

Council Meeting of
September 27, 2011

Honorable Mayor and Members
of the City Council
City Hall
Torrance, California

Members of the Council:

SUBJECT: Public Works – Appropriate funds and approve agreement for Machado Lake stormwater quality monitoring and reporting. Expenditure: \$364,063.

RECOMMENDATION

Recommendation of the Public Works Director that City Council:

- 1) Appropriate \$364,063 from the Sewer Enterprise Fund balance to the Machado Lake Watershed Best Management Practices for Nutrient and Toxics TMDLs, which includes \$75,000 for project management;
- 2) Approve a contract services agreement with Northgate Environmental Management, Inc. for an amount not to exceed \$282,559, for Machado stormwater quality monitoring and reporting for a 3 year term from September 27, 2011 through October 31, 2014; and
- 3) Authorize a \$6,504 contingency for up to 6 additional samples and analysis.

Funding

Funding is available from the Sewer Enterprise Fund balance.

BACKGROUND/ANALYSIS

The City of Torrance is part of the Machado Lake watershed and must comply with the Machado Lake Nutrient Total Maximum Daily Loads (TMDL) adopted by the Los Angeles Regional Water Quality Control Board (RWQCB). The Machado Lake Nutrient TMDL first requires the City to implement a monitoring and reporting program before developing a Best Management Practices (BMP) Implementation Plan. The Machado Lake Nutrient TMDL requires the City to start monitoring within 60 days of approval of our monitoring and reporting plan. The RWQCB approved our plan on July 28, 2011.

The Palos Verdes peninsula cities of Rolling Hills Estates, Rolling Hills, Rancho Palos Verdes and Palos Verdes Estates distributed a Request for Proposal (RFP) on January 25, 2011 and again on March 24, 2011 to find a firm to perform water quality monitoring and reporting for the Machado Lake Nutrient TMDL. With their first effort they had only 1 firm respond, Northgate Environmental Management, Inc. They issued

a second RFP and obtained 2 proposals and have awarded Northgate Environmental Management, Inc. a contract. It is staff's recommendation to award an agreement to Northgate Environmental Management, Inc. because by hiring the same firm, it ensures coordination of monitoring with Palos Verdes Peninsula cities that drain into Torrance and simplifies the annual reporting requirements to the RWQCB. Northgate Environmental Management, Inc's fee schedule is the same as provided to the Palos Verdes Peninsula cities.

The costs are \$110,190 for the first year with a 3 year total not to exceed amount of \$282,559. The agreement includes monthly sampling at 9 locations, 16 samples during rain events each year, and 5 retakes of samples each year required when there are TMDL exceedences. Staff is recommending a contingency of \$6,504 for 6 additional samples, should the number of rain events or TMDL exceedences be higher than estimated. The extra samples give staff time to amend this agreement if needed.

The first year costs are higher in order to cover the costs of purchasing continuous flow monitoring equipment. The flow monitoring data is required to prove our compliance with the Machado Lake Nutrient TMDL because we propose to divert as much urban run off and stormwater as possible to existing detention basins for infiltration. The only way to prove effectiveness of this BMP is to measure flow. A separate BMP Implementation Plan is required after 1.5 years of monitoring.

Carollo Engineers is currently preparing a citywide Stormwater Quality Master Plan that will include conceptual designs for diverting stormwater for infiltration. Carollo Engineers also prepared the Machado Lake Nutrient Total Maximum Daily Load Special Study Work Plan (Monitoring and Reporting Plan). After 1 year of obtaining water quality and flow data, the City can request Carollo Engineers to prepare the BMP Implementation Plan. Monitoring and reporting plans and BMP Implementation Plans were not included in the original contract with Carollo Engineers for the Stormwater Quality Master Plan because the requirements for the various TMDLs were not set by the RWQCB at the time that contract was awarded.

Staff is proposing to fund this agreement from the Sewer Enterprise Fund balance because the flow monitoring data can also be used to comply with flow measurement requirements of the Sewer System Management Plan, adopted in 2009. The City is required to report any sanitary sewer overflows over 1,000 gallons and this system will give accurate data for those reports, in this part of the City.

The total budget needed to complete this first phase of the project is as follows:

3 Years of Monitoring & Reporting	\$ 282,559.00
6 additional samples as needed	6,504.00
3 Years Contract Management	75,000.00
Total Estimated Project Budget	\$ 364,063.00

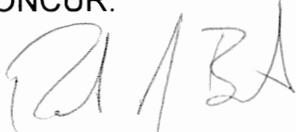
Respectfully submitted,

ROBERT J. BESTE
Public Works Director

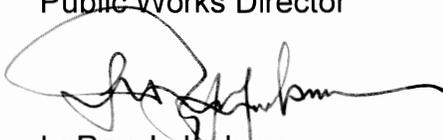


By: John Dettle
Engineering Manager

CONCUR:



Robert J. Beste
Public Works Director



LeRoy J. Jackson
City Manager

- Attachments:
- A. Contract Services Agreement for Northgate Environmental Management, Inc.
 - B. Infrastructure Action Plan for Machado Lake Watershed Best Management Practices for Nutrient and Toxics TMDLs
 - C. Site map of Water Quality Sampling Locations

CONTRACT SERVICES AGREEMENT

This CONTRACT SERVICES AGREEMENT ("Agreement") is made and entered into as of September 27, 2011 (the "Effective Date"), by and between the CITY OF TORRANCE, a municipal corporation ("CITY"), and Northgate Environmental Management, Inc., a California corporation ("CONTRACTOR").

RECITALS:

- A. The CITY wishes to retain the services of an experienced and qualified CONTRACTOR to provide water quality monitoring for compliance with Machado Lake Nutrient TMDL.
- B. In order to obtain the desired services, The CITY has requested a proposal from the same firm selected by the City of Rolling Hills Estates for monitoring of the Machado Lake Nutrient TMDL for the cities of Rolling Hills Estates, Rolling Hills, Rancho Palos Verdes, and Palos Verdes Estates."
- C. CONTRACTOR has submitted a Proposal (the "Proposal") and represents that it is qualified to perform those services requested in the City's Machado Lake Nutrient Total Maximum Daily Load Special Study Work Plan dated May 18, 2011 and that the fee schedule is consistent with those provided to the City of Rolling Hills Estates. Based upon these conditions the CITY is willing to award the contract to CONTRACTOR."

AGREEMENT:

1. **SERVICES TO BE PERFORMED BY CONTRACTOR**
CONTRACTOR will provide the services and install those materials listed in CONTRACTOR's Proposal. A copy of the Proposal is attached as Exhibit A. A copy of the Machado Lake Nutrient Total Maximum Daily Load Special Study Work Plan dated May 18, 2011, is attached as Exhibit B.
2. **TERM**
Unless earlier terminated in accordance with Paragraph 4 below, this Agreement will continue in full force and effect from the Effective Date through October 31, 2014.

3. **COMPENSATION**

A. CONTRACTOR's Fee.

For services rendered pursuant to this Agreement, CONTRACTOR will be paid in accordance with the compensation schedule set forth in the Proposal; provided, however, that in no event will the total amount of money paid the CONTRACTOR, for services initially contemplated by this Agreement, exceed the sum of \$282,559 ("Agreement Sum"), unless otherwise first approved in writing by the CITY.

B. Schedule of Payment.

Provided that the CONTRACTOR is not in default under the terms of this Agreement, upon presentation of an invoice, CONTRACTOR will be paid monthly, within 30 days after the date of the monthly invoice.

4. **TERMINATION OF AGREEMENT**

A. Termination by CITY for Convenience.

1. CITY may, at any time, terminate the Agreement for CITY's convenience and without cause.
2. Upon receipt of written notice from CITY of such termination for CITY's convenience, CONTRACTOR will:
 - a. cease operations as directed by CITY in the notice;
 - b. take actions necessary, or that CITY may direct, for the protection and preservation of the work; and
 - c. except for work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.
3. In case of such termination for CITY's convenience, CONTRACTOR will be entitled to receive payment for work executed; and costs incurred by reason of such termination, along with reasonable overhead and profit on the work not executed.

B. Termination for Cause.

1. If either party fails to perform any term, covenant or condition in this Agreement and that failure continues for 15 calendar days after the nondefaulting party gives the defaulting party notice of the failure to perform, this Agreement may be terminated for cause; provided, however, that if during the notice period the defaulting party has promptly commenced and continues diligent efforts to remedy the default, the defaulting party will have such additional time as is reasonably necessary to remedy the default.
2. In the event this Agreement is terminated for cause by the default of the CONTRACTOR, the CITY may, at the expense of the CONTRACTOR and its surety, complete this Agreement or cause it to be completed. Any check or bond delivered to the CITY in connection with this Agreement, and the money payable thereon, will be forfeited to and remain the property of the CITY. All moneys due the CONTRACTOR under the terms of this Agreement will be retained by the CITY, but the retention will not release the CONTRACTOR and its surety from liability for the default. Under these circumstances, however, the CONTRACTOR and its surety will be credited with the amount of money retained, toward any amount by which the cost of completion exceeds the Agreement Sum and any amount authorized for extra services.
3. Termination for cause will not affect or terminate any of the rights of the CITY as against the CONTRACTOR or its surety then existing, or which may thereafter accrue because of the default; this provision is in addition to all other rights and remedies available to the CITY under law.

C. Termination for Breach of Law.

1. In the event the CONTRACTOR or any of its officers, directors, shareholders, employees, agents, subsidiaries or affiliates is convicted (i) of a criminal offense as an incident to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of a contract or subcontract; (ii) under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property, or any other offense indicating a lack of business integrity or business

honesty which currently, seriously, and directly affects responsibility as a public consultant or contractor; (iii) under state or federal antitrust statutes arising out of the submission of bids or proposals; or (iv) of violation of Paragraph 19 of this Agreement; or for any other cause the CITY determines to be so serious and compelling as to affect CONTRACTOR's responsibility as a public consultant or contractor, including but not limited to, debarment by another governmental agency, then the CITY reserves the unilateral right to terminate this Agreement or to impose such other sanctions (which may include financial sanctions, temporary suspensions or any other condition deemed appropriate short of termination) as it deems proper. The CITY will not take action until CONTRACTOR has been given notice and an opportunity to present evidence in mitigation.

5. FORCE MAJEURE

If any party fails to perform its obligations because of strikes, lockouts, labor disputes, embargoes, acts of God, inability to obtain labor or materials or reasonable substitutes for labor or materials, governmental restrictions, governmental regulations, governmental controls, judicial orders, enemy or hostile governmental action, civil commotion, fire or other casualty, or other causes beyond the reasonable control of the party obligated to perform, then that party's performance shall be excused for a period equal to the period of such cause for failure to perform.

6. RETENTION OF FUNDS

CONTRACTOR authorizes the CITY to deduct from any amount payable to CONTRACTOR (whether or not arising out of this Agreement) any amounts the payment of which may be in dispute or that are necessary to compensate the CITY for any losses, costs, liabilities, or damages suffered by the CITY, and all amounts for which the CITY may be liable to third parties, by reason of CONTRACTOR's acts or omissions in performing or failing to perform CONTRACTOR's obligations under this Agreement. In the event that any claim is made by a third party, the amount or validity of which is disputed by CONTRACTOR, or any indebtedness exists that appears to be the basis for a claim of lien, the CITY may withhold from any payment due, without liability for interest because of the withholding, an amount sufficient to cover the claim. The failure of the CITY to exercise the right to deduct or to withhold will not, however, affect the obligations of CONTRACTOR to insure, indemnify, and protect the CITY as elsewhere provided in this Agreement.

7. THE CITY'S REPRESENTATIVE

Robert Beste is designated as the "City Representative," authorized to act in its behalf with respect to the work and services specified in this Agreement and to make all decisions in connection with this Agreement. Whenever approval, directions, or other actions are required by the CITY under this Agreement, those actions will be taken by the City Representative, unless otherwise stated. The City Manager has the right to designate another City Representative at any time, by providing notice to CONTRACTOR.

8. CONTRACTOR REPRESENTATIVE(S)

The following principal(s) of CONTRACTOR are designated as being the principal(s) and representative(s) of CONTRACTOR authorized to act in its behalf with respect to the work specified in this Agreement and make all decisions in connection with this Agreement:

Derrick Willis, Principle

9. INDEPENDENT CONTRACTOR

The CONTRACTOR is, and at all times will remain as to the CITY, a wholly independent contractor. Neither the CITY nor any of its agents will have control over the conduct of the CONTRACTOR or any of the CONTRACTOR's employees, except as otherwise set forth in this Agreement. The CONTRACTOR may not, at any time or in any manner, represent that it or any of its agents or employees are in any manner agents or employees of the CITY.

10. BUSINESS LICENSE

The CONTRACTOR must obtain a City business license prior to the start of work under this Agreement, unless CONTRACTOR is qualified for an exemption.

11. OTHER LICENSES AND PERMITS

CONTRACTOR warrants that it has all professional, contracting and other permits and licenses required to undertake the work contemplated by this Agreement.

12. FAMILIARITY WITH WORK

By executing this Agreement, CONTRACTOR warrants that CONTRACTOR (a) has thoroughly investigated and considered the scope of services to be performed, (b) has carefully considered how the services should be performed, and (c) fully understands the facilities, difficulties

and restrictions attending performance of the services under this Agreement. If the services involve work upon any site, CONTRACTOR warrants that CONTRACTOR has or will investigate the site and is or will be fully acquainted with the conditions there existing, prior to commencement of services set forth in this Agreement. Should CONTRACTOR discover any latent or unknown conditions that will materially affect the performance of the services set forth in this Agreement, CONTRACTOR must immediately inform the CITY of that fact and may not proceed except at CONTRACTOR's risk until written instructions are received from the CITY.

13. CARE OF WORK

CONTRACTOR must adopt reasonable methods during the term of the Agreement to furnish continuous protection to the work, and the equipment, materials, papers, documents, plans, studies and other components to prevent losses or damages, and will be responsible for all damages, to persons or property, until acceptance of the work by the CITY, except those losses or damages as may be caused by the CITY's own negligence.

14. CONTRACTOR'S ACCOUNTING RECORDS; OTHER PROJECT RECORDS

Records of the CONTRACTOR's time pertaining to the project, and records of accounts between the CITY and the CONTRACTOR, will be kept on a generally recognized accounting basis. CONTRACTOR will also maintain all other records, including without limitation specifications, drawings, progress reports and the like, relating to the project. All records will be available to the CITY during normal working hours. CONTRACTOR will maintain these records for three years after final payment.

15. INDEMNIFICATION

CONTRACTOR will indemnify, pay for cost of defense, and hold harmless CITY, the City Council, each member thereof, present and future, its officers, agents and employees from and against any and all liability, expenses, including defense costs and legal fees, and claims for damages whatsoever, including, but not limited to, those arising from breach of contract, bodily injury, death, personal injury, property damage, loss of use, or property loss. The obligation to indemnify, pay for cost of defense, and hold harmless includes, but is not limited to, any liability or expense, including defense costs and legal fees, arising from the negligent acts or omissions, or willful misconduct of CONTRACTOR, its officers, employees, agents, subconsultants or vendors. It is further agreed, CONTRACTOR's obligations to indemnify, defend and hold harmless will apply, but only to the extent covered by Consultant's negligence, even in the event of concurrent negligence on the party of CITY, the City Council,

each member thereof, present and future, or its officers, agents and employees, except for liability resulting from the negligence or willful misconduct of CITY, its officers, employees or agents. Payment by CITY is not a condition precedent to enforcement of this indemnity.

16. NON-LIABILITY OF THE CITY'S OFFICERS AND EMPLOYEES

No officer or employee of the CITY will be personally liable to CONTRACTOR, in the event of any default or breach by the CITY or for any amount that may become due to CONTRACTOR.

17. INSURANCE

A. CONTRACTOR and its subcontractors must maintain at its sole expense the following insurance, which will be full coverage not subject to self insurance provisions:

- (1) Automobile Liability, including owned, non-owned and hired vehicles, with at least the following limits of liability:
 - (a) Primary Bodily Injury with limits of at least \$500,000 per person, \$1,000,000 per occurrence; and
 - (b) Primary Property Damage of at least \$250,000 per occurrence; or
 - (c) Combined single limits of \$1,000,000 per occurrence.
- (2) General Liability including coverage for premises, products and completed operations, independent contractors/vendors, personal injury and contractual obligations with combined single limits of coverage of at least \$1,000,000 per occurrence.
- (3) Workers' Compensation with limits as required by the State of California and Employer's Liability with limits of at least \$1,000,000.

B. The insurance provided by CONTRACTOR will be primary and non-contributory.

C. CITY ("City of Torrance"), the Redevelopment Agency of the City of Torrance, the City Council and each member thereof, members of boards and commissions, every officer, agent, official, employee and volunteer must be named as additional insured under the automobile and general liability policies.

- D. CONTRACTOR must provide certificates of insurance and/or endorsements indicating appropriate coverage, to the City Clerk of the City of Torrance before the commencement of work.
- E. Each insurance policy required by this Paragraph must contain a provision that no termination, cancellation or change of coverage can be made without thirty days notice to CITY.

18. SUFFICIENCY OF INSURERS

Insurance required by this Agreement will be satisfactory only if issued by companies admitted to do business in California, rated "B+" or better in the most recent edition of Best's Key Rating Guide, and only if they are of a financial category Class VII or better, unless these requirements are waived by the Risk Manager of the CITY ("Risk Manager") due to unique circumstances. In the event the Risk Manager determines that the work or services to be performed under this Agreement creates an increased or decreased risk of loss to the CITY, the CONTRACTOR agrees that the minimum limits of any insurance policies and/or the performance bond required by this Agreement may be changed accordingly upon receipt of written notice from the Risk Manager; provided that CONTRACTOR will have the right to appeal a determination of increased coverage by the Risk Manager to the City Council of the CITY within 10 days of receipt of notice from the Risk Manager.

19. CONFLICT OF INTEREST

- A. No officer or employee of the CITY may have any financial interest, direct or indirect, in this Agreement, nor may any officer or employee participate in any decision relating to the Agreement that effects the officer or employee's financial interest or the financial interest of any corporation, partnership or association in which the officer or employee is, directly or indirectly interested, in violation of any law, rule or regulation.
- B. No person may offer, give, or agree to give any officer or employee or former officer or employee, nor may any officer or employee solicit, demand, accept, or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any way pertaining to any program requirement, contract or subcontract, or to any solicitation or proposal.

20. NOTICE

A. All notices, requests, demands, or other communications under this Agreement will be in writing. Notice will be sufficiently given for all purposes as follows:

- (1) Personal delivery. When personally delivered to the recipient: notice is effective on delivery.
- (2) First Class mail. When mailed first class to the last address of the recipient known to the party giving notice: notice is effective three mail delivery days after deposit in an United States Postal Service office or mailbox.
- (3) Certified mail. When mailed certified mail, return receipt requested: notice is effective on receipt, if delivery is confirmed by a return receipt.
- (4) Overnight delivery. When delivered by an overnight delivery service, charges prepaid or charged to the sender's account: notice is effective on delivery, if delivery is confirmed by the delivery service.
- (5) Facsimile transmission. When sent by fax to the last fax number of the recipient known to the party giving notice: notice is effective on receipt. Any notice given by fax will be deemed received on the next business day if it is received after 5:00 p.m. (recipient's time) or on a non-business day.

Addresses for purpose of giving notice are as follows:

CONSULTANT: Northgate Environmental
Management, Inc.
24411 Ridge Route Drive, Suite
130
Laguna Hills, CA 92653

Fax: (949) 716-0055

CITY: City Clerk
City of Torrance
3031 Torrance Boulevard
Torrance, CA 90509-2970
Fax: (310) 618-2931

- B. Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified, will be deemed effective as of the first date the notice was refused, unclaimed or deemed undeliverable by the postal authorities, messenger or overnight delivery service.
- C. Either party may change its address or fax number by giving the other party notice of the change in any manner permitted by this Agreement.

21. PROHIBITION AGAINST ASSIGNMENT AND SUBCONTRACTING

This Agreement and all exhibits are binding on the heirs, successors, and assigns of the parties. The Agreement may not be assigned or subcontracted by either the CITY or CONTRACTOR without the prior written consent of the other.

22. INTEGRATION; AMENDMENT

This Agreement represents the entire understanding of the CITY and CONTRACTOR as to those matters contained in it. No prior oral or written understanding will be of any force or effect with respect to the terms of this Agreement. The Agreement may not be modified or altered except in writing signed by both parties.

23. INTERPRETATION

The terms of this Agreement should be construed in accordance with the meaning of the language used and should not be construed for or against either party by reason of the authorship of this Agreement or any other rule of construction that might otherwise apply.

24. SEVERABILITY

If any part of this Agreement is found to be in conflict with applicable laws, that part will be inoperative, null and void insofar as it is in conflict with any applicable laws, but the remainder of the Agreement will remain in full force and effect.

25. TIME OF ESSENCE

Time is of the essence in the performance of this Agreement.

26. GOVERNING LAW; JURISDICTION

This Agreement will be administered and interpreted under the laws of the State of California. Jurisdiction of any litigation arising from the Agreement will be in Los Angeles County, California.

27. COMPLIANCE WITH STATUTES AND REGULATIONS

CONTRACTOR will be knowledgeable of and will comply with all applicable federal, state, county and city statutes, rules, regulations, ordinances and orders.

28. WAIVER OF BREACH

No delay or omission in the exercise of any right or remedy by a nondefaulting party on any default will impair the right or remedy or be construed as a waiver. A party's consent or approval of any act by the other party requiring the party's consent or approval will not be deemed to waive or render unnecessary the other party's consent to or approval of any subsequent act. Any waiver by either party of any default must be in writing and will not be a waiver of any other default concerning the same or any other provision of this Agreement.

29. ATTORNEY'S FEES

Except as set forth in Paragraph 15, in any dispute, litigation, arbitration, or other proceeding by which one party either seeks to enforce its rights under this Agreement (whether in contract, tort or both) or seeks a declaration of any rights or obligations under this Agreement, the prevailing party will be awarded reasonable attorney's fees, together with any costs and expenses, to resolve the dispute and to enforce any judgment.

30. EXHIBITS

All exhibits identified in this Agreement are incorporated into the Agreement by this reference.

31. CONTRACTOR'S AUTHORITY TO EXECUTE

The persons executing this Agreement on behalf of the CONTRACTOR warrant that (i) the CONTRACTOR is duly organized and existing; (ii) they are duly authorized to execute this Agreement on behalf of the CONTRACTOR; (iii) by so executing this Agreement, the CONTRACTOR is formally bound to the provisions of this Agreement; and (iv) the entering

into this Agreement does not violate any provision of any other Agreement to which the CONTRACTOR is bound.

CITY OF TORRANCE,
a Municipal corporation

Northgate Environmental Management, Inc.,
a California corporation

Frank Scotto, Mayor

By: _____
Derrick Willis, Principal

ATTEST:

Sue Herbers, City Clerk

APPROVED AS TO FORM:

JOHN L. FELLOWS III
City Attorney

By: _____

Attachments: Exhibit A: Proposal
 Exhibit B: Machado Lake Nutrient TDML Work Plan

Revised: 10/29/2008

EXHIBIT A
PROPOSAL



August 29, 2011

Mr. John C Dettle, Engineering Manager
City of Torrance, Public Works Department
20500 Madrona Avenue
Torrance, California 90503

RE: Response to Request for Proposal
Stormwater Sampling Services, Special Studies Workplan (SSWP)

Dear Mr. Dettle:

Northgate Environmental Management, Inc. (Northgate) appreciates this opportunity to submit our qualifications and proposal in response to the City of Torrance's solicitation for stormwater sampling services. Based on our review of the *Machado Lake Nutrient Total Maximum Daily Load Special Study Work Plan (SSWP)*, (Carollo Engineers, 2011), Northgate understands that the City of Torrance requires assistance in planning, sampling and analysis, and reporting of water quality monitoring as stipulated in the SSWP for a period of three years.

Northgate has a proven track record in project management, field sampling planning and implementation, and timely reporting to public agencies. We can provide expert staff for this project with experience in hydrologic and surface water characterization, water sampling, and work planning. We will subcontract with TestAmerica, a fixed-based laboratory located in Irvine, California, for laboratory analytical services. TestAmerica has been certified by the National Environmental Laboratory Accreditation Program (NELAP) and the California Environmental Laboratory Accreditation Program (CA ELAP). Northgate and TestAmerica are dedicated to providing the City with the highest quality work that will successfully respond to regulatory requirements and meet the City of Torrance's goals.

We thank you in advance for considering our proposal, and look forward to an opportunity to work with the City on this interesting project. If you would like more information or have any questions, please feel free to contact the undersigned.

Sincerely,
Northgate Environmental Management, Inc.

A handwritten signature in black ink, appearing to read 'Derrick Willis'.

Derrick Willis
Principal and Southern
California Operations Manager

A handwritten signature in black ink, appearing to read 'Dana R. Brown'.

Dana R. Brown
Senior Geologist

Enclosures:

City of Torrance ***Proposal to Provide Stormwater*** ***Monitoring Services***

August 29, 2011

Prepared for:

The City of Torrance

Prepared By:



24411 Ridge Route Drive, Suite 130
Laguna Hills, California
92653

Telephone: (949) 716-0050

Fax: (949) 716-0055

Email: derrick.willis@ngem.com

dana.brown@ngem.com



TABLE OF CONTENTS

COVER LETTER

SECTION 1 – PROJECT UNDERSTANDING AND SCHEDULE	1
SECTION 2 – IMPRESSION OF PROJECT	4
SECTION 3 – PROJECT TEAM	4
SECTION 4 – QUALIFICATIONS OF PROJECT TEAM	6
SECTION 5 – RELATED EXPERIENCE	8
SECTION 6 – REFERENCES	9
SECTION 7 – ESTIMATED COSTS	9

ATTACHMENTS

ATTACHMENT A – SPECIFICATION SHEET FOR FLOW SENSORS

ATTACHMENT B – SAFE WORK PRACTICES

ATTACHMENT C – FIELD FORMS

ATTACHMENT D – RESUMES



1. PROJECT UNDERSTANDING AND SCHEDULE

The City of Torrance (City) intends to implement a stormwater sampling program as part of a special study of the storm drains that discharge into Machado Lake. The scope of work for the stormwater sampling program is described in the *Machado Lake Nutrient Total Maximum Daily Load Special Study Work Plan* (SSWP), (Carollo Engineers, 2011). The first phase of activity, *Initial Pre-BMP Implementation Study Period*, lasts for one year and includes monthly monitoring of nine sampling locations under dry weather conditions, continuous recording of stage or flow depth at all nine sample locations, collection of four storm-event water samples during qualifying precipitation events, and water samples collected when Los Angeles County (LACo) pumps stormwater from Walteria Lake into a 54-inch storm drain located at Supply Station TOR-53.

This proposal contains a description of tasks designed to ensure that the City is in compliance with the Total Maximum Daily Load (TMDL) for eutrophic, algae, ammonia, and odors (Nutrients) for Machado Lake. The TMDL was established by the Los Angeles Regional Water Quality Control Board (LARWQCB) on May 1, 2008. It was subsequently approved by the United States Environmental Protection Agency and became effective on March 11, 2009. The TMDL sets forth stringent numerical limits for nitrogen and phosphorus, as well as numerical targets for ammonia, dissolved oxygen, and chlorophyll to assess overall water quality in the Lake.

