4.6 HYDROLOGY, DRAINAGE, AND WATER QUALITY

4.6 HYDROLOGY, DRAINAGE, AND WATER QUALITY

Introduction

This section describes the existing and planned hydrology, drainage, and water quality conditions in and around the Dixon Downs Horse Racetrack and Entertainment Center project site (Proposed Project), including the current site characteristics and drainage patterns, normal and flood condition hydrology and water quality, potential pollutant loads, applicable water quality regulations and consistency with applicable plans, and water supply impacts. As discussed in the Initial Study (see Appendix A), the Proposed Project site is not within the 100-year flood plain nor is it subject to risk associated with seiche, tsunami, volcanic hazard because of the absence of large bodies of water where seiches and tsunamis occur and because of the lack of volcanic activity in the region; therefore, no impacts associated with these conditions would occur and these issues are not discussed further in this section. Issues specifically evaluated in this section with regards to hydrology and water quality include groundwater supply, drainage modifications and flooding, storm water quality and sediment transport, and regional drainage issues.

Comments in letters received in response to the NOP (see Appendix B) include remarks pertaining to the requirements for a National Pollutant Discharge Elimination System (NPDES) permit for a Large Concentrated Animal Feeding Operation (CAFO), FEMA floodplain mapping, on-site storm water detention and clarification of alternatives, and groundwater usage and drawdown. Impacts associated with flooding and potential impacts to residences have been addressed in the Initial Study (see Appendix A).

Information in this section was obtained from the *City of Dixon Northwest Quadrant Specific Plan (NQSP) Draft EIR* (1994)*,* the *City of Dixon Northeast Quadrant Specific Plan* (1995), *Conceptual Drainage Report, Dixon Downs (Part of NQSP) Dixon California* (Morton & Pitalo, Inc., September 8, 2004), *Stormwater Management Plan, Fiscal Years 2003-2004 through 2007-2008 Cities of Vacaville and Dixon* (2003), *Dixon California Engineering Design Standards & Construction Specifications* (City of Dixon Engineering Department, April 2003), *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region Fourth Edition -1998 The Sacramento River Basin and The San Joaquin River Basin* (1998), *Dixon Municipal Code* (June 22, 2004), and *Dixon Downs Drainage/Flood Control EIR Evaluation* (West Yost and Associates, March 10, 2005. Copies of all of the above reports are available at the City of Dixon, 600 East A Street, Dixon.

Environmental Setting

Regional Setting

The Proposed Project site is located within the City of Dixon Watershed D, in the Lower Putah Creek area (watershed number 511.20, USGS HUC 18020109) of the Valley Putah-Cache Creek hydrologic unit in the Sacramento River Basin, Central Valley, California. Watershed D drains into the Dixon Resource Conservation District's Tremont 3 Drain. The Tremont 3 Drain discharges into the Reclamation District (RD) 2068 Main Canal, which in turn drains into RD 2068's V-Drain. The V-Drain discharges into the Hass Slough, which outfalls into the Sacramento River (Figure 4.6-1 Project Vicinity Drainage). The Sacramento River is currently listed as impaired due to unknown toxicity, mercury, and diazinon.[1] Causes of impairment are agriculture, resource extraction, and unknown causes.

The climate in the region is semi-arid with hot, dry summers and wet, mild winters. Normal mean annual rainfall at Dixon is about 19 to 20 inches per year, which is similar to precipitation measured at the Davis station (19.05 inches per year, with 84 percent occurring in the winter, November through April).[2]

Northeast Quadrant Drainage

Central Area

The general flow pattern in the Dixon region is from the northwest to the southeast. Runoff from about 2,700 acres of agricultural lands north of I-80 flows through several culverts under I-80 (and over the highway in a 100-year storm) and into the central part of the Northeast Quadrant (NEQ). I-80 was constructed above the surrounding ground by a few feet, and it impedes the flow of floodwater to the southeast. Consequently, routine flooding occurs to the northwest of I-80. Flow through the I-80 culverts (or over the highway) enters a series of drainage channels and pipes through the center of the NEQ. The drainage channels in this area are privately owned and maintained. The channels/pipes convey flow across the NEQ and across the Proposed Project site to a single 36" wide by 22" high oval culvert under Pedrick Road. This culvert lacks adequate capacity for even small (2-year to 3-year) storm events, and flood flows routinely overtop Pedrick Road and continue to the east.

North Area

Runoff from about 780 acres north of I-80 crosses I-80 in a series of culverts and then flows through an open channel around the north end of the NEQ. At Pedrick Road, there is a 22" wide by 18" high arch culvert that is filled with sediment. At this point most flow overtops Pedrick Road and flows east as sheet flow over the fields between Pedrick Road and the Union Pacific Railroad.

South Area

The southeast corner of the NEQ drains to a 36" wide by 22" high oval culvert under Vaughn Road. From this culvert runoff enters a drainage ditch that flows to the southwest along the railroad for about 800 feet. At this location it enters a 36-inch culvert under the railroad. However, the railroad culvert is almost completely plugged with sediment and can convey very little flow. Also, the ditch downstream of the railroad culvert has been filled, so any flow passing through the railroad culvert would sheet flow across the fields east of the railroad and then enter the Tremont 3 Drain system.

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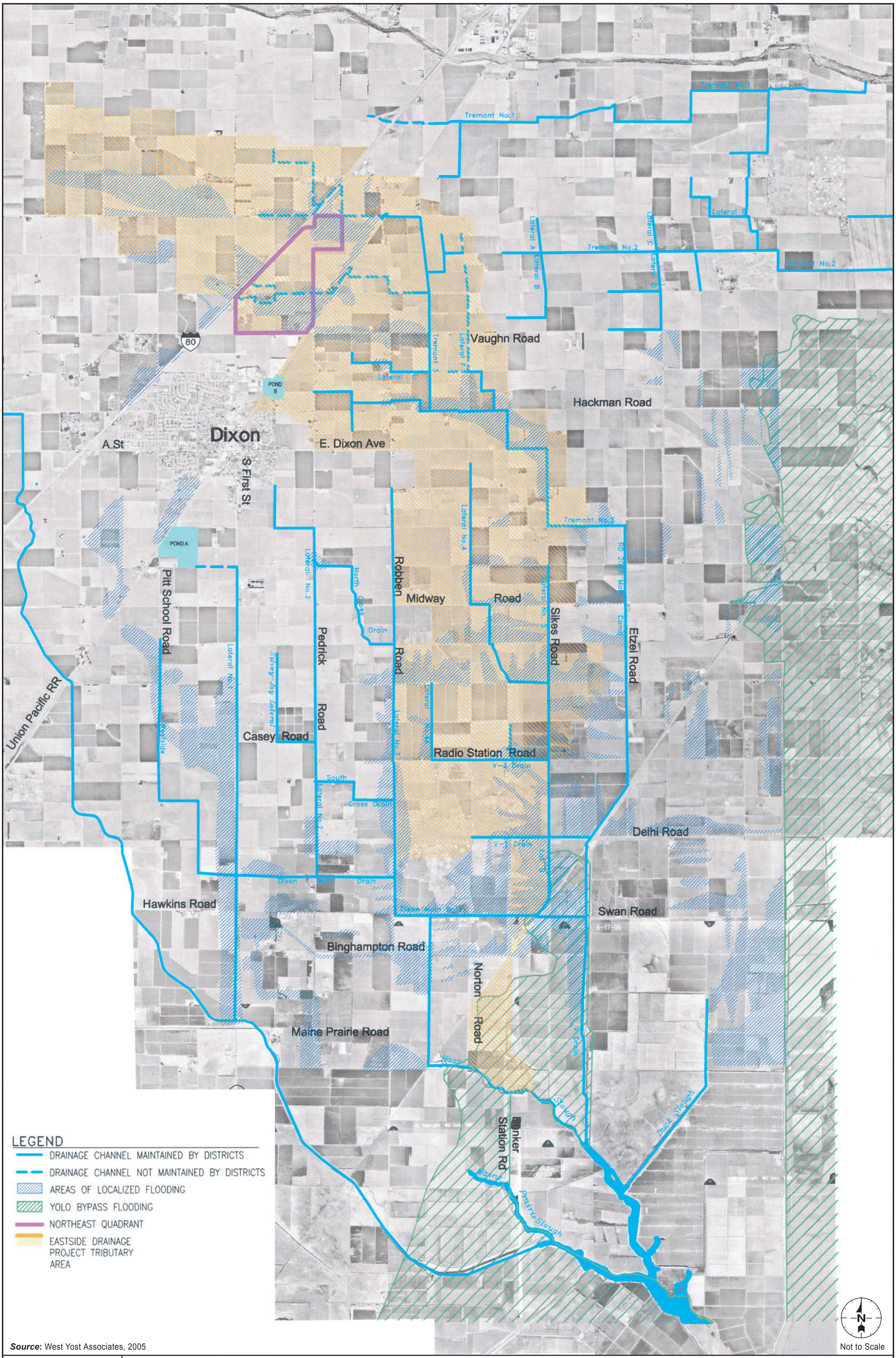
1 Central Valley Regional Water Quality Control Board. 2002 CWA Section 303(d) List of Water Quality Limited Segment. Approved by the USEPA in July, 2003.

2 NOAA. Davis 1 WSW, *California NCDC 1971-2000 Monthly Normals*. Western Regional Climate Data Center. www.wrcc.dri.edu Accessed 12/2/2004



Source: West Yost Associates, 2005

EIP ASSOCIATES

FIGURE **4.6-1**
Dixon Regional Drainage

10811-00 City of Dixon

Union Pacific Railroad

Like I-80, the Union Pacific Railroad was constructed above the surrounding ground, and it impedes the flow of floodwater to the southeast. Consequently, routine flooding occurs to the west of the railroad (the railroad would not be overtopped even in a 100-year storm). Along the east side of the railroad is a borrow pit (for the railroad construction), and flow from the Central NEQ drainage and the North NEQ drainage are hydraulically connected by this borrow pit. There are 3 culverts under the railroad that are open to convey flow under the railroad, including a 48-inch culvert, a 30-inch culvert, and a 36-inch culvert. Flow through the 48-inch culvert directly enters the upstream end of the Tremont 3 Drain. Flow through the 30-inch culvert enters a privately owned channel and continues east to the Tremont 3 Drain. Flow through the 36-inch culvert enters a ditch that has been partly filled, resulting in flooding flow across the fields east of the railroad and then into the Tremont 3 Drain system.

There is also a plugged 36-inch culvert just north of the Pedrick Road-Railroad crossing. However, since this culvert has been plugged, it was not included as a drainage feature in this environmental analysis.

Water Quality

Drainage water quality in the project region was measured for the Central Valley Regional Water Quality Control Board as part of the Conditional Waiver for Agriculture Water Quality Monitoring Program[3]. The Willow Slough at Road 99 in Yolo County site is within the vicinity of the Proposed Project location and drains area with similar land uses. Flow ranged from 29 to 64 cfs in this drain during five sampling events from the beginning of July through middle of September. Precipitation was negligible, consequently, drainage flow reflected irrigation returns. Pesticides (DDE, Dieldrin, Simazine, Chlorpyrifos, and Dimethoate) were detected in some samples during the growing season. Average temperature was between 22 to 27 degrees centigrade, pH was 7.97, dissolved nitrogen was 0.887 milligrams per liter (mg/L), dissolved phosphorous was 0.077 mg/L, hardness was 190 mg/L as calcium carbonate, total dissolved solids were 296 mg/L, total organic carbon was 16.8 mg/L, and dissolved oxygen remained above 6.5 mg/L.

Groundwater

The Proposed Project site is located within the Solano sub-basin of the larger 27,200 square mile Sacramento River Hydrologic Region (Sacramento Groundwater Basin). The Sacramento valley is a northward-trending trough filled with marine and continental sediments. Fresh groundwater in the basin is contained in unconsolidated deposits of the older alluvium (Quaternary), Pliocene, Eocene deposits, and the Tehama Formation. The Sacramento Groundwater Basin supplies approximately 2.5 million acre-feet of water to municipal, industrial, and agricultural users on an average annual basis. The Sacramento Groundwater Basin is filled with sediments having variable permeabilities and thickness, which result in well production levels in areas with coarser materials to produce larger amounts of water than those with finer materials. In general, well yields are considered good: they range from about 100 to several thousand gallons per minute (gpm).[4]

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3 CVRWQCB. Central Valley Regional Water Quality Control Board Conditional Waiver for Irrigated Agriculture Monitoring Program Phase II Sampling Results July 2004 – September 2004 Prepared for the Central Valley Regional Water Quality Control Board by Aquatic Ecosystems Analysis Laboratory, John Muir Institute of the Environment, University of California, Davis January 29, 2005

4 California Department of Water Resources, *California's Groundwater, Bulletin 118*, Sacramento, CA, 2003, page 158.

Solano Groundwater Sub-basin

The Solano Groundwater Sub-basin (groundwater basin) is located in the southernmost extent of the Sacramento Groundwater Basin and is bounded by Putah Creek on the north, the Sacramento River on the East, the North Mokelumne River on the southeast, and the San Joaquin River on the south, and roughly by the English and Montezuma Hills to the west. Subsurface groundwater inflow into the groundwater basin sometimes occurs from the Yolo basin to the north, and outflow sometimes occurs to the South American basin to the east. The Solano groundwater basin primarily contains the fresh-water bearing formations of younger alluvium, older alluvium, and the Tehama Formation. These formations generally range in thickness from 200 to 3000 feet thick from west to east, respectively.[5]

Groundwater Levels

Groundwater levels in the Solano groundwater basin have been documented for about 90 years. From 1912 to 1932, reduced precipitation levels resulted in a lowering of the groundwater table, while during the period from 1932 to 1941, water levels increased due to an abundance of precipitation. Subsequent to 1941, and until the Solano Project[6] started in 1959, groundwater levels in the basin continued to decline to the point that there was a measurable cone of depression centered between Dixon and Davis. After the Solano Project began in earnest, groundwater levels rebounded slowly, with minor dips during the drought of the 1970's and late-1980's that recovered quickly with subsequent above-average periods of precipitation.[7] More recently, groundwater levels in the basin located within a two mile radius from the center of Dixon have been fairly stable with seasonal and inter-annual fluctuations reflecting typical patterns associated with summer and winter water use.[8]

Groundwater levels are further affected by groundwater production in Dixon. In general, most groundwater wells create "cones of depression" by actively pumping water out of the aquifer and reducing groundwater levels around the wells such that groundwater levels are less affected with an increase in distance from the well location. Cones of depression can affect nearby groundwater levels based on the pump rates and the physical characteristics of the aquifer material (i.e., alluvium). In addition, wells spaced too closely together can have overlapping cones of depression, which create an increased decline in groundwater levels and increase the energy required to pump (or lift) the water out of the aquifer. Therefore, Dixon Solano Municipal Water Service has set specific criteria for the location of wells based on the underlying aquifer storage material and pump rates. Wells should be placed at least 1,320 feet apart for wells which pump at a 1,500 gpm rate and up to 1,700 feet apart for wells which pump at 2,000 gpm. These distances are guidelines which can be used for planning purposes. Ultimately, the conditions that exist at each well site are tested and distances are adjusted to prevent overlapping cones of depression.[9]

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5 California Department of Water Resources, *California's Groundwater, Bulletin 118, Sacramento Valley Groundwater Basin, Solano Subbasin*, February 27, 2003.

6 The Solano Project includes Monticello Dam, Putah Diversion Dam, Putah South Canal, and necessary waterways, laterals, and drainage works. The project was designed to irrigate 96,000 acres of land. The Solano Project also provides municipal and industrial water to cities in Solano County.

7 California Department of Water Resources, *California's Groundwater, Bulletin 118, Sacramento Valley Groundwater Basin, Solano Subbasin*, February 27, 2003.

8 California Department of Water Resources, Division of Planning and Local Assistance website, http://wdl.water.ca.gov/gw/gw_data/hyd/ , accessed November 9, 2004.

9 Solano Water Authority, *Project Agreement #4, North Central Solano County Groundwater Resources Report*, May 16, 1995, pages 25 and 26.

Groundwater Quality

All sources of water, including groundwater and rainwater, contain constituents from the surrounding environment. As it percolates through the soil, groundwater dissolves and incorporates many constituents, which may be naturally occurring minerals and gases, or man-made contaminants. Surrounding land uses also influence water quality; for example, receiving water (surface water or groundwater) predominantly surrounded by urban uses can contain elevated levels of oil, grease, heavy metals, and sediments. Agricultural land uses primarily contribute excess nutrients (derived from fertilizers) and sediments to receiving water. Pesticides and herbicides are typically present in irrigation return water.

