

# Water Quality Sampling and Analysis on Construction Sites



# Level 2 Pre & Post Assessment

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- ➔ **This is not a test**
- ➔ **It's an assessment of the effectiveness of the course material**

# Who Are We

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- ⇒ **Who am I?**
- ⇒ **What is my background?**
- ⇒ **What is my storm water background?**
- ⇒ **What is my sampling background?**
- ⇒ **Audience Introductions**

# Why Are You Here?

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- ➔ To Review Regulations and Permits
- ➔ To Learn About SWRCB and Caltrans Sampling and Analysis Requirements
- ➔ To Review SAP Guidelines
- ➔ To Review Sample Collection Procedures

# What Will You Learn?

- ➔ **What are the pollutants of concern**
- ➔ **The requirements of Resolution 2001-046**
- ➔ **Caltrans requirements**
- ➔ **How to use the Pollutant Testing Guidance Table**
- ➔ **How to review Sampling and Analysis Plans**
- ➔ **An overview of field sampling methods**



# Keep in mind

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- ➔ **Caltrans personnel will not be taking water quality samples – this is the responsibility of the contractor**
- ➔ **WPCP projects are not subject to these requirements**

# Glossary

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- ➔ **BMP** - Best Management Practice
- ➔ **CPD** – Construction Procedure (Program) Directive
- ➔ **CSWC** – Construction Storm Water Coordinator
- ➔ **NPDES** - National Pollutant Discharge Elimination System
- ➔ **RWQCB** - Regional Water Quality Control Board
- ➔ **SAP** – Sampling and Analysis Plan
- ➔ **SSP** – Standard Special Provision
- ➔ **SWPPP** - Storm Water Pollution Prevention Plan
- ➔ **SWRCB** - State Water Resources Control Board

# Introduction

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## ➔ Course Highlights

- ⇒ **Introduction**
- ⇒ NPDES Permit Requirements
- ⇒ Caltrans Requirements
  - Construction Procedure Directive – CPD
  - Caltrans Special Provisions and Handbooks
- ⇒ 303(d) Sedimentation / Siltation or Turbidity
- ⇒ Non-visible Pollutants
- ⇒ Sampling and Analysis Plan Review Guidelines
- ⇒ Contractor Sample Collection Procedures
- ⇒ Inspection Tips



# Introduction

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## ➔ First things first

- ⇒ Caltrans personnel will not be collecting any samples – this is the responsibility of the contractor or their lab
- ⇒ Sampling and Analysis requirements apply to SWPPP projects only – for now

# Introduction

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## ➔ Resolution 2001-046

- ⇒ San Francisco Bay Keepers lawsuit
- ⇒ Modification to California's General Construction Permit Monitoring and Reporting Section
- ⇒ Requires that permittees implement specific sampling and analytical procedures
- ⇒ Determine whether BMPs implemented on construction site are
  - Preventing further impairment of water bodies by sediment
  - Preventing other pollutants from causing or contributing to exceedances of water quality objectives



# Introduction

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## ➔ What are these Sampling and Analysis requirements intended to do?

- ⇒ The requirements are intended to determine if BMPs implemented on the construction site are effective for preventing sediment/silt and other non-visible pollutants from impacting water quality objectives.

