CONSTRUCTION AND POST-DEVELOPMENT WATER / SEDIMENT QUALITY AND BIOLOGICAL MONITORING PLAN FOR THE PANAMA CITY – BAY COUNTY INTERNATIONAL AIRPORT RELOCATION

Introduction

Construction and post-development water and sediment quality monitoring will be conducted in waters downstream of the relocated Panama City – Bay County International Airport as a condition of the Wetland Resource Permit issued by the Florida Department of Environmental Protection (FDEP). The purpose of the monitoring program is to document water quality conditions in downstream water bodies (Burnt Mill and Crooked Creeks and the northern portion of West Bay) during airport construction and post-development periods, detect any significant changes in water quality, determine if those changes in water quality are the direct result of activities or conditions on the airport property, and to take corrective action to alleviate water quality degradation related to construction or operation of the airport. Burnt Mill and Crooked Creeks (and their tributaries) are Class III waters; West Bay is Class II water. Stormwater leaving the airport property will discharge to Class III waters.

BACKGROUND Previous Baseline Sampling

A two-year baseline (pre-construction) monitoring program was developed and implemented in 2002 and 2003 to establish the baseline (existing) water and sediment quality characteristics of Crooked and Burnt Mill Creeks and adjacent open waters of West Bay near the creek mouths. The purpose of this program was to establish baseline water and sediment quality conditions within these water bodies, located downstream of the airport site, prior to construction and operation of the relocated airport. Additionally, this information assisted in the siting, planning, permitting, and design of the relocated airport. The baseline sampling will be used for comparison with water and sediment quality results during construction and post-development periods.

During the first year of baseline monitoring, 10 sampling stations were established and monitored monthly for various water quality parameters. This included *in situ* measurements across a depth gradient (using a Hydrolab MiniSonde 4A), as well as near-surface water samples collected for laboratory analysis. Twenty-four hour (24-hr) dissolved oxygen measurements were also conducted at a subset of stations using a Hydrolab twice per year (summer and winter). Sediment quality samples were also collected at a subset of four of the water quality stations (two sites in each creek) twice per year (wet season and dry season). During the second year, an additional water quality station was added (total of 11 stations) to capture additional data near a residential area with known septic tanks. Also, collection and laboratory analysis of both near-surface and near-bottom water quality samples were added for a subset of the water quality stations during the second year of monitoring.

The parameters and methods proposed below for additional baseline, construction, and post-development monitoring are based on the same parameters and methods used for the two-year baseline monitoring period. For more information on the baseline monitoring results, please refer to the Proposed Panama City – Bay County International Airport Year 1 and Year 2 Water Quality Reports prepared for Bechtel by PBS&J (dated 2002 and 2003).

NEW CONSTRUCTION -Additional Baseline Monitoring and Sampling Stations

One additional round of baseline monitoring will be conducted just prior to the onset of construction, to include the 11 stations and water quality and sediment parameters addressed during the previous baseline monitoring periods. Seven new stations will also be added to the sampling regime. These stations will be located approximately 300 ft downstream of the airport property boundary on tributaries to Burnt Mill and Crooked Creeks that will receive treated stormwater discharge from the airport site. The seven new stations will include sites on Bell Bay Branch, Bear Bay (Branch), Kelly Branch, Morrell Branch, and three un-named tributaries to Burnt Mill Creek. Each of the seven additional stations will be sampled for water quality and sediment parameters as described below. Figure 1 depicts the locations of the 11 existing and seven new monitoring stations (18 stations total).

New Construction and Post-Development Monitoring

Construction and post-development monitoring will include the 18 stations described above. During construction of the initial phase of development (over approximately 3 years or less), water quality monitoring will be conducted on a quarterly basis (unless otherwise stated below). Twenty-four hour (24-hr) dissolved oxygen monitoring will be conducted at a subset of stations (at least 1 station per water body) during two of the quarterly sampling periods, corresponding to summer and winter months (as was done during the previous two-year baseline monitoring period). Water samples collected for laboratory analysis will include near-surface samples for all stations and near-bottom samples for a subset of stations (as during the previous baseline sampling). At stations where depth is not sufficient and/or estuarine conditions (and water column stratification) do not occur, only near-surface samples will be collected. Sediment sampling and testing will occur once during the mid-point of the construction operations and once every 2 years during the post-construction period.

During the post-development period following the initial construction phase, the same sampling regime described above for the construction period will be continued for a minimum of six years, with the exception that water quality samples will be collected twice per year (wet season and dry seasons) rather than quarterly. Sampling will be discontinued once no significant water quality changes (relative to the baseline monitoring results and FDEP water quality criteria and sediment guidelines) directly attributed to airport property discharges are observed over three consecutive years.

