



**SACRAMENTO AREA  
SEWER DISTRICT**  
SERVING YOU 24/7

March 5, 2014

Mike Motroni  
Wood Rodgers  
3301 C Street, Suite 100-B  
Sacramento, CA 95816

**Subject: Elk Grove Southeast Policy Area – Level 2 Sewer Study  
Approval**

**Board of Directors**

Representing:

County of Sacramento  
City of Citrus Heights  
City of Elk Grove  
City of Folsom  
City of Rancho Cordova  
City of Sacramento

Dear Mr. Motroni:

Sacramento Area Sewer District staff reviewed the subject submittal and finds it sufficiently addresses District requirements and is considered approved. Any significant change in the proposed and/or assumed land use presented in this document, which impacts the sewer design, may require a revision to this study.

If you have any questions regarding these comments, please call me at 916-876-6278, or call Amandeep Singh at 916-876-6296.

**Prabhakar Somavarapu**  
*District Engineer*

**Rosemary Clark**  
*Director of Operations*

**Christoph Dobson**  
*Director of Policy & Planning*

**Karen Stoyanowski**  
*Director of Internal Services*

**Joseph Maestretti**  
*Chief Financial Officer*

**Claudia Goss**  
*Public Affairs Manager*

Sincerely,

*Stephen Moore*

Stephen Moore, P.E., M.B.A.  
Development Services

10060 Goethe Road  
Sacramento, CA 95827-3553

**Tel 916.876.6000**

Fax 916.876.6160

[www.sacsewer.com](http://www.sacsewer.com)

# Elk Grove Southeast Policy Area Level II Sewer Study

March 5, 2014

*Prepared for*



*Prepared by*



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## 1.0 Executive Summary

### Purpose

The purpose of this sewer study is to identify the backbone sewer conveyance facilities for the Elk Grove Southeast Policy Area (SEPA). This report is part of an overall high-level infrastructure analysis for the plan area. This study will demonstrate it is possible to provide sewer service for the project and technical compliance with the sewer district's requirements for sewer conveyance. The project falls within the jurisdiction of the Sacramento Area Sewer District (SASD).

Existing and planned sewer conveyance facilities border the project area to the north, west, and east. It is anticipated that these facilities will be extended to provide sewer service to the project area. This study has been prepared to present the project's ultimate build out sewer conveyance facilities for the plan area. The study includes backbone trunk and collector mains to serve each proposed land use. This study includes a discussion on the proposed project, sewer flows, alignments, and sewer facilities.

### Project and Study Characteristics

The plan area encompasses approximately 1,200 acres and will convey 7,904 ESD's. The plan area is located in the south portion of Elk Grove between the Laguna Ridge Specific Plan and Elk Grove Promenade / Lent Ranch Specific Plan. The project proposes a mix of land use including residential, commercial, office, and industrial. The full plan area build out will convey a total of 2.5 mgd and 5.4 mgd during average dry weather flow and peak wet weather flow, respectively.

### Findings

This study identifies onsite facilities required to serve the plan area. Design of the Laguna Ridge south lift station will need to provide consideration for planned flows from SEPA during development of level three studies. The existing Elk Grove Promenade lift station and force main will also require analysis at time of level three sewer study to show that these facilities are capable of conveying sewer flow from the plan area, as proposed in this study. These findings are discussed in detail within this study.

## 2.0 Introduction

### Level of Study

This study is a level two study for a community plan level sewer assessment. The focus of this study is on backbone or trunk infrastructure required to serve the plan area. This level of study is not sufficient for design and it is anticipated that a level three study or series of studies will be required prior to improvement plan approval for backbone facilities.

### Location

The SEPA project encompasses approximately 1,200 acres and is located in the southeast portion of the City of Elk Grove. In general the project area is located east of Bruceville Road, north of Kammerer Road, east of Big Horn Boulevard, and south of Poppy Ridge Road. The Laguna Ridge Specific Plan borders the project on the north and west. Proposed Sterling Meadows project borders the project directly to the east.

See **Figure 2-1: Vicinity Map** for a vicinity map of the project site.

### Topography

The site currently consists of a mix of farm and ranch land with a number of residential structures on large lots spread throughout the plan area. The existing topography varies from elevation 39-feet to 22-feet and falls from the northeast to the southwest. Bisecting the project is a drainage canal flowing from east to west.

### Detail Description

SEPA is the last large-scale development area within the urbanized portion of Elk Grove. It lies directly south of the Laguna Ridge Specific Plan area and west of Lent Ranch/Elk Grove Promenade and the approved Sterling Meadows development.<sup>1</sup>

### Land Use and Zoning

The project area is currently zoned in the City's general plan as a special planning area. Therefore, specific polices are required to guide development within this area. The proposed land use will consist of residential (very low, low, medium and high density), mixed use, commercial, office, light industrial / flex space, schools, parks, and open space. The proposed land use for SEPA includes a total of 4,790 dwelling units from residential and mixed use land areas. See **Table 2-1: Proposed Project Land Use** for detailed project land uses and **Figure 2-2: Land Use Plan** for an exhibit showing the proposed land use, within the project area.

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<sup>1</sup> Project description per City of Elk Grove, planning department website, 1 October 2013.

**Table 2-1: Proposed Project Land Use**

Source: Land use spreadsheet provided by City of Elk Grove, September 10, 2013

Land Use		Area <sup>2</sup> (acres)	Estimated Dwelling Units (DU)
ER	Estate Residential	62.6	288
LDR	Low Density Residential	212.0	1,341
MDR	Medium Density Residential	95.2	1,324
HDR	High Density Residential	60.7	1,511
MUR	Mixed Use Residential	14.0	267
COM	Commercial	14.2	-
MUV	Mixed Use Commercial	27.3	58
ES	Elementary School	27.7	-
OFF	Office	279.9	-
LI/FS	Light Industrial / Flex Space	108.2	-
P/OS	Park / Open Space	56.8	-
Greenway	Greenway	35.5	-
Basin	Basin	49.4	-
Drainage	Drainage Channel	1.7	-
Channel	Channel	65.3	-
	Right of Way <sup>3</sup>	84.4	-
<b>Total</b>		<b>1,195</b>	<b>4,790</b>

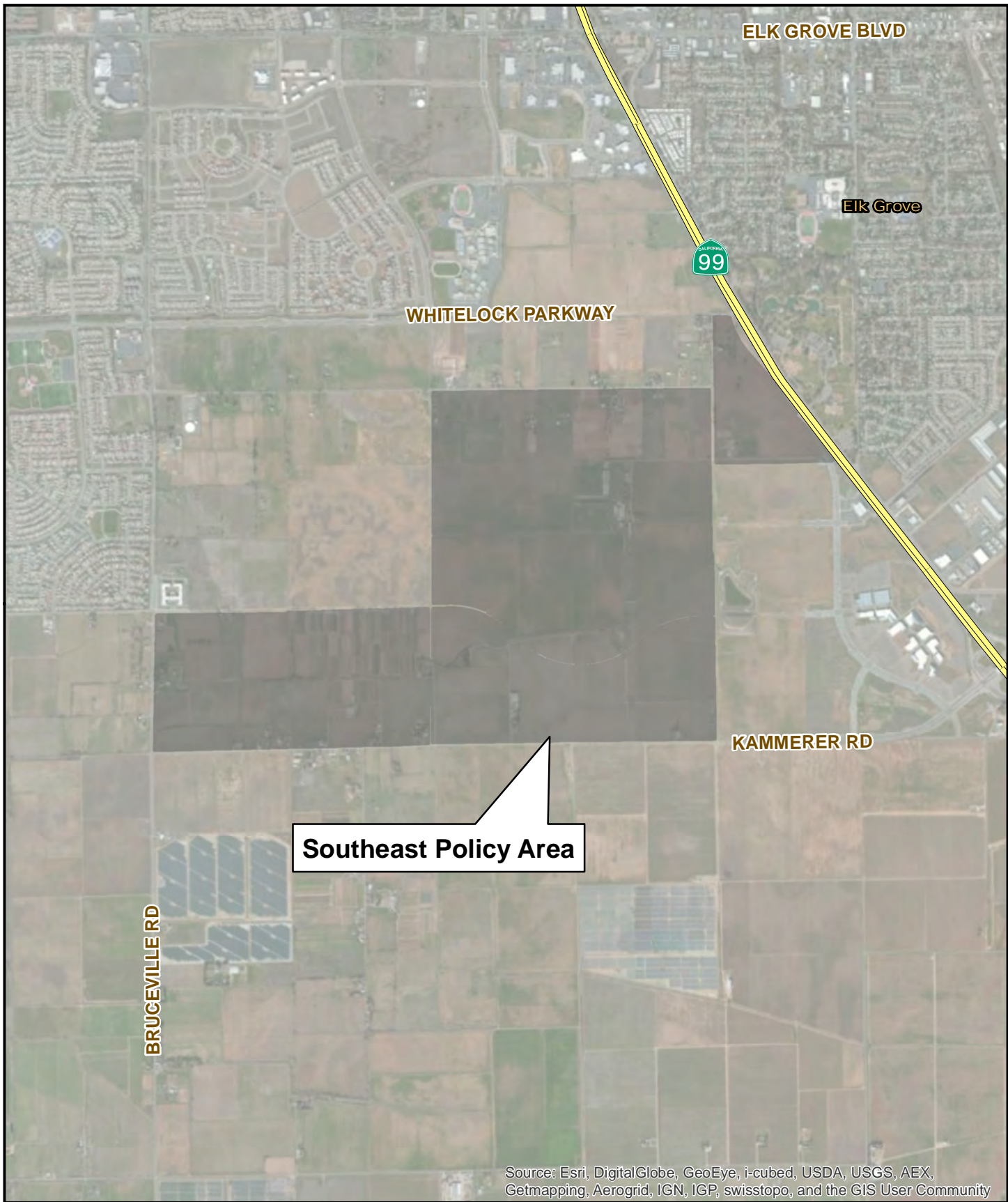
### Existing Studies

The following studies were reviewed and referenced within this study.

