

Water Quality Monitoring Plan

ENVIRONMENTAL AND WATER QUALITY MONITORING
FOR THE
DEVELOPMENT OF THE ST. JOHN MARINA
U.S. VIRGIN ISLANDS

INTRODUCTION

The following is the proposed water quality monitoring program for the development of the St. John Marina in Coral Harbor, St. John.

The proposed project involves direct impacts to the seabed through the installation pilings for the construction of the marina. A total of 1333 piles will be driven (1230 @ 15" diameter, 34 @ 17" diameter and 69 @ 12" diameter). The piles will be driven with a vibra hammer. A total of 87 moorings are proposed 12 associated with the marina proper and 75 associated with the managed Coral Harbor mooring fields. The moorings will utilize helix anchoring systems with floated lines. No dredging or fill is proposed. Mangroves will be utilized to stabilize the shoreline.

In any marine construction the potential for negative impacts to marine life and degradation of water quality exist. When sediments are suspended in the water column through bottom disturbance, these suspended sediments add to the turbidity of the water. The lowering of the transparency of seawater can greatly affect sessile marine organisms that rely on the transmission of the light for their existence. Settling sediments can also smother coral colonies and prevent larval sediment of reef organisms. There are coral colonized reefs close to the area which contain federally listed and federally nominated threatened and endangered species. Through careful planning and monitoring, such potential impacts can be minimized and abated.

In order to ensure that water quality is maintained this water quality monitoring program will be implemented during construction. This plan will monitor turbidity and look at the effectiveness of the sedimentation control. If any degradation of water quality is detected immediate measures will be taken to abate the impacts. This plan will also monitor the benthic community adjacent to and within the potential impact area of the proposed project.

The purpose of this monitoring plan is to document any degradation in water quality or in the health of the benthic community and detail a course of action that can be immediately implemented to abate that degradation if significant changes are observed.

WATER QUALITY MONITORING

Prior to the start of construction a baseline of water quality conditions will be established. A total of 6 sampling location will be established in the project area and control sampling sites. The monitoring samples will be placed in the areas most likely to be impacted by the project. The control sites will be placed in areas which should be exposed by the same ambient conditions, but should not be impacted by the marina project.

At each site the turbidity expressed as NTUs will be sampled. Samples will be taken on a weekly basis for 2 months prior to the start of construction.

Baseline data will be used to compare with data collected during the construction project to help assess whether readings are a result of the construction project or are due to ambient conditions.