During future potential construction and post-development periods, the need for additional monitoring will be determined based on the results from the initial construction and post-development monitoring. Assuming the monitoring results for the initial construction and post-development phase indicate no major water quality issues or concerns directly attributed to airport construction or operation, future monitoring will not be required. Any future monitoring will consist of a similar or less intensive monitoring effort than that used for the initial construction and post-development monitoring.

Monitoring Parameters and Methods

Monitoring parameters and methods to be used for this monitoring program fall into the following major categories:

- *In Situ* Physical and Chemical Measurements;
- 24-Hour Dissolved Oxygen Monitoring;
- Near-Surface and Near-Bottom Water Quality Constituents; and
- Trace Metals and Hydrocarbons in Sediments.

The parameters and methods described below are the same as those used during the previous two-baseline monitoring period, unless otherwise noted. For a listing of specific laboratory methods that will be used, please refer to the attached laboratory methods sheet.

In Situ Physical and Chemical Measurements

In situ physical and chemical parameters are to be recorded quarterly or twice per year at each sampling station (as described above), using a calibrated Hydrolab. Parameters will include:

- Water depth;
- Water temperature;
- Dissolved oxygen;
- Conductivity;
- Salinity; and
- pH.

Water column profiles from the surface to the bottom in 0.5 m increments shall be performed at each sampling station for the *in situ* measurements. A secchi disk will also be used to estimate water clarity/light penetration (secchi depth) at each station.

24-Hour Dissolved Oxygen Monitoring

Diel (24-hour) measurements of dissolved oxygen (DO) near the bottom will be completed twice per year as described above. Measurements will be recorded in 10-

minute intervals. Water temperature, salinity, and pH will be recorded simultaneously with the DO measurements. A calibrated Hydrolab will be used to collect these data.

Near Surface and Near Bottom Water Quality Constituents

The following water quality constituents shall be sampled quarterly or twice per year (as described above) near the water surface at all stations, and near the bottom at selected stations. Near-bottom samples will be collected using a Niskin bottle or similar device. Samples are to be collected, labeled, stored, and transported to a certified laboratory within 24 hours of the sampling event (or sooner as required for certain tests, e.g., fecal coliforms).

Enterococci testing in addition to fecal and total coliforms will be performed (enterococci was not monitored during the previous baseline period). Enterococci is recommended as a saltwater quality indicator. According to EPA studies, enterococci have a greater correlation with swimming-associated gastrointestinal illness in both marine and fresh waters than other bacterial indicator organisms, and are more likely to persist (survive) in marine and estuarine environments. Since regulatory FDEP criteria for enterococci do not exist, results will be compared to criteria recommended by EPA, as adopted by the Florida Department of Health's Florida Healthy Beaches Program.

Water quality constituents will include:

- Color;
- Chloride;
- Turbidity;
- NO2 + NO3 Nitrogen;
- NH3 + NH4 Nitrogen;
- Total Kjeldahl Nitrogen;
- Ortho-Phosphorus;
- Total Phosphorus;
- Chlorophyll *a*;
- Total Coliform;
- Fecal Coliform; and
- Enterococci.

Ambient Trace Metals and Hydrocarbons

Trace metals and hydrocarbons will be evaluated using sediment samples collected during the baseline event, once during the middle of the construction period and every 2 years during the post-contruction period using a standard core sampler, Ekman grab, or similar device. Sediment samples for these parameters are more meaningful than water samples, since these compounds can occur at very low concentrations and are typically quite transient in the water column. Sediment samples will be analyzed for twelve trace metals, listed below:

- Arsenic;
- Barium;
- Cadmium;
- Chromium;
- Lead;
- Mercury;
- Selenium;
- Silver;
- Zinc;
- Copper;
- Nickel; and
- Aluminum.

Sediment samples will also be analyzed for semi-volatile hydrocarbons including polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, etc. Sediments will also be analyzed for total extractable organics. Grain size analysis will also be conducted for the sediment samples.

Tidal Cycle and Rainfall Data

Tidal cycles and rainfall can be closely related to water and sediment quality results. Predicted tide chart data will be determined for the sampling period at each station. Monthly rainfall data will also be provided in relation to sampling periods and locations. Rainfall recording devices located on the airport property will be used. Field observations related to tides, weather, etc. will be recorded during all sampling events.

Biological Monitoring

In addition to the water and sediment monitoring activities described above, rapid stream assessments using the FDEP BioRecon method will be employed at each of the seven (7) newly proposed stations located near the airport project site. BioRecon assessments involve freshwater stream habitat, water quality, and macroinvertebrate field observations and sampling based on established FDEP protocols. BioRecon results are evaluated and interpreted using established macroinvertebrate community metrics and indices.