- Laguna Ridge Specific Plan, Sewer Master Plan, Technical Addendum #2, by Wood Rodgers, Inc., dated May 2005.
- Laguna Ridge Specific Plan, Sewer Master Plan, Figure 5 Exhibit, by Wood Rodgers, Inc., revised November 2012.
- Elk Grove Promenade, Maser Sewer Study, by Wood Rodgers, Inc., dated October 2006.
- Elk Grove Promenade, Interim Sewer Lift Station (S-142) & Force Main Project, by Wood Rodgers Inc., dated February 16, 2007.
- SASD 2010 System Capacity Plan Expansion Trunk Sheds, by Sacramento Area Sewer District, dated 2010.

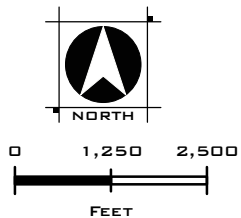
<sup>2</sup> Acreage values are approximate and reflect high-level master planning. Acreages are subject to change through subsequent development processing in keeping with the policies and procedures provided in the City's Special Planning Area document.

<sup>3</sup> Assumed to be internal roadways per the land use plan plus fifty feet of right of way adjacent to SEPA boundary except 100 feet along future Lotz Parkway.

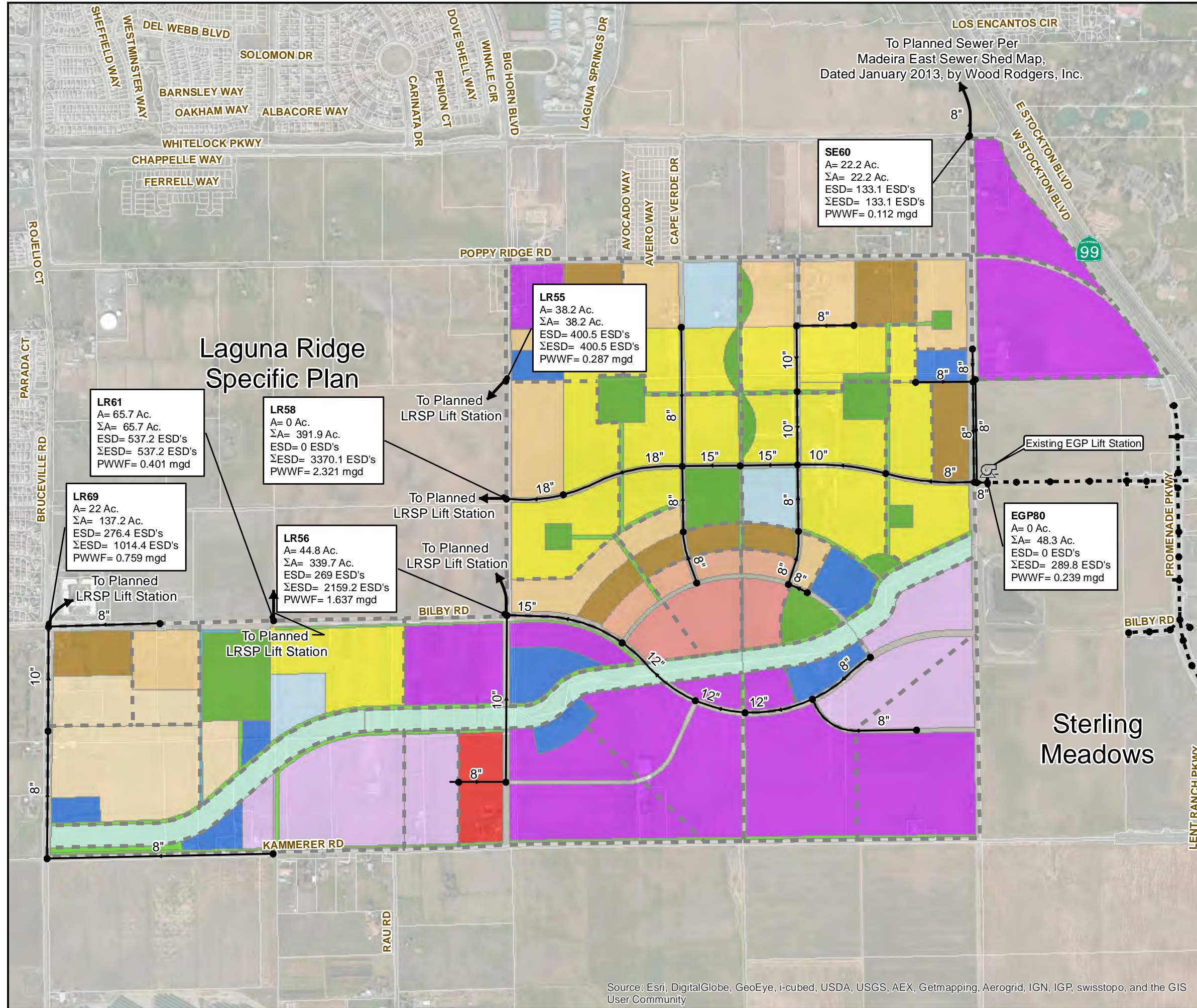


Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Elk Grove Southeast Policy Area  
 Vicinity Map - Figure 2-1  
 Elk Grove, California  
 March 5, 2014



**WOOD RODGERS**  
 DEVELOPING INNOVATIVE DESIGN SOLUTIONS  
 3301 C Street, Bldg. 100-B Tel: 916.341.7760  
 Sacramento, CA 95816 Fax: 916.341.7767



**SE60**  
 A= 22.2 Ac.  
 ΣA= 22.2 Ac.  
 ESD= 133.1 ESD's  
 ΣESD= 133.1 ESD's  
 PWWF= 0.112 mgd

**LR55**  
 A= 38.2 Ac.  
 ΣA= 38.2 Ac.  
 ESD= 400.5 ESD's  
 ΣESD= 400.5 ESD's  
 PWWF= 0.287 mgd

**LR61**  
 A= 65.7 Ac.  
 ΣA= 65.7 Ac.  
 ESD= 537.2 ESD's  
 ΣESD= 537.2 ESD's  
 PWWF= 0.401 mgd

**LR58**  
 A= 0 Ac.  
 ΣA= 391.9 Ac.  
 ESD= 0 ESD's  
 ΣESD= 3370.1 ESD's  
 PWWF= 2.321 mgd

**LR69**  
 A= 22 Ac.  
 ΣA= 137.2 Ac.  
 ESD= 276.4 ESD's  
 ΣESD= 1014.4 ESD's  
 PWWF= 0.759 mgd

**LR56**  
 A= 44.8 Ac.  
 ΣA= 339.7 Ac.  
 ESD= 269 ESD's  
 ΣESD= 2159.2 ESD's  
 PWWF= 1.637 mgd

**EGP80**  
 A= 0 Ac.  
 ΣA= 48.3 Ac.  
 ESD= 0 ESD's  
 ΣESD= 289.8 ESD's  
 PWWF= 0.239 mgd

**Land Use**

- Estate Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mixed Use Residential
- Mixed Use Commercial
- Commercial
- Office
- Light Industrial / Flex Space
- Elementary School
- Parks / Open Space
- Greenway
- Channel
- Basin
- Drainage Channel
- Existing Sewer Pipes
- SEPA Sewer Sheds
- Manhole
- SEPA Sewer Pipes
- Parcels





### 3.0 Design & Sewer Flow Information

The proposed design is included in **Appendix B: Level II Sewer Study** with a reduced copy included as **Figure 3-1: Level II Sewer Study**. The design illustrated in the above referenced exhibits is based upon the subsequent discussion in this section.

