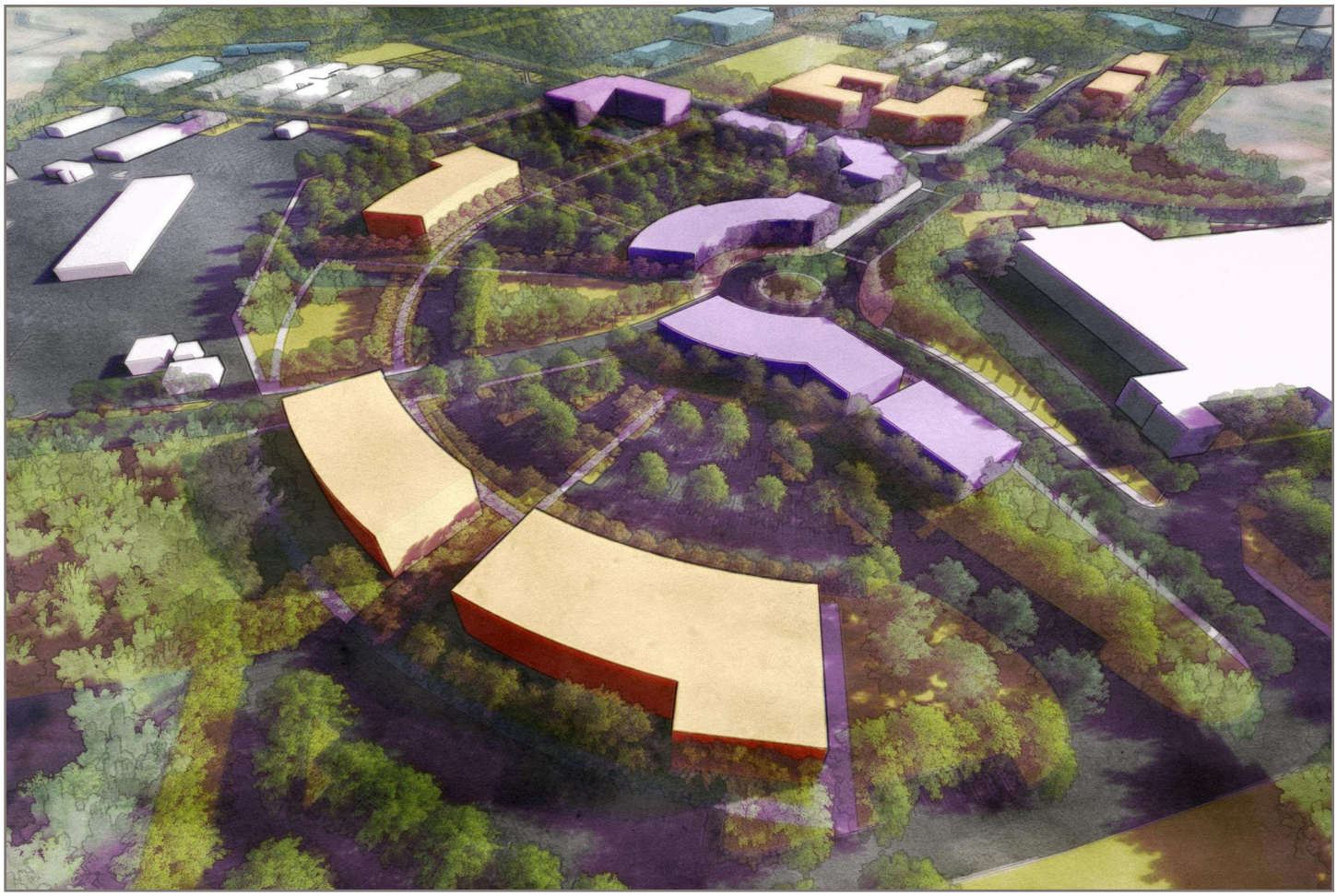
PLACER COUNTY GOVERNMENT CENTER MASTER PLAN UPDATE - APPENDICES

VOLUME 2

15 FEBRUARY 2019



COUNTY OF Placer®

MP-A2

APPENDIX E: WET UTILITIES INFRASTRUCTURE ASSESSMENT

Williams + Paddon Architects + Planners Inc.
Master Plan Update – Wet Utility Infrastructure Assessment

PLACER COUNTY GOVERNMENT CENTER MASTER PLAN UPDATE

November 9, 2018

CARTWRIGHT

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Master Plan Update Wet Utility Infrastructure

INTRODUCTION

0.1 SUMMARY

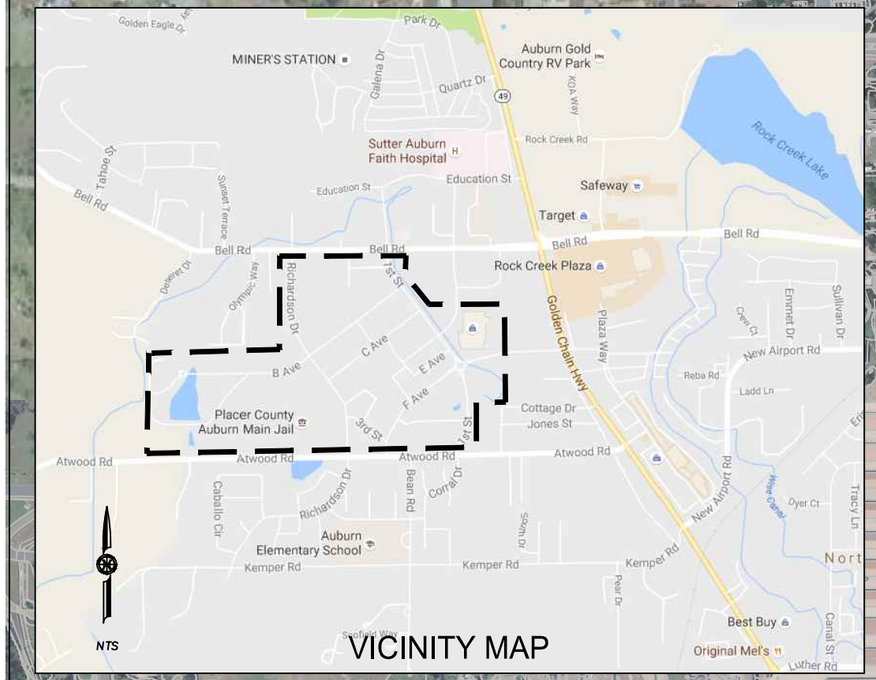
The purpose of this report is to provide a comprehensive overview of the utility infrastructure within the approximate 200-acre campus boundaries of the Placer County Government Center located in North Auburn, Placer County, California (refer to Figure 1). This report, entitled Master Plan Update – Wet Utility Infrastructure, is written as a supplement to the Placer County Government Center (PCGC) Master Plan Update, a document intended to provide a detailed update to the *1993 Comprehensive Facilities Master Plan (CFMP)*, dated July 1993. The specific wet utilities addressed in this report include the following: domestic water supply and distribution, water supply and distribution for campus-wide fire suppression, water supply and distribution for campus-wide irrigation, sanitary sewer systems throughout the campus, and the storm system conveying storm runoff generated on the campus. For purposes of this report, the word "campus" will also be interchangeably referred to as the onsite system to draw a distinct difference, as applicable, to offsite areas and systems that are not within the boundaries of the PCGC campus. As such, this report will also address "outside" systems that either influence or impact the wet utility system within the campus. By the same token, the report also details, as applicable, how the onsite system impacts or influences offsite utilities.

With respect to the aforementioned wet utilities, this report will describe the existing utilities currently in place at the campus based on a compilation of data, maps, and documentation received by various sources referenced in this report in conjunction with numerous site visits to the site in an effort to aid in verifying or updating, wherever visibly possible, the collected data, maps, and documentation. This system of information collection and verification was performed in an effort to produce the most accurate picture possible relative to the specific and major water, irrigation, sewer, and storm systems that will have a material impact in evaluating and assessing these systems, integrating both existing facilities and a plan for future facilities consistent with the Master Plan. Pursuant to creating this picture, the evaluation and assessment of the system and its existing and proposed improvements is the second part of this report. The descriptions provided in this report and the associated collection and verification of information has also largely been supported by stakeholder meetings with key staff within the Placer County Department of Public Works and Facilities, Placer County Water Agency (PCWA), Nevada Irrigation District (NID), and with consultants who, on behalf of Placer County, have

diligently provided mapping, modelling, and documentation either directly or indirectly associated with the PCGC.

It should be noted that while the *1993 Comprehensive Facilities Master Plan (CFMP)* provided cursory information relative to wet utilities, subsequent reports, and mapping efforts performed by various consultants on behalf of the County have provided valuable information as the basis for our methodology within both the findings and assessment sections of this report. These documents have been referenced throughout the report. Since there has been some lag between the time that these documents were prepared and today, this report seeks to update the inventory of existing utilities, their current function, and our assessment of capacity of each system as they exist today as well as the ability for each system to accommodate uses proposed in the Placer County Government Center Master Plan Update (PCGC Master Plan Update).

This Wet Utility Infrastructure Report is divided into three primary sections: Section 1, which details the efforts related to finding and compiling existing utility system data and maps and assessing utility capacity based on this data; Section 2, which finalizes the development of existing baseline utility models used to assess capacity and provides a summary analysis and recommendations of development alternatives towards developing the proposed Master Plan Update based on impacts to utilities; Section 3, which establishes proposed analytical models to assess capacity and provide recommendations of existing and proposed utilities to accommodate the 20-year horizon of the Master Plan Update.



VICINITY MAP

BELL ROAD
RICHARDSON DR
COUNTY CENTER DR
PROFESSIONAL DR
CDRC
A AVE
FINANCE ADMIN
HEALTH & HUMAN SERVICES
HOME DEPOT
WILLOW CREEK DR
B AVE
C AVE
D AVE
E AVE
F AVE
1ST STREET
2ND STREET
3RD STREET
PEACE FOR FAMILIES
PLACER COUNTY CES
PLACER COUNTY ANIMAL CONTROL
ANIMAL SERVICES CENTER (UNDER CONSTRUCTION)
AUBURN JUSTICE CENTER
JUVENILE DETENTION CENTER
JAIL
CORPORATION YARD
ATWOOD RD

Drawn by: WY | Plot Date: 8/5/16 | Project #: 216056
File Name: U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-FIGURE1-Vicinity Map and Campus Boundary(11x17).dwg

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ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

LEGEND: — — — PROJECT BOUNDARY

150 0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
VICINITY MAP AND CAMPUS BOUNDARY

FIGURE NO.
1

0.2 EXISTING SITE DESCRIPTION AND HISTORY

The central historic core of the Placer County Government Center is the area formerly known as the DeWitt General Hospital (see Figure 2 below, ref. militarymuseum.org). Prior to acquisition for the DeWitt General Hospital, the majority of the site was used as pasture. The general area was primarily a producer of deciduous shipping fruit until the 1930s. Within five years preceding the establishment of former DeWitt, a portion of the land was converted to permanent irrigated pasture for livestock. Small farm buildings were present on site when the land was acquired by the War Department in 1943. Formerly the DeWitt General Hospital and then the DeWitt State Hospital, the site cared for battle casualties during the last two years of World War II (1943-1945) and thousands of mental patients after the State of California took over the property in the post-war years. In late 1945, DeWitt was deactivated and closed as an Army installation. The State of California then acquired DeWitt from the War Assets Administration in 1946. DeWitt was activated as a California State Hospital in the early summer of 1946. The state transferred the land to Placer County in 1972 after closing the hospital and the site eventually became known as the DeWitt Government Center, the core employment center for Placer County Government. The site is also referred to as the Placer County Government Center.

Today, the Placer County Government Center houses many County facilities including the Community Development Resource Center (CDRC), the Finance Administration Building (FAB) and Assessor's office, Health and Human Services (HHS), Facility Services (FS), the Auburn Justice Center (AJC), the County Jail and Juvenile Detention Center (JDC), the Women's Center, the Corporation Yard and the Animal Services Center. These facilities are a mixture of relatively new buildings (CDRC, FAB, AJC, County Jail and JDC) that have been built within the last 10 years and old buildings (FS, DPW, HHS) with structures built as early as 1942 (Placer County Government Center Facility Condition Assessment, May 2013). A portion of the older buildings and the site which they reside (approximately 66 acres) that are part of the old hospital compound are listed in the National Register of Historic Places (Auburn Journal, March 16, 2016).

In addition to the Government Center Facilities, the campus also leases land to The Home Depot, located in the northeast corner of 1st Street and Willow Creek Drive. The Home Depot was built and opened in 2015. Since then, there has been additional interest from other commercial retailers to locate within the campus boundaries.

Figure 2: Placer County Government Center Site in 1940's

0.3 CONTEXT OF SITE RELATIVE TO UTILITIES

With a good number of the 1940s structures still intact, specifically along the east and central portion of the existing campus (bound by Richardson Drive to the west, 1st Street to the east, B Avenue to the north and F Avenue on the south), the underground utility infrastructure is also quite old. Much of the underground utilities were constructed to service the hospital facilities in the 1940's with a good number of the pipe material being a vintage iron (cast and ductile) for waste and water lines (domestic and irrigation) as well as copper for domestic water. From a storm water perspective, much of this

specific area, conveys runoff by way of surface flow with little to no underground storm pipes used to convey runoff. The site's surface topography lends itself to good drainage, but this area is likely subject to localized flooding where existing underground storm improvements do not exist to alleviate the flooding.

The newly developed areas of the site have been improved with a more current standard for underground utilities. This includes a combination of plastic and ductile iron as well as corrugated metal and concrete. That said, many of the new areas are still interspersed with locations where older existing underground utilities may exist and the system may be impacted from a capacity standpoint as a result. Storm runoff in the areas outside of the 1940s era facilities but also within a portion of the older areas (the 200 series buildings – Facility Services) is generally collected in underground pipes by way of drainage inlets and catch basins. Runoff is conveyed to the natural low areas of the campus where existing wet and dry basins collect and ultimately convey runoff downstream.

An existing raw water irrigation canal also exists within the campus and runs from south to north along the eastern side of 1st Street. The surface canal carries raw water and exits the campus at Bell Road to the north where it continues to flow towards and eventually into the Combie Ophir Canal. This system is owned and operated by the Nevada Irrigation District (NID) and appears to have been in use since the early 1940s for farming and irrigation purposes. There appears to be a metered gate provided to the County for prescriptive rights to use at the canal and along the north side of the campus. While there exists a right to an allocated use of the raw water, the County does not currently utilize raw water onsite. Its potential use within the campus is warranted and further detailed in this report.

While the context of this report is focused exclusively on establishing, with relative confidence, an inventory of existing wet utilities and determining capacity of major systems, a condition and operating assessment of existing utilities can be a critical component to ascertaining the mid to long-term viability of the system and is a vital component in accurately assessing and analyzing the life-cycle of existing utilities. Short of this detailed assessment, certain assumptions have been made throughout this report and in our analysis relative to the functionality of the system and its general condition. Where we believe it is appropriate, we have indicated within the utility findings and assessment portion of this report specific recommendations where a more in-depth assessment of utility condition is warranted beyond the scope of this report.

SECTION 1: FINDINGS AND ASSESSMENT

1.1 METHODOLOGY

As previously mentioned, this comprehensive overview of wet utility infrastructure involves two primary components:

1. Collection of existing wet utility information by way data compilation, review of maps and documents, and meetings with key utility stakeholders along with a visual verification of utilities, where possible, by way of a site survey. For purposes of this report, this component will be referred to as the **Findings** phase of this report.

2. The **Assessment** phase of this report provides an overview of existing system capacities based on our independent review of the most current reports (as available), associated analyses, and modelling followed by our own verification, where applicable, of each system by conducting our own analysis or modelling and calibration of the system.

1.1.1 FINDINGS METHODOLOGY

For the Findings section of this report, we have applied the American Society of Civil Engineers (ASCE) Standard 38-02 (CI/ASCE 38-02), the "*Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."* For this report, ASCE 38-02 applies to our methods to collect and depict existing underground water, sewer, and storm systems along with our collection and depiction of the NID canal along 1st Street. ASCE 38-02 defines four different Quality Level Attributes that pertain to the levels of depicted accuracy of the existing utilities from the least level of accuracy (Quality Level D) to the most accurate level of accuracy (Quality Level A). A brief description of each level (from least to most) is as follows:

- **Quality Level D:** Existing utilities are depicted on a map, drawing or plan based on the engineer's collection of utility record information, as-builts, service, and facility maps. This data can also be verified or provided verbally by a utility owner with first-hand knowledge of the location of the owned utility and documented on the map as information provided directly by an owner without the benefit of an existing record map.

- **Quality Level C:** The engineer further verifies Quality Level D data and mapping by visually verifying surface appurtenances of existing subsurface utilities by reviewing a topographic plan and ground surface or by performing a site survey to collect the surface appurtenances. Once collected and mapped, these surface appurtenances are correlated against utility records collected during Quality Level D and resolving, as applicable, any potential differences. The correlation may also verify and further refine the connection of utility lines from surface feature to surface feature (i.e. water valve to hydrant, manhole to manhole, catch basin to manhole).

- **Quality Level B:** In conjunction with Quality Levels D and C, engineer utilizes a suite of surface geophysical methods to search for utilities by detecting a trace of the utility and

marking the trace in the field to be surveyed. The surveyed markings are to the accuracy and precision dictated by the project's survey control. Once surveyed, the 'designated' utilities are depicted on a map with line work distinguished as to the type of utility. Any utilities depicted through Quality Level B supersede, by virtue of accuracy level, the line work established on the maps determined through Levels C and D.

- Quality Level A: Where the specific horizontal and vertical position of a utility requires a precise determination in design and in an effort to resolve conflicts, Quality Level A is employed. The current practice to perform Level A is by physically exposing the underground utility at the location needed by way of excavation through minimally intrusive means. Once the specific location is exposed, a survey to determine the precise horizontal and vertical position of the utility (top and/or bottom) is performed with the project survey datum established to determine horizontal/vertical position, elevation of the existing ground above the utility, the outside diameter, or dimensioned details related to the utility.

Quality Levels A and B are typically performed during the development of precise design level documents when a project is ready to be permitted for construction. These levels are generally not warranted during the planning or Master Planning phase of a project. For the Placer County Government Center and for the evaluations necessary to perform an assessment of the existing system as well as an analysis of a combined system of existing and proposed utilities towards the establishment of a Master Plan, Quality Level D and limited (described in detail below) Quality Level C is more than sufficient.

The primary maps utilized during the Quality Level D process were the County provided Water, Sanitary Sewer and Storm Drain Plans as well as the composite Utility Plan provided as part of Addendum 2 to the Request for Proposals, as prepared in November of 2010 by West Yost Associates Consulting Engineers. It is understood that these plans involved the latest utility mapping exercise related to the overall campus and the CAD drawing information reflects the survey work that went into preparing these maps to a control system approved by the County and correlated with the site's latest topographic survey provided by the County and prepared by Andregg Geomatics as Aerial Mapping with Photography dated June 26, 2015 at a scale of 1"=100'. These maps are a compilation of record data obtained by West Yost. Since these maps were prepared in late 2010, Cartwright also requested a review of the maps by County staff as well as other utility purveyors (PCWA and NID) to provide further update and revision based on utility improvements that may have occurred subsequent to November of 2010 or based on information gathered and confirmed on the existing utility systems that takes the place of how they were depicted in the West Yost Plans.

The aforementioned topographic aerial map prepared in June of 2015 by Andregg along with initial site visits formed the basis for a limited Quality Level C assessment. The limited Quality Level C process includes verification of the wet utility systems by our review of surface appurtenances that are shown on the Andregg map followed by our initial site visits conducted in late July and early August intended to further verify the presence of utility surface features to further confirm the depiction of utilities as shown on the West Yost plans. This report and associated maps document

field and map review findings and identify any discrepancies or updates to the West Yost plans with a recommendation where needed to resolve any potential discrepancies. If site visits identified utility surface features that were previously not shown on the West Yost Plans or the Andregg topographic survey those surface features, collected data (horizontal and vertical by general field tape measurements as accessible), have been noted in these findings. Since this exercise is focused on developing an update to the Master Plan, a more accurate survey of these surface features based on the project's datum and surveyed control is not provided herein as this level of accuracy is not warranted at this time. Should this become necessary during the development of alternatives towards a Master Plan where more accurate information is necessary, coordination of those elements will be done at that phase of the project. This is the reason for the limited Quality Level C exercise at this point.

Based on the methodology associated with the findings, it is possible to depict the system and develop the basis for performing the assessments and analysis of system capacities for water, fire, irrigation, sanitary sewer, and storm.

1.1.2 ASSESSMENT METHODOLOGY

Once the utilities are defined as described in the Findings section, a transition to the methodology for assessing the applicable utility system and associated capacities is made. As mentioned, the assessment entails a two-step phased approach:

- Phase 1: Review existing reports and associated models and analysis and report on the review of system capacities and potential deficiencies as detailed in these reports.
- Phase 2: Develop assessments and analysis of each utility system utilizing the reports gathered in Phase 1 above as the baseline. In addition to referencing the previous reports as a baseline and recognizing that engineering standards, guidelines and agency requirements have potentially evolved since the preparation of the referenced reports, each modelled and calibrated system will take that into account. If new data has become available from respective agencies as an update to the referenced report, this new data will also be utilized as a replacement to any older data used in prior analyses. Section 1 of this report currently documents our assessment based on Phase 1. Phase 2 is documented within Sections 2 (Development Alternatives) and 3 (Master Plan) and a baseline analytical model has been developed for each applicable utility and for existing conditions as the basis for the Phase 2 assessments within Sections 2 and 3.

For Phase 1 above, the following reports were gathered, reviewed and referenced as part of the assessment methodology:

Water (fire and domestic):

1. Technical Memorandum of the Placer County DeWitt Center Fire Flow Evaluation, June 25, 2012, West Yost Associates, Consulting Engineers

A copy of this memorandum can be found in Appendix A of this report.

Sanitary Sewer:

2. North Auburn DeWitt Trunk Sewer Capacity Evaluation Report, March 6, 2015, Stantec Consulting Services, Inc. prepared for Western Care Construction, Inc.
3. Auburn Creekside Project Specific Report, June 10, 2015, Stantec Consulting Services, Inc. prepared for Auburn Pacific Properties, LLC

A copy of both reports can be found in Appendix C of this report.

Storm:

Pursuant to a meeting held August 1, 2016 with key staff members of Placer County Department of Public Works and Facilities, specifically Mary Keller, Placer County Stormwater and Floodplain Program Coordinator and Dennis Hughes, Assistant Building Maintenance Superintendent, the campus has not developed an overall Master Drainage Report detailing system capacities and describing a storm water management plan with criteria for collection, conveyance, treatment, and attenuation. The Placer County Flood Control and Water Conservation District Storm Water Management Manual (SWMM, February 1994) will be referenced where applicable to the storm water system design. In addition, the West Placer County Storm Water Quality Design Manual will be the referencing manual and methodology for assessing and planning the storm systems with regard to current general permit requirements for storm water management.

While the Placer County Government Center currently lacks a campus-wide study, a number of local projects within the PCGC have prepared drainage reports and analyses as part of the development of that specific project. A number of those reports have been provided by the County as well as the plans and as-builts designed and built based on the drainage reports. These documents are too numerous to list in this section of the report. A thorough and complete list of documents and reports is listed in Section 2.1 of the Master Drainage Report included in the Appendix (D) of this report.

Lastly, information provided by utility stakeholders in meetings relative to existing utility capacities and deficiencies must also be considered, especially in situations where the campus is dependent on a supply from outside sources. This is especially applicable to the campus' water system and its ability to meet fire suppression needs and peak demands from an outside supply source.

1.2 FINDINGS (ASCE 38-02)

1.2.1 WATER

Figure W-1 of this section provides an overview of the County's existing campus water distribution system in conjunction with the surrounding and influencing water lines owned and operated by PCWA and NID. A majority of the onsite system has been previously confirmed and depicted in the referenced West Yost Water Plan (November 2010). A series of unconfirmed lines have also been depicted as Quality Level D information (ASCE 38-02) and are denoted on Figure W-1. Our initial site visit and observation on August 1, 2016 of above ground water facilities including fire hydrants, valves, and fire department connections have aided in verifying the presence of underground waterlines both on the confirmed and unconfirmed lines (limited Quality Level C) but at this point

the information is not sufficient enough to be able to change the designation of the unconfirmed lines.

An initial site observation was conducted on August 1, 2016 and counted approximately 65 fire hydrants throughout the campus. However, at the time of the visit, access was not available to secure portions of the campus (Jail, Women's Center), which may alter the number of actual hydrants. In addition, a request was made for updated hydrant flow data. As a result, updated flow tests for hydrants throughout the Government Center were received in February 2018 and incorporated into the updated (calibrated) water model. An inventory of onsite water pipes, line sizes and fire hydrants is shown in Figure W-2 of this section. Much of this data has been obtained from the West Yost Technical Memorandum for the Placer County DeWitt Center Fire Flow Evaluation (June 25, 2102) and further confirmed by Placer County staff. The West Yost model was updated to include the new information gathered by County Staff as well as information about connections to PCWA and NID. This is the basis for the model which was calibrated to the fire flow tests performed in 2018 (See Section 1.3).

The Placer County Government Center receives water from PCWA through a single metered connection located on the east side of 1st Street and immediately north of Professional Drive. This connection includes two reduced pressure detector assemblies in parallel (AMES 5000 CIV) and one turbo meter (Recordall Turbo 3500 Meter). The metered connection and the two RP assemblies are shown in Figure W-3. One exception to the single metered connection involves water service to the Community Development Resources Center located in the southeast corner of Richardson Drive and Bell Road. It is currently understood that NID provides both domestic and fire service to the CDRC.

Notably absent from a number of County facilities were the presence of Double Detector Check Assemblies or Reduced Pressure Detector Assemblies. While the connection to the PCWA system is protected by backflow prevention devices, the campus system is not protected by the potential for cross contamination. This report is focused on flow capacity and does not address system protection and state health standards imposed on water purveyors to protect the public with safe drinking water. If the campus water system is to be owned and operated by either PCWA or NID, the installation of backflow prevention devices will be required and flow with the associated pressure and head loss parameters at each protected facility must be applied to the model when analyzing fire suppression.

Based on our review of the West Yost Technical Memorandum, the PCGC has two emergency connections to the Nevada Irrigation District (NID). The first connection is located at Richardson Drive and Bell Road (see Figure W-4) and the second connection is located at 1st Street and Atwood Road (see Figure W-5). These connections have been further verified by provided NID Facility Maps, the West Yost Water Maps (November 2010), and the NID Willow Creek & 1st Street Transmission Main Plans. According to the West Yost Technical Memo, the connections to NID are for emergency conditions only and are normally closed valves that must be opened manually. It was determined that without an automatic opening valve the NID system could not be reliably depended on during a fire event, even if the connection is occasionally left open. However, recent

discussions with NID indicate their willingness to investigate the feasibility of implementing an automated system to allow valves to fully open during a fire event.

Aside from the current Animal Control Building no other onsite County facilities are individually metered. Consequently, actual demand data cannot be determined for each specific County building. The West Yost Technical Memorandum has established demands based on data received from PCWA at the metered connection to the campus as well as actual metered flows at the Animal Control Building. Estimated demands at the Juvenile Detention Center and Jail have been applied based on a factor associated with the number of beds occupied. These demands were referenced as part of the assessment in section 1.3 below. This report further establishes planning level demands under a peak day scenario which is used to update Master Plan demands as part of the analysis detailed in sections 2 and 3.

BELL ROAD

RICHARDSON DR

CDRC

FINANCE ADMIN

HEALTH & HUMAN SERVICES

PROFESSIONAL DR

HOME DEPOT

1ST STREET

WILLOW CREEK DR

PEACE FOR FAMILIES

PLACER COUNTY CES

PLACER COUNTY ANIMAL CONTROL

ANIMAL SERVICES CENTER (UNDER CONSTRUCTION)

AUBURN JUSTICE CENTER

JUVENILE DETENTION CENTER

JAIL

CORPORATION YARD

ATWOOD RD

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Granite Bay, California 95746
T (916) 978-4001

LEGEND:

- UNCONFIRMED WATER LINE
- PCWA LINE
- COUNTY WATER LINE
- NID LINE (INCLUDING NID CANAL)
- IRRIGATION LINE
- PROJECT BOUNDARY

150 0 150 300

SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
OVERALL WATER SYSTEM

FIGURE NO.

W-1

Drawn by WY | Plot Date:8/8/18 | Project #: 216056
File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Overall Water with Boundary(11x17).dwg

NOTE:

1. POTENTIAL CLOSED/BROKEN VALVE LOCATIONS BASED ON INFORMATION PROVIDED BY PLACER COUNTY STAFF.

2. FIRE HYDRANT LOCATION DISCREPANCIES BETWEEN THE JUNE 25, 2012 TECHNICAL MEMO AND THE NOVEMBER 2010 WATER PLAN HAVE BEEN ASTERISKED. FINAL SITE VERIFICATION OF FIRE HYDRANTS IS WARRANTED.

BELL ROAD
RICHARDSON DR
CDRC
FINANCE ADMIN
HEALTH & HUMAN SERVICES
PROFESSIONAL DR
HOME DEPOT
PCWA CONNECTION
PCWA WATER METER
(2) PCWA DOUBLE CHECK DETECTOR ASSEMBLY
1ST STREET
WILLOW CREEK DR
NID CANAL
PEACE FOR FAMILIES
PLACER COUNTY CES
PLACER COUNTY ANIMAL CONTROL
ANIMAL SERVICES CENTER (UNDER CONSTRUCTION)
AUBURN JUSTICE CENTER
JUVENILE DETENTION CENTER
JAIL
CORPORATION YARD
ATWOOD RD

LEGEND:

- 4" DIAMETER AND LESS
- 6" DIAMETER
- 8" DIAMETER
- 10" DIAMETER
- 12" DIAMETER
- POTENTIAL CLOSED/ BROKEN VALVE
- FIRE HYDRANT
- 16" DIAMETER (NID)

150 0 150 300
SCALE IN FEET

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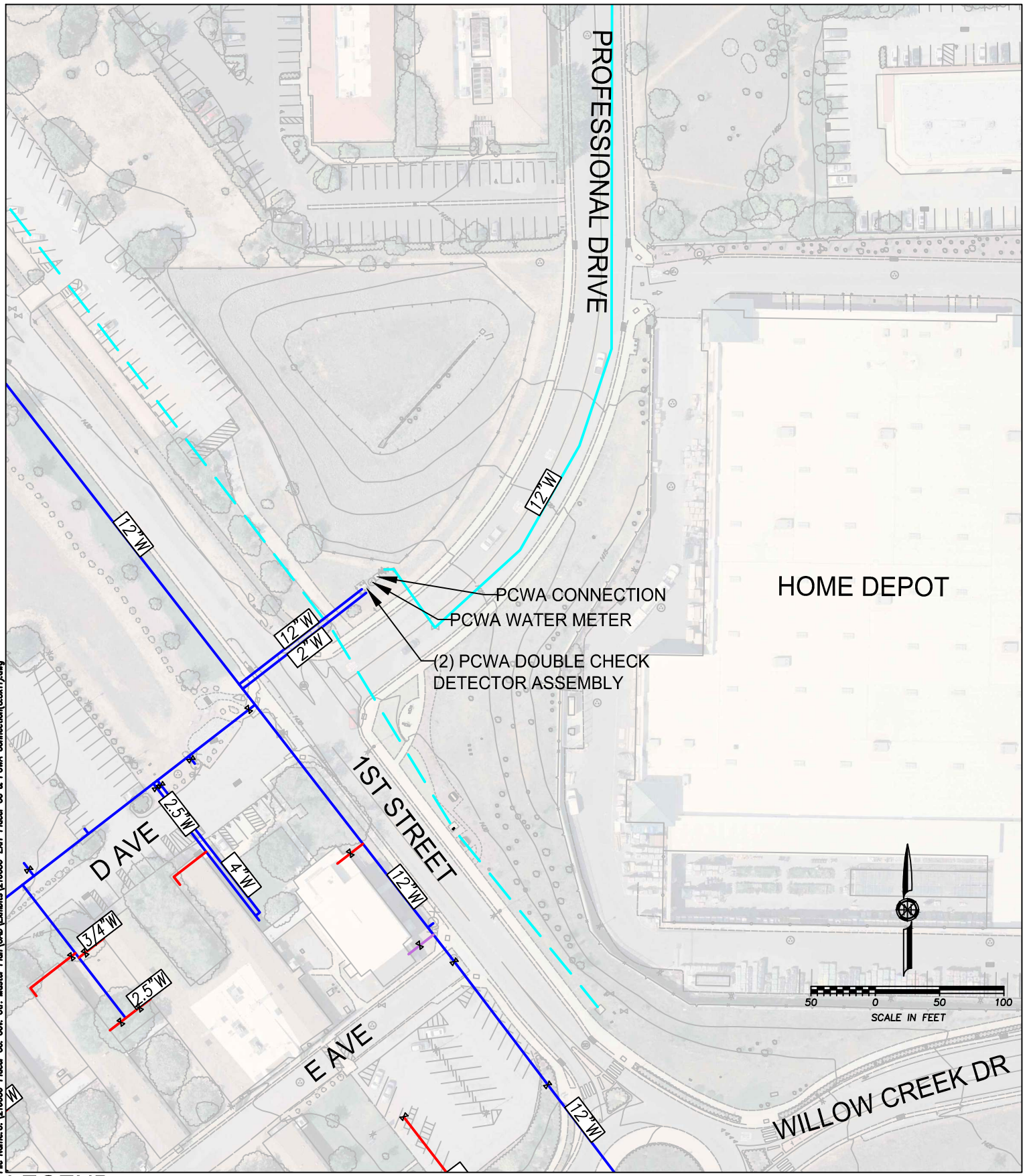
PLACER COUNTY GOVERNMENT CENTER
ON-SITE WATER SYSTEM

FIGURE NO.
W-2

Drawn by:
File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Overall Water Existing System(11x17).dwg | Plot Date:8/9/16 | Project #: 216056



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File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Placer Co. & PCWA Connection(8.5x11).dwg

LEGEND:

- UNCONFIRMED WATER LINE
- PCWA LINE
- COUNTY WATER LINE
- NID LINE
- IRRIGATION LINE

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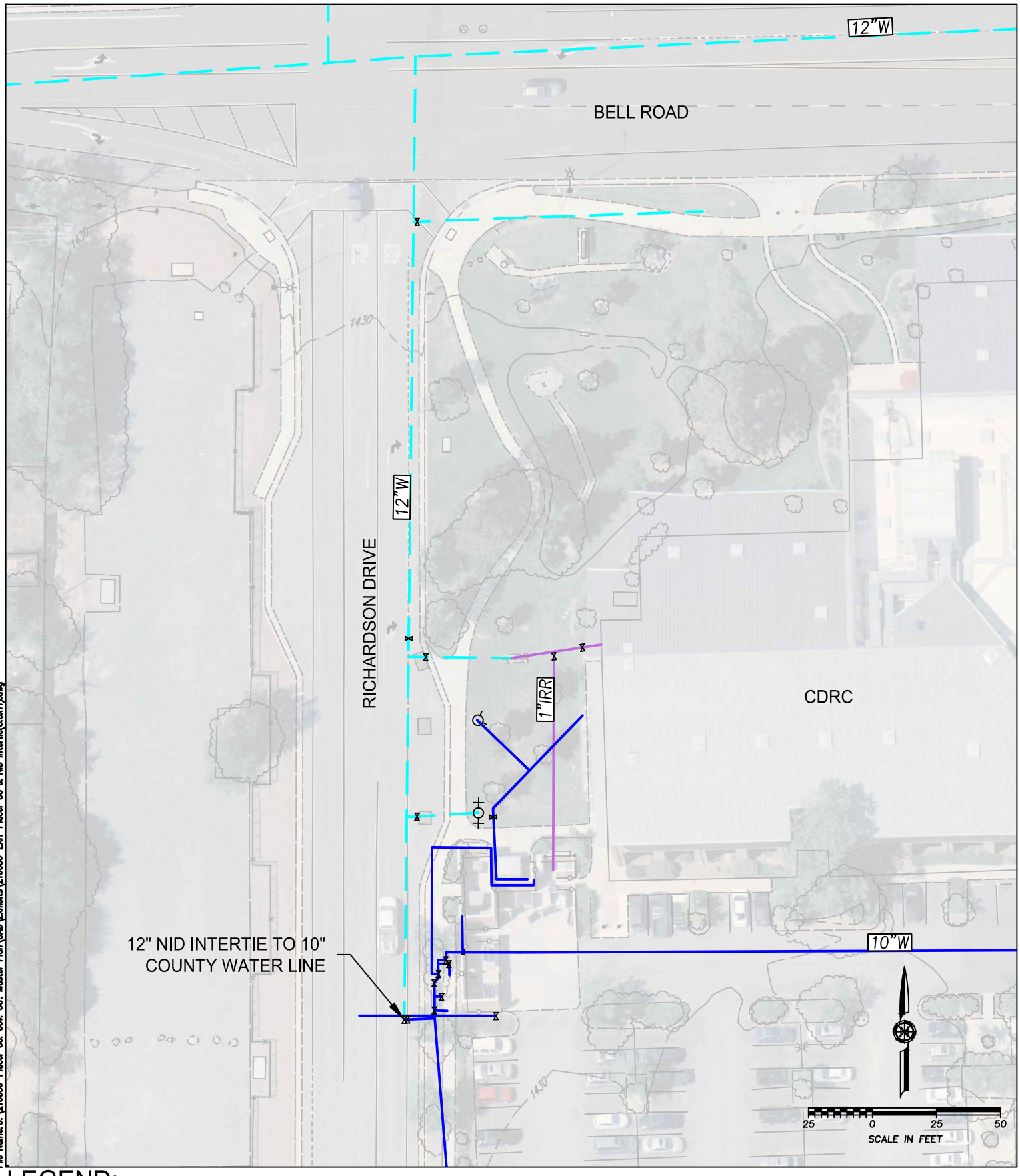
PLACER COUNTY GOVERNMENT CENTER
PCWA METERED CONNECTION

FIGURE NO.
W-3



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File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Placer Co. & NID Intertie(8.5x11).dwg

LEGEND:

COUNTY WATER LINE

IRRIGATION LINE

NID LINE

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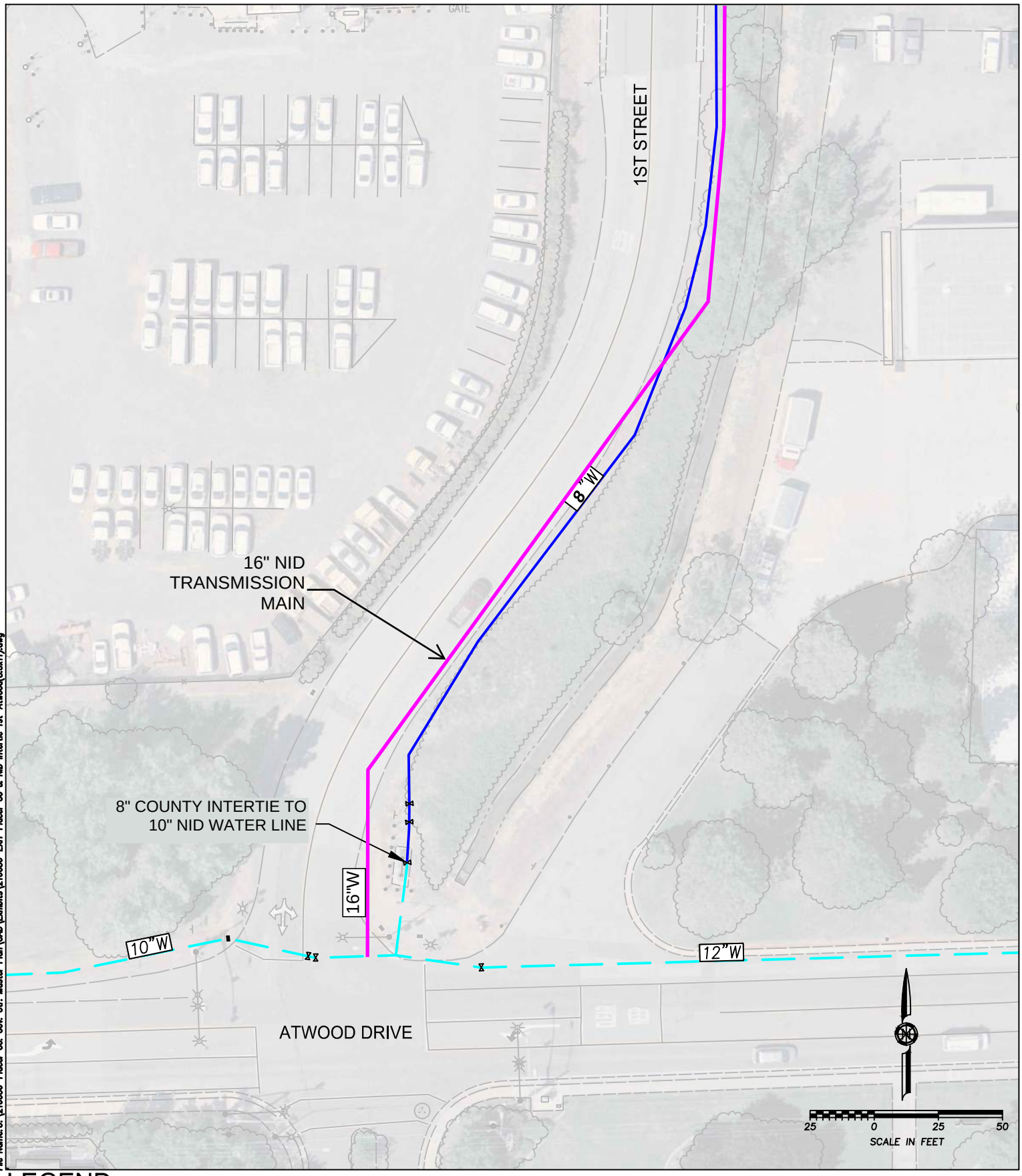
PLACER COUNTY GOVERNMENT CENTER NID CONNECTION AT RICHARDSON AND BELL

FIGURE NO.
W-4



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File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Placer Co. & NID Intertie 1st-Atwood(8.5x11).dwg

LEGEND:

COUNTY WATER LINE

NID TRANSMISSION MAIN

NID LINE

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PLACER COUNTY GOVERNMENT CENTER NID CONNECTION AT 1ST AND ATWOOD

FIGURE NO.
W-5

1.2.2 IRRIGATION

Figure W-1 illustrates the existing onsite irrigation system based on the limited field reconnaissance by Cartwright (August 2016), the Placer County Dewitt Center Water Lines & Water Services Map (Jan. 84, Feb. 86, July 86, Nov. 86; refer to Appendix B), and the survey and mapping performed by West Yost (November 2010). The DeWitt Center irrigation system has largely been installed off of individual building domestic water services and are not separate irrigation systems, a majority of which are absent backflow prevention devices. This practice was very common during the operation of the facilities from the 40's – 80's where these facilities were irrigated utilizing manual sprinklers and hoses; to the 80's – late 90's where installation of underground sprinkler systems were tied into building water supplies. The County Facilities and Grounds Department has begun installing reduced pressure principal (RP's) back flow protection as new improvements or system repairs take place to prevent backflow contamination to domestic water services.

