

# HYDROLOGY STUDY FOR MTD 1761 Monrovia Nursery San Gabriel River Watershed MAIN REPORT

Prepared for:

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> August 8, 2005 JN 10-103800

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# 1 INTRODUCTION

## 1.1 DESCRIPTION OF THE MONROVIA NURSERY PROPERTY

The Monrovia Nursery property (Nursery) is situated in the San Gabriel River watershed, located partially in the Cities of Azusa and Glendora.

Approximately 500 acres of the Nursery are within the jurisdiction of the City of Azusa (Azusa). The remaining 100 acres are within the jurisdiction of the City of Glendora (Glendora). The common address for the Nursery is 18331 East Foothill Boulevard. The Vicinity Map and Site Map for the Nursery are shown in Figures 1-1 and 1-2, respectively.

## 1.2 BACKGROUND

Azusa has approved plans for the development of the Nursery property consisting of 1,250 homes, 50,000 square feet of retail commercial, a K-8 school, fire station, community recreation center, local parks and open space. Development of the Property is governed by a number of environmental studies, land use entitlements and agreements, including:

- Certified Final Environmental Impact Report No. SCH #2002071046 and Mitigation Monitoring and Reporting Program,
- General Plan Amendment No. 2002-03, Resolution No. 03-C8,
- Zone Change No. Z-2002-03, Ordinance No. 03-01,
- Monrovia Nursery Specific Plan, SP-6, Ordinance No. 04-I-A,
- Vesting Tentative Tract Map No. 54057, Resolution No. 03-C9,
- City of Azusa Development Agreement dated May 27, 2004, and
- City of Glendora Settlement Agreement dated March 18, 2003,

Collectively, the "Project Approvals."

Specific conditions of approval and requirements of the above-referenced Project Approvals related to drainage and runoff management are summarized in Section 1.3.1 below.

## 1.3 **OBJECTIVES**

In general, the objectives of the Monrovia Nursery Runoff Management Plan (RMP) include the following:

- Develop a master plan of drainage and provide 50-year flood protection for the planned development
- Attenuate increases in peak storm water runoff caused by the planned development
- Minimize impacts to downstream storm drain facilities
- Minimize impacts to storm water quality
- Minimize impacts during the construction period
- Provide guidelines to be followed during the construction period
- Provide guidelines for post-construction operation and maintenance.

Figure 1-1 Vicinity Map

Figure 1-2 Site Map

The primary objective of the RMP is to ensure substantial conformance with the drainage-related conditions of approval and mitigation measures governing the development of the Project, as set forth in the Project Approvals. These drainage-related items are stated below.

## **1.3.1 Project Conditions of Approval (Drainage-related)**

#### **1.3.1.1** Master Plan of Drainage (No. 14)

Prior to recordation of a subdivision map (except for financing and/or conveyance purposes only), or the issuance of any grading permits, the landowner and/or master developer shall prepare a Runoff Management Plan in a manner meeting the approval of the Azusa City Engineer in consultation with Glendora and the Los Angeles County Flood Control District (LACFCD). Said plan shall include identifying areas to receive nuisance flow from developed areas consistent with Mitigation Measure BR3 of the Project EIR.

## 1.3.1.2 Sierra Madre Avenue Under-crossing (No. 23)

Prior to recordation of a subdivision map (except for financing and/ or conveyance purposes only) that includes the realignment of Sierra Madre Avenue, the subdivider shall, in a manner meeting the approval of the Azusa City Engineer, design necessary drainage facilities for proper disposal of storm runoff.

## 1.3.1.3 Drainage Study (No. 25)

Prior to recordation of a subdivision map (except for financing and/or conveyance purposes only) or the issuance of any grading permits, which ever comes first, the following drainage studies shall be submitted to and approved by the Azusa City Engineer in consultation with Glendora and the LACFCD:

- A drainage study of the subdivision including diversions, offsite areas that drain onto and/or through the subdivision, and justification of any diversions
- When applicable, a drainage study evidencing that proposed drainage patterns will not overload existing storm drains
- Detailed drainage studies indicating how the tract map grading in conjunction with the drainage conveyance systems, including applicable swales, channels, streets, catch basins, storm drains, and flood retarding basins, will allow building pads to be safe from inundation from rainfall runoff, which may be expected from all storms up to and including the 50-year Project storm event

## 1.3.1.4 Drainage Improvements, Part A (No. 26)

Prior to the recordation of a subdivision map (except for financing and/or conveyance purposes only), the applicant shall in a manner meeting the approval of the Azusa City Engineer:

- Design provisions for surface drainage
- Design all necessary storm drain facilities extending to a satisfactory point for the proper control and disposal of storm runoff

• Dedicate the associated easements and/or facilities to the County, if determined necessary

#### **1.3.1.5** Memorandum of Understanding with the City of Glendora (No. 34)

Prior to recordation of a subdivision map (except for financing and/or conveyance purposes only), the landowner and/or master developer shall enter into a Memorandum of Understanding with the City of Glendora governing the design and installation of the following detention basins:

- A temporary detention (proposed Facility 2C) basin not to exceed a capacity of 15 acre-feet installed concurrent with the first phase of grading in a location northeast of the existing terminus of North Calera Avenue, reducing the existing peak flow rate in a 50-year storm event to 25 percent of the existing peak flow rate. This detention basin may be removed and/or replaced subject to further review and approval of an alternative solution; and
- A detention basin (proposed Facility 2B) in Area 2 with a maximum peak flow release in a 50-year storm event, not exceeding 40 cfs.

Both detention basins shall be designed so as not to create new impacts associated with any existing high groundwater conditions.

## **1.3.1.6** Offsite and Cross-lot Grading/Drainage (No. 63)

Prior to the issuance of any grading permit, if determined necessary by the City Engineer, a letter of consent, in a form approved by the City Engineer, suitable for recording, shall be obtained from the affected property owners for offsite grading and/or drainage. The landowner/master developer shall record said letters of consent for offsite drainage and/or cross-lot drainage prior to the issuance of any grading permit. Acceptance of cross-lot drainage on lots within the tract/parcel map boundaries shall be noted on the recorded map.

#### **1.3.1.7** Jurisdictional Impacts (No. 64)

Prior to impacts to jurisdictional waters of the U. S. and State, subdivider shall submit evidence of approvals from the U. S. Army Corps of Engineers and California Department of Fish and Game for impacts to jurisdictional areas as described in Mitigation Measures BR1, BR2, BR4 and BR7 of the Project EIR, in a manner meeting approval of the Community Development Director.

#### 1.3.1.8 Pollutant Runoff (No. 69)

Prior to issuance of precise grading or building permits, whichever comes first, the applicant shall submit and obtain approval from the City Engineer, of a Water Quality Management Plan (WQMP) specifically identifying Best Management Practices (BMPs) that will be used onsite for that area of precise grading and/or building, to control predictable pollutant runoff. This WQMP shall identify structural and non-structural measures, assignment of long-term maintenance responsibilities (specifying the developer, parcel owner, maintenance association, lessee, etc.); and, shall reference the location(s) of structural BMPs. This WQMP will analyze those items requested in the

November 13, 2002 California Regional Water Quality Control Board letter in the context of the established performance.

## **1.3.1.9** NPDES General Storm Water Permit (No. 70)

Prior to issuance of any grading permits, the applicant shall submit evidence to the City Engineer that the applicant has obtained coverage under the NPDES statewide General Storm Water Permit from the State Water Resources Control Board. Applicant shall prepare a Storm Water Pollution Prevention Plan (SWPPP) consistent with the City's municipal storm water permit. The SWPPP shall include construction and postconstruction BMPs. This condition satisfies mitigation measure WR3 of the project EIR.

#### 1.3.1.10 Drainage Improvements/Part B (No. 100)

Prior to issuance of any certificates of use and occupancy, said improvements in Condition No. 26 shall be constructed in a manner meeting the approval of the Azusa City Engineer.

## **1.3.1.11** Detention Basin Safety Fencing (No. 105)

Prior to final design of each detention basin, the Community Development Director will determine whether safety fencing is required around each particular detention basin in accordance with the Uniform Building Code. The fencing shall be attractive, decorative, non-chain link, and non-lethal (no pointed tops).

## **1.3.2 Project Mitigation Measures (Drainage-related)**

The following mitigation measures are from the Certified Final Environmental Impact Report No. SCH #2002071046 and Mitigation Monitoring and Reporting Program:

## 1.3.2.1 Seismically Induced Landslides and Flooding

#### Mitigation Measure GS18

Appropriate flood control planning and design, which considers the existence of these potential water and debris sources in addition to normal design flow and bulking factors shall be incorporated. This mitigation measure will allow identification of engineering measures to minimize the potential for impacts to homes from flooding as a result of a seismic event.

## 1.3.2.2 Debris Flow and Rock Fall

## Mitigation Measure GS19

Prior to the issuance of grading permits, the Applicant shall submit final grading plans and supporting technical documentation that indicate the complete boundaries of the debris flow zones presently designated as A, B, and C. The grading plans and associated final geotechnical and engineering geology reports shall also indicate the preferred methods, such as debris fences, trenches, basins, or other engineering methods that will be used to satisfactorily protect adjoining homes and structures from potential debris flow. The zone designations and mitigation measures shall be reviewed and approved by the City's engineering geology and geotechnical representative. This mitigation measure will ensure that recognized engineering measures are implemented to ensure a level of safety consistent with the construction of homes.

## **1.3.2.3 Biological and Agricultural Resources**

#### Mitigation Measure BR1

Drainages under the U. S. Army Corps of Engineers jurisdiction (0.01 acre of ephemeral channel) shall be replaced at a ratio of 1:1, which will take place in the riparian corridor proposed for the Project.

## Mitigation Measure BR2

The Project shall be required to obtain a California Department of Fish and Game Section 1603 Streambed Alteration Agreement and a Los Angeles County Regional Water Quality Control Board Section 401 Water Quality Certification for 0.01 acre of impact to "waters of the U. S. and the State." In addition, impacts must be disclosed to the U. S. Army Corps of Engineers within 30 days of Project completion pursuant to Nationwide Permit No. 39.

## Mitigation Measure BR3

Riparian habitat shall be constructed to receive nuisance flow from developed areas of the site. This constructed habitat will serve the dual purpose of mitigating for impacted habitat and provide water quality benefits. This mitigation measure will allow the replacement and enhancement of 0.01 acre of "waters of the U. S. and the State" impacted by the Project and allow water quality management to urban runoff.

#### 1.3.2.4 Water Resources

## Mitigation Measure WR3

Prior to grading, the Applicant shall file a Notice of Intent (NOI) with the State Water Resources Control Board and prepare a Storm Water Pollution Prevention Plan (SWPPP) consistent with the City's municipal storm water permit. The SWPPP shall include construction and post-construction Best Management Practices (BMPs) to manage water quality during and after construction.

# 1.4 DESCRIPTION, PURPOSES AND FUNCTIONS OF RMP MITIGATION MEASURES

Runoff mitigation measures within the San Gabriel River watershed can be divided into two categories: 1) mitigation for impacts associated with peak storm water runoff and 2) mitigation for impacts associated with storm water and urban (i.e., dry weather) runoff quality.

## 1.4.1 Storm Water Runoff Quantity

The primary means for mitigating increases in peak storm water runoff is the design and implementation of eight (8) new detention basins. These detention basins will reduce post-project 10- and 50-year peak storm water flows to less than or equal to pre-project levels or less than or equal to the design capacity of the downstream receiving storm

drain facility, whichever is more limiting. Currently, there are no existing detention basins providing this function for the Nursery property or adjacent communities.

#### **1.4.2 Debris and Sediment Production, Delivery, and Control**

Debris and sediment produced and delivered from the natural canyons will be primarily controlled/mitigated through the design and implementation of five (5) new debris basins upstream of the planned development to function in conjunction with the existing sediment control structures in place (i.e., Beatty Debris Basin and two crib dams). These structures will remove sediment and debris from flood flows, resulting in clear flows discharging downstream. The removal of debris and sediment from flood flows results in the reduction of effective peak discharges and subsequent impacts downstream.

#### 1.4.3 Storm Water and Urban Runoff Quality

The proposed Best Management Practices (BMPs) for the Project shall collectively satisfy the requirements set forth by the Standard Urban Storm Water Mitigation Plan (SUSMP) for Los Angeles County and Cities in Los Angeles County.

