4.6 HYDROLOGY AND WATER QUALITY

This section analyzes water quality conditions of ground and surface waters in the project vicinity and the project's potential impacts to these water resources. This analysis uses existing information from previously completed documents that address water resources in the project vicinity, including the following: Merced County Year 2000 General Plan (Merced County 1990); the City's *Merced Vision 2015 General Plan* (1997a); Preliminary Site Drainage Analysis (Carter-Burgess 2007); City of Merced Storm Drain Master Plan (City of Merced 2002); Water Supply Assessment, Proposed Wal-Mart Regional Distribution Center (City of Merced 2006); Geotechnical Feasibility Report, Merced Distribution Center, APN 061-025-018, 061-025-035, 061-029-001, and 061-029-027 (ENGEO 2004); Final Geotechnical Exploration Report (FGR2), Proposed Industrial Warehouse Distribution Center, Merced, CA. (ENGEO 2006); and Groundwater Recharge Discussion, Wal-Mart Distribution Center, Merced, California (ENGEO 2007).

Numerous federal, state, regional, and local laws, rules, regulations, plans, ordinances, and policies define the framework for regulating hydrology and water quality in the project study area. The section also focuses on hydrology and water quality requirements applicable to the proposed project. This analysis assumes that the project applicant would follow NPDES and Basin Plan guidelines as described below in Section 4.6.2, "Regulatory Setting."

4.6.1 ENVIRONMENTAL SETTING

The proposed project site is situated on relatively flat terrain, with a slight downhill gradient from northeast to southwest and elevation ranging from 195 feet above mean sea level (msl) near the northeast corner of the property to 187 feet msl at the southwest corner (ENGEO 2004, 2007). The climate is typical of the middle San Joaquin Valley – semi-arid with dry summers of extended hot weather, and cool winter temperatures with fog and light to intermediate rain. Temperatures often exceed 100 degrees Fahrenheit during the summer and average 46 degrees Fahrenheit during January, the coldest month. The average annual precipitation in Merced is 12.63 inches, more than 80 percent of which falls from October through March (City of Merced 1997b).

SURFACE WATER

The City of Merced (the City) is located in the San Joaquin Valley hydrologic region. Overall surface water quality in the vicinity is good to excellent in the higher foothill areas and decreases in quality toward the valley's central low areas (Merced County 1990). The proposed project site is located within the City's Specific Urban Development Plan (SUDP) area. This area has been subdivided into eleven primary local watersheds, denoted A through K, based on initial watershed delineations and areas having a common existing or proposed drainage outfall. The proposed project site is within Watershed H located in the far southeast corner of the SUDP area. The total area of the watershed is approximately 2.7 square miles.

The site is currently utilized for agriculture. Current and past irrigation sources include surface water from the Merced Irrigation District (MID) canal and groundwater from an on-site well located in the northeastern portion of the site. The amount of groundwater pumped annually from this well is unknown (City of Merced Planning and Permitting 2006). There are no lakes, streams, or waterbodies meeting the criteria of "waterbodies of the United States" on the proposed project site. Runoff generated within Watershed H flows into the Merced Irrigation District's Doane Lateral Canal, located approximately 1,200 feet west of the proposed project site, which discharges into Miles Creek approximately one mile south of the proposed project site (City of Merced 2002). Miles Creek is an ephemeral creek that receives water from naturally occurring runoff (Caltrans 2000). No monitoring data or information exists to characterize typical stormwater surface runoff water quality at the proposed project site.

FLOODING

The Federal Emergency Management Agency (FEMA) is responsible for identifying and delineating flood hazard zones. Based on the most current FEMA map for the proposed project area (Flood Insurance Rate Map 06047C0445 E, Panel 445, effective 2006) (Exhibit 4.6-1), the proposed project site falls within Zone AH and Zone AO. Zone AO is defined as areas that are subject to inundation by the 100-year flood predominantly from sheet flow, with base flood elevations between 1 and 3 feet. Zone AH is defined as areas that are subject to inundation by the 100-year flood predominantly from ponding, with the same base flood elevations as Zone AO have been determined.

GROUNDWATER

The proposed project site is located within the Merced hydrologic sub-area (HSA 535.80), which is located within the San Joaquin Valley groundwater basin, the largest in California. The four aquifers found beneath the Merced area, listed from deepest to shallowest, are the Mehrten Formation, a confined aquifer between the Mehrten Formation and the base of the Corcoran Clay, an intermediate aquifer above the Corcoran Clay and below the shallow clay, and a shallow unconfined aquifer. Groundwater in the proposed project vicinity tends to flow northeast to southwest, although cones of depression from groundwater pumping and mounding from irrigation can complicate flow patterns and cause changes over time. Total dissolved solids (TDS) values in HSA 535.80 range from 100 to 3,600 mg/l, with a typical range of 200 to 400 mg/l, and there are localized areas of high hardness, iron, nitrate, and chloride (DWR 2003). Perched groundwater (i.e., local saturated zones above or discontinuous from the water table which exist above an impervious layer of limited extent) was observed at the proposed project site at between 34 and 40 feet below existing grade (ENGEO 2004).

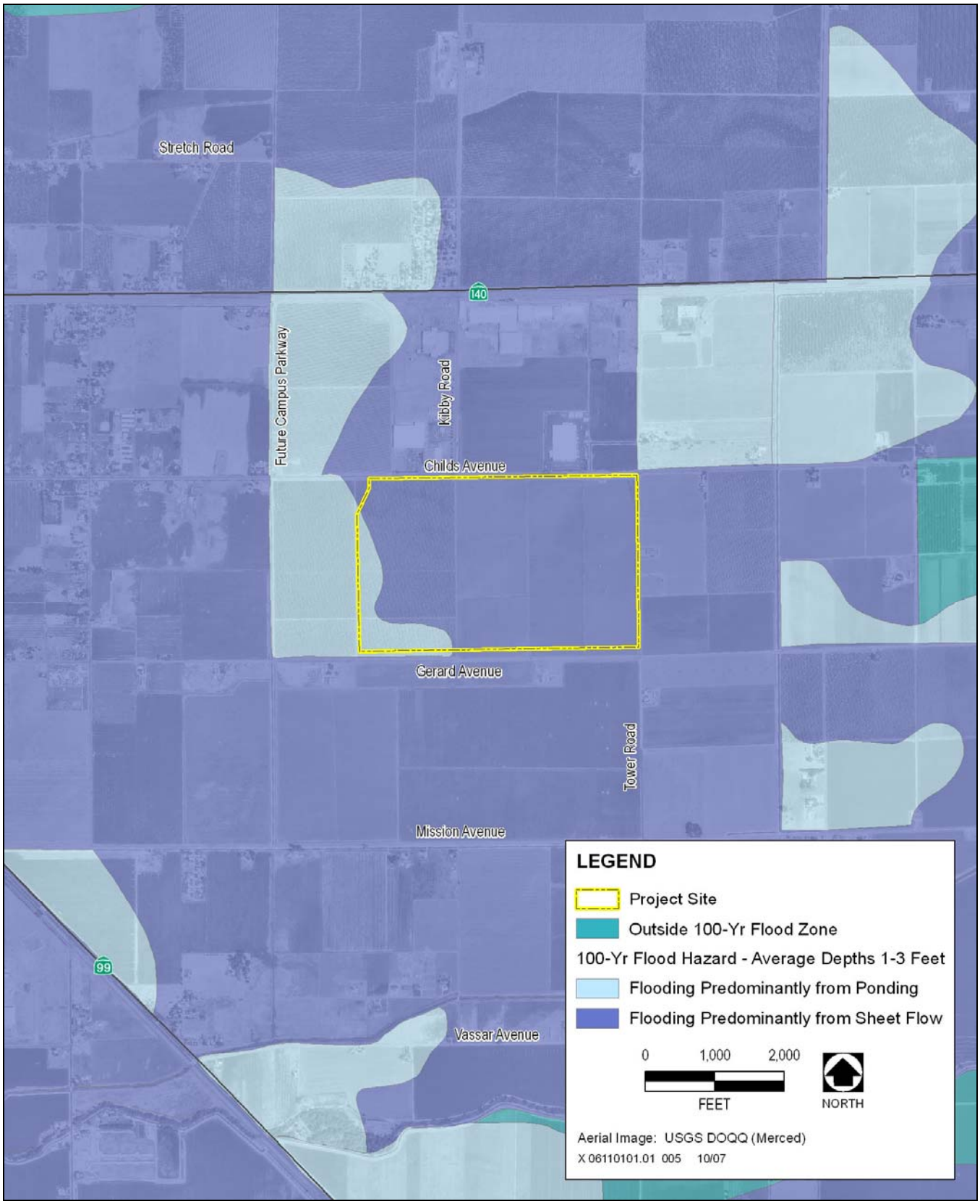
The City relies on groundwater for its primary domestic water source, which is recharged primarily from precipitation on the foothills and areas east of Merced. The City's domestic wells range in depth from 161 to 800 feet, with an average depth of 414 feet. The existing water quality from the City's domestic wells can be characterized as moderate to good (City of Merced 1997c). The most significant groundwater quality issue in the vicinity of the proposed project site was the discovery of trichloroethene (TCE) in 1984 during sampling of domestic and industrial water supply wells in the vicinity of a former General Electric Company (GE) facility. The disposal pond for this property is located approximately 2,500 feet north of the proposed project site. A shallow aquifer monitoring well located on the site is part of the monitoring well network for the GE study of TCE in groundwater. Data from February 2006 sampling of the monitoring well show that TCE was not detected at laboratory reporting limits of 0.5 parts per billion (ppb). Additionally, trichloroethane (TCA), volatile and semivolatile organic compounds were tested and were not found in measurable amounts (ENGEO 2006a). For the past several years GE has been conducting shallow groundwater remediation activities at the site (Tucker and Raggio, pers. comm., 2008)