It is also understood that the campus has prescriptive rights to raw water from the NID canal that runs along the east side of 1st Street. The current allocation of raw water from NID is up to 12 miner's inches or approximately 135 gallons per minute (GPM). Raw water can be drawn from the existing canal by way of a metered structure. Also, based on initial discussions with the County and a cursory site visit on August 1, 2016, this structure is located along the existing canal on the east side of 1st Street just north of its intersection with B Avenue. The details regarding the structure are beyond the scope of this report. Further information on the raw water irrigation system can be found in section 1.3.2 Irrigation.

1.2.3 SANITARY SEWER

The sewer facilities on the PCGC site are within the Sewer Maintenance District 1 (SMD 1). The collection system in this area consists of two main sewer trunks, the DeWitt trunk and the Highway 49 trunk. These trunks convey flows from the southern portions of the SMD 1 service area to the County Wastewater Treatment Plant located on Joeger Road west of Highway 49 and north of Dry Creek Road in the unincorporated area north of the City of Auburn. The majority of the sewer catchment areas on the PCGC site flow into the DeWitt trunk, but the eastern portion of the PCGC flows into the Highway 49 trunk. An overview of the DeWitt trunk and Highway 49 trunk lines showing pipe trunk lines and catchments are shown in Figure SS-01 and Figure SS-02, respectively, located at the end of this section.

In order to provide an accurate assessment of the sanitary sewer system, the existing infrastructure required identification and mapping. The first step in determining the existing sewer infrastructure was obtaining existing maps and as-builts (ASCE 38-02 Quality Level D). The County supplied sanitary sewer maps from several sources including maps prepared by West Yost and Associates dated November 2010, maps and reports prepared by Stantec Consulting Services finalized in 2015 and 2016, and construction documents from recent developments in the area. Also utilized were Sewer Inflow Improvement Plans, dated June 1979, for the Dewitt Center prepared by Falconi and Associates as well as improvement plans for the Auburn Office Complex, dated July 2002, prepared by Warren-Green Engineering. Additionally, the County provided an aerial topographic map showing surface features performed by Andregg Geomatics dated June 26, 2015.

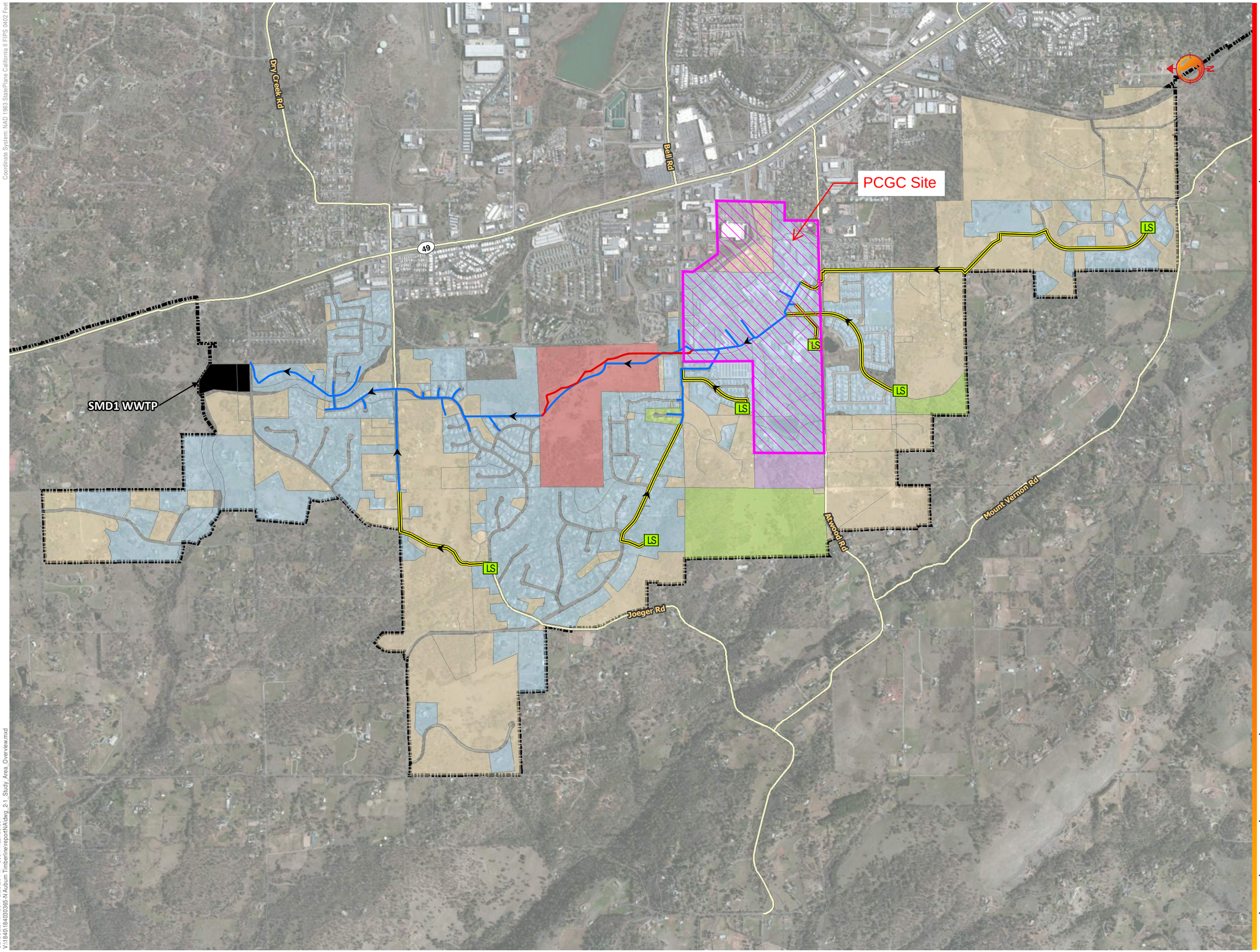
A comprehensive review of these provided maps and as-built plans was performed. After review and comparison of the current topographic survey to the West Yost Associates maps, it was found that there have been significant changes since 2010 when the West Yost maps were prepared that required further investigation. After assessing the maps for discrepancies, areas requiring verification and more information or clarification were identified, resulting in a site visit to perform the verification and gather additional information (Limited ASCE 38-02 Quality Level C).

The sanitary sewer site visit was performed on August 2, 2016 for the purpose of verifying the provided maps, obtaining additional information, and for clarifying discrepancies identified in our desktop review and found the majority of the West Yost Associates 2010 maps to be correct with a few variances. The variances consisted of some new manholes, some removed manholes, and a few locations where the connections shown on the maps were different in the field.

The Andregg topographic survey identified manhole information not included on the West Yost Associates maps, primarily in and around the Placer County Jail and in the area at the west end of B Avenue. While access to the Jail was possible to identify manholes, pipe sizes, and flow directions for inclusion in this report. Access was not available to the secured west end of B Avenue to perform site investigations. This is important since there is a lift station in this area and future development both north and south of the area could rely on the current unverified/unidentified pipe network. Verification was made of the outfall location and pipe size of the force main associated with this lift station as a manhole in B Avenue just south of the Placer County Animal Control building.

The most significant update to the West Yost maps identified were the sewer lines on the south end of the Placer County Auburn Jail and the newly renovated lift station with its associated inflow pipes and force main. A map of the areas updated or modified is included as Figure SS-03. See section 1.3.3 for a complete assessment of these findings.

In addition to maps provided by the County, topographic survey, and site visits, the County provided several sewer capacity evaluation reports prepared by Stantec Consulting Services which have been reviewed and incorporated into this report. These reports are specifically referenced in Section 1.1.2 of this report and a complete copy of the reports are also included in Appendix C.



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Stantec

Stantec Consulting Services Inc.
3875 Atherton Road
Rocklin, CA 95765
www.stantec.com

Legend

- Sanitary Sewer
- Proposed New Sewer Alignment
- Forcemain

Scenario

- Existing Catchments
- Existing Catchments with Internal Growth
- Entitled Catchments
- Full Buildout Catchments
- Timberline Development Lands
- SMD1 WWTP
- SMD1 Buildout Boundary
- LS Lift Stations

Client/Project

WESTERN CARE CONSTRUCTION, INC.
SEWER CAPACITY EVALUATION - NORTH AUBURN DEWITT TRUNK - TIMBERLINE
North Auburn, Placer County

Title

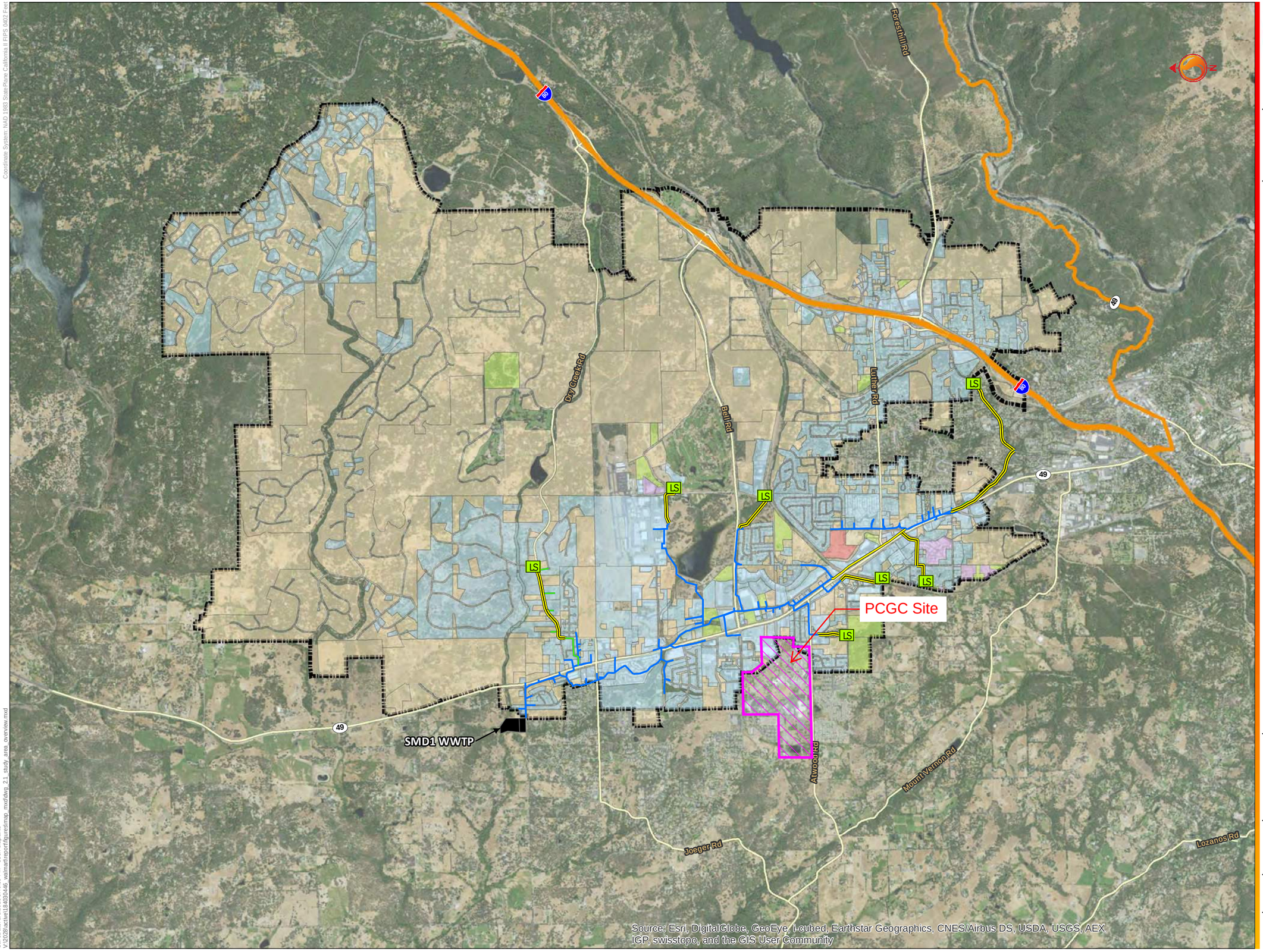
Study Area Overview

Project No.
184030365

Scale
0 0.1 0.2 0.3 Miles

Figure No.
SS-01

Issue/Revision
A/



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Save Date: 1/9/2015 9:46:55 PM User: blaplante
V:\2028\active\184030446_walmart\report\figures\map_mxd\dwg_2.1_study_area_overview.mxd

Stantec

Stantec Consulting Services Inc.
3875 Atherton Road
Rocklin, CA 95765
www.stantec.com

Legend

- Sanitary Sewer
- Siphon
- Forcemain
- Low Pressure Sewer
- Existing Catchments
- Existing Catchments w/ Entitled
- Entitled Catchments
- Walmart Development Lands
- Full Buildout Catchments
- Hwy49 Buildout Boundary
- LS Lift Stations

Client/Project

RSC ENGINEERING, INC.
SEWER CAPACITY EVALUATION - WALMART
NORTH AUBURN HWY 49 TRUNK
North Auburn, Placer County

Title

Study Area Overview

Project No. **184030446**

Scale 0 0.2 0.4 0.6 0.8 Miles

Figure No. **SS-02**

Issue/Revision **A/**

BELL ROAD

RICHARDSON DR

PROFESSIONAL DR

1ST STREET

WILLOW CREEK DR

ATWOOD RD

CDRC

FINANCE ADMIN

HEALTH & HUMAN SERVICES

HOME DEPOT

PEACE FOR FAMILIES

PLACER COUNTY ANIMAL CONTROL

PLACER COUNTY CES

ANIMAL SERVICES CENTER (UNDER CONSTRUCTION)

JUVENILE DETENTION CENTER

AUBURN JUSTICE CENTER

JAIL

CORPORATION YARD

Drawn by WY | Plot Date:8/30/16 | Project #: 216056
File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Overall Sewer with Boundary(11x17).dwg

CARTWRIGHT
ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

LEGEND:

- SEWER LINE
- FIELD VERIFIED SEWER LINE
- PROJECT BOUNDARY

150 0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
OVERALL SANITARY SEWER SYSTEM

FIGURE NO.
SS-03

1.2.4 STORM DRAIN

In order to approach the findings of the entire storm water system it was necessary to separate the findings into several sections. Those sections are: storm drainage pipe network, watersheds, and storm water quality.

1.2.4.1 STORM DRAINAGE PIPE NETWORK

To provide an accurate assessment of the storm drainage system, the existing infrastructure required identification and mapping. The first step was obtaining existing maps and as-builts. The County supplied storm sewer maps prepared by West Yost and Associates dated November 2010 and construction documents from recent developments in the area. These recent developments were the Home Depot, the Willow Creek Shopping Center, the Auburn Justice Center, Placer County Main Jail Housing Unit 4, the Financial Administration Building, the Dewitt Center (CDRC), and the Animal Services Center. Additionally, the County provided an aerial topographic map performed by Andregg Geomatics dated June 26, 2015.

A comprehensive review of these provided maps and as-built plans was performed. After review and comparison of the current topographic survey to the West Yost Associates maps, it was found that there have been significant changes since 2010 when the West Yost maps were prepared which required further investigation. After assessing the maps for discrepancies, Areas for verification and areas requiring more information or clarification, finally planning a site visit to perform the verification and gather additional information.

The site visit was performed on August 3rd and 4th, 2016 and found the majority of the West Yost Associates 2010 maps to be correct with a few variances. The variances consisted of some new manholes and inlets not previously identified, some inlets and manholes which have been removed, and a few locations where links between structures were found to be different than shown on the maps.

The Andregg topographic survey identified manhole and inlet information not included on the West Yost Associates maps, primarily in and around the Placer County Jail, B and C Avenues, and in the area at the secured west end of B Avenue. While it was not possible to access the County Jail to identify manholes, inlets, some pipe sizes, and flow directions for inclusion in this report. Access was possible to the secured west end of B Avenue to perform site investigations. Accessing this area will be important since there are several ponds in this area and the potential for future development both north and south of the area could rely on the current unverified and unidentified pipe network. The most significant update to the West Yost map identified was along 1st Street between B & C Avenues. Additionally, the area along Ian Lane to the northwest of the PCGC was not part of the West Yost study but was identified as contributing to on-site drainage. A map showing the areas updated or modified is included as Figure SD-01 at the end of Section 1.2.4. See section 1.3.4 for a complete assessment of these findings.

1.2.4.2 WATERSHEDS

The Andregg Geomatics aerial survey data was used to determine the watersheds within the PCGC and was supplemented with the USGS topographical maps where necessary. The PCGC

consists of six (6) separate overall watersheds. Figure SD-02 shows the watershed delineations. The figure also identifies the outfall points where concentrated flow leaves the PCGC site limits. The table below shows the total catchment areas, pervious areas, and percent impervious for each catchment basin.

Table 1 – Summary of Watershed Areas

Catchment	Watershed Area, A (ACRE)	Pervious Area, Ap (ACRE)	Percent Impervious (%)
1	88.50	59.30	33.0%
2	41.40	20.24	51.1%
3	12.80	4.74	63.0%
4	12.70	7.84	38.3%
5	29.90	12.98	56.6%
6	45.80	15.48	66.2%

The existing land uses within these watersheds were determined from data that was provided by the County and is shown for all watersheds in Figure SD-03. The primary land use type is commercial with some low density residential, rural, open space, and mixed-use types within the drainage watersheds. All roadways were considered paved. Soil type is important in the calculation of water quality treatment measures as well as in determining runoff. No soil reports were provided but according to the Natural Resources Conservation Service Hydrologic Soils Maps, the soil in the entire PCGC site area is Type C.

A detailed baseline model was developed and is described in subsequent sections of this report, and the above hydrologic parameters were further refined and adjusted to meet the applicable design standards and criteria (current Placer County Manuals). In addition, each overall catchment was subdivided into sub-catchments to further define the path of travel and route of storm water to the ultimate catchment outfall.

1.2.4.3 STORM WATER QUALITY

No water quality infrastructure was identified on the maps or in the information provided by the County. The site visits found the existing storm water quality infrastructure is minimal within the project boundaries and the catchment areas of which the PCGC is a part. The catchment areas are shown in Figure SD-02. The PCGC spans a topographic high point, with the western portion of the site (roughly 80% of the total area) draining south into the North Auburn Ravine watershed and the eastern portion draining north into the Rock Creek Watershed. While portions of the watersheds are outside of the PCGC and existing infrastructure is currently without treatment and fall outside of the water quality requirements for the County, any new development will need to incorporate treatment methods. Based on these field visits, there were a total of four (4) possible storm drain inlet mechanical filters located within the existing government center. These were located in the County's corporation yard and facility

services area, as well as along the Professional Drive frontage by the Home Depot. See Figure SD-01 for an overall existing storm drain system map that shows the few locations where mechanical water quality devices were noted. It is known that the existing Home Depot development was designed for a certain level of water quality treatment based on their Drainage Report, dated 3/26/2007. Additional water quality measures are a recommendation of this report for the campus and as each individual project within the PCGC comes online. It is anticipated that a project-specific report, in conjunction with the more comprehensive Master Drainage Report included herein (Appendix D) will be the defining standard for the development of project-based water quality measures that meet the criteria established in the West Placer Stormwater Quality Design Manual (April 2016).

LEGEND

- FIELD VERIFIED STORM DRAIN LINE
- STORM DRAIN LINE
- AS-BUILT STORM DRAIN LINE
- INLET PROTECTION
- CHANGES TO WEST YOST INFORMATION
- CHANGES TO ANDREGG TOPOGRAPHIC INFORMATION

BELL ROAD
RICHARDSON DR
PROFESSIONAL DR
1ST STREET
WILLOW CREEK DR
ATWOOD RD
CDRC
FINANCE ADMIN
HEALTH & HUMAN SERVICES
HOME DEPOT
PEACE FOR FAMILIES
PLACER COUNTY ANIMAL CONTROL
PLACER COUNTY CES
AUBURN JUSTICE CENTER
JUVENILE DETENTION CENTER
JAIL
CORPORATION YARD

Drawn by: WY | Plot Date:8/30/16 | Project #: 216056
File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Overall Storm with Boundary(11x17).dwg

CARTWRIGHT ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

LEGEND: — — — PROJECT BOUNDARY

150 0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
OVERALL STORM DRAIN SYSTEM

FIGURE NO.
SD-01

Legend

Project Boundary

Catchment Boundary

Bell Road

CDRC

Outfall C4

Outfall C5

Highway 49

Olympic Way

Finance Admin

Professional Drive

Home Depot

Willow Creek Drive

Peace for Families

Placer County CES

Animal Services Center

Juvenile Detention Center

Auburn Justice Center

Richardson Drive

Corporation Yard

1st St

Atwood Drive

Outfall C1

Outfall C2/3

Outfall C6

1

2

3

4

5

6

2

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4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

150 0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
STORM DRAIN WATERSHED MAP

FIGURE NO.

SD-02

LEGEND

- RURAL REAL ESTATE/RURAL RESIDENTIAL
- LOW MEDIUM DENSITY RESIDENTIAL
- ENTITLED CATCHMENTS
- MIXED USE
- OPEN SPACE
- COMMERICAL
- MEDIUM DENSITY RESIDENTIAL
- PROFESSIONAL OFFICE

BELL ROAD

RICHARDSON DR

PROFESSIONAL DR

1ST STREET

WILLOW CREEK DR

ATWOOD RD

CDRC

FINANCE ADMIN

HEALTH & HUMAN SERVICES

HOME DEPOT

PEACE FOR FAMILIES

PLACER COUNTY CES

PLACER COUNTY ANIMAL CONTROL

ANIMAL SERVICES CENTER (UNDER CONSTRUCTION)

AUBURN JUSTICE CENTER

JUVENILE DETENTION CENTER

JAIL

CORPORATION YARD

Drawn by: WY | Plot Date:8/30/16 | Project #: 216056
File Name:U:\216056-Placer Co. Gov. Ctr. Master Plan\CAD\Exhibits\216056-EXH-Storm Land Use with Boundary(11x17).dwg

CARTWRIGHT
ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

LEGEND: PROJECT BOUNDARY

150 0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
LAND USE MAP

FIGURE NO.
SD-03

1.3 ASSESSMENT

As previously mentioned under the methodology section of this document, the assessment is based on the two phases previously described: review of existing data and documentation (Phase 1) and the development of analytical models (Phase 2) using the existing reports and models in conjunction with current agency standards as the baseline for establishing both existing and proposed conditions towards developing the PCGC Master Plan. Equally critical to this process, each of these 2 phased elements are also supplemented and/or updated based on information gathered from key County and Utility agency stakeholders and other consultants throughout the duration of the project and by way of information exchange via e-mail or during meetings.

The baseline analytical models developed as part of the second phase have been calibrated and vetted against existing models or created as new guidelines (in the case of drainage) for the existing system. These models were then used and revised to reflect planning layout alternatives and refined to the final PCGC Master Plan Update.

1.3.1 WATER

The initial Phase 1 assessment of the water system includes three integrated processes with a consistent inquiry of data and information, primarily with County and Water agency staff, along the way. The inquiry helped to further clarify any findings and assessment related issues discovered while conducting the three processes. The three primary processes involved (1) a thorough review of the Technical Memorandum of the Placer County DeWitt Center Fire Flow Evaluation (June 25, 2012 by West Yost Associates Consulting Engineers -see Appendix A) in concert with a review of the West Yost Water Plans (November 2010), (2) a compilation and review of information and meeting notes gathered at the first County and Utility stakeholder and existing infrastructure meeting held on July 13, 2016 with applicable follow-up coordination, and (3) a validation of data from (1) and (2) by conducting an initial water infrastructure site visit on August 1, 2016. It should be noted that no particular order or process took precedence over the other. For the most part, each process was conducted during the same general timeframe in an effort to provide a clear description of our assessment of the existing water system based on the latest received information.

1.3.1.1 PROCESS 1

The West Yost technical memo identified base background information and assumptions after conducting their own extensive site survey, record drawing and map research, and input from County staff, PCWA and NID. This included an inventory of water lines, associated sizes, material type, and relative age. The various pipeline materials and relative age was utilized to establish Hazen-Williams Roughness Coefficients (C Factors) with a C of 100 for ductile iron pipe installed in the 1940's and a C of 130 for newer pipeline (PVC or DIP). West Yost also conducted an extensive site survey, verified by County staff, of existing onsite fire hydrants and documented and analyzed upwards of 65 fire hydrants. Based on County conducted hydrant flow tests, data was used as a guide relative to current available fire flow. Hydraulic losses through the two reduced pressure detector assemblies at the PCWA metered connection at 1st Street and Professional Drive were obtained by each assemblies' head loss curves provided in the specifications. Hydraulic boundary conditions were estimated at the PCWA connection

based on PCWA monitored flow and pressures both upstream and downstream of the connection. This was conducted during normal operating conditions as well as the application of hydrant flow tests on a specific date to evaluate the pressure drop. This helped to establish a hydraulic grade line (HGL) used as the basis for building the DeWitt Center water model. The modelling software used by West Yost was a GIS based program known as InfoWater. The model was obtained from West Yost and converted into H2ONET Suite 12 (developed as part of Phase 2) and confirmed to match the results presented in the West Yost Technical Memorandum.

As previously mentioned, the West Yost technical memo indicates that the two NID emergency connections are "for emergency conditions only and are normally closed valves that must be opened manually." As such, it is assumed that the initial model was set up with these lines being closed. The memo states that pressure monitoring occurred at these two inter-tie locations to establish boundary conditions for normal operating conditions and that the boundary conditions "do not reflect potential limitations within the NID system for conveying large amounts of water for fire flows." Furthermore, based on review of as-built plans provided for the CDRC, is it assumed that the CDRC building draws water from the NID system for both domestic use (separate meter directly connected to NID 12" water on Richardson) and for fire flow as needed. While the plans show a system of valves and a 10" Reduced Pressure Backflow Device with Detector Check, there is no indication that this connection is closed and every indication that the connection in fact supplies fire flows to CDRC. A second model scenario was created to show the effect of an open NID connection at this location as well as the location at Atwood and 1st Street.

The West Yost Technical memo establishes a daily demand for the DeWitt Center based on flow data and metered demands supplied by PCWA (October 21, 201 to November 1, 2011). In addition to flow data at the PCWA meter, actual demands were extracted from the existing meter at the Animal Control Building and a calculated demand was established for the Juvenile Detention Center and the County Jail based on a factor related to the beds occupied at each facility. The daily demand for the DeWitt Center was estimated and modelled at 312 gallons per minute (gpm), which is a minor demand compared to the upper limit of required fire flows for sprinklered buildings of 4,000 gpm. As a result, fire flow is the governing factor for evaluating system capacity. As previously mentioned, updated flow and demand data was provided by PCWA at the PCWA DeWitt meter on July 15, 2016 and on February 28, 2018 fire hydrant flow tests were provided at approximately 57 onsite locations. This data was used to update the model for existing baseline conditions. A system calibration scenario was created to determine the Hazen-Williams roughness coefficients which would result in the model conditions matching field measured flows. Through an iterative process it was determined that the Hazen-Williams roughness coefficients needed to be altered to achieve a closer relationship between the model and tested fire flows (C values of 100 and 90 were used for existing pipes). The PCWA connection was also modified to achieve system calibration. Once calibrated, the existing model was used to create a developed conditions model to be contemplated as part of Sections 2 and 3 of this report. The technical memo does not look at applying peaking factors to the daily demand to include maximum day or peak hour. In addition, it does not assess the

potential for instantaneous flows or anomalies in the system causing spiked demands. Again, the the assumption is that the overriding factor related to demands and associated system capacity relates to fire demand due to the much larger demand a fire presents to the system.

The technical memo correctly addresses requirements for fire flow as the basis for both evaluating the existing system and potential upsizing or other system changes to the water infrastructure to meet today's code requirements for fire demand. Based on coordination with the fire department, the 2010 California Fire Code (CFC) has been used as the governing document for fire flow and it was confirmed that the department does allow a 50% reduction of the CFC fire flow demand for buildings with an approved fire sprinkler system, a mandate for all new buildings. By making prudent future development assumptions regarding buildings, associated range of square footage (30,000 s.f. to 200,000 s.f.) and building construction type (Type V assumed and a conservative assumption relative to fire flows), an upper limit of fire flow demand of 4,000 gpm (a 50% reduction to a sprinklered building in excess of 100,000 s.f.) was established as the basis for evaluating flow and pressures modelled at each building within the system. Each hydrant was evaluated at producing the highest rate of flow while maintaining a minimum residual pressure of 20 psi with the conservative goal of achieving 4,000 gpm in the system at each hydrant location to cover the anticipated maximum range of building size, although a lower flow can be provided at some locations which will still achieve fire protection. Appendix A of this report contains a copy of the technical memorandum for reference as it is the basis of the analysis performed in this report.

The West Yost Memorandum comes to the following conclusions to increase system capacity during a fire:

- A closer look at evaluating valves that were previously modelled as closed to ascertain if they can be opened or repaired and opened for operational use.
- Upsize several existing undersized pipes with new ones
- Complete system looping by adding new pipelines

These improvements were modelled in the memo and are graphically illustrated in Figure 3 of the West Yost technical memo. This modelled change of basic system improvements delivered an increase in overall fire flow of an average of 18% or approximately 519 gpm across all hydrants. Table 2 of the memo summarizes a hydrant by hydrant comparison of the existing system to the Pipeline and Valve Improved system.

Lastly, the memo utilizes the Pipeline and Valve Improvements model as a baseline for evaluating and recommending 4 additional scenarios for significantly improving and increasing fire flows while maintaining a minimum residual pressure of 20 psi:

1. Connect NID as a service provider or convert the emergency connections to automatically open for fire flows when system pressures drop to a critical level.
2. Construct a bypass pipeline around the PWCA double detector checks to minimize the typical losses through the detector checks. The bypass line would

open for fire flows when system pressures drop to a critical level.
3. Install an in-line booster pump station with back-up power at the PCWA connection to boost pressures during fire flow demands.
4. Construct a campus on-site storage tank and booster pump station to meet campus-wide fire flow demands.

The technical memo in Appendix A concludes by providing the following recommendations, which are further validated by this report and established the basis of the model update presented in this report:

- Perform additional flow tests during the higher demand periods in PCWA service area
- Create and perform a valve exercise program to identify any closed or partially closed valves or any valves that may need repair.
- Calibrate the hydraulic model
- Design and construct new pipeline to improve system looping to the southeast area of the DeWitt Center.
- Replace existing undersized pipelines for any proposed future development.

These recommendations were followed to establish a new calibrated model. While a valve exercise program was not implemented, the flow tests were robust enough to develop an updated calibrated baseline existing conditions model.

Both the West Yost memo and this report acknowledges that the largest constraint resulting in fire flow limitations that impact the DeWitt Center are attributed to the single service connection and the limited supply that can be provided by PCWA as the sole provider of water supply to the PCGC. The results from the PCWA sole source model demonstrate that fire suppression flows cannot be achieved without the delivery of additional supply.

The findings herein generally concur with the technical memorandum with the few exceptions noted above.

1.3.1.2 PROCESS 2

On July 13, 2016, a meeting was held at the Placer County CDRC with key staff of the Placer County Department of Public Works and Facilities, the Placer County Water Agency, and the Nevada Irrigation District. The meeting focused on a discussion about the existing water and sanitary sewer systems within the campus. With regard to the water, the meeting was also an overview of the County water system and its current interaction with the PCWA and NID water systems immediately surrounding the DeWitt Center. A summary of key elements discussed is as follows:

PCWA

- PCWA provides treated water delivery through the noted single point of connection.
- Supply is provided via the Bowman WTP which treats 7 MGD and has 11 MG of storage.

- The DeWitt Center resides within PCWA Zone 1 and is within the Channel Hill Pressure Zone.
- The PCWA system is protected and separated from the Placer County system by the above noted two reduced pressure detector assemblies.
- The County should consider an internal cross connection control program that installs individual building and facility backflow prevention devices. Should Placer County continue to be its own water purveyor, or should decisions be made about inclusion of the campus system as part of either the PCWA or NID system or split between the two districts. State health standards should be adhered to in an effort to protect the system from cross contamination.
- The Home Depot provides its own supply for fire flow with a 1M gallon underground storage tank and booster pump station.
- Given the current configuration of the PCWA distribution system, the existing 12" waterline that provides water supply to the DeWitt Center has a present capacity of 2400 gpm, well short of the 4,000 gpm fire flow needed for larger facilities. The dead-end line and limited supply availability for fire is a significant constraint.
- One option as a capital improvement that would increase supply would be to extend a 16" waterline on Bell Road from New Airport Road to State Highway 49 to complete a loop to the 12" waterline.
- PCWA's design criteria for treated water systems require that pipeline velocities not exceed 7 feet per second

NID

- NID's current service within the Government Center is to provide both manual back-up supply to the campus and domestic and fire suppression to CDRC while County owns and operates an in-line booster pump to pressurize flows to the CDRC building.
- NID also has jurisdiction over the Ophir canal along 1st Street. An allocation to the County exists and is paid for monthly by the County. It is a resource that could be used possibly for irrigation purposes throughout the campus.
- Data was provided by NID from their simulated water model for the two emergency intertie connections. This has been utilized to calibrate the baseline model in this report.

1.3.1.3 PROCESS 3

Where feasible, each of the above processes were further verified by a field visit (8/1). The existing NID/PCWA intertie connections were located and the manual operation was confirmed. The single PCWA metered location and the dual double detector check assemblies were noted.

As mentioned, the Phase 2 assessment of the water system with a calibrated water model was updated and detailed within Sections 2 and 3 below. The model developed at this phase is the baseline for all proposed modeling scenarios, including the evaluation of Master Plan options (See Section 2) and the refinement of these options into a Final Master Plan (See Section 3).

1.3.2 IRRIGATION

The existing water system throughout the core of the campus is aged and failing. Many of the pipes in the historical core (existing Dewitt Buildings) were originally installed in the late 1940's and have leaks, reduced flow capacity due to rust, calcification and mineral deposition incising within the pipe. These aged facilities have reduced the available water demand supply and pressure to successfully irrigate this area of the campus during the most efficient watering times of the day. When irrigation is upgraded or repaired there is always risk that the immediate repair will place further stress on the system and cause the next weakest portion to fail causing more work and added expense to the County's maintenance budget.

As newer portions of the campus have been developed and constructed the irrigation systems have required the installation of pumps and multiple zones to accommodate the reduced pressure and availability. The aged water infrastructure, until fully upgraded, will require future development to rely on costly upgrades to pumps and multiple zone watering which may force irrigation to occur during peak transpiration and evaporation times of the day and reduce efficiency and water conservation. A full upgrade of the dated water system, including pipeline replacements and upsizing, will significantly improve water supply for irrigation. An upgrade could also implement separate irrigation services to isolate irrigation uses from domestic uses and would allow for the installation of backflow prevention devices to prevent cross contamination.

Another resource that could significantly improve supply and reduce the consumption of domestic water for irrigation purposes includes the use of raw water from the NID Ophir Canal. Based on discussions with Placer County, the NID raw water canal is currently an unused resource that the County pays to keep a monthly account inactive that enables the County to reserve the right to use up to 12 miner's inches as necessary. Given this allocation, an onsite raw water system is an opportunity to offset the peak irrigation demands of the Placer County Government Center. A system would include a supply line to extract raw water from the canal, an onsite storage reservoir to provide the volume necessary to supply irrigation to landscaped areas under a specified duration and during the peak summer months, and a pressurized distribution system to deliver the irrigation supply. Since the allocation is dedicated to the County, this system would only be for the government services portion of the campus which would also include common space, community gathering areas, and points of entry. The private, mixed-use areas would still rely on potable water supplied by PCWA but could also explore opportunities of individual taps to the NID canal. For the government uses, a current irrigation demand of 410 gpm (Maximum Day Demand, MDD) has been estimated. This represents approximately 45% of the total MDD estimated for the campus. This demand has been used as the basis for analyzing the onsite system. Section 3 of this report provides details regarding the development of an onsite raw water irrigation model for the government side of the Master Plan.

1.3.3 SANITARY SEWER

It is important to note that the information provided in the assessment below is exclusively based on our findings as described above. In subsequent sections and as part of the Phase 2 portion of the assessment, a model has been developed to provide more specific system related data. This model provides a more detailed analysis and output flow rates for the campus and it has been

developed to correspond with and correlate to the methodology utilized by the Stantec reports as sewer flows from the Government Center impacts the main trunk sewer system detailed in these documents and these reports have been deemed the approved and acceptable standard for evaluating sewer system capacities in Placer County. As a result, the assessment information described in this section of the report provides the necessary framework for developing the campus model.

The assessment as described in this section and the development of the campus sewer model relies on two capacity evaluation reports (referenced above) provided by Placer County and prepared by Stantec Consulting Services, Inc. The methodology evaluation criteria, and capacity analysis from those reports is discussed in this section. These reports were reviewed for accuracy and relevance to the PCGC Master Plan Update. For clarity the assessment section discusses each impacted trunk line under separate headings.

1.3.3.1 METHODOLOGY

The Stantec model used MIKE Urban 2011, Service Pack 7 software developed by HDI. The physical sanitary sewer collection system information including pipe lengths, diameters, inverts, manhole depths, etc. were imported to the model from GIS database files provided by Placer County. The Manning's roughness coefficients assigned to gravity sewer pipes were:

Table 2 – Manning's "n" Input Values

Material	Manning's "n" value
Asbestos Cement	0.013
Ductile Iron	0.0145
PVC	0.012
Tranzite	0.013
Unidentified	0.013
Vitrified Clay Pipe	0.0145

A universal loss coefficient (Km) value of 0.10 was applied which the software then automatically modified based upon calculated total losses through each manhole. The modification factors include losses for entry/exit, flow angles, plunging manholes, and drop elevations as well as others. Stantec found a number of issues once the GIS source data was imported into the model such as connectivity issues, incomplete data, invert pipe slope inconsistency, and pipe size inconsistencies. These various issues were resolved through discussions with County staff, making appropriate assumptions to maintain connectivity and positive flow.

Network manholes and pipes were identified by the County and were generally defined as any sewer trunks tributary to and including the DeWitt trunk or the Highway 49 trunk downstream of all active lift stations. Lift stations were included to facilitate the start/stop effects of the force mains on the system. Below is a table of data provided by the County used for determining the actual discharge capacity of the force mains for the DeWitt and Highway 49

trunk lines:

Table 3 – DeWitt Trunk Line Lift Station Information

Lift Station	Model ID No.	Lead Pump Start Level (ft)	Lag Pump Start Level (ft)	Lead Pump Modeled Flow Rate (gpm)	Lag Pump Modeled Flow Rate (gpm)
Vineyards Lift Station	AA3-LS01	1195.5	1196.0	90	21
Joeger Road Lift Station	AE1-LS34	1266.0	1266.5	146	132
County Jail Lift Station	AC3-LS21	1395.6	1395.9	167	90
Olympic Village Lift Station	AD2-LS87	1379.7	1379.9	243	14
Atwood 3 Lift Station	AC2-LS35	1312.7	1313.2	90	83

Table 4 – Highway 49 Trunk Line Lift Station Information

Lift Station	Model ID No.	Lead Pump Start Level (ft)	Lag Pump Start Level (ft)	Lead Pump Modeled Flow Rate (gpm)[(a)]	Lag Pump Modeled Flow Rate (gpm)[(a)]
Airport Lift Station	AD5-LS42	1446.4	1446.9	181	21
Alpine Lift Station	AB4-LS57	1341.0	1341.5	97	14
Edgewood Lift Station	AB4-LS20	1349.0	1350.0	299	125
Golf Course Lift Station	AE5-LS17	1467.0	1468.0	153	21
Kemper Lift Station	AC3-LS61	1382.5	1446.9	188	21
Saddleback Lift Station	AG4-LS38	1309.0	1309.5	179	21
Auburn Ravine Lift Station	Modeled as Pressurized Sewer				

Sub-catchments were used to represent the combined land area and population contributing to flows within parts of the system and are typically upstream of a manhole or lift station. A diagram of the sub-catchments is included as Figure SS-04 for the DeWitt trunk line and Figure SS-05 for the Highway 49 trunk line.

Design storms contribute to the wet weather operational conditions of the sanitary sewer system. They are included for assessing the potential of surcharging the system. Placer County Facility Services directed the use of a 10-year, 24-hour design storm and the Placer County Flood Control and Water Conservation District Storm Water Management Manual was used to create the design storm. The design storm total rainfall over a 24-hour period at an elevation of 1400 feet was 4.59 inches with a peak intensity of 0.90 in/hr occurring at the mid-way point of the storm event.

To establish a baseline, the model created by Stantec was first calibrated to Dry Weather Flow (DWF) conditions which is the most consistent metric available. DWF condition data was collected, compiled and modeled and the results were compared against actual measured flows

for average, peak and minimum flows. Some anomalies were detected in the data but were considered by Stantec to be "abnormal and not representative of typical flow".

Once the model was calibrated to DWF conditions, it was used as the basis for expanding the model to Wet Weather Flow (WWF). The following WWF rainfall dependent infiltration and inflow (RDII) Equation Parameters were used by Stantec in the MIKE Urban software model for both the DeWitt and Highway 49 trunk line models

Table 5 – Sanitary Sewer Model Parameters

Model A Parameters	
Impervious Area [%]	1.1
Reduction Factor [1/1]	0.7
Initial Loss [inch]	0.03
Time of Concentration [min]	120
RDI Parameters	
RDI Area [%]	14
Umax [inch]	2
Lmax [inch]	40
Cqof [1/1]	0.3
Carea [1/1]	1
Ck [h]	8
Ckif [h]	300
Ckbf [h]	500
Tof [1/1]	0
Tif [1/1]	0
Tg [1/1]	0
InitU [inch]	0
InitL [inch]	20
InitGwl [ft]	32.808
InitOf [in/h]	0
InitIf [in/h]	0
GwSy [1/1]	0.3
GwLmin [ft]	0
GWLbf0 [ft]	32.808
GWLfl1 [ft]	0

The following calibration results were summarized in the table below from the Stantec report for both the DeWitt and Highway 49 trunk lines:

Table 6 – Sanitary Sewer Calibration Results

Calibration Results for WWTP Flows	Dec 16 – 21, 2010		Mar 13 – 18, 2011		March 23 – 28, 2011		Nov 28 – Dec 5, 2012	
	WWF Peak [mgd]	Total Volume [mil gal]	WWF Peak [mgd]	Total Volume [mil gal]	WWF Peak [mgd]	Total Volume [mil gal]	WWF Peak [mgd]	Total Volume [mil gal]
Modeled Flow	9.55	24.66	10.69	21.73	10.33	27.73	11.32	28.99
Measured Flow	9.98	23.72	10.42	20.80	9.85	24.97	10.43	29.06
% Error	(4.33%)	3.96	2.56%	4.48%	4.85%	11.02%	8.55%	(0.23%)

1.3.3.2 EVALUATION CRITERIA

Both reports for the DeWitt Trunk Sewer Capacity Evaluation Report and the Auburn Creekside Project Specific Report used criteria supplied by Placer County for the evaluation of the system. The evaluation criteria included values for:

- Level of Service/Freeboard
- Velocity
- Pipe Capacity

Level of Service/Freeboard

The criteria for level of service placed limits on the distance between the elevation of the hydraulic grade line (HGL) and a manhole rim elevation called freeboard. A surcharge occurs when the HGL exceeds the top of pipe. In existing manholes deficiencies were determined to occur when:

1. There is a surcharge and the manhole rim is less than or equal to 8-feet from the top of pipe.
2. There is less than 8-feet of freeboard or a surcharge greater than or equal to 1-foot.

