5.9 HYDROLOGY AND WATER QUALITY

This section of the EIR describes existing drainage and water resources for the Project area and the region, and evaluates potential impacts of the Project with respect to flooding, surface water resources, and groundwater resources. Sources utilized to complete this section include the *Water Supply Assessment for Elk Grove Southeast Policy Area* prepared by the Sacramento Water Agency; *Elk Grove Southeast Policy Area Master Water Plan* and *Southeast Policy Area Drainage Study*, both prepared by West Yost Associates; and other sources cited as appropriate.

5.9.1 EXISTING SETTING

SURFACE HYDROLOGY

Elk Grove is part of the Sacramento River watershed, which covers approximately 27,000 square miles. More specifically, surface water resources in Elk Grove are a part of the Morrison Creek Stream Group and include Elder, Elk Grove, Laguna (and tributaries), Morrison, Strawberry, and Whitehouse creeks. All surface water resources in the City drain into the Morrison Creek Stream Group, which ultimately drains into the Sacramento River (City of Elk Grove 2003b, p. 8-1). The Project area slopes to the southwest with an elevation of 39 feet to 22 feet and is bisected by a drainage canal that drains the site flowing to the west (Wood Rodgers 2013, p. 3).

Precipitation

According to the National Weather Service (2013), the annual average precipitation for the Project area ranges from 15 to 20 inches. Most annual rainfall arrives during the winter storm season from October through April, with the heavier rainfall occurring between December and February.

Drainage

The Project area lies within the City's Drainage Shed C, which covers nearly 7,900 acres in southern Sacramento County (see **Figure 2.0-4**). Of that total, approximately 2,100 acres are in Elk Grove. The watershed generally slopes from east to west with an average slope of about 0.10 percent. The existing land use in the watershed is agricultural with the exception of the Elk Grove Promenade site, which covers 525 acres in the upstream (eastern) portion of the watershed. Although the Promenade project stalled before completion, many of the site improvements were constructed, including roads, parking lots, buildings, and underground utilities including a storm drainage pipe system. The pipe system that collects runoff from the Promenade site delivers it to a detention basin that was constructed on the west side of the future Sterling Meadows project (West Yost Associates 2013, p. 1).

Downstream of the existing detention basin, runoff is conveyed through the Project area in an agricultural drainage channel, which is referred to in this section as the Shed C Channel. The Shed C Channel begins near the western boundary of the Sterling Meadows project and conveys runoff to the southwest for approximately 12,600 feet until it reaches Bruceville Road. At that point, the channel exits the City and continues west for approximately 22,000 feet where it crosses under Interstate 5 and enters the Stone Lakes National Wildlife Refuge (West Yost Associates 2013, p. 1).

Flooding

According to the Federal Emergency Management Agency's (FEMA) (2013) Flood Insurance Rate Maps (FIRM) (Panel No. 06067C0450H, 06067C0319H, and 06067C0318H), the Project area is not in any flood hazard zones and is not designated as being in an area protected from flooding

inundation by a levee system (FEMA 2013). Furthermore, the Project area is not located in the inundation area of any dams (Cal OES 2008).

GROUNDWATER HYDROLOGY

The SCWA's Zone 40 Groundwater Management Plan (2004) discusses groundwater in Zone 40, which includes both the City of Elk Grove and areas of Sacramento County and the City of Sacramento surrounding the Project area. According to the plan, formations that constitute the water-bearing deposits underlying Sacramento County include an upper, unconfined aquifer system consisting of the Victor, Fair Oaks, and Laguna formations (now known as the Modesto Formation) and a lower, semi-confined aquifer system consisting primarily of the Mehrten Formation known for its fine black sands. These formations are typically composed of lenses of inter-bedded sand, silt, and clay, interlaced with coarse-grained stream channel deposits. Groundwater in the Central Basin is generally classified as occurring in a shallow aquifer zone (Laguna or Modesto Formation) or in an underlying deeper aquifer zone (Mehrten Formation). In Zone 40, the shallow aquifer extends approximately 200 to 300 feet below the ground surface and, in general, the water quality in this zone is considered to be good except for the occurrence of arsenic in some locations. The shallow aquifer is typically targeted for private domestic wells requiring no treatment unless high arsenic values are encountered. The deep aquifer is separated from the shallow aquifer by a discontinuous clay layer that serves as a semi-confining layer for the deep aquifer. The base of the potable water portion of the deep aquifer averages approximately 1,400 feet below the ground surface. Water in the deep aquifer typically has higher concentrations of total dissolved solids (TDS), iron, and manganese. Groundwater used in Zone 40 is supplied from both the shallow and deeper aquifer systems (SCWA 2004, p. 13).

Groundwater Elevation

Intensive use of groundwater over the past 60 years has resulted in a general lowering of groundwater elevations. Over time, isolated groundwater depressions have grown and coalesced into a single cone of depression that is centered in the southwestern portion of the basin, approximately 5 miles northwest of the Project area. Groundwater level trends through much of the basin have generally declined consistently from the 1950s and 1960s to about 1980 by 20 to 30 feet. From 1980 through 1983, water levels recovered by about 10 feet and remained stable until the beginning of the 1987–1992 drought, but wells in the vicinity of Rancho Cordova appear to have recovered less than other wells in the basin since 1995 (generally less than 10 feet). From 1995 to 2003, most groundwater levels recovered to levels that were generally higher than levels prior to the 1987–1992 drought. Much of this recovery can be attributed to the increased use of surface water in the Central Basin and the fallowing of previously irrigated agricultural lands transitioning into new urban development areas. In the western portion of the Central Basin, where the Project area is located, groundwater level trends observed in Department of Water Resources (DWR) monitoring wells generally vary between 20 feet below to 60 feet below mean sea level over the period of the 1950s through the early 2000s (SCWA 2013, p. 15).

A groundwater contour map of Sacramento County indicates that groundwater levels near the Project area range from approximately 40 feet below ground surface in the spring to 60 feet below ground surface in the fall (SCGA 2012). Groundwater-level data for two wells near the Project area indicate that groundwater levels range from approximately 30 to 60 feet below ground surface (DWR 2013).