We understand that the City is interested in rapidly implementing the stormwater sampling program during the *Initial Pre-BMP Implementation Study* period of one year, and two additional years of monitoring (three years total project duration); Northgate Environmental Management Inc. (Northgate) is prepared to fast-track the project to accomplish this goal. The following sections provide Northgate's understanding of the project, and a proposed schedule for completion of project tasks.

Task 1: Project Initiation and Planning. Northgate will develop a Field Sampling Plan (FSP) and a Health and Safety Plan (HSP) that outline the field procedures to be used, and the health and safety concerns and protocols in performing the work. The FSP and HSP will be submitted to the City within 10 days of Northgate receiving a Notice to Proceed.

Following a review of the FSP and HSP by the City, we will initiate a kickoff meeting to discuss and resolve project issues prior to beginning field work. We will revise the FSP and HSP based upon comments received from the City during the kickoff meeting.

Following approval of the FSP dedicated flow monitoring equipment will be procured. The SSWP specifies the use of Global Water Instrumentation, Inc. FL16 flow loggers (flow sensors). A specification sheet for the flow sensors is included as Attachment A. Purchase of nine dedicated flow sensors for the project will require 4 to 5 weeks for manufacture and delivery.

Northgate will apply for Right-of-Entry permits at the two sampling sites located in LACo, and two sites located in The City of Lomita. Application for Right-of-Entry permit from the City will also be submitted for the remaining sampling sites. Our experience indicates that Right-of-Entry permit



applications submitted to the County of Los Angeles for stormwater sampling activities undergo considerable delay as the application is reviewed and processed.

Task 2: Initial Site Visit. Prior to commencing water sampling the field team will perform an initial visit to each sampling station to install the dedicated flow sensors, measure flow within the storm drain, and document the size & construction of the conduit. Based on the unique geometry and depth of each manhole, the field team will test different methods of sample collection and sample collection devices to determine the appropriate technique and equipment for each sample station. The FSP will then be updated with descriptions of the sampling methods at each station, and the quality assurance/quality control (QA/QC) testing frequency for the sample collection devices.

The flow sensors will be securely attached to the floor of the storm drain to prevent loss during periods of high water. A data cable will connect the sensor to a download plug located in a waterproof housing secured inside the manhole cover. The data cable will be attached to the access ladder using cable ties.

After the flow sensor is installed water flow adjacent to the sensor will be measured with a portable flowmeter. The geometry of the conduit will be measured and recorded, and the calculated flow obtained with the portable flowmeter compared to the flow measured by the dedicated flow sensor.

Due to potential hazards associated with the confined-space inside manholes and storm drains, the field team will use confined-space entry procedures, specialized safety equipment, and follow approved safe work practices during installation and testing of the flow sensors (see Attachment B, Safe Work Practices). Only one team member will enter the confined-space at a time (Entrant). The other team member (Attendant) will remain at the surface to monitor the Entrant and provide support during all times when the worker is inside the manhole. The Attendant will also act as the operator of the rescue equipment and provide notification to the authorities in case of emergency.

Task 3: Field Sampling and Flow Measurement. The field sampling and flow measurement activities are projected to occur at least monthly, and will not normally require confined-space entry. Specific tasks include: 1) monthly sampling and continuous flow measurement at nine permanent monitoring stations; 2) sampling and flow measurement at one permanent monitoring station during at least four qualifying wet weather events per year, and 3) sampling and flow measurement at one station during events where LACo pumps stormwater from Walteria Lake into the 54-inch storm drain (an estimated ten events per year).

Northgate will employ a two-person team for sampling and flow measurement to ensure worker safety and timely completion of field activities during rain events. The team will work outside the manholes by opening the manhole cover and lowering tools into the manhole for sample collection. Data and observations will be recorded at each station during sample collection on a *Sample Data Sheet* (see Attachment C).

Samples will be collected using a polyethylene dipper or disposable bailer, as appropriate. After rinsing the collector three times in the sample stream, a sample will be retrieved and poured from the dipper into laboratory supplied, pre-preserved 250 milliliter (ml) polyethylene sample bottles.



Some of the bottles will contain sulfuric acid (H_2SO_4) as a preservative, and care will be exercised to ensure that sample preservative is not spilled into the water body or onto the ground.

Following sample collection, data from the flow sensors will be downloaded and stored on a laptop computer. As a check on the data recorders, flow at monitoring points that can be accessed from the surface will be measured using a portable flow meter and the data recorded on the *Sample Data Sheet*.

One field duplicate sample, and one equipment blank will be collected for each dry weather monitoring event, and QA/QC samples will be collected on at least a 10% frequency or one per event, whichever is greater in the dry weather and discharge sampling. Sample bottles will be labeled and stored in an iced cooler for shipment to the analytical laboratory under proper chain-of-custody protocol. Laboratory data and field data sheets for each monitoring event will be reviewed by the project Quality Assurance Manager (QA Manager) within 10 days of the sampling event. All field procedures will be performed in accordance with provisions of the SSWP.

Task 4: Laboratory Analysis and Data Reporting. Samples will be delivered to Test America, Irvine, California, under chain-of-custody protocol. Test America is a CAL ELAP and Federal Contract Laboratory Program participant. Samples will be analyzed for the following:

- Ammonia-Ammonium using ISE4500,
- Nitrate-Nitrite, using EPA Method 300.0,
- Total Kjeldahl Nitrogen (TKN) using EPA Method 351.2,
- Total Phosphorous using EPA Method 365.3, and
- Orthophosphate using EPA Method 300.0.

Analytical results will be reported to the project QA Manager within 10 days of sample receipt by the laboratory. The QA Manager will review the laboratory data reports, field data sheets and chain of custody form to ensure compliance with the requirements and data quality objectives of the SSWP.

Task 5: Annual Report. Northgate will prepare an annual monitoring report for submittal to the City by October 1 of each year, in accordance with the requirements of the SSWP (Section 6.0, Data Management and Reporting). Following review of the annual report by the City, Northgate will make any necessary changes to the annual report, for submittal to the LARWQCB by December 14 of each year. The report will include a discussion of compliance with interim and final waste load allocations; a tabular database including sample dates, sample locations, laboratory results, and detection limits; copies of field data sheets and laboratory analytical reports; an evaluation of data quality based on QA/QC results; and a discussion of any requested changes or modifications to the SSWP along with supporting documentation.

Task 6 (Optional): Additional Sampling Events. The City may request that Northgate conduct additional sampling events at one or more of the monitoring locations, likely in response to exceedances of interim waste load allocations from the Machado Lake Nutrient TMDL. The sampling procedure for this task will be the same procedure as outlined under Task 3, Field



Sampling and Flow Measurement. Additional sampling events will be conducted within 5 working days notice from the City.

For purposes of this cost estimate, we have assumed that two monitoring locations will be included in the additional sampling event, and three samples will be collected (2 primary and 1 QA/QC sample per event). Each of the water samples will be analyzed for the complete list of parameters described in Section 4.0. If additional sample stations are required during an event, the work will be billed at the same hourly and project rates as described in Task 3, Field Sampling and Flow Measurement.

Task 7 (Optional): Confined-Space Entry. To service the dedicated flow sensors or data cables entry into the confined-space of the manhole is required. Task 7 presents rates for Northgate to provide confined-space entry equipment for use on the project. All work performed within the confined-space will be billed at standard project rates; but tasks will require additional time to complete due to equipment setup, air monitoring, and Attendant monitoring as the Entrant performs work within the confined-space.

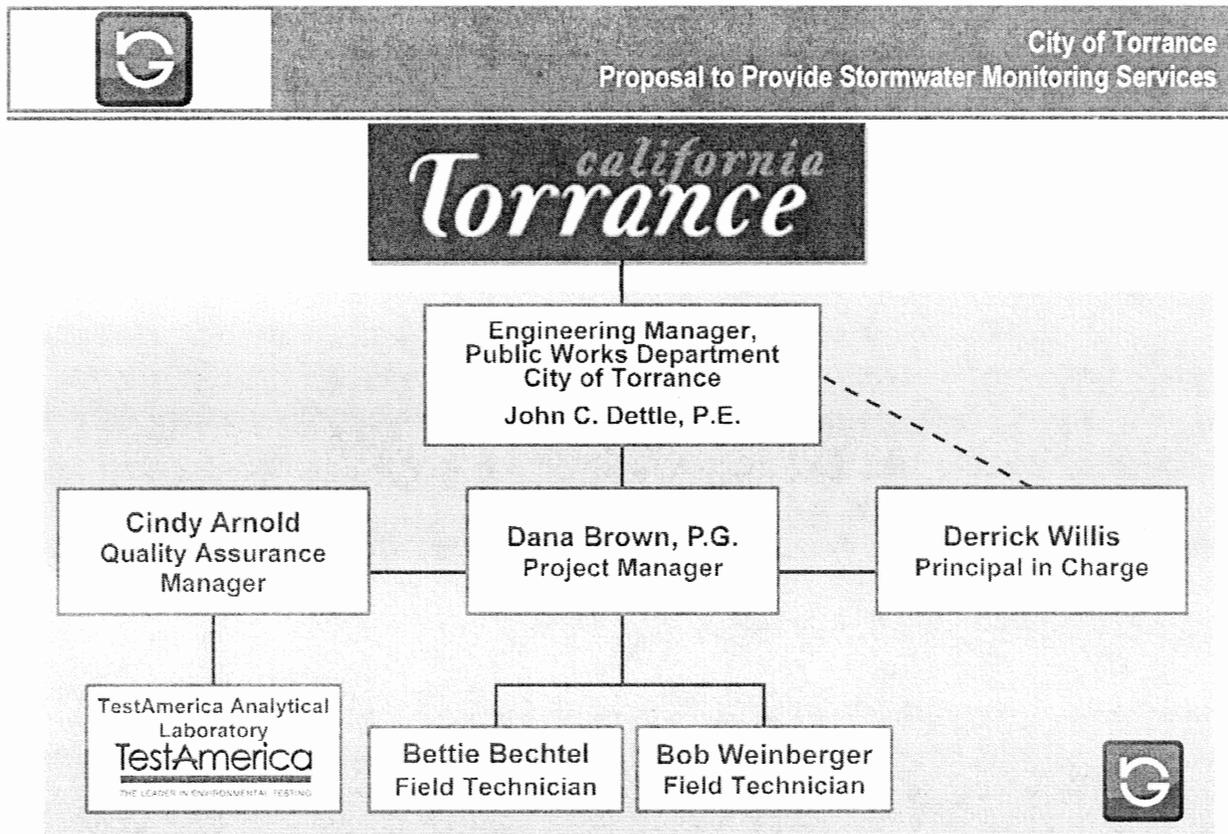
2. IMPRESSION OF PROJECT

Northgate believes that the scope of work outlined in the SSWP is sufficient to achieve its monitoring and data collection objectives, and that we can successfully complete this scope of work in a timely and cost-effective manner. Here is a summary of the cost-saving measures we will implement for this project:

- 1) We propose to accomplish the sampling using a polyethylene dipper or disposable bailer to allow the field team to remain outside the manhole, and avoid confined-space entry requirements.
- 2) We propose to use laboratory-supplied pre-preserved sample containers, and deliver the collected samples to the laboratory at the conclusion of each field day to ensure that the samples are not cross-contaminated and that proper hold times for the analytical methods are met.

3. PROJECT TEAM

Northgate has assembled a top-notch team of professionals who are dedicated to serving the City for this contract. Our project team, shown on the organization chart below, was selected based on relevant experience and expertise and availability over the duration of the contract. Our project team resumes can be found in Attachment D. The analytical laboratory for this project will be Test America. By assigning a small dedicated team to serve the City, we ensure high-level service and continuity in approach and deliverables, while maintaining our cost-effectiveness.



A short summary of each staff member's relevant expertise for this project is presented below.

Derrick Willis – Principal-in-Charge. Derrick Willis is the Operations Manager of Northgate's Laguna Hills office, and has over 20 years experience serving both public sector and private clients in California and Canada on a wide variety of environmental projects. Mr. Willis has served as a client director for multiple clients with a diverse portfolio of projects, including RREEF, Opus Corporation, Watson Land Company, and Texaco. In this capacity, Mr. Willis has been focused on ensuring client satisfaction with Northgate's work. As the Principal-in-Charge for this project, Mr. Willis will ensure the overall quality of Northgate's work and ensure that sufficient resources are available to perform the scope of work. Mr. Willis will also serve as an alternate point of contact for the City.

Dana Brown, PG – Project Manager. Dana Brown is a Professional Geologist with over 18 years of professional experience. Mr. Brown has been responsible for multiple hydrologic characterization studies including extensive field experience in surface water characterization studies. Mr. Brown's project experience includes establishing surface water monitoring networks; collecting storm water samples to quantify "first-flush" impacts and composite samples for pollutant loading characterization (bacterial constituents, nitrates and phosphates); and obtaining NPDES permits and managing the water sample collection process to ensure permit compliance. As the Project Manager, Mr. Brown will be Northgate's primary point of contact for the City, will coordinate field staff for the sampling and reporting effort, will ensure that the field sampling and reporting is performed on-time and on budget, and will routinely communicate with the City to ensure the smooth functioning of the project.



Cindy Arnold – QA Manager. Ms. Arnold has over 20 years of experience in environmental chemistry both in the laboratory setting and as an environmental consultant. She has worked on numerous remedial investigations and feasibility studies, performing baseline risk assessments, ecological assessments, and community relations planning. She has served as a Quality Assurance Officer for a wide variety of state and federal programs across a national network of offices, in addition to serving on special technical teams for both the public and private sector. Ms. Arnold has performed data validation for organic analysis, high resolution analysis of PCB congeners and dioxin/furans, radiochemistry, inorganic analysis and classical wet chemistry. She has experience with air and industrial hygiene sampling and analysis. Ms. Arnold has also served as a litigation support chemist in the statistical impact analysis of environmental data.

Bob Weinberger – Field Team Leader. Bob Weinberger is the Field Service Manager for Northgate's Laguna Hills office. Mr. Weinberger has over 10 years of experience in the construction and environmental field, and has provided oversight on a wide variety of environmental remediation, construction dewatering and engineered wetlands projects. Mr. Weinberger's project experience includes developing a program to treat and discharge water into the storm water system, including designing a mobile unit for water treatment, obtaining permits for the system from the Regional Boards in all nine regions of the State and developing the administrative and field framework to track, treat, sample and report the discharges under the general permit. As the Field Team Leader for this project, Mr. Weinberger will be responsible for coordinating sampling events with the analytical laboratory, performing and supervising sampling in the field and communicating any recommended revisions to the sampling protocol to the Project Manager, in order to create additional efficiencies.

Bettie Bechtel – Field Technician. Bettie Bechtel is a Senior Staff Geologist with over 10 years of experience in the environmental field, performing a wide variety of field investigation activities and report writing, including soil and groundwater sampling, sample handling and custody and data analysis. Ms. Bechtel has also served as a quality control officer for aspects of environmental investigations, including QC of laboratory reports and chains of custody and input of analytical results into the project database. Ms. Bechtel will be part of the field team responsible for sampling events.

4. QUALIFICATIONS OF PROJECT TEAM

Northgate is a full-service environmental engineering firm headquartered in Oakland, California with a local office in Laguna Hills, California. For this project, we are teamed with Test America, who will provide laboratory analytical services. Northgate's staff of 40 professional and administrative employees serves the environmental needs of industry, public agencies, municipalities, regional and state government, developers, insurers, and attorneys. Our team achieves results by providing professional management at every stage of the process. We focus on remaining within budget and on timely completion of technically excellent deliverables, and we believe we are highly qualified to perform this scope of work and deliver quality products and services to the City. Several key areas of performance which will be essential to the success of this project are outlined below.



Project Management. Northgate has a proven track record managing environmental projects, many of which have involved multiple responsible parties (RPs) and large stakeholder groups. Our history of success is based on sound technical judgment and our ability to build consensus among multiple parties, negotiate with regulatory agencies, and optimize environmental programs using a multidisciplinary approach. We also believe that communication is one key to project success, and our project manager will be in regular communication with the City to provide project updates, to ensure that we are meeting the expectations of the City, and to make recommendations for optimizing the monitoring and reporting program.

Cost Control. Northgate's success can be attributed to our staff's ability to prepare accurate cost estimates and maintain project budgets and schedules. Project managers use a standardized budget-estimating sheet, which is designed to ensure that all potential costs for a project are considered when preparing project cost estimates. Northgate uses a state-of-the-art accounting system to monitor all project-related labor time, expenses, invoices, and budgets. This 'real-time' cost-control accounting process allows our project managers to perform accurate tracking and reporting of project costs, manage budgets efficiently, conserve financial resources, and provide up-to-date information to clients. Together, these controls allow accurate and timely tracking and reporting of cash flows for work completed to-date and projections to complete the project.

Project Schedule. Northgate understands that our work is the basis for engineering designs, regulatory actions, and business decisions. We recognize the importance of meeting milestones on regulatory driven projects. At the kickoff meeting, Northgate will provide the City with a detailed schedule for the TMDL monitoring and reporting program. Throughout the course of the project, Northgate will routinely update the City on the project status including completed, ongoing, and proposed activities.

Health and Safety. The health and safety of the public, our employees, and site workers is of the utmost importance to Northgate. The project manager has been trained in the behavior-based loss prevention system (LPS) and has successfully implemented it on many projects. Northgate personnel have current OSHA HAZWOPER training and medical monitoring, to ensure they are familiar with the most recent health and safety concerns. Our staff will read the HSP before starting field work, and field staff will carry a copy of the HSP whenever they are in the field.

Chief among the health and safety concerns will be the safety of Northgate field staff when working inside manholes. Installation and testing of dedicated flow sensors inside the storm drains, and periodic maintenance of the systems will require a Northgate worker to periodically enter the confined-space inside the manholes to perform the service. Northgate has developed safe work practices that ensure the safety of workers inside manholes, support staff working around the open manhole, and the public in the area surrounding the work. We will use appropriate safety equipment to test the atmosphere before entering a confined-space environment, monitor the atmosphere during performance of the work, provide a ventilation fan to deliver fresh breathing air when workers are within the manhole, and also provide safety equipment to facilitate emergency retrieval of a worker within the manhole.



A secondary health and safety concern will be the safety of field staff during wet weather sampling events. Rain events in Southern California can be extreme, resulting in high storm flows and even flash flooding. Northgate will employ a minimum of two people for each sampling event, to ensure the safety of the sampling crew and the proper performance of field procedures.

5. RELATED EXPERIENCE

Stormwater Sampling, TDML Compliance Monitoring and Reporting, Peninsula Cities (Rancho Palos Verdes, Palos Verdes Estates, Rolling Hills, and Rolling Hills Estates), California. Northgate is performing TDML compliance monitoring and reporting for the Peninsula Cities under the Palos Verdes Peninsula Coordinated Monitoring Plan (CMP). The CMP is administered by the City of Rolling Hills Estates, and work performed includes the collection of dry weather and storm event water quality data and stream flow measurements. Northgate is also under contract to produce annual monitoring reports for submission to the Regional Water Quality Control Board for compliance with the Machado Lake Nutrient TMDL.

Surface Water Sampling, NPDES Permit Acquisition and Reporting, Gridley Pit Stop, Gridley, California. Northgate staff obtained an NPDES permit and managed the permit compliance process and water sample collection during discharge of treated groundwater from the remediation of a former petroleum retail facility located in Northern California. Established a surface water monitoring network and collected routine water quality data and stream flow measurements to support NPDES permit compliance and reporting.

Stormwater Discharge Characterization, Cave Lake Country Store, Lake Tahoe, Nevada. Northgate staff established a surface water monitoring network and collected stormwater samples to characterize discharges from an active fueling station into a stream entering Lake Tahoe. Collected grab samples to quantify "first-flush" impacts and composite samples for pollutant loading characterization in storm runoff from a paved site adjacent to a natural creek that discharges into Lake Tahoe less than 300 feet downstream of the facility. Samples were collected for chemical contaminants, bacterial constituents, nitrates and phosphates.

NPDES Permit Compliance, RREEF, Marina Marketplace, Marina del Rey, California. Northgate designed, installed, operates, and maintains a 100,000 gallon-per-day basement dewatering/treatment system that includes treatment of groundwater for volatile organic compounds, metals and nutrients to TMDL-derived discharge limitations under NPDES general permit/order R4-2008-0032. Northgate coordinates with the LARWQCB on behalf of the client, collects monthly samples to verify compliance with the NPDES permit, and prepares and submits annual and quarterly reports to the LARWQCB.

Specialized NPDES Permit Compliance and On-Call Water Quality and Pollutant Control Consulting Services, Alameda County Countywide Clean Water Program, Alameda County, California. Northgate has held this on-call contract with Alameda County since 2005. In this capacity, we have provided the County with expertise in evaluating potential sources of pollution in their storm water discharges. More recently, Northgate is also assisting the County with managing



their data and GIS systems to better understand and communicate information regarding the distribution of contaminants in their storm water discharges.

6. REFERENCES

1. Mr. Jon Wactor

Wactor & Wick, LLP

180 Grand Avenue, Suite #950

Oakland, California 94612

510-465-5750 extension 1

Project(s): Phase I/II Environmental Site Assessments and Well Abandonment Oversight, Soil Remediation

2. Mr. Greg Boehm

Watson Land Company

22010 S. Wilmington Avenue

Carson, California 90745

310-952-6413

Project(s): Phase I/II Environmental Site Assessments, Excavation Oversight, Soil Import Management, UST Removal and Borrow Site Evaluations

3. Mr. Russ Bengali

RREEF

535 Anton Boulevard, Suite 200

Costa Mesa, California 92626

714-640-3825

Project(s): NPDES Permitting, Dewatering and Remediation System Design

7. ESTIMATED COSTS

Total cost for three years of project work, consisting of Tasks 1 through Task 5 is \$282,559. Included in this cost are \$13,976 for the purchase and installation of nine dedicated flow sensors. The installation will include calibrating and testing of the sensors, and collection of background flow data. The total cost for the project startup and first year of monitoring is \$110,190. The cost for analysis of a single water sample is \$106, and the cost to perform a single on-call monitoring event (including analytical fees) is \$1,084.

The costs for each task are summarized in Table 1, and are broken out by first year (startup costs), and total three year project costs. The unit costs for optional Tasks 6 (Additional Sampling Events), is also presented in Table 1. The estimated cost details, broken out on a task-specific basis, are presented in Tables 2 through 7. The hourly rate schedule for all employees and staffing levels to be used in the project are provided in Tables 2 through 7, along with reimbursable expenses for each of these tasks.

TABLE 1
Cost Summary
City of Torrance TMDL Monitoring

Task	Name	First Year Cost	Three Year Cost
Task 1:	Project Initiation and Planning	\$4,933	\$4,933
Task 2:	Initial Site Visit	\$19,072	\$19,072
Task 3:	Field Sampling and Flow Measurement	\$53,846	\$161,539
Task 4:	Laboratory Analysis and Data Reporting	\$24,047	\$72,141
Task 5:	Annual Report	\$8,291	\$24,873
Task 6:	Additional Sampling Events (optional)	\$1,084	
Total Estimated Cost		\$110,190	\$282,559

TABLE 2
Task 1: Project Initiation and Planning
City of Torrance TMDL Monitoring

		Task 1				TOTAL	
STAFF CATEGORY:	RATE	Field Health and Safety Plan	Field Sampling Plan	Kickoff Meeting	Permit Applications		
		Units/Hrs	Units/Hrs	Units/Hrs	Units/Hrs	UNITS/HRS	COST
Principal	\$175.00	1		4	1	6	\$ 1,050
Principal I	\$175.00					0	\$ -
Principal Risk Assessor	\$295.00					0	\$ -
Associate	\$155.00					0	\$ -
Senior	\$145.00	2	2	4	2	10	\$ 1,450
Project	\$135.00					0	\$ -
Senior Field Geologist	\$115.00					0	\$ -
Staff II	\$110.00					0	\$ -
Staff I	\$90.00	3	6			9	\$ 810
Data Base Specialist	\$75.00					0	\$ -
Contract Administrator	\$90.00			1		1	\$ 90
Illustrator/CAD Operator	\$75.00	1	2		1	4	\$ 300
Field Technician	\$75.00					0	\$ -
Project Assistant	\$65.00		4		6	10	\$ 650
Administrative Assistant	\$55.00	1				1	\$ 55
Labor Hours Subtotal		8	14	9	10	41	
Labor Cost Subtotal		\$ 865	\$ 1,240	\$ 1,370	\$ 930		\$ 4,405
REIMBURSABLE EXPENSES:	RATE	Unit	Unit	Unit	Unit	Total Qty	Total Cost
Fed Ex/Courier	\$30.00	2		2	2	6	\$ 180
Plots	\$25.00	4		6	2	12	\$ 300
						0	\$ -
Reimbursable Expenses Subtotal (Includes 10% markup)		\$ 176	\$ -	\$ 231	\$ 121		\$ 528
TOTAL TASK 1 COST							\$ 4,933

TABLE 3
Task 2: Initial Site Visit
City of Torrance TMDL Monitoring

STAFF CATEGORY:	RATE	Task 2: Initial Site Visit	TOTAL	
		Units/Hrs	UNITS/HRS	COST
Principal	\$175.00	0.5	0.5	\$ 88
Associate	\$155.00		0	\$ -
Senior	\$145.00		0	\$ -
Project	\$135.00		0	\$ -
Senior Field Geologist	\$115.00	20	20	\$ 2,300
Staff II	\$110.00		0	\$ -
Staff I	\$90.00		0	\$ -
Data Base Specialist	\$75.00		0	\$ -
Contract Administrator	\$90.00		0	\$ -
Illustrator/CAD Operator	\$75.00		0	\$ -
Field Technician	\$75.00	20	20	\$ 1,500
Project Assistant	\$65.00		0	\$ -
Administrative Assistant	\$55.00		0	\$ -
Labor Hours Subtotal		40.5	40.5	
Labor Cost Subtotal		\$ 3,888		\$ 3,888
REIMBURSABLE EXPENSES:				
	RATE	Unit	Subtotal	Total Cost
Vehicle Mileage	\$0.59	100	100	\$ 59
Safety Equipment	\$150.00	2	2	\$ 300
Manhole Fan	\$50.00	2	2	\$ 100
Portable Gas Monitor	\$95.00	2	2	\$ 190
Harness	\$50.00	1	1	\$ 50
Traffic Control Equipment	\$65.00	2	2	\$ 130
Flowmeter	\$45.00	2	2	\$ 90
Mounting Hardware	\$20.00	9	9	\$ 180
Reimbursable Expenses Subtotal (Includes 10% markup)				\$ 1,209
SUBCONTRACTORS:				
	RATE	Unit	Subtotal	Total Cost
Global Water FL16 flow sensors	\$1,320.00	9	9	\$ 11,880
Data Cable Extensions (three)	\$275.00	3	3	\$ 825
				\$ -
Subcontractor Subtotal (Includes 10% markup)				\$ 13,976
TOTAL TASK 2 COST				\$ 19,072

TABLE 4
Task 3: Field Sampling and Flow Measurement
City of Torrance TMDL Monitoring