There are six (6) primary BMPs that will be implemented as part of the Project: 1) public education; 2) common area maintenance practices; 3) catch basin inserts; 4) storm drain inserts; 5) wet ponds; and 6) storm drain system stenciling and signage. Public education and common area practices are commonly referred to as non-structural BMPs. Catch basin inserts, storm drain inserts, wet ponds, and storm drain stenciling and signage are classified as structural BMPs.

For residential and commercial areas, one of the most effective BMPs is public education. A comprehensive education program will inform individuals and households about the steps that can be taken to reduce storm water pollution, such as properly disposing of used motor oil or household hazardous waste.

Common area maintenance practices should only consider the use of chemical control for pest and vegetation control as a last resort. Manual vegetation control and natural predators for pest control is the preferred maintenance practice.

Wet ponds will be constructed along the proposed riparian corridor to help establish and sustain the riparian habitat as well as provide water quality benefits. These wet ponds will remove sediment, Biochemical Oxygen Demand (BOD), organic nutrients, and trace metals from storm water runoff.

Storm drain inserts, such as Continuous Deflective Separation (CDS) devices, are designed to provide removal of pollutants associated with trash and debris. The use of CDS devices or their equivalent will be implemented within the Project to treat urban runoff and the "first flush" discharge rate per the Los Angeles Regional Water Quality Control Board's current NPDES standards.

Drainpac® catch basin inserts or their equivalent will be installed in those catch basins directly discharging storm water runoff to downstream receiving storm drain facilities

without prior treatment. The purpose of these inserts is to minimize the amount of gross pollutant discharge (i.e., trash and debris).

Storm drain system stenciling and signage provides a highly visible means of source control and is typically placed adjacent to storm drain inlets. The stencil or sign contains a brief statement that prohibits the dumping of improper material into the storm water conveyance system.

For additional information and guidelines regarding the BMPs discussed above, refer to the County published requirements and guidelines (LACDPW, 2002).

## 1.5 **DESCRIPTION OF CONDITIONS**

#### **1.5.1 Existing (Pre-project) Conditions**

The existing (pre-project) conditions are defined as those land uses, facilities, and soils present onsite as of August 2004.

#### **1.5.2 Construction Period**

The construction period is defined as the time between the disturbance of the existing topography to completion of the infrastructure and building construction. The construction period usually begins with mass site grading followed by rough grading and infrastructure improvements, and ends with precise grading, building construction, and expiration of the landscape establishment period. There will be some overlap with Nursery operations.

#### **1.5.3 Proposed (Post-project) Conditions**

The proposed (post-project) conditions are defined as the conditions that exist after the Project is completed.

#### 1.6 CRITERIA, METHODOLOGY, STANDARDS, AND PROCEDURES

#### 1.6.1 Los Angeles County Modified Rational Method (MODRAT)

All hydrologic analyses were performed in accordance with the Los Angeles County Department of Public Works (LACDPW) Hydrologic Method – Addendum to the Hydrology/Sedimentation Manual (2002) and LACDPW Hydrology Manual (1991).

The Los Angeles County MODRAT computer program was used to model both the existing and proposed conditions hydrologic models. MODRAT was implemented using the Watershed Modeling System (WMS) computer program as the user interface. The County has used WMS/MODRAT to develop hydrologic models in other cases, such as modeling the Beatty Debris Basin watershed (Los Angeles County Job No. H03003686).

MODRAT is a modified rational method computer program developed by the LACDPW to compute peak runoff rates under a variety of conditions common to the County. The objective of the interface developed in WMS for MODRAT is to provide graphical representation of MODRAT data, as well as automate the definition of many of the required parameters.

The time of concentrations were computed using the regression equation developed by the LACDPW.

#### **1.6.2 Detention Basin Routing Analysis**

The modified-Puls routing method was used to analyze the functional adequacy of each proposed detention basin facility. A stage-storage curve and a stage-discharge curve are required for each facility to be modeled.

A stage-storage curve was computed for each proposed detention facility based on the applicable conceptual grading plan.

Applicable nomograph charts from the Federal Highway Administration publications, HDS-5 (2001) and HEC-22 (2001), were used to develop the outlet structure performance curve for each basin (i.e., stage versus discharge). Changes implied in the HDS-5 (2004) errata didn't affect any of the nomograph charts used.

Each detention basin was sized to mitigate the downstream impacts based on clear flow conditions.

#### **1.6.3 Storm Drain Hydraulics**

The backbone storm drain system shall be designed and constructed in accordance with LACDPW requirements and standards to convey the 50-year storm event. The analysis of the backbone storm drain system is deferred to the final design phase of the Project. All storm drains proposed downstream of existing or proposed debris control facilities shall be designed based on clear flow conditions.

#### **1.6.4 Debris and Sediment Production, Delivery, and Control**

All sediment retention facilities shall be designed and constructed in accordance with the LACDPW Sedimentation Manual (1993) and Debris Dams and Basins Design Manual (1979).

The Capital Flood level of protection applies to facilities designed to intercept sedimentladen floodwaters.

Sediment retention facilities must be designed to mitigate the design sediment volume.

The type of structure depends on the sediment delivery volume, which is dependent on the Debris Potential Area (DPA) zone for the particular drainage area. Those facility locations expected to receive between 1,000 and 4,999 cubic yards shall have either a debris basin or elevated inlet constructed. A debris basin shall be constructed for those locations estimated to receive 5,000+ cubic yards. The use of an elevated inlet in DPA zone 1 will only be approved by the LACDPW in special circumstances, otherwise, a debris basin is required.

The design sediment volume for each proposed facility is less than 15 acre-feet and thus, all facilities are not expected to be subject to state jurisdiction.

General design guideline considerations include, but are not limited to the following:

- Each sediment retention facility shall be located in the existing watercourse with the dam perpendicular to the direction of flow. The longer dimension of the basin should fall along the flow line.
- The debris cone shall not exceed more than 50 percent of the capacity of the debris basin (i.e., cone capacity). The slope of the cone shall not exceed 5 percent of the average natural slope of the stream.
- The debris basin capacity up to the spillway elevation (i.e., level capacity) shall be large enough to accommodate at least 50 percent of the debris event (Debris event Quantity of sediment produced by a saturated watershed significantly recovered from a burn (after four years) as a result of 24-hour rainfall amounts with a recurrence interval of once in 50 years).

## 1.6.5 Best Management Practices (BMPs) Sizing Criteria

All post-construction structural BMPs, proposed as part of the planned development, were sized to treat storm water runoff using either volumetric or flow-based treatment control in accordance with the Standard Urban Storm Water Mitigation Plan (SUSMP) standards described below.

## 1.6.5.1 Volumetric Treatment Control BMPs

The volume of runoff produced from a 0.75-inch storm event, prior to its discharge to a storm water conveyance system

#### 1.6.5.2 Flow-based Treatment Control BMPs

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

# 2 EXISTING (PRE-PROJECT) CONDITIONS

## 2.1 LAND USE AND SOIL CHARACTERISTICS

Most of the Nursery property consists of native soil with very little impervious cover. The Nursery's administration, operations, and maintenance buildings, concrete loading docks, paved roads and concrete ditches account for all of the impervious ground cover within the property boundaries. The steeper mountainous terrain located to the north is covered with native vegetation. The mild-sloping areas at the base of this steep mountainous terrain are covered with nursery container stock. Portions of the nursery stock are sensitive to direct sunlight and thus, are protected with screened awnings that allow rainfall to pass through and are assumed to be pervious.

A substantial portion of the natural terrain north of Sierra Madre Avenue consists of steep slopes in excess of 50 percent. South of Sierra Madre Avenue, the Nursery property slopes lessen substantially as compared to the upland terrain with an average gradient between five and ten percent.

The Nursery property captures irrigation and storm water runoff in an extensive network of channels and pipelines leading to collection basins. Runoff received by the collection basins is pumped to a central treatment facility, treated, and re-circulated for irrigation use. If the capacity of a collection basin is exceeded, provisions are in place to direct the overflow to an existing storm drain system.

In some areas, Nursery improvements have altered the historic drainage patterns. For purposes of evaluating the existing conditions, these diversions have been ignored and the historic drainage patterns respected. The adjacent properties to the east, within the City of Glendora, are comprised of residential neighborhoods with very little commercial and industrial development.

An aerial photograph of the Nursery property is shown in Figure 2-1. The Nursery property and outlying tributary areas are divided into five (5) drainage areas. The delineation of the major drainage boundaries and outfalls is shown in Figure 2-2.

The proportion impervious values (LACDPW, 2002) assumed for each hydrologic land use type are as follows:

- Nursery/Mountain 1 %
- Residential 41.8 %
- 4-unit Residential 81.9 %
- Commercial 90.9 %

The percent hydrologic land use breakdown for each drainage area is as follows:

- 1 84 % Nursery/Mountain and 16 % Commercial
- 2-65.7 % Nursery/Mountain, 33.7 % Residential, and 0.6 % Commercial
- 3-86 % Nursery/Mountain and 14 % Residential

- 4-94 % Nursery/Mountain, 4 % Commercial, and 2 % 4-unit Residential
- 5-98 % Nursery/Mountain and 2 % Residential

The land use definitions for each drainage area are defined in Tables 2-1 through 2-5.

## Table 2-1 Land Use Definition – Drainage Area 1 (Existing Conditions)

|                       |                          |                 | Land Use         |                     |                       |
|-----------------------|--------------------------|-----------------|------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре             | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1.0                      | 49.0            | Nursery          | 77                  | 22                    |
| SWC                   | IA                       | 40.0            | Commercial       | 23                  | 22                    |
|                       | 3A                       | 19.6            | Nursery/Mountain | 100                 | 42                    |

|                       |                          |                 | Land Use         |                     | Percent<br>Impervious<br>1<br>14<br>8<br>6<br>38<br>15 |                  |         |    |    |
|-----------------------|--------------------------|-----------------|------------------|---------------------|--|------------------|---------|----|----|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре             | Percent<br>Coverage | Percent<br>Impervious                                  |                  |         |    |    |
|                       | 1A                       | 39.9            | Nursery/Mountain | 100                 | 1  |                  |         |    |    |
|                       | 24                       | 25 F            | Residential      | 33                  | 1.4  |                  |         |    |    |
|                       | ЪА                       | 25.5            | Nursery          | 67                  | 14   |                  |         |    |    |
|                       | 10                       | 18.0            | Residential      | 16                  | Q  |                  |         |    |    |
|                       | 44                       | 10.0            | Nursery          | 84                  | 0  |                  |         |    |    |
|                       | 64                       | 15.0            | Residential      | 12                  | 6  |                  |         |    |    |
|                       | 0A                       | 15.0            | Nursery          | 88                  | 0  |                  |         |    |    |
|                       | ٥٨                       | 22.0            | Residential      | 91                  |  |                  |         |    |    |
|                       | 88                       | 32.0            | Nursery          | 9                   | 30   |                  |         |    |    |
|                       | 9B                       | 10.0            | Residential      | 35                  | 15   |                  |         |    |    |
|                       |                          | 90              | 90               | 30                  | 40.2   | Nursery/Mountain | 65      | 15 |    |
|                       | 11B                      | 25.9            | Residential      | 49                  | 21   |                  |         |    |    |
|                       |                          |                 | Nursery/Mountain | 51                  | 21   |                  |         |    |    |
| Hicrest               | 120                      | 17.5            | Residential      | 10                  | 5  |                  |         |    |    |
|                       | 120                      | 17.5            | Nursery/Mountain | 90                  | 5  |                  |         |    |    |
|                       | 14C                      | 37.4            | Nursery/Mountain | 100                 | 1  |                  |         |    |    |
|                       | 18A                      | 18A             | 18A              | 184                 | 184  | 30.1             | Nursery | 25 | 30 |
|                       |                          |                 |                  | 50.1                | Residential  | 75               | 52      |    |    |
|                       |                          |                 | Commercial       | 5                   |  |                  |         |    |    |
|                       | 20A                      | 32.1            | Nursery          | 93                  | 6  |                  |         |    |    |
|                       |                          |                 | Residential      | 2                   |  |                  |         |    |    |
|                       | 21D                      | 40.5            | Nursery          | 29                  | 30   |                  |         |    |    |
|                       | 210                      | +0.0            | Residential      | 71                  | 71   |                  |         |    |    |
|                       |                          |                 | Commercial       | 5                   |  |                  |         |    |    |
|                       | 23D                      | 12.9            | Nursery          | 93                  | 6  |                  |         |    |    |
|                       |                          |                 | Residential      | 2                   |  |                  |         |    |    |
|                       | 26A                      | 0.5             | Residential      | 100                 | 42   |                  |         |    |    |