Groundwater Recharge

Groundwater in central Sacramento County moves from sources of recharge to areas of discharge. Recharge to the local aquifer system occurs along active river and stream channels where extensive sand and gravel deposits exist, particularly along the American, Cosumnes, and Sacramento river channels. Additional recharge occurs along the eastern boundary of Sacramento County at the transition point from the consolidated rocks of the Sierra Nevada to the alluvial deposited basin sediments. This typically occurs through fractured granitic rock that makes up the Sierra Nevada foothills. Other sources of recharge in the area include deep percolation from applied surface water, precipitation, and small streams. Changes in the groundwater surface elevation result from changes in groundwater recharge, discharge, and extraction. The majority of Elk Grove has poor groundwater recharge capabilities (City of Elk Grove 2003b).

WATER QUALITY

Surface Water

Based on the most current Watershed Sanitary Surveys for the American and Sacramento rivers, both rivers are excellent sources of supply for drinking water in the Sacramento Metropolitan Area. These sources waters can be treated to meet all Title 22 drinking water standards using both conventional and direct filtration processes, as well as membranes. No persistent constituents in the raw waters require additional treatment processes; however, there are seasonal treatment requirements at times for rice herbicides on the Sacramento River. This treatment requirement is addressed through chemical oxidation processes. High turbidities during storm events are a treatment challenge that can be managed by optimizing operations, including adjusting chemical types and dosing schemes and by reducing plant flow (SCWA 2004, p. 22).

As described more fully in Section 5.8, Hazards and Hazardous Materials, the Phase I Environmental Site Assessments (ESAs) done for properties within the Project area that contain dairies identified potential groundwater contamination associated with past manure and dairy wastewater discharges. The Phase I ESA prepared for the Souza property also disclosed that at the time of the study, the Regional Water Quality Control Board (RWQCB) was considering legal action against the property for illegal discharges to surface water (Engeo 2003).

The California Clean Water Act Section 303(d) list identifies water bodies with impaired water quality. As described previously, surface waters in Elk Grove drain to the Morrison Creek Stream Group, including Elder, Elk Grove, Laguna, Morrison, and Strawberry creeks, which drains to the Sacramento River. According to the 303(d) list, Elder, Elk Grove, and Morrison creeks and the Sacramento River are designated as impaired water bodies. In addition, the Delta waterways (northern portions), which are the downstream receiving waters for the Sacramento River, are also designated as impaired water bodies (SWRCB 2010).

Groundwater

The groundwater quality in Elk Grove meets all the California Code of Regulations Title 22 drinking water quality standards, with the exception of iron, manganese, and arsenic. Water quality in the upper aquifer system is regarded as superior to that of the lower aquifer system, principally because the lower aquifer system (specifically the Mehrten Formation) contains higher concentrations of iron and manganese. Water from the upper aquifer generally does not require treatment (other than disinfection). The lower aquifer system also has higher concentrations of total dissolved solids (TDS, a measure of salinity) than the upper aquifer, although it typically meets water quality standards as a potable water source. In general, in

groundwater at depths of approximately 1,400 feet or greater (actual depth varies throughout the basin), the TDS concentration exceeds 2,000 milligrams per liter (mg/L). At these concentrations, groundwater is considered to be non-potable unless reverse osmosis treatment is used to remove the dissolved solids (SCWA 2004, p. 14).

5.9.2 REGULATORY FRAMEWORK

FEDERAL

Clean Water Act

The Clean Water Act (CWA) regulates the water quality of all discharges into waters of the United States including wetlands and perennial and intermittent stream channels. Section 401, Title 33, Section 1341 of the CWA sets forth water quality certification requirements for "any applicant applying for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters." Section 404, Title 33, Section 1344 of the CWA in part authorizes the US Army Corps of Engineers to:

- Set requirements and standards pertaining to such discharges: subparagraph (e);
- Issue permits "for the discharge of dredged or fill material into the navigable waters at specified disposal sites": subparagraph (a);
- Specify the disposal sites for such permits: subparagraph (b);
- Deny or restrict the use of specified disposal sites if "the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies and fishery areas": subparagraph (c);
- Specify type of and conditions for non-prohibited discharges: subparagraph (f);
- Provide for individual State or interstate compact administration of general permit programs: subparagraphs (g), (h), and (j);
- Withdraw approval of such State or interstate permit programs: subparagraph (i);
- Ensure public availability of permits and permit applications: subparagraph (o);
- Exempt certain federal or State projects from regulation under this Section: subparagraph (r); and
- Determine conditions and penalties for violation of permit conditions or limitations: subparagraph (s).
- Section 401 certification is required prior to final issuance of Section 404 permits from the US Army Corps of Engineers.

The California statutes enforced by the California State Water Resources Control Board and Regional Water Quality Control Boards (RWQCB) are equivalent to or more stringent than the federal statutes. Regional Boards are responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters including Morrison Creek and other

creeks in and downstream of Elk Grove. In the City, the Central Valley RWQCB is responsible for protecting surface waters and groundwater from both point and non-point sources of pollution.

Federal Emergency Management Agency (FEMA)

Sacramento County is a participant in the National Flood Insurance Program (NFIP), a federal program administered by FEMA. Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 adopted as a desired level of protection an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years, although such a flood may occur in any given year. Sacramento County is occasionally audited by the DWR to ensure the proper implementation of FEMA floodplain management regulations.

STATE

Department of Water Resources

The Department of Water Resources' (DWR) major responsibilities include preparing and updating the California Water Plan to guide development and management of the State's water resources, planning, designing, constructing, operating, and maintaining the State Water Resources Development System, protecting and restoring the Sacramento-San Joaquin Delta, regulating dams, providing flood protection, assisting in emergency management to safeguard life and property, educating the public, and serving local water needs by providing technical assistance. In addition, the DWR cooperates with local agencies on water resources investigations, supports watershed and river restoration programs, encourages water conservation, explores conjunctive use of groundwater and surface water, facilitates voluntary water transfers, and, when needed, operates a State drought water bank.

