4.4 SURFACE WATER HYDROLOGY

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4.4 SURFACE WATER HYDROLOGY

This chapter discusses the potential for stream bank erosion and flooding as a result of the Seasonal Storage Project (SSP).

IMPACTS EVALUATED IN OTHER SECTIONS

The following items are related to the Surface Water Hydrology Section, but are evaluated in other sections of this document:

- Erosion Due to Construction. Erosion caused by construction outside of the aquatic environment (i.e., not in or adjacent to waterways) is addressed in Section 4.3, Geology, Soils, and Seismicity.
- Impacts on Groundwater Level. This issue is addressed in Section 4.5, Groundwater.
- Impacts on Water Quality. This issue is addressed in Section 4.6, Surface Water Quality and Section 4.7, Public Health and Safety.

SETTING

The SSP is located in the Santa Rosa Plain adjacent to the Laguna de Santa Rosa (Laguna) as shown on Figure 1-5, in Chapter 1, Introduction. The Laguna is a principal tributary of the Russian River. Among the many tributaries of the Laguna, the largest are Mark West Creek, Santa Rosa Creek, Copeland Creek, Hinebaugh Creek, Five Creek, Washoe Creek, and Blucher Creek. The five alternative storage pond sites are located just east of the Laguna's floodplain, approximately 8 to 11 miles upstream of its confluence with the Russian River.

Russian River

The Russian River drains a basin of approximately 1,485 square miles in Sonoma and Mendocino counties. The drainage basin, lying between adjoining ridges of the Coast Range, is about 80 miles long and from 10 to 30 miles wide. The total length of the river from its source north of Ukiah to its mouth at Jenner, where it empties into the Pacific Ocean, is about 110 miles. Principal tributaries to the Russian River are Dry Creek and the Laguna. Dry Creek drains the west central portion of the drainage basin and empties into the Russian River about two miles below Healdsburg. The Laguna and its tributary, Mark West Creek, drain an area located in the southeastern portion of the drainage basin and join the Russian River at Mirabel Park in the community of Forestville. Other major tributaries include the East Fork Russian River, Big Sulphur Creek, Maacama Creek, and Austin Creek.

Laguna de Santa Rosa

The Laguna is an important hydrologic feature of the Lower Russian River Basin, with a watershed of approximately 255 square miles. The Laguna is a wide, marshy area lying along the western edge of the Santa Rosa Plain that drains to the Russian River. The headwaters of the Laguna are located in the hills south and east of the City of Santa Rosa

(City). Flow enters the Santa Rosa Plain near Stony Point Road and meanders to the north. Immediately west and north of the City, the Laguna merges with Mark West Creek. About two miles above the confluence with Mark West Creek, Santa Rosa Creek enters the Laguna. Other minor tributaries include Hinebaugh and Copeland Creeks in Rohnert Park. For purposes of this report, the Laguna is defined as that area of the Santa Rosa Plain below elevation 77.25 feet NGVD (FEMA 1992), located between Stony Point Road to the south and the Russian River to the north.

During large storm events the Laguna becomes a lake, temporarily storing water that would otherwise increase flood peaks farther down the Russian River. As the water level in the Russian River rises, water backs up into the Laguna, impeding downstream flow from the Laguna watershed itself. On average, a lake forms every other year in the Laguna with a depth of 22 feet at the confluence with the Russian River. During the December 1964-January 1965 storms, the Laguna became a lake with a surface area of 7,400 acres and a stored water volume of 80,000 acre-feet. The storage provided by the Laguna is estimated to have reduced downstream Russian River flow by 40,000 cubic feet per second (cfs) and the flood crest at Guerneville by 14 feet during this event.

During the summer months, the Laguna becomes a slow-flowing stream confined within a narrow channel. Flow at this time is usually low. In dry years, the portion of the Laguna above the confluence with Santa Rosa Creek is reduced to isolated pools. Monthly mean measured flows in the Laguna at Guerneville Road are shown in Table 4.4-1. Currently the Subregional System is allowed to release recycled water directly to the Laguna during winter months (October 1 through May 14). These discharges are limited to 5 percent of the flow of the Russian River, but sometimes represent a much higher proportion of flow in the Laguna. During summer months, recycled water is used to irrigate pasture or fodder in the Laguna area.

TABLE 4.4-1

Flows in the Laguna at the USGS Gauging Station #11465750[a] (1998-2006)

Month	Measured Mean Monthly Flow at Laguna (cfs)[b]
Oct	3.5
Nov	41
Dec	263
Jan	210
Feb	296
Mar	163
Apr	77
May	33
Jun	4.3
Jul	1.5

TABLE 4.4-1

Flows in the Laguna at the USGS Gauging Station #11465750[a] (1998-2006)

Month	Measured Mean Monthly Flow at Laguna (cfs)[b]
Aug	0.66
Sep	0.43

Notes:

[a] Located on right bank of Laguna de Santa Rosa, upstream side of Occidental Road Bridge, 1.6 mi north of Sebastopol.

[b] Data gathered from USGS Surface-Water Monthly Statistics Gauging Station #11465750; cfs is cubic feet per second.