Velocity

Gravity sewers to have a minimum flow velocity of 2.5 ft/s and maximum of 7 ft/s and Force mains to have a minimum of 2 ft/s and maximum of 7 ft/s.

Pipe Capacity

Under design storm conditions sewer pipes shall have a maximum d/D of:

- 70% for pipes less than or equal to 24 inches
- 100% for pipes greater than 24 inches

1.3.3.3 SANITARY SEWER CAPACITY

The sections below are broken into two portions: the DeWitt Trunk line and the Highway 49 trunk line.

1.3.3.3.1 DEWITT TRUNKLINE

The majority of the PCGC sewer catchments flow into the DeWitt trunk line. There are four points where force mains contribute flow into the PCGC sanitary sewer system. These force mains can be seen on Figure SS-03. Many of the sewer lines on PCGC that contribute to the DeWitt trunk line were constructed in the 1940's and therefore infiltration and inflow are

anticipated to be large contributors to the peak flows.

System Capacity

For the purposes of this section of the report, data from the North Auburn DeWitt Trunk Sewer Capacity Evaluation Report prepared by Stantec Consulting Services, Inc. was used. A thorough review of the report was performed and two existing models were selected for inclusion and relevance to the PCGC Master Plan Update. The two models from the DeWitt Trunk System Capacity Evaluation which correspond to the existing system are the Existing System model and the Existing System + Entitled model. The average DWF, Peak DWF, and Peak WWF values for the Existing Conditions Model, and the Existing + Entitled model are summarized in the table below and discussed in separate sections below:

Table 7 – DeWitt Trunk Line Peak Flows

Model	Average DWF [mgd]	Peak DWF [mgd]	Peak WWF [mgd]
Existing Conditions	0.282	0.518	2.909
Existing + Entitled	0.309	0.557	2.917

Capacity – Existing System WWF Condition

The Stantec model peak flow of 2.909 mgd was predicted to cause surcharging in several reaches along the DeWitt Trunk Sewer as well as lateral sewers downstream of several of the lift stations. Figure SS-06 shows the segments within the PCGC that exceed capacity under the peak flow for this condition. These segments were identified as the segment coming from Bell Road, running down Wilson Drive and connecting to the DeWitt trunk line at the Financial Administrative Building (FAB) and a portion of the DeWitt trunk line from A Avenue to Bell Road. It should be noted that since the preparation of the Stantec North Auburn Dewitt Trunk Sewer Capacity Evaluation Report, the existing sewer line from the FAB facility to Bell Road has been upsized from a 15” pipe to an 18” sewer line to meet the upsizing recommendations described and illustrated in the report. This is further detailed in Figure SS-10 of this report.

Capacity – Existing System + Entitled WWF Condition

The Stantec model peak flow of 2.917 mgd was predicted to cause slightly more surcharging in the same reaches that are affected under the Existing System WWF condition. No new reaches were seen to be impacted by the additional flow for this condition. Figure SS-07 shows the segments within the PCGC that exceed capacity under the peak flow for this condition. It should be noted that since the preparation of the Stantec North Auburn Dewitt Trunk Sewer Capacity Evaluation Report, the existing sewer line from the FAB facility to Bell Road has been upsized from a 15” pipe to an 18” sewer line to meet the upsizing recommendations described and illustrated in the report. This is further detailed in Figure SS-10 of this report.

1.3.3.3.2 HIGHWAY 49 TRUNKLINE

System Capacity

The information and results of both the Auburn Creekside Project Specific Report and the Timberline Project Specific Report (North Auburn Dewitt Trunk Sewer Capacity Evaluation Report) were used for information pertaining to the North Auburn Highway 49 Trunk. Both sewer Capacity Evaluation Reports were prepared by Stantec Consulting Services, Inc. A thorough review of the reports was performed and information from the Auburn Creekside report was selected for inclusion here. The report contained several model conditions of which two models were identified for inclusion and relevance to the current PCGC Master Plan Update. The two models from the Highway 49 Trunk System Capacity Evaluation which correspond to the existing system are the Existing System model and the Existing System + Entitled model. The average DWF, Peak DWF, and Peak WWF values for the Existing Conditions Model, and the Existing + Entitled model are summarized in the table below and discussed separate sections below:

Table 8 – Hwy 49 Trunk Line Peak Flows

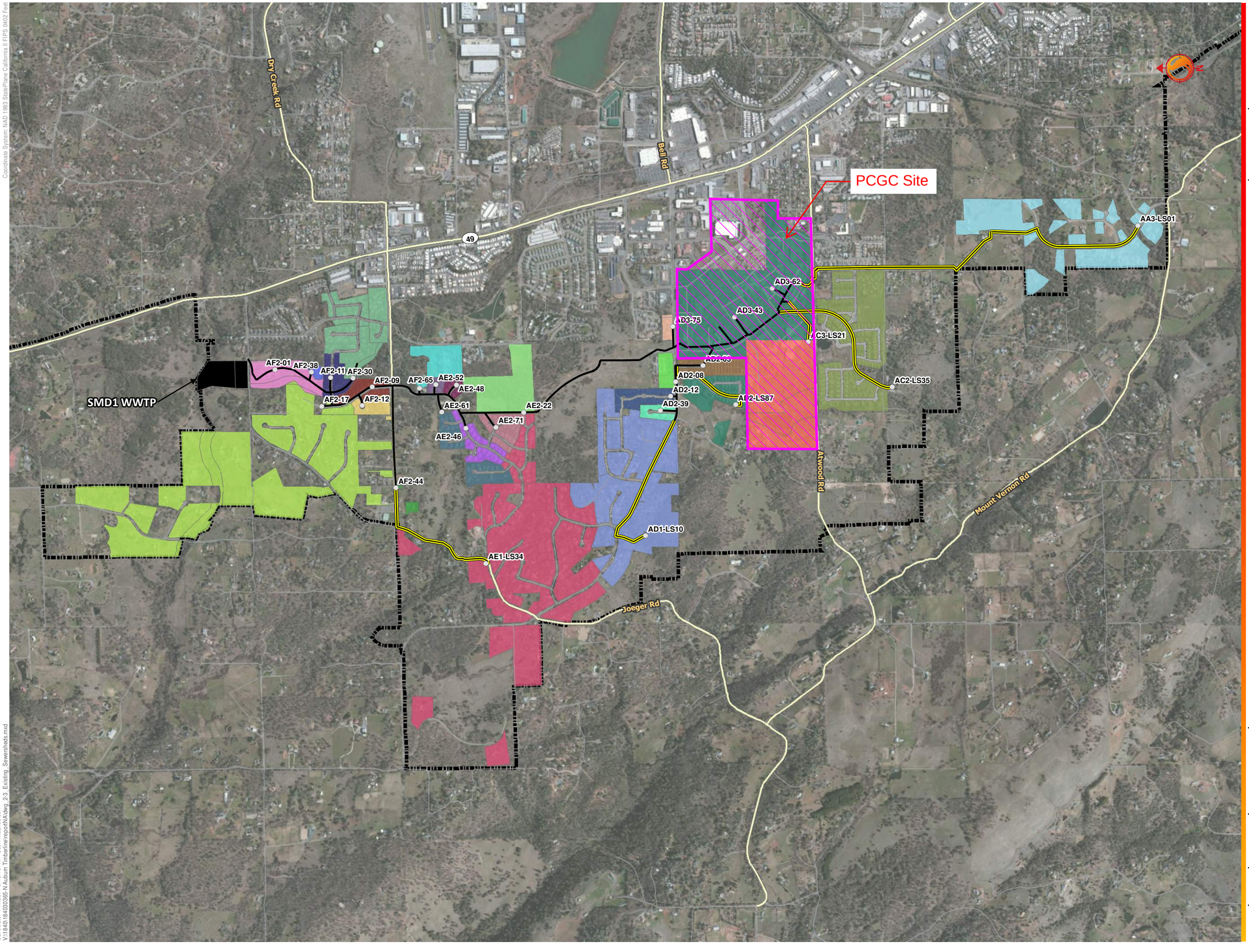
Model	Average DWF [mgd]	Peak DWF [mgd]	Peak WWF [mgd]
Existing Conditions	1.573	2.643	11.489
Existing + Entitled	1.690	2.784	11.534

Existing System WWF Condition

The Stantec model peak flow of 11.489 mgd was predicted to cause surcharging in several reaches along the Highway 49 Trunk Sewer as well as lateral sewers downstream of several of the lift stations. While many of these impacted reaches are located in the trunk line downstream of the PCGC site, the reaches immediately downstream of the PCGC are within capacity. Figure SS-08 shows the segments that exceed capacity under the peak flow for this condition.

Existing System + Entitled WWF Condition

The Stantec model peak flow of 11.489 mgd was predicted to cause slightly more surcharging in the same reaches that are affected under the Existing System WWF condition along the Highway 49 Trunk Sewer. No new reaches were seen to be impacted by the additional flow for this condition. Figure SS-09 shows the segments that exceed capacity under the peak flow for this condition.



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Stantec

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3875 Atherton Road
Rocklin, CA 95765
www.stantec.com

Legend

Sewer Connection
- AA3-LS01
- AC2-LS35
- AC3-LS21
- AD1-LS10
- AD2-03
- AD2-08
- AD2-12
- AD2-39
- AD2-LS87
- AD3-75
- AE1-LS34
- AE2-22
- AE2-46
- AE2-48
- AE2-52
- AE2-61
- AE2-71
- AF2-01
- AF2-09
- AF2-11
- AF2-12
- AF2-17
- AF2-30
- AF2-38
- AF2-44
- AF2-65

Modeled Nodes
SMD1 WWTP
SMD1 Buildout Boundary
Sanitary Sewer
Forcemain

Client/Project

WESTERN CARE CONSTRUCTION, INC.
SEWER CAPACITY EVALUATION - NORTH AUBURN DEWITT TRUNK - TIMBERLINE
North Auburn, Placer County

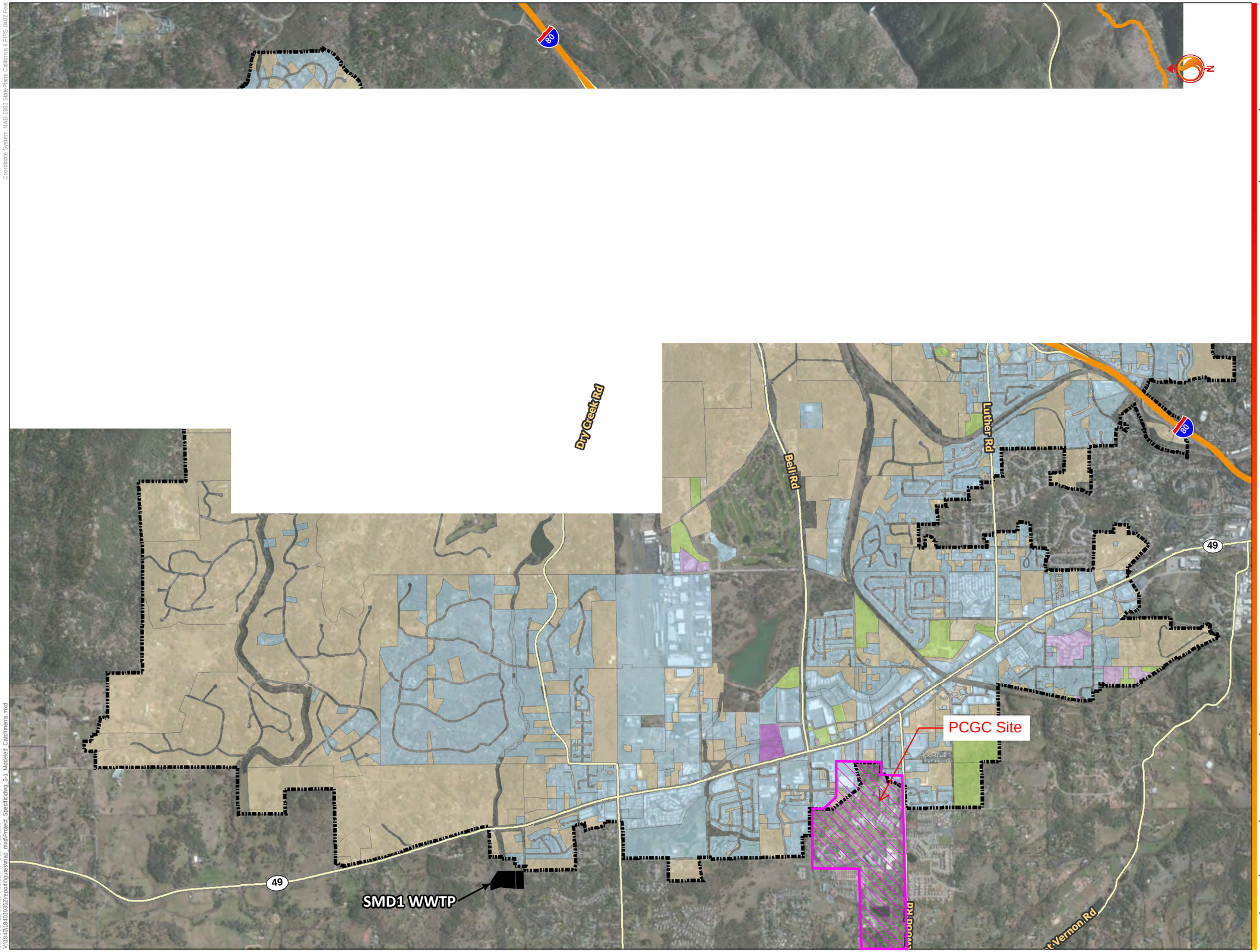
Title
Connection of Existing Sewersheds to Modeled Network

Project No.
184030365

Scale
0 0.1 0.2 0.3 Miles

Figure No.
SS-04

Issue/Revision
A/



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www.stantec.com

Legend

- Hwy49 Buildout Boundary
- Existing Catchments
- Existing Catchments w/ Entitled
- Entitled Catchments
- Auburn Creekside Development Lands
- Full Buildout Catchments
- SMD1 WWTP

Client/Project

AUBURN PACIFIC PROPERTIES, LLC
AUBURN CREEKSIDE EVALUATION
NORTH AUBURN HWY 49 TRUNK
North Auburn, Placer County

Title

Highway 49
Modeled Catchments

Project No.
184030352

Scale
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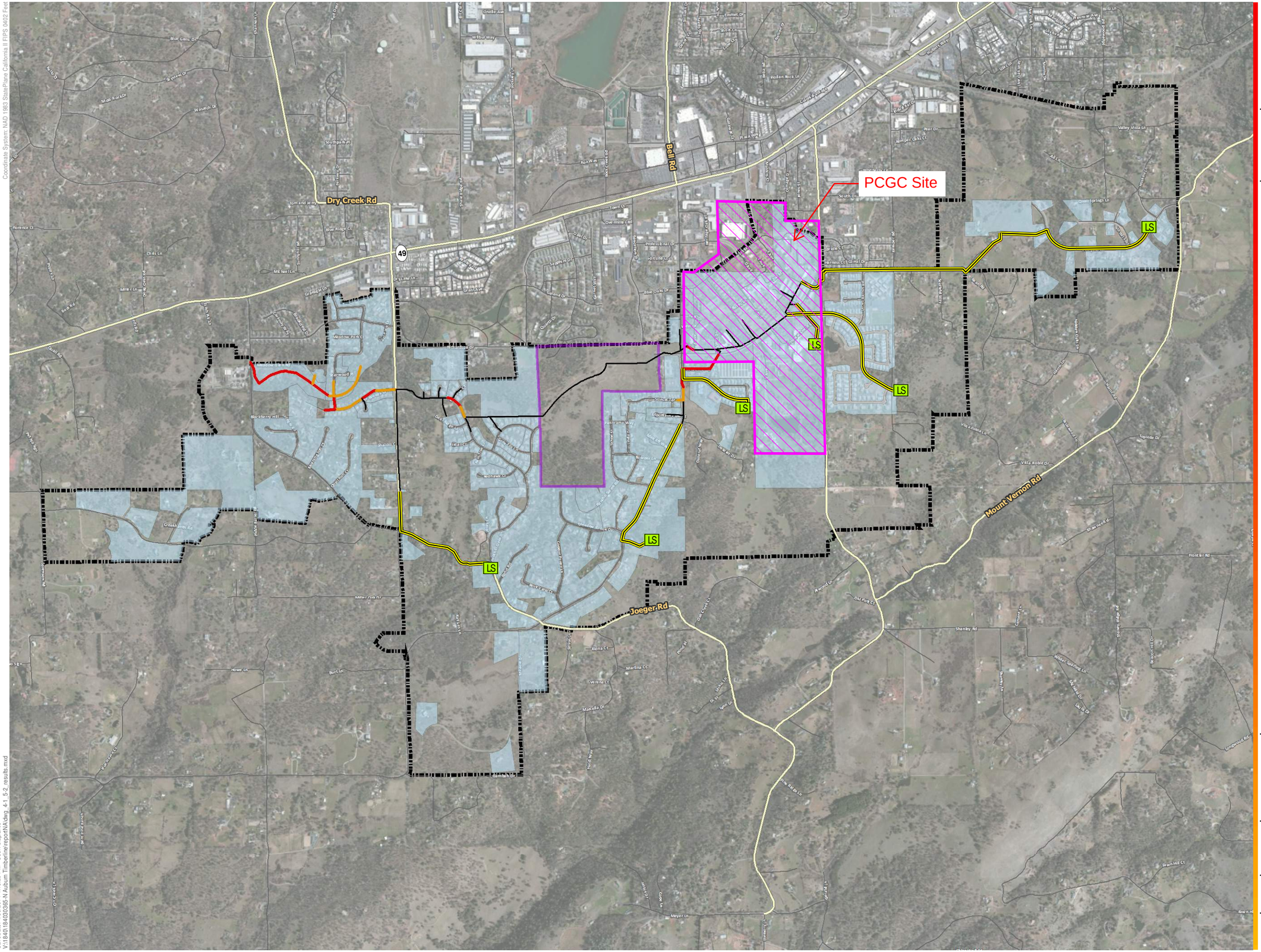
Figure No.
SS-05

Issue/Revision
A/



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Stantec

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3875 Atherton Road
Rocklin, CA 95765
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Legend

LOS Results - 1:10yr Design Rainfall
- No Surcharging
- Backwatered with allowable freeboard
- Backwatered without allowable freeboard
- Throttled with allowable freeboard
- Throttled without allowable freeboard
- Forcemain

Scenario
- Existing Catchments
- Timberline Development Lands
- Dewitt Buildout Boundary
- LS Lift Stations

Client/Project

WESTERN CARE CONSTRUCTION, INC.
SEWER CAPACITY EVALUATION - NORTH AUBURN DEWITT TRUNK - TIMBERLINE
North Auburn, Placer County

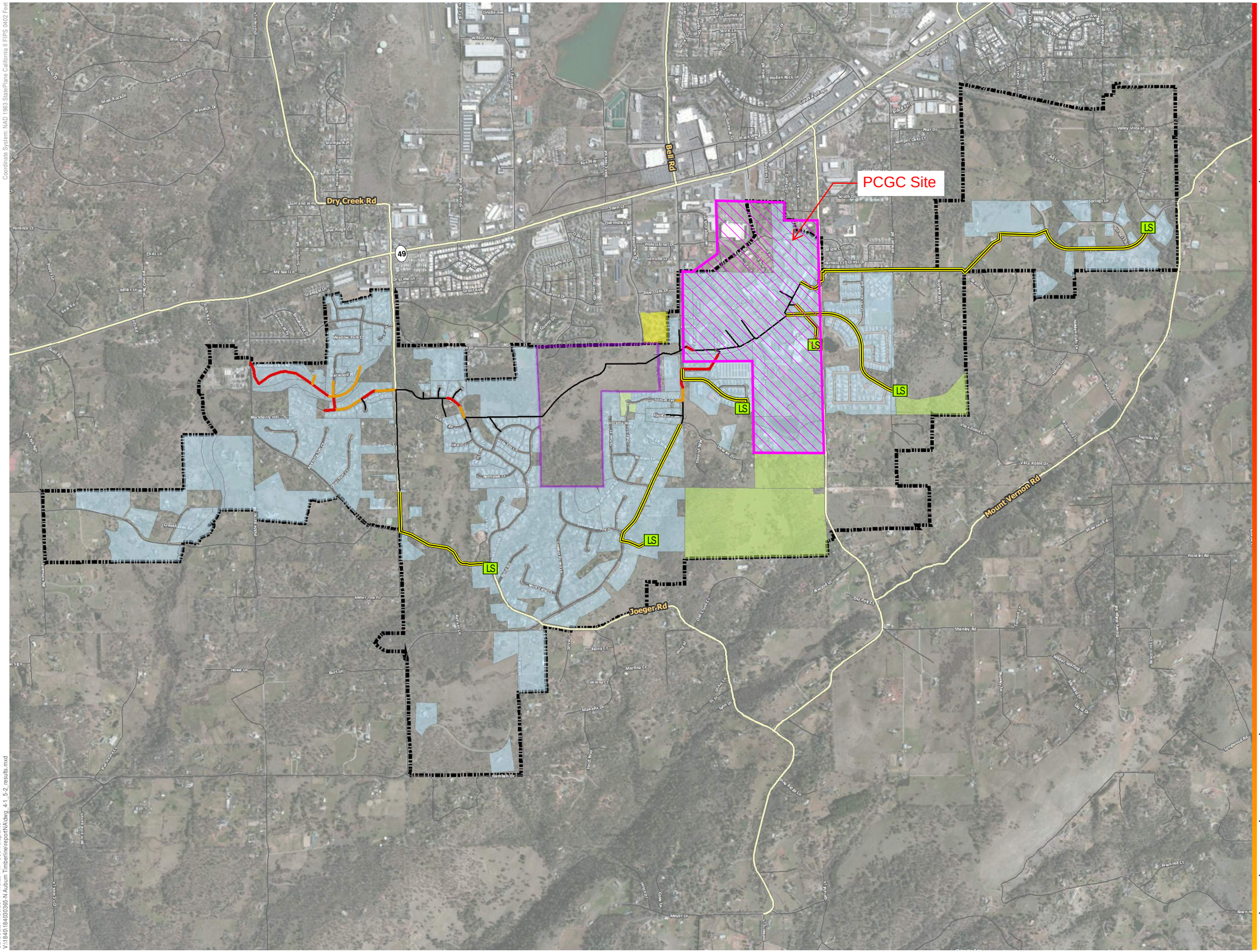
Title
Existing Level of Service

Project No.
184030365

Scale
0 0.1 0.2 0.3 Miles

Figure No.
SS-06

Issue/Revision
A/



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Rocklin, CA 95765
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Legend

LOS Results - 1:10yr Design Rainfall
- No Surcharging
- Backwatered with allowable freeboard
- Backwatered without allowable freeboard
- Throttled with allowable freeboard
- Throttled without allowable freeboard
- Forcemain

Scenario
- Existing Catchments
- Entitled Catchments
- Timberline Development Lands
- Offsite Catchments
- Dewitt Buildout Boundary
- LS Lift Stations

Client/Project

WESTERN CARE CONSTRUCTION, INC.
SEWER CAPACITY EVALUATION - NORTH AUBURN DEWITT TRUNK - TIMBERLINE
North Auburn, Placer County

Title

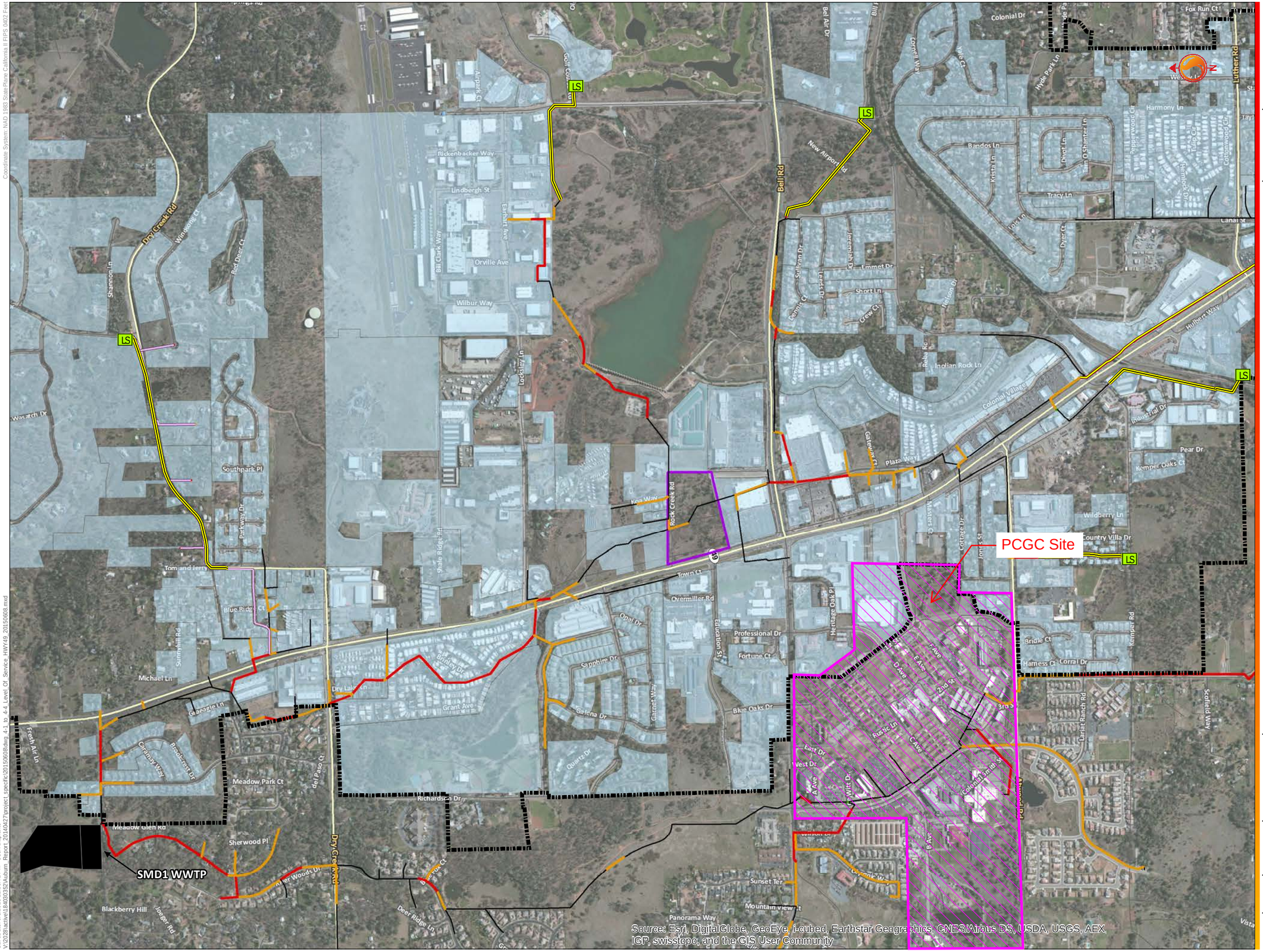
Existing + Entitled Level of Service

Project No.
184030365

Scale
0 0.1 0.2 0.3 Miles

Figure No.
SS-07

Issue/Revision
A/



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, IGP, swisstopo, and the GIS User Community

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3875 Atherton Road
Rocklin, CA 95765
www.stantec.com

Legend

- No Surcharging
- Backwatered with allowable freeboard
- Backwatered without allowable freeboard
- Throttled with allowable freeboard
- Throttled without allowable freeboard
- Siphon
- Forcemain
- Low Pressure Sewer
- Existing Catchments
- Auburn Creekside Development Lands
- SMD1 WWTP
- Hwy49 Buildout Boundary
- LS Lift Stations

Note: Sewers identified as "Throttled with allowable freeboard" have surcharged as a result of a localized capacity restraint, though the degree of surcharging meet the County's design standard. Sewers identified as "Throttled without allowable freeboard" have surcharged as a result of a localized capacity restraint and do not meet the County's design standard.

Client/Project

AUBURN PACIFIC PROPERTIES, LLC
AUBURN CREEKSIDE EVALUATION
NORTH AUBURN HWY 49 TRUNK
North Auburn, Placer County

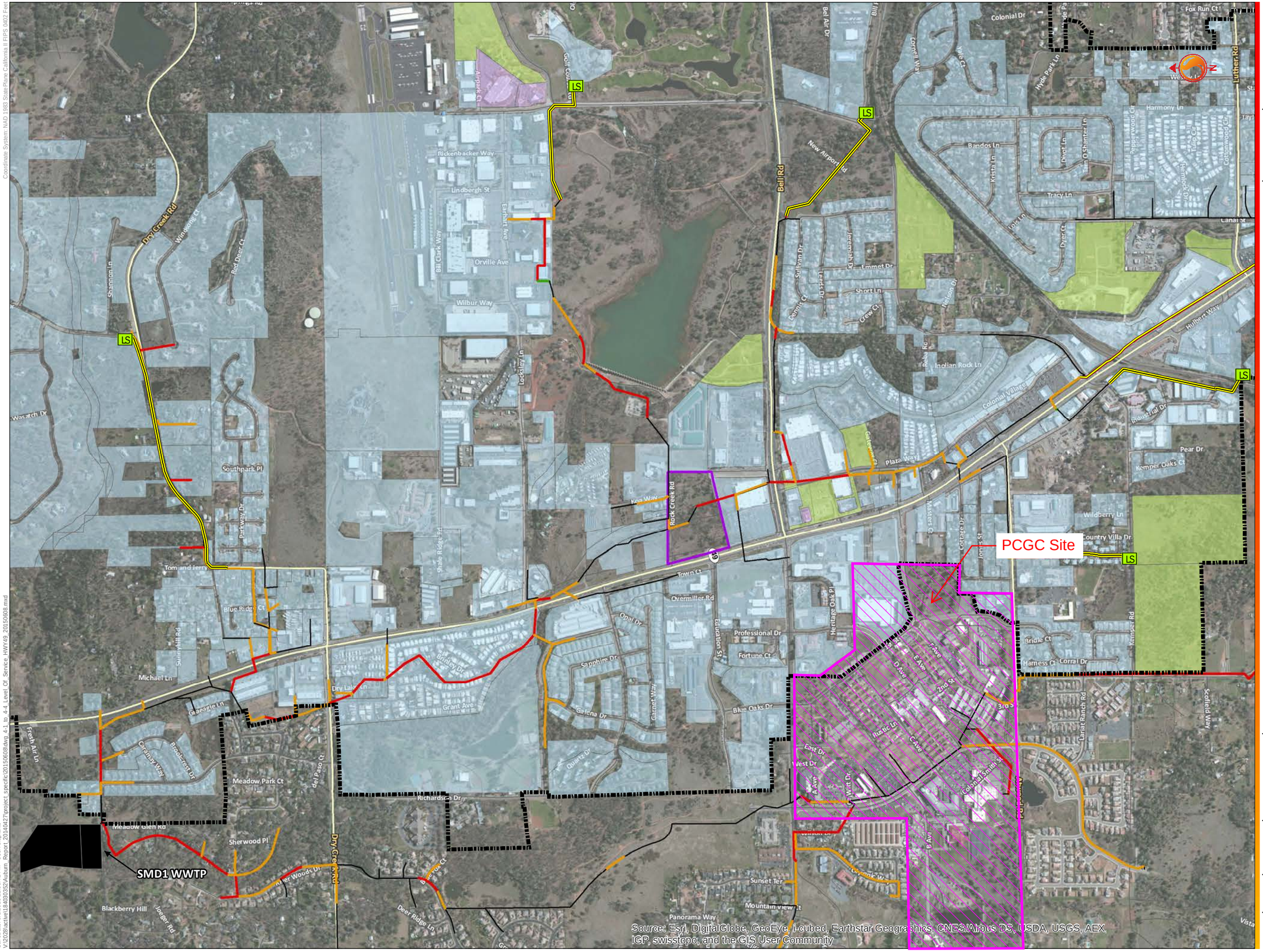
Title
Existing
Level of Service
1:10 Year 24hr WWF

Project No.
184030352

Scale
0 0.05 0.1 0.15 0.2 Miles

Figure No.
SS-08

Issue/Revision
A/



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Stantec Consulting Services Inc.
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Rocklin, CA 95765
www.stantec.com

Legend

- No Surcharging
- Backwatered with allowable freeboard
- Backwatered without allowable freeboard
- Throttled with allowable freeboard
- Throttled without allowable freeboard
- Siphon
- Forcemain

Scenario

- Existing Catchments
- Existing Catchments w/ Entitled
- Entitled Catchments
- Auburn Creekside Development Lands
- SMD1 WWTP
- Hwy49 Buildout Boundary
- LS Lift Stations

Note: Sewers identified as "Throttled with allowable freeboard" have surcharged as a result of a localized capacity restraint, though the degree of surcharging meet the County's design standard. Sewers identified as "Throttled without allowable freeboard" have surcharged as a result of a localized capacity restraint and do not meet the County's design standard.

Client/Project

AUBURN PACIFIC PROPERTIES, LLC
AUBURN CREEKSIDE EVALUATION
NORTH AUBURN HWY 49 TRUNK
North Auburn, Placer County

Title
Existing + Entitled
Level of Service
1:10 Year 24hr WWF

Project No.
184030352

Scale
0 0.05 0.1 0.15 0.2 Miles

Figure No.
SS-09

Issue/Revision
A/

1.3.4 STORM DRAIN

The hydrology and storm drain hydraulics of PCGC were modeled using the XPSTORM software package (XP Solutions, 2016). XPSTORM integrates hydrologic and hydraulic computations into a single model thereby streamlining the modeling process. The model includes multiple hydrologic parameterization methods which allow the rainfall-to-runoff calculations to conform to the prevailing engineering standards. Lastly, XPSTORM is well-suited for modeling complex urban watersheds because it is capable of simulating a variety of features including pipes, manholes, ponds, weirs, and overland flow. The model development described herein is consistent with the methods described in Section V.3 of the Placer County Flood Control and Water Conservation District Stormwater Management Manual (SWMM) for HEC-1 models, which are required for master planning models. XPSTORM has the ability to parameterize a hydrologic model in an identical manner as HEC-1.

1.3.4.1 METHODOLOGY

Mean annual precipitation at the PCGC is on the order of 36 inches. Precipitation is almost entirely rainfall, with the winter months typically being the wettest time of year, although intense rainfall during summer thunderstorms is also common. Rainfall depths for the 2-, 10-, and 100-year, 24-hour storms were estimated from the Design Storm Procedures presented in Appendix V-B of the SWMM as 2.78, 4.53, and 6.73 inches, respectively. The depths were adjusted for the average elevation of PCGC, approximately 1,400 feet (NAVD88). Design storm hyetographs were generated for each storm using the depth-duration-frequency coefficients in Appendix V-A of the SWMM.

The runoff routing of the catchments was modeled using the Kinematic wave method for overland flow. The required data for this method includes area (acres), percent impervious, subcatchment width (feet), and slope (feet/feet). Rainfall abstractions were represented as an initial loss of zero and a constant infiltration rate of 0.16 inches/hour.

1.3.4.2 WATERSHEDS

The following paragraphs provide a description of the individual catchments and the general layout of the storm drain network within each catchment. See Plate 1 in Appendix D of the Master Drainage Report for a general map of the PCGC and the names of nodes and links used in the XPSTORM baseline model. Catchments and subcatchments are shown in Plate 2.

Catchment 1. Catchment 1 (C1) is located on the western edge of the PCGC and is bounded by Bell Road and the Combie Canal to the north and Atwood Drive to the south. C1 has an area of 88.5 acres and drains to the North Auburn Ravine watershed. Subcatchment 1J is the highest portion of C1 and includes the northern portion of the Community Development Resources Center. Flows from 1J are detained in a 0.3-acre-foot detention basin (1J/Storage1) at the southeast corner of the intersection of Bell Road and Richardson Drive. Flows leaving the detention basin flow west along Bell Road in a combination of pipes and open channels to the intersection of Bell Road and Olympic Way. Flow crosses Olympic Way through a 24-inch culvert and drains southwest in a natural channel. The natural channel continues until it enters a 0.05-acre-foot on-line detention basin (Node 1I/Storage1) located to the west of the Olympic

Residential Development. The outflow from the detention basin is controlled by an 18-inch pipe and overflow spillway. The flow continues down the natural channel toward B Avenue. On the upstream side of B Avenue, a small amount of flow ponds (Node 1E/Storage2) before entering three parallel box culverts (each 5.2-feet wide by 3.7-feet high) under B Avenue. Runoff from Sub-catchments 1F and 1G also flows into Node E1/Storage upstream of B Avenue. Flow passing under B Avenue then enters the large southwest pond (Node 1B/Storage1, capacity 13.4 acre-feet). Runoff from sub-catchment 1D is collected by a series of inlets along B Avenue and piped through an 18-inch pipe into the northeastern end of this pond. Flows from the Animal Services Center (Subcatchment 1C) also flow into Node 1B/Storage1 on the southern end, after being collected and detained by a 0.33-acre-foot detention basin (Node 1C/Storage1). Flows out of Node 1B/Storage are controlled by a weir box at the southern end and flow through a 48-inch diameter pipe to a natural channel. Flow is constricted at an old 6-foot wide concrete structure represented by Link 122. The southernmost storage (Node 1A/Storage1) is a natural depression, created from the natural topography and the Atwood Drive road embankment. The outfall from C1 is a 48-inch culvert under Atwood Drive with open channel downstream.

Catchment 2. Catchment 2 (C2) has an area of 41.4 acres. C2 spans the central portion of the PCGC and drains to the south towards the North Auburn Ravine watershed. The upstream extent of C2 is the southern portion of the Community Development Resources Center, Finance Administration Building, Auburn Justice Center, and associated parking lots. A series of inlets collects runoff from Subcatchments 2B through 2F and conveys flow under Catchment 3 (the Jail complex) and to a 3-acre-foot detention basin (Node 2A/Storage1) located to the west of Jail House #4. Outflow from the detention basin is metered by an outlet control structure (Node 2A Control Structure: a combination orifice, v-notch weir and overflow weir); this feature was modeled in XPSTORM by a stage-discharge table. Flow leaves through a 42-inch pipe to a natural channel and storage pond (Node 2A/Storage2) located just north of Atwood Road. Flow from Catchment 3, and overflow from Catchment 6 combine at the Node 2A/Storage2 pond. Two culverts (one 30- and one 15-inch pipe) convey flows under Atwood Drive to an existing pond south of Atwood Road (not modeled), with the inflow to the pond designated as Outfall C2/C3.

Catchment 3. Catchment 3 (C3) has an area of 12.8 acres located in the south-central portion of the PCGC and drains to the North Auburn Ravine watershed. Catchment 3 drains the Jail and Juvenile Detention Center. Runoff is collected by the parking lots and drains through a 42-inch diameter pipe to the southern end of the Jail Complex and into the natural pond (Node 2A/Storage2).

Catchment 4. Catchment 4 (C4) has an area of 12.7 acres located in the northeast corner of the PCGC and drains to the Rock Creek watershed. The Ophir Canal traverses C4, but is not part of the storm drain system and only receives direct precipitation. C4 collects runoff from the existing Health and Human Services buildings and parts of 1st Street, with flow directed beneath the Ophir Canal in a pipe. Flow travels north to an inlet at the eastern boundary of the PCGC, then is conveyed offsite via a 24-inch pipe directed east toward Professional Drive.

Catchment 5. Catchment 5 (C5) has an area of 29.9 acres located on the eastern boundary of the PCGC and drains to the Rock Creek Watershed. C5 includes the Home Depot development and the 1st Street and Professional Drive stormwater basins. Runoff from the southern end of C5 (Subcatchment 5C) drains to the 1.03-acre-foot 1st Street detention basin (Node 5C/Storage1) where the outflow is controlled by an orifice outlet. Outflow from the 1st Street detention basin combines with runoff from Subcatchment 5E and is piped along Willow Creek Drive and under the Home Depot parking lot. Runoff from the west end of C5 (Subcatchment 5D) drains to the 2.00-acre-feet Professional Drive detention basin (Node 5D/Storage1) where the outflow is controlled by an orifice outlet. Flow is then piped along the northern edge of Home Depot and routed to the 30-inch outlet pipe (Outlet C5) located at the northeast corner of the C5. On-site runoff from Home Depot is collected and detained in an underground storage facility (Node 5A/Storage1) beneath the parking lot. Flows are controlled by multiple orifices before entering the 30-inch outfall pipe.

Catchment 6. Catchment 6 (C6) drains the southeastern 45.8-acre portion of the PCGC and drains to the North Auburn Ravine watershed. C6 includes the County Government offices, the Corporation Yard, and the Atwood Ranch 1 development (Subcatchment 6I). The C6 storm drain system appeared to contain some of the oldest storm drain infrastructure of the PCGC. All runoff in C6 drains toward an open channel along the north side of Atwood Drive. Many of the collector storm pipes were not incorporated into the XPSTORM baseline model as they are less than 10 inches in diameter. The model simplified the feeder drain layout by selecting a main point of concentration for each of the subcatchments. Runoff from the northern Subcatchments 6E, 6F, 6G and 6H are piped to a common junction at Richardson Drive. Runoff from Subcatchments 6B, 6C and 6D are piped towards Atwood Drive where they daylight into the open channel along Atwood Drive. Flows then converge at Richardson Drive and flow west under the road through a 36-inch culvert. After the culvert a natural channel routes flow to the west to a junction and culvert along Atwood Drive. A 22-inch culvert goes under Atwood Drive as Outfall C6. At that junction (Node 6A/6) an overflow weir allows flows in excess of the capacity of the 22-inch culvert to overflow to the east along an open channel to the Node 3A/Storage1 pond, and leave the site through Outfall C2/C3

Two irrigation canals traverse the PCGC: the Combie Canal runs along the western boundary and the Ophir Canal runs parallel to 1st Street though the eastern portion of the site. Neither canal is known to be managed as part of the storm drain system, although it is possible they receive small amounts of runoff during extreme storm events.

