

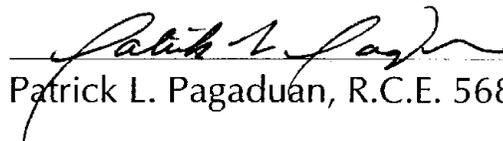
**APPENDIX G DRAINAGE STUDY INCLUDING PRELIMINARY HYDROLOGY
ANALYSIS AND WATER QUALITY ANALYSIS FOR PACIFIC CITY**

DRAINAGE STUDY
INCLUDING
PRELIMINARY HYDROLOGY
ANALYSIS
AND
WATER QUALITY ANALYSIS
FOR
PACIFIC CITY

City of Huntington Beach



PREPARED UNDER THE SUPERVISION OF:


Patrick L. Pagaduan, R.C.E. 56820 Exp. 6/30/05

4/14/03
Date

**Drainage Study
including
Preliminary Hydrology Analysis
and
Water Quality Analysis
for
Pacific City

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Sections 2, 3, 4, 5, 8, and tabs 6A, 6B, and 6C of the Hydrology and Water Quality Analysis are not included in this version of the document and are available for review at the City of Huntington Beach and City of Huntington Beach Central and Main libraries.

SECTION 1 – DISCUSSION

Introduction

The proposed Pacific City project subsequently known as "The Project" is a mixed-use visitor-serving commercial center together with a residential village located on a 31.5-acre vacant parcel on the inland side of Pacific Coast Highway. The Project is located at the intersection of First Street and Pacific Coast Highway (PCH). Residential streets bound the project to the north (Atlanta Avenue), to the east (Huntington Street) and to the west (First Street) and the State of California Highway to the South (Pacific Coast Highway). The Project falls within the City of Huntington Beach's (The City) Downtown Specific Plan (DSP), Districts 7 & 8. The project location is shown on Exhibits 1 & 2.

The project is proposed to include approximately 240,000 square feet of mixed commercial use facilities and a 400-room hotel along PCH to serve visitors and a residential village of approximately 515 multi-family homes. The City filed a Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) in January of 2003, which is consistent with the provisions of the California Environmental Quality Act (CEQA). NOP responses were received from the following agencies, California Coastal Commission (CCC); California Regional Water Quality Control Board (RWQCB); County of Orange – Planning and Development Services (OCPDS); Orange County Sanitation District (OCSA); Orange County Coastkeeper (OCC); and Southern California Association of Governments (SCAG).

This report of the drainage and water quality analysis was created to provide necessary background information, site characteristics, and flow patterns before development and post-development describing overall impacts and mitigation measures to convey compatibility with each respective agency's requirement to substantiate the findings and recommendations of the DEIR publication.

Purpose

This study will define and evaluate the pre-development and post-development stormwater flow, conveyance systems, water quality impacts and related mitigation measures and Best Management Practices (BMP's) to comply with local and regional goals set-forth by various agencies and permits. The following list of items outline the scope and definitions of this study:

1. Estimate the tributary area and peak flow rate discharges for the on-site and off-site areas, as they interrelate to existing and future condition based on completion of current City/County improvement projects.
2. Demonstrate that the proposed drainage facilities to be constructed with the Pacific City project will reduce the amount of urban runoff to the Atlanta Storm Water Pump Station (ASWPS) and evaluate the pre-developed and post-developed flows (Q's¹) for their differential impacts on the Talbert Valley Drainage Watershed (TVDW).
3. Estimate the volume of on-site first-flush², or 85th percentile runoff targeted to satisfy water quality requirements.
4. Identify any related construction permits required. This includes pre-development and post-development requirements from various agencies.

-
5. Demonstrate that there is no net increase of pollutants from the site to receiving bodies of water or wetland areas. A discussion of existing structural Best Management Practices (BMP's) that are currently installed within the TVDW system to promote water quality before entering receiving waters.
 6. Identify and analyze site-specific attenuation alternatives.

Background

A Notice of Preparation (NOP) of a DEIR was submitted by the City to various agencies as previously mentioned. Each agency addressed multiple issues relating to the final DEIR. The points of interest from the various agencies that are relevant to this report, generally relate to stormwater run-off, flow patterns and water quality. The respondents to the NOP requested a detailed discussion in the DEIR of the pre-development and post-development stormwater run-off effects on the downstream areas and drainage systems with a main goal to improve and maintain the integrity of the receiving water while achieving site specific water quality objectives. The respondents also requested additional discussion regarding the implementation of structural and non-structural BMP's for the project as it relates to the Countywide Drainage Area Management Plan (DAMP).

The Talbert Valley Watershed District (TVDW) has an overall area of 7,855-acres and is comprised of multiple tributary areas that contribute urban run-off along existing drainage channels as shown on Exhibit 1. The Project is a 31-acre portion of one of the larger tributary areas (618 acres) directed toward the Atlanta Stormwater Pump Station (ASWPS) yielding approximately 1,125 CFS during a 100-year storm, which is then discharged into the Huntington Beach Channel (HB Channel D01). The ASWPS has an existing capacity of 551 CFS³. The County of Orange is currently constructing improvements along the Channel D01 with an expected completion in the summer of 2004. The improvements will increase the efficiency of the channel to a 100-year storm capacity. The ASWPS, by City estimates, needs a capacity of 1,125 CFS for protection from a 100-year storm event⁴, therefore the ASWPS is currently 574 CFS under capacity.

The ASWPS also provides a level of water quality protection to the urban run-off. During dry weather and low flow drainage events the water from the ASWPS is discharged into the Orange County Sanitation District sewer lines. This allows for further treatment of nuisance runoff. The majority of the pollutants are transferred from impervious surfaces to receiving waters during nuisance flow conditions.

In order to provide improved flood control protection and relief to the ASWPS, the City is currently planning for the construction of a new storm drain system in First Street. This new 42 inch line will divert flows away from the ASWPS, thus reducing the current pumping capacity deficiency. This new storm drain has undergone complete environmental review, funding has been obtained, and construction is scheduled to occur prior to the summer of 2003. A portion of the preliminary plans of this system have been included in Section 5. The initial purpose of the First Street Storm Drain System (FSSDS) is to provide flood control protection to the Alabama Street drainage area (see Exhibit 2). The development of the 31 acre project will complete the construction of the FSSDS as shown on Exhibit 6.

Methodology

The hydrology calculations used for this preliminary hydrologic analysis are based on the 1986 Orange County Hydrology Manual and Addendums as incorporated in the Advanced Engineering Software (AES) Rational Method Hydrology Computer Program Package. The 1986 County manual uses a modified rational method equation which incorporates factors which include: land uses, rainfall intensity, infiltration rates and pervious area ratios to calculate storm discharges. The 1986 Manual updated the historic rainfall data, which resulted in an increase in design runoff volumes that were greater than those shown in earlier studies.

Design Criteria

The Project will generate storm water flows from two separate drainage areas labeled on Exhibit 4 as Drainage area "A" and "B". The subsequent discussions will explain the discharge from each area and their impact on the surrounding drainage systems (pre and post-development). Drainage Area "A" (shown in green on Exhibit 4) in the post development condition is proposed to discharge only a small portion of the site storm water into the existing Pacific View Avenue storm drain system, well below the maximum allowable discharge rate previously established for the existing system by previous studies, in order to provide relief to the ASWPS. Drainage Area "B" (shown in yellow on Exhibit 4) is proposed to discharge the remainder of the site storm water to the First Street storm drain system.