#### Table 2-2 Land Use Definition – Drainage Area 2 (Existing Conditions)

|                       |                          |                 | Land Use         |                     |                       |
|-----------------------|--------------------------|-----------------|------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре             | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1A                       | 26.4            | Nursery/Mountain | 100                 | 1                     |
| 1.0th                 | 2A                       | 22.8            | Nursery/Mountain | 100                 | 1                     |
| TOUT                  | ЗA                       | 26.1            | Nursery/Mountain | 100                 | 1                     |
|                       | 5A                       | 12.1            | Residential      | 100                 | 42                    |

#### Table 2-3 Land Use Definition – Drainage Area 3 (Existing Conditions)

#### Table 2-4 Land Use Definition – Drainage Area 4 (Existing Conditions)

|                       |                          |                 | Land Use           |                     |                       |
|-----------------------|--------------------------|-----------------|--------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре               | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1A                       | 25.6            | Nursery/Mountain   | 100                 | 1                     |
|                       | ЗA                       | 26.2            | Nursery/Mountain   | 100                 | 1                     |
|                       | 5A                       | 25.0            | Nursery/Mountain   | 100                 | 1                     |
| Dolm                  | 7A                       | 35.8            | Nursery/Mountain   | 100                 | 1                     |
| Failii                | 9A                       | 29.2            | Nursery/Mountain   | 100                 | 1                     |
|                       |                          |                 | Nursery            | 74                  |                       |
|                       | 11A                      | 41.0            | Commercial         | 17                  | 24                    |
|                       |                          |                 | 4-Unit Residential | 9                   |                       |

|                       |                          |                                | Land Use         |                     |                       |
|-----------------------|--------------------------|--------------------------------|------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | AT<br>sin Area<br>(acres) Type |                  | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1A                       | 29.8                           | Nursery/Mountain | 100                 | 1                     |
|                       | 2A                       | 29.6                           | Nursery/Mountain | 100                 | 1                     |
|                       | 4A                       | 25.9                           | Nursery/Mountain | 100                 | 1                     |
|                       | 6A                       | 49.5                           | Nursery/Mountain | 100                 | 1                     |
| Beatty<br>Basin       | 8A                       | 25.2                           | Nursery/Mountain | 100                 | 1                     |
| Baoin                 | 9B                       | 9.1                            | Nursery/Mountain | 100                 | 1                     |
|                       | 10B                      | 14.0                           | Nursery/Mountain | 100                 | 1                     |
|                       | 124                      | 19 5                           | Residential      | 27                  | 10                    |
|                       | 134                      | 10.5                           | Nursery/Mountain | 73                  | 12                    |
| NW<br>Beatty          | 1A                       | 15.0                           | Nursery/Mountain | 100                 | 1                     |

#### Table 2-5 Land Use Definition - Drainage Area 5 (Existing Conditions)

Figure 2-1 Monrovia Nursery Aerial Photo (Existing Conditions)

Figure 2-2 Drainage Areas and Outfalls (Existing Conditions)

## 2.2 DRAINAGE FEATURES

The Nursery property is tributary to five (5) major drainage outfall locations, which eventually drain to the San Gabriel River:

- Outfall 1 LACDPW 1601 Drain Line "A" (Pasadena Avenue)
- Outfall 2C- LACPDW 1264 Drain (Foothill Boulevard/Citrus Avenue)
- Outfall 3B LACPDW 1601 Drain Line "B"(Tenth Avenue) via concrete channel
- Outfall 4 LACPDW 1264 Drain via concrete channel
- Outfall 5C– LACDPW Beatty Canyon Channel (Sierra Madre Avenue)

Outfalls 2, 3, and 5 series represent intermediate discharge points as well as the most downstream discharge point for the represented drainage area. Each outfall and its tributary drainage area are described below.

## 2.2.1 Outfall 1 (LACDPW 1601 Drain Line "A")

Outfall 1 represents the most downstream discharge point for Drainage Area 1, which consists of a 30-inch RCP inlet located northeast and adjacent to the A. T. & S. F. Railroad crossing at Pasadena Avenue at the downstream terminus of an earthen channel aligned along the north side of the A. T. & S. F. Railroad. The 30-inch RCP inlet discharges runoff intercepted by the earthen channel to LACDPW 1601 Drain Line "A", an 81-inch RCP in Pasadena Avenue. Runoff produced from Drainage Area 1, comprised of approximately 68 acres located in the southwest corner of the Nursery property, drains southwesterly to the earthen channel.

Los Angeles County Flood Control District (LACFCD) design hydrology for the LACDPW 1601 drain indicates that Line "A" has a 10-year design capacity of 561 cfs downstream of the confluence with the 30-inch RCP inlet. This peak discharge is based on a tributary drainage area of 370.9 acres, which corresponds to a discharge per area ratio of 1.5 cfs./acre. The LACFCD design hydrology assumes 46.4 acres is tributary to the 30-inch RCP inlet. This corresponds to a peak discharge of 70 cfs at the inlet, based on the previously calculated discharge per area ratio of 1.5 cfs/acre. The peak discharge per area ratio of 1.5 cfs/acre. The peak discharge per area ratio of 1.5 cfs/acre. The peak discharge per area ratio of 1.5 cfs/acre. The peak discharge per area ratio of 1.5 cfs/acre. The peak discharge per area ratio of 1.5 cfs/acre. The peak discharge at this point was not calculated as part of the design hydrology for the LACDPW 1601 Drain and thus, the discharge to area ratio computed based on known data downstream from the confluence of Outfall 1 and Line "A" was considered a reasonable alternative for determining the 10-year design discharge at Outfall 1. The 50-year peak discharge in excess of the capacity of the 30-inch RCP inlet and adjoining earthen channel likely overflows on to Pasadena Avenue.

#### 2.2.2 Outfalls 2A, 2B and 2C (LACDPW 1264 Drain)

Drainage Area 2 is comprised of approximately 376 acres, including a portion of the Glendora community. The storm water runoff produced from this area generally drains from north to south starting in the steep mountainous reaches north of Sierra Madre Avenue. Once the storm water runoff drains across Sierra Madre Avenue, it traverses a portion of the Nursery property before it flows through existing Glendora neighborhoods

and then crosses another portion of the Nursery property before being intercepted by a 78-inch RCP inlet located north of Foothill Boulevard and east of Citrus Avenue. This inlet is situated at the upstream terminus of LACDPW 1264 Drain. The flow from Drainage Area 2 confluences with the flow from Drainage Area 4 further downstream. The confluence point is identified as Outfall 2C. The 10-year design discharge at Outfall 2C is 920 cfs, based on data provided on as-built plans.

A portion of the Project, consisting of approximately 55 acres, drains to the upstream terminus of an existing concrete channel, identified as Outfall 2A, located at the Glendora boundary approximately 950 feet south of Sierra Madre Avenue. The flow released at Outfall 2A is conveyed to a point of confluence with the balance of the downstream storm water runoff from the north. This combined runoff is conveyed south in an unlined channel through existing neighborhoods and across the Nursery property to Outfall 2C. The local residences have reported periodic flooding near Outfall 2A and also near the upstream terminus of North Calera Avenue, identified as Outfall 2B.

## 2.2.3 Outfalls 3A and 3B (LACDPW 1601 Drain Line "B")

Drainage Area 3 is located south of Sierra Madre Avenue and adjacent to the westerly Project boundary. Drainage Area 3 represents approximately 88 acres. The storm water runoff produced from this area generally drains south to a point immediately north of the Lakeview Terrace Condominiums, also known as the old Rainbow Angling Club. From this point, identified as Outfall 3A, runoff drains into an existing concrete channel that roughly follows the westerly boundary of the Lakeview Terrace Condominiums and eventually terminates at Tenth Street. Channel flows discharge to LACDPW 1601 Drain Line "B", a 42-inch RCP in Tenth Avenue, via a box inlet identified as Outfall 3B. Line "B" transitions to a 48-inch RCP and confluences with Line "A" at Pasadena Avenue.

LACFCD design hydrology for the LACDPW 1601 drain indicates that Line "B" has a 10-year design capacity at the upstream terminus (Outfall 3B) of 137 cfs. This peak discharge is based on a tributary drainage area of 81.2 acres, which corresponds to a discharge per area ratio of 1.7 cfs/acre. The LACFCD design hydrology assumes 72.8 acres is tributary to the upstream terminus of the concrete-lined channel (Outfall 3A). This corresponds to a peak discharge of 124 cfs, based on the previously calculated discharge per area ratio of 1.7 cfs/acre. The peak discharge at this point was not calculated as part of the design hydrology for the LACDPW 1601 Drain and thus, the discharge to area ratio computed based on known data at Outfall 3B was considered a reasonable alternative for determining the 10-year design discharge at Outfall 3A. The 50-year peak discharge in excess of the capacity of the inlet and adjoining concrete-lined channel at Tenth Street is assumed to overflow on to Tenth Street.

#### 2.2.4 Outfall 4 (LACDPW 1264 Drain)

Drainage Area 4, comprised of approximately 183 acres, represents the center portion of the Project and extends nearly the entire length of the Nursery property from north to south. The upper reaches of Drainage Area 4 contain two existing LACDPW crib dam structures designed to control debris flows. Runoff produced from the upper reaches of Drainage Area 4 drains under Sierra Madre Avenue and is conveyed by open channel to

an existing 30-inch inlet, identified as Outfall 4, located north of the Nursery's administration building. This inlet conveys storm water runoff across the A. T. & S. F. Railroad and discharges into a concrete-lined channel that bisects the neighborhood immediately south of the A. T. & S. F. Railroad. Channel flows are conveyed southeast and eventually confluence with the LACDPW 1264 Drain approximately 200 feet downstream from Outfall 2C. The 10-year design discharge downstream of the confluence is 920 cfs, based on data provided on as-built plans.

## 2.2.5 Outfalls 5A, 5B and 5C (LACDPW Beatty Canyon Channel)

Drainage Area 5 is comprised of approximately 217 acres located in the northwest corner of the Nursery property and largely consists of steep mountainous terrain. Most of Drainage Area 5 is tributary to the LACDPW Beatty Basin, which discharges to the upstream terminus of Beatty Canyon Channel, an existing 69-inch storm drain at Sierra Madre Avenue. The upstream terminus of Beatty Canyon Channel is referred to as Outfall 5A.

Additional area downstream and west of the basin confluences with the Beatty Canyon Channel at points identified as Outfall 5B, a 36-inch RCP inlet, and Outfall 5C, 27-inch RCP inlet. The design discharge for the LACDPW Beatty Basin and Beatty Canyon Channel varies between different reports and previously prepared studies. The design discharge, however, has always been based on the Capital Flood event. The assumed Capital Flood design discharge at Outfall 5A is 760 cfs (clear flow), based on data provided from the analysis performed as part of Los Angeles County project to update the Capital Flood flow rates for LACDPW Beatty Basin (Job No. H0300386). The assumed Capital Flood design discharges downstream of Outfall 5B and Outfall 5C are 837 cfs and 899 cfs, respectively, based on the discharge per area ratio computed at Outfall 5A.