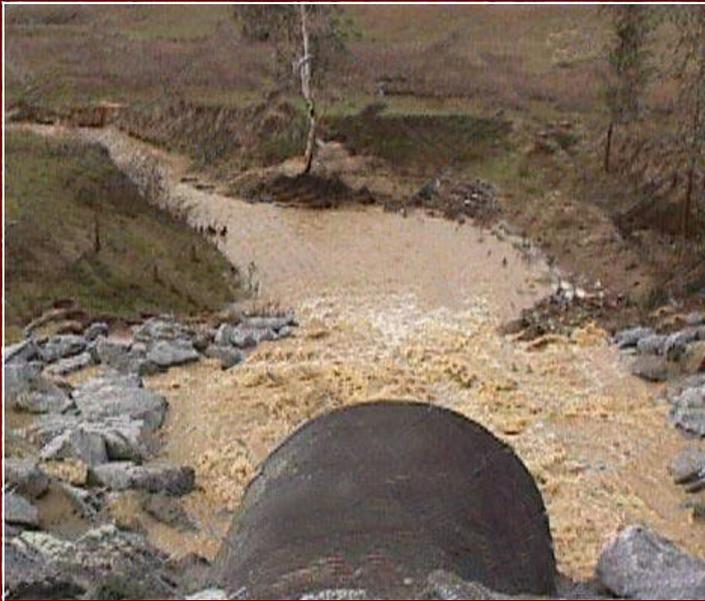


# Introduction

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## What are the Pollutants

Sediment/Silt and  
Turbidity



Non Visible Pollutants -  
Construction Materials



# Introduction

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## ➔ How do they Affect Your Site?

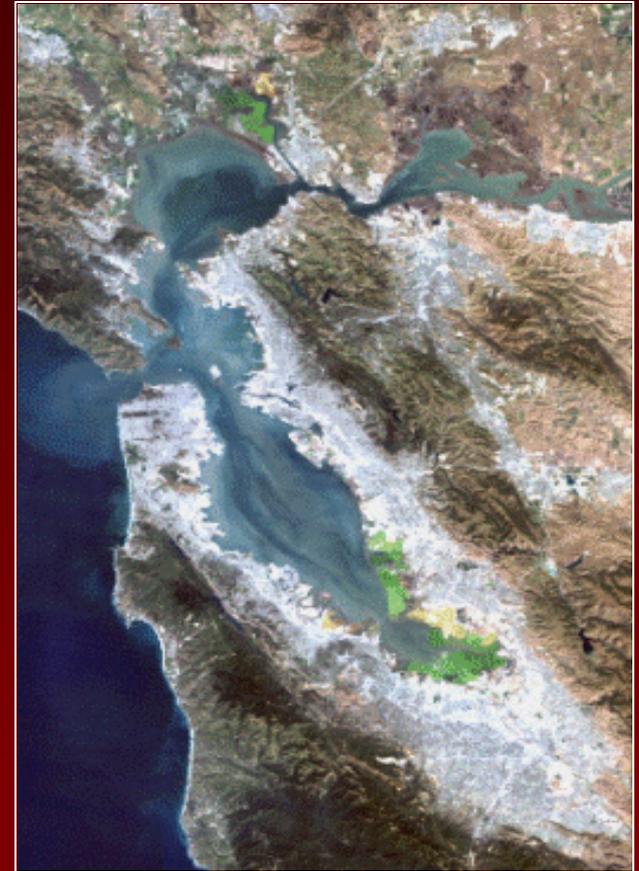
⇒ Almost every job site has the potential to contribute pollutants to storm water runoff such as;

- Sediments from disturbed soil areas
- Toxic pollutants from chemical compounds and materials used to build projects, including structures



## ➔ 303(d) listed Water Bodies

- ⇒ In 2002, 685 water bodies were listed as impaired in the State of California, most of them for multiple pollutants.
- ⇒ 134 of the 685 water bodies are listed as impaired for sediment / siltation and turbidity
- ⇒ Example 303(d) water bodies: Tomales Bay, Morro Bay, Truckee River, San Diego Creek and Buena Vista Lagoon
- ⇒ 2004 Update currently being prepared by the SWRCB



## ➔ What is ....

### ⇒ Sediment

- Soil particles that have been dislodged from their original or placed location and deposited down gradient

