

**PRELIMINARY DRAINAGE, DETENTION, AND SUSMP ANALYSIS
FOR
MONROVIA NURSERY PROJECT – GLENDORA PORTION
(PROGRESS SUBMITTAL)**

**Job Number 15927
June 15, 2009
Revised: October 30, 2009**

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FOR
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(PROGRESS SUBMITTAL)

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June 15, 2009
Revised: October 30, 2009

TABLE OF CONTENTS

1.0	Introduction.....	1
2.0	Hydrology and Detention.....	2
3.0	Hydraulics.....	5
4.0	Water Quality (SUSMP).....	6
5.0	Conclusion	9

Appendices:

Appendix A: Summary Tables Showing Results of Los Angeles County Department of Public Work's (LACDPW) Modified Rational Method for Detention Basins 2B, 4D, G1 and Outfall 2C (from various sources)

Appendix B: Los Angeles County Department of Public Work's (LACDPW) Modified Rational Method 50-year Storm Event [Pre-Project]

Appendix C: Los Angeles County Department of Public Work's (LACDPW) Modified Rational Method 50-year Storm Event [Post-Project]

Appendix D: Backup Materials for Los Angeles County Department of Public Work's (LACDPW) Modified Rational Method

Appendix E: Exhibits showing "Preliminary Storm Drain Layout" and "Preliminary Water Quality BMP Layout" (2 sheets, 11"x17")

Map Pockets:

Map Pocket 1: Drainage Study Map for Monrovia Nursery [Pre-Project]

Map Pocket 2: Drainage Study Map for Monrovia Nursery [Post-Project]

1.0 INTRODUCTION

At the request of the City of Glendora, Rick Engineering Company has prepared a preliminary hydrology study to analyze the hydrologic impacts of development for the north and south portions of the City of Glendora Monrovia Nursery project area. The Monrovia Nursery property previously comprised nearly 600 acres that extended across the City of Azusa and City of Glendora. A portion of the property was sold in recent years for the development of the City of Azusa portion, leaving the City of Glendora portion as a separate development project.

The two projects share the same overall watershed and are tributary to an existing LACDPW storm drain line, 1264 Drain – 78-inch RCP, located adjacent to Citrus Avenue near the railroad crossing. Therefore, during planning stages for the Glendora project, our design team has reviewed the design criteria utilized and approved by the City of Glendora, City of Azusa, and LA County DPW for allowable discharge rates into this downstream storm drain system. A report was prepared by RBF Consulting and approved by all three parties titled “Hydrology Study for MTD 1761, Monrovia Nursery, San Gabriel River Watershed,” dated August 8, 2005.

The August 8, 2005 report identified two detention basins that were to be constructed by the City of Azusa project, known as Detention Facilities 2B and 4D, while the storage volume for 4D was also designed to accept runoff from a large area of the Glendora portion of the watershed on a temporary basis. With the development of the Glendora project, an additional Detention Facility, G1, will be constructed at the southwest corner of the Glendora project. With the construction of G1 in this location, the Glendora portion of 4D can be filled and runoff that had been temporarily conveyed to the detention facility 4D will be conveyed within a proposed storm drain system down Baldy Vista Avenue and directed into G1. During later stages of engineering, a geotechnical engineer will provide recommendations for over-excavation and compaction requirements for the filling of this part of G1.

2.0 HYDROLOGY & DETENTION

Only a portion of the preliminary hydrology study has been completed thus far. The initial focus was to prepare the hydrologic and detention analyses for the proposed Glendora project in order to obtain preliminary volumes and discharge rates at each of the detention facilities.

The following provides an overview of the names and locations of detention basins for reference purposes, followed by an overview of the content provided within the draft/progress hydrology study.

Overview for Names and Locations of Detention Basins

Throughout the many previous reports prepared as part of the Azusa project and within the attached report for the Glendora project, several detention basins are discussed and identified. To help provide clarity to the names and locations of these various basins, the basins relevant to the Glendora project are listed below with a brief description:

- (Existing) Facility 2B (or Area D Basin), at Node 2a – this is located just west of West Leadora Avenue, on the City of Azusa side of the City boundary line. It was constructed as part of the Azusa project and was designed to discharge less than 40 cfs.
- (Existing) Facility 4D (or Citrus Basin) – this is located further south along the City boundary line, and south of the existing Cemetery. It is the basin partially within the City of Azusa, partially within the City of Glendora.
- (Proposed) Facility G-1 – this is to be located at the southwest corner of the Glendora project and is intended to replace the Glendora portion of Facility 4D. It would be placed on the northeast corner of the Citrus Avenue and Existing Railroad intersection.