1.3.4.3 STORM DRAINAGE PIPE NETWORK

The drainage facilities on the PCGC site consist of open channels, ditches, storm drainage pipe networks, culverts, and ponds. The geometry of the storm drain system was assimilated into the model based on the background information for pipe sizes, lengths, alignments, materials, and elevations. Manning's roughness values were applied based on the pipe material or assumed to be 0.014 if no material was known. The storm system was simplified for the modeling, and smaller (less than 10-inch) lateral pipes were generally excluded from the model.

The sections of the storm drain system with open channel flow were modeled as either an irregular or a trapezoidal channel shape, as appropriate. The roughness for the channels was approximated during the site visits and averaged over the channel length.

In instances where the amount of flow was greater than the capacity of the storm drain system, the baseline model was configured to show temporary surface flooding at the model nodes. When flooding occurred at a node, water was stored above ground at the respective node until there is sufficient hydraulic capacity within the system for it to reenter the network. This method allows areas to be identified where the storm drain system is inadequately sized to convey flood flows and where shallow surface flooding would be expected.

The baseline PCGC model included 13 storage basins which represented the existing stormwater detention basins or natural depressions that attenuate stormwater runoff. Storage in the basins was modeled using stage-storage tables generated from the background information or from survey data.

As discussed previously, PCGC has five outfall locations, with three along Atwood Drive (C1, C2/C3, and C6), one on Professional Drive (C4), and one between Highway 49 and Heritage Oaks Circle (C5). All outfalls were set with a free outfall boundary condition, with the depth set equal to the minimum of the normal or critical depth for the flow in the outfall conduit. The three outfalls along Atwood Road are all free outfalls because the 100-year flood level in the pond in the Atwood Ranch development (A.R. Associates, 2008) is lower than the invert of the outfall pipe. For the other two outfalls the 10- and 100-year events are completely contained within the pipes. No previous studies were found that suggested there is a tailwater condition that would violate the assumption of a free outfall boundary condition, and this study assumed that the downstream pipe system was designed to convey the 10- and 100-year events.

The detention ponds along Atwood Drive were modeled by A.R. Associates (2000) for the addition of Unit 4 to the Placer County Main Jail House. A wetland area located south of the jail was slated to be used as a detention pond (approximate location of Node 3A/Storage1), however, the wetland designation prompted relocating the detention pond to the west (location of Node 2A/Storage2). Based on an October 2016 site visit it is clear the wetland area receives stormwater runoff from Atwood Drive. The culvert along Atwood Drive (Link 136) was partially blocked with sediment at the time of the site visit (the Manning's roughness was set to 0.1 to account for the loss of capacity), which causes water to overflow into the wetland. For this reason, the wetland was modeled as a shallow storage facility in the baseline model.

The precise alignment of a storm drain pipe along Atwood Drive between 1st Street and F Avenue (Link 16 in Subcatchment 6B) could not be confirmed through the background information or field verification. This pipe connects the northern Corporation Yard to an open channel along Atwood Drive. The pipe size for this link was assumed to be the same as the upstream pipe size leaving the Corporation Yard, and its length was estimated from an assumed alignment.

Sunset Terrace Estates was assumed to drain to the north and away from the PCGC stormwater catchments. The Sunset Terrace Estates are located to the northwest of the Bell Road and Richardson Drive intersection. The drainage report for Sunset Terrace Estates (Western Planning and Engineering, 1990) showed all on-site stormwater draining to an 18-inch pipe located near a low point on the north side of Bell Road. The 18-inch pipe is not believed to turn south and drain through Catchment 1 because (1) it would require crossing the Combie Canal, and (2) no storm drain outlet was found in this location during field investigation. For these reasons, runoff from Sunset Terrace Estates was assumed to drain north.

Table 9 – Summary of baseline model results for peak flow rates at outfalls from PCGC

Outfall Location by Catchment	Peak Flow Rate (cfs)		
	2-yr	10-yr	100-yr
C1	17.8	43.8	84.8
C2/3	23.5	41.4	67.0
C4	9.0	17.7	29.4
C5	9.2	20.1	34.2
C6	22.8	32.1	37.7

1.3.4.4 STORM WATER QUALITY

The 1972 Clean Water Act set the framework for storm water regulations where pollutants are discharged to waters of the United States. Within the project area, these regulations are defined in the State Water Resources Control Board Water Quality Order No. 2013-001-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (Phase II MS4 Permit), as regulated by the State Water Resources Control Board. As a discharge permittee, Placer County must comply with the Phase II Small MS4 Permit. Below is a brief summary of the provisions sections of the Phase II MS4 Permit that require implementation by the County. The permit went into effect on July 1, 2013 and at the time of this Master Plan Update, the County is in year five of the permit. Refer to the permit document for additional information.

Table 9 – Summary of Phase II Small MS4 Provisions Impacting Water Quality

MS4 Provisions	Sub Tasks	Summary / Task Description
E.6 – Program Management Element		Permittee shall have an overarching storm water management program to implement a coordinated storm water program.
	E.6.a – Legal Authority	Within the second year of the effective date of the permit, the Permittee shall review and revise relevant ordinances or other regulatory mechanisms, or adopt any new ordinances or other regulatory mechanisms, to obtain adequate legal authority, to the extent allowable under state or local law, to control pollutant discharges into and from, as applicable, its MS4, and to meet the requirements of this Order.
	E.6.b – Certification	Within the second year of the effective date of the permit, the Permittee shall certify by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative as described in 40 Code of Federal Regulations section 122.22(b) that the Permittee has and will maintain full legal authority to implement and enforce each of the requirements contained in this Order.
	E.6.c – Enforcement Measures and Tracking	Within the third year of the effective date of the permit, the Permittee shall develop and implement an Enforcement Response Plan. The Enforcement Response Plan shall contain enforcement procedures and actions and identify the Permittee's responses to violations and describe how the Permittee will address repeat and continuing violations by implementing progressively stricter responses as needed to achieve compliance.
E.7 – Education and Outreach Program		Traditional Small MS4 Permittees may be required to implement Community-Based Social Marketing (CBSM) requirements (upon determination by a Regional Board Executive Officer).
	E.7.a - Public Education and Outreach	Within the first year of the effective date of the permit, all Permittees shall select one or more Public Education and Outreach programs defined in the permit documents. Within the second year of the effective date of the permit, the Permittee shall develop and implement a comprehensive storm water public education and outreach program. The public education and outreach program shall be designed to reduce pollutant discharges in storm water runoff and non-storm water discharges to the MS4 through increased storm water knowledge and awareness in target communities.
	E.7.b.1 - Illicit Discharge Detection and Elimination Training	Within the third year of the effective date of the permit, the Permittee shall develop and implement a training program for all Permittee staff who, as part of their normal job responsibilities, may be notified of, come into contact with, or otherwise observe an illicit discharge or illegal connection to the storm drain system.
	E.7.b.2 - Construction Outreach and Education	Within the second year of the effective date of the permit, the Permittee shall ensure that all staff implementing the construction site storm water runoff control program are adequately trained. Within the third year of the effective date of the permit, the Permittee shall develop and distribute educational materials to construction site operators.
	E.7.b.3 - Pollution Prevention and Good Housekeeping Staff Training	Within the second year of the effective date of the permit, the Permittee shall develop a biennial employee training program for appropriate employees involved in implementing pollution prevention and good housekeeping practices as specified in Section E.11. Pollution

		Prevention/Good Housekeeping for Permittee Operations of this Order.
E.8. – Public Involvement and Participation Program		Within the second year of the effective date of the permit, the Permittee shall involve the public in the development and implementation of activities related to the program. The public participation and involvement program shall encourage volunteerism, public comment and input on policy, and activism in the community. The Permittee shall also be involved in their Integrated Regional Water Management Plan (IRWMP) or other watershed-level planning effort, if applicable
E.9. Illicit Discharge Detection and Elimination		The Permittee shall develop an Illicit Discharge Detection and Elimination program to detect, investigate, and eliminate illicit discharges, including illegal dumping, into its system, to the extent allowable under law.
	E.9.a. - Outfall Mapping	Within the second year of the effective date of the permit, the Permittee shall create and maintain an up-to-date and accurate outfall map.
	E.9.b. - Illicit Discharge Source/Facility Inventory	Within the second year of the effective date of the permit, the Permittee shall maintain an inventory of all industrial/ commercial facilities/ sources within the Permittee's jurisdiction (regardless of ownership) that could discharge pollutants in storm water to the MS4. The Permittee shall utilize the inventory to identify facilities for inspections of potential illicit discharges.
	E.9.c. - Field Sampling to Detect Illicit Discharges	Within the second year of the effective date of the permit, the Permittee shall sample any outfalls that are flowing or ponding more than 72 hours after the last rain event. The Permittee shall also conduct dry weather sampling of outfalls annually identified as priority areas.
	E.9.d. - Illicit Discharge Detection and Elimination Source Investigations and Corrective Actions	Within the second year of the effective date of the permit, the Permittee shall develop written procedures for conducting investigations into the source of all non-storm water discharges suspected to be illicit discharges, including approaches to requiring such discharges to be eliminated, and procedures to implement corrective actions (e.g., BMPs).
	E.9.e. - Spill Response Plan	Within the first year of the effective date of the permit, the Permittee shall develop and implement a spill response plan.
E.10 - Construction Site Storm Water Runoff Control Program		The Permittee shall develop, implement, and enforce a program to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. The program shall include the development of an enforceable construction site storm water runoff control ordinance for all projects that disturb less than one acre of soil.
	E.10.a. - Construction Site Inventory	Within the first year of the effective date of the permit, the Permittee shall maintain an inventory of all projects subject to the local construction site storm water runoff control ordinance within its jurisdiction.
	E.10.b. - Construction Plan Review and Approval Procedures	Within the first year of the effective date of the permit, the Permittee shall develop procedures to review and approve relevant construction plan documents.
	E.10.c. - Construction Site Inspection and Enforcement	Within the second year of the effective date of the permit, the Permittee shall use legal authority to implement procedures for inspecting public and private construction projects and conduct enforcement if necessary. The Permittee may leverage existing inspection procedures and personnel to conduct construction site inspections and enforcement.
E.11 – Pollution		The Permittee shall develop and implement a program to prevent or reduce

Prevention/ Good Housekeeping For Permittee Operations Program		the amount of pollutant runoff from Permittee operations. The Permittee shall implement appropriate BMPs for preventing or reducing the amount of storm water pollution generated by Permittee operations.
	E.11.a. - Inventory of Permittee-Owned and Operated Facilities	Within the second year of the effective date of the permit, the Permittee shall develop and maintain an inventory of Permittee-owned or operated facilities within their jurisdiction that are a threat to water quality, if applicable.
	E.11.b. - Map of Permittee-Owned or Operated Facilities	Within the second year of the effective date of the permit, submit a map of the area within the permit boundary and identify where the inventoried Permittee-owned or operated facilities are located.
	E.11.c. - Facility Assessment	Within the third year of the effective date of the permit, for all the inventoried Permittee-owned or operated facilities, the Permittee shall conduct a comprehensive inspection and assessment of pollutant discharge potential and identification of pollutant hotspots using the Center for Watershed Protection's (CWP) guide on Urban Subwatershed and Site Reconnaissance, or equivalent.
	E.11.d. - Storm Water Pollution Prevention Plans	Within the fourth year of the effective date of the permit, the Permittee shall develop and implement SWPPPs for pollutant hotspots. If a Permittee has an existing document such as Hazardous Materials Business Plan, Spill Prevention Plan, or other equivalent document the Permittee is not required to develop a SWPPP.
	E.11.e. - Inspections, Visual Monitoring and Remedial Action	Within the fifth year of the effective date of the Permit, the Permittee shall conduct regular inspections of Permittee-owned and operated facilities.
	E.11.f. Storm Drain System Assessment and Prioritization	Within the second year of the effective date of the permit, the Permittee shall develop and implement procedures to assess and prioritize MS4 storm drain system maintenance, including but not limited to, catch basins, pipe and pump infrastructure, above-ground conveyances, including receiving water bodies within the Permittee's urbanized area and detention basins.
	E.11.g. Maintenance of Storm Drain System	Within the third year of the effective date of the permit, the Permittee shall begin maintenance of all high priority storm drain systems on an ongoing schedule.
	E.11.h. Permittee Operations and Maintenance Activities (O&M)	Within the third year of the effective date of the permit, the Permittee shall assess their O&M activities for potential to discharge pollutants in storm water and inspect all O&M BMPs on a quarterly basis.
	E.11.i. Incorporation of Water Quality and Habitat Enhancement Features in New Flood Management Facilities	Within the third year of the effective date of the permit, the Permittee shall develop and implement a process for incorporating water quality and habitat enhancement features into new and rehabilitated flood management facilities.
	E.11.j. Landscape Design and Maintenance	Within the second year of the effective date of the permit, the Permittee shall implement a landscape design and maintenance program to reduce the amount of water, pesticides, herbicides and fertilizers used during Permittee operations and activities.
E.12. - Post Construction Storm Water Management		[REFER TO WEST PLACER STORM WATER QUALITY DESIGN MANUAL FOR HOW THE APPLICABLE PROVISIONS THAT PLACER COUTNY HAS INCORPORATED TO ADDRESS THIS SECTION OF THE PHASE II SMALL MS4 PERMIT]

Program		
	E.12.a. Post-Construction Measures	Permittees shall regulate development to comply with the following provision sections; Site Design Measures, Regulated Projects, Source Control Measures, Low Impact Development (LID) Design Standards, Hydromodification Measures, Enforceable Mechanisms, Operation and Maintenance of Storm Water Control Measures, Post-Construction Best Management Practice Condition Assessment, Planning and Development Review Process, Post-Construction Storm Water Management Requirements Based on Assessment and Maintenance of Watershed Processes, and Alternative Post-Construction Storm Water Management Program
	E.12.b. Site Design Measures	Within the second year of the effective date of the permit, the Permittee shall require implementation of site design measures for all projects that create and/or replace (including projects with no net increase in impervious footprint) between 2,500 square feet and 5,000 square feet of impervious surface, including detached single family homes that create and/or replace 2,500 square feet or more of impervious surface and are not part of a larger plan of development. Site design measures as specified in this section are not applicable to linear underground/overhead projects (LUPs).
	E.12.c. Regulated Projects	Within the second year of the effective date of the permit, the Permittee shall implement standards to effectively reduce runoff and pollutants associated with runoff from Regulated Projects as defined below.
	E.12.d. Source Control Measures	Regulated Projects with pollutant-generating activities and sources shall be required to implement standard permanent and/or operation source control measures as applicable.
	E.12.e. Low Impact Development (LID) Design Standards	The Permittee shall require all Regulated Projects to implement low impact development (LID) standards designed to reduce runoff, treat storm water, and provide baseline hydromodification management to the extent feasible, to meet the Numeric Sizing Criteria for Storm Water Retention and Treatment.
	E.12.f. Hydromodification Management	Within the third year of the effective date of the permit, the Permittee shall develop and implement Hydromodification Management procedures. Hydromodification management projects are Regulated Projects that create and/or replace one acre or more of impervious surface. A project that does not increase impervious surface area over the pre-project condition is not a hydromodification management project.
	E.12.g. Enforceable Mechanisms	Within the third year of the effective date of the permit, the Permittee shall develop and/or modify enforceable mechanisms that will Effectively implement the requirements.
	E.12.h. Operation and Maintenance of Post-Construction Storm Water Management Measures	Within the second year of the effective date of the permit, the Permittee shall implement an O&M Verification Program for storm water treatment and baseline hydromodification management structural control measures. Storm Water Treatment Measures and Baseline Hydromodification Management Measures on all Regulated Projects.
	E.12.i. Post-Construction Best Management Practice Condition Assessment	Within the third year of the effective date of the permit, the Permittee shall inventory and assess the maintenance condition of structural post-construction BMPs (including BMPs used for flood control) within the Permittee's jurisdiction.
E.13. WATER QUALITY MONITORING		Traditional Small MS4 Permittees that are required to conduct monitoring of discharges to ASBS, TMDL, or 303(d) impaired water bodies, are not required to perform additional monitoring as specified in this Section.
	E.13.a. ASBS	All Permittees that discharge to an ASBS and are covered by an Ocean Plan

	Monitoring	exception shall comply with the monitoring requirements described in the terms, prohibitions and special conditions.
	E.13.b. TMDL Monitoring	All Permittees that are assigned a wasteload allocation or identified as a responsible party in a TMDL approved by the U.S. EPA where urban runoff is listed as the source, shall comply with the monitoring requirements included in Attachment G and consult with the Regional Water Board within one year of the effective date of the permit to determine the monitoring study design and a monitoring implementation schedule.
	E.13.c. 303(d) Monitoring	All Permittees that discharge to waterbodies listed as impaired on the 303(d)28 list where urban runoff is listed as the source, shall consult with the Regional Water Board within one year of the effective date of the permit to assess whether monitoring is necessary and if so, determine the monitoring study design and a monitoring implementation schedule. Permittees shall implement monitoring of 303(d) impaired water bodies as specified by the Regional Water Board Executive Officer.
	E.13.d. Receiving Water Monitoring and Special Studies	Traditional Small MS4 Permittees with a population greater than 50,000 listed in Attachment A that are not already conducting ASBS, TMDL or 303(d) monitoring efforts shall participate in one of the following monitoring programs, subject to Regional Water Board Executive Officer approval: Receiving Water Monitoring & Special Studies.
	E.13.d.1. Receiving Water Monitoring	Within the second year of the effective date of the permit, the Permittee shall develop and implement a receiving water monitoring program to (1) Monitor receiving water quality at upstream location in an area undergoing development and evaluate changes in receiving water quality over time, and (2) Monitor receiving water quality at a downstream location in an urban area and evaluate changes in receiving water quality over time.
	E.13.d.2. Special Studies	Within the first year of the effective date of the permit, the Permittee, as an alternative to Section E.13.d.1. Receiving Water Monitoring, may develop and implement a special study monitoring program to assess and evaluate the effectiveness of water quality projects or storm water program elements designed to reduce specific water quality pollutants that are causing or contributing to beneficial use impairment. The special studies must demonstrate the nexus between storm water program implementation, water quality protection and pollutant reduction effectiveness.
E.14. PROGRAM EFFECTIVENESS ASSESSMENT AND IMPROVEMENT		
	E.14.a. Program Effectiveness Assessment and improvement Plan	The Permittee shall develop and implement a Program Effectiveness Assessment and Improvement Plan that tracks annual and long-term effectiveness of the storm water program. The Program Effectiveness Assessment and Improvement Plan will assist the Permittee to document compliance with permit conditions and to adaptively manage its storm water program and make necessary modifications to the program to improve program effectiveness at reducing pollutants of concern, achieving the MEP standard, and protecting water quality.
	E.14.b. Storm Water Program Modifications	The Permittee shall modify BMPs and/or the program as a whole to improve compliance with permit conditions and improve program effectiveness at reducing pollutant loads, achieving the MEP standard, and protecting water

		quality. The Permittee shall use information gained through effectiveness assessment and MS4 discharge and receiving water monitoring to identify priority areas for program improvement.
E.15. TOTAL MAXIMUM DAILY LOADS COMPLIANCE REQUIREMENTS		a) The Permittee shall comply with all applicable TMDLs approved pursuant to 40 Code of Federal Regulations section 130.7 that assign a Waste Load Allocation to the Permittee. b) Compliance dates that exceed the term of this Order are included for reference and become enforceable in the event that this Order is administratively extended. c) The Regional Water Boards are directed to review, within one year of the effective date of this Order, the TMDL-specific permit requirements contained in Attachment G and to develop or propose revisions, as appropriate, to TMDL specific permit requirements to the State Water Board after consultation with the Permittees and State Water Board staff. d) The Permittee shall complete and report the status of their implementation of the specific TMDL implementation requirements that have been incorporated into the permit with each Annual Report via SMARTS. e) The Permittee shall comply with implementation requirements specified in Category 4b demonstrations associated with Clean Water Act Sections 303d, 306b, and 314 Integrated Reporting and Listing Decisions.
E.16. ANNUAL REPORTING PROGRAM		a) The Permittee shall use State Water Board SMARTS to submit a summary of the past year activities for each program element and certify compliance with all requirements of this permit. b) Permittees shall complete and retain all Annual Report information on the previous fiscal year beginning July 1 and ending June 30. c) The Permittee shall submit when requested by the Executive Officer of the applicable Regional Water Board a detailed written online annual report or in person presentation of the annual report that addresses the activities described in Provision E. d) Permittees involved in regional programs may coordinate with the members to identify reporting responsibility.

Section E.11 of the Phase II Small MS4 Permit will play a large role in improving storm water quality throughout the project area because the Master Plan Update area contains numerous existing government building and facility operations, which are required to assess storm water pollution hotspots and upgrade storm water quality elements of their existing facilities and storm water infrastructure. Existing government facilities and roadways make up more than half of the project area.

To comply with the Post Construction Storm Water Management Program section of the permit (section E.12), specifically the section setting the minimum treatment standard as "reducing the discharge of pollutants from their MS4s to waters of the U.S. to the maximum extent practicable", the County assisted in preparing and has since adopted the West Placer Storm Water Quality Design Manual, dated April 2016. This manual along with the Phase II Small MS4 Permit is the basis of the storm water quality design measures assessment discussed below. None of the existing developments within the Master Plan area were permitted when these regulations were in place and therefore none of the existing storm drain facilities meet these current requirements. These requirements are intended to apply to new and/or

redevelopment areas and are not retroactively enforced on existing storm drain infrastructure. The existing government owned and operated facilities as well as the County storm drain infrastructure will be addressed from a water quality standpoint as part of other sections of the Phase II Small MS4 Permit as noted above.

Based on conversations with County Staff, they plan on requiring each new development within the Master Plan Update area to be responsible for providing water quality treatment and hydromodification that meet the current standards at the time of their development. These water quality features will need to be a part of the early design plans for any new development so that the site will be design and area allotted to meet these requirements. The West Placer Storm Water Quality Design Manual is the current standard as of July 2016 and requires that all new development projects meeting the regulated project criteria comply with the following:

Table 10 – Post Construction Water Quality Requirements for Regulated Projects

Project Category	Definition	Post-Construction Requirements
Regulated Redevelopment Projects	Any land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more exterior impervious surface area on a site on which some past development has occurred.	• Where a redevelopment project results in an increase equal to or greater than 50 percent of the impervious surface of a previously existing development, runoff from the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be treated per the requirements for Regulated Projects to the extent feasible. • Where a redevelopment project results in an increase of less than 50 percent of the impervious surface of a previously existing development, only runoff from the new and/or replaced impervious surface, must be treated per the requirements for Regulated Projects.
Regulated Road Projects and Regulated Linear Underground/ Overhead Projects (LUPs)	Any of the following types of projects that create 5,000 square feet or more of newly constructed contiguous impervious surface and that are public road projects and/or fall under the building and planning authority of a Permittee: 1. New streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads. 2. Widening of existing streets or roads with additional traffic lanes. 3. LUPs	• Infiltrate impervious surface runoff onsite from the post-construction 85th percentile 24-hour storm event. • Treatment of runoff that cannot be infiltrated onsite shall follow U.S. EPA guidance regarding green infrastructure to the extent feasible (EPA, 2008). • Where the addition of traffic lanes results in an alteration of equal to or greater than 50 percent of the impervious surface of an existing street or road, runoff from the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design. • Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street

		or road, only runoff from the new, and/or replaced impervious surface must be included in the treatment system design.
Hydromodification Management Projects	Regulated Projects that create and/or replace one acre or more of impervious surface. Projects that do not increase impervious surface area over the pre-project condition are not Hydromodification Management Projects.	Same as for Regulated Projects plus: • Post project runoff shall not exceed estimated pre-project flow rate for the 2year,24-hour storm.

It is assumed that the current undeveloped project areas will be developed in portions consisting of more than one (1) acre of impervious surface and create a net increase in impervious area. Developments surpassing this impervious area threshold will be required to implement hydromodification control measures to maintain the post-project runoff at or below pre-project flow rates for the 2-year, 24-hour storm event. Three existing stormwater basins will be retrofitted and seven new stormwater basins will be implemented as new projects come online to provide hydromodification controls (the same set of basins have been designed to meet County requirements for flood control). It is important to note, however, that the basins were designed for an assumed amount of future impervious area. As such, final designs for new projects will need to be verified with the stormwater model to ensure the hydromodification controls are adequate.

Based on discussions with the County, they are in the process of complying with Section E.11 of the Small MS4 General Permit. This section of the permit covers pollution prevention and good housekeeping for existing sites that the permittee jurisdiction owns and operates. The County expects to have their facility assessments completed by October 2016 and have their BMP plans in place by the following year. These items will provide the County with specific actions to improve storm water quality throughout their government buildings and storm drain infrastructure that is within the Master Plan Update area. Also discussed with County Staff was the possibility of regional water quality treatment and/or hydromodification facilities. The County is not opposed to considering these, but have no current or future regional water quality treatment projects identified at this time.

SECTION 2: DEVELOPMENT ALTERNATIVES

Subsequent to efforts described in Section 1 of this report and the overall findings and assessment of the team relative to the existing site, there is a substantial amount of data to begin to effectively inform decisions around the development of site layout alternatives. The overall assessment coupled with ongoing County, stakeholder, and community meetings has resulted in the development of three options that propose a mix of County and Private Use areas. In this section, the establishment of the analytical baseline models and criteria developed for the onsite water system, sanitary sewer system, and storm drain system based on data developed in Section 1 is described. This information is then followed by input and assessment of each of the three options relative to the major water, sewer and storm systems onsite including recommendations for modifications to each existing system in order to accommodate each plan.

2.1 PHASE 2 BASELINE MODEL DEVELOPMENT

As indicated in Section 1, Phase 2 entails the development of assessments and analysis of each utility system utilizing the reports and utility data gathered during the Phase 1 process as the baseline for our analysis. In addition to referencing the previous reports and utility data, current engineering standards, guidelines and agency requirements to establish each baseline model have been implemented. Lastly, as new data has become available from respective agencies as an update to the referenced reports, this new data has been utilized as a replacement to any older data used in prior analyses. With each major wet utility (water, sewer, storm), where applicable, a baseline analytical model has been calibrated with an attempt to establish results that coincide with that of previous reports as the basis for then beginning to update each model. Once calibrated to coincide with or produce similar results to past reports, we then updated each model as applicable to reflect current standards and agency requirements as well as new data received from applicable utility stakeholders or determined based on our own site visits and data collection efforts. Below is a summary with respect to the water, sanitary sewer and storm systems.

2.1.1 WATER

A baseline model was established utilizing Innovyze H2ONET Suite 12.0. This is an effective modeling application for water distribution systems widely accepted and used by a multitude of utility agencies, municipalities, and engineering firms. The water distribution system was initially laid out and calibrated to achieve the results similar to that detailed in the West Yost Technical Memorandum, dated June 25, 2012 for the Placer County Dewitt Center Fire Flow Evaluation. This included the main pipe system, designated elevations at ground surface, designations for junction labels to match the fire hydrants modeled in the West Yost memo, the connection point to the PCWA system (with a supply curve matching PCWAs supply and check valve to mimic the reduced pressure detector assemblies), an average daily demand applied across the entire system of 312 gpm, and a roughness value consistent with the existing pipes and with that used in the West Yost model.

Once calibrated to achieve results that were within acceptable levels of each other, the model was modified as a new scenario to reflect more recent data including PCWA data of direct flows extracted from the PCWA metered connection, updated onsite fire hydrant flow tests (February 2018), NID model output for the two NID emergency connections, and additional information

gathered by our field verification as well as from the County, PCWA, and NID. This model was used as the basis for evaluating the three options noted above and for providing initial input and recommendations for system upgrades. These recommendations are provided in sub-section 2.2 below. A copy of the baseline models is included in Appendix A. A model of the current final option has been developed and included in the Appendix of this report. Final models to reflect phasing of the Master Plan will also be added as needed and as part of the preparation of Section 3.2 (FINAL MASTER PLAN AND PHASED DEVELOPMENT) of this report.

It should be noted that the existing conditions baseline model was developed based on the elements defined in the findings section of this report along with the maps provided in the West Yost Technical Memorandum. In addition to these maps and the West Yost memo, the NID Willow Creek & 1st Street Water Transmission plans (Draft Revision June 2015, County approved June 3, 4, 2015) were also received. When the baseline model was prepared it was assumed that this transmission line would not be a part of the campus network as it is a separate NID system. Therefore, it was not analyzed as part of the existing (current) system model. However, we understand that this transmission line will serve as the baseline for supply of water to the PCGC for projects that are intended to be developed as private uses (i.e. retail, commercial, residential uses). This would be a separate water system built to NID standards and intended to serve private development within the Master Plan. Consequently, the proposed modelling scenarios used to evaluate system capacity for the Master Plan options incorporates the use of the 16" NID line and models a proposed NID system. The addition of the 16" line is integral to our assessment of capacity for a future NID system to service the proposed private uses of the PCGC.

2.1.2 SANITARY SEWER

No prior overall campus-wide sewer system model had been established specifically for the Placer County Government Center. As currently understood, each system was developed on a project by project basis or as new facilities came online. Therefore, the assessment developed a new model for the onsite campus-wide system that is then compared to and combined with the data and analysis detailed in the Stantec Reports for the Dewitt Trunk (North Auburn Dewitt Trunk Sewer Capacity Evaluation Report) and the Highway 49 Trunk Auburn Creekside Project Specific Report) systems. An onsite baseline model was established utilizing Bentley Systems SewerCAD. This is an effective software application for sewer modeling that is widely used by a multitude of utility agencies, municipalities, and engineering firms. The onsite sewer system was initially laid out based on the West Yost sanitary sewer maps dated November 2010. Where there were gaps or noted corrections based on our field verification or on receipt of additional information from the County, the layout was revised accordingly. Additionally, several as-built drawings were used to develop the model. These include: the Dewit Center as-builts by Falconi & Associates dated 10/28/80, the Auburn Office Complex as-builts by Warren Green Engineering dated 5/28/03, and the Timberline Phase 1 Improvement Plans by Wood Rodgers dated 4/1/16. This layout was used as the basis for developing a new onsite model to evaluate the existing system. It was then used to evaluate both the existing and proposed sewer system based on a derivation of wastewater flows established for all existing and proposed onsite facilities. This model was used as the basis for evaluating the three options noted above and for providing initial input and recommendations for system upgrades. These recommendations are provided in sub-section 2.2 below. A copy of the baseline model is

included in Appendix C. A model of the current final option has been developed and included in the Appendix of this report. Final models to reflect phasing of the Master Plan will also be added as needed and as part of the preparation of Section 3.2 (FINAL MASTER PLAN AND PHASED DEVELOPMENT) of this report.

2.1.3 STORM DRAIN

The existing storm drain system of the campus had been previously evaluated on a project by project basis. A number of separate but individual drainage reports were provided by the County for each of these projects. Each project's storm system was designed based on the established agency criteria at the time of development with a connection to the next downstream system. Consequently, no prior campus-wide baseline models had been established for the Placer County Government Center.

The absence of an established drainage plan for the Placer County Government Center created an opportunity for the project team to work with the County and with the Community to achieve the vision and goals set forth in this Master Plan that contemplates a system that provides the basis for ensuring the implementation of "regional" measures to effectively mitigate flood impacts during high event storms while also developing systems that address current standards for stormwater quality and quantity (including hydromodification) and encourages practices such as low impact development, dispersed runoff, filtration achieved through the use of site specific vegetation, bioswales, biobasins, and other biofiltration systems.

To that end, as part of this Utility Infrastructure Assessment, a Placer County Government Center Master Drainage Report was prepared that provides a greater level of technical detail and documentation necessary to establish the baseline criteria for campus-wide drainage that effectively addresses Federal, State and local requirements for conveyance and stormwater routing, storage, and treatment including hydromodification. The Master Drainage Report utilized the XP STORM software package (XP Solutions 2016) to evaluate both the hydrology and storm drain hydraulics of the PCGC and is included in Appendix D of this report. Sub-section 2.2 below provides a cursory summary of recommendations based on the overall analysis performed and detailed in the Master Drainage Report.

2.2 SUMMARY ANALYSIS AND INPUT – THREE OPTIONS

The baseline analytical models established and updated to reflect recent data were then run to analyze and provide input and recommendations for the three options developed over the course of the assessment. The three options and associated land use areas can be referenced from the Placer County Government Center Master Plan Update as well as the March 21, 2017 presentation to the County Board of Supervisors. The conceptual (sketched) version of these options were used to provide the input and recommendations and the impact of each option on the utility.

Below is a summary of our analysis and input by utility with respect to each of the three provided conceptual alternatives.

2.2.1 WATER

The analysis was made by overlaying the existing water distribution system onto the three alternative sketches of the proposed development options. The baseline model was then amended to create three scenarios to reflect each of the three alternative layouts. In addition, pipes that were in conflict which would require removal and pipes that should be considered for replacement to serve the new developments were identified. Initial quantities of system upgrades for each of the three conceptual alternatives based on model runs were provided. As a summary, generally noted are the impacts associated with each option and rated each option accordingly (i.e. from least impact to most impact). This rating was based solely on the extent of existing pipe impacts and the quantity of new utility pipe needed to accommodate the option. This provided a minimum overall assessment of impacts associated with the implementation of each option as it pertained to the water system and provided one of the many components to consider in evaluating each option which served to enable the team to make an informed decision about the development of a final configuration of a land plan.

Referencing the 3 concept Master Plan options (sketches), provided below are cursory thoughts relative to the NID Willow Creek & 1st Street Transmission plans and the proposed 16" waterline and its impact on these options:

<u>Alignment</u>

- Option 1 appears to maintain the alignment of 1st Street which would provide sufficient access to the corresponding alignment of the proposed NID transmission line for operation and maintenance. There does not appear to be provision for a roadside easement on the NID plans that covers the proposed waterline and it cannot be ascertained where the existing right-of-way is on either 1st or Willow Creek.
- Options 2 and 3 propose the termination of 1st Street at the existing roundabout which will limit access to the proposed NID line. However, this does not necessarily preclude the implementation on a Master Plan option of a smaller roadway corridor and public easement for both the proposed 16" transmission line and the existing 10" waterline. The same would apply to other utilities that currently run along this stretch of 1st Street.
- With Options 2 and 3, there should be adequate spacing between proposed buildings to accommodate a corridor and easement sufficient for access and maintenance. Typical NID easement widths range from 25-30 feet. Additional width may be required between multi-story buildings to meet code requirements.

<u>Service to Campus</u>

- There is an existing tee with a 16" end cap on the NID plans located at the southern end of the roundabout. This is an opportunity to extend the 16" transmission line north on 1st Street to the existing NID waterline on Bell Road. This provides a water corridor along 1st Street for NID to provide supply and service to the proposed private uses of the Master Plan.
- All 3 options illustrate a mix of residential, retail, and hotel uses along the 1st Street alignment and south of Willow Creek Drive. This area could easily be serviced by the NID transmission line under a separate agreement with NID.

- An NID system would require installation in accordance with current NID requirements and standards.
- Any new buildings that connect to the NID transmission line would likely meet fire flow demands with adequate capacity and pressures.

2.2.2 SANITARY SEWER

Similar to the water distribution system, an analysis was made by overlaying the existing system onto the three alternative sketches of the proposed development options. The baseline SewerCAD model was then amended to create layouts for each of the three alternative layouts. In addition, pipes that were in direct conflict with new facilities which would require 1940 and pipes that should be considered for replacement to serve the new developments were identified. Initial quantities of system upgrades for each of the three conceptual alternatives based on our model runs were provided. In addition, existing system deficiencies were identified. In summary, the impacts associated with each option are noted and each option is rated accordingly (i.e. from least impact to most impact). This rating was based solely on the extent of existing pipe impacts and the quantity of new utility pipe needed to accommodate the option. This provided a minimum overall assessment of impacts associated with the implementation of each option as it pertained to the water system and provided one of the many components to consider in evaluating each option which served to enable the team to make an informed decision about the development of a final configuration of a land plan.

The analysis summarized that Option 3 presented the greatest degree of impact relative to both water and sewer pipe replacements and upgrades with Option 2 having the least impacts. However, the quantities did not result in a substantial difference between the three alternatives to necessarily negate the consideration of one option over the other. It is likely that recommendations based on the analysis of a proposed water and sewer system for each of the options was not a major decision factor in determining a viable alternative for development of an updated Master Plan.

2.2.3 STORM DRAIN

During this stage of the evaluation of conceptual options, there were no simulations of the alternatives with the hydrologic-hydraulic model. Consequently, input and suggestions were purely conceptual but provided a great deal of invaluable insight relative to an effective overall Stormwater Management Plan for the Placer County Government Center. What was learned from the baseline conditions model has been applied to highlight areas where proposed development coincides with existing problem flooding areas. For purposes of the Section 2 analysis, Option 1 of the site alternatives was reviewed to help communicate input on the stormwater system; only Option 1 was marked but the same generally applies to all three options. An initial mark-up of the considerations is illustrated in **Figure SD- 4**. A list of considerations to be evaluated are indicated as follows:

<u>Locations of Existing Stormwater Detention Basins:</u>

- The 1st Street Stormwater Detention Basin is located to the southwest of the roundabout

between 1st Street and F Ave. All three options propose development that would impact this detention basin. The detention basin is part of the off-site improvements for Home Depot. Any alteration of the 1st Street Stormwater Detention Basin will require that the stormwater management system for Home Depot and the surrounding area be evaluated in detail.

- The Professional Drive Stormwater Detention Basin is located at the corner of Professional Drive and 1st Street. Options 1 and 3 propose development that has the potential to impact this detention basin. Option 2, although currently proposed as green space, will still need to account for this basin. The detention basin is part of off-site improvements for Home Depot. Any alteration of the Professional Drive Stormwater Detention Basin will require that the stormwater management system for Home Depot and the surrounding area be evaluated in detail.
- The stormwater basin to the southeast of the intersection of Richardson and Bell and located adjacent to the CDRC building is included in the XPSTORM model. Plate 1 of the Master Drainage Report in Appendix D of the WUR shows the locations of all storage areas accounted for in the modeling.

Existing Stormwater Problem Areas:

- The baseline model suggests that the area bound by C Avenue, Richardson Drive, F Avenue, and 2nd Street floods in the 10-year storm event. Any development that increases the impervious area within this area would exacerbate existing flooding problems. The storm drains in this area appear to be constructed as part of the original DeWitt Center, and would require upgrades extending down to Atwood Drive at the jail maintenance access driveway (approximately 1,600 linear feet) to comply with current Placer County design standards.
- Field efforts thus far have not been conclusive in mapping stormwater infrastructure in the vicinity of proposed Building I (Administrative Services Warehouse); it is likely that key manholes and/or drain inlets have been buried or overgrown with vegetation. Any development in this area will either require (1) subsurface investigations to conclusively locate existing stormwater infrastructure or (2) treating the area as new development building an entirely new stormwater system.
- The baseline model suggests that the area of the proposed Buildings D & L (Clerk Recorder Facility and CDRC Growth and Consolidation) floods in the 100-year storm event. Development of this area may require stormwater detention facilities to meet current Placer County design standards and should focus on minimizing additional impervious area.

Other Notable Input:

- Building H (Fire Station Expansion) is outside of the baseline stormwater model, and we cannot speak to existing flooding problems, if any. This area is not hydrologically connected to one of the five primary outfalls described in the MDR and is a topographically isolated segment of the Placer County Government Center from a drainage perspective.
- The NID irrigation canal is located along the eastern boundary between Willow Creek Drive and 1st Street and runs north along the east side of 1st Street. Any development in this area

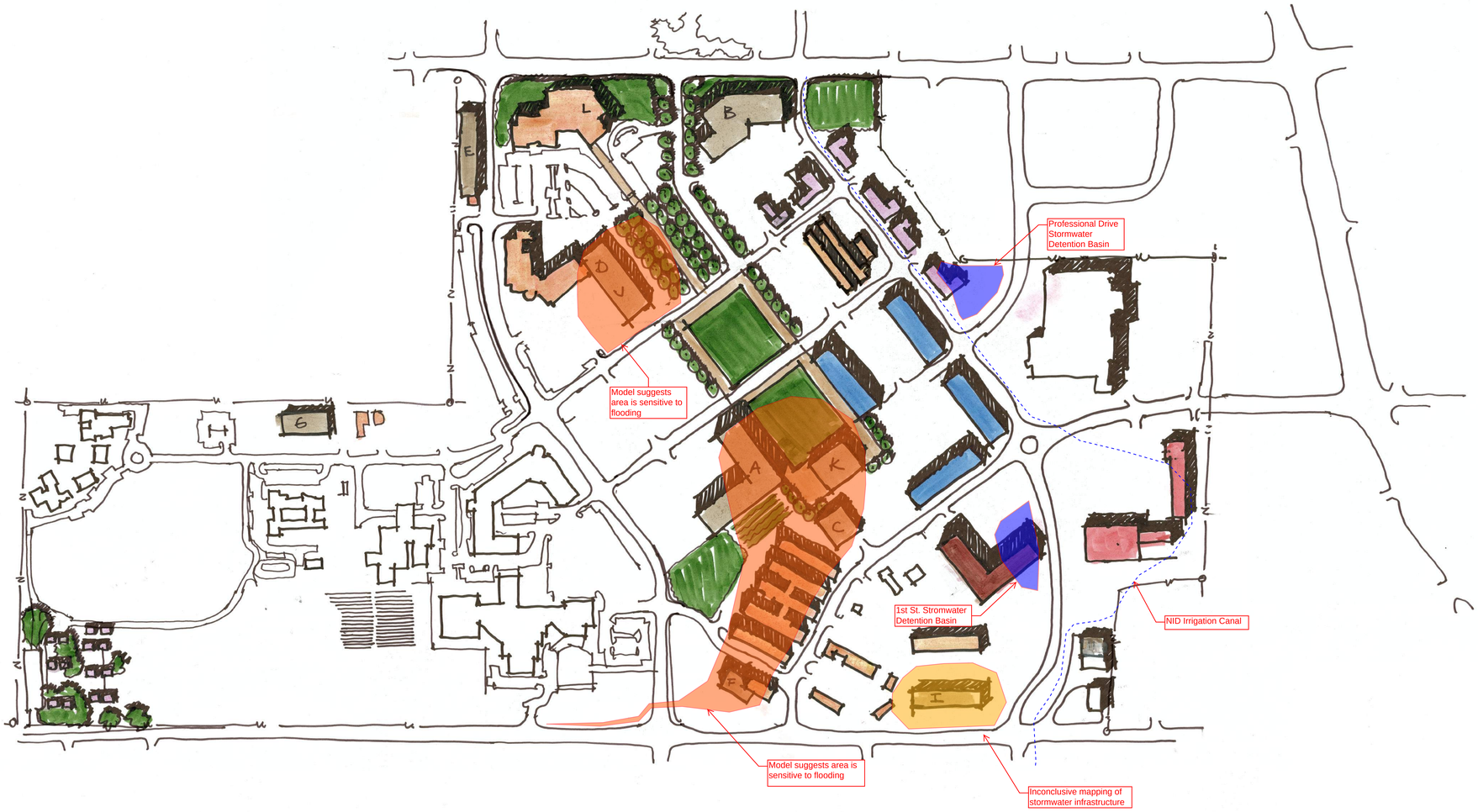
would need to take the canal into consideration and design.