The State has set thresholds for potential contaminants, including such primary health concerns as bacteriological, inorganic and organic contaminants. These thresholds are set as Maximum Contaminant Levels (MCLs). Examples of primary contaminants include arsenic, nitrates and selenium, as well as pesticides and volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Nitrates are of particular interest because of their broad range of possible sources in the central valley, including fertilizers and dairy activities. Arsenic is of current issue as the State and federal governments are in the process of revising the MCL thresholds.

The State has also set thresholds for other contaminants that may result in direct health concerns, but could result in secondary concerns such as aesthetics, including taste, turbidity and odor. For these constituents, no primary MCL is set, but a secondary MCL is provided. Examples of potential secondary inorganic contaminants include iron, manganese and total dissolved solids (TDS), which are typically forms of salts. The primary and secondary MCLs are listed in the California Code of Regulations, Title 22 for inorganic, organic, bacteriological and radiologic constituents.

According to the DWR, the groundwater quality in the Solano groundwater basin is generally suitable for most urban and agricultural uses with only local impairments. The primary contaminants of concern are TDS, nitrate, boron, chloride, and organic compounds. Overall, 123 public supply wells within the groundwater basin are monitored to meet the State's primary MCLs for drinking water. Approximately six percent of the wells had constituents exceeding one or more MCLs. Of these, 23% were pesticides, 61% were nitrates, 8% were VOCs/SVOCs, and 8% were inorganic contaminants.

Most important to water supply considerations are the concentrations of the arsenic in the groundwater basin which typically range between 0.02 and 0.05 milligrams per liter (mg/L), also referred to as parts per million (ppm), with the highest concentrations of arsenic found on the southeastern border of the basin. Although these levels of arsenic are at or below the exiting primary MCL of 0.050 mg/L, California has set a public health goal (PHG) for arsenic levels in drinking water at 0.004 mg/L and a new federal MCL of 0.01 mg/L will be effective January 23, 2006 .[10]

In terms of secondary contaminants, the TDS levels in the groundwater basin range between 250 and 500 mg/L in the eastern and northwest portions of the basin, with levels approaching 800 mg/L in the central and southern areas. The State has set the secondary MCL for TDS at 1,000 mg/L. Chloride concentrations in the basin range from 100 mg/L in the southern areas to a maximum of 600 mg/L having been recorded in the region, which is in excess of the secondary MCL for chloride of 500 mg/L.

10 California Department of Health Services, Division of Drinking Water and Environmental Management website, http://www.dhs.ca.gov/ps/ddwem/chemicals/arsenic/newmcl.htm, accessed July 22, 2005.

Iron concentrations increase from west to east in the basin, ranging from less than 0.02 mg/L in the west to greater than 0.05 mg/L along the Sacramento River, exceeding the secondary MCL of 0.3 mg/L. Likewise, manganese concentrations increase from the west (0.01 mg/L) to the east where levels have occasionally exceeded the secondary MCL of 0.05 mg/L.

Site Characteristics

The project site has been farmed for over 100 years as orchard, row crops, or for livestock grazing. Soils have been exposed and disturbed on a regular basis as a result of farming activities. The majority of parcels within the project site are currently fallow, or used for irrigated row crops and corn. I-80 abuts the site at the northwest corner.

The project site is located on the same alluvial plain formed by Putah Creek, which generally slopes from the northwest to the southeast at a 0.1 to 1 percent slope. The project site has been graded to a nearly flat condition, and runoff is collected in roadside ditches adjacent to Pedrick Road on the east and Vaughn Road on the south, before being conveyed to a depressed area adjacent to the Union Pacific Railroad tracks. Runoff water often contains sediment from exposed soil, as well as fertilizers and pesticides used during agricultural production.

Flows from the northwest side of I-80 drain to the site via an eight-foot by four-foot reinforced concrete box (RCB) culvert crossing under Highway 80 near the Curry Road/North First Street interchange, through a 30-inch corrugated metal pipe (CMP) culvert and then through two 18-inch CMPs northeast of the interchange. The flows are conveyed from this point eastward by channel to a depressed area of approximately 4.5-acres. Flow that crosses under I-80, through twin 29-inch by 18-inch oval CMPs located northwest of the box culvert also drains to the 4.5-acre depressed field. This depressional area remains wet year round due to irrigation runoff. A channel conveys the flows from this point via the Proposed Project site to Pedrick Road.

An additional 360 acres drain to the four 36-inch CMP culvert crossings of Highway 80 southwest of the Pedrick Road Interchange. An existing channel bisecting a 60-acre parcel east of Pedrick Road carries flows eastward and away from the project site.

As indicated in the 1995 NQSP EIR, the project site is not in the 100-year floodplain. Review of FEMA maps indicates the property is not in the 100 year flood zone, but is in Zone C, which is an area identified to experience minimal flooding.

Soils in the project area are mostly Yolo silty clay loams, Brentwood clay loams (0 to 2 percent slope), Capay silty clay loams, or Yolo loams.[11] These soils are nearly level to level with slow runoff and low to slight susceptibility to erosion. Existing land use is mostly agriculture with corn and tomatoes comprising the major crops. Potential sediment transport, calculated using the Revised Universal Soil Loss Equation program,[12] from corn-cropped areas is relatively low (approximately 0.9 tons per acre per year) and does not exceed the tolerable soil loss of five tons per acre per year.[13] However, for tomato cropped areas, erosion is approximately 6.5 tons per acre per year, which does exceed the tolerable soil loss.

11 USDA-NRCS. *Solano County Soil Survey.*
12 USDA-ARS and USDA-NRCS. *Rusle2 version 1.18.40* Aug. 4, 2004.
13 USDA-NRCS. *Solano County Soil Survey.*

Table 4.6-1 lists the application rates of typical pesticides, Diazinon, and Chlropyrifos used on corn and tomato crops in California. Typical pesticides were determined based on the amount of acres they were applied to in 2003.[14] In addition to pesticide applications, the existing crops are likely to be fertilized with nitrogen, phosphorous, and potassium (tomatoes).[15] Dissolved nitrates and phosphorous (0.887 mg/L and 0.077 mg/L, respectively) in the regional summer drainage water exceeds the US EPA total nutrient criteria for streams, where the total phosphorous criteria = 0.47 mg/L, and the total nitrogen criteria = 0.31 mg/L (Aggregate Ecoregion I).[16] Even though Chlorpyrifos and Diazinon, two organophosphate pesticides known to contribute to water quality degradation in several regional waterbodies, have been banned for household use, they were still used to control pests on both crops in California during 2003.

Table 4.6-1

Application Rates of Major Pesticides for Corn and Tomatoes in California, 2003

Pesticide	Corn	Tomatoes	Toxicity[1]
	lbs ai/ac[2]	lbs ai/ac[2]	
Methomyl	0.45		Toxic
Esfenvalerate	0.04		Not Listed
Cyfluthrin	0.04		Not Listed
Cyhalothrin; lambda	0.03		Not Listed
Glyphosphate	0.95		Not Listed
Diazinon	0.75	0.93	Toxic
Chlorpyrifos	0.75	1.06	Toxic
Sulfur		27.0	Not Listed
Trifluralin		0.55	Not Listed
Rimsulfuron		0.01	Not Listed
Chlorothalonil		1.79	Toxic
Tebufenozide		0.17	Not Listed

Notes:
[1] Toxic = Pesticide Action Network (PAN) Bad Actor rating based on whether the pesticide is a known or probable carcinogen, reproductive or developmental toxin, cholinesterase inhibitors, known groundwater contaminant, or is designated as a high acute toxic chemical by the U.S. National Toxicology Program, World Health Organization, US EPA
[2] pounds of active ingredient per acre
Source: PAN Database, 2005.

14 S. Orme and S. Kegley, *PAN Pesticide Database*, Pesticide Action Network, North America (San Francisco, CA. 2004), http:www.pesticideinfo.org.

15 Tyler K. B. and 0. A. Lorenz. *Fertilizer Guide for California Vegetable Crops*. 1991. Department of Vegetable Crops, University of California. http://vric.ucdavis.edu/veginfo/topics/fertilizer/fertguide.html

16 US EPA. Summary Table for the Nutrient Criteria Documents, Nutrient Water Quality Criteria. July 2002. http://www.epa.gov/waterscience/criteria/nutrient/ecoregions/ last updated 3/31/2005.

Regulatory Framework

Federal Regulations

Clean Water Act

The Clean Water Act (CWA) was designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA also directs states to establish water quality standards for all "waters of the United States" and to review and update such standards on a triennial basis. Other provisions of the CWA related to basin planning include Section 208, which authorizes the preparation of waste treatment management plans, and Section 319, which mandates specific actions for the control of pollution from non-point sources. The EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES) Program, to the nine individual states.

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. Section 304(a) requires the EPA to publish water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards.

Section 303(c)(2)(b) of the CWA requires states to adopt numerical water quality standards for toxic pollutants for which EPA has published water quality criteria and which reasonably could be expected to interfere with designated uses in a water body.

All projects resulting in discharges, whether to land or water, are subject to Section 13263 of the California Water Code and are required to obtain approval of Waste Discharge Requirements (WDRs) by the RWQCBs. Land and groundwater-related WDRs (i.e., non-NPDES WDRs) regulate discharges of privately or publicly treated domestic wastewater and process and wash-down wastewater. WDRs for discharges to surface waters also serve as NPDES permits, which are further described below.

Large CAFO NPDES Permit

Because this facility may house more than 500 horses at a single time, it is considered a Large Concentrated Animal Feeding Operation (Large CAFO) (Section 122.23(b)(4) of Title 40 Code of Federal Regulations) and will need to obtain coverage under the General CAFO NPDES Permit (Section 122.23(d)(1) of Title 40 Code of Federal Regulations) (2003). Requirements for coverage under the General CAFO permit include, at a minimum:

- Implementation of a nutrient management plan that must include provisions for
    - Assuring adequate manure storage capacity
    - Proper handling of dead animals and chemicals
    - Diverting clean water from the production area

  - Keeping animals out of surface water
  - Using site-specific conservation practice
  - Developing ways to test manure and soil
  - Assuring appropriate use of nutrients when spreading manure
  - Keeping records of nutrient management practices
- Submission of annual reports to the local permitting authority
- Keeping permit current until operation is completely close and manure removed
- Records archive of nutrient management practices for at least 5 years

Horse and sheep operations should design their facility to contain all of their CAFO's manure plus the runoff from a confined area up to a 25-year, 24-hour rainfall event (i.e., large storms).

Floodplain Development

The Federal Emergency Management Agency (FEMA) is responsible for determining flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers studies. FEMA is also responsible for distributing the Flood Insurance Rate Maps (FIRMS), which are used in the National Flood Insurance Program (NFIP). These maps identify the locations of special flood hazard areas, including the 100-year floodplain.

FEMA allows non-residential development in the floodplain; however, construction activities are restricted within the flood hazard areas depending upon the potential for flooding within each area. Federal regulations governing development in a floodplain are set forth in Title 44, Part 60 of the Code of Federal Regulations (CFR) which enables FEMA to require municipalities that participate in the National Flood Insurance Program (NFIP) to adopt certain flood hazard reduction standards for construction and development in 100-year flood plains.

State Regulations

Responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and State water quality statutes and regulations. The RWQCBs develop and implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water quality characteristics, and water quality problems. The Central Valley Regional Water Quality Control Board (CVRWQCB) implements a number of federal and State laws, the most important of which are the State Porter-Cologne Water Quality Control Act and the Federal Clean Water Act.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act authorizes the SWRCB to adopt, review, and revise policies for all waters of the state (including both surface and groundwater) and directs the RWQCBs to develop regional Basin Plans. Section 13170 of the California Water Code also authorizes the SWRCB to adopt water quality control plans on its own initiative.

The Central Valley Region Basin Plan specifically: (1) designates beneficial uses for surface and ground waters; (2) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy; and (3) describes implementation programs to protect all waters in the region. In cases where the Basin Plan does not contain a standard for a particular pollutant, other criteria are used to establish a standard. These may be applied from SWRCB documents (e.g., the Inland Surface Waters Plan and the Pollutant Policy Document) or from water quality criteria developed under Section 304(a) of the Clean Water Act (e.g., California Toxics Rule).

National Pollutant Discharge Elimination System

The NPDES permit system was established in the CWA to regulate both point source discharges (a municipal or industrial discharge at a specific location or pipe) and non-point source discharges (diffuse runoff of water from adjacent land uses) to surface waters of the U.S. Non-point source pollution often enters receiving waters, such as the Sacramento River, in the form of overland flow, i.e., surface runoff that is not delivered by pipelines or other discrete conveyances. As defined in the federal regulations, such non-point sources generally are exempt from federal NPDES permit program requirements, with two exceptions that are controlled by the NPDES program: (1) non-point source discharges caused by general construction activities, and (2) stormwater discharges in municipal stormwater systems (either as part of a combined system or as a separate system in which runoff is carried through a developed conveyance system to specific discharge locations). To meet the goals of the NPDES permit, each local stormwater program and each permittee within a program establishes a Stormwater Management Plan (SWMP). These SWMPs give specific local requirements targeted to meet the environmental needs of each watershed, as well as to reflect the political consensus of each community.

For point source discharges, each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge; however, the Project Area would not be considered a point source for regulatory purposes. For non-point source discharges, the NPDES program establishes a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. The NPDES program consists of (1) characterizing receiving water quality, (2) identifying harmful constituents, (3) targeting potential sources of pollutants, and (4) implementing a Comprehensive Stormwater Management Program. Each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Sections 401 and 402 of the CWA contain general requirements regarding NPDES permits. Section 307 of the CWA describes the factors that the EPA must consider in setting effluent limits for priority pollutants.

The reduction of pollutants in urban stormwater discharge through the use of structural and nonstructural Best Management Practices (BMPs) is one of the primary objectives of the water quality regulations. BMPs typically used to manage runoff water quality include controlling roadway and parking lot contaminants by installing oil and grease separators at storm drain inlets, cleaning parking lots on a regular basis, incorporating peak-flow reduction and infiltration features (such as grass swales, infiltration trenches, and grass filter strips) into landscaping, and implementing educational programs.

The RWQCB requires that an NPDES permit be obtained for construction grading activities for all projects greater than one acre. This permit requires implementation of non-point source control of stormwater pollution runoff through the application of a number of Best Management Practices, meant to reduce the amount of pollutants entering streams and other water bodies. Projects of less than one acre, the MS4 operations are controlled through issuance of a Notice of Intent (NOI) to comply with the terms of the region-specific General Construction Activity Stormwater Permit (General Permit). A MS4 System is defined as a stormwater collection system.

NPDES General Construction Activity Stormwater Permit

In accordance with NPDES Phase I regulations, to minimize the potential effects of construction runoff on receiving water quality, the State requires that any construction activity affecting five acres or more must obtain coverage under the General Construction Storm Water Permit. Implementation of NPDES Phase II expanded this requirement to include construction activities disturbing one acre or more. The SWRCB permits all regulated construction activities under Order No. 98-08-DWQ (1999).

Prior to beginning any construction activities, the permit applicant is required to obtain coverage under the Construction General Permit by preparing and submitting an NOI and a Stormwater Pollution Prevention Plan (SWPPP) to the SWRCB; and, by implementing the SWPPP to mitigate potential construction impacts on receiving water quality. In addition, 2003 revisions to the original Construction General Permit clarify that all construction activity, including small construction sites that are part of a larger common plan, must obtain a coverage under this Construction General Permit. Because construction of the Proposed Project would disturb more than one acre, it would be subject to these permit requirements.

Required elements of a SWPPP include: (1) site description addressing the elements and characteristics specific to the site; (2) descriptions of BMPs for erosion and sediment controls; (3) BMPs for construction waste handling and disposal; (4) implementation of approved local plans; (5) proposed post-construction controls, including a description of local post-construction erosion and sediment control requirements; and (6) non-stormwater management. The SWPPP must include BMPs that address source control, and, if necessary, include BMPs that address specific pollutant control.

Examples of typical construction BMPs in completed SWPPPs include: scheduling or limiting activities to certain times of year; prohibiting certain construction practices; implementing equipment maintenance schedules and procedures; implementing a monitoring program; other management practices to prevent or reduce pollution, such as 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.

Large CAFO NPDES Permit

In addition to the Federal Requirements for coverage under the General CAFO (Concentrated Animal Feeding Operation) NPDES Permit, state requirements include submission of a Report of Waste Discharge (ROWD) to the CVRWQCB. This ROWD must include the following information along with the completed forms and fees:

- All information required in Section 122.21 (i)(1) of Title 40 CFR;
- Copies of any Conditional Use Permits issued by the City of Dixon;
- Final facility design plan;
- Final drawing illustrating the waste management system including any structural facilities such as wastewater ponds, wastewater distribution systems, and others;
- If applicable, plans for construction of any ponds, including mitigation measures implemented during construction;
    - Hydrogeologic Evaluation Plan with at least:
    - Uppermost groundwater zone identification including depth, flow direction, gradient;
- Groundwater monitoring for existing supply wells and monitoring wells;
- FEMA Flood Zone Mapping for the 25-year, 24-hour and 100-year, 24-hour storm events;
- Final Irrigation Nutrient Management Plan.

