

**Announcement of an  
Urban Stormwater Runoff Water Quality Management Short-Course:  
An Introduction to the Technical Basis for  
BMP Ratcheting Down to Meet Water Quality Standards**

A two-day short-course devoted to review of the basic principles of urban area and highway stormwater runoff water quality impact evaluation and management will be presented by Dr. G. Fred Lee, PE, DEE and Scott Taylor, PE at the County of Orange Santiago Oaks Regional Park facilities in Orange, CA on November 18 and 19, 1998. The course instruction begins at 9:00 am and ends at 4:30 pm with breaks at mid-morning and mid-afternoon and one hour for lunch.

**Course Sponsorship and Financial Arrangements**

The course is co-sponsored by the Orange County Public Facilities and Resources Department(PFRD), G. Fred Lee & Associates of El Macero, CA and Robert Bein, William Frost and Associates of Irvine, CA. Orange County is making the Santiago Oaks Regional Park facilities where the course will be presented available at no cost. Orange County PFRD (Chris Crompton) is making the local arrangements for the course. As part of enhancing the quality of science and engineering in urban area and highway stormwater runoff water quality management, Dr. Lee and Mr. Taylor are donating their time in the development and preparation of the course as well as its presentation. Participants will need to cover the cost of refreshments during breaks, lunches which will be catered sandwiches and the expense of a hotel/motel and local transportation, such as auto rental. The cost of the refreshments and lunches will be \$25.00 which is to be paid in advance.

In addition to several motels located within a few miles of the of the Orange County Santiago Oaks Park, the Park is located about six miles from the Disneyland hotel/motel area. A list of nearby motels will be proved to course registrants Local transportation - automobile from the motel to the Park will need to be provided by the course participants.

**Course Objectives**

The objective of the course is to provide an introduction to the technical base of information that is being used to regulate urban area and highway stormwater runoff under the BMP ratcheting-down process. In January 1998, the US EPA Region 9 and Washington DC headquarters explicitly stated that NPDES-permitted urban area and highway stormwater runoff will ultimately have to be managed/treated so the residual constituents in the stormwater runoff do not cause or contribute to violations of water quality standards. Since there are no mixing zones allowed for NPDES permitted stormwater runoff in California, the stormwater runoff must meet water quality standards in the discharge to surface waters. Upon finding an exceedance of a water quality standard in the stormwater runoff, the stormwater runoff water quality management agencies must modify their stormwater management plan through the development of best management practices (BMPs) to address the exceedance. The BMP ratcheting-down process will likely play out over three to ten years where the time will likely be determined by environmental groups' litigation. An outline of the major topic areas covered in the course is appended to this announcement.

**Who Should Attend**

Individuals interested in urban area and highway stormwater runoff water quality impact evaluation and management, including engineers, natural and social scientists, planners, attorneys and others.

**Course Technical Level**

This course will be taught at an introductory technical level where the major topic areas pertinent to understanding the technical basis of how the BMP ratcheting-down process should be conducted will be discussed. The emphasis will be on an introduction to establishing technically valid, cost-effective management of NPDES-permitted urban area and highway stormwater runoff where public funds are used to address real significant water quality use impairments that are caused by the urban/highway stormwater runoff. If there is sufficient interest, a follow-on course will be made available to discuss the topics areas in greater detail.

While the course is intended for participants with natural science and/or engineering backgrounds, those with social science and other backgrounds will gain considerable insight in the current problems and needed regulatory reform for appropriate management of urban area and highway stormwater runoff to protect the beneficial uses of the receiving waters for the runoff without significant unnecessary public expenditures for runoff constituent control. .

The course is specifically designed for the technical staff of stormwater runoff management agencies, their co-permittees and the regulatory agencies. It will also be of value to industrial stormwater runoff water quality managers and consultants. Participants are encouraged to bring specific stormwater runoff water quality problems for discussion by the course participants

**Course Materials**

A course notebook consisting of the text slides and selected papers/reports will be made available to course participants. References to US EPA and other literature pertinent to topics covered will be provided.

**Course Registration**

The course will be offered if 20 individuals register for the course. It is important to register using the attached form early by contacting Dr. G. Fred Lee at 27298 E. El Macero Dr., El Macero, CA 95618. Tel 530 753-9630; Fx 530 753-9956; Em: gfredlee@aol.com. The registration/attendance will be limited to 50 participants with first preference given to public agency staff until November 13, 1998. A registration form is appended to this announcement.