4.6.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Clean Water Act

The objective of the Federal Clean Water Act (CWA) is to restore and maintain the physical, chemical and biological integrity of the nation's waters. Mechanisms to achieve this include the regulation of discharges of pollutants to navigable waters, establishment of numeric and narrative water quality objectives based on beneficial uses of water bodies, and periodic review of the water quality objectives. Water quality objectives for both surface and groundwater are established under CWA Section 303. The EPA has given California the authority to implement the provisions of the CWA through the Porter-Cologne Water Quality Control Act of 1969.



Source: Adapted by EDAW 2007

FEMA 100-Year Flood Zone in the Proposed Project Area **Exhibit 4.6-1**

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

In November 1990, the EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity if the project would disturb more than 5 acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects that disturb 1 acre or more. Phase 2 of the municipal permit system (known as the NPDES General Permit for Small MS4s) required small municipal areas of less than 100,000 persons to develop stormwater management programs. The City of Merced is part of the Merced Storm Water Group (MSWG), a coalition with the City's of Atwater, Merced County, and Merced Irrigation District. The State Regional Water Quality Control Board approved MSWG's Storm Water Management Program (SWMP) in April 2007.The RWQCBs in California are responsible for implementing the NPDES permit system (see NPDES Permits below).

Federal Emergency Management Agency

FEMA identifies flood zones, that is, areas subject to flooding, through Flood Insurance Rate Maps (FIRMs). The standard for flood protection established by FEMA, and used by CEQA guidelines, is the 1-in-100 annual exceedance probability (AEP), commonly referred to as the 100-year flood event. The State of California has started implementing requirements for the Central Valley to protect the area from a 200-year flood event, to be in place by 2015.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Porter-Cologne Water Quality Act of 1969

The Porter-Cologne Water Quality Control Act (Porter-Cologne) established the State Water Resources Control Board (SWRCB) and divided the state into nine regional basins, each represented by a Regional Water Quality Control Board (RWQCB). The SWRCB is the primary agency responsible for protecting the quality of the state's surface water and groundwater, and is authorized by Porter-Cologne to draft state policies regarding water quality. The Central Valley Region RWQCB (Region 5) has jurisdiction at the proposed project site.

In addition, Porter-Cologne authorizes the SWRCB to issue Waste Discharge Requirement Permits (WDRs) and NPDES Permits, and requires that either the State or Regional Water Quality Control Boards adopt water quality control plans (Basin Plans) for the protection of surface water and groundwater quality. The Basin Plans also provide the technical basis for determining NPDES permits, WDR permits, and thresholds and conditions for taking enforcement actions. All discharges to surface water or groundwater at the proposed project site are subject to Region 5 Basin Plan requirements (CVRWQCB 1998).

NPDES Permits

A Statewide NPDES Stormwater Permit for General Construction Activity (Order No. 99-08 DWQ) would be required for the proposed project. The SWRCB adopted a statewide NPDES stormwater permit for general construction activity, which requires the preparation of a stormwater pollution prevention plan (SWPPP) that identifies and describes the best management practices (BMPs) to be implemented at construction sites to control

pollution from stormwater runoff. Effective on March 10, 2003, the size of the construction disturbance subject to the statewide NPDES permit is 1 acre or more.

The SWRCB adopted a General Industrial Storm Water Permit (Order No. 97-03-DWQ), which covers specific industries including certain transportation, warehousing, and storage facilities. The general permit requires industrial dischargers to eliminate illicit discharges to storm drains, develop and implement a SWPPP, and perform monitoring of discharges to stormwater systems.

The General Industrial Storm Water Permit requires industrial dischargers to eliminate illicit discharges to storm drains, develop and implement a SWPPP, and perform monitoring of discharges to stormwater systems. The SWPPP should include the following items:

- source identification,
- practices to reduce pollutants,
- an assessment of potential pollution sources,
- a materials inventory,
- a preventive maintenance program,
- spill prevention and response procedures,
- general stormwater management practices,
- employee training,
- facility inspection,
- record keeping, and
- elimination of discharges other than stormwater that aren't permitted into the industrial stormwater system.

Senate Bill 5

Senate Bill (SB) 5, promulgated on October 10, 2007, enacts the Central Valley Flood Protection Act of 2008. Requirements of the Department of Water Resources (DWR) and the Central Valley Flood Protection Board (previously known as the State Reclamation Board) under SB5 are:

- To prepare and adopt a Central Valley Flood Protection Plan (the Plan, described below) by 2012.

- To establish 200-year protection as the minimum urban level of flood protection.

- By July 1, 2008, the DWR must produce preliminary maps for 100-year and 200-year floodplains protected by project levees, and to make them available to cities and counties in the Sacramento-San Joaquin Valley ("Central Valley"). (Water Code § 9610[a])

- Sets deadlines for cities and counties in the Central Valley to amend their general plans and their zoning ordinances to conform to the Plan within 24 months and 36 months, respectively, of its adoption.

- Restricts approval of development agreements rezones and subdivision maps in flood hazard zones, once the general plan and zoning ordinance amendments have been enacted, unless certain findings are made.

- Obligates Central Valley counties to develop flood emergency plans within 24 months of adoption of the Plan.

- By 2009, the Department of Water Resources ("Department") must propose amendments to the California Building Standards Code ("Building Code") to protect areas with flood depths anticipated to exceed three feet for the 200-year flood event. SB 5 requires that the Building Code amendments are designed to reduce the risk of flood damage and increase safety.