As with any project design, the on-site structures need to be protected from a theoretical design storm event. In this case, the design storm event is a 100-year storm as outlined in the City of Huntington Beach Standard Plan 300, and the County of Orange Local Drainage Manual criterion. The proposed structures are protected by adhering to the mitigation requirements and elevating the structures above the 100 year flood level. In addition, city design criteria requires one travel lane to be protected from a 25-year storm event⁵ in a sump condition⁶. The proposed City storm drain project on First Street has been designed to accept flows from the Project to maintain protection of the on-site streets from a 25-year storm event. The design of the proposed on-site storm drain system introduces an underground detention basin to limit the flowrate from the project to comply with the First street storm drain design capabilities (See Preliminary Hydraulic Analysis for discussion of storm events and drainage design).

Existing Drainage Patterns

The existing on-site drainage currently discharges through the ASWPS to the HB Channel DO1 and contributes the flows shown on the following table for Pre-Development conditions. The flows have been re-calculated based on the revised and updated rainfall data as presented in the 1986 Orange County Hydrology Manual. Exhibit 3 details the Existing Hydrology and surface flows.

**Pre-Development Conditions
(Post 1986 Values)**

Storm Event (Year)	On-Site Area (CFS)
25	48.6
100	67.0

Proposed Drainage Patterns

The Project area is proposed to be divided into two separate drainage areas with separate storm drain systems. The intent will be to reduce runoff directed to the ASWPS. The "Predevelopment" drainage area of 34.6 acres, currently tributary to the ASWPS, will be reduced to 7.7 acres (Drainage Area "A"). The result will be a reduction in 100-year storm flow of 67.0 CFS to 21.8 CFS to the ASWPS. The storm flows from drainage Area "B" will be diverted away from the ASWPS to the City's FSSDS. The estimated 100-year storm flows from Drainage Area "B" is approximately 85.2 CFS however, the addition of an underground detention basin will limit these flows to 20 CFS, as directed by the City Public Works Department. The proposed project storm drain system will improve the storm flow protection for the ASWPS drainage area.

A summary of the proposed on-site discharges in the 25 and 100-year events are shown on Exhibit 4 and the table below:

Post-Development Conditions (Post 1986 Values)

Storm Event (Year)	Drainage Area "A" 7.7 Acres (CFS)	Drainage Area "B" 26.9 Acres (CFS)
25	16.7	66.1
100	21.8	85.2

Drainage Impacts from Development

Area "A"

Per the included plan by Fuscoe, Williams, Lindgren & Short, titled "Phase I Improvement Plans, (Section 5) the Waterfront Hilton (Tract 13045) Storm Drain Improvements", sheet 8 of 11, the existing storm drain system in Pacific View Avenue (pipe size is 42" RCP) was assigned a future allowable discharge of 34.4 CFS for a 25-year event. The discharge was limited here in order to reduce the volume conveyed to the Atlanta Pump Station (see "Drainage Study, The Waterfront Hilton, Huntington Beach", prepared by Fuscoe Engineering – San Diego, Inc., July 1998, and "Hydrology and Hydraulics Calculations for Mayer Corporation – Waterfront Hilton Phase I Hilton Hotel", prepared by Fuscoe, Williams, Lindgren and Short, Inc., dated February 1989).

In the post-developed condition, a maximum of approximately 21.8 CFS will be permitted to be discharged into the existing 42" RCP in Pacific View Avenue because it cannot flow to First Street without pumping. Therefore, the Project drainage area "A" has been sized appropriately to this discharge limit for estimates a discharge of 21.8 CFS for the 100-year event. The expected discharge to the ASWPS is well below the previously designed allowable discharge of 34.4 CFS.

Area "B"

In the developed condition, Area "B", a 25-year storm will generate approximately 66.1 CFS to First Street without flood routing. Flood routing through an underground detention basin is proposed in order to limit the discharge to 20 CFS. This area, currently being conveyed to the

existing storm drain system in Pacific View Avenue, will no longer be discharged to the Atlanta Storm Water Pump Station.

A tabular representation of pipe flow storm pre and post-development discharges are shown on Exhibit 5 and summarized below:

Summary of Pipe Flow Discharges

Discharges to:	Area "A" (CFS)	Area "B" (CFS)
ASWPS (pre-development)	(total 67.0 in 100-year event in both areas)	
ASWPS (post-development)	21.8	0
First Street (pre-development)	0	0
First Street (post-development)	0	20 CFS max. (for all storm events)

Existing on-site storm flows from both areas (approximately 67.0 CFS for the 100-year event) currently discharge to the existing 42" storm drain system in Pacific View Avenue. In the developed condition, only the northerly, easterly and southerly perimeter area shown as Drainage Area "A" (shown as the color green) on Exhibit 4 and 5 (approximately 21.8 CFS for the 100-year event) will discharge to the existing 42" pipe located in Pacific View Avenue. On the same exhibits, Drainage Area "B" (shown as the color yellow) is proposed to limit its maximum discharge to 20 CFS in the 25-year storm event to the City storm drain in First Street. This results in a net reduction of 45.2 CFS, or about 67% of the flow to ASWPS.

Preliminary Hydraulic Analysis

The proposed drainage systems for this site shall be designed to meet 100-year flood level protection as outlined per the City of Huntington Beach Standard Plan 300, and the County of Orange Local Drainage Manual criterion. Design pipe flow discharges are detailed in the Summary of Pipe Flow Discharge table located in the previous section and shown with the preliminary storm drain alignments on Exhibit #6.

Area "A" will be serviced by a proposed system of inlets and underground pipe conduits joining the existing 42" storm drain pipe at the intersection of Pacific View Avenue and Huntington Avenue. As stated previously, this existing 42" system was allocated a maximum future allowable discharge of 34.4 CFS in the 25-year event from the project. However, by reducing the area to the minimum size allowed without pumping, the post-development hydrology indicates that 21.8 CFS is produced in the 100-year event. Therefore, the net discharge of storm flows to the existing 42" system results in a reduction of flows discharge to the ASWPS and meets the flood protection goals outlined above.

Area "B" will also be serviced by a proposed system of inlets and underground pipe conduits joining to proposed City of Huntington Beach storm drain system in First Street. Per the City of Huntington Beach, their proposed system will be designed to convey the 25-year event from the Alabama street drainage area outlined in Exhibit #2 and will accept 20 CFS from the proposed Pacific City, which is a portion of the proposed runoff Drainage Area "B".

Since the post-development hydrology of Area "B" indicates that 66.1 CFS is produced in the 25-year event, attenuation of about 46 CFS is required. A detention basin is proposed to store the excess storm flows and limit the amount of discharge into the proposed City of Huntington Beach system. This proposed detention basin will limit the maximum peak outflow into the system to approximately 20 CFS as required by the City of Huntington Beach First Street Storm Drain design. A volume of about 0.82 acre-feet is required for this attenuation. Details of the detention basin will be included when final engineering begins. Flow exceeding attenuation limits will be allowed to runoff via surface streets without impacting drainage systems or flooding lanes.

A preliminary mainline hydraulic analysis was performed using the L.A. County Flood Control District "WSPG" Program. Lateral pipe hydraulics were performed using the L.A. County Department of Public Works "Storm Drain Analysis". Typically, this program is used for lateral connector pipes to reduce the amount of calculations to determine water surface elevations.

Per the County of Orange Local Drainage Manual, a 100-year protection for all habitable structures is required. The proposed City of Huntington Beach drainage system along First Street, and the Pacific City Area "B" drainage system, are designed to convey the 25-year event. In storms above the 25-year event and up to the 100-year event, habitable structures will be placed above the 100-year flood elevation and site discharges shall be conveyed via surface street flow along First Street, thus meeting the flood protection goals as outlined above. A more detailed discussion regarding design storms and flood protection goals can be found in City of Huntington Beach Standard Plan 300, and Chapter 1, *Design Criteria*, found the County of Orange Local Drainage Manual.