- The development will be required to provide water quality and hydromodification controls for runoff originating from the project site per the requirements of the West Placer Storm Water Quality Design Manual.

Stormwater Management – Campus-wide and Project Basis Approach

Based on preparation of the Master Drainage Report along with careful consideration of each of the three options, an approach considered to be a viable policy to be adopted in conjunction with the Master Plan is presented. The approach is a way to share the development responsibility by requiring individual projects within the Placer County Government Center boundary to address and implement water quality while having regional or campus-wide facilities regulate the 2-year (for hydromodification), 10-year and 100-year storm event flows. An initial markup of the regional stormwater facilities based on review of the 3 land plans is presented in Figure SD- 5 (Regional Stormwater Facilities Markup) below. This will be used as the basis for finalizing an overall plan as presented in Section 3 below. In terms of space requirements for water quality features versus flood control features, this would amount to an approximate 25%-75% split and would fulfill the County's requirement for dispersed water quality treatment features.

This report also recommends setting aside approximately 10% of each sub-catchment area (or each project) for water quality features, which is a reasonable assumption at this stage. The new 2016 West Placer Storm Water Quality Design Manual (WPSWQDM) requires that regulated projects incorporate site design measures (i.e. dispersed treatment features instead of a single basin in some corner of a project site). Each individual project within the PCGC will likely need to adhere to the WPSWQDM.



LEGEND

A	HEALTH AND HUMAN SERVICES
B	COUNTY ADMINISTRATIVE CENTER
C	AGRICULTURAL COMMISSIONER AND FARM ADVISOR FACILITY
D	CLERK RECORDER ELECTIONS TRAINING/ WAREHOUSE FACILITY
E	MUSEUM WAREHOUSE FACILITY
F	CORPORATION YARD ADMINISTRATION AND TRAINING CENTER
G	SHERIFF AND PROBATION SUPPORT FACILITY
H	FIRE STATION 180 EXPANSION
I	ADMINISTRATION SERVICES IT/TELECOM/ WAREHOUSE
J	FINANCE ADMINISTRATION BUILDING ANNEX
K	COMMUNITY BUILDING
L	CDRC GROWTH AND CONSOLIDATION

NEW COUNTY BUILDINGS

RESIDENTIAL

HOTEL

FLEX SPACE/ MIXED-USE

RETAIL

0 200 800

100 400

FIGURE NO. SD-04

OPTION 1 MARKUP

PLACER COUNTY GOVERNMENT CENTER
AUBURN, CALIFORNIA

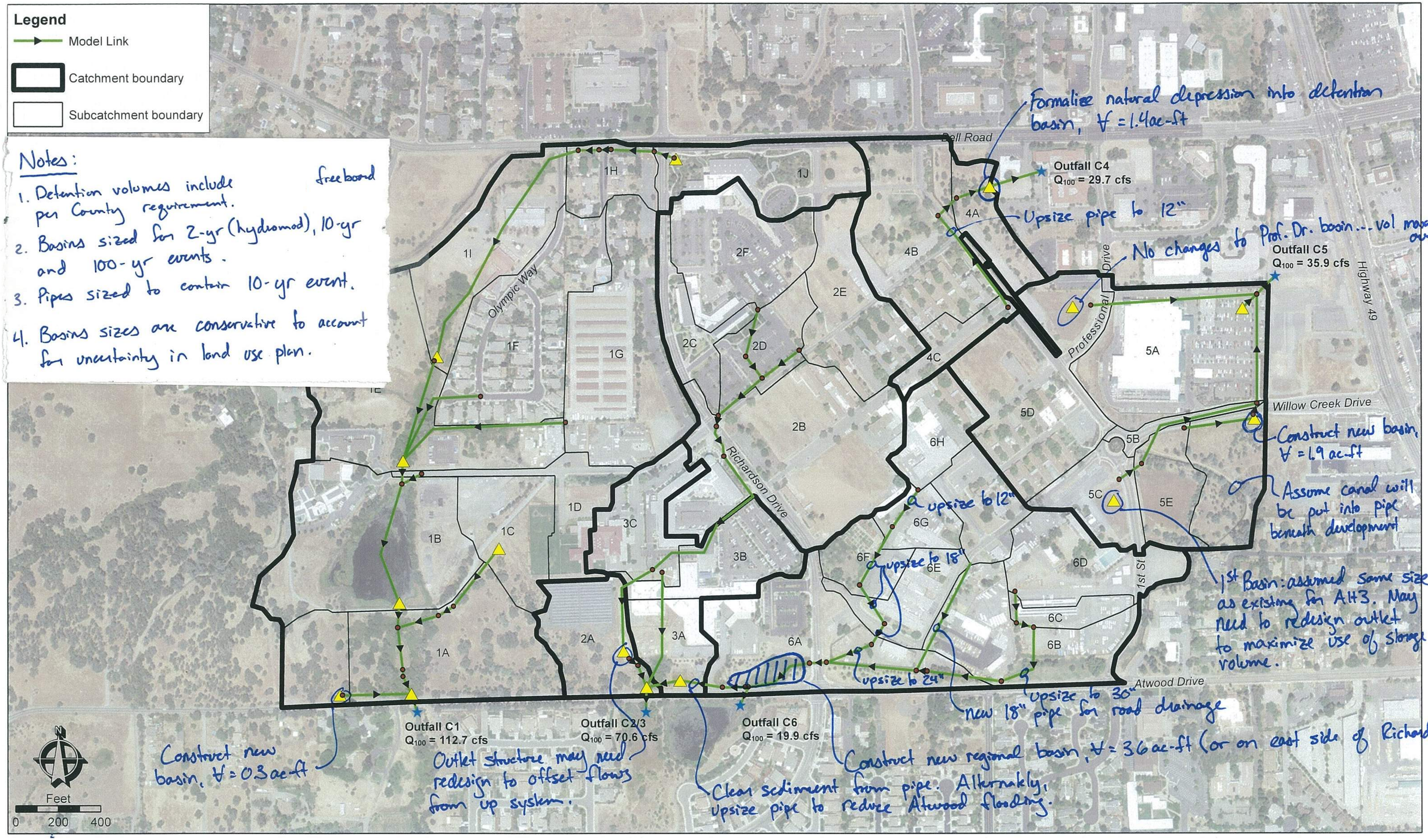


FIGURE NO. SD-05

REGIONAL STORMWATER FACILITIES MARKUP

SECTION 3: MASTER PLANNING

The input and recommendations provided in Section 2 of this report include an essential portion of the critical elements evaluated towards the evolution of the development alternatives into one final option called the proposed Placer County Government Center (PCGC) Campus Master Plan. The PCGC Campus Master Plan integrates a Community input based mix of land uses that achieves the vision of the campus to implement a series of districts to include a County Services District, a Centralized Green Space for community gathering, a core Dewitt Heritage District that sustains and memorializes the history of the campus, and a residential and commercial multi-use district with a range of residential densities and uses as well as commercial and retail uses.

The final PCGC Campus Master Plan option will be utilized to concisely summarize assessment findings towards developing final recommendations which are detailed in Section 3.1 below. Pursuant to the finalization of the Master Plan that incorporates any final recommendations, Section 3.2 will focus on the planning level documentation necessary to detail future PCGC utility improvements (water, irrigation, sanitary sewer, storm) to be implemented on a phased basis to include campus backbone utility infrastructure as well as localized (project based) improvements or associated requirements driven by the guidelines established in the Master Plan Update. In addition to providing detailed planning elements to each major wet utility, some level of input and consideration will also be included in this section to describe the potential for resource conservation related elements to reduce impacts to both the existing utility system (onsite and offsite downstream areas) as well as the environment.

3.1 MASTER PLAN UPDATE – FINDINGS AND ASSESSMENT OF FINAL OPTION

Efforts in this section are focused on providing further refined input and recommendations based on assessment of the final PCGC Campus Master Plan option while carefully considering the site and building data included as part of the Master Plan Update and Appendices (Williams + Paddon August, October 2018 versions). The tabulated data within the Master Plan Update provides critical site and facility information such as site acreages, building(s) square footages, number of stories and building types projected over a 20-year horizon. This information is used to establish demand and flow criteria necessary to apply to each of the analytical models contained within each respective Appendix of this report as well as establish the base hydrologic and hydraulic information necessary to complete the drainage analysis and the Master Drainage Report. The findings and assessment and associated recommendations are included within each of the below sub-sections that pertain to each of the major campus utilities (water, sewer, storm). Each section is written with concise recommendations or input given our specific review of the PCGC Campus Master Plan Final Option (dated October 2018 as provided by Williams + Paddon).

3.1.1 WATER

The water model and associated pipe network has been updated to incorporate a layout that accommodates the final option. Figure W-6 illustrates the baseline model calibrated to match existing conditions based on efforts described in Sections 1 and 2 of this report. An existing conditions aerial has been overlaid as reference. Figure W-7 details the proposed onsite 'County Facilities' water system improvements to accommodate the updated PCGC Campus Master Plan. Figure W-8 details the proposed onsite 'Private Uses' base water system improvements, served by

NID, to accommodate the updated PCGC Campus Master Plan. Figure W-9 illustrates a detailed summary of available fire flows throughout each proposed water system: (1) the County system primarily supplied by PCWA with NID Emergency Intertie connections and (2) the Private Development system served by NID. The fire flow model assumes that a minimum pressure of 20 psi is to be maintained throughout each system onsite. Each hydrant node is simulated to produce the highest available fire flow until a residual pressure of 20 psi is calculated in the system. Where proposed facilities border the two service area (i.e. County served by PCWA and Private served by NID), it is assumed that site hydrants nearest each facility could be used to meet fire flow requirements regardless of the service area. The baseline existing conditions model and the modeled final options and associated demand scenarios are included in Appendix A of this report. Below is a concise summary of input of the proposed water system:

Demands

As previously mentioned, two systems are proposed as a part of the Master Plan development. The NID system, which will serve the private development areas and the PCWA system which will serve the County buildings. The total potable demand under a maximum day scenario for the private and public buildings at buildout of the government center is 401 gpm. The total demand including irrigation is 908 gpm. The 908 gpm was input in the model at nodes located at proposed building locations. Since the pipe sizing for the system is primarily based on fire flow requirements, the distribution of the demands can change without causing significant impact to the system. A system demand table, with domestic, irrigation and fire demands estimated for each facility (existing and proposed) within the Master Plan, is provided in Appendix A.

Water Line Upgrades

Figure W-7 shows areas within the PCWA supplied County system where pipes require upgrading or are added to meet the required fire flow demands, along with areas of pipeline to remove or abandon due to new construction. Pursuant to discussions with the County in February 2018, the ultimate plan for the Placer County Government Center is to fully replace the water system within the government center. This is necessary due to the age of the current system (1940's system). As it is currently understood, the plan is to phase the replacement of the old pipe over the course of development of the Master Plan but to replace the applicable lines based on the implementation of specific facilities and their associated sites. Phasing of the project is covered in Section 3.2 of this report.

Figures W-8 and W-9 shows private areas to be served by NID where pipes are proposed to be added to provide service and meet the required fire flow demands. These figures illustrate a base system of main waterlines. It is anticipated that additional distribution lines of equal or lesser size will branch off the illustrated main lines to serve each private building accordingly. These secondary lines have not been modelled and are not shown as part of this assessment. Discussions were held with the County along with follow-up discussions with NID in early 2018 regarding the addition of a separate NID system to provide water for domestic use and fire suppression to the campus. These discussions evolved into an NID served system to meet the needs of the private, mixed-use and residential areas of the Master Plan. This provides further relief to the County, PCWA supplied water system which is presently over capacity to meet fire demands without the NID intertie

connections. The specific recommendation is to extend the 16" transmission line from an existing stub at the intersection (roundabout) of Willow Creek Drive and 1ST Street north on 1st Street to the existing 12" waterline on Bell Road and to install a 10" primary loop to serve the mixed-use facilities in the southeast corner of the Master Plan.

County System Upgrades

Total quantities of pipeline upgrades needed are as follows:
8275 LF - 10 inch
6725 LF - 12 inch

Total quantities of pipeline to abandon or remove are as follows:
220 LF - 6 inch
720 LF - 8 inch
7020 LF - 10 inch
6340 LF - 12 inch

NID System - Baseline Improvements

Total quantities of new pipeline for a base system are as follows:
1000 LF - 10 inch
1800 LF - 16 inch

Valves (County System only)

As previously indicated in this report, prior investigations have determined that there are many valves that can only partially open or not open at all. The existing conditions model Hazen-Williams C values were modified based on field calibration tests to account for the partially closed valves. Using the modified C values, modeling efforts have currently assumed all lines to be open. For the proposed conditions model a C value for new pipes of 130 was used. Valves are all assumed operational and open since they will be a part of the new construction.

Water Source (County System)

As detailed in Section 1 of the report, currently one regular water source exists at the east edge of the campus from PCWA (Dewitt Master Meter). This is located behind the existing Home Depot and at the intersection of Professional Drive and 1st Street. This connection incorporates two pressure detector assemblies in parallel along with a flow meter. During times of high demand, the pressure drop is substantial. In the event of a fire, the available fire flow is below the required amounts. To calibrate the baseline model and to reflect the hydrant flow test data received in February 2018, one water model scenario was created to determine the results of a single connection to PCWA. The results of these models can be found in Appendix A.

Valves at the north end and south end of the property can be manually opened in the event of an emergency, providing additional water from NID (Nevada Irrigation District). A second model scenario was created to show how the system would operate with these connections available. Without these connections to NID, the PCGC water system cannot meet the required fire flows.

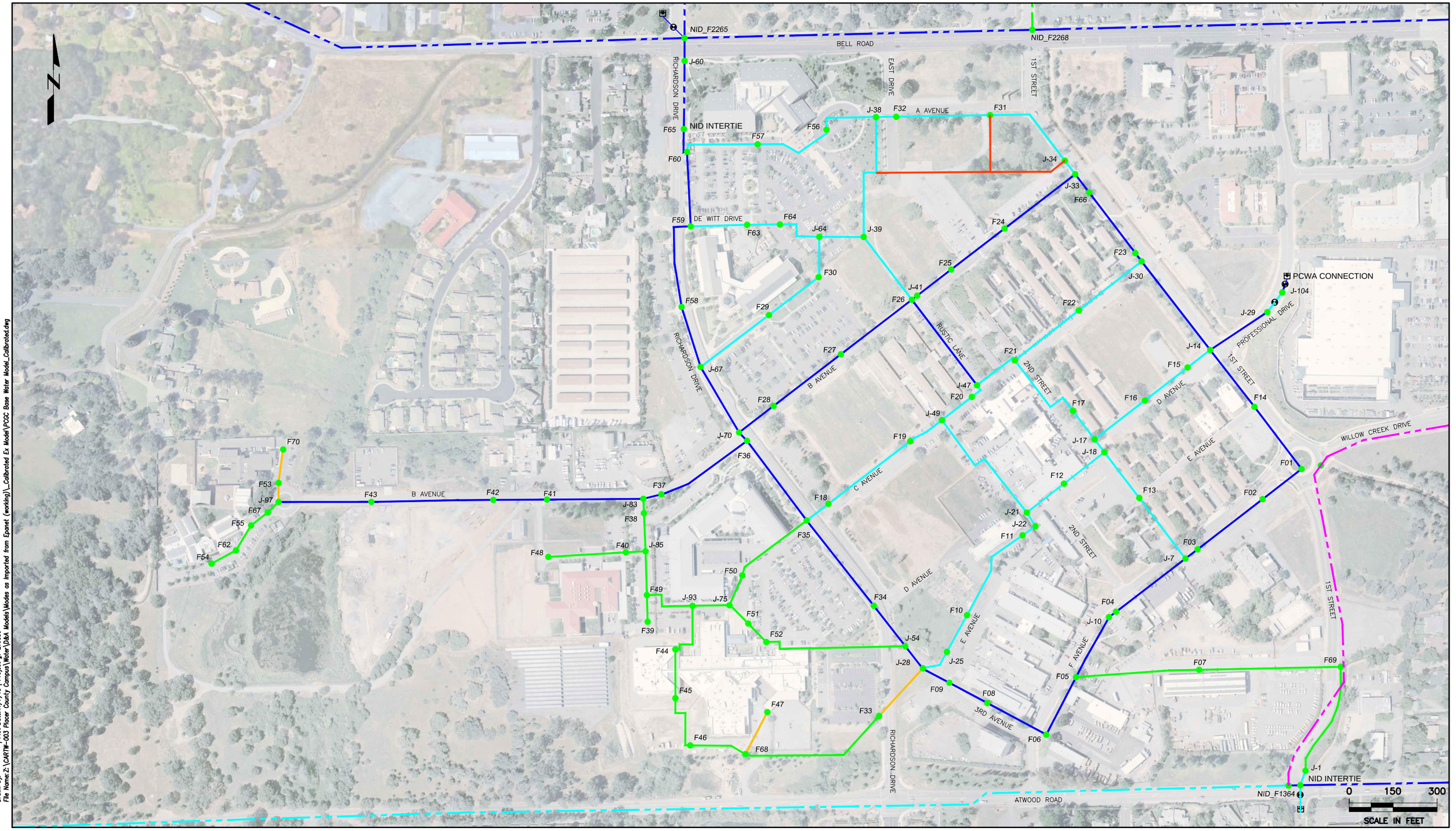
Model Results (County System)

Steps should be taken to reach an agreement with NID to allow permanent connections with an automatic valving system that allows water flow at the two intertie connections in the event of an emergency fire (i.e., a pressure drop). With such a system in place and with the wholesale upgrade of the old County water lines, the model results indicate that the proposed improvements can meet the full buildout demands and fire flow requirements of the Master Plan. Without the NID connection, the PCGC cannot be adequately served for fire protection without substantial improvements to the PCWA system.

The full buildout model for the County system also relies on the wholesale replacement of the old 1940s era pipeline which will further serve to greatly increase capacity and minimize system losses. This includes a majority of the main lines that exist through the heart of the Dewitt campus and bound by Richardson Drive to the west, 1st Street to the east, F Avenue to the south, and A Avenue to the north (excluding the water line in front of the CDRC Building). These lines have been previously identified by Placer County Department of Public Works and Facilities as requiring removal and replacement due to the aged system and the deteriorating conditions of the water system. Section 3.2 below will address and provide detail regarding the phasing of the campus water system to remove and replace segments of water lines in 5-year increments. Water models for each 5-year Tier will be developed to ensure the system meets interim demand and fire flow conditions.

Model Results (NID System)

The model results indicate that the proposed improvements can meet the full buildout demands and fire flow requirements of the private uses shown on the Master Plan. The extension of a proposed 16” transmission main along the alignment of 1st Street to the 12” line on Bell Road serves as the spine for the NID system and connects to the existing 16” water main at the existing roundabout that marks the intersection of Willow Creek Drive and 1st Street. This allows for three primary points of connection to the NID system where supply can be provided to the private uses of the Placer County Government Center: Highway 49, Atwood Road, and Bell Road. This greatly increases the supply that can be delivered by the NID water system. Section 3.2 below will address and provide detail regarding the phasing of the campus NID water system in 5-year increments.



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NODE LEGEND

J## - JUNCTION

F## - FIRE HYDRANT

EX COUNTY	EX NID	
		4-INCH DIAMETER
		6-INCH DIAMETER
		8-INCH DIAMETER
		10-INCH DIAMETER
		12-INCH DIAMETER
		16-INCH DIAMETER

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

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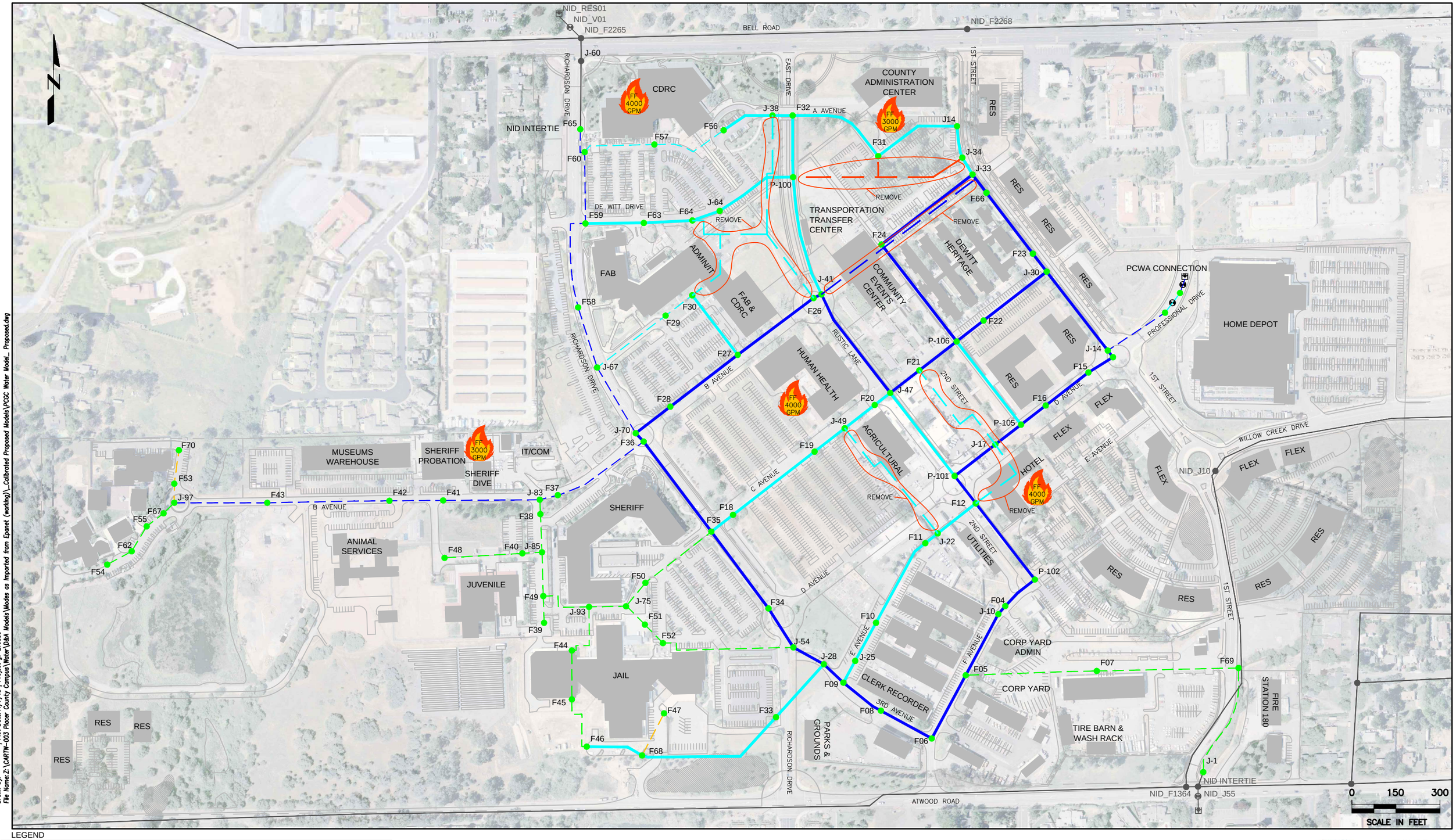
PLACER COUNTY GOVERNMENT CENTER
EXISTING WATER PIPELINE

FIGURE NO.
W-6



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LEGEND

- Node / Number
- FF 4000 GPM — Required Fire Flow
  Note: Minimum Required FF 2375 gpm in all areas highlighted

LINE TYPE & WIDTH
- EX PCWA PIPE
- PROPOSED PCWA PIPE
- EX NID PIPE
- J## - JUNCTION
- F## - FIRE HYDRANT

PIPE COLOR
- 4-INCH DIAMETER
- 6-INCH DIAMETER
- 8-INCH DIAMETER
- 10-INCH DIAMETER
- 12-INCH DIAMETER
- 16-INCH DIAMETER

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
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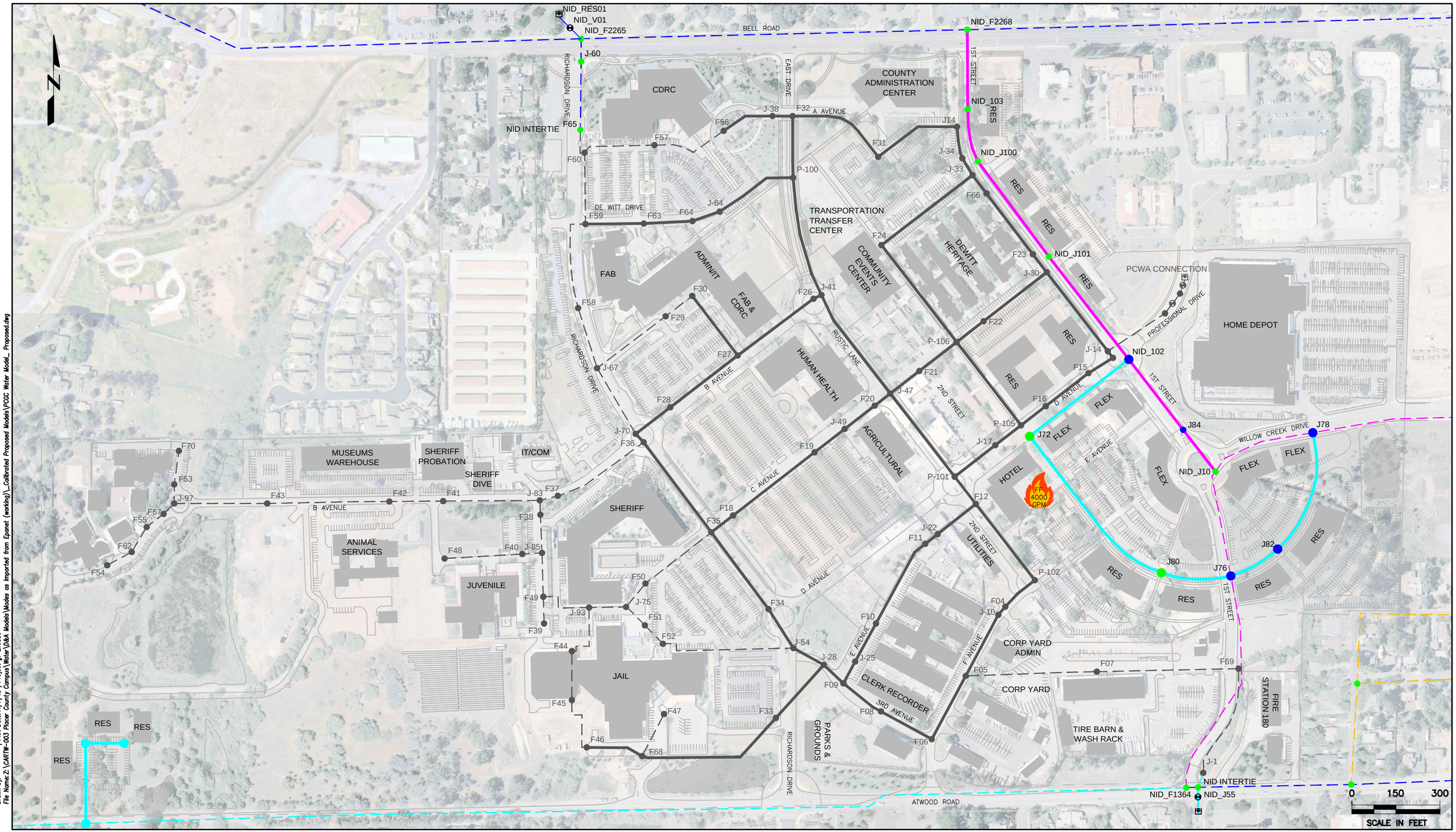
PLACER COUNTY GOVERNMENT CENTER MASTER PLAN 2018
COUNTY PROPOSED WATER IMPROVEMENTS

FIGURE NO.
W-7



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Plot Date:11/7/18 | Project #: 216056

LEGEND

- Node / Number
- FF 4000 GPM — Required Fire Flow
  Note: Minimum Required FF 2375 gpm in all areas highlighted

LINE TYPE & WIDTH
- EX NID PIPE
- PROPOSED NID PIPE
- EX COUNTY PIPE
- PROPOSED COUNTY PIPE
- J## - JUNCTION
- F## - FIRE HYDRANT

PIPE COLOR
- 4-INCH DIAMETER
- 6-INCH DIAMETER
- 8-INCH DIAMETER
- 10-INCH DIAMETER
- 12-INCH DIAMETER
- 16-INCH DIAMETER

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

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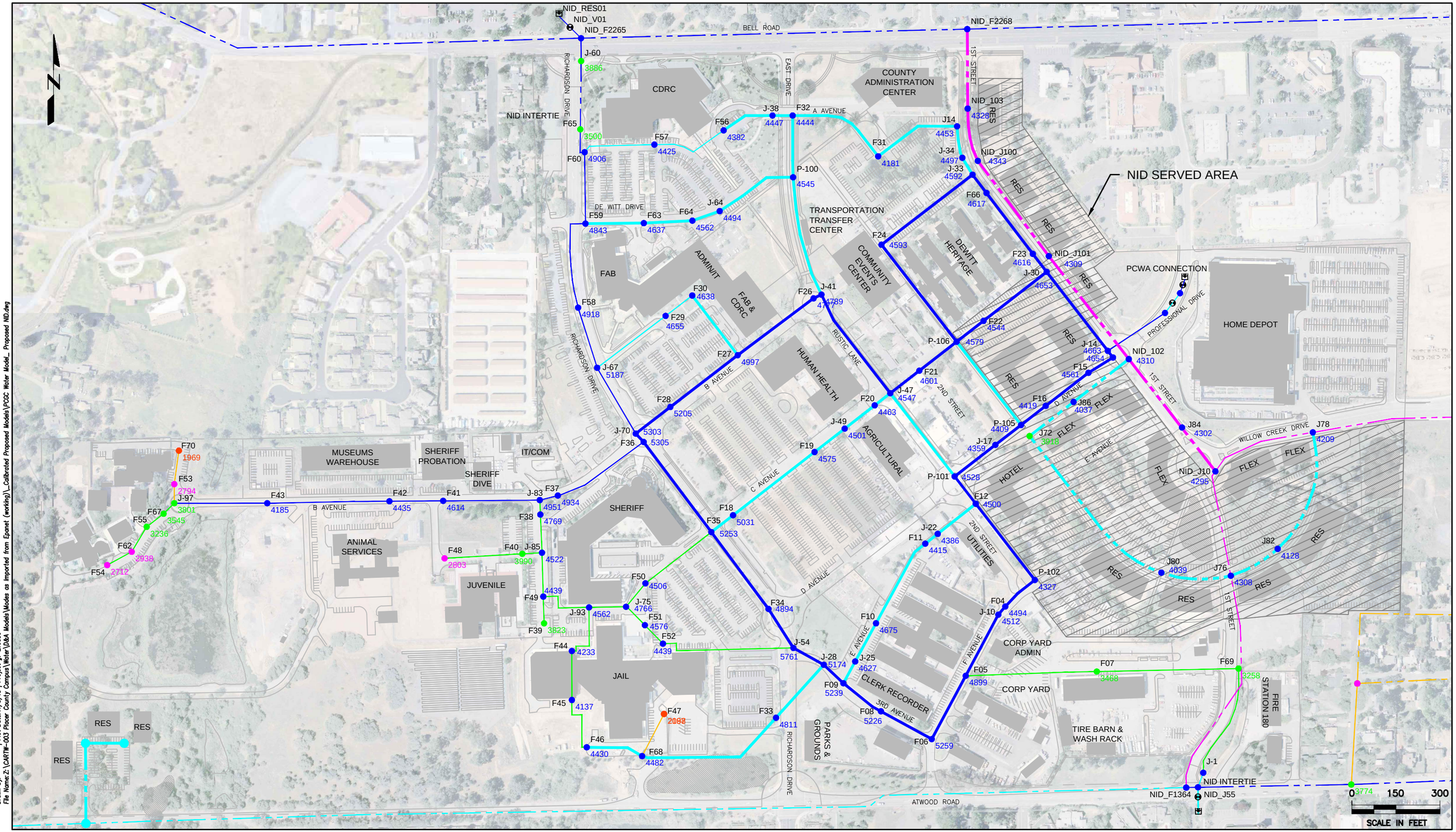
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

PLACER COUNTY GOVERNMENT CENTER MASTER PLAN 2018
NID PROPOSED WATER IMPROVEMENTS

FIGURE NO.
W-8



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File Name:Z:\CARTW-003 Placer County Campus\Water\Q&A Models\Modes as Imported from Epanet (working)_Calibrated Proposed Models\PCGC Water Model_ Proposed NID.dwg

LEGEND

- EX PCWA PIPE
- PROPOSED PCWA PIPE
- EX NID PIPE
- PROPOSED NID PIPE
- J## - JUNCTION
- F## - FIRE HYDRANT

PIPE COLOR

- 4-INCH DIAMETER
- 6-INCH DIAMETER
- 8-INCH DIAMETER
- 10-INCH DIAMETER
- 12-INCH DIAMETER
- 16-INCH DIAMETER

AVAILABLE FIRE FLOW

- <2,375 gpm
- 2,375 to 3,000 gpm
- 3,000 to 4,000 gpm
- 4,000 gpm and Greater

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

CARTWRIGHT ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

PLACER COUNTY GOVERNMENT CENTER
PROPOSED SYSTEM-PCWA SUPPLY & NID INTERTIE
AVAILABLE FIRE FLOW AT SYSTEM 20PSI

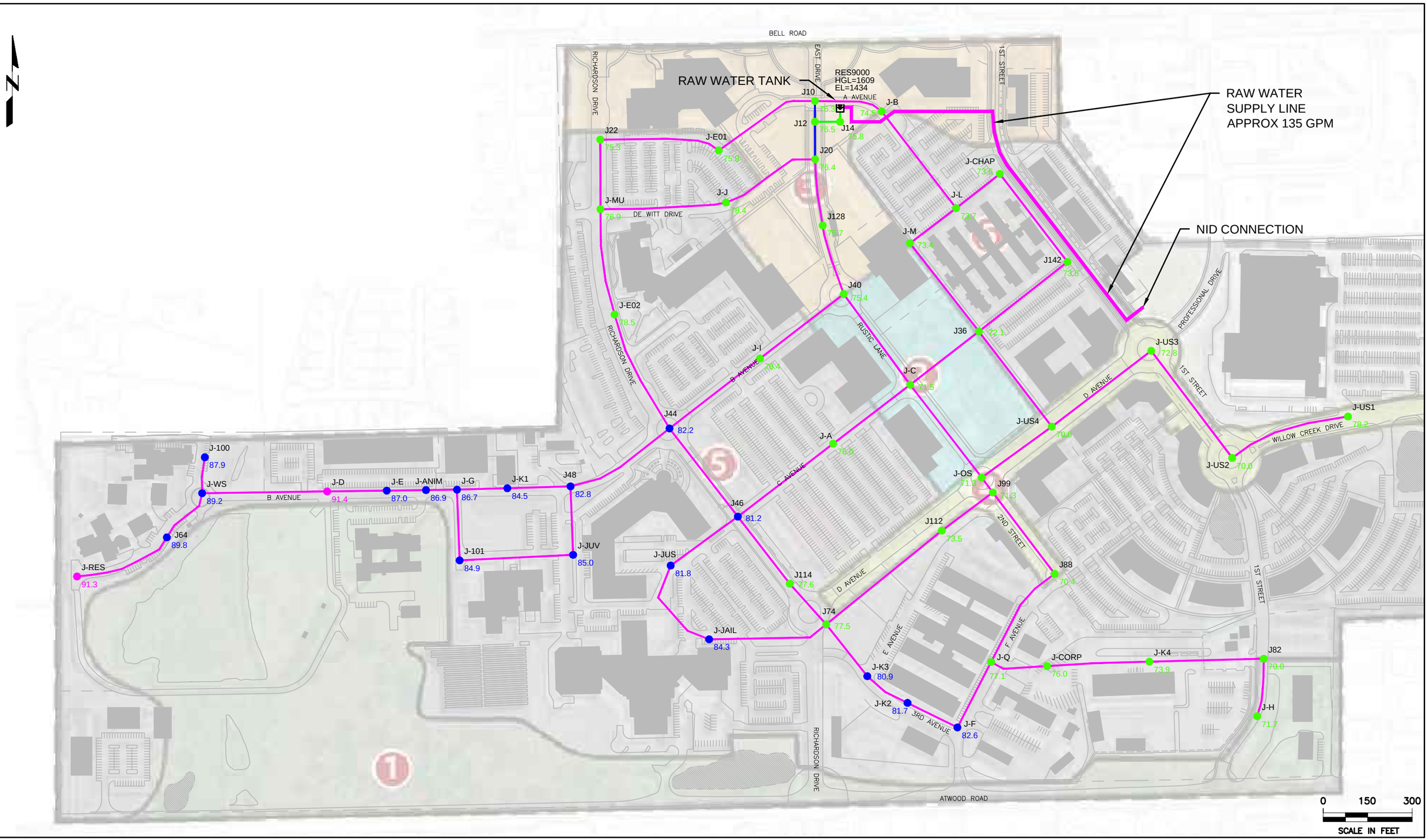
FIGURE NO.
W-9

3.1.2 RAW WATER FOR IRRIGATION

A new raw water model and associated pipe network have been created to depict a raw water irrigation system for the Master Plan. Figure I-1 below illustrates the modelled condition of an onsite supply and distribution system used to deliver raw water for irrigation purposes throughout the campus. As previously mentioned this system is planned to provide irrigation service to the landscape uses only for the County facilities. However, Figure I-1 illustrates a campus-wide system should it be determined at some point in the future that raw water could also be provided to the private, mixed-use areas of the Master Plan. In developing the raw water model depicted in the figure, certain parameters were established for the analysis. These parameters are based on discussions with the County and with an irrigation specialist with experience in developing large-scale irrigation systems. The parameters are as follows:

- A pressurized supply line would extract raw water from the existing NID canal at a location along 1st Street to fill the onsite storage facility (See Raw Water Tank, Figure I-1)
- The storage facility is located at one of the highest points on the campus to minimize the pressure head needed to deliver irrigation throughout the campus.
- The storage facility has been preliminarily and conservatively sized at 50,000 gallons to provide enough volume to deliver the peak irrigation demand to County facilities. This demand is approximately 410 gpm and represents a maximum day irrigation demand (refer to Appendix A for the irrigation demand estimate associated with County uses). This represents delivery of 410 gpm for a 2-hour duration. Again, this is a conservative estimate since such a delivery would not occur simultaneously throughout the campus County facilities as the distribution system would likely be designed in separate zones.
- Although a simulated storage and draw down analysis has not been performed with this report, it provides a general idea of the size of an onsite storage reservoir to deliver raw irrigation water.
- Pipes were sized to maintain a pressure range at a peak flow of 410 gpm distributed throughout the campus. The model used a minimum pressure of 70 psi and an upper limit of 90 psi to account for an acceptable delivery range to remote sprinkler heads. The predominant pipe size throughout the system is 4-inches with a few 6-inch and 8-inch segments at the reservoir which are needed to maintain maximum allowable velocities while minimizing head losses.
- Approximately 175’ of head or 76 psi of pressure is required at the storage reservoir to deliver flows within the pressure range. Refer to Appendix B for the current raw water irrigation model.

The current results of the raw water irrigation model demonstrate that an onsite system can be developed to significantly offset the peak demand (roughly 45% of the Master Plan Maximum Day Demand) while utilizing an allocated resource that has not been used to date. This significantly reduces the burden on an aged system and reduces consumption of potable water that can be used for domestic purposes.



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LEGEND

PROPOSED IRRIGATION LINES	SYSTEM PRESSURES (410GPM DEMAND)
4-INCH DIAMETER	70-80 PSI
6-INCH DIAMETER	80-90 PSI
8-INCH DIAMETER	>90 PSI

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

CARTWRIGHT ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

PLACER COUNTY GOVERNMENT CENTER
DRAFT RAW WATER IRRIGATION SYSTEM

FIGURE NO.
I-1

3.1.3 SANITARY SEWER

The SewerCAD model and associated pipe network has been updated to incorporate a layout that accommodates the final option. Figure SS-10 illustrates the baseline model analyzed to match existing conditions (pre PCGC Master Plan Update Option) based on efforts described in Sections 1 and 2 of this report. An existing conditions aerial has been overlaid as reference. Figure SS-11 details the proposed onsite sewer system improvements to accommodate the updated PCGC Campus Master Plan. Both upstream and downstream contributing watersheds that either impact the PCGC Master Plan Update or to which the campus may have an impact have been evaluated accordingly. The baseline existing conditions model and the modeled final option and associated wastewater flow scenarios are included in Appendix C of this report. Below is a concise summary of input of proposed sewer system changes:

Sewer Line Rerouting

Figure SS-11 shows areas where sewer pipe rerouting is required due to proposed planned facilities.

Dewitt Trunk Line Upsizing

Based on the study completed by Stantec and referenced herein, *North Auburn Dewitt Trunk Sewer Capacity Evaluation Report*, the main trunk lines that run along Richardson Drive have been recommended for upsizing. Based on information recently received from the County a number of these lines have already been upsized (AD2-45 to AD2-44 upsized from 15" to 18" and AD2-44 to AD3-78 upsized from 12" to 15"). Figures SS-10 and SS-11 reflect the increased sizes and the baseline and Master Plan models have been updated to account for the upsizing. The modelling for the Master Plan further substantiates the need for the upsizing detailed in the Stantec Report.

Sewer Line Upgrades

Figure SS-11 shows areas where lines need to be upgraded or added along with areas of pipeline to be removed or abandoned due to new planned facilities. The following quantities are based on the assumptions made in Figure SS-11.

Total quantities of pipeline upgrades needed are as follows:
6100 LF - 6 inch
670 LF - 8 inch
1380 LF - 10 inch
360 LF - 12 inch
1400 LF – 15 inch

Total quantities of pipeline to abandon or remove are as follows:
260 LF - 6 inch
1180 LF - 8 inch
260 LF - 10 inch
2260 LF - 12 inch

Parallel Sewer Systems and Low-Pressure System

Figure SS-11 and Figure SS-A show one area on Atwood Road where the existing topography cannot be accommodated with gravity sewer in order to service the planned residential development in the southwest corner of the Master Plan. Consequently, a 3" low-pressure system for a minor segment along Atwood Road is proposed to convey sewer flows to a higher elevation on Atwood where it could then gravity sewer into the Atwood Ranch III subdivision, connect to existing gravity sewer lines on Caballo Circle and flow towards the existing Atwood Ranch Unit III Sewage Lift Station. The County has indicated that this offsite lift station has sufficient capacity to accommodate the additional flows from the planned residential units.

In addition, a parallel sewer line will need to be constructed for the area just north of Atwood Road and east of Richardson Drive (for the planned Parks & Grounds Facility, Tire Barn and portions of the Corp Yard). The existing grades in this area are approximately 10' lower than the area to the north where a connection to the existing sewer system would otherwise be made. As a result, a parallel line would run north along Richardson Drive for approximately 2110' until the sewer system is deep enough to tie into at C Avenue.