## **Instructors**

### **Dr. G. Fred Lee, PE, DEE**

President, G. Fred Lee & Associates, El Macero, California

Dr. Lee has over 38 years of professional experience in water quality evaluation and management. He pioneered in the investigation of urban area and highway stormwater runoff water quality impacts in the 1960s and has been active as a researcher and consultant in this area since that time. Dr Lee is active with the CA State Storm Water Quality Task Force and chairs the Stormwater Science Work Group. Dr. Lee has a bachelor's degree from San Jose State College, a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill and a PhD in environmental engineering from Harvard University. For 30 years, until 1989, he held graduate-level university environmental engineering teaching and research positions where he conducted over \$5 million in research devoted to water quality evaluation and management issues and published over 500 professional papers and reports on this work. He has developed over 50 professional papers and reports devoted to urban area and highway stormwater runoff water quality evaluation and management. He and his associates developed the Evaluation Monitoring approach to more reliably evaluate the water quality impacts of urban area and highway stormwater runoff-associated constituents on receiving water quality - beneficial uses. He and Mr. Taylor of RBF have been instrumental in adapting the Evaluation Monitoring approach to site-specific highway runoff situations and are now conducting a three-year demonstration project devoted to the implementation of the Evaluation Monitoring approach in the Upper Newport Bay watershed in Orange County, CA. Dr. Lee is a registered Professional Engineer and a Diplomate in the American Academy of Environmental Engineers.

Dr Lee has established a web site, <http://members.aol.com/gfredlee/gfl.htm>, where he lists and makes available many of his papers and reports that are pertinent to the topics covered in this course. Also available is further information on Dr Lee's qualifications and experience in urban area and highway stormwater runoff water quality management.

### **Scott Taylor, PE**

Associate, Robert Bein, William Frost and Associates, Irvine, CA

Mr. Taylor holds the position of Director of Flood Control Engineering with RBF and has over 15 years of experience in hydrologic, hydraulic and flood control design. He has a bachelor's degree in civil and environmental engineering and a master's degree in civil and water resources engineering. He is a registered Professional Engineer and has extensive experience in the design of regional and local flood control improvements associated with transportation and other public works projects. Mr Taylor chairs the State Storm Water Quality Task Force BMP Work Group. He is a part-time instructor in hydrology and hydraulic design at the University of California, Irvine and the California State University at Long Beach. Mr. Taylor has developed stormwater pollution prevention plans for many public and private sector clients, including specialized post-construction

stormwater quality management plans. RBF is one of the Silverado consortium of engineering and construction firms responsible for the design and construction of the Eastern Transportation Corridor (ETC), a new, 26-mile toll road that is being constructed in Orange County, CA. Mr. Taylor has the specific responsibility for the development of the stormwater runoff water quality management program for the ETC.

Mr. Taylor is the RBF staff person responsible for conducting a \$3 million/yr, three-year Caltrans project that is evaluating the ability of conventional BMPs to treat highway stormwater runoff.

**Outline of Short-Course**  
**◀ Urban Stormwater-Related Water Quality Issues ▶**  
**With Emphasis on BMP Ratcheting Down Process**

<b>Duration:</b>	2 days (9:00 am-4:30 pm; 1-hr lunch) November 18-19, 1998	<b>Course Organizer:</b> <b>Dr. G. Fred Lee, PE (TX), DEE</b>
<b>Location:</b>	Santiago Oaks Regional Park 2145 North Windes Dr., Orange, CA (714) 538-4400	G. Fred Lee & Associates El Macero, CA Ph: (530) 753-9630
<b>Cost:</b>	\$25.00 to cover cost of refreshments-soft drinks and coffee and luncheon sandwiches, to be paid in advance,	Fx: (530) 753-9956b Em gfredlee@aol.com

**Local Arrangements:** Chris Crompton, Manager Environmental Resources  
Orange County PFRD, Ph: 714-567-6360

**Course Instructors:**

**G. Fred Lee**, PhD, PE, DEE, G. Fred Lee & Associates, El Macero, CA  
**Scott Taylor**, PE, Robert Bein, William Frost and Associates, Irvine, CA

**Objective of the Course:** To provide an introduction to the basic water quality issues that are pertinent to understanding and evaluating the water quality impact and cost-effective management of urban area and highway stormwater runoff water quality. The ultimate goal of the course is to provide an introduction to technically valid, cost-effective urban area and highway stormwater runoff water quality management.