Regional Water Quality Control Board Discharge Permits

The Porter-Cologne Water Quality Control Act (Porter-Cologne) governs the coordination and control of water quality in the State and includes provisions relating to non-point source pollution. The State Water Resources Control Board (SWRCB) has the ultimate authority over State water rights and water quality policy. However, Porter-Cologne also establishes nine Regional Water Quality Control Boards to oversee water quality on a day-to-day basis at the local/regional level. The Central Valley RWQCB oversees the Elk Grove area.

Permits issued to control pollution (i.e., waste discharge requirements and National Pollutant Discharge Elimination System [NPDES] permits) must implement Basin Plan requirements (i.e., water quality standards), taking into consideration beneficial uses to be protected.

Municipal Stormwater NPDES Permit

The City of Elk Grove Department of Public Works has jurisdiction over aspects of stormwater management in the City. The City became a joint participant with Sacramento County's NPDES permit. The permit, most recently renewed in September 2008, allows the City to discharge urban runoff from Municipal Separate Storm Sewer Systems (MS4s) in its municipal jurisdiction. The permit requires that the City impose water quality and watershed protection measures for all development projects. The NPDES also requires a permit for every new construction project that implements the following measures:

- Eliminate or reduce non-stormwater discharges to stormwater systems and other waters of the nation.
- Develop and implement a stormwater pollution prevention plan (SWPPP).
- Perform inspections of stormwater control structures and pollution prevention measures.

General NPDES Permits

The SWRCB issued a statewide General Permit (Water Quality Order No. 209-0009-DWQ) for construction activities within the State. The Construction General Permit (CGP) is implemented and enforced by the RWQCBs. The CGP applies to construction activity that disturbs 1 acre or more and requires the preparation and implementation of a stormwater pollution prevention plan that identifies best management practices to minimize pollutants from discharging from the construction site to the maximum extent practicable.

Certain actions during construction may also need to conform to a General Permit (Water Quality Order No. 5-00-175), which requires that a permit be acquired for dewatering and other low threat discharges to surface waters, provided that they do not contain significant quantities of pollutants and either (1) are four months or less in duration, or (2) the average dry weather discharge does not exceed 0.25 million gallons per day (mgd). Examples of activities that may require the acquisition of such a permit include well development water, construction dewatering, pump/well testing, pipeline/tank pressure testing, pipeline/tank flushing or dewatering, condensate discharges, water supply system discharges, and other miscellaneous dewatering/low threat discharges. However, the actions applicable to site development may already be covered under the CGP and therefore a separate permit may not be required.

LOCAL

Sacramento Area Flood Control Agency

The Sacramento Area Flood Control Agency (SAFCA) was formed in 1989 to address the Sacramento area's vulnerability to catastrophic flooding. In response to record flooding in 1986, the City of Sacramento, the County of Sacramento, the County of Sutter, the American River Flood Control District, and Reclamation District 1000 created SAFCA through a Joint Exercise of Powers Agreement to provide the Sacramento region with increased flood protection along the American and Sacramento rivers. SAFCA's mission is to provide the region with at least a 100-year level of flood protection as quickly as possible while seeking a 200-year or greater level of protection over time. Under the Sacramento Area Flood Control Agency Act of 1990, the California Legislature has given SAFCA broad authority to finance flood control projects and has directed the agency to carry out its flood control responsibilities in ways that provide optimum protection to the natural environment (SAFCA 2013).

Development Impact Fee Program

The SAFCA Board of Directors implemented a development fee program to ensure that new structures placed in the 200-year floodplain do not increase Sacramento's exposure to flood damages and the associated governmental costs. The fee program is intended to fund a series of flood risk reduction projects in order to achieve the goal of at least a 200-year level of protection (SAFCA 2013).

Sacramento County Water Agency Zone 40

The Sacramento County Water Agency (SCWA) created Zone 40 through Resolution No. 663 in May 1985. The purpose of Zone 40 is the acquisition, construction, maintenance, and operation of facilities for the production, conservation, transmittal, distribution, and sale of groundwater or surface water or both for the present and future beneficial use of the lands or inhabitants in the zone. The boundaries and scope of Zone 40's activities were expanded in 1999 by Resolution WA-2331 and included the use of recycled water in conjunction with groundwater and surface water. Refer to Section 5.12, Public Utilities, for more information regarding water supply and delivery.

Zone 40 Water Supply Master Plan

The Zone 40 Water Supply Master Plan was adopted February 8, 2005, and provides a plan of water management alternatives to be implemented and revised as availability and feasibility of water supply sources change in the future. The Master Plan reflects recent trends in the pattern of water demand growth, treatment for water quality, expansion of the original service area, and the availability of potential sources of surface water supplies. The objectives of the plan are:

- Identify the assumptions and recommendations from the 1987 Master Plan that are no longer appropriate.
- Develop a set of water supply alternatives that provide a long-term balance between water demands and supplies that include conservation, groundwater, surface water, and recycled water as the building blocks for water management alternatives.
- Evaluate the engineering, institutional, social, financial, and environmental aspects associated with implementing each of the potential water management alternatives.
- Recommend a water management alternative that is flexible and can be modified as situations change and additional information becomes available.
- Identify an appropriate and flexible means of financing the recommended water management alternative.
- Provide a foundation on which to base future decisions regarding the acquisition, construction, operation, and maintenance of facilities required for the production, conservation, transmission, distribution, and sale of water.

Zone 40 Groundwater Management Plan

The Zone 40 Groundwater Management Plan is a planning tool that assists the SCWA in maintaining a safe, sustainable, and high quality groundwater resource for users of the groundwater basin underlying Zone 40. The SCWA prepared the plan primarily to begin the groundwater planning process for Zone 40, positioning the agency for future activities. Groundwater management plan contain numerous technical requirements and provisions that are briefly summarized below.

