by the District was utilized, with the existing ("BASE") pipeline and manhole facilities sets used as the basis for the capacity analysis to ensure only existing system facilities were being analyzed. In order to assess impacts to existing infrastructure due to the addition of the Carlton Oaks PA-1, PA-2 and PA-3 loadings only, a scenario with only the additional Weston development loadings (without the new Carlton Oaks loadings) was analyzed. The peak dry weather flow (PDWF) results of the Weston only analysis are shown graphically on **Figures 3.1** and **3.2**. The analysis indicates that prior to the addition of the Carlton Oaks PA-1, PA-2 and PA-3 flows, none of the existing pipes downstream of the proposed Carlton Oaks development are anticipated to exceed the District's depth of flow per inch pipe diameter (d/D) criteria (maximum d/D > 0.75 criteria[2]) under peak dry weather conditions.

While not a result of the Phase 2 Carlton Oaks development, the District should note that the Weston only analysis indicates that 348 LF of existing 8-inch pipe upstream of the tie-in with the existing 15-inch Carlton Oaks pipe located south of Carlton Oaks Dr is projected to exceed the District's d/D criteria (maximum d/D of 0.78 > 0.5 criteria) once the Weston development is fully connected. The hydraulic profile generated by the sewer hydraulic model indicates that a backwater effect from the larger downstream trunk sewers is the source of this high d/D.

The PDWF results scenarios with the additional Carlton Oaks PA-1, PA-2 and PA-3 loadings are shown graphically on **Figures 3.3** and **3.4**. The analysis indicates that none of the existing pipes downstream of the proposed Carlton Oaks development are projected to exceed the District's maximum d/D criteria. Note that the addition of the PA-3 flows (at model manhole ID 2988) causes a slight backwater in the upstream pipe, resulting in the pipe slightly exceeding the 0.75 d/D criteria.

## 3.2.2 Existing Peak Wet Weather Flow

For this analysis, the existing 2020 PWWF loading scenario in the model was utilized. The existing 2020 PWWF loading scenario utilized a 10-year, 24-hour design storm rainfall pattern for generating the PWWF (including Simulation Settings using "OPT-4, 10Year, 24HourStorm"). Note that the hydraulic model does not have in operation the District's diversion structures, which allow the District to divert some high, peak wet weather flows upstream of this study location away from the IPS and into the San Diego County Interceptor and the City of San Diego Metro system.

In order to assess impacts to existing infrastructure due to the addition of the Carlton Oaks PA-1, PA-2 and PA-3 loadings only, a scenario with only the additional Weston development loadings (without the new Carlton Oaks loadings) was analyzed. The results of the Weston only analysis are shown graphically on **Figures 3.5** and **3.6**. The analysis indicates that prior to the addition of the Carlton Oaks PA-1, PA-2 and PA-3 flows, 161.5 linear feet (LF) of the existing 15-inch pipe downstream of the proposed PA-1 & PA-2 Carlton Oaks development and the existing 8-inch tie-in is anticipated to exceed the District's d/D criteria (maximum d/D of 0.84 > 0.75 criteria[2]). The existing 24-inch pipe

[2] From District's 2015 Comprehensive Facilities Master Plan Table 5.3 (Appendix B). Note that the maximum d/D > 0.75 requirement is for new sewers.

downstream of the proposed PA-3 Carlton Oaks development is anticipated to exceed the District's d/D criteria (maximum surcharged d/D of 1.40 > 0.75). This surcharged condition in the 24-inch pipe was discussed with District staff and staff indicated that this model result is consistent with field conditions during significant wet weather events.

As shown on **Figures 3.7** and **3.8**, with the addition of the Weston and Phase 2 Carlton Oaks development sewage loads, 161.5 LF of existing 15-inch pipe downstream of the proposed Phase 2 Carlton Oaks development is projected to exceed the District's d/D criteria under existing PWWF conditions at the same d/D value of 0.84. Similarly, the existing 24-inch pipe downstream of the proposed PA-3 Carlton Oaks development is anticipated to exceed the District's d/D criteria with the same surcharged d/D value of 1.4. Therefore, the addition of the Phase 2 Carlton Oaks development loads is not anticipated to exacerbate the existing wet weather conditions in the existing sewer infrastructure. Note that there is a backwater effect at the PA-3 discharge manhole. There is potential for this to impact influent flows from PA-3 into this manhole depending on the invert elevations of the PA-3 collection system. However, the District's ability to divert flows upstream of this location would reduce the backwater impact at this location.

*Figure 3.1. 2020 PDWF with Weston Only (No Carlton Oaks PA-1, PA-2 and PA-3) (Overview)*