Santa Rosa Creek

Santa Rosa Creek is a 22-mile long tributary to the Laguna, which flows into the Russian River, and flows east to west about 1.9 miles north of the northernmost alternative storage site, Kelly Farm 1 (KF1). In this reach, Santa Rosa Creek was channelized for flood control purposes. Santa Rosa Creek was converted into a trapezoidal channel lined with grouted rock rip-rap. Major tributaries to Santa Rosa Creek include Brush Creek, Piner Creek, and Matanzas Creek.

Roseland Creek

Roseland Creek is an ephemeral stream that drains an area of 4.59 square miles. East of Llano Road Roseland Creek flows through private property until it reaches property owned by the Sonoma County Water Agency (SCWA). Through the SCWA property, Roseland Creek consists of a constructed earthen channel with access roads and lacks a natural riparian canopy. West of Llano Road, Roseland Creek flows just south of the southernmost alternative storage site, Alpha Farm (AF), before joining the Laguna.

Regulatory Framework

The federal Clean Water Act [Federal Water Pollution Control Act (33 United States Code 1251 - 1376; Chapter 758; P.L. 845, June 30, 1948; 62 Stat. 1155)] regulates the discharge of storm water from construction sites. Construction activities include clearing, grading, or excavation that results in soil disturbance of at least one acre of land. The owner of the land where construction would occur is responsible for obtaining coverage under a General Permit to Discharge Storm Water Associated with Construction Activity (WQ Order No. 99-08-DWQ), and is required to file a Notice of Intent for each construction activity prior to commencement of construction. The WQ Order No. 99-08-DWQ requires development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) and identification of a Monitoring Program and reporting requirements.

Sonoma County, the City of Santa Rosa, and the SCWA have jointly developed guidelines for their Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that went into effect in June 2005. SUSMP requirements include preparation of a Preliminary Storm Water Mitigation Plan, a Final Storm Water Mitigation Plan, and a Written Certification of Best Management Practices (BMPs) installation. SUSMP requirements limit the post-development runoff to pre-development conditions by designing the project to minimize the introduction of pollutants and to prevent increases in storm water runoff from the two-year 24-hour storm event for Sonoma County.

The Federal Emergency Management Authority (FEMA) prepares maps of flood zones. Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. The FIRM indicates zones for the 100-year flood; within the 100-year flood zone, FEMA provides base flood elevations (BFE) derived from detailed analyses at selected intervals within these zones. For the Laguna floodplain, FEMA has set a 75-foot elevation as the BFE.

Site Characteristics

Because the FIRM for this area was prepared in 1992, elevations may have changed since the mapping was prepared. Therefore, elevation surveys were conducted in 2007 in preparation of base maps for the conceptual engineering effort. As a result, the actual surveyed BFE contour (75-foot elevation, as set by FEMA and determined by survey) is shown, as well as the 1992 FEMA 100-year floodplain, on the floodplain figures.

Kelly Farm (KF1 and KF2)

The KF1 and Kelly Farm 2 (KF2) alternative storage ponds would be located approximately 1,350 and 2,250 feet from the low flow channel of the Laguna, respectively. Upland runoff from local drainage areas to the east of the pond sites may require interception and diversion away from the pond embankments. The drainage areas that flow toward the pond sites are illustrated on Figure 4.4-1, KF1 and KF2 Pond Drainage Areas. An unnamed tributary drainage to the Laguna lies between the two Kelly ponds and would be used to convey the intercepted drainage runoff and any water released from the emergency spillways. The upland runoff would be directed away from the embankments into the ephemeral channel. As illustrated in Figure 4.4-2, the KF1 pond would have minor encroachment on the existing FEMA-mapped 100-year floodplain, though it does not encroach below the surveyed 75-foot BFE. The KF2 pond would be located outside the 100-year floodplain defined by either the FEMA or 75-foot BFE.

Brown Farm (BF1 and BF2)

The Brown Farm 1 (BF1) and Brown Farm 2 (BF2) alternative storage ponds would be located approximately 3,350 and 1,900 feet from the low flow channel of the Laguna, respectively. Upland runoff from local drainage areas lay both to the north and south of the ponds, but they do not flow toward the pond embankments. Any water released from the spillway would flow westward via an unnamed ephemeral drainage swale north of BF1 and BF2 and ultimately discharge into the Laguna. As illustrated in Figure 4.4-3, the BF1 and BF2 ponds would be located outside the 100-year floodplain defined by either the FEMA or 75-foot BFE.

Alpha Farm (AF)

The AF alternative storage pond includes two existing ponds that would be incorporated into a single larger pond located approximately 2,950 feet from the Laguna and as close as 100 feet from Roseland Creek. The approximate drainage area for the AF pond is illustrated on Figure 4.4-4, AF Drainage Area. Upland runoff from local drainage areas to the east of the pond sites would be directed away from the embankment into an unnamed tributary drainage to Roseland Creek. As a result of Mitigation Measure 3.3.14 Avoid Loss of Aquatic Habitat due to Storage Reservoirs, drainage would need to be redirected around the reservoir in a natural channel, which would compensate for the loss of waters of the U.S. and aquatic habitat caused by the pond. Any water released from the spillway would discharge directly to Roseland Creek.

As illustrated in Figure 4.4-5, existing FEMA maps indicate that the embankments for the AF pond would fall slightly within the 100-year floodplain, though the pond does not encroach below the surveyed 75-foot BFE.