No later than 2015, but potentially sooner depending on when the Central Valley Flood Protection Plan takes effect, SB 5 prohibits local governments from entering development agreements or approving entitlements or permits, including ministerial permits resulting in construction of a new residence in a flood zone, which result in construction of a new residence in a flood zone unless one of three conditions are met:

- flood management facilities provide level of protection necessary to withstand 200-year flood event;
- the development agreement or other entitlements include conditions that provide protections necessary to withstand 200-year flood event; or
- the local flood management agency has made adequate progress on construction of a flood protection system that will result in protections necessary to withstand 200-year flood event by 2025.

Central Valley Flood Protection Plan

The Central Valley Flood Protection Plan (CVFPP, as set forth in Water Code, § 9614) is a descriptive document that includes the following elements:

1. a description of the Flood Management System, its performance, and the challenges to modifying it;
2. a description of the facilities included in the State Plan of Flood Control;
3. a description of probable impacts of projected climate change, land-use patterns, and other potential challenges;
4. an evaluation of needed structural improvements and a list of facilities recommended for removal; and
5. a description of both structural and nonstructural methods for providing an urban level of flood protection to currently urbanized areas in the Central Valley.

Groundwater Wells

The proposed project site contains an irrigation well, and City of Merced Water Well 10-R2. Section 13801 of the California Water Code requires the state board to adopt a model, and each county, city, or water agency to adopt ordinances for well placement, construction, and abandonment, that meet or exceed California Department of Water Resources (DWR) standards (California Water Code Section 231). Standards for wells in California are found in DWR Bulletins No.74-81 and 74-90, entitled “Water Well Standards, State of California.” The City of Merced Standard Designs – Well Destruction (Department of Public Works, Sheet W-10, August 5, 1991) lists the procedures and performance standards for well abandonment.

LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Goals and policies contained in the *Merced Vision 2015 General Plan* (City of Merced 1997a) that are applicable to hydrology, water quality, and flood control issues related to the proposed project are listed below.

- Protect ground and surface water resources from contamination (Chapter 11-Safety, Policies S-7.1 and 7.2; Chapter 7-Open Space, Policy OS-1.5).
- Preserve and protect surface water resources in the Merced Urban Area. (Chapter 5-Public Facilities, Policy P-5.2; Chapter 7-Open Space, Policies OS-1.2, 1.5, and 5.2).

- Protect groundwater quality by minimizing the need to use septic systems for wastewater treatment and disposal, and the use of private wells as a source of domestic water supply. (Chapter 2-Urban Expansion, Policy UE-1.7; Chapter 5-Public Facilities, Policy P- 4.1; Chapter 7-Open Space, Policy OS-1.5).

- Enhance urban groundwater recharge opportunities. (Chapter 5-Public Facilities, Policy 5.2).

- Promote water conservation strategies throughout the Merced Urban Area. (Chapter 5-Public Facilities, Policies P-4.2 and 5.2; Chapter 7-Open Space, Policy OS-5.1).

- Reduce the threat of flooding and flood water damage. (Chapter 5-Public Facilities, Policy 5.1; Chapter 11-Safety, Policy S-3.1).

The City of Merced Storm Drain Master Plan (SDMP) describes required drainage infrastructure recommendations for the SUDP area, including the proposed project site, that are designed to accommodate stormwater runoff under buildout conditions per the City of Merced Vision 2015 General Plan. Based on direction provided by the Merced City Council in 2001, the SDMP conveyance infrastructure has been configured to accommodate runoff generated during a 10-year storm event under upstream buildout conditions, pursuant to the General Plan, a standard utilized by many Northern California communities.

4.6.3 ENVIRONMENTAL IMPACTS

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the State CEQA Guidelines and thresholds reviewed and accepted by the City of Merced a hydrology and water quality impact is considered significant if implementation of the proposed project would do any of the following:

- contribute substantially to the nonattainment of Basin Plan thresholds for water quality through:

    - substantial degradation or depletion of ground water resources or
    - substantial degradation of surface water quality;

- diminish water quantity and the continued availability of water supplies by:

    - interfering substantially with ground water recharge or
    - creating water demand in excess of known available supplies; or

- create flooding or other water related hazards through:

    - placement within a 100-year flood hazard area structures which would impede or redirect flood flows; or

    - substantial change in absorption rates, drainage patterns, or the rate and amount of surface runoff, so that existing drainage capacity is exceeded.

- exceed the following City of Merced Storm Drain Master Plan thresholds:

    - Accommodate conveyance for runoff generated during a 10-year storm event under buildout conditions per the Merced Vision 2015 General Plan; or

    - Detention basin accommodation of runoff generated by a 50-year storm event under buildout conditions per the Merced Vision 2015 General Plan, with the rate of outflow being limited to the discharge generated by the watershed during a 2-year storm event under existing conditions.

IMPACT ANALYSIS

IMPACT 4.6-1 Short-Term Degradation of Water Quality from Project-Related Construction Activities. *Construction disturbances associated with the proposed project would create the potential for soil erosion and sedimentation of stormwater drainage systems and runoff to the Merced Irrigation District Doane Lateral Canal west of the proposed project site. The construction process may also involve the potential for releases of other pollutants to surface waters and/or the future storm drain system, including oil and gas, chemical substances used in the construction process, accidental discharges, waste concrete and wash water. This impact is considered* ***potentially significant****.*

Because construction activities would occur over a large area (approximately 235 acres), the substantial construction-related alteration of drainages could result in soil erosion and stormwater discharges of suspended solids, increased turbidity, and potential mobilization of other pollutants from project construction sites as contaminated runoff to on-site and ultimately off-site drainage channels. Many construction-related wastes , including fuels, solvents, oil and grease from paved areas, disturbed topsoil, fertilizers and related landscaping materials, have the potential to degrade existing water quality by altering the dissolved-oxygen content, temperature, pH, suspended-sediment and turbidity levels, or nutrient content, or by causing toxic effects in the aquatic environment. Project construction activities that are implemented without mitigation could violate water quality standards or cause direct harm to aquatic organisms.

Consequently, project-related impacts on water quality within on-site drainage channels as a result of temporary construction activities are considered ***potentially significant***.

Mitigation Measure 4.6-1a.Acquire Appropriate Regulatory Permits and Implement SWPPP and BMPs. Before the approval of grading permits and improvement plans, the project applicant for all project phases shall consult with the City of Merced, the SWRCB, and the Central Valley RWQCB to acquire the appropriate regulatory approvals that may be necessary to obtain a SWRCB statewide NPDES stormwater permit for general construction activity, and any other necessary site-specific Waste Discharge Requirements WDRs or waivers under the Porter-Cologne Act. The project applicant shall prepare and submit the appropriate Notice of Intent (NOIs) and prepare the SWPPP and any other necessary engineering plans and specifications for pollution prevention and control. After completion of construction and issuance of a Notice of Completion by the City of Merced, the project applicant shall prepare and submit the appropriate Notice of Termination (NOT) of the NOI. The SWPPP and best management practices (BMPs) therein shall identify and specify:

- the use of erosion and sediment-control BMPs, including construction techniques that will reduce the potential for runoff as well as other measures to be implemented during construction. These may include but not be limited to sedimentation ponds, inlet protection, perforated riser pipes, check dams and silt fences;
- the means of waste disposal;
- the implementation of approved local plans, nonstormwater-management controls, permanent postconstruction BMPs, and inspection and maintenance responsibilities;
- the pollutants that are likely to be used during construction that could be present in stormwater drainage and nonstormwater discharges, and other types of materials used for equipment operation;
- spill prevention and contingency measures, including measures to prevent or clean up spills of hazardous waste and of hazardous materials used for equipment operation, and emergency procedures for responding to spills;
- personnel training requirements and procedures that will be used to ensure that workers are aware of permit requirements and proper installation methods for BMPs specified in the SWPPP; and
- the appropriate personnel responsible for supervisory duties related to implementation of the SWPPP.