**Course Outline**

(All sessions will be taught by Dr. G. Fred Lee unless noted otherwise)

**Urban Area Stormwater Runoff as a Source of Potential Pollutants**

**Introduction - Overview of Issues**

Overview of Urban Stormwater Runoff Related Water Quality Problems - Real and Perceived

**Physical Impacts**

Flow-Related Erosion  
Altered Biological Habitat  
Suspended Solids - Physical & Chemical  
Abrasion, Deposition, Turbidity

**Chemical Impacts**

Heavy Metals (Cu, Cd, Pb, Zn, Hg)  
Organics (PAHs, Petroleum Hydrocarbons, Pesticides, etc.)  
Nutrients - N and P Compounds

**Microorganisms** - Sanitary Quality (Coliforms)

**Litter**

## **Urban Stormwater Regulatory Requirements**

### **Municipal and Highway NPDES-Permitted Runoff**

Control "Pollution" Using BMP to MEP

### **Application of Water Quality Standards (Objectives) to Stormwater Runoff**

Overview of BMP Ratcheting Down Process To Achieve Water Quality Standards

Litigation likely to Determine Period of Ratcheting Down

## **Principles of Water Quality Evaluation**

### **Basic Concepts**

- Designated Beneficial Uses - Water Quality
- Water Quality Criteria and Standards/Objectives
  - Drinking Water MCLs
    - Primary and Secondary Standards
  - Chemical-Specific • Toxicity-Based (Acute and Chronic) • Aquatic Life Criteria
  - Bioaccumulation of Hazardous Chemicals
    - Fish Advisories
  - Sanitary Quality
    - Domestic Water Supplies, Contact Recreation and Shellfish Harvesting
  - Narrative Standards
    - Toxicity - WET
      - Toxicity Units
    - Nutrients N and P - Eutrophication
      - Nutrient Water Quality Criteria/Standards
    - Sediments - Turbidity - Habitat - Shoaling
    - Aesthetics
  - Biological Criteria
    - Numbers, Types and Characteristics of Aquatic Organisms
    - Relative to Habitat Characteristics
  - Wildlife Standards
    - Endangered Species Act Issues
  - Compliance with Water Quality Standards/Objectives
    - Averaging Period and Occurrence Frequency

### **What Makes a Chemical Hazardous to Aquatic Life**

- Overview of Principles of Aquatic Chemistry
  - Chemical Species - Toxic/Available
    - Soluble vs. Total Contaminants
  - Relationship Between Analytical Results for Specific Chemicals and Water Quality
  - Toxicity Testing Methods used to Establish Criteria/Standards

- Overview of Basic Principles of Aquatic Toxicology
  - Duration of Exposure
  - Sensitivity of Organisms
- Chemical Constituents vs. Pollutants
  - The Characteristics of the Source and the Receiving Water Determines if a Chemical Constituent is a Pollutant

### **Characteristics of Urban Stormwater Runoff**

- Elevated Concentrations of Unavailable/Non-Toxic Forms of Constituents
- Duration of Organism Exposure
  - Typically Short Durations of Exposure; Episodic Events

### **Testing Discharge/Runoff vs. Ambient Waters To Assess Impacts**

Objectives of Water Pollution Control - Protect Designated Beneficial Uses

- Numbers, Types, Character of Desirable Aquatic Organisms in Receiving Water
- Use of Water for Domestic Water Supplies
- Contact and other Recreation
- Runoff Testing as Measure of Potential Impact on Receiving Water Quality-Often Unreliable
  - Translation of Runoff Concentrations to Receiving Water Impacts

### **Water Quality Impairment**

Exceedances of Water Quality Standards -

Adverse Impact on Designated Beneficial Uses

“Administrative Exceedance-Use Impairment”

“Administrative Exceedance” “Beneficial Use Impairment”

Problems with Use of Exceedances of Water Quality Objectives (Standards) as Determiner of Water Quality Impairment