Construction Site Dewatering

Clean or relatively pollutant-free construction-generated wastewater that poses little or no threat to water quality may be discharged directly to surface water under certain conditions. Permit conditions for the discharge of these types of wastewaters to surface water are specified in Waste Discharge Requirements General Order for Dewatering and Other Low-Threat Discharges to Surface Waters, Order No. 5-00-175. Discharges may be covered by the permit provided either (1) they are four months or less in duration, or (2) the average dry weather discharge does not exceed 0.25 million gallons per day. Construction dewatering, well development water, pump/well testing, and miscellaneous dewatering/low-threat discharges are among the types of discharges that may be covered by the permit. This general permit also specifies standards for testing, monitoring and reporting, receiving water limitations, and discharge prohibitions.

NPDES Phase II (WQO 2003-0005-DWQ)

The 1987 amendments to the CWA directed the federal EPA to implement the stormwater program in two phases. Phase I addressed discharges from large (population 250,000 or above) and medium (population 100,000 to 250,000) municipalities and certain industrial activities. Phase II addresses all other discharges defined by EPA that are not included in Phase I, and construction activities that affect one to five acres. The City of Dixon is regulated under the Phase II regulations, which were published in the Federal Register on December 8, 1999. The Phase II regulations cover the activities of the Small Municipal Separate Storm Sewer System (MS4) Program. An MS4 system is defined as a stormwater collection system that is not a combined sewer system or part of a Publicly Owned Treatment Works (POTW).

Under these regulations, the permittee must implement a Stormwater Management Program that addresses six minimum control measures, including (1) public education and outreach, (2) public participation/involvement, (3) illicit discharge detection and elimination, (4) construction site stormwater runoff control for sites greater than 1 acre, (5) post-construction stormwater management in new development and redevelopment, and (6) pollution prevention/good housekeeping for municipal operations. These control measures will typically be addressed by developing BMPs. Major provisions of the NPDES Phase II permit requirements include the following conditions:

A.1. Discharges shall not cause or contribute to an exceedance of water quality standards contained in a Statewide Water Quality Control Plan, the California Toxics Rule (CTR), or in the applicable RWQCB Basin Plan.

A.2. The permittees shall comply with Receiving Water Limitations A.1 [described above] through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications.

All regulated MS4s must adopt an ordinance or other document to ensure implementation of the Design Standards included herein or a functionally equivalent program that is acceptable to the appropriate RWQCB. These Design Standards include the following provisions, unless there is conflict with established local codes or other regulatory mechanisms that are more stringent than those set forth in Attachment 4 (see Appendix J):

1. Peak Storm Water Runoff Discharge Rates. Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

2. Conservation of Natural Areas.

3. Minimization of Storm Water Pollutants of Concern: In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the California Storm Water Best Management Practices Handbooks; Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide.

4. Protect Slopes and Channels.

5. Provide Storm Drain System Stenciling and Signage.

6. Properly Design Outdoor Material Storage Areas.

7. Properly Design Trash Storage Areas.

8. Provide Proof of Ongoing BMP Maintenance.

9. Design Standards for Structural or Treatment Control BMPs.

   The Permittees shall require that post-construction treatment control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

   1) Volumetric Treatment Control BMP:

      a) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

      b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/ Commercial, (2003); or

      c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

   2) Flow Based Treatment Control BMP

      a) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or

      b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Included in Attachment 4 of the Phase II permit are provisions for a waiver, limitations on use of infiltration BMPs and an alternative certification for stormwater treatment mitigation.

Local Regulations

Northeast Quadrant Specific Plan (NQSP)

Resource Management Element

The intent of the NQSP is that the stormwater flows will be detained on-site in basins incorporated in the landscape and parking areas surrounding each building and there will be no net increase in pre-project flows. According to the NQSP, "when a specific development project is submitted to the City, the project will be required to submit a detailed drainage improvement plan. If that project proposes a drainage program that does not provide for pre-project flow detention on-site, the project will be required to provide a master drainage plan. The environmental effects of the drainage improvements will be evaluated at that time." Pertinent NQSP policies regarding hydrology and water quality are summarized below and include policies to protect water quality and prevent soil erosion:

POLICY 5.9.4 Soil Protection and Grading

1. All development plans submitted to the City review and approval shall provide an erosion and sediment control plan. Required measures will include, seeding of graded areas and watering during grading activities to reduce wind erosion.

4. Prior to development of any individual project area, a master conceptual grading plan should be submitted which identifies the overall grading concept for the plan area.

5. Drainage problems resulting from poor soil permeability should be reduced through development of gravel sub-drains and the creation of swales and channels to convey runoff.

POLICY 5.9.5 Water quality

1. Paved parking areas should be designed to provide the minimum amount of paving area necessary to meet required parking standards. Permeable paving materials may be considered where feasible.

2 Best Management Practices (BMP) such as sediment traps, evaporation basins, flow reduction devices, and other methods to treat pollutants draining from parking areas and streets shall be installed in the storm drain system for individual projects within the plan area in accordance with City standards.

3. Plan proposed detention ponds shall incorporate similar BMP devices and methods in accordance with City standards.

4. Design of storm detention facilities should be consistent with the City's retention/detention system design standards. In general, allowable storage capacity shall be determined by the city engineer. Maximum depth shall be ten feet, the freeboard shall maintain a minimum of one-foot and the highest water elevation shall be set by the lowest catch basin elevation. If a maximum four foot depth can be maintained at the perimeter, no enclosure fencing will be required. Low growing groundcover is recommended around the periphery of the pond. Other aesthetic enhancements may e allowed with approval from the city engineer.

Public Facilities and Services Element

Existing storm drainage infrastructure in the NQSP area is inadequate to handle current peak flow conditions resulting in downstream flooding. The City of Dixon has adopted and is in the process of implementing a city-wide drainage system. The Dixon Resource Conservation District (DRCD) drainage master plan includes construction of three retention basins along the eastern perimeter of Dixon's 50-year development boundary and a new channel paralleling Pedrick Road to empty to Haas Slough. Each application for development pursuant to the NQSP will be required to demonstrate the capacity to retain all storm water in a 100-year event unless a comprehensive storm drainage system is available to serve the Proposed Project.[17] Storm flow from NQSP drainage areas upstream of the Proposed Project site would flow across or through the site and into the downstream storm drainage system. Language regarding this detention policy is being revised to clarify the requirement for detention of storm flow specific to flow associated with each project; projects should not be responsible for flows contributed by other contributing areas. On-site detention ponds will be incorporated as amenity features in individual land uses. Pertinent NQSP Public Facilities and Services policies, regarding hydrology and water quality are summarized below. These include policies on detention, water conservation/irrigation, wastewater disposal, and drainage.

17 City of Dixon. *City of Dixon Northeast Quadrant Specific Plan (NQSP) Draft EIR*.1994

POLICY 6.11.1 General Policies

1. Dedication requirements for all public facilities and easements including detention ponds, drainage channels, fire station and electric substations should be set forth in the PUD.

POLICY 6.11.2 Water

1. Efficient plumbing fixtures, irrigation systems, drought-tolerant landscape materials, and other methods should be utilized to reduce overall water consumption.

POLICY 6.11.4 Drainage

1. Urban run-off shall be directed to the proposed city-wide drainage conveyances and shall meet standards for peak run-off period flows. However, each application for a PUD pursuant to this Specific Plan will be required to demonstrate the capacity to retain all on-site storm water in a 100-year event unless a comprehensive storm drainage system is available to serve the Proposed Project.

2. The Dixon Public Works Department shall review all drainage facilities prior to improvement and approval of individual project plans

3. Required retention/detention basins should be developed in coordination with facilities requiring additional on-site stormwater storage.

4. Overall stormwater volumes generated from the plan area will be mitigated through plan area participation in a regional drainage project, funded, in part through the Dixon North First Street Assessment District and supplemented by other methods as determined by the City.

City of Dixon Engineering Design Standards and Construction Specifications

The City of Dixon Engineering Design Standards and Construction Specifications provide minimum storm drainage design standards for all new development. These include storm drainage and structure elevation designs based on 10-year or 100-year design storms (volume and rate), minimizing the use of open channels for drainage, along with detention pond capacities and holding-times. The proposed Dixon Downs project and associated storm drainage system must comply with the City's Engineering Standards and Construction Specifications. The most significant of these standards are listed below; however, all of the standards must be complied with by the Proposed Project.

- Storm Drains must be sized for the 10-year storm with the hydraulic grade line at least one foot below the gutter flow line.

- The 100-year hydraulic grade line may exceed the gutter flow line, resulting in floodwater in the streets, parking lots, or other area where flooding does not damage houses or buildings. The 100-year hydraulic grade line must be at least one foot below the building pad elevations.

- Open channels are not allowed except in special circumstances and require the written approval of the City Engineer. Open channels shall be designed to convey the 100-year storm. The minimum freeboard shall be one foot if the design water level is below the surrounding ground surface and shall be three feet if the design water level is above the surrounding ground surface. The maximum velocity is three feet per second unless additional erosion protection is provided. The side slopes shall be no steeper than four horizontal to one vertical. Additional requirements, per City Standards, include maintenance roads, erosion control, and perimeter fencing.

- Detention ponds must be sized for the critical 100-year four-day storm. The minimum freeboard shall be one foot if the design water level is below the surrounding ground surface and shall be three feet if the water design level is above the surrounding ground surface. The side slopes shall be no steeper than four horizontal to one vertical, and side slopes within public access areas (e.g. parks or green belts) shall be no steeper than six horizontal to one vertical. The detention basin discharge shall be determined on a case-by-case basis and is subject to review and approval by the City Engineer.

City of Dixon Stormwater Management Plan

The City of Dixon has a Stormwater Management Plan that includes six required programs:

1. Public Education and Outreach Program
2. Public Involvement and Participation Program
3. Illicit Discharge Detection and Elimination Program
4. Construction Site Stormwater Runoff Control.
5. Post Construction Stormwater Management in New and Redevelopment Program. Proposed projects will need to propose a water quality plan and have it approved by the City of Dixon to comply with the requirements of this program.
6. Pollution Prevention and Good Housekeeping for Municipal Operations.

Some measurable goals for item 5 include updating the Agency Design Criteria to include BMPs to prevent stormwater pollution from site runoff, completion of a BMP manual, and development of structural and non-structural strategies for pollutant removal. These goals have yet to be met; no BMPs guidance or design criteria have yet been developed or implemented; however, compliance with the SMP is regulated under statewide NPDES Phase II General Permit.

City of Dixon Ordinances

The City of Dixon has two pertinent ordinances related to potential stormwater pollution and drainage hydrology: Grading Control Ordinance (Chapter 16.04, Title 16 of the Dixon Municipal Code) and Storm Water Control Ordinance (Chapter 16.06, Title 16 of the Dixon Municipal Code).

The following are excerpts from Chapter 16.04.040, Section A:

> GRADING CONTROL: Grading permits required for clearing or grubbing of 1 acre or more of land or 350 cubic yards of excavation or fill.
>
> 6. To avoid the disruption of natural or City authorized drainage flows caused by the activities of clearing and grubbing, grading, filling and excavation of land.
>
> 7. To avoid the degradation or pollution of water courses with nutrients, sediments, or other materials generated by new development or redevelopment.

8. To minimize increased in storm water runoff from development and redevelopment in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels

9. To meet the requirements of state and federal law and the City's municipal storm water National Pollutant Discharge Elimination System ("NPDES") permit.

An Erosion and Sediment Control (ESC) plan and Post Construction Erosion and Sediment Control Plan (PC plan) are required, per 16.40.040, Section B, paragraph 6; and per 16.04.020, Section B, paragraph 7, respectively.

STORM WATER CONTROL

The purpose and intent of the Storm Water Control Ordinance is to ensure the health, safety, and general welfare of the citizens of the City of Dixon, and to protect and enhance water quality of watercourses and water bodies in a manner pursuant to and consistent with the Federal Clean Water Act and the Porter-Cologne Act by reducing pollutants in storm water discharges to the maximum extent practicable and by prohibiting non-storm water discharges to the storm drain system (Chapter 16.06.020).

Key sections of the Storm Water Control Ordinance are noted below, however all sections of this ordinance shall apply to the Proposed Project.

- This ordinance is administered, implemented, and enforced by the Public Works Director of the City (16.06.050)
- Illegal discharges, illicit connections, and waste disposal are prohibited (16.06.080, 10.06.090, and 10.06.100)
- Discharges must comply with Industrial or Construction Activity NPDES Storm Water Discharge Permits (10.06.110).
- Prevention, control, and reduction of storm water pollution is required (16.06.120) through use of Best Management Practices
- Watercourses are to be protected (16.06.150)
- Remediation is required if a pollutant is discharged (16.06.160)
- and other provisions for prevention of pollutant transport.

Dixon Resource Conservation District (DRCD)

The DRCD owns, maintains, and operates the Tremont 3 Drain. An encroachment permit is required from DRCD in order to add or modify culverts or pipes contributing drainage to the Tremont 3 Drain. The primary requirements for obtaining the encroachment permit are to ensure that any new or modified drainage does not result in an increase of flows into the Tremont 3 Drain and that the new or modified drain pipe serves areas that are within the Tremont 3 service area.

Joint Powers Agreement – Dixon Regional Watershed Joint Powers Authority

The City of Dixon, DRCD, RD 2068, and the Maine Prairie Water District (MPWD) recently formed a Joint Powers Authority (JPA) to cooperatively manage storm water issues and related flooding from the

Dixon Regional Watersheds, which include the Northeast Quadrant Proposed Project area. The JPA specifically states the following:

(k) With regard to drainage from the Northeast Quadrant of the City, the Parties agree that the City is entitled to drain into the DRCD drainage system the present natural runoff from the Northeast Quadrant, without concentration or acceleration, recognizing that, prior to development, most rainfall was impounded within the Northeast Quadrant due to natural variability in topography. The Parties agree that, pursuant to this Agreement and for the purpose of settling potential disputes, the baseline present storm flows from the Northeast Quadrant shall be set at 23.1 cfs for a 5-year storm, 27.2 cfs for a 10-year storm, and 37.2 cfs for a 100-year storm measured at the 30-inch CMP in the railroad embankment as set forth in a letter from West Yost & Associates to the City dated June 16, 2004 and attached hereto as Exhibit K.

(i) All storm flows shall be released from the Northeast Quadrant at the greatest rate consistent with the terms of paragraph 10(f)(3)(a).

(ii) The City will address, in a manner fully consistent with applicable law, any storm flows in excess of the baseline flows as part of its review of development projects in the Northeast Quadrant and will cause there to be sufficient mitigation for the effects, if any, of such excess storm flows.

(iii) The City shall address, in a manner fully consistent with applicable law, the question of whether development in the Northeast Quadrant may be required to pay for downstream improvements needed to convey the baseline storm flows from the Northeast Quadrant to Haas Slough without damage.

(l) With regard to drainage originating outside the Northeast Quadrant of the City but draining into the Northeast Quadrant, the Parties acknowledge that they must accept the natural runoff from such lands, without concentration or acceleration. The Parties further acknowledge that such drainage has been concentrated and accelerated by virtue of the construction of Interstate 80 and other improvements. The Parties agree that, pursuant to this Agreement, the City may release flows originating outside the Northeast Quadrant of the City but draining into the Northeast Quadrant at the greatest rate consistent with the terms of paragraph 10(f)(3)(a). Such flows shall be included within the drainage rate established by paragraph 10(f)(3)(k).

Standards of Significance

The following thresholds of significance are based on Appendix G of the State CEQA Guidelines, unless otherwise noted. For purposes of this EIR, implementation of the Proposed Project may have a significant adverse impact on hydrology and water quality if it would result in any of the following:

- 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 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);
- 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 that would result in substantial erosion or siltation on or off site;

- 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 that would result in flooding on or off site;

- 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; or

- Otherwise substantially degrade water quality.

Methods of Analysis

The Proposed Project is evaluated for impacts on drainage ways, including drainage pattern modifications; changes in storm flow peak flow rate, elevation, and duration; drainage system capacity, including impacts on downstream conditions and regional implications; changes in pollutant and sediment load to surface water systems; and effect on groundwater supplies. Methods for analysis of drainage modifications and hydrologic impacts are addressed in *Dixon Downs Drainage/Flood Control EIR Evaluation* (see Appendix C). In general, local existing and Proposed Project hydrology and hydraulics were evaluated using XP-SWMM for four scenarios. XP-SWMM is a drainage computer model that simulates:

- The rainfall to runoff process based on the input rainfall data and the characteristics of the ground surface, such as the areas of soil versus pavement, the ground roughness, the ground slope, and other variables.