#### 3.1 Elk Grove Promenade Trunk Sewer Shed

Preceding the date of this sewer study significant discussions have occurred regarding the Elk Grove Promenade (EGP) lift station and force main (designated as S-142) and available capacity. Development interests within the Elk Grove Promenade / Lent Ranch Specific Plan are working to ensure sufficient capacity for build out of their respective plan areas. The following discusses the different variations and assumptions regarding the Elk Grove Promenade sewer shed and how it relates to SEPA.

##### 2006 Elk Grove Promenade Study

The 2006 Elk Grove Promenade Master Sewer Study and Interim Lift Station and Force Main design report identified the facilities to serve a portion of the Elk Grove Promenade sewer shed. The originally designed shed that would convey via the interim lift station and force main included the mall site, adjacent commercial properties, and proposed Sterling Meadows subdivision. The lift station conveys sewer via an existing force main under Highway 99 to a trunk sewer main in East Stockton Boulevard.

At the time of the 2006 studies the ultimate conveyance of sewer flows from this shed would be conveyed through SEPA and LRSP to the Laguna Ridge South Interceptor. The EGP lift station and force main would then be abandoned, once sufficient gravity infrastructure was in service.

##### 2010 Sewer Capacity Plan

As part of the 2010 Sewer Capacity Plan, SRCSD had determined that the Laguna Ridge South Interceptor would not be constructed as originally planned. As a result SASD staff revised their sewer capacity plans, which resulted in significant changes to the size of the EGP sewer shed. The revised plan makes permanent the EGP lift station and force main. However, the shed area conveying to this lift station was significantly increased to include eastern portions of SEPA immediately to the west and north of the original EGP sewer shed. Copies of shed maps showing both the Elk Grove and Laguna Ridge trunk sheds from the 2010 System Capacity Plan are included as **Figure 3-2** and **Figure 3-3**, respectively.

##### 2013 Proposed Trunk Sheds

Concern among Elk Grove Promenade / Lent Ranch Specific Plan developers and the City of Elk Grove led to further discussion regarding the size and extent of the ultimate shed that would convey via the EGP lift station and force main. The discussions resulted in a reversion back to the EGP sewer shed just slightly larger than originally proposed in 2006. This slightly modified sewer shed adds about 48 acres of office land use for 290 ESD's of SEPA (NE corner) that SASD now plans on serving through the EGP lift station and force main.

Further analysis of the existing capacity of the EGP lift station and force main will be required as a subsequent part of level three sewer studies. This study only looks at, and supports, most flows conveying to the west via SEPA's backbone facilities to the LRSP south lift station as shown in **Figure 3-4: Proposed Trunk Sewer Sheds**. This approach results in the most conservative design for the onsite SEPA trunk and backbone facilities.

### 3.2 Laguna Ridge South Trunk Sewer Shed

To date, multiple interests have discussed sewer conveyance for the Laguna Ridge South Trunk Sewer Shed. Since SEPA in large part will convey via the LRSP south sewer lift station, this study further discusses conveyance alternatives. Similar to the conversion of a permanent facility for the Elk Grove Promenade sewer lift station (S-142) the two interim sewer lift stations that were planned to serve the Laguna Ridge Specific Plan and surrounding areas are now or will be considered permanent facilities.

#### Laguna Ridge Specific Plan Sewer Studies

Wood Rodgers prepared the initial sewer study to serve the Laguna Ridge Specific Plan (LRSP) in a study dated May 2005 and revised November 2012. Since then other developers have prepared supplemental level three sewer studies to serve individual projects within LRSP. The study envisioned two lift stations would serve LRSP before regional interceptor facilities would be constructed to serve LRSP and SEPA. To date, only the LRSP north lift station (S-136), as known as the Whitelock Pump Station, is built and operational.

Additionally, SASD has received a number of requests for shed shifts for developments to convey flow from the future south lift station to the operational north lift station. This in large part is because parcels that would otherwise be served by the south lift station are moving ahead with development in advance of the south lift station being operational. SASD provided Wood Rodgers with revised sewer shed boundaries that reflect the current shed boundaries for the south lift station.<sup>4</sup> These flows are discussed in more detail later in this report.

Most SEPA sewer flows will flow directly into the Laguna Ridge development. Approximately 22.2 acres or 133.1 ESD's of office land use will flow to the existing Laguna Ridge north lift station via planned collector mains in Lotz Parkway as part of the Madeira East project. With the exception of those land uses previously discussed as they relate to the Elk Grove Promenade lift station, the remainder of the project will convey flows via the Laguna Ridge south lift station.

### 3.3 Design

The project sewer study consisted of calculating the sewer flows and designing the sewer system to serve the plan area. The SASD Design Standards, dated June 24, 2013 and Minimum Sewer Study Requirements, dated February 25, 2009 were utilized as the basis for this study.

#### Assumptions

There were a number of assumptions that are included in the design approach for this level two study. It is understood that as this plan area develops level three sewer studies, these assumptions may require further refinement. These assumptions are stated below:

- Per the sewer study for the Laguna Ridge Specific Plan (LRSP), by Wood Rodgers, dated May 2005 and revised November 2012, proposed sewer mains within LRSP are to provide for sewer service to SEPA. The LRSP study, consistent with trunk sewer sheds at the time, assumed that the EGP sewer shed, served by EGP lift station S142, would convey sewer through SEPA and LRSP to then proposed Laguna Ridge South Interceptor. As previously discussed district staff have indicated the EGP sewer shed will permanently convey flows to the east via force main as it does today. The future LRSP south lift station and associated force main will have to be designed to provide sufficient wet well depth to serve SEPA.

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<sup>4</sup> Provided to Wood Rodgers via email from SASD on February 21, 2014.

- There will be no upstream development or significant increase in on-site densities that will affect the planned on-site or off-site sewer facilities.
- Only major nodal manholes are shown in this study. Additional manholes, per SASD Design Guidelines, will be included along the proposed sewer alignments. To allow for the additional manholes, a one-tenth drop is accounted for in the inverts shown in the study, for every 200-feet of pipe length. The slope published on the plans is representative of sewer pipe slope and is irrespective of the additional one-tenth drops. Further study will incorporate additional manholes per SASD Design Guidelines.
- Pipes were sized and flow lines calculated based on the SASD design standards and adhere to SASD "Minimum Sewer Study Requirements" Criteria. Actual alignments will be determined with subsequent level three study design scope.
- At time of this report a grading study of the plan area has not been developed. The existing topographic contours have been utilized as part of this study to determine invert depth.
- The land use plan has designated a number of parcels in the northeast part of the plan area with a sports and entertainment overlay. Flows from an entertainment overlay have not be analyzed and it is assumed that any flows from a stadium or other high peak flow venue would require attenuation onsite before discharging via collector pipes.

### Approach

The following general procedure was used in the development of this study.

1. Gross areas based on the proposed Elk Grove Southeast Policy Area land use dated September 10, 2013 were used to calculate sewer flows.
2. Sub sheds areas were defined by topographic elevations, proposed service lines, and land use.
3. Equivalent dwelling units (ESD's) were calculated for each shed based on the underlying land use and shed area.
4. 310 gallons per day is assumed to be the average dry weather flow or a single equivalent single family dwelling unit (ESD).
5. This study does not include lateral mains as onsite street patterns are not defined.
6. Due to the flat terrain, minimum slopes were utilized to calculate inverts and run sewer lines to the upstream portions of the plan area.
7. Minimum sewer depth was set between five to six feet from existing elevation at street centerline.
8. Flows were determined based on the SASD, County Improvement Standards, and on the design criteria and assumptions identified in this study.
9. A schematic backbone trunk and collector system was established.
10. Major sheds were divided into sub-sheds in order to define the areas, which contribute flows to certain points (nodes) on the collection system.
11. To estimate sewage flows, land use boundaries were overlaid on the sub-sheds creating sub-areas of single land use within each sub-shed. The acreages of these sub-areas were determined and multiplied by the average number of equivalent single family dwellings (ESDs) per acre for their particular land use in order to determine the total number of ESDs entering each

pipe system. Pipes were sized and inverts calculated using an iterative process. For hydraulic calculations refer to **Appendix A: Demand & Hydraulic Calculation Table**.

### Design Criteria

SASD Standards and Specifications, dated July 24, 2013 were used as the basis for this design. The flows were generated using the information found in Chapter 201 (Capacity Design) of the standards and specifications. The flow criteria used for this report is presented in **Table 3-1: Design Flow Criteria**.