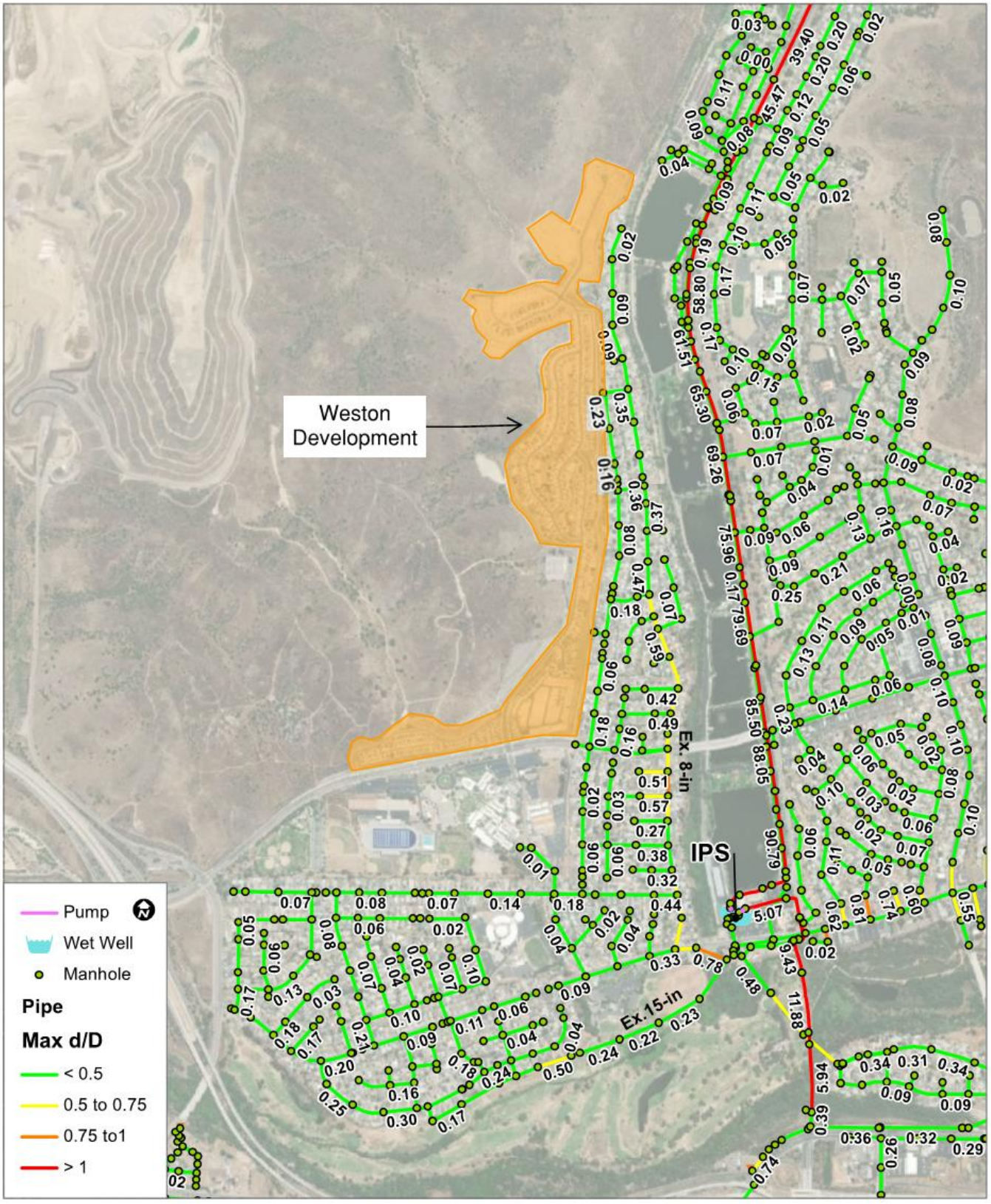


*Figure 3.2. 2020 PDWF with Weston Only (No Carlton Oaks PA-1, PA-2 and PA-3) (Near IPS)*

*Figure 3.3. 2020 PDWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Overview)*

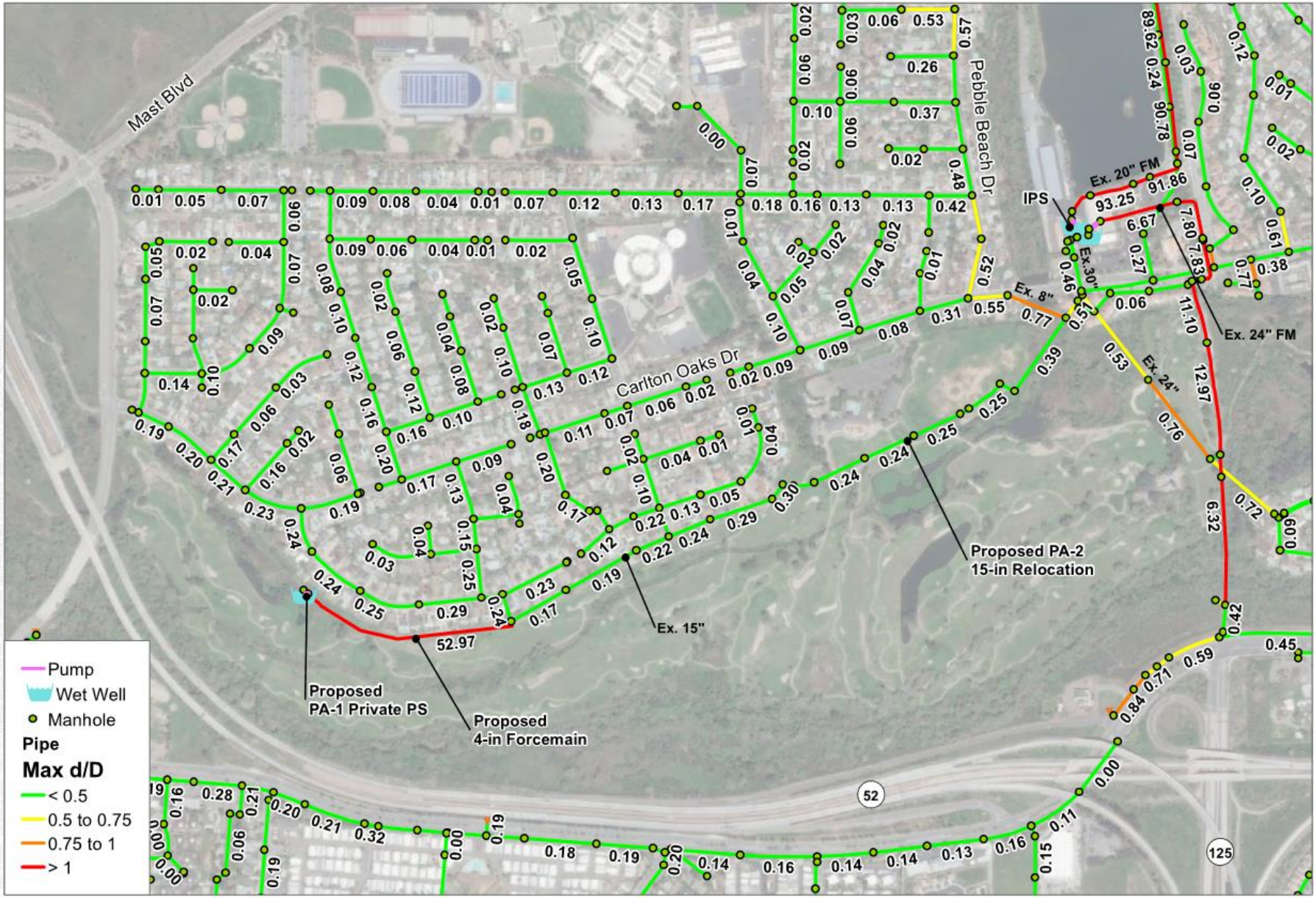


*Figure 3.4. 2020 PDWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Near IPS)*

