

MONTECITO COUNTRY CLUB GOLF COURSE

“Water Quality Monitoring Protocol “

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By

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TABLE OF CONTENTS

PROJECT OVERVIEW.....	1
MAP.....	2
SURFACE WATER QUALITY MONITORING STUDY PROGRAM.....	3
<i>Introduction</i>	3
<i>Baseline Monitoring</i>	3
<i>Sampling Sites and Methods</i>	3
<i>Post-construction Monitoring</i>	5
<i>Reporting Requirements</i>	6
WATER QUALITY GOALS AND OBJECTIVES.....	6
<i>Program Goals and Objectives</i>	6
<i>Water Quality Objectives</i>	7
<i>Contingency Sampling Procedures</i>	12
<i>Outline of Pesticide Use and Practices</i>	13
CHEMICAL CONSTITUENTS OF CONCERN.....	14
<i>Surface Water Samples</i>	15
<i>Selected pesticides For Monitoring</i>	16

PROJECT OVERVIEW

The planned 18-hole remodel of the Montecito Golf Course is part of a master plan to remodel the entire Montecito Country Club.

The golf courses (see map) is being planned, and will be re-built and operated, in such a way as to protect and enhance water quality on or leaving the property, as well as protecting and improving the habitat in and around the golf course.

The following Monitoring Plan outlines the timing and methods that will be implemented to achieve and maintain good water quality standards.

MAP



- LEGEND**
- SEDIMENTATION/INFILTRATION BASIN
 - WET POND
 - RAIN INSERT
 - NATURAL CHANNEL
 - VEGETATED SWALE
 - FLOW LINE
 - PROPOSED STORM DRAIN
 - EXISTING STORM DRAIN
 - PIPE TO BE REMOVED
 - STORM DRAIN INLET



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NO.	DATE	REVISIONS

CITY OF SANTA BARBARA
 REVIEWED BY: _____ DATE: _____
 SQUARE: _____

PRELIMINARY IMPROVEMENT PLANS
 STORMWATER QUALITY EXHIBIT
 MONTECITO COUNTRY CLUB
 920 SUMMIT ROAD, SANTA BARBARA, CALIFORNIA

CONCEPTUAL CREEK RESTORATION PLANS
 MONTECITO COUNTRY CLUB
 MONTECITO, CA



DATE: 10/15/2010
 PROJECT: MONTECITO COUNTRY CLUB
 SHEET: 10 OF 10

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CONCEPTUAL CREEK RESTORATION PLANS
 MONTECITO COUNTRY CLUB
 MONTECITO, CA