**Table 3-1: Design Flow Criteria**

Source: Sacramento Area Sewer District

Criteria	Modifier
<b>Flow Generation</b>	
Estate Residential	6 ESD/acre
Low Density Residential	6 ESD/acre
Medium Density Residential	10 ESD/acre
High Density Residential	20 ESD/acre
Office	6 ESD/acre
Commercial	6 ESD/acre
School	6 ESD/acre
Light Industrial / Flex Space	6 ESD/acre
Mixed Use	6 ESD/acre
Open Space / Public Recreation	6 ESD/acre
Detention Basins	6 ESD/acre
	Not less than 6 ESD/acre for any land use.
<b>Peaking Factor</b>	$PF = 3.5 - 1.8 * Q_{ADWF}^{0.05}$ (Minimum PF = 1.2)
<b>Minimum Velocity</b>	Minimum 2 fps at Peak Dry Weather Flow
<b>Rainfall Infiltration Factor</b>	Existing Areas: 1,600 gpd per acre New areas: 1,400 gpd per acre
<b>Hydraulic Grade Line</b>	Maximum HGL at crown of pipe at Peak Wet Weather Flow
<b>Friction Factor (Manning's n-value)</b>	0.01300

## 3.4 Sewer Flow Information

### Onsite Sewer Flows

Onsite sewer flows were generated based on design flow criteria identified in **Table 3-1** overlaid with the proposed land use. The project area consists of nearly 1,200 acres with about 1,043 acres generating sewer flow. The balance of the acreage that does not produce sewer flow are drain channels and backbone roadways. These flows, by land use, are shown in **Table 3-3: Sewer Flows by Land Use**. Detailed calculations for flow generation are included in **Appendix A: Demand & Hydraulic Calculation Table**.

For school facilities the SASD standards require an additional analysis to determine the maximum sewer flow to utilize for sewer calculations. This analysis is shown in **Table 3-2: School Sewer Flows**. Method A calculates the sewer flow at 6 ESD's per acre. Method B utilizes the flow rates identified in Table 201-1 and Table 201-2 of the SASD standards and converts the flow to ESD's. The flow rate for middle / junior high schools was utilized. These sites are not anticipated to be high schools.

**Table 3-2: School Sewer Flows**

School Site	Upstream Node	Method A		Method B		Maximum ESD's Utilized
		Area (acres)	Flow (ESD)	Flow (mgd)	Flow (ESD)	
1	SE70	10.2	61.1	0.06	193.5	193.5
2	SE43	9.0	54.0	0.06	193.5	193.5
3	SE61	8.5	50.8	0.06	193.5	193.5

**Table 3-3: Sewer Flows by Land Use**

Land Use	Area (acres)	Sewer Flow per Acre (ESD/acre)	Sewer Flow (ESD's)
ER Estate Residential	62.6	6	375
LDR Low Density Residential	212.0	6	1,272
MDR Medium Density Residential	95.2	10	952
HDR High Density Residential	60.7	20	1,214
MU Mixed Use	41.3	6	248
COM Commercial	14.2	6	85
ES Elementary School	27.7	See footnote 5	581
OFF Office	279.9	6	1,679
LI/FS Light Industrial / Flex Space	108.2	6	649
P/OS Park / Open Space	56.8	6	341
Greenway	35.4	6	212
Basin	49.4	6	296
Drainage Channel	1.7	-	-
Channel	65.3	-	-
Right of Way <sup>6</sup>	84.4	-	-
<b>Total</b>	<b>1,195</b>		<b>7,904</b>

Offsite Sewer Flow

No upstream flows are anticipated to pass through the plan area. Flows generated by SEPA will connect to existing or planned facilities that serve adjacent projects. This study proposes to convey flows through six different points of connection to sewer facilities planned with the Laguna Ridge Specific Plan. One additional connection to the Elk Grove Promenade lift station will also be required to serve the plan area. Onsite sewer flows produced by SEPA will convey via offsite sheds / lift stations identified in **Table 3-4: Onsite Sewer Flows by Conveyance Shed** and shown in **Figure 3-4: Proposed Trunk Sewer Sheds**.

<sup>5</sup> Flow rate for schools determined on a flow rate per school type basis. See **Table 3-2: School Sewer Flows** for additional information.

<sup>6</sup> Assumed to be internal roadways per the land use plan plus fifty feet of right of way adjacent to SEPA boundary except 100 feet along future Lotz Parkway.

**Table 3-4: Onsite Sewer Flows by Conveyance Shed**

Sewer Shed	Area (acres)	Sewer Flow (ESD's)
To Elk Grove Promenade Lift Station	48.3	289.8
To Laguna Ridge North Lift Station	22.2	133.1
Via Laguna Ridge South Sewer Shed	972.7	7,481.5
<b>Total SEPA Sewer Flows</b>	<b>1,043.2</b>	<b>7,904</b>

Subsequent level three sewer studies they will provide more detailed analysis and updating of the LRSP sewer study based on known conveyance from SEPA. These updates are not a part of this study and will be required for the LRSP south lift station. Part of the LRSP master sewer plan update should include the permanent location of a planned LRSP lift station that will serve the south portion of Laguna Ridge and SEPA. At time of this study SASD has indicated that an engineering firm is coordinating with them on the level 3 sewer study for the LRSP south area and the permanent Lift Station. It is anticipated that this study will locate the LRSP south lift station and provide conveyance facilities for SEPA flows entering through LRSP.

However, this study does address the total anticipated flows that are to be conveyed via the Laguna Ridge south lift station. As part of this task, SASD provided Wood Rodgers with the shed areas for the Laguna Ridge south sewer shed. The shed as envisioned today by SASD encompasses 355 acres. These flows as provided by SASD are shown in **Table 3-5** below.

**Table 3-5: Laguna Ridge South Sewer Flows**

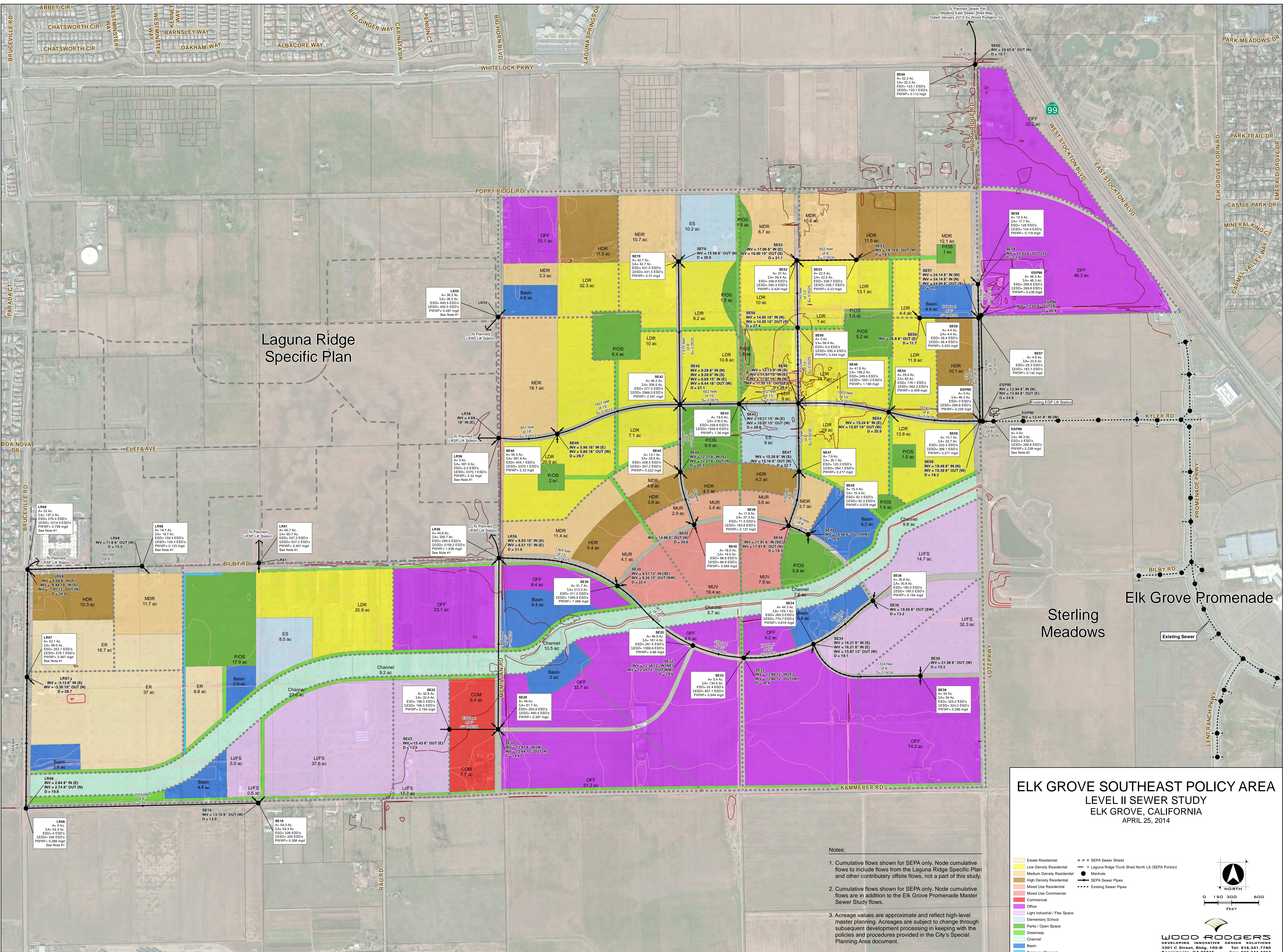
Source: Sacramento Area Sewer District email dated February 7 and February 21, 2014