		Task 3: 12 Dry Weather, 4 Wet Weather, 10 LA Co Discharge Sampling Events	TOTAL	
STAFF CATEGORY:	RATE	Units/Hrs	UNITS/HRS	COST
Principal	\$175.00		0	\$ -
Associate	\$155.00		0	\$ -
Senior	\$145.00		0	\$ -
Project	\$135.00		0	\$ -
Senior Field Geologist	\$115.00	252	252	\$ 28,980
Staff II	\$110.00		0	\$ -
Staff I	\$90.00		0	\$ -
Data Base Specialist	\$75.00		0	\$ -
Contract Administrator	\$90.00		0	\$ -
Illustrator/CAD Operator	\$75.00		0	\$ -
Field Technician	\$75.00	252	252	\$ 18,900
Project Assistant	\$65.00		0	\$ -
Administrative Assistant	\$55.00		0	\$ -
Labor Hours Subtotal		504	504	
Labor Cost Subtotal				\$ 47,880
REIMBURSABLE EXPENSES:				
	RATE	Unit	Subtotal	Total Cost
Vehicle Mileage	\$0.59	1,600	1600	\$ 944
Flow meter	\$45.00	26	26	\$ 1,170
Traffic Control Equipment	\$65.00	26	26	\$ 1,690
Sampling Supplies	\$90.00	18	18	\$ 1,620
Reimbursable Expenses Subtotal (Includes 10% markup)				\$ 5,966
TOTAL TASK 3 YEARLY COST				\$ 53,846
TOTAL TASK 3 THREE YEAR COST				\$ 161,539

TABLE 5
Task 4: Laboratory Analysis and Data Reporting
City of Torrance TMDL Monitoring

		Task 4				
		Dry Weather Sampling	Wet Weather Sampling	LA Co Discharge Sampling	TOTAL	
STAFF CATEGORY:	RATE	Units/Hrs	Units/Hrs	Units/Hrs	UNITS/HRS	COST
Principal	\$175.00				0	\$ -
Associate	\$155.00				0	\$ -
Senior	\$145.00				0	\$ -
Project	\$135.00	12	4	10	26	\$ 3,510
Senior Field Geologist	\$115.00				0	\$ -
Staff II	\$110.00				0	\$ -
Staff I	\$90.00				0	\$ -
Data Base Specialist	\$75.00				0	\$ -
Contract Administrator	\$90.00				0	\$ -
Illustrator/CAD Operator	\$75.00				0	\$ -
Field Technician	\$75.00				0	\$ -
Project Assistant	\$65.00				0	\$ -
Administrative Assistant	\$55.00				0	\$ -
Labor Hours Subtotal		12.0	4.0	10.0	26.0	
Labor Cost Subtotal		\$ 1,620	\$ 540	\$ 1,350		\$ 3,510
SUBCONTRACTORS:						
	RATE	Unit	Unit	Unit	Subtotal	Total Cost
Analytical Testing						
Ammonia-Ammonium: ISE 4500	\$12.00	132	8	30	170	\$ 2,040
Nitrate-Nitrite: EPA Method 300.0	\$30.00	132	8	30	170	\$ 5,100
Total Kjeldahl Nitrogen: EPA 351.2	\$31.50	132	8	30	170	\$ 5,355
Total Phosphorous: EPA 365.3	\$17.50	132	8	30	170	\$ 2,975
Orthophosphate: EPA 300.0	\$15.00	132	8	30	170	\$ 2,550
EDD Fee	\$25.00	12	4	10	26	\$ 650
Subcontractor Subtotal (Includes 10% markup)		\$15,721	\$1,043	\$3,773	\$20,537	\$20,537
TOTAL SINGLE SAMPLE ANALYTICAL COST						\$ 106
TOTAL TASK 4 YEARLY ANALYTICAL COST						\$ 24,047
TOTAL TASK 4 THREE YEAR ANALYTICAL COST						\$ 72,141

TABLE 6
Task 5: Annual Report
City of Torrance TMDL Monitoring

		Task 5			
		Draft Annual Report	Final Annual Report	TOTAL	
STAFF CATEGORY:	RATE	Units/Hrs	Units/Hrs	UNITS/HRS	COST
Principal	\$175.00	3	2	5	\$ 875
Associate	\$155.00	0	0	0	\$ -
Senior	\$145.00	6	3	9	\$ 1,305
Project	\$135.00			0	\$ -
Senior Field Geologist	\$115.00			0	\$ -
Staff II	\$110.00	24	6	30	\$ 3,300
Staff I	\$90.00			0	\$ -
Data Base Specialist	\$75.00			0	\$ -
Contract Administrator	\$90.00			0	\$ -
Illustrator/CAD Operator	\$75.00	8	2	10	\$ 750
Field Technician	\$75.00			0	\$ -
Project Assistant	\$65.00	16	2	18	\$ 1,170
Administrative Assistant	\$55.00	8	1	9	\$ 495
Labor Hours Subtotal		65.0	16.0	81.0	
Labor Cost Subtotal		\$ 6,115	\$ 1,780		\$ 7,895
REIMBURSABLE EXPENSES:					
	RATE	Unit	Unit	Subtotal	Total Cost
Fed Ex/Courier	\$30.00	1	1	2	\$ 60
Plots	\$25.00	6	6	12	\$ 300
Reimbursable Expenses Subtotal (Includes 10% markup)		\$ 198	\$ 198	\$ 396	\$ 396
TOTAL TASK 5 COST FIRST YEAR					\$ 8,291

TABLE 7
Task 6: Additional Sampling Events (per event)
Work Includes Two Stormwater Samples and One QA/QC Sample
City of Torrance TMDL Monitoring

		Task 6		
		Sampling & Analysis	TOTAL	
STAFF CATEGORY:	RATE	Units/Hrs	UNITS/HRS	COST
Principal	\$175.00		0	\$ -
Associate	\$155.00		0	\$ -
Senior	\$145.00		0	\$ -
Project	\$135.00		0	\$ -
Senior Field Geologist	\$115.00	8	8	\$ -
Staff II	\$110.00		0	\$ -
Staff I	\$90.00		0	\$ -
Data Base Specialist	\$75.00		0	\$ -
Contract Administrator	\$90.00		0	\$ -
Illustrator/CAD Operator	\$75.00		0	\$ -
Field Technician	\$75.00	7	7	\$ 525
Project Assistant	\$65.00		0	\$ -
Administrative Assistant	\$55.00		0	\$ -
Labor Hours Subtotal		15.0	15.0	
Labor Cost Subtotal		\$ 1,445		\$ 525
SUBCONTRACTORS:				
	RATE	Unit	Subtotal	Total Cost
Vehicle Mileage	\$0.59	60	60	\$ 35
Flowmeter	\$45.00	1	1	\$ 45
Traffic control equipment	\$65.00	1	1	\$ 65
Sampling Supplies	\$20.00	1	1	\$ 20
Analytical Testing				
Ammonia-Ammonium: ISE 4500	\$12.00	3	3	\$ 36
Nitrate-Nitrite: EPA Method 300.0	\$30.00	3	3	\$ 90
Total Kjeldahl Nitrogen: EPA 351.2	\$31.50	3	3	\$ 95
Total Phosphorous: EPA 365.3	\$17.50	3	3	\$ 53
Phosphate: EPA 300.0	\$15.00	3	3	\$ 45
EDD Fee	\$25.00	1	1	\$ 25
Subcontractor Subtotal (Includes 10% markup)		\$559		\$ 559
TOTAL TASK 6 COST				\$ 1,084



ATTACHMENT A
SPECIFICATION SHEET FOR FLOW SENSORS



FL16 Flow Logger

Water Flow and Temperature Recorder for Partially Filled Pipes, Flumes, and Weirs

Description

Global Water's FL16 Flow Logger will revolutionize the way you collect flow data. The FL16 consists of a sensor and a datalogger that will record over 81,000 depth, temperature, flow, and velocity readings. The FL16 operates on two standard 9 volt batteries, which it monitors so you are never caught off guard with dead batteries.

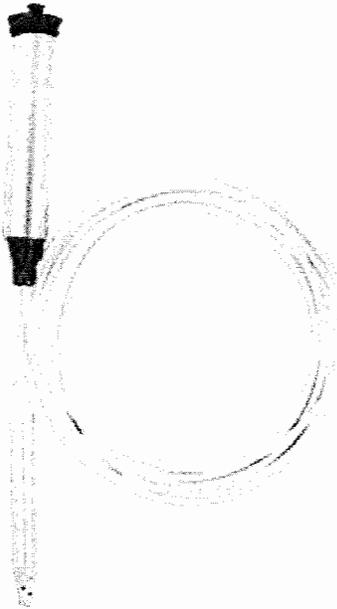
Specially Engineered Sensor

The FL16's specially engineered, non-fouling level sensor works in depths as low as ½" and allows for deployment in manholes and other difficult to access areas without the need to enter the confined space. The sensor is fully encapsulated with marine-grade epoxy so that moisture can never leak in or work its way down the vent tube to cause drift or level sensor failure (as can be the case with other pressure sensors).

Powerful Flow Logger Software

The FL16 includes user-friendly Windows™-based Flow Logger software that is tailored specifically for calculating flows in partially filled sewer and drainage pipes using the Manning's Equation. Pull-down menus for selecting and entering the necessary pipe or primary device information make programming quick and easy. A unique calibration feature allows users to view calculated water velocity, compare this to actual measured data, and adjust the flow parameters to calibrate the flow conditions of a specific application. Flow equations for over 40 standard flumes and weirs are provided, and users can define their own custom lookup tables to convert water level to flow for virtually any application. Once configured, all setup and flow parameters are stored in the FL16's memory and are uploaded to the software automatically upon connection. This information can also be saved to a file for later use, allowing the FL16 to be deployed in multiple locations without the need to re-enter the flow parameters each time it is moved. The FL16 also includes Windows™ CE-based PDA software for easy field data collection.

NOTE: 64 bit operating systems are not currently supported.



Specifications

Datalogger

Memory	Non-volatile flash memory
Power	Two 9VDC alkaline batteries
Battery Life	Up to 1 year (depending on recording intervals)
Resolution	12 bit
Moisture Protection	Silicon coating (prevents damage to electronics from condensation)
Temperature	-40° to +185°F (-40° to +85°C)
Humidity	0-95% non-condensing
Storage Capacity	81,759 time/date stamped datapoints (including battery voltage)
Recording Rate	High Speed (10 samples per second), Fixed Interval (programmable from 1 sec. to >1 year), Logarithmic, Exception
Data Overwrite	Select memory wrap or unwrap (unwrap will stop logging once memory is full)
Clock	Synchronizes to user's computer; accuracy of 0.0025% or 1 minute in 1 month; format is m/d/yr and hr/min/sec
Enclosure	Stainless steel UV protected PVC Vented for barometric pressure compensation
Communication Port	FL16S: RS-232 4-pin circular connector FL16U: USB Type B Selectable Baud Rates: 9600, 19200, 28800, 38400, 57600, 115200
Dimensions	1-7/8" dia. x 11-1/2" long, fits in 2" well (4.8 cm dia. x 29 cm long)
Weight	2.4 lbs (1 kg) (includes logger, 25' cable, and sensor)

Features

- Compact, self-powered and easy to use
- Over 81,000 flow, velocity, level, and temperature readings
- Free user-friendly Windows™ and Windows™ CE-based PDA software included
- USB or serial communications
- No confined space entry required for sensor deployment
- User-programmable start and stop alarms, engineering units, and field calibration setup

Flow Sensor

Sensor Element	Silicone Diaphragm, Wet/Wet Transducer	
Pressure Range	0 to 3' of water	
Temperature Range	32 to 122°F (0 to 50°C)	
Linearity and Hysteresis	±0.1% full scale	
Pressure Accuracy	±0.1% full scale at constant temperature, ±0.2% over 32°F to 70°F range	
Overpressure	2 x full scale range	
Burst Pressure	10 x full scale range	
Resolution	Infinite (analog)	
Output Currents	Level: 4-20mA ±1mA full scale	Temperature: 0-10mA ±1mA full scale
Supply Voltage	10 to 36VDC	
Current Draw	Combined level and temperature output currents	
Warm Up Time	3 seconds recommended	
Operating Temperature	0° (not frozen) to +185°F	
Compensation	Dynamic temperature compensation 32 to 70°F, automatic barometric pressure compensation	
Material	316 stainless steel outer sleeve, PVC diffuser and strain relief	
Dimensions	9" long x 1" dia. x 2.5 cm dia.	(22.9 cm long)
Weight	~9 oz (250 g)	

Temperature Sensor

Temperature Range	32° to 100°F (0 to 50° C)
Accuracy	±1.0% of reading

Ordering & Options

Flow Loggers

Order No.	Comm. Port	Sensor Range	Cable Length
FL16U	USB	0 to 3'	25'
FL16S	Serial	0 to 3'	25'

Options

Order No.	Description
WLEXC	Extra Sensor Cable (up to 500')

Accessories

Order No.	Description
PDAWL16	PDA Package
FLMNT	Protective Mounting Sleeve



Global Water
The Leader in Water Instrumentation

In the U.S. call toll free
at 1-800-876-1172
International: 916-638-3429
Fax: 916-638-3270
Email: globalw@globalw.com

Visit our online catalog at:
www.globalw.com
Our Address:
11390 Amalgam Way
Gold River, CA 95670



ATTACHMENT B
SAFE WORK PRACTICES





1. CONFINED SPACE ENTRY & MANHOLE SAFETY

This document provides an overview of safe work practices and procedures for complying with OSHA requirements (29 CFR 1910.146) when entering into the confined space inside a manhole, or working around an open manhole. Entry into a manhole, work around an open manhole, and opening/closing manholes require personnel to work in coordinated teams, use specialized safety equipment, and follow confined space entry procedures.

1.1 Introduction

A manhole structure is a confined space that presents possible fall hazards, the potential for toxic gases or oxygen deficient atmosphere to be present, and other general safety hazards. Entry into the confined space of a manhole requires a two man team where one worker is the Entrant, the other an Attendant. At a minimum the following safety equipment must be present and in use whenever a confined space is entered:

- Approved gas detector (properly calibrated).
- Fresh air blower.
- Safety harness, tripod, and wire line safety system; and,
- Level D personal protective equipment (PPE) including coveralls, gloves, hard hat and eye protection.

1.2 Confined Space Entry Procedure

No employee may enter a confined space until several requirements are met. These requirements include:

- Conducting pre-entry atmospheric testing,
- Ventilating and cleaning the confined space as necessary,
- Use of appropriate PPE,
- Having an Attendant in place,
- Having rescue equipment in place, and
- Having an approved *Emergency Action Plan*.



A description of each requirement of the Confined Space Entry Procedure is contained in the following sections.

1.2.1 Atmospheric Testing

Atmospheric testing is required prior to entering the confined space, and air monitoring within the confined space is required to be performed during the entire time the employee is working inside the confined space. Combustible gases (CG) and oxygen (O₂) will be measured continuously in the worker breathing space using a combination CG/O₂ sensor (QRAE-II or equivalent). Before allowing any personnel inside the confined space, ambient air within the space is tested for a minimum of four atmospheric conditions:

- Oxygen content,
- Flammable or explosive gases,
- Carbon monoxide, and
- Hydrogen sulfide.

The following sections describe the testing methods and limits for atmospheric conditions and hazardous vapors:

Oxygen Content

The oxygen content must be at least 19.5% in the confined space, measured at all levels (bottom, middle, and top). The safe oxygen level is between 19.5% and 21%. **Do not enter the confined space if the oxygen level is below 19.5% or above 21%.** Due to the extreme danger of suffocation in confined spaces, constant and continuous oxygen monitoring is required throughout each work period. Oxygen content above 23% can cause explosions and vigorous burning of flammable materials, including hair or clothing.

Flammable or Explosive Gases

The flammable nature of the confined space must be measured at all levels within the confined space (bottom, middle, and top). Flammability is measured in terms of the *Lower Flammable Limit* (LFL) or the *Lower Explosive Limit* (LEL). This is the smallest concentration of a combustible gas in air that will explode when it contacts a spark or open flame. Prior to entry into a confined space, the level of flammable gases measured at all levels (bottom, middle, and



top), must be below 10% of LEL. The safe flammable gas level is below 10% of the LEL; **Do not enter the confined space if the LEL is above 10%.**

Carbon Monoxide

There is a potential for toxic concentrations of carbon monoxide (CO) to be present in the confined space. CO is an odorless, invisible gas that can be extremely toxic to humans. Because it cannot be detected without instruments, it is possible for workers to advance far enough into a space containing CO that they can no longer self-rescue when the symptoms manifest. For that reason the concentration of CO must be measured and compared to the Threshold Limit Values (TLVs) for CO of 25 parts per million (ppm) by the field team prior to entering a confined space, and continuously when working inside a confined space.

Hydrogen Sulfide

There is a potential for toxic concentrations of Hydrogen Sulfide (H₂S) vapors to be present in the confined space. H₂S is a flammable, toxic, and acid gas which irritates the eyes and mucus membranes at concentrations between 20 to 150 ppm. Slightly higher concentrations cause irritation to the upper respiratory tract. Concentrations above 600 ppm can be fatal within 30 minutes due to respiratory paralysis. Smell alone cannot be relied upon to detect the presence of H₂S due to the paralyzing effect it has on the olfactory nerves. H₂S must be measured and compared to the TLV of 10 ppm by the field team prior to entering a confined space and continuously when working inside a confined space.

1.2.2 Ventilation

A fresh air blower ventilation system shall be set up and in operation **before and during** all confined space entry procedures. The blower shall provide a continuous source of fresh air to the breathing zone of a worker within the confined space. Operation of the blower shall be monitored by a worker outside the confined space to ensure it remains operational during the entire time a worker is within the confined space.

1.2.3 Personal Protective Equipment

The use of appropriate PPE is required for all work in and around the manhole, and selection of the PPE shall be based on the expected hazard(s). At a minimum Level D PPE shall be worn and an approved rescue system (harness-safety line-tripod) shall be utilized.



After the ventilation system has been in operation for at least 15 minutes, and the confined space has been tested and determined to be safe for entry; workers entering the confined space shall be equipped at a minimum with the following:

- Rescue equipment including harness, lifeline, and safety retrieval system,
- An approved, properly calibrated gas detector,
- Hard hat,
- Coveralls,
- Steel-toed safety shoes,
- Dust mask,
- Safety Glasses with side shields or goggles, and
- Gloves.

1.2.4 Rescue Equipment

No person shall enter a confined space without the use of specialized rescue equipment designed to aid the removal of the worker from the confined space if they become incapacitated. The specialized equipment shall consist of a safety harness, lifeline, and tripod safety system with attached winch.

The harness shall consist of an OSHA and ASNI compliant full body harness with back D ring. The harness must be fitted to the individual worker, and shall contain stress-indicating safety tabs to indicate when the harness has been involved in a fall and should be removed from service. The harness shall have a minimum breaking strength of 5,000 pounds, and feature mating buckles to prevent improper connection.

The lifeline will consist of a galvanized steel cable at least 3/16" in thickness with a breaking strength in excess of 5,000 pounds. The cable shall be secured to a fully enclosed spool with anti-backlash system and brake. The spool will be contained in a winch offering at least 5:1 gear ratio and ratchet crank handle.

The Tripod safety system is an anchor point for the winch and pulley, providing at least 5,000 pound loading strength. It is used to anchor the ratcheting winch, and must be capable of operation by a single worker. The tripod and pulley system provides a mechanical advantage



during the retrieval of a worker from the confined space, and allows personnel at the surface to provide assistance without entering the confined space.

1.2.5 Duties of the Entrant and Attendant

A confined space team consists of a minimum of two members: Entrant and Attendant. The Entrant does the work, and the Attendant remains outside while the work is being performed. The Entrant and Attendant have specific responsibilities that include use of appropriate PPE, pre-entry atmospheric testing, use of safety equipment, area and personnel monitoring, and performance of the assigned task within the confined space. Specific responsibilities for each position are detailed in the following sections.

Entrant

The Entrant does the assigned task within the confined space. He is required to wear the appropriate safety equipment and be trained to use the equipment in an emergency. The Entrant is responsible for performance of continuous air monitoring when inside the confined space, and for monitoring their own physical reactions that could signal an unsafe condition. The Entrant shall maintain contact with the Attendant, and respond to evacuation orders if given. If the Entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately.

Attendant

The Attendant shall be stationed immediately outside the confined space and remain there for the duration of activity within the confined space. The Attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area. **No employee is to enter a confined space if another employee goes down!** In the event of emergency the Attendant shall activate the Emergency Action Plan and always seek assistance.

The Attendant shall:

- Not enter the confined space,
- Remain at the entry point unless relieved by another trained attendant,
- Be trained in rescue protocols,



- Keep track of who is in the confined space at all times,
- Keep unauthorized people out of the area,
- Make sure the ventilation equipment is working,
- Attend to the lifeline worn by the Entrant,
- Maintain continuous communication, visual or voice, with the Entrant during entry,
- Remain alert for early symptoms of danger within the confined space,
- Watch for hazards outside and inside the confined space,
- Notify the Entrant and order evacuation if conditions warrant,
- Have means to summon assistance, and
- Have safety and rescue equipment on hand.

1.2.6 *Emergency Action Plan*

No person shall enter a confined space to retrieve someone who is unconscious without having **additional trained** personnel above ground to assist. Employees shall follow the *Emergency Action Plan* in the event of a jobsite emergency. The plan provides procedures to be used in case of jobsite emergency, and directs the Attendant to summon the authorities before commencing any rescue activity on a worker who is within the confined space area. The person entering the confined space for rescue purposes must be equipped with the required rescue equipment and follow the specific rescue procedure. A qualified person shall inspect all safety devices and instruct all involved employees on proper confined space safety procedures. All defective safety devices shall be reported to the foreman immediately.



ATTACHMENT C

FIELD FORMS



Water Sample Data Sheet



northgate

environmental management, inc.

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653

main (949) 716-0050; fax (949) 716-0055

Page 1 of _____

Project Name: _____ **Date:** _____
Client Name: _____ **Arrival Time:** _____
Project No.: _____ **Leaving Time:** _____
Recorded By: _____

Water Sample Data

Site Name: _____

Sample ID: _____

Time of Sample Collection: _____

Date: _____

Number of Containers: _____

Flow Measurements

Depth of Water: _____ in, ft

Width of Flow: _____ in, ft

Flow Rate: _____ gal/min

Time: _____ 24-hour format

Depth of Water: _____ in, ft

Width of Flow: _____ in, ft

Flow Rate: _____ gal/min

Time: _____ 24-hour format

Depth of Water: _____ in, ft

Width of Flow: _____ in, ft

Flow Rate: _____ gal/min

Time: _____ 24-hour format

Water Conditions Circle the Appropriate Identifier

Odor: None, Musty, Sewage, Rotten Egg, Sour milk, Fishy, Other:

Color: None, Yellow, Brown, Grey, Green, Red, Other:

Clarity: Clear, Cloudy, Opaque, Suspended solids, Other:

Floatables: None, Oil sheen, Foam, Animal waste, Green waste, Food, Paper, Plastic, Grease, Hydrophytes, Trash, Other:

Settleables: None, Salt, Clay, Oil, Rust, Microbes, Other:

Weeds: None, Normal, Excessive, Note:

Biology: None, Algae bloom, Larvae, Crawfish, Frog, Fish, Waterfowl, Hydrophytes, Blue-green algae

Other:

Sky: Stormy, Overcast, Partial clouds, Haze, Fog, Clear

Wind: Calm, Light breeze, Strong breeze, Windy, Gusty

Flow Characterization: Storm/Flood, Rapid, Tranquil, Laminar, Standing, Dry

Low Flow/No Flow Conditions

Was there flow?: Yes, No If there was flow, but no sample was taken, explain why.

Field Activity Report



Page 1 of _____

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
main (949) 716-0050; fax (949) 716-0055

Date: _____
Recorded By: _____

Project Name: _____ Project No.: _____
Client Name: _____
Weather: _____ Temperature: _____
Site Conditions: _____

NORTHGATE PERSONNEL ON-SITE

VISITORS

Name	Company/Agency	Time Arrived	Time Left

CONTRACTORS

Contractor Name: _____ Phone No.: _____
Supervisor: _____ Task: _____

Company	No. of Supervisors	No. of Workers	Remarks

EQUIPMENT



DAILY SITE SAFETY MEETING RECORD

24411 Ridge Route Drive, Suite 130, Laguna Hills, CA 92653
 main (949) 716-0050; fax (949) 716-0055

Page 1 of 1

Recorded By: _____

Date & Time: _____ **Project No.:** _____

Project Name: _____ **Project Location:** _____

Field Activities: Stormwater sampling, stream flow measurement, stream channel profile measurement in open channel streams and subsurface storm drains.

Chemicals Present: Nitrate-nitrate, Total Kjeldahl Nitrogen, Total Phosphorus.

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: Level D: Steel-toed safety shoes, coveralls, gloves, safety glasses, hardhat, reflective traffic vest.

Hazards of Chemicals Present: No hazardous levels of site specific chemicals have been determined yet. Bacterial hazards from the stormwater may be present and exposure should be prevented.

Physical Hazards: Truck and vehicle traffic; heavy lifting; slips-trips-falls; pinch points;

Special Hazards: Spiders or insects inside manholes; reptiles or rodents in landscape surrounding manholes;

Other Topics of Concern: Use proper lifting procedures (bend at knees, do not use back to lift) when moving manhole covers. Avoid pinch points by keeping feet away from the cover as lid is moved. Wear leather gloves when using manhole hooks.

SITE SAFETY CHECKLIST	YES	NO
Attached Signature Page - No, see below		X
Written Health and Safety Plan (HASP) is on-site	X	
Information in the HASP matches conditions and activities at the site	X	
Site personnel have appropriate training and certification and medical clearance	X	
Air monitoring equipment has been calibrated daily	X	
Site zones are set up and observed where appropriate	X	
Access to Work Areas is limited to authorized personnel	X	
Decontamination stations (including hand/face wash) are set up and used	X	
Personal protective equipment used matches HASP requirements	X	
Emergency and First Aid equipment is on-site as described in the HASP	X	
Drinking water is readily available	X	

Note: All "NO" answers must be addressed & corrected immediately. Note additionally health and safety observations here.

--	--	--	--

Conducted By
Print Initials: _____ **Signature:** _____ **Date:** _____



ATTACHMENT D
RESUMES





DERRICK S. WILLIS, CEM

PRINCIPAL

Mr. Willis has over 20 years experience serving both public sector and private clients in California and Canada on a wide variety of environmental projects. For the last several years, Mr. Willis' focus has been on formulating and facilitating closure and development strategies for large, complex, high profile, environmental projects for aerospace, industrial, and real estate development firms. Mr. Willis has extensive experience with due diligence/property transfer and development issues in a wide variety of industrial and regulatory settings. He is familiar with the industrial processes that generate environmental wastes, the fate and transport of chemicals in the environment, the potential adverse effects of these substances on human and ecological receptors, compliance challenges faced by business operators, the performance of remedial technologies, and how these issues play into site acquisition, development, and divestiture.