Chemical-Specific Objectives

Worst-Case Assumptions

Chemical Constituent Toxicity/Availability

Chronic Exposure Conditions

Organism Sensitivity

Criteria/Objectives: 1-hr Avg.; 4-day Avg.; 1 Exceedance/3 yrs

Overly-protective

303 (d) list of Impaired Waterbodies - Often Unreliable as Currently Developed

### **Biological Impact Evaluation**

Effluent/Discharge Aquatic Life Toxicity Test Limitations

- Toxicity Test Conditions More Severe Than Typically Occurs in Ambient Waters
- Runoff Toxicity Cannot Be Directly Translated to Receiving Water Toxicity

## Biological Assessment

- Factors Affecting Numbers & Types of Organisms  
Habitat • Natural Variability • Storms • Flows • Other Influences

## **Aquatic Sediment Water Quality Impacts**

### Particulates in Urban Stormwater Runoff

#### Assessing Water Quality Impacts

##### Chemical Approaches

##### Co-Occurrence-Based Approaches

##### Long and Morgan Sediment Quality Guidelines-Unreliable

##### Biological Assessment

##### Toxicity

##### Bioaccumulation Potential

### WRCB BPTCP Toxic Hot Spot Designation and Ranking

#### Unreliable Designation of Toxic Hot Spots

#### Sediment Superfund-Aquafund

#### Designation of Responsible Parties and Modified NPDES Permits

#### Inappropriate Use of Chemical Information in Sediment Quality Triad

## **Overview of Principles of Aquatic Life Hazard/Risk Assessment**

### Tiered, Integrated Evaluation of

- **Aquatic Chemistry** (Constituent Fate & Transport), and
- **Aquatic Toxicology** (Constituent Availability, Duration of Exposure, Sensitivity/Types of Organisms), to Assess Potential Impairment of Designated Beneficial Uses by Particular Source/Discharge/Runoff

## **Evaluation Monitoring**

### Focus on Assessing Receiving Water Impacts on Beneficial Uses

### Watershed-Based, Technical Stakeholder Managed Consensus on Problems and Management Approaches

Examples: Orange County Upper Newport Bay, CA  
Sacramento River Watershed

## **Physical Aspects of Stormwater Runoff - Scott Taylor**

### **Urban and Highway Stormwater Runoff Flows**

#### Hydrology - Precipitation Runoff Relationships for Paved and Unpaved Areas

#### Traditional Flow Conveyance Structure Components and Design

#### Regulation of Stormwater Flow Impacts

### **Erosion**

#### Sediment Transport, Siltation



## **Management of Urban Stormwater-Runoff Associated Constituents**

### **Conventional BMP Approaches** - Scott Taylor and G. Fred Lee

Detention Basins • Filters • Infiltration Systems • Wetlands • Vegetative Areas • Others  
Efficacy in Controlling Pollutants - Real Significant Water Quality Problems;  
Toxic Pit Issues  
Managing Soil Lead Issues