Planning Area	Land Use	Area (acres)	Sewer Flow per Acre (ESD/acre)	Sewer Flow (ESD's)
LRSP	High Density Residential #1	11.6	20.4	236.6
LRSP	High Density Residential #2	7.9	21.0	165.9
LRSP	All other land uses	315.1	6.0	1,890.6
SEPA	From <b>Table 3-4</b>	972.7	varies	7,481.5
<b>Total</b>		<b>1,307.4</b>	-	<b>9,775</b>

The peak wet weather flows from these areas total 6.7 mgd. The LRSP south sewer lift station should be designed to accommodate these flows either now or in the future with expansion projects. The LRSP south sewer lift station was originally planned to utilize one of the five force mains within Bruceville Road. These force mains convey sewer flows north to Laguna Blvd where they discharge into the Laguna Interceptor and where it will convey to the regional treatment plant. SASD has indicated that these gravity sewer facilities have sufficient capacity to serve LRSP South and SEPA as defined in this study.

Per SASD the existing force mains in Bruceville Road have a current available capacity of 6.5 mgd. There is a dry 12-inch force main that that was installed by the Laguna Ridge Owners Group that was to serve the LRSP south lift station. This existing force main runs from just south of Poppy Ridge Road to the Laguna Interceptor gravity sewer connection in Laguna Boulevard to the north.

The undeveloped areas will generate 6.7 mgd resulting in a need for additional 0.2 mgd in conveyance capacity. This will require an additional 4-inch force main to be installed in Bruceville Rd from the proposed LRSP south sewer lift station to the Laguna Interceptor sewer to accommodate the plan area build out.



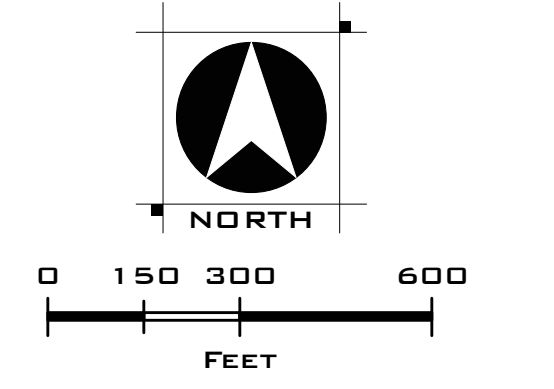
# Laguna Ridge Specific Plan

# ELK GROVE SOUTHEAST POLICY AREA LEVEL II SEWER STUDY ELK GROVE, CALIFORNIA APRIL 25, 2014

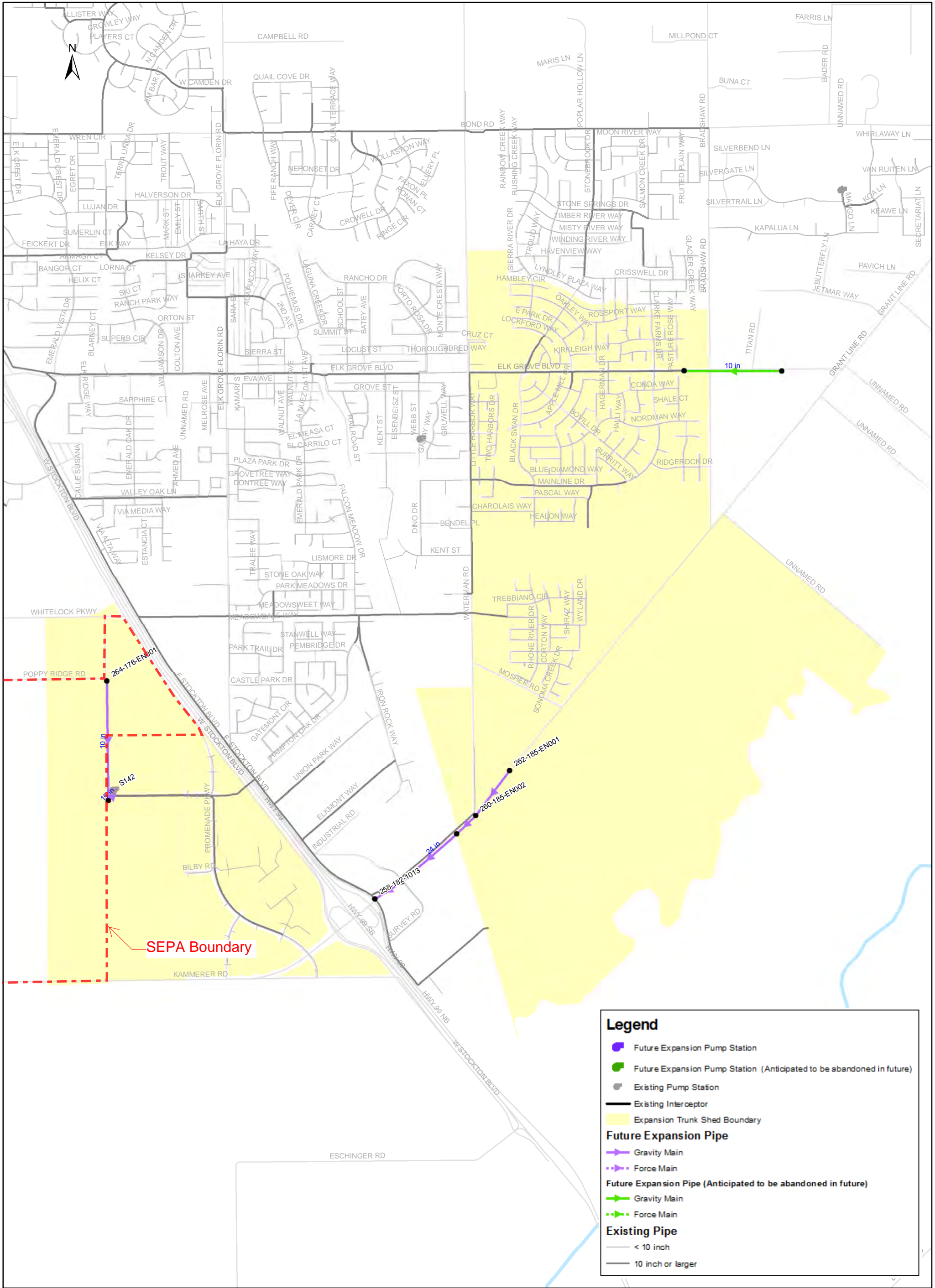
**Notes:**

- Cumulative flows shown for SEPA only. Node cumulative flows to include flows from the Laguna Ridge Specific Plan and other contributory offsite flows, not a part of this study.
- Cumulative flows shown for SEPA only. Node cumulative flows are in addition to the Elk Grove Promenade Master Sewer Study flows.
- Acres values are approximate and reflect high-level master planning. Acres are subject to change through subsequent development processing in keeping with the policies and procedures provided in the City's Special Planning Area document.

