## 4.8 HYDROLOGY AND WATER QUALITY

This section characterizes the hydrologic setting related to the proposed project site, and evaluates the effects the proposed project would have on flooding potential and water quality.

### *A. Regulatory Framework*

This section describes federal, State, regional and local regulations pertinent to hydrology, drainage and water quality issues in the project area.

#### 1. Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) requires flood-prone communities to implement comprehensive floodplain management measures in order to qualify for federal flood insurance coverage. FEMA has two main designations for lands that are subject to flooding: the 100-year floodplain and the regulatory floodway. The 100-year floodplain is the area that has a statistical probability of being flooded once in every 100 years. The regulatory floodway is the portion of the floodplain that is capable of conveying the 100-year flood with no more than a 1-foot rise in water surface from the original unencroached river channel and floodplain. Within certain constraints, development is typically allowed to encroach in the portion of the floodplain that is located outside the floodway. FEMA also recognizes a 500-year floodplain.

The intent in designating the floodway is to limit construction adjacent to the river to activities that will not significantly affect the flow of water. FEMA has produced a Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) that delineate a 100-year and a 500-year floodplain and a regulatory floodway for the Petaluma area.

#### 2. Clean Water Act

The Clean Water Act (CWA) requires the reporting of any prohibited discharge of oil or hazardous substance. In the project area, the requirement is regulated by the San Francisco Bay Regional Water Quality Control Board

(RWQCB) and the City of Petaluma's Department of Water Resources and Conservation. The following provides an overview of the key features of the CWA.

a. Sections 401 and 404

Discharge of dredge or fill material into waters within the U.S. (including wetlands and creeks) are regulated under Section 404 of the CWA. Such activities would require a Section 404 permit from the U.S. Army Corps of Engineers, as well as an associated Section 401 Water Quality Certification from the San Francisco Bay RWQCB.

b. National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program was established in the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities.

In November 1990, the U.S. EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity if the project would disturb more than 5 acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, require that NPDES permits be issued for construction activity for projects that disturb between 1 and 5 acres. Phase 2 of the municipal permit system (known as the NPDES General Permit for

Small MS4s) require small municipal areas of fewer than 100,000 persons to develop stormwater management programs. The RWQCBs in California are responsible for implementing the NPDES permit system. The San Francisco Bay RWQCB is the regulatory agency having national NPDES permit oversight authority for Petaluma.

**3. Basin Plan**

The San Francisco Bay Basin Water Quality Control Plan is referred to as the Basin Plan. The Basin Plan is the master policy document that describes the program of water quality protection for the Bay and its tributaries. The three main elements that the Plan provides are:

- A statement of beneficial uses of the water that the Plan must protect.
- The water quality objectives that have been defined to protect the beneficial uses.
- The strategy and time schedule for achieving the water quality objectives.

The Basin Plan lists beneficial uses for each separate water body in the San Francisco Bay region and defines water quality objectives to support these uses. The June 1995 Plan, currently under review for amendments, identifies the following beneficial uses for the Petaluma River:

- Cold Freshwater Fisheries and Aquatic Habitat
- Marine Habitat
- Fish Migration
- Navigation
- Preservation of Rare and Endangered Species
- Water Contact Recreation
- Water Non-contact Recreation
- Fish Spawning

- Warm Freshwater Fisheries and Aquatic Habitat
- Wildlife Habitat[1]

**4. Petaluma River Watershed Management Plan**

The Southern Sonoma County Resource Conservation District prepared the Petaluma River Watershed Management Plan in 1999.[2] One purpose of the plan is to improve water quality and groundwater recharge in the Petaluma watershed, with the ultimate purpose of removing the Petaluma River from the 2002 Clean Water Act's Section 303(d) list of impaired waters.[3]

**5. Petaluma General Plan**

The Community Health and Safety Element of the existing Petaluma General Plan directs the City to protect the community from risk of flood damage, and to continue to preclude new developments from compounding or negatively impacting the potential for flooding in developed areas. Similarly, policies in the proposed General Plan serve to provide for adequate drainage facilities throughout the City and to reduce potential impacts to water quality. Relevant policies and programs are listed in Table 4.8-1.

**6. Petaluma Storm Water Management Plan**

The City's Storm Water Management Plan was adopted by the City Council in March 2003 to comply with the NPDES permit requirements. It requires the City to effectively prohibit non-stormwater discharges from the incorporated area of the city into the city's MS4 except as otherwise permitted by

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[1] San Francisco Regional Water Quality Control Board, *Basin Plan*, 1995, Table 2-1. Available at: http://www.waterboards.ca.gov/sanfranciscobay/basinplan/web/BP_CH2.html.

[2] Southern Sonoma County Resource Conservation District website, http://www.sonomamarinrcds.org/district-ssc/resources/pubs/other-pubs.html, accessed on June 14, 2006.

[3] California Coastal Conservancy, 2006, *California's Critical Coastal Areas State of the CCAs Report*, 26 January, page 1. Available for review at http://www.coastal.ca.gov/nps/Web/CCA_bg.htm.

TABLE 4.8-1 **PETALUMA GENERAL PLAN POLICIES AND PROGRAMS — HYDROLOGY AND WATER QUALITY**

| Policy/Program Number | Policies and Programs |
|---|---|
| **Existing General Plan** | |
| *Community Health & Safety Element* | |
| Policy 10 | The City shall continue to require fees, standards, and other measures to mitigate downstream impacts associated with new development. |
| Program 4 | Enforce measures to minimize soil erosion and volume and velocity of surface runoff both during and after construction. |
| Program 6 | Continue to support the programs of the Sonoma County Water Agency to protect drainage channels and keep them clear of silt and debris. |
| Program 8 | Encourage landowners who desire development of floodplain parcels to develop plans and funding mechanisms to prevent flooding. |
| **Proposed General Plan** | |
| *Water Resources Element* | |
| Goal 8-G-6 | Preserve and maintain the City's groundwater resources. |
| Policy 8-P-20 | Manage groundwater as a valuable and limited shared resource by protecting potential groundwater recharge areas and stream sides from urban encroachment within the Petaluma watershed. |
| Goal 8-G-8: | Provide surface drainage and flood protection facilities to meet the community's needs. |
| Goal 8-G-9: | Preserve the design conveyance capacity of the surface water drainage system. |
| Policy 8-P-37 | Due to potential positive impact to increased water discharge, all development activities shall be constructed and maintained in accordance with Phase 2 National Pollutant Discharge Elimination System (NPDES) permit requirements. |
| Policy 8-P-37(A) | The Water Resources and Conservation Department shall review, and have the authority to conditionally approve, all development permits to insure compliance with NPDES Phase 2 requirements. |
| Policy 8-P-37 (C) | A funding mechanism, such as a storm water utility fee connected to the waste water collection fee, shall be implemented by the City to insure a dedicated source of funds is available for all surface water drainage system maintenance and improvement needs. |

law.[4] The City's Storm Water Program, administered through the Water Resources and Conservation Department, is responsible for implementing the Storm Water Management Plan.[5]