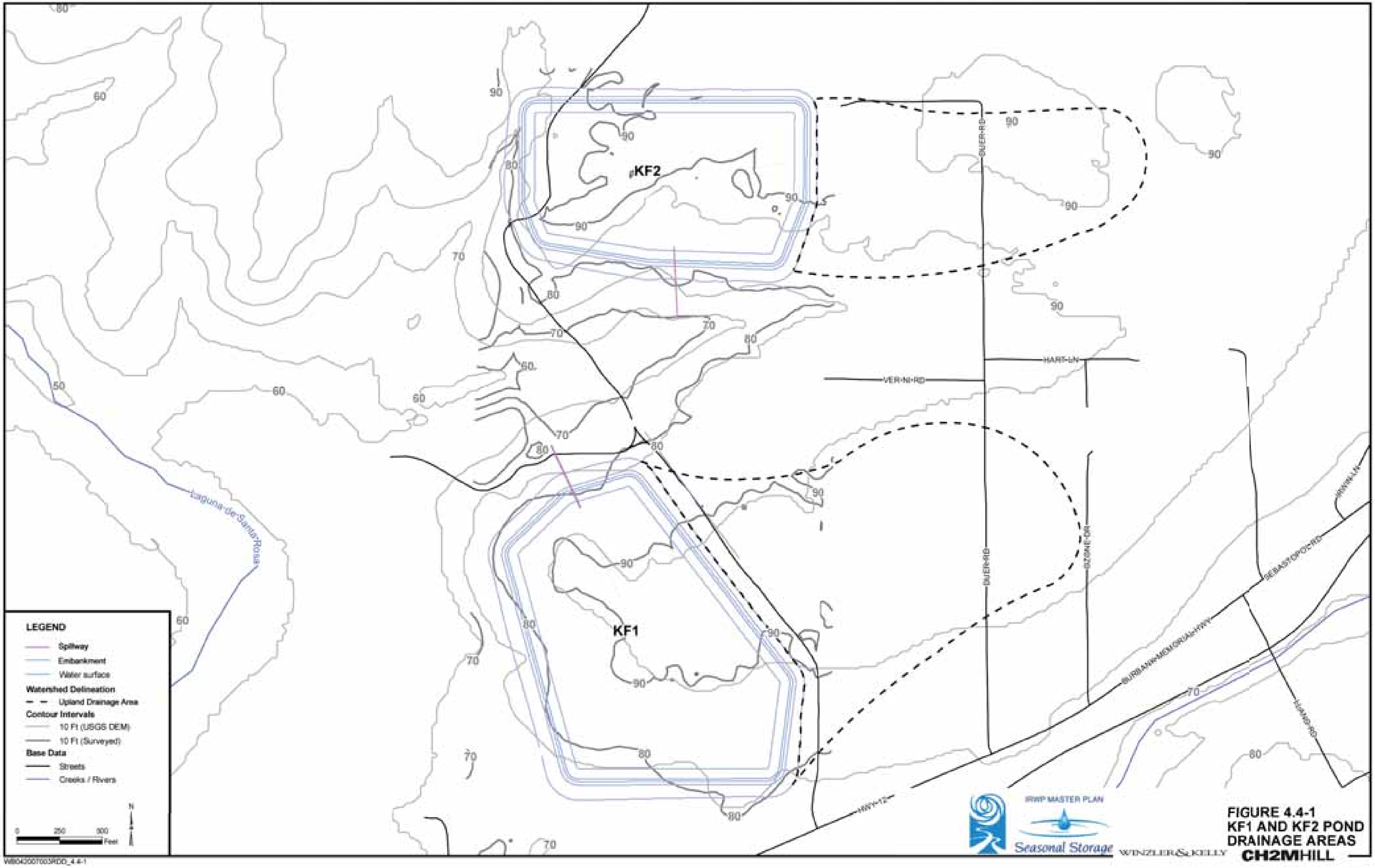

FIGURE 4.4-1
KF1 AND KF2 POND
DRAINAGE AREAS

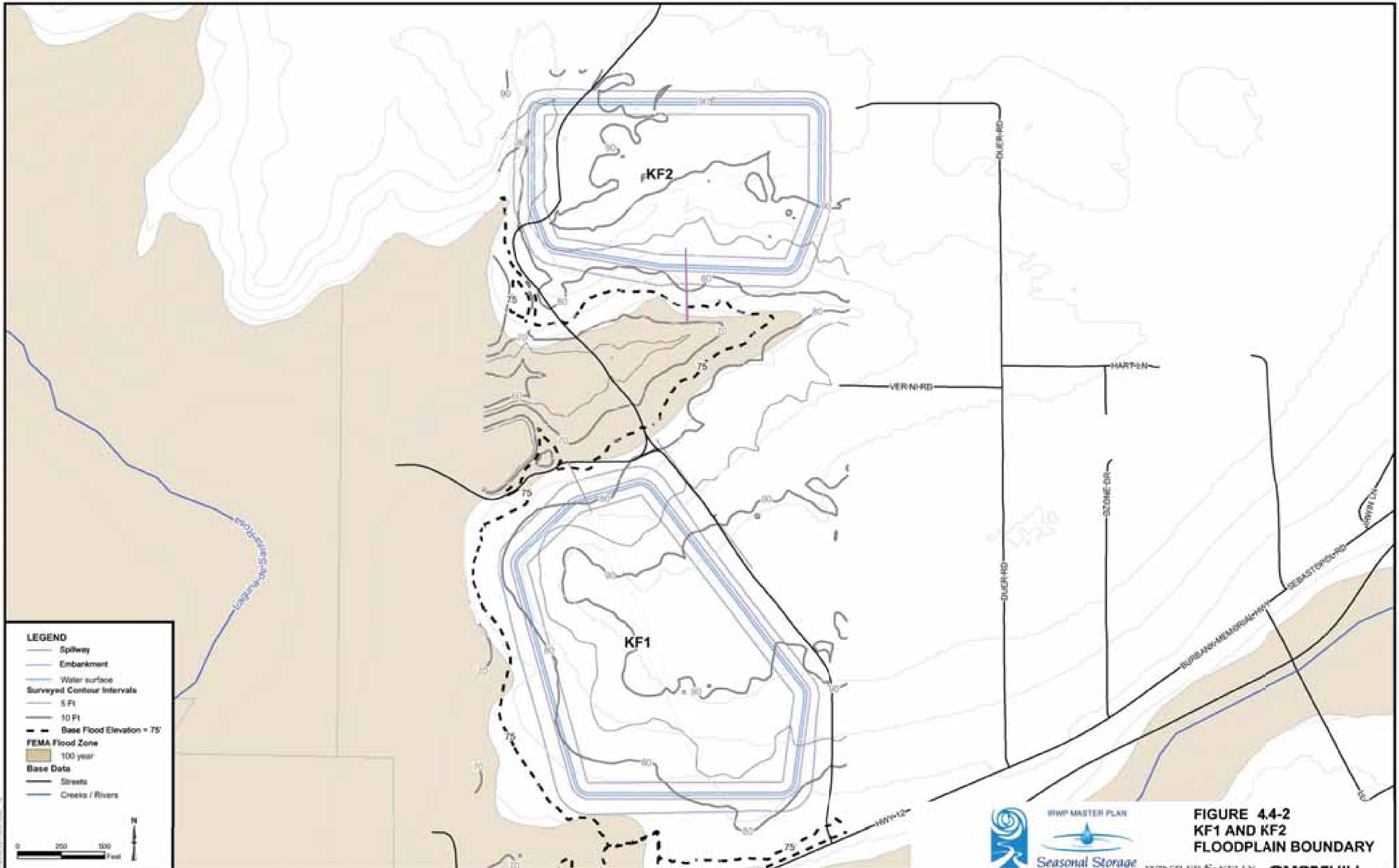

FIGURE 4.4-2
KF1 AND KF2
FLOODPLAIN BOUNDARY

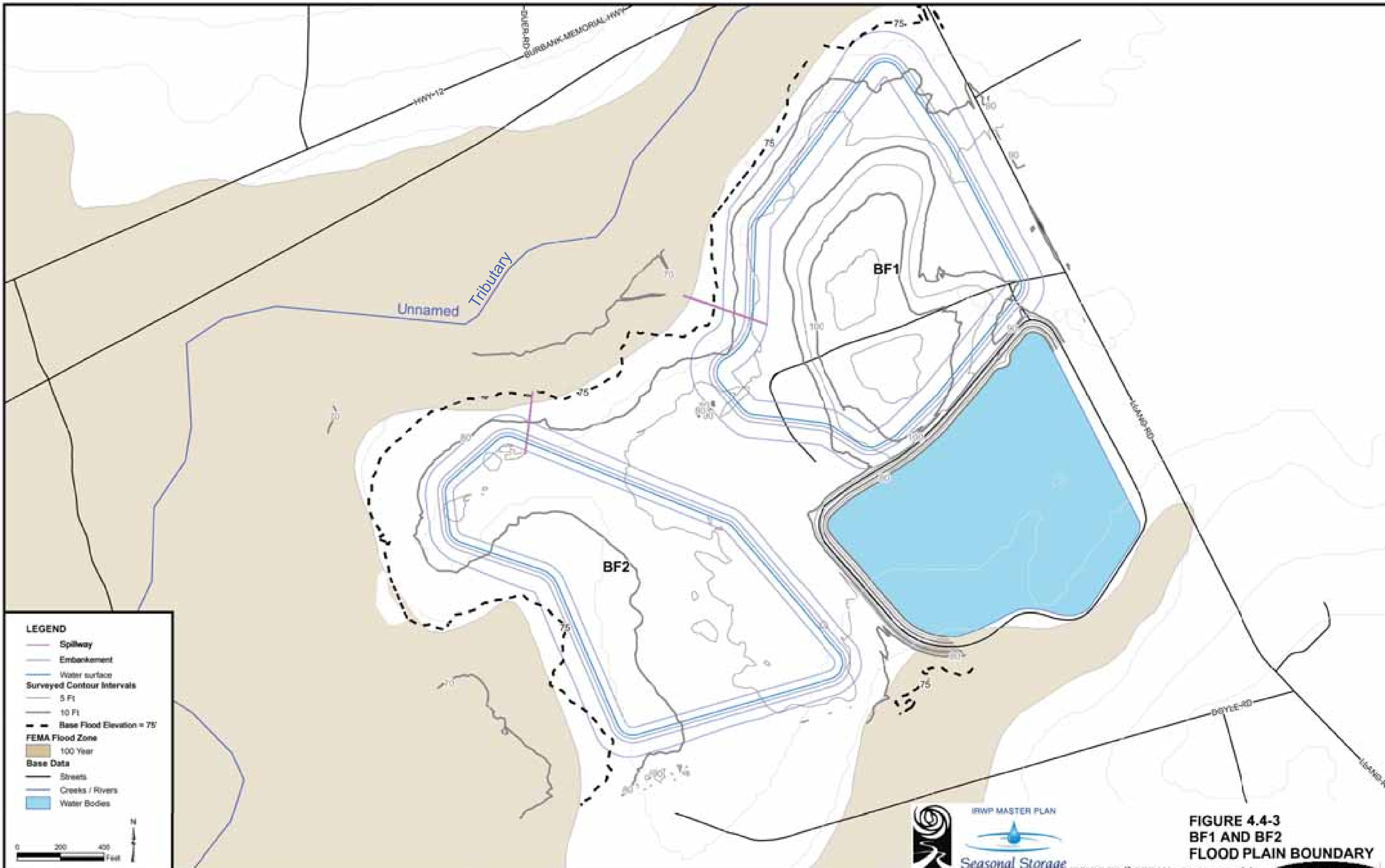

FIGURE 4.4-3