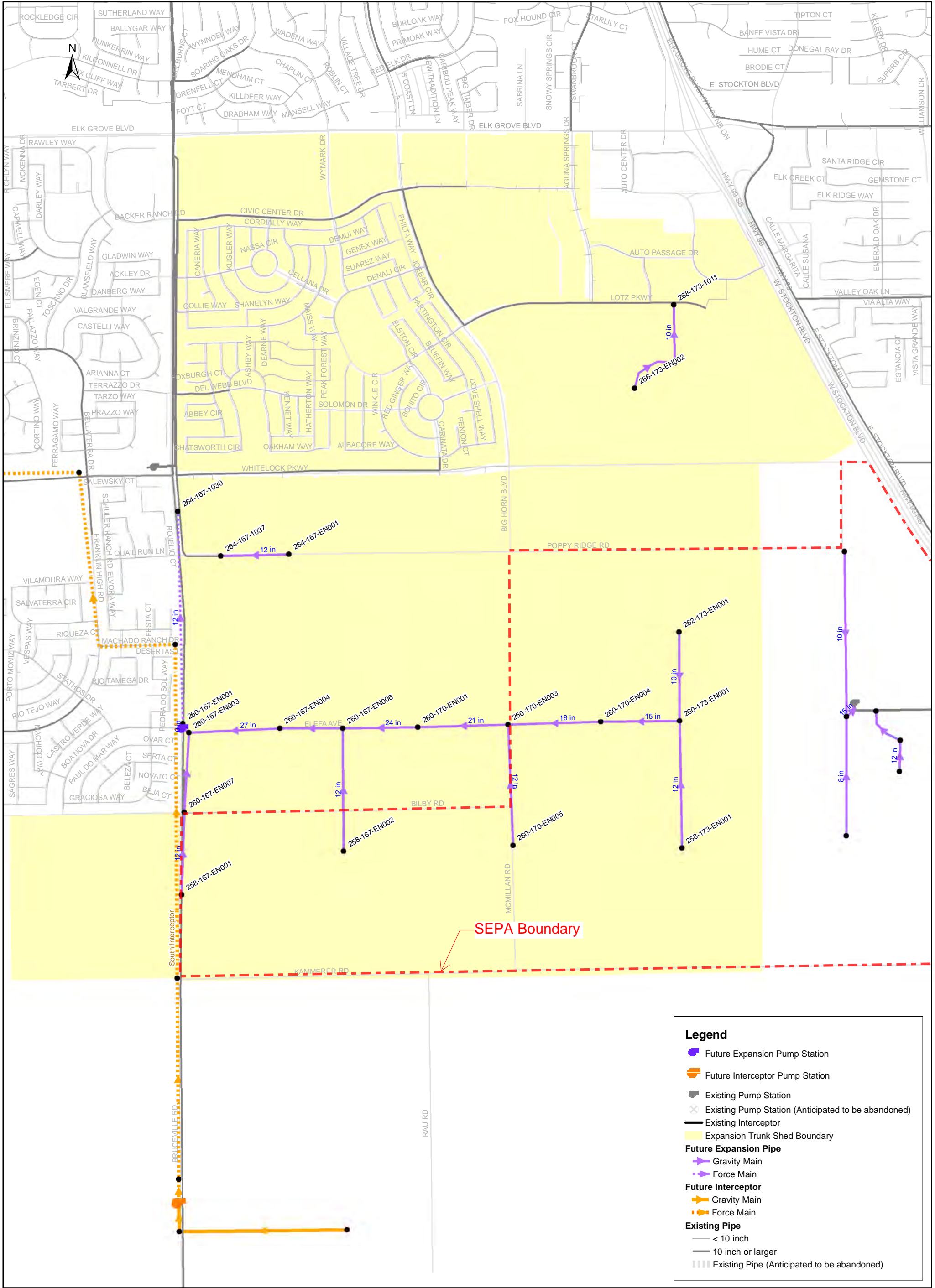
Estate Residential	SEPA Sewer Sheds
Low Density Residential	Laguna Ridge Trunk Shed North LS (SEPA Portion)
Medium Density Residential	Manhole
High Density Residential	SEPA Sewer Pipes
Mixed Use Commercial	Existing Sewer Pipes
Office	
Light Industrial / Flex Space	
Elementary School	
Parks / Open Space	
Greenway	
Channel	
Basin	
Drainage Channel	



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**Legend**

- Future Expansion Pump Station
- Future Interceptor Pump Station
- Existing Pump Station
- Existing Pump Station (Anticipated to be abandoned)
- Existing Interceptor
- Expansion Trunk Shed Boundary
- Future Expansion Pipe**
- Gravity Main
- Force Main
- Future Interceptor**
- Gravity Main
- Force Main
- Existing Pipe**
- < 10 inch
- 10 inch or larger
- Existing Pipe (Anticipated to be abandoned)

Elk Grove Southeast Policy Area  
Level II Sewer Study



2010 SASD SYSTEM CAPACITY PLAN

March 5, 2014

**LA Laguna Ridge  
Buildout Expansion Plan**

**Figure 3-3**

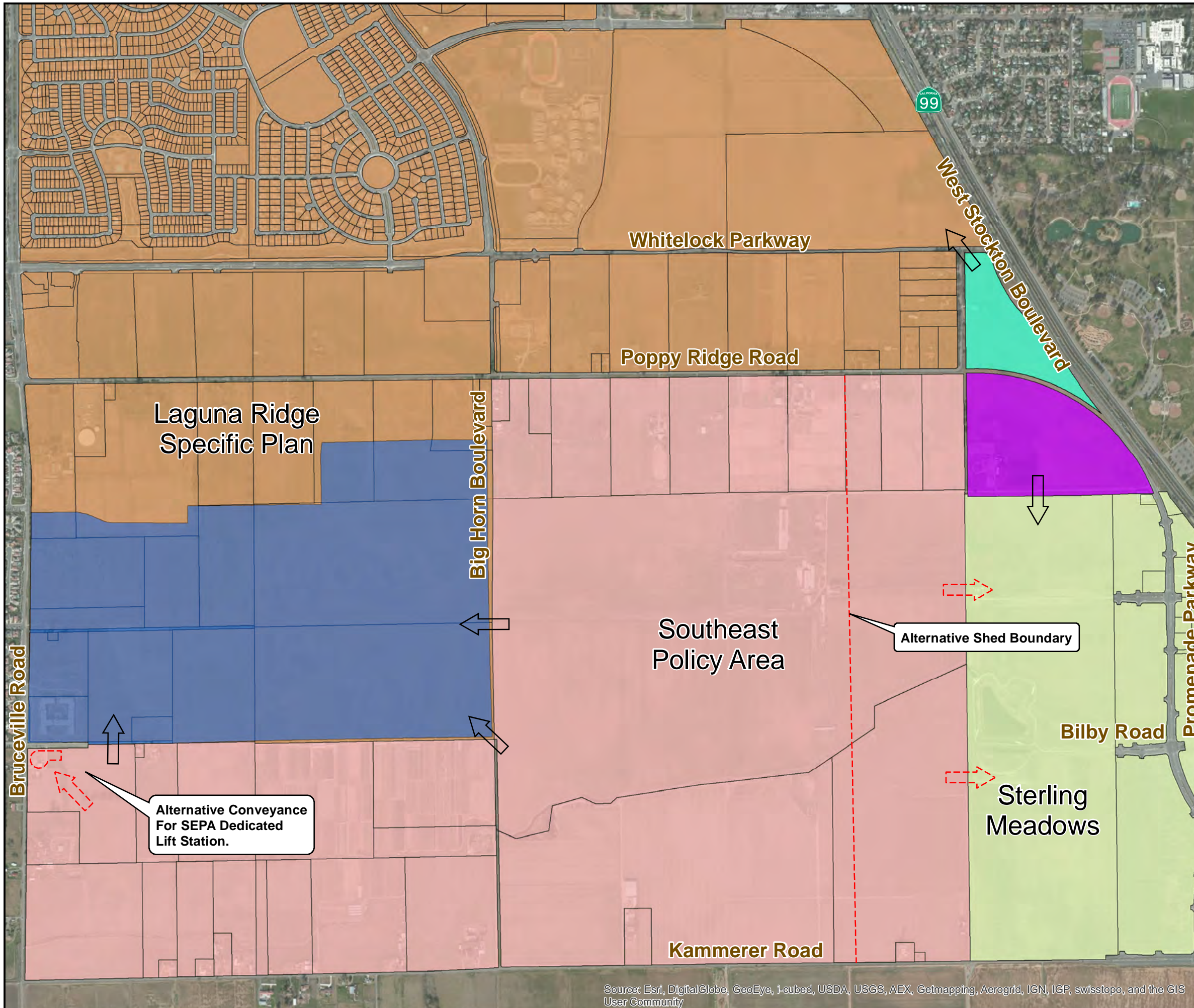
**FIGURE A.15-2**







Date last revised:10/12/2011

ELK GROVE SOUTHEAST POLICY AREA  
 PROPOSED TRUNK SEWER SHEDS - FIGURE 3-4  
 ELK GROVE, CALIFORNIA  
 MARCH 5, 2014



Not to Scale



-  Elk Grove Trunk Shed (West of Hwy. 99)
-  Elk Grove Trunk Shed (SEPA Portion)
-  Laguna Ridge Trunk Shed (North LS)
-  Laguna Ridge Trunk Shed South LS (SEPA Portion)
-  Laguna Ridge Trunk Shed (South LS)
-  Laguna Ridge Trunk Shed North LS (SEPA Portion)
-  Indicates Preferred Sewer Conveyance Path
-  Indicates Alternative Sewer Conveyance Path

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



## 4.0 Sewer Alignments and Facilities

### Interim Facilities

There are currently no interim facilities proposed with this project. As individual developments move forward with proposals, interim facilities maybe considered and should be evaluated at time of level three sewer study development.

### Ultimate Facilities

This level two study schematically shows the proposed trunk and backbone sewer alignments. Ultimately, further refinement of the land use plan, determination of roadway alignments, and additional level three studies will further define position and depth of sewer conveyance facilities.