# 2.3 HYDROLOGY

The hydrologic analysis for the existing conditions was completed for the 50-year design storm frequencies implementing the methodology and standards of practice documented in the LACDPW Hydrology Manual (1991) and LACDPW Hydrologic Methods - Addendum to the 1991 Hydrology/Sedimentation Manual (2002). Exhibit 1 presents the delineation of the drainage boundaries for the existing conditions. The estimated peak discharges for the existing conditions are summarized in Table 2-6 for each outfall location. Burned or Burned and Bulked flows were determined where necessary. All burned flows were determined using the Watershed Modeling System computer program (WMS Version 7.1), Hydrologic Modeling Module (Los Angeles County, Department of Public Works MODRAT program), while bulking was performed per the procedure documented in the County of Los Angeles, Sedimentation Manual, dated June 1993, Section 3-C. Bulked peak flow calculations are summarized in Table 2.7. No bulking was applied in outfall 5 as all the debris is captured by the Betty Debris basin and the existing riser just north of View Crest Avenue. Outfall 1 did not require any bulking since the entire tributary area was covered with awning and was therefore considered developed.

|         |                  | D/S System   |                              |                |                       |                        |   |
|---------|------------------|--|------------------------------|----------------|-----------------------|------------------------|---|
|         |                  |  | Assumed                      |                | Existing C            | conditions             | Q <sub>0050</sub><br>(cfs)<br>295<br>525<br>2,461<br>412<br>448 |
| Outfall | Drainage<br>Area | Description  | Design<br>Discharge<br>(cfs) | TDA<br>(acres) | Q <sub>50</sub> (cfs) | Q <sub>h50</sub> (cfs) | Q <sub>bb50</sub><br>(cfs)                                      |
| 1       | 1                | LACDPW 1601 Drain Line "A"<br>(30-inch RCP inlet to 81-inch RCP) | 70                           | 67.6           | 98                    | 98                     |   |
| 2A      | 2                | concrete channel   |                              | 54.9           | 133                   | 150                    | 295   |
| 2B      | 2                | North Calera Avenue  |                              | 98.4           | 262                   | 281                    | 525   |
| 2C      | 2                | LACDPW 1264 Drain (78-inch RCP)                                  | 920                          | 559.1          | 1,383                 | 1,452                  | 2,461   |
| ЗA      | 3                | concrete channel   | 124                          | 75.3           | 188                   | 206                    | 412   |
| 3B      | 3                | LACDPW 1601 Drain Line "B"<br>(10' x 2.5' inlet to 42-inch RCP)  | 137                          | 87.4           | 222                   | 241                    | 448   |
| 4       | 4                | LACPDW 1264 Drain<br>(concrete channel to 78-inch RCP)           |                              | 182.8          | 494                   | 514                    | 912   |
| 5A      | 5                | LACDPW Beatty Canyon Channel<br>(Outlet to 78-inch RCP)          | 760                          | 183.1          | 576                   | 595                    |   |
| 5B      | 5                | LACDPW Beatty Canyon Channel<br>(36" RCP inlet to 69-inch RCP)   | 837                          | 201.6          | 618                   | 641                    |   |
| 5C      | 5                | LACDPW Beatty Canyon Channel<br>(27" RCP inlet to 69-inch RCP)   | 899                          | 216.6          | 660                   | 686                    |   |

TDA = tributary drainage area;  $Q_{\rm 50,}$   $Q_{\rm b50}$  and  $Q_{\rm bb50}$  = 50-year clear, burned and burned & bulked peak discharges, respectively

## 2.4 DEBRIS AND SEDIMENT PRODUCTION, DELIVERY, AND CONTROL

A substantial portion of the natural terrain north of Sierra Madre Avenue consists of steep slopes in excess of 50 percent, which can generate debris in the form of vegetation litter and sediment flow during a rainfall-runoff event. If left unchecked, receiving drainage facilities located downstream can be adversely impacted. The County has constructed and maintains three debris control structures within the Project boundaries: (1) Beatty Basin located just north of Sierra Madre Avenue near the westerly Project boundary, (2) a crib dam located upstream in the largest of the canyons tributary to the LACDPW Beatty Basin, and (3) a crib dam located upstream in one of the neighboring canyons to the east.

| Outfall | Total Area<br>A<br>(Sq. Miles) | Undeveloped Area<br>A <sub>u</sub><br>(Sq. Miles) | Developed Area<br>A <sub>d</sub><br>(Sq. Miles) | DPA  | BF <sub>(A)</sub> | BF <sub>(Au)</sub> | Q <sub>b50</sub><br>(cfs) | Q <sub>bb50</sub><br>(cfs) |
|---------|--------------------------------|---|---|------|-------------------|--------------------|---------------------------|----------------------------|
| 2A      | 0.086                          | 0.083   | 0.003   | 1.00 | 2.00              | 2.00               | 150                       | 295                        |
| 2B      | 0.154                          | 0.133   | 0.021   | 1.00 | 2.00              | 2.00               | 281                       | 525                        |
| 2C      | 0.874                          | 0.608   | 0.266   | 1.00 | 2.00              | 2.00               | 1452                      | 2461                       |
| ЗA      | 0.118                          | 0.118   | -   | 1.00 | 2.00              | -                  | 206                       | 412                        |
| 3B      | 0.137                          | 0.118   | 0.019   | 1.00 | 2.00              | 2.00               | 241                       | 448                        |
| 4       | 0.286                          | 0.222   | 0.064   | 1.00 | 2.00              | 2.00               | 514                       | 912                        |

Table 2-7 Estimated Bulked Peak Discharges (Existing Conditions)

DPA = Debris Production Area;  $BF_{(A)}$  and  $BF_{(AU)}$  = Bulking factor based on total area and undeveloped area respectively;  $Q_{b50}$  and  $Q_{bb50}$  = 50-year burned and burned & bulked peak discharges, respectively.

#### 2.5 WATER QUALITY SUMMARY

The Nursery property captures irrigation and storm water runoff in an extensive network of channels and pipelines leading to collection basins. Storm water runoff received by the collection basins is pumped to a central treatment facility, treated, and re-circulated for irrigation use. If the capacity of a collection basin is exceeded, provisions are in place to direct the overflow to an existing storm drain system.

# **3 PROPOSED (POST-PROJECT) CONDITIONS**

## 3.1 LAND USE

The planned development for the Nursery property is presented in Figure 3-1. No development or improvements are proposed within the City of Glendora, except for the following:

- Diversion channels leading to a proposed detention basin, Facility 4D, east of the Dhammakaya, including a portion of Facility 4D
- Proposed (temporary) detention basin, Facility 2C, located immediately northeast of the upstream terminus of North Calera Avenue

Facilities 4D and 2C are clearly identified in the facilities map (Exhibit 3).

The Nursery property and tributary outlying areas are divided into five (5) drainage areas as in the existing conditions, however only four (4) major outfalls remain with abandonment of Outfall 4. The delineation of the major drainage boundaries and outfalls is presented in Figure 3-2.

A land use map for the planned development is shown in Figure 3-3. The proportion impervious values (LACDPW, 2002) assumed for each hydrologic land use type are as follows:

- Nursery/Mountain 1 %
- Residential 41.8 %
- 3-unit Residential 68.2 %
- 4-unit Residential 81.9 %
- Commercial 90.9 %

The percent land use breakdown for each drainage area is as follows:

- 1 100 % 3-unit Residential
- 2-46 % Nursery/Mountain and 54 % Residential
- 3 100 % Residential
- 4 57.6 % Residential, 31.9% Nursery/Mountain 7.1 % 3-unit Residential, 3.2 % 4-unit Residential, and 0.2 % Commercial
- 5 89 % Nursery/Mountain and 11 % Residential

Exhibit 3 depicts the proposed storm water facilities. The land use definitions for each drainage area are defined in Tables 3-1 through 3-5.

|                        |                          |                 | Land Use           |                     |                       |
|------------------------|--------------------------|-----------------|--------------------|---------------------|-----------------------|
| MODRA I<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре               | Percent<br>Coverage | Percent<br>Impervious |
|                        | 1A                       | 8.8             | 3-unit Residential | 100                 | 68                    |
| Basin<br>3C            | ЗA                       | 39.6            | 3-unit Residential | 100                 | 68                    |
| 50                     | 5A                       | 18.7            | 3-unit Residential | 100                 | 68                    |

#### Table 3-1 Land Use Definition – Drainage Area 1 (Proposed Conditions)

## Table 3-2 Land Use Definition – Drainage Area 2 (Proposed Conditions)

|             | MODDAT                   |                 | Land Use         |                     |                       |
|-------------|--------------------------|-----------------|------------------|---------------------|-----------------------|
| Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре             | Percent<br>Coverage | Percent<br>Impervious |
|             | 1A                       | 39.9            | Nursery/Mountain | 100                 | 1                     |
|             | 24                       | 0E E            | Residential      | 33                  | - 14                  |
|             | 34                       | 20.0            | Nursery          | 67                  |                       |
|             | 4.0                      | 19.0            | Residential      | 16                  | 8                     |
|             | 4A                       | 10.0            | Nursery          | 84                  |                       |
|             | 64                       | 15.0            | Residential      | 12                  | 6                     |
|             | 6A                       |                 | Nursery          | 88                  |                       |
|             | 0.4                      | 32.8            | Residential      | 91                  | 38                    |
|             | оА                       |                 | Nursery          | 9                   |                       |
|             |                          | 40.0            | Residential      | 35                  | 15                    |
|             | 90                       | 48.2            | Nursery/Mountain | 65                  |                       |
| Hicrest     | 11B                      | 11B 18.8 ·      | Residential      | 49                  | 21                    |
| Last        |                          |                 | Nursery/Mountain | 51                  |                       |
|             | 14A                      | 37.8            | Nursery          | 25                  | 20                    |
|             |                          |                 | Residential      | 75                  | 32                    |
|             | 15C                      | 7.7             | Nursery/Mountain | 100                 | 1                     |
|             | 17C                      | 7.5             | Residential      | 100                 | 42                    |
|             | 405                      | ND 4.7          | Residential      | 9                   |                       |
|             | 190                      | 4.7             | Nursery          | 91                  | 5                     |
|             | 22C                      | 9.0             | Residential      | 100                 | 42                    |
|             | 23E                      | 8.8             | Residential      | 100                 | 42                    |
|             | 260                      | ~ ~ ~ ~         | Residential      | 63                  | 07                    |
|             | 26C                      | 7.1             | Nursery          | 37                  | 21                    |

|                        |                          |                 | Land Use    |                     |                       |
|------------------------|--------------------------|-----------------|-------------|---------------------|-----------------------|
| MODRA I<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре        | Percent<br>Coverage | Percent<br>Impervious |
|                        | 1A                       | 35.3            | Residential | 100                 | 42                    |
| Basin<br>4A            | 2A                       | 38.4            | Residential | 100                 | 42                    |
|                        | 4A                       | 15.5            | Residential | 100                 | 42                    |

#### Table 3-3 Land Use Definition – Drainage Area 3 (Proposed Conditions)

## Table 3-4 Land Use Definition – Drainage Area 4 (Proposed Conditions)

|                       |                          |                 | Land Use           |                     |                       |
|-----------------------|--------------------------|-----------------|--------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре               | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1A                       | 25.6            | Nursery/Mountain   | 100                 | 1                     |
|                       | ЗA                       | 11.0            | Nursery/Mountain   | 100                 | 1                     |
|                       | 4B                       | 11.6            | Nursery/Mountain   | 100                 | 1                     |
|                       | 7C                       | 16.9            | Nursery/Mountain   | 100                 | 1                     |
|                       | 10A                      | 16.3            | Residential        | 100                 | 42                    |
|                       | 12A                      | 9.2             | Residential        | 100                 | 42                    |
|                       | 14A                      | 17.8            | Residential        | 100                 | 42                    |
|                       | 16D                      | 14.9            | Residential        | 100                 | 42                    |
|                       | 19A                      | 30.9            | Residential        | 100                 | 42                    |
|                       | 21 0                     | Q /             | 4-unit Residential | 83                  | 75                    |
| ST                    | 217                      | 5.4             | Residential        | 17                  |                       |
| L R                   | 23A                      | 17.7            | 4-unit Residential | 7                   | 45                    |
| ¥                     |                          |                 | Residential        | 93                  |                       |
|                       | 26A                      | 19.7            | 3-unit Residential | 100                 | 68                    |
|                       | 28A                      | 22.9            | 5% Commercial      | 5                   | 6                     |
|                       |                          |                 | 93% Nursery        | 93                  |                       |
|                       |                          |                 | 2% Residential     | 2                   |                       |
|                       | 20E                      | 40.5            | 29% Nursery        | 29                  | 30                    |
|                       | 231                      | 40.0            | 71% Residential    | 71                  | 50                    |
|                       |                          |                 | 5% Commercial      | 5                   | 6                     |
|                       | 31F                      | 12.9            | 93% Nursery        | 93                  |                       |
|                       |                          |                 | 2% Residential     | 2                   |                       |
|                       | 33G                      | 1.0             | Residential        | 100                 | 42                    |

|                       | MODEAT                   |                 | Land Use         |                     |                       |
|-----------------------|--------------------------|-----------------|------------------|---------------------|-----------------------|
| MODRAT<br>Basin<br>ID | MODRAT<br>Subbasin<br>ID | Area<br>(acres) | Туре             | Percent<br>Coverage | Percent<br>Impervious |
|                       | 1A                       | 29.8            | Nursery/Mountain | 100                 | 1                     |
|                       | 2A                       | 29.6            | Nursery/Mountain | 100                 | 1                     |
|                       | 4A                       | 25.9            | Nursery/Mountain | 100                 | 1                     |
|                       | 6A                       | 49.5            | Nursery/Mountain | 100                 | 1                     |
| Beatty<br>Basin       | 0.4                      | 07.0            | Residential      | 36                  | 16                    |
|                       | оA                       | 21.3            | Nursery/Mountain | 64                  |                       |
|                       | 9B                       | 7.2             | Nursery/Mountain | 100                 | 1                     |
|                       | 104                      | 5.0             | Residential      | 26                  | 10                    |
|                       | IZA                      | 5.2             | Nursery/Mountain | 74                  | 12                    |
|                       | 104                      | 404 7.0         | Residential      | 27                  | 44                    |
|                       | IJA                      | 7.8             | Nursery/Mountain | 73                  | 11                    |
|                       | 15C                      | 16.2            | Nursery/Mountain | 100                 | 1                     |
|                       | 17C                      | 10.0            | Residential      | 100                 | 42                    |
| NW<br>Beatty          | 1A                       | 5.4             | Nursery/Mountain | 100                 | 1                     |

#### Table 3-5 Land Use Definition - Drainage Area 5 (Proposed Conditions)

Figure 3-1 Tentative Site Plan

Figure 3-2 Drainage Areas and Outfalls (Proposed Conditions)
Figure 3-3 Land Use Map for the Planned Development

# 3.2 DRAINAGE FEATURES

The planned development and remaining Nursery property is tributary to four (4) major drainage outfall locations, which eventually drain to the San Gabriel River:

- Outfall 1 LACDPW 1601 Drain Line "A" (Pasadena Avenue)
- Outfall 2C LACPDW 1264 Drain (Foothill Boulevard/Citrus Avenue)
- Outfall 3B LACPDW 1601 Drain Line "B"(Tenth Avenue) via concrete channel
- Outfall 4 Not used
- Outfall 5C LACDPW Beatty Canyon Channel (Sierra Madre Avenue)

Outfalls 2, 3, and 5 series represent intermediate discharge points as well as the most downstream discharge point for the represented drainage area. Each outfall and its tributary drainage area are described below.