BF1 AND BF2
FLOOD PLAIN BOUNDARY

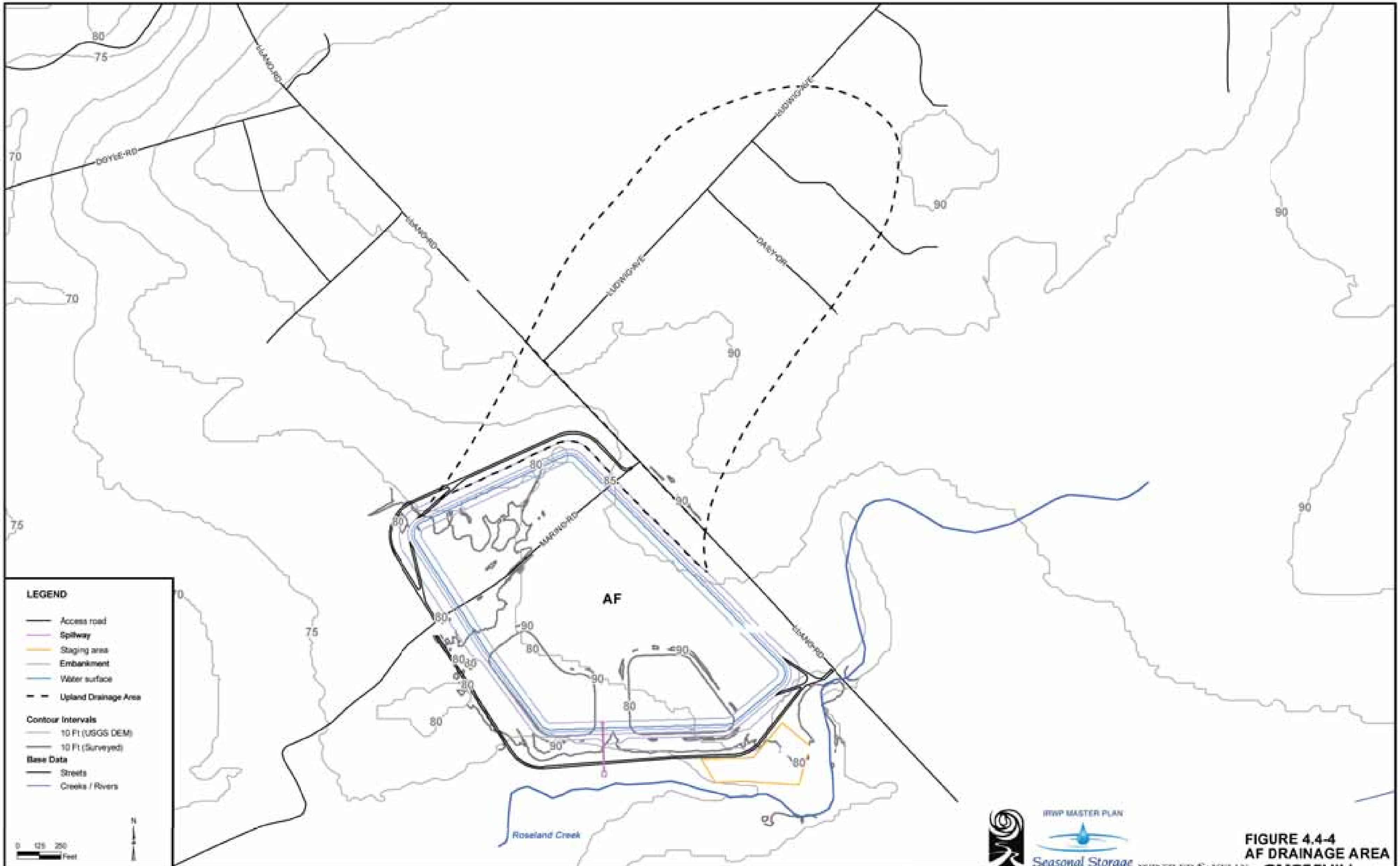

FIGURE 4.4-4
AF DRAINAGE AREA

WB042007003RDD_4.4-4

GOALS, OBJECTIVES, AND POLICIES

The City of Santa Rosa General Plan and Creek Master Plan identify goals, objectives, and policies that provide guidance for development of evaluation criteria in relation to surface hydrology. Table 4.4-2 also indicates which criteria in the Surface Water Hydrology Section are responsive to each set of policies.