### ⇒ Siltation

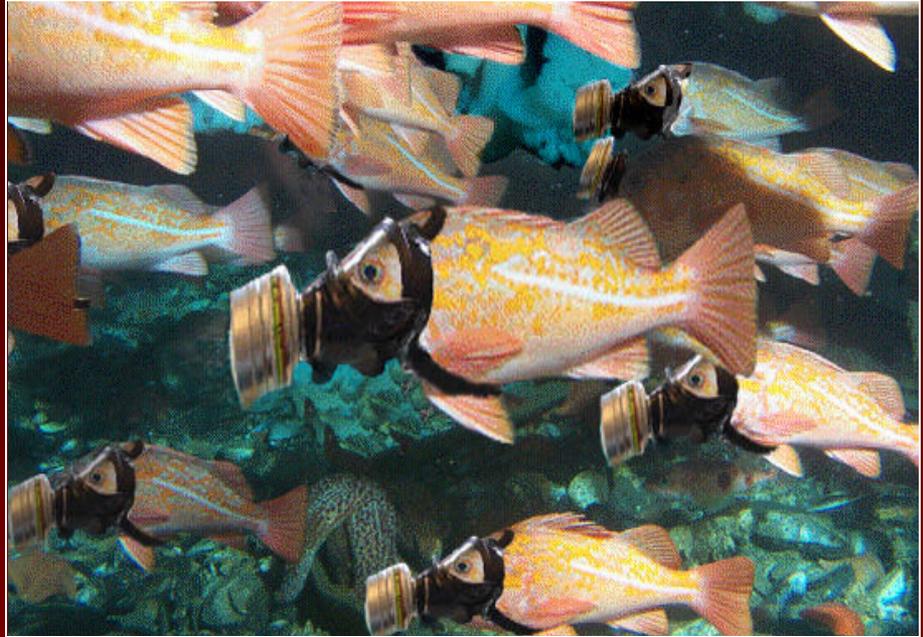
- The deposition of finely divided soil and rock particles upon the bottom of streams and river beds and in reservoirs

### ⇒ Turbidity

- Cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. Measured in Nephelometric Turbidity Units (NTU)

## → Sediment / silt in a water body:

- Decreases water clarity, which causes a decrease in aquatic plant production, obscures sources of food, habitats, refuges, and nesting sites of fish
- Fills gravel spaces in stream bottoms, smothering fish eggs and juvenile fish
- Carries nutrients such as nitrogen and phosphorous that may cause algal blooms
- Pesticides attach to soil particles and enter waters
- Decreases recreational, commercial, and aesthetic values of water bodies
- Decreases quality of drinking water



## ➔ Turbidity

- ⇒ Turbidity in water bodies effects both aquatic and human life by increasing bacteria levels, introducing viruses, and protozoan.
- ⇒ Blocks light transmission and light penetration
- ⇒ Reducing oxygen levels
- ⇒ Affecting the food chain



## ⇒ Non-Visible Pollutants

⇒ They are not visually detectable in storm water discharges

- Examples: Acids, Solvents, Lime, Gypsum, Copolymer



## ➔ How do Non-Visible Pollutants effect water bodies

- ⇒ They can dissolve or remain suspended in water or get deposited on the bed
- ⇒ Deteriorates water quality
- ⇒ Affects aquatic ecosystems
- ⇒ Pollutants can also seep down and effect groundwater

# Introduction

## ➔ Why should we care

- ⇒ The effects of water pollution are not only devastating to people but also to animals, fish, and birds
- ⇒ Polluted water is unsuitable for drinking, recreation, agriculture, and industry. It diminishes the aesthetic quality of lakes and rivers
- ⇒ Contaminated water destroys aquatic life and reduces its reproductive ability
- ⇒ Nobody can escape the effects of water pollution



# Quick Fact Review

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- ➔ **What are the new Sampling and Analysis requirements intended to do?**

# Quick Fact Review

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➔ **What is a 303(d) listed water body?**

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## ➔ Course Highlights

⇒ Introduction

⇒ **NPDES Permit Requirements**

⇒ Caltrans Requirements

- Construction Procedure Directive – CPD
- Caltrans Special Provisions and Handbooks 303(d)  
Sedimentation / Siltation or Turbidity

⇒ Non-Visible Pollutants

⇒ Sampling and Analysis Plan Review Guidelines

⇒ Contractor Sample Collection Procedures

⇒ Inspection Tips



- ⇒ 1948 Federal Clean Water Act (CWA)
  - ⇒ Enacted to protect water bodies within the United States
- ⇒ 1970 Porter Cologne Water Quality Control Act
  - ⇒ Protecting water bodies within the state of California
  - ⇒ Updated January 2002
- ⇒ 1992 California's General Permit
  - ⇒ Established Requirements for Discharges Associated with Construction Activities