All preliminary hydraulic calculations regarding the proposed drainage systems First Street, and Areas "A" & "B", detention volume, and preliminary storm drain plan and profile alignments are contained in the Appendix.

Atlanta Storm Water Pump Station

Per the City of Huntington Beach, Master Plan of Drainage, Pump Station Analysis (Table 3), the Atlanta Storm Water Pump Station (ASWPS) has a current capacity of 551 CFS. The tributary area it services discharges approximately 1124 CFS in the 100-year event. This indicates a capacity deficiency of about 573 CFS.

In the current condition, a total of approximately 177 CFS is discharged to the ASWPS from the Alabama Street Discharge Area including Pacific City. With the proposed City of Huntington Beach storm drain system along First Street, and Pacific City Area "B" drainage system, approximately 155.2 CFS in the 100-year event will be diverted away from the ASWPS. Therefore, only 21.8 CFS from Area "A" will be discharged to the ASWPS from the Project and Alabama Street Discharge Area – a net reduction of about 85%. Design flows to the ASWPS can summarily be reduced from 1124 to 968.8 CFS, approximately 14%, and the capacity deficiency is reduced from 574 to 396 CFS, approximately 31%.

Stormwater Mitigation

The proposed on-site storm drain systems will include water quality devices, as shown on Exhibit 6. First flush discharges, based on Order No. R8-2002 (NPDES No. CAS6018030) – The County of Orange, OCFCD, and Incorporated Cities Area-wide Urban Storm Water Runoff, will be routed via

water quality pipes through water quality devices and discharged to the Huntington Beach Channel (D01) via the ASWPS for Area "A", and First Street storm drain via the proposed City of Huntington Beach system FSSDS for Area "B". A more extensive discussion of the Recommended Water Quality Mitigation Post Construction Best Management Practices (RWQMPCBMP) can be found in Section 6 of this study.

A summary of the pre- and post-development first flush discharges (CFS) are shown on Exhibit 6 and in the table below:

Summary of First Flush Discharges

Discharges to:	Area "A" (CFS)	Area "B" (CFS)
ASWPS (pre-development)	(total 5.0	from both areas)
ASWPS (post-development)	1.2	0
First Street (pre-development)	0	0
First Street (post-development)	0	3.8

Discharges are based on the criteria from the above reference. Preliminary calculations can be found in the Appendix.

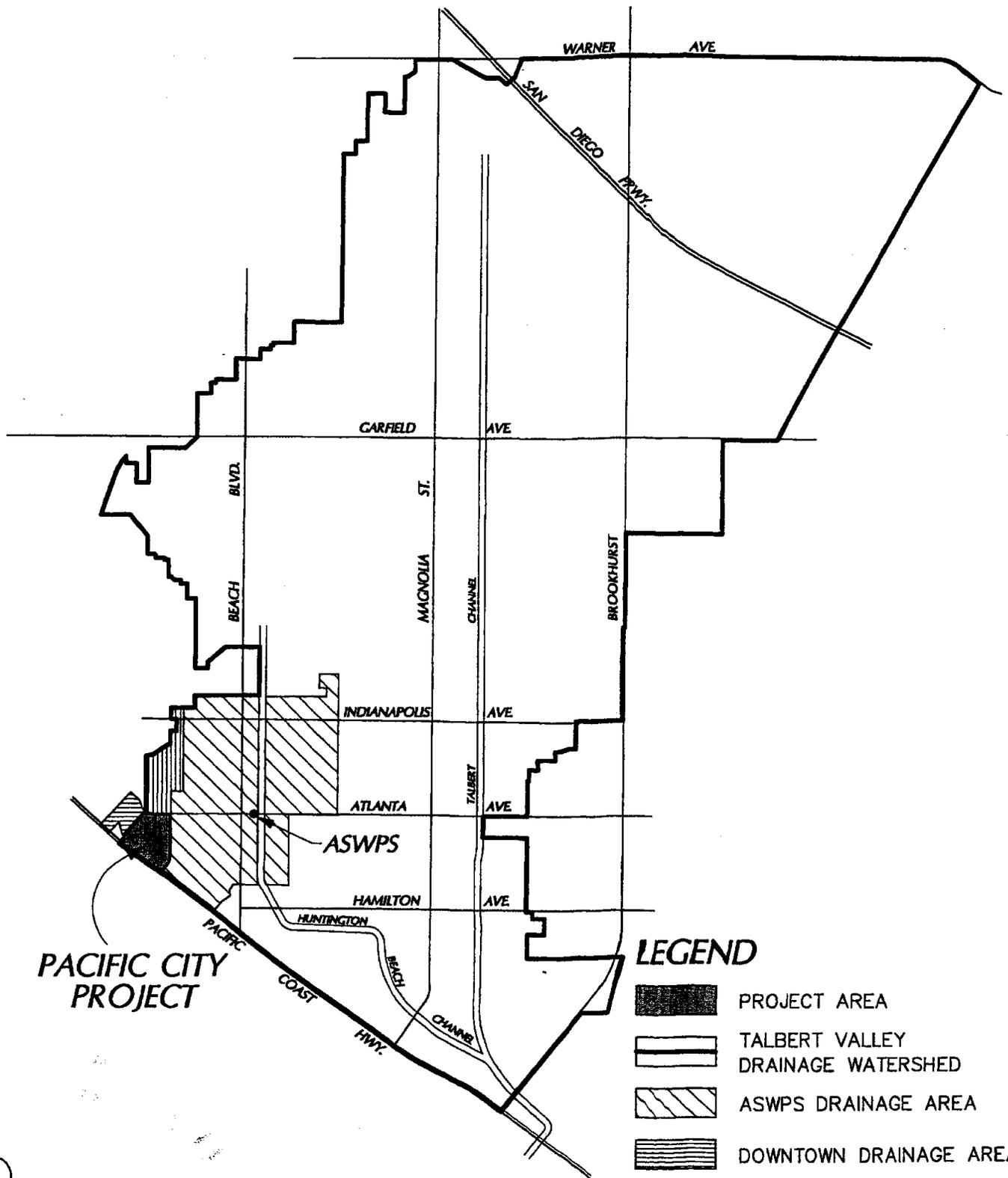
Construction Storm Water Mitigation

The NPDES General Permit for Storm Water Discharge Associated with Construction Activity requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP is a separate document that is site specific and provide guidelines to identify impacts and mitigation of storm water discharges and quality pre- and post construction. The SWPPP identifies BMP's (storm water, non-storm water and post construction), site monitoring including reports and revisions, responsible parties and training of the implementation of the BMP's. A more extensive outline of the proposed SWPPP can be found in Section 7 of this study.

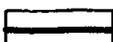
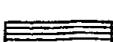
Previous hydrology studies for this area include:

Previous hydrology studies and reports for this area include:

1. Hydrology and Hydraulics Calculations for Mayer Corporation – Waterfront Hilton Phase I – Hilton Hotel by Fuscoe, Williams, Lindgren & Short, Inc. (February 1989).
2. Hydrology Analysis for 31 Acres Mixed-Use Development, City of Huntington Beach by Hunsaker & Associates (December 1998).
3. Drainage Study, The Waterfront Hilton, Huntington Beach by Fuscoe Engineering – San Diego, Inc. (July 1998).
4. Lake Street Hydrology Study, City of Huntington Beach (6/4/87).
5. City of Huntington Beach, Master Plan of Drainage, Pump Station Analysis, Pump Station Capacity Evaluation (October 1992).