### Offsite Conveyance Alternatives

Currently there are five force mains located in Bruceville Road that convey flows from south to north. As previously discussed, SASD has indicated, based on their internal modeling, that there is 6.5 mgd of capacity within the existing force mains. Two conveyance alternatives have been identified to convey the balance of sewer flows and are briefly discussed below:

- Construct the south lift station to convey 6.7 mgd, as discussed in this study, and convey flows via existing and proposed force mains to the north. These force main would terminate at the Laguna Interceptor where the flows are conveyed to the regional treatment plant.
- Construct the south lift station to convey 6.5 mgd of flows and fully utilize capacity within the Bruceville Road force mains. The balance of flows within SEPA to be conveyed via the Elk Grove Promenade Lift Station with approval of a shed shift through SASD. SASD anticipates the pumps at the existing lift station could be upsized to provide additional capacity. This option would require further study and analysis.

As previously discussed SASD staff has determined that the Elk Grove Promenade lift station and force main are considered permanent SASD facilities and will convey sewer from a larger sewer shed than originally planned. This additional shed area includes office land use identified in SEPA.<sup>7</sup> Development of this area will require a level 3 sewer study. The level 3 study will include the required analysis of the existing EGP lift station and force main and design of conveyance facilities in Lotz Parkway to serve the land use tributary to the EGP lift station.

### Dedicated SEPA Lift Station

While this study anticipates connection to the LRSP south lift station, currently in design, as an alternative, the SEPA flows could be directed to a SEPA lift station, located near the future intersection of Bilby Road and Big Horn Boulevard. Flows from this lift station would then run through a force main along Bilby Road west of Bruceville Road. This alternative requires further analysis and support from SASD prior to design, as it would result in additional SASD infrastructure. The intent of this alternative is to allow development of SEPA independent of outside constraints, should the LRSP south lift station not move forward consistent with the development goals of the City.

---

<sup>7</sup> This shed area does not include areas that would be conveyed via the EGP lift station in order to reduce flows from the south lift station to within existing capacity of the Bruceville Road force mains.

## 5.0 Conclusion

This study has been prepared in accordance with SASD design guidelines to identify backbone conveyance facilities to serve the Elk Grove Southeast Policy Area. The study has been prepared as a level two study. **Appendix B: Level II Sewer Study** identifies the required backbone infrastructure through the plan area.

Interim facilities are not proposed with this study. Subsequent level three sewer studies may identify interim facilities as necessary for the conveyance of flow from specific developments.

The total acreage of the project is 1,195 acres and conveys 7,904 ESD's. This equates to a total of 2.5 mgd and 5.4 mgd during average dry weather flow and peak wet weather flow, respectively.

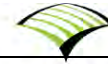


## Appendix A Demand & Hydraulic Calculation Table

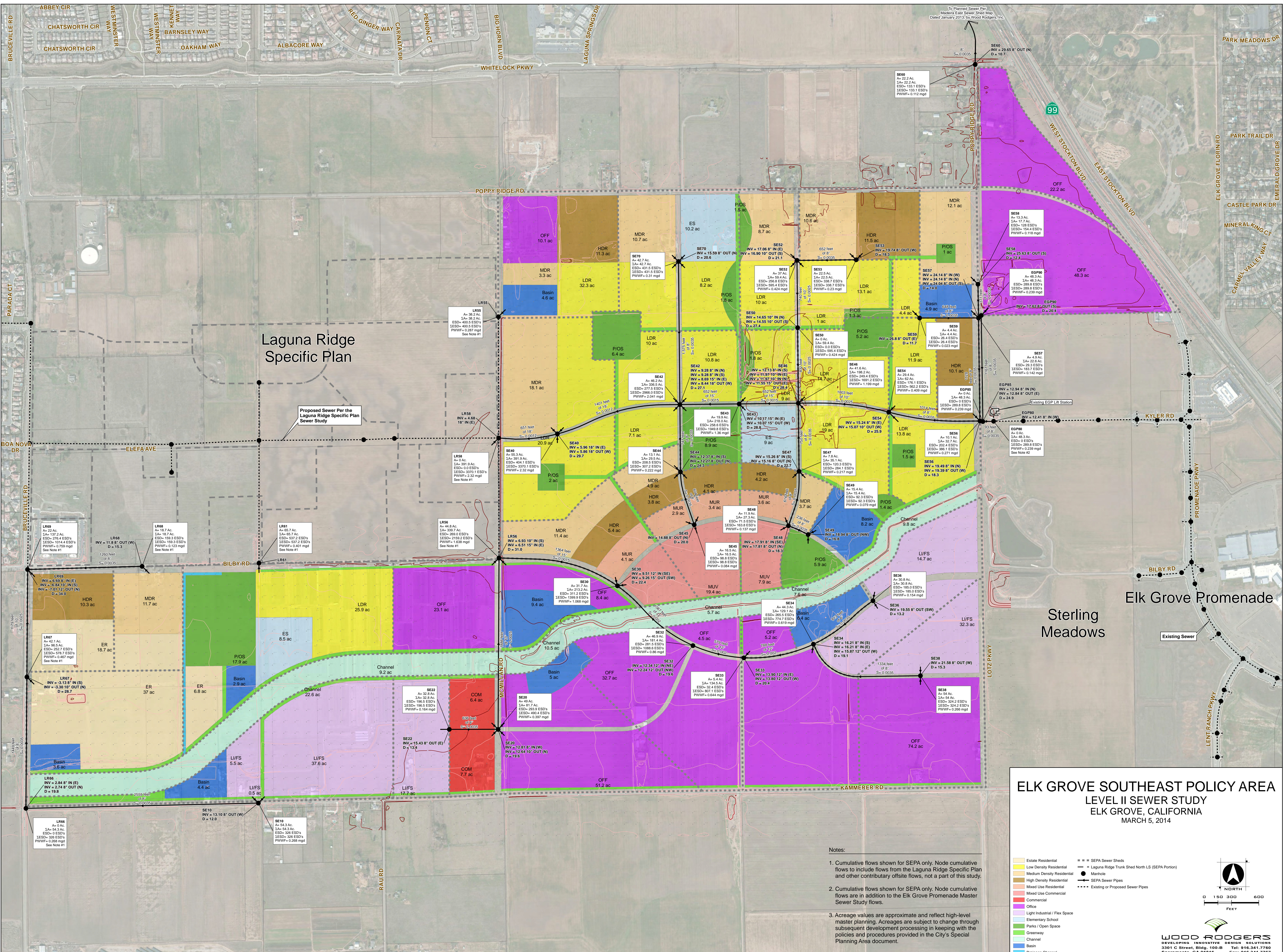
Elk Grove Southeast Policy Area  
Level II Trunk Sewer Study - Demand & Hydraulic Calculation Table