DATE	DESCRIPTION
10/15/2010	ISSUED FOR PERMIT

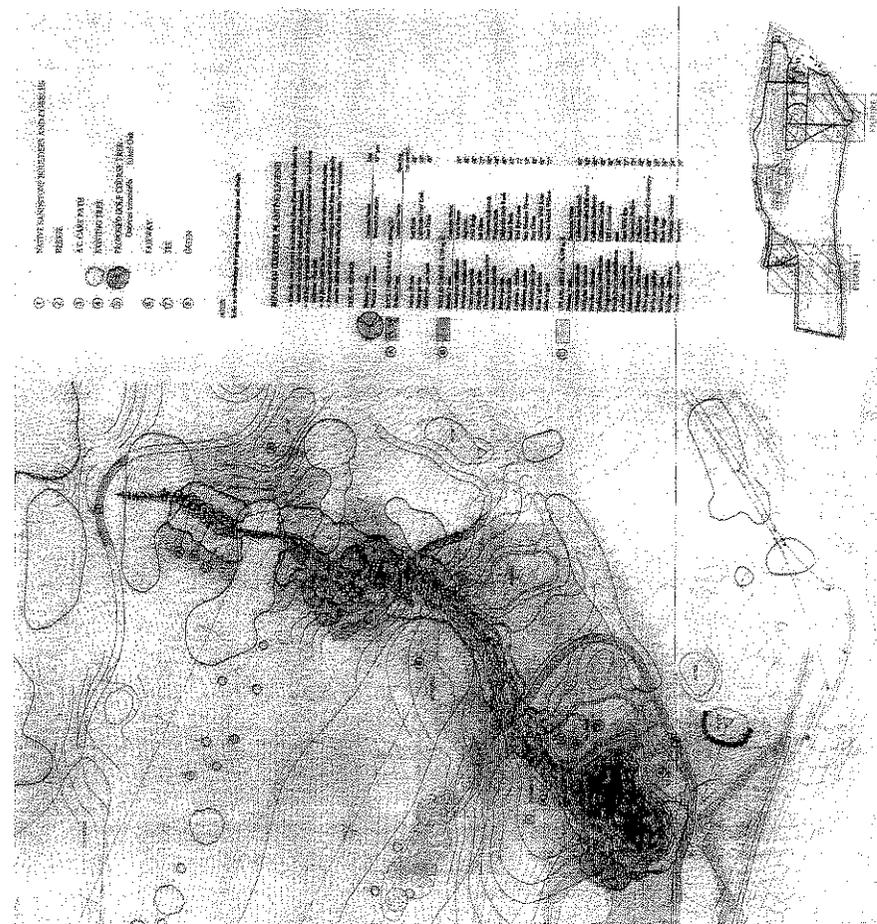


FIGURE 2 - MIDDLE DRAINAGE

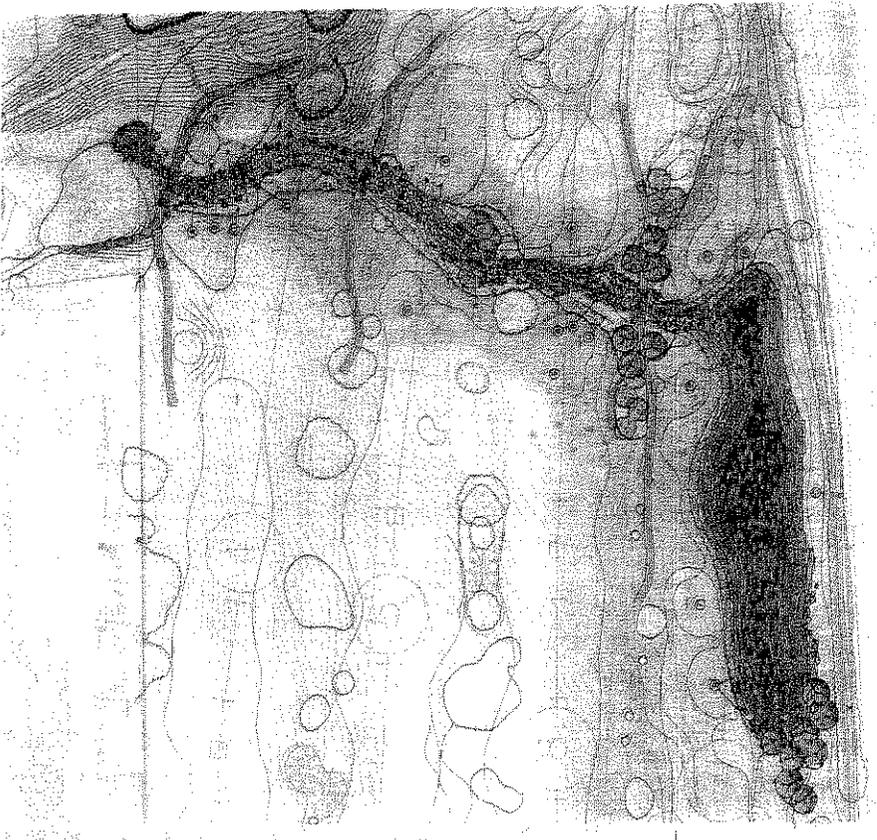


FIGURE 1 - WEST DRAINAGE

SURFACE WATER QUALITY MONITORING STUDY PROGRAM

INTRODUCTION

The surface water monitoring program consists of pre-construction (or baseline) sample collection and analysis activities as well as post-construction activities to provide the basis for determining the effects of the golf course development and operation on surface water quality for a *minimum of 3-year period*. The program does not include evaluation of the potential water quality effects of the offsite housing areas.