- Contains an inventory of water supplies and describes water uses within a given region.
- Establishes groundwater Basin Management Objectives (BMOs) that are designed to protect and enhance the groundwater basin.

- Identifies monitoring and management programs that ensure the BMOs are being met.
- Outlines a stakeholder involvement and public information plan for the groundwater basin.

Sacramento County Department of Water Resources

Local Floodplain Management Plan

A Local Floodplain Management Plan is required for a community to participate in the NFIP Community Rating System. The original plan for the County of Sacramento was prepared by the Sacramento County Department of Water Resources in 1997 and was adopted by the County Board of Supervisors on September 16, 1997 (Resolution 97-1112). The most recent update to the plan was in 2001. A Floodplain Management Plan is a comprehensive plan that describes how a community will deal with its flooding problems and protect the natural and beneficial functions of its floodplain. The 2001 Local Floodplain Management Plan for the County of Sacramento identifies the major watersheds and watercourses in the unincorporated area of the county, the flooding problems associated with these watercourses, and the measures being taken to minimize the flood risk for each watercourse. It also seeks to protect new development from the potential of flooding from a 100-year flood event to identify activities to reduce the potential of flood damage to existing structures. The 2001 plan identifies five major watersheds in Sacramento County. The Project area is located in the Morrison Creek Stream Group (County of Sacramento 2001).

Floodplain Management Ordinance

Effective April 24, 2010, the Floodplain Management Ordinance (Sacramento County Zoning Code Sections 901 through 907) describes what types of development activities are allowed and how proposed development may be permitted. All proposed development activity in floodplains, defined as those areas designated by FEMA on the FIRMs for Sacramento County (Community Number 060262) and other areas subject to flooding, must be reviewed and permitted by the County's Floodplain Administrator prior to construction (County of Sacramento 2010).

Water Forum Agreement

In 1993, the City and County of Sacramento created the Water Forum, a diverse group of business and agricultural leaders, citizens groups, environmentalists, water managers, and local governments, to find solutions to the water dilemma. Community leaders from Sacramento County, along with water managers from Placer and El Dorado counties, agreed on principles to guide development of a regional water supply solution and negotiated the Water Forum Agreement (WFA). One of the main goals of the WFA is to provide a reliable and safe water supply for the region's economic health and planned development to the year 2030. Many cities and water agencies surrounding Elk Grove are members of the Water Forum, such as Sacramento, Folsom, Galt, the SCWA, and the Omochumne-Hartnell Water District (Water Forum 2013). Refer to Section 5.12, Public Utilities, for a more detailed description of the Water Forum Agreement and the Water Forum Successor Effort.

City of Elk Grove General Plan

The City of Elk Grove General Plan contains the following policies and actions related to hydrology and water quality that apply to the proposed Project. These policies and goals are

contained in the Conservation and Air Quality Element as well as the Safety Element (City of Elk Grove 2003a). The Project does not include any actions or components that conflict with these General Plan policies. However, it should be noted that the final authority for interpretation of a policy statement, determination of the Project's consistency, ultimately rests with the Elk Grove City Council.

"CAQ-12 The City shall seek to ensure that the quality of groundwater and surface water is protected to the extent possible."

"CAQ-12-Action 1 Continue to cooperate with the County, other cities, and the Regional Water Quality Control Board regarding compliance with the NPDES permit system, and support other water quality improvement projects in order to maintain compliance with the Basin Plan."

"CAQ-12-Action 2 Implement the City's NPDES permit on all public and private development projects and activities."

"CAQ-12-Action 3 Collect information on design, construction, and operation techniques which help prevent water pollution, and provide this information to the public and the development community."

"CAQ-13 Implement the City's NPDES permit through the review and approval of development projects and other activities regulated by the permit."

"CAQ-14 The City shall seek to minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and use on-site infiltration of runoff in areas with appropriate soils where the infiltration of storm water would not pose a potential threat to groundwater quality."

"CAQ-15 The City shall encourage water supply service providers and County Sanitation District 1 to design water supply and recycled water supply facilities in a manner that avoids and/or minimizes significant environmental effects. The City shall specifically encourage the Sacramento County Water Agency to design well facilities and operation to minimize surface flow effects to the Cosumnes River."

"CAQ-16 Future land uses that are anticipated to utilize hazardous materials or waste shall be required to provide adequate containment facilities to ensure that surface water and groundwater resources are protected from accidental releases. This shall include double containment, levees to contain spills, and monitoring wells for underground storage tanks, as required by local, State and federal standards."

"CAQ-17 The City recognizes the value of naturally vegetated stream corridors, commensurate with flood control and public acceptance, to assist in removal of pollutants, provide native and endangered species habitat and provide community amenities."

"CAQ-18 Post-development peak storm water runoff discharge rates and velocities shall be designed to prevent or reduce downstream erosion, and to protect stream habitat."

"CAQ-19 Encourage the retention of natural stream corridors, and the creation of natural stream channels where improvements to drainage capacity are required."

"CAQ-19-Action 1 Re-vegetation using native plant species shall be encouraged; use of non-native species shall be discouraged. Use of invasive species shall be prohibited."

"SA-13 The City shall require that all new projects not result in new or increased flooding impacts on adjoining parcels on upstream and downstream areas."

"SA-32-Action 1 Review new development for adequate water supply and pressure, fire hydrants, and access to structures by fire fighting equipment and personnel."

City of Elk Grove Development Standards

On its incorporation in July 2000, the City of Elk Grove adopted two County codes that provide legal authority for the Stormwater Quality Improvement Program—the Stormwater Management and Discharge Control (Elk Grove Municipal Code Chapter 15.12) and the Land Grading and Erosion Control (Elk Grove Municipal Code Chapter 16.44).

Stormwater Management and Discharge Control Ordinance

Elk Grove Municipal Code Chapter 15.12 provides authority to the City for inspections and enforcement related to control of illegal and industrial discharges to the City storm drainage system and local receiving waters.