## **Appropriate Implementation of BMP Ratcheting-Down Process**

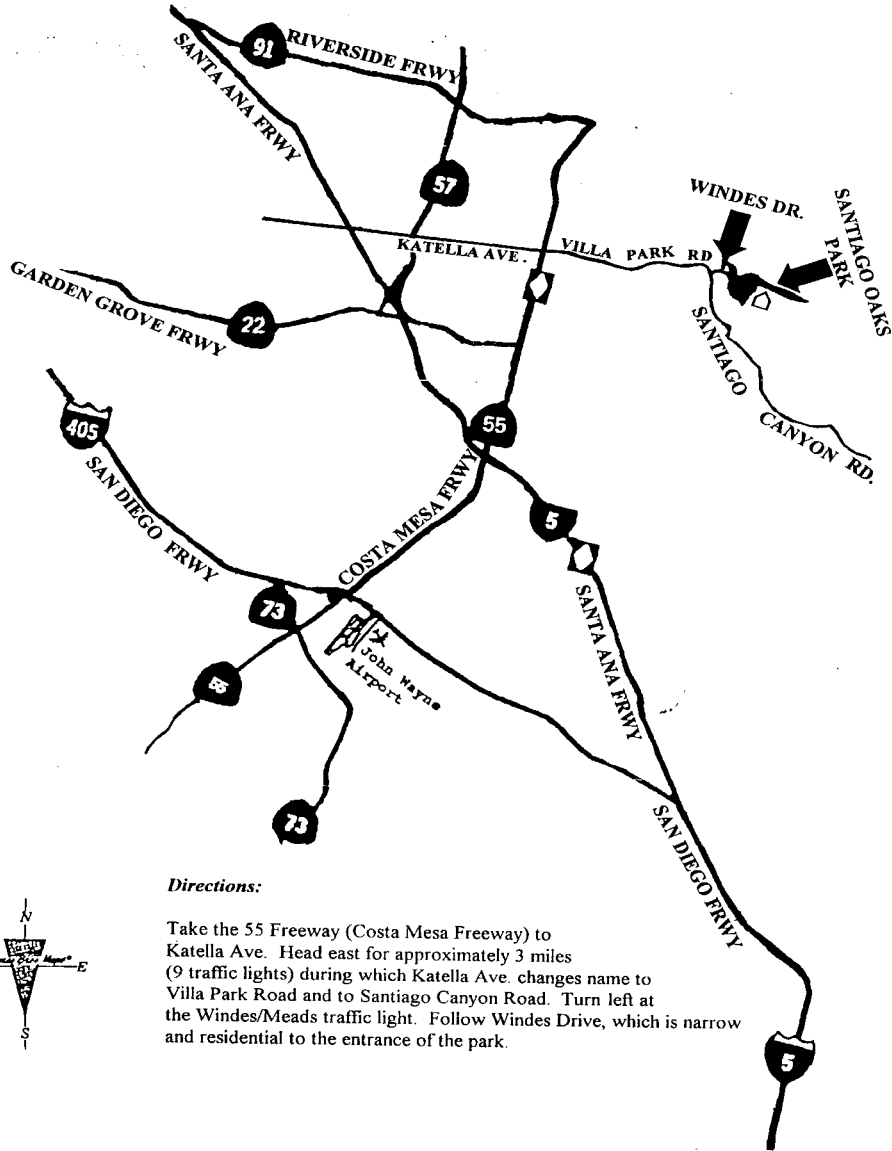
Use US EPA Worst-Case-Based Water Quality Criteria Adjustment Approaches to Develop  
Technically Valid, Cost-Effective Discharge Limits/Discharge Standards  
Standards Adjustment for Site-Specific Conditions  
Characteristics/Components of Site-Specific Studies  
Variances  
Use Attainability Analysis  
Economic Feasibility

## **Changes in Urban Stormwater Runoff Water Quality Management Regulations**

Clean Water Action Plan  
Additional Regulation of Stormwater Runoff  
ANPRM  
Changes in Water Quality Standards Regulations  
Revision of the Clean Water Act