*Figure 3.5. 2020 PWWF with Weston Only (No Carlton Oaks PA-1, PA-2 and PA-3) (Overview)*

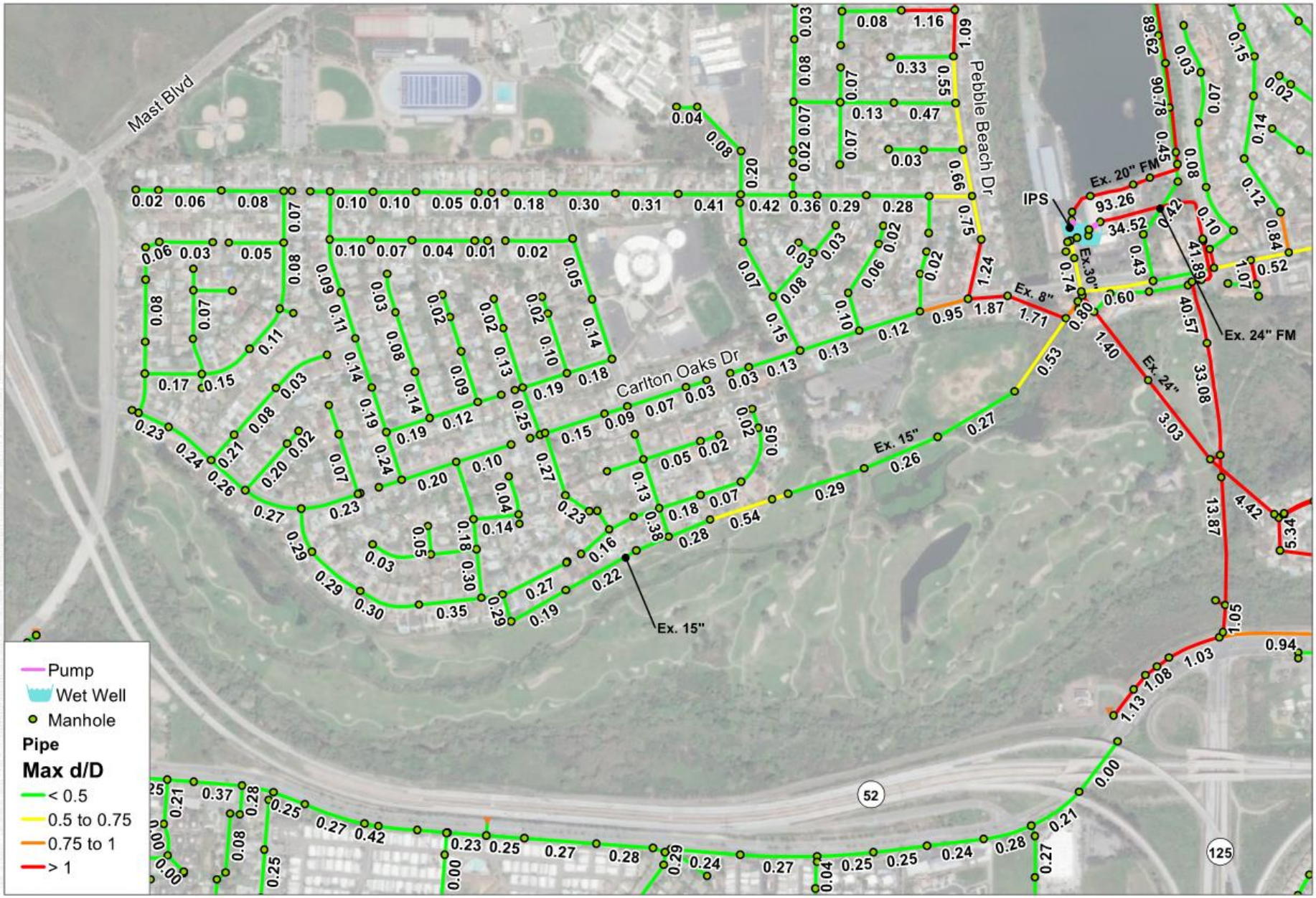


*Figure 3.6. 2020 PWWF with Weston Only (No Carlton Oaks PA-1, PA-2 and PA-3) (Near IPS)*

*Figure 3.7. 2020 PWWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Overview)*