**7. Petaluma Grading and Erosion Control Ordinance**

The City's Grading and Erosion Control Ordinance further requires a stormwater pollution prevention plan (SWPPP) for projects that result in soil disturbance of 1 acre or greater. The purpose of a SWPPP is to identify sources of sediment and other pollutants that affect the quality of stormwater discharges and to describe and ensure the implementation of best management practices to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges. Additionally, the ordinance requires submission of an erosion and sediment control plan. The final erosion and sediment control plan must effectively minimize soil erosion and sedimentation from the completed project site and must also provide for the control of runoff from the site.

**8. Petaluma Stormwater Management and Pollution Control Ordinance**

The Stormwater Management and Pollution Control Ordinance establishes requirements to help the City comply with the federal Water Pollution Control Act and the State Porter-Cologne Water Quality Control Act by reducing pollutants in stormwater discharges to the maximum extent practicable (MEP) and by prohibiting non-stormwater discharges to the City's municipal separate storm system (MS4). The Ordinance enables the City to adopt requirements identifying appropriate best management practices (BMPs) including, but not limited to, source control and post construction treatment control measures to control the volume, rate, and potential pollutant load of stormwater runoff from new development and redevelopment projects as

[4] *City of Petaluma Municipal Code*, Section 15.80.020.B. http://www.codepublishing.com/ca/petaluma.html, accessed on February 20, 2007.

[5] City of Petaluma Stormwater Program website, http://www.cityofpetaluma.net/wrcd/stormwater.html, accessed on June 13, 2006.

may be appropriate to minimize the generation, transport and discharge of pollutants.

The Ordinance further directs the City to incorporate such requirements in any land use entitlement and construction or building-related permit issued. The selection and the design of the BMPs, including post-construction treatment control measures, shall be per the City's stormwater policy and design standards and per the applicable NPDES permit issued to the City and other available guidance documents.

Final occupancy will not be authorized until the BMPs and post-construction treatment measures are properly installed and provisions for long-term maintenance of these BMPs and treatment measures are accepted by the City.[6]

### *B. Existing Conditions*

This section describes the regional drainage and groundwater setting in which the project site exists and site-specific drainage, groundwater and other hydrologic conditions.

#### 1. Regional Drainage

The project site is located within the Petaluma River watershed, which drains an area of approximately 146 square miles.[7] The Petaluma city limits encompass approximately 13 square miles situated in the upper portion of the watershed.[8] The watershed is approximately 19 miles long and 13 miles wide with the City of Petaluma near its center. It covers parts of Sonoma and Marin

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[6] *City of Petaluma Municipal Code*, Chapter 15.80, Section 15.80.150. http://www.codepublishing.com/ca/petaluma.html, accessed on February 20, 2007.

[7] City of Petaluma, *Existing Conditions Report*, Water Resources Chapter, page 85, available for review at City Hall, Community Development Department, 11 English St., Petaluma.

[8] City of Petaluma Stormwater Program website, http://www.cityofpetaluma.net/wrcd/stormwater.html, accessed on June 13, 2006.

counties, extending from the steep southwestern slopes of Sonoma Mountain to the mouth of the Petaluma River at San Pablo Bay. The confluence of Willow Brook, Liberty Creek, and Weigand's Creek form the headwaters of the Petaluma watershed. The Petaluma River itself flows across the Denman Flat area and through the City of Petaluma. Tidal influence extends upstream of the confluence with Lynch Creek (beyond the railroad crossing).[9] A map of the Petaluma River watershed is shown in Figure 4.8-1.

Petaluma's surface water drainage system includes open channels, conduits, culverts, bridge openings and control structures such as dams, weirs, and orifices. The addition of impervious areas within the City has changed the local hydrology. Runoff conveyed over paved streets and parking lots into open channels or pipes that carry flows to the Petaluma River reaches the River more quickly, generally creating higher peak flows, than runoff conveyed through natural streams or through native vegetation.[10] The City of Petaluma and the Sonoma County Water Agency share responsibility for maintaining improved stormwater conveyance channels in the city.[11]

**2. Regional and Local Groundwater**

The project site is located in the Petaluma Valley groundwater basin,[12] which is part of the San Francisco Bay Hydrologic Region. This region has 28 identified groundwater basins, which underlie 1,400 square miles. The Petaluma

[9] Southern Sonoma County Resource Conservation District website, http://www.sonomamarinrcds.org/district-ssc/area/petaluma.html, accessed on June 14, 2006.

[10] City of Petaluma, *Existing Conditions Report*, Water Resources Chapter, page 85.

[11] City of Petaluma, *Existing Conditions Report*, Water Resources Chapter, page 87.

[12] Sonoma County General Plan Draft Groundwater Basins and Sub-basins Map, January 2006. Available for review at Sonoma County Permit and Resource Department, 2550 Ventura Avenue, Santa Rosa.

Valley groundwater basin is one of the more heavily utilized basins in this region.[13]

The total annual natural recharge volume (and corresponding safe yield) for the northern Petaluma groundwater basin was estimated to be around 40,000 acre-feet (approximately 25,000 gpm) by the Department of Water Resources in June 1982. As of 2002, the City did not have any projects in place to recharge the groundwater basin.[14] However, more recently, as part of the surface water and groundwater studies completed for the General Plan Update, the City has identified potential locations for groundwater recharge projects and has begun conceptual analysis to determine project feasibility.

