

STATEMENT OF WORK

SOUTH MIAMI-DADE ISSUE COORDINATION AREA STATISTICAL ANALYSIS

1.0 INTRODUCTION/BACKGROUND

The South Florida Water Management District (DISTRICT) has set up a database for South Miami-Dade County projects which includes hydrology, water quality, geographic and regulatory data. The South Miami-Dade Issues Coordination Area (Project) has multiple ongoing projects with multiple objectives. The Project is located in southeast Miami-Dade County south of the C-4 canal, east of the L31W levee and includes DISTRICT water within Florida Bay and Biscayne Bay (Figure 1.). Initial evaluations of the area revealed that there were problems with data accessibility (spread across different agencies and databases). A data scrub was completed under a separate work order to support the development of a dedicated database for the Project. The next step for the selected consultant (CONSULTANT) is to conduct statistical analyses of the scrubbed database to evaluate correlations between salinity and hydrologic data.

2.0 OBJECTIVES

The objectives of this Statement of Work (SOW) are to perform appropriate statistical analyses of screened/scrubbed data in the dedicated South Miami-Dade database that identify temporal and spatial correlations between hydrologic and water quality (salinity) data for the Project area. These data have been collected for many years by several agencies and are characterized by varying levels of sampling duration, frequency, spatial distribution, and quality.

3.0 SCOPE OF WORK

The Project Area is bounded by the following decimal degrees of latitude and longitude: 25.8273, -80.6141 and 24.9500, -80.1118. The Figure 1 map boundary outlines the specific Project area.

The Project shall include the following hydrologic data types and approximate number of stations:

- Groundwater:
 - Level – 300 stations
 - Salinity (or surrogate parameters) – 250 stations
- Surface water:
 - Stage(headwater/tailwater) in canals – 200 stations
 - Flow (at canal structures) – 50 stations

- Water quality (salinity or surrogate parameters) in canal and Biscayne Bay – 250 stations
- Meteorological (rainfall) – 50 stations

The following parameters can be used as surrogates for salinity:

- chlorides
- total dissolved solids
- conductivity (uncorrected for temperature)
- specific conductance (corrected for 25°C)

The stations with data to be statistically analyzed under this Purchase Order are included in Appendix A: USGS Daily Water Wells, USGS Real Time Sites, Discrete Salinity Sampling, Continuous Salinity Sampling Stations, Calibration Wells and Gages, DBHYDRO Rain Gauge Monitoring Stations, DBHYDRO Stage Monitoring Stations, and DBHYDRO Flow Monitoring Stations. In general, these data sets are comprised of continuous data collected for the period of interest: January 1, 2000 through December 31, 2009 with varying sampling frequencies. Some stations and data types currently have breakpoint (or instantaneous values) whereas others express data as a daily average, daily sum, or other regular discrete sampling intervals.

Salinity data sets may not have the regular frequency or continuity of the hydrologic data sets but are merged to complete the best record available within the period of interest. Typically, surface and groundwater quality sampling is performed on a monthly basis.

The set of stations for each data type has been prescreened by DISTRICT staff and provides the source databases, required station or site identification, and defined data type to facilitate the compilation of data. Appendix A consists of maps of the prescreen stations for each of the data types and sources. ESRI shapefiles which contain the associated metadata can also be provided in electronic format to the CONSULTANT.

The CONSULTANT shall provide the Project Management and coordination for the activities performed under this Purchase Order. The CONSULTANT shall monitor labor utilization, Project schedule, and Project budget on a regular basis. It shall be the ongoing responsibility of the CONSULTANT'S Project Manager (CPM) to ensure that task budgets are being strictly adhered to and that deliverables are submitted to the District on time. The CPM shall be fully responsible for the performance of the CONSULTANT'S team, including sub-consultants, for this Purchase Order.

All submittals, including memoranda, reports and studies, shall undergo quality management reviews in accordance with the CONSULTANT'S documented QA/QC processes for the Project. The purpose of the QC review is to verify that the resulting deliverables meet acceptable practice and that the documents have been properly coordinated to the satisfaction of the DISTRICT. The QC reviewer shall inform the

Project team of any exception or proposed improvement that may be noted. QC reviews shall be provided for all submittals. The QC reviews shall be conducted prior to submittal to allow time for incorporation of any recommended revisions.