LEGEND

-  PROJECT AREA
-  TALBERT VALLEY DRAINAGE WATERSHED
-  ASWPS DRAINAGE AREA
-  DOWNTOWN DRAINAGE AREA
-  ALABAMA STREET DRAINAGE AREA



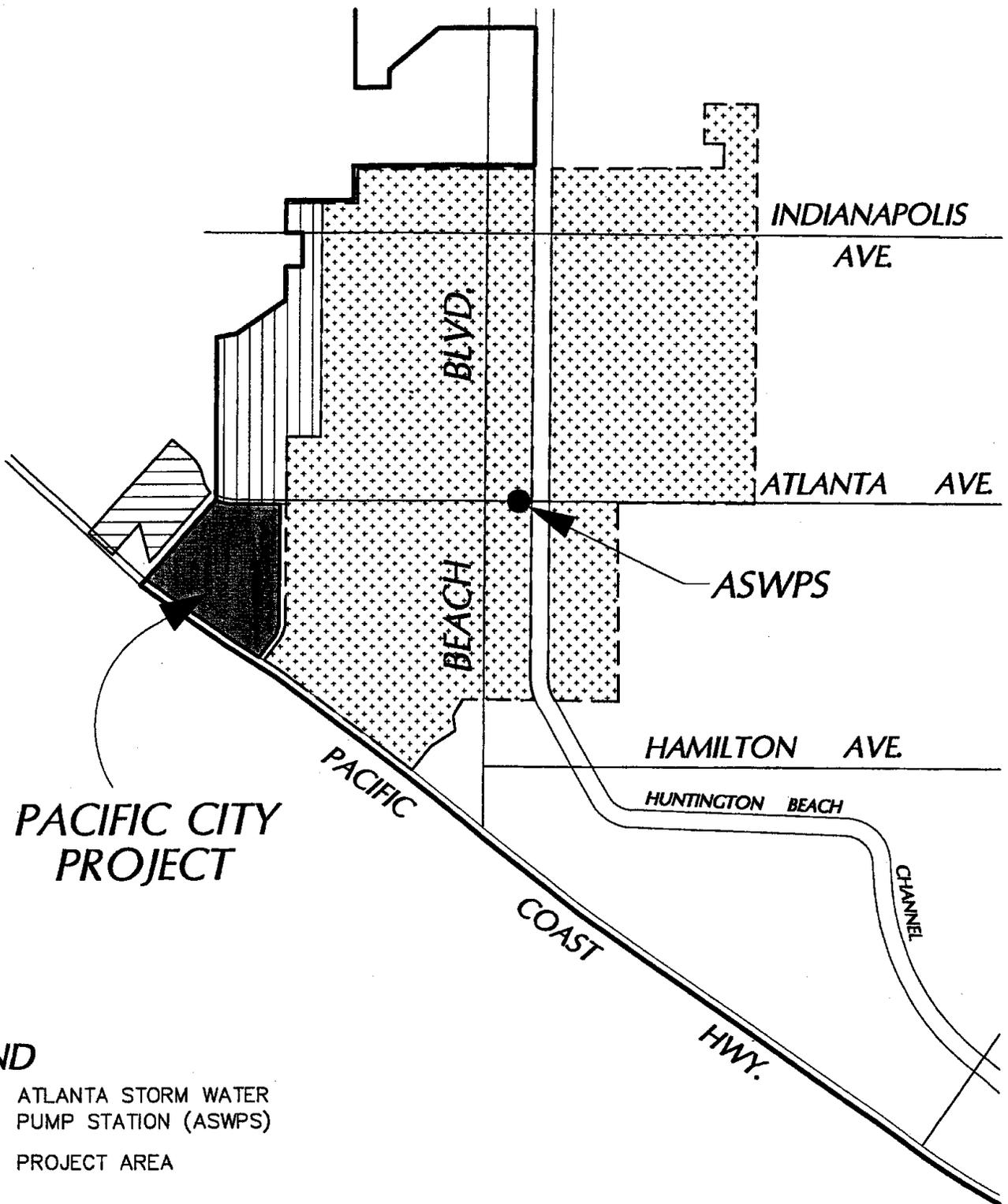
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Hunsaker & Associates Irvine, Inc.

Vicinity Map & Drainage Areas

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Exhibit 1



LEGEND

- ATLANTA STORM WATER PUMP STATION (ASWPS)
- PROJECT AREA
- ▨ ASWPS DRAINAGE AREA
- ▧ DOWNTOWN DRAINAGE AREA
- ▩ ALABAMA STREET DRAINAGE AREA

⌚
Not to Scale

**Location Map & ASWPS
Drainage Area**

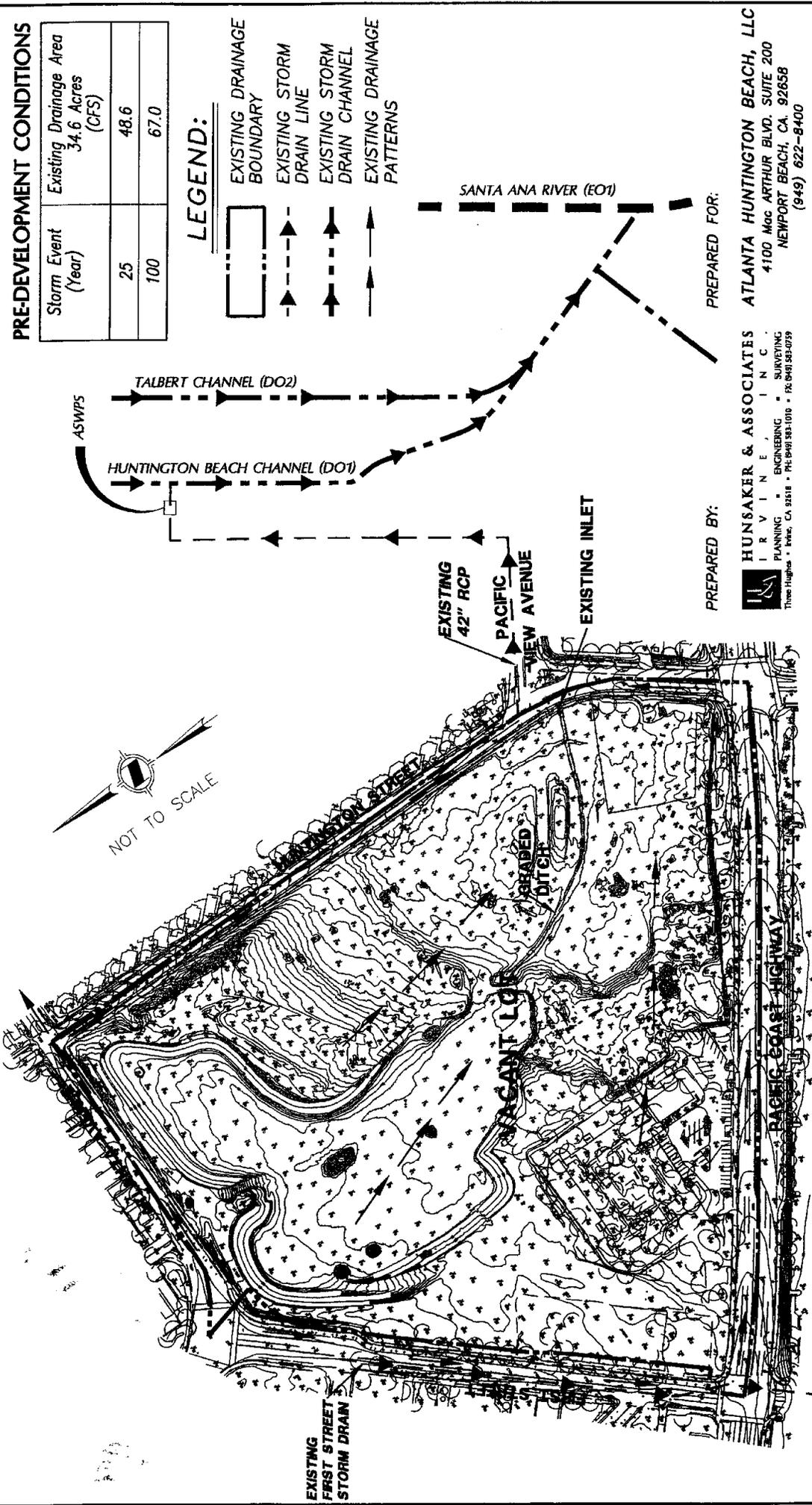
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Date Prepared: 4/14/03