New Development Area Summaries

The summary that follows outlines recommendations to provide sewer service for each of the new proposed construction areas:

SR1, SR2, SR3 – Small Residential Units (SW corner)

- Gravity sewer to Caballo Circle in Atwood Ranch Unit III Subdivision (with segment of 3" low pressure main)

R1 & R2 – Residential Units (NE corner)

- Option 1 – Gravity sewer through site of existing office buildings to the east and tie into public sewer on Professional Drive and Heritage Oak Place. This is the modelled option.
- Option 2 – Pressure system to MH AD3-47 on B Avenue at 1st Street

I, K2, K3, K4 – Parks, Utilities, Corporation Yard, Tire Barn (South)

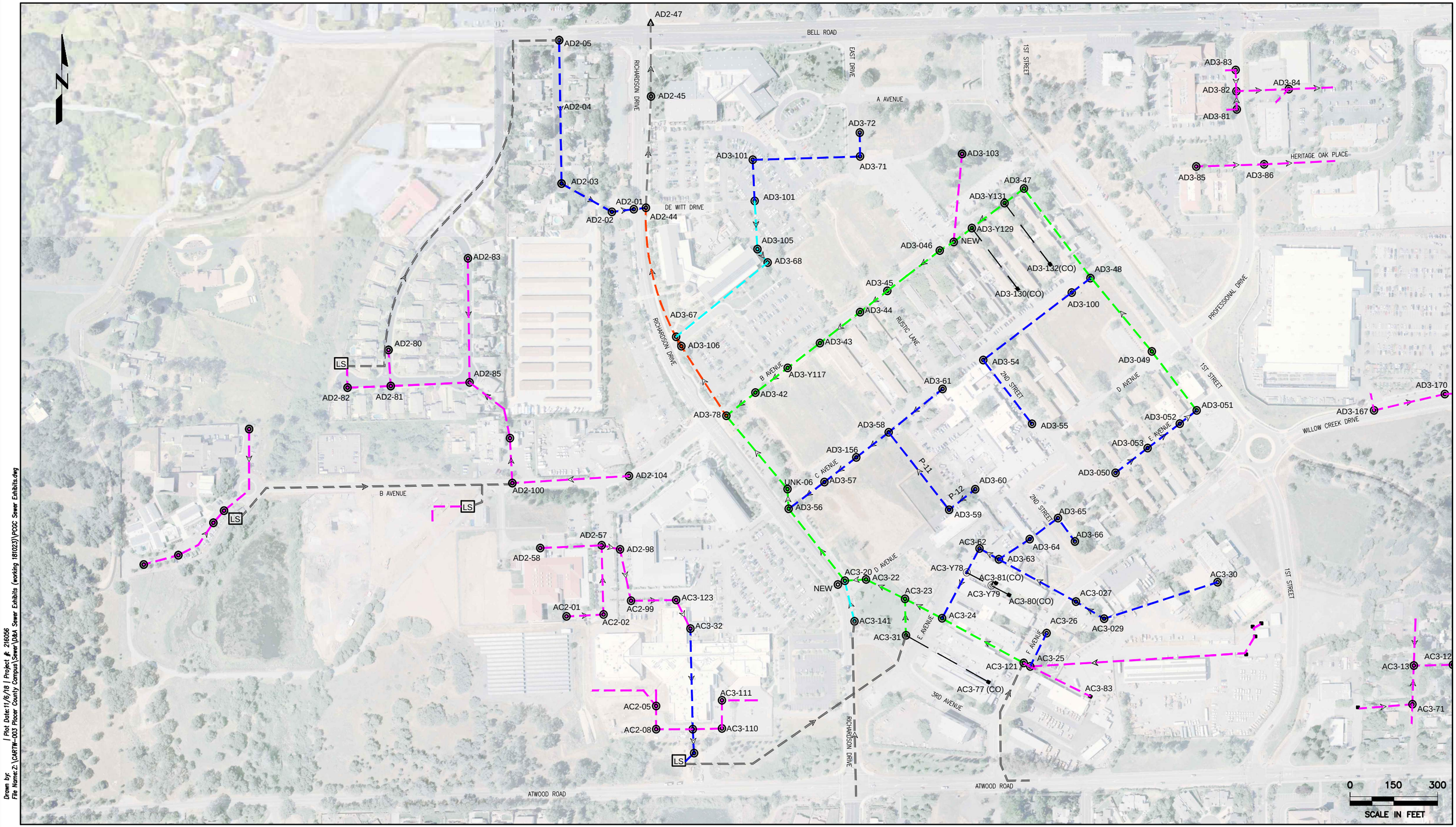
- Option 1 – Gravity sewer north, parallel line along Richardson to MH AD3-78 (B Avenue). This is the modelled option.
- Option 2 – Pressurized system to MH AC3-31

R7, R8, F5, F6 – Residential and Flex Units (SE corner)

- Gravity to manhole by Home Depot on Willow Creek Drive (MH3-167).

B – Community Admin Center (NE corner)

- Option 1 – Gravity to manhole AD3-103 (assumed to still be in service). This is the current modelled system.
- Option 2 – Gravity to manhole AD3-72 (to the west)
- Option 3 - Gravity to manhole AD3-47 (to the southeast)



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MANHOLE
SEWER CLEANOUT
LS SEWER LIFT STATION
SEWER FORCEMAIN

EXISTING SEWERLINES
LATERAL
6-INCH DIAMETER
8-INCH DIAMETER
10-INCH DIAMETER
12-INCH DIAMETER
15-INCH DIAMETER
18-INCH DIAMETER

DOMENICHELLI & ASSOCIATES
1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

CARTWRIGHT ENGINEERS
4180 Douglas Blvd, Suite 200
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PLACER COUNTY GOVERNMENT CENTER MASTER PLAN 2018 EXISTING SEWER PIPELINE

FIGURE NO.
SS-10

NOTES:

1. THE INSTALLATION OF THE PROPOSED 10" LINE IS PREDICATED ON THE TIMING ASSOCIATED WITH THE REMOVAL OF THE EXISTING BUILDING.
2. REPLACE EXISTING 12" SEWER LINE FROM MH AD3-78 TO MH AC3-121 (APPROX 1390LF) WITH 15" SEWER LINE PER TIMBERLINE REPORT.

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EXISTING SEWERLINES
- LATERAL
- 6-INCH DIAMETER
- 8-INCH DIAMETER
- 10-INCH DIAMETER
- 12-INCH DIAMETER
- 15-INCH DIAMETER
- 18-INCH DIAMETER

NEW SEWERLINES
- 3-INCH DIAMETER (LOW PRESSURE)
- 6-INCH DIAMETER
- 8-INCH DIAMETER
- 10-INCH DIAMETER
- 12-INCH DIAMETER
- 15-INCH DIAMETER
- 18-INCH DIAMETER

- MANHOLE
- SEWER CLEANOUT
- LS SEWER LIFT STATION
- SEWER FORCEMAIN

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

CARTWRIGHT ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
T (916) 978-4001

PLACER COUNTY GOVERNMENT CENTER MASTER PLAN 2018 PROPOSED SEWER IMPROVEMENTS

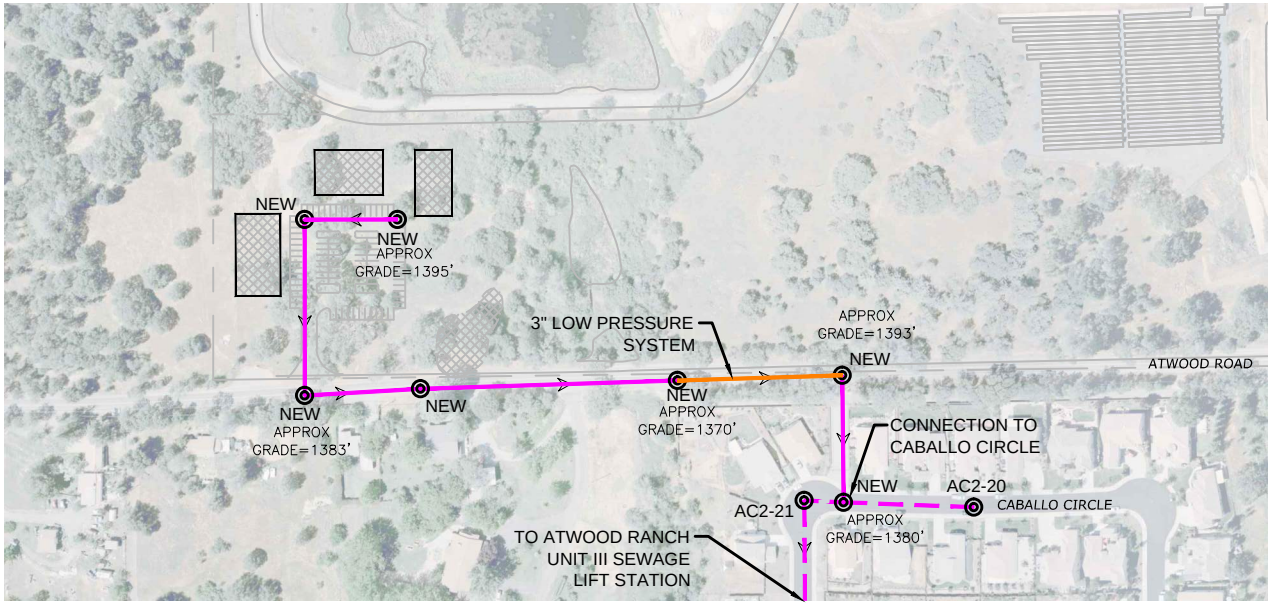
FIGURE NO.

SS-11

0 150 300
SCALE IN FEET

PLACER COUNTY GOVERNMENT CENTER
MASTER PLAN 2018

PROPOSED SEWER IMPROVEMENTS
EXHIBIT A - CABALLO CIRCLE CONNECTION



0 150 300
SCALE IN FEET

MANHOLE
SEWER CLEANOUT
LS SEWER LIFT STATION
SEWER FORCEMAIN

EXISTING SEWERLINES
6-INCH DIAMETER
8-INCH DIAMETER
10-INCH DIAMETER
12-INCH DIAMETER
15-INCH DIAMETER
18-INCH DIAMETER

NEW SEWERLINES
3-INCH DIAMETER (LOW PRESSURE)
6-INCH DIAMETER
8-INCH DIAMETER
10-INCH DIAMETER
12-INCH DIAMETER

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1101 Investment Blvd. Suite 115
El Dorado Hills, CA 95762
Ph: (916) 933-1997
Fax: (916) 933-4778

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FIGURE NO.
SS-A

Drawn by:
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3.1.4 STORM DRAIN

This section details an update to the three-conceptual options relative to stormwater planning considerations for the Placer County Government Center (PCGC) Master Plan Update. A coupled hydrologic-hydraulic model to simulate stormwater dynamics for the entire PCGC campus, plus offsite areas that contribute run-on has been developed. The development of the existing conditions model is detailed in the PCGC Master Drainage Report included in Appendix D (dated October 23, 2018). Williams +Paddon provided a land plan (dated October 10, 2018), which is understood to be the final option. At this point, this land plan has been assimilated into the model to test it against the anticipated stormwater infrastructure improvements required to comply with Placer County design standards. The design team along with the County has agreed on a strategy of meeting flood control and hydromodification requirements with several regional (campus) stormwater basins while leaving water quality treatment requirements to individual projects as they come online.

The proposed stormwater basins and their dimensions are summarized below. Refer to Figure SD-6 below for the locations of stormwater basins.

- Basin 1K: A new small basin to control runoff from the proposed residential development in the southwest corner of the project site.

- Basin 1L: A new small basin to control runoff from Subcatchments 1G and 1L and additional impervious area shown along B Avenue.

- Basin 2A: A large existing basin to control runoff from Catchment 2. A study by A.R. Associates (2000) indicated this basin is sized to accommodate a complete buildout condition, however, their study assumed different ultimate watershed conditions than the current land plan. The model indicated that the volume of Basin 2A will need to be increased to accommodate the additional runoff. We assumed the basin could be expanded into the open space south of the solar farm. The footprint of the basin would need to be increased by roughly 8,700 square feet (a 34 percent increase).

- Basin 4A: A new small basin located in the northeast corner of the project site to control runoff from the north portion of the Multi-family Housing site (Subcatchment 4A). The basin is proposed for dual use for flood control and water-quality treatment for the north portion of the Multi-family Housing project.

- Basin 4B: A new small basin to control runoff from Subcatchment 4B.

- Basin 5C (1st Street Basin): An existing basin, the volume of which is not fully utilized under existing conditions. The land plan impinges on the footprint of the existing basin, and it will need to be slightly regraded to be compatible with the Final Option. The outlet structure will need to be reconfigured to control flow rates in a way that enhances utilization of the storage volume.

- Basin 5D (Professional Drive Basin): An existing basin that controls runoff from Subcatchment 5D and 5F. The model suggested that the increase in impervious area in 5D will be offset by the decrease in subcatchment area. The only change to Basin 5D is minor regrading of the emergency overflow outlet to raise its elevation by a minimum of 0.4 feet so the basin will comply with the County freeboard criteria.

- Basin 5E: A new medium-sized basin to control runoff from Subcatchment 5E. While the footprint of this basin fits within the current land plan, it may be possible to reduce its size by grading a portion of Subcatchment 5E to drain to Basin 5C, thereby using the extra volume in Basin 5C to control flows from a portion of Subcatchment 5E.

- Basin 6A: A new large basin to control runoff from Catchment 6. There appears to be additional open space areas in Catchment 6 (for instance, the landscaped area along Atwood Drive) that could be utilized to meet the total storage volume requirement.

- Basin 6F: A new medium-sized basin to control runoff from Subcatchments 6G and 6F. The footprint of Basin 6A was maximized within the open space south of the jail building, and Basin 6F is needed to provide supplemental storage to alleviate flooding that the baseline model showed to occur along Atwood Drive.

The stormwater basin geometry is summarized in the table below. Depths and volumes are inclusive of the one foot of freeboard required by County standards. For basins that are proposed to be regraded (e.g. 2A and 5C) the figures are for the total new basin size, not the incremental increase.

Table 11 – Final Option Regional Basins

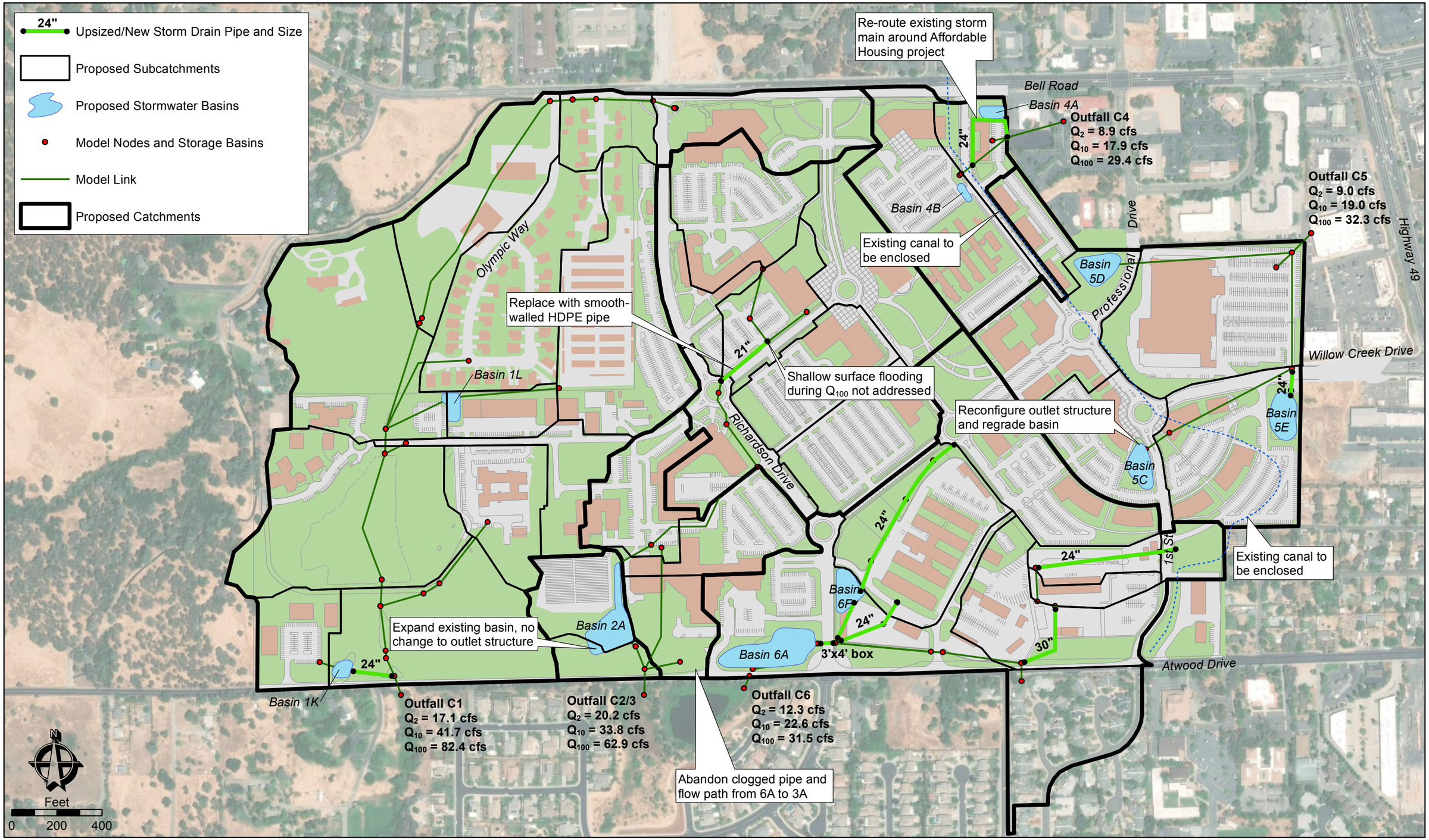
Basin	Basin Geometry				Outlet Structure Geometry		
	Bottom Area (ft^2)	Top Area (ft^2)	Depth (ft)	Total Volume (ac-ft)	Orifice Diameter (in)	Weir Width (ft)	Weir Stage (ft)
1K	1,665	5,588	6	0.48	6	4	4.25
1L	2,600	8,244	6	0.72	15	5	3.75
2A	14,939	35,720	6.5	3.81	same as existing		
4A	3,320	5,760	3	0.31	1.0' x 0.5'	3	1.5
4B	572	2,783	4	0.15	12	4	2.5
5C	6,975	16,207	7	1.83	8	5	7
5D	923	20,015	7	2.00	same as existing		
5E	9,705	21,156	8	2.78	4	5	6
6A	32,015	49,549	6	5.59	2.5' x 2.5'	4	4.75
6F	8,303	16,678	6	1.70	10	4	4.85

1. Basin geometry is inclusive of the required 1 foot of freeboard for storage basins.
2. All orifices were designed at stage = 0.0 ft (at basin floor).
3. For basins proposed to be regraded (e.g. 2A and 5C) the figures are for the total new size.

Aside from stormwater basin locations and sizes, additional improvements to the stormwater system and other considerations are annotated on Figure SD-6. The model showed that the stormwater basins are effective in limiting peak flow rates at each of the five outfalls from PCGC to be no greater than the existing peak flow rates. Table 13 below compares peak flow rates under existing conditions to the buildout condition.

Table 12 – Comparison of outfall peak flow rates under existing and buildout conditions

Outfall	2-yr Event			10-yr Event			100-yr Event		
	Existing	Buildout	Change	Existing	Buildout	Change	Existing	Buildout	Change
C1	17.8	17.1	-0.7	44.2	41.7	-2.5	85.3	82.4	-2.9
C2/3	23.5	20.2	-3.3	41.2	33.8	-7.4	66.5	62.9	-3.6
C4	9.3	8.9	-0.4	18.2	17.9	-0.3	29.5	29.4	-0.1
C5	9.2	9.0	-0.2	20.1	19.0	-1.1	34.2	32.3	-1.9
C6	22.8	12.3	-10.5	32.1	22.6	-9.5	37.7	31.5	-6.2



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ENGINEERS
4180 Douglas Blvd, Suite 200
Granite Bay, California 95746
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PRELIMINARY STORMWATER SYSTEM DESIGN
PLACER COUNTY GOVERNMENT CENTER CAMPUS
MASTER PLAN

FIGURE NO.

SD-06

3.2 FINAL MASTER PLAN AND PHASED DEVELOPMENT

This section is focused on finalizing planning recommendations for the Master Plan including details associated with the implementation of a phasing program broken out by 4, 5-year increments (Tiers) over a 20-year horizon and towards final development of the Master Plan. This section addresses the removal and replacement of utility infrastructure associated with each 5-year Tier to accommodate new development.

Appendix A – Water

WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: June 25, 2012 Project No.: 330-00-10-05

TO: Hope Bostic, Placer County Facility Services

FROM: Brenda Estrada, R.C.E. #67062

REVIEWED BY: Charles Duncan, R.C.E. #55498

SUBJECT: Placer County DeWitt Center Fire Flow Evaluation

The purpose of this Technical Memorandum is to document the hydraulic model analysis performed for the Placer County DeWitt Center. A hydraulic model was developed based on available information. The developed hydraulic model was used to evaluate the ability of the existing DeWitt system to meet minimum fire flow requirements for future development and provide system improvement alternatives to meet requirements. West Yost Associates (West Yost) did not perform any field verification or calibration of the hydraulic model as part of this project. Additional constraints or limitations of the Placer County Water Agency's (PCWA's) system were not addressed in this analysis. A brief discussion of potential constraints within the PCWA system is included in the Conclusion section.

BACKGROUND AND ASSUMPTIONS

The Placer County DeWitt Center is located northwest of Auburn city limits between Bell Road on the north and Atwood Road on the south. Much of the eastern side of the DeWitt Center is composed of government and commercial land uses, housed within a complex of buildings originally constructed between 1943 and 1945 as a military hospital. In addition to the original buildings, the west side of the site includes newer buildings such as the County Animal Shelter, Juvenile Hall, Main County Jail, Children's Emergency Shelter, and a Women's Center.

Placer County plans on demolishing several of the older buildings which require high maintenance and constructing several new buildings to house the County government services as well as potential office and commercial tenants. As part of the planning, Placer County contracted West Yost to develop a hydraulic model of the existing water system and evaluate the ability of the system to meet fire flow requirements.

The water distribution system was developed based on a site survey performed for the DeWitt Center utilities and information provided by Placer County. The existing water system is composed of 2½-inch diameter to 12-inch diameter pipelines. The main loop around the DeWitt Center is a 12-inch diameter pipeline. A majority of the pipelines on the east side of the DeWitt center are ductile iron constructed in the 1940's. Hydrant locations were provided by the site survey performed by West Yost and confirmed by Placer County staff as being representative of their actual locations, see Figure 1.

In discussion with Placer County, it was indicated to West Yost that there were several locations in the older portions of the water system where pipelines may have closed or partially closed valves. Based on operational experience with the system, Placer County staff provided a figure to show where they suspect valves may be closed. These potential closed valve locations were incorporated into the hydraulic model for the existing system simulation.

The DeWitt Center receives water from PCWA through a single metered connection located on the east side near the intersection of First Street and Professional Drive. This connection includes two reduced pressure detector assemblies in parallel (AMES 5000 CIV) and one turbo meter (Recordall Turbo 3500 Meter). The specifications for each facility were provided so West Yost could develop the head loss curves to use in the hydraulic model, see attached specifications. To determine boundary conditions for the model, PCWA monitored flow and upstream/downstream pressures at the DeWitt Center connection from October 21, 2011 to November 1, 2011. During this time period, Placer County conducted hydrant flow tests on October 28, 2011. The information collected by PCWA and Placer County was used to establish the hydraulic grade line (HGL) for the PCWA connection to the DeWitt Center system. The HGL was established for average day conditions and for high flow condition based on when the hydrants were flowing within the DeWitt Center. The HGLs established are approximate and may not represent actual boundary conditions for fire flow volumes over the amount recorded during the monitoring period.

The DeWitt Center also has two emergency connections to the Nevada Irrigation District (NID). The first connection is located at First Street and Atwood Road and the second connection is located at Richardson Drive and Bell Road. The connections to NID are for emergency conditions only and are normally closed valves that must be opened manually. NID does provide domestic and fire flow to the Community Development Resources Agency (CDRA) building located in the northwest corner of the DeWitt center at Bell Road and Richards Drive. NID conducted pressure monitoring at the upstream connection locations to the DeWitt Center from November 1, 2011 to November 7, 2011. This monitoring was performed so West Yost could develop boundary conditions for the NID inter-tie locations. The boundary conditions are for normal operating conditions and do not reflect potential limitations within the NID system for conveying large amount of water for fire flows.

Because the Animal Control building is the only metered facility within the DeWitt Center service area, developing and allocating demands accurately in the model for the DeWitt Center is not possible at this time without significant cost to Placer County. However, total demand going into the DeWitt Center is metered at the PCWA connection. The PCWA metered demands were used to develop overall demands for the hydraulic model. Demands for the Animal Control building were developed based on available meter data provided by Placer County. Demands for the Juvenile Detention Center and County Jail were calculated based on a demand factor for the number of beds occupied at each facility. The remainder of demands within the DeWitt Center were evenly allocated to demand junctions within the model. While it is not possible to allocate demands more accurately at this time for the DeWitt Center, for the hydraulic evaluation performed, the daily demands (approximately 312 gallons per minute (gpm)) are minor when compared to the required fire flow (4,000 gpm).

The fire flow requirements for future development are the controlling factor when it comes to sizing water system infrastructure for the DeWitt Center. Based on a meeting with the Fire Department, fire flow requirements for future development are based on the 2010 California Fire Code (CFC), Appendix B. The Fire Department does allow for a 50 percent reduction of the required CFC fire flow demand for buildings with approved fire sprinkler systems which will be required for any new buildings constructed. Detailed information on future development plans have not been established by Placer County at this time. However, based on the future development assumptions provided by Placer County, proposed building square footage ranges between 30,000 square feet (sf) to 200,000 sf per building. Assuming building Type V, per Placer County and Fire Department direction, Table 1 shows non-sprinklered and sprinklered building fire flow requirements. These fire flow requirements are based on maintaining a 20 pounds per square inch (psi) residual within the DeWitt Center. It should be noted the building Type V assumption results in conservative fire flow estimation. Determination of actual fire flow requirements will be made on a site or building specific basis as more information becomes available.

Table 1. Recommended Fire Flow Requirements[a,b]

Potential Building Square Footage	Non-Sprinklered			Sprinklered[c,d]		
	Fire Flow, gpm	Duration, hours	Recommended Storage, MG	Fire Flow, gpm	Duration, hours	Recommended Storage, MG
30,000 sf	4,750	4	1.14	2,375	2	0.29
50,000 sf	6,000	4	1.44	3,000	3	0.54
100,000 > sf	8,000	4	1.92	4,000	4	0.96

(a) Construction type and fire area are not generally known during the development of a master plan; consequently, fire flow requirements set forth in this table are based on building size estimates provided by Placer County.
(b) Unique projects or projects with alternate materials may require higher fire flows and will be reviewed by the Fire Marshal on a case-by-case basis.
(c) The Fire Marshal allows up to a 50 percent reduction in fire flows if a building is sprinklered. However, the Fire Code also requires that no fire flow be less than 1,500 gpm for all building types other than residential.
(d) Specific fire flows were determined from Table B105.1 of the 2010 CFC, and depend on construction type and fire area. These fire flow requirements are based on new buildings being fully sprinklered.

Placer County conducts annual hydrant flow tests on all hydrants within the DeWitt Center service area. The pitot pressure is recorded at the flowing hydrant and a residual pressure collected. The approximate flow through the hydrant is calculated based on the flowing hydrant nozzle diameter and pressure readings. The collected data for testing performed in March 2011 and February 2012 was provided to use as a guide on the current available fire flow.

EXISTING SYSTEM FIRE FLOW RESULTS

The hydraulic model was developed using the following assumptions based on the above information and data:

- DeWitt Center demand equal to 312 gpm
- Hazen-William C Factor for 1940's ductile iron pipeline = 100
- Hazen-William C Factor for newer pipeline = 130

- Average demand conditions (approximately 312 gpm):
  - PCWA connection upstream HGL = 1,554 ft (elevation = 1,428 ft plus 55 psi).
  - Check detector valve head loss = 27.6 ft (12 psi) at 156 gpm (assume average flow of 321 gpm is split evenly through each valve)
  - Meter head loss = 0 ft
- Hydrant flowing conditions (approximately 950 gpm):
  - PCWA connection upstream HGL = 1531 ft (elevation = 1,428 ft plus 45 psi)
  - Check detector valve head loss = 25.4 ft (11 psi) at 475 gpm (assume flow of 950 gpm is split evenly through each valve)
  - Meter head loss = 0.7 ft

Fire flow demands were simulated at all hydrant locations within the DeWitt Center to determine the available fire flow at minimum residual pressure of 20 psi. Using hydraulic model's "Available Fire Flow Analysis" option, the available fire flow at a minimum residual pressure of 20 psi within the existing system was simulated. Figure 2 illustrates the available fire flow at a minimum 20 psi at each fire hydrant location within the DeWitt Center. As shown in Figure 2, results indicate that only a few locations within the system are capable of meeting a 4,000 gpm fire flow demand at 20 psi residual. Several locations indicate they would be capable of meeting a 3,000 gpm or greater fire flow at 20 psi residual. Table 2 displays the existing system available fire flow at 20 psi residual.

It should be noted that the PCWA connection HGL is based off the data collected in October and November of 2011. Determining the actual HGL during the summertime or during higher fire flow demands for PCWA was beyond the scope of this project. Pressure measured during the data collection period indicate the initial PCWA HGL for serving the DeWitt Center does drop significantly as the flow demand increases. The long term cumulative effect on the PCWA system to the higher demands is beyond the scope of this project.

FIRE FLOW RESULTS WITH SYSTEM IMPROVEMENTS

A second scenario for the existing system was analyzed assuming all the previously suspected closed valves within the system are opened, several undersized pipeline diameters were increased, and new pipelines added to complete system looping, see Figure 3. The fire flow results assuming the proposed system configuration improvements indicate how overall system fire flows could be improved by performing a valve exercise program and updating key pipeline segments, see Figure 4. This program would assist in identifying any locations where valves are currently closed or partially closed and in need of repair.

Table 2 shows the available fire flow for the system improvements and compares the available fire flow to the existing system available fire flow. Overall available fire flow was increased by an average of 18 percent or approximately 519 gpm.

Table 2. Fire Flow Results and Comparisons

	Approximate Fire Flow Available (gpm) @ 20 psi Residual										
Model ID	Existing System	Pipeline and Valve Improvements	Percent Increase/ Decrease from Existing System	NID Connection	Percent Increase/ Decrease from Existing System	Double Check Assemblies By-Pass	Percent Increase/ Decrease from Existing System	PCWA Connection In-line Booster Pump	Percent Increase/ Decrease from Existing System	PCWA Connection Storage Tank	Percent Increase/ Decrease from Existing System
F01	3,290	3,357	2%	4,752	44%	5,848	78%	5,131	56%	5,165	57%
F02	2,817	2,837	1%	4,193	49%	5,266	87%	4,807	71%	4,911	74%
F03	2,681	2,703	1%	4,089	53%	5,203	94%	4,763	78%	4,878	82%
F04	3,501	3,600	3%	4,866	39%	5,915	69%	5,203	49%	5,220	49%
F05	3,936	4,166	6%	5,337	36%	6,286	60%	5,470	39%	5,430	38%
F06	4,378	4,618	5%	5,697	30%	6,563	50%	5,691	30%	5,607	28%
F07	1,442	2,380	65%	3,062	112%	3,390	135%	3,572	148%	3,772	162%
F08	4,422	4,672	6%	5,763	30%	6,594	49%	5,718	29%	5,629	27%
F09	4,334	4,610	6%	5,765	33%	6,597	52%	5,700	32%	5,614	30%
F10	3,663	3,778	3%	4,784	31%	5,480	50%	5,045	38%	5,088	39%
F11	3,437	3,509	2%	4,669	36%	5,539	61%	5,027	46%	5,078	48%
F12	3,193	3,249	2%	4,403	38%	5,387	69%	4,917	54%	4,993	56%
F13	2,531	2,558	1%	3,732	47%	4,707	86%	4,503	78%	4,661	84%
F14	3,950	3,979	1%	4,803	22%	6,819	73%	5,597	42%	5,520	40%
F15	4,066	4,073	0%	4,660	15%	7,051	73%	5,686	40%	5,586	37%
F16	3,215	3,237	1%	4,121	28%	5,581	74%	5,002	56%	5,063	57%
F17	3,089	3,159	2%	4,267	38%	5,341	73%	4,883	58%	4,966	61%
F18	2,485	4,345	75%	5,586	125%	6,215	150%	5,488	121%	5,447	119%
F19	2,867	3,648	27%	4,810	68%	5,494	92%	5,029	75%	5,078	77%
F20	2,919	3,335	14%	4,701	61%	5,548	90%	5,002	71%	5,062	73%
F21	3,117	3,307	6%	4,581	47%	5,655	81%	5,044	62%	5,096	64%
F22	3,127	3,165	1%	4,233	35%	5,181	66%	4,806	54%	4,901	57%
F23	3,855	3,938	2%	5,095	32%	6,576	71%	5,512	43%	5,458	42%
F24	3,192	3,502	10%	4,989	56%	5,605	76%	5,055	58%	5,102	60%
F25	3,097	3,496	13%	5,013	62%	5,615	81%	5,058	63%	5,105	65%
F26	3,200	3,849	20%	5,514	72%	6,145	92%	5,343	67%	5,329	67%
F27	3,453	4,078	18%	5,607	62%	6,072	76%	5,367	55%	5,349	55%
F28	3,844	4,539	18%	6,143	60%	6,538	70%	5,659	47%	5,581	45%
F29	3,077	3,604	17%	5,126	67%	5,150	67%	4,847	58%	4,922	60%
F30	2,974	3,518	18%	5,108	72%	5,146	73%	4,833	63%	4,913	65%
F31	1,387	3,193	130%	4,827	248%	5,339	285%	4,886	252%	4,968	258%
F32	1,182	2,893	145%	4,234	258%	4,607	290%	4,466	278%	4,612	290%
F33	1,587	3,935	148%	4,763	200%	5,274	232%	4,965	213%	5,016	216%
F34	3,665	4,056	11%	5,326	45%	6,047	65%	5,352	46%	5,337	46%
F35	3,684	4,193	14%	5,367	46%	5,903	60%	5,324	45%	5,316	44%
F36	3,931	4,608	17%	6,163	57%	6,578	67%	5,693	45%	5,608	43%
F37	3,666	4,139	13%	5,298	44%	5,670	55%	5,206	42%	5,220	42%
F38	3,519	3,876	10%	4,799	36%	5,128	46%	4,874	38%	4,936	40%
F39	2,545	2,661	5%	3,140	23%	3,363	32%	3,504	38%	3,662	44%
F40	2,724	2,875	6%	3,425	26%	3,666	35%	3,765	38%	3,918	44%
F41	3,483	3,810	9%	4,642	33%	4,929	42%	4,745	36%	4,821	38%
F42	3,250	3,502	8%	4,192	29%	4,444	37%	4,388	35%	4,497	38%
F43	3,220	3,432	7%	4,013	25%	4,230	31%	4,222	31%	4,335	35%
F44	1,935	1,989	3%	2,289	18%	2,458	27%	2,665	38%	2,810	45%
F46	1,261	2,800	122%	3,244	157%	3,503	178%	3,620	187%	3,770	199%
F48	1,932	1,990	3%	2,289	18%	2,452	27%	2,658	38%	2,801	45%
F49	2,943	3,133	6%	3,799	29%	4,088	39%	4,110	40%	4,250	44%
F50	3,143	3,379	8%	4,158	32%	4,510	44%	4,431	41%	4,549	45%
F51	3,278	3,497	7%	4,236	29%	4,569	39%	4,478	37%	4,585	40%
F52	3,124	3,300	6%	3,964	27%	4,274	37%	4,255	36%	4,381	40%
F54	1,768	1,809	2%	2,028	15%	2,152	22%	2,335	32%	2,450	39%
F55	2,376	2,463	4%	2,802	18%	2,960	25%	3,116	31%	3,255	37%
F56	1,650	2,988	81%	4,689	184%	4,615	180%	4,476	171%	4,616	180%
F57	3,076	3,250	6%	3,756	22%	3,952	29%	3,994	30%	4,116	34%
F58	3,086	3,761	22%	5,868	90%	5,579	81%	5,089	65%	5,126	66%
F59	2,676	3,344	25%	6,029	125%	5,161	93%	4,818	80%	4,906	83%
F60	1,259	2,948	134%	6,233	395%	4,654	270%	4,497	257%	4,637	268%
F62	2,697	2,828	5%	3,273	21%	3,461	28%	3,575	33%	3,716	38%
F63	2,721	3,269	20%	5,122	88%	4,911	80%	4,676	72%	4,784	76%
F64	1,454	2,876	98%	4,824	232%	4,395	202%	4,331	198%	4,488	209%
F65	1,245	2,769	122%	7,117	472%	4,317	247%	4,277	243%	4,444	257%
F66	3,478	3,738	7%	5,197	49%	6,084	75%	5,296	52%	5,293	52%
F67	2,015	2,075	3%	2,346	16%	2,489	24%	2,674	33%	2,806	39%
F68	1,370	3,099	126%	3,608	163%	3,904	185%	3,958	189%	4,096	199%
F69	874	2,792	219%	4,654	432%	4,496	414%	4,392	402%	4,550	420%

FIRE FLOW RESULTS WITH SERVICE CONNECTION AND SUPPLY IMPROVEMENT

Several alternatives were evaluated for Placer County's consideration to improve the available fire flow for future developments. All alternatives evaluated include the system pipeline and valve improvements discussed previously and listed below:

- Recommendation of a valve exercise program to identify any closed or partially closed valves or any valves that may need repair.
- Construction of new pipeline to improve system looping to the southeast area of the DeWitt Center.
- Replacement of existing pipelines which are undersized for the proposed future development fire flow needs.

The alternatives evaluated also include improvements or changes to the service connection locations as well as on-site storage. Each alternative should be further analyzed to determine additional feasibility issues such as meeting with PCWA and NID to negotiate any service connection updates or changes. The scenarios evaluated are listed below:

1. Connection NID as a service provider or conversion of the emergency connection to NID to automatically open for fire flow purposes when pressures drop to a critical level within the DeWitt Center.
    - NID currently has two emergency tie-in locations to the DeWitt Center which are opened manually when needed. Conversion of the service provider to NID or updates to the tie-in locations to operate automatically depending on system pressure within the DeWitt Center for emergency purposes would provide a redundant system. The current DeWitt Center relies on a single tie-in to PCWA which limits the reliability of the system during emergency conditions. However, this alternative requires negotiation between Placer County, NID, and PCWA to determine the feasibility of changing water service providers. In addition, further analysis is needed to determine improvements required at each NID connection location to ensure available fire flows meet system requirements.
    - The model scenario is limited in the ability to fully evaluate the NID system option due to limited data on the NID system response to fire flow conditions. NID did provide boundary conditions at the two tie-in locations based on average system conditions in November 2011. For the model scenario, it was assumed available pressure from the NID system would decrease by approximately 20 psi from the average system conditions provided.
    - See Figure 5 for the model results of available fire flow and Table 2 for a comparison to existing system available fire flow.

2. Construct a bypass pipeline around the double detector checks at the PCWA connection to open for fire flow purposes when pressure drops to a critical level within the DeWitt Center.

    - The current PCWA connection includes the parallel detector check valve assemblies as well as system meter. The water served to the DeWitt Center on an average basis is minor and results in minimal head loss through each of the facilities. However, during fire flow conditions, the higher flow rates result in increased head loss through the facilities. Approximately 15 psi would be lost through the detector check assemblies and meter during a 4,000 gpm fire flow (based on specifications provided by Placer County and PCWA and assumes flow is evenly distributed between the two detector check valves). Installation of a bypass facility would minimize the 15 psi loss in pressure and result in additional water and pressure being available for fire flows. This scenario requires further discussion with PCWA to determine if it is possible to bypass the meter and double check valve assemblies during an emergency fire flow condition.

    - The model scenario assumes a 16-inch bypass line is installed which conveys water from PCWA directly into the DeWitt Center for fire flow purposes. See Figure 6 for the model results of available fire flow and Table 2 for a comparison to existing system available fire flow.

3. Installation of an in-line booster pump station with back-up power at the PCWA connection to compensate for the pressure drop created during fire flow conditions.

    - As discussed in Scenario 2, the current connection facilities between PCWA and Placer County's DeWitt Center results in approximately 15 psi loss across the facilities during a fire flow demand of 4,000 gpm (assumes flow is evenly distributed between the two detector check valves). An alternative to constructing the bypass facility is to construct an in-line booster pump station to compensate for the pressure loss. This facility would need to meet minimal standards to be considered a reliable alternative. These standards would include having redundant pumping capacity and standby power availability. This scenario requires further discussion with PCWA and consultation with the Fire Marshall to ensure facilities meet requirements.

    - The model scenario assumes the system in-line booster pump has a design point of 4,000 gpm at 15 psi. Additional analysis would be required to determine the actual facility capacity and operational parameters. See Figure 7 for the model results of available fire flow and Table 2 for a comparison to existing system available fire flow.

4. Construction of an on-site storage tank and booster pump station to meet fire flow requirements within the DeWitt Center is another alternative.

    - One method of providing fire flow within a water system is the installation of storage and booster pump stations. For the DeWitt Center, the storage tank would need to be sized to contain an adequate volume of water to meet fire flow requirements. The largest fire flow within the DeWitt Center is 4,000 gpm for a four-hour duration. The total volume of water needed to meet this fire flow requirement is approximately 1.0 million gallons (MG). However, not all of the fire flow required would need to be located in the storage tank. PCWA could provide a portion of the required fire flow concurrently through the existing connection. This assumption results in a reduction in the required volume of water needed for on-site storage. Review of the results based on the scenario

with system valve and pipeline improvements indicates PCWA would be capable of reliably supplying approximately 2,000 gpm to most locations. Based on the assumption PCWA is capable of providing this amount of fire flow to the DeWitt Center, the required on-site fire flow storage is reduced to approximately 0.5 MG.

- The model scenario assumes the storage tank would be located at the existing PCWA connection location. This location would allow the tank to be designed as a flow through tank to prevent stagnation due to low turnover. Additional feasibility studies would need to be performed to determine the best on-site location, actual tank volume required, and operational parameters for the tank. See Figure 8 for the model results of available fire flow and Table 2 for a comparison to existing system available fire flow.