4.0 WORK BREAKDOWN STRUCTURE

The following Work Breakdown Structure describes the objectives of data analyses to be performed by the CONSULTANT for this Purchase Order.

Task 1.0 – Kick-off Meeting

The CONSULTANT shall participate in a kick-off meeting with the DISTRICT project team at DISTRICT Headquarters in West Palm Beach, Florida. The objectives of the kick-off meeting are to review contract terms including project scope, schedule, and deliverables; provide results of the database scrub performed under a separate contract; and provide background documentation on the ongoing surface water and groundwater investigations in South Miami-Dade County. Preliminary discussion of proposed statistical analyses shall also be provided. Data provided to the CONSULTANT will include time-series data sets from the prescreened monitoring stations identified in Appendix A, limited to the period of interest, 1/1/2000 through 12/31/2009. (*Note: the time-series data sets provided to the CONSULTANT are referred to as the “scrubbed” data sets in this SOW.*) After the kick-off meeting, the CONSULTANT shall document the key assumptions and statistical approaches discussed during the meeting.

- **Deliverable:**
 - 1.0 Kick-off Meeting

Task 2.0 – Exploratory Statistical Data Analysis

The CONSULTANT shall conduct an exploratory statistical analysis on the scrubbed data sets for the period of interest, 1/1/2000 through 12/31/2009. For hydrologic, meteorological and water quality data, the CONSULTANT shall use appropriate statistical methods, including but not limited to graphics, correlation analysis, regression and time series analysis, to:

- 1) Quantify the correlations between stations for “*same*” data types (e.g., groundwater to groundwater, etc.) during the *period of interest*
- 2) Quantify the correlations between stations for “*different*” data types (e.g., groundwater to rainfall, etc) during the *period of interest*
- 3) Conduct appropriate evaluations of the data sets to determine and describe any significant lags for Items 1 and 2
- 4) Quantify the correlations between stations for “*same*” data types during “*wet*” and “*dry*” seasons the *period of interest*
- 5) Quantify the correlations between stations for “*different*” data types (e.g., groundwater to surface water, etc) during “*wet*” and “*dry*” seasons the period of interest

- 6) Express/quantify the relationship between a given station's data as a function of neighboring stations' data (*different and same* data types should be used for this analysis). For example, Station A's groundwater level can be explained by X percent of rainfall, Y percent of the neighboring groundwater station level and Z percent by canal stage. The remaining percent ($100 - X - Y - Z$) would be unexplained or random.

For the purposes of this analysis, the "wet" season will be defined as May 1st – October 14th and the "dry" season is defined as October 15th – April 30th.

Written justification shall be provided for all statistical methods used. Distributional assumptions of any statistical method used must be verified. It is understood that some correlations/relationships identified in this task may be spurious and may not represent meaningful environmental conditions.

- **Deliverables:**
2.0 Exploratory Statistical Data Analysis and Report

Task 3.0 – Review Meeting of Exploratory Statistical Data Analysis

The CONSULTANT shall attend a meeting at the DISTRICT headquarters in West Palm Beach with DISTRICT technical staff (including a hydrogeologist). The purpose of the meeting is to: 1) review results of the exploratory statistical data analysis, 2) identify all spurious/non-meaningful correlations (i.e., stations that show a statistical correlation when the correlation should not exist.) in consultation with DISTRICT technical staff, and 3) review CONSULTANT'S recommendations and conclusions resulting from the exploratory statistical analysis including proposals for additional and or refined analyses to be conducted under Task 4.0. The DISTRICT shall provide direction to the CONSULTANT on the recommendations provided as a pre-requisite to Task 4.0. After the meeting, the CONSULTANT shall summarize the strategy for refining the statistical analysis along with all relevant conclusions resulting from the meeting, in a letter to the DISTRICT for review and approval prior to the CONSULTANT proceeding with Task 4.0.

- **Deliverable:**
3.0 Exploratory Analysis Review Meeting

Task 4.0 – Focused Statistical Analysis

The CONSULTANT shall conduct a focused statistical analysis based on the results of Task 2.0 and input from DISTRICT staff in Task 3.0.

- **Deliverable:**
4.0 Focused Statistical