Exhibit 2

HUNTINGTON BEACH, CALIFORNIA

EXISTING HYDROLOGY EXHIBIT FOR PACIFIC CITY



PRE-DEVELOPMENT CONDITIONS

Storm Event (Year)	Existing Drainage Area (CFS)
25	48.6
100	67.0

- LEGEND:**
- EXISTING DRAINAGE BOUNDARY
 - EXISTING STORM DRAIN LINE
 - EXISTING STORM DRAIN CHANNEL
 - EXISTING DRAINAGE PATTERNS

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EXISTING HYDROLOGY EXHIBIT 3

HUNTINGTON BEACH, CALIFORNIA

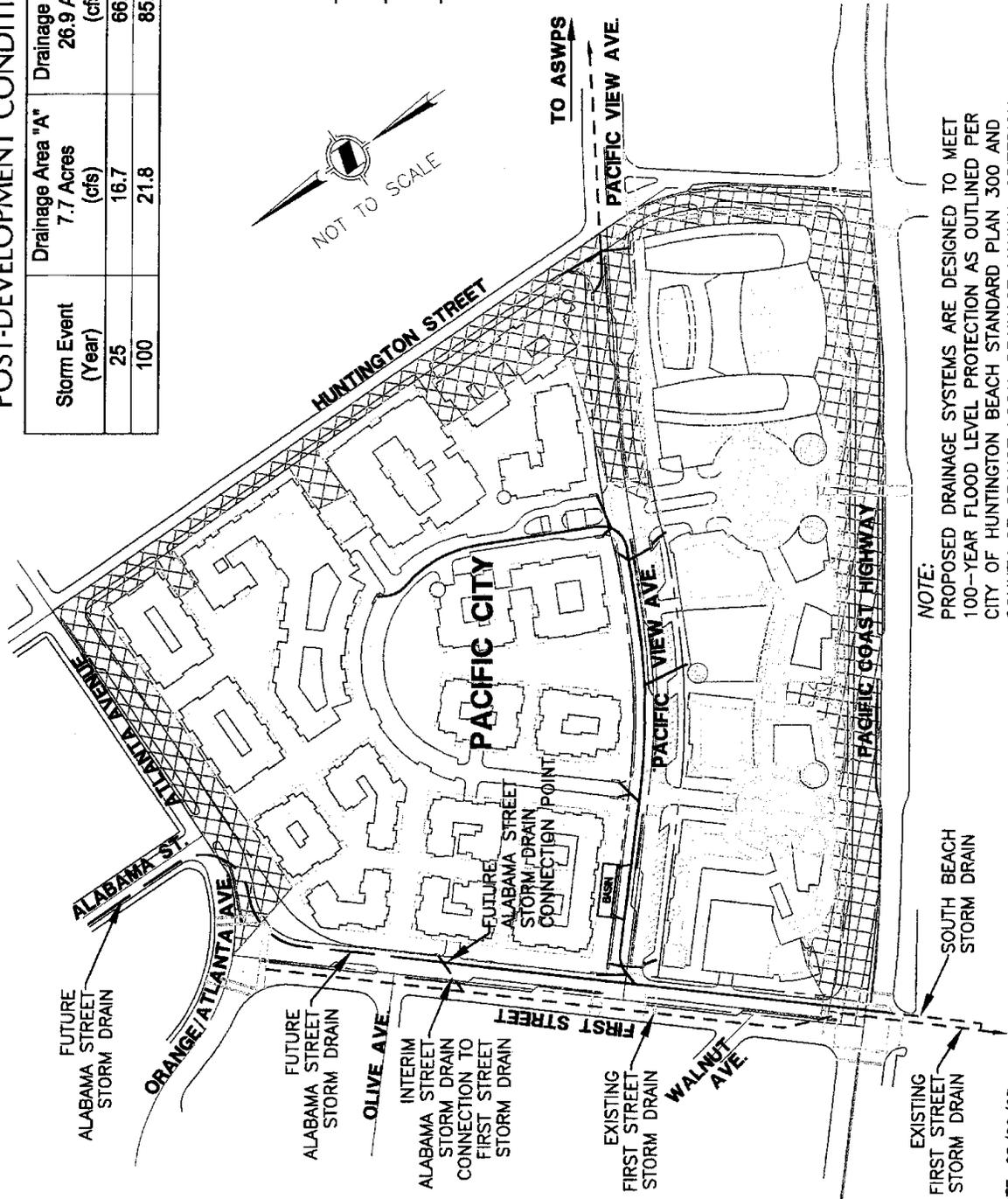
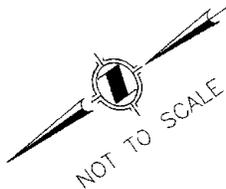
PROPOSED HYDROLOGY EXHIBIT FOR PACIFIC CITY

POST-DEVELOPMENT CONDITIONS

Storm Event (Year)	Drainage Area "A" (cfs)	Drainage Area "B" (cfs)
25	16.7	66.1
100	21.8	85.2

LEGEND:

-  DRAINAGE AREA "A"
-  DRAINAGE AREA "B"
-  PROPOSED STORM DRAIN INSTALLED BY PACIFIC CITY
-  FUTURE ALABAMA STREET STORM DRAIN INSTALLED BY CITY
-  EXISTING CITY OF HUNTINGTON BEACH STORM DRAIN SYSTEM



NOTE:
 PROPOSED DRAINAGE SYSTEMS ARE DESIGNED TO MEET 100-YEAR FLOOD LEVEL PROTECTION AS OUTLINED PER CITY OF HUNTINGTON BEACH STANDARD PLAN 300 AND COUNTY OF ORANGE LOCAL DRAINAGE MANUAL CRITERION.