## ➔ **General Construction Permit CAS000002 - The “02” permit**

- ⇒ Requires all construction projects that disturb 1 acre or more to gain coverage
- ⇒ Requires all SWPPPs as of August 1, 2001 to include monitoring for BMP assessment
- ⇒ 303(d) List of Water Bodies Impaired due to Sediment/Siltation and Turbidity
  - [http://www.waterboards.ca.gov/tmdl/303d\\_lists.html](http://www.waterboards.ca.gov/tmdl/303d_lists.html)

- ➔ Modification to the General Construction Permit – adopted April 2001
  - ⇒ Implement specific sampling and analytical procedures to determine whether BMPs implemented are:
    - Preventing further impairment, from storm water discharge, of 303(d) listed water bodies for sedimentation/siltation or turbidity.
    - Preventing other non-visible pollutants from causing or contributing to exceedances of water quality objectives.
- ➔ The Modification is Now included in the “02” Permit

# CAS000002

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## ➔ Exceptions Listed in Permit (02)

### ⇒ Discharges from Tribal Lands

- Construction on Tribal Lands is regulated by a US EPA permit

### ⇒ Lake Tahoe Hydrologic Unit

- Lahontan Regional Water Control Board adopted a separate NPDES permit for the Lake Tahoe Hydrologic Unit

# Quick Fact Review

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- ➔ **What are the two general categories of pollutants that may be subject to sampling and analysis ?**

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## ➔ Course Highlights

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- ⇒ **Caltrans Requirements**
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  - **Caltrans Special Provisions and Handbooks**
- ⇒ 303(d) Sedimentation / Siltation or Turbidity
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# CPD

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## ➔ Construction Procedure Directive (CPD 01-7) – July 2001

- Caltrans mechanism for implementing a new requirement on existing projects
- Contract Change Order (CCO)
  - Procedures for RE to follow to have Contractor:
    - Update SWPPP
    - Implement new changes

# CPD 01-7

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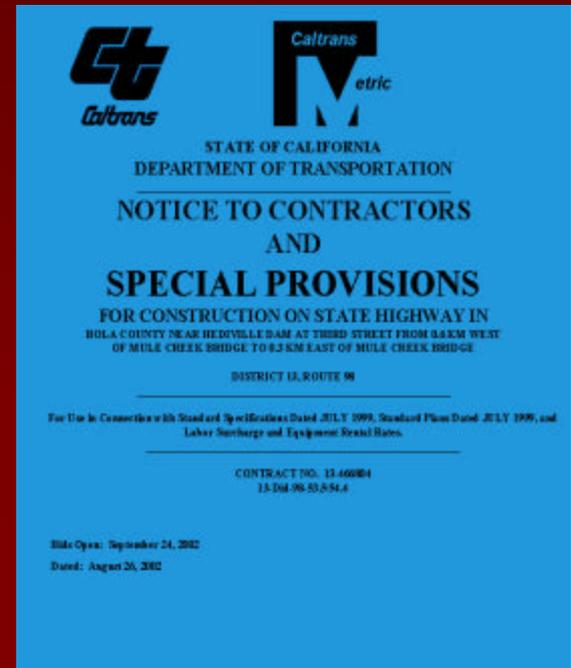
## ➔ Directive issued to:

- ⇒ Comply with the State Water Resources Control Board Modification of General Permit (CAS 000002) - Resolution 2001-046
- ⇒ Include Sampling and Analytical Requirements for SWPPP projects
  - Water Pollution Control Programs (WPCPs) are exempt at this time