Land Grading and Erosion Control Ordinance

Elk Grove Municipal Code Chapter 16.44 establishes administrative procedures, standards for review and implementation, and enforcement procedures for controlling erosion, sedimentation, other pollutant runoff, and the disruption of existing drainage and related environmental damage. The ordinance requires that prior to grading activities, a detailed set of plans be developed that include measures to minimize erosion, sediment, and dust created by improvement activities.

Improvement plans must identify the alteration of the natural flow of drainage before and after grading, as well as identify all natural and man-made drainage facilities. In general, plans must identify time of concentration, overflow time, concentrated flow times, rainfall intensity, runoff coefficient, and watersheds affecting the drainage facilities to which such surface water flows drain.

Where increased drainage flows have the potential to exceed the capacity of the existing facilities, plans must identify the improvements needed to accommodate the increased flows. These improvements are typically the responsibility of the point source development.

City of Elk Grove Storm Drainage Master Plan

The City adopted a comprehensive Storm Drainage Master Plan (SDMP) to provide a variety of drainage concepts for upgrading the existing storm drainage and flood control collection system. The SDMP identifies and analyzes the existing drainage deficiencies throughout the City, provides a range of drainage concepts for the construction of future facilities required to serve the City at buildout of the General Plan, and establishes criteria for selecting and prioritizing projects. The SDMP may also be utilized for the development of a capital drainage financing program. The SDMP combines the demands of flood risk reduction with ecosystem enhancements while incorporating urban development and rural residential land uses to provide an effective plan that will meet both the City's and the community's vision (City of Elk Grove 2013).

Previous drainage planning for the Project area is described in Chapter 15 of the SDMP, Volume II. The drainage concept plan in the SDMP defines an approximate configuration, alignment, and size for the future drainage channel to serve the area, and defines approximate locations and sizes of required detention basins to mitigate for increased runoff due to development. The sizing of these facilities was based on runoff rates generated from assumed future land use data based on the available information at that time (West Yost Associates 2013, p. 1)

5.9.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following CEQA Guidelines Appendix G thresholds of significance for hydrology and water quality. A hydrology and water quality impact is considered significant if implementation of the Project would result in any of the following:

1) Violate any water quality standards or waste discharge requirements.

2) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

3) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.

4) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

5) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

6) Otherwise substantially degrade water quality.

7) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

8) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

9) Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

10) Inundation by seiche, tsunami, or mudflow.

Section 1.0, Introduction, of this DEIR identifies that the proposed Project would result in no impacts related to inundation by seiche, tsunami, and mudflow. In addition, as described previously in this section, the Project area is not located in a 100-year flood hazard area as mapped on the applicable FIRMs or in the inundation areas of any levee systems or dams. Therefore, these issues (Standards of Significance 7, 8, 9, and 10) are not addressed further in the Draft EIR.

The reader is referred to Section 5.12, Public Utilities, for further discussion related to the provision of water supply as a utility. Effects on groundwater resources are addressed in Impact 5.9.3 below.

METHODOLOGY

Drainage and Flooding

The following drainage and flooding impact analyses were largely based on the Southeast Policy Area Drainage Study prepared for the proposed Project by West Yost Associates in December 2013. Following is a summary of the methodologies used in preparation of this study. A complete description of the methodologies can be found in **Appendix F**. The analysis was also based on review of the City's SDMP and applicable FEMA FIRMs for the Project area.

The drainage plan for Project area must reflect the needs of the entire Shed C watershed. Therefore, the drainage analysis for Project area includes an analysis of the entire Shed C watershed with a focus on the area located in Elk Grove. The Shed C analysis consists of two major components: (1) a continuous hydrologic analysis and (2) an event-based analysis.

The continuous hydrologic analysis considered the potential hydromodification effects of development in the watershed. Hydromodification is the change in runoff characteristics in a watershed caused by land use changes. These altered runoff characteristics can result in increased erosion and sedimentation, degradation of stream habitat, increased flood flows from increases in impervious surfaces, and other negative effects. Research has shown that a large percentage of the sediment transport and erosion in a stream system occurs at flow rates less than generated by the 2-year storm. Because of this, traditional hydrologic analyses that focus on individual design storms (e.g., 2-year, 10-year) are not suitable for hydromodification analyses. To ensure the cumulative effects of all potentially erosive flows are considered, a continuous hydrologic model is required. For the SDMP, a continuous hydrologic simulation was performed using the Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS) software. The model was used to evaluate the long-term rainfall-runoff response for the Shed C watershed for two land use conditions:

- Base Conditions – This represents existing land use conditions in the watershed plus projects that already have approved tentative maps. Projects with approved tentative maps will not be required to include hydromodification mitigation. Therefore, these projects were included in the base conditions modeling to provide a reasonable starting

point that could be used to assess the potential impacts of development of the Project area.

- Buildout Conditions – This represents full buildout of City land in Shed C. The results from buildout conditions were compared against those for base conditions to assess the performance of the drainage facilities proposed for hydromodification mitigation.

A traditional event-based analysis was also performed to assess the flood control performance of the proposed system. Single-event hydrologic and hydraulic models were prepared for the 10-year and 100-year storms for both predevelopment conditions and for mitigated buildout conditions. The results were used to confirm that the ultimate improvements would adequately mitigate for potential impacts to flood flows and to confirm the required size of the flood control channel (West Yost Associates 2013, p. 3).

Groundwater

The analysis of impacts to groundwater is based primarily on the Water Supply Assessment prepared for the proposed Project by the SCWA (2013) as well as a review of the Water Forum Agreement, SCWA's Zone 40 Groundwater Management Plan (2004), and available DWR data.

PROJECT IMPACTS AND MITIGATION MEASURES

Degrade Water Quality (Standards of Significance 1, 3, and 6)

Impact 5.9.1 Development within the proposed Project area would include construction-related activities that could expose soil to erosion during storm events, causing degradation of water quality. Urban runoff from the Project area post-construction could also contribute to the degradation of downstream water quality. Compliance with existing regulations would reduce this impact to a level that is **less than significant**.