TABLE 4.4-2

Goals, Objectives, and Policies – Surface Water Hydrology

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Santa Rosa General Plan	Noise and Safety Element Public Services and Facilities Element	Goal NS-D Goal PSF-1	Minimize hazards associated with storm flooding. Manage, maintain, and improve storm water drainage and capacity.	2 1
Santa Rosa City-wide Creek Master Plan	Appendix F Hydrologic Assessment		Analyze recommended actions to determine potential impacts on flood carrying capacity.	2

Source: Santa Rosa 2002, Santa Rosa & Sonoma County Water Agency 1989

Note: 1. Evaluation criteria are identified in Table 4.4-3.

EVALUATION CRITERIA WITH SIGNIFICANCE THRESHOLDS

TABLE 4.4-3

Evaluation Criteria with Significance Thresholds – Surface Water Hydrology

Evaluation Criteria	As Measured by	Significance Thresholds	Sources of Criteria
1. Will the SSP cause streambank erosion?	Percentage increases in the average stream power when the average channel velocity exceeds erosion threshold velocities[1] for maximum daily flow in the wet year type[2].	Greater than 2 percent increase[2]	Based on the typical particle size distribution, erosion of the material in the stream channel should only occur when the average channel velocity is greater then erosion threshold velocities. CEQA checklist question VIII.c)[3].
2. Will the SSP cause flooding?	Increase in the 100-year flood elevation for maximum daily flow in the wet year type[1].	Greater then 0.1 foot increase	FEMA uses 1 foot as a guideline for significance. Sonoma County Water Agency generally does not consider increases of less then 0.1 foot significant during project review[4]. CEQA checklist questions VIII.d through VIII.j)[5].

Notes:

1. The 10 percent exceedance criteria used to define a wet year translates to a 10 percent chance that there will be a wetter year, or conversely, that there is a 90 percent chance that the year will be drier.
2. The 2 percent threshold was defined based on the resolution of stage-discharge data available for the analysis.
3. CEQA checklist question VIII.c) asks if the project would 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. Evaluation criterion 4.4.1 evaluates whether the project will increase the average stream power sufficiently to cause erosion. This increase in stream power could result from alteration of drainage patterns or alteration of stream or river courses.
4. Dames & Moore (1995).
5. CEQA checklist question VIII.d) asks if the project will 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. Evaluation criterion 4.4.2 evaluates whether the project will increase flooding. This increase in flooding could result from alteration of drainage patterns, alteration of stream or river courses, or a substantial increase in the rate or amount of surface runoff.

   CEQA checklist question VIII.e) asks if the project would create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. The potential for runoff water to exceed the capacity of existing or planned storm water drainage systems is evaluated in Section 4.15 Public Services, Utilities, and Recreation. The potential for runoff water to provide substantial additional sources of polluted runoff is evaluated in Section 4.6 Surface Water Quality.

   CEQA checklist question VIII.h) asks if the project would place within a 100-year flood hazard area structures, which would impede or redirect flood flows. Evaluation criterion 4.4.2 evaluates whether the project would significantly increase in the 100-year flood elevation, which could result from placing structures within the 100-year flood hazard area.

CEQA checklist question VIII.i) asks if the project would 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. This is discussed in Section 4.7 Public Health and Safety.

CEQA checklist question VIII.j) asks if the project would cause inundation by seiche, tsunami, or mudflow. Inundation by seiches, tsunamis, and mudflow would result from release of extremely large volumes of water such as could result from the failure of a levee or dam. This is evaluated in Section 4.7 Public Health and Safety. Smaller amounts of mudflow could occur if improper construction techniques were uses. Erosion due to construction is evaluated in Section 4.3 Geology, Soils, and Seismicity.

METHODOLOGY

Surface water hydrology impacts associated with streambank erosion and flooding can occur due to construction or storm water runoff. The impact analysis is based on a review of relevant hydrologic literature and technical reports, as well as data and information contained in the *TM 3, Site Hydrology Evaluation Technical Memorandum* provided in Volume 5 of this Draft EIR. A complete list of hydrologic data sources is included in the technical memorandum. The SSP components were analyzed for their potential to cause local streambank erosion during construction and during operation as a result of increases in impervious surfaces that may lead to locally increased runoff.

IMPACTS AND RECOMMENDED MITIGATION MEASURES

TABLE 4.4-4

Surface Water Hydrology Impacts

Evaluation Criteria	Significance Threshold	Impact	Type of Impact[1]	Level of Significance[2]
4.1. Will the SSP cause streambank erosion?	Greater than 2 percent increase in the average stream power when the average channel velocity exceeds erosion threshold velocities for maximum daily flow in the wet year type.	< 2 percent increase	P	❍
4.2. Will the SSP cause flooding?	Greater than 0.1 foot increase in the 100-year flood elevation for maximum daily flow in the wet year type.	< 0.1 foot increase	P	❍

Notes:
1. Type of Impact:
   - C: Construction
   - O&M: Operation and Maintenance
   - P: Permanent
2. Level of Significance:
   - ● Significant impact before and after mitigation
   - ⦿ Significant impact before mitigation; less than significant impact after mitigation
   - ❍ Less than significant impact; no mitigation proposed
   - == No impact

Impact: 4.1 and 4.2. Will the SSP cause streambank erosion or flooding?