A supply of local groundwater is maintained by the City of Petaluma for standby purposes. The water is naturally filtered by the sand and gravel it passes through in the aquifers. Chlorine is added for disinfection.[15] During preparation of the City's Water Resources Element for the General Plan Update, West Yost & Associates was retained by the City of Petaluma to develop a Groundwater Master Plan. Dodson Engineers utilized the work prepared by West Yost & Associates to complete a Water Demand and Supply Analysis Report in 2006. As stated in the Demand and Supply Report, the City of Petaluma currently has seventeen (17) groundwater wells.[16] Since completion of the Supply and Demand Analysis Report, four more wells have been constructed, but remain inactive. Twelve of the wells are permitted by the Cali-

[13] California Department of Water Resources Planning and Local Assistance, 2003, *California's Groundwater Update 2003*, Bulletin 118, page 131. Available at http://www.groundwater.water.ca.gov/bulletin118/.

[14] City of Petaluma, *Existing Conditions Report*, Water Resources Chapter, page 87.

[15] City of Petaluma Department of Water Resources and Conservation, 2004, *Annual Water Quality Report*, page 2. Available for review at City Hall, Community Development Department, 11 English St., Petaluma.

[16] Dean Eckerson, City of Petaluma, Engineering Manager in the Water Resources and Conservation Department. Email correspondence received by DC&E on January 3, 2007.

fornia Department of Health Services (DHS) while the other five are not permitted. The five non-permitted wells and one of the permitted wells are inactive. These wells have low yields and water quality issues. The wells are predominately on the east side of the City because the City has experienced better water quality in these areas. Well depths range from 229 to 680 feet, with most wells being around 500 feet deep.

The City's policy has been to design wells with a short-term (2 to 3 days) maximum capacity independent of drawdown to enable their use for standby, emergency, peak hour, or maximum use day. Due to aesthetic issues such as bitter taste, discolored water, iron staining, low chlorine residuals, and odor when using the existing wells, the City has limited their use and utilized SCWA water for potable water demands. City wells have been used when required to meet peak summer demands to avoid exceeding SCWA's Average Day Maximum Month (ADMM) limit in past years, but the preference is to reserve the City wells for emergency use only.

Based on findings by West Yost & Associates the annual groundwater limit for the City of Petaluma is estimated at 3,000 acre-feet/year (afy) (973.2 million gallons per year (mgy). The limit provided by West Yost & Associates was used for this analysis.[17]

### 3. Project Site Drainage

A preliminary hydrology study for the project site was completed in August 2004. A full copy of the study report is available as part of the project application at City Hall.

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[17] Dodson Engineers, 2006, *Water Supply and Demand Analysis Report,* Technical Appendix C to the Draft General Plan 2025, Vol. 2, page 1-12. Available for review at City Hall, Community Development Department, 11 English St., Petaluma. (Copies of the draft General Plan 2025 and Draft Environmental Impact Report, General Plan 2025, are also available on the City's website at http://cityofpetaluma.net; the full set of General Plan documents, including technical appendices, are also available for review or purchase from General Plan Administration, 27 Howard St., Petaluma.)

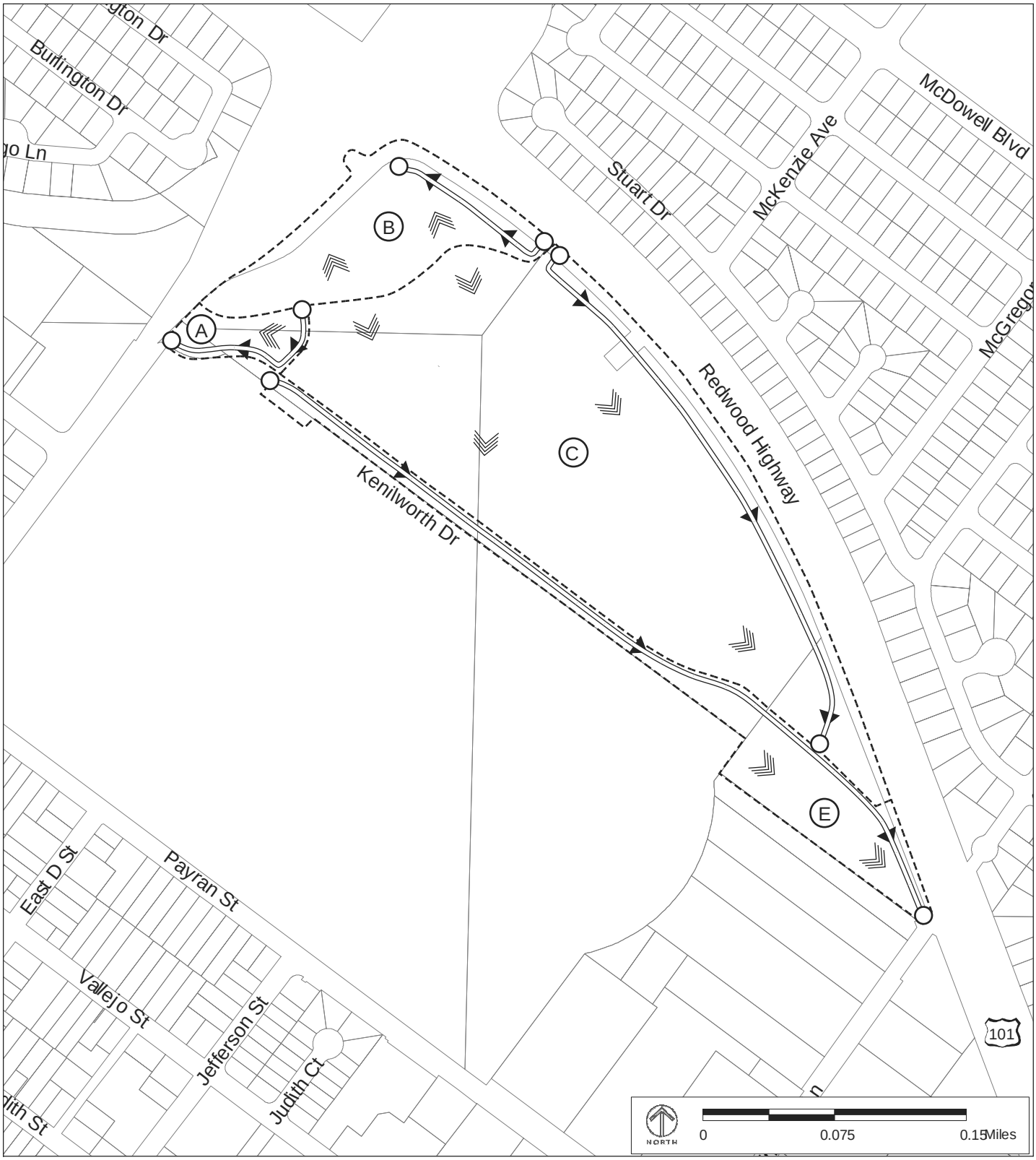
Topography of the project site is flat with slopes ranging from 0 to 5 percent. Site vegetation consists of natural grasses, non-native grasses, various trees and landscaping.[18] The closest surface water feature to the project site is Washington Creek, which is located north of the project site and East Washington Street. The creek runs in a roughly northwest to southwest direction and drains into the Petaluma River.