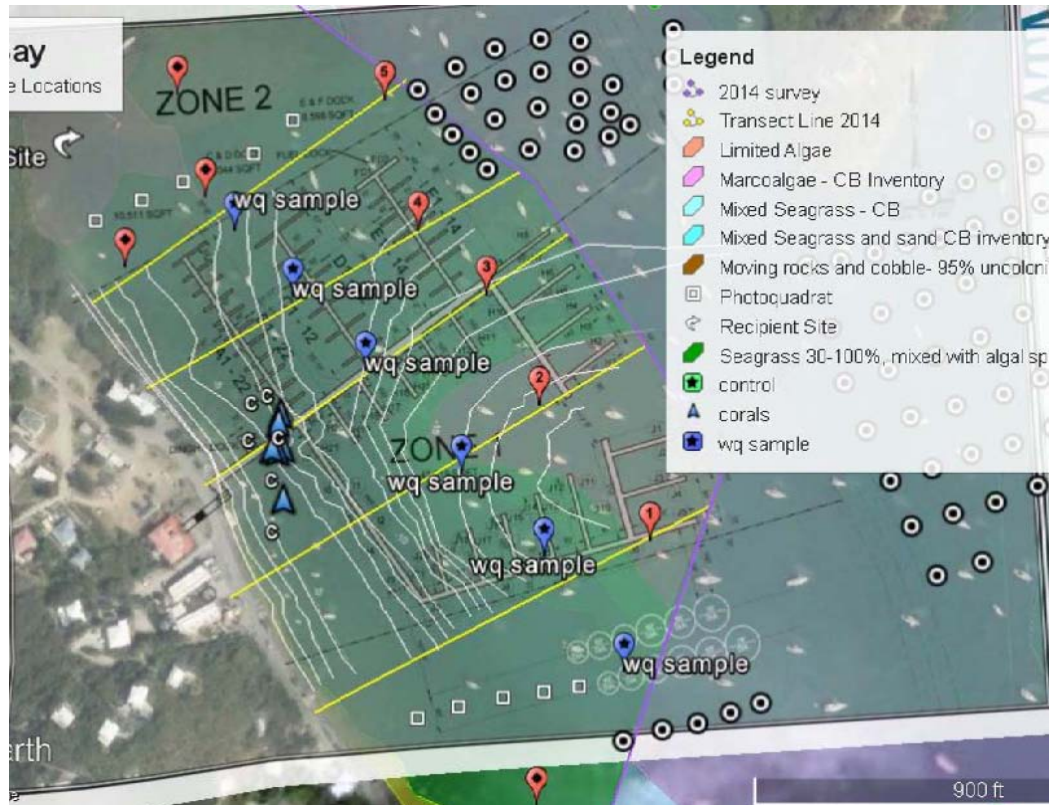


Figure 1: Water Quality and Environmental Monitoring Locations. The water sampling stations and proposed photoquadrats are shown above.

DURING CONSTRUCTION

During construction 6 samples will be taken around the area of in-water work; these samples will be taken in a radial pattern around the area of work at a distance of 20 meters outside the turbidity booms. Samples will be taken 1 meter below the surface and will be analyzed by either a Hach 2100 Turbidity meter or a YSI Multi-meter for turbidity expressed as NTU.

The control samples will be utilized to determine whether elevated turbidity is a function of the project or due to ambient conditions. As per the Virgin Islands Code, visual depth visibility readings (Secchi disk measurements) should not fall below 1 meter. Class B has an allowable turbidity level of 3 NTU. Allowable limits will be determined from the baseline survey and approved by DEP/CZM and the federal reviewing agencies prior to the start of construction.