The baseline water quality monitoring will be conducted in order to establish existing surface water quality at the site. Monitoring conducted after the golf courses are developed will be compared to the baseline monitoring results to evaluate any changes that may occur, determine the magnitude of changes and whether established limits have been exceeded, and determine whether the changes are attributable to golf course operations. Sample collection sites were also selected to provide a basis for determining effects of only the golf courses on surface water quality. Samples will be collected upstream and downstream of the predominant areas of golf course development.

BASELINE MONITORING

SAMPLING SITES AND METHODS

The **offsite water** sampling site will be taken where water first enters the project at the mid point of the 18th fairway.

The second and third sampling sites will be the exit points from the two new lakes. These **on-site surface** water sampling sites are located at the two lake outfalls and represents the most likely area where water quality will be compromised, if such an unlikely event ever occurs. These three sites are shown on the map above.

Samples should be taken in a grab fashion, where the sample bottle provided by the commercial laboratory is used to collect the water directly from the stream. The bottle

should be labeled with an appropriate identification label for the laboratory records. A field log book should be maintained by the sample collection personnel that identifies names of the staff conducting the sampling, samples collected and locations, date and time of collection, and pertinent field notes regarding conditions of potential influence to water quality (i.e., weather, presence of livestock, odors, unusual water color, etc.). The sample should be collected from the middle of the stream channel and at mid-depth (a pole-type sample bottle holder may be a convenient means to reach out into the channel without the use of boot waders).

Sampling Frequency

As a minimum frequency for baseline monitoring, a sample will be collected from all sample sites according to the time of year, preferably beginning in the fall prior to the start of any major grading activities. Surface samples will be collected on the same day and on dates that follow the general guidelines listed below:

- during a "first flush event" in the fall, before 2 inches of seasonal rainfall has accumulated and between 0.5 - 1.0 inch has fallen in the sampled event;
- spring storm event (i.e., February-March), after 2 inches of seasonal rainfall accumulation and after 0.5 inch of rainfall during the sampled event; and
- late spring/early summer (i.e., April-May), while flow is still present in the surface channels.

Analytical Parameters

The staff collecting the samples will record a visual description of the flow conditions present in the stream channel at the time of sampling and measure water temperature to the nearest 0.5 C and pH to the nearest 0.2 standard unit. The commercial laboratory will analyze the samples for the following chemical parameters with procedures capable of achieving the method detection limits for each parameter:

- nitrate and nitrite (0.05 mg/l N);
- orthophosphate (0.01 mg/l P);
- total Kjeldahl nitrogen (0.1 mg/l N);
- total alkalinity (20 mg/l as CaCO₃);
- specific conductance (10 S/cm);
- turbidity (1 nephelometric turbidity unit (NTU)); and

- hardness (5 mg/l as CaCO₃).

Based on the field observations made during the preparation of the Montecito Country Club Monitoring Protocol, contamination of the site by toxic compounds such as organic pesticides and trace metals are presumed to be absent from surface waters at this time. These constituents will not be included in the baseline monitoring because of the substantial laboratory costs involved.

POST-CONSTRUCTION MONITORING

Post-construction water quality monitoring will be performed after development of the golf course is underway. Staff will employ the same types of equipment, procedures, and analytical methods to collect the samples as described for the baseline monitoring. The procedures are more specifically described below.

Sampling Sites

Surface samples will be collected at the same sites utilized for the baseline monitoring program.

Sampling Frequency

Post-construction water sample collection will commence when at least 25 percent of the golf holes located within the monitored sub-basins have been seeded and are receiving active turf maintenance activities. Three surface water samples will be collected per water year according to the same seasonal program described for the baseline monitoring program.