Construction Water Quality Impacts

Construction activities associated with development under the proposed Project would include grading, demolition, and vegetation removal, which would disturb and expose soils to water erosion, increasing the amount of silt and debris entering downstream waterways. In addition, refueling and parking of construction equipment and other vehicles on-site during construction could result in oil, grease, or related pollutant leaks and spills that may discharge into storm drains. Improper handling, storage, or disposal of fuels and materials or improper cleaning of machinery close to the on-site drainage canal could cause water quality degradation.

Individual development projects within the Project area would be required to comply with Chapter 16.44 of the Elk Grove Municipal Code, which requires implementation of measures to minimize erosion, sediment, dust, and other pollutant runoff created by improvement activities. Individual development projects that would disturb 1 or more acres would also be required to obtain coverage under the State's General Construction NPDES permit, which requires projects to develop and implement a SWPPP that includes best management practices (BMPs) and requires inspections of stormwater control structures and pollution prevention measures. Examples of typical construction best management practices in SWPPPs include using temporary mulching, seeding, or other suitable stabilization measures to protect uncovered soils; storing materials and equipment to ensure that spills or leaks cannot enter the storm drain system or surface water; developing and implementing a spill prevention and cleanup plan; installing

traps, filters, or other devices at drop inlets to prevent contaminants from entering storm drains; and using barriers, such as straw bales or plastic, to minimize the amount of uncontrolled runoff that could enter drains or surface water. The discharger must also install structural controls, such as sediment control, as necessary, which would constitute Best Available Technologies (BAT) to achieve compliance with water quality standards. Compliance with these requirements would ensure that site development activities do not result in the movement of unwanted material into waters within or outside the Project area.

Operational Water Quality Impacts

Subsequent development under the proposed Project would result in urbanization of the Project area. Direct surface water quality impacts could occur from the following general land use activities:

- Residential: Maintenance of yards associated with the use of fertilizers, herbicides, and pesticides, motor vehicle operation and maintenance, and pet care.

- Commercial/Industrial/Community: Maintenance of landscaped areas associated with the use of fertilizers, herbicides, and pesticides, and motor vehicle operation and maintenance.

- Recreation/Education: Maintenance of parks and playfields associated with the use of fertilizers, herbicides, and pesticides, and motor vehicle operation and maintenance.

Runoff typically contains oils, grease, fuel, antifreeze, and byproducts of combustion (such as lead, cadmium, nickel, and other metals), as well as nutrients, sediments, and other pollutants. Additionally, animal waste from pets (e.g., dogs and cats) could lead to fecal contamination of water sources. Precipitation during the early portion of the wet season (December to April) displaces these pollutants into stormwater runoff, resulting in high pollutant concentrations in the initial wet weather runoff. This initial runoff, containing peak pollutant levels, is referred to as the "first flush" of storm events. It is estimated that during the rainy season, the first flush of heavy metals and hydrocarbons would occur during the first 5 inches of seasonal rainfall.

Development of the Project area, which is currently largely undeveloped, would significantly increase the impervious surface area, thus increasing runoff flow rates (see Impact 5.9.2). This additional drainage could result in an increase of urban runoff pollutants and first flush roadway contaminants such as heavy metals, oil, and grease, as well as an increase in nutrients (e.g., fertilizers) and other chemicals. These constituents could result in water quality impacts to on- and off-site drainage flows to area waterways. Conversely, conversion of the Project area from agricultural use to urban uses with limited landscaping could result in an overall reduction of fertilizers, pesticides, and animal waste in runoff entering downstream waterways. For example, the Project area currently contains dairies that result in runoff that could exceed water quality standards. These uses would ultimately be replaced with urban uses.

The City implements a stormwater quality program to preserve and improve water quality in its natural waterways, including ongoing compliance with the joint MS4 NPDES permit, collaboration with the other joint permittees in the Sacramento Stormwater Quality Partnership (SSQP), stream maintenance, and permit inspections and construction compliance. The SSQP educates and informs the public about urban runoff pollution, encourages public participation in cleanup events, works with industries and businesses to encourage pollution prevention, and requires development projects to implement construction and post-construction pollution controls. The drainage plan for the Project was designed to provide flood protection and

mitigation, stormwater quality treatment, and hydromodification mitigation. The Project would include natural channels with permanent water features within the stream corridor or widened areas along the corridor, which would slow flows and improve water quality, as would detention basins included in the Project.

Potential impacts to water quality from construction and operation activities are addressed through the existing requirements of Municipal Code Chapter 16.44 and individual NPDES permits. Compliance with the State General Construction Activity Storm Water Permit requirements (where applicable) and Chapter 16.44 of the Municipal Code would be required. This impact is avoided through the use of effective construction-phase, source control, and treatment control BMPs that include site preparation, runoff control, sediment retention, and other similar measures. The effectiveness of BMPs has been recognized in the California Stormwater Quality Association's Stormwater Best Management Practice Handbooks and would be ensured through routine RWQCB and City inspections. Therefore, compliance with existing regulations would reduce surface water quality impacts associated with implementation of the proposed Project to a level that is **less than significant**.

Mitigation Measures

None required.

Drainage and Flooding (Standard of Significance 5)

Impact 5.9.2 Urbanization of the Project area would increase stormwater runoff and alter existing drainage patterns, potentially resulting in flooding. The Project includes a drainage plan to accommodate increased flows; however, this impact is **potentially significant**.

Development of the Project area, which is currently largely undeveloped, would significantly increase the impervious surface area, thus increasing runoff flow rates. Section 16.44 of the Elk Grove Municipal Code requires projects that would increase drainage flows and have the potential to exceed the capacity of existing drainage facilities to identify the improvements needed to accommodate the increased flows on project plans.

As described previously, the City's SDMP contains a preliminary drainage concept plan for the Shed C watershed, which includes the Project area, based on assumed future land use data. A drainage study was prepared for the proposed Project (West Yost Associates 2013; see **Appendix F**) to update this preliminary drainage concept plan based on the currently proposed land use plan.