REPRESENTATIVE EXPERIENCE

Environmental Site Assessments and Regulatory Compliance

- *RREEF, Multiple Sites, Southern California, California*— Mr. Willis serves as client director for RREEF on multiple projects including acquisition studies (which mold, asbestos and indoor air quality surveys), tenant audit programs, soil remediation, groundwater investigation and remediation, third party oversight, agency negotiation, and mold and asbestos abatement programs.
- *Opus Corporation, Multiple Sites, Southern California*— Mr. Willis has directed over 50 acquisition-related due diligence investigations for Opus Corporation (Opus). Scope of work has included Phase I ESAs, soil and groundwater investigations, risk evaluations, agency negotiation, and aiding Opus in evaluating and quantifying the potential risk associated with recognized environmental concerns.
- *Various Clients, Various Locations, Southern California*— Project manager for more than 200 Phase 1 environmental assessments (ESAs) for industrial facilities including aerospace, furniture and paper manufacturing factories; utility companies, vehicle and equipment maintenance facilities; and landfills as well former agricultural land. The objective of the ESAs was to evaluate and quantify potential liabilities associated with the acquisition and development of the properties.
- *Borrow Source Characterization and Material Compliance Program, Multiple Sites, Southern California, Watson Land Company, Chino, CA* — Developed and implemented a program to expeditiously characterize borrow source materials for contaminants including naturally occurring metals and asbestos, organic chemicals, and petroleum hydrocarbons and screen borrow source soils ahead of excavation and transfer to trucks to ensure compliance with borrow material specifications. Program included load control, inspection, certification, and internal manifesting of material.
- *Vivendi, Expedited Due Diligence, Universal Studios, Universal City, CA* – Project manager on an expedited due diligence program to assist client in evaluating environmental liabilities of the Universal Studios properties. Program was completed in two weeks and provided a summary of potential environmental liabilities, remedial options and associated costs for remedial action.
- *Former Wood Preserving Facility, Maui Toyota, Maui Hawaii* – Served as project manager for a RCRA facility investigation, decommissioning, remediation, and closure of a former



Derrick S. Willis

Principal

wood preserving facility. Contamination consisted of pentachlorophenol, chromated copper arsenate, permithrin, and disodium octoborate. Maui Toyota purchased a former wood treatment facility property that had been abandoned with the intent of redeveloping the property as automotive sales and service center. The scope of work consisted of sampling and characterizing chemicals in storage and processing tanks.

Site Investigation and Remediation

- *Tronox LLC, Henderson, Nevada* – Project manager for a fast-track multi-media investigation and soil remediation program at a 453-acre industrial facility within the Black Mountain Industrial Complex. Previously the world's largest magnesium production plant during World War II and later used for a variety of other manufacturing activities, resulting in subsurface impacts from heavy metals, perchlorate, pesticides, chlorinated solvents, radionuclides, and other chemicals. Mr. Willis oversaw investigation programs and developed remedial plans and rapidly mobilized and managed a team of staff and subcontractors to remove approximately 800,000 cubic yards of soil from the site to meet commercial soil cleanup goals for direct contact exposure in less than a year.
- *Playa Capital Corporation, Playa Vista Development Project, Los Angeles, California*— Mr. Willis served as program manager for the Playa Vista project, one of the largest and most visible brownfield development projects in the country. At 1,100 acres, it is the largest underway in Los Angeles County. His primary responsibility included environmental program management (including scoping, developing, scheduling, and tracking environmental activities for the development project), risk management (including developing and negotiating with agencies for appropriate cleanup criteria), remedial strategy/management (including development and implementation of pilot tests and oversight of investigation and remediation activities), agency/RP/buyer negotiations, consultant and contractor selection/oversight, coordination with Playa's infrastructure group on the development/implementation of integrated remedial approach where appropriate, litigation support, data management, and transactional support with respect to the sale of remediated parcels.
- *Project Manager, Brownfield Redevelopment, Torrance, California*— Served as project manager and for site redevelopment project for a PacTrust. Evaluated environmental liabilities associated with a 12-acre parcel that was part of a butadiene plant (Del Amo Superfund Site) left undeveloped as a brownfield, and formulated a strategy to expedite regulatory closure and redevelopment. A comprehensive investigation was completed on the parcel, and the report submitted to the Environmental Protection Agency (EPA) for review. Successfully negotiated with EPA to conduct a non-Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) closure program. Conducted soil remediation program under EPA oversight in conjunction with site construction activities.
- *Lockheed Martin Former International Light Metals Facility, Torrance, California*— Served as project manager and principal investigator for a 67-acre aerospace facility where client objective was expedited redevelopment. The project included facility demolition, preparation and implementation of a Resource Conservation and Recovery Act (RCRA) closure plan for 11 permitted RCRA units, negotiations with the Department of Toxic Substance Control (DTSC), preparation of a RCRA Facility Assessment (RFA) (210 features identified that required intrusive investigation), implementation of a RCRA Facility Investigation (RFI) for soil, preparation of a health-based risk assessment, and implementation of soil remediation. Site closure for soil was granted only three years after project initiation, in contrast to the normal six to eight year process, and has been used as an example by head DTSC officials as an example of industry and the regulatory community working together to achieve expedited site closures for property redevelopment purposes. Mr. Willis also developed strategy for groundwater investigation and remediation and negotiated the corrective action consent agreement (CACA) with DTSC.



Derrick S. Willis

Principal

- *Security Capital Industrial Trust, Kraft Foods Facility, Buena Park, CA*— Served as project manager for multi-media remediation project at a commercial development in Buena Park, California. The site was a former food processing facility that was redeveloped into commercial offices and warehouse space. He evaluated the environmental liability for a Real Estate Investment Trust (REIT) that subsequently purchased the property. Mr. Willis worked with the buyer and seller throughout property transaction, helping construction arm of developer to integrate environmental construction/remediation into overall construction schedule. and managed remediation program in conjunction with site redevelopment. Was able to minimize impacts to construction schedule and to limit future environmental liability of client (Buyer) while ensuring an adequate system was funded by seller to meet the buyer's desired closure deadline.
- *Project Manager, Confidential Client, Buena Park, CA*— Served as project manager for multi-media remediation project at a commercial development in Buena Park, California. The site was a former food processing facility that was redeveloped into commercial offices and warehouse space. Evaluated the environmental liability for a Real Estate Investment Trust (REIT) that subsequently purchased the property, and managed remediation program in conjunction with site redevelopment.
- *Project Manager, Investigation and Remediation Program, Safety Kleen, Vancouver, British Columbia, Canada*— Managed remediation of former solvent recycler transfer stations in British Columbia and Alberta, Canada. Sites involved characterization and remediation of soil and perched groundwater zones. Assessed feasibility of vapor extraction for cleanup of vadose zone contamination, and designed and installed a dewatering system for perched water in former tank cavities and surficial saturated zone for Vancouver transfer station. Achieved regulatory site closure two years faster than previous consultant's estimate.
- *Cupples Manufacturing, Investigation and Remediation Program, La Mirada, California*— Project manager for soil/groundwater characterization and remediation program at a truck maintenance facility in La Mirada, California. Conducted an underground storage tank and clarifier removal program in conjunction with site characterization activities. Implemented remediation of soil and groundwater impacted with petroleum hydrocarbons. Negotiated and received closure from Regional Water Quality Control Board (RWQCB).
- *Alberta Environment, Abandoned Wood Treatment Sites, Various Locations, Alberta, Canada*— Project manager for the Wood Preserving Sites Characterization Program for Alberta Environment. Performed site characterization of four former wood preservation sites in Alberta, Canada. The sites had been used for many years for treating wood poles and railroad ties with a pentachlorophenol/diesel mixture. Soil and/or groundwater were impacted at the sites. Soil borings and groundwater monitoring wells were installed, and laboratory analysis of soil and groundwater was performed, to help determine the lateral and vertical migration of dissolved-phase hydrocarbons in the groundwater and dense nonaqueous phase liquids (DNAPLs) through glacial tills and several non-confining layers. Detailed drilling and sampling plans were necessary to ensure correct evaluation of vertical DNAPL migration. Aquifer tests were performed and receptor data were collected in order to formulate a quantitative assessment of both health-based and environmental risk.
- *Texaco Refining and Marketing Inc., Investigation and Remediation Programs, Various Locations, Southern California*— Responsible for remediation programs at several petroleum retail outlets for Texaco in the southern California area. Projects included soil and groundwater investigation programs, underground storage tank (UST) removals, remedial design (including design and implementation of vapor extraction and aquifer tests), implementation of remedial program, and operation and maintenance of remediation systems. This included designing, specifying, permitting, and installing of all equipment (including piping, downhole pumps, off-gas treatment, and water treatment).



Derrick S. Willis

Principal

- *Groundwater Contamination Investigation and Analysis, Technisol, Raymond, Alberta, Canada*— Conducted a groundwater investigation program at a solvent recycling facility located in southern Alberta, Canada. The program was implemented to determine the lateral and vertical extent of several species of chlorinated volatile organic compounds present in the confined aquifer beneath the facility. Aquifer testing was performed to estimate migration rates and to provide preliminary data for remedial action. Successfully negotiated with Alberta Environment (lead regulatory agency) for monitored natural attenuation approach.
- *Pier A Railyard, Port of Los Angeles, Los Angeles, California*— Managed a soil and groundwater investigation a program at a Port of Los Angeles rail transfer yard. The objective of the project was to characterize previously identified polynuclear aromatic compounds, volatile organic compounds, and petroleum hydrocarbons in the soil and groundwater, and identify any regulated building materials in the site structures in order to facilitate an expedited redevelopment program. The project was finished ahead of schedule and under budget.
- *Soil and Groundwater Remediation, Texaco, Various Locations, Southern California*— Conducted vapor extraction tests, performed data analysis, and generated recommendations for an industrial manufacturing facility to determine the viability of using vapor extraction for remediating chlorinated solvents, primarily tetrachloroethene (PCE), present in the soil beneath the facility. Each test was designed to assess air flowrates and vacuums, vertical interference and crossflow, radii of influence, potential for water upwelling, and effectiveness of vapor extraction in both vadose and capillary zones. Extracted vapors were collected to determine volatile organic compound concentrations. Data were used to determine well spacing and slotting intervals, optimum flowrate/vacuum combinations, extraction blower sizing, and vapor treatment equipment.
- *Texaco, Various Locations, Southern California*— Responsible for preparation of South Coast Air Quality Management District (SCAQMD) permitting, installation, operation and maintenance of thermal and catalytic oxidizers/vapor extraction systems for the remediation of soil (containing petroleum hydrocarbons) beneath operating service stations.

EDUCATION

B.S., Geology, University of Alberta, Alberta, 1988
 Certified Environmental Manager, Nevada No. 2252

PROFESSIONAL HISTORY

Northgate Environmental Management, Principal, 2006 to date
 LFR Levine Fricke, Principal Hydrogeologist, 2002 – 2006
 Integrated Environmental Services, Director of Operations/Senior Program Manager, 1999 – 2002
 ARCADIS Geraghty & Miller, Inc. Senior Hydrogeologist, 1993 – 1999
 Environmental Design Corporation, Vice President, 1992
 Environmental Science & Engineering, Inc., Staff Geologist, 1991
 Terracon Geotechnique, Ltd., Geologist, 1989 – 1991
 Contract Positions, Various Locations, Geologist, 1988

REGISTRATIONS

Registered Geologist: Alberta, Canada No. 48113
 Certified Environmental Manager, Nevada No. 2252



DANA R. BROWN, C.E.M., P.G., R.E.A.
 SENIOR GEOLOGIST

Dana Brown is a Professional Geologist and Certified Environmental Manager with over 22 years of professional experience. He has been responsible for geologic and hydrologic site characterization studies, remedial alternative feasibility studies, and remedial systems implementation. His project experience includes large industrial facilities, mine sites, commercial centers, and private industrial facilities located in the United States and overseas. He has extensive field experience including environmental drilling and well installation, soil vapor studies, surface water characterization, and site cleanups. He specializes in coordinating the activities of multiple rigs and contractors to accomplish large, fast-tracked field investigations and remedial systems installation. He has participated in multiple site remediation projects involving biostimulation, in-situ chemical oxidation, groundwater treatment, dual-phase extraction, and controlled excavation. He is proficient in electronic drafting using Autocad, project scheduling software, interface with field systems using portable data acquisition systems, and the MS Office suite of programs.

REPRESENTATIVE EXPERIENCE

- *BMI Complex, Henderson, Nevada* – Conducted a Phase I Environmental Site Assessment on behalf of buyer for a 2,200-acre parcel of land that was a former disposal facility for wastes generated by magnesium production during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. Developed confirmation sampling work plans and peer reviewed remediation documents on behalf of buyer.
- *Watson Land Company, Judith Young Trust, Opus West Corporation* – Performed Phase I Environmental Site Assessments at various locations in Southern California. Performed evaluations of site and vicinity listings on federal, state, and local environmental databases; conducted file reviews at state and local agencies; conducted site visits to determine Recognized Environmental Conditions for site and vicinity; reviewed historical documents and interviewed relevant individuals to determine current and historical uses of the site and vicinity; provided findings of the Phase I investigations in written reports.
- *Underground Workings and Above-Ground Processing Facilities Site Cleanup and Heap Leach Closure, Darwin Mine, Blue Range Mining Company, Darwin, CA*—Performed Phase I and II Environmental Site Assessments, hazardous materials inventories, and characterization for all portions of an inactive lead-zinc mine located in Inyo County, CA. The facility included underground workings and above-ground mill buildings with intact processing equipment, tailings impoundment, and heap leach facility. Managed the removal and remediation of hazardous materials including storage tanks, transformers, asbestos, lead-based products, and assay laboratory wastes. Performed site and heap materials characterization and reporting to develop closure documentation for inactive heap leach facility. Performed open portal and shaft identification combined with patented claims verification in rugged 920 acre site to develop recommendations for access restrictions and/or closures for the adjacent claims.
- *Tailings Disposal Evaluation, Mill Facility Cleanup and Site Remediation, Heath and Shoemaker Mine Sites, The Hillman Company, Lewistown, MT*—Performed Phase I and II Environmental Site Assessments for the surface and underground portions of inactive gypsum mines located in Central Montana. Evaluated the potential for tailings disposal within the mine to impact regional



Dana R. Brown, C.E.M., P.G., R.E.A.
Senior Geologist

aquifer systems and groundwater quality. Supervised the cleanup of petroleum impacted soils, above-ground storage tanks, spent chemicals, mineral processing and laboratory wastes.

- *Downtown Reno Groundwater Characterization, Reno, NV* — Worked with the State of Nevada to develop a Workplan for field activities that included shallow and intermediate zone monitoring well installation, soil and groundwater sampling, and aquifer characterization studies to create a hydrological model of the contaminant fate and transport within the heavily developed section of downtown Reno. Managed bids and contracts for sub-contractors, supervised all field work to drill and install the wells, develop and sample, perform aquifer testing, and then prepare a combined Site Characterization Report and Corrective Action Plan.
- *Hydrocarbon Impacted Bedrock and Stained Soils Characterization, Twin Creeks Mine, Winnemucca, NV* — Performed remediation of soils and fractured bedrock impacted by diesel and gasoline releases from AST complex with buried piping systems. Excavated over 1,000 cubic yards of hydrocarbon contaminated soils, and set up biodegradation cell to treat wastes onsite. Performed routine monitoring of the bioreactor, and provided nutrients during system operations. Developed reporting procedures to quantify the performance of the treatment system during operation, and obtained closure for the release site following remediation from the State of Nevada.
- *Sulfuric Acid Transfer Station Site Characterization and Soil Cleanup, Koch Sulfur Products, Beowawe, NV* — Supervised the characterization and cleanup of sulfuric acid impacted soils at a bulk transfer station that provided loading and trucking services for delivery of acids in northern Nevada.
- *Initial Site Investigation Study – City of Lodi Area of Contamination, City of Lodi and Resolution Law Group, P.C., Lodi, CA* — Responsible for performance of site characterization including installation of 465 grab-groundwater sampling points and 20 monitoring wells. Managed bid and contract processes, and supervised field activities of subcontractors providing drilling, monitoring well installation, drive point sampling, analytical services, utility locations, surveying, paving, traffic control, waste disposal, and site restoration services. Performed all permitting, site access agreement negotiations, scheduling, and management of investigation derived residuals including waste profile development and disposal.
- *Tronox LLC, Henderson, Nevada* – Performed field investigations of soil, groundwater, and airborne particulates at a large industrial site with multiple contaminant sources and historic uses. Supervised multiple drill crews using direct-push, sonic, and hollow stem auger methods to characterize soils for site cleanup. Performed water sampling and hydraulic testing to characterize groundwater for remedial methods feasibility studies. Coordinated drilling permit process and utility clearance with plant production staff, geophysical contractor, and plant manager for multiple borings within a dense network of active, inactive, and abandoned underground and above ground services.
- *Litigation Defense & Legal Support Services, Chico Central Plume, Noret, Inc.; Resolution Law Group, P.C.; and Stoel Rives, LLP, Chico, CA* — Performed drilling and well installation, geophysical characterization, aquifer testing, and contaminant fate & transport analysis for a solvent plume in downtown Chico, CA. Participated in the legal defense of clients downgradient of the release, and also site investigations for responsible parties that contributed to the plume by preparing expert witness declarations and reviewing the activities of consultants employed by the PRPs. Oversaw field work performed by consultants for the PRPs on properties that were named as potential contributors to the plume, and participated in the legal defense of those entities. Also supervised aquifer properties testing of the deep and intermediate zone aquifer systems for remedial investigation feasibility studies and Corrective Action Plan development.



Dana R. Brown, C.E.M., P.G., R.E.A.

Senior Geologist

- *Mine Waste & Site Hydrology Characterization, Leviathan Mine, Regional Water Quality Control Board, Lahontan Region, Markleeville, CA* — Performed investigations to characterize mine wastes for interactions with rainfall and runoff, created an inventory of site springs and seeps, developed a sampling program for portal discharge and pit water, and documented the site surface water balance. Supervised site drilling and sampling activities for installation of 17 monitoring wells in decomposed volcanic terrain using the Rotosonic method. Developed and sampled the groundwater monitoring wells, and performed aquifer testing to facilitate groundwater modeling. Developed and implemented programs for sampling of surface waters, springs, seeps, and stream gauging to characterize surface water hydrology.
- *Borrow Source Characterization and Material Compliance Inspections, Building 818, Watson Land Company, Chino, CA* — Performed investigations to characterize borrow source materials for contaminants including naturally occurring metals and asbestos, organic chemicals, and petroleum hydrocarbons. Screened borrow source soils daily ahead of excavation and transfer to trucks to ensure compliance with borrow material specifications. Performed load control to inspect material then supply trucks with load tickets to certify source of material at receiving station. Prepared daily reports of screening activities and results of onsite testing, and reconciled load tickets with receiving station.
- *Naturally Occurring Asbestos Evaluation, Private Residence, Cox, Castle, Nicholson, El Dorado Hills, CA* — Conducted surface soils and limited subsurface investigation for naturally occurring asbestos (NOA) at a private residence in El Dorado Hills. Performed soil sampling and test pitting at a private residence impacted by blasting and grading at an adjacent construction site. Field screened the soils NOA, and collected samples for laboratory analysis. Prepared a report of findings detailing the results of the investigation and analysis.
- *Borrow Source Characterization and Material Compliance Inspections, Building 219, Watson Land Company, Long Beach, CA* — Performed site investigations to characterize multiple borrow sources according to DTSC information advisory for clean imported fill material. Site contaminants included metals, NOA, organic chemicals, and petroleum hydrocarbons. Screened borrow source soils daily ahead of excavation and transfer to trucks to ensure compliance with borrow material specifications. Performed load control to inspect material then supply trucks with load tickets to certify source of material at receiving station. Prepared daily reports of screening activities and results of onsite testing, and reconciled load tickets with receiving station.
- *Site-wide Soils Asbestos Content Evaluation and Particulate Air Monitoring Network Establishment and Baseline Monitoring, Tronox LLC, Henderson, NV* — Performed soil sampling at a large industrial facility with multiple areas soil impacted with asbestos from historic operations. Asbestos contamination included settling pond soils mixed with hazardous wastes, construction debris, landfill materials, and soils disturbed in historic site construction activities. Established air monitoring network to quantify airborne total particulate levels and sample for asbestos content during site remediation and grading activities, and collected baseline data prior to the onset of construction.
- *Fractured Aquifer System Contaminant Fate and Transport Study, Deep Monitoring Well Installations; Former Rocketdyne Testing Facility, Stead, NV* — Performed volatile organic compound (VOC) contaminant characterization in a fractured bedrock aquifer system at the Rocketdyne Testing Facility in Stead, NV using air-rotary and dual-tube flooded reverse circulation drilling. Evaluated the occurrence and movement of groundwater, aquifer properties, and developed systems for plume control and cleanup. During the drilling program changes to the drilling methods were required in response to subsurface conditions. Worked with contractors and client to determine the most effective method of drilling and sampling, and implement revised protocols for successful sample collection and well completion.
- *Industrial Process Water Supply Evaluation; J.R. Simplot, Inc., Wells, NV* — Investigation of the physical availability of water and evaluation of the groundwater resource for design of production



Dana R. Brown, C.E.M., P.G., R.E.A.
Senior Geologist

well field to support industrial chemical manufacture. Performed exploration work to evaluate the water resource, and aquifer testing to determine aquifer specific capacity. Performed drilling, testing, and design of 2,400 foot deep production well that initially flowed artesian at temperatures approaching the boiling point of water. Implemented health & safety protocols to protect workers exposed to produce fluids with potential to flash into steam.

- *Infiltration Pond Rehabilitation and Injection Water Well Installation; Cortez Gold Mine, Crescent Valley, NV* — Logging performance crippled dewatering efforts at a large open-pit gold mine in north-central Nevada. Efforts to increase infiltration at the existing dewatering ponds included drilling injection wells inside and adjacent to the pond footprints, as well as citing studies for new ponds. Participated in dewatering pond site evaluation, and injection water well installation and testing. Performed geologic interpretation of produced core data, and created geohydrologic cross sections to portray interaquifer gradients and flow systems.
- *Multiple Contaminant Characterization, Toiyabe Mine, Crescent Valley, NV* — Performed subsurface investigations to characterize impacts from cyanide-leach process, waste rock, and mixed hydrocarbon & solvent releases in maintenance areas. Performed AST closure investigation for fuel tanks removed from service, and waste oil tank in shop area. Performed routine monitoring for surface water, groundwater, pond recirculation and stormwater management systems integrity, and developed regulatory compliance reports.
- *Subsurface Materials Investigation, North Block Leach Area, Barrick Goldstrike Mine, Elko, NV* — Performed hollow stem and mud rotary drilling with continuous and interval sampling to characterize subsurface materials for hydrogeologic and engineering properties, and collect samples for geotechnical characterization. Performed packer and discharge testing in borings to characterize fracture flow in groundwater systems, and geophysical surveys to characterize water quality and flow within the subsurface environment.
- *Closure Monitoring, Trinity Mine, Jungo, NV* — Performed closure monitoring for spent heap leach pad at the Trinity Mine site. Supervised periodic Rotosonic drilling and sampling of heap material, and bi-weekly inspection of heap leach solution systems. Monitored heap material for slope stability, and leachate collection systems integrity on bi-weekly schedule and performed closure reporting to State of Nevada.
- *Environmental Monitoring Services, Ruth Mine, Ely, NV* — Provided environmental monitoring services including bi-weekly water sampling, inspection of heap leach pads and pit operations, and evaluation of subcontractor compliance with existing operations permit requirements.
- *Multiple Contaminant Characterization, Lawrence Livermore National Laboratories, United States Department of Energy, Environmental Restoration Division, Livermore, CA* — Responsible for collection of soil, surface water, and groundwater samples; monitoring well installation; soil vapor surveys; and installation of soil borings for multiple contaminant characterization at a CERCLA facility with former military and ongoing DOE operations. Supervised drilling and sampling using wireline punch core (94mm) mud rotary methods, hollow stem auger, Geoprobe, and cone-penetrometer methods. All work performed within security clearance zones of the Main Laboratory and Site 300 areas, and in compliance with relevant USEPA Superfund site protocols.
- *Geosynthetic Liner Monitoring System Installation, and Liner Integrity Monitoring, Sleeper Mine, Winnemucca, NV* — Performed electronic liner integrity monitoring system installation and calibration, and performed routine monitoring and reporting for 3 heap leach systems at the Sleeper Mine. Developed reporting procedures to evaluate and report electronic leak detection data, and integrate with leak observation port and groundwater data for compliance reporting to State of Nevada.



Dana R. Brown, C.E.M., P.G., R.E.A.
Senior Geologist

EDUCATION

B.S., Geology: California State University, Long Beach, 1984

PROFESSIONAL HISTORY

Northgate Environmental Management, Inc., Senior Geologist, 2006 to date

E2C Remediation, Bakersfield, CA, Senior Geologist 2005-2006

Hanover, Inc., Chico, CA, Senior Geologist 2001-2005

Henshaw Associates, Dublin, CA, Senior Project Manager 2000-2001

WESTEC/SRK, Reno, NV, Project Manager, 1990-1999

Weiss Associates, Emeryville, CA, Staff Geologist 1989-1990

REGISTRATIONS

California Registered Professional Geologist, #7188

Nevada State Certified Environmental Manager, #1528





CINDY ARNOLD

SENIOR CHEMIST

Ms. Arnold has over 20 years of experience in environmental chemistry both in the laboratory setting and as an environmental consultant. She has worked on numerous remedial investigations and feasibility studies, performing baseline risk assessments, ecological assessments, and community relations planning. She has served as a Quality Assurance Officer for a wide variety of state and federal programs across a national network of offices, in addition to serving on special technical teams for both the public and private sector. Ms. Arnold has performed data validation for organic analysis, high resolution analysis of PCB congeners and dioxin/furans, radiochemistry, inorganic analysis and classical wet chemistry. She has experience with air and industrial hygiene sampling and analysis. Ms. Arnold has also served as a litigation support chemist in the statistical impact analysis of environmental data.

REPRESENTATIVE EXPERIENCE

Site Investigation and Remediation

- *BMI Henderson Project, Henderson, Nevada*—Performed pre-purchase due diligence for a 2200-acre parcel – the largest Brownfields site in the United States. Involvement included participation in meetings with NDEP, where Northgate gained their respect and confidence. This property served as a disposal facility for wastes generated by the world's largest magnesium production plant during World War II. The property was later used as a disposal site for other manufacturing activities, resulting in a mixed-waste stream of heavy metals, radionuclides, pesticides, chlorinated solvents, perchlorates, and other chemicals. In order for the cleanup project to meet residential standards, an estimated 2 million cubic yards of soil will be removed from the parcel. Remediation efforts are complex due to the presence of existing nearby residential developments and the Las Vegas Wash, which flows into Lake Mead, a major source of water for the Southwest. Following remediation, construction of the development will occur, including parks, schools, trails, housing, and a business district. The Site is the largest Brownfields project in Nevada. The City of Henderson anticipates that the project will revitalize the downtown area and provide housing for those employed in Henderson and Las Vegas.
- *Luke Air Force Base, Phoenix, AZ* – Ms. Arnold served as the Quality Assurance Officer (QAO) during the data fraud investigation and Remedial Investigation resampling at Luke AFB. She worked directly with USEPA Region IX, USACE Omaha District and Arizona DEQ to resolve the impact of data fraud on 23 NPL sites CERCLA protocol.
- *Remedial Investigation, Former Pesticide Manufacturing Facility, Lakeland, FL* – Ms. Arnold served as Quality Assurance Officer during the RI for a former pesticide manufacturing facility listed on the NPL in Lakeland, Florida. CERCLA process experience included remedial investigation planning and implementation. Site issues included offsite exposure issues including groundwater, surface water, sediment, and soils. Contaminants include pesticides, metals, and several inorganic analytes such as nitrates, sulfate, and ammonia.