# 3.2.1 Outfall 1

Storm water runoff produced in Drainage Area 1 drains to the earthen channel and 30inch RCP inlet (Outfall 1), as in the existing conditions (Section 2.2.1), but via a proposed system of streets, storm drains, and three (3) detention basins (Facilities 1A, 1B, and 1C). Refer to Sections 2.2.1, 4.1.1, and 5.1.1 for additional information.

# 3.2.2 Outfalls 2A, 2B and 2C

A minor portion of Drainage Area 2 is included as part of the planned development. This portion drains to Outfall 2A, including an undeveloped portion of the Nursery property, via a proposed system of streets, storm drains, and a detention basin (Facility 2B). The portion of Drainage Area 2 tributary to Outfall 2B is unchanged with the exception of a proposed (temporary) detention basin (Facility 2C) located immediately northeast of the upstream terminus of North Calera Drive. Flow released from Outfalls 2A and 2B, combined with the storm water runoff produced from a portion of Drainage Area 2 located downstream, drains through the existing streets and channels to another proposed detention basin (Facility 4D). This same detention basin also receives storm water runoff produced from the remaining portion of Drainage Area 2, combined with flow released from Facility 4D, drains to Outfall 2C. Refer to Sections 2.2.2, 4.1.2, and 5.1.2 for additional information

# 3.2.3 Outfalls 3A and 3B

Storm water runoff produced in Drainage Area 3, within the planned development, drains via a proposed system of streets, storm drains, and a detention basin (Facility 3) to Outfall 3A. Flow released from Outfall 3A, combined with storm runoff produced in the existing development downstream, drains to Outfall 3B via an existing concrete channel. Refer to Sections 2.2.3, 4.1.3, and 5.1.3 for additional information.

# 3.2.4 Outfall 4

The abandonment of Outfall 4 is included as part of the proposed conditions. Refer to Sections 2.2.4, 4.1.4, and 5.1.4 for additional information.

# 3.2.5 Outfalls 5A, 5B and 5C

Most of the storm water runoff produced in Drainage Area 5 drains through the LACDPW Beatty Basin. The area tributary to Beatty Basin is proposed to remain largely undeveloped, therefore differences in tributary peak flows at Outfall 5A are considered insignificant. The LACDPW Beatty Basin is primarily a debris control facility and is assumed to have no detention storage. A small portion of Drainage Area 5 located downstream of the LACDPW Beatty Basin is included as part of the planned development. Storm water runoff produced in this portion drains via a proposed system of streets, storm drains, and park open space to a detention basin (Facility 5B) prior to being released to Outfall 5B. A very minor portion of Drainage Area 5 located downstream of the LACDPW Beatty Basin drains to Outfall 5A via an existing channel and storm drain and will remain undeveloped. Refer to Sections 2.2.5, 4.1.5, and 5.1.5 for additional information.

# 3.3 HYDROLOGY

The hydrologic analysis for the existing conditions was completed for the 50-year design storm frequencies implementing the methodology and standards of practice documented in the LACDPW Hydrology Manual (1991) and LACDPW Hydrologic Methods - Addendum to the 1991 Hydrology/Sedimentation Manual (2002). Exhibit 2 presents the delineation of the drainage boundaries for the proposed conditions.

# 3.4 DEBRIS AND SEDIMENT PRODUCTION, DELIVERY, AND CONTROL

Refer to Sections 4.3 and 5.2.

# 3.5 WATER QUALITY SUMMARY

Refer to Sections 4.4 and 5.3.

# 4 IMPACTS OF THE PLANNED DEVELOPMENT

## 4.1 DRAINAGE AREA COMPARISON

The distribution of drainage area between the various outfalls will change as a result of the planned development. Table 4-1 below shows a comparison of the existing and proposed drainage area distribution. The combined tributary drainage area for all outfalls is about 930 acres. The net differential between the existing and proposed combined tributary drainage areas is roughly 0.1 percent, or 1 acre. This discrepancy is as a result of minor grading in the area north west of watershed 3 and south of Sierra Medre Avenue causing the tributary area boundary to move slightly.

## 4.1.1 Outfall 1

Outfall 1 will experience a reduction of 0.5 acres in tributary area as a result of the proposed development. There will however be a combined net increase from Outfalls 1 and 3B to the LACDPW 1601 Drain Line "A" of approximately 1 percent.

## 4.1.2 Outfalls 2A, 2B, and 2C

Outfall 2A will experience a reduction in tributary drainage area as a result of the planned development. The drainage area tributary to Outfall 2B will not be affected by the planned development. All the storm water runoff previously tributary to Outfall 4 will be redirected to Outfall 2C, the upstream terminus of the LACDPW 1264 Drain, resulting in a net increase of 182.8 acres in drainage area tributary to this concentration point. However, this will even out about 200 feet down pipe from the upstream terminus of the LACDPW 1264 Drain.

## 4.1.3 Outfalls 3A and 3B

Outfalls 3A will experience a reduction of 1.6 acres while Outfall 3B will experience an increase of 1.8 acres, in tributary drainage area as a result of the planned development.

## 4.1.4 Outfall 4

The planned development includes the abandonment of Outfall 4. Under the existing conditions, the LACDPW 1264 Drain receives storm runoff from Outfall 4 via a concrete channel and 30-inch RCP inlet. The concrete channel traverses southeasterly through a neighboring community on the south side of the A. T. & S. F. Railroad. The concrete channel confluences with the LACDPW 1264 Drain, approximately 200 feet down pipe from the upstream terminus.

## 4.1.5 Outfalls 5A, 5B, and 5C

Outfall 5A will experience a reduction of 13.8 acres in tributary drainage area as a result of the planned development, 6.9 acres of which will be redirected to Outfall 5B due to changes that will occur to the shared drainage boundary. The drainage area tributary to Outfall 5C will be subjected to a decrease of 2.7 acres, which will be effectively redistributed to Outfall 1.

|         |                  |  | Tributary<br>Drainage Area<br>(acres) |                        |
|---------|------------------|--|---------------------------------------|------------------------|
| Outfall | Drainage<br>Area | D/S System<br>Description  | Existing<br>Condtions                 | Proposed<br>Conditions |
| 1       | 1                | LACDPW 1601 Drain Line "A"<br>(30-inch RCP inlet to 81-inch RCP) | 67.6                                  | 67.1                   |
| 2A      | 2                | concrete channel   | 54.9                                  | 37.7                   |
| 2B      | 2                | North Calera Avenue  | 98.4                                  | 98.4                   |
| 2C      | 2                | LACDPW 1264 Drain (78-inch RCP)                                  | 559.1                                 | 559.1                  |
| ЗA      | 3                | concrete channel   | 75.3                                  | 73.7                   |
| ЗB      | 3                | LACDPW 1601 Drain Line "B"<br>(10' x 2.5' inlet to 42-inch RCP)  | 87.4                                  | 89.2                   |
| 4       | 4                | LACPDW 1264 Drain<br>(concrete channel to 78-inch RCP)           | 182.8                                 | 0.0                    |
| 5A      | 5                | LACDPW Beatty Canyon Channel<br>(Outlet to 78-inch RCP)          | 183.1                                 | 169.3                  |
| 5B      | 5                | LACDPW Beatty Canyon Channel<br>(36" RCP inlet to 69-inch RCP)   | 201.6                                 | 208.5                  |
| 5C      | 5                | LACDPW Beatty Canyon Channel<br>(27" RCP inlet to 69-inch RCP)   | 216.6                                 | 213.9                  |

| Table 4-1 Outfall / Drainage | e Area Comparison | (Existing vs. Proposed) |
|------------------------------|-------------------|-------------------------|
|------------------------------|-------------------|-------------------------|

# 4.2 STORM WATER RUNOFF COMPARISON AND IMPACTS

A comparison of the estimated peak discharges between the existing and proposed conditions is presented in Table 5-2. Most outfalls receiving storm water runoff originating from the Nursery will experience an increase in runoff as a result of the planned development, and therefore require mitigation. Changes in unmitigated peak discharges result from changes in the magnitude and characteristics of the drainage area tributary to each outfall. A detailed discussion is included in Chapter 5.

# 4.3 IMPACTS RELATED TO DEBRIS AND SEDIMENT FLOW

Debris and sediment produced and delivered from the steep mountainous reaches upstream will adversely impact the planned development, if adequate controls are not implemented to supplement the protection provided by the existing LACDPW debris control structures. Due to the bulked nature of debris and sediment-laden flood flows, the existing and proposed system of streets, channels, storm drains, detention basins, and water quality features located downstream may potentially be overwhelmed, and in some cases fail. Properties in the path of debris and sediment-laden flood flows may suffer damage as well.

# 4.4 STORM WATER AND URBAN RUNOFF QUALITY IMPACTS

Storm water and urban runoff quality impacts are expected as a result of the planned development. The Nursery property runoff indirectly discharges at two separate points along the San Gabriel River: 1) approximately two miles upstream from Santa Fe Dam via the Beatty Canyon Channel and 2) between Santa Fe Dam and Whittier Narrows via LACDPW 1264 and 1601 Drains, Little and Big Dalton Wash, and Walnut Channel.

The primary concerns with respect to runoff quality impacts to downstream receiving waters include:

- Gross pollutant discharge (i.e., trash and debris)
- Petroleum by-products (i.e., oil and grease)
- Heavy metals
- Pesticides, herbicides, and fertilizers
- Sanitary quality (i.e., pathogens)

Urbanization can be a source of gross pollutants to downstream receiving waters. The public may consider any trash or debris in the receiving waters an impairment. Commercial and recreational parking areas and streets within the watershed may increase the amount of oil and grease as well as heavy metals transported to receiving waters. Impacts from the use of pesticides, herbicides, and fertilizers, which are associated with landscape maintenance practices, may increase due to development.

Runoff from urban areas may also contain pathogens from soil litter and animal droppings that may impair receiving waters with respect to water contact recreation. Pathogens are of the most concern during dry weather when water contact recreation is at a peak.

There are literally hundreds of constituents that can be found in urban and storm water runoff, most of which will not likely cause receiving water impairments on a routine basis. Other constituents that do have the potential to cause beneficial use impairment that are found in urban runoff include aluminum, ammonia nitrogen, antimony, bis (2ethylhexyl) phthalate, cadmium, chlorine residual, chromium, copper, diazinon, dissolved solids, fluoride, iron, lead, manganese, nickel, nitrate/nitrite (as N), nitrate-N, nitrite-N, pH, phenolics, phosphorus, silver, total suspended solids, turbidity, and zinc.