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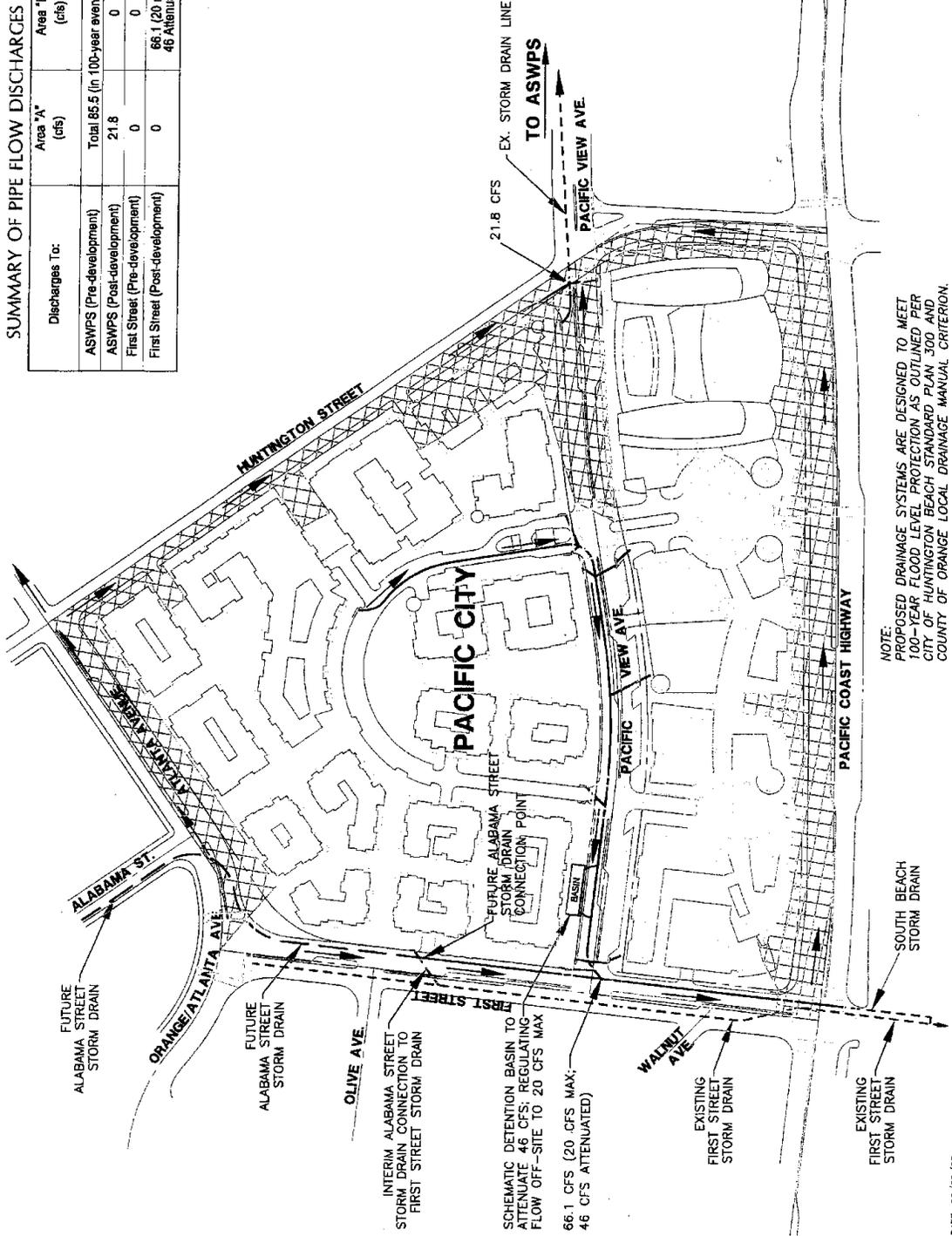
PROPOSED HYDROLOGY EXHIBIT 4

HUNTINGTON BEACH, CALIFORNIA

PROPOSED DISCHARGE EXHIBIT FOR PACIFIC CITY

SUMMARY OF PIPE FLOW DISCHARGES

Discharges To:	Area "A" (cfs)	Area "B" (cfs)
ASWPS (Pre-development)	Total 85.5 (in 100-year event)	
ASWPS (Post-development)	21.8	0
First Street (Pre-development)	0	0
First Street (Post-development)	0	66.1 (20 max, 46 Attenuated)



NOTE: PROPOSED DRAINAGE SYSTEMS ARE DESIGNED TO MEET 100-YEAR FLOOD LEVEL PROTECTION AS OUTLINED PER CITY OF HUNTINGTON BEACH STANDARD PLAN 300 AND COUNTY OF ORANGE LOCAL DRAINAGE MANUAL CRITERION.

DATE: 06/29/03
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HUNTINGTON BEACH, CALIFORNIA

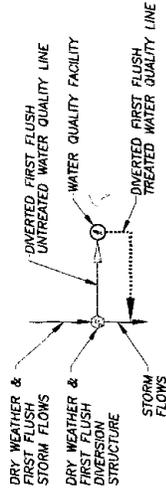
STORM DRAIN FACILITIES EXHIBIT FOR PACIFIC CITY

MITIGATED WATER QUALITY RETURN TO STORM DRAIN FOR DRY WEATHER AND FIRST FLUSH FLOWS

PRELIMINARY WATER QUALITY DESIGN

WATER QUALITY TREATMENT LOCATION	FIRST FLUSH (CFS)	APPROXIMATE NUMBER OF STORM FILTERS
A	1.2	36
B	3.8	114

DRY WATER & FIRST FLUSH DIVERSION & TREATMENT CHAIN



NOTE:

1. EACH FILTER CAN PROCESS 15 GPM (0.033 CFS).
2. TYPICALLY 30 FILTER UNITS PER 8' X 16' VAULT.
3. ALL WATER QUALITY TREATMENT SYSTEMS TO BE LOCATED OUTSIDE OF PUBLIC RIGHT-OF-WAY ON PRIVATE PROPERTY AND SHALL BE MAINTAINED BY PACIFIC CITY H.O.A.

- #### LEGEND:
- EXISTING CITY OF HUNTINGTON BEACH STORM DRAIN SYSTEM
 - PROPOSED STORM DRAIN INSTALLED BY PACIFIC CITY
 - FUTURE ALABAMA STREET STORM DRAIN INSTALLED BY CITY
 - PROPOSED TREATED WATER QUALITY LINE
 - PROPOSED UNTREATED WATER QUALITY LINE
 - ⊙ PROPOSED WATER QUALITY FACILITY
 - ⊙ PROPOSED DRY WEATHER & FIRST FLUSH DIVERSION STRUCTURE

PREPARED BY:

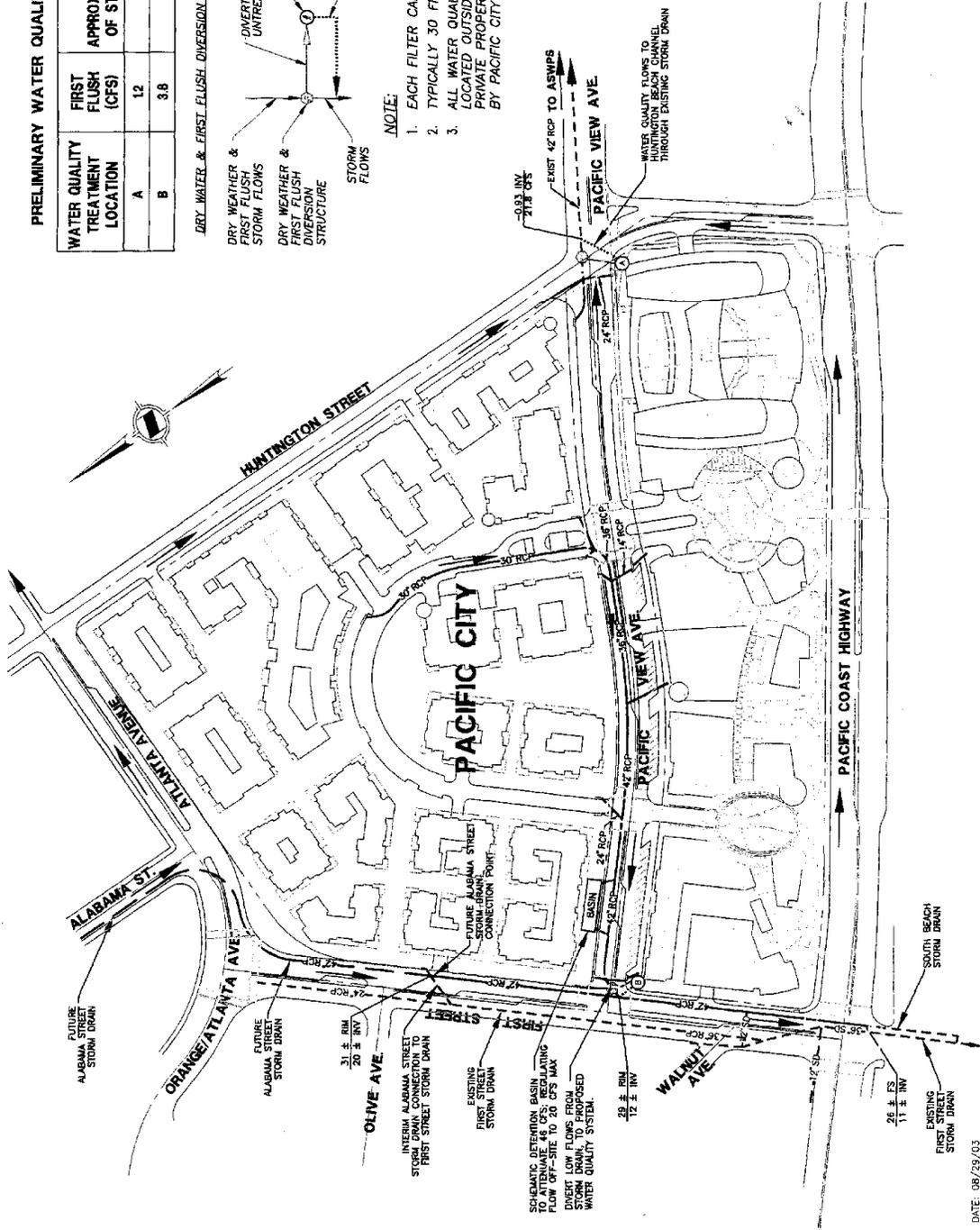
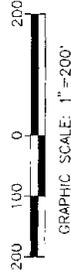


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SUMMARY OF FIRST FLUSH DISCHARGES

Discharges To:	Area "A" (cfs)	Area "B" (cfs)
ASWPS (Pre-development)	1.2	(total 6.0 from both areas)
ASWPS (Post-development)	0	0
FIRST STREET (Pre-development)	0	3.8
FIRST STREET (Post-development)	0	3.8



STORM DRAIN FACILITIES EXHIBIT 6

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Glossary

¹ Q's – Defined as direct surface runoff, usually expressed in cubic feet per second (CFS). For hydrology the run-off (Q) is calculated by multiplying the rainfall intensity (I) expressed as inches per hour (in/hr), the overall area (A) in acres (acres) and a runoff coefficient (C) (dimensionless), which is based on the land type, i.e. pavement (fast run-off), dirt (slower run-off), and a myriad of in-between scenarios).

² First Flush – as defined the first flush is the first $\frac{3}{4}$ of an inch of rainfall over an area, or the 85th percentile of the overall storm event.

³ CFS – cubic feet per second; unit of measure relating to water flow.

⁴ 100 Year Storm Event – is defined as a theoretical storm that produces a quantity of run-off with the frequency of 1 storm event within a 100 year period. (Based on historical data)

⁵ 25 Year Storm Event – is defined as a theoretical storm that produces a quantity of run-off with the frequency of 1 storm event within a 25 year period. (Based on historical data)

⁶ Sump condition – sump condition is defined as a low area in a tributary area. City of Huntington Beach codes specify that only 25-year discharges are allowed in a sump condition.

**SECTION 6 – Recommended Water Quality
Mitigation Post Construction Best Management
Practices**

**RECOMMENDED WATER QUALITY MITIGATION
POST CONSTRUCTION BEST MANAGEMENT PRACTICES**

for

PACIFIC CITY PROJECT

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN
for
PACIFIC CITY PROJECT

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I. INTRODUCTION

The purpose of this Preliminary Water Quality Management Plan (PWQMP) is to outline the comprehensive approach that will be used in the attainment of water quality goals and mitigation required for the Pacific City development project. This approach is in conformance with the NPDES Permit, current County of Orange Drainage Area Master Plan (DAMP) and supports the City of Huntington Beach's commitment to the protection and enhancement of coastal water quality. This plan also compliments the goals and mission statement of the City of Huntington Beach citywide Water Quality Management Plan Task Force.

The Pacific City project is required by the City of Huntington Beach to develop and implement a Water Quality Management Plan (WQMP), that upon approval will serve the manual to maintain water quality in conformance with the NPDES Permit and County of Orange Drainage Area Master Plan (DAMP). The WQMP shall be specific to the expected pollutants that will be present in storm water flow from the site after completion of the construction. The WQMP will also detail the specific operation and maintenance of each structural and non-structural BMP. Some of the BMP's may be simply street sweeping on a monthly basis, while others may be structural BMP's, such as filters in vaults to filter the first flush run-off before discharging off-site. Non structural BMP's include programs to educate the public on proper disposal of hazardous /toxic wastes, regulatory approaches, street sweeping and facility maintenance, and detection and elimination of illicit and illegal dumping and non structured BMP measures listed in the Orange County Drainage Area Master Plan (DAMP) Appendix G which identifies specific water pollutant control program elements of the Orange County Storm Water Program.

The WQMP will also outline the type of BMP being used and what mitigation is expected. Also, the WQMP outlines a routine maintenance schedule for each BMP, further complying with the DAMP and local regulations. The WQMP is considered a living document that grows with the experience of the project and the science. For example, the type of structural BMP that is slotted for installation (StormFilter) can contain a variety of filter material, each material with specific pollutant restricting capabilities. Upon completion of the project and after a short period of time, the filter material is removed, and tested for actual pollutant discharge for further filter recommendations, thus maximizing the water quality.

The WQMP is established from industry and agency historical data and the best available information or initial concept and design. It should be understood that the PWQMP discussed herein will only contain the general building blocks of the actual final WQMP and shall serve to explain the methodology to determine which type of mitigation measure is best suited for Pacific City to achieve the required water quality levels as detailed by the DAMP and local requirements.

II. PROJECT DESCRIPTION

Makar Properties, Inc. is proposing the development of approximately 31 acres, known as Pacific City, located at First Street and Pacific Coast Highway in the City of Huntington Beach. The Pacific City development will consist of a mixed use residential and commercial development including a premier 400-room hotel and parking structure. The site is presently vacant and is generally lower in elevation than the surrounding properties and drains to the southeast to existing storm drain facilities. For a more detailed description of the existing hydrology, please see the Preliminary Hydrology Study.

III. RUNOFF MANAGEMENT CONCEPT PLANS

A. General

The runoff management concept includes water quality approaches for the 31-acre project site. Treatment of this runoff is defined as "filtration" by the City of Huntington Beach. As a result, the approach includes a treatment train concept that includes filtration as a key component of the overall system. Using the city's recommended rule of 3/4 inches of rain for the first flush event, pollutant loads for existing and developed conditions were calculated. These calculations are summarized in the "Drainage Area Description" on the following page.

B. Stormwater Management System

This concept utilizes state-of-the-art permanent proprietary structural best management practices (BMPs) developed by Stormwater Management, Inc.

Filtration is achieved through the use of a series of StormFilters in conjunction with the storm drain system. The StormFilter is a premier filtration system widely recognized as a versatile BMP for removing a variety of pollutants. The StormFilter cartridges are filled with an array of media, selected to treat specific pollutant loadings at each site. These site-specific media options give the StormFilter the ability to remove high levels of storm water pollutants such as sediments, oil and grease, soluble heavy metals, organics and soluble nutrients. The StormFilter is unique in its ability to meet current and future pollution challenges. No other system offers this degree of excellence and versatility. It is important to note the Stormwater Management Inc's pollutant treatment claims are supported by independent third party testing and evaluation. (See Appendix A for data.)