Cynthia Arnold
Senior Chemist

- ◆ *Remedial Investigations and Baseline Risk Assessments, Homestead AFB, FL, USACE Omaha* - Served as the Quality Assurance Officer for Homestead AFB, an installation listed on the NPL. CERCLA process experience included remedial investigations, baseline risk assessments, ecological assessments, and community relations planning. Twenty-five sites were identified and designated as separate operable units: nineteen sites were CERCLA-based investigations, five sites were state petroleum contamination-based investigations, and one site was a RCRA closure investigation. All of the investigations included groundwater, surface water, sediment, and soils evaluations. Contaminants include pesticides, metals, waste oils, and jet fuel.
- ◆ *Sloss Industries, Alabama* - Project chemist for preparation and implementation of RCRA RFI Work Plan for a southeastern manufacturer of chemicals, industry grade coke, and mineral fiber. The facility has 39 identified Solid Waste Management Units (SWMUs) requiring a RFI and a CMS. Proximity and similarity of several SWMUs requiring a RFI and a CMS permitted grouping of SWMUs into four areas and development of a staged approach of implementing the RFI over a five-year period.
- *Ford Motor Company Corporate Consortium* – Ms. Arnold was the corporate representative at the consortium who acted as a consultant to Ford Motor Company in developing standard protocol for environmental sampling, analysis, database management, retrieval, access security and storage for all Ford Motor Company consultants to utilize.
- *Uranium Mill Tailings Remedial Action (UMTRA), Albuquerque, NM* – Ms. Arnold developed and implemented the statistical analysis of historical data for the DOE Uranium Mill Tailings Remedial Action (UMTRA) project. Successfully trained staff to update the database for all 24 UMTRA sites for radiological, organic, and inorganic data prior to monitoring and disposal/containment.
- *RCRA Corrective Measures, Chemical Manufacturing Facility, Central Alabama* - Project Manager for an agricultural chemical manufacturer and managed RCRA-related compliance issues at the facility, including evaluation of the current Detection Monitoring Program for the regulated units, evaluation and redesign of the corrective action systems for the SWMUs. Also managed stormwater-permitting activities at the site. Prepared RCRA Part B Modification Groundwater Monitoring Program based on site-wide approach to corrective action at the SWMU areas and an ACL evaluation of the constituents of concern at the facility.

Laboratory Experience

- *USEPA Contract Laboratory Services* - Ms. Arnold performed both quantitative and statistical analyses in support of federal programs for the USEPA under the Contract Laboratory Program (CLP), Routine Analytical Services (RAS) and Special Analytical Services (SAS) in support of environmental studies, treatability projects, bioassays, ecological risk assessments, industrial hygiene and government contracts.
- *NASA's Space Shuttle Program* – As the primary contractor for NASA, Ms. Arnold provided quantitative support to NASA's space shuttle program performing routine industrial hygiene analysis and pre-launch analysis of drinking water, vehicle assembly building worker safety program and environmental post launch analyses.
- *Florida Institute of Phosphate Research (FIPR)* – Ms. Arnold served as a chemist providing radiological testing services for ecological and vegetative impact studies throughout the state of Florida.

EDUCATION AND TRAINING

Bachelor of Science, Chemistry, Florida Atlantic University

Finnigan/MAT GC/MS and MS Interpretation Training Courses

Finnigan/MAT ITD Training Course

40 Hour HAZWOPER

FL and AZ DEQ Field Sampling Course – Soil and Groundwater

Access Database Management Course IRPIMS Database Management Course

ISO 9001 Project Management Training

Building Envelope Seminar: Mechanics of Moisture, Dr. Joe Lstiburek

Dr. Chin Yang and Dr. Li lecture series

- Fungal identification, ecology and species succession
- Fungal life cycles for water damage species
- Timelines for fungal growth in water damage circumstances
- Legal cases and consultant preparation
- Comparison of sampling techniques and the interpretation of clearance samples

Guidelines for the Assessment of Microbiological Contamination in Indoor Environments 2004

Asbestos Awareness, Conestoga Rovers 2005

Health & Safety, Conducting an Accident Investigation, USF Education & Research Center 2006

PROFESSIONAL HISTORY

Northgate Environmental Management Inc., Senior Chemist, 2008 - present

Independent Contractor, 2007– 2008

HSA Engineers & Scientist, Senior Scientist/Manager, 2003 –2007

ARCADIS, Senior Project Scientist, 1992 –2003

Post, Buckley, Schuh and Jernigan, Laboratory Division 1985 - 1992



ROBERT WEINBERGER

Field Service Manager

Mr. Weinberger has eleven years of experience working on a major redevelopment project overseeing all environmental aspects of construction, oversight for several different types of remediation projects at the site, oversight on all dewatering activities, liaison between project and regulatory agencies, and oversight and management of engineered wetlands project.

Mr. Weinberger was Director of Operations for a major Orange County Engineering firm overseeing removal and replacement of underground storage tank systems and the investigation and remediation of petroleum impacted sites. He has six years experience working as an environmental consultant with an emphasis on Phase I Environmental Site Assessments, site investigations, and remediation of petroleum impacted sites. Mr. Weinberger has experience working on all phases of air, soil and groundwater remediation. He also has experience working with the State Water Board and several clients to develop a general permit covering discharges into the State stormwater system.

REPRESENTATIVE EXPERIENCE

- *Field Services* – Performed various tasks associated with site assessment and remediation of petroleum impacted sites: air, soil and water sampling, SCAQMD Rule 1166 monitoring, on-site treatment of VOC contaminated soil, portable and stationary treatment of impacted water.
- *Site Remediation* – Developed a system for the excavation and on-site treatment of VOC contaminated soil resulting from leaking underground storage tanks. The system utilizes both old technology as well as new technology and employs the principle of chemical oxidation to decontaminate the above mentioned soil. Work on design, permitting, installation and operation of several different types of soil and groundwater remediation systems.
- *Water Treatment* – Developed a program to treat and discharge water collected in underground structures into the stormwater system across the State. First, assisted in designing a mobile unit to treat the collected water prior to discharge into the stormwater system. Second, permitted the system in all nine regions of California. Third, developed the administrative and field framework to complete a turnkey program to track, treat, sample, and report the discharges under this general permit. Worked with the Regional Water Quality Control Board and Industrial Waste on temporary and permanent dewatering discharges.

PROFESSIONAL HISTORY

Northgate Environmental Management, Inc., 2006 to date
 Playa Vista, Environmental Field Services Manager, 2000 to date
 Groundwater Remediation, Project Manager, 1998 – 2000
 Advantage Environmental Services, Director of Operations, 1996 – 1998
 Environmental Resolutions Incorporated, Staff Scientist, 1994 – 1996
 Delta Environmental, Staff Scientist, 1992 – 1994
 Weinberger Consultants, Environmental Consultant, 1989 – 1992
 Tank Protect Engineering, Director of Operations, 1985 – 1989





BETTIE A. BECHTEL

SENIOR STAFF GEOLOGIST

Ms. Bechtel has ten years of experience in the environmental field. She has performed numerous field investigative tasks such as soil, soil vapor, and groundwater sampling; monitoring well installation and development; Phase I and Phase II site investigations; annual environmental audits; geologic mapping; and aerial photo analysis. Ms. Bechtel is also knowledgeable in the interpretation and presentation of analytical data, geologic data, and hydrogeologic site descriptions. She is skilled in report preparation and writing.

REPRESENTATIVE EXPERIENCE

Site Investigations

- *Tronox, Henderson, Nevada* – Support of soil sampling and remediation activities for a former producer of electrolytic chemicals. Managed soil sampling tables during the final phase of soil sampling, including QC of laboratory sample acknowledgement reports and chains-of-custody, input of analytical results, addition of new sample locations, notification of sample activations to laboratories. Generated boring and well logs using gINT software. Reviewed subcontractor invoices and backup documentation.
- *Former Monsanto site, Carson, California* – Conducted field work at a former detergent manufacturing facility contaminated with benzene in soil and groundwater, including LNAPL. Monitored air quality and supplied-air equipment during well installations; development of groundwater and air sparging wells.
- *RREEF, Villa Marina Marketplace, Marina del Rey, California* – Conducted file reviews and gathered and analyzed information in support of RREEF's efforts to prove off-site contamination of groundwater beneath the shopping center.
- *Lockheed Martin former International Light Metals Facility, Torrance, California* – Performed soil sampling, groundwater monitoring well installation oversight, and groundwater sampling in support of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). Responsible for soil sample collection, well development, water-level measurement, groundwater sample collection, sample handling and custody, data analysis, and report preparation.
- *Solar Turbines former Navistar facility, San Diego, California* – Performed soil sampling at a 27-acre site in support of a site remedial investigation administered by the Department of Toxic Substances Control (DTSC).
- *Former Ford Aeronutronic facility, Newport Beach, California* – Performed quarterly groundwater monitoring, with the oversight of the Santa Ana Regional Water Quality Control Board (RWQCB), for a 114-acre facility slated for development as a planned community. Conducted groundwater-level measurements, well development, onsite water parameter testing, and sample collection from on- and offsite wells, as well as data analysis and report preparation.
- *Watson Land Company, Kenco Logistics Services, Redlands, California* – Conducted an initial inspection of an engineered infiltration basin contaminated with diesel fuel from a truck that fell into the basin. Subsequently conducted 1166 air monitoring and oversight of removal of diesel-contaminated soil using a vacuum truck.



Bettie A. Bechtel
Senior Staff Geologist

- *Watson Land Company, multiple Southern California locations* – Conducted oversight of soil import activities at construction sites; monitored incoming loads and documented debris found in the imported soil.
- *Westrux facility, Long Beach, California* – Supervised removal of an underground storage tank (UST) and conducted confirmation soil sampling of the UST cavity and soil pile.

Environmental Due Diligence

- *Watson Land Company, Multiple Sites, Southern California* – Conducted Phase I and Phase II Environmental Site Assessments (ESAs) for sites including:
 - Tustin – 6.5-acre property with office building and warehouse. Conducted a Phase I ESA for multiple tenants including a medical supplies warehouse and a restaurant;
 - Carson – 5.8-acre property with a warehouse. Conducted a Phase I ESA that included recommendations for further investigation of two historical onsite diesel spills from locomotive engines; and
 - Apple Valley – 156 acre desert property. Conducted a Phase I ESA of open desert formerly used as a precision bombing range, and currently used for small-arms target practice by individuals. A Phase II ESA was subsequently conducted to determine if soil was contaminated from former contents of a 55-gallon drum located on the property.
- *Opus West Corporation, Multiple Sites, Southern California* – Conducted Phase I and Phase II ESAs for sites including:
 - San Juan Capistrano – 76-acre former orchard currently used as a ministry campus by Crystal Cathedral. Issues noted in the Phase I ESA report included improper storage of chemicals including PCE; four dilapidated structures dating from the 1920s with possible asbestos, lead-based paint, and septic tank concerns; an actively eroding creek posing a threat to the property; landslide and mudslide concerns; and location in a paleontologically sensitive area;
 - Los Angeles – 2.5-acre site developed with a 204-unit apartment building under construction. A Phase I ESA Update was conducted, revealing the former presence of an oil well on the site;
 - Chino Hills – 47 acres formerly agriculturally developed with ranch house and outbuildings. Findings of the Phase I ESA Update included the presence of several former public water-supply wells on the property. Subsequently, oversight of abandonment of the water wells was conducted;
 - Irvine – A Phase I ESA Update for a newly developed four-story apartment building was conducted. The site was formerly developed with a manufacturing facility that had documented releases of chlorinated solvents; and
 - San Diego – 12.5-acre former ranch land currently part of a planned business park. Phase I ESAs were conducted for several parcels on the property, which is located in a high paleontological resource sensitivity area.
- *RREEF Management Company, multiple sites, Southern California* – Project manager for conducting Annual Environmental Audits of commercial and industrial properties, including shopping centers, industrial parks, and industrial sites. The purpose of the audits is to review and evaluate chemical use, environmental permitting, and industrial processes at the properties to determine the environmental risk to the owner. Tenants at the properties have included spice



Bettie A. Bechtel
Senior Staff Geologist

and herb processing, vegetable oil packaging; pest control services, retail facilities, restaurants, plastics manufacturing, printing services, and others.

- *Phase I and Phase II ESAs for multiple clients in Southern California including:*
 - *Patriot Environmental Laboratory Services, Inc.* – Conducted Phase II ESAs including a soil vapor survey at a car dealership in Torrance that was formerly an aircraft manufacturing facility; a soil vapor survey of the overflow parking lot at the Baldwin Park City Hall; and soil sampling beneath the floor of a classroom lab at Artesia High School;
 - *Western Tire Company* – Conducted a Phase I ESA of a property containing a tire shop and a residence. Further investigation was recommended due to poor chemical storage practices at the tire shop, the presence of two hydraulic lifts, and the presence of adjacent car repair and historical drycleaning facilities;
 - *Florida's Natural Growers* – Conducted soil sampling in conjunction with another environmental consulting company at a 5-acre former juice processing facility with a history of industrial use documented to the early 1900s. Also conducted a Phase I ESA Update of the western half of the facility along with asbestos and lead-based paint surveys;
 - *People for the Ethical Treatment of Animals (PETA)* – Conducted a Phase I ESA and follow-on Phase II ESA of a commercial property on Sunset Boulevard in Los Angeles, a .2-acre site consisting of one building constructed in 1930 and historically used as a car dealership, car repair facility, army/navy surplus store, and mattress factory. The building included a driveway leading into the rear of the building. Soil, soil vapor, and grab groundwater sampling were conducted to investigate historical impacts from on- and off-site uses, including a historical drycleaner;
 - *Reed Smith LLP* – A Phase I and Phase II ESA was conducted on a .3-acre site formerly containing a residence and machine shop, and currently used as parking for the local Post Office. Soil vapor sampling was conducted to determine the impact from onsite activities as well as an adjacent former drycleaner; and
 - *Huffman West* – Conducted a Phase I ESA and soil sampling for vacant property in Corona, California; also conducted a Phase I ESA Update of the property following development as a medical office building.

EDUCATION

Single Subject Teaching Credential, National University, 2000

Master of Science, Geology, Miami University of Ohio, 1994

Bachelor of Arts, Spanish, Texas Christian University, 1975

PROFESSIONAL HISTORY

Northgate Environmental Management, Inc., Senior Staff Geologist, 2007–present

LFR Inc., Senior Staff Geologist, 2005 –2007

Santa Ana Unified School District, Earth Science Teacher, 1998 –2005

ARCADIS, Geologist, 1994 –1998

Dames & Moore, Junior Technical Editor, 1994



Bettie A. Bechtel
Senior Staff Geologist

Miami University, Graduate Assistant, 1991 –1994

U.S. Department of Agriculture, Food Program Specialist/Budget Analyst, 1975 –1990

PRESENTATIONS

Bechtel, B.A. and L. Mayer. 1993. Relations between rainfall amount, soil moisture and landslides in Hamilton County, Ohio, measured by strain survey and tensiometers. Geological Society of America Abstracts with Programs, Vol. 25, No. 3, North Central Section Meeting, Rolla, MO. March.

Mayer, L. and B.A. Bechtel. 1993. Complex behavior of landslides in Hamilton County, Ohio — implications of field and laboratory study. Geological Society of America Abstracts with Programs, Vol. 25, No. 6, National Meeting, Boston, MA. October.



EXHIBIT B

**Machado Lake Nutrient Total Maximum
Daily Load Special Study Work Plan**



City of Torrance, California

MACHADO LAKE NUTRIENT TOTAL MAXIMUM DAILY LOAD SPECIAL STUDY WORK PLAN

May 18, 2011



City of Torrance, California

**MACHADO LAKE
NUTRIENT TOTAL MAXIMUM DAILY LOAD
SPECIAL STUDY WORK PLAN**

May 18, 2011

TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION	1
1.1 Background.....	1
1.2 Site Conditions and Characteristics	2
1.2.1 Study Site Location.....	2
1.2.2 Hydrology and Hydraulics.....	2
1.2.3 Land Use	3
1.2.4 Water Quality Issues	4
1.3 Special Study Work Plan	10
2.0 PRE-BMP IMPLEMENTATION STUDY	11
2.1 Introduction	11
2.2 Objectives of the Pre-BMP Implementation Study.....	11
2.2.1 Pollutant Loading and Analysis Tool (PLAT)	12
3.0 FIELD SAMPLING PLAN	12
3.1 Sampling Locations and Access.....	12
3.2 Sample Collection Frequency.....	20
3.3 Selection of Analytical Parameters	20
3.4 Continuous Flow Monitoring	21
3.5 The Sampling Team	21
4.0 SAMPLE COLLECTION PROCEDURES.....	22
4.1 Preparation for conducting the sampling	22
4.1.1 Sampling Equipment	22
4.2 Sampling Method.....	23
4.3 Personal Safety	24
4.4 Clean Sampling Techniques.....	24
4.5 Sample Packing and Shipping.....	24
4.6 Chain of Custody	25
5.0 QUALITY ASSURANCE AND QUALITY CONTROL	25
5.1 Data Quality Objective	25
5.1.1 Field Quality Control Samples	26
5.2 Field Quality Assurance/Quality Control	27
5.2.1 Equipment Blanks.....	27
5.2.2 Field Duplicate Samples.....	27
5.2.3 Matrix Spike Samples.....	27

5.3	Laboratory Quality Control.....	27
5.3.1	Method Blanks.....	27
5.3.2	Matrix Spike and Laboratory Control Samples.....	27
6.0	DATA MANAGEMENT AND REPORTING.....	28

APPENDIX A – Detailed Maps of Sampling Locations

APPENDIX B – Field Data Sheet

APPENDIX C – Chain of Custody

LIST OF TABLES

Table 1	Waste Load Allocations.....	2
Table 2	Total Annual Nutrient Load Entering Machado Lake ⁽¹⁾	4
Table 3	Schedule or Work Plan Elements.....	11
Table 4	Sampling Location Characteristics.....	14
Table 5	Monitoring Constituents.....	21
Table 6	Monitoring Constituents and Sample Container Requirements.....	23
Table 7	Quality Assurance Objective.....	26
Table 8	Field Quality Control Sample Types.....	26

LIST OF FIGURES

Figure 1	Regional Map of Torrance.....	6
Figure 2	Subregional Watersheds.....	7
Figure 3	Existing Land Use.....	8
Figure 4	2007 Satellite Imagery of Machado Lake and Ken Malloy Harbor Regional Park Overview.....	9
Figure 5	General Location Map of Sampling Locations.....	15

SPECIAL STUDY WORK PLAN

1.0 INTRODUCTION

This Field Sampling Plan (FSP) presents the approach and procedures to implement stormwater sampling activities in 2011 for a Special Study of the City of Torrance (City) storm drains discharging stormwater into Machado Lake. The field study sampling procedures, methods, and analyses for stormwater are described in this document.

1.1 Background

The City is subject to the requirements of the Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) Total Maximum Daily Load (TMDL) per the Los Angeles Regional Quality Control Board's (Regional Board's) Resolution R08-006. Under the Regional Board's resolution, the City shall submit to the Regional Board's Executive Officer a Monitoring and Reporting Plan (MRP) within 1 year of the effective date of the resolution or propose a Special Study Work Plan following the requirements of one of three optional studies. This Special Study Work Plan details the approach proposed by the City to perform Optional Study No. 3, to assess compliance with the Waste Load Allocations (WLA) on a mass basis for total nitrogen and total phosphorus originating from the City's watersheds. The Special Study Work Plan proposes a pre-Best Management Practices (BMP) Implementation Study including field sampling and data collection to be followed by submittals to the Regional Board including a BMP Evaluation and Selection Report, a MRP, and a BMP Implementation Report to be provided at a later date.

Machado Lake is identified on the 1998 and 2002 Clean Water Act 300(d) list of impaired water bodies as impaired due to eutrophic conditions, algae, ammonia, and odors. Resource agencies, local governments, project implementers, the scientific community, environmental groups, decision-makers at the city, county, state, and federal levels, and many others have continued to take meaningful steps towards the restoration of Machado Lake and its basin. Among these efforts, restoration activities are expanding through continued implementation of erosion control, stormwater management, and riparian restoration projects, development of the Machado Lake Nutrient TMDL that is providing a quantitative, science-based approach for pollutant reduction, and a strong research/monitoring effort to evaluate key ecological processes and response to water quality improvement projects.

The Machado Lake Nutrient TMDL allows for the establishment of annual mass-based WLAs for total phosphorus (TP) and total nitrogen (TN) equivalent to monthly average concentrations of 0.1 mg/L TP and 1.0 mg/L TN, based on approved flow conditions. When the concentration based WLAs are met under the approved flow condition of 8.45 hm³, the annual mass of the TP discharged to the lake will be 845 kg and the annual mass of TN discharged to the lake will be 8,450 kg. The City of Torrance mass-based WLA will be proportional to the City owned area in the sub-watershed. The City of Torrance area

accounts for 35.6% of the Machado Lake Watershed. Table 1 lists the interim and final WLAs based on this area.

Responsible Party	Years after TMDL Effective Date	TP (kg)	TN (kg)
City of Torrance	5	3,760	7,370
	9.5 (final WLAs)	301	3,008

1.2 Site Conditions and Characteristics

1.2.1 Study Site Location

The City is located about 15 miles south of Downtown Los Angeles (LA), in southern LA County, just north of the Palos Verdes Hills. The City was incorporated on May 12, 1921, and is just over 20.5 square miles in area. The City is bounded by Redondo Beach on the west and north, Lawndale and Gardena on the north, LA on the east, Lomita to the southeast, and Rolling Hills Estates and Palos Verdes Estates on the south. The City is also bounded by approximately 4,000 feet of Santa Monica Bay coastline. The City's storm conveyance systems are interconnected with neighboring city systems. Neighboring cities located at generally higher elevation such as Rolling Hills Estate and Palos Verde Estate discharge stormwater into the City's and/or LA County's storm conveyance systems located within the City's boundaries. Figure 1 shows a regional location map of the City.

1.2.2 Hydrology and Hydraulics

The Machado Lake subwatershed is located in the southwestern area of the Dominguez Watershed and includes portions of the Cities of Los Angeles, Torrance, Lomita, Rolling Hills, Rolling Hills Estates, Carson, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, and the communities of unincorporated Los Angeles County, including Wilmington and Harbor City. However, much of the Machado Lake watershed consists of the hilly regions of Rolling Hills Estates and Rolling Hills. This portion of the watershed is unique, as it consists of relatively steep hills with drainage into the canyons. The Machado Lake Watershed covers an area of approximately 20 square miles and is itself divided into six primary subdrainage areas. These subdrainages are the Walteria Lake, Project 77/510, Wilmington Drain, Project 643 (72-inch Storm Drain), Project 643 (Figueroa Drain), and Private Drain 553.

Machado Lake, about 40 acres in area and the Machado Lake Wetlands (64 acres) are located within the Ken Malloy Harbor Regional Park in the southeastern corner of the Machado Lake Watershed. Both Machado Lake and the Machado Lake wetlands serve as flood retention basins for the Machado Lake Watershed.

1.2.2.1 Storm Drain

As the area is highly urbanized, drainage is primarily conducted through an extensive network of underground storm drain facilities. The Los Angeles County Department of Public Works maintains the system of storm drains in the City of Rolling Hills Estates. The primary use of the Dominguez Channel and all other open channels in the Dominguez Watershed (including Wilmington Drain, Machado Lake, and Madrona Marsh) is flood protection.

Machado Lake receives urban and storm water runoff from a complex network of storm drain systems. The first of three primary storm drain channels that flow into Machado Lake is the Wilmington Drain. Approximately 65 percent of the runoff from the Machado Lake Watershed flows through the Wilmington Drain into Machado Lake. The other two primary storm drain channels are the Project No. 77 Drain and the Harbor City Relief Drain. Several smaller storm drains also discharges into Machado Lake, including Project No. 643's Figueroa Street Outlet and a 72-inch storm drain outlet. Machado Lake discharges at the southern end by overflowing a concrete dam into the Machado Lake wetland. Water discharges from the wetland through the Harbor Outflow structure and into the West Basin of the Los Angeles Harbor.

The Walteria Lake, located within the City's boundaries, is owned and operated by LA County. It is approximately 1,005 acre-feet in capacity and receives raw stormwater mainly from Rolling Hills Estates and Palos Verdes Estates. Effluent from the lake is pumped at a maximum rate of 57 cubic feet per second (cfs) through a force main system into a 54-inch drain line that lies under Skypark Drive. The discharge eventually leaves the City near the intersection of Crenshaw Boulevard and Amsler Street.

Figure 2 shows the drainage basins and stormwater conveyance infrastructure in the City. The figure also shows nearby communities discharging stormwater into the City's drainage system.

1.2.3 Land Use

The City of Torrance is predominantly residential land use, with concentrations of industrial and commercial uses. This reflects the City's history as a "company town," where homes were built to house the local work force of industries. Residential development covered almost half of the City's land area. Industrial uses occupied the second largest land area, at 22 percent. Commercial and Public/Quasi-Public/Open Space uses represent the third largest land uses in the City, about 12 percent each. Torrance also had a limited supply of vacant land mostly within commercial and industrial areas. Given the built-out character of the community, only minor land use changes from baseline year 2010 conditions will occur over the long term.

Residential uses are located throughout Torrance at varying development densities. The highest residential densities occur along major streets and near major transportation corridors, in older neighborhoods, and in apartment or condominium developments and Planned Development communities around Sepulveda Boulevard and Plaza Del Amo between Hawthorne and Crenshaw Boulevards. The lowest residential densities are largely

located in the western and southern portions of the City. Figure 3 identifies the land uses in Torrance.

1.2.4 Water Quality Issues

Machado Lake, located in the Dominguez Channel watershed in southern LA County, is identified on the 1998 and 2002 Clean Water Act 303(d) list of impaired water bodies as impaired due to eutrophic conditions, algae, ammonia, and odors. The Machado Lake eutrophic, algae, and odor impairments are caused by excessive loading of nutrients, including nitrogen and phosphorus, to Machado Lake (Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft – April 2008). Ammonia is found to be at levels below the toxicity standards, but nevertheless, these concentrations contribute to the total nitrogen loading in the Lake. Table 2 provides a summary of the quantifiable loads entering Machado Lake on an annual basis (Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft – April 2008). Nutrient flux from the sediments and atmospheric nitrogen deposition are the two directly quantifiable non-point sources included as part of the total nutrient load. The total annual nitrogen and phosphorus loads are estimated to be 24,327 kg and 10,421 kg, respectively.

Machado Lake is located in the Ken Malloy Harbor Regional Park (KMHRP), which is a 231 acres LA City Park serving the Wilmington and Harbor City areas. As shown on Figure 4, the park is located west of the Harbor freeway (110) and east of Vermont Avenue between the Tosco Refinery on the south and the Pacific Coast Highway on the North. Machado Lake is one of the last lake and wetland systems in LA; the area is approximately 103.5 acres in total size. The upper portion, which includes the open water area, is approximately 40 acres and the lower wetland portion is about 63.5 acres. Machado Lake is a shallow polymictic lake; the depth is generally 0.5 to 1.5 meters; the *average* depth is approximately 1.0 meter. The lake was originally developed as part of Harbor Regional Park in 1971 and intended for boating and fishing. Over the years water quality generally declined; boating was stopped and signs were posted warning of the risk of eating fish from the lake.