# 5 MITIGATION MEASURES

## 5.1 STORM WATER RUNOFF MITIGATION MEASURES

Eight (8) storm water detention basins (Facilities 1A, 1B, 1C, 2B, 2C, 3, 4D, and 5B) are proposed to mitigate the increase in peak storm water flows caused by the planned development or correct existing deficiencies. All proposed detention basins are designed as flow-through type basins. As a minimum, the post-project 50-year burned peak flows are mitigated to less than existing levels at each outfall associated with the Project. In some cases, post-project burned peak flows were over-mitigated to compensate for an inadequate receiving storm drain facility located downstream. The existing and proposed storm drain facilities are shown on Exhibit 3 located at the back of this report. The control of debris and sediment immediately upstream of the planned development allows for the design of the proposed system of storm drains and detention basins to be based on burned clear flow.

All proposed detention basins are designed to temporarily store less than 15 acre-feet of storm water runoff volume with the exception of Facility 4D, which provides approximately 28 acre-feet of storage volume with a downstream embankment height of less than 6 feet. All proposed detention basins, without exception, are not subject to state jurisdiction. The conceptual grading plans for the proposed detention basins are presented in Figures 5-1 through 5-8.

## 5.1.1 Outfall 1

The proposed detention basins (Facilities 1A, 1B, and 1C) located in the southwest corner of the Project function in series to mitigate the 50-year post-project burned peak storm water flows produced from Drainage Area 1 to less than existing levels at Outfall 1 as well as below the 10-year design capacity of the downstream receiving storm drain system, LACDPW 1601 Drain Line "A".

## 5.1.2 Outfalls 2A, 2B and 2C

The proposed detention basin, Facility 2B, located immediately upstream of Outfall 2A mitigates the 50-year post-project burned peak storm water flows to less than 40 cfs, to significantly reduce the downstream flooding impacts in the adjacent Glendora neighborhood to the east. As a result, mitigated peak flows are substantially less than existing levels.

The proposed (temporary) detention basin, Facility 2C, located immediately northeast of the upstream terminus of North Calera Avenue (Outfall 2B), mitigates the 50-year post-project burned peak runoff to less than 25 percent of its pre-project condition magnitude to significantly reduce the downstream flooding impacts within the surrounding Glendora neighborhood. This facility is intended to be temporary until an approved permanent alternative solution can be implemented, concurrent with future development of the Glendora property.

Facilities 2B and 2C are specifically designed to comply with the requirements of the settlement agreement between Glendora, Azusa, and the Monrovia Nursery Company,

dated March 18,2003, and Condition No. 34 of Vesting Tentative Tract Map 54057. No ground water conditions will be impacted and the soils engineer will continue to periodically monitor the conditions when these facilities will be in operation. The proposed detention basin, Facility 4D, located adjacent to the east boundary of the Dhammakaya property, functions in series with Facility 2B discussed above to mitigate the 50-year post-project burned peak flows to less than existing levels at Outfall 2C as well as below the 10-year design capacity (920 cfs) of the receiving storm drain system, LACDPW 1264 Drain, located downstream. Due to the temporary nature of Facility 2C, the mitigation benefit provided by this detention basin was ignored. The allowable peak discharge at outfall 2C is 895 cfs based on the 1.6cfs/acre rate provided by the County of Los Angeles, and included in the technical appendix.

## 5.1.3 Outfalls 3A and 3B

The proposed detention basin, Facility 3, located at the upstream terminus of existing concrete channel within the Lakeview Terrace Condominium property, mitigates the 50-year post-project burned peak flows to less than existing levels at Outfall 3A (upstream terminus of the channel) and Outfall 3B (downstream terminus of the channel). The 50-year peak discharge, in excess of the design capacity, will likely overflow on to Tenth Street, as in the existing conditions, since Line "B" is only sized to convey the existing conditions 10-year storm event.

## 5.1.4 Outfall 4

The abandonment of Outfall 4 is included as part of the proposed conditions. The planned development redirects most of the storm water runoff originally produced by Drainage Area 4 from Outfall 4 to Outfall 2C. The remaining amount is redirected to Outfall 1 (LACDPW 1601 Drain Line "A"). Outfall 2C and Outfall 4 discharge to the same receiving storm drain system, LACDPW 1264 Drain. The 10-year design capacity at both confluence points is 920 cfs, based data provided on as-built plans.

## 5.1.5 Outfalls 5A, 5B and 5C

Approximately 14 acres of the drainage area tributary to LACDPW Beatty Basin is redirected to Outfall 5B under the proposed conditions as a result of the proposed grading associated with the planned development. As a result, the 50-year post-project burned peak flows are less than existing levels at the upstream terminus of LACDPW Beatty Canyon Channel (Outfall 5A).

The proposed detention basin, Facility 5B, located within the proposed park downstream of LACDPW Beatty Basin and north of Sierra Madre Avenue, mitigates the 50-year post-project burned peak flows to less than existing levels at Outfall 5B (36-inch RCP inlet) and Outfall 5C (27-inch RCP) as well as below the 50-year design capacity of the receiving storm drain system, LACDPW Beatty Canyon Channel, located downstream.

|                 |                  |                |                  |                               |   |                           | Outflow                   | 0                                  | Q <sub>b50</sub>           |                               |
|-----------------|------------------|----------------|------------------|-------------------------------|---|---------------------------|---------------------------|------------------------------------|----------------------------|-------------------------------|
| Facility<br>No. | Drainage<br>Area | TDA<br>(acres) | Invert<br>(feet) | Enbankment<br>Crest<br>(feet) | Outlet<br>Structure<br>Type                                     | Q <sub>b50</sub><br>(cfs) | Q <sub>b50</sub><br>(cfs) | Q <sub>b50</sub><br>WSEL<br>(feet) | Storage<br>Used<br>(ac-ft) | Maximum<br>Storage<br>(ac-ft) |
| 1A              | 1                | 8.8            | 630.0            | 638.0                         | 18-inch RCP<br>(FHWA HDS-5 Chart 1-1)                           | 24                        | 6                         | 631.4                              | 0.8                        | 3.8                           |
| 1B              | 1                | 48.4           | 627.0            | 633.0                         | 39-inch RCP<br>(FHWA HDS-5 Chart 1-1)                           | 111                       | 53                        | 630.9                              | 2.5                        | 3.7                           |
| 1C              | 1                | 67.1           | 621.0            | 629.0                         | 36-inch RCP<br>(FHWA HDS-5 Chart 1-1)                           | 94                        | 55                        | 625.5                              | 2.0                        | 3.6                           |
| 2B              | 2                | 37.7           | 765.0            | 771.0                         | 2.5' x 2.5' RCB<br>(FHWA HDS-5 Chart 8-1)                       | 128                       | 36                        | 768.1                              | 2.1                        | 3.6                           |
| 2C              | 2                | 98.4           | 806.6            | 817.0                         | 6' x 1' RCB<br>(FHWA HDS-5 Chart 8-1)                           | 281                       | 65                        | 912.0                              | 5.6                        | 10.7                          |
| 3               | 3                | 73.7           | 682.0            | 692.0                         | 2 x 30-inch RCP<br>(FHWA HDS-5 Chart 1-1)                       | 201                       | 133                       | 691.0                              | 1.7                        | 1.9                           |
| 4D              | 2, 4             | 462.1          | 668.0            | 680.0                         | Improved 78-inch RCP<br>Taper = 6 to 1<br>(FHWA HDS-5 Chart 56) | 1,168                     | 556                       | 677.7                              | 23.9                       | 27.6                          |
| 5B              | 5                | 26.2           | 752.0            | 756.0                         | 14' x 5" Curb Inlet<br>(FHWA HEC-12 Chart 13)                   | 91                        | 51                        | 754.9                              | 0.8                        | 1.2                           |

#### Table 5-1 Proposed Detention Basin Preliminary Design Specifications

TDA = tributary drainage area;  $Q_{b50}$  = 50-year burned peak discharges, respectively, WSEL = water surface elevation

Box Culvert Analysis computer program version 1.6 of 1985, 1986 and Pipe Culvert Analysis program version 1.7 of 1984-1986 by Dodson & Associates Inc. which applies nomograph charts from Federal Highway Administration publications, HDS-5 (1985/2001) and HEC-22 (2001), were used to develop the outlet structure performance curve for each basin (i.e., stage versus discharge).

|         | D/S System   |                              |                  | Existing       |                           |                            |                  | Proposed Conditions |                           |  |  |
|---------|--|------------------------------|------------------|----------------|---------------------------|----------------------------|------------------|---------------------|---------------------------|--|--|
|         |  | Assumed                      | Conditions       |                |                           |                            | Mitigated        |                     |                           |  |  |
| Outfall | Description  | Design<br>Discharge<br>(cfs) | Drainage<br>Area | TDA<br>(acres) | Q <sub>b50</sub><br>(cfs) | Q <sub>bb50</sub><br>(cfs) | Drainage<br>Area | TDA<br>(acres)      | Q <sub>b50</sub><br>(cfs) |  |  |
| 1       | LACDPW 1601 Drain Line "A"<br>(30-inch RCP inlet to 81-inch RCP) | 70                           | 1                | 67.6           | 98                        |                            | 1                | 67.1                | 55                        |  |  |
| 2A      | concrete channel   | 40                           | 2                | 54.9           | 150                       | 295                        | 2                | 37.7                | 36                        |  |  |
| 2B      | North Calera Avenue  | 70                           | 2                | 98.4           | 281                       | 525                        | 2                | 98.4                | 65                        |  |  |
| 2C      | LACDPW 1264 Drain (78-inch RCP)                                  | 920                          | 2                | 559.1          | 1,452                     | 2,461                      | 2 and 4          | 559.1               | 686                       |  |  |
| ЗA      | concrete channel   | 124                          | 3                | 75.3           | 206                       | 412                        | 3                | 73.7                | 133                       |  |  |
| 3B      | LACDPW 1601 Drain Line "B"<br>(10' x 2.5' inlet to 42-inch RCP)  | 137                          | 3                | 87.4           | 241                       | 448                        | 3                | 89.2                | 62                        |  |  |
| 4       | LACPDW 1264 Drain<br>(concrete channel to 78-inch RCP)           |                              | 4                | 182.8          | 514                       | 912                        |                  |                     |                           |  |  |
| 5A      | LACDPW Beatty Canyon Channel<br>(Outlet to 78-inch RCP)          | 760                          | 5                | 183.1          | 595                       |                            | 5                | 169.3               | 577                       |  |  |
| 5B      | LACDPW Beatty Canyon Channel<br>(36" RCP inlet to 69-inch RCP)   | 837                          | 5                | 201.6          | 641                       |                            | 5                | 208.5               | 625                       |  |  |
| 5C      | LACDPW Beatty Canyon Channel<br>(27" RCP inlet to 69-inch RCP)   | 899                          | 5                | 216.6          | 686                       |                            | 5                | 213.9               | 640                       |  |  |

#### Table 5-2 Proposed Storm Water Peak Runoff Mitigation Summary

TDA = tributary drainage area;  $Q_{b50}$  and  $Q_{bb50}$  = 50-year burned and burned & bulked peak discharges, respectively

# 5.2 DEBRIS AND SEDIMENT CONTROL MITIGATION MEASURES

Debris and sediment produced from the upper natural reaches of the Nursery property will be controlled by five (5) proposed debris basins (Facilities 2A, 4A, 4B, 4C, and 5A) to function in conjunction with the existing debris control facilities in order to provide adequate protection for the downstream planned development. The existing and proposed debris control facilities are shown in Figure 5-9 as well as in Exhibit 3 located at the back of this report. Table 5-3 presents the estimated debris production volume tributary to each proposed debris basin. Proposed debris basins shall be designed to adequately mitigate the tributary debris and sediment volume in accordance with the LACDPW Sedimentation Manual (1993) and Debris Dams and Basins Design Manual (1979).

|          | Tributary<br>Drainage Area |       |             | Debris<br>Potential | Debris<br>Production<br>Rate | Debris P<br>Volu | roduction<br>ume |
|----------|----------------------------|-------|-------------|---------------------|------------------------------|------------------|------------------|
| Facility | acres                      | mi²   | Basin       | Area                | (cy/mi <sup>2</sup> )        | су               | ac-ft            |
| 5A       | 12.0                       | 0.019 | Los Angeles | DPA-1               | 240,000                      | 4,500            | 2.8              |
| Beatty   | 149.0                      | 0.233 | Los Angeles | DPA-1               | 170,000                      | 39,578           | 24.5             |
| 4A       | 16.9                       | 0.026 | Los Angeles | DPA-1               | 240,000                      | 6,338            | 3.9              |
| 4B       | 5.0                        | 0.008 | Los Angeles | DPA-1               | 240,000                      | 1,875            | 1.2              |
| 4C       | 43.2                       | 0.068 | Los Angeles | DPA-1               | 240,000                      | 16,200           | 10.0             |
| 2A       | 6.0                        | 0.009 | Los Angeles | DPA-1               | 240,000                      | 2,250            | 1.4              |

 Table 5-3 Estimated Debris Production Volumes

## 5.3 STORM WATER AND URBAN RUNOFF QUALITY MITIGATION MEASURES

The proposed water quality Best Management Practices (BMPs), which include CDS devices, Drainpac® catch basin inserts, and wet ponds, are shown in Exhibit 3 located at the back of this report. The proposed detention basins and BMP structures collectively satisfy the requirements set forth by the Standard Urban Storm Water Mitigation Plan (SUSMP) for Los Angeles County and Cities in Los Angeles County.