BioRecon assessments will be conducted once each during the 1) pre-construction baseline period, 2) at the completion of construction, and 3) near the termination of post-development monitoring, for a total of three (3) BioRecon sampling events. BioRecon assessments will be conducted in the same season and under similar conditions (to the degree feasible) during each sampling period. BioRecon assessments will be conducted by or under the supervision of biologists certified by FDEP in the BioRecon method. Macroinvertebrate specimen identification will be conducted or verified by a FDEP-approved laboratory.

Summary of Monitoring Program

The monitoring program, including water quality, sediment quality, and biological assessment is summarized below by monitoring phase (baseline, construction, and post-development periods) (Table 1).

Table 1. Duration, frequency, and number of monitoring events.

	Water	Sediment	Biological
Additional Baseline Sampling[1]	1 event	1 event	1 event
Construction Monitoring Duration	≤3 years	n/a	1 event
Construction Monitoring Frequency	Quarterly[2]	1 event	n/a
Construction Monitoring Total Sampling Events	12 events	n/a	1 event
Post-Development Monitoring Duration[3]	6 years	6 years	1 event
Post-Development Monitoring Frequency	Semi-annual	Every 2 years	n/a
Post-Development Monitoring Total Sampling Events	12 events	3 events	1 event
Total Monitoring Events[3]	25 events	5 events	3 events

[1]Two years of baseline data already exists
[2]Most parameters and sample types
[3]Minimum based on monitoring results

Quality Assurance/Quality Control

The organizations conducting the field sampling and sample analyses (**PBS&J** and **STL Laboratories** were involved in the baseline monitoring program) shall have and maintain required certifications and a project specific Quality Assurance / Quality Control (QA/QC) program to assure the integrity of the samples and laboratory analyses. The laboratory conducting the water and sediment analyses shall be NELAP-certified. The QA/QC program used for the baseline monitoring program will be adapted and updated for the construction and post-development monitoring.

Reporting

Quarterly/Semi-Annual Reporting

Quarterly or semi-annual reports (based on the sampling frequency described above) shall be provided to FDEP within 90 days after the end of each sampling period and the receipt of laboratory results. The reports shall include the following:

- A narrative describing the monitoring effort, tide and meteorological conditions, and monitoring results;
- A map of monitoring stations and GPS coordinates;
- A numerical presentation of the sampling data in table and/or graph form, as appropriate;
- A description of the QA/QC procedures;
- A copy of the laboratory analysis results;
- Copies of logs/reports or other documentation from the erosion/sedimentation control and turbidity monitoring program conducted under the separate NPDES permit;
- An analysis and discussion of how the monitoring results compare to baseline conditions and FDEP standards; and
- Suggested action(s), as applicable (corrective actions, termination or continuation of sampling, etc.).

Summary Reports

In addition to the quarterly or semi-annual reports, summary reports at the end of the construction monitoring and post-development monitoring periods will be provided to FDEP (two reports total). For the post-development period, the suggested termination or continuation of monitoring and the suggested need (or lack thereof) for additional monitoring corresponding to future construction phases will be addressed.