Analytical Parameters

The staff collecting the samples will record a visual description of the flow conditions present in the stream channel at the time of sampling and record water temperature and pH values. Surface water samples will be analyzed for the following constituents at the same method detection limits stated for the baseline monitoring period:

- temperature (± 0.5 C);
- pH (± 0.2 standard units);
- nitrate and nitrite (0.05 mg/l N);
- orthophosphate (0.01 mg/l P);
- total Kjeldahl nitrogen (0.1 mg/l N);
- specific conductance (10 S/cm);
- turbidity (1 NTU);

- oil and grease (1.0 mg/l); and
- selected pesticides.

The fall first-flush storm event and late spring/early summer surface water samples will be analyzed for the pesticides that were used in the previous year of active turf maintenance activities. The pesticides to be monitored in surface water are the same as those described for the post-construction monitoring for groundwater above. The method of analysis for the pesticides and appropriate method detection limits will be chosen at the time of sample collection. Grab samples will be collected at the same time as the routine surface samples in appropriate bottles provided by the laboratory. The method of analysis and appropriate method detection limits will be chosen at the time of sample collection.

REPORTING REQUIREMENTS

All laboratory results, including supporting quality assurance and quality control documentation, will be delivered to the golf course superintendent, who will retain them on permanent file. Copies will be provided to Santa Barbara County Environmental Health Services upon 30 days written notice. In addition, an annual summary of test results will be provided to Santa Barbara County Environmental Health Services.

In addition, any violations of water quality objectives identified by water analysis, as determined in accordance with the interpretation guidelines presented below, must be reported to Santa Barbara County Environmental Health Services within 5 days of receipt of the results from the laboratory.

WATER QUALITY GOALS AND OBJECTIVES

PROGRAM GOALS AND OBJECTIVES

The overall goal for the use of monitoring results obtained from implementing this WQMSP is to ensure that water quality in receiving waters, both onsite and downstream from the project, is not impaired by golf course operations. Another goal is to sufficiently document compliance with the environmental commitments established for the golf courses. The environmental commitments are generally structured to

ensure that all potential adverse water quality impacts from the golf courses are prevented.

The objectives of this WQMSP are to provide the methods and procedures to accurately represent the effects of the golf courses on water quality (if they should occur); provide precise instructions and guidelines for the performance of the required monitoring activities; establish criteria for evaluating the monitoring results; and recommend procedures for further documentation of water quality if problems attributable to the golf courses should arise.

WATER QUALITY OBJECTIVES

Narrative and numerical water quality objectives for the protection of designated beneficial uses of water resources are specified in the Water Quality Control Plan Narrative objectives generally state that the discharged water will not contain various substances "in concentrations which cause nuisance or adversely affect beneficial uses". Numerical objectives specify concentrations that must be maintained in groundwater or receiving waters that are down gradient of any project related discharges. Numerical limits for toxic compounds were also established in the California Inland Surface Waters Plan (State Water Resources Control Board 1991), a plan that is currently undergoing regulatory review as a result of a lawsuit brought against it in 1994.

The Basin Plan includes numerical objectives for many constituents, several of which are unlikely to be influenced by the golf courses. The objectives presented here are for only those constituents deemed relevant to this WQMSP and the golf courses. Below are specific objectives for water quality associated with the Montecito golf courses:

1. The water that enter the site on the north side of the 18th hole is the primary drainage outlet for the adjacent property and continues through the golf course shall not contain any of the following constituents in sufficient concentrations to cause a nuisance either directly or indirectly resulting from the management of the golf courses:
 - biostimulatory substances (i.e., nitrogen and phosphorus compounds);
 - floating material;
 - oil and grease;

- pesticides (individual or in combination); and
 - sediment.
2. No pesticide concentrations shall accumulate in bottom sediments or aquatic life that adversely affect beneficial uses.