## 5.3.1 CDS Devices

Seven (7) CDS devices or their equivalent are proposed to treat a majority of the storm water and urban runoff received by the tributary storm drain system, prior to discharging to a detention basin downstream. Table 5-4 shows the proposed CDS device preliminary design specifications. The Peak mitigation flow rates were determined per the procedure outlined in the Los Angeles County Manual for Standard Urban Storm Water Mitigation Plan (SUSMP), dated September 2002.

All peak mitigated flow rates  $(Q_{pm})$  are based on the maximum allowable time of concentration (30 minutes). The intensity and undeveloped runoff coefficient used for all calculations were 0.193 inches per hour and 0.1, respectively.

| CDS<br>Device | Drainage<br>Area | Location           | Total<br>TDA<br>(acres) | Developed<br>TDA<br>(acres) | Q <sub>PM</sub><br>(cfs) | Q <sub>b50</sub><br>(cfs) |
|---------------|------------------|--------------------|-------------------------|-----------------------------|--------------------------|---------------------------|
| WQ-1A         |                  | U/S of Facility 1A | 8.8                     | 8.8                         | 1.1                      | 24                        |
| WQ-1B         | 1                | U/S of Facility 1B | 39.6                    | 39.6                        | 5.0                      | 111                       |
| WQ-1C         |                  | U/S of Facility 1C | 18.7                    | 18.7                        | 2.3                      | 94                        |
| WQ-2          | 2                | U/S of Facility 2B | 37.7                    | 16.3                        | 1.8                      | 128                       |
| WQ-3          | 3                | U/S of Facility 3  | 73.7                    | 73.7                        | 5.8                      | 201                       |
| WQ-4B         | 4                | U/S of Facility 4D | 181.3                   | 116.2                       | 9.5                      | 498                       |
| WQ-5B         | 5                | U/S of Facility 5B | 26.2                    | 10.0                        | 1.2                      | 91                        |

 Table 5-4 Proposed CDS Device Preliminary Design Specifications

TDA = tributary drainage area;  $Q_{PM}$  = peak mitigated flow rate;  $Q_{b50}$  = 50-year burned flow rate

#### 5.3.2 Catch Basin Inserts

Catch basins connected to an onsite storm drain system that discharges directly to an offsite storm drain facility will rely on catch basin inserts to mitigate storm water and urban runoff quality impacts. Drainpac® catch basin inserts or their equivalent will be implemented at locations indicated by structural BMP identifiers WQ-4C and WQ-5A. The total tributary area to WQ-4C (catch basins inserts) is approximately 97 acres, producing a total Qb50 of approximately 188 cfs and a total Qpm of 3.0 cfs. The specific Qpm for each catch basin insert will be provided in final design. Additional catch basin inserts will be specified as needed. Catch basin inserts will also be used to treat storm water and urban runoff not treated previously by a proposed CDS device, prior to discharging to a proposed detention basin.

## 5.3.3 Wet Ponds

A series of six (6) proposed wet ponds, located in the proposed riparian corridor along the east side of Street "A" south of Sierra Madre Avenue and along the east side of Street "B" north of Sierra Madre Avenue. These wet ponds will collectively treat the required storm water volume to be mitigated,  $V_m$ , estimated at 2.0 acre-feet based on a total tributary drainage area of 123.3 acres (65.1 acres undeveloped). These wet ponds will also help establish and sustain the constructed riparian habitat within the designated corridor.

Figure 5-1 Proposed Detention Basin (Facility 1A) Conceptual Grading Plan

Figure 5-2 Proposed Detention Basin (Facility 1B) Conceptual Grading Plan

Figure 5-3 Proposed Detention Basin (Facility 1C) Conceptual Grading Plan

Figure 5-4 Proposed Detention Basin (Facility 2B) Conceptual Grading Plan

Figure 5-5 Proposed Detention Basin (Facility 2C) Conceptual Grading Plan

Figure 5-6 Proposed Detention Basin (Facility 3) Conceptual Grading Plan.

Figure 5-7 Proposed Detention Basin (Facility 4D) Conceptual Grading Plan

Figure 5-8 Proposed Detention Basin (Facility 5) Conceptual Grading Plan.

Figure 5-9 Existing and Proposed Debris Control Structures

# 6 CONSTRUCTION IMPACTS AND MITIGATION

## 6.1 EROSION, SEDIMENT, AND POLLUTANT CONTROL

This section describes the construction program for addressing sediment, erosion, and pollutant control. The program outlined herein is intended to comply with the General Construction Permit, and Azusa, Glendora, and County grading manuals and ordinances.

### 6.1.1 Erosion Control

Erosion control will include maintenance of interim natural vegetative growth on pads and slopes, paving and landscaping. Hydro-seeded slopes will be covered with a mix containing a soil-binding agent to be applied at a rate of 120 pounds per acre. The binding agent will stabilize the soil prior to the establishment of a vegetative cover. Irrigation and landscaping will occur as the site is graded and water is available. Figure 6-1 summarizes the work program for erosion control implementation. This procedure has also been applied to large mass-graded pads. An Erosion Control Plan and a Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and implemented as part of the Project.

## 6.1.2 Sediment Control

Descriptions or illustrations of BMPs that will be implemented to prevent a net increase of sediment load in storm water discharge relative to pre-construction levels are included in the Erosion Control Plan and SWPPP Implementation Plan. Sediment control BMPs will be installed at appropriate locations along the site perimeter and at all operational internal inlets to the storm drain system at all times during the wet season. Sediment control practices may include filtration devices and barriers (e.g., fiber rolls, silt fences, and gravel inlet filters) and settling devices (e.g., sediment trap or desilting basin).

During the dry season, adequate sediment control materials shall be available to control sediment discharges at the downgrade perimeter and operational inlets in the event of a predicted storm. A full range of sediment controls should be considered. At a minimum, an effective combination of erosion and sediment control shall be implemented on all disturbed areas during both the wet and dry season.

Figure 6-1 Overall Erosion Control Plan

The following practices will be implemented, as required, to reduce or prevent a net increase in sediment load in a storm water discharge:

- Gravel bags, berms, and/or silt fences may be used to divert drainage from adjacent undeveloped hills around the active construction area.
- Gravel bags, silt fences, fiber rolls, hay bales, and/or desilting basins will be used to desilt runoff within the Project. The storm water runoff will be collected and desilted prior to entering the underground storm drain system and/or where runoff exits the Project.
- Gravel bags, berms, and/or rock dams will be used as check dams in existing channels.
- Interim desilting basins will be maintained pending completion of construction of connections to the storm drains discharging to offsite facilities.
- Concentrated flows will be avoided, where possible.

# 6.1.2.1 Control of Sedimentation during Construction

In order to minimize the impacts of construction operation with respect to sedimentation, erosion control measures during and immediately following grading operation will be necessary. Soil loss will occur due to sheet erosion and channel erosion, therefore, these two processes must be properly controlled. The most serious erosion occurs along slopes; therefore, soil on steep slopes must be preserved by planting to reduce this potential. The following stabilizing agents can be used during the interim period before groundcover becomes established:

- Polymer with seed mix,
- Bonded fiber matrix,
- Rolled erosion control material,
- Straw,
- Wood chips, and
- Plastic (visqueen).

Overland flow must be prevented from running uncontrolled over slopes. The top of slopes should bermed to prevent overflow. Due to the steep terrain in the watershed, the overland flows will probably have high erosive velocities and will need to be slowed to tolerant limits. Possible solutions include gravel bag dams placed perpendicular to the flow or to direct the overland flow into temporary gravel-bottom channels. In addition, energy dissipation devices should be provided to prevent erosion of natural channel beds directly downstream of high-velocity storm drain outlets. In general, the basic principles involved in effectively controlling erosion and sedimentation include the following:

- Leave the soil exposed for the shortest time possible,
- Provide protective cover for the soil utilizing vegetation,

- Reduce the velocity and control the flow of runoff,
- Retain runoff onsite to trap sediment,
- Release runoff safely to downstream areas,
- Use gravel bags and/or silt fences at toes of slopes, and
- Use gravel bags around catch basins and along the top of curb of paved streets.

Sediment control structures should be provided where construction has created a potential for erosion.

#### 6.1.3 Pollutant Control

The delivery, loading, unloading, storage, and use of construction materials, equipment, and vehicles on the job site will be actively controlled and managed through the construction specifications and the management practices listed below.

Material staging and vehicle parking areas will be located away from storm drain inlets and will be protected from surface storm water flows using gravel bags, silt fences, fiber rolls, and/or berms constructed of earthen materials. Any water-soluble construction materials will be stored in enclosed containers or covered with plastic sheeting to protect them from direct contact with rainfall. Waste oil and fuel storage areas will be contained, provided with sumps and impervious plastic liners, to prevent leakage into storm water flows, or equipped with spill containment pallets.

Contractors and subcontractors shall be required to perform on-site operations, including fueling and equipment maintenance in such a manner to prevent contamination of the soil. Storage tanks shall be required for used oil or other equipment maintenance waste products. These waste products will then be exported from the construction site to an appropriate offsite disposal station. Spillage of any waste of significant magnitude will be cleaned up and processed in accordance with industry standards, and governing ordinances and regulations. Dumping of used oil, solvents, or contaminated soil into a storm drain or natural drainage course is strictly forbidden. Subcontractors shall be familiar with and comply with all federal, state, and local laws, codes, ordinances, and regulations that pertain to the protection of surface and groundwater quality from storm water runoff. The Owner shall ensure that its employees, contractors, contractor's employees, subcontractors, and subcontractor's employees do not discharge such chemicals on the site and do not engage in cleanup, or repair activities on the site, which will result in the discharge of such chemicals. The Owner shall ensure that its employees, contractors, contractor's employees, subcontractors, and subcontractor's employees will, upon completion of all work, remove all supplies, materials, and waste on the site, which if exposed, could result in the discharge of such chemicals into storm water or soil.

Construction of the planned community shall adhere to sound construction practices, which require contractors, among other things, to keep equipment in good condition (e.g., no fluid leaks). Contractors are required to ensure that equipment and facilities meet requirements of ordinances and laws; keep the work site clean and free from rubbish and

debris; keep paved areas clean; clear the work site of equipment and unused material; comply with air pollution regulations; provide sanitation and control wastewater; provide water pollution, mud, and silt control to protect storm drain inlets; and manage drainage within and throughout the job site.

# 6.1.3.1 Methods of On-Site Storage and Disposal of Construction Material

Materials shall be stored on the job site in a manner that will ensure the preservation of their quality and fitness for work and to facilitate prompt inspection. When appropriate, materials shall be stored off the ground on pallets or platforms. Storage of materials on bare ground shall be avoided whenever possible. Covers shall be placed over the materials to divert storm water runoff away from them to avoid contamination of such runoff.

Among the construction items that will be on-site are:

- Temporary toilets for employee During construction, these shall be emptied by tank truck with the contents disposed of into a sanitary sewer.
- Concrete ready mix in trucks Special concrete washout pits shall be constructed for wash out of concrete trucks so that the concrete can cure before proper disposal.
- Asphalt and asphalt laying equipment shall only be on-site for a short time. When this equipment remains overnight, it will be parked on the streets being paved.
- Toxic, hazardous, and volatile waste will be stored in appropriate covered containers, and removed from the premises on a regular basis. Adequate ventilation will be provided during the use of volatile or noxious substances.

The following chemicals are expected to be the most commonly used on the Project site:

- Construction film (e.g., polyethylene or modified polyethylene),
- Small amounts of PVC glue, a limited amount of lime for use as a marker, and
- Chlorine used in water line testing to kill bacteria.

Cleaning and disposal operations will be conducted to comply with local ordinances and anti-pollution laws. The contractor shall not burn or bury rubbish and waste materials on the Project site or dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm drains and sanitary sewer. Waste generated by construction activity on the site generally is considered domestic waste, equipment maintenance waste, or excess earthen material.