- The flow rate of the runoff in storm drains, open channels, pump stations, and other conveyance facilities.

- The storage of water in detention basins.

- The water surface elevations resulting from the flow in the storm drains, channels, pump stations, and detention basins.

Drainage Scenarios

The following four different conditions have been modeled with the drainage model of the Dixon Region for the 100-year, 4-day storm; the 10-year, 24-hour storm; and the 5-year, 24-hour storm. Impacts for hydrologic and hydraulic conditions were only evaluated for the Proposed Project after completion of both Phase 1 and Phase 2. Phase 1 development contains all drainage and detention facilities associated with the CAFO and race track facilities and major infrastructure to drain and detain the entire Proposed Project site; these will not change upon completion of Phase 2. Phase 2 would include additional stormwater facilities for completion of development of the Proposed Project site, which would be undeveloped prior to implementation of the Phase 2, and therefore, remain similar to existing conditions under Phase 1. Modeling potential impacts following completion of both phases allows for evaluation of the worst-case situation; any impacts of Phase 1, alone, would be less than Phase 1 and Phase 2.

Existing Conditions (EC)

This condition is evaluated to establish the current flow rates and water surface elevations in the Northeast Quadrant (NEQ) and in the downstream agricultural drain system. It includes the existing AKT retention pond with a storage volume of about 50 ac-ft. Exhibit A of the Conceptual Drainage Report (CDR) shows the major drainage facilities included in the existing conditions evaluation (see Exhibit A, Conceptual Drainage Report, Morton and Pitalo, 2005; available at the City of Dixon for review).

Dixon Downs Stand Alone Project (DDSAP)

This condition includes full development of both Phases 1 and 2 of the Proposed Project, but no other development within the Northeast Quadrant; this represents the Existing plus Proposed Project conditions. It is evaluated to demonstrate that development of Proposed Project with the proposed drainage improvements (including a 100 ac-ft detention basin in the interior of the race track) does not cause any increases in flooding either upstream or downstream of the Proposed Project site. Figure 4.6-2 from the CDR shows the major drainage facilities included in the DDSAP. As described in the CDR and the drainage model, the proposed drainage plan includes:

- The current land use of this area is agricultural, and the impervious percentage is 3 percent. After full development of the Proposed Project site, the average impervious percentage was modeled at 72 percent. Thus, the process of development was reasonably represented in the drainage model of the project site.

- Runoff from the areas west of the project site would be conveyed through the project site with (starting at the west parcel boundary and moving eastward to Pedrick Road):

    - Twin 60-inch RCP culverts to an on site open channel. The twin 60-inch culverts would be restricted to the equivalent of a single 42-inch culvert. Above this culvert, a structure would be constructed that allows floodwater from west of the Proposed Project to flow over the ground surface and into the open channel segment at the same elevation as occurs under existing conditions. The twin 60-inch culverts would be needed for future development within the NEQ, and the 42-inch restriction would be needed to eliminate downstream impacts under the DDSAP condition.

    - A segment of open channel, which would collect floodwater from west of the Proposed Project site.

    - A segment of trunk storm drain (twin 60-inch RCP drains),

    - Parallel 48-inch and 27-inch RCP drains under Pedrick Road. These drains would be smaller than the twin 60-inch drains so that the water level upstream of Pedrick road would be high enough to force water to be detained in the detention basin within the interior of the racetrack. Pedrick Road would be raised by about 3.5 feet. Thus it would also be necessary to improve/raise driveways that would be affected by this raising of Pedrick Road.

- A storm water detention basin located within the interior of the racetrack. This basin would provide a detention volume of about 100 acre-feet of storage, including the necessary freeboard. The detention basin would receive all of the runoff from the Proposed Project areas North 1 through North 4, Service Area, and Race Track Area (see Figure 1, Morton and Pitalo SWQMP Exhibit D). It would also receive flow from the 60-inch pipes through a 48-inch pipe, which would have a flap gate that would allow flow into the basin and prevent flow out of the basin through the 48-inch pipe. The detention basin would be drained by an 18-inch RCP storm drain outlet to the twin 60-inch drains, just west of Pedrick Road.

- Storm drain collection systems would convey storm water from the northern project areas to the detention basin. Each of these storm drains would include a smaller collection system, but the smaller collection systems have not been included in the CDR or the model.

- Storm drain collection systems would convey storm water from the southern project area (94 acres) to the open channel or the trunk drain system (twin 60-inch drains). Each of these storm drains would include a smaller collection system, but the smaller collection systems have not been included in the CDR or the model.

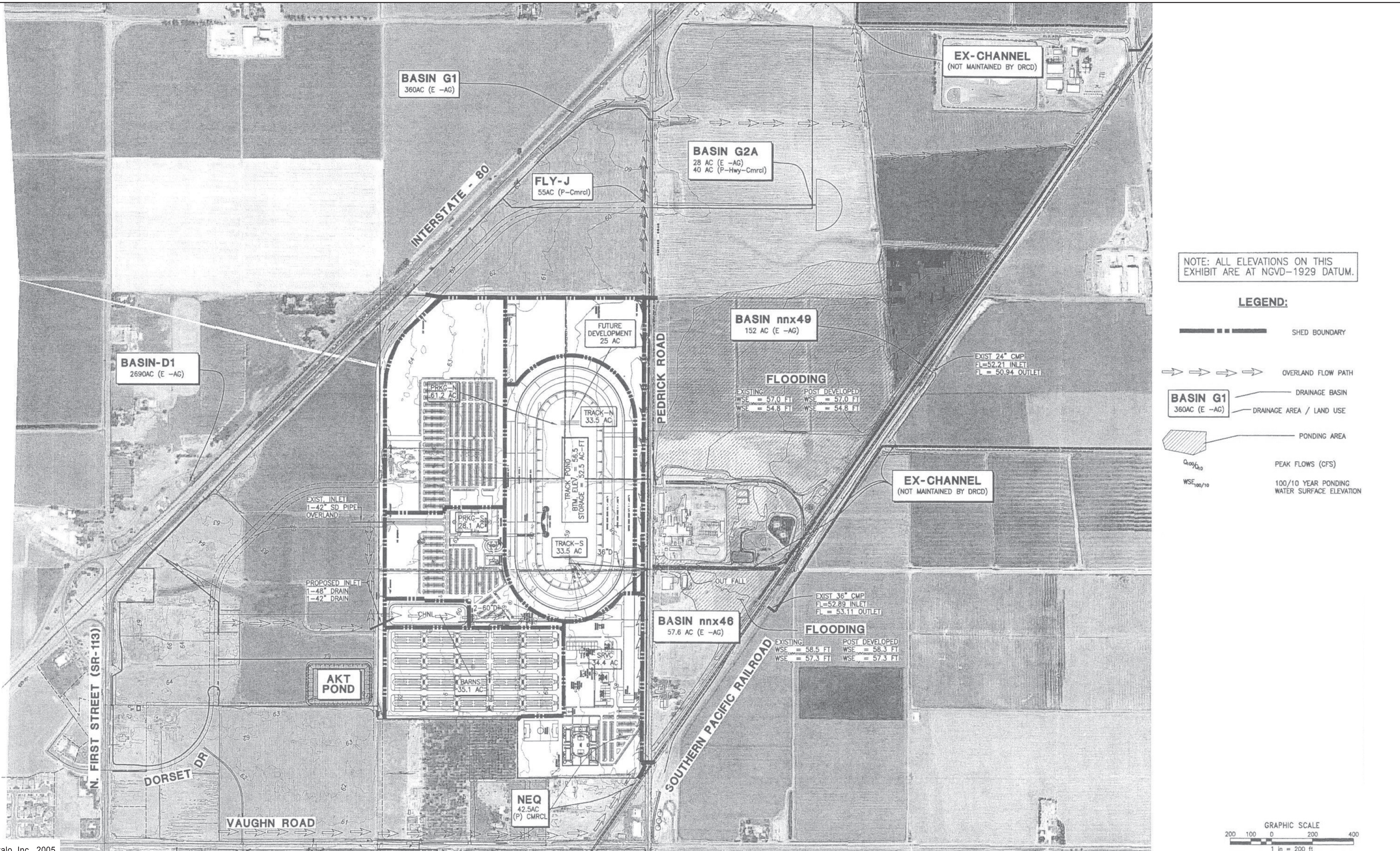
- At the south parcel boundary, the project would include a berm that would prevent floodwater from flowing off of the Proposed Project site and onto the property to the. At this location, there would also be a storm drain with a flap gate that would allow water to flow from the area south of Proposed Project to the twin 60-inch drains; but, prevent flow from the 60-inch drains to the area to the south.

- A storm drain would be placed in Pedrick Road from the intersection of Professional Drive and Pedrick Road to the downstream end of the twin 60-inch pipes. This drain would collect the runoff from north section of Professional Drive and part of Pedrick Road. It would also collect flood flow from parcels north of Proposed Project that currently flow to the south onto the Proposed Project site.

- Runoff from the entire project site, except the Stable Area, would be provided water quality treatment through grassy swales.

- Runoff from the Stable Area walkways and process areas (pervious areas) would receive a higher level of water quality treatment. Runoff from the horse wash pads would drain into the sanitary sewers. Runoff from up to the 25-year 24-hour storm event would be directed into a storage area and then pumped into the sanitary sewer. Runoff from rainfall greater than the 25-year 24-hour storm would sheet flow to the Storm Water Detention Channel located north of the Stable Area, and then into the Trunk Storm Drainage system.

- Runoff from the Stable Area rooftops and impervious areas would be routed through a BMP treatment mechanical device (CDS Interceptor or Vortex Interceptor) before gravity discharge to the Storm Water Detention Channel located north of the Stable Area, which would discharge into the Trunk Storm Drainage system.



Source: Morton & Pitalo, Inc., 2005

EIP ASSOCIATES

FIGURE **4.6-2**
Conceptual Drainage Plan

10811-00

City of Dixon

- The project applicant and the City would enter into a maintenance agreement with a commitment to maintain and keep the CASQA BMPs operational to the standards recommended in the CASQA Handbook. Depending on the type of BMP, the maintenance agreement could include inspection, reporting, general maintenance and repair, and periodic/event-triggered cleaning.

Full Development of the NQSP with Full Detention (FDFD)

Full development of the NQSP, alone, would cause drainage impacts to the downstream areas that are not consistent with the NQSP policies, which require on-site detention of all post-project increases in the 100-year storm flow. Therefore, the cumulative condition modeled for this EIR includes multiple on-site detention basins as needed to eliminate the impacts of the full development of the NQSP. This condition is the Full Development Full Detention condition (FDFD). At this time, the exact location of the multiple detention basins is unknown, but a total of up to 450 ac-ft of additional detention storage would be needed to reduce the discharge rate after full development back to the existing conditions discharge rate of 95 cfs, compared to 167 cfs without full detention, during a 100-yr storm event. This detention could be implemented as one to several large, regional facilities, or smaller detention areas associated with smaller, independent projects.

Water Quality

Pollutant and sediment transport is evaluated using the Simple Method using typical stormwater concentrations of Constituents of Concern (COC) from similar land uses (Table 4.6-2) and the Revised Universal Soil Loss Equation (RUSLE) for sediment. The Proposed Project grassy swale BMP removal efficiencies are modeled using estimates of design characteristics, which were included in the associated Storm Water Quality Management Plan (SWQMP), and the P8 Urban Catchment Model.[18] However, the Proposed Project SWQMP also included other structural and non-structural water quality mitigation measures such as street sweeping, potential for CDS or Vortechnics units, materials and waste handling practices, and landscaped areas. The pollutant mitigation potential of these features is part of the Proposed Project, and is included in the assessment of Proposed Project potential pollutant loads on a qualitative basis (see Figures 1 to 4, Storm Water Quality Management Plan). Both the Track Area and Barn Area are included in Phases 1 and 2; only the Undeveloped Area, and therefore the amount of Other Developed Areas, changes between Phases.

Track Area (77.4 acres)

This area would consist of a both dirt and grass race tracks, and a grassed or landscaped inner area that would serve as the Track Area Detention Basin. Percent imperviousness is considered minimal (approximately three percent) and slopes would be graded to 10:1. Even though the amount of imperviousness is minimal, runoff during a storm event can be expected to be about 25 to 35 percent of the rainfall for lawns with slopes greater than seven percent.[19] Runoff from North Areas 1 through 4, and the Service Area, would be routed through underground drainage systems to 'bubble up' within the inner track area during large storm events. The Track Area Detention Basin is designed to detain about 92 acre-feet of water. This type of system is not anticipated to have any water quality benefit. No water quality BMPs have been proposed for this area.

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18 Walker, W.W., Jr. *P8 Urban Catchment Model: Program for Predicting Polluting Particle Passage thru Pits, Puddles, and Ponds Version 2.4. 2000.* www.shore.net/~wwwalker.

19 Caltrans. *Attachment D: Computation Sheet for Determining Runoff Coefficients* http://www.dot.ca.gov/hq/construc/stormwater/sw_attachments/attachment_d.doc accessed 5/2/2005

Table 4.6-2

Stormwater Pollutant Concentrations for Applicable Land Uses

Constituent of Concern (COC)	Existing Conditions[1]	Mixed Open Space[1]	Mixed Commercial[1]
	mg/L	*mg/L*	*mg/L*
Oil and Grease	6.0	6.0	5.0
Total Suspended Solids (TSS)	578	84	54
Biochemical Oxygen Demand (BOD)	31	6.0	9.2
Total Kjeldahl Nitrogen (TKN)	5.51	1.12	1.39
Total Nitrogen (TN)	12.4	1.82	1.97
Nitrate+Nitrite (NO_x)	6.87	0.70	0.58
Ammonia as N	2.21	0.51	0.60
Dissolved Phosphorous (DisP)	0.76	0.09	0.12
Total Phosphorous (TP)	1.72	0.27	0.26
	No./100 mL	*No./100 mL*	*No./100 mL*
Fecal Coliforms	65000	26000	4980
	µg/L	*µg/L*	*µg/L*
Dissolved Chromium	6.07	2.3	2.5
Total Chromium	71.00	8.3	5.0
Dissolved Copper	24.4	10.9	10.0
Total Copper	37.0	34.7	17.0
Dissolved Lead	11.4	1.8	5.25
Total Lead	19.73	25.0	17.0
Dissolved Mercury	0.02	0.02[2]	0.80
Total Mercury	0.11	0.11[2]	0.20
Dissolved Zinc	32.0	32.0[2]	92.0
Total Zinc	217.0	88.0	135.0

Notes:
1. These are general terms used for the NPDES Database.
2. Not available, assumed to equal at least existing conditions.

Source: NPDES database, 2004 and US EPA, 1983.

Barn Area (34.5 acres)

The stables in the barn area would be covered and all impervious surface runoff would be captured in a storm drainage system, routed through a hydrodynamic water quality BMP device (e.g., CDS or Vortechnics type of unit) and then discharged to the Storm Detention Channel, which outlets to the Trunk Drainage System.[20] Process water (e.g., horse wash water and water from unpaved surfaces, such as the stable walkways) would first be filtered through a 20-mesh screen at the storm drain inlet, followed year, 24-hour storm event would be detained in an underground storage system and pumped to the by filtration through sand traps to remove grit and sand. Volumes of water less than or equal to the 25-sanitary sewer system for final disposal (see Figure 4, SWQMP). This storm drainage system would include an industrial monitoring station prior to discharge of pollutants off-site. When storm flows would be greater than the 25–year, 24-hour storm event (large storms), excess water from impervious

20 Storm Water Quality Management Plan, 2005; Appendix D, Conceptual Drainage Report for Dixon Downs

areas would sheet flow to the Storm Detention Channel system. There would be no mixing of the larger storm flows with the initial 25-year, 24-hour captured volume.

In addition to capture and treatment of stormwater from covered areas and process wastewater, used bedding material and manure would be temporarily stored in a covered facility and removed daily for disposal. Storage facilities would also be slightly elevated to prevent overland flow of stormwater from washing off waste material.

Individual stalls floors would be lined with a soil slurry seal, topped with crushed limestone, and then bedding material on top to absorb the majority of animal waste products. This layered system would prevent animal waste products from migrating to the groundwater.

Because stormwater from this area is partially conveyed through a separate, treated drainage system and partially through hydrodynamic separators with unknown specifications, potential pollutant load calculations from this area are not included in the water quality analysis. It is, however, included in the storm flow and flooding analyses as described above and potential water quality impacts are discussed qualitatively.