INTERPRETATION OF MONITORING RESULTS AND RESPONSE STRATEGIES

- Water analysis results will be considered "Satisfactory" if all the conditions listed below are met. Satisfactory results may be filed and no management response is required.
- No pesticides that are used for golf course maintenance are detected in any sample
- The value of a given sample for nitrate and nitrite nitrogen, orthophosphate, total Kjeldahl nitrogen, specific conductance, or turbidity at a given downgradient sampling site is less than 10% greater than the high value of the baseline samples or less than 10% greater than its respective upgradient sample taken on the same day.
- Oil and grease is not detected more than once at any of the downgradient sampling sites within a given water year.
- The pH of surface waters are either +/- 1.0 of baseline or between 6.5 and 8.5.

Results will be considered "Cautionary" if any of the conditions listed below are met. Cautionary results require management response as described under each condition. Notification to Santa Barbara County Environmental Health Services is not required for cautionary results.

- Pesticides are detected in one or more of the samples exiting the property and the concentration is less than an established standard or objective, if applicable. The following procedures should be followed:

1. If the pesticide source appears to be due to golf course maintenance, increase sample frequency at sites where it was detected to four times per year. These additional samples need to be tested only for the target pesticide.
 2. If concentrations of the target pesticide are found to be increasing with time, reduce application rate and/or frequency by at least one-half. Continue monitoring for this pesticide.
 3. Further reduce applications of target pesticide as necessary until monitoring results show a reduction in concentration consistent with the establishment levels resulting in "No significant negative impact"
 4. After use of target pesticide is suspended, monitoring for its presence must continue until three consecutive samples, taken at least 1 month apart, are negative.
- The value of a given sample for nitrate nitrogen, orthophosphate, or ammonia nitrogen at a given down gradient sampling site is more than 10% larger than the high value of the baseline samples or more than 10% larger than its respective up gradient sample taken on the same day.
 1. Identify source of nutrient loading; take additional water samples if necessary.
 2. If a point source is identified, take corrective action to eliminate the source.
 3. If no point source is identified, it should be assumed that turf fertilization is responsible for the increase. Reduce fertilizer application amounts/application, solubility type, and/or frequency as necessary to reduce nitrate concentrations consistent with the established levels resulting in "No Significant Negative Impact"

Oil and grease are detected at less than 15 mg/l.

 1. Identify source. Most likely, surface waters are receiving runoff from roads or parking lots. Contact golf course superintendent to correct drainage and/or eliminate source.

- Turbidity is greater than 10 NTU in any surface water samples.
 1. Perform a visual inspection to determine whether turbidity is due to suspended algae (water is obviously green) or sediments (water is muddy brown). Microscopic examination may be necessary.
 2. If turbidity is due to algae, excess nutrients or water stagnation should be assumed to be the cause. Identify problem or source (see nitrates above), and take corrective action to eliminate.
 3. If turbidity is due to sediment, visually inspect golf courses grounds to identify site(s) where excess erosion may be occurring. Implement appropriate erosion control measures (e.g., straw bale dams, reseeding bare soil) as appropriate to the situation.
 4. If excess sediments are from an offsite source, beyond the control of golf course management, inform golf course superintendent of the problem areas.

- The pH of down gradient surface samples are greater than the baseline of 8.5 or less than 6.5 and more than 1.0 unit different than the up gradient sample from the same day.
 1. Excessive increases in pH can occur in surface waters when active photosynthesis by submersed plants and/or algae is occurring. Observe surface waters for signs of impairment to aquatic organisms. If corrective action is required, increase the supply of fresh irrigation water to the streams or harvest vegetation from open water areas.

Results will be considered "Unsatisfactory" if any of the conditions listed below are met. Timely notification must be provided to Santa Barbara County Environmental Health Services of any and all unsatisfactory results. Notification must include a copy of the laboratory results¹, a description of the management response being taken to correct the problem, and a description of any changes in the monitoring program being made to confirm successful correction.