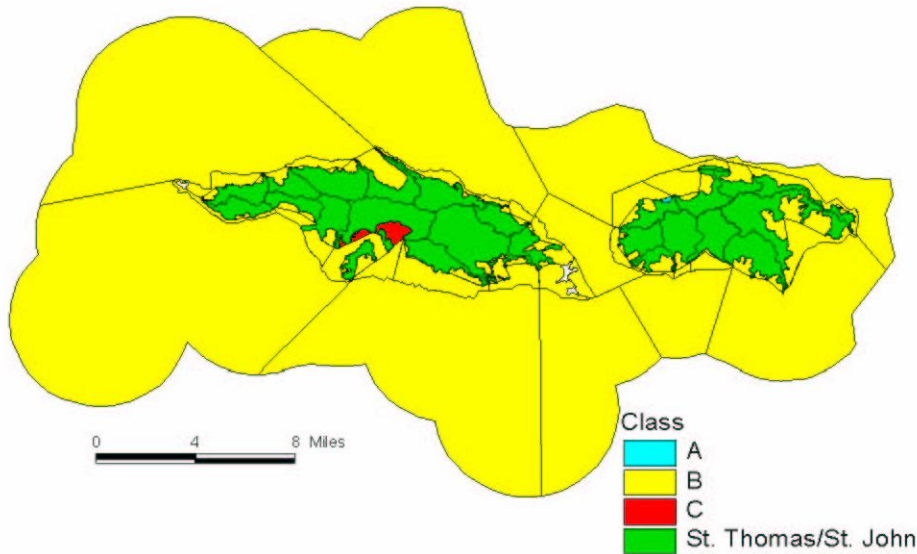


Figure 3 Location of Water Quality Classes

Table II.B.1 Summary of Virgin Islands Water Quality Criteria

Pollutant	Class B	Class C
Dissolved Oxygen	Not less than 5.5 mg/l from other than natural sources	Not less than 5.0 mg/l
pH	<8.3 Tolerable Limit> 7.0	<8.5 Tolerable Limit> 6.7
Temperature	Less than 32° Celsius	Same as Class B
Bacteria	Not to exceed 70 fecal coliforms per 100 ml by MF or MPN count Not to exceed a geometric mean of 35 enterococci per 100 ml, not to exceed a single sample maximum of 104 per 100 ml at any time	Not to exceed 200 fecal coliforms per 100 ml by MF or MPN count Not to exceed a geometric mean of 35 enterococci per 100 ml, not to exceed a single sample maximum of 104 per 100 ml at any time
Phosphorus	Not to exceed 50 mg/l in any coastal waters	Same as Class B
Chlorine	4-day average concentration of Chlorine not to exceed 7.5 ug/l. The 1-hour average concentration of Chlorine not to exceed 13 ug/l.	Same as Class B
Suspended, colloidal or settleable solids	None from waste water which would cause deposition or be otherwise deleterious.	Same as Class B
Oil and Floating substances	No residue attributable to waste water. No visible film; no globules of grease	Same as Class B
Radioactivity	Gross Beta: 1000 picocuries per liter, in the absence of Sr 90 and alpha emitters Radium-226: 3 picocuries per liter Strontium-90: 10 picocuries per liter	Same as Class B
Taste and Odor	None in amounts to interfere with use for primary contact recreation, potable water supply or to render undesirable taste or odor to edible aquatic life	Same as Class B
Color and Turbidity	A. A secchi disc shall be visible at a minimum depth of one meter. For waters where the depth does not exceed one (1) meter, the bottom must be visible. B. A maximum nephelometric turbidity unit reading of three (3) shall be permissible	A Secchi disc shall be visible at a minimum depth of one (1) meter.

Baseline samples will be utilized to determine if elevated readings are the result of sea conditions.

Wind speed and direction, wave height and direction, and rainfall will be recorded at the time of sampling.

During construction if the water samples show NTUs readings in excess of the allowable limits, DPNR, DEP and Summer's End Group will be notified, in writing. The baseline samples will be utilized to determine if an increase in turbidity is a result of natural

phenomena or if the monitoring sample is elevated above the ambient background as a result of the marina project. If it is determined that the elevated turbidity is the result of the marina project, the source of the problem will be identified and methods worked out to reduce suspended sediments. Someone must be on hand at the site at all times who has the authority to implement sediment control devices, so that problems can be solve or resolved by the monitor, Summe's End Group, DEP, and DPNR.

If elevated readings are encountered the construction will stop and if any deficiencies in the deployed turbidity control are encountered they will need to be corrected. Construction may resume once turbidity has fallen to allowable levels. If there are no deficient in the deployed turbidity control, additional curtains will need to be or pile driving may need to be slowed. Work will have to stop until turbidities reach allowable levels before resuming. If the additional measures cannot be deployed which are adequate to control turbidity then in water work will have to be shut down everytime readings become elevated over acceptable ranges and will only be able to resume once they have fallen back into acceptable ranges.

ENVIRONMENTAL MONITORING

Fauna and flora that will be affected by the project shall be surveyed and monitored. They are the true indicators of the water's ability to sustain its existing residents.

Ten permanently marked modified meter square photoquadrats will be established on the adjacent seagrass beds which are within the area of potential impact of the construction project (Figure 1).

PVC stakes will be inserted into the substrate to serve as markers for the camera stand to insure the exact relocation of the photograph in repetitive samplings. Seagrass abundance and health will be assessed.

The quadrats will be established and monitored monthly for a period of two months prior to the commencement of the project to establish a baseline.

The photoquadrats will be monitored on a monthly basis during in-water work. All visible changes will be documented and reasons for these changes assessed. Photographs and detailed survey information containing the above listed parameters will be given to the Department of Planning and Natural Resources (DPNR), the Division of Environmental Protection (DEP) and Summer's End Group on a monthly basis.

If at anytime any of the monitoring sites shows significant deterioration that does not appear to be natural phenomena, DPNR, DEP and Summer's End Group will be immediately notified in order that remedial measures can be implemented to prevent future negative impacts. Within each quadrat the number and health of all benthic invertebrates such as sea cucumbers, anemones, urchins and mollusk will be assessed as part of the monitoring. If significant changes in numbers are noted the agencies will be immediately notified. If a deterioration of health of any of the organisms are noted the agencies will be notified immediately.

REPORTING OF DATA

In the event of any emergency or noted increase in any of the water quality parameters above the allowable limit, Summer's End Group, DPNR and DEP will be immediately notified by e-mail or by hand delivery. Weekly water quality reports will be delivered to the agencies. The photoquadrat reports will be delivered on a monthly basis to the agencies. A report will be filed after the completion of all construction summarizing any impacts noted.