CONCLUSIONS

The hydraulic model developed for the DeWitt Center is based on the best available data for the DeWitt distribution system. The model results indicate the existing system has limitations on meeting fire flow demands. A factor in the fire flow limitations involves uncertainty regarding valve status in the older part of the water distribution system and several undersized pipelines or lack of pipeline looping. The following recommendations to improve delivery of fire flow within the DeWitt distribution system should be initiated by Placer County to address current fire flow issues:

- Perform additional flow tests during the higher demand periods in PCWA service area
- Create and perform a valve exercise program to identify any closed or partially closed valves or any valves that may need repair.
- Calibrate the hydraulic model
- Design and construct new pipeline to improve system looping to the southeast area of the DeWitt Center.
- Replace existing undersized pipelines for any proposed future development.

Based on the results shown in Table 2, performing the above listed recommendations would result in improved fire flow availability throughout the DeWitt Center. Areas to the southeast and northwest which currently are the most limited in supplying the required fire flow and would see the largest benefits.

The major contributor to the fire flow limitations within the DeWitt Center are based on the single service connection to PCWA and the amount of head loss from PCWA's system to the DeWitt Center at this connection. The four scenarios evaluated with the hydraulic model incorporate the above system pipeline and valve recommendations. However, limitations within the PCWA and NID systems for supplying fire flow to the DeWitt Center were outside the scope of this TM. Each of the scenarios evaluated using the hydraulic model indicates significant fire flow improvement could be achieved. However, each of the scenarios requires further evaluation or discussions with the water service provider to determine the feasibility of implementing the improvements.

Known constraints or limitations associated with the PCWA system for delivering adequate water at required pressure need to be determined at the tie-in location to the DeWitt Center. The DeWitt Center is located at the end of the PCWA system and has limited transmission and distribution pipelines serving the area. The known limitations within the PCWA system are listed below and shown in Figure 9:

- Maximum velocity allowed in pipelines is 5 feet per second
- DeWitt served from Rock Creek PRV station. The largest diameter pipeline for this service area is 12 inch.
- Rock Creek PRV station fed by a 12-inch pipeline. Largest diameter pipeline upstream is 16-inch diameter located at intersection of Bell Road and New Airport Road
- A single 12-inch diameter pipeline feeds the entire Rock Creek service area west of Highway 49 which includes the DeWitt Center.

Of the scenarios evaluated, constructing a bypass pipeline for emergency purposes at the NID connections is the least disruptive and least cost involved alternative. Placer County, PCWA, and NID need to determine the feasibility of installing automatic valves to open when pressures within the DeWitt Center drop to a critical value.

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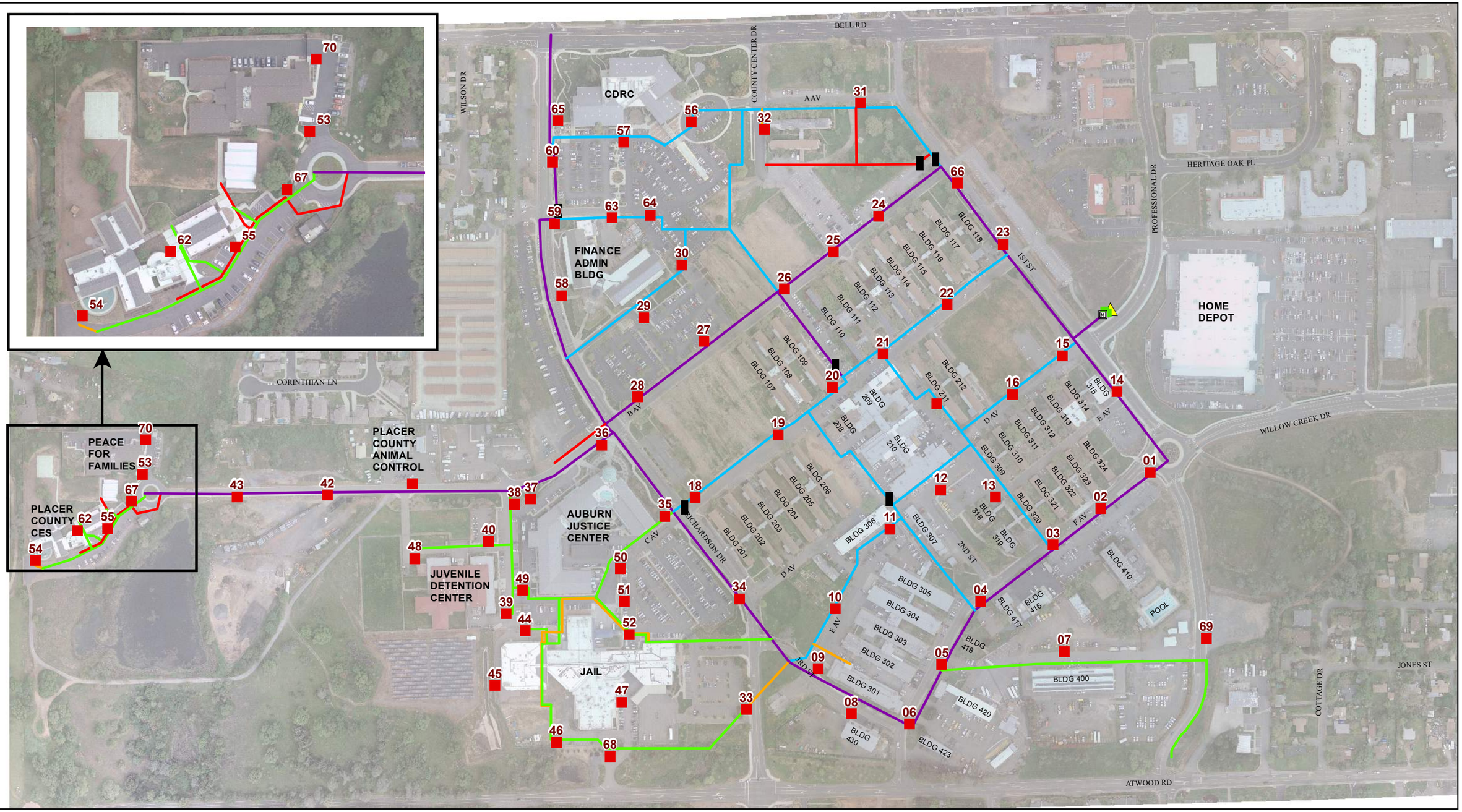

Fire Hydrant
PCWA Detector Assemblies
PCWA Meter
PCWA Connection
Potential closed/broken valve

4 inch diameter and less
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Note:
- The potential closed/broken valve locations based on information provided by Placer County staff.

N

0 160 320

Scale in Feet

FIGURE 1

Placer County
DeWitt Center Hydraulic Analysis

EXISTING SYSTEM

WEST YOST ASSOCIATES
Consulting Engineers

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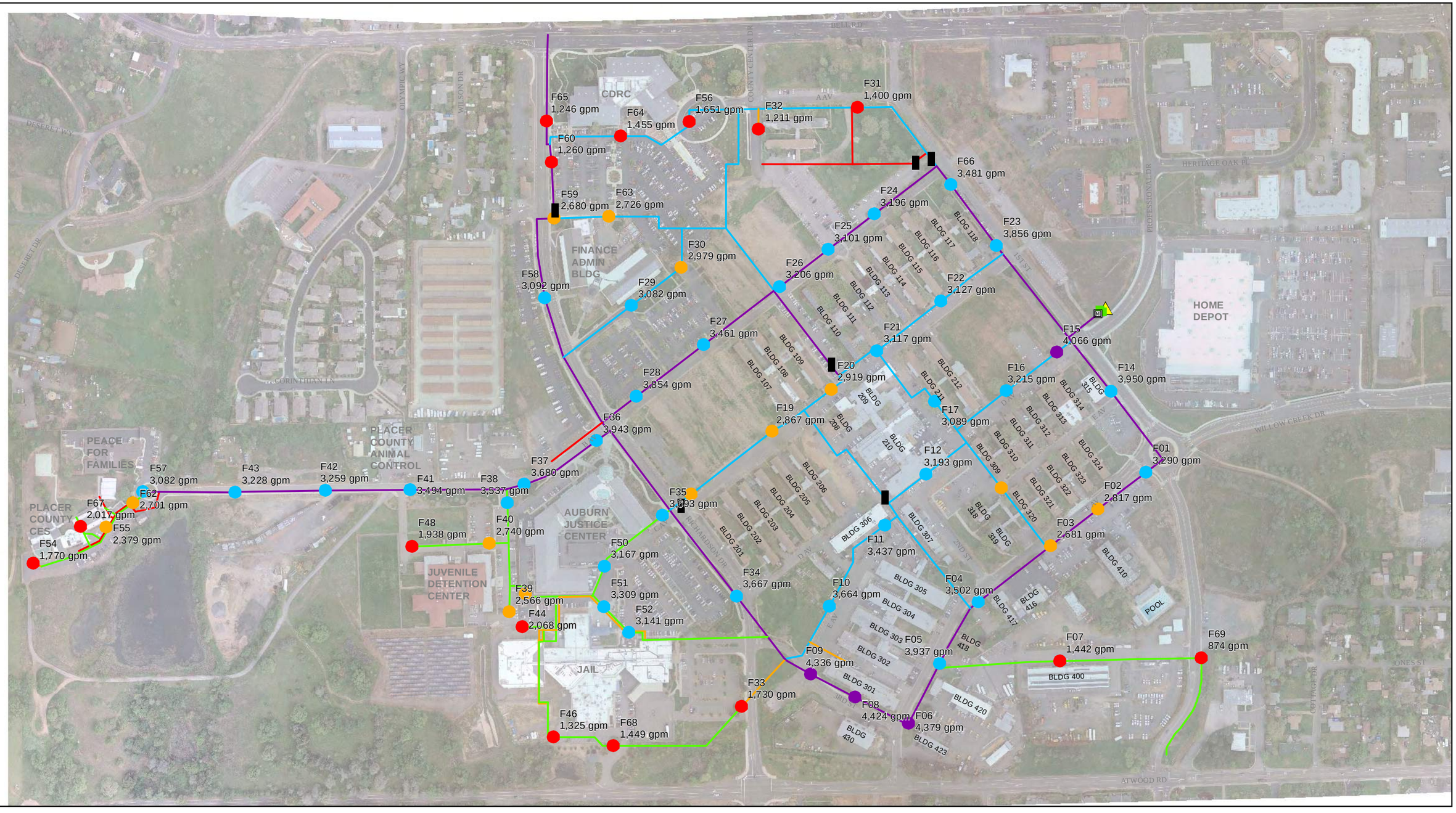


PCWA Detector Assemblies
PCWA Meter
PCWA Connection
4 inch diameter and less
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Potential closed/broken valve

Available Fire Flow
Less than 2,375 gpm
2,375 to 3,000 gpm
3,000 to 4,000 gpm
4,000 gpm and Greater

Note:
- The potential closed/broken valve locations based on information provided by Placer County staff.
- Available fire flow shown based on 20 psi residual.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

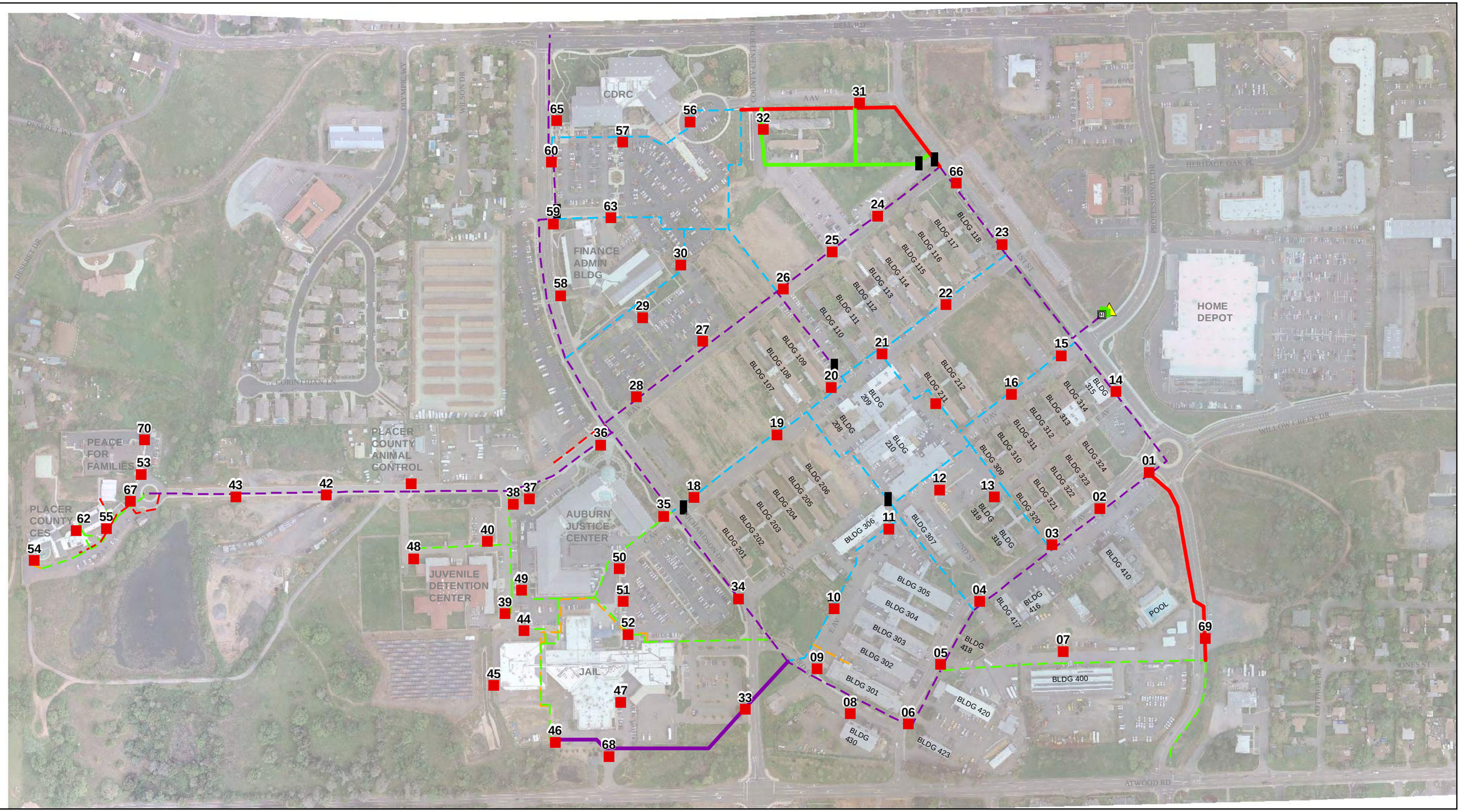
N
0 160 320
Scale in Feet

FIGURE 2

Placer County
DeWitt Center Hydraulic Analysis
EXISTING SYSTEM
AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig3_DeWitt_Pipe_Improve.mxd 6/25/2012



Fire Hydrant
PCWA Detector Assemblies
PCWA Meter
PCWA Connection
Potential closed/broken valve

Existing Pipelines
- 4 inch diameter
- 6 inch diameter
- 8 inch diameter
- 10 inch diameter
- 12 inch diameter

New or Upsized Pipelines
- 8 inch diameter
- 10 inch diameter
- 12 inch diameter

Note:
- The potential closed/broken valve locations based on information provided by Placer County staff.
- All valves located in older areas of the system should be high priority in a valve excercise plan.

N

0 160 320

Scale in Feet

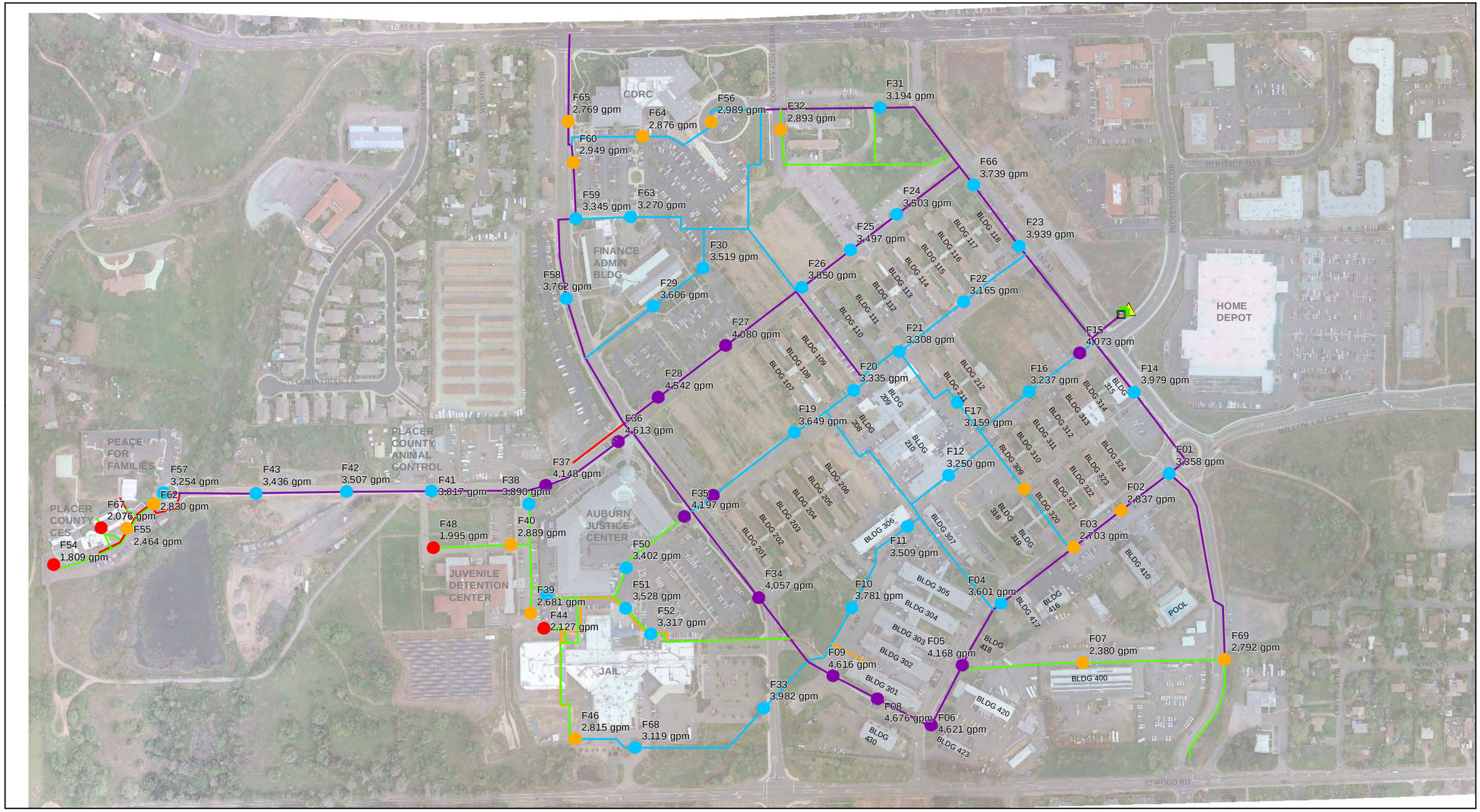
FIGURE 3

Placer County
DeWitt Center Hydraulic Analysis

PIPELINE IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig4_DeWitt_Imp_Avail_FF.mxd 6/25/2012



PCWA Detector Assemblies
PCWA Meter
PCWA Connection
4 inch diameter
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Available Fire Flow
- Less than 2,375 gpm
- 2,375 to 3,000 gpm
- 3,000 to 4,000 gpm
- 4,000 gpm and Greater

Note:
- Available fire flow shown based on 20 psi residual.
- Available fire flow shown based on hydraulic model results. Actual hydrant testing required to confirm available flow at specific locations.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

N

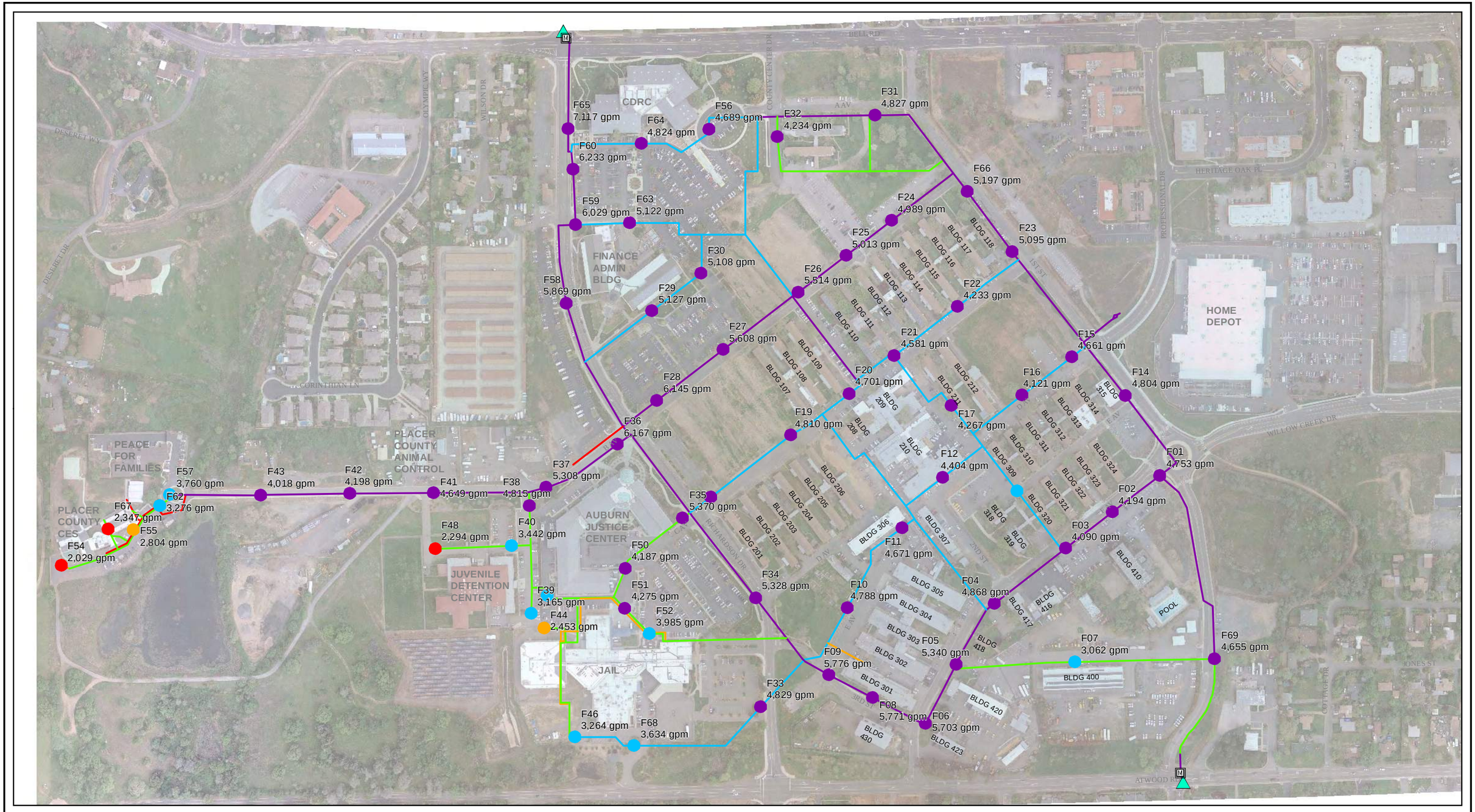
0 160 320
Scale in Feet

FIGURE 4

Placer County
DeWitt Center Hydraulic Analysis
PIPELINE IMPROVEMENTS
AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig5_DeWitt_NID_Avail_FF.mxd 6/25/2012



Meter
NID Connection
4 inch diameter
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Available Fire Flow
- Less than 2,375 gpm
- 2,375 to 3,000 gpm
- 3,000 to 4,000 gpm
- 4,000 gpm and Greater

Note:
- Available fire flow shown based on 20 psi residual.
- Available fire flow shown based on hydraulic model results. Actual hydrant testing required to confirm available flow at specific locations.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

N

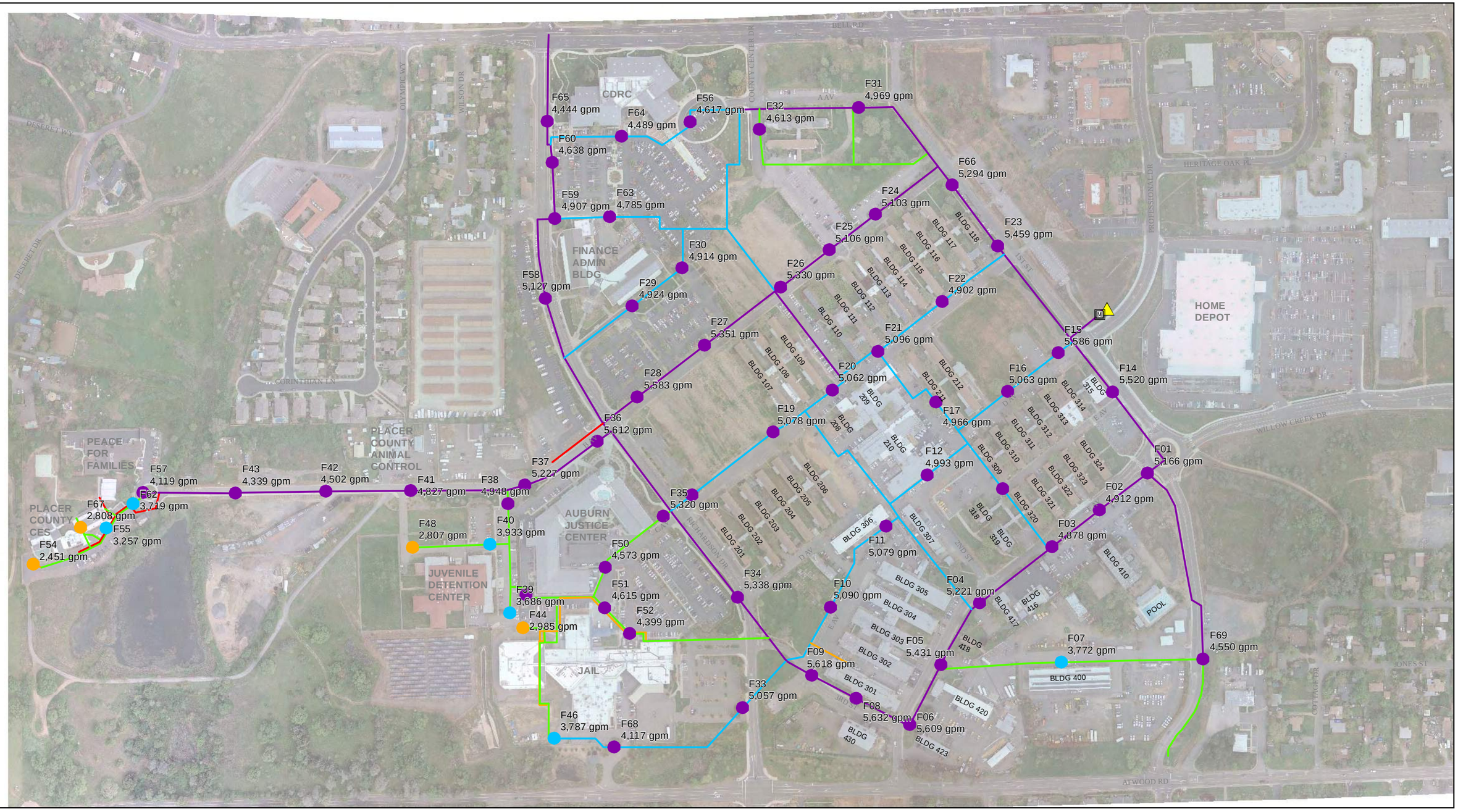
0 160 320
Scale in Feet

FIGURE 5

Placer County
DeWitt Center Hydraulic Analysis
NID SERVICE CONNECTION AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig6_DeWitt_PCWA_ByPass_Avail_FF.mxd 6/25/2012



PCWA Meter
PCWA Connection
4 inch diameter
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Available Fire Flow
- Less than 2,375 gpm
- 2,375 to 3,000 gpm
- 3,000 to 4,000 gpm
- 4,000 gpm and Greater

Note:
- Available fire flow shown based on 20 psi residual.
- Available fire flow shown based on hydraulic model results. Actual hydrant testing required to confirm available flow at specific locations.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

N

0 160 320
Scale in Feet

FIGURE 6

Placer County
DeWitt Center Hydraulic Analysis
PCWA EMERGENCY BYPASS AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

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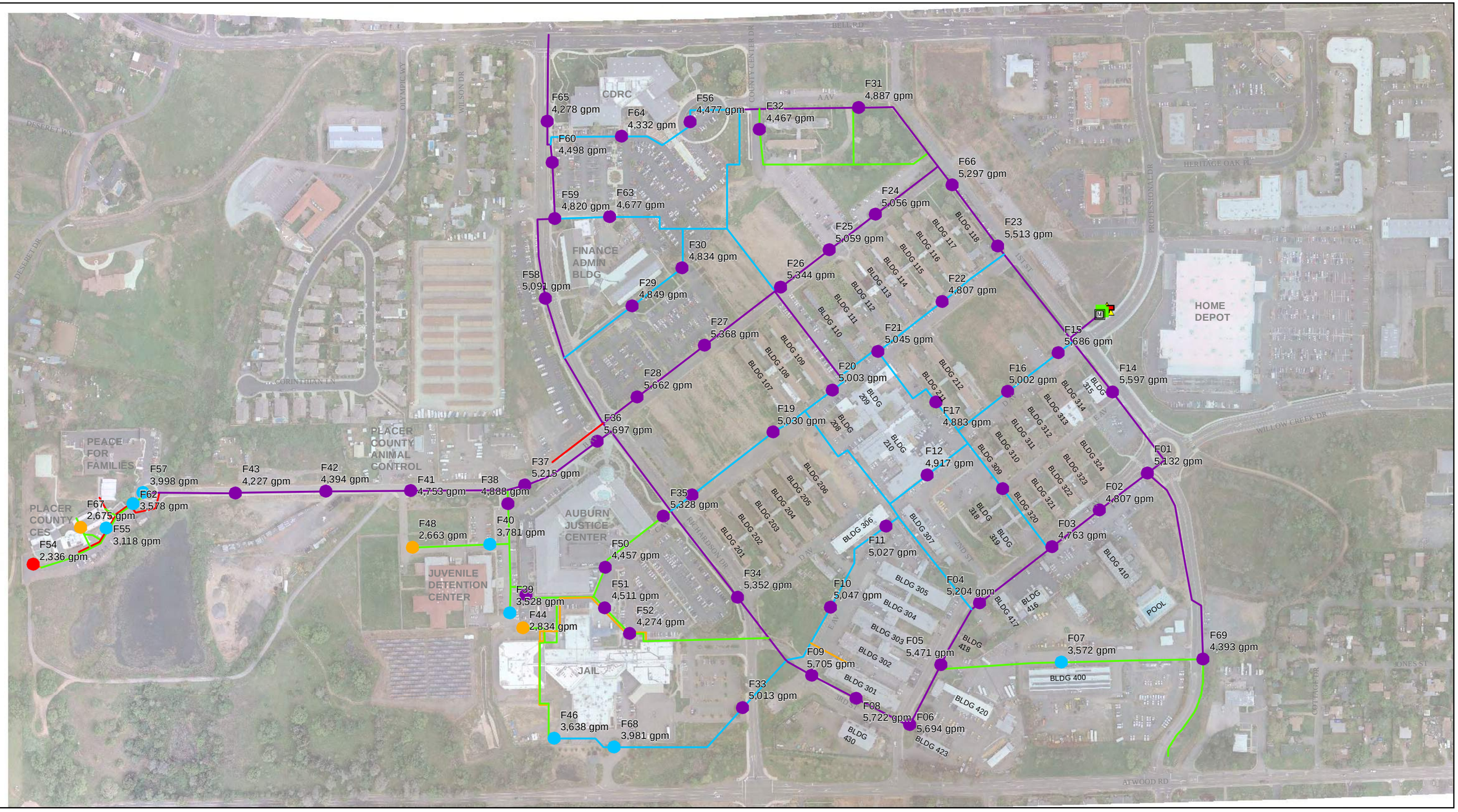


PCWA Detector Assemblies
PCWA Meter
PCWA Connection
4 inch diameter
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

In-Line Booster Pump

Available Fire Flow

- Less than 2,375 gpm
- 2,375 to 3,000 gpm
- 3,000 to 4,000 gpm
- 4,000 gpm and Greater

Note:
- Available fire flow shown based on 20 psi residual.
- Available fire flow shown based on hydraulic model results. Actual hydrant testing required to confirm available flow at specific locations.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

N

0 160 320

Scale in Feet

FIGURE 7

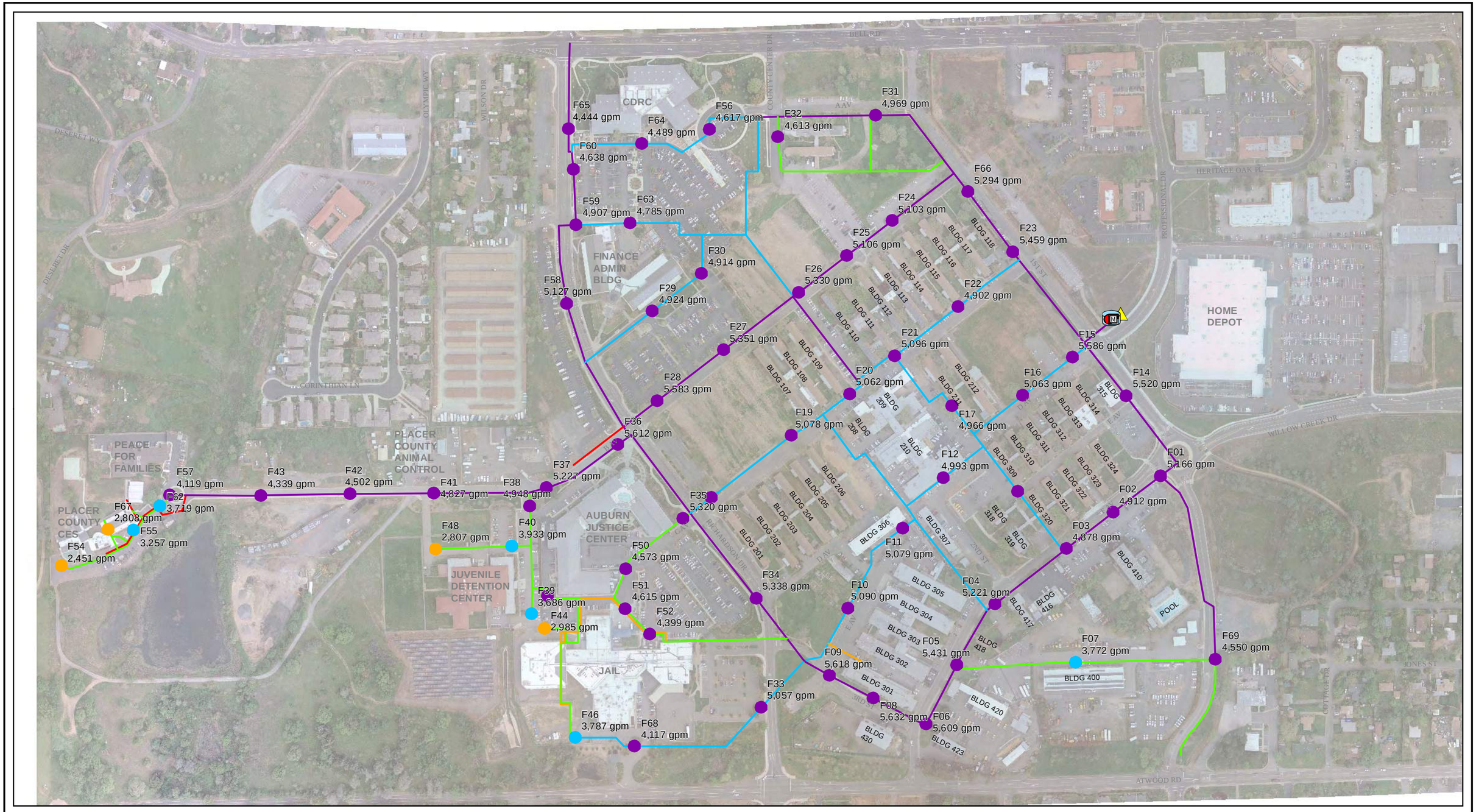
Placer County

DeWitt Center Hydraulic Analysis

PCWA IN-LINE BOOSTER PUMP AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig8_DeWitt_PCWA_Tank_Avail_FF.mxd 6/25/2012



PCWA Meter
PCWA Connection
4 inch diameter
6 inch diameter
8 inch diameter
10 inch diameter
12 inch diameter

Booster Pump
Storage Tank

Available Fire Flow
Less than 2,375 gpm
2,375 to 3,000 gpm
3,000 to 4,000 gpm
4,000 gpm and Greater

Note:
- Available fire flow shown based on 20 psi residual.
- Available fire flow shown based on hydraulic model results. Actual hydrant testing required to confirm available flow at specific locations.
- Boundary conditions do not account for PCWA system constrictions/limitation for flow greater than 2,000 gpm.

N

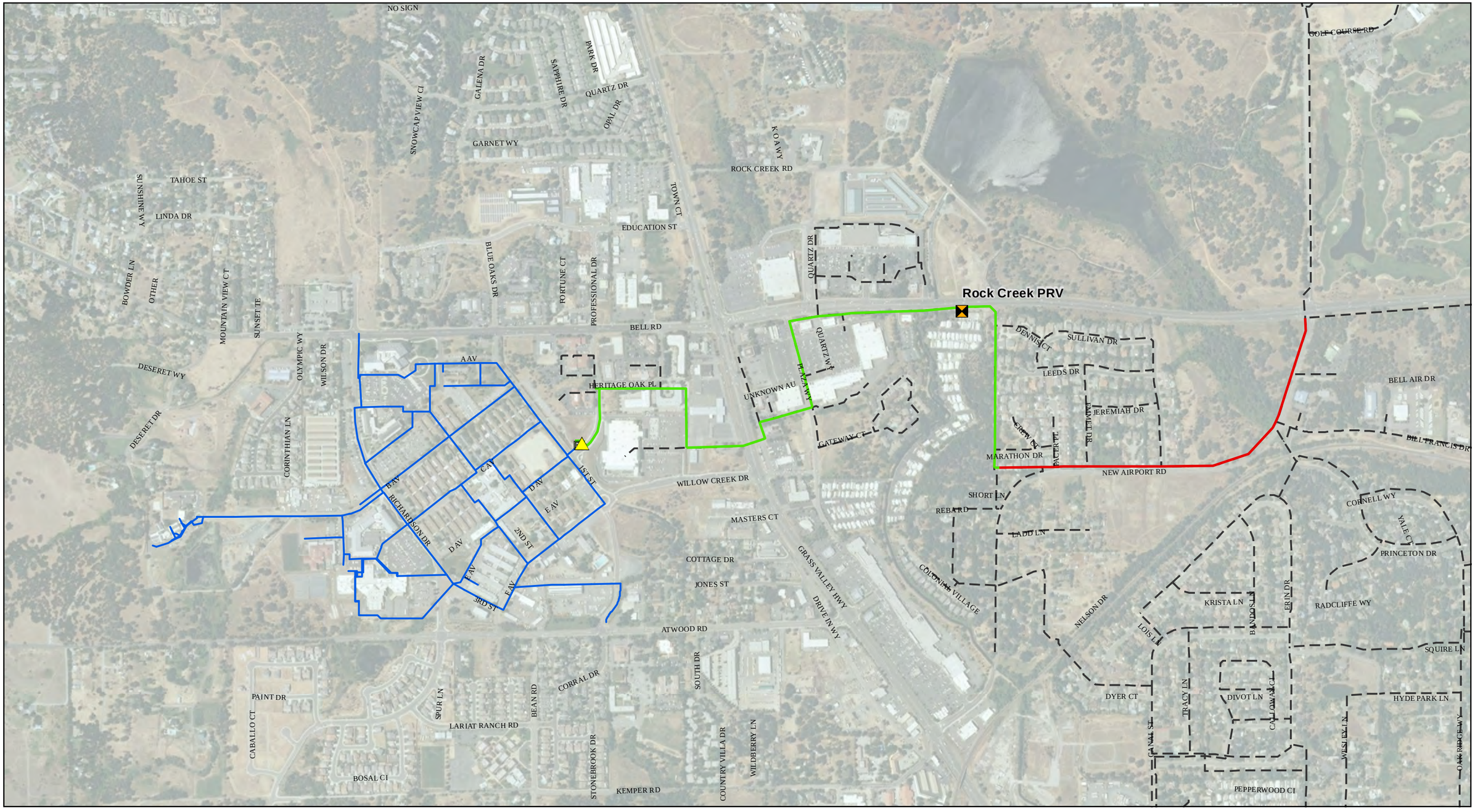
0 160 320
Scale in Feet

FIGURE 8

Placer County
DeWitt Center Hydraulic Analysis
PCWA TANK AND BOOSTER PUMP AVAILABLE FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

N:\Clients\330 Placer County\00-10-05 PC Goverment CUI Survey\GIS\Figures\Fig9_PCWA_DeWitt_Exist_System.mxd 6/25/2012



PCWA Detector Assemblies
PCWA Meter
PCWA Connection
DeWitt Distribution System
PCWA Distribution System

PCWA Transmission System
12 inch diameter
14 inch diameter

Note:
- PCWA transmission pipeline shown based on available information. Transmission pipelines highlighted are the main feed for the DeWitt Center and result in constraints for delivery of water for fire flow purposes.

N

0 400 800
Scale in Feet

FIGURE 9

Placer County
DeWitt Center Hydraulic Analysis

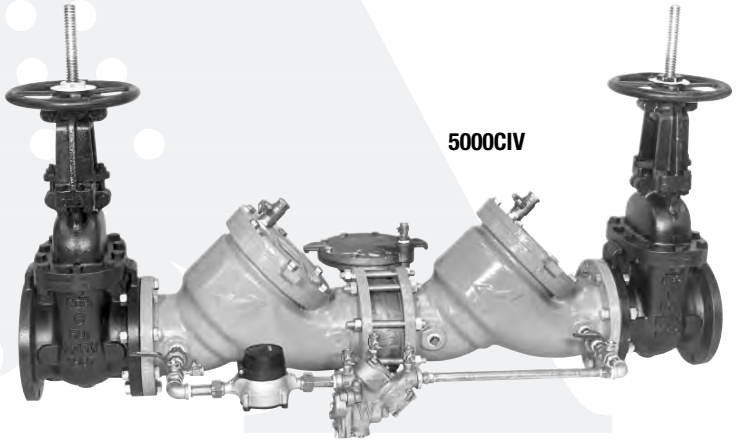
PCWA SYSTEM

WEST YOST ASSOCIATES
Consulting Engineers

Series 5000CIV

Reduced Pressure Detector Assemblies

Sizes: 2½" – 10" (65 – 250mm)



Features

- Body construction fused epoxy coated cast iron
- Replaceable bronze seats
- Maximum flow at low pressure drop
- Compact for economy combined with performance
- Design simplicity for easy maintenance
- Furnished with a CFM or GPM ⅝" x ¾" (16 x 19mm) recordall meter Model 25, bronze
- No special tools required

Series 5000CIV Reduced Pressure Detector Assemblies are used in health hazard applications and are designed exclusively for use in accordance with water utility authority containment requirements. It is mandatory to prevent the reverse flow of fire protection system substances, i.e., glycerin wetting agents, stagnant water and water of non-potable quality from being pumped or siphoned into the potable water line. The Series 5000CIV is ideal for fire protection systems to detect leaks or unauthorized use of water.