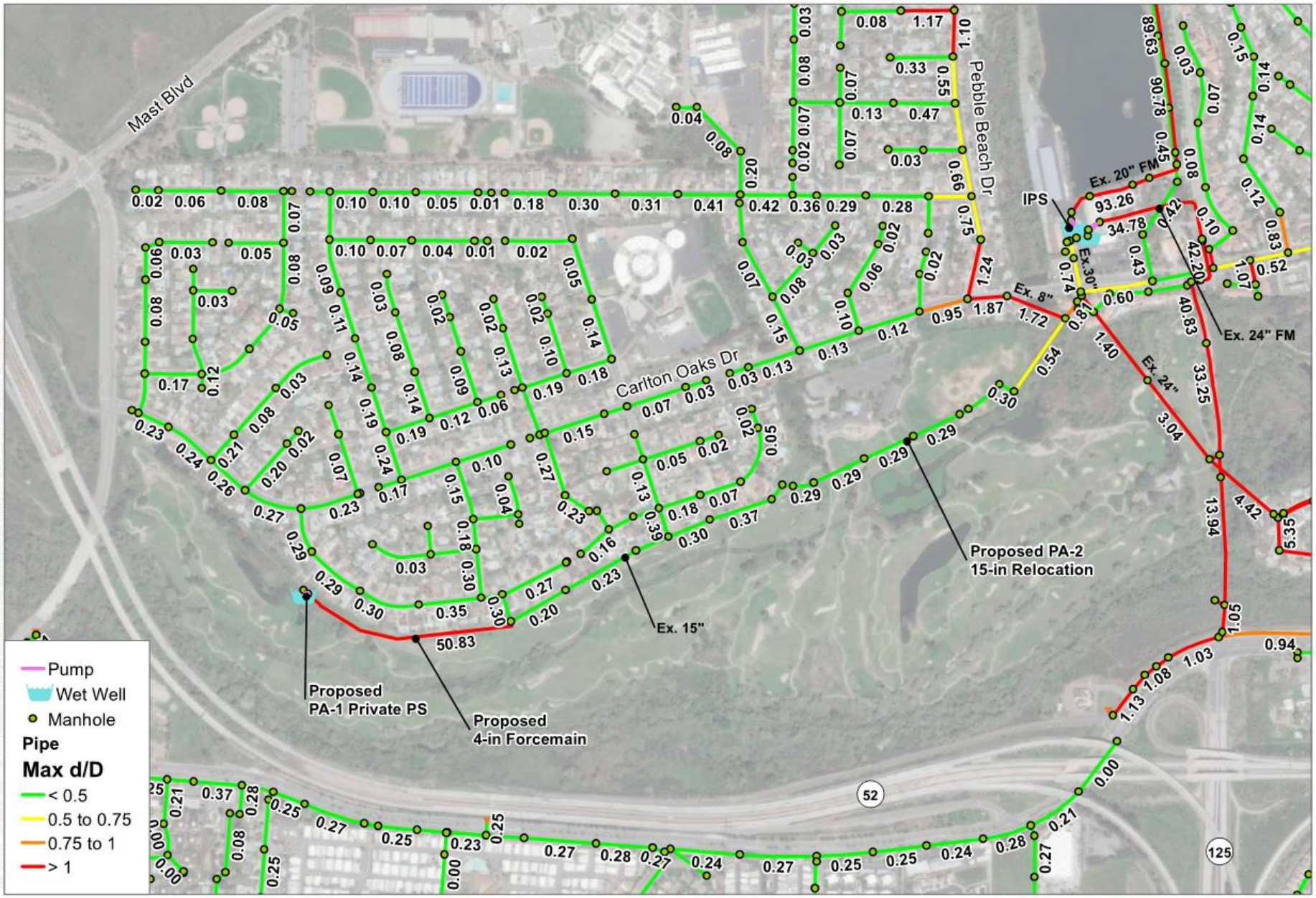


*Figure 3.8. 2020 PWWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Near IPS)*

### 3.2.3 Buildout Peak Dry Weather Flow

For this analysis, the 2040 ADWF loading scenario in the model was utilized, along with the "2040_IMPROVE" pipeline and manhole sets. In the "2040_IMPROVE" pipeline set, the existing 30-inch pipe just upstream of the IPS is projected to be upsized to 36-inch. As shown on **Figures 3.9** and **3.10**, with the Weston and Carlton Oaks PA-1, PA-2 and PA-3 development sewage loads, none of the existing pipelines downstream of the proposed Carlton Oaks development are projected to exceed the d/D requirement (maximum d/D > 0.75 criteria) during projected buildout PDWF conditions. Note, there are backwater effects in the pipeline upstream of the PA-3 discharge manhole; however, the maximum d/D of this pipeline is still below the District's 0.75 design criteria value.

### 3.2.4 Buildout Peak Wet Weather Flow

For this analysis, the 2040 PWWF loading scenario in the model was utilized. With both the Weston and Carlton Oaks PA-1, PA-2 and PA-3 development sewage loads, none of the existing 15-inch pipelines downstream of the proposed PA-1 and PA-2 Carlton Oaks developments are projected to exceed the d/D requirement (maximum d/D of > 0.75 criteria). As shown on **Figures 3.11** and **3.12**, surcharged conditions in the existing 24-inch pipeline serving PA-3 are only slightly above what they were projected to be in the 2020 PWWF condition. This surcharged condition in the 24-inch pipe was discussed with District staff and staff indicated that this result is consistent with existing field conditions found during significant wet weather events; therefore, the condition is expected to be present in 2040 without major system modifications. District operations staff does have the ability to divert a portion of these flows to the County of San Diego sewer line in order to reduce flows in this line, if needed. The additional Carlton Oaks PA-1, PA-2 and PA-3 sewer loads are not anticipated to exacerbate buildout PWWF conditions.

*Figure 3.9. 2040 PDWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Overview)*