¹ The Analytical Laboratory had not been selected at the time of this printing. Please contact Owner for the lab name, address and phone number.

- Any pesticide is detected in any sample at a concentration greater than the established standard or objective.
 1. All use of the detected pesticide must be discontinued, and any remaining stock properly disposed of. A full review of all previous target pesticide handling procedures must be implemented. Storage methods, application rates, schedules, and techniques; weather conditions at time of application; and elapsed time between application and detection shall be considered.
 2. Additional water samples shall be collected as necessary to determine the extent of contamination. This will include installation of additional monitoring wells in the event of groundwater contamination. In the event that substantial groundwater contamination occurs, a professional consultant experienced in groundwater remediation will be retained to determine whether the contamination can be contained within project boundaries and allowed to break down naturally or whether a remediation effort must be undertaken.
 - A down gradient sample exceeds an increase value of 5 mg/l N for nitrate and nitrite.
- 3. Identify source of nutrient loading; take additional water samples if necessary.
- 4. If a point source is identified, take corrective action to eliminate the source.
- 5. If no point source is identified, turf fertilization should be assumed to be responsible for the increase. Reduce fertilizer application rate by 50%.
- 6. Increase monitoring frequency to monthly for nitrate.
- 7. Reduce fertilizer application rates by additional 50% increments as necessary until nitrate monitoring results are satisfactory.
 - Oil and grease are present as visible floating films.
 1. Identify source. Most likely, surface waters are receiving runoff from roads or parking lots. Contact golf course superintendent to correct drainage or eliminate source. Evaluate and implement corrective actions if a spill is identified.

CONTINGENCY SAMPLING PROCEDURES

Baseline Monitoring

Several factors may affect the ability of the baseline sampling sites to provide adequate and representative samples of water quality. If chemical concentrations of surface and groundwater samples routinely exceed acceptable limits, or significant differences are indicated between the downstream and upstream samples, the results may indicate that a water quality problem currently exists on the project site. Additional samples or changes to the sampling sites would be added, as required, to locate or avoid existing problems.

Post construction Monitoring

In the event that any unacceptable results are obtained during Post-construction monitoring samples, as determined in accordance with the interpretation guidelines presented below, additional samples will be collected as necessary to identify the contaminant source and confirm the effectiveness of corrective measures.

If after three years of consecutive monitoring, the data indicates that golf courses operation and maintenance activities are not affecting water quality, sample collection will be eliminated at all sites, as agreed upon by the Owners/Operator and Development Review Committee.

If monitoring indicates that golf courses operations are affecting water quality, additional samples will be collected and the frequency of sample collection or location of sampling sites would be adjusted to define the problem conditions and identify corrective measures. The potential additional surface and groundwater sampling sites would be the same as identified for contingency baseline monitoring in the map above. Sample collection would be initiated at the sites, as needed.

OUTLINE OF PESTICIDE USE AND PRACTICES

- The pest will be properly identified. The use of disease, insect, and weed identification guides will be used. Diagnostic aid kits will be used on pathogens for which they have been developed;
- UC Davis Cooperative Extension, University of California, or equal commercial laboratory will be used to identify any unknown activity;
- The golf course superintendent will identify and document when the economic threshold (excessive damage) of pest activity has been exceeded;
- Environmental conditions will be reviewed and altered if possible to reduce unfavorable conditioning triggers, pest activity (i.e. reduce shade);
- Cultural controls appropriate to the turf related problem will be used to reduce impact (i.e. fertilizers, leaching of salts, removal of mycelium, etc.);
- Mechanical practices (aerifying, spiking, verticutting, etc.) will be considered to help reduce stress and improve turf condition;
- A pesticide application will be made when there is no alternative measure for control;
- The actual application of a pesticide will be made under the direction of a certified, licensed applicator;
- The golf course superintendent will be licensed in the following qualified California pesticide applicator categories: Aquatic, Category (F), and Landscape Maintenance, Category (B).
-
- The applicator will adhere to all label specifications for loading, mixing, and applying the compound. All protective clothing as specified by the label will be worn by the applicator;
- All pesticide applications will be made in accordance with label specifications;
- In order to minimize drift from the target area, applications will not be made in winds in excess of 5 mph unless a spray

shroud is used. Documentation will be verified by the Environmental Pestcaster or weather monitoring station;