- Other Detention Basins – many more detention basins were constructed throughout the Azusa project and are part of the regional detention plan implemented as part of these two projects. However, only the basins listed above are located within the same watershed as the Glendora project.

Approach to Preliminary Hydrology and Detention Analyses

Since the project plans to fill the Glendora portion of Detention Facility 4D and redirect the Glendora runoff to Detention Facility G-1, it was important to analyze each of these facilities for the proposed conditions. With respect to Detention Facility 2B, the Glendora project will redirect a small portion of the tributary area away from 2B and into the storm drain system within the Glendora project, therefore, impacts will not be significant for 2B.

The preliminary hydrology study includes a comprehensive analysis of the overall watershed, including both the City of Azusa and City of Glendora project areas that are tributary to the 1264 Drain. For the Glendora project, the existing condition is considered the proposed condition from the City of Azusa project, with the north and south portions of the Glendora project undeveloped. The proposed condition for the Glendora project models the north and south portions as developed, and uses a proposed storm drain alignment that conveys flows from the north to the south within Baldy Vista Avenue to the southwest corner of the project into Facility G-1. For the purposes of the preliminary hydrology study, the previously prepared Tentative Map layouts were utilized for the Glendora project, not the latest Conceptual Land Plan. However, the results are appropriate since the land use assumptions will remain the same, the travel time throughout the study area will remain the same (i.e. – storm drain flow from the north to the southwest corner), and the drainage area boundaries to each detention facility will remain the same.

Results of Preliminary Hydrology and Detention Analyses

The results are best summarized in tabular form in Appendix A of the preliminary hydrology study. As shown within the table, Detention Basin 2B will see a decrease in tributary area of about 8.8 acres, a decrease in the maximum Water Surface Elevation (WSEL) of about 0.5-feet, and a decrease in maximum outflow of about 8 cfs (from 34.5 cfs to 27.7 cfs, as compared to the approved August 2005 report). The reductions are due to portions of the Glendora project area no longer draining into the facility, as there are no physical modifications proposed for Detention Basin 2B. Detention Basin 4D will see a decrease in tributary area from 462.1 acres to 181.3 acres, an increase in the maximum WSEL of about 0.9-feet, and a decrease in maximum outflow from 516 cfs to 212 cfs. The increase in the maximum WSEL is acceptable since the maximum WSEL is 678.1-feet, well below the top of basin elevation that is approximately 684-feet. Detention Basin G1 will be constructed as part of the Glendora project and would receive runoff from about 359.3 acres, have a maximum WSEL of 661.6 (plus freeboard), and a maximum outflow of 403 cfs. The resulting discharge rate at Outfall 2C, into LACDPW 1264 Drain (78-inch RCP) would be approximately 630 cfs, less than the approved post-project flow rates in the August 2005 report of 639 cfs, and significantly less than the approved design discharge flowrate of 920 cfs for the 1264 Drain (as stated in the August 2005 report).

3.0 HYDRAULICS

Storm Drain

There are existing drainage problems (i.e. – flooding concerns) identified within the Glendora project site. Proposed drainage improvements should help alleviate these issues and adequately convey runoff through the project site to the downstream storm drain facility (at the southwest corner of the project site). The proposed improvements should be sized to convey off-site flows received from the north (entering the site from Sierra Madre Avenue at two separate locations), from the west (entering the site from one existing detention basin, while the other existing detention basin is routed down Citrus Avenue within the City of Azusa project limits), and on-site flows from throughout the Glendora site (both existing and proposed residential streets and lots).

The general configuration of these drainage improvements is expected to remain similar to those identified in previous studies. The exact alignment of the main storm drain segments may shift in final engineering; however, the storm drain systems will run towards the southwest corner and ultimately discharge to the LACDPW facility (1264 Drain – 78-inch RCP). A preliminary layout for the proposed storm drain system and existing storm drain systems to remain in place are shown on an exhibit titled “Preliminary Storm Drain Layout,” located in Appendix E.