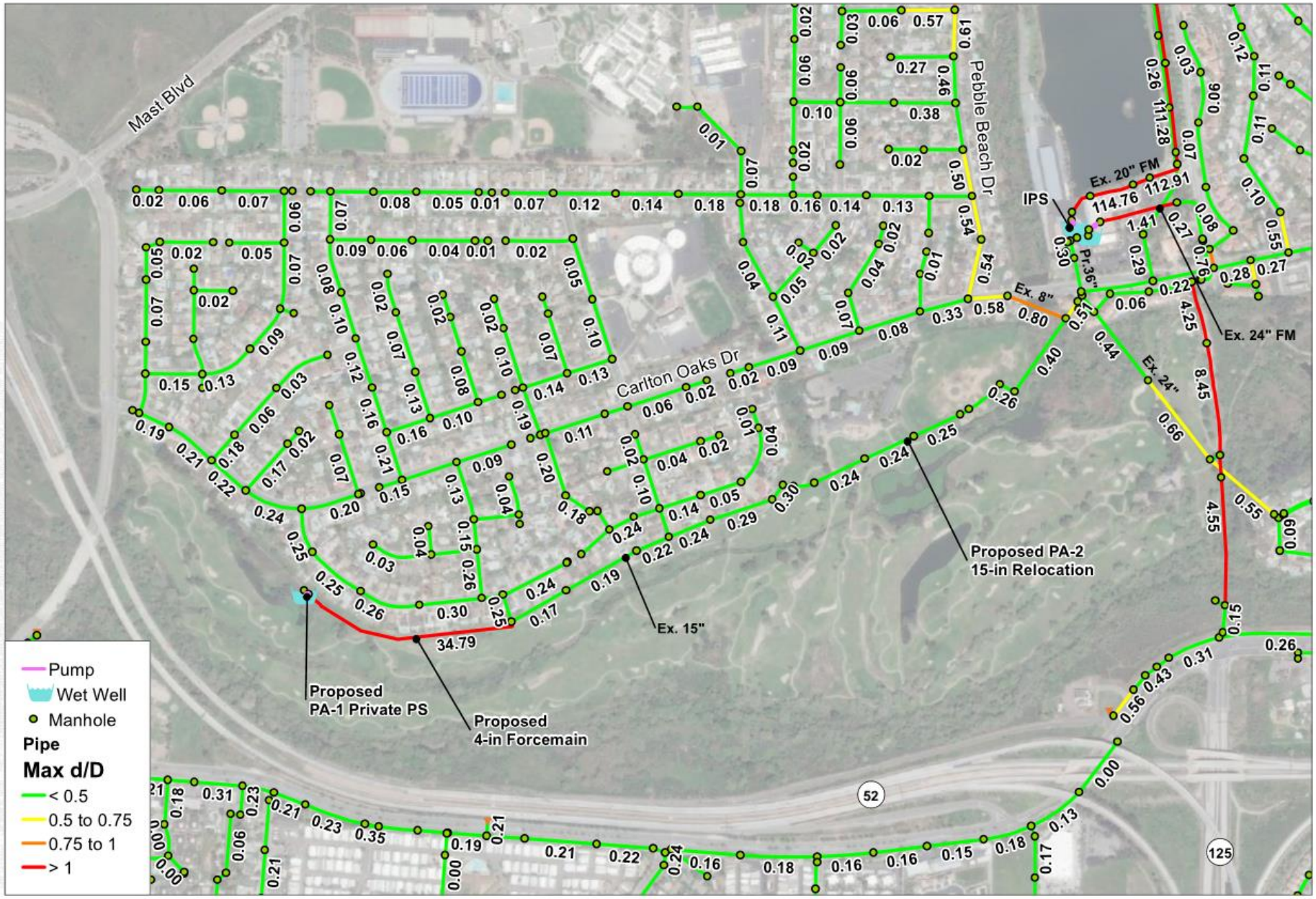


*Figure 3.10. 2040 PDWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Near IPS)*

*Figure 3.11. 2040 PWWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Overview)*

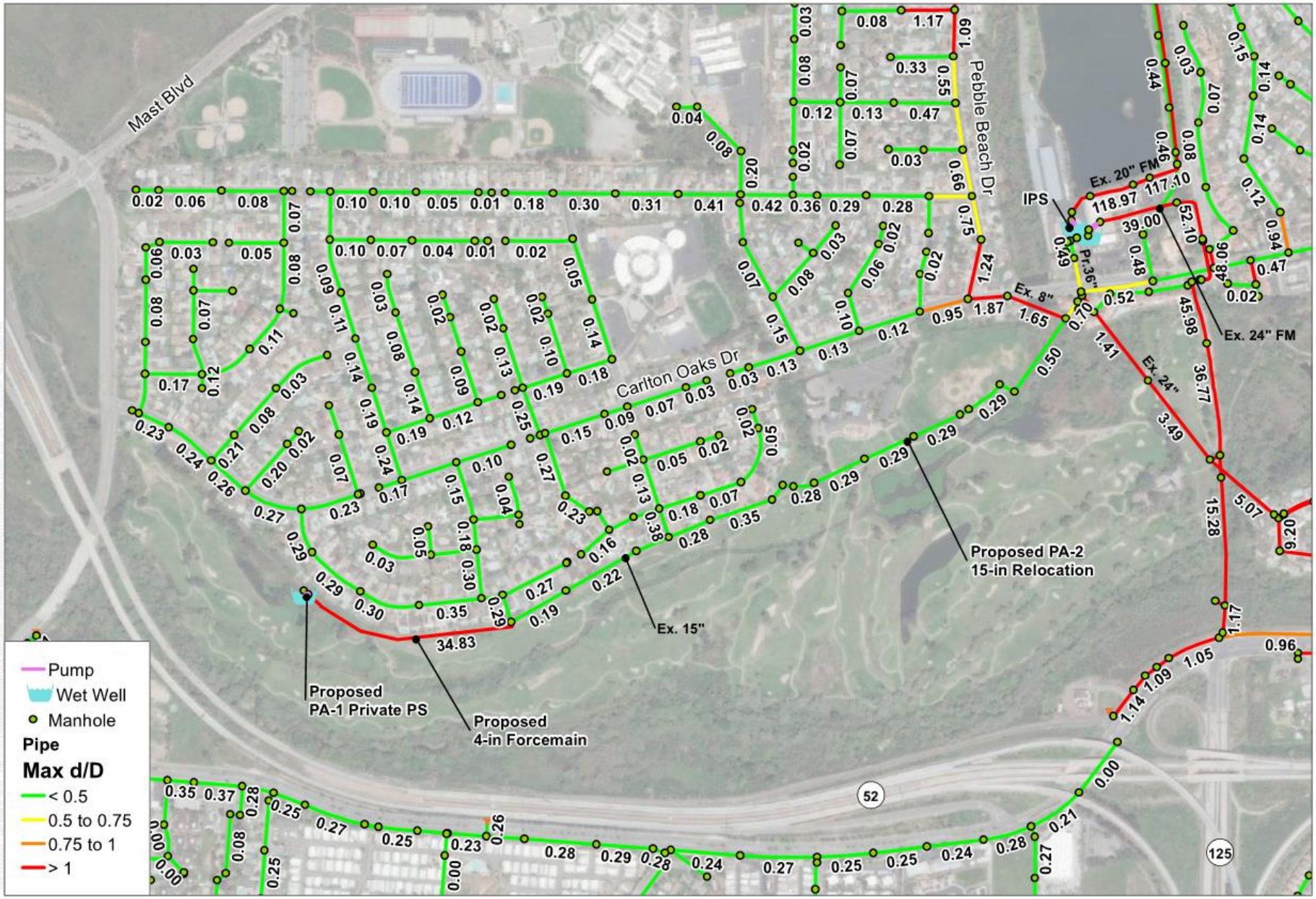


*Figure 3.12. 2040 PWWF with Weston and Carlton Oaks PA-1, PA-2 and PA-3 (Near IPS)*