Where applicable, BMPs identified in the SWPPP shall be in place throughout all site work and construction and shall be used in all subsequent site development activities. BMPs shall include the following measures:

- Implementing temporary erosion-control measures in disturbed areas to minimize discharge of sediment into nearby drainage conveyances. These measures may include silt fences, staked straw bales or wattles, sediment/silt basins and traps, geofabric, sandbag dikes, and temporary vegetation.

- Establishing permanent vegetative cover to reduce erosion in areas disturbed by construction by slowing runoff velocities, trapping sediment, and enhancing filtration and transpiration.

- Using drainage swales, ditches, and earth dikes to control erosion and runoff by conveying surface runoff down sloping land, intercepting and diverting runoff to a watercourse or channel, preventing sheet flow over sloped surfaces, preventing runoff accumulation at the base of a grade, and avoiding flood damage along roadways and facility infrastructure.

All construction contractors shall retain a copy of the approved SWPPP on the construction site. Implementation of Mitigation Measure 4.6-1a would reduce the potentially significant impact of water quality degradation from project-related construction activities to a ***less-than-significant*** level because the project applicant would conform to applicable local and state regulations regulating construction discharges and successfully implement the SWPPP. However, Mitigation Measure 4.6-1b, discussed below, is necessary to assure that the measures put in place by Mitigation Measure 4.6-1a are properly maintained during the life of the project.

Mitigation Measure 4.6-1b: Establish a Maintenance Entity for BMPs. The project applicant shall establish a maintenance district, Community Facilities District (CFD), or other maintenance entity acceptable to the City of Merced and the MID, prior to recordation of any Final Maps, to provide funding for the operation, maintenance, and replacement costs of the stormwater BMPs. The maintenance entity shall insure that stormwater runoff shall meet all state and local water quality requirements, through modification of BMPs or stormwater pretreatment measures if required.

Several technical studies have been conducted regarding water the impacts of quality control features on groundwater (e.g., City of Fresno Nationwide Urban Runoff Project [EPA 1983] and *California Storm Water Best Management Practices Handbook* prepared by the Stormwater Quality Task Force) and surface water (e.g., Cumulative Water Quality Analysis Report for the Lahontan Development 1996–2002 [Huffman and Carpenter 2003]). These studies have identified that water quality control features such as revegetation, erosion control measures, detention and infiltration basins have been successful in controlling water quality and avoiding water quality impacts (metals and organic compounds associated with stormwater are typically lost within the first few feet of the soil of the retention basins associated with groundwater). Technical studies associated with the Lahontan Development demonstrated that the use of a variety BMPs such as source control, detention basins, revegetation and erosion control, have been able to maintain surface water quality conditions in adjacent receiving waters. Implementation of Mitigation Measure 4.6-1b would establish a maintenance entity to provide the funding source for BMPs, which would further reduce the potentially significant impact of water quality degradation from project-related construction activities to a ***less-than-significant*** level.

IMPACT 4.6-2 Long-Term Degradation of Surface Water Quality from Project-Related Contaminants. *The conversion of undeveloped land to urban land uses would alter the types, quantities, and timing of contaminant discharges in stormwater runoff. Overall, the potential for the proposed project to cause or contribute to long-term discharges of urban contaminants (e.g., oil and grease, trace metals and organics, trash) into the stormwater drainage system would increase compared to existing conditions. This impact is considered potentially significant.*

An increase in the amount of impervious surfaces within the SUDP area has resulted in higher rates of runoff during rainy periods, which can be a source of surface water pollution (City of Merced 1997b). Urban runoff

pollutants may stem from erosion of disturbed areas, deposition of atmospheric particles derived from automobile or industrial sources, corrosion or decay of building materials, rainfall contact with toxic substances, and spills of toxic materials on surfaces which receive rainfall and generate runoff. New urban industrial and commercial development can generate urban runoff from parking areas as well as any areas of hazardous materials storage exposed to rainfall. Therefore, this impact is considered ***potentially significant***.

Mitigation Measure 4.6-2. Develop and Implement a BMP and Water Quality Maintenance and Monitoring Plan. Design standards for water quality treatment are being formulated that would meet or exceed City of Merced Storm Drain Master Plan and Standard Design requirements. The design standards, when completed, will incorporate the adopted City of Merced Master Storm Drain Plan and Design guidance (City of Merced 2002):

- Excavated Open Channels – 60-foot right-of-way open channels would convey runoff through areas where the estimated peak flow rates from a watershed exceed the capacity of a 66-foot storm drain. These open channels would include landscaping and bike paths for recreational opportunities. They shall be turfed or otherwise protected to prevent erosion. A minimum of 1 foot of freeboard shall be maintained above the design 10-year water surface elevation to the top of the banks. One side of the channel shall provide for all weather maintenance unless the channel is adjacent to a public road.

- Storm Drains – Underground storm drain pipelines would be utilized. Storm drain trunk lines would be sized to convey the 10-year discharges operating under uniform flow conditions, and shall be located in public streets.

- Stormwater Detention Facilities – The two stormwater detention basins, one draining the north portion of the proposed project site and the other draining the south portion, have been designed to accommodate runoff generated during a 50-year 24-hour storm event under General Plan buildout conditions, with the rate of outflow being limited to the discharge generated by the watershed during a 2-year storm event under existing conditions. Detention basins have been conceptually designed with a maximum depth of 5 feet below ground surface due to the relatively shallow depth to groundwater in some of the areas surrounding the proposed Project. One foot of freeboard from the 50-year 24-hour storm to the top of the basin has also been included in the conceptual design.

- Pump Stations – Due to the relative flatness of the proposed Project terrain, pump stations would be used to augment the gravity flow draining of the detention basins. The pumps have been conceptually designed to handle the 2-year discharge flow from the basins. Facilities would consist of a low flow pump, a high flow pump, and a backup pump.

The stormwater treatment system would reduce the increased amount of stormwater runoff and associated erosion created by the proposed project site. The runoff would be collected by overland flow and an underground storm sewer system into detention ponds to control the quantity of runoff exiting the site. The quality of runoff would be controlled by sedimentation ponds, biological treatment of the water by vegetation, infiltration of the water into the ground and a skimmer plate to skim floatable objects from the water surface. Implementation of these mitigation measures would reduce impacts to a ***less-than-significant*** level.

Design Criteria and Methodology

To design a treatment system that meets or exceeds the City and MID guidelines and standards for stormwater quantity and quality that must be met or exceeded, the site was analyzed to determine the peak discharge rates for the predeveloped and developed conditions under various storm event scenarios (Carter-Burgess 2007). The City requires the detention ponds to be designed (1) to store water deposited on site by the so-called 50-year storm and (2) to control the allowable discharge from developed conditions so as not to exceed the 2-year predeveloped discharge (City of Merced 2002). The City also has a requirement that the ponds be dry in 48 hours, if the maximum discharge rate will allow it. The MID requires that the allowable discharge from developed conditions not exceed the 10-year storm. However, the MID requested that the maximum allowable discharge be 2,200 gpm (gallons per minute), which is less than both the 10-year storm and the 2-year predeveloped discharge rates. The

MID maximum allowable rate of 2,200 gpm, lower than the City's discharge rate of 8,960 gpm, was agreed on by the City and MID (Carter-Burgess 2007).

The 24-hour rainfall values were selected from NMFS Atlas 14, Volume I by the National Oceanic and Atmosphere Administration. Time of concentration values were computed based on the methods in the Soil Conservation Service Technical Report Manual SCS TR-55, widely used for calculating stormwater runoff in small urban watersheds (USDA 1986). The detention ponds were size based on volume required to hold the stormwater runoff from a 100-year storm event. The computer program Interconnected Pond Routing by Streamline Technologies, Inc., a FEMA approved stormwater modeling system, was utilized to rout the various storms through the detention ponds and the pump station. The 2-year, 10-year, 25-year, 50-year and 100-year 24-Hour Storms were used in the analysis to size the stormwater conveyances such that they would handle the water volumes of all of those stormwater volumes.

Pre- and Postdevelopment Conditions

The site is currently used as farmland, with cultivation of alfalfa and almonds being the primary crops. Site topography indicates that the site slopes from northeast to southwest, with elevations ranging from approximately 195 feet msl near the northeast corner to approximately 187 feet msl at the southwest corner. Stormwater runoff from the site currently ponds in a low lying area near the southwest corner of the site and eventually spills over to a roadside ditch running to the west along the north side of Gerard Avenue.

The development of the approximately 235 acre site would create approximately 110 acres of impervious surface area. To offset the additional impervious area, a series of detention ponds would be constructed around the perimeter of the site area to store stormwater runoff (Exhibit 4.6-2). The detention ponds would be utilized to control the quantity and quality of runoff. The retention time of the stormwater in the ponds would allow additional stormwater infiltration into the soil (Infiltration rates are described in Mitigation measure 4.6-4).As determined by MID based on their review of the proposed Project Preliminary Site Drainage Analysis (Carter-Burgess 2007), stormwater would be pumped from the detention ponds into a connection to an existing irrigation canal. The preferred pump location is shown on Exhibit 4.6-2.

The preferred project canal to receive the stormwater runoff would be MID Fairfield Canal (Exhibit 4.6-3). This is the canal preferred by the MID as well based on their review of the proposed Project Preliminary Site Drainage Analysis (Carter-Burgess, 2007). To discharge in to this canal, a pump station would be located near the northeast corner of the development. Stormwater would be pumped in a closed system within the property owned by Wal-Mart, City right-of-way and MID easement/property to Fairfield Canal. In the event the Fairfield Canal could not be utilized, the alternative canal to receive the flow would be the Farmdale Lateral (Exhibit 4.6-4). To reach the Farmdale Lateral, a pump station would be located near the southwest corner of the development (Exhibit 4.6-5). Stormwater would be pumped in a closed system within the property owned by Wal-Mart, City right-of-way or easement and MID easement/property to the Farmdale Lateral. The detention ponds and the drainage channels would be grassed-lined to help filter stormwater runoff. In addition all of the ponds would be interconnected to each other and a discharge pipe would connect the detention ponds to the wet well basin of the pump station. The inlet side of this discharge pipe would have a skimmer plate on it to prevent floating contaminants from entering the wet well basin and leaving the site.

Using the maximum discharge rate of 2,200 gpm as required by the MID, the ponds could not be drained within 48 hours for the 10-year storm, as required by the City. Therefore the City would agree to allow longer drawdown duration time for the system. The drawdown durations for the 10-year, 25-year, 50-year and 100-year would be approximately 72 hours, 88 hours, 95 hours and 108 hours, respectively. These drawdown times assume that once the pumps start pumping they would operate continuously; however, the pumps would be controlled by MID. If MID determined that downstream conditions warranted the discharge from the proposed project site be discontinued, then MID would have the ability to shut the pumps down to discontinue the discharge. This would then increase the duration stormwater would remain in the ponds and the additional volume that could infiltrate

into the soil. The 10-year, 24-Hour storm runoff volume for the entire 235 acre site for predeveloped conditions is 10.7 af and for developed conditions is 26.2 af.

Permanent water quality improvement BMPs may include but not be limited to unlined detention ponds for filtration, biological treatment of runoff over vegetation, skimmer plates on discharge structures and sedimentation basins. The expected pollutant removal success rates listed in Table 4.6-1 suggest that multiple BMPs, when properly installed and maintained, can achieve nearly 100% sediment removal. Multiple temporary construction and permanent BMPs would therefore be used in combination to achieve this result. Although 100% contaminant removal is often infeasible, BMPs would be selected and designed with the objective of achieving maximum contaminant removal, using the best available technology that is economically feasible, and explicitly identifying the expected level of BMP effectiveness in removing contaminants.

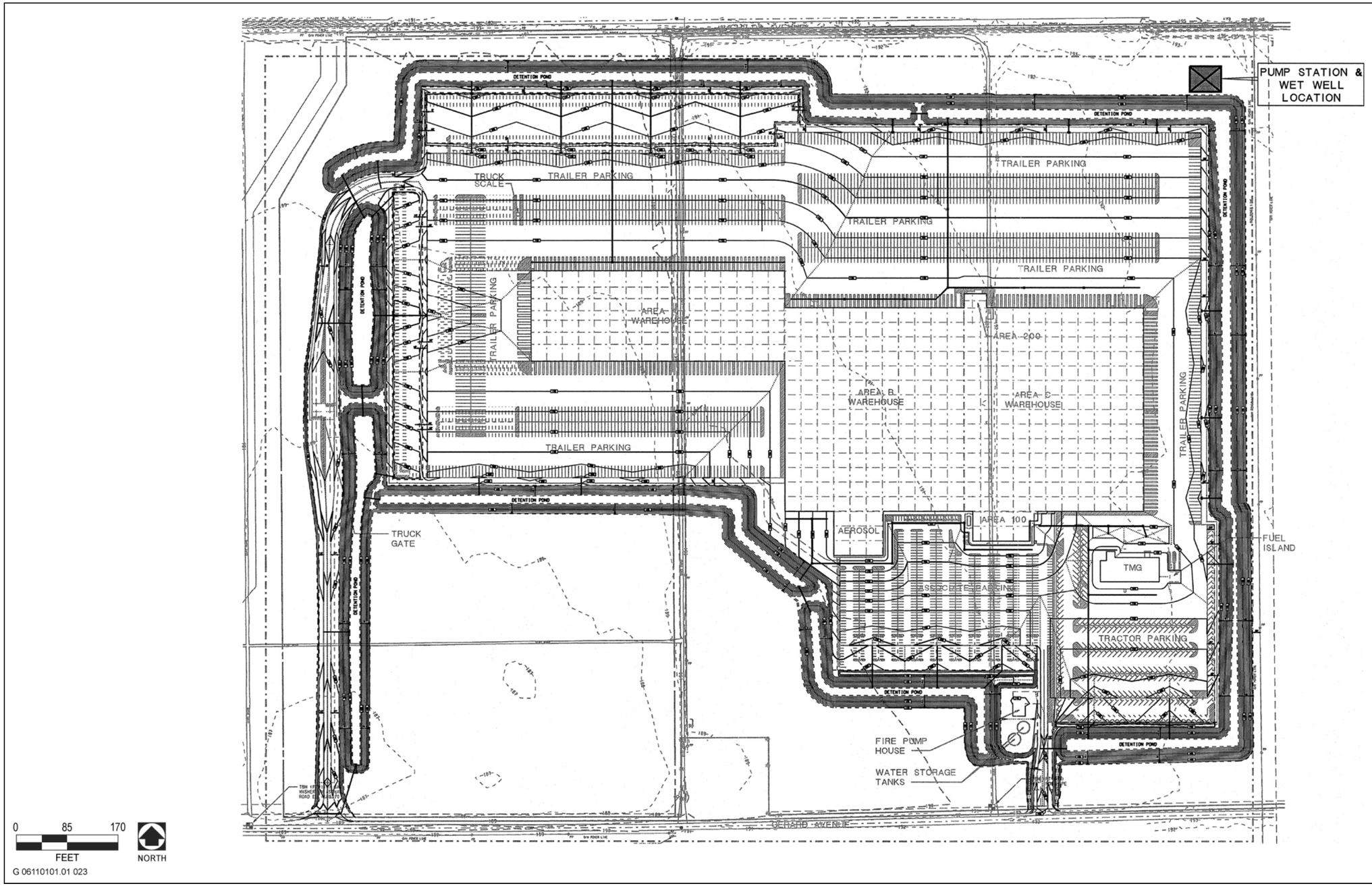
Table 4.6-1
Expected Pollutant Removal Efficiency of Best Management Practices

BMP Type	Typical Pollutant Removal (%)				
	Suspended Solids	Nitrogen	Phosphorus	Pathogens	Metals
Structural BMPs					
Dry detention basins	30–65	15–45	15–45	<30	15–45
Retention basins	50–80	30–65	30–65	<30	50–80
Constructed wetlands	50–80	<30	15–45	<30	50–80
Infiltration basins	50–80	50–80	50–80	65–100	50–80
Infiltration trenches, dry wells	50–80	50–80	15–45	65–100	50–80
Porous pavement	65–100	65–100	30–65	65–100	65–100
Grassed swales	30–65	15–45	15–45	<30	15–45
Vegetated filter strips	50–80	50–80	50–80	<30	50–80
Surface sand filters	50–80	<30	50–80	<30	50–80
Other media filters	65–100	15–45	<30	<30	50–80
Construction Site BMPs					
Silt fence	50–80				
Sediment basin	55–100				
Sediment trap	60				

Note: BMP = best management practice
Source: EPA 1999

In summary, the stormwater management design for the proposed project would consist of the following measures to safely convey on-site and off-site flows through the project site, and prevent increased flood hazard on downstream areas by limiting peak discharges to below pre-project levels.

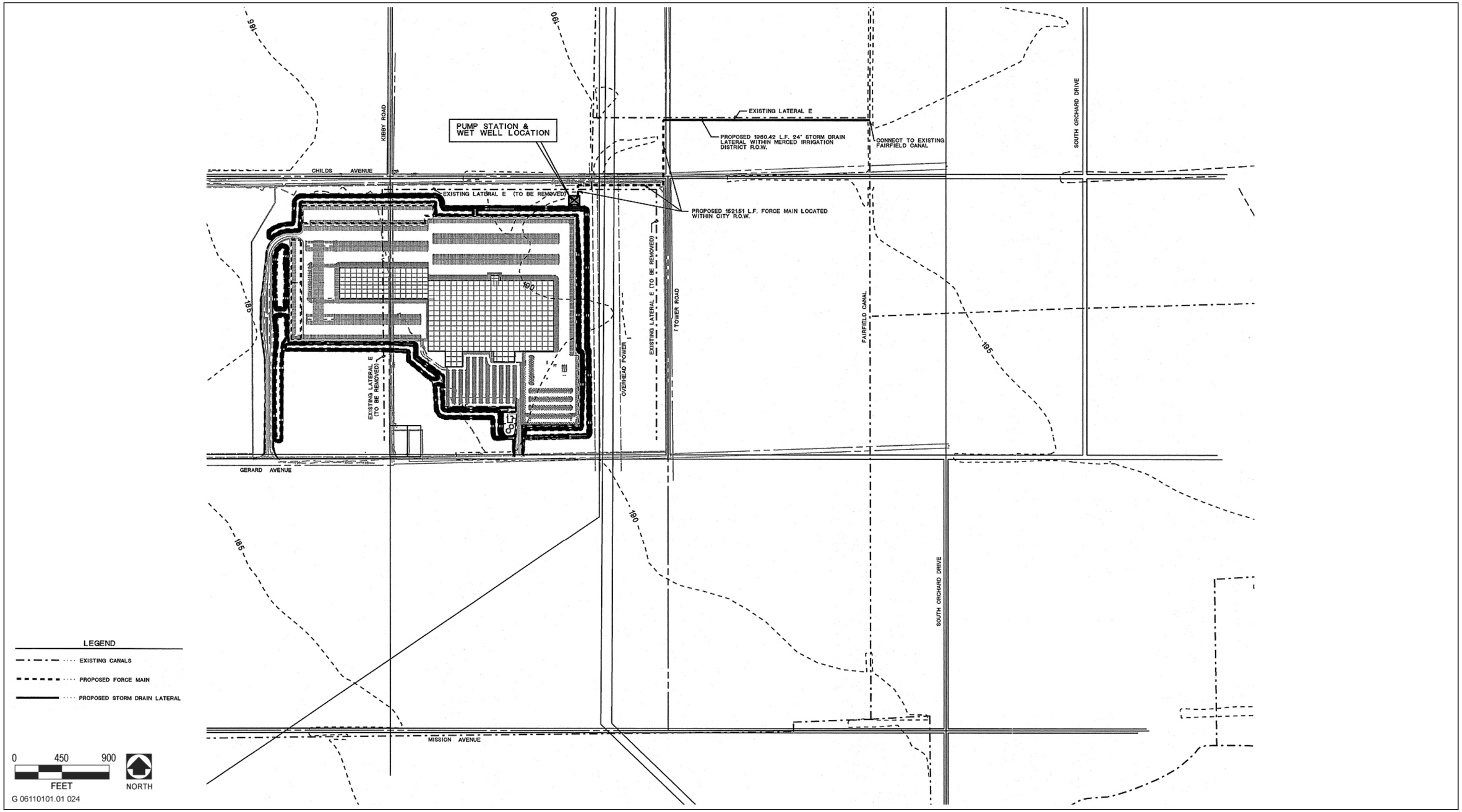
- Stormwater would be captured and conveyed in a closed system within the property owned by Wal-Mart, City right-of-way and MID easement/property
- Detention ponds in the system would be sized based on volume required to hold the stormwater runoff from a 100-year storm event
- Stormwater would be conveyed to Fairfield Canal (preferred) or Farmdale Lateral (alternative)
- Discharge would be limited to 2,200 gpm for all storm events.



Source: Carter & Burgess 2007

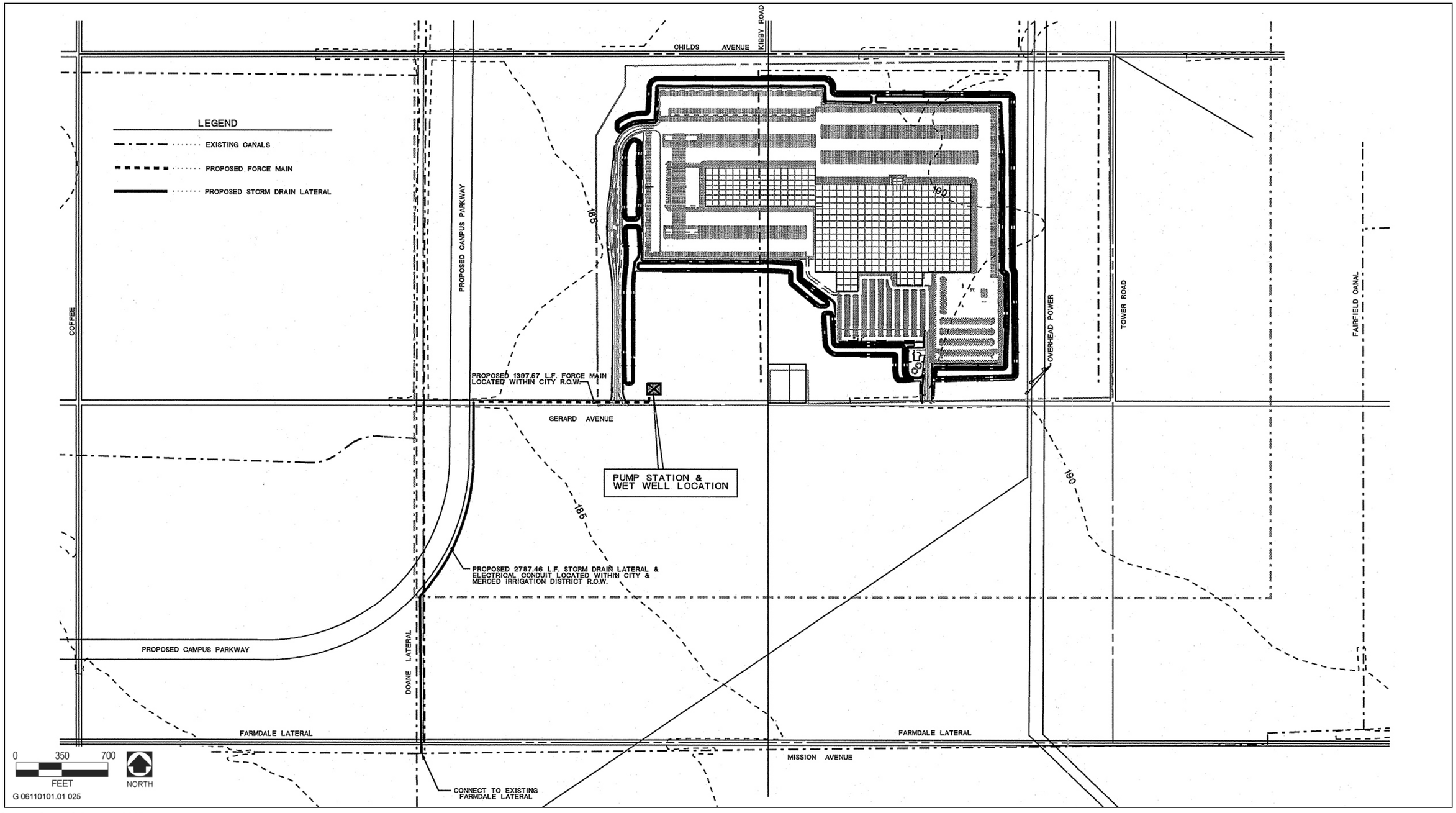
Preferred Pump Location

Exhibit 4.6-2



Source: Carter & Burgess 2007

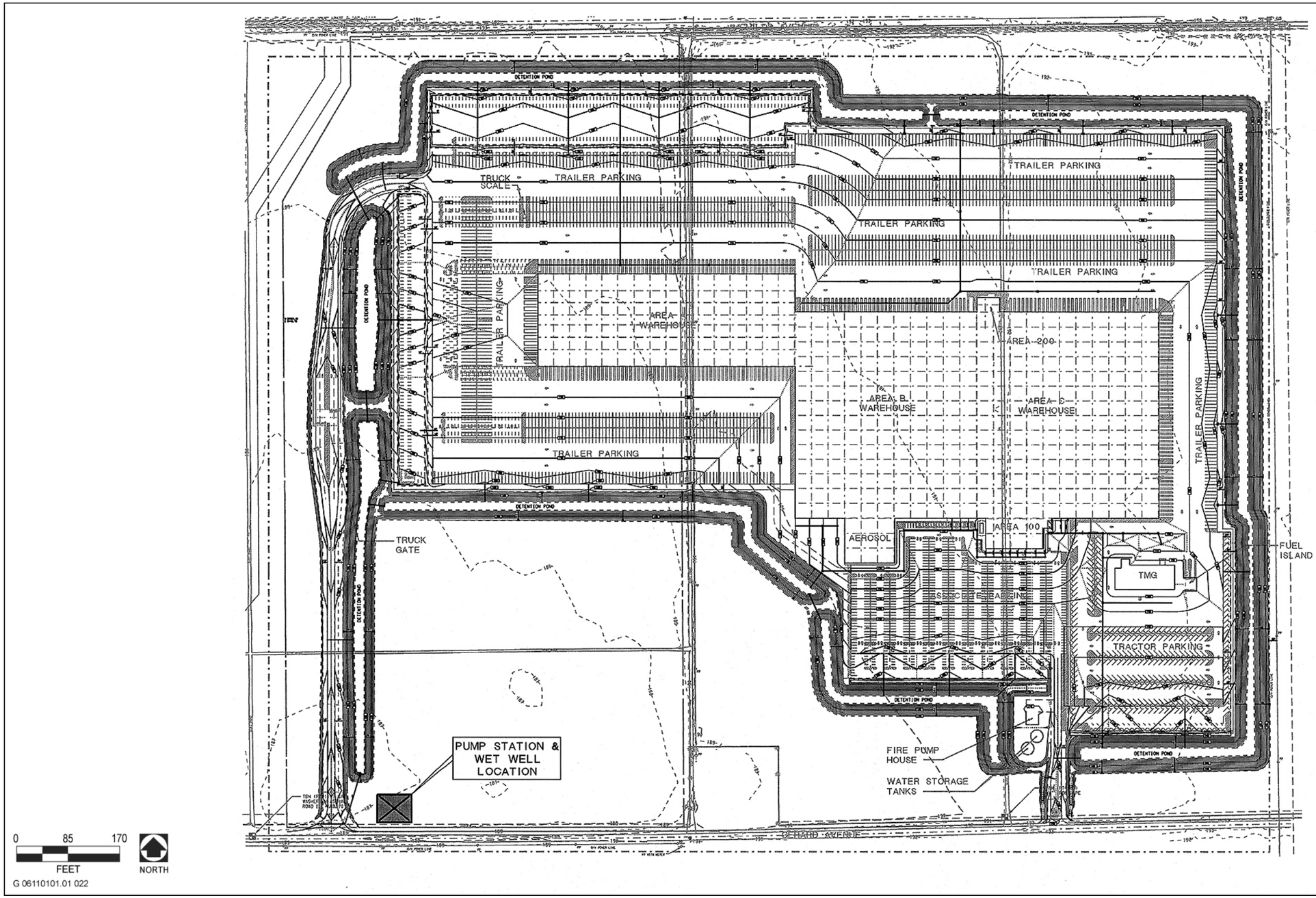
Preferred Drainage Path **Exhibit 4.6-3**



Source: Carter & Burgess 2007

Alternative Drainage Path

Exhibit 4.6-4



Source: Carter & Burgess 2007

Alternative Pump Location

Exhibit 4.6-5

The finish floor elevation of each structure on the site would be at least 2 feet above the existing ground elevation at the location of the structure, pursuant to City requirements for development within Zone A. The proposed project would meet or exceed City requirements for development within Zone A, and the stormwater management system would safely convey runoff from the 100-year storm.

Implementation of Mitigation Measure 4.2-2 would reduce the potentially significant impact related to long-term degradation of surface water quality from proposed project-related contaminants to a less-than-significant level because the project applicant would demonstrate to the City and MID that the proposed project would conform to applicable state and local regulations regulating surface water runoff. The design criteria described in detail in the Master Drainage Plan (City of Merced 2002) are designed to meet or exceed the City of Merced Storm Drain Master Plan and Standard Design requirements pertaining to stormwater treatment. The permanent BMPs to be utilized in the stormwater treatment system described in detail in the Master Drainage Plan (City of Merced 2002) have been shown to be effective in reducing contaminant levels in urban runoff (EPA 1999, CASQA 2003).

IMPACT 4.6-3 On-Site and Off-Site Flooding Hazards from Increased Stormwater Runoff. *The proposed project would alter the ground surface and drainage patterns of the majority of the site, creating approximately 110 acres of impervious surface area. This impact is considered* ***potentially significant****.*

The site would consist of a 1,100,000-square-foot warehouse, a truck maintenance garage, a truck gate, a truck wash, a fuel island, and a fire pump house. Other site construction would include paved entrance roads, paved parking areas, utilities necessary to service each building. This increase in impervious surfaces would increase stormwater runoff patterns and volume. As noted above, the 10-year, 24-Hour storm runoff volume for the entire 235 acre site for predeveloped conditions is 10.7 af and for developed conditions is 26.2 af. Thus, the project would result in a net increase of 15.5 af in storm runoff volume for the 10-year, 24-hour storm. This impact is considered ***potentially significant***.

Implementation of Mitigation Measure 4.6-2 would reduce the potentially significant impact related to on-site and off-site flooding hazards from proposed project-related stormwater runoff to a ***less-than-significant*** level because the project applicant would demonstrate to the City that the proposed project would conform with applicable state and local regulations regulating surface water runoff. The design criteria described in detail in the Master Drainage Plan (City of Merced 2002) are designed to meet or exceed the City of Merced Storm Drain Master Plan and Standard Design requirements pertaining to stormwater runoff. Specific project design standards would, when implemented, provide flood protection to meet FEMA 100-year flood protection criteria, would safely convey on-site and off-site flows through the proposed project site, and would prevent increased flood hazard on downstream areas by limiting peak discharges to below preproject levels.

IMPACT 4.6-4 Depletion of Groundwater Supplies or Substantial Interference with Groundwater Recharge. *The impervious surface area resulting from the proposed project has the potential to interfere with groundwater recharge compared to existing conditions. However, the existing groundwater recharge potential of the site is low due low permeability soil characteristics, and the existing agricultural uses utilize groundwater at a rate greater than that which would be lost to recharge via impermeable surfaces. Therefore this impact is* ***less than significant****.*

A recent geotechnical evaluation of the proposed project site (ENGEO 2006b) showed that the existing recharge potential of the site is relatively low, due to soil characteristics of low permeability in the upper three feet of silty clay materials, including portions of near-surface hardpan over much of the site, as well as high evapotranspiration from the crops grown on the site. The estimated annual recharge to groundwater from rainfall on the site is approximately 23.5 acre-feet per year (afy), based on 12 inches of annual rainfall and a 10% recharge rate (DWR 2003). The estimated post-development annual groundwater recharge from rainfall from the remaining 125 acres of open space is approximately 12.5 afy, based on site runoff characteristics utilizing the same rainfall and recharge rate.

Additional groundwater recharge would occur through infiltration from the stormwater treatment system detention basins (Exhibit 4.6-1). This infiltration rate is expected to be greater than the infiltration rate through the ground surface because the depth of the basins (approximately 10 feet) would introduce water into the deeper silty sand/sandy silt soil horizons with higher soil permeability than the silty clay surface horizons. In addition, the basin retention times would increase the contact time of water for infiltration. Based on a percolation rate of 1 gallon per day per square foot for the silty sand/sandy silt, and a retention time of 48 hours (conservative as up to 72 hours have been approved) the total estimated percolation amount would be approximately 5.6 afy. Therefore the estimated amount of reduced groundwater recharge due to site development is estimated at 5.4 afy (predevelopment recharge [23.5 afy]—post-development recharge [12.5 afy]—recharge from stormwater detention basins [5.5 afy]). This would result in a drawdown of 0.005 feet (0.6 inches) to the aquifer at the edge of the proposed project site. This is not significant given the overall thickness of the aquifer of 300 to 1,000 feet. Therefore, this impact is ***less than significant***.

Mitigation Measure

No mitigation is required.

IMPACT 4.6-5 **Proposed Project Structures within the 100-year Flood Zone Could Impede or Redirect Flood Flows.** *Portions of the proposed project are within the 100-year flood zone. However, the project stormwater management system, and compliance with City requirements regarding placement of structures in the flood zone, makes this impact less than significant.*

The proposed project would be constructed within the FEMA 100-year flood zone (see Exhibit 4.6-1). The proposed Project site is located primarily in Zone AO, defined as areas that are subject to inundation by the 100-year flood predominantly from sheet flow with base flood elevations between 1 and 3 feet. The far western portion is located in Zone AH, defined as areas that are subject to inundation by the 100-year flood predominantly from ponding, with the same base flood elevations as Zone AO.

The stormwater management design described in Mitigation Measure 4.6-2 for the proposed project would consist of the following measures to safely convey on-site and off-site flows through the project site, and prevent increased flood hazard on downstream areas by limiting peak discharges to below preproject levels.

- Stormwater would be captured and conveyed in a closed system within the property owned by Wal-Mart, City right-of-way and MID easement/property
- Detention ponds in the system would be sized based on volume required to hold the stormwater runoff from a 100-year storm event
- Stormwater would be conveyed to Fairfield Canal (preferred) or Farmdale Lateral (alternative)
- Discharge would be limited to 2,200 gpm for all storm events.

The finish floor elevation of each structure on the site would be at least 2 feet above the existing ground elevation at the location of the structure, pursuant to City requirements for development within Zone A. The proposed project would meet or exceed City requirements for development within Zone A, and the stormwater management system would safely convey runoff from the 100-year storm. Therefore, this impact is ***less than significant***.

Mitigation Measure

No mitigation is required.

IMPACT 4.6-6 **Wells Not Properly Decommissioned Could Directly Transport Effluent Irrigation Water to the Groundwater Aquifer.** *The irrigation well on the northeastern portion of the proposed project site has a potential for negative impacts to the site if not removed or filled in a proper manner. The well would be decommissioned pursuant to applicable State and City requirements. Therefore, this impact is* ***less than significant****.*

If wells are not properly decommissioned, they could act as direct conduits for effluent water to enter the groundwater aquifer. This could cause a significant impact to groundwater quality in the project area. The irrigation well on the site would be decommissioned in conformance with Section 13801 of the California Water Code and City of Merced Standard Designs—Well Destruction. This would reduce the potentially significant impact of improperly decommissioned wells to a less-than-significant-level because California DWR and California Water Code Section 231 standards for wells in California would be met or exceeded. City of Merced Well Destruction standards including grout sealing material and procedures, soil backfill and compaction, and post-decommission inspection would ensure that groundwater contamination and interchange between aquifers would be eliminated. Therefore this impact is ***less than significant***.

Mitigation Measure

No mitigation is required.

IMPACT 4.6-7 **Potential Exposure to 200-Year Flood Prior to Implementation of SB 5.** *The project site is located within an area that will require 200-year flood protection as required by SB5, as described in Section 1.2 "Regulatory Setting" above. The potential exists for exposure of the proposed project to the 200-year flood. Therefore this impact is* ***potentially significant****.*

Mitigation Measure 4.6-6: Comply with SB 5 Criteria Establishing 200-Year Urban Flood Protection.
Prior to submittal to the City of development agreements, tentative maps or rezones after 2015, but potentially sooner depending on when the Central Valley Flood Protection Plan takes effect, the project applicant would be required to show that one of three conditions would be met:

- flood management facilities provide level of protection necessary to withstand 200-year flood event;
- the development agreement or other entitlements include conditions that provide protections necessary to withstand 200-year flood event; or
- the local flood management agency has made adequate progress on construction of a flood protection system that will result in protections necessary to withstand 200-year flood event by 2025.

Implementation of Mitigation Measure 4.6-6 would reduce the potential for increased risk of flooding from the 200-year storm event to a less-than-significant level because the project applicant would demonstrate to the City that the proposed project would comply with SB 5 criteria protecting the proposed project from the 200-year flood.