Modular check design concept facilitates maintenance and assembly access. All sizes are standardly equipped with AWWA epoxy coated, UL/FM listed OSY resilient seated gate valves, CFM (cubic feet per minute) or GPM (gallon per minute) meter and ball type test cocks. A pressure differential relief valve is located in a zone between the check valves.

Specifications

A Reduced Pressure Detector Assembly shall be installed on fire protection systems when connected to a public water supply. Degree of hazard present is determined by the local authority having jurisdiction. The unit shall be a complete assembly including UL listed OSY shutoff valves with FM approval. Including an auxiliary line consisting of an approved backflow preventer and water meter. The assembly shall meet the requirements of AWWA C511-92; UL Classified File No. EX3185; CSA B64 and USC Manual 8th. Edition. Assembly shall be an Ames Company Series 5000CIV.

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

Materials

Epoxy coated cast iron body, bronze seat and disc holder; stainless steel trim and durable, tight-seating rubber check valve discs.

All sizes furnished with bronze body ball valve test cocks. Furnished with outside stem and yoke (OSY) gate valves UL/FM listed. Series 5000CIV bypass line unit consists of an approved Reduced Pressure Zone Assembly and CFM or GPM ⅝ x ¾ (16 x 19mm) water meter.

Available Models

Suffix:

LG – less gates

OSY – UL/FM outside stem and yoke resilient seated gate valves

¾" Bypass Line Meter:

CFM – cubic feet per minute meter

GPM – gallons per minute meter

LM – less meter

Note: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary.

Pressure – Temperature

Temperature Range: 33˚F – 140˚F (5˚C – 60˚C)
Maximum Working Pressure: 175psi (12.06 bar)

Standards

AWWA C511-92; CSA B64
USC Manual for Cross-connection Control, 8th Edition

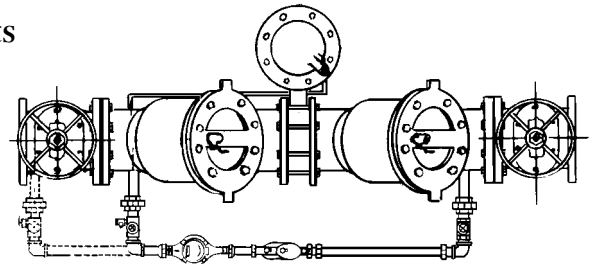
Approvals

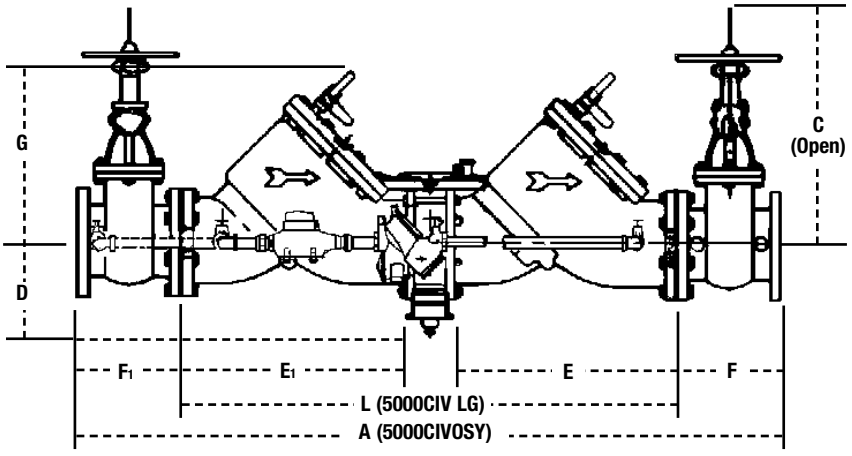
ASSE 1047 · CLASSIFIED C UL US · FM Approved

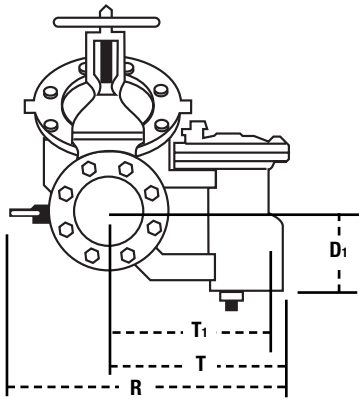
IMPORTANT: *INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS*

NOTE: Piping for 3" 5000CIV will start from #1 gate valve and connect at #2 check valve.

Dimensions — Weights







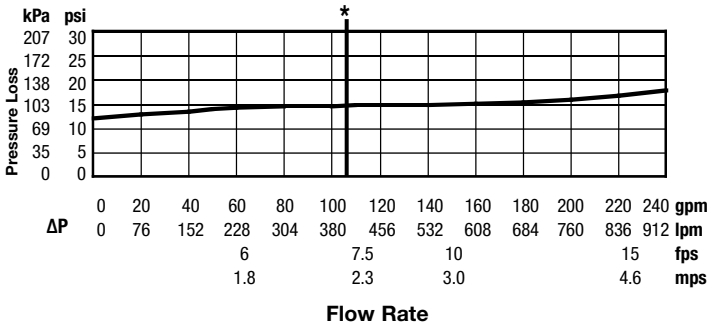
SIZE (DN)		DIMENSIONS																				WEIGHT	
		A		C (OSY)		D		D1		E, E1		F, F1		G		L		R		T		T1			
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*
2½	65	42⅛	1070	16⅜	416	5¼	133	4¼	114	12	305	8	203	7	178	26⅛	664	14	356	9	229	7⅝	194	230	104
3	80	42⅛	1070	18⅞	479	5¼	133	4¼	114	12	305	8	203	7	178	26⅛	664	14	356	9	229	7⅝	194	230	104
4	100	55⅛	1400	22¾	578	6	152	5⅞	149	17	432	9	229	9½	241	37	940	15	381	13⅝	346	11¾	299	470	213
6	150	65½	1664	30⅛	765	6	152	6	152	20¾	527	10½	267	14½	368	44½	1130	16	406	13⅝	346	11¾	299	798	362
8	200	78½	1994	37¾	959	9¾	248	8⅝	219	26	660	11½	292	18½	470	55¼	1403	17	432	18½	470	16⅜	416	1456	660
10	250	93⅜	2378	45¾	1162	9¾	248	8⅝	219	32	813	13	330	21½	546	67½	1715	18	457	18½	470	16⅜	416	2230	1012

Capacity

As compiled from documented Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California lab tests.

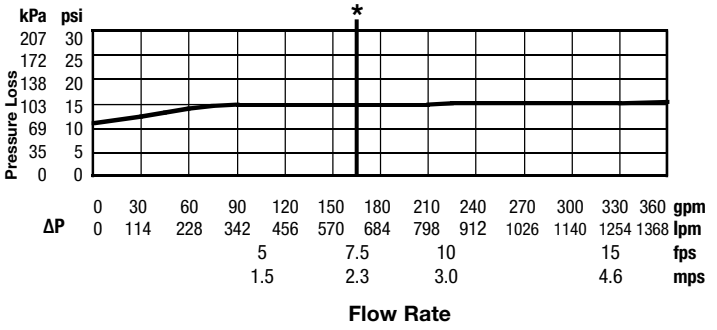
*Typical maximum flow rate (7.5 feet/sec.) (including shutoffs)

2½" (65mm)



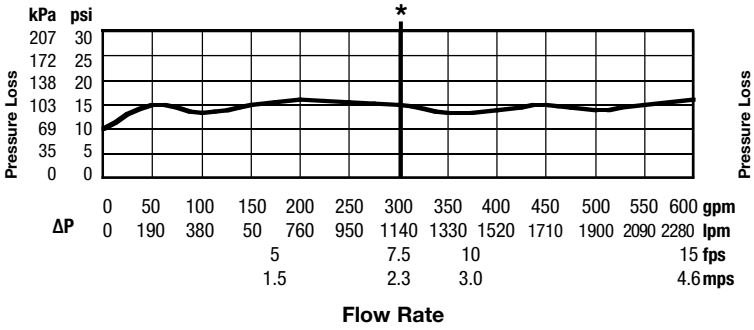
Flow Rate

3" (80mm)



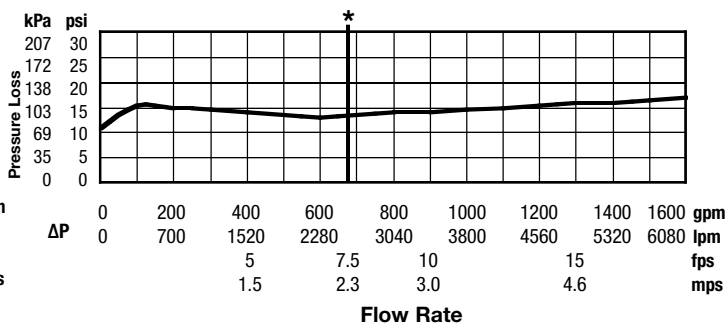
Flow Rate

4" (100mm)



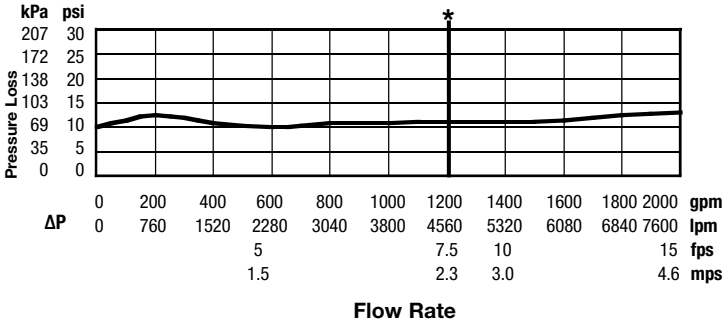
Flow Rate

6" (150mm)



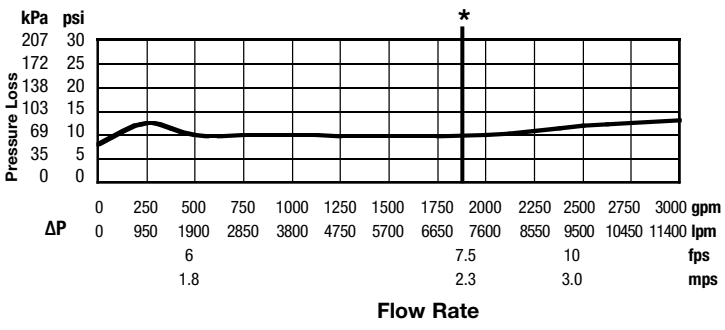
Flow Rate

8" (200mm)



Flow Rate

10" (250mm)



Flow Rate

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITHOUT NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITHOUT NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F01	3.63	43.96	1,537.67	1,079.98	20
F02	3.63	43.1	1,537.66	1,059.27	20
F03	3.63	40.5	1,537.64	1,000.25	20
F04	3.63	46.11	1,537.63	1,122.08	20
F05	3.63	50.65	1,537.63	1,224.61	20
F06	3.63	56.05	1,537.62	1,366.03	20
F07	3.63	47.41	1,537.63	1,052.08	20
F08	3.63	55.19	1,537.62	1,344.64	20
F09	3.63	54.75	1,537.62	1,335.14	20
F10	3.63	50.65	1,537.62	1,218.55	20
F11	3.63	46.97	1,537.62	1,137.28	20
F12	3.63	44.81	1,537.63	1,093.29	20
F13	3.63	41.36	1,537.64	1,016.63	20
F14	4.63	46.13	1,537.68	1,133.58	20
F15	4.63	45.7	1,537.68	1,124.28	20
F16	3.63	43.96	1,537.66	1,079.30	20
F17	3.63	44.39	1,537.64	1,085.47	20
F18	3.63	53.46	1,537.62	1,297.77	20
F19	3.63	49.13	1,537.62	1,185.44	20
F20	3.63	45.03	1,537.63	1,099.52	20
F21	3.63	44.82	1,537.64	1,096.79	20
F22	3.63	45.47	1,537.64	1,107.47	20
F23	3.63	46.55	1,537.65	1,139.10	20
F24	3.63	46.54	1,537.63	1,132.02	20
F25	3.63	46.76	1,537.62	1,137.54	20
F26	3.63	47.84	1,537.62	1,163.87	20
F27	3.63	50.86	1,537.62	1,231.62	20
F28	3.63	53.89	1,537.62	1,312.13	20
F29	3.63	50.64	1,537.62	1,215.36	20
F30	3.63	50	1,537.62	1,200.05	20
F31	3.63	44.38	1,537.62	1,074.22	20
F32	3.63	44.81	1,537.62	1,085.09	20
F33	3.63	56.48	1,537.61	1,266.96	20
F34	3.63	50.86	1,537.62	1,231.38	20
F35	3.63	54.54	1,537.62	1,331.77	20
F36	3.63	54.75	1,537.61	1,337.38	20
F37	3.63	55.62	1,537.61	1,346.29	20
F38	3.63	57.34	1,537.61	1,380.37	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITHOUT NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F39	3.63	58.21	1,537.61	1,347.91	20
F40	3.63	57.34	1,537.61	1,339.83	20
F41	3.63	59.51	1,537.61	1,421.27	20
F42	3.63	60.37	1,537.61	1,430.15	20
F43	3.63	64.26	1,537.60	1,495.01	20
F44	3.63	57.34	1,537.61	1,334.26	20
F45	3.63	57.34	1,537.61	1,313.49	20
F46	3.63	60.37	1,537.61	1,365.23	20
F47	3.63	57.56	1,537.61	1,127.70	20
F48	3.63	57.78	1,537.61	1,258.58	20
F49	3.63	57.56	1,537.61	1,368.46	20
F50	3.63	54.97	1,537.61	1,314.79	20
F51	3.63	58.21	1,537.61	1,391.34	20
F52	3.63	57.56	1,537.61	1,368.84	20
F53	3.63	62.1	1,537.60	1,325.83	20
F54	3.63	62.96	1,537.60	1,326.62	20
F55	3.63	62.53	1,537.60	1,383.99	20
F56	3.63	46.1	1,537.62	1,110.07	20
F57	3.63	46.1	1,537.62	1,109.44	20
F58	3.63	50	1,537.62	1,204.65	20
F59	3.63	47.4	1,537.62	1,145.50	20
F60	3.63	46.1	1,537.62	1,113.40	20
F62	3.63	62.96	1,537.60	1,357.80	20
F63	3.63	48.27	1,537.62	1,160.42	20
F64	3.63	48.27	1,537.62	1,160.80	20
F65	3.63	45.24	1,537.62	1,091.23	20
F66	3.63	46.98	1,537.64	1,144.90	20
F67	3.63	62.53	1,537.60	1,412.19	20
F68	3.63	59.51	1,537.61	1,335.54	20
F69	3.63	43.51	1,537.62	904.82	20
F70	3.63	60.8	1,537.60	1,178.32	20
J-1	3.63	45.24	1,537.62	885.35	20
J-10	3.63	46.33	1,537.63	1,126.58	20
J-104	0.63	57.93	1,560.97	1,484.92	20
J-14	21.63	46.57	1,537.70	1,167.94	20
J-17	3.63	43.09	1,537.64	1,060.26	20
J-18	3.63	42.66	1,537.64	1,049.83	20
J-21	3.63	46.11	1,537.63	1,122.02	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITHOUT NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
J-22	3.63	46.11	1,537.63	1,119.79	20
J-25	3.63	48.48	1,537.62	1,171.18	20
J-28	3.63	53.89	1,537.62	1,314.19	20
J-29	0.63	47.92	1,537.82	1,193.52	20
J-30	4.63	46.55	1,537.65	1,140.96	20
J-33	3.63	46.54	1,537.63	1,134.73	20
J-34	3.63	46.54	1,537.63	1,131.17	20
J-38	3.63	45.67	1,537.62	1,105.73	20
J-39	3.63	47.4	1,537.62	1,148.44	20
J-41	3.63	47.84	1,537.62	1,163.48	20
J-47	3.63	44.6	1,537.63	1,091.72	20
J-49	3.63	47.19	1,537.62	1,146.78	20
J-54	3.63	62.97	1,537.62	1,551.84	20
J-60	3.63	46.97	1,537.62	1,120.41	20
J-64	3.63	47.4	1,537.62	1,146.53	20
J-67	3.63	53.02	1,537.62	1,288.08	20
J-7	3.63	40.93	1,537.64	1,010.04	20
J-70	3.63	54.54	1,537.62	1,331.96	20
J-75	3.63	56.7	1,537.61	1,364.33	20
J-83	3.63	56.7	1,537.61	1,372.23	20
J-85	3.63	57.99	1,537.61	1,383.15	20
J-93	3.63	54.53	1,537.61	1,303.27	20
J-97	3.63	62.1	1,537.60	1,423.24	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITH NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITH NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F01	3.63	55.67	1,564.73	4,479.38	20
F02	3.63	54.8	1,564.73	4,411.78	20
F03	3.63	52.21	1,564.73	4,288.02	20
F04	3.63	57.83	1,564.74	4,711.39	20
F05	3.63	62.37	1,564.74	5,126.87	20
F06	3.63	67.78	1,564.74	5,448.23	20
F07	3.63	59.17	1,564.83	3,806.60	20
F08	3.63	66.91	1,564.74	5,397.70	20
F09	3.63	66.48	1,564.73	5,418.66	20
F10	3.63	62.37	1,564.73	4,746.43	20
F11	3.63	58.7	1,564.73	4,554.02	20
F12	3.63	56.53	1,564.73	4,508.34	20
F13	3.63	53.07	1,564.73	4,226.50	20
F14	4.63	57.83	1,564.73	4,731.58	20
F15	4.63	57.4	1,564.73	4,686.03	20
F16	3.63	55.67	1,564.73	4,431.91	20
F17	3.63	56.1	1,564.73	4,497.52	20
F18	3.63	65.18	1,564.73	5,200.94	20
F19	3.63	60.86	1,564.73	4,780.87	20
F20	3.63	56.75	1,564.73	4,698.15	20
F21	3.63	56.53	1,564.73	4,672.39	20
F22	3.63	57.18	1,564.73	4,497.39	20
F23	3.63	58.26	1,564.74	4,884.68	20
F24	3.63	58.27	1,564.74	4,782.01	20
F25	3.63	58.48	1,564.74	4,871.41	20
F26	3.63	59.56	1,564.74	5,117.14	20
F27	3.63	62.59	1,564.74	5,165.67	20
F28	3.63	65.62	1,564.74	5,457.55	20
F29	3.63	62.38	1,564.76	4,945.89	20
F30	3.63	61.73	1,564.76	4,950.43	20
F31	3.63	56.11	1,564.75	4,279.20	20
F32	3.63	56.54	1,564.76	4,477.01	20
F33	3.63	68.21	1,564.73	3,349.58	20
F34	3.63	62.59	1,564.73	5,086.96	20
F35	3.63	66.26	1,564.73	5,519.04	20
F36	3.63	66.48	1,564.74	5,617.95	20
F37	3.63	67.34	1,564.73	5,192.75	20
F38	3.63	69.07	1,564.73	4,995.33	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITH NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F39	3.63	69.94	1,564.73	3,977.55	20
F40	3.63	69.07	1,564.73	4,150.60	20
F41	3.63	71.23	1,564.73	4,814.44	20
F42	3.63	72.1	1,564.73	4,613.90	20
F43	3.63	75.99	1,564.72	4,347.99	20
F44	3.63	69.07	1,564.73	4,044.01	20
F45	3.63	69.07	1,564.73	3,727.61	20
F46	3.63	72.1	1,564.73	3,634.90	20
F47	3.63	69.29	1,564.73	2,093.77	20
F48	3.63	69.5	1,564.73	3,022.70	20
F49	3.63	69.29	1,564.73	4,586.68	20
F50	3.63	66.69	1,564.73	4,676.43	20
F51	3.63	69.94	1,564.73	4,741.54	20
F52	3.63	69.29	1,564.73	4,566.90	20
F53	3.63	73.83	1,564.72	2,997.16	20
F54	3.63	74.69	1,564.72	2,899.73	20
F55	3.63	74.26	1,564.72	3,445.18	20
F56	3.63	57.85	1,564.78	4,547.56	20
F57	3.63	57.86	1,564.80	4,652.74	20
F58	3.63	61.74	1,564.77	5,227.11	20
F59	3.63	59.15	1,564.78	5,152.46	20
F60	3.63	57.87	1,564.82	5,188.69	20
F62	3.63	74.69	1,564.72	3,147.67	20
F63	3.63	60.01	1,564.77	4,849.40	20
F64	3.63	60.01	1,564.77	4,822.55	20
F65	3.63	57.01	1,564.84	3,604.45	20
F66	3.63	58.7	1,564.74	4,873.31	20
F67	3.63	74.26	1,564.72	3,734.70	20
F68	3.63	71.23	1,564.73	3,484.93	20
F69	3.63	55.33	1,564.95	3,619.99	20
F70	3.63	72.53	1,564.72	2,186.07	20
J-1	3.63	57.1	1,565.05	5,055.97	20
J-10	3.63	58.05	1,564.74	4,729.80	20
J-104	0.63	58.38	1,562.00	1,858.67	20
J-14	21.63	58.26	1,564.73	5,004.45	20
J-17	3.63	54.8	1,564.73	4,555.72	20
J-18	3.63	54.37	1,564.73	4,521.03	20
J-21	3.63	57.83	1,564.73	4,647.91	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
EXISTING COUNTY SYSTEM (WITH NID INTERTIE)
AVAILABLE FIRE FLOW
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
J-22	3.63	57.83	1,564.73	4,556.32	20
J-25	3.63	60.21	1,564.73	4,746.43	20
J-28	3.63	65.61	1,564.73	5,418.76	20
J-29	0.63	59.56	1,564.73	4,923.08	20
J-30	4.63	58.26	1,564.73	4,904.83	20
J-33	3.63	58.27	1,564.74	4,855.55	20
J-34	3.63	58.27	1,564.74	4,717.95	20
J-38	3.63	57.41	1,564.76	4,651.27	20
J-39	3.63	59.14	1,564.75	4,962.50	20
J-41	3.63	59.56	1,564.74	5,087.25	20
J-47	3.63	56.32	1,564.74	4,755.38	20
J-49	3.63	58.91	1,564.73	4,823.92	20
J-54	3.63	74.7	1,564.73	6,012.54	20
J-60	3.63	58.77	1,564.91	3,930.43	20
J-64	3.63	59.14	1,564.76	4,930.37	20
J-67	3.63	64.76	1,564.75	5,512.28	20
J-7	3.63	52.64	1,564.73	4,351.40	20
J-70	3.63	66.27	1,564.74	5,630.99	20
J-75	3.63	68.42	1,564.73	4,930.51	20
J-83	3.63	68.42	1,564.73	5,203.51	20
J-85	3.63	69.72	1,564.73	4,699.29	20
J-93	3.63	66.26	1,564.73	4,657.29	20
J-97	3.63	73.83	1,564.72	3,969.37	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED COUNTY SYSTEM (WITH NID INTERTIE) - PCWA SUPPLY
AVAILABLE FIRE FLOW AT SYSTEM 20PSI
MAXIMUM DAY

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED SYSTEM-PCWA SUPPLY & NID INTERTIE
AVAILABLE FIRE FLOW AT SYSTEM 20PSI (COUNTY SYSTEM)
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F04	0.49	57.01	1,562.85	4,493.59	20
F05	0.49	61.56	1,562.85	4,898.54	20
F06	0.49	66.96	1,562.85	5,258.89	20
F07	12.49	58.38	1,562.99	3,467.55	20
F08	5.59	66.09	1,562.84	5,225.94	20
F09	0.49	65.66	1,562.84	5,239.18	20
F10	6.39	61.55	1,562.84	4,675.24	20
F11	0.49	57.88	1,562.84	4,414.52	20
F12	0.49	55.71	1,562.84	4,500.38	20
F15	0.49	56.58	1,562.84	4,560.84	20
F16	0.49	54.85	1,562.84	4,418.96	20
F18	0.49	64.36	1,562.84	5,030.54	20
F19	0.49	60.04	1,562.84	4,574.81	20
F20	6.19	55.93	1,562.84	4,462.66	20
F21	69.99	55.71	1,562.83	4,600.62	20
F22	0.49	56.36	1,562.83	4,543.59	20
F23	0.49	57.44	1,562.83	4,616.38	20
F24	78.49	57.44	1,562.83	4,592.82	20
F26	0.49	58.75	1,562.85	4,777.20	20
F27	5.69	61.77	1,562.85	4,997.25	20
F28	0.49	64.8	1,562.85	5,205.33	20
F29	0.49	61.56	1,562.85	4,655.29	20
F30	6.69	60.91	1,562.85	4,638.10	20
F31	0.49	55.29	1,562.85	4,181.26	20
F32	0.49	55.73	1,562.87	4,443.57	20
F33	5.59	67.39	1,562.84	4,810.75	20
F34	0.49	61.77	1,562.84	4,894.07	20
F35	0.49	65.45	1,562.84	5,252.64	20
F36	0.49	65.66	1,562.85	5,305.15	20
F37	0.49	66.53	1,562.84	4,933.96	20
F38	0.49	68.25	1,562.84	4,768.78	20
F39	0.49	69.12	1,562.84	3,823.32	20
F40	0.49	68.25	1,562.84	3,989.66	20
F41	11.59	70.42	1,562.83	4,614.13	20
F42	15.99	71.28	1,562.83	4,434.70	20
F43	0.49	75.17	1,562.83	4,185.43	20
F44	0.49	68.25	1,562.84	4,232.61	20
F45	0.49	68.25	1,562.84	4,137.28	20
F46	0.49	71.28	1,562.84	4,429.82	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED SYSTEM-PCWA SUPPLY & NID INTERTIE
AVAILABLE FIRE FLOW AT SYSTEM 20PSI (COUNTY SYSTEM)
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
F47	0.49	68.47	1,562.84	2,096.55	20
F48	0.49	68.69	1,562.84	2,802.72	20
F49	7.99	68.47	1,562.84	4,438.65	20
F50	0.49	65.88	1,562.84	4,505.73	20
F51	0.49	69.12	1,562.84	4,576.18	20
F52	37.19	68.47	1,562.83	4,438.77	20
F53	0.49	73.01	1,562.83	2,794.07	20
F54	4.09	73.87	1,562.83	2,711.62	20
F55	0.49	73.44	1,562.83	3,235.51	20
F56	0.49	57.03	1,562.89	4,382.08	20
F57	0.49	57.05	1,562.92	4,425.26	20
F58	5.69	60.92	1,562.87	4,917.68	20
F59	0.49	58.34	1,562.90	4,843.35	20
F60	50.79	57.06	1,562.94	4,905.77	20
F62	0.49	73.87	1,562.83	2,938.44	20
F63	0.49	59.2	1,562.89	4,637.38	20
F64	0.49	59.19	1,562.89	4,561.74	20
F65	0.49	56.21	1,562.99	3,500.41	20
F66	5.79	57.87	1,562.83	4,616.87	20
F67	0.49	73.44	1,562.83	3,544.98	20
F68	0.49	70.42	1,562.84	4,481.55	20
F69	0.49	54.57	1,563.19	3,257.89	20
F70	4.09	71.71	1,562.83	1,968.70	20
J-1	0.49	56.37	1,563.35	4,687.76	20
J-10	0.49	57.23	1,562.85	4,511.76	20
J-104	0.49	48.39	1,538.90	1,575.84	20
J-14	0.49	57.44	1,562.84	4,663.11	20
J-17	0.49	53.98	1,562.84	4,359.44	20
J-22	0.49	57.01	1,562.84	4,385.52	20
J-25	0.49	59.39	1,562.84	4,626.56	20
J-28	0.49	64.8	1,562.84	5,173.66	20
J-29	0.49	58.74	1,562.84	4,606.83	20
J-30	0.49	57.44	1,562.83	4,652.61	20
J-33	8.09	57.44	1,562.83	4,591.88	20
J-34	0.49	57.44	1,562.83	4,497.03	20
J-38	0.49	56.6	1,562.88	4,446.53	20
J-41	0.49	58.75	1,562.85	4,789.29	20
J-47	0.49	55.5	1,562.84	4,546.91	20
J-49	11.69	58.09	1,562.84	4,501.35	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED SYSTEM-PCWA SUPPLY & NID INTERTIE
AVAILABLE FIRE FLOW AT SYSTEM 20PSI (COUNTY SYSTEM)
MAXIMUM DAY

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
J-54	0.49	73.88	1,562.84	5,761.11	20
J-60	0.49	57.99	1,563.10	3,885.56	20
J-64	0.49	58.33	1,562.88	4,493.72	20
J-67	13.49	63.94	1,562.86	5,186.55	20
J-70	0.49	65.45	1,562.85	5,302.66	20
J-75	0.49	67.61	1,562.84	4,766.25	20
J-83	0.49	67.61	1,562.84	4,951.34	20
J-85	9.79	68.9	1,562.84	4,522.27	20
J-93	0.49	65.44	1,562.84	4,561.64	20
J-97	7.69	73.01	1,562.83	3,800.58	20
J14	49.99	57.44	1,562.84	4,452.62	20
J76	0.49	55.07	1,563.35	4,136.61	20
J78	0.49	55.07	1,563.34	4,107.79	20
NID_F1364	0.49	58.96	1,563.35	4,444.75	20
NID_F2265	0.49	60.17	1,563.14	4,136.00	20
NID_F2268	0.49	58.47	1,563.22	4,095.34	20
NID_J10	0.49	55.07	1,563.34	4,115.89	20
NID_J30	0.49	79.71	1,563.32	5,027.21	20
NID_J31	0.49	72.79	1,563.33	4,855.91	20
NID_J55	0.49	58.96	1,563.36	4,466.83	20
NID_J70	0.49	74.52	1,563.34	4,755.00	20
NID_J71	0.49	80.14	1,563.32	5,027.21	20
NID_J72	0.49	55.93	1,563.34	2,532.51	20
NID_J75	0.49	72.36	1,563.34	4,691.99	20
NID_J80	0.49	70.63	1,563.34	4,565.29	20
NID_J95	0.49	53.34	1,563.35	3,773.89	20
P-100	0.49	56.59	1,562.87	4,545.23	20
P-101	0.49	55.71	1,562.84	4,528.20	20
P-102	0.49	54.85	1,562.84	4,327.41	20
P-105	0.49	54.42	1,562.84	4,408.92	20
P-106	0.49	56.14	1,562.83	4,578.69	20
P-107	0.49	57.44	1,562.84	4,653.65	20

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED NID SYSTEM (PRIVATE)
AVAILABLE FIRE FLOW AT SYSTEM 20PSI
MAXIMUM DAY

PLACER COUNTY GOVERNMENT CENTER

WATER MODEL OUTPUT
PROPOSED NID SYSTEM (PRIVATE)
AVAILABLE FIRE FLOW AT SYSTEM 20PSI (NID SYSTEM)
MAXIMUM DAY

ID	Static Demand	Static Pressure (psi)	Static Head (ft)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
J72	33.6	55.02	1,564.24	3,919.85	20
J76	31.3	55.46	1,564.25	4,315.84	20
J78	13.7	55.46	1,564.25	4,208.80	20
J80	35.1	55.46	1,564.25	4,039.07	20
J82	32.9	55.46	1,564.25	4,128.36	20
J84	36.6	55.46	1,564.25	4,305.50	20
J86	63.9	55.02	1,564.24	4,036.87	20
NID_102	57.2	58.06	1,564.25	4,507.00	20
NID_103	0	58.07	1,564.28	4,450.98	20
NID_F1364	0	59.37	1,564.28	4,588.44	20
NID_F2268	0	58.94	1,564.29	4,510.95	20
NID_J10	25.5	55.46	1,564.25	4,294.58	20
NID_J100	29.5	58.06	1,564.27	4,479.44	20
NID_J101	25.1	58.06	1,564.26	4,474.16	20
NID_J31	0	73.19	1,564.25	4,790.94	20
NID_J55	40.3	59.37	1,564.29	4,636.49	20

Appendix B – Irrigation

PLACER COUNTY

DEWITT

WATER LINES & WATER SERVICES

- MAIN Water Shutoff Valve
- Water Service Valves & Valves on Water Services Lines
- Fire Hydrants
- Post Indicator Valve — P.I.V.
- Automatic Sprinkler Riser — A.S.R.
- Under Ground Sprinkler System — S/To/Off * no post indicator
- Hose Bibbs
- Gate Valves in or under building
- Irrigation Sprinkler Systems

* NOTES: ALL Fire Hydrants have a shutoff valve between main & fire hydrant.
* Bldg 1 to 18 are tied together with plastic PVC. line under corridor. Valve is located in inset off corridor.
* Note: Most Services 3/4" to 2" are Curb or Corporation Stop Valves Tapped into main. In some cases a double strap Service Clamp is used. Hose Bibbs 3/4"

SCALE 1" = 50'

DETAIL OF JAIL
VIEW A
NOT TO SCALE

FIRE SYSTEM
MANUAL PULL STATIONS
HORNS
SPRINKLER DRAINS
SPRINKLER SHUTOFF VALVE

VIEW 'B'
NOT TO SCALE

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
COUNTY FACILITIES ONLY

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
JUNCTION REPORT

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-100	0	1,397.00	1,599.80	87.90
J-101	0	1,404.00	1,600.00	84.90
J-A	5.1	1,424.00	1,599.40	76.00
J-ANIM	5.1	1,399.50	1,599.90	86.90
J-B	47.6	1,432.00	1,603.90	74.50
J-C	5.1	1,434.50	1,599.40	71.50
J-CHAP	5.1	1,430.00	1,599.90	73.60
J-CORP	5.1	1,423.00	1,598.50	76.00
J-D	5.1	1,389.00	1,599.80	91.40
J-E	5.1	1,399.00	1,599.90	87.00
J-E01	47.6	1,431.00	1,606.20	75.90
J-E02	5.1	1,422.00	1,603.20	78.50
J-F	5.1	1,408.00	1,598.60	82.60
J-G	5.1	1,400.00	1,600.00	86.70
J-H	5.1	1,433.00	1,598.40	71.70
J-I	5.1	1,420.00	1,600.90	78.40
J-J	5.1	1,426.00	1,606.90	78.4
J-JAIL	5.1	1,404.50	1,599.00	84.3
J-JUS	5.1	1,410.50	1,599.20	81.8
J-JUV	5.1	1,404.00	1,600.10	85
J-K1	5.1	1,405.00	1,600.10	84.5
J-K2	5.1	1,410.00	1,598.70	81.7
J-K3	5.1	1,412.00	1,598.70	80.9
J-K4	5.1	1,428.00	1,598.50	73.9
J-L	5.1	1,430.00	1,600.10	73.7
J-M	69.5	1,430.00	1,599.30	73.4
J-MU	5.1	1,428.00	1,605.60	76.9
J-OS	69.5	1,434.00	1,598.50	71.3
J-Q	0	1,420.50	1,598.50	77.1
J-RES	5.1	1,389.00	1,599.80	91.3
J-US1	13.4	1,417.00	1,597.50	78.2
J-US2	13.4	1,436.00	1,597.60	70
J-US3	13.4	1,430.00	1,597.90	72.8
J-US4	13.4	1,437.00	1,598.50	70
J-WS	5.1	1,394.00	1,599.80	89.2
J10	0	1,432.00	1,608.20	76.3
J112	0	1,429.00	1,598.70	73.5
J114	0	1,420.00	1,599.10	77.6
J12	0	1,432.00	1,608.60	76.5
J128	0	1,430.00	1,604.70	75.7

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
JUNCTION REPORT

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J14	0	1,434.00	1,608.90	75.8
J142	0	1,430.00	1,599.60	73.5
J20	0	1,432.00	1,608.20	76.4
J22	0	1,432.00	1,605.80	75.3
J36	0	1,433.00	1,599.30	72.1
J40	0	1,427.00	1,601.10	75.4
J44	0	1,411.00	1,600.70	82.2
J46	0	1,412.00	1,599.40	81.2
J48	0	1,409.00	1,600.20	82.8
J64	0	1,392.50	1,599.80	89.8
J74	0	1,420.00	1,598.90	77.5
J82	0	1,437.00	1,598.40	70
J88	0	1,436.00	1,598.50	70.4
J99	0	1,434.00	1,598.50	71.3

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
PIPE REPORT

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P101	J-K2	J-F	187.5	4	130	18.9	0.5	0.1	0.3
P103	J-F	J-Q	248.4	4	130	13.8	0.4	0	0.2
P105	J-CORP	J-K4	345.7	4	130	10.2	0.3	0	0.1
P107	J-K4	J82	385.9	4	130	5.1	0.1	0	0
P109	J82	J-H	196.5	4	130	5.1	0.1	0	0
P115	J-US2	J-US1	420.8	4	130	13.4	0.3	0.1	0.2
P125	J-Q	J88	373.2	4	130	-1.5	0	0	0
P129	J40	J-C	379.5	4	130	75.5	1.9	1.7	4.5
P131	J-C	J-A	327.3	4	130	1.4	0	0	0
P133	J-A	J46	404.8	4	130	-3.7	0.1	0	0
P135	J-C	J-OS	395	4	130	52.1	1.3	0.9	2.2
P137	J-OS	J99	63.2	4	130	-21.9	0.6	0	0.5
P139	J99	J112	215.2	4	130	-23.5	0.6	0.1	0.5
P141	J112	J74	501.9	4	130	-23.5	0.6	0.3	0.5
P143	J99	J88	344.8	4	130	1.5	0	0	0
P145	J-C	J36	293.5	4	130	16.9	0.4	0.1	0.3
P147	J36	J-US4	404.5	4	130	49	1.3	0.8	2
P149	J-OS	J-US4	292.3	4	130	4.6	0.1	0	0
P151	J-US4	J-US3	421.8	4	130	40.2	1	0.6	1.4
P155	J-US3	J-US2	452.8	4	130	26.8	0.7	0.3	0.7
P157	J20	J128	467.2	4	130	100.7	2.6	3.6	7.6
P167	J-E	J-D	200.9	4	130	15.3	0.4	0	0.2
P169	J-K1	J-G	169.8	4	130	18.3	0.5	0.1	0.3
P171	J74	J-K3	223.2	4	130	29.1	0.7	0.2	0.8
P173	J-K3	J-K2	164.3	4	130	24	0.6	0.1	0.5
P175	J-G	J-ANIM	104.6	4	130	25.5	0.7	0.1	0.6
P177	J46	J-JUS	280	4	130	28.1	0.7	0.2	0.7
P179	J-JUS	J-JAIL	344.2	4	130	23	0.6	0.2	0.5
P181	J-JAIL	J74	410.6	4	130	17.9	0.5	0.1	0.3
P183	J-Q	J-CORP	194.8	4	130	15.3	0.4	0	0.2
P185	J-L	J-CHAP	187.5	4	130	34.8	0.9	0.2	1.1
P187	J-CHAP	J142	374.6	4	130	29.7	0.8	0.3	0.8
P189	J142	J36	379.5	4	130	29.7	0.8	0.3	0.8
P19	RES9000	J14	40.4	8	130	410.2	2.6	0.1	3.5
P21	J14	J12	85.1	8	130	410.2	2.6	0.3	3.5
P23	J12	J10	70.2	6	130	241.2	2.7	0.4	5.3
P25	J10	J-B	238.9	4	130	159.4	4.1	4.3	17.8
P27	J-B	J-L	411.9	4	130	111.8	2.9	3.8	9.2
P39	J-L	J-M	195.3	4	130	71.9	1.8	0.8	4.1
P41	J-M	J36	377.8	4	130	2.4	0.1	0	0
P43	J10	J-E01	377	4	130	81.8	2.1	2	5.2

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
PIPE REPORT

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P45	J-E01	J22	408.4	4	130	34.2	0.9	0.4	1
P47	J22	J-MU	234.7	4	130	34.2	0.9	0.2	1
P49	J12	J20	126.8	6	130	169	1.9	0.3	2.8
P51	J20	J-J	344.7	4	130	68.3	1.7	1.3	3.7
P53	J-J	J-MU	424.7	4	130	63.2	1.6	1.4	3.2
P55	J-MU	J-E02	360.6	4	130	92.3	2.4	2.3	6.5
P57	J-E02	J44	429	4	130	87.2	2.2	2.5	5.8
P59	J128	J40	467.2	4	130	100.7	2.6	3.6	7.6
P61	J40	J-I	356.8	4	130	25.2	0.6	0.2	0.6
P63	J-I	J44	385.5	4	130	20.1	0.5	0.1	0.4
P65	J44	J48	392.5	4	130	40.8	1	0.6	1.4
P67	J48	J-JUV	231.1	4	130	17.4	0.4	0.1	0.3
P69	J-JUV	J-101	383.1	4	130	12.3	0.3	0.1	0.2
P71	J-101	J-G	238.7	4	130	12.3	0.3	0	0.2
P73	J48	J-K1	213.4	4	130	23.4	0.6	0.1	0.5
P75	J-ANIM	J-E	132.4	4	130	20.4	0.5	0.1	0.4
P77	J-D	J-WS	421.8	4	130	10.2	0.3	0	0.1
P79	J-WS	J-100	121.9	4	130	0	0	0	0
P81	J-WS	J64	198.3	4	130	5.1	0.1	0	0
P83	J64	J-RES	343.8	4	130	5.1	0.1	0	0
P95	J44	J46	376.5	4	130	66.5	1.7	1.3	3.5
P97	J46	J114	286.4	4	130	34.7	0.9	0.3	1.1
P99	J114	J74	184.2	4	130	34.7	0.9	0.2	1.1

PLACER COUNTY GOVERNMENT CENTER

RAW WATER MODEL OUTPUT
IRRIGATION SYSTEM
RESERVOIR REPORT

ID	Flow (gpm)	Head (ft)
RES9000	-410.2	1,609.00

Appendix C – Sanitary Sewer

Auburn Creekside Project
Specific Report

Revised Final Report

Prepared for:
Auburn Pacific Properties, LLC

Prepared by:
Stantec Consulting Services Inc.

June 10, 2015

Revision Record							
Revision	Description	Prepared By		Checked By		Approved By	
A	Draft Report	BL	2014/04/26			DP	2014/04/27
B	Final Report	BL	2015/04/30			DP	2015/04/30
C	Revised Final Report	BL	2015/06/10			DP	2015/06/10

Sign-off Sheet

This document entitled Auburn Creekside Project Specific Report was prepared by Stantec Consulting Services Inc. for the account of Auburn Pacific Properties, LLC. The material in it reflects Stantec's best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Stantec Consulting Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Prepared by _____

Brett Laplante, E.I.T.

Reviewed by

David Price, P.E.

6/10/2015