# 4 Conclusions and Recommendations

The following conclusions and recommendations are drawn from the hydraulic analyses performed:

- While the additional sewer flows generated by Carlton Oaks PA-1, PA-2 and PA-3 are not anticipated to require upsizing of existing District sewer infrastructure to accommodate the increase in loadings, the sewer model found that the hydraulic conditions at the confluence area of the 8-inch, 15-inch, and 24-inch sewers near Carlton Oaks Drive and Calle del Verde result in backwater effects in both existing and proposed conditions. The amount of flow contributed by the Carlton Oaks development is small in comparison to the existing flows entering the confluence area. To improve existing and proposed hydraulics through the manholes and bends in this area, it is recommended that the District consider installing engineered sewer manhole liners, such as the PREDL Systems FRP liners, in the three manholes between the 8-inch tie-in from the northwest and the 24-inch tie-in from the southeast, as shown in **Figure 4.1**. The sizing of the existing and proposed 15-inch sewer serving the additional PA-1 and PA-2 sewer loads was found to be adequate to accommodate existing and future PWWF conditions.
- The Study found other pipelines with d/D values exceeding District criteria under current PWWF conditions that are not impacted by the projected PA-1, PA-2 and PA-3 sewer loadings.
- The proposed discharge manhole location for the 4-inch forcemain from the PA-1 private lift station is anticipated to be satisfactory; no hydraulic issues were identified in the analysis.
- All currently planned on-site system improvements for PA-1, PA-2 and PA-3 are adequately sized for the increased sewer loads anticipated for PA-1, PA-2 and PA-3.
- The 15-inch sewer main located within the back yards of private properties on Inverness Road is not recommended to be used to serve the proposed project in its current location due to the introduction of additional flow and odors from the PA-1 Lift Station wet well to an area with limited accessibility to District maintenance staff. It is recommended that either: a) the proposed PA-1 LS forcemain extend to the 15-inch sewer main located within the PA-2 development area to serve the proposed PA-1 development thereby bypassing the Inverness back yards, or b) the 15-inch sewer be abandoned in the back yards and relocated to the north side of the golf course property for approximately 1,700 linear feet from Massot Avenue to PA-2, as shown in **Figure 4.2**. While not required as a result of the additional flows from the new PA-1, PA-2 and PA-3 development, the recommended relocation alternative would serve the proposed PA-1 LS forcemain and improve District maintenance accessibility.