Other Developed Areas (129.9 acres)

Other Developed Areas in Phase 1 include parking lots, jockey housing, service area, and other structures associated with the rack track facilities, whereas Other Developed Areas in Phase 2 would also include additional areas of mixed use and commercial land uses (see Table 4.6-3). Typical mixed-use urban runoff constituent concentrations were used in the analysis of potential pollutant load, since uses could include high density housing, parks and recreation, parking lots, and commercial facilities. Consequently, it is reasonable to assume runoff characteristics would be similar to those from overall mixed-use land use. Assuming that about 90 percent of the area would be impervious at the end of Phase 2, runoff is about 86 percent of precipitation for this area (see Appendix H for calculation of percent runoff).

Table 4.6-3

Proposed Project Runoff Characteristics for Stormwater Quality

Land Use	Phase 1	Phase 2	R
	acres	acres	
Track Area	77.5	77.5	0.44†
Barn Area[1]	34.4	34.4	NA‡
Other Developed	82.6	129.9	0.86
Undeveloped	47.3		0.08

Note:
†estimated
‡Not included in calculations, separate drainage system to sanitary sewer
1Not used in load calculations, only used to check adequacy of track detention pond
Source: Drainage Report, April 27, 2005.

Pollutant Load Analysis

Table 4.6-2 lists typical pollutant concentrations in stormwater runoff from land uses similar to Existing Conditions and the Proposed Project. Information is not available for all pertinent of Concern (COCs). Only COCs where information is available for all land uses assessed are listed. Existing Conditions concentrations are assumed to be adequately describe by 'general agriculture' concentrations.[21] Except where noted, Undeveloped Land area (Phase 1 only) is assigned values from the 'mixed open space' category in the NPDES database, and developed land was assigned values from the "mixed commercial" category. The Track Area was assumed to have the same characteristics as 'mixed open space' and the Barn Area was not included in load analysis since runoff would be conveyed in a separate drainage system to the wastewater treatment facility. Additionally, the Proposed Project includes an associated Storm Water Quality Management Plan to meet requirements for the General CAFO NPDES Permit. All feed and manure storage facilities would also be covered, and hence, these constituents would not contribute additional pollutants to stormwater. Grassy swales contributions to pollutant removal are included in the Proposed Project load analysis.

Impacts and Mitigation Measures

Impact 4.6-1	**Implementation of the Proposed Project would change local drainage patterns and could contribute to exceedance of existing or planned drainage systems.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, Joint Powers Agreement JPA Recommended Project for detention and conveyance improvements	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase 1: Phases 1 and 2:	None required None required
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phases 1 and 2

As mentioned above in the Methods section, impacts for each phase were not separately addressed in either the Conceptual Drainage Plan (CDP) or the Dixon Downs Drainage/Flood Control EIR Evaluation (Drainage Report). Consequently, the impact analysis only addresses full-build out of the Proposed Project (Phases 1 and 2), which would be a 'worst-case' analysis. This analysis provides a conservative estimate of Proposed Project impacts; development of only a portion of the Proposed Project would result in impacts that are less than those discussed below.

21 U.S. EPA. Results of the Nationwide Urban Runoff Program, Volume 1- Final Report. 1983

The City of Dixon Storm Drain Report dated March, 1999 (prepared by West Yost & Associates) indicates that the project site is in Drainage Basin D, which has a total watershed area of approximately 3,280 acres (most of which is located west of I-80). A more updated Conceptual Drainage Report prepared by Morton and Pitallo indicated the total watershed area includes 2,700 acres. For the purposes of this analysis, we are assuming the watershed area encompasses 2,700 acres. Drainage from the project site would discharge into the Tremont 3 lateral of the Dixon Resource Conservation District ("DRCD") (see Figure 4, Drainage Report). Drainage plans for the NQSP are described in Alternate 3 "Outfall Southeast to Tremont 3" in the Storm Drain Report.

The DRCD drainage facilities are designed to handle discharge rates of approximately 0.017 cfs per acre of its service area; neither the NEQ nor any area north of I-80 was included in the Tremont 3 Drain service area. Actual runoff rates from Drainage Basin D agricultural properties are exceeding system capacity. In the event of a 100-year storm, the 2,700-acre portion of Drainage Basin D located west of I-80 is currently expected to discharge drainage flows under the freeway and onto the NQSP property at a rate of approximately 269 cfs. Drainage facilities in the lower portions of the Tremont 3 Drain were designed to convey 123 cfs and have been assessed to currently have the capacity to convey approximately 112 cfs.

For the 100-year storm, existing conditions already exceed the existing drainage system capacities, as evidenced by modeled flow and water surface elevations (Figures A1 through A6, Drainage Report) and ponded areas (CDR, Exhibits A though C). The Proposed Project would increase impervious surfaces and the potential for higher storm flows; however, planned on-site detention would reduce off-site discharge to the same level as existing conditions. These impacts, as described below in detail, are considered to be less than significant.

The model results of the 100-year, 24-hour storm, 10-year, 24-hour storm, and 5-year, 24-hour storm are presented in the Drainage Report. Results from the 100-year, 24-hour storm, and 5-year, 24-hour storm are discussed below.

Modeled Flooding Effects

Downstream Drainage System

The water surface elevation (WSEL) at the point that flows from the western part of the NEQ (including the flow from north of I-80) enters the Proposed Project site is the same for the Proposed Project (DDSAP) as under the Existing Conditions (EC) at this location, for the 100-year storm, and lower for the 5-year storm. Additionally, the duration of flooding of the adjacent fields would be slightly decreased with the Proposed Project. There would be no upstream impacts due to the Proposed Project with the proposed drainage plan. Consequently, there would be no impacts from the Proposed Project on flows upstream of the Proposed Project area.

Downstream of the Proposed Project site, flooding duration would only increase slightly, just south of the Campbell's Soup facility and remain essentially the same as existing conditions for further downstream sites:

- For the Proposed Project, the maximum WSEL for the drainage ditch at the upstream side of the 36-inch RCP culvert under the UPRR railroad, just south of the Campbell's Soup Facility, would be essentially the same as the Existing Conditions; consequently there would be no impact due to

Proposed Project. Under existing conditions the 100-year WSEL would be above the low point in the field south of the Campbell's Soup facility for over five days. In the DDSAP this duration of flooding would increase by about 10 hours. This increase in the duration of flooding is considered to be less than significant, since any potential crop damage would already have occurred[22] and this would only increase the duration by less than 10 percent. The 5-year flood duration would be unchanged compared to existing conditions. Thus, the Proposed Project impacts at this location would be less than significant.

- With the Proposed Project, the maximum WSEL for Tremont 3 Drain at the upstream side of the Vaughn Road culvert is essentially unchanged from the Existing Conditions. The duration of flooding of the Vaughn Road and the adjacent farm fields would increase by an insignificant duration for the 100-year storm and would decrease slightly for the 5-year event. Thus, Proposed Project contributions to flooding at this location are less than significant.

- With the Proposed Project, the maximum WSEL and duration of flooding for Tremont 3 Drain at the upstream side of the Hackman Road culverts and in the RD 2068 V-Drain at Delhi Road would be essentially unchanged from the Existing Conditions at this location. Thus, there would be less than significant impacts from the Proposed Project at these locations.

- With the Proposed Project, the maximum WSEL for Tremont 3 Drain at the upstream side of the Sikes Road culverts would be essentially unchanged from the Existing Conditions. The increase in duration of flooding of the adjacent field would be less than significant at this location (the 100-year event duration of flooding is increased by about 6 hours out of about 11 days, or less than 3 percent). Therefore, Proposed Project impacts at this location are less than significant.

- The maximum WSE for Hass Slough near the end of the V-Drain is primarily controlled by the tidal fluctuations of the water level in the Sacramento River Delta (from about 4 to 7 feet NAVD) or by flooding of the Yolo Bypass (15 to 17 feet NAVD in 1997 and 1998 floods). Because Hass Slough represents the downstream end of the channel system that was modeled, it was necessary to use an assumed tail water elevation in Hass Slough. For this evaluation a tail water elevation of about 8.6 feet was assumed. This tail water elevation represents an elevation that is higher than a typical high tide, representing the water level during a large storm event. However, it is not as high as when the Yolo Bypass is flooded (at which time the flow from the V-drain is insignificant compared to the flow in the bypass and Sacramento River). Even using this reasonably conservative tail water elevation in analyzing the Proposed Project the maximum WSEL is essentially unchanged from the Existing Conditions at this location. Thus, there would be no impacts at this location from the Proposed Project.

Flows under the UPRR Railroad

The peak 100-year flow rate under the railroad tracks that eventually enters the Tremont 3 Drain for existing conditions is about 95 cfs. Adequate detention basin capacity would be included in the Proposed Project to prevent an increase in the flow rate under the railroad, and thus the DDSAP would

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22 Wheat and barley would experience severe damage in less than three days and corn in less than five days. North Dakota State University Extension Service. Flooding Effects on Crops. http://www.ag.ndsu.nodak.edu/aginfo/procrop/env/fldwhb07.htm

not cause an increase in flow under the railroad. The peak 5-year flow rate under the railroad is about 51 cfs for existing conditions and would be reduced under the Proposed Project to about 48 cfs.

Tremont 3 Drain Capacity

Flow rates in the Tremont 3 Drain system at Sikes road would remain the same as existing conditions through the Sikes Road culverts and would not exceed existing capacity. In the lower portions of Tremont 3 Drain, however, existing conditions currently exceed capacity. The Proposed Project would not contribute to a greater exceedance of the Tremont 3 Drain system capacity:

- The maximum flow rate in Tremont 3 Drain through the Sikes Road culverts and the flooding flow that overtops the Tremont 3 Drain channel and flows south to Lateral 5 would be unchanged under the Proposed Project compared to the existing conditions. Additionally, the DRCD and RD 2068 have a drainage agreement that limits flows from Proposed Project's Tremont 3 Drain to RD 2068's main canal to 120 cfs. The discharge limit of 120 cfs would not be exceeded under either existing or Proposed Project conditions. Thus, there would be no flow-based impacts from the Proposed Project.

- The flow capacity in the lower portions of the Tremont 3 Drain is approximately 112 cfs. Under both existing and Proposed Project conditions, 100-yr storm flow rates exceed 165 cfs, or more than 1.4 times the existing system capacity. Modeled flow during the 10-year storm event is currently 125 to 127 cfs for both existing and Proposed Project (DDSAP) conditions, which also exceeds existing capacity by 8 to 10 cfs. Therefore, there would be a ***less than significant impact*** on the existing drainage system capacity with implementation of the Proposed Project.

The planned capacity in this region would not change as a result of the Proposed Project. However, drainage and detention modifications are planned within the entire drainage area and these will be addressed in the Cumulative Impacts section.

The NQSP requires that projects enter into Development Agreements. Three such agreements already exist. Part of the rationale for this requirement is to ensure the orderly implementation of fair-share master infrastructure planning and funding for the entire 643 acres of the NQSP area where virtually no utilities exist. An example is a master management plan for drainage.

Impact 4.6-2	**Development of the Proposed Project would alter drainage patterns and hydrology that could contribute to on- or off-site flooding.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, Joint Powers Agreement JPA Recommended Project for detention and conveyance improvements	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Potentially Significant Potentially Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase 1: Phases 1 and 2:	4.6-2 4.6-2
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phases 1 and 2

Based on modeling of the existing conditions and Proposed Project conditions, increased flow to the southeast corner of the NQSP would contribute to greater flooding in that location (see Figure 5, West Yost report). The development of the Proposed Project would result in an increased runoff rate and runoff volume. The approximately 92 acre-foot[23] detention basin in the interior of the racetrack would mitigate some of the potential increase in runoff. However, even with the detention basin, during the 100-year storm there would be greater flood flow with the Proposed Project compared to existing conditions, within the site area. Flood flows both to and from the area south of Proposed Project would increase; however, these increases would be less than significant (Impact 4.6-1). For the 100-year storm, the water surface elevation level (WSEL) in the Proposed Project area increases by about 0.3 feet, which would drive more flow to the south and increase the depth of flooding by about 0.3 feet south of the Proposed Project. During the 10-year storm and the 5-year storm, the Proposed Project detention basin lowers the WSEL in the Proposed Project area; consequently, there would be flooding flow from the south area onto the Proposed Project site. These flows would continue to drain to the main NEQ drainage ditch, which would then effectively lowers the maximum WSEL in the areas south of the Proposed Project site by about 0.2 feet.

However, the Proposed Project includes construction of a low earthen berm or floodwall along the southern portion of the property, sufficient to create a barrier to overland flow. The berm or floodwall would create a barrier to flow that would prevent flooding flow from the Proposed Project site to the south eastern areas, thereby contributing to off-site flooding. It would also prevent flood flow from the smaller storm events from flowing onto the Proposed Project site and contributing to on-site flooding. However, flow from larger events would be allowed to flow through a storm drain with a flap gate and into the Proposed Project twin 60-inch drainage system. Flood flow north of the berm would be routed as part of the project's on-site storm flow. Flows to the south of the berm would run along Vaugh Road

23 The size of the detention basin has not yet been finalized. Currently, the size range from 81.8 acre-feet up to 100 acre-feet. The exact size of the basin will be determined once project plans are finalized.

and then Pedrick Road into the drainage channel leading to the Tremont Drain #3 system, or through a 36-inch by 22-inch oval CMP culvert under Vaugh Road.

This berm system has not yet been included in the CDR, a conceptual grading plan illustrating this flood prevention measure and other detention facilities has not been prepared, the storm drain through the berm with a flap gate system has not been designed, and the collector system of drains within the Proposed Project has not been designed. Consequently, it is unknown whether these measures and features of the Proposed Project will adequately prevent on- or off-site flood conditions. Therefore, the Proposed Project's impact on on-site drainage and flooding would be ***potentially significant***.

<u>Mitigation Measure</u>

Incorporation of the mitigation measures listed below would reduce the impact to a *less-than-significant level.*

4.6-2 *(Phases 1 and 2)*

The project applicant must prepare a grading plan, including the flood berm and storm drain from the southern properties, and submit it to the City of Dixon for review and approval.

Prior to issuance of a grading permit, a precise grading plan, detention basin/cistern plan, pervious pavement designs, and final hydrologic/hydraulic analysis shall be submitted to the City of Dixon for review and approval. Detailed design of the Proposed Project storm drain system shall be consistent with the recommendations of the final hydrologic and hydraulic analysis, shall conform to the requirements of the City of Dixon, and shall ensure that the post-construction runoff volume and peak flows from the Proposed Project site do not exceed the existing runoff volume and peak flow. The updated grading plan and supporting calculations shall allow assessment of mitigation sufficiency.

Impact 4.6-3	**Development of the Proposed Project would place structures and possibly fill material within a flood area that could impede or restrict flow or otherwise contribute to off-site flooding.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, Joint Powers Agreement JPA Recommended Project for detention and conveyance improvements	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant
Mitigation Measures	Phase 1: Phases 1 and 2:	None required None required
Applicable NQSP Mitigation Measures	None	
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phases 1 and 2

The Proposed Project is not within a FEMA Special Flood Hazard Zone (SFHZ); however, several areas within the Proposed Project site are subject to flooding due to an inadequate existing drainage system. Implementation of the Proposed Project would add sufficient conveyance capacity to the storm drainage system to eliminate these flooded areas from the Proposed Project site. The placement of fill material that would alter drainage patterns as part of the Proposed Project is included in the Drainage Report analysis. Impacts associated with these issues are discussed under Impacts 4.6-1 and 4.6-2. Therefore, the Proposed Project placement of structures or fill material in flood areas would be ***less than significant***.

Impact 4.6-4	**Development of the Proposed Project could result in erosion and siltation during the construction phases.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, NPDES Construction General Permit, CAFO NPDES Waste Discharge Requirements Permit, NPDES General Construction Permit, City of Dixon Stormwater Management Plan – Construction site stormwater runoff control and post-construction stormwater management.	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Potentially Significant Potentially significant
Applicable NQSP Mitigation Measures	WQ-C; G-A	
Mitigation Measures	Phase 1: Phases 1 and 2:	4.6-4 (a) through (c) 4.6-4 (a) through (c)
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than significant

Phase 1

When the project site is rough-graded, the potential for mud and discharge from the site during a rainstorm would substantially increase and would adversely affect the quality of surface flows. The amount of silt could be calculated based on potential sediment yield, acreage, and slope. Surface mulch, other surface stabilizers, or vegetation reestablishment can reduce erosion rates. Desilting basins, perimeter straw wattles, and other construction BMPs could be use to retain this sediment, and sandbags placed at catch basin openings and at intervals on proposed roadways and stabilized construction entrances would substantially reduce sediment levels in site runoff. Phasing the project could also lessen the effect of construction-related discharge from the site by reducing exposure of disturbed areas to stormwater runoff.