Based on the preliminary layout shown, one storm drain that requires further evaluation is the existing system in Yucca Ridge between Sierra Madre Avenue and Leodora Avenue. If it is determined that the project will increase flow rates to this existing system as result of the proposed storm drain connection for the northwest corner lots, then the system may require upsizing, a parallel pipe, or redirecting drainage from the northwest lot to a separate connection.

4.0 WATER QUALITY (SUSMP)

Background for Requirements

The Los Angeles County Municipal Storm Water Permit (L.A. County MS4 Permit), dated December 13, 2001 (and amended on September 14, 2006 by Order R4-2006-0074 and on August 9, 2007 by Order R4-2007-0042), applies to all land development projects meeting one of several categories, including development of 10 or more residential units. In order to comply with the MS4 Permit, the County of Los Angeles and 84 permittees developed the Standard Urban Storm Water Mitigation Plan (SUSMP) to provide requirements for development projects. The SUSMP was originally adopted March 8, 2000, and revisions have occurred including an update in February 2002 identifying water quality requirements for development.

A clarification letter was later sent from the Los Angeles Regional Water Quality Control Board (LARWQCB) to the County of Los Angeles and the other Municipal Permittees. The letter, dated December 15, 2006, identified deficiencies in implementation of the MS4 Permit requirements and clarified expectations for specific actions related to development standards. Important components of the letter that may impact this project include: incorporating Low Impact Development (LID) techniques, reducing the percentage of “effective” impervious area to 5 percent or less, utilizing treatment control BMPs, and hydromodification flow duration control criteria for downstream channel protection.

If hydromodification flow control criteria is established and required for this project, it may impact sizing of the detention basin or require additional landscape features throughout the project to receive impervious areas. This typically requires continuous simulation modeling to demonstrate compliance. However, it may be determined that the downstream channels are not subject to erosion from higher flow rates and durations (i.e. Walnut Creek Wash and/or San Gabriel River). A majority of the downstream channels are concrete lined which are exempt from this type of criteria; however, portions of unlined channels do exist.

The project team should also recognize that the LA County MS4 Permit could be updated prior to project completion that may introduce additional requirements. Similar updates have occurred to the Municipal Permits in the San Diego Region (adopted January 2007) and Ventura Region (currently in a Draft format). The components of the clarification letter described above have made their way into these permits and its anticipated they will be present in the next LA permit.

Project Approach to Water Quality

In the City of Glendora, water quality treatment solutions are to use infiltration, extended detention, or retention based solutions. For large single family lots similar to this project, requirements include installing an infiltration trench or bioretention area along the front edge of each single family lot, sized to infiltrate 0.75-inches from the lot. This would satisfy the water quality treatment requirements for the new lots, however, the newly created streets would also require treatment. Solutions for the streets could include vegetated swales with infiltration (where feasible), bioretention areas adjacent to inlet locations, proprietary systems such as Filterra or Modular Wetland, or directing street runoff to vegetated areas for infiltration. The bottom portion of flood control basin could be used for infiltration or extended detention (water quality benefits), however, with commingling of off-site upstream runoff, this approach may be limited to streets in close proximity to the basin.

Pursuant to LID and Effective Percent Impervious (EPI) requirements, the lots will require site design BMPs directing all impervious areas to pervious areas (i.e. – roof drains to landscaping), and directing street runoff through vegetated areas as well. Therefore, water quality treatment, LID, and EPI requirements could all be met with similar features. For portions of the streets where it is not feasible to direct runoff to natural vegetated areas, then proprietary bioretention systems may be utilized that will provide contact time with soil and vegetation for water quality storm events.

Proposed Solutions to Water Quality

Based on the project approach to water quality discussed above, the following summarizes the preliminary solutions proposed for water quality and LID/EPI requirements:

- Lots – Infiltration Trench and/or Bioretention Raingarden

- Streets –
 - i. Vegetated Swales w/ Bioretention or Infiltration Trench
 - ii. Bioretention System(s) at Curb Inlet Locations
 - iii. Soft Bottom Detention Basin w/ Bioretention/Infiltration

Each of the above systems will be numerically sized to detain, retain, or infiltrate the first 0.75-inches of storm water runoff. Preliminary locations of these facilities are shown on an attached exhibited titled, “Preliminary Water Quality BMP Layout,” located in Appendix E.