Table 2 Total Annual Nutrient Load Entering Machado Lake⁽¹⁾

Source	Total N (kg)	Total P (kg)	Ortho-P (kg)	Inorg-N (kg)
External Load	7,587	3,260	737	3,736
Sediment Flux	16,520	7,161	4,963	16,520
Atmospheric Deposition	220			
Total Annual Load	24,327	10,421	5,700	20,256

Notes:

1. Source: Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) TMDL, Revised Draft - April 2008.

The dominant land use in the Machado Lake Watershed is high-density single-family residential, accounting for approximately 45 percent of the land use. Industrial, vacant, retail/commercial, multi-family residential, transportation, and educational institutions each account for 5 to 7 percent of the land use, while "all other" accounts for the remaining 23

percent. Machado Lake is a receiving body of urban and stormwater runoff from a network of storm drains throughout the watershed. As indicated on Figure 4, there are three discharge points into Machado Lake from the following storm drain channels:

- Wilmington Drain.
- Project No. 77.
- Harbor City Relief Drain.

Approximately 88 percent of the Machado Lake Watershed drainage area flows through the Wilmington Drain into Machado Lake.

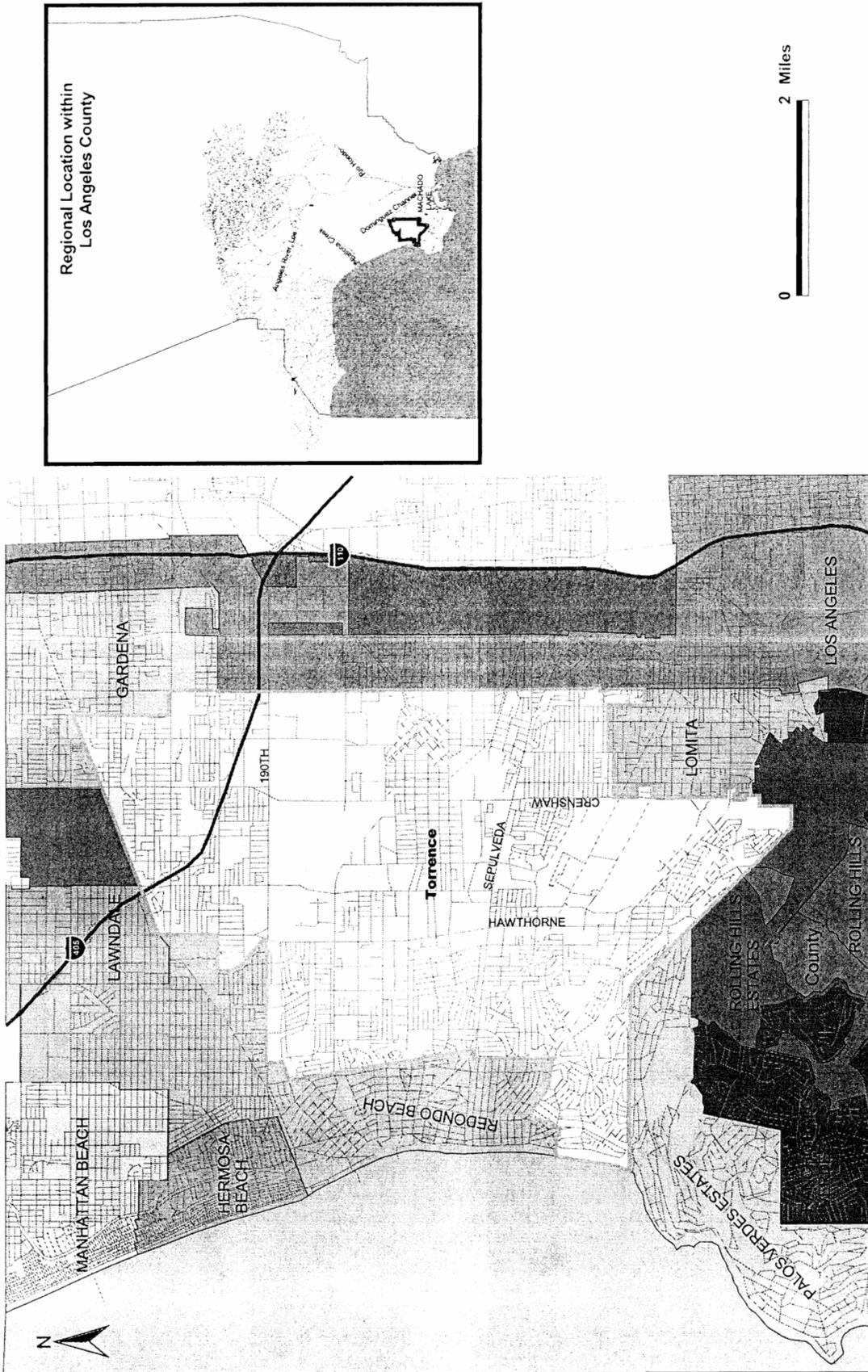
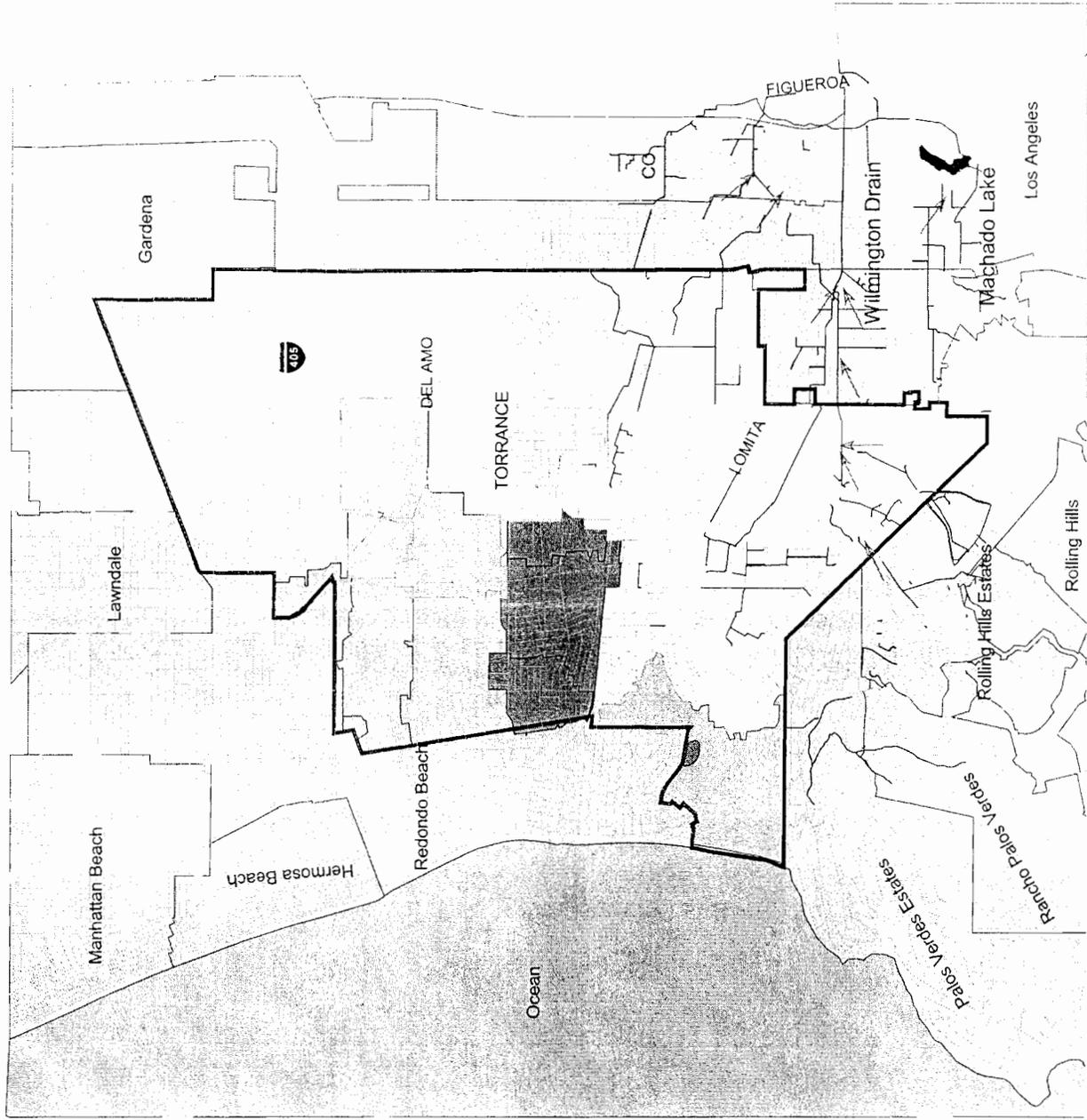


Figure 1 Regional Map of Torrance



- Storm Drain
- Torrance
- Retention Basins
- Santa Monica Bay Watershed
- Dominguez Channel Watershed
- Machado Lake Watershed



Figure 2 Subregional Watersheds

Land Use

-  Airport
-  Commercial
-  Heavy Industrial
-  Heavy Manufacturing
-  Hospital/Medical
-  Light Agricultural
-  Light Industrial
-  Light Manufacturing
-  Limited Multi-Family
-  Mixed
-  Multi-Family Residential
-  Public Use/Open Space
-  Residential Townhouse
-  Restricted Multi-Family
-  Single Family Residential
-  Transportation
-  Two Family Residential
-  Waltheria Lake Park



Figure 3 Existing Land Use of Torrance



Figure 4 2007 Satellite Imagery of Machado Lake and Ken Malloy Harbor Park Overview

1.3 Special Study Work Plan

This document provides the overall structure of the Special Study Work Plan with submittals to the Regional Board, as well as providing the initial Pre-BMP Implementation Study Plan (including a proposed field data collection and sampling plan). The Special Study Work Plan addresses the requirements of Optional Study No. 3 to assess compliance with WLAs for total nitrogen and total phosphorus originating from the City's watersheds. The scope of work for this plan includes the following:

- Pre-BMP Implementation Study Period - Including conducting dry weather sampling as outlined within this submittal as well as reviewing water quality models developed by LA County for wet weather events and Machado Lake.
- BMP Evaluation and Selection Study Report - This study report is to be submitted at a later date (see proposed schedule of work plan elements), and will summarize the collected field data and the applicable results obtained from the regional water quality model being developed by LA County for wet weather conditions. The field data and the water quality model data will be used to assess compliance with WLAs under the TMDL. Based on the assessment of compliance, the BMP and Selection Study Report will identify and screen structural BMPs for mitigation to bring the City into compliance with the TMDL.
- Monitoring and Reporting Plan - Subsequent to acceptance by the Regional Board of the findings and conclusions of the City's BMP Evaluation and Selection Study Report, the City will submit an MRP specific to the needs for assessment of future compliance with the TMDL.
- BMP Implementation Report - This report will summarize the monitoring data collected after 12 months of BMP implementation and will provide to the Regional Board an assessment of the success of the structural BMPs implemented by the City to support compliance with the TMDL.

The actual start date for the sampling will be determined following the Regional Board's approval of this Special Study Work Plan. Other conditions that may affect the sampling schedule are weather and equipment conditions and availability. The schedule for the work plan is summarized in Table 3.

The Special Study Work Plan identifies the proposed tasks the City agrees to perform, their timelines, and the roles and responsibilities of various parties in completing the work. The purpose of this document is to serve as a starting point for work planning discussions between the City and the Regional Board.

ID	Work Plan Element	Schedule
1	Special Study Work Plan	May, 2011 (submittal)
2	Regional Board Review/Approval	June, 2011 (approval)
3	Pre-BMP Implementation Study	July, 2011 – July, 2012 (field sampling)
4	BMP Evaluation, Monitoring and Reporting Plan	September, 2011 (submittal)
5	Regional Review/Approval	August, 2012 (approval)
6	BMP Implementation	Nov., 2012 (implementation)
7	BMP Implementation Report	Nov., 2013 (submittal)

2.0 PRE-BMP IMPLEMENTATION STUDY

2.1 Introduction

The Pre-BMP Implementation Study includes a 12-month FSP and evaluation of regional water quality models for wet weather conditions and Machado Lake to assess the City's current compliance with WLAs. The FSP covers sample collection methods, analytical procedures, data analysis and reporting, and health and safety aspects. The FSP will generate a variety of data including discharge rates and flow volumes, the concentrations of chemical parameters, and the measurement of physical parameters. Utilizing the mass balance approach, the data will be used to estimate the mass of nutrients originating from the City as well as nearby agencies discharging stormwater into the City's storm drain system. The data will also be examined for patterns and trends, comparing stormwater quality between different sampling locations over time.

The Pre-BMP Implementation Study will be undertaken once approval is obtained from the Regional Board for the Special Study Work Plan.

The remaining sections of this document contain the FSP providing field sampling methods and analytical procedures that will be used to collect dry weather water quality data and continuous flow data.

2.2 Objectives of the Pre-BMP Implementation Study

The Pre-BMP Implementation Study will provide the City data needed to assess water quality impacts to the City's drainage network. The objective of this study is to support the City's compliance with the Machado Lake Nutrient TMDL by performing Special Study No. 3. Data and information elements that are part of the Pre-BMP Implementation Study include:

1. Dry weather flow data including calculation of continuous volume data and water quality data obtained through field monitoring and sampling (data to be collected by implementing the FSP included within this document).

2. Estimates of wet weather stormwater quality impacts identified using an integrated water quality model developed by the City of Torrance. The water quality model is described in Section 2.2.1.
3. Identification of BMPs that will be implemented by the City to mitigate observed water quality impacts in the City's outflows to Machado Lake.

2.2.1 Pollutant Loading and Analysis Tool (PLAT)

In order to estimate wet weather stormwater quality impacts, the City has developed an integrated watershed modeling tool to simulate watershed hydrology, nutrient, sediment, and contaminant dynamics. This tool called Pollutant Loading and Analysis Tool (PLAT), incorporates existing and commonly used watershed models. The main models used by PLAT are PLOAD, Program for Predicting Polluting Particle Passage thru Pits, Puddles, and Ponds (P8), and U.S EPA SUSTAIN model. PLAT is based on spatially distributed inputs derived from high resolution satellite imagery. PLAT has four main components: pollutant hot-spots characterization, BMP screening, continuous simulation, and BMP design, optimization, and placement. The SUSTAIN model provides an optimization routine that helps identify the appropriate size of BMPs for treating stormwater runoff from respective source areas to meet TMDL reduction goals. The tool has been validated with results from the LA County Watershed Management Model System (WMMS).

3.0 FIELD SAMPLING PLAN

The 12-month FSP is designed to collect continuous flow data and discrete dry weather water quality data to support the overall study objectives summarized in Section 2.

3.1 Sampling Locations and Access

Site selection is a major challenge, given the scarcity of funding for sampling and laboratory analysis. The number of locations to be sampled was decided based on the program objectives, regulatory requirements, and the size and complexity of the drainage sub-basins and conveyance system. In addition, the frequency of sampling at each location was considered.

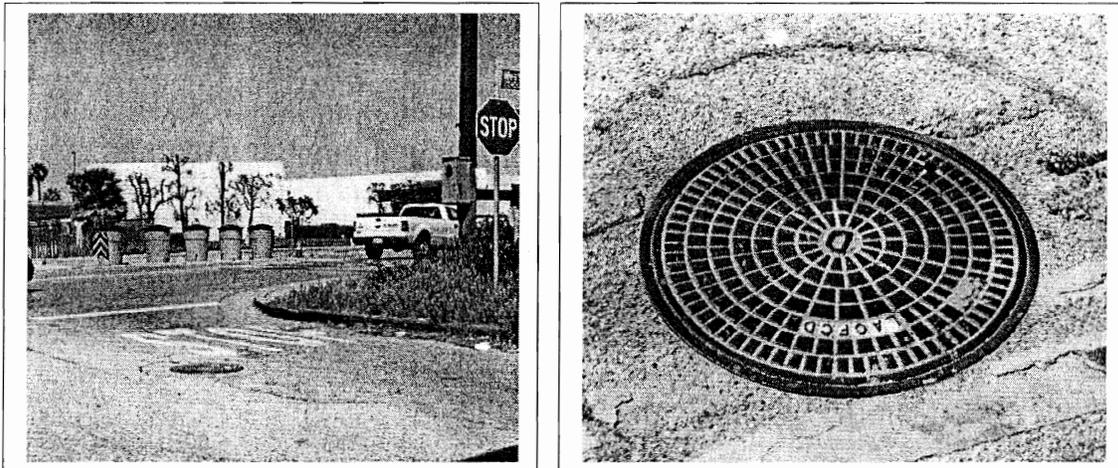
As a first step in the selection process, the City's watersheds, sub-basins and drainage system network were reviewed. Based on this review, nine locations were identified that could be used to characterize the flows in and out of each subbasin. Four of these locations are needed at a minimum to characterize the flows conveyed to Machado Lake. The final selection of sample locations was based on factors such as site permission, access, clustering, personal safety, equipment safety, and the likelihood that stormwater would flow at the location. Table 4 summarizes the proposed stormwater sampling locations, types, and characteristics. The general sampling locations are depicted on Figure 5. Appendix A shows detailed characteristics of each sampling location.

At a minimum, four sampling locations will meet the objectives of this program. However, the City will sample five additional locations, Tor-S3, Tor-S6, Tor-S7, Tor-S8, and Tor-S9 as shown on Figure 4 because the results will support critical decisions including identifying sources originating outside of the City's boundaries or sources not under the direct control of the City. The sampling locations Tor-S6, Tor-S7, Tor-S8, and Tor-S9 are discharge points for Rolling Hills and Palos Verdes Estates.

The sampling locations are described below.

Tor-S1

This site is located 40 ft north and 80 ft east of the intersection of Plaza Del Amo and Western Avenue. The total upstream drainage area is approximately 63 acres. The drainage area is mainly residential and commercial land use. Residential and commercial land uses represent 36 percent and 33 percent, respectively, of the drainage area. This site is easily accessible and safe for conducting sampling during both dry and wet weather conditions. The storm sewer conveying stormwater to this site is a 36-inch reinforced concrete pipe. This site is one of the four sites that will provide information on the amount of pollutants leaving the City limits.



Sampling Site: TOR-S1

Table 4 Sampling Location Characteristics

Sampling Location Name	Description	Land Use	GPS Coordinates	Associated Upstream Storm Drain Name	Diameter (in) and Material
Tor-S1	Located 40 ft north and 80 ft east of the intersection of Plaza Del Amo and Western Avenue.	Residential/commercial	33° 49.3572' 118° 18.5208'	City	36 RCP
Tor-S2	Approximately 50 ft west of 246th Place and Pennsylvania Avenue intersection.	Mixed	33° 48.093' 118° 19.5252'	City	33 RCP
Tor-S3	Effluent of Waleria Lake, approximately 100 ft east of Madison St. and Skypark Drive intersection.	Mixed	33° 48.6312 118° 20.8674'	Waleria Lake	54
Tor-S4	Approximately 210 ft north and 85 ft east of 236th Street and Western Avenue intersection.	Mostly residential	33° 48.7056' 118° 18.5196'	City	9'-2"Wx11'H RCB
Tor-S5	About 25 ft west of intersection of Bani Avenue and 250th Street (two pipes intersect from south and west).	Residential/Airport	33° 47.8956' 118° 19.6872'	City	8'-9"Wx9'-7"H RCB
Tor-S6	Approximately 600 ft east of Estates Lane and Crenshaw Boulevard.	Mostly residential	33° 47.1822' 118° 20.43'	Rolling Hills Estates	36 RCP
Tor-S7	About 160 ft south and 280 ft east of Rolling Hills Road and Hawthorne Blvd. intersection. Will monitor dry weather flow originating from Rolling Hills Estates.	Mostly residential	33° 47.6826 118° 20.9232'	Rolling Hills Estates	10'x10' RCB
Tor-S8	About 500 ft northwest of Paseo De Las Tortugas and Mesa St. intersection. Will monitor dry weather flow originating from Rolling Hills Estates.	Mostly residential	33° 48.0522' 118° 21.4254'	Rolling Hills Estates	24 RCP
Tor-S9	About 830 ft east and 120 ft south of Paseo de las Tortugas and Vista Montana intersection. Will monitor dry weather flow originating from Palos Verdes Estates.	Mostly residential	33° 48.2742' 118° 21.7776'	Palos Verdes Estates	42 RCP

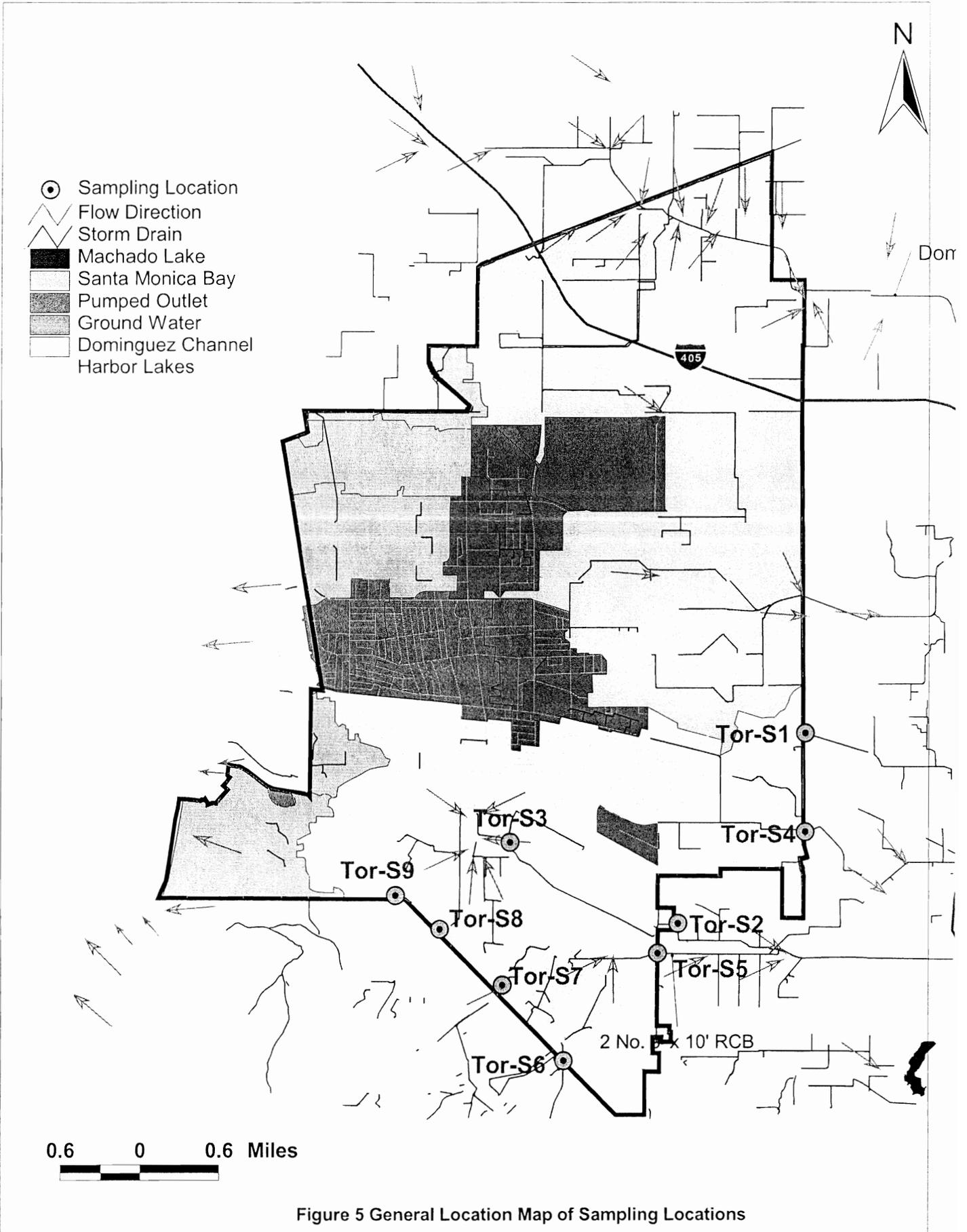
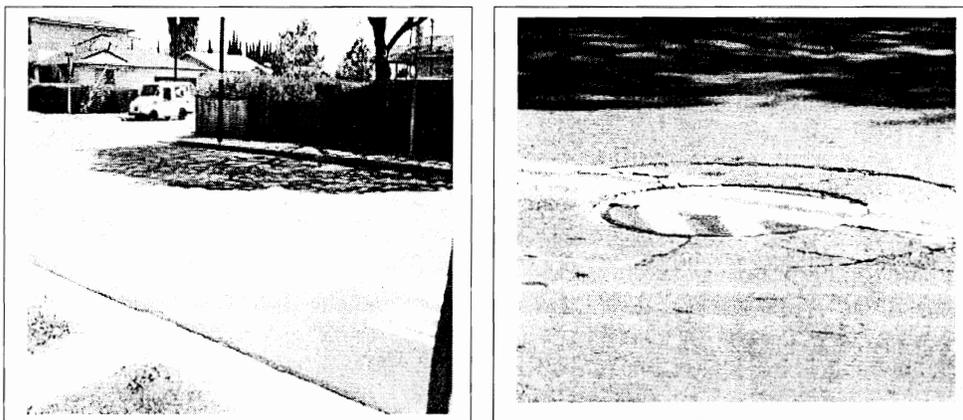


Figure 5 General Location Map of Sampling Locations

Tor-S2

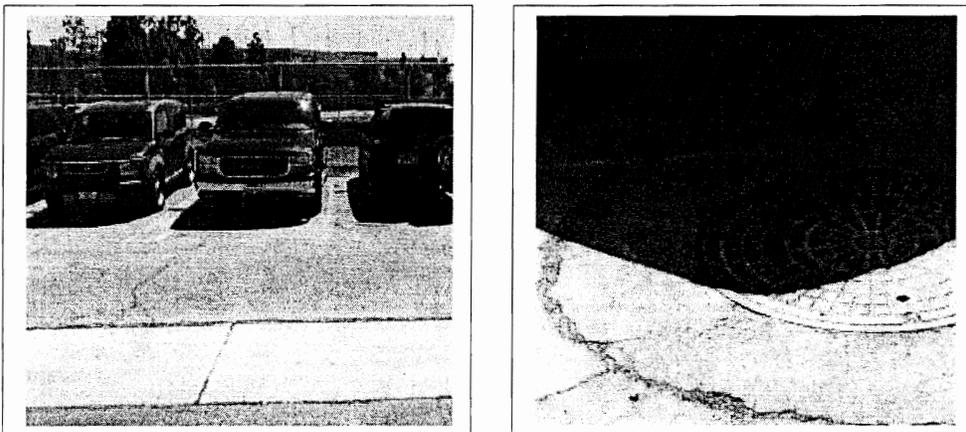
Tor-S2 is approximately 50 ft west of the intersection of 246th Place and Pennsylvania Avenue. The total upstream drainage area is about 2,605 acres. The drainage area is a mixed land use, about 32 percent residential, 10 percent commercial and 11 percent industrial. The Torrance Airport accounts for 12 percent of the drainage area. Tor-S2 is easily accessible and safe for conducting sampling during both dry and wet weather conditions. Stormwater is conveyed to this site through an 8' x 7' reinforced concrete box. This site is one the four sites that will provide information to quantify the amount of pollutants leaving the City limits.