- No pesticide will be applied within the native grass areas or in areas of influence to the intermittent streams.
- Liquid application of a pesticide will be made using a low pressure boom type sprayer with the boom height no higher than 18" to further minimize drift;
- The use of low volume hollow cone nozzles and applicator spray shields will be installed on the spray boom; and
- Notification of the application of a pesticide will be made in accordance with California State Posting Laws.
- Monthly reporting of all pesticide use will be reported to the County Agricultural Commissioner according to state law.
- 2-4D applications will be made only after a 24 hour notice of intent to apply is given to the Ag Commissioner

The golf course superintendent will be responsible for the administration of the above policies.

CHEMICAL CONSTITUENTS OF CONCERN

Implementation of this WQMSP requires that staff personnel conducting the program and reporting results are thoroughly familiar with the appropriate procedures for collecting samples and performing field measurements, coordination of the sample analyses for appropriate chemical parameters by a commercial laboratory, interpreting results of the analyses, and reporting results to the appropriate regulatory authorities. All water samples will be collected by personnel trained and familiar with proper sampling procedures. Samples will be delivered to a California certified analytical laboratory in containers provided by the laboratory.

SURFACE WATER SAMPLES

Baseline Monitoring

The staff collecting the samples will record a visual description of the flow conditions present in the stream channel at the time of sampling and record water temperature and pH values. The commercial laboratory will analyze the samples for the following chemical parameters with procedures capable of achieving the method detection limits given in parentheses:

- temperature (± 0.5 C);
- pH (± 0.2 standard units);
- nitrate and nitrite (0.05 mg/l N);
- orthophosphate (0.01 mg/l P);
- total Kjeldahl nitrogen (0.1 mg/l N);
- total alkalinity (20 mg/l as CaCO₃);
- specific conductance (10 S/cm);
- turbidity (1 NTU); and
- hardness (5 mg/l as CaCO₃).

Contamination of the site by toxic compounds such as organic pesticides and trace metals are presumed to be absent from surface waters at this time. These constituents will not be included in the baseline monitoring because of the substantial laboratory costs involved.

Postconstruction Monitoring

- visual description of stream flow, weather, etc.;
- temperature (± 0.5 C);
- pH (± 0.2 standard units);
- nitrate and nitrite (0.05 mg/l N);
- orthophosphate (0.01 mg/l P);
- total Kjeldahl nitrogen (0.1 mg/l N);
- specific conductance (10 S/cm);
- turbidity (1 NTU);
- oil and grease (1.0 mg/l); and
- selected pesticides.

The fall first-flush storm event and late spring/early summer surface water samples will be analyzed for the pesticides that were used in the previous year of active turf

maintenance activities. The pesticides to be monitored in surface water are the same as those described for the Post-construction monitoring for groundwater above. Grab samples will be collected at the same time as the routine surface samples in appropriate bottles provided by the laboratory. The method of analysis for the pesticides and appropriate method detection limits will be chosen at the time of sample collection.

SELECTED PESTICIDES FOR MONITORING

The pesticides selected for initial Post-construction monitoring are the herbicide 2-4-D and the fungicide Banner Max. The insecticide Sevin will not be used unless organically synthesized products fail and is therefore not proposed for monitoring. If Sevin is used, it will be monitored in the next scheduled monitoring event. The herbicide 2-4-D was selected for monitoring because it has a high proposed rate of application relative to the other compounds, it has a higher runoff potential, and it is regulated by both federal and state drinking water standards. The fungicide Banner Max was selected because it has a relatively high proposed rate of application, it has a higher runoff potential, and has some persistent.