Typical domestic waste includes such items as broken vitrified clay pipe, PVC scraps, used and broken survey stakes, used corrugated metal pipe, packing materials, paper, and broken gravel bags, which can be disposed of at a sanitary landfill permitted for the disposal of domestic waste. Domestic waste shall be placed in a dumpster for disposal at a sanitary landfill. Any transport of domestic waste by the contractor or subcontractors

shall be done in accordance with all County and local waste management requirements. Waste transport vehicles shall be covered to prevent the loss of waste in transit.

Equipment maintenance waste such as fuel, oil, and lubricant contaminated materials and soil, solvents, hydraulic fluid, anti-freeze, and containers, etc., shall be collected and stored on-site in an approved manner in covered containers prior to disposal at a landfill permitted to accept and dispose of such waste. Transport of equipment maintenance waste shall conform, in all respects, to the County and local waste management requirements.

Excess earthen materials, rock, and concrete shall be recycled or disposed of at a sanitary landfill permitted to accept domestic waste, as described earlier. Excess earthen materials, rock, and concrete shall not be dumped into drainage structures or drainage channels.

# 6.2 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A SWPPP will be required for any site disturbing more than one acre, and must, at a minimum, contain the information presented in the SWPPP checklist available from the State Regional Water Quality Control Board. Azusa, Glendora, and/or County may require that additional information be presented in the SWPPP. The work program flowchart in Figure 6-2 illustrates what items need to be included in the SWPPP.

Figure 6-2 Storm Water Pollution Prevention Plan Development

The SWPPP shall be updated and maintained on the site in the construction trailer by the Owner throughout the construction process. In addition, a copy of the SWPPP shall be made available to representatives of the Los Angeles Regional Water Quality Control Board, Azusa, Glendora, or the County upon request. The typical program flowchart in Figure 6-3 outlines the procedure to follow once the SWPPP is completed until 3 years after construction completion.

The SWPPP should be prepared to meet the following objectives:

- Identify potential pollutant sources that may affect the quality of storm water discharges associated with construction activity from the construction site, and
- Identify non-storm water discharges, and
- Identify, for construction and implementation in accordance with a time schedule, Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and non-storm water discharges form the construction site during construction, and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).

Figure 6-3 Storm Water Pollution Prevention Plan

# 7 IMPLEMENTATION PLAN

## 7.1 **RESPONSIBILITIES OF OPERATION AND MAINTENANCE**

Responsibilities for the operation and maintenance of temporary and permanent Best Management Practices (BMPs) within the Project, during construction and following the completion of the Project will be addressed under a separate agreement.

## 7.2 OPERATION AND MAINTENANCE

The operation and maintenance associated with each Structural mitigation measure is discussed in the following section. Estimated operation and maintenance costs are also provided.

The operation and maintenance costs are based on the following task components: administration, operation, maintenance, vector control, equipment use, and direct costs. Activities and items included under each task are described below:

#### Administration

- General Support and Follow-up
- Travel: includes travel time to and from BMP sites for operation and maintenance purposes
- Allowance for unscheduled events

For the purposes of estimating potential administration time for the O&M of the proposed BMPs within the Project, an administration cost of 15% of the O&M cost was assumed based on the review of data from BMP programs.

#### Operation

- Wet season inspections as specified in the BMP Maintenance Plan
- Dry season inspections as specified in the BMP Maintenance Plan
- Unscheduled inspections/field calls

#### Maintenance

- Scheduled maintenance, including time at the BMP required for maintenance activities as described in the BMP Maintenance Guidelines
- Unscheduled maintenance
- Vandalism repair

#### Vector Control

• Coordination with the Vector Control Agency as needed

- Vector Prevention Maintenance, including time at the BMP required to perform vector prevention maintenance activities as specified by the Vector Control agency.
- Response to Vector Control District (VCD) call maintenance
- Vector Control District (VCD) effort maintenance, including hours and average rate reported by the contracted Vector Control Agency.

## Equipment

- Equipment rental fees, fuel, and wear and tear.
- Direct costs
- Vector control agency supplies
- Vehicle rental /lease
- Field supply/expendables
- Landscape maintenance
- Sediment removal
- Sediment analysis
- Sediment disposal

# 7.2.1 Catch Basin Inserts

DrainPac® catch basin inserts are a flexible storm drain collection and filtration liner designed to collect contaminants and debris prior to discharge into the storm drain. The filtration liner traps suspended solids in a basket minimizing discharge of heavy metals and petroleum hydrocarbons. The filters should be cleaned on a biannual basis. Filters located downstream of construction activity should be cleaned on an as needed basis.

# 7.2.1.1 Operation and Maintenance Practices

Table 7-1 Inlet Filters Preventive Maintenance and Routine Inspections

| Design Criteria and  | Maintenance             | Inspection           | Maintenance Activity |
|----------------------|-------------------------|----------------------|----------------------|
| Routine Actions      | Indicator               | Frequency            |                      |
| Inspect for          | Sufficient debris/trash | Weekly during        | Remove and dispose   |
| debris/trash         | that could interfere    | extended wet periods | of debris/trash      |
|                      | with proper function of | Bimonthly during the |                      |
|                      | filter                  | dry season           |                      |
| Inspection and       | Broken or otherwise     | Monthly              | Replace filter/liner |
| structural integrity | damaged filter          |                      |                      |

The expected lifespan for the DrainPac® components are summarized below:

• Support and frame should last forever unless subjected to prolonged ultraviolet exposure
• Filter needs to be replaced every 3 to 4 years

## 7.2.2 Continuous Deflective Separation Device

The Continuous Deflective Separation (CDS) device is a non-blocking, non-mechanical screening process, which will provide a second line of defense for solids removal. CDS devices are self-operating. They have no moving parts and they are entirely gravity driven, requiring only the hydraulic energy available within the storm water flow. The screens and supporting hardware are stainless steel and will resist corrosion.

CDS devices have very large sump capacities relative to their design flows, and only need to be cleaned out with a standard vacuum truck approximately one to four times per year. This operation eliminates workers' exposure to the materials captured in a CDS device.

#### 7.2.2.1 Operation and Maintenance Practices

|   | 1  | 1   | 1   |
|---|--|---|---|
| Design Criteria and   | Maintenance  | Inspection  | Maintenance Activity  |
| Routine Actions   | Indicator  | Frequency   | _   |
| Inspection for  | Device 85% full  | Monthly during the  | Empty device when it  |
| and debris  |  | wei season  | in May  |
| Inspect for vector<br>harborage   | Standing water for more than 72 hours                              | Monthly and 72 hours<br>after target storm<br>event                           | Immediately notify<br>VCD for vector<br>abatement<br>assessment   |
| Inspect the screen for<br>damage and to<br>ensure that it is<br>properly fastened | Screen becomes<br>clogged, damaged, or<br>loose                    | Annually, prior to wet season   | Brush or high<br>pressure wash the<br>screen  |
| Inspection for<br>structural integrity  | Holes in screen, large<br>debris, damage to<br>housing or weir box | Monthly or prior to a target storm during the wet season, and annually in May | Immediately consult<br>with engineer and<br>manufacturer's<br>representative to<br>develop a course of<br>action, effect repairs<br>within 10 working<br>days |

Table 7-2 CDS Device Preventive Maintenance and Routine Inspections

### 7.2.3 Wet Ponds

The purpose of the proposed wet ponds is to aid in the removal of pollutants. Wet ponds provide the following pollutant removal mechanisms: settling or sedimentation; adsorption to sediments, vegetation, or detritus; filtration by plants; microbial uptake and/or transformations; and uptake by wetland plants or algae.

## 7.2.3.1 Operation and Maintenance Practice

| Design Criteria and<br>Routine Actions  | Maintenance Indicator   | Inspection Frequency  | Maintenance Activity  |
|---|---|---|---|
| 24-hour draw-down<br>measured between the<br>rim of the outlet structure<br>and invert of the water<br>quality orifice in the<br>outlet structure | Draw-down greater than<br>25 hours or water is<br>flowing over weir   | Once during the wet<br>season and after<br>completion or<br>modification of the<br>facility | <ul> <li>If &gt; 25 hours:</li> <li>Open gate to<br/>discharge water to<br/>permanent pool<br/>elevation, clear<br/>outlet of debris, and<br/>consult engineer if<br/>needed</li> <li>If water is spilling<br/>over weir, open<br/>canal gate until<br/>water level is at<br/>permanent pool<br/>elevation</li> <li>Check/clear outlet<br/>of debris/trash</li> </ul>   |
| Inspect for sediment<br>accumulation in forebay<br>and main pond  | More than 2 inches in<br>forebay and 4 inches in<br>main pond, or sediment<br>depth exceeds marker<br>on staff gage   | When pond is drained<br>for vegetation removal,<br>or every 3 years                         | <ul> <li>Remove and<br/>properly dispose of<br/>sediment</li> <li>By November,<br/>restore vegetation<br/>to the plan shown<br/>on the as-built<br/>drawings</li> </ul>   |
| General Maintenance<br>Inspection   | Inlet structures, outlet<br>structures, side slopes<br>or other features<br>hindered by debris or<br>damaged, significant<br>erosion, graffiti or<br>vandalism, and fence | Semi-annually, late wet<br>season and late dry<br>season                                    | <ul> <li>Take corrective<br/>action, or restore to<br/>as-constructed<br/>condition prior to<br/>wet season</li> <li>Consult engineer if<br/>immediate solution<br/>is not evident</li> </ul>   |
| Inspect open water zone<br>for vegetation coverage<br>and density to sustain<br>vector abatement<br>efficacy                                      | Observable vegetation<br>coverage / density   | Annually  | <ul> <li>Have a biologist<br/>survey the wet pond<br/>to determine if any<br/>birds are nesting or<br/>other sensitive<br/>animals are present</li> <li>If birds are nesting,<br/>with advice from the<br/>biologist, proceed<br/>with the<br/>maintenance</li> <li>Lower and maintain<br/>the water level to<br/>expose the area to<br/>be maintained (do<br/>not completely drain<br/>the pond)</li> <li>Cut vegetation</li> <li>Dispose of the<br/>vegetation material<br/>in a landfill or other<br/>appropriate disposal<br/>area</li> </ul> |

 Table 7-3 Wet Pond Preventive Maintenance and Routine Inspections

| Design Criteria and<br>Routine Actions | Maintenance Indicator  | Inspection Frequency                   | Maintenance Activity  |
|--|--|--|---|
|  |  |  | Restock mosquito<br>fish as<br>recommended by<br>the Vector Control<br>Agency   |
| Inspect shallow water<br>bench         | Vegetation density is<br>such that mosquito fish<br>can not swim freely in<br>the planted area | Annually                               | <ul> <li>Annually, or at<br/>special request of<br/>the local Vector<br/>Control Agency</li> <li>Have a biologist<br/>survey the wet pond<br/>to determine if any<br/>birds are nesting or<br/>other sensitive<br/>animals are present</li> <li>If birds are nesting,<br/>with advice from the<br/>biologist, proceed<br/>with the<br/>maintenance</li> <li>Lower and maintain<br/>the water level to<br/>expose the area to<br/>be maintained (do<br/>not completely drain<br/>the pond)</li> <li>Cut vegetation to<br/>below the<br/>permanent pool<br/>water surface</li> <li>Dispose of the<br/>vegetation material<br/>in a landfill or other<br/>appropriate disposal<br/>area</li> <li>Monitor vegetation<br/>density quarterly to<br/>determine grow<br/>back rate</li> </ul> |
| Inspect for burrows                    | Burrows, holes, and mounds   | Annually and after vegetation trimming | Where burrows cause<br>erosion or jeopardize<br>structural integrity,<br>backfill firmly  |

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Exhibit 1 Hydrology Study Map for MTD 1761 (Existing Conditions)

Exhibit 2 Hydrology Study for MTD 1761(Proposed Conditions – Onsite & Offsite)

Exhibit 3 Existing and Proposed Storm Water Facilities.

Appendix A LACDPW Modified Rational Method – Parameter Development Appendix B

LACDPW Modified Rational Method – Existing Conditions

B-1: 50-year Storm Event (Clear Water)

B-2: 50-year Storm Event (Burned)

Appendix C

LACDPW Modified Rational Method – Proposed Conditions (Mitigated)

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- Reference table for Main Report Tables Computer run locations.
- LACDPW Allowable Discharge Summary
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Appendix B: LACDPW Modified Rational Method - Existing Conditions

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