The Proposed Project would be subject to the provisions of the NPDES General Permit for construction activity. Under this permit, the developer would be required to eliminate or reduce non-stormwater discharge into the drainage system and prepare a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must include Best Management Practices (BMPs) that would reduce sediment and other pollutants in stormwater discharges during construction. Applicable BMPs will be compiled in the SWPPP and based on final site characteristics, runoff potential, and project design needs. Typical measures that have been proven feasible and are commonly required are listed in Mitigation Measure 4.6-4(a) and (b).

For compliance with the City's Grading Control Ordinance, the project applicant would also need to prepare and submit an Erosion and Sediment Control Plan (ESC) and Post Construction Erosion and Sediment Control Plan (PC plan). Additionally, an encroachment permit must be obtained from the Dixon Resource Conservation District (DRCD) in order to prevent new or modified drainage systems from increasing flow in the Tremont 3 service area. For compliance with both federal and state implementation of the CAFO NPDES Permit, an Irrigation Nutrient Management Plan must be prepared for post-construction operations and maintenance of animal waste handling. This plan must include monitoring for water quality constituents. For compliance with the City of Dixon Stormwater Management Plan, the project applicant must obtain a CVRWQCB- and City of Dixon- approved Water Quality Plan.

Because of the higher stormwater flow rates and volume and soil disturbance during construction, erosion and siltation from Phase 1 of the Proposed Project is considered a ***potentially significant impact***.

Phase 2

Construction activities associated with Phase 2 would have a similar effect on the potential to result in erosion and off-site siltation as construction activities associated with Phase 1. Because of the higher stormwater flow rates and volume and soil disturbance during construction, erosion and siltation from Phase 2 of the Proposed Project is considered a ***potentially significant impact***.

Mitigation Measures

Mitigation measures noted below provide typical requirements and mechanisms to be implemented and included in the construction and post-construction phases of the Proposed Project. Compliance with these mitigation measures would reduce impacts to a *less-than-significant level*.

4.6-4(a) *(Phases 1 and 2)*

Implement Mitigation Measure WQ-C from the NQSP:

Prior to commencement of on-site grading, the project sponsor shall develop a surface water quality control plan, to be implemented and approved by the City of Dixon. The plan shall include, but not necessarily be limited to reducing runoff containment concentration by:

- *installing sediment and grease traps at all catch basins or within storm drain lines;*
- *properly maintaining sediment and grease traps, with responsibility for maintenance assigned to site operations to be established by the project sponsors prior to completion of construction of the first phase of development;*
- *incorporating infiltration facilities (porous pavement or grass swales) within the project to reduce peak flow of runoff;*

- *reducing source pollution causes through practices such as minimal use of fertilizer, pesticides and herbicides, proper application of water for landscape irrigation, keeping roadways and parking lots free of litter and sediments, proper methods and locations for disposal of automobile hazardous wastes; and*
- *maximizing distances between inlets and outlets perhaps using elongated basin shapes.*

4.6-4(b) *(Phases 1 and 2)*

Prior to the issuance of a grading permit, the project applicant shall file a Notice of Intent (NOI) with the State of California and obtain coverage under the NPDES General Construction Permit.

This process includes the preparation of a SWPPP incorporating BMPs for construction-related control of the site runoff. This will require construction sediment and erosion control plans in connection with site grading activities. The plan shall be reviewed and approved by the City of Dixon. The SWPPP should also include the following applicable measures:

- *Diversion of off-site runoff away from the construction site*
- *Prompt revegetation of proposed landscaped areas*
- *Perimeter sandbagging and straw wattles and/or temporary basins to trap sediment*
- *Regular sprinkling of exposed soils to control dust during construction*
- *Installation of a minor retention basin(s) to alleviate discharge of increased flows*
- *Specifications for construction waste handling and disposal*
- *Erosion control measures maintained throughout the construction period including stabilization of exposed surfaces by prompt revegetation and/or soil erosion mats, mulch, or other soil stabilizers.*
- *Construction of stabilized construction entrances to avoid trucks from imprinting debris on City roadways*
- *Training of subcontractors on general site housekeeping*

The SWPPP is a "live" document; it shall be updated and modified as necessary, as construction phases are completed or begun, and as storm event inspection dictate the need for additional BMPs. The SWPPP shall be kept on-site and current by the person responsible for its implementation. Periodic inspections by City or State staff shall be made to assure compliance with the SWPPP and proper maintenance of BMPs.

4.6-4(c) *(Phases 1 and 2)*

Implement Mitigation Measure G-A from the NQSP EIR:

An erosion control plan shall be prepared prior to construction. This plan shall include standards for permanent erosion control design, requirements for full establishment of vegetation, and emphasize drought-tolerant and climate-adapted vegetation.

Impact 4.6-5	**Development of the Proposed Project could result in post-construction erosion and siltation.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, NPDES Construction General Permit, CAFO NPDES Waste Discharge Requirements Permit, NPDES General Construction Permit, City of Dixon Stormwater Management Plan – Construction site stormwater runoff control and post-construction stormwater management.	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase1: Phases 1 and 2:	None required None required
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phase 1

Post-construction overland flow, horse washing and traffic, and race track runoff could also contribute to erosion and siltation potential.

The Proposed Project would be subject to the provisions of the NPDES General Permit. Under this permit, the project applicant or developer would be required to implement a Storm Water Quality Management Plan (SWQMP). The SWQMP must include BMPs that would reduce sediment and other pollutants in stormwater discharges after development Proposed Project. Applicable BMPs would be compiled in the SWQMP and based on final site characteristics, runoff potential, and project design needs. Typical measures that have been proven feasible and are commonly required are listed in Mitigation Measure 4.6-4(a). For compliance with the City's Grading Control Ordinance, the project applicant would also need obtain an encroachment permit from the DRCD in order to prevent new or modified drainage systems from increasing flow in the Tremont 3 service area. Additionally, a PC Plan would be required for post-construction erosion and sediment control.

Conversion of agricultural lands to paved areas and race track facilities would likely decrease sediment transport due to creation of impervious surfaces and less exposed soil compared to agriculture; consequently, post-construction erosion and siltation would likely be lower for Phase 1. Erosion rates calculated for grassed areas and pavement would be less than corn and tomato agriculture. Using the RUSLE method (defined in the Methods of Analysis section), modeled sediment transport rates would be reduced from 0.9 (corn) to 6.5 (tomatoes) tons per acre per year to less than 0.1 (common Bermuda grass) to 0 (pavement) tons per acre per year following implementation of the Proposed Project. Therefore, even though there would be greater amounts of impervious surfaces and higher on-site stormwater flow rates, lower concentrations of sediment in urban runoff (Table 4.6-2) and more protective soils covers would result in less on-site erosion and siltation from the Proposed Project compared to Existing Conditions. Therefore, potential post-construction erosion and siltation from Phase 1 would be ***less than significant.***

Phase 2

Conversion of agricultural lands to mixed-use and commercial lands would likely decrease sediment transport due to creation of impervious surfaces and less exposed soil compared to agriculture; consequently, post-construction erosion and siltation would be lower for Proposed Project Phase 2 compared to Existing Conditions, as identified in the Phase 1 analysis. Therefore, post-construction erosion and siltation from the Proposed Project Phase 2 would be ***less than significant.***

<u>Mitigation Measures</u>

None required.

Impact 4.6-6	**Development of the Proposed Project could contribute additional polluted runoff to downstream receiving waters or otherwise contribute to degradation of water quality.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, NPDES Construction General Permit, CAFO NPDES Waste Discharge Requirements Permit, NPDES General Construction Permit, City of Dixon Stormwater Management Plan – Construction site stormwater runoff control and post-construction stormwater management.	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Potentially Significant Potentially Significant
Applicable NQSP Mitigation Measures	WQ-C	
Mitigation Measures	Phase 1: Phases 1 and 2:	4.6-6(a) 4.6-6(a)
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phase 1

Project impacts on pollutant transport and water quality occur during construction and post-construction. Transport of sediments (and their associated pollutants) during construction is addressed in Impact 4.6-5. Post-construction transport can be approximated using the Simple Method as described in the Methods section and Appendix H.

Conversion of agricultural lands to mixed-use lands would eliminate the need for corn and tomato pesticide applications. Therefore, with implementation of the Proposed Project, it can be expected that there would be a proportionate reduction in the amount of these pesticides per unit area that, as listed in Table 4.6-1, would no longer have the potential to be transported in stormwater runoff.

Table 4.6-4 lists the projected mean annual pollutant loads for Existing Conditions and Proposed Project conditions. For the Proposed Project analysis, the barn area is not included since it would be served by a separate stormwater drainage system that conveys some polluted water to a sanitary treatment facility and diverts some through hydrodynamic separators before discharge to Trunk Drainage System. Moreover, in order to operate this facility, a Water Quality Management Plan would be developed that addresses operations, water quality standards, water quality monitoring, manure and straw handling systems, spill containment, and post-construction BMPs. A SWQMP has been prepared and is included as Appendix H; however, it has not yet been approved the CVRWQCB or City of Dixon. Approximate characteristics of the post-construction BMPs (grassy swales) identified in the SWQMP indicate that they would be under-designed and would not provide adequate water quality treatment.

Table 4.6-4

Phase 1 Mean Annual Stormwater Pollutant Load (post BMP)

Constituent of Concern (COC)	Existing Conditions	Phase 1	Difference Due to Phase 1
	lbs	*lbs*	*Percent increase*
Oil and Grease	437	1,674	307
Total Suspended Solids (TSS)	42,246	19,538	-54
Biochemical Oxygen Demand (BOD)	2,281	2,545	12
Total Kjeldahl Nitrogen (TKN)	403	536	33
Total Nitrogen (TN)	905	792	-12
Nitrate+Nitrite (NOx)	502	257	-49
Ammonia as N	162	235	45
Dissolved Phosphorous (DisP)	56	45	-18
Total Phosphorous (TP)	126	109	-13
	number	*number*	
Fecal Coliforms	2.1×10^{12}	8.1×10^{11}	-62
	lbs	*lbs*	
Dissolved Chromium	0.56	1.06	138
Total Chromium	6.50	2.14	-59
Dissolved Copper	2.23	4.48	151
Total Copper	3.39	9.55	253
Dissolved Lead	1.04	1.76	112
Total Lead	1.80	6.19	329
Dissolved Mercury	0.00	0.23	15,679
Total Mercury	0.01	0.07	768
Dissolved Zinc	2.93	31.00	1,223
Total Zinc	79.87	49.07	209

Source: EIP Associates, 2005.

According to the California Stormwater Quality Association BMP design guidelines,[24] in order to function effectively, grassy swales should meet the following minimum requirements:

1. The contributing area being treated should be less than or equal to 10 acres;

2. The length of the swale should be long enough that it takes at least ten minutes for the treated volume of water to flow from one end to the other, but at least 100 feet long;

3. The bottom width should be less than or equal to ten feet;

4. The depth of flow should be less than or equal to four inches;

5. The maximum flow velocity should be less than or equal to 1.5 feet per second (fps);

6. A roughness coefficient of 0.25 for water quality flow should be used in design calculations.

When conveying flood flows through the swale, as the Proposed Project would do, the roughness coefficient should be reduced in order to take into account that much of the flow is not necessarily flowing through the grass portion and would therefore move faster. Approximate design analysis calculations are included in Appendix H.

For the Proposed Project, the contributing area being treated by grassy swales would range from about 20 to 32.4 acres, or two to three times the recommended area. The bottom width would be acceptable; however, the flow length would not be long enough for ten minutes of contact time. For the smallest treated area (20 acres) water would take only about 4.8 minutes to flow through, and from the larger area (32 acres) it would take only about 4 minutes to flow through; about half the amount of time required. Additionally, during storm flows, flow velocities would exceed or equal 3.0 fps, which could lead to erosion of the swale.

As characterized in the SWQMP, the grassy swales are also modeled for their potential effectiveness in removing pollutants in stormwater to determine if the Proposed Project would have an impact on either stormwater pollutant loads or concentrations (see Appendix F for details). Stormwater runoff from the Barn Area, which would be routed through a different treatment system, is not included in the analysis.

Constituent of Concern (COC) loads are calculated based on land use and the typical concentrations of COCs in stormwater associated with those land uses (Table 4.6-2). Resulting Existing Conditions and Proposed Project potential COC loads are listed in Table 4.6-4. The load of several COCs would be reduced as a result of Proposed Project implementation. However, oil and grease, dissolved chromium, and total and dissolved copper, lead, mercury, and zinc loads would be potentially significantly higher for the Proposed Project compared to Existing Conditions.

Water quality impacts could also result from changes in concentration of a COC, in addition to changes in overall mass loading. Table 4.6-5 lists estimated COC concentrations that would be in the Proposed Project stormwater runoff compared to the Existing Conditions. These could be compared with acute numeric criteria (Table 4.6-6) to determine potential impacts on the receiving water body. Acute numeric criteria, instead of chronic criteria, are used for comparison because storm events are episodic and potential impacts of stormwater runoff are likely to be of short duration, or an acute effect. Several

24 CASQA. *New Development and Redevelopment Handbook*. 2004. http://www.cabmphandbooks.com/

COCs have no acute numeric criteria. Fecal coliforms, total and dissolved copper, total and dissolved mercury, and total and dissolved zinc all exceed acute numeric criteria in stormwater runoff. This does not necessarily mean there would be an impact on the receiving water, since the numeric criteria are for in-stream concentrations of these chemicals and the amount of COCs in the stormwater runoff may not be enough to change the overall receiving waterbody concentration. However, it does illuminate where there may be potentially significant impacts. Both analyses, load and concentration, indicate that Phase 1 of the Proposed Project would have a ***potentially significant impact*** on water quality.

Table 4.6-5

Phase 1 Pollutant Concentrations in Stormwater Runoff

Constituent of Concern (COC)	Phase 1[1]	Acute Criteria	Significance
	mg/L	*mg/L*	
Oil and Grease	3.85	none	NS
Total Suspended Solids (TSS)	44.9	none	NS
Biochemical Oxygen Demand (BOD)	5.85	none	NS
Total Kjeldahl Nitrogen (TKN)	1.23	NA	NS
Total Nitrogen (TN)	1.82	NA	NS
Nitrate+Nitrite (NOx)	0.59	NA	NS
Ammonia as N	0.54	Variable[2]	PS
Dissolved Phosphorous (DisP)	0.10	NA	NS
Total Phosphorous (TP)	0.25	NA	NS
	No./100 mL	*No./100 mL*	
Fecal Coliforms	4158	400	PS
	μg/L	*μg/L*	
Dissolved Chromium	2.43	290	NS
Total Chromium	4.91	900	NS
Dissolved Copper	10.3	6.3	PS
Total Copper	22.0	6.6	PS
Dissolved Lead	4.06	27	NS
Total Lead	14.2	30	NS
Dissolved Mercury	0.53	NA	PS
Total Mercury	0.16	0.14	PS
Dissolved Zinc	71.3	60	PS
Total Zinc	113	61	PS

Notes:
[1] Includes known structural and operational BMPs that are already part of the Proposed Project.
[2] temperature and pH dependant
NA = Not available
PS = Potentially significant
NS = Not Significant
Source: Basin Plan, California Toxics Rule, USEPA (Nutrient Criteria), 2002.

Table 4.6-6

Receiving Waterbody Numeric Criteria

Constituent of Concern (COC)	Acute (1 hour)	Chronic (4 day average)	Authority
	mg/L	*mg/L*	
Oil and Grease	none	none	
Total Suspended Solids (TSS)	none	none	
Biochemical Oxygen Demand (BOD)	none	none	
Total Kjeldahl Nitrogen (TKN)	NA	0.19	EPA Recommended
Total Nitrogen (TN)	NA	0.35	EPA Recommended
Nitrate+Nitrite (NOx)	NA	0.12	EPA Recommended
Ammonia as N	variable	variable	see Basin Plan; pH and temperature dependant
Dissolved Phosphorous (DisP)	NA	NA	
Total Phosphorous (TP)	NA	0.077	EPA Recommended
	No./100 mL	*No./100 mL*	No./100 mL
Fecal Coliforms	400	200[1]	Basin Plan
	µg/L	*µg/L*	µg/L
Dissolved Chromium	290	93	National Toxics Rule
Total Chromium	900	110	National Toxics Rule
Dissolved Copper	6.3	4.5	California Toxics Rule and National Toxics Rule
Total Copper	6.6	4.7	California Toxics Rule and National Toxics Rule
Dissolved Lead	27	1	California Toxics Rule and National Toxics Rule
Total Lead	30	1.2	California Toxics Rule and National Toxics Rule
Dissolved Mercury	NA	NA	
Total Mercury	01.4	0.77	USEPA Ambient Water Quality Criterion
Dissolved Zinc	60	60	California Toxics Rule and National Toxics Rule
Total Zinc	61	61	California Toxics Rule and National Toxics Rule

Notes
[1] 30 day geometric mean
NA = Not available
Source: Basin Plan, California Toxics Rule, USEPA (Nutrient Criteria), 2002.