## ➔ If your project SWPPP has not been updated to include Sampling and Analysis requirements, do so ASAP

# Contract Special Provisions

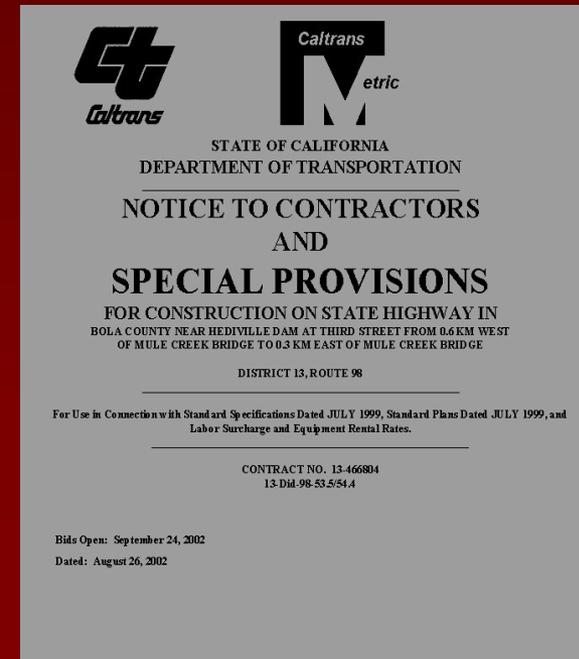
- ➔ Section 10-1.02 Water Pollution Control
  - ⇒ Issued to satisfy the NPDES Permit requirements
  - ⇒ Defines water pollution control requirements



# Contract Special Provisions

## ➔ Water Pollution Control Requirements (cont)

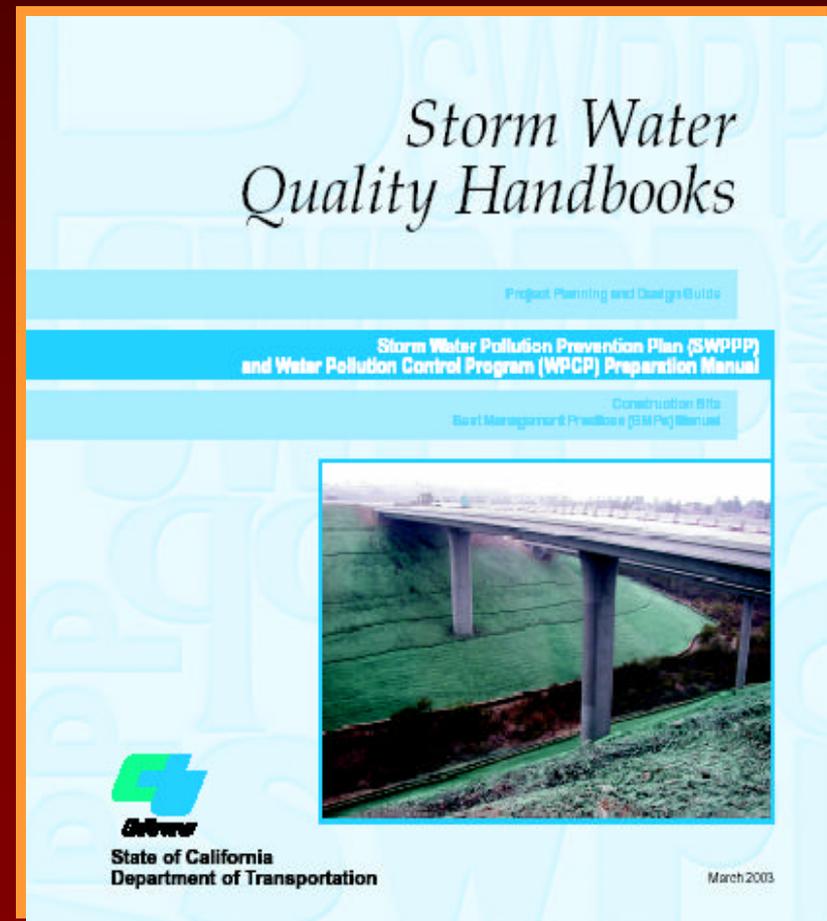
⇒ Sampling and Analytical Requirements



# Construction Handbook

## ➔ SWPPP and WPCP Preparation Manual

- ⇒ Updated version
- ⇒ Section 600.4 Sampling and Analysis Plan for Sediment
- ⇒ Section 600.5 Sampling and Analysis Plan for Non-Visible Pollutants
- ⇒ Attachment R Sampling Activity Log/Chain of Custody Form
- ⇒ Attachment S Pollutant Testing Guidance Table
- ⇒ Attachment T Sampling Data Reporting Form