The StormFilter unit consists of multiple filter cartridges housed in a buried concrete vault that is installed offline from the storm drain system. Pollutant removal is primarily accomplished by percolating accumulated storm water through the filter cartridges. A typical unit consists of an inlet bay where floatables, oils, and surface scum are trapped; a filter bay for the cartridges; and an outlet bay. Water from the inlet bay ponds in the filter cartridge bay and infiltrates the filter media, after which it moves into the outlet bay. Treated water then flows into the storm drainage system. (See Appendix A for details of the StormFilter system.)

In conjunction with the StormFilter, a StormScreen unit is also proposed. This unit provides additional screening of stormwater and is primarily focused on the treatment of trash, debris and larger settable solids. (See Appendix A for details on this unit.)

C. Design Features

All Stormwater Management, Inc. BMP treatment systems are flow-based systems, and therefore, are sized by estimating the peak water quality flow rate (WQF) associated with

the design storm. As previously mentioned, the WQF was determined in accordance with the Standard Urban Storm Water Mitigation Plan (SUSMP). This concept proposes separate systems to treat the off-site area and the on-site area. These distinct areas have the following characteristics:

Drainage Area Description

On-Site Area "A"		On-Site Area "B"	
Total Area	7.7 Acres	Total Area	26.3 Acres
CD	0.796	CD	0.75
Time of Concentration	30 min.	Time of Concentration	30 min.
Intensity, I	0.193 in/hr	Intensity, I	0.193 in/hr
Peak Design Flow	21.8 cfs	Peak Design Flow	66.1 cfs
WQF	1.2 cfs	WQF	3.8 cfs

The design schematic for these areas can be described as follows: (see attached schematics)

1. Option 1: StormFilter

The StormFilter for Area "A" was sized based on a treatment flow rate of 1.2 cfs. To accommodate this flow rate, Stormwater Management recommends using a 6' x 12' StormFilter in series with an 8' x 16' precast StormFilter with a total of 36 cartridges (see attached detail).

The StormFilter for Area "B" was based on a treatment flow rate of 3.8 cfs. To accommodate this flow rate, Stormwater Management recommends using a cast-in-place StormFilter with 114 cartridges. The internal dimensions of this system would be approximately 15' x 41' ID (see attached schematic), although the configuration of the system can be modified with regard to the restrictions of the project site.

2. Option 2: StormFilter/StormScreen Combination

The second option for Area A is to treat the 1.2 cfs with a combined StormFilter/StormScreen system. The two units would be combined in such a way that the first 0.60 cfs would be treated by a StormFilter. When the flow rate exceeds 0.60 cfs the balance of the water quality flow rate would be treated by a StormScreen that would be downstream of the StormFilter and sized to accommodate an additional 2 cfs. To accommodate the 0.60 cfs, Stormwater Management recommends using an 8' x 16' precast StormFilter with a total of 18 cartridges (see attached detail). To accommodate the additional 2 cfs, Stormwater Management recommends using a 4.5' x 8.5' StormScreen with 4 screen cartridges.

The second option for Area "B" is to treat the 3.8 cfs with a combined StormFilter/StormScreen system. The two units would be combined in such a way that the first 1.90 cfs would be treated by a StormFilter. When the flow rate exceeds 1.90 cfs the balance of the water quality flow rate would be treated by a StormScreen that would be downstream of the StormFilter and sized to accommodate an additional 4 cfs. To accommodate the 1.90 cfs, Stormwater Management recommends using two 8' x 16' precast StormFilter in series with a total of 57 cartridges (see attached detail). To accommodate the additional 4 cfs, Stormwater Management recommends using a 6' x 12' StormScreen with 8 screen cartridges.

3. Other Design Features

Both of the on-site areas will have first flush and dry weather flows treated by the above systems. The first flush and dry weather flows will be treated and then outletted into the city storm drain system up to 1.2 cfs would be treated then returned to the storm drain system in Pacific View. The large drainage area would include the treatment of up to 3.8 cfs then returned to the storm drain in First Street.

If additional treatment of petroleum hydrocarbons is required, the BioBuoy can be added to the above systems. The Stormwater Management's BioBuoy insert uses a patented organic medium to stimulate the growth of natural microbes that consume free and emulsified oil and grease in stormwater treatment systems between storm events. (See Appendix 1 for further description.)

4. Treatment System Placement & Maintenance

It is proposed that all "first flush/low flow" water quality treatment systems be located within the private project of the Pacific City project. These treatment systems will be sited with consideration for the size of the facility, the space available and maintenance access to the treatment systems.

5. Pollutant Removal Predictions

We have attached calculations prepared by Stormwater Management Inc. showing the predicted pollutant removals based upon average pollutant loading as obtained from City Staff. These calculations are preliminary and are provided for the pollutant profile.

IV. WATER QUALITY BEST MANAGEMENT PRACTICES

As part of a comprehensive treatment train approaches to water quality, the Pacific City project will incorporate the County of Orange DAMP Section 7. The purpose of the appendix is to identify relatively small-scale development source pollutant prevention and treatment measures that could be incorporated into new developments. These measure include both structural and non- structural approaches.

V. DEWATERING CONTINGENCY PLAN

The Pacific City project does not currently anticipate the need for a dewatering operation for the proposed development. Should project revisions or site conditions require a dewatering program, it will be developed in accordance with the California Regional Water Quality Control board, Santa Ana Region Order No. 93-49, NPDES No. CAG 998001 (de minimum order) and Template Monitoring and Reporting Program No. 98-67 (see Appendix C). We have also enclosed a preliminary dewatering action plan (see Appendix C).

**SECTION 7 - STORM WATER POLLUTION
PREVENTION PLAN**

1. STORM WATER POLLUTION PREVENTION PLAN

The National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) (California Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2002-0010, NPDES No. CAS618030) requires the development and implementation of a Storm Water Pollution Prevention Plan for many construction sites. The SWPPP specifies the implementation of Best Management Practices (BMPs), as appropriate, to control the discharge of pollutants to surface waters.

The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges, and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water as well as non-storm water discharges.

In order to meet these objectives the SWPPP will be prepared according to the following outline.

1. Introduction and required notices
 - Legal framework and objectives
 - Notice of Intent
 - Change of Information
 - Notice of Termination
2. Site Conditions
 - Vicinity Map
 - Site Map
 - Storm water patterns
 - Pre-construction site conditions
 - Construction and development schedule
3. Potential Pollutant Sources
4. Best Management Practices
 - Description
 - Schedule for BMP implementation
 - BMPs for sediment and erosion control
 - General requirements for contractors
5. BMPs for Pollutants other than sediment

6. Non-Storm water BMPs
7. Post-Construction BMPs
8. Site Monitoring
 - Routine quality control monitoring
 - Storm-related quality control monitoring
 - Installation, repairs, and emergency preparedness
 - Annual compliance certification
 - Site inspection report
 - Non-visible pollutant monitoring
 - Sediment/silt and turbidity monitoring
6. Reporting and Revisions.
7. Responsible Parties.
8. Training.

The developer or his agent is required to implement the provisions contained in the SWPPP and must comply with the standard provisions and reporting requirements contained in the General Permit. A copy of the General Permit will be included as a part of the SWPPP. A copy of the SWPPP shall be kept on site while the site is under construction, commencing with the initial construction activity and ending with termination of coverage under the General Permit.