Sampling Site: TOR-S2

Tor-S3

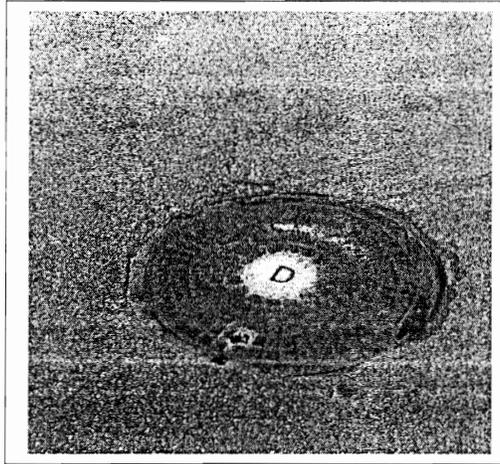
This site, which is approximately 100 ft east of Madison St. and Skypark Drive intersection, will assist the City in characterizing discharges from WALTERIA Lake. The total upstream drainage area is approximately 2,285 acres. This site is upstream of Tor-S2. Land use is mixed with 37 percent residential, 10 percent commercial and 9 percent industrial. A 54-inch pipe conveys stormwater to this site. The site is easily accessible and safe for all weather sampling.



Sampling Site: TOR-S3

Tor-S4

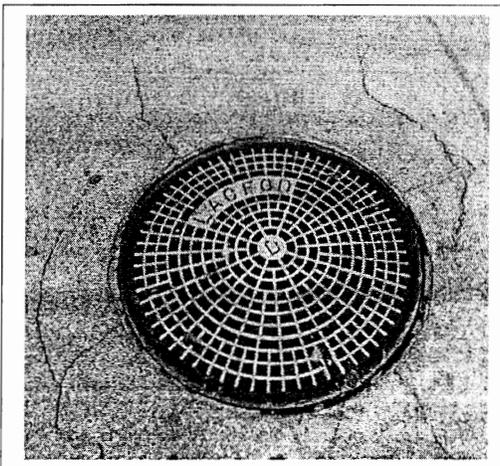
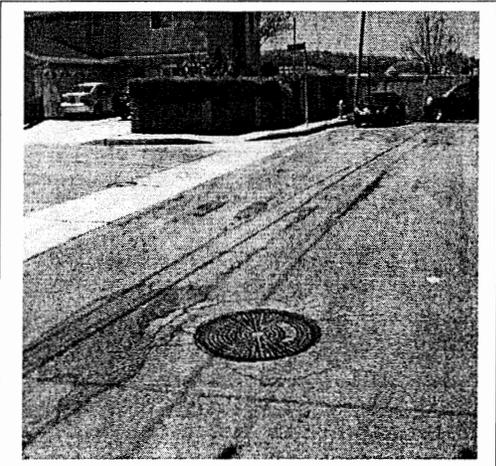
Tor-S4 is approximately 210 ft north and 85 ft east of 236th Street and Western Avenue intersection. The total drainage area upstream of this sampling location is approximately 1,014 acres. Residential land use represents nearly 60 percent of the drainage area. Commercial and industrial land uses represent only 9 percent of the drainage area. The storm drain serving this site is a 9'-2" x 11' RCB. The site is safe for all weather sampling and it is easily accessible.



Sampling Site: TOR-S4

Tor-S5

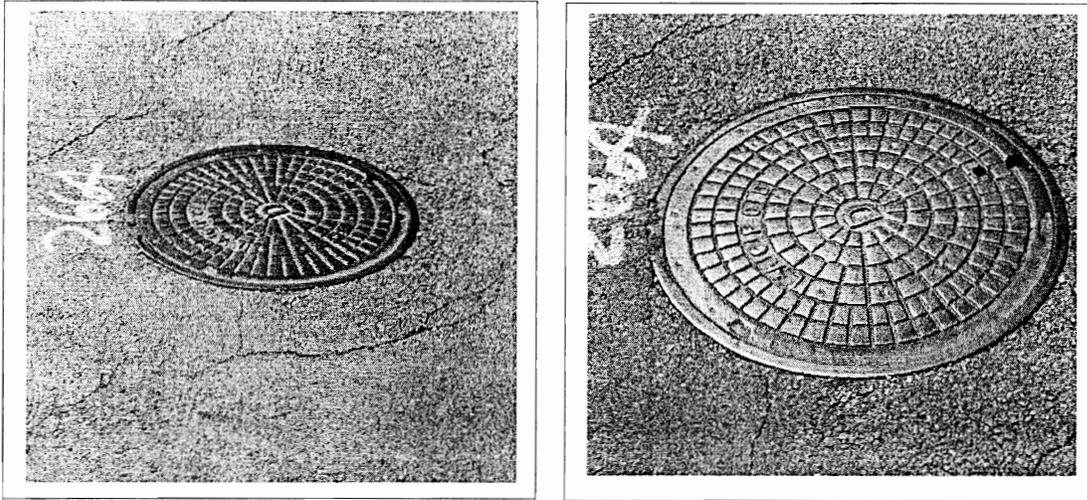
This site is about 25 ft west of the intersection of Bani Avenue and 250th Street (two pipes intersect from south and west). This sampling site serves an upstream drainage area of approximately 661 acres. This site is mainly residential and airport land use; residential and airport land uses represent 43 and 24 percent of the drainage area, respectively. The storm drain discharging stormwater to this site is an 8'-9" x 9'-7' RCB. This site is easily accessible and safe for sampling activities.



Sampling Site: TOR-S5

Tor-S6

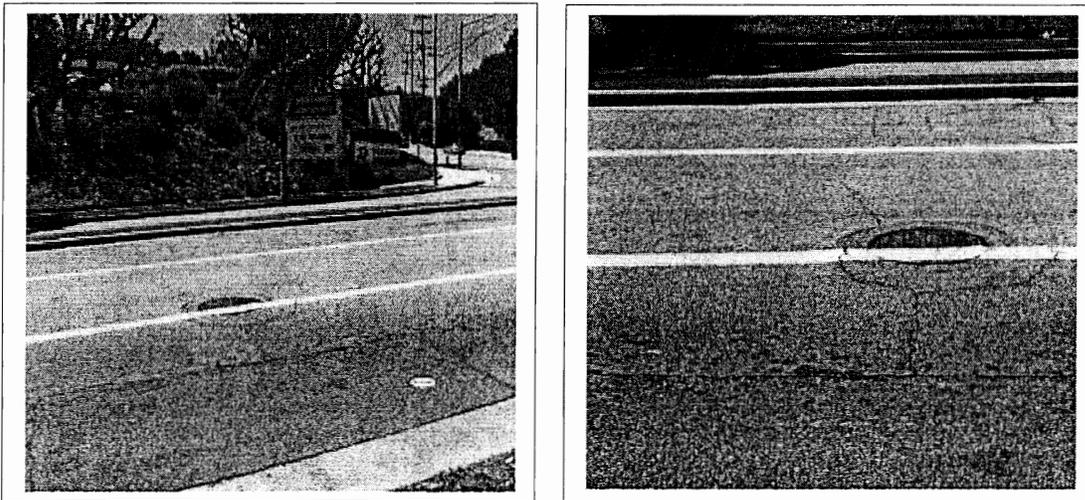
Tor-S6 is located at approximately 600 ft east of Estates Lane and Crenshaw Boulevard. This site will monitor flow entering the City's storm drain from Rolling Hills Estate. The sampling site is safe and easily accessible.



Sampling Site: TOR-S6

Tor-S7

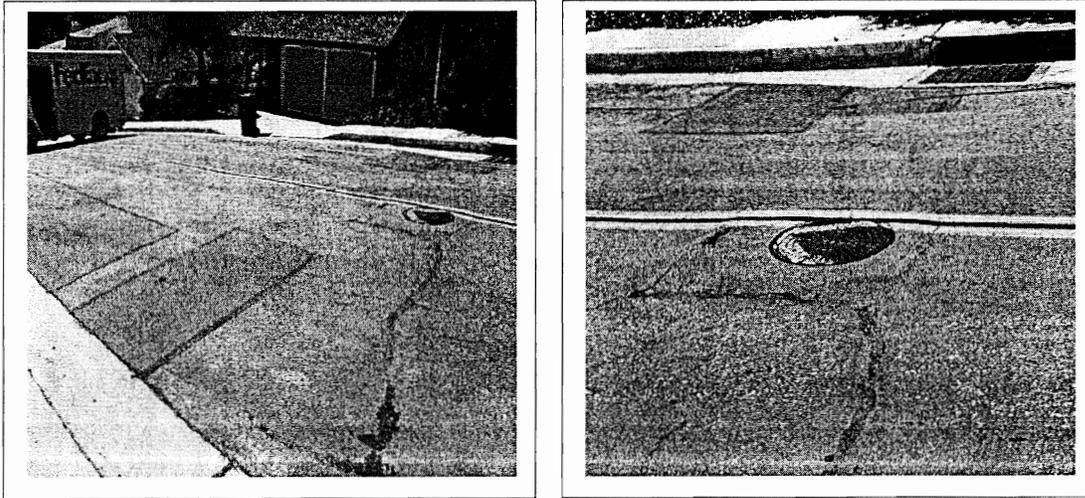
This site is about 160 ft south and 280 ft east of Rolling Hills Road and Hawthorne Blvd. intersection. It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions.



Sampling Site: TOR-S7

Tor-S8

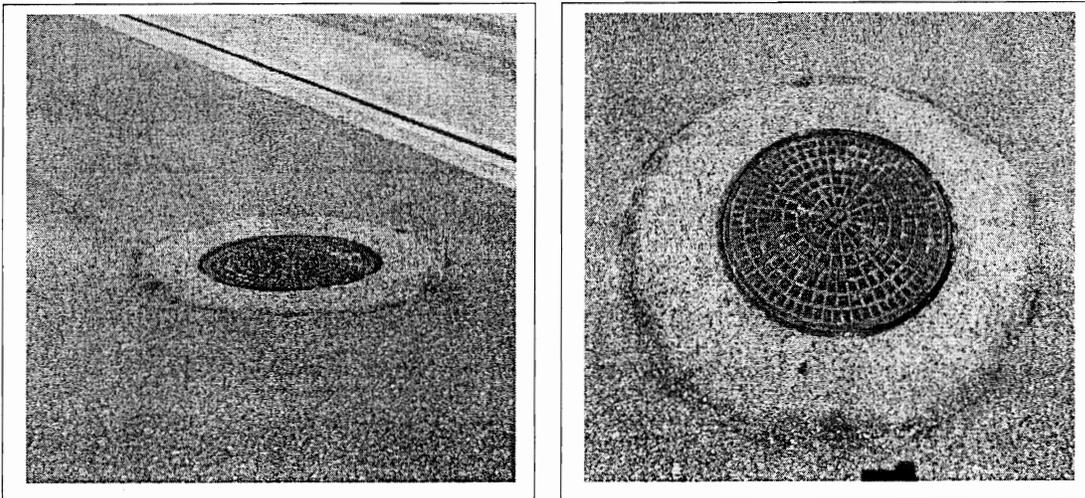
This site is located at about 500 ft northwest of Paseo De Las Tortugas and Mesa St. intersection. It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditions.



Sampling Site: TOR-S8

Tor-S9

Tor-S9 is about 830 ft east and 120 ft south of Paseo de Las Tortugas and Vista Montana intersection. This site will monitor dry weather flow originating from Palos Verdes Estates. The site is accessible and safe for sampling activities.



Sampling Site: TOR-S9

3.2 Sample Collection Frequency

The City's sampling program consists of three major elements:

1. Monthly sampling during dry weather conditions for all sampling locations. Grab samples will be collected from each sampling location. Dry weather conditions must be preceded by at least 24 hours of no greater than trace precipitation or have an intensity of less than 0.1 inches of rain in a 24-hour period.
2. Samples will be collected from Tor-S3 during four discrete storm events and anytime time the LA County pumps stormwater from the Walteria Lake into the 54-inch storm drain. Pumping schedule will be obtained from LA County.
3. Continuous recording of stage or flow depth during dry weather periods for flow estimation will be collected from the proposed sample locations during dry weather flow conditions.

Regarding Tor-S3, one grab sample for each of the four storm events will be collected under the following conditions:

1. Sampling will occur during a storm event with at least 0.1 inch of precipitation (defined as a "measurable" event). Weather forecasts will be evaluated before deciding whether or not to sample a particular rain event. The monitoring manager will periodically establish a modem connection with each sampling unit to monitor rainfall, flow rates, and sampling activity. The monitoring manager will download stored data from the National Weather Service as needed.
2. Sampling will not occur at a frequency greater than once every 72 hours.
3. Sampling will not occur unless there has been at least 72 hours of continuous dry weather immediately preceding the "measurable" event.
4. Grab samples will be collected from this location during approximately the first 30 minutes to 1 hour of stormwater discharge (where possible).

The intention of the sample collection frequency and stormwater event requirements described above is to collect samples that are representative of runoff conditions from Tor-S3. No samples will be collected from the remaining eight sampling locations during storm events. The City's Pollutant Loading and Analysis Tool (PLAT) will be used to estimate nutrient loading for these sampling location during storm events.

3.3 Selection of Analytical Parameters

The City proposes to use a mass based WLA compliance option to evaluate TMDL compliance. Samples submitted for nutrients will be tested for ammonia-N (NH_3^+), ammonium, nitrite (NO_2), nitrate (NO_3), total Kjeldahl nitrogen (TKN), total phosphorus (TP), and phosphate (PO_4). Water samples submitted for conventional water parameters (general chemistry) will be tested for alkalinity, pH, chloride, total suspended solids (TSS), total solids, dissolved solids, turbidity, dissolved organic carbon (DOC), total organic carbon (TOC), and standard metals. The constituents to be sampled are listed in Table 5.

Analyte	Method of Analysis	Detection Limits
NH ₃ ⁺	SM 4500-NH ₃ -H	0.02 mg/l
NO ₃	SM 4500-NO ₃ -F	0.02 mg/l
NO ₂	SM 4500-NO ₃ -F	0.01 mg/l
TKN	EPA 351.3	0.1 mg/l
TP	EPA 365.4	0.06 mg/l
PO ₄	SM 4500-P-F	0.01 mg/l
TSS	EPA 160.2	0.5 mg/l
Turbidity	n/a	0.01 NTU

3.4 Continuous Flow Monitoring

Accurate assessment of flow is crucial to pollutant loads assessments and analysis. Continuous flow data will be collected as part of this sampling effort for all nine sampling locations. The primary benefit of these continuous monitoring sites is the ability to gauge the increase in flow due to a storm event and apply concentration data to calculate pollutant loading.

Global Water's FL16 Water Flow Logger will be used for flow data collection. The FL16 Water Flow Loggers will record over 81,000 depth, temperature, water flow and velocity readings in the drainage pipes. The specially engineered, non-fouling water level sensor works in depths as little as ½ inch and allows for deployment in manholes and other difficult to access areas without the need to enter the confined space.

FL16 Water Flow Recorder's user-friendly Windows-based software is tailored specifically for calculating water flows in partially filled sewer and drainage pipes using the Manning's Equation, with pull-down menus for selecting and entering the necessary information. The Water Flow Recorder software has a unique calibration feature which allows users to view calculated water velocity, compare this to actual measured data, and adjust the water flow parameters to calibrate for the water flow conditions of a specific application.

The flow measuring systems will be calibrated before data collection begins and that these will be re-calibrated monthly.

3.5 The Sampling Team

Grab samples from the nine sampling locations will be collected by a contract lab retained by the City. Pre-labeled sample bottles will be provided by the certified laboratory that will be conducting the analyses. The Sampling Team will be responsible for ensuring that all required equipment is ready for field operation. They are also responsible for performing the entire field sampling activities and most of the sampling preparation. Any member of the Sampling Team may recommend canceling sampling if the predicted conditions do not materialize or if health or safety of the team could be imperiled due to site conditions or extreme weather.

4.0 SAMPLE COLLECTION PROCEDURES

This section describes the sampling procedures, record keeping, sample handling, storage, and field quality control procedures that will be used during stormwater sampling.

4.1 Preparation for conducting the sampling

Several things will be done to prepare to conduct stormwater sampling. First, the laboratory to analyze the samples will be contacted. The following information will be sought from the lab:

- Type and size of bottles needed
- Procedures to filling the bottles
- Sample volume requirements
- Labels or additional forms required
- Explanation of the chain of custody form
- Sample preservation requirements and/or holding time restrictions
- Means of sample delivery to the lab
- Overnight delivery requirements
- Costs

Once a lab has been selected the sampling equipment (sampling bottles from a lab, sampling instruments, and personal safety equipment) will be made ready, as well as the field sheet to document the required information. Table 6 lists constituents and sample container requirements.

Field personnel will complete a field condition data sheet. The following items will be listed on the field sampling sheet and included in the stormwater discharge monitoring report:

- Person who conducted the sampling
- Date and time of discharge
- Length of storm event
- Time between sampled storm event and previous storm event (at least 72 hrs)
- Total rainfall during storm event
- Photo documentation

A field data sheet is attached as Appendix B.

4.1.1 Sampling Equipment

Monitoring equipment will be gathered ahead of time because opportunities to sample during rainfall events often come with little advanced notice. The following equipments will be required for the sampling efforts:

- Field forms
- Waterproof pens
- Permanent markers

- Powder-free nitrile gloves
- Clear glass jar for visual examinations
- Sample containers
- Sample preservatives
- Sample container labels
- COC forms
- COC seals
- Ice chests
- Ice
- Foul-weather gear
- Manhole sampler

Table 6 Monitoring Constituents and Sample Container Requirements

Analyte	Container	Volume	Preservation	Holding Time
NH ₃ ⁺	Plastic	50 ml	≤ 6°C H ₂ SO ₄ PH < 2	28 days
NO ₃	Plastic	50 ml	≤ 6°C, H ₂ SO ₄ PH <2	48 hours
NO ₂	Plastic	50 ml	≤ 6°C, H ₂ SO ₄ PH <2	48 hours
TKN	Plastic	50 ml	≤ 6°C, H ₂ SO ₄ PH <2	28 days
TP	Plastic	50 ml	≤ 6°C, H ₂ SO ₄ PH <2	28 days
PO ₄	Plastic	50 ml	≤ 6°C	48 hours
TSS	Plastic	200 ml	≤ 6°C	7 days

4.2 Sampling Method

Water samples will be collected from storm sewer manhole and outfall sites. All samples will be collected as individual grabs. Samples will be collected directly into sample containers or with a laboratory-supplied container attached to a pole with duct tape or other means. Sampling containers will be held with container openings facing upstream to prevent contamination during sampling. Field personnel will wear powder-free nitrile disposable gloves. Each sample will be given a field identification, tagged, and kept cool at 4 degrees C. Chain-of-custody (COC) procedures will be observed and samples delivered to the laboratory within the allowable holding times for each parameter.

It is assumed that sampling locations will have well-mixed conditions so that single grabs are representative of water quality. Field personnel will record the degree of turbulence or quiescence as well as the dimensions of the conveyance sampled and/or a description of water flowing in the conveyance. Field personnel will also record the date and time of sample collection and the flow rate.

Sampling containers for direct grabs (either by hand or with pole attached to laboratory supplied container) will be pre-cleaned by the laboratory. It will be made certain that if a sample is transferred (either for collection purposes or to form grab-composite samples), that only laboratory-supplied containers are permitted to come in contact with the sample.

4.3 Personal Safety

A Health and Safety Plan approved by the contract lab will be reviewed by the all field personnel before the sampling operations covered in this monitoring plan begin. Personal safety will be of primary concern while conducting all stormwater sampling related activities. All persons involved in the sampling operation will be made aware of the hazards associated with monitoring and should freely voice any concerns if potential hazards become apparent. The Occupational Safety and Health Administration (OSHA) provides regulations and guidance on occupational safety, many of which are directly applicable to the types of activities involved in stormwater monitoring. It is the direct responsibility of each person involved in the monitoring program to read the Health and Safety Plan and adhere to its requirements. The following list provides a few basic health and safety procedures that will help to create a safer sampling environment.

- Do not sample alone, a minimum of two-person field crews will be used for stormwater sampling.
- Do not enter a confined space without proper training, equipment, and surface support.
- Never remove or replace manhole covers with your bare hands or feet.
- Never leave an open manhole unattended.
- Do not start staging or sampling until traffic control has been established.

4.4 Clean Sampling Techniques

Clean sample collection techniques will be followed to minimize the potential for contamination of stormwater runoff samples. Care will be taken during all sampling operations to avoid contamination of the water samples by human, atmospheric, or other potential sources of contamination. The monitoring team should prevent contamination of any of the following items: composite bottles, lids, sample, tubing, and strainers.

4.5 Sample Packing and Shipping

Monitoring personnel will deliver the samples to the laboratory. Sample bottles will be placed in coolers or some other package that is rigid enough to provide protection of the samples and is insulated to keep samples cold. During packing, the sample from one monitoring location will not be separated into separate shipping containers unless bottles of one size need to be shipped together because of container size. If samples from a location are separated a copy of the field-sampling sheet pertaining to the bottles will be enclosed in each shipping container. Prior to shipping, all sample bottles will be recorded on the packing lists, which will include the shipping date and the method of transporting the samples. Samples will be delivered to the analytical laboratory within 4 hours of sampling to ensure the maximum holding time for bacteria of 6 hours is not exceeded.

4.6 Chain of Custody

After samples have been obtained and the collection procedures properly documented, a written record of the COC of each sample will be made. This record ensures that samples will not be tampered with or inadvertently compromised in any way, and it also tracks the requested analysis for the analytical laboratory. COC refers to the documented account of changes in possession that occur for samples.

The COC record tracks the sampling path from origin through laboratory analysis. Information necessary in the COC includes:

- Name of the persons collecting the sample(s).
- Date and time of sample collection.
- Location of sample collection.
- Names and signatures of all persons handling the samples in the field and in the laboratory.
- Laboratory analysis requested and control information (e.g., duplicate or spiked samples etc.) and any special instructions (e.g., time sensitive analyses).

To ensure that all necessary information is documented a COC form will accompany each sample or set of samples. COC forms will be printed on multipart carbonless paper so that all personnel handling the samples may obtain a copy. A COC record should accompany all sample shipments and the sample originator will retain a copy of the forms. When transferring custody of samples the transferee will sign and record the date and time of each transfer. Each person who takes custody will complete the appropriate portion of the chain of custody documentation. A sample COC form to be used for this field sampling is attached as Appendix C.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Data Quality Objective

The quality assurance/quality control (QA/QC) program will be implemented to satisfy the data quality objectives of the monitoring program. The primary data quality objectives are to obtain defensible data of acceptable sensitivity and quality to:

- Evaluate the stormwater management program.
- Evaluate stormwater quality.
- Evaluate of BMP as corrective measure.

The analytical laboratory selected for this study will evaluate the accuracy of its sample extraction and/or analytical procedures using spiked samples, which may include matrix spikes (MS), laboratory control samples (LCS) and surrogate spikes. Acceptable spike recoveries must fall within statistically derived laboratory "control limits." Precision is the agreement among a set a replicate measurements of the same parameter. The analytical laboratory will evaluate precision by performing matrix spike duplicate (MSD), laboratory control sample duplicate (LCSD) and duplicate stormwater sample analyses (typically

performed for inorganic parameters only). The data quality objectives also include obtaining data that are comparable and representative of the water quality conditions at each monitoring location. Comparable data will be collected if comparable sampling, analysis, QA/QC and reporting procedures are implemented throughout the monitoring program. Representative samples will be collected by performing sampling activities compliant with the procedures described in this monitoring plan. Duplicate samples will be collected and the results will be used to evaluate representativeness. Comparability expresses the confidence with which one data set can be compared to another. Data are comparable if collection techniques, measurement procedures, methods, and reporting are equivalent for the samples within a sample set. Data quality assurance objectives are summarized in Table 7.

Analyte	Units	Precision	Accuracy	Reporting Limit	Completeness
NH ₃ ⁺	mg/l	±20%	±30%	0.10 mg/l	90%
NO ₃	mg/l	±20%	±30%	0.1 mg/l	90%
NO ₂	mg/l	±20%	±30%	0.1 mg/l	90%
TKN	mg/l	±20%	±30%	0.1 mg/l	90%
TP	mg/l	±20%	±30%	0.1 mg/l	90%
PO ₄	mg/l	±20%	±30%	0.025 mg/l	90%
TSS	mg/l	±20%	±30%	1 mg/l	90%

5.1.1 Field Quality Control Samples

Field quality control samples will be collected at a 10% frequency in order to provide quality performance information for the sampling program. One in ten samples submitted for analysis will be one of three field QC sample types: field blank; field duplicate; and/or performance evaluation blank. Table 8 lists the quality performance goals that each of the three types of field QC sample types is intended to address.

Quality Performance Goal	Field Blank	Field Duplicate	Performance Evaluation Blank
Minimize false positive results	X		X
Sample bottles free of contamination	X		
No contamination introduced by sampling process	X		
Measurement error attributable to sample inhomogeneity		X	

5.2 Field Quality Assurance/Quality Control

This section summarizes the QA/QC procedures that will be implemented by field personnel to evaluate sample contamination, sampling precision, and matrix interference.

5.2.1 Equipment Blanks

After the intermediate sample container or scoop is cleaned, an equipment blank will be collected by pouring reagent-grade water into the apparatus. The water will be transferred into sample bottles and analyzed for the full analytical suite.

5.2.2 Field Duplicate Samples

Field duplicate samples will be collected to evaluate the precision and representativeness of the sample collection procedures as well as sample homogeneity. The duplicate sample will be collected using the specified manual grab sampling techniques. Twice the volume required for the analytical suite will be collected with each duplicate sample. For grab samples, intermediate sample containers will be used, and the volume collected will be apportioned equally between the intermediate containers. The water in each intermediate container will be poured into a discrete set of sample bottles. One set of bottles will be labeled with fictitious sample identification and submitted "blind" to the laboratory.

5.2.3 Matrix Spike Samples

MS and MSD analyses will be performed by the laboratory using project samples. Field crews will submit twice the required sample volume for the sample selected as the matrix spike sample. Field personnel will identify the MS/MSD sample on the COC form.

5.3 Laboratory Quality Control

This sub-section summarizes the QC procedures the laboratory will perform and report with the analytical data packages. These procedures are not inclusive of the QA/QC that is required for compliance with the analytical method.

5.3.1 Method Blanks

A method blank is prepared using reagent-grade water, and is extracted and analyzed with each sample batch (typically 20 samples extracted and/or analyzed on a given day). Method blank results are used to identify potential sources of sample contamination resulting from laboratory procedures. Target analytes should not be detected in the method blank above the practical quantitative limit.

5.3.2 Matrix Spike and Laboratory Control Samples

MS, MSDs, LCS, and LCSDs will be performed by the laboratory to evaluate the accuracy of the sample extraction and analysis procedures. MS/MSDs will also be performed to evaluate matrix interference. Matrix interference is the effect of the sample matrix on the analysis, which may partially or completely mask the response of the analytical instrumentation to the target analyte(s). Matrix interference may affect the accuracy of the extraction and/or analysis procedures to varying degrees, and may bias the sample results high or low. The

MS/MSD is prepared by adding known quantities of target analytes to a sample. The sample is then extracted and/or analyzed as a typical environmental sample, and the results are reported as percent recovery.

6.0 DATA MANAGEMENT AND REPORTING

The sampling results will be reported by the laboratory as hard copy and as electronic files. Hard copy data will be entered into an electronic format, and checked at least once by a different person. Electronic submittal of results will be discussed with the analytical laboratory in advance of delivery and its format arranged. A separate record will be generated for each sample analysis.

In addition, the key information such as station ID, sample date and time, name of sampler, name of constituent, all results, units, detection limits, methods used, name of the laboratory, and any field notes will be entered into the database. Additional information, such as compositing of multiple samples, or the use of grab will also be included.