*Figure 4.1. Recommended Facilities (Near IPS)*

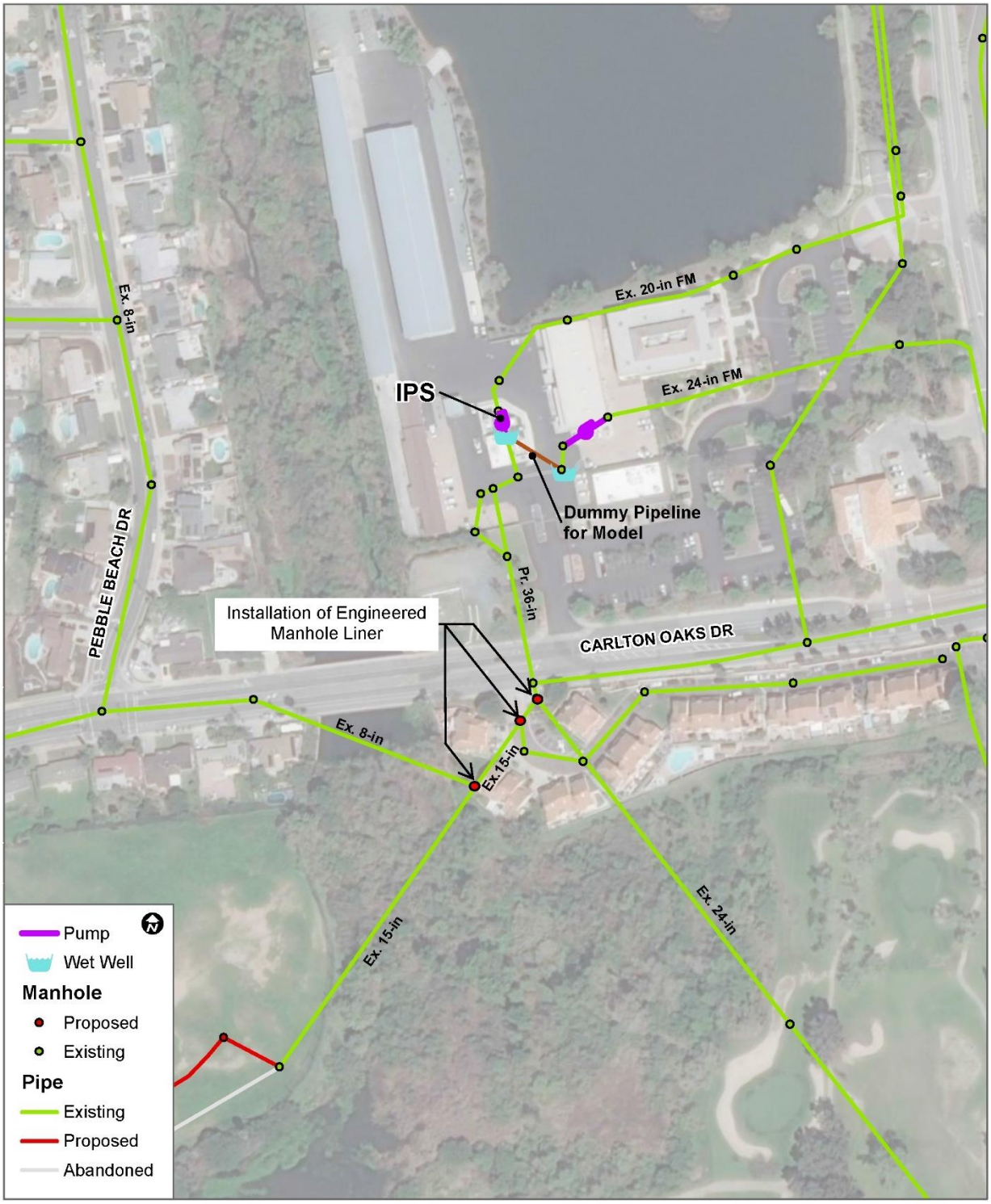
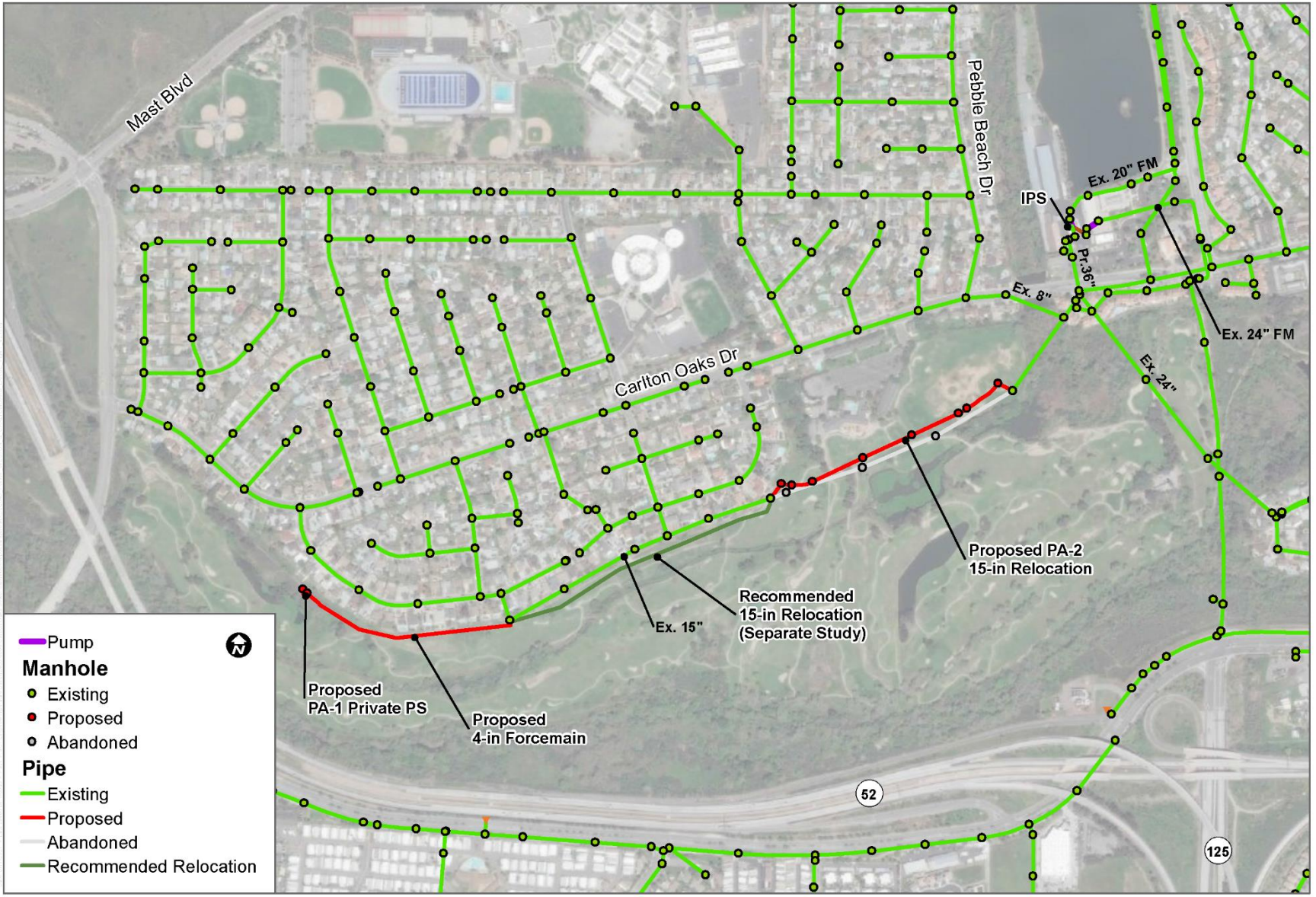


*Figure 4.2. Recommended Facilities (Overview)*



# Appendix A

## Map of Carlton Oaks PA-1, PA-2 and PA-3

# OVERALL SITE EXHIBIT FOR:
# CARLTON OAKS GOLF COURSE

## DEVELOPMENT SUMMARY

PA–1

| RESIDENTIAL WEST | |
|---|---|
| EXISTING ZONING | PD |
| EXISTING LAND USE | GOLF COURSE |
| PROPOSED ZONING | R7 |
| PROPOSED LAND USE | MULTIFAMILY RESIDENTIAL |
| PROPOSED GROSS AC. | 9.37 |
| DENSITY (DU/GROSS AC) | 9.07 |
| PROPOSED NUMBER OF UNITS | 85 |
| REQUIRED PARKING SPACES | 191 |
| PARKING SPACES (GARAGE) | 170 |
| GUEST PARKING SPACES | 36 |
| PARKING SPACES PROVIDED | 206 |
| PARKING RATIO | 2.42 |
| STREETS | PRIVATE |
| SEWER | PRIVATE |
| WATER | PRIVATE |
| EARTHWORK | |
| CUT (CY) | 20,000 |
| FILL (CY) | 178,000 |
| IMPORT (CY) | 158,000 |