Phase 2

Impacts of Phase 2 development on pollutant transport and water quality occur both during construction and post-construction. Transport of sediments (and their associated pollutants) during construction are addressed in Impact 4.6-5. Post-construction transport can be approximated using the Simple Method as described in the Methods section. The post-construction Phase 2 analysis and issues are similar to Phase 1, except that more land would be developed as mixed-use and commercial land use in Phase 2.

COC loads were calculated based on land use and the typical concentrations of COCs in stormwater associated with those land uses (Table 4.6-2). Resulting Existing Conditions and Proposed Project potential COC loads are listed in Table 4.6-7. The load of only a few COCs would be reduced as a result of the Proposed Project implementation (total nitrogen, fecal coliforms, and total chromium). All other COC loads would be potentially significantly higher for the Proposed Project compared to Existing Conditions. The potentially higher loads would be, in part, a result of greater volume of stormwater runoff from the Proposed Project compared to Existing Conditions.

Table 4.6-7

Phase 2 Mean Annual Stormwater Pollutant Load

Constituent of Concern (COC)	Existing Conditions	Phase 2	Difference Due to Phase 2
	lbs	*lbs*	*Percent increase*
Oil and Grease	437	3,053	117
Total Suspended Solids (TSS)	42,246	35,504	92
Biochemical Oxygen Demand (BOD)	2,281	4,955	23
Total Kjeldahl Nitrogen (TKN)	403	774	-30
Total Nitrogen (TN)	905	1,117	107
Nitrate+Nitrite (NO_x)	502	350	18
Ammonia as N	162	334	20
Dissolved Phosphorous (DisP)	56	65	117
Total Phosphorous (TP)	126	151	92
	number	*number*	
Fecal Coliforms	2.7×10^{12}	7.8×10^{11}	-46
	lbs	*lbs*	
Dissolved Chromium	0.56	1.13	222
Total Chromium	6.50	1.92	-40
Dissolved Copper	2.23	4.35	234
Total Copper	3.39	6.79	346
Dissolved Lead	1.04	1.90	211
Total Lead	1.80	6.03	597
Dissolved Mercury	0.00	0.26	24,578
Total Mercury	0.01	0.07	1,190
Dissolved Zinc	2.93	29.66	1,844
Total Zinc	79.87	46.42	352

Source: EIP Associates, 2005.

Water quality impacts could also result from changes in concentration of a COC, in addition to changes in overall mass loading. Table 4.6-8 lists the estimated COC concentrations that would be in the Proposed Project stormwater runoff compared to the Existing Conditions. These could be compared with acute numeric criteria (Table 4.6-6) to determine potential impacts on the receiving waterbody. Acute numeric criteria, instead of chronic criteria, are used for comparison because storm events are episodic and potential impacts of stormwater runoff are likely to be of short duration, or an acute effect. Several COCs have no acute numeric criteria. Fecal coliforms, total and dissolved copper, total and dissolved mercury, and total and dissolved zinc all exceed acute numeric criteria in stormwater runoff. This does not necessarily mean there would be an impact on the receiving water, since the numeric criteria are for in-stream concentrations of these chemicals and the amount of COCs in the stormwater runoff may not be enough to change the overall receiving waterbody concentration. However, it does illuminate where there may be potentially significant impacts. Both analyses, load and concentration, indicate Phase 2 of the Proposed Project would have a ***potentially significant impact*** on water quality.

Table 4.6-8

Phase 2 Pollutant Concentrations in Stormwater Runoff

Constituent of Concern (COC)	Phase 2	Acute Criteria	Significance
	mg/L	*mg/L*	
Oil and Grease	5.23	none	NS
Total Suspended Solids (TSS)	60.9	none	NS
Biochemical Oxygen Demand (BOD)	8.49	none	NS
Total Kjeldahl Nitrogen (TKN)	1.33	NA	NS
Total Nitrogen (TN)	1.91	NA	NS
Nitrate+Nitrite (NOx)	0.60	NA	NS
Ammonia as N	0.57	variable[1]	PS
Dissolved Phosphorous (DisP)	0.11	NA	NS
Total Phosphorous (TP)	0.26	NA	NS
	No./100 mL	*No./100 mL*	
Fecal Coliforms	4427	400	PS
	μg/L	*μg/L*	
Dissolved Chromium	2.45	290	NS
Total Chromium	5.38	900	NS
Dissolved Copper	10.2	6.3	PS
Total Copper	20.7	6.6	PS
Dissolved Lead	4.45	27	NS
Total Lead	17.2	30	NS
Dissolved Mercury	0.62	NA	PS
Total Mercury	0.18	0.14	PS
Dissolved Zinc	78.0	60	PS
Total Zinc	123	61	PS

Notes:
[1] temperature and pH dependant
NA = Not available
PS = Potentially significant
NS = Not significant
Source: Basin Plan, California Toxics Rule, USEPA (Nutrient Criteria). 2002

Mitigation Measures

Mitigation Measure 4.6-6 would provide typical requirements and mechanisms to be implemented and included in the post-construction phases of the Proposed Project that would reduce pollutant loads and concentrations in both Phases to a *less-than-significant level*. In particular, a reduction in stormwater flow would reduce pollutant loads to the same magnitude as any runoff volume reduction. However, it may still be necessary to further treat stormwater to reduce pollutant loads and concentrations to acceptable levels because changes in land use could increase COC loads and concentrations despite a reduction in storm flow.

4.6-6(a) *(Phases 1 and 2)*

Implement Mitigation Measure WQ-C from the NQSP EIR:

Prior to commencement of on-site grading, the project applicant shall develop a surface water quality control plan, to be implemented and approved by the City of Dixon. The plan shall include, but not necessarily be limited to reducing runoff containment concentration by:

- *installing sediment and grease traps at all catch basins or within storm drain lines;*
- *properly maintaining sediment and grease traps, with responsibility for maintenance assigned to site operations to be established by the project sponsors prior to completion of construction of the first phase of development;*
- *incorporating infiltration facilities (porous pavement or grass swales) within the project to reduce peak flow of runoff;*
- *reducing source pollution causes through practices such as minimal use of fertilizer, pesticides and herbicides, proper application of water for landscape irrigation, keeping roadways and parking lots free of litter and sediments, proper methods and locations for disposal of automobile hazardous wastes; and*
- *maximizing distances between inlets and outlets perhaps using elongated basin shapes.*

4.6-6(b) *(Phases 1 and 2)*

Prior to the issuance of any grading permit, the project applicant shall submit a Water Quality Plan as required by the City's Storm Water Control Ordinance (based on the Storm Water Management Plan). This Water Quality Plan shall include use of structural and non-structural BMPs for reducing pollutants in discharge waters, to the maximum extent practical. Some potential BMPs for the project location include the following:

- *Control of impervious area runoff, including installation of detention basins, retention areas, filtering devices, energy dissipaters, pervious drainage systems, and porous pavement alternatives;*
- *Implementation of regular sweeping of impervious surfaces, such as streets and driveways;*
- *Use of efficient irrigation practices;*

- *Provision of infiltration trenches and basins;*
- *Linings for urban runoff conveyance channels;*
- *Vegetated swales and strips;*
- *Protection of slopes and channels;*
- *Landscape design, such as xeriscape or other designs, minimizing the use of fertilizers;*
- *Minimization of stormwater runoff through site design;*
- *Construction of slough walls at toes of slopes for sediment control;*
- *Street and parking lot sweeping every two weeks;*
- *Minimization of exposed metal surfaces or materials;*
- *Chemical management in landscaped areas;*
- *Use of porous concrete where practicable;*
- *Water quality basins;*
- *Provision of covered trash enclosures;*
- *Provision of post-construction BMPs, such as approved stormwater filtration devices at the storm drain system in Monarch Drive and Haverstock Road;*
- *Provision of proof of obtaining annual maintenance for the proposed basins and BMPs by the developer; and*

The City Engineer and the Public Works Director shall evaluate the WQP and determine if it meets the City of Dixon Storm Water Management Plan goals and reduces potential water quality impacts to the maximum extent practicable. Reasonable COC reduction goals or technology standards shall be determined by the City Engineer and the Public Works Director with concurrence from the CVRWQCB. Concurrence by the CVRWQCB will assure that goals will result in less than significant impacts to receiving waters. Design, size, and estimated effectiveness of selected BMPs shall be assessed to determine if BMPs are adequate for reducing impacts to less-than-significant levels.

Many BMPs require logistical considerations as well as appropriate design criteria. Additionally, certain BMPs are more suitable for removal of particular pollutants. Consequently, each BMP shall be selected for the targeted pollutant(s), the location it would be treating, and any operational and design constraints. Generally, hydrodynamic separators are not effective at nutrient removal, and many are sufficiently effective at only certain flow velocities. If used, hydrodynamic separators shall be used to treat particulate and hydrocarbon pollutants, unless effectiveness monitoring indicates they are successful at reducing dissolved COCs concentrations to an acceptable level. Table 4.6-9 lists potential BMPs and their removal rates that may be incorporated into the SWQMP.

Table 4.6-9

BMP Pollutant Removal Efficiencies

Constituent of Concern (COC)	Hydro-dynamic Device %	Swale/ Biofilter %	Basins %	Sand Filter %	Media Filter %	Drop Inlet Filter %	Street Sweep[1] %	Storm-Filter™ %	Vortechs STS %	Storm-ceptor %	Non-Structural[2] %
Oil and Grease	NA	15	NA	NA	30	65	NA	85	NA 5	35	20
Total Dissolved Solids (TDS)	NA	-40	NA	NA	NA	NA	NA	NA	NA	NA	20
Total Suspended Solids (TSS)	20	67	75	70	65	85	80	90	30	60	20
Biochemical Oxygen Demand (BOD)	15	35	NA	70	NA	NA	60	70	25	30	20
Fecal Coliforms	NA	NA	70	75	NA	NA	NA	NA	NA	NA	20
Total Nitrogen (TN)	*5*	*10*	*30*	20	NA	NA	60	30	65	-25	20
Total Kjeldahl Nitrogen (TKN)	0	10	20	45	NA	NA	*60*	*20*	*65*	-25	20
Nitrate (NO_3)	5	0	30	0	NA	NA	*60*	20	*65*	-25	20
Heavy Metals											
Total Cadmium (TotCd)	0	50	50	*45*	30	80	60	90	*15*	*20*	20
Dissolved Cadmium (DisCd)	-50	35	-35	NA	NA	NA	NA	70	NA	NA	20
Total Chromium (TotCr)	*15*	10	40	*45*	*30*	*80*	*60*	70	*15*	*20*	20
Dissolved Chromium (DisCr)	*5*	0	40	NA	NA	NA	NA	60	NA	NA	20
Total Copper (TotCu)	15	62	52	*45*	25	95	55	80	15	20	20
Dissolved Copper (DisCu)	5	35	0	NA	NA	NA	NA	85	NA	NA	20
Total Lead (TotPb)	30	75	30	45	30	80	60	70	*15*	*20*	20
Dissolved Lead (DisPb)	0	25	0	NA	NA	NA	NA	70	NA	NA	20
Total Mercury (TotHg)	*15*	*60*	*50*	*45*	*25*	*95*	*55*	*80*	*15*	*20*	20
Dissolved Mercury (DisHg)	*5*	*35*	*0*	NA	NA	NA	NA	*85*	NA	NA	20
Total Nickel (TotNi)	*15*	40	50	*45*	*15*	*90*	*60*	90	*40*	*75*	20

Table 4.6-9

BMP Pollutant Removal Efficiencies

Constituent of Concern (COC)	Hydro-dynamic Device %	Swale/ Biofilter %	Basins %	Sand Filter %	Media Filter %	Drop Inlet Filter %	Street Sweep[1] %	Storm-Filter™ %	Vortechs STS %	Storm-ceptor %	Non-Structural[2] %
Dissolved Nickel (DisNi)	*-10*	25	-15	NA	NA	NA	NA	70	NA	NA	20
Total Selenium (TotSe)	*-15*	*75*	*70*	*45*	*15*	*90*	*60*	65	*40*	*75*	20
Dissolved Selenium (DisSe)	*-18*	*55*	*0*	NA	NA	NA	NA	60	NA	NA	20
Total Zinc (TotZn)	-15	75	70	45	15	90	60	80	40	75	20
Dissolved Zinc (DisZn)	-10	55	0	NA	NA	NA	NA	75	NA	NA	20

Notes:
[1] Street sweeping removal based on frequency and type of machine; values are for weekly sweeping with a dry vacuum machine
[2] Estimated operational and non-structural removals
NA = Not Available
Italicized removals estimated based on removal of similar particles
Sources: NPDES National BMPs Database, California Sites, 2003 (basins, swale/biofilters, hydrodynamic Devices); U.S. Dept of Transportation, Federal Highway Administration; Washington State DOT, 2003; NFESC, 2004; Lu et al, 2003.

Grassy swales must be designed with appropriate slope, length, width, flow residence time, grass cover, peak flow conveyance, side slopes, and other environmental and logistical considerations (e.g., crossing). In order to be effective, they must be appropriately designed and sited. Typically, water quality BMPs are designed to treat first-flush runoff, which will have a lower flow rate and volume than peak flows. Consequently, if grassy swales will be conveying all storm flow, they must be designed to convey peak flows without damage to the water quality treatment functions. To remain effective, BMPs must be periodically maintained and restored. Operations and maintenance practices for assuring continued BMP effectiveness must be included in this Water Quality Plan with detailed standard operating procedures and maintenance schedules. For discharge of wastewater, wastewater monitoring is required under either the WDR or NPDES permit.

Impact 4.6-7	**Development of the Proposed Project could substantially impede groundwater recharge, diminish groundwater supplies, or contribute to groundwater quality degradation.**	
Applicable Policies and Regulations	California Code of Regulations, Title 22, Water Code Sections 10631, 10910, 10912, SB 610	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Potentially Significant Potentially Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase 1: Phases 1 and 2:	4.6-7 4.6-7
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phases 1 and 2

Development of the Proposed Project may impact groundwater supplies through reduced recharge from agricultural irrigation and by creation of impervious surfaces (less infiltration). If groundwater is used for landscape irrigation and operations (instead of Solano Irrigation District surface water, or DSMWS potable water), groundwater supplies may also be impacted through increased consumptive use for landscape irrigation, horse washing, track dust control, and other operations.

Effects of the Proposed Project on groundwater recharge are expected to be minimal. The project site is located within the Solano sub-basin of the Sacramento River Hydrologic Region groundwater basin. The Solano Groundwater sub-basin (groundwater basin) is located in southernmost extent of the Sacramento Groundwater Basin and is bounded by Putah Creek on the north, the Sacramento River on the East, the North Mokelumne River on the southeast, and the San Joaquin River on the south, and roughly by the English and Montezuma Hills to the west. Subsurface groundwater inflow in to the groundwater basin sometimes occurs from the Yolo basin to the north and outflow sometimes occurs to the South American basin to the east.

Under natural conditions, groundwater recharge in the region was through seepage of stream flow runoff from the surrounding mountains and into the valley. Most recharge occurred at the margins of the valley; groundwater moved down in the subsurface to lower altitudes and discharged into surface-water bodies that drain each basin. The Proposed Project would be sited in an historic groundwater-discharge region. Development and groundwater usage, however, has changed the gradient somewhat. Irrigation with surface water and deep aquifer groundwater now contributes to shallow groundwater recharge and stream flow recharge at the lower elevations (compared to pre-development discharge into streams at these locations). Regardless, the Proposed Project would not be located within a significant groundwater recharge zone; land surface infiltration in the project vicinity is not a significant component of groundwater recharge.[25]

Estimated irrigation requirements would be approximately 20 percent more than evapotranspiration losses. An estimation of groundwater recharge is therefore considered to be 20 percent of the evapotranspiration rate, or 247 acre-feet per year for the Proposed Project area (259.7 acres, annual evapotranspiration rate of 57.04 inches).[26] If all irrigation recharge were eliminated (including Proposed Project landscape irrigation potential recharge), there would be a net decrease in local groundwater recharge of 247 acre-feet per year. According to the Draft Water Supply Assessment (Draft WSA),[27] planned groundwater demands would increase by 7,514 acre-feet per year at full build-out. With the Proposed Project, landscape irrigation demands would create an additional 435 acre-feet per year demand[28] and reduce recharge by an estimated 247 acre-feet per year. These combined effects would effectively increase groundwater supply demands by only about nine percent (682 acre-feet combined potential reduction) at full build-out of the NQSP area.