Analysis: *Storage component - Less than Significant: KF1, KF2, BF1, BF2, and AF*

The pond embankments would be designed to divert local runoff around the embankments to protect them from erosion. Upland drainage is not directed toward the BF1 or BF2 ponds. However, for KF1, KF2, and AF, the upland runoff from local drainages to the east would require interception and diversion away from the pond embankments via a diversion ditch as illustrated on Figures 4.4-1 and 4.4-5.

The diversion ditches would be sized to convey upland runoff from the 5-year storm event. An unnamed tributary drainage to the Laguna, which lies between the KF1 and KF2 ponds, would be used to convey the intercepted runoff. Similarly, an unnamed tributary drainage to Roseland Creek would be used to convey the intercepted runoff at AF pond. Discharge of water from the diversion ditch to the unnamed tributaries could increase local velocities and thus stream power. However, the diversion ditch design would include riprap and other energy dissipation and bank protection structures so that the velocity of water in downstream reaches would be approximately that which normally occurs in the channel in the absence of a pond, and the increase in average stream power would be less than 2 percent. The potential impacts from erosion would be less than significant due to the design features of the diversion ditch. Mitigation Measure 3.3.14 Avoid Loss of Aquatic Habitat due to Storage Reservoirs will require that the diversion ditch around the AF pond be converted to a natural waterway; this waterway would be sized to receive the same flows and velocities as the diversion ditch.

Construction of the Storage component could increase sedimentation into the Laguna as a result of increased on-site vehicle traffic, vegetation clearing activities, pond excavation, pipeline trenching, and use of an on-site staging area during construction. These activities would expose soil, making sedimentation more likely to occur. Construction activities also would temporarily alter onsite drainage patterns which could cause localized streambank erosion and flooding. The size of the temporary construction area for each pond is shown in Table 4.4-5. Under Project Measure 3.2.3 Storm Water Pollution Prevention Plan, the City shall prepare a site-specific SWPPP for each construction area. The plan must include BMPs as needed to prevent increases in downstream runoff volume during construction. The SWPPP would provide for storm water controls during construction and would reduce the potential for these temporary impacts to a level that is less than significant. After construction, ground surfaces in construction areas would be restored to their pre-construction condition, and thus the net effect on post-construction surface water hydrology would be less than significant.

The creation of new impervious surfaces by Storage component facilities could increase runoff from the site. These facilities include the pond embankment and access road. Installation of the pipeline would not result in increased impervious coverage. Impervious surfaces for each pond site are shown in Table 4.4-5. Increases are minor (approximately 3 acres at maximum), but may lead to locally increased runoff, which in turn could cause local streambank erosion. The top of the pond embankment would be sloped toward the pond interior to direct any run-off into the pond. Therefore this runoff would not cause local streambank erosion. Runoff from the access road would be direct to grassy swales on either side of the road and would not cause erosion. The runoff coefficient from the embankment (regevetated with grass) may be greater than the land directly under the embankment was, but the post-construction runoff from the site would be substantially less than pre-construction runoff due to the pond capturing precipitation over a large area.

Project Measure 3.2.24, adopted as part of the project, provides for compliance with local SUSMP requirements (if required), which include designing the project to minimize the introduction of pollutants and to prevent increases in storm water runoff from the two-year, 24-hour storm event for Sonoma County. Project measure 3.2.24 would be applied to each site, regardless of whether or not it is located within the SUSMP boundary. This measure would limit post-development runoff to pre-development conditions to the maximum extent practical, and thus would reduce potential streambank erosion impacts to a level that is less than significant.

TABLE 4.4-5

Pond and Pump Station Characteristics Relative to Erosion and Flooding Potential

Site	Temporary Construction Zone (acres)	Permanent Disturbance (acres)	Impervious Area (acres)	Encroachment into 100-year Floodplain[(a)]
KF1	92	62.1	1.6 for access road + 0.2 for at-grade pump station	Minor per FIRM; none per 75-foot BFE
KF2	75	48.1	2.5 for access road + 0.2 for at-grade pump station	None per FIRM; none per 75-foot BFE
BF1	75	58.1	1.1 for access road + 0.2 for at-grade pump station	None per FIRM; none per 75-foot BFE
BF2	66	50.5	1.9 for access road	None per FIRM; none per 75-foot BFE
AF	76	4.1	2.8 for access road	Minor per FIRM; none per 75-foot BFE

Note:

(a) FIRM refers to the 1992 Flood Insurance Rate Maps published by FEMA; 75-foot BFE refers to the Base Flood Elevation at 75-foot elevation as set by FEMA and determined by survey.

Each of the ponds is required by the California Division of Safety of Dams (DSOD) to include a spillway which would act as an emergency overflow in the event that the ponds filled to a level that exceeded pond capacity. This could occur as a result of unintentional overfilling of recycled water into the pond during the winter or spring when water storage in the pond is at its maximum. The potential for a spillway release to occur due to over pumping would be reduced by implementation of Project Measure 3.2.25, which requires that pond instrumentation include a high water level sensor and alarm. The alarm would either alert City staff that the water level is reaching pond capacity or would shut down the pump automatically.