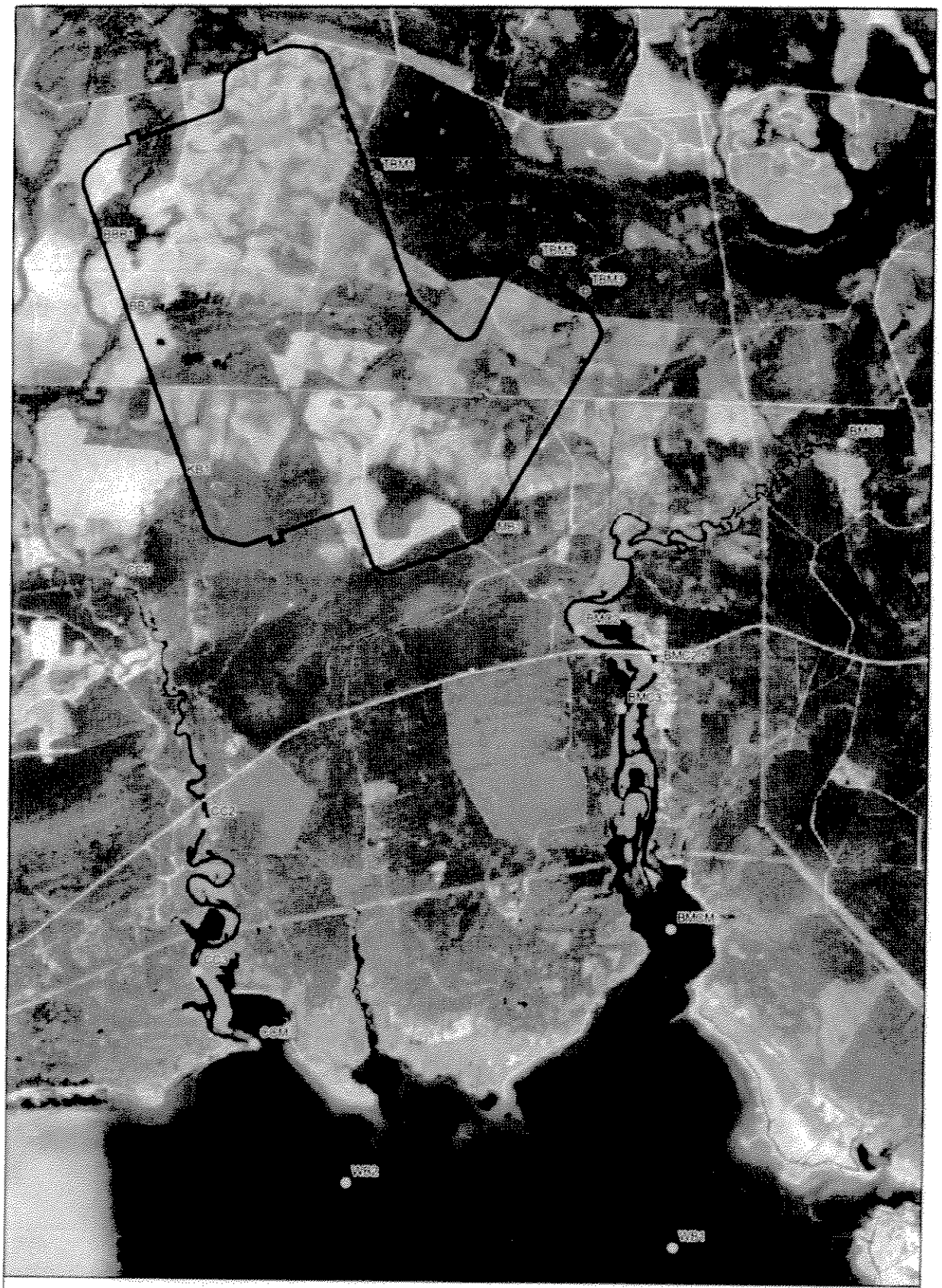

Figure 1. Water Quality Stations

SEVERN TRENT STL

METHOD SUMMARY

Client: Post, Buckley, Schuh & Jernigan (PBS&J) Job Number: 640-1258.1

Description	Method	Preparation Method
Matrix: Solid		
Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	SW846 8270C	
Ultrasonic Extraction		SW846 3550B
Ultrasonic Extraction		SW846 3550B
Inductively Coupled Plasma - Atomic Emission Spectrometry	SW846 6010B	
Acid Digestion of Sediments, Sludges, and Soils		SW846 3050B
Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)	SW846 7471A	
Mercury in Solid or Semi-Solid Waste (Manual Cold Vapor		SW846 7471A
Percent Moisture	EPA 160.3	
Matrix: Water		
Inductively Coupled Plasma - Atomic Emission Spectrometry	SW846 6010B	
Acid Digestion of Waters for Total Recoverable or Dissolved Metals		SW846 3005A
Mercury in Liquid Waste (Manual Cold Vapor Technique)	SW846 7470A	
Mercury in Liquid Waste (Manual Cold Vapor Technique)/Preparation		SW846 7470A
Chlorophyll-a	SM20 10200H	
Color, Colorimetric	MCAWW 110.2	
Turbidity, Nephelometric	MCAWW 180.1	
Chloride (Colorimetric, Automated Ferricyanide, AAI	MCAWW 325.2	
Nitrogen (Ammonia, Colorimetric, Automated Phenate)	MCAWW 350.1	
Nitrogen, Total Kjeldahl (Colorimetric, Semi-Automated Block Digester, AAII)	MCAWW 351.2	
Nitrogen, Total Kjeldahl (Colorimetric, Semi-Automated Block Digestor AAII)/Prep		MCAWW 351.2
Nitrogen, Nitrate-Nitrite (Colorimetric, Automated, Cadmium Reduction)	MCAWW 353.2	
Phosphorus, orthophosphate, Colorimetric, Single Reagent	MCAWW 365.2	
Total Phosphorus	EPA 365.4	
Sample Digestion for Total Phosphorous		MCAWW 365.2/365.3
Multiple-Tube Fermentation Technique - Fecal Coliform Procedure	SM18 9221E	
General Sub Contract Method	Subcontract	

SEVERN TRENT STL

METHOD SUMMARY

Client: Post, Buckley, Schuh & Jernigan (PBS&J) Job Number: 640-1258.1

Description	Method	Preparation Method

REFERENCES

EPA - US Environmental Protection Agency

MCAWW - "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM18 - "Standard Methods For The Examination Of Water And Waatewater", 18th Edition, 1992.

SM20 - "Standard Methods For The Examination Of Water And Wastewater", 20th Edition.*

SW846 - "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.