Furthermore, because evapotranspiration consumptive use (57.04 inches per year) is much greater than annual precipitation (19.05 inches per year), precipitation is not likely to contribute significantly to groundwater recharge under Existing Conditions or Proposed Project conditions. Consequently, creation of more impervious surfaces would not significantly affect groundwater recharge.

According to the Draft WSA, there would be sufficient groundwater to meet planned needs; there would be no apparent overdraft conditions and safe yield would not be exceeded. Existing conditions suggest there is an excess of 25,000 to 30,000 acre-feet of water in the shallow groundwater that should be pumped to avoid soil water-logging. Current pumping rates are approximately 6,000 to 14,000 acre-feet per year. Consequently, at least 11,000 acre-feet of groundwater would be available for use without creating an overdraft impact. The Proposed Project and full build-out of the NQSP may consume up to 8,196 acre-feet of water per year over Existing Conditions.[29] This demand, including the Proposed Project, would be only a nine percent increase over conditions assessed in the Draft WSA. Therefore, the Proposed Project impacts to groundwater supplies would be considered less than significant.

Development of the Proposed Project may contribute to groundwater quality degradation. The Proposed Project SWQMP indicates that a soil-sludge-slurry seal would be placed at the bottom of each stall, which would be covered with crushed limestone and absorbent bedding. This system would be intended to prevent migration of animal waste material to the shallow groundwater by providing an absorbing layer and barrier to downward transport. The absorbent bedding would be removed daily and the limestone layer repaired as necessary. However, the underlying soil-sludge slurry would not be replaced or maintained. As required by the SWRCB for large CAFOs, existing groundwater supply wells

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25 Planert, M. and J.S. Williams. *Ground Water Atlas of the United States, California, Nevada.* USGS HA 730-B. 1995.

26 Singh. R. Memo: Dixon Downs – SID Water for Landscaping Irrigation. Morton and Pitalo, Inc. November 19, 2004.

27 Solano Irrigation District. *Water Supply Assessment for the Northeast Quadrant, Dixon, California*. Prepared for the DSMWS, December 24, 2003.

28 Morton and Pitalo Memo.

29 Full build out demand from WSA + additional potential loss in supply from the Proposed Project = 7,514 afy + 682 afy = 8,196 afy

and monitoring wells must be monitored. This monitoring will assure that human health hazards are not encountered; however, it would not assure non-degradation of the groundwater resource. Without adequate assurance that the Proposed Project barrier system would be effective, there could be a ***potentially significant impact*** on groundwater quality.

Mitigation Measures

Mitigation Measure 4.6-7 would provide assurance that this CAFO operation did not result in groundwater quality degradation by animal waste products and that potential Proposed Project impacts would be reduced to a *less-than-significant level.*

4.6-7 *(Phases 1 and 2)*

Prior to the issuance of any grading permit, the applicant shall either:

(1) Submit documentation and design specification assuring that the groundwater protection system in Stable Area stalls will prevent groundwater contamination, or

(2) Implement and design a groundwater monitoring program to assure that animal waste material is not leaching to groundwater.

If waste material would be found to contaminate or still have the potential to contaminate groundwater, soil below the stalls shall be removed and an alternative barrier system installed.

Cumulative Impacts and Mitigation Measures

Project-specific impacts associated with future planned land uses within the region would not necessarily be additive. However, future conditions were evaluated for comparison, as described in the Methods section, for Full Development with Full Detention.

Impact 4.6-8	**The Proposed Project, in combination with other development, would exceed existing and planned drainage system capacities.**	
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, NPDES Construction General Permit, CAFO NPDES Waste Discharge Requirements Permit, NPDES General Construction Permit, City of Dixon Stormwater Management Plan – Construction site stormwater runoff control and post-construction stormwater management.	
Significance before Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant
Applicable NQSP Mitigation Measures	None	
Mitigation Measures	Phase 1: Phases 1 and 2:	None required None required
Significance after Mitigation	Phase 1: Phases 1 and 2:	Less than Significant Less than Significant

Phases 1 and 2

The NQSP identifies the use of multiple on-site detention basins that can retain 100 percent of the on-site runoff unless another drainage system is available. The Full Development Condition modeled for analysis included multiple on-site detention basins, as needed, to eliminate the impacts of full development of the NEQ (called Full Development Full Detention, FDFD) for compliance with the NQSP. At this time, the exact location of the multiple detention basins is unknown, but a total of up to 450 ac-ft of additional detention storage would be used to reduce the discharge rate after Full Development to the Existing Conditions discharge rate (95 cfs). As an alternative to the on-site detention storage, the developers in the NQSP area could participate in a regional drainage plan, such as the JPA Recommended Project, which requires less detention storage, but includes construction of additional downstream conveyance capacity.

The water surface elevation (WSEL) and duration of flooding at the point that flows from the western part of the NEQ (including the flow from north of I-80) enter the Proposed Project site are lower for the Full Development with Full Detention Condition compared to the Existing Condition at this location. Consequently, there are no upstream cumulative impacts on flooding due to the Proposed Project.

For the Full Development with Full Detention scenario, the maximum WSEL for the drainage ditch at the upstream side of the 36-inch RCP culvert, under the UPRR railroad just south of the Campbell's Soup Facility, decreases, so there would be no cumulative impact. The 100-year duration of flooding would increase slightly, but this increase in the duration of flooding would be less than significant. During the 5-year event, all flooding would be eliminated at this location under the Full Development with Full Detention scenario. Therefore, cumulative impacts at this location would be less than significant and the Proposed Project would not contribute significantly to cumulative impacts.

The Proposed Project maximum WSEL for Tremont 3 Drain at the upstream side of the Vaughn Road culvert would increase about 0.1 feet for the 100-year storm compared to Existing Conditions. However, the duration of flooding of the Vaughn Road and the adjacent farm fields would be reduced by about 18 hours. Both maximum WSEL and flood duration would be lower under the Full Development with Full Detention scenario compared to Existing Conditions. Therefore, cumulative impacts at this location would be less than significant and the Proposed Project could not contribute significantly to cumulative impacts.

The 100-year event maximum WSEL for Tremont 3 Drain at the upstream side of the Hackman Road culverts would increase by about 0.1 feet for the FDFD condition; however, the duration of flooding would decrease slightly. For the 5-year event, maximum WSEL would not be changed, but flood duration would be reduced significantly. Overall, cumulative impacts at this location would be less than significant and the Proposed Project would not contribute significantly to cumulative impacts.

The 100-year maximum WSEL for Tremont 3 Drain at the upstream side of the Sikes Road would increase by about 0.1 foot and the duration of flooding would increase by about 1 day (existing conditions duration of 11 days). For the 5-year event, the depth and duration of flooding of adjacent fields would decrease slightly for the Full Development with Full Detention Condition. The Proposed Project impacts would account for all of the increase in maximum WSEL for the Full Development with Full Detention scenario, but the effect of the Proposed Project on flood duration would be only 25 percent of the cumulative impact. Additionally, overall cumulative impacts at this location would be less than significant. Therefore, the Proposed Project would not contribute significantly to cumulative impacts.

The maximum WSEL in the RD 2068 V-Drain at Delhi Road would be essentially unchanged from the Existing Conditions at this location. Therefore, there would be no cumulative impacts at this location.

The maximum WSEL for Hass Slough near the end of the V-Drain is primarily controlled by the tidal fluctuations of the water level in the Sacramento River Delta (from about 4 to 7 feet NAVD) or by flooding of the Yolo Bypass (15 to 17 feet NAVD in 1997 and 1998 floods). Because Hass Slough represents the downstream end of the channel system that is modeled, it is necessary to use an assumed tail water elevation in Hass Slough. For this evaluation a tail water elevation of about 8.6 feet was assumed. This tail water elevation represents an elevation that is higher than a typical high tide, representing the water level during a large storm event. However, it is not as high as when the Yolo Bypass is flooded (at which time the flow from the V-drain is insignificant compared to the flow in the bypass and Sacramento River). Even using this reasonably conservative tail water elevation for analyzing the Full Development with Full Detention Condition, the maximum WSEL would be essentially unchanged from the Existing Conditions at this location. Thus, there would be no cumulative impacts at this location.

The peak 100-year flow rate under the railroad that eventually enters the Tremont 3 Drain for Existing Conditions is about 95 cfs. Under the Full Development with Full Detention scenario, there would be no increase in flow rate under the railroad for the 100-year event and there would be a significant decrease for the 5-year event. The maximum Full Development with Full Detention condition flow rate in Tremont 3 Drain through the Sikes Road culverts would increase by about 5 cfs for the 100-year storm, but would decrease for the 5-year storm. The flooding flow that overtops the Tremont 3 Drain channel and flows south to Lateral 5 would be unchanged compared to the Existing Conditions for the 100-year storm and there would be no flooding for the 5-year storm for either Existing or Full Development with Full Detention conditions. Additionally, the DRCD and RD 2068 have a drainage agreement that limits flows from DRCD's Tremont 3 Drain to RD 2068's main canal to 120 cfs. The discharge limit of 120 cfs would not be exceeded under either Existing or Full Development with Full Detention Conditions. Thus, cumulative flow-based impacts would be less than significant and there would be no significant Proposed Project contributions to cumulative flow-based impacts.

Overall, cumulative impacts to flood depth and duration would not be cumulatively considerable resulting in a ***less than cumulatively considerable impact*** and the Proposed Project's contribution to cumulative impacts would be minimal.

Mitigation Measures

None required.

Impact 4.6-9	**The Proposed Project, in combination with other development, would contribute sediment and other pollution to downstream receiving waters.**
Applicable Policies and Regulations	City of Dixon Engineering Design Standards and Construction Specifications, Grading Control Ordinance, Storm Water Control Ordinance, Dixon Resource Conservation District encroachment permit, NPDES Construction General Permit, CAFO NPDES Waste Discharge Requirements Permit, NPDES General Construction Permit, City of Dixon Stormwater Management Plan – Construction site stormwater runoff control and post-construction stormwater management.
Significance before Mitigation	Phase 1: Potentially Significant Phases 1 and 2: Potentially Significant
Applicable NQSP Mitigation Measures	None
Mitigation Measures	Phase 1: 4.6-9 Phases 1 and 2: 4.6-9
Significance after Mitigation	Phase 1: Less than Significant Phases 1 and 2: Less than Significant

Phases 1 and 2

Urban contaminants in runoff from full development of the area could lower the quality of stormwater runoff and infiltrating groundwater both during and after construction. Erosion and sedimentation are major visible water quality impacts attributable to construction activities. Sediment impact on water quality includes interference with photosynthesis, oxygen exchange, and respiration, growth, and reproduction or aquatic species. Other pollutants such as nutrients, trace metals, and hydrocarbons can attach to sediment and be transported by it. Development would include construction activities, such as excavation and trenching for foundations and utilities, grubbing and clearing, soil compaction and moving, cut and fill activities, and grading that would disturb soil and could decrease permeability. Unprotected disturbed soil is susceptible to high rates of erosion from wind and rain, resulting in sediment transport from the site. Increased runoff from the site because of decreased permeability both during and after construction could further exacerbate the amount of sediment transport. Sediment-laden runoff from construction and post-construction operations at the site could enter receiving waters, such as the Sacramento River and eventually the San Francisco Bay, and could contribute to degradation of water quality. Cumulative impacts would be ***potentially significant***; however the Proposed Project's contribution to cumulative impacts would be minimal with mitigation incorporated.

Delivery, handling and storage of construction materials and wastes; as well as use of construction equipment onsite during the construction phase of the project would also introduce a risk for stormwater contamination that could impact water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination of stormwater. Some hydrocarbon compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas, or building sites can be the source of pollution due to paints, solvents, cleaning agents, and metals contained in the surface of equipment and materials. The impacts associated with metal pollution of stormwater include toxicity to aquatic organisms, bioaccumulation of metals in aquatic animals, and potential contamination of drinking supplies. Pesticide use (including herbicides, fungicides, and rodenticides) associated with site preparation work is another potential source of stormwater contamination. Pesticide impact to water quality includes toxicity to aquatic species and bioaccumulation in larger species through the food chain. Gross pollutants such as trash, debris, and organic matter are additional potential pollutants associated with the construction phase of the project. Impacts include health hazards and aquatic ecosystem damage associated with bacteria, viruses and vectors which can be harbored by gross pollutants.

In the post-construction phase of the development, the major source of pollution to runoff and infiltrating groundwater would be contaminants that have accumulated on the land surface over which storm water passes. In developed areas, driveways, parking lots, sidewalks, streets and gutters are often connected directly to storm drains that collect and guide stormwater runoff. Between rainstorms, materials are deposited on these surfaces from debris dropped or scattered by individuals, street sweepings, debris and other particulate matter washed into roadways from adjacent areas, wastes and dirt from construction and renovation or demolition, fecal droppings from animals, remnants of household refuse dropped during collection or scattered by animals or wind, oil and various residues contributed by automobiles, and fallout of air-borne particles.

Pollutants associated with the post-construction phases would include nutrients, oil and grease, metals, organics, pesticides, and gross pollutants. Nutrients that may be contributed to stormwater in the post construction phase include nitrogen and phosphorous from fertilizers applied to landscaped areas. Excess nutrients can impact water quality by promoting excessive and/or rapid growth of aquatic vegetation; reducing water clarity, and resulting in oxygen depletion. Pesticides also may enter into stormwater after application on post-construction landscaped areas. Pesticides impact water quality because they are often toxic to aquatic organisms and can bioaccumulate in larger species such as birds and fish. Oil and grease may be contributed to stormwater from automobile leaks, car washing, restaurants, and waste oil disposal during the post construction phase of development. Metals may enter stormwater in the post-construction phase as surfaces corrode, decay, or leach. Potential gross pollutants associated with the post-construction phases include clippings from with landscape maintenance, street litter, and animal excrement.

During rainfall, a film of water builds up on impermeable surfaces. Once this film is of sufficient depth (about 0.1 inch), the water collecting on the impermeable surface begins to flow. The initial flow of each storm often contains the highest concentrations of pollutants, but this is not always the case because the phenomenon is dependent on the duration of the preceding dry weather period, rainfall patterns, rainfall intensity, the chemistry of individual pollutants, and other site-specific conditions.

If uncontrolled, the accumulation of urban pollutants could have a detrimental cumulative effect during both the construction and post-construction phases of the development of the NSQP area because overland flow from paved surfaces and landscaped areas would transport many of the above-mentioned constituents, thereby contributing to the deterioration of the quality of stormwater runoff and infiltrating groundwater.

Mitigation Measure

Mitigation Measures 4.6-3 through 4.6-6 would reduce the cumulative impact to a *less-than-significant level.*

4.6-9 (Phases 1 and 2)

Implement Mitigation Measures 4.6-3 through 4.6-6(a).

Impact 4.6-10	**The Proposed Project, in addition to existing and future water demands in the Solano groundwater basin, would increase pumping of groundwater which could degrade local groundwater quality.**
Applicable Policies and Regulations	California Code of Regulations, Title 22, Water Code Sections 10631, 10910, 10912, SB 610
Significance before Mitigation	Phase 1: Less than Significant Phases 1 and 2: Less than Significant
Applicable NQSP Mitigation Measures	None
Mitigation Measures	Phase 1: None required Phases 1 and 2: None required
Significance after Mitigation	Phase 1: Less than Significant Phases 1 and 2: Less than Significant

Phases 1 and 2

The Proposed Project, in addition to current and future water demands, would incrementally increase the amount of groundwater pumped in the City of Dixon and elsewhere in the Solano groundwater basin. An increase in pumping groundwater to meet the DSMWS' service area demands at buildout in 2024 would result in a permanent and localized decline in groundwater levels, which could ultimately increase the concentrations of groundwater constituents such as TDS, nitrites, nitrates, and arsenic, or cause areas of contaminated groundwater to shift.[30] In accordance with the technical requirements set forth in California Water Code Section 10750 through 10756 and Assembly Bill 3030, the DSMWS and other neighboring water districts have prepared and implemented groundwater monitoring and management plans. The groundwater management plans provide the DSMWS with critical information on local groundwater quality in relation to increased urban development and water demand. Because the DSMWS maintains current data on the local groundwater quality and quantity, has more than sufficient water supplies for projected growth, and is legally responsible for monitoring the groundwater quality in its delivery system, it is better equipped to decide how future water demand would be met if groundwater quality affected future use (i.e., drinking water treatment plants). Therefore, cumulative impacts on groundwater quality would be considered cumulatively ***less than considerable or significant***.

Mitigation Measures

None required.

30 Solano Water Authority, *North Central Solano County Groundwater Resources Report*, May 16, 1995, pages 26 and 27.