Updated: 2/26/2014

Upstream Node #	Downstream Node #	Estate Residential		Low Density Residential		Medium Density Residential		High Density Residential		Office		Commerical		Light Industrial / Flex Space		Mixed Use		Elementary School		Public / Open Space / Rec		Greenway		Basin		Total Shed		Cumulative Sheds		Average Flows, Q		Infiltration		Peak Flows, Qp		Required Pipe		
		(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	(acres)	(ESD)	Q <sub>AVG</sub>	Peaking Factor	Q <sub>I/I</sub>	Q <sub>PDWF</sub>	Q <sub>PDWFF</sub>	Diameter (inch)	Slope (ft/ft)	Velocity (fps)	
SE60			0.0	0.0	0.0	0.0	22.2	133.1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	133.1	22.2	133.1	0.041	1.965	0.031	0.081	0.112	8"	0.0035	1.69		
LR55			0.0	8.9	53.6	3.3	33.1	11.3	225.8	10.1	60.4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	27.5	38.2	400.5	38.2	400.5	0.124	1.878	0.053	0.233	0.287	8"	0.0035	2.13	
LR56			0.0	0.0	0.0	0.0	31.5	188.7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	24.2	9.4	56.2	44.8	269.0	339.7	2159.2	0.669	1.736	0.476	1.162	1.637	18"	0.0012	2.32
SE20	LR56		0.0	0.0	0.0	0.0	42.0	251.8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	11.9	5.0	30.2	49.0	293.9	81.7	490.4	0.152	1.862	0.114	0.283	0.397	10"	0.0025	2.07	
SE22	SE20		0.0	0.0	0.0	0.0	0.0	14.2	85.1	17.7	105.9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	5.5		0.0	32.7	196.5	32.7	196.5	0.061	1.935	0.046	0.118	0.164	8"	0.0035	1.88	
SE30	LR56		0.0	0.0	11.4	114.0	5.4	107.6			0.0	0.0	13.9	83.2			0.0	0.0	0.0	0.0	0.0	1.1	6.5		0.0	31.7	311.2	213.2	1399.9	0.434	1.774	0.298	0.770	1.068	15"	0.0015	2.17	
SE32	SE30		0.0	0.0	0.0	0.0	46.5	278.8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.7		0.0	46.9	281.5	181.4	1088.6	0.337	1.795	0.254	0.606	0.860	12"	0.0020	2.27	
SE33	SE32		0.0	0.0	0.0	0.0	5.2	31.2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2		0.0	5.4	32.4	134.5	807.1	0.250	1.820	0.188	0.455	0.644	12"	0.0020	2.13	
SE34	SE33		0.0	0.0	0.0	0.0	37.1	222.6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.3	6.4	38.6	44.3	265.5	129.1	774.7	0.240	1.824	0.181	0.438	0.619	12"	0.0020	2.12	
SE36	SE34		0.0	0.0	0.0	0.0	0.0	0.0			0.0	30.8	185.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.8	185.0	30.8	185.0	0.057	1.940	0.043	0.111	0.154	8"	0.0035	1.83	
SE38	SE34		0.0	0.0	0.0	0.0	37.1	222.6			0.0	16.2	97.0			0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.6		0.0	54.0	324.2	54.0	324.2	0.101	1.895	0.076	0.190	0.266	8"	0.0035	2.12	
LR58			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	391.9	3370.1	1.045	1.696	0.549	1.772	2.321	28"	0.0010	2.29	
SE40	LR58		0.0	34.7	208.4	18.1	180.5	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	12.0	0.5	3.2		0.0	55.3	404.1	391.9	3370.1	1.045	1.696	0.549	1.772	2.321	18"	0.0012	2.34
SE42	SE40		0.0	27.9	167.4	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	92.3	3.0	17.7		0.0	46.2	277.5	336.5	2966.0	0.919	1.708	0.471	1.570	2.041	18"	0.0012	2.32
SE70	SE42		0.0	17.7	106.1	10.7	106.8	0.0	0.0			0.0	0.0	0.0	10.2	193.5	1.8	11.0	2.3	14.1					0.0	42.7	431.5	42.7	431.5	0.134	1.872	0.060	0.250	0.310	8"	0.0035	2.20	
SE43	SE42		0.0	9.0	54.1	0.0	0.0	0.0	0.0			0.0	0.0	0.0	9.0	193.5	1.8	11.0	0.0	0.0					0.0	19.9	258.6	218.0	1949.8	0.604	1.745	0.305	1.055	1.360	15"	0.0015	2.28	
SE44	SE42		0.0	0.0	4.9	49.2	7.9	157.6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7				0.0	13.1	208.5	29.5	307.2	0.095	1.900	0.041	0.181	0.222	8"	0.0035	2.02		
SE45	SE44		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	16.0	96.0	0.0	0.0	0.5	2.8				0.0	16.5	98.8	16.5	98.8	0.031	1.988	0.023	0.061	0.084	8"	0.0035	1.55		
SE46	SE43		0.0	33.7	202.1	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	6.6	39.8	1.3	7.6					0.0	41.6	249.4	198.2	1691.2	0.524	1.757	0.277	0.921	1.199	15"	0.0015	2.24		
SE47	SE46		0.0	0.0	3.7	36.5	4.2	83.8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	35.6	1.2	7.3	8.2	49.4	15.4	92.3	15.4	92.3	0.029	1.993	0.022	0.057	0.079	8"	0.0035	1.52
SE48	SE47		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	11.5	68.8	0.0	0.0	0.5	2.7				0.0	11.9	71.5	27.3	163.8	0.051	1.949	0.038	0.099	0.137	8"	0.0035	1.78		
SE49	SE48		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	35.6	1.2	7.3	8.2	49.4	15.4	92.3	15.4	92.3	0.029	1.993	0.022	0.057	0.079	8"	0.0035	1.52
SE50	SE46		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	16.6	1.5	8.8		0.0	37.0	256.8	59.4	595.4	0.185	1.846	0.083	0.341	0.424	10"	0.0025	2.09
SE52	SE50		0.0	24.0	144.2	8.7	87.2	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	16.6	1.5	8.8		0.0	37.0	256.8	59.4	595.4	0.185	1.846	0.083	0.341	0.424	10"	0.0025	2.09
SE53	SE52		0.0	0.0	10.6	106.2	11.5	230.6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.9		0.0	22.5	338.7	22.5	338.7	0.105	1.892	0.031	0.199	0.230	8"	0.0035	2.04		
SE54	SE46		0.0	25.7	154.4	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	8.9	2.1	12.8		0.0	29.4	176.1	62.0	562.2	0.174	1.851	0.087	0.323	0.409	10"	0.0025	2.08
SE56	SE54		0.0	0.0	0.0	0.0	10.1	202.4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1	202.4	32.7	386.1	0.120	1.881	0.046	0.225	0.271	8"	0.0035	2.13	
SE57	SE56		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	29.3	4.9	29.3	22.5	183.7	0.057	1.940	0.032	0.110	0.142	8"	0.0035	1.81	
SE58	SE57		0.0	0.0	12.1	120.9	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	6.1	0.2	1.0		0.0	13.3	128.0	17.7	154.4	0.048	1.954	0.025	0.094	0.118	8"	0.0035	1.71
SE59	SE57		0.0	4.4	26.4	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	26.4	4.4	26.4	0.008	2.084	0.006	0.017	0.023	8"	0.0035	1.09	
LR61			6.8	41.0	25.9	155.2	0.0	0.0			0.0	0.0	0.0	0.0	0.0	8.5	193.5	17.9	107.6	3.7	22.5	2.9	17.3	65.7	537.2	65.7	537.2	0.167	1.854	0.092	0.309	0.401						
LR69			11.7	70.2	0.0	0.0	10.3	206.2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	276.4	137.2	1014.4	0.314	1.801	0.192	0.566	0.759	12"	0.0020	2.21	
LR68	LR69		7.0	42.0	0.0	11.7	117.3	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	159.3	18.7	159.3	0.049	1.951	0.026	0.096	0.123	8"	0.0035	1.74	
LR67	LR69		37.0	222.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	9.4	3.6	21.3	42.1	252.7	96.5	578.7	0.179	1.848	0.135	0.332	0.467	10"	0.0025	2.14		
LR66	LR67		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.3	326.0	0.101	1.895	0.076	0.192	0.268	8"	0.0035	2.13
SE10	LR66		0.0	0.0	0.0	0.0	0.0	0.0	0.0			43.6	261.4			0.0	0.0	0.0	0.0	0.0	0.0	6.4	38.2	4.4	26.5	54.3	326.0	54.3	326.0	0.101	1.895	0.076	0.192	0.268	8"	0.0035	2.13	
EGP80																										0.0	0.0	0.0	48.3	289.8	0.090	1.904	0.068	0.171	0.239	10"	0.0015	2.00



## **Appendix B Level II Sewer Study Exhibit**



### Laguna Ridge Specific Plan

Proposed Sewer Per the Laguna Ridge Specific Plan Sewer Study

### Elk Grove Promenade

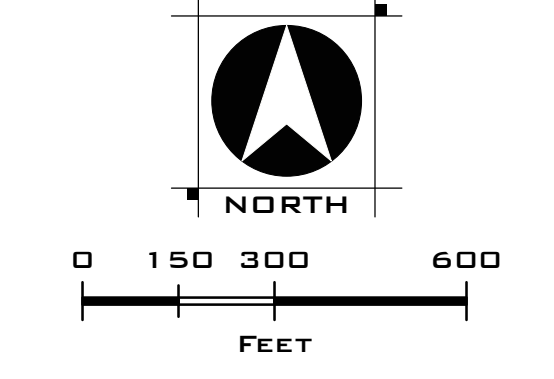
### Sterling Meadows

## ELK GROVE SOUTHEAST POLICY AREA LEVEL II SEWER STUDY ELK GROVE, CALIFORNIA MARCH 5, 2014

#### Notes:

- Cumulative flows shown for SEPA only. Node cumulative flows to include flows from the Laguna Ridge Specific Plan and other contributory offsite flows, not a part of this study.
- Cumulative flows shown for SEPA only. Node cumulative flows are in addition to the Elk Grove Promenade Master Sewer Study flows.
- Acres values are approximate and reflect high-level master planning. Acres are subject to change through subsequent development processing in keeping with the policies and procedures provided in the City's Special Planning Area document.

Estate Residential	SEPA Sewer Sheds
Low Density Residential	Laguna Ridge Trunk Shed North LS (SEPA Portion)
Medium Density Residential	Manhole
High Density Residential	SEPA Sewer Pipes
Mixed Use Residential	Existing or Proposed Sewer Pipes
Commercial	
Office	
Light Industrial / Flex Space	
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**WOOD RODGERS**  
 DEVELOPING INNOVATIVE DESIGN SOLUTIONS  
 3301 C Street, Bldg. 100-B  
 Sacramento, CA 95816  
 Tel: 916.341.7760  
 Fax: 916.341.7767





## **Appendix C Electronic GIS Files**