The drainage concept for Shed C includes a multifunctional drainage corridor that would create and enhance the natural stream and habitat values. The multifunctional corridor would include a low-flow channel that is stable and self-sustaining and would be designed based on natural processes. The low-flow channel would meander within a larger floodplain corridor that would provide flood storage and conveyance as well as an opportunity for the creation of wetland habitat. Additional key components of the drainage concept are detention basins that would be included at major inflow points to the drainage corridor. These detention basins would provide flood storage and flow duration control to mitigate for potential flood flow increases and hydromodification effects due to the proposed urban development in the watershed (West Yost Associates 2013, p. 2).

Specifically, the new channel would be constructed between Lotz Parkway and Bruceville Road. The approximate alignment of the channel is shown on **Figure 2.0-5**. The channel would include five reaches; within each reach, the channel cross section would have the same general configuration, but with different dimensions. Box culverts are proposed at the five road crossings in the Project area. The downstream end of the proposed channel, especially Reach 4 (see **Figure 2.0-5**), is relatively shallow. To provide as much depth as possible in this reach of the channel, it is proposed that some excavation be performed to deepen the existing channel downstream of Bruceville Road. The excavation would be limited to construction of a small pilot channel to eliminate existing high points in the existing channel, which would allow the proposed Project channel to be constructed deeper. The off-site excavation is only intended to provide extra depth in the on-site channel and is not intended to provide a significant increase in capacity downstream of Bruceville Road. It is estimated that the pilot channel would extend approximately 3,200 feet downstream of Bruceville Road and the average depth of excavation would be approximately 1.8 feet.

Runoff from within the Project area would be directed into one of the nine detention basins. The general locations and approximate areas of the basins are shown on **Figure 2.0-5**. Underground pipe systems would convey runoff from small to moderate storms to the detention basins. During large events that exceed the capacity of the pipe systems, excess flow would be conveyed overland through streets and open space.

Table 5.9-1 provides the calculated peak flood flows from the Project area for the 10-year and 100-year storm events under predevelopment and buildout conditions. As shown in **Table 5.9-1**, buildout of the proposed Project, including the proposed drainage channel and associated detention basins, would result in an overall reduction of peak flood flows.

TABLE 5.9-1
COMPARISON OF FLOOD FLOWS (CUBIC FEET PER SECOND)

Location	10-Year Storm Event		100-Year Storm Event	
	Pre-Development	Buildout	Pre-Development	Buildout
Bruceville Road	504	409	802	772

Source: West Yost Associates 2013, p. 30

According to the Project drainage study (West Yost Associates 2013, p. 30), the existing drainage channel and culvert capacities are insufficient to pass the 10-year or 100-year storm flows and significant overbank flooding would occur with potential structure flooding in certain portions of the Project area during a 100-year storm event. Under buildout conditions, the proposed detention basins and channel improvements would provide adequate storage and conveyance to protect the Project area from flooding and mitigate potential flood flow increases downstream (West Yost Associates 2013, p. 15). However, as individual projects are designed, it may be infeasible to direct flow overland from some small isolated areas to the planned detention basins due to existing topography and/or proposed site design. Therefore, this impact would be **potentially significant**.

Impacts associated with construction of the planned drainage facilities described here are assumed as part of the Project and are addressed in the individual technical sections of this Draft EIR (Sections 5.1 through 5.13). Where necessary, mitigation measures are provided to reduce impacts to levels that are less than significant. Potential impacts include disturbance of biological and/or cultural resources, conversion of agricultural land, temporary air emissions, soil

erosion and water quality degradation, handling of hazardous materials, temporary construction noise, and temporary construction traffic.

Mitigation Measures

MM 5.9.2a New development applications within the Project area shall be accompanied by site-specific drainage reports consistent with the Southeast Policy Area Drainage Study. The project drainage reports shall be reviewed and approved by the Public Works Department prior to improvement plan approval for new development. The project drainage report shall include, at a minimum, written text addressing existing conditions, the effects of project improvements, all appropriate calculations, a watershed map, potential increases in downstream flows and volumes, proposed on-site improvements, and drainage easements, if necessary, to accommodate flows from the site. The site-specific drainage plans shall ensure that peak flows from developed areas do not exceed pre-development conditions. Temporary or interim improvements may be allowed provided the Public Works Department has determined such temporary or interim improvements do not impede development of the drainage master plan contained in the Southeast Policy Area Drainage Study.

Timing/Implementation: *Prior to improvement plan approval*

Enforcement/Monitoring: *City of Elk Grove Public Works Department*

MM 5.9.2b Grading plans for individual development projects in the Project area shall be designed in such a way to direct all overland flow into proposed on-site detention basins. If this is not feasible, separate stormwater quality treatment facilities shall be constructed and a detailed drainage study shall be completed which demonstrates that the overall flood control and hydromodification goals for the watershed, contained in the City's SDMP, are still met.

Timing/Implementation: *As a condition of Project approval and implemented during review of individual development projects*

Enforcement/Monitoring: *City of Elk Grove Public Works Department*

Implementation of mitigation measures **MM 5.9.2a** and **MM 5.9.2b** would ensure that on-site drainage facilities are designed and constructed in accordance with the assumptions of the Project's drainage study or that, where necessary, individual drainage and stormwater treatment facilities would be designed to ensure adequate capacity. With implementation of the mitigation measures, this impact would be **less than significant**.

Deplete Groundwater Supplies (Standard of Significance 2)

Impact 5.9.3 The proposed Project would result in increased use of groundwater from the Central Basin to meet domestic demand. The total water demand would not exceed the basin's sustainable yield. Therefore, this impact would be **less than significant**.

The proposed Project would obtain domestic water supplies from the Sacramento County Water Agency (SCWA). The Project's water demand, as part of the Zone 40 water demand, would be met by conjunctive use of groundwater and surface water. Groundwater would be pumped from the South American Subbasin of the Central Basin as defined by the California Department of Water Resources (DWR) (2003) Bulletin 118.