The preliminary hydrology study located several tributary areas for the project site, marked A through E in Figure 4.8-2 (however, tributary area D, where the skate park and swim center are located, is not shown because since the preparation of the study, that area was removed from the project). Water flowing into Tributary Area A continues on to a curb inlet on Kenilworth Drive near East Washington Street and then into Washington Creek. Tributary Area B flows remain on site and converge toward a low point at the northern property corner near the East Washington Street overpass. Tributary Area C flows southerly to a triple 24-inch corrugated metal pipe on Kenilworth Drive near the southern property corner. Tributary Area E flows toward the southern property corner and near Lindberg Lane.[19]

Existing runoff is conveyed into three drainage basins. The majority of the site runoff flows southerly and is intercepted by various drainage channels and underground storm drain pipes. The systems converge and eventually discharge to the existing storm drain system in Lindberg Lane. This system has recently been improved to within 200 feet of the southern boundary of the project site. A much smaller northern area of the school is collected into various drainage inlets that flow through an underground storm drain system

[18] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 1. Available for review at City Hall, Community Development Department, 11 English St., Petaluma.

[19] Tributary Area D, which was listed in the Preliminary Hydrology Study, is not part of the project site.




Source: Pulte Homes, Pleasanton, California and Regency Centers, Walnut Creek, California. June 2005.

Ⓒ Tributary Area

Flow Direction

Primary Drainage Flow Path

FIGURE 4.8-2

DITCHES AND WATER FLOW AROUND PROJECT SITE

in Kenilworth Drive near East Washington Street. This system eventually discharges into Washington Creek, just north of East Washington Street.[20]

The storm drain facilities at the project site were designed for the development conditions that existed when the former school and bus facility were operating. The Wilson/Lakeville and Lindberg Lane storm drain systems convey stormwater flows from the project site to the Petaluma River and were designed by the Sonoma County Water Agency. The design assumptions used for the Wilson/Lakeville and Lindberg Lane storm drain systems include the following:

- a run-off value (c-value) of 0.50 for the Kenilworth Junior High School property;
- a c-value of 0.90 for the Petaluma Fairgrounds property fronting on Washington Street; and
- a c-value of 0.50 for the rest of the property.

Both the Wilson/Lakeville and Lindberg Lane storm drain systems are 10-year designs with larger storm flows calculated to run into the streets.[21]

**4. Surface Water Quality**

Runoff from the project site ultimately discharges into the Petaluma River. Water quality criteria and objectives for the Petaluma River are applicable to the tributaries and surface waters that drain to the river.

The Petaluma River Watershed supports beneficial uses for cold and freshwater habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, and contact and non-contact water recreation. The Petaluma River's water quality is affected by urban growth, construc-

[20] Wayne Leach, CSW/Stuber-Stroeh Engineering Group, Inc. Personal email communication with Catherine Reilly, DC&E, April 19, 2006.

[21] Chris Murray, Principal Engineer, Sonoma County Water Agency, Letter to Craig Spalding, Petaluma City Engineer, and Mike Moore, Petaluma Community Development Director, May 14, 2003.

tion, land development, atmospheric deposition, and agricultural activities that contribute a variety of pollutants to the surface water runoff. This pollution has resulted in the listing of the Petaluma River on the 2002 Clean Water Act's Section 303(d) list for nutrients, pathogens, and sediment.[22]

**5. Project Site Groundwater Quality**

As explained in more detail in Section 4.7, Hazards and Hazardous Materials, of this EIR, a Phase II Soil Investigation for two parcels of the project site was conducted in 2004. The areas studied were associated with the bus maintenance facilities used by the Petaluma School District and the Petaluma Transit Agency. In 1987, three underground storage tanks (USTs) were found to have leaked and were removed. Investigations of the former UST location in 1990 and 1991 indicated that the soils and groundwater were impaired and required remediation. Several tons of soil was removed for off-site disposal and groundwater was pumped from the excavation. The concrete tie-down for the USTs was left in place.

At the request of Sonoma County Department of Environmental Health (DEH) groundwater has been monitored on-site quarterly in four monitoring wells since 1991, although no on-site monitoring took place from 1996 through October 2001. The most recent groundwater monitoring event on the bus maintenance facility site took place in January 2004 and was reported in a Geysers Geothermal Association report dated February 24, 2004. Concentrations of total petroleum hydrocarbons (TPH) and benzene exceeding typical cleanup levels were detected in one of the wells. Based on the data and soil conditions, the contamination was likely localized and had probably not migrated a significant distance.[23]

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[22] City of Petaluma Stormwater Program website, http://www.cityofpetaluma.net/wrcd/stormwater.html, accessed on June 13, 2006.

[23] URS, 2004, *Phase II Soil Investigation for 993 Lindberg Lane and 482 Kenilworth Drive,* June 2, pages 2. Available for review at City Hall, Community Development Department, 11 English St., Petaluma.

The data indicate that groundwater remains impaired by fuel constituents. These include TPH as gasoline and diesel, and benzene. Over the years, three of the wells, including two upgradient wells and one downgradient well, have generally been minimally impacted by the former leak. In fact, TPH, benzene and other fuel constituents have seldom been detected in these three wells since 2001. One of the downgradient wells has consistently shown the presence of TPH as gasoline, diesel, benzene, toluene, ethylbenzene, and xylenes over the years, indicating that a source remains on-site.