When reporting the laboratory results for each stormwater sample the following information will be provided:

- Sample site.
- Sample date and time.
- Sample number (or identification).
- Sampling technician(s).
- Detection limit and reliability limit of analytical procedure(s).
- Sample results with clearly specified units.

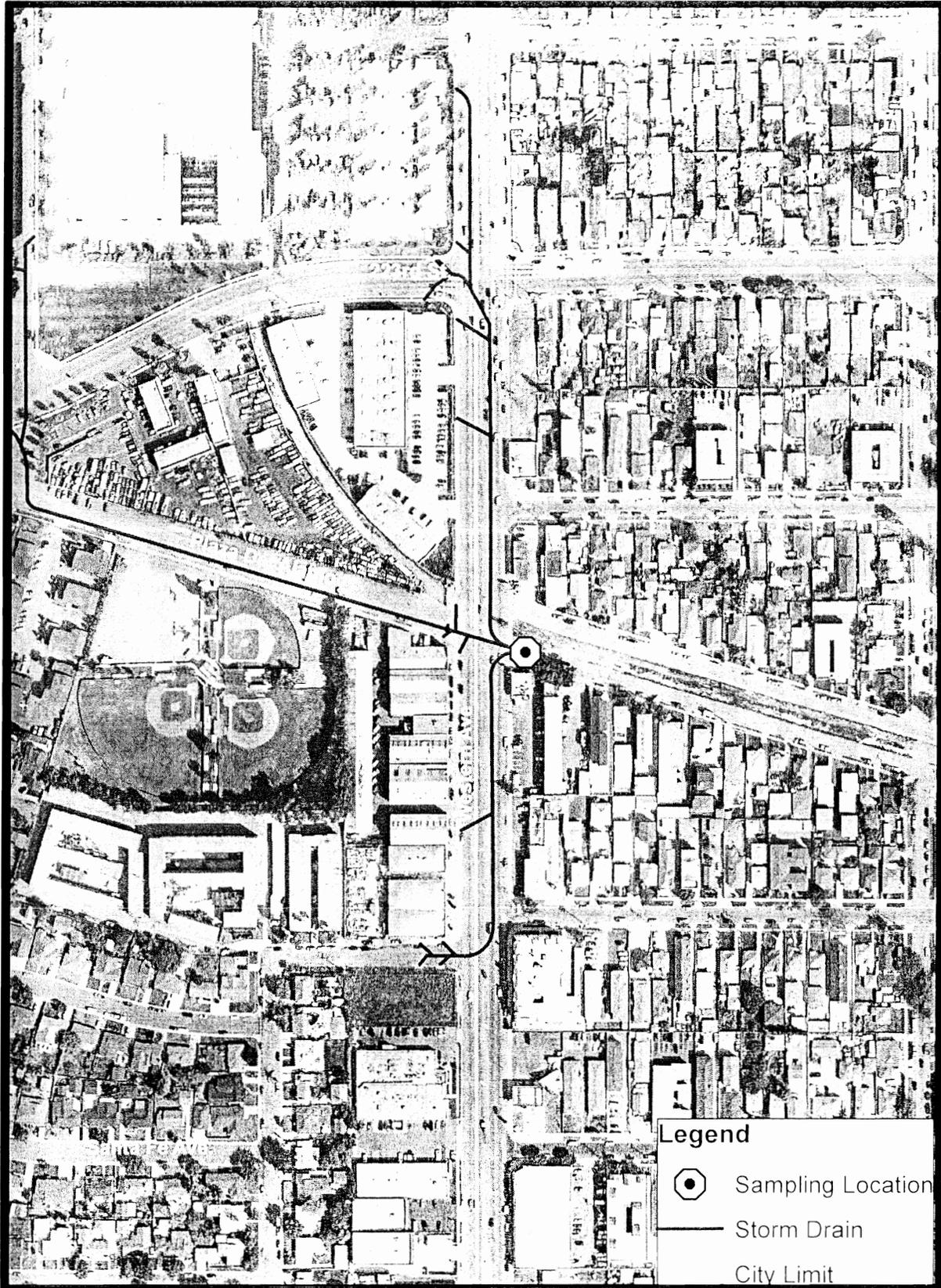
The results of all samples collected under this plan will be submitted to Regional Board in a monitoring report. Monitoring report will include:

- Introduction and background information
- Documentation and summary of each sampling event, including photos
- Electronic copies of field conditions data sheets
- Summary discussion of results
- Tabular results of all samples, including quality assurance quality control samples, in electronic format, (Excel)
- Evaluation data quality based on QAPP requirements.

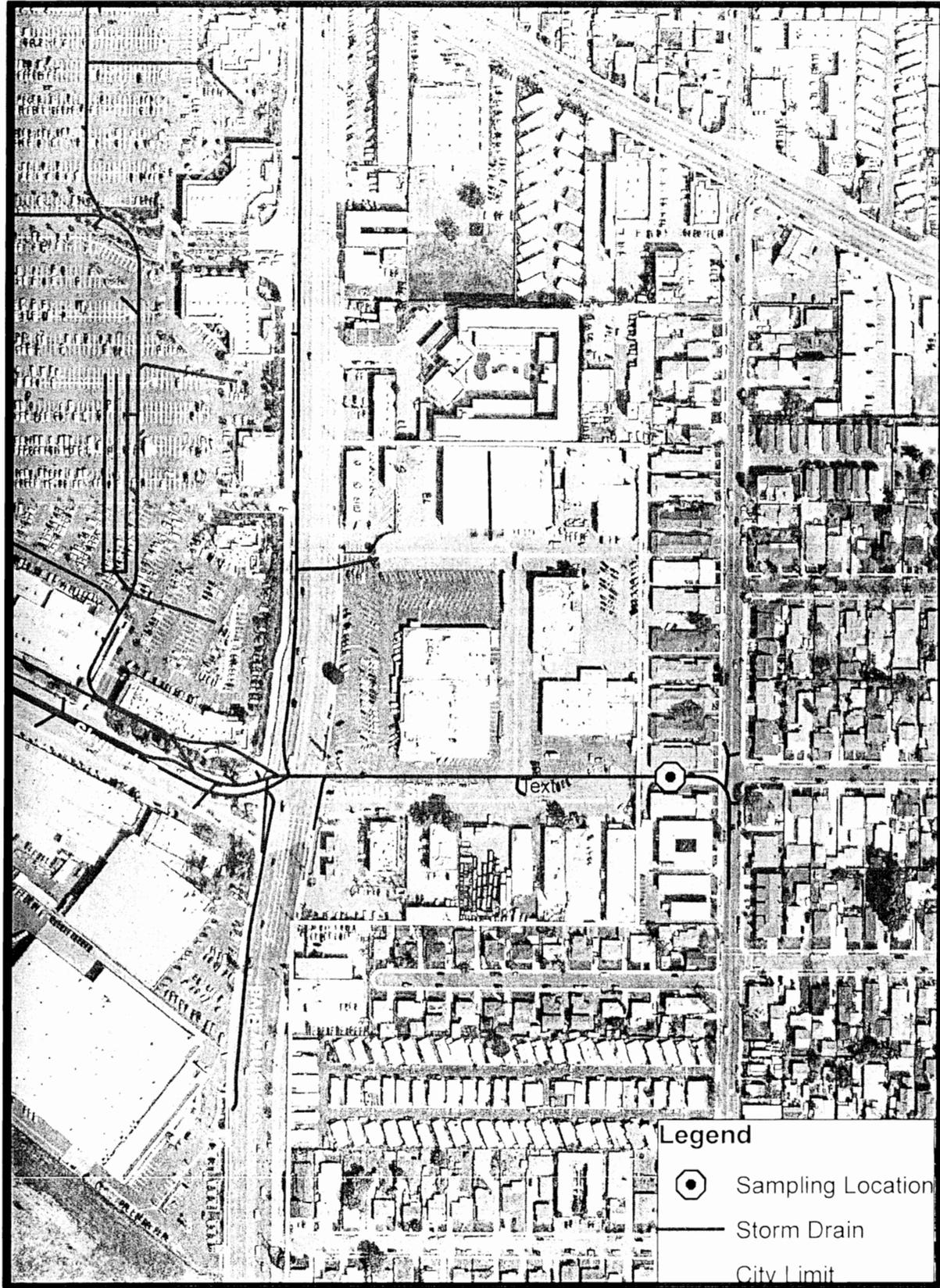
APPENDIX A

Detailed Maps of Sampling Locations

Stormwater Sampling Location - Tor-S1



Stormwater Sampling Location - Tor-S2



Stormwater Sampling Location: Tor-83



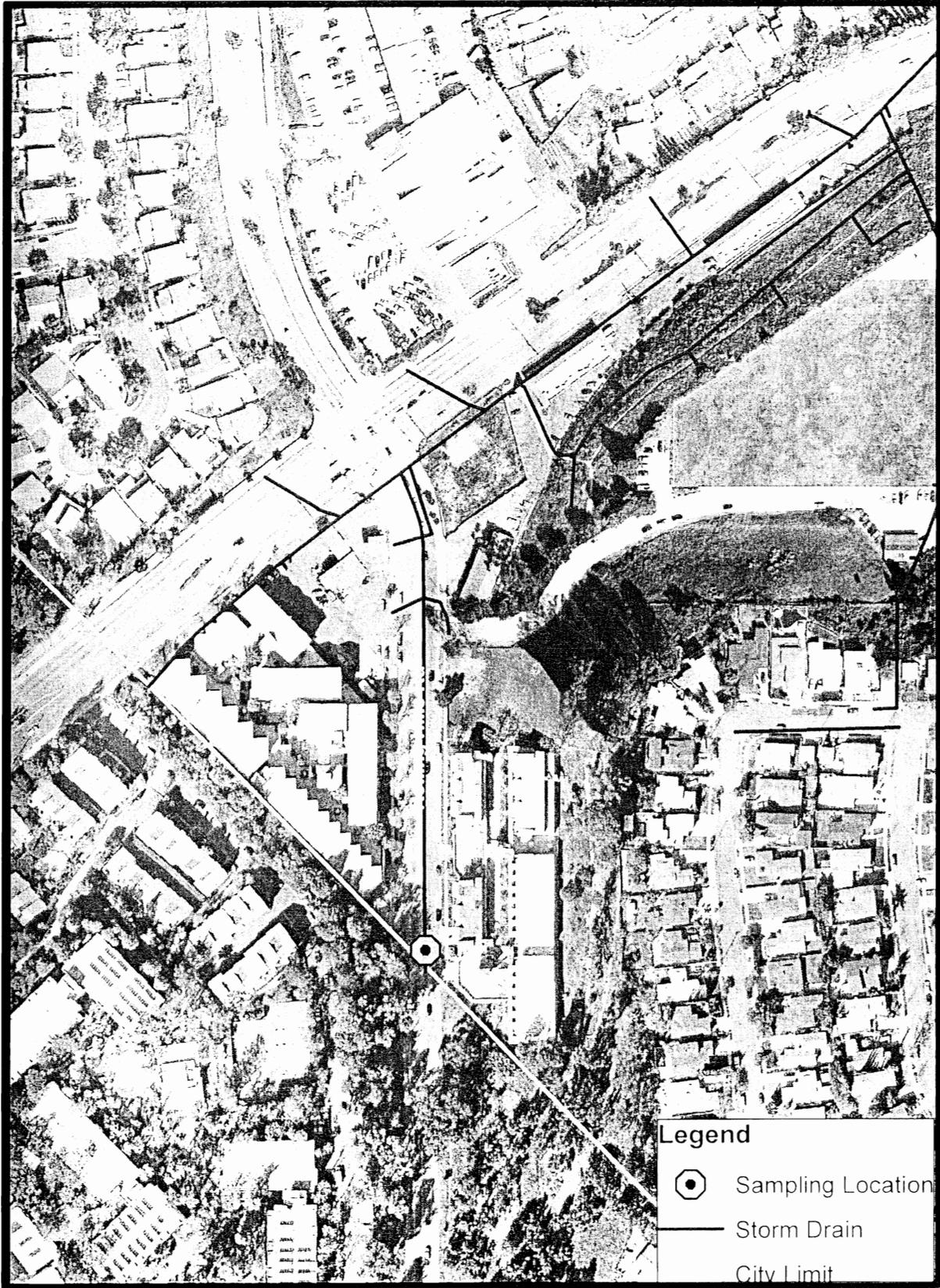
Stormwater Sampling Location - Tor-S4



Stormwater Sampling Location - Tor-S5



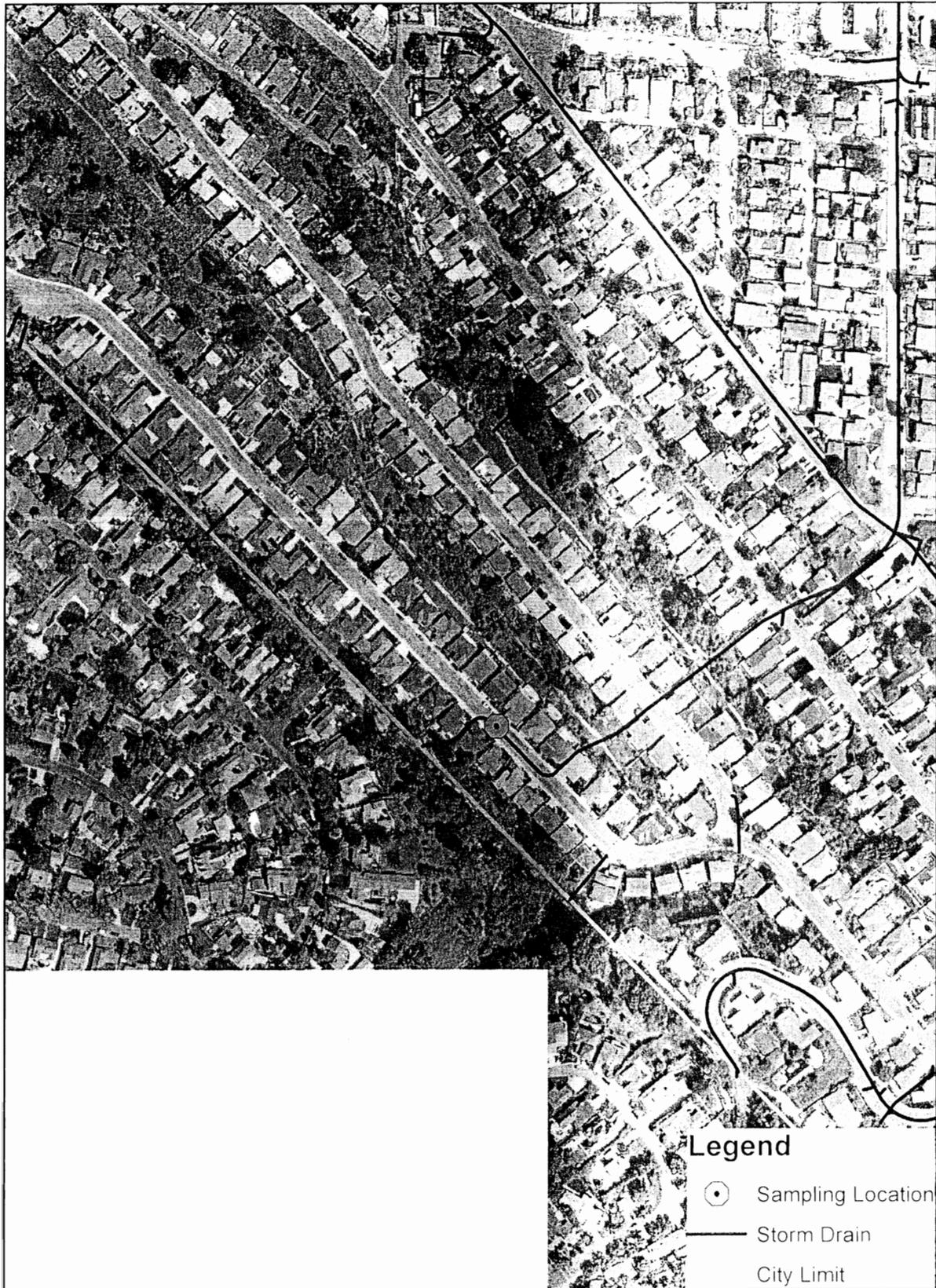
Stormwater Sampling Location - Tor-S6



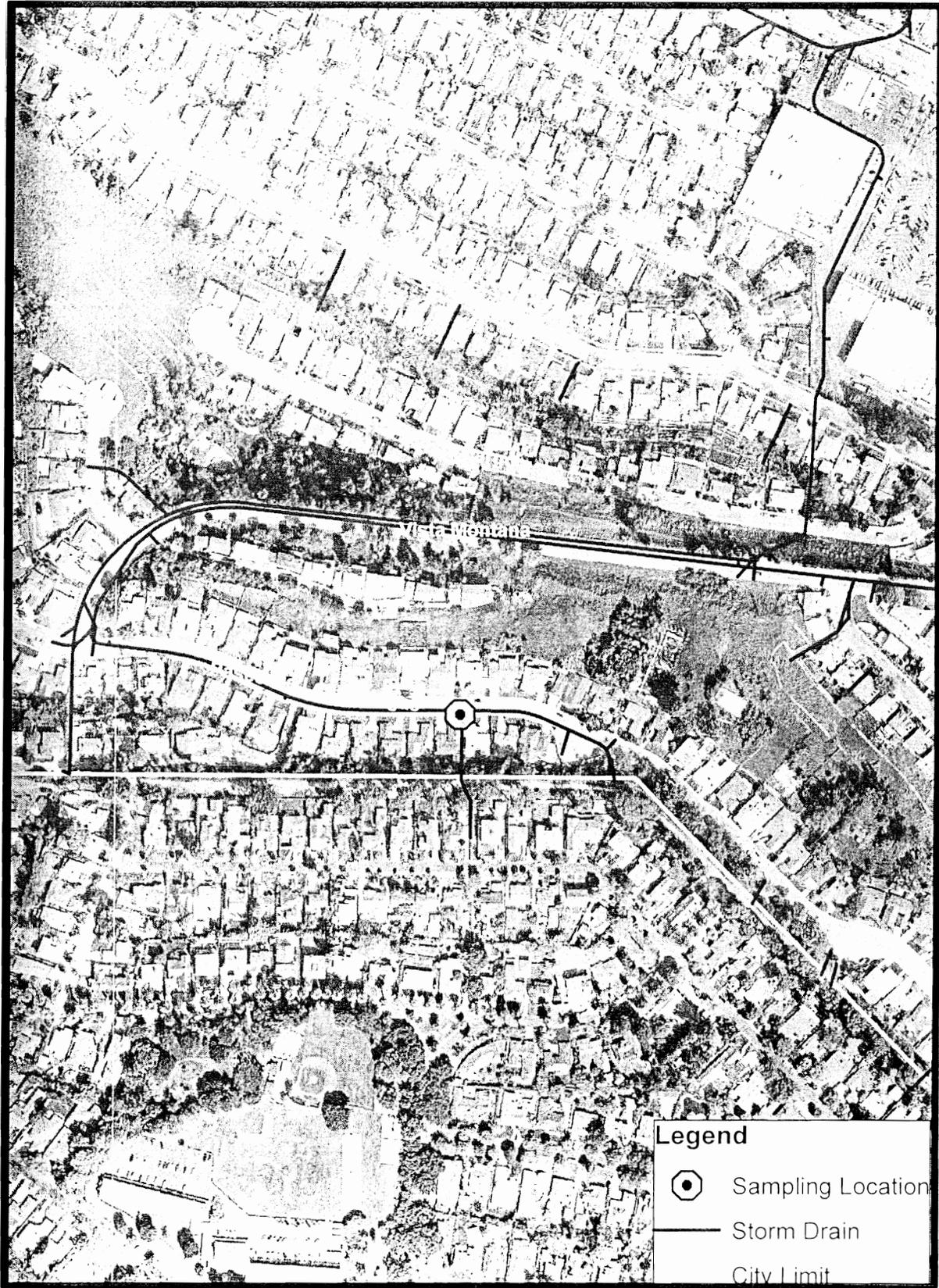
Stormwater Sampling Location - Tor-S7



Stormwater Sampling Location - Tor-S8



Stormwater Sampling Location - Tor-S9



APPENDIX B

Field Data Sheet

APPENDIX C

Chain of Custody

GENERAL CHAIN-OF-CUSTODY FORM

EVIDENCE/PROPERTY CUSTODY		Tracking Number		
		Investigation ID Number		
NAME OF RECIPIENT FACILITY		LOCATION		
NAME, TITLE AND CONTACT NUMBER OF PERSON FROM WHOM RECEIVED		ADDRESS		
LOCATION FROM WHERE OBTAINED		REASON OBTAINED	DATE/TIME OBTAINED	
ITEM NO	QUANTITY	DESCRIPTION OF ARTICLES		(Include model, serial number, condition and unusual marks or scratches)
CHAIN OF CUSTODY				
ITEM NO.	DATE	RELEASES BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	

Chain-of-Custody (continued)

ITEM NO.	DATE	RELEASES BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
		PRINTED NAME & CONTACT INFORMATION	PRINTED NAME & CONTACT INFORMATION	
		SIGNATURE	SIGNATURE	
FINAL DISPOSAL ACTION				
RELEASE TO OWNER OR OTHER (NAME/ORGANIZATION)				
DESTROY				
OTHER (Specify)				
FINAL DISPOSAL AUTHORITY				
ON THIS DOCUMENT PERTAINING TO THE INQUIRY/INVESTIGATION INVOLVING;				
ITEM(S) (IS)(ARE) NO LONGER REQUIRED AS EVIDENCE AND MAY BE DOSPOSED AS INDICATED ABOVE. <i>If articles must be retained do not sign, but explain in separate correspondence.</i>				
(Typed or Printed Name & Organization)		(Signature)	(Date)	
WITNESS TO DESTRUCTION EVIDENCE				
THE ARTICLES LISTED AT ITEM NUMBERS (WAS)(WERE) DESTROYED BY THE EVIDENCE CUSTODIAN IN MY PRESENCE, ON THE DATE INDICATED ABOVE				
(Typed or Printed Name & Organization)		(Signature)	(pole)	

Request #: 2011-00050

Infrastructure Action Plan (IAP)

Type of Project	Infrastructure
Project Location	South Torrance
Project Title	Machado Lake Watershed Best Management Practices for Nutrient and Toxics TMDLs (Water Quality Monitoring & Reporting Plan)
Submitting Department	Public Works - Project Design and Admin
Prepared By	DETTLE, JOHN C.
Preparer's Email	jdettle@torranceca.gov
Managing Department	Public Works - Project Design and Admin
Project Leader	DETTLE, JOHN C.
Project Leader's Email	jdettle@torranceca.gov
Project Start Date	09/27/2011
Estimated Completion Date	10/31/2014

Project Request Status	Pending
Approved Project Status	

Description

The City is required by the Regional Board to implement water quality monitoring at City boundaries of the Machado Lake Watershed, then use that study to develop structural and programmatic Best Management Practices (BMPs) to prevent nutrients and toxics from leaving the City and being deposited into Machado Lake. Once the BMPs are determined that will bring the City into compliance with the Machado Lake Nutrient and Toxics TMDLs, then the budget will be requested.

Justification

The City is required to comply with TMDLs adopted by the Regional Board and incorporated into the City's NPDES Permit. The Machado Lake Nutrient TMDL Monitoring and Reporting Plan is the first requirement of the TMDL.

Impact of Non-Approval

The Regional Board can issue fines up to \$25,000 per day for non-compliance with TMDL water quality regulations.

Other Alternatives Considered

Pay the fines.

Department Priority

1

High

Recommendation

Recommendation Last Changed

Operator

Date/Time

Cost Activity By Fiscal Year

Original Budget Amount: \$364,063		Created By: DETTLE, JOHN C. Created Date: 3/15/2011 4:23:02 PM				
	2011-12	2012-13	2013-14	2014-15	2015-16	Total
Project Management	\$25,000	\$25,000	\$25,000			\$75,000
Design						\$0
Construction Management						\$0
Construction						\$0
Environmental Assessment						\$0
Right-of-way						\$0
Inspection						\$0
Water Quality Monitoring & Implementation Plan	\$282,559					\$282,559
Additional Water Sampling & Analysis	\$6,504					\$6,504
Sub-Total:	\$314,063	\$25,000	\$25,000	\$0	\$0	\$364,063

Cost Activity By Financing Source

Original Budget Amount: \$364,063		Created By: DETTLE, JOHN C. Created Date: 3/15/2011 4:23:02 PM	
Financing Source	To Be Determined		Total
Project Management	\$75,000		\$75,000
Design			\$0
Construction Management			\$0
Construction			\$0
Environmental Assessment			\$0
Right-of-way			\$0
Inspection			\$0
Water Quality Monitoring & Implementation Plan	\$282,559		\$282,559
Additional Water Sampling & Analysis	\$6,504		\$6,504
Sub-Total:	\$364,063	\$0	\$0

Project Timeline

Original Timeline		Created By: DETTLE, JOHN C.		Created Date: 3/15/2011 4:23:02 PM	
Description	2011-12	2012-13	2013-14	2014-15	
Project Management	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right-of-way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water Quality Monitoring & Implementation Plan	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Financing Source - Details

Original Budget Amount: \$364,063		Created By: DETTLE, JOHN C. Created Date: 3/15/2011 4:23:02 PM					
Financing Source	Council Approved Date/Time	2011-12	2012-13	2013-14	2014-15	2015-16	Total
To Be Determined		\$314,063	\$25,000	\$25,000			\$364,063
Sub-Total:		\$314,063	\$25,000	\$25,000	\$0	\$0	\$364,063

Financing Source Options

Original Budget	Created By:	DETTLE, JOHN C.
Total Amount: \$364,063	Total Percentage: 100%	Created Date: 3/15/2011 4:23:02 PM
Financing Source	Percent	Amount
Sewer Capital Project Fd	100%	\$364,063

Financing Source - Summary

Project Budget By Funds (Excluding Ongoing cost)
 Total Project Cost: \$364,063

Financing Source	Life to Date Appropriation	Total Amount
To Be Determined	\$314,063	\$364,063
Grand Total:	\$314,063	\$364,063

By Sources/By Fiscal Year (Excluding Ongoing cost)
 Total Project Cost: \$364,063

Financing Source	2011-12	2012-13	2013-14	2014-15	2015-16	Total
To Be Determined	\$314,063	\$25,000	\$25,000			\$364,063
Sub-Total:	\$314,063	\$25,000	\$25,000	\$0	\$0	\$364,063

Original Budget Amount: \$364,063
 Created By: DETTLE, JOHN C.
 Created Date: 3/15/2011 4:23:02 PM

Financing Source	2011-12	2012-13	2013-14	2014-15	2015-16	Total
To Be Determined	\$314,063	\$25,000	\$25,000			\$364,063
Sub-Total:	\$314,063	\$25,000	\$25,000	\$0	\$0	\$364,063

Budget vs. Expenses

Last Payroll Update Budget As Of

Expenses

Revenue

Life To Date Budget - Posted	_____	Life To Date Budget - Posted	_____
Life To Date Budget - Unposted	_____	Life To Date Budget - Unposted	_____
Total Life To Date Budget	_____	Total Life To Date Budget	_____
Actual	_____	Actual	_____
Encumbrances	_____		
Unposted Transaction	_____	Unposted Transaction	_____
Available Budget	_____	Available Budget	_____