The estimated long-term annual sustainable yield of groundwater from the Central Basin is 273,000 acre-feet per year (AF/year). Currently, groundwater extractions are estimated to be 235,000 AF/year (excluding remediation). In addition, the SCWA, as a member of the Sacramento Central Groundwater Authority (SCGA), actively participates in the implementation of the adopted Groundwater Management Plan, which was developed to maintain a safe and sustainable groundwater resource within the Central Basin. Some of the objectives of the Groundwater Management Plan are to maintain a long-term average extraction rate at or below the sustainable yield, maintain groundwater elevations, and protect against land surface subsidence. The SCWA's current Urban Water Management Plan (UWMP) would not result in the exceedance of the basin's sustainable yield or the agency's groundwater allocation per the WFA. The projected annual water demand for the Project is 3,278.3 AF/year (SCWA 2013). This projected water demand is accounted for in the SCWA's (2011) current Urban Water Management Plan; therefore, the Project would not result in the exceedance of the basin's sustainable yield or the agency's groundwater allocation per the WFA. Implementation of the proposed Project would not result in the substantial depletion of groundwater supplies, and this impact would be **less than significant**.

In addition, as described previously, recharge to the local aquifer system primarily occurs along active river and stream channels where extensive sand and gravel deposits exist. Although the proposed Project would result in the creation of impervious surfaces within the Project area, the Project area does not contain any river or stream channels or other conditions conducive to significant aquifer recharge. Therefore, the proposed Project would have a **less than significant** impact on groundwater recharge.

Mitigation Measures

None required.

5.9.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The cumulative setting for drainage impacts is the area identified as Drainage Shed C in the City's Storm Drainage Master Plan, which covers nearly 7,900 acres in southern Sacramento County. The cumulative setting for groundwater impacts is the area that pumps groundwater from the Central Basin, which includes the cities of Elk Grove, Sacramento, and Folsom as well as areas of unincorporated Sacramento County.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Water Quality Impacts (Standards of Significance 1, 3, and 6)

Impact 5.9.4 Development of the Project area, in combination with other development in Drainage Shed C, would alter existing drainage patterns and result in water

quality degradation. Compliance with existing regulations would reduce these impacts to a level that is **less than cumulatively considerable**.

As described under Impact 5.9.1, development of the Project area could contribute to water quality degradation from construction and operation activities as well as alteration of existing drainage patterns. Development associated with the proposed Project, in combination with cumulative development in Drainage Shed C, could result in cumulative water quality impacts.

All future development in the Project area and other portions of the drainage shed that lie within the City would be required to comply with Elk Grove Municipal Code Chapter 16.44, which requires implementation of measures to minimize erosion, sediment, dust, and other pollutant runoff created by improvement activities. Other areas of the drainage shed in unincorporated Sacramento County would be required to comply with similar regulations under the County's Land Grading and Erosion Control Ordinance. All projects that would disturb 1 acre or more would also be required to obtain coverage under the State's General Construction NPDES permit, which requires projects to develop and implement a SWPPP and requires inspections of stormwater control structures and pollution prevention measures.

This impact is reduced through the use of effective BMPs that include site preparation, runoff control, sediment retention, and other similar features. The effectiveness of BMPs has been recognized in the California Stormwater Quality Association's California Stormwater Best Management Practice Handbooks and would be ensured through routine RWQCB and City inspections. Compliance with these existing regulations would minimize water quality impacts associated with cumulative development in the drainage shed to a level that is less than significant; therefore, contributions by the Project would be **less than cumulatively considerable**.

Mitigation Measures

None required.

Cumulative Drainage and Flooding Impacts (Standards of Significance 4 and 5)

Impact 5.9.5 Development of the Project area, in combination with other development in Drainage Shed C, would increase stormwater runoff and alter existing drainage patterns. Compliance with existing regulations would reduce these impacts to a level that is **less than cumulatively considerable**.

Continued urbanization in Drainage Shed C would increase drainage flows through the creation of impervious surfaces including roads, parking lots, and rooftops. Increased drainage flows could exceed existing and/or planned drainage facilities, resulting in flooding. However, the City has developed the Storm Drainage Master Plan to identify deficiencies in the City's drainage system and plan for necessary improvements to accommodate drainage flows as the City is built out in accordance with the General Plan. In addition, Section 16.44 of the Municipal Code requires projects that would increase drainage flows and have the potential to exceed the capacity of existing drainage facilities to identify the improvements needed to accommodate the increased flows on project plans. Implementation of the City's SDMP and compliance with this existing requirement would ensure that future development projects within Drainage Shed C are designed and constructed with adequate drainage facilities to prevent flooding. Furthermore, as shown in **Table 5.9-1** and discussed in Impact 5.9.2, buildout of the Project area, including the proposed drainage channel and associated detention basins, would result in an overall reduction in peak flood flows in the Project area. With implementation of mitigation measures **MM 5.9.2a** and **MM 5.9.2b**, the proposed Project's drainage system would provide

adequate storage and conveyance to prevent flooding in the Project area and downstream. Therefore, this impact would be less than significant and contributions by the Project would be **less than cumulatively considerable**.

Mitigation Measures

None required.

Cumulative Water Demand Increase (Standard of Significance 2)

Impact 5.9.6 Development of the Project area, in combination with other development within the SCWA's Zone 40, would increase demand for groundwater and could potentially interfere with recharge of the aquifer. This impact would be **less than cumulatively considerable**.

As development occurs in the region, the demand for groundwater resources will increase, resulting in greater withdrawals from the Central Basin. However, continued implementation of the Water Forum Agreement and the Groundwater Management Plan would protect the Central Basin from overdraft by limiting withdrawals to below the established sustainable yield. While the proposed Project, as described under Impact 5.9.3, would increase demand for groundwater resources, the increase would not result in exceedance of the sustainable yield of the aquifer and would not affect implementation of the Water Forum Agreement or the Groundwater Management Plan. Therefore, this impact would be less than significant, and the proposed Project's contribution to this impact would be **less than cumulatively considerable**.

Mitigation Measures

None required.

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