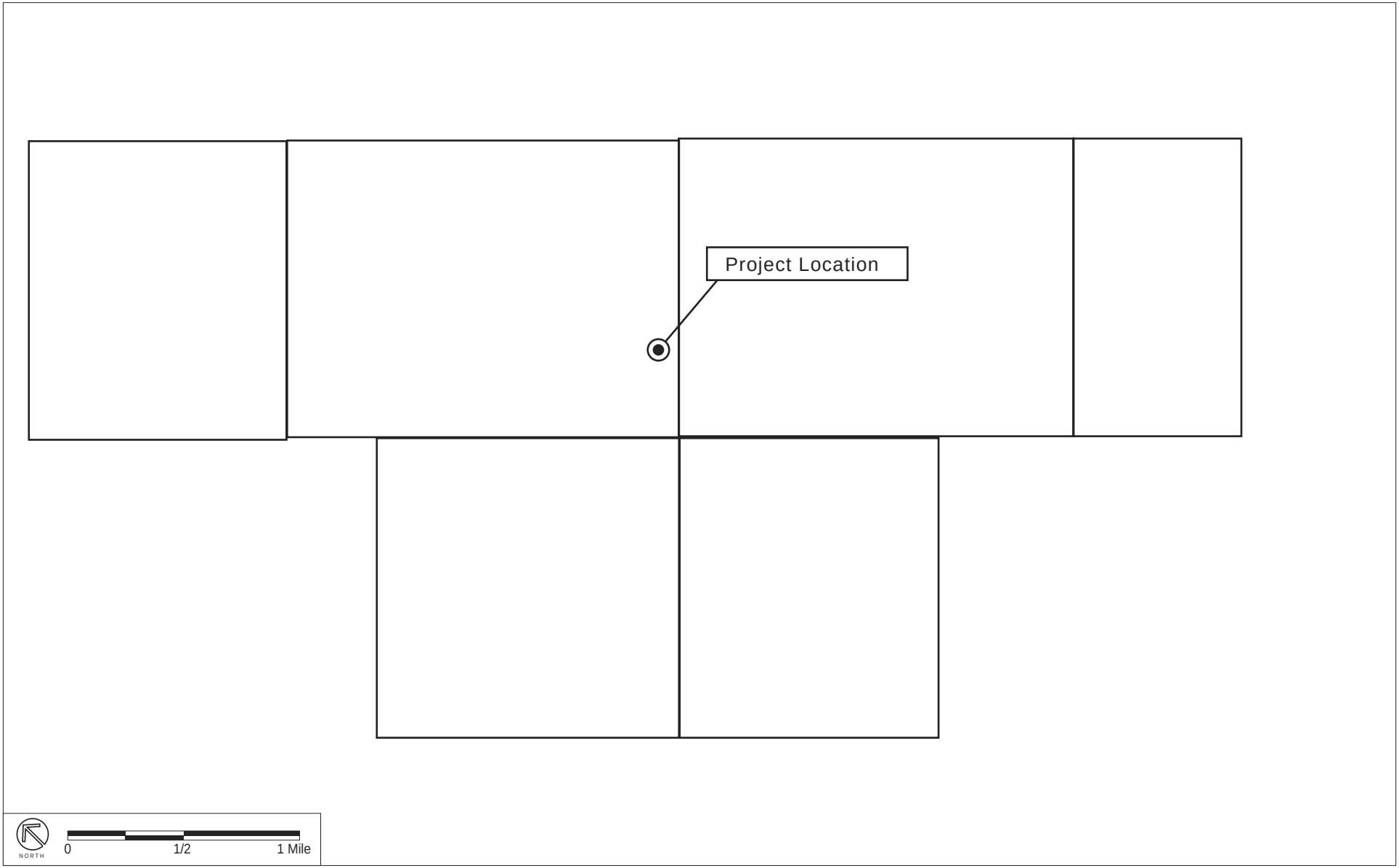
**6. Flooding**

According to FEMA's and Flood Insurance Rate Map (FIRM), which delineates a 100- and 500-year floodplain, as well as a regulatory floodway for the Petaluma area, the project area is not in the 100- or the 500-year floodplain. Figure 4.8-3 outlines FEMA FIRM boundaries in relation to the proposed project.

**7. Seiche, Tsunami or Mudflow Inundation Risk**

Seiches are standing waves oscillating in a partially or fully enclosed body of water due to seismic or atmospheric pressure changes. Tsunamis are ocean waves generated by undersea disturbances, such as earthquakes. Mudflow is primarily a risk in areas downslope of hillsides and volcanoes. The project site's elevation and distance from partially or fully enclosed bodies of water makes it low-risk for seiches. The site's distance from the San Francisco and San Pablo bays provides protection from inundation by tsunami. Since the site is not downslope of a hillside or volcano, it is not at risk from mudflows.[24]

[24] *Sonoma County General Plan*, Figure PS-1h. Available for review at Sonoma County Permit and Resource Department, 2550 Ventura Avenue, Santa Rosa.




Source: Flood Insurance Rate Map, Community-Panel Numbers 060379 0001-0006, Revised Sept. 29, 1989

Flood Prone Areas

FIGURE 4.8-3

FEMA FLOOD INSURANCE RATE MAP (FIRM) BOUNDARIES

### *C. Standards of Significance*

The implementation of the proposed project would have a significant impact on hydrology and water quality if it would:

- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a significant lowering of the local groundwater table level.
- Substantially alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion, siltation or flooding on- or off-site.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems. Provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality.
- Place occupied development 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.
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows.
- 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.
- Potentially be inundated by seiche, tsunami or mudflow.

## *D. Impact Discussion*

### 1. Project Impacts

The proposed project includes a retail/commercial use on the northern portion of the site with attached single-family residential units toward the south. East Washington Street is proposed to be modified to improve vehicle traffic and to facilitate entering and exiting the site. Below are the potential impacts associated with this development. For the following analysis, both the existing and proposed General Plans were reviewed to determine whether there would be different conclusions under either Plan. Unless otherwise stated below, the following impact analysis and its conclusions would apply under either General Plan scenario.

a. Water Quality

Development of the project site could degrade water quality during construction and following construction when there would be an intensification of urban land uses and increased imperviousness. As previously described, the Petaluma River is already on the Clean Water Act's 303(d) list of impaired water bodies for nutrients, pathogens, and sediment.

*i. Construction Impacts*

Construction activities associated with the proposed project could temporarily impact water quality. Erosion and sedimentation are typically of greatest potential concern during the construction phase of development. For example, grading and vegetation removal at the site would disturb surface soils, which could lead to increased sediment loading in receiving waterways. Also, construction debris and fuel from construction equipment may further degrade runoff. Contaminants, such as motor oil and cleaning supplies used at the site or hydrocarbons from asphalt paving, could be transported in storm runoff to the Petaluma River via creeks or storm drain systems. Such contamination would be considered a *significant* impact of the project without mitigation.