Maintenance Responsibilities

These permanent storm water BMPs located on lots will be maintained by the private landowner or an established HOA (if appropriate), while the permanent BMPs installed for treatment of street runoff will be maintained by the City of Glendora. In the case of the soft bottom detention basin, the County of Los Angeles DPW/FCD will maintain the flood control integrity of the basin (i.e. – inlet and outlet works, concrete side slopes, access ramp and fencing), while the City of Glendora or an established HOA (if appropriate) will maintain the soft-bottom vegetation and surrounding landscaping that will be used for screening/aesthetic purposes.

5.0 CONCLUSION

The project includes development of the north project area and the south project area, located on the Monrovia Nursery property, in the City of Glendora. The project is currently in preliminary stages of planning and design, including the preparation of a Specific Plan document. As part of the preliminary design, this report has been prepared to provide an overview of the drainage characteristics of the project area and its tributary watershed.

The overall hydrology of the watershed that includes the project area has been completed previously for the recent Monrovia Nursery project located immediately west in the City of Azusa. Several hydrology and hydraulic studies were prepared in support of that project, including the August 8, 2005 report that was approved by the City of Azusa, City of Glendora, and the County of Los Angeles. Therefore, the City of Glendora project has utilized the approved study as a baseline for the design criteria related to hydrology and detention for the overall watershed tributary to the southwest corner of the project (LACDPW 1264 Drain, 78-inch RCP).

The results presented herein include the existing and proposed hydrologic conditions for the project area and surrounding watershed. It includes detention analyses for both existing and proposed conditions as well. Specifically, under existing conditions, Detention Basins 2B and 4D are included in the analysis, while proposed conditions includes Detention Basins 2B, 4D (modified), and proposed detention basin G-1. The results demonstrate the post-project peak flow rate is detained below pre-project levels, and below the allowable discharge rate per the County of Los Angeles for the 1264 Drain.

Water quality requirements have also been addressed on a conceptual basis for the overall project, and include the use of infiltration trenches and/or raingardens on each individual lot (i.e. – 20,000 sf single-family lots), and an assortment of infiltration/bioretenion-based solutions for the streets. The proposed solutions for the streets will include vegetated swales (with infiltration and/or bioretention), bioretention systems at curb inlet locations (i.e. – Filterra and/or Bioclean

Modular Wetland Systems), and the soft-bottom detention basin for areas located in the southwest corner of the project.

As the project planning and design efforts proceed through the discretionary approval stage and ultimately final engineering, the drainage and water quality solutions will be addressed in further detail.

APPENDIX A

Summary Tables Showing Results

of

Los Angeles County Department of Public Work's (LACDPW)

Modified Rational Method

for

Detention Basins 2B, 4D, G1 and Outfall 2C

(from various sources)

APPENDIX B

Los Angeles County Department of Public Work's (LACDPW)

Modified Rational Method

50-year Storm Event

[Pre-Project]

APPENDIX C

Los Angeles County Department of Public Work's (LACDPW)

Modified Rational Method

50-year Storm Event

[Post-Project]

APPENDIX D

Backup Materials

for

Los Angeles County Department of Public Work's (LACDPW)

Modified Rational Method

- **Time of Concentration Calculations**
- **Stage-Elevation (SE), Stage-Volume (SV), Stage-Discharge (SQ) Rating Curves**

Time of Concentration Calculations
[Pre-project] & [Post-project]

**Stage-Elevation (SE), Stage-Volume (SV), Stage-Discharge (SQ)
Rating Curves**

APPENDIX E

Exhibits Showing

“Preliminary Storm Drain Layout”

and

“Preliminary Water Quality BMP Layout”

(2 sheets, 11”x17”)

MAP POCKET 1

Drainage Study Map

For

Monrovia Nursery

[Pre-project]

MAP POCKET 2

Drainage Study Map

For

Monrovia Nursery

[Post-project]