## **Specific Stormwater Runoff Water Quality Issues Raised by Course Participants**

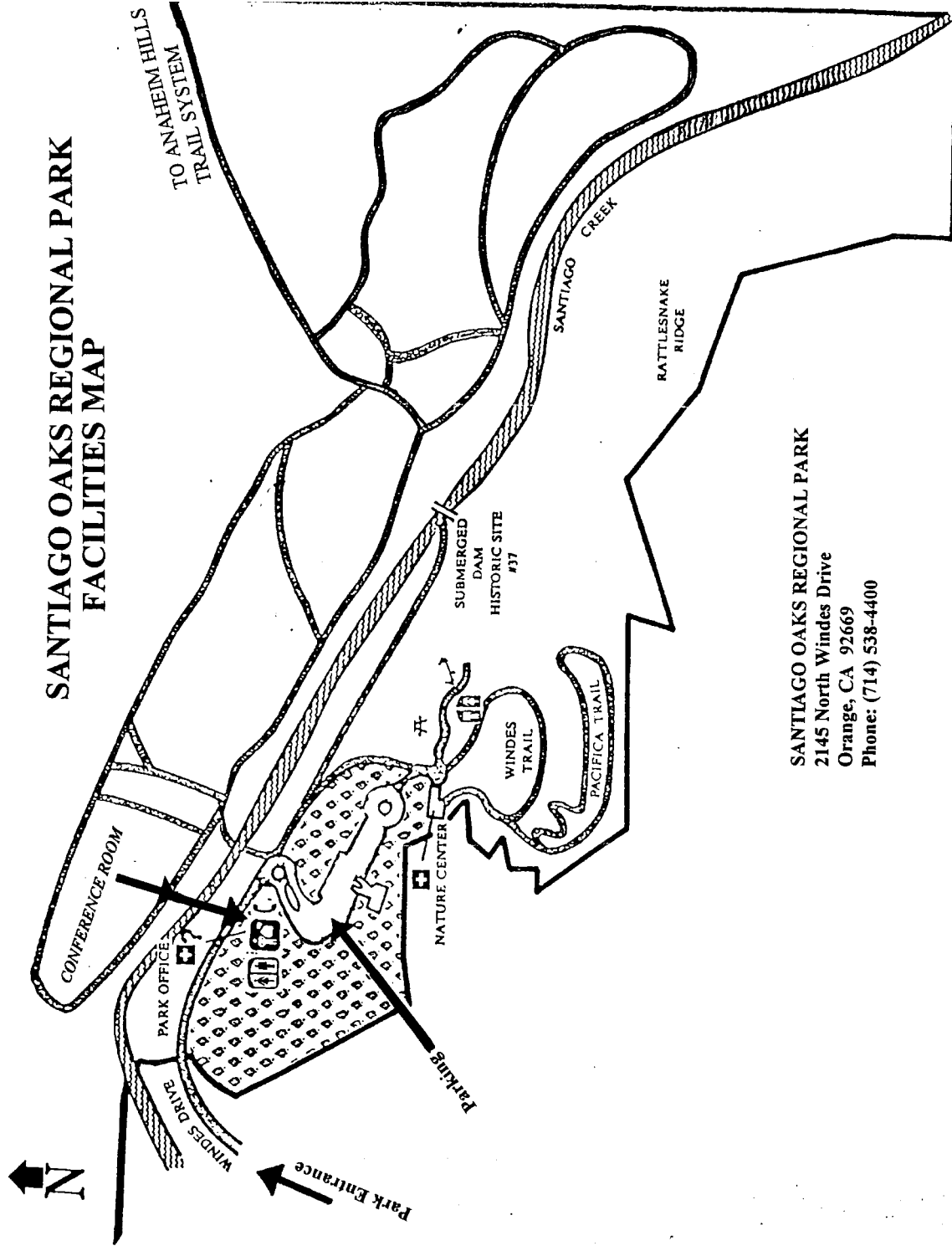
## **Course Evaluation and Closure**



**Directions:**

Take the 55 Freeway (Costa Mesa Freeway) to Katella Ave. Head east for approximately 3 miles (9 traffic lights) during which Katella Ave. changes name to Villa Park Road and to Santiago Canyon Road. Turn left at the Windes/Meads traffic light. Follow Windes Drive, which is narrow and residential to the entrance of the park.

# SANTIAGO OAKS REGIONAL PARK FACILITIES MAP



SANTIAGO OAKS REGIONAL PARK  
2145 North Windes Drive  
Orange, CA 92669  
Phone: (714) 538-4400

**Registration for Stormwater Science/Engineering Short-Course  
November 18-19, 1998; Orange County, CA**

Those interested in attending the Stormwater Science/Engineering Short-Course that is being offered by Dr. G. Fred Lee and Scott Taylor should submit this form to Dr. Lee.

Name: \_\_\_\_\_ Position: \_\_\_\_\_

Affiliation: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_ Fax : \_\_\_\_\_

E-mail: \_\_\_\_\_

Years of Professional Experience in Water Quality Related Activities: \_\_\_\_\_

Undergraduate degree major: \_\_\_\_\_ Yr of Degree: \_\_\_\_\_

Graduate degree major: \_\_\_\_\_ Yr of Degree: \_\_\_\_\_

Are you involved in urban area and/or urban area stormwater runoff water quality management?  
If so, explain your involvement.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Have you examined the course outline? Yes\_\_ No\_\_ It is available at Dr. Lee's web site:  
<http://members.aol.com/gfredlee/gfl.htm>? \_\_\_\_\_

Please summarize your interest in taking the course.

\_\_\_\_\_

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Please submit this form as soon as possible. Course registration is limited to 50 participants with preference give to governmental agency personnel. A minimum enrollment of 20 individuals is required by November 13, 1998 to avoid cancellation. Please send a check made out to G. Fred Lee and Associates in the amount of \$25.00 to cover break refreshments and lunch sandwiches. If there are questions about the course, please contact Dr. G. Fred Lee: em: gfredlee@aol.com; Ph: 530-753-9630; Fax: 530-753-9956; or 27298 E. El Macero Drive, El Macero, CA 95618-1005.