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## ➔ Course Highlights

- ⇒ Introduction
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- ⇒ **303(d) Sedimentation / Siltation or Turbidity**
- ⇒ Non-Visible Pollutants
- ⇒ Sampling and Analysis Plan Review Guidelines
- ⇒ Contractor Sample Collection Procedures
- ⇒ Inspection Tips



## ⇒ Sediment / Silt / Turbidity

- ⇒ Projects that discharge directly into a 303(d) water body listed for Sediment / Silt / Turbidity require a SAP
  - List of 303(d) water bodies available from SWRCB  
[http://www.waterboards.ca.gov/tmdl/303d\\_lists.html](http://www.waterboards.ca.gov/tmdl/303d_lists.html)
- ⇒ Determine whether there is a net increase in sediment load from storm water discharge from the project

# 303(d) Water Bodies

## Sediment / Silt / Turbidity

- ➔ Exemptions (non-direct discharge) – SAP not required
  - Discharges that flow to tributaries of 303(d) waters
    - That are not listed themselves as impaired
  - Discharges to Municipal Separate Storm Sewer Systems
    - Including Caltrans storm drainage system



# Sediment / Silt / Turbidity

- ➔ Project Discharges Directly into 303(d) Water Body
  - ⇒ Identify sampling locations for monitoring discharges
    - Upstream of the project
    - Immediately down stream from last discharge point of the project
    - Run-on that enters the Caltrans right-of-way
  - ⇒ Sampling must occur during the first two hours of discharge
    - During daylight hours – sunrise to sunset
    - Year round / seven days a week – including holidays
  - ⇒ Sample a maximum of four events per month
    - Minimum 72 hours of dry weather between events
  - ⇒ Samples collected by personnel trained in water quality sampling procedures
    - Contractors staff or Laboratory personnel

## Triggers

### Is sampling required ?

#### Assume:

- River is 303(d) listed impaired for sediment
- Time is 0700
- Rain event began 45 minutes ago
- Direct discharge has occurred