PA–2

| RESIDENTIAL NORTH | |
|---|---|
| EXISTING ZONING | PD |
| EXISTING LAND USE | HOTEL/CLUBHOUSE |
| PROPOSED ZONING | R7 |
| PROPOSED LAND USE | MULTIFAMILY RESIDENTIAL |
| PROPOSED GROSS AC. | 19.77 |
| DENSITY (DU/GROSS AC) | 7.99 |
| PROPOSED NUMBER OF UNITS | |
| 47'x70' | 71 |
| 50'x56' | 87 |
| TOTAL | 158 |
| REQUIRED PARKING SPACES | 356 |
| PARKING SPACES (GARAGE) | 316 |
| GUEST PARKING SPACES | 99 |
| PARKING SPACES PROVIDED | 415 |
| PARKING RATIO | 2.63 |
| STREETS | PRIVATE |
| SEWER | PRIVATE |
| WATER | PRIVATE |
| EARTHWORK | |
| CUT (CY) | 102,000 |
| FILL (CY) | 126,000 |
| IMPORT (CY) | 24,000 |

PA–3

| HOTEL AND CLUBHOUSE | |
|---|---|
| EXISTING ZONING | PD & P/OS |
| EXISTING LAND USE | GOLF COURSE |
| PROPOSED ZONING | PD & P/OS |
| PROPOSED LAND USE | HOTEL – 27 ROOMS |
| | COTTAGES – 25 ROOMS |
| | GOLF CLUB HOUSE – 18 HOLES |
| | RESTAURANT – 3,434 SF |
| | TOURNAMENT HALL – 6,059 SF |
| | DRIVING RANGE, LEARNING CENTER |
| | CART BARN, PRACTICE AREA |
| | PUBLIC TRAIL HEAD |
| PROPOSED GROSS AC. | HOTEL – 8.43 |
| REQUIRED PARKING SPACES | 227 |
| PARKING SPACES PROVIDED | 310 |
| | TRAIL HEAD – 5 |
| STREETS | PRIVATE |
| SEWER | PRIVATE |
| WATER | PRIVATE |
| HOTEL EARTHWORK | |
| CUT (CY) | 27,000 |
| FILL (CY) | 116,000 |
| IMPORT (CY) | 89,000 |
| GOLF COURSE EARTHWORK | |
| CUT (CY) | 201,000 |
| FILL (CY) | 63,000 |
| EXPORT (CY) | 138,000 |

PA–1

PA–2

PA–3

PARKWAY

CARLTON HILLS

SAN CLEMENTE CANYON FREEWAY

OAKS DRIVE

INVERNESS ROAD

OAKBOURNE ROAD

KNOLLWOOD WAY

PEBLE BEACH DRIVE

FANITA PARKWAY

EXIST. INWOOD DRIVE (TO BE VACATED)

PROP PDMWD SEWER ESMT.

DRIVING RANGE

SECONDARY EMERGENCY ACCESS

CONNECT TO EXIST. WATER

CONNECT TO EXIST. SEWER

SEWER PUMP STATION

PROPOSED WATER

PROPOSED SEWER

FUTURE SANDAG TRAIL

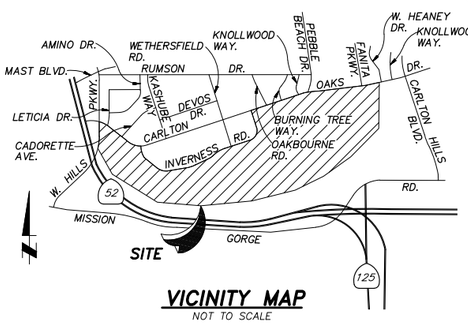
CITY OF SANTEE

CITY OF SAN DIEGO

MISSION GORGE ROAD

52

125




**VICINITY MAP**
NOT TO SCALE

SCALE: 1" = 200'

GRAPHIC SCALE
200 0 200 400 600

**DRAFT**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FILE NAME: D:\73832 CARLTON OAKS CALATLANTIC\03 DWG\EX\73832EX01-OVERALL SITE CODE.DWG, PLOTTED BY: JOSH SCHROEDER ON 8/11/2020 3:50 PM

DUDEK

# Appendix B

## PDMWD Sewer Design Criteria

(Table 5.3 from the Comprehensive Facilities Master Plan Final Report – October 2015)

**Table 5.3 Wastewater System Evaluation Criteria**
**Comprehensive Facilities Master Plan**
**Padre Dam Municipal Water District**

| Pipe Material | Manning's n Coefficients |
|---|---|
| ABS | 0.011 |
| ACP | 0.011 |
| CIPP | 0.011 |
| DIP(Lined) | 0.013 |
| HDPE | 0.011 |
| PVC | 0.011 |
| RCP | 0.013 |
| Techite | 0.011 |
| VCP | 0.013 |

| Maximum Flow Depth for Existing Sewers | |
|---|---|
| Peak Wet -Weather Flow: | 3' Below Manhole Rim |

| Maximum d/D for New Sewers[1] | |
|---|---|
| Pipe Diameter (inches) | Maximum d/D Ratio (during Peak Flows) |
| Less than or equal to 12 | 0.50 |
| Larger than 12 | 0.75 |

| Minimum Slope | | | |
|---|---|---|---|
| Pipe Diameter (inches) | Minimum Slope[2][3] (feet/feet) | Calculated Flow at Maximum d/D[3] | |
| | | d/D | Maximum Flow (mgd) |
| 6 | 0.0068[4] | 0.50 | 0.15 |
| 8 | 0.0040[4] | 0.50 | 0.25 |
| 10 | 0.0028[4] | 0.50 | 0.38 |
| 12 | 0.0021[4] | 0.75 | 0.96 |
| 15 | 0.0018[4] | 0.75 | 1.62 |
| 18 | 0.0011[2] | 0.75 | 2.06 |
| 21 | 0.0009[2] | 0.75 | 2.84 |
| 24 | 0.0008[2] | 0.75 | 3.70 |
| 27 | 0.0007[2] | 0.75 | 4.68 |
| 30 | 0.0006[2] | 0.75 | 5.79 |

Notes:
(1) Per *Water Agencies' Standards Design Guidelines for Water and Sewer Facilities* (September 2009).
(2) Recommended minimum slope for flows at a velocity greater than or equal to 2 ft/s
(3) Calculated flow is determined using the minimum slope and maximum allowable d/D
(4) Slope and flow for pipe diameters 6 inches to 15 inches are from WAS Design Guidelines
(5) Calculated flow is determined using the minimum slope, maximum allowable d/D, and a Manning's n coefficient of 0.013