Potential construction-phase and post-construction pollutant impacts from development can be successfully addressed through preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) that incorporates stormwater Best Management Practices (BMPs) and erosion control measures. Stormwater BMPs include, but are not limited to, in-line oil and grease traps, sediment traps, good house keeping, and other measures as described in the City of Petaluma's Storm Water Management Plan.

The project site is relatively flat and the soils are at low risk of erosion, so potential construction-phase impacts related to erosion could be easily avoided by preparing and implementing a conventional erosion control plan.[25] Erosion control plans typically include components such as phasing of grading, limiting areas of disturbance, designation of restricted-entry zones, diversion of runoff away from disturbed areas, protective measures for sensitive areas, outlet protection and provisions for revegetation or mulching. The plans may also prescribe treatment measures to trap sediment once it has been mobilized, at a scale and density appropriate to the size and slope of the catchment. These measures typically include inlet protection, straw bale barriers, straw mulching, straw wattles, silt fencing, check dams, terracing, and siltation or sediment ponds.

Neither an erosion control plan nor a Stormwater Pollution Prevention Plan has yet been prepared for the proposed project. However, both are required by the City's Grading and Erosion Control Ordinance. Until such plans are developed and approved by the City, the project's potential to degrade water quality remains *significant*.

*ii. Post-Construction Impacts*

After a project has been constructed and the landscaping has been installed, erosion from the developed site would be minimal. However, the potential for other pollutants to impact surface and groundwater quality would still

[25] Association of Bay Area Governments (ABAG), *Manual of Standards for Erosion and Sediment Control Measures*, 2nd Edition, May 1995. Available for review or purchase at ABAG office, 101 Eighth St., Oakland.

exist. Urban runoff contaminants might include petroleum products (gasoline, diesel, kerosene, oil and grease), paints and solvents, detergents, nutrients (fertilizers), pesticides (insecticides, fungicides, herbicides and rodenticides) and litter. Because the storm drain system would ultimately discharge to the Petaluma River, these pollutants could potentially degrade water quality.

Regulatory guidance for post-construction water quality enhancement, such as the *Start at the Source* handbook[26] and the recently revised *California Storm Water BMP Handbook: New Development and Redevelopment*[27] emphasize site design to reduce impervious area coverage, source control to prevent pollutants from becoming entrained in runoff, and infiltration to reduce peak flows and enhance water quality.

b. Proposed Stormwater Treatments

There are three primary storm water treatments proposed for the project: vegetated swales, tree basins and specialized planter boxes. Vegetated swales would be used to treat the majority of the stormwater. Runoff would travel through the vegetated swales prior to discharge into the storm drain system. Runoff would also be filtered through the topsoil and into an underlain perforated pipe. Tree basins would be used as a stormwater treatment method, whereby runoff would be intercepted by the tree basin, cleaned, then released into the storm drain system. Specialized planter boxes, located along the condominiums, would filter runoff produced from the roof leaders. The runoff would then be routed into the proposed storm drain system.

Compliance with the new Phase 2 Statewide NPDES Municipal Stormwater Permit requires incorporation of post-construction water quality control

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[26] Bay Area Stormwater Management Agencies Association, 1999, *Start at the Source*, 2nd Edition, 165 p. Available for review at http://basmaa.org/resources/files/Start%20at%20the%20Source%20-%20Design%20Guidance%20Manual%20for%20Stormwater%20Quality%20Protection.pdf.

[27] California Storm Water Quality Task Force, 2003, *California Storm Water Best Management Practices Handbooks*, three volumes. http://www.cabmphandbooks.com/.

measures into new developments or significant redevelopment projects. Currently, the City of Petaluma, through its Municipal Code, requires the proper installation of BMPs and post-construction treatment measures and provisions for long-term maintenance of these BMPs and treatment measures before it will authorize final occupancy. The City's Grading and Erosion Control Ordinance further requires a stormwater pollution prevention plan (SWPPP) for projects that result in soil disturbance of 1 acre or greater. The purpose of a SWPPP is to identify sources of sediment and other pollutants that affect the quality of stormwater discharges and to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater as well as nonstormwater discharges. Additionally, the ordinance requires submission of an erosion and sediment control plan.

If the proposed treatments described above are not sufficient to meet the current applicable NPDES general permit requirements for the City, there would be a *significant* impact. Furthermore, until the project applicant provides a SWPPP and an erosion and sediment control plan, potential water quality impacts are considered *significant.*

c. Groundwater

The proposed project would result in a need for potable water to serve the proposed retail and residential components. The estimated project-specific demand is 25.7 mgy, which would result in a net increase of 19.8 mgy over existing demand at the site.[28] Existing demand at the site is 8,018 CCF (801,800 cubic feet), which equates to 5.9 mgy.[29]

As explained in the water supply discussion of Section 4.14, Utilities, the City is not able to depend on an increase in SCWA water supplies to meet the de-

[28] Demand factors identified in the 2006 Water Supply and Demand Analysis Report completed by Dodson Engineers were used to quantify the project-specific water demand. Residential and commercial demand would be 15.9 and 9.8 million gallons/year, respectively.

[29] Bruce Qualls, Regency Development Corporation. Personal email communication, November 14, 2006.

mand associated with future growth, including the proposed project, and there is a projected shortfall in water supply within the next year. As a result, the City is examining alternative sources to meet the increased demand that will occur as a result of this project and others occurring under the 2025 General Plan. One of the sources being examined is increased groundwater supplies.

Based on the Groundwater Feasibility Study completed in February 26, 2004, a production rate of 2,000 to 3,000 afy was identified as a reasonable assumption for the City's maximum developable groundwater capacity, given the known constraints on water quality and the potential risks associated with excessive drawdown and salt intrusion.[30] More recently, the 2006 Water Supply and Demand Analysis Report concluded that the annual groundwater limit for the City of Petaluma is estimated at 3,000 afy (973.2 mgy).[31] This volume is based on the assumption that the City would access additional groundwater through the construction of new wells.

Assuming a worst-case scenario in which the project were to depend entirely on groundwater supplies for potable water, the demand for 25.7 mgy represents only 3 percent of the suggested capacity of 973.2 mgy. As a result, the project, by itself, would have a *less-than-significant* impact on groundwater supplies and recharge capacity.

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[30] Technical Memorandum No. 4. Groundwater Feasibility Study. West Yost and Associates Consulting Engineers, February 26, 2004. Technical Appendix F-2 to the Draft General Plan 2025, Vol. 2, page 34. Available for review at City Hall, Community Development Department, 11 English St., Petaluma. (Copies of the draft General Plan 2025 and Draft Environmental Impact Report, General Plan 2025, are also available on the City's website at http://cityofpetaluma.net; the full set of General Plan documents including technical appendices are also available for review or purchase from General Plan Administration, 27 Howard St., Petaluma).

[31] Dodson Engineers, 2006, *Water Supply and Demand Analysis Report.* page 1-12.

d. Site Drainage and Stormwater Drainage System Capacity

The proposed project would result in the replacement of permeable surfaces, such as the former playing field, with impervious ones, such as parking lots and building roofs, reducing the infiltration that would take place. This would increase stormwater peak flows and runoff volumes.

The proposed improvements would continue to flow into the existing condition drainage basins. The only exception is a small portion that previously collected at a low point near the northern property corner. This runoff was directed into a storm drain system which eventually connects to the existing storm drain system on Lindberg Lane.[32]

The site is designed to sheet flow through the parking lots and proposed street system into a network of drainage swales, channels, and underground storm drain system. The underground storm drain system would connect directly into an extended storm drain system in Lindberg Lane at the southern end of the project site. The previous storm drain system that was routed through adjacent properties before reaching Lindberg Lane would be capped off.[33]

Increases in surface runoff flows from the proposed project were calculated in the preliminary hydrology report, based on the Sonoma County Water Agency Flood Control Design Criteria Manual.[34] Using coefficients to represent differences in saturation for pervious and impervious surfaces, along with average precipitation and precipitation for predicted 10- and 100-year storm events, flow rates, in cubic-feet per second (cfs), were predicted for post-development conditions. As shown in Tables 4.8-2 and 4.8-3, the existing 10-

[32] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 1.

[33] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 1.

[34] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 2.

TABLE 4.8-2 **COMPARISON OF EXISTING AND PROJECTED 10-YEAR FLOW RATES**

| Point of Concentration (P.O.C.) | Location of P.O.C. | Existing Condition (cfs) | Proposed Condition (cfs) | Increase Due To Project (cfs) |
|---|---|---|---|---|
| Line 1 (A) | Curb Inlet on Kenilworth Dr. near E. Wash. St. | 1.97 | 2.57 | 0.60 |
| Line 2 (B) | Low Point near the northern property corner | 5.73 | 10.10 | 4.37 |
| Line 3 (C) | Triple 21-inch c.m.p. on Kenilworth Dr. near the southern property corner | 20.01 | 44.80 | 18.15 |
| Line 4 (D) | E. Washington Street | 7.92 | 8.34 | 0.42 |
| Line 5 (E) – Existing Condition Only | Southern property corner near Lindberg Ln. | 6.64 | N/A | N/A |
| **Total** | | **42.27** | **65.81** | **23.54** |

TABLE 4.8-3 **COMPARISON OF EXISTING AND PROJECTED 100-YEAR FLOW RATES**

| Point of Concentration (P.O.C.) | Location of P.O.C. | Existing Condition (cfs) | Proposed Condition (cfs) | Increase Due To Project (cfs) |
|---|---|---|---|---|
| Line 1 (A) | Curb Inlet on Kenilworth Dr. near E. Wash. St. | 2.81 | 3.68 | 0.87 |
| Line 2 (B) | Low Point near the northern property corner | 8.16 | 14.39 | 6.23 |
| Line 3 (C) | Triple 21-inch c.m.p. on Kenilworth Dr. near the southern property corner | 28.30 | 63.47 | 25.63 |
| Line 4 (D) | E. Washington Street | 11.32 | 11.89 | 0.57 |
| Line 5 (E) - Existing Condi-tion Only | Southern property corner near Lindberg Ln. | 9.54 | N/A | N/A |
| **Total** | | **60.13** | **93.43** | **33.30** |

and 100-year flow rates were 42.27 and 60.13 cfs, respectively. The proposed 10- and 100-year flow rates were 65.81 and 93.43 cfs, respectively.[35]

Thus the proposed project would result in an increase in total runoff due to the addition of impervious surfaces. The increases would be 23.54 and 33.30 cfs during 10- and 100-year storm events, respectively. The project would have a significant impact if runoff from the site exceeded the existing condition since the existing storm drain facilities were designed for the school and bus facility developments.

This difference in runoff is proposed to be detained on-site through the use underground storm drain pipes. Sufficient storage would be provided by over sizing the storm drain pipes and restricting the flow discharging the system. Runoff would flow overland and be intercepted by curb inlets, area drains and vegetative swales.[36] Through implementation of these measures, existing conditions flow rates from the site could be achieved.[37]

However, since the final design for the storm drain system, including any potential off-site downstream drainage improvements, has not been finalized or approved by Sonoma County Water Agency, the increase in flows would be a *significant* impact.

e. Flooding

Implementation of the proposed project would not place any development on the 100- or 500-year flood hazard area as recognized by FEMA and denoted on the FIRM maps, presenting *no impacts*.

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[35] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 1.

[36] CSW/Stuber-Stroeh Engineering Group, Inc., 2004, *Preliminary Hydrology Study: East Washington Place*, page 1.

[37] Wayne Leach, CSW/Stuber-Stroeh Engineering Group, Inc. Personal communication with Ted Heyd (DC&E), February 2, 2007.

f. Seiche, Tsunami or Mudflow Inundation

Since the project site is at low risk for seiches, tsunamis and mudflows, the proposed project would have *no impact* with regard to inundation from these occurrences.

**2. Cumulative Impacts**

A list-based approach has been used for this cumulative analysis. The analysis considers the development projects listed in Appendix C (Cumulative Projects) and whether this project would have significant cumulative impacts on hydrology and water quality in combination with the cumulative projects. However, since the water usage for each of the cumulative projects is unknown, the following analysis is based on the cumulative study completed for the 2025 General Plan. This study, which assumes the use of ground water, is based on a worse case scenario in that it assumes a greater amount of development that that projected to occur under the existing General Plan.

As stated in the groundwater impact discussion above, the project, by itself, would result in a *less-than-significant* impact on groundwater. However, the proposed project, in combination with other projects listed in Appendix C and anticipated by buildout of 2025, could have a significant cumulative impact on groundwater supplies and recharge capacity.

The cumulative water demand in Petaluma in 2025 is projected to be 5,139 mgy. The annual groundwater limit to avoid negatively affecting the aquifer for the City of Petaluma is estimated at 3,000 afy (973.2 mgy). The recommended supply/offset program in the 2006 Water Supply and Demand Analysis Report includes groundwater supply via City-owned wells as a minor program component. The recommended program would require the use of 25 percent of the City's existing well capacity during the four summer months starting in Year 2024 to meet the City's potable water demands. The

annual amount of potable water produced by the wells would be 60.75 MG/ year.[38]

If the recommended program in the Water Supply and Demand and Analysis Report is implemented, the Report shows that there would not be a significant cumulative impact on groundwater resulting from growth anticipated under the 2025 General Plan. This is because only 25 percent of the available groundwater supply would be used. As a result, since the proposed project is included in the general growth assumptions for the 2025 General Plan, it would not contribute to a significant cumulative impact.

However, the recommended water supply program has not yet been adopted by the City and it is uncertain as to whether a greater portion (>25 percent) of groundwater would be relied upon to serve water demand over the next 20 years. Until a recommended water supply program is formally adopted, future demand on groundwater remains uncertain. Based on this uncertainty and because future demand on groundwater could actually be much greater under the final supply program, it has been concluded that the project would result in a *significant cumulative impact* on groundwater.

The project also has the potential to result in significant cumulative impacts related to flooding and stormwater contamination. However, since all the cumulative projects would be required to comply with the National Pollutant Discharge Elimination System, and RWQCB and Sonoma County Water Agency regulations, as would the proposed project as a result of Mitigation Measures HYDRO-1 to HYDRO-3, there would not be a cumulative impact related to flooding and stormwater, and the project *would not contribute* to a significant cumulative impact in relation to these issues.

[38] Capacity from existing groundwater wells only is estimated to be 243 MG/Year. This does not include expanded capacity that could be made available through the addition of new wells. The 60.75 MG/year volume represents approximately ¼ of the 243 MG/year total.

## *E. Impacts and Mitigation Measures*

### 1. Water Quality

**Impact HYDRO-1:** Development of the project site could degrade water quality during construction and post-construction due to the intensification of urban land uses and increased imperviousness. Because a Storm Water Pollution Prevention Plan (SWPPP), which would normally include construction-phase housekeeping measures and post-construction source-control and treatment best management practices (BMPs), for the project site has not yet been prepared, the project would lead to significant impacts on surface and groundwater quality.

Mitigation Measure HYDRO-1a: No grading permits or other construction permits for the project site should be issued until the project applicant prepares a SWPPP and the SWPPP is reviewed and approved by the City of Petaluma.

Mitigation Measure HYDRO-1b: Prior to construction, the applicant should submit preliminary calculation or design details to the City justifying adequate on-site treatment measures to comply with the City NPDES permit, specifically, the numeric design criteria provided in Attachment 4 of the NPDES permit.

Significance After Mitigation: Implementation of this mitigation measures would reduce this impact to a *less-than-significant* level.

**Impact HYDRO-2:** The lack of an erosion control plan would lead to a significant impact on surface and groundwater quality.

Mitigation Measure HYDRO-2: The project applicant should prepare and submit an erosion control plan. The plan should be reviewed and approved by the City of Petaluma prior to issuance of a grading permit for the proposed development. The erosion control plan should include phasing of grading, limiting areas of disturbance, designation of re-

stricted-entry zones, diversion of runoff away from disturbed areas, protective measures for sensitive areas, outlet protection and provision for revegetation or mulching. The plan should also prescribe treatment measures to trap sediment, such as inlet protection, straw bale barriers, straw mulching, straw wattles, silt fencing, check dams, terracing, and siltation or sediment ponds.

Significance After Mitigation: Implementation of this mitigation measures would reduce this impact to a *less-than-significant* level.

**2. Site Drainage and Stormwater Drainage System Capacity**

**Impact HYDRO-3:** There would be a net increase in runoff from the site during 10- and 100-year storm events. Since the final design for the storm drain system, including any potential off-site downstream drainage improvements, has not been finalized or approved by Sonoma County Water Agency, the increase in off-site flows would be a *significant* impact.

Mitigation Measure HYDRO-3a: The project applicant should provide a storm drain infrastructure analysis that demonstrates the adequacy of the proposed storm drain facilities to accommodate the proposed development of the project site. The applicant should identify necessary improvements on-site to provide capacity and include those improvements in site development. Prior to issuance of a building permit, the applicant should secure approval from the Sonoma County Water Agency for the proposed storm drainage plans.

Mitigation Measure HYDRO-3b: The applicant should evaluate all off-site storm drain systems used for surface runoff exiting the project. The evaluation should include all storm drains from the project site to the Petaluma River. The applicant should be responsible for constructing any off-site improvements necessary, as determined by the evaluation and the City, to provide the required capacity.

Significance After Mitigation: Implementation of this mitigation measures would reduce this impact to a *less-than-significant* level.

**3. Groundwater Recharge Capacity**

**Impact HYDRO-4:** The ultimate volume of groundwater that the City would use to accommodate cumulative growth is unknown and will remain so until a water supply program is adopted. The project would contribute to a cumulative demand for groundwater that could exceed supply, depending on the selected program. Until such a time as a program is adopted and the volume of groundwater to be used through 2025 is known, the project could contribute to a *significant* cumulative impact on groundwater supplies.

Mitigation Measure HYDRO-4: The City should continue to examine the availability of alternative, long-term water sources, including but not limited to groundwater supplies and move to adopt a supply program early in 2007. The City should not issue a building permit to the project until a water supply program has been adopted, which does not exceed the availability of groundwater supplies.

Significance After Mitigation: This impact would remain *significant and unavoidable* until such a time as a water supply program is adopted by the City that quantifies a long-term plan for usage of groundwater supplies in relation to available supply. Should the ultimate demand on groundwater as set forth in a supply program exceed available supply, this impact would remain *significant and unavoidable*. However, if future demand does not exceed available supply, this would be a be a less-than-significant impact.