The required capacity of the spillway was determined using direct rainfall rates (probable maximum precipitation) and the maximum fill rate. The spillway would utilize an overflow standpipe which would drain into a stilling basin, which would in turn discharge into the tributary. The stilling basin would be used to dissipate the energy of the water prior to entering the local drainage. The channel downstream of the stilling basin would be armored for about 50 feet to protect against erosion caused by water from the ponds. The spillway would be used in emergency situations only; otherwise normal discharge from the ponds would be through pump stations and pipelines into the Subregional System. A typical spillway plan and cross section are shown in Figure 2-13 in Chapter 2, Project Description. The potential impacts from erosion and flooding would be less than significant due to the design features of the spillway. As described in Chapter 2, Project Description, considering that: 1) the design of the ponds would limit spillway use to once every 1,000 years on average; 2) the operation of the Subregional System would further reduce the frequency of spillway use; and 3) no spillway release from the existing City-owned ponds has ever occurred, the probability for spillway use is extremely low. Similarly, the Project Description provides information showing that the pond embankments would meet the design, construction, and operational standards of safety established by the DSOD, eliminating the possibility of embankment failure by the major causes of failure.

As explained in Section 4.5, Groundwater, seepage from the ponds may range from 3 gallons per minute (gpm) to 29 gpm. However, the groundwater model predicts that if recycled water seeps from the proposed ponds, it would travel downward and toward the municipal wells in the area due to the strong pumping at the wells. Water from the ponds would not ultimately discharge to the surface, either on land or to the Laguna or other creeks. No hydrologic impacts would occur from seepage.

Each of the ponds is generally located above the 100-year floodplain as defined by either the FEMA Flood Insurance Rate Maps or by the 75-foot elevation BFE set by FEMA; refer to Figures 4.4-2, 3, and 5. The KF2, BF1, and BF2 ponds are located completely out of the 100-year floodplain; the KF1 and AF ponds have minor encroachments into the 100-year floodplain as shown on the FEMA maps, but they do not extend onto land below the 75-foot BFE.

The City has requested that FEMA review and possibly revise the 100-year floodplain map for this area, because the maps are inconsistent with the surveyed BFE. Upon publication of the revised 100-year floodplain map, ponds are expected to be found to be completely outside of the floodplain. However, even if the ponds are found to encroach into the floodplain, impacts would remain less than significant due to implementation of Project Measure 3.2.23, Flood Storage Management. This measure requires that the City avoid encroachment on the 100-year floodplain or compensate for the loss of flood storage capacity in an adjacent area. Impacts are found to be less than significant.

Pump Station component - Less than Significant: KF1, KF2, BF1, BF2, and AF

For each of the ponds, a pump station would be constructed on the embankment of the pond and enclosed in a masonry building, unless due to implementation of Mitigation Measure 3.3.18, pump stations are moved off the embankment at KF1, KF2, or BF1.

If built on the embankment, construction and operation of the pump station would not result in temporary or permanent disturbance not already addressed in the storage pond component above. Construction of the pump station or installation of the associated electrical power supply would not result in an increase in runoff and would not permanently increase the area of impervious surfaces.

The creation of new impervious surfaces by Pump Station component facilities could increase runoff from the site, if it is built at-grade, as may occur at KF1, KF2, and BF1. Impervious surfaces for each pump station site are shown in Table 4.4-5. Increases are minor (approximately 0.2 acre), but may lead to locally increased runoff in combination with the Storage component, which in turn could cause local streambank erosion. However, post-construction runoff from the site as a whole would be substantially less than pre-construction runoff due to the pond capturing precipitation on site.

If built at grade at KF1, KF2, or BF1, construction of the pump station would not result in additional temporary disturbance beyond that required for the Storage component. This facility would be subject to the same protections as the storage pond, namely 3.2.3 Storm Water Pollution Prevention Plan, 3.2.24 Standard Urban Storm Water Mitigation Plan, and 3.2.23 Flood Storage Management, which would be adopted as part of the project mitigating impacts to erosion and flooding to less than significant.

The Pump Station component, either on the embankment or at grade, would have a less-than-significant impact on erosion and flooding.

Mitigation: No mitigation is needed.

No Project Alternative

Impact: 4.1 and 4.2. Will the No Project alternative cause streambed erosion or flooding?

Analysis: *No Impact*

The No Project alternative would not result in new facilities or operations that could cause streambed erosion or flooding or otherwise affect surface water hydrology.

Mitigation: No mitigation is needed.

CUMULATIVE IMPACTS

All cumulative development in the Laguna watershed has the potential to cause erosion and flooding as a result of both construction-period impacts and creation of additional impervious surface area.

Impact: 4.1C and 4.2C. Will SSP plus cumulative projects cause streambed erosion or flooding?

Analysis: *Less than Significant*

All impacts of the SSP on streambed erosion and flooding would be avoided or compensated for by measures included in the project. Construction impacts would be addressed by preparation of site-specific SWPPPs (Measure 3.2.3) and implementation of the local SUSMP Requirements (Measure 3.2.24), included as part of the project. Project Measure 3.2.23, Flood Storage Management, requires that the City avoid the 100-year floodplain or compensate for any loss of flood storage capacity. Therefore, the project would not contribute to cumulative impacts relative to streambed erosion or flooding.

Mitigation: No mitigation is needed.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

No significant impacts to surface water hydrology have been identified for the SSP.

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