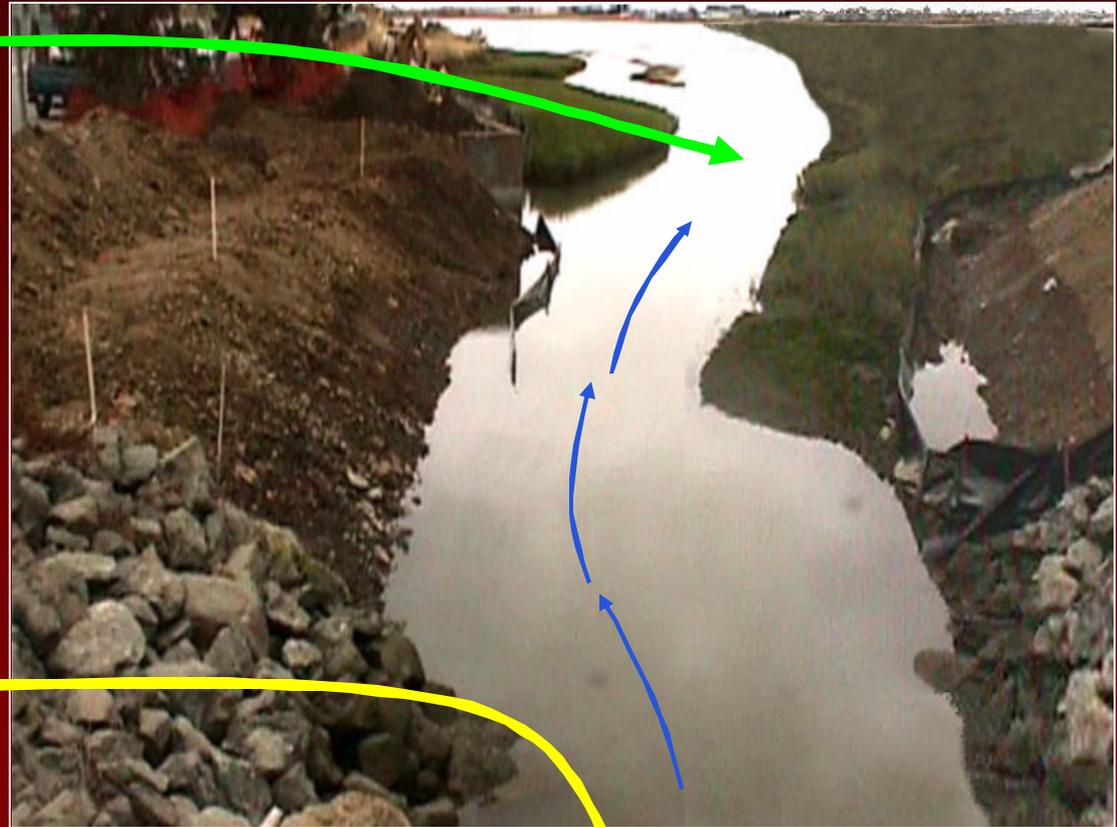
YES

# Sediment / Silt / Turbidity Sampling Triggers

Where should samples be taken ?

Downstream of project

Upstream of project



Remember: SAFETY FIRST

# 303(d) Water Bodies

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## Sediment / Silt / Turbidity

### ➔ Analytical Requirement

- ⇒ Impaired due to Sedimentation / Siltation
  - Settleable Solids (SS)
  - Total Suspended Solids (TSS)
  - Or Suspended Sediment Concentration (SSC)
- ⇒ Impaired due to Turbidity
  - Nephelometric Turbidity Units (NTU)
- ⇒ Laboratory analysis in accordance with 40 Code of Federal Regulations (CFR) Part 136
  - By State of Ca. Department of Health Services certified laboratory
- ⇒ Field analysis by Contractor
  - Collection, analysis, and equipment calibration in accordance with manufacturer's specifications

# 303(d) Water Bodies

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## Sediment / Silt / Turbidity

### ⇒ Sample Documentation

- ⇒ Water quality sample analytical results and Quality Assurance / Quality Control (QA/QC) Data
  - Submitted to Resident Engineer
    - 5 days for field analysis
    - 30 days for laboratory
  - Evaluation of results
  - Filed with SWPPP document
  - Category 20

# Evaluation of Results

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## ➔ Data Evaluation

- ⇒ The contractor will submit an evaluation of the water quality sample analytical results, including figures with sample locations and QA/QC data for every sampling event.
- ⇒ Should downstream samples exceed upstream or background levels, the WPCM will evaluate:
  - BMPs
  - Site Conditions
  - Surrounding influences/other site factors

# Evaluation of Results

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## ➔ Data Evaluation

- ⇒ Contractor will determine probable cause for the increase in levels downstream
- ⇒ Appropriate BMPs will be repaired or modified to mitigate increases/discharges
- ⇒ Any revisions to the BMPs will be recorded as an amendment to the SWPPP

# Reporting of Results

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## ⇒ Sampling Data Reporting Form

- ⇒ SWPPP Preparation Manual Appendix A, Attachment T
- ⇒ Contractor to use form to electronically submit data to the RE or other person designated by Caltrans
- ⇒ Contractor to sign and certify all data reporting forms

## ⇒ What if

⇒ Data shows an increase in the pollutant

⇒ The contractor should

- Identify the location of the BMP failure
- Repair or replace any BMP that has failed
- Maintain any BMP that is not functioning properly due to lack of maintenance
- Evaluate whether any additional or alternative BMPs should be implemented
- Amend SWPPP if additional BMPs were installed

# 303(d) Water Bodies

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## What may be Causing the Increase?

- ➔ Exposed soil areas with inadequate erosion control measures
- ➔ Poorly stabilized slopes
- ➔ Lack of perimeter sediment controls
- ➔ Areas of concentrated flow or unprotected soils
- ➔ Poorly maintained erosion and sediment controls
- ➔ Unprotected stockpiles
- ➔ Failure of other erosion or sediment control BMPs

# 303(d) Water Bodies

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- ⇒ How is Sampling and Analysis for Sediment/Siltation or Turbidity paid for?
  - ⇒ Extra Work at Force Account