5.0 WATER QUALITY ASSESSMENT

The purpose of this section is to define the water quality treatment approach for the Newport Banning Ranch Project consistent with the details of the current planning level, and summarize the various water quality systems and concepts being considered within the development areas. As a result of the Project's alteration of existing conditions, the proposed development will create new pollutant sources, and in turn, change the makeup of pollutant constituents generated by the Project's current operations. In order to reduce the amount of pollutants in storm water runoff from the new development plan, best management practices (BMPs) are required to be implemented in accordance with California Coastal Commission, the City of Newport Beach and local Regional Board standards.

5.1 REGULATORY FRAMEWORK

5.1.1 FEDERAL REGULATIONS

Controlling pollution of the nation's receiving water bodies has been a major environmental concern for more than three decades. Growing public awareness of the impacts of water pollution in the United States culminated in the establishment of the federal Clean Water Act[6] (CWA) in 1972, which provided the regulatory framework for surface water quality protection.

The United States Congress amended the CWA in 1987 to specifically regulate discharges to waters of the US from public storm drain systems and storm water flows from industrial facilities, including construction sites, and require such discharges be regulated through permits under the National Pollutant Discharge Elimination System (NPDES).[7] Rather than setting numeric effluent limitations for storm water and urban runoff, CWA regulation calls for the implementation of Best Management Practices (BMPs) to reduce or prevent the discharge of pollutants from these activities to the Maximum Extent Practicable (MEP) for urban runoff and meeting the Best Available Technology Economically achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) standards for construction storm water. Regulations and permits have been implemented at the federal, state, and local level to form a comprehensive regulatory framework to serve and protect the quality of the nation's surface water resources.

In addition to reducing pollution with the regulations described above, the CWA also seeks to maintain the integrity of clean waters of the United States – in other words, to keep clean waters clean and to prevent undue degradation of others. As part of the CWA, the Federal Antidegradation Policy [40 CFR Section 131.12] states that each state "shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy…" [40 CFR Section 131.12(a)]. Three levels of protection are defined by the federal regulations:

---

[6] Also referred to as the Federal Water Pollution Control Act of 1972
[7] CWA Section 402(p)

1. Existing uses must be protected in all of the Nation's receiving waters, prohibiting any degradation that would compromise those existing uses;

2. Where existing uses are better than those needed to support propagation of aquatic wildlife and water recreation, those uses shall be maintained, unless the state finds that degradation is "…necessary to accommodate important economic or social development" [40 CFR Section 131.12(a)(2)]. Degradation, however, is not allowed to fall below the existing use of the receiving water; and

3. States must prohibit the degradation of Outstanding National Resource Waters, such as waters of National and State parks, wildlife refuges, and waters of exceptional recreation or ecological significance.

5.1.2 STATE AND LOCAL REGULATIONS

California Coastal Commission

The California Coastal Commission is responsible for protecting water quality in coastal environments as defined under Sections 30230 and 30231 of the California Coastal Act. These water quality provisions provide a broad basis for protecting coastal waters, habitats and biodiversity associated with new development and redevelopment projects. To meet the objectives of Sections 30230 and 30231, the Coastal Commission supports a three-pronged approach to water quality management: site design, source control and treatment control of BMPs. New development and redevelopment projects that are within the coastal zone are required to apply for a coastal development permit (CDP) through the Coastal Commission prior to construction. As part of the CDP process, projects must demonstrate water quality protection with the implementation of site design, source control, and treatment control BMPs.

State Water Resources Control Board

In the State of California, the State Water Resources Control Board (SWRCB) and local Regional Water Quality Control Boards (RWQCBs) have assumed the responsibility of implementing US EPA's NPDES Program and other programs under the CWA such as the Impaired Waters Program and the Antidegradation Policy. The primary quality control law in California is the Porter-Cologne Water Quality Act (Water Code Sections 13000 et seq.). Under Porter-Cologne, the SWRCB issues joint federal NPDES Storm Water permits and state Waste Discharge Requirements (WDRs) to operators of municipal separate storm sewer systems (MS4s), industrial facilities, and construction sites to obtain coverage for the storm water discharges from these operations.

Basin Plan Requirement

In addition to its permitting programs, the SWRCB, through its nine RWQCBs, developed Regional Water Quality Control Plans (or Basin Plans) that designate beneficial uses and water quality objectives for California's surface waters and groundwater basins, as mandated by both the CWA and the state's Porter-Cologne Water Quality Control Act. Water quality standards are thus established in these Basin Plans and provide the foundation for the regulatory programs implemented by the state. The Santa Ana RWQCB's Basin Plan, which covers the Newport Banning Ranch project area, specifically (i) designates beneficial uses for surface waters and ground waters, (ii) sets narrative and numerical objectives that must be met in order to protect the beneficial uses and conform to the state's antidegradation policy, and (iii) describes implementation programs to protect all waters in the Region.[8] In other words, the Santa Ana RWQCB Basin Plan provides all relevant information necessary to carry out federal mandates for the antidegradation policy, 303(d) listing of impaired waters, and related TMDLs, and provides information relative to NPDES and WDR permit limits.

303(d) List of Water Quality Limited Segments

Under Section 303(d) of the CWA, states are required to identify water bodies that do not meet their water quality standards. Once a water body has been listed as impaired, a Total Maximum Daily Load (TMDL) for the constituent of concern (pollutant) must be developed for that water body. A TMDL is an estimate of the daily load of pollutants that a water body may receive from point sources, non-point sources, and natural background conditions (including an appropriate margin of safety), without exceeding its water quality standard. Those facilities and activities that are discharging into the water body, collectively, must not exceed the TMDL.

Storm water runoff from the project site ultimately discharges into the Lowlands basin area and into the Tidal Prism of the Santa Ana River. The Tidal Prism of the Santa Ana River is not listed as impaired according to the 2006 303(d) list published by the Santa Ana RWQCB (Region 8), and does not have any TMDLs in place.

General Construction Permit

The General Construction Permit (GCP), (Order 99-08-DWQ, NPDES Permit No. CAS000002), issued by the SWRCB, regulates storm water and non-storm water discharges associated with construction activities disturbing 1 acre or greater of soil. Construction sites that qualify must submit a Notice of Intent (NOI) to gain permit coverage or otherwise be in violation of the CWA and California Water Code.

The GCP requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for each individual construction project greater than or equal to 1 acre of disturbed soil area. The SWPPP must list Best Management Practices (BMPs) that the discharger will use to control sediment and other pollutants in storm water and non-storm water runoff; the BMPs must meet the BAT and BCT performance standards. Additionally, the SWPPP must contain a visual monitoring inspection program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be contained in a SWPPP." [9]

The Project grading limit is greater than 1 acre within the City of Newport Beach, and is therefore subject to the storm water discharge requirements of the GCP. The Project will

[8] Regional Water Quality Control Board (RWQCB) Santa Ana Region. Water Quality Control Plan for the Santa Ana River Basin (8). January 24, 1995.
[9] Website: http://www.swrcb.ca.gov/stormwtr/construction.html.

require submittal of an NOI and preparation of a SWPPP prior to the commencement of soil disturbing activities. In the Santa Ana Region, the SWRCB is the permitting authority, while the Santa Ana RWQCB provides local oversight and enforcement of the GCP.

Orange County MS4 Permit (Santa Ana Region)

In January 2002, the Santa Ana RWQCB reissued the MS4 Storm Water Permit (WDR Order R8-2002-0010, NPDES Permit No. CAS618030) to the County of Orange and the incorporated cities of Orange County within the Santa Ana Region. Pursuant to the MS4 permit, (currently in its third term) the County of Orange and incorporated cities were required to develop a Drainage Area Management Plan (DAMP). The Orange County Drainage Area Management Plan (OC DAMP) approved by the Santa Ana RWQCB in early 2002, includes a Model Local Implementation Program (LIP) for municipalities, such as the City of Newport Beach, to implement in their jurisdiction.

City of Newport Beach Water Quality Management Plan (WQMP)

One component of the New Development / Significant Redevelopment Section of the City's LIP is the provision to prepare a Water Quality Management Plan (WQMP) for specified categories of development aimed at reducing pollutants in post-development runoff. Specifically, a project-specific WQMP includes Santa Ana RWQCB approved BMPs, where applicable, that address post-construction management of storm water runoff water quality. This includes operation and maintenance requirements for all structural or treatment control BMPs required for specific categories of developments to reduce pollutants in post-development runoff to the Maximum Extent Practicable (MEP). The categories of development that require preparation of a project-specific WQMP include:

- Residential development of 10 units or more;
- Commercial and industrial development greater than 100,000 square feet including parking area;
- Automotive repair shops (SIC codes 5013, 5014, 5541, 7532-7534, and 7536-7539);
- Restaurants where the land area of development is 5,000 square feet or more including parking area (SIC code 5812);
- Hillside developments on 10,000 square feet or more, which are located on areas with known erosive soil conditions or where natural slope is twenty-five percent or more;
- Impervious surface of 2,500 square feet or more located within, directly adjacent to (within 200 feet), or discharging directly to receiving waters within Environmentally Sensitive Areas;
- Parking Lots 5,000 square feet or more, or with 15 parking spaces or more, and potentially exposed to urban storm water runoff;
- All significant redevelopment projects, where significant redevelopment is defined as the addition of 5,000 or more square feet of impervious surface on an already developed site.

As required by the City of Newport Beach's municipal ordinances on storm water quality management, the Project WQMP must be submitted to the City for approval prior to the City issuing any building or grading permits. Since the Newport Banning Ranch project includes the development of several of the categories listed above, the Project is therefore subject to the requirements of the City of Newport Beach WQMP.

5.2 PREDICTED POLLUTANTS AND SOURCES

The pollutants of concern for water quality are those pollutants that are anticipated (expected) or potentially could be generated by the Project, based on past and proposed land uses, along with those pollutants that have been identified by regulatory agencies as potentially impairing beneficial uses in receiving water bodies.

Based on the projected land uses of the Newport Banning Ranch project site, the pollutants of concern can be divided up into anticipated pollutants and potential pollutants.[10] Anticipated pollutants for the proposed development include:

POLLUTANTS OF CONCERN									
Priority Project Categories and/or Project Features	Bacteria/ Virus	Heavy metals	Nutrients	Pesticides	Organic compounds	Sediments	Trash & debris	Oxygen demanding substances	Oil & grease
Detached Residential Development	X		X	X		X	X	X	X
Attached Residential Development	P		X	X		X	X	P(1)	P(2)
Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	X	P(1)	X
Restaurants	X						X	X	X
Hillside Development >10,000ft^2	X		X	X		X	X	X	X
Parking Lots	P (6)	X	P (1)	P (1)	X (4)	P (1)	X	P (1)	X
Streets, Highways & Freeways	P (6)	X	P (1)	P (1)	X (4)	X	X	P (1)	X

(1) A potential pollutant if landscaping or open area exist on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.
(6) Analyses of pavement runoff routinely exhibit bacterial indicators.

X = Anticipated
P = Potential

Source: County of Orange Flood Control District, *2003 Drainage Area Master Plan, Table 7-1.3*, July 1, 2003.

Table 5.1 Anticipated and potential pollutants of concern for Project land use categories.

[10] Source: California Stormwater Quality Association. Stormwater Best Management Practices (BMP) Handbooks for New Development and Redevelopment. January 2003.

- Bacteria/Pathogens. Elevated pathogens are typically caused by the transport of human or animal fecal wastes from the watershed. Runoff that flows over land such as urban runoff can mobilize pathogens, including bacteria and viruses. Even runoff from natural areas can contain pathogens (e.g., from wildlife, plant matter, and soils). Other sources of pathogens in urban areas include pets and leaky sanitary sewer pipes. The presence of pathogens in runoff can impair receiving waters. Total and fecal coliform, enterococcus bacteria, and E. coli bacteria are commonly used as indicators for pathogens due to the difficulty of monitoring pathogens directly.
- Trace Metals. The primary sources of trace metals in storm water are metals typically used in transportation, buildings and infrastructure and also paints, fuels, adhesives and coatings. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, mercury are typically not detected in urban runoff or are detected at very low levels.[11] Trace metals have the potential to cause toxic effects on aquatic life and are a potential source of groundwater contamination.
- Nutrients. Nutrients are inorganic forms of phosphorous and nitrogen. The main sources of nutrients in urban areas include fertilizers in lawns, pet wastes, failing septic systems, and atmospheric deposition from automobiles and industrial operations. The most common impact of excessive nutrient input is eutrophication of the receiving water body, resulting in excessive algal production, hypoxia or anoxia, fish kills and potential releases of toxins from sediment due to changes in water chemistry profiles.
- Pesticides. Pesticides (including herbicides) are chemical compounds commonly used to control insects, rodents, plant diseases, and weeds. Excessive application of a pesticide or impractical application of pesticides (i.e. right before rain events) may result in runoff containing toxic levels to receiving water bodies and the microorganisms.
- Organic Compounds. Organic compounds are carbon-based, and are typically found in pesticides, solvents, and hydrocarbons. Dirt, grease, and other particulates can also adsorb organic compounds in rinse water from cleaning objects, and can be harmful or hazardous to aquatic life either indirectly or directly.
- Sediment. Sheet erosion and the transport and deposition of sediment in surface waters can be a significant form of pollution that may result in water quality problems. Increases in runoff velocities and volumes can cause excessive stream erosion and sediment transport altering the sediment equilibrium of a stream or channel. Alternatively, unstable tributaries can result in excess sediment loading into the main channels thereby increasing the amount of sediment moving downstream during storm events, such as the Southern Arroyo. Excessive fine sediment, such as total suspended solids, can impair aquatic life through changes to the physical characteristics of the stream (light reduction, temperature changes, etc.).

[11] Los Angeles County, 2000. Los Angeles County 1994–2000 Integrated Receiving Water Impacts Report. Los Angeles County Department of Public Works, Alhambra, CA, September 2000.

- Trash and Debris. Improperly disposed or handled trash such as paper, plastics and debris including the biodegradable organic matter such as leaves, grass cuttings, and food waste can accumulate on the ground surface where it can be entrained in urban runoff. The large amount of trash and debris can have significant negative impacts on the recreational value of water body. Excessive organic matter can create a high biochemical oxygen demand in a stream and lower its water quality.
- Oxygen Demanding Substances. Oxygen-demanding substances include biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds, such as proteins, carbohydrates, fats, as well as ammonia and hydrogen sulfide. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions, resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds.
- Petroleum Hydrocarbons/Oil and Grease. The most common sources of oil and grease in urban runoff stem from spilled fuels and lubricants, discharge of domestic and industrial wastes, atmospheric deposition, and runoff. Runoff can contain leachate from roads, breakdown of tires/rubber and deposition of automobile exhaust. Some petroleum hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), can bio-accumulate in aquatic organisms and are toxic at low concentrations. Hydrocarbons can be measured in a variety of ways including petroleum hydrocarbons (TPH), oil and grease, or as individual groups such as PAHs. Hydrocarbons can persist in sediment for long periods of time in the environment and can result in adverse impacts on the diversity and abundance of benthic communities.

5.3 APPROACH

The holistic approach to water quality treatment for the Newport Banning Ranch Project includes incorporation of site design/low impact development (LID) strategies and source control measures throughout the site in a systematic manner that maximizes the use of LID features to provide treatment of storm water and runoff reduction benefits. Throughout the project site, the use of LID features will be implemented to cover the treatment requirements, while in other areas of the project that are more constrained from using LID features, treatment control BMPs may also be utilized to accommodate flows not handled by the LID features. In this design, the treatment control BMPs will serve more in the function of a secondary BMP to handle areas where LID implementation is infeasible.

In addition to the use of LID features, it the intent of the Project to improve the water quality of the off-site runoff that passes through the property. A regional water quality basin is proposed to provide treatment of runoff from the 16th street drainage area of the City of Costa Mesa. This basin will provide a significant regional benefit to water quality protection and the basin will also serve to reduce the peak flow rates entering the Southern Arroyo, thereby reducing scour potential for the long term stability of the natural drainage channel.

Consistent with regulatory requirements and design guidelines for water quality protection, the following principles are being followed for the Project and will be supported by construction level documents in the final Water Quality Management Plans (WQMPs) per each phase of development and prior to grading permit(s) issuance by the City of Newport Beach:

- Where feasible, LID features will be sized for water quality treatment credit according to local Regional Board sizing criteria as defined in the County-wide Storm Water Permit for either flow-based or volume-based BMPs. There will be a significant effort to integrate LID techniques within the internal development areas (site design objectives), thereby providing treatment of low-flow runoff directly at the source and runoff reduction of small (i.e. more frequent) storm event runoff.
- All LID features identified in this report are preliminary in nature but have been sized to show their relative footprint requirements for technical planning purposes (siting, treatment volumes, typical profiles, etc.). Detailed drainage calculations, grading, and confirmation of sizing to occur during the detailed design phase and subsequent WQMP documentation.

5.3.1 CONSTRUCTION BEST MANAGEMENT PRACTICES

Clearing, grading, excavation and construction activities associated with the proposed Project may impact water quality due to sheet erosion of exposed soils and subsequent deposition of particulates in local drainages. Grading activities, in particular, lead to exposed areas of loose soil, as well as sediment stockpiles, that are susceptible to uncontrolled sheet flow. Although erosion occurs naturally in the environment, primarily from weathering by water and wind action, improperly managed construction activities can lead to substantially accelerated rates of erosion that are considered detrimental to the environment.

Prior to the issuance of a grading permit, the applicant shall provide evidence that the development of the project(s) shall comply with the most current General Construction Permit (GCP) and associated local NPDES regulations to ensure that the potential for soil erosion is minimized on a project-by-project basis. Also, in accordance with standard City project permitting and approval procedures, a NOI for coverage of projects under the GCP will be filed with the SWRCB prior to the issuance of a grading permit (projects one acre or greater of soil disturbance).[12] Accordingly, a SWPPP must be prepared and implemented at the project site, and revised as necessary, as administrative or physical conditions change. The SWPPP must be made available for review by the RWQCB, upon request. The SWPPP must describe construction BMPs that address pollutant source reduction and provide measures/controls necessary to mitigate potential pollutant sources. These include, but are not limited to: erosion controls, sediment controls, tracking controls, non-storm water management, materials & waste management, and good housekeeping practices.[13] The above-mentioned BMPs for construction activities are briefly discussed below.

- Erosion control BMPs, such as hydraulic mulch, soil binders, and geotextiles and mats, protect the soil surface by covering and/or binding the soil particles. Temporary earth dikes or drainage swales may also be employed to divert runoff away from exposed

[12] Any dewatering activities associated with construction must be in accordance with applicable RWQCB and local agency dewatering permits, as well.
[13] California Stormwater Quality Association. California BMP Handbook for Construction (2003): http://www.cabmphandbooks.com/Construction.asp

areas and into more suitable locations. If implemented correctly, erosion controls can effectively reduce the sediment loads entrained in storm water runoff from construction sites.

- Sediment controls are designed to intercept and filter out soil particles that have been detached and transported by the force of water. All storm drain inlets on the project site or within the project vicinity (i.e along streets immediately adjacent to the project boundary) should be adequately protected with an impoundment (i.e. gravel bags) around the inlet and equipped with a sediment filter (i.e. fiber roll). They should also be placed around areas of soil disturbing activities, such as grading or clearing.
- The proposed project site will stabilize all construction entrance/exit points to reduce the tracking of sediments onto adjacent streets. Wind erosion controls should be employed in conjunction with tracking controls.
- Non-storm water management BMPs prohibit the discharge of materials other than storm water, as well as reduce the potential for pollutants from discharging at their source. Examples include avoiding paving and grinding operations during the wet season where feasible, and performing any vehicle equipment cleaning, fueling and maintenance in designated areas that are adequately protected and contained.
- Waste management consists of implementing procedural and structural BMPs for collecting, handling, storing and disposing of wastes generated by a construction project to prevent the release of waste materials into storm water discharges.

5.3.2 POST-CONSTRUCTION BEST MANAGEMENT PRACTICES

Post-construction BMPs are typically divided into three main categories: site design/LID, source control and treatment control BMPs. The following sections provide a more in depth discussion of each category.

Site Design / Low Impact Development BMPs

Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments. In general, site design objectives include a combination of factors that may include: minimization of impervious surfaces including roads and parking lots; preservation of native vegetation and root systems; minimization of erosion and sedimentation from susceptible areas such as slopes; incorporation of water quality wetlands, biofiltration swales, etc. where such measures are likely to be effective and technically and economically feasible; and minimization of impacts from storm water and urban runoff on the biological integrity of natural drainage systems and water bodies.

Many of the site design BMPs may also be considered low impact development (LID) features. The goal of using LID features is to mimic the sites existing hydrology by using design measures that capture, filter, store, evaporate, detain and infiltrate runoff, rather than runoff flowing directly to piped or impervious systems. This includes directing runoff to vegetated areas, protecting native vegetation, and reducing amount of impervious surfaces. Many LID features can also serve as treatment control BMPs when sized property to treat low-flow runoff and “first flush” runoff from storm events. The incorporation of site design BMPs and LID features may reduce the need and/or sizing of treatment control BMPs needed for the site.

Overall, primary site design includes the integration and emphasis of landscaping features to provide treatment of runoff and control the rate and volume of runoff from impervious surfaces.

Source Control BMPs

Source control BMPs are operational practices that reduce potential pollutants at the source, and include both structural and routine non-structural practices. Example source control measures include street sweeping, low use irrigation systems, catch basin stenciling, and educational materials for homeowners. A list of typical source control measures for residential and commercial developments is provided in Appendix E.

Treatment Control BMPs

Treatment control BMPs are structural/engineered systems that are similar to LID features in that they are sized to capture, filter, and/or treat runoff the required runoff volume or flow prior to discharging into receiving waters. Treatment control BMPs are typically larger scale than LID features accommodating larger drainage areas, larger treatment volumes, and are typically located outside the core development areas. Structural treatment BMPs may be located on-or off-site, used singly or in combination with other treatment controls, or may be shared by multiple projects. Selection of treatment control BMPs is based on the pollutants of concern of the project site based on the Project's land use categories (see Section 5.2) and the BMP's ability to effectively mitigate those pollutants, in consideration of site conditions and constraints.

In keeping consistent with local Regional Board water quality treatment requirements, treatment control BMPs will be designed to infiltrate, filter, and/or treat runoff from the project footprint. Unlike flood control measures, treatment control BMPs are designed to treat more frequent, low-flow runoff from nuisance flows and frequent storm events (generally referred to as the "first flush" events). In accordance with local regulations, treatment control BMPs are either sized to treat the volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (termed Storm Water Quality Volume [SQDV]), or be sized to treat the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event as determined from the local historical rainfall record (termed Storm Water Quality Flow [SQDF]).

5.3.3 INTERIOR WATER QUALITY FEATURES

Water quality protection will begin within the interior of the Project development areas (i.e. resort, hotel, condominiums, parks, common areas, etc.). It is the intent of the overall Project to include a variety of sustainable design measures that address water quality and quantity. One of the primary sustainable commitments is to incorporate LID techniques into the design phase to reduce storm water runoff and to maximize water quality capture and treatment at the source. Rather than conveying runoff from small, frequent storm events to storm drains directly, runoff is directed to landscape features and permeable surfaces (as applicable) located on-site to dissipate and infiltrate the runoff, thereby reducing runoff volumes. These techniques may include pocket rain gardens within impervious areas such as courtyards and common areas, porous/permeable paving integration into traditional impermeable paved areas, landscaped storm water planters, and use of cisterns for capturing rainwater for re-use from buildings (condominiums, flats, attached units, resorts, etc.).[14] Provided below is a summary of the various opportunities for implementation of interior LID features within the major land use categories proposed for the Project:

- Single-Family Residential – For single-family residences, opportunities exist for incorporating landscaped areas into the drainage design that can also be aesthetically pleasing due to their small scale implementation. Roof runoff and driveway runoff can drain to landscaped gardens or pocket rain gardens. Rain barrels can also be used to capture and store roof runoff for reuse as irrigation water. In addition, porous pavements can be used in driveways and patios to reduce runoff.
- Multi-Family Residential / Mixed Use – Although multi-family and mixed use developments usually have lesser amounts of landscaping than single-family, opportunities exist for draining impervious areas to landscaping on-site as well as for implementing LID features within the parking areas and drive aisles. Roof runoff can drain to landscaping or to cisterns for reuse as irrigation. Runoff from sidewalks, courtyards, and common areas can be directed to landscaped areas or to pocket rain gardens. Alternatively, sidewalks and courtyards may be constructed with porous pavement. Porous pavement can also be implemented in parking lots and low-traffic drive aisles to reduce runoff.
- Resort / Commercial Use – Opportunities for LID implementation in resort, hotel and other commercial land use areas are similar to those for multi-family and mixed use developments. Landscaping can be incorporated into the drainage design by diverting runoff from rooftops and other impervious areas (i.e. sidewalks, parking lots) to landscaping, storm water planters or pocket rain gardens. Cisterns can be used to capture runoff from rooftops for reuse as irrigation water, and parking stalls and drive aisles can be constructed of porous pavement to further reduce runoff.

Incorporation of these features within the interior development areas provide pre-treatment of storm water runoff, removing large sediment and trash and debris, thereby reducing the pollutants reaching the larger transitional phase water quality features and improving their overall effectiveness. In addition, by capturing a portion of the first-flush runoff, the volume and flow rate of runoff discharged from these features is reduced. Further details on the examples of interior LID features are discussed below.

- Cisterns and Rain Barrels – Cisterns are storage vessels that are designed to collect and store storm water runoff for non-potable uses as irrigation water. Cisterns may be placed either above ground or below ground, placed below decks, or may be decorative in nature to improve aesthetics. Smaller cisterns, ranging from 75 to 150 gallons, are typically referred to as "rain barrels", and are typically used at single-family residences and small buildings. Larger cisterns can range in size from 150 gallons to over 10,000 gallons, and are typically used at larger residences, multi-family buildings, or larger commercial buildings. Cisterns are typically sized based on

[14] County of San Diego, Department of Planning and Land Use. Low Impact Development Handbook Stormwater Management Strategies. December 31, 2007.

the size of the building and irrigation water demand, and typically are not sized to treat water quality volume requirements unless provided in large quantities.

- Storm Water Planters – Storm Water planters are structural, vegetated planters that receive storm water runoff from roof downspouts and allow pollutants to filter and settle out prior to discharging off-site. Runoff collected in the planter filters through a minimum of 18 inches of soil where vegetation will uptake nutrients (e.g. nitrogen and phosphorous), microbial contaminants, oil and grease, and pesticides, and sediments and fine particulates can settle out. Treated runoff is drained at the bottom of a planter through a gravel layer and perforated underdrain system. In general, storm water planters can be sized with a 0.04 sizing factor (surface area of planter / surface area of tributary impervious area). [15]
- Common Area Porous Pavement – Permeable pavement, such as permeable pavers, grass pavers, porous concrete, and porous asphalt, provides a surface suitable for courtyards, common areas, and other light-load applications in which water can drain through pore spaces to an underlying rock reservoir (approximately 1-3 feet deep) underneath. The sub-surface base allows for physical and microbial filtering processes to take place thereby removing pollutants such as particulates, organics, hydrocarbons and total suspended sediments, including attached heavy metals. Porous pavement can be generally sized based on its capacity to store runoff in the rock reservoir. In general, an approximate ratio of 20% porous pavement to impervious pavement is sufficient to accommodate treatment requirements for a reservoir depth of 10 to 12 inches.
- Tree Box Filters – Tree box filters are similar to storm water planters, in that they are a contained planter that receives storm water runoff. Whereas storm water planters are typically located above ground and receive roof runoff, tree box filters are installed below grade along a curb line and receive runoff from streets, sidewalks and other impervious surfaces. Tree box filters consist of a concrete box containing a filter media designed to capture and filter pollutants. One tree or large shrub is planted within the media to provide biological processes to provide additional pollutant removal. A standard curb inlet catch basin is typically placed immediately downstream of the tree box filter to capture high flows that bypass the filter. On average, one tree box filter can treat up to 0.5-acre of impervious surface.[16]
- Pocket Rain Gardens – Rain gardens are small, vegetated depressions that promote filtration of storm water runoff. They combine shrubs, grasses, and flowering perennials in depressions (approximately 6 to 8 inches deep) that allow water to pool, infiltrate or evaporate and/or slowly drain out within 48 to 72 hours. Additional design details include a soil planting depth between 18 inches to 4 feet deep (depending on plants selected), with a 2-3 inch mulch layer on top to protect from erosion. Perforated underdrains may be provided for soils with low infiltration rates and in areas with high groundwater levels to discharge treated water back into the storm drain system. Due to the limited ponding area, pocket rain gardens treat small

[15] LFR Inc. and Dan Cloak Environmental Consulting. Contra Costa Clean Water Program Infiltration Site Characterization Criteria and Guidance Study, Milestone Report #3. April 1, 2005.
[16] Website: http://www.filterra.com

areas of adjacent impervious runoff from sidewalks and courtyards, but typically are not suitable for treating large drainage areas.

The specific details and locations of these measures occur during the detailed design phase of each community, and will be implemented during the design phase and accounted for in the project-level WQMPs. All LID site design features sized to handle the treatment requirements will be identified in the WQMP's for water quality credit from these areas.

5.3.4 TRANSITIONAL PHASE WATER QUALITY FEATURES

The transitional phase refers to those primary streets and travel ways that lead into and out of the development areas. Whereas the interior water quality features provide pre-treatment of runoff and reduce runoff quantities, transitional phase water quality features provide primary treatment of runoff via filtration and adsorption, which aids in dropping out particulates, sediment and pollutants adsorbed into sediment (including, for example certain pesticides and pathogens). The primary water quality mechanism here is the use of integrated runoff treatment within "Green Streets" or sustainable travelways. Green Streets incorporate inverted medians, porous/permeable pavements, curbless edge conditions, bioswales (biocells), trails and/or biofiltration zones within the landscape setback areas for a variety of different sized streets within the project area. This allows for the treatment of water quality at the source as well as the reduction of peak storm water runoff volumes and rates. These streets will provide significant water quality treatment of flows generated from the streets themselves, and provide treatment of adjacent interior core development areas dependent upon the volumes available within the LID landscaping features. Several types of these features are described further below.

- Porous Pavement – See previous description
- Tree Box Filters – See previous description
- Vegetated Swales – Vegetated swales are treatment BMPs that provide filtration through a grassed or vegetated bottom, and the vegetation provides a mechanism for retarding surface runoff and filtering flows to drop sediments, fines, debris, and organics. Due to the slow velocity of runoff through the swale, fine particulates can settle in the bottom of the channel and the runoff will infiltrate into the soil profile where the vegetation will uptake nutrients (e.g. nitrogen and phosphorous), microbial contaminants, oil and grease, and pesticides. Swales are typically sized based on variety of factors, including treatment flow rate, velocity, residence time, length, and ponding depth to maximize pollutant removal of runoff.
- Landscaping Biocells – Biocells are features that can be utilized within the landscaping areas of the parkway and medians to capture, treat and infiltrate runoff. Landscaping biocells, also known as bioretention zones, are small, vegetated depressions to promote infiltration and filtration of storm water runoff. They combine shrubs, grasses, and flowering perennials in depressions that allow water to pool and infiltrate or evaporate within 24 to 48 hours. Landscaping biocells are typically sized based on the water stored within the cell and the amount of water filtering through the biocell during storm events.

The following section provides an example of how a Green Street LID feature (landscaping biocell) can be sized for the Newport Banning Ranch project.

Landscaping Biocells

As previously mentioned, landscaping biocells function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The major treatment of runoff occurs through the percolation of runoff through several layers of the biocell within the landscaped area prior to either infiltrating into the ground or collected by sub-drains. Biocells function similarly in nature to bioretention cells but tend to have shallower depths based on a higher reliance on sand-based soil amendments. Biocells remove storm water pollutants through processes such as adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization.[17] Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the biocell media, such as the plant cover and planting soil which aids in dropping out particulates, sediment and pollutants adsorbed onto sediment (including, for example certain pesticides and pathogens).

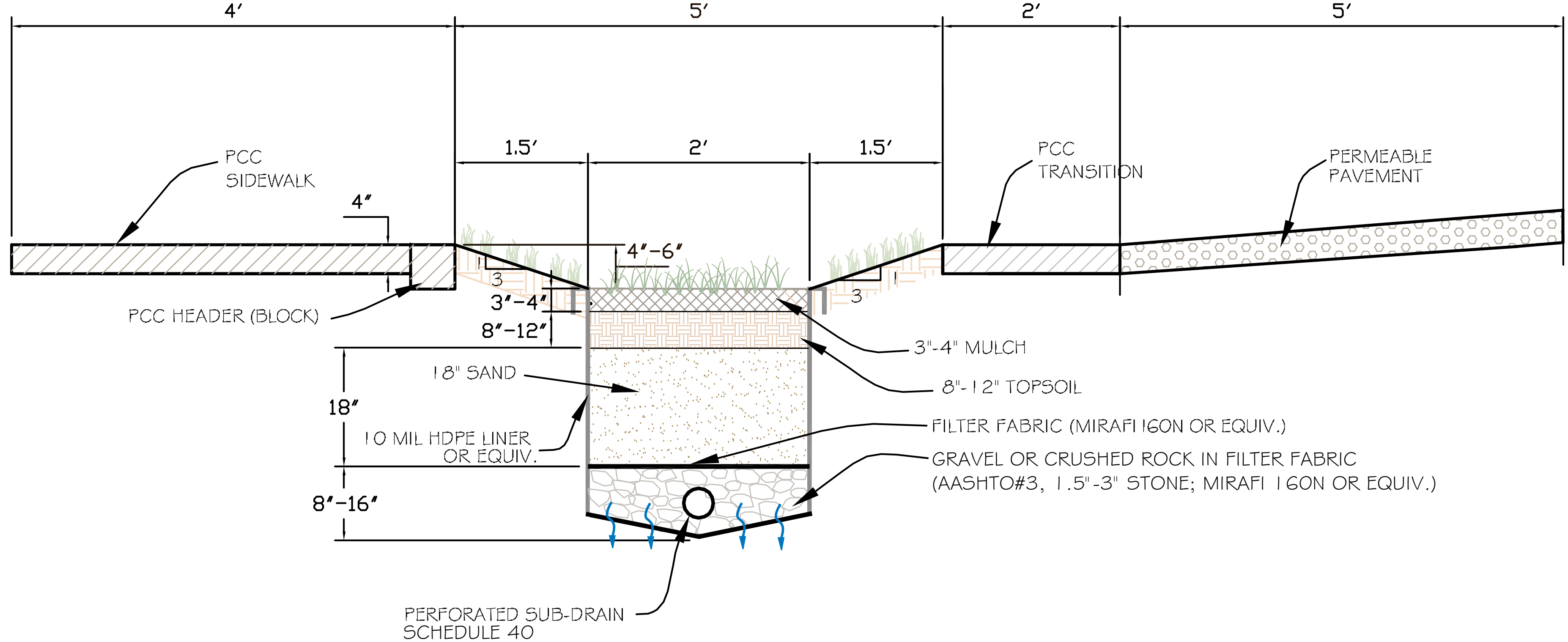
The following properties of landscaping biocells within the Green Streets were used to calculate the water quality treatment potential for these features as an example for the Project:

- 8-16" gravel base above the sub-grade with perforated drainage pipes to remove any excess water that does not infiltrate
- 18" of sandy loam with filter fabric to separate from the gravel base.
- 8-12" of topsoil
- 3-4" of mulch
- 4-6" ponding depth where the bottom occurs at the top of the mulch and the top occurs at the spill over elevation where water will bypass the biocell and drain towards the nearest catch basin inlet when at full capacity.
- The volume of treatment for each cell will be demonstrated by adding the volume of capacity of each layer with the designed drawdown time (infiltration capacity) of the storage reservoir for a total volume of treatment (see Table 5.2).

Drainage from the roadways and adjacent lot drainage may be directed to the biocell features mainly by sheet flow for water quality treatment. The biocells will be located in a manner that maximizes the delivery of flows via sheet flow. In some instances, a surface slope (longitudinally) may be required within the biocell. In these instances, the slope and ponding depth will be accounted for in the treatment volume calculation. Figure 15 provides a typical cross section for design of the landscaping biocell. The profile and depths of the biocell may vary in the final design and all changes will be accounted for in the treatment volume calculations.

[17] Environmental Protection Agency (EPA). Storm Water Phase II Proposed Rule Fact Sheet Series, Fact Sheet 3.0. April 1999.

This page intentionally left blank



NEWPORT BANNING RANCH

FIGURE 15: Landscape Biocell Typical Detail

FUSCOE ENGINEERING

August 1, 2008

NOT TO SCALE

One area of the development plan was studied in sufficient detail to understand how the Green Street features could accommodate the water quality treatment requirements for the core development areas and street runoff. More specifically, the biocell areas within the landscape parkways and medians were evaluated to determine the appropriate volume they could treat based on the upstream tributary drainage areas. The purpose of this analysis was to develop a ratio of treatment volumes (SQDV) to required landscaping areas for compliance with water quality requirements. The establishment of a technical ratio also sets how much landscaping is required to handle water quality treatment for the remainder of the project areas. Results of the sizing analyses for the biocell sizing options are summarized in Table 5.2 below. Detailed calculations are provided in Appendix E.

VEGETATED BIOCELL SIZING OPTIONS									
Symbol	Parameter	Potential Green Street Landscaping Biocell Dimensions (ft)				Potential Landscape Median Biocell Dimensions (ft)			
		5x10	8x20	5x30	10x20	40x100	40x200	50x150	30x150
A_T	Top Area (ft^2)	50	160	150	200	4,000	8,000	7,500	4,500
A_B	Bottom Area (ft^2)	24	108	84	144	3,725	7,524	7,104	4,144
P	Ponding Depth (ft)	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
M	Mulch Depth (ft)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
η_M	Mulch Porosity (%)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
G	Gravel Depth (ft)	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
η_G	Gravel Porosity (%)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
S	Planting Soil Depth (ft)	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
η_S	Planting Soil Porosity (%)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
S_o	Sand Filter Depth (ft)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
η_{So}	Sand Filter Porosity (%)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
T	Total Depth Below Surface (ft)	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
w	Soil Water Content (%)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
F_P	Infiltration Capacity (in/hr)	1	1	1	1	1	1	1	1
SF	Safety Factor for Infiltration	1	1	1	1	1	1	1	1
v_i	Infiltration Velocity (ft/hr)	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
T	Time Infiltration Occurs (hr)	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
V_P	Ponding Volume (ft^3)	12	44	39	57	1,275	2,561	2,410	1,426
V_{MGS}	Volume in Gravel/Sand/Mulch (ft^3)	28	91	85	114	2,276	4,552	4,268	2,561
V_{So}	Volume in Sand Filter (ft^3)	11	36	34	45	900	1,800	1,688	1,013
V_I	Volume Infiltrated (ft^3)	89	284	266	355	7,100	14,200	13,313	7,988
V_{BC}	Total Volume Treated (ft^3)	141	455	424	571	11,551	23,113	21,677	12,987

Table 5.2 Summary of landscaping biocell water quality sizing options.

Based on the analyses summarized in Table 5.2, a ratio of 2.8 was determined to satisfy water quality requirements. For every square foot of biocell landscaping with the profile parameters set forth above, 2.8 cubic feet of treatment is provided. For example, if 500 ft^2 of biocell is implemented within a 5 ft parkway (5'W x 100'L), a treatment capacity of 1,400 ft^3 would be accommodated within this parkway for water quality treatment. This volume is equivalent to 0.73 acre of drainage from an 80% impervious tributary area (e.g. high density attached condominiums). Based on these ratios, appropriate landscaping areas can be set for each development area and integrated within the Green Streets or more internal to the development areas themselves dependent upon the site conditions.

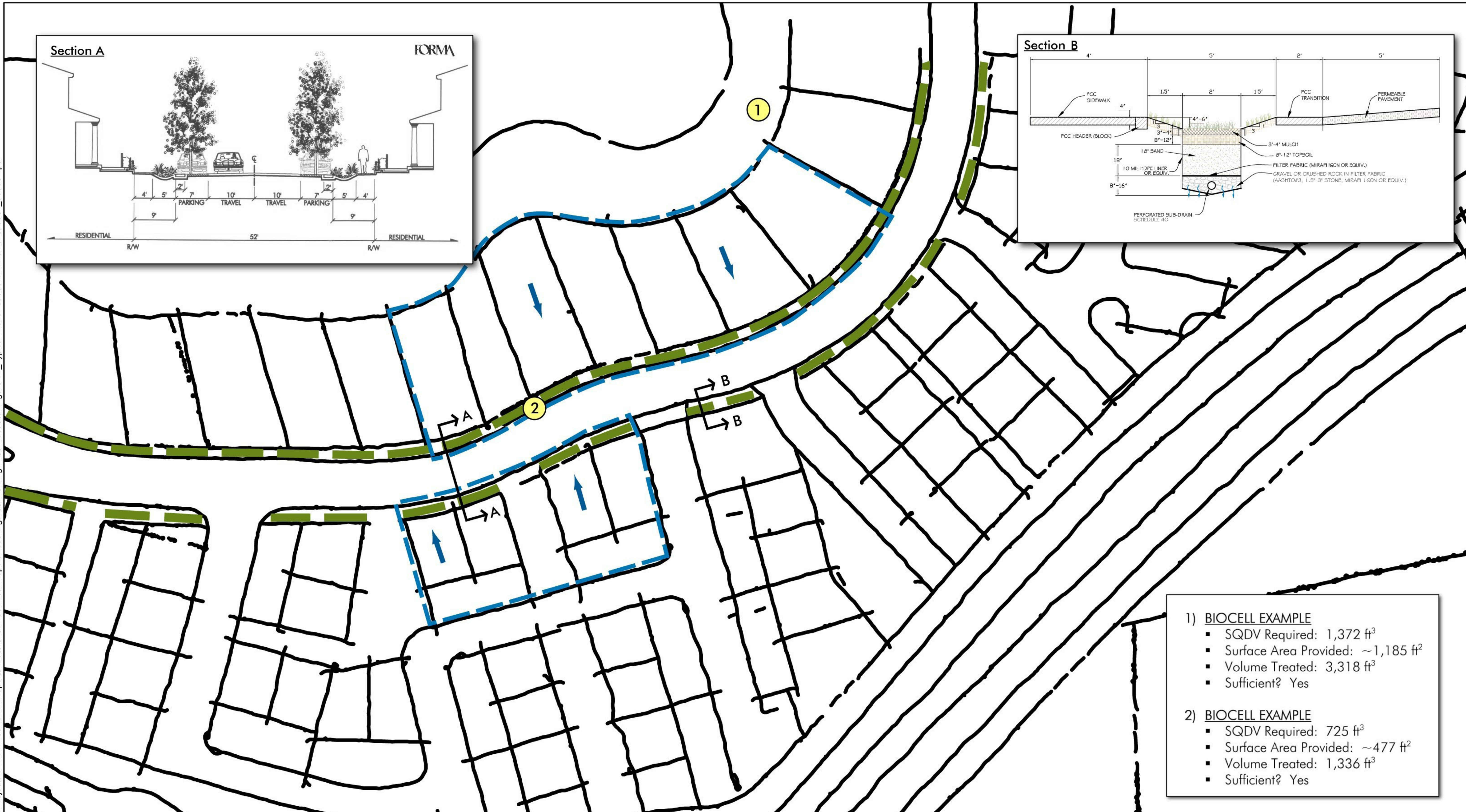
The use of the landscaping biocells in combination with other LID and Green Street features will result in a significant treatment and reduction of runoff at the source of the development areas. Each LID feature will be designed to accommodate the required treatment volume and flow beyond this requirement will be designed to bypass the features for conveyance into the traditional storm drain system. In those instances where the individual features are not sufficient to handle treatment requirements independently, water quality calculations will quantify how much the additional treatment is required by the next downstream LID feature.

As previously mentioned, one area of the development plan was studied in sufficient detail to demonstrate the treatment functionality of the proposed LID features. Figure 16 provides a typical representation of how the LID features might be integrated within the design. Various calculations are provided based on the noted ratios for landscaping biocells to show treatment capabilities within the typical design. Table 5.4 below summarizes the results of this in-depth look into the site plan. Detailed calculations are provided in Appendix E.

BIOCELL SIZING EXAMPLES						
BMP		Drainage Area (ft^2)	Minimum Treatment Volume (ft^3)[1]	Approximate Surface Area Provided (ft^2)	Volume Treated (ft^3)	Sufficient?
FRONT-LOADED RESIDENTIAL LOTS (FIGURE 16)						
1	Biocell	39,103	1,372	1,185	3,318	Yes
2	Biocell	9,412	392	477	1,336	Yes
1 SQDV. Calculations are based on Per Orange County Drainage Area Management Plan (DAMP), Table A-1, Exhibit 7.11 – Attachment A.						

Table 5.4 Summary of landscaping biocell sizing examples.

The calculations provided above demonstrate the ability of the example LID feature to provide the necessary water quality treatment requirements integrated into the site design measures. For those LID features that differ from the specific characteristics of the biocells, a similar approach will be utilized to quantify the specific treatment capability of the feature and how it will be utilized to satisfy water quality requirements.



NEWPORT BANNING RANCH

Figure 16: Typical Front-Loaded LID Demonstration

August 1, 2008

FUSCOE ENGINEERING

Direction of Flow

Drainage Area Boundary

Landscaping Biocell

NOT TO SCALE

P:\Projects\821\01\WatAdmin\Reports\Watershed Technical Report 2008\Figures\Working Files\Illustrator\Figure 17_Typical Front-Loaded LID Demonstration_080502.pdf

Infiltration and Sub-Drain Systems

All LID features will include sub-drains to ensure flows are collected, treated and discharged from to the backbone storm drain system or to provide hydrologic nourishment to newly created habitat areas. Field percolation tests will also be performed throughout the site to determine areas of high infiltration rates where sub-drains may not be necessary. To the maximum extent, all sub-drains will be perforated to promote infiltration into sub-grade per the geotechnical engineer specifications.

Maintenance Considerations

Based on the high level of reliance of the LID features for water quality treatment, maintenance of the facilities and enforcement of the appropriate measures to control the loading of sediment-causing clogging from entering these features will be required.

For the landscaping biocells and other LID features, the key components to ensuring the long-term functionality of each system include the following:

- Trash and debris removal (typically 1x/week)
- Weeding, trimming, and landscape maintenance (typically monthly) to ensure the vegetative height does not prohibit runoff from entering the biocell
- Visual inspection for health of vegetation, excess ponded water, and excess trapped sediment and debris (minimum 4x/year)
- Inspect inlet/outlet facilities for signs of damage, and clean out as necessary
- Routine sweeping & vacuuming porous pavement areas as required (typically monthly)

5.3.5 REGIONAL NATURAL TREATMENT SYSTEMS

The proposed project will also incorporate the use of water quality basins to provide the final treatment of runoff for certain portions of the site. For those areas served by the regional water quality basin, the upstream use of LID features will be provided in the form of pre-treatment and will be deployed to the maximum extent practicable. For those areas not served by a water quality basin, the upstream LID features will be sized in accordance with the water quality treatment requirements.

Water quality basins are typically designed with a small debris/entrapment area, a spreading ground, and a deeper pool prior to discharging out the riser tower. Regional water quality basins are typically planted emergent wetland bottoms with vegetated side slopes that impound surface runoff and gradually filtrates through the sub-soil. The detained runoff is filtered through the soil beneath the basin, removing both fine and soluble pollutants. Removal mechanisms include absorption, filtering, and microbial decomposition in the basin subsoil. Due to the slow velocity, fine particles will settle in the bottom of the channel and vegetation will uptake fertilizers and nutrients (e.g., nitrogen and phosphorous), soluble metals, microbial contaminants, pesticides and organic matter. The underlying clays in the native soil below the sub-surface permeable soil will provide absorption sites for heavy metals, nutrients and other pollutants for further treatment.

One regional water quality facility will be implemented to accommodate the off-site treatment of urban runoff and first flush flows from areas tributary to the Southern Arroyo. The off-site drainage area located within the City of Costa Mesa is approximately 48 acres and is 100% built out. The regional facility will be able to accommodate up to 2-acre-feet of water quality treatment which will accommodate all urban runoff (dry-weather) and almost all of the first flush event in terms of water quality treatment control standards. The basin will also provide detention capabilities to reduce the peak flow runoff of a 100-year event by 30 cubic feet per second (cfs) mitigating the peak flow down to a 25-year event. Refer to Figure 6 for location of the proposed basin treating off-site runoff.

A basin is also proposed within the lowlands of the property (see Figure 6). This basin will also serve as a diffuser basin to control the rate at which water drains from the top of the Mesa down to the Lowlands. The basin will also serve as the downstream water quality basin for Storm Drain Systems D & E dependent upon how much treatment is satisfied by the upstream LID facilities. The water quality basin has the capacity to accommodate approximately 1.6 acre-ft of treatment and without the use of any LID features, 2.6 acre-ft of treatment is required. Therefore, a combination of LID features and treatment control BMPs will be utilized for the largest drainage area (Storm Drains D & E) of the proposed project.

5.4 WATER QUALITY IMPACT ASSESSMENT

Under existing conditions, the Newport Banning Ranch project site consists of former oil operations and open space areas. No project design features or BMPs for water quality exist under the current conditions for the site.

Under the proposed conditions, site design and LID features will be integrated throughout the development areas of the project to address pollutants of concern from the project site. In addition, treatment control BMPs are proposed to treat runoff not treated by LID measures, as well as treating off-site runoff from upstream areas that drain towards the Southern Arroyo. Overall, the Project will provide water quality treatment that exceeds water quality regulations for the long-term protection against downstream impacts on adjacent habitat areas and downstream receiving waters.

The impact assessments are based on the significance criteria established in Section 1.4 for water quality. The impact assessments are based on the proposed drainage system inclusive of project design features and water quality BMPs within the project areas.

Impact A *Would the Project violate any water quality standards or waste discharge requirements?*

Impact Analysis: Based on the proposed LID features and other source control and treatment control BMPs, the proposed project will treat runoff prior to exiting the project site. As a result of the project design features, LID features, and selected BMPs, water quality exceedances are not anticipated, and pollutants are not expected in project runoff that would adversely affect beneficial uses in downstream receiving waters. Individual assessments are provided below:

- Sediment: Sediments are typically characterized into two main categories: course sediment that includes large sand grains, pebbles, etc. and fine particulate sediments that include total suspended solids. Of concern to water quality are the fine particulate sediments that are more typically associated with sheet erosion. Due to the increase in impervious surfaces (buildings, roads, sidewalks), the proposed Project will result in a corresponding decrease in sheet erosion potential through less exposed areas, which is considered beneficial to water quality. However, during the construction of the proposed Project, sediment has the potential to move off-site due to the exposed condition of the site. In order to reduce the amount of sediment discharged off-site due to construction activities, the Project will implement and effective combination of erosion and sediment control BMPs in conformance with the General Construction Permit (GCP). During the post-development condition, any sediment and TSS generated from the development areas will be collected in the proposed LID features (such as vegetated biocells) and treatment control BMPs (regional water quality basins), all of which are considered effective for targeting pollutants typically associated with these impervious surfaces. Further, measures will be taken to stabilize the eroding tributaries entering the Southern Arroyo thereby controlling the amount of sediment available for transport to the Oxbow Loop. Lastly, the diffuser basin at the downstream end of the Arroyo will also provide an additional measure to control sediment loading into the Oxbow Loop. As a result, sediment impacts to water quality are considered less than significant.
- Trash & Debris: Urban development can generate significant amounts of trash and debris if not properly managed. The proposed Project is not expected to increase the amount of potential trash and debris generated on-site. However, the Project will implement additional measures, such as source control measures and treatment BMPs, to minimize the adverse impacts of trash and debris. Source control measures such as periodic sweeping, litter patrol, and storm drain stenciling will be effective in reducing the amount of trash and debris leaving the site. The proposed LID features and treatment BMPs also possesses moderate to high removal effectiveness for trash and debris. Based on these proposed features, impacts from trash and debris for the proposed Project are less than significant.
- Oil & Grease: The Project can implement several source control measures to reduce the amount of oil and grease in storm water from the project site. Maintenance activities, vehicle and equipment fueling and waste handling that have the potential to introduce oil and grease related compounds will be strictly prohibited in outdoor areas where they could potentially come into contact with rain. In addition, porous pavement is effective at removing oil and grease from storm water runoff. Based the incorporation of source control and treatment control measures, levels of oil and grease or other hydrocarbons such as PAHs that could adversely affect beneficial uses of the Project's receiving waters or exceed water quality standards are not anticipated. Impacts on water quality, as a result of the proposed Project, are less than significant.
- Bacteria & Pathogens: Based on the existing literature and land use/pollutant categories, the existing and proposed Project may be a source of pathogens, especially during storm water runoff conditions. Since natural sources of pathogens

are difficult to control (such as wild animal waste), the focus of the Project source control measures is on human-related (anthropogenic) and residential sources. In order to reduce the proposed pathogen contributions from the project site, the following source control measures are recommended for implementation:

- o Landscaping with efficient irrigation design to control runoff and allowing for maximum infiltration opportunities.
- o Proper monitoring and maintenance of landscaped areas to remove accumulated dead plant material and debris.
- o Landscape maintenance activities that include the removal of animal feces.
- o Activity restrictions on outdoor mat washing and equipment cleaning related to restaurant and dining activities, which potentially contribute bacteria entrained in storm water, as well as waste accumulation and disposal methods.
- o LID features (such as vegetated biocells) and treatment control BMPs (water quality basins) further treat bacteria in storm water runoff via filtration and infiltration.

- Nutrients: Nutrients, particularly nitrogen and phosphorous found within common fertilizers, can be of a concern based on the potential for over-application and over use. Low demand irrigation systems with slow release fertilizers are recommended to be used on-site to ensure minimal runoff from irrigation that has the potential to transport nutrients in runoff. Slow-release fertilizers are inorganic fertilizers that slowly release nutrients at a slower rate and are less susceptible to leaching and loss of fertilizer in runoff from rain events. In addition, source control measures such as provisions against applying fertilizers proximate to expected rain events are also recommended. Through the proper implementation of source control design measures, there is no expected increase of nutrients in runoff from the project site. Nutrients will not be contained in Project runoff at levels that could adversely affect water quality or beneficial uses in downstream receiving waters and potential nutrient impacts are less than significant.
- Pesticides: Pesticides can be of a concern based on potential uses as well as previous uses in the past. Under the proposed condition, the localized LID features and treatment control BMPs throughout the project site will assist in the removal of pesticides adsorbed to sediment. Low demand irrigation systems will be used on-site ensuring minimal runoff from irrigation that has the potential to transport pesticides in runoff. In addition, source control measures such as provisions against applying pesticides prior to expected rain events and the use of properly certified pesticide workers will be required. As a result, it is anticipated that water quality standards will not be exceeded, and potential pesticide impacts are less than significant.
- Metals: Copper, lead and zinc are the most common metals found in urban runoff. Other trace metals such as chromium, mercury and nickel are not usually detected in urban runoff or are measured at very low levels. The proposed project will result in increases in metals due to the additional streets and parking lot land uses proposed for the site. The incorporation of the LID features throughout the project site will offset these increases and provide a means for the settling of metals attached to particulates as well as vegetative uptake of metals. Additional source control measures, such as street and parking lot sweeping, will also reduce the potential for metals to reach the

storm drain system. As a result, it is anticipated that water quality standards will not be exceeded, and potential impacts from metals are less than significant.

- Oxygen Demanding Substances: Oxygen-demanding substances include all organic materials, which consume oxygen as they decompose. Animal droppings, sewage overflows, fallen leaves, and grass clippings are a few examples of oxygen-demanding substances. The combination of LID features, source control measures and treatment control BMPs are aimed at reducing the potential for these types of substances to be created on-site, and the structural measures including the LID features will provide a means to remove the potential for these substances to enter the downstream water bodies. Impacts of oxygen demanding substances are considered less than significant.
- Dry Weather Flow: Although the previous discussions have focused on wet weather flows, dry weather flows are also important. Dry weather flows due to anthropogenic sources have the potential to impact local receiving water bodies. Dry weather flows are typically low in course sediment due to the low flow rates but pollutants associated with suspended solids such as phosphorous, trace metals, pesticides) are typically found in low concentrations in dry weather flows. The project is not expected to generate significant amounts of dry weather flows due to the drought tolerant landscaping, the use of efficient irrigation systems, the lack of high intensive water use activities on-site, and the use of integrated storm water landscaping features to collect, hold and treat these flows and eliminate dry flow discharges (LID features and treatment control BMPs). Therefore, there are no significant impacts anticipated with respect to water quality as a result of dry weather flows.
- Vector Control: The use of integrated storm water landscaping (e.g. biocells) for storm water treatment increases the potential for vector issues due to the potential for standing water in these features. The potential for mosquito breeding is considered a risk when ponding water exists greater than 72 hours. Thus, the estimated depths of ponding within the vegetated biocells will range from 4-6 inches and will be designed to infiltrate and/or discharge from the facility within 24-36 hours. In the event additional vector control is needed, a number of abatement measures will be used, including habitat reduction (reconfiguring of plant palettes), temporary flooding and drying (draining) of the ponds, trapping and killing pests, and biochemical pesticides (i.e., the bacteria *Bacillus sphaericus* [Bs] and *Bacillus thuringiensis israeliensus* [Bti]).
- Construction-Related Impacts: Clearing, grading, excavation and construction activities associated with the proposed Project could impact water quality due to sheet erosion of exposed soils and subsequent deposition of particles and pollutants in drainage ways or introduction of construction-related pollutants. Under the Statewide GCP (Order 99-08-DWQ or subsequent update), the Project proponents will submit a Notice of Intent (NOI) to the SWRCB prior to commencement of construction activities. In addition, a SWPPP will be prepared and implemented at the project site, and revised as necessary as administrative or physical conditions change. The SWPPP will describe construction BMPs meeting the BAT/BCT standards required by the GCP and that address pollutant source reduction, and will ensure that water quality standards are not exceeded in downstream receiving waters due to construction activities. These include, but are not limited to erosion controls, sediment controls, tracking controls, non-storm water management, materials & waste management, and good housekeeping practices. The SWPPP shall be developed in accordance with the

construction plans. The SWPPP shall provide construction BMPs that are to be maintained for the duration of the construction as well as measures that are specific to each phase of construction.

Impact F *Would the Project otherwise substantially degrade water quality?*

Impact Analysis: As a result of the site design/LID, source control, and additional treatment control BMPs, water quality exceedances are not anticipated, and pollutants are not expected in Project runoff that would adversely affect beneficial uses in downstream receiving waters. Therefore, impacts to water quality are considered less than significant. See Impact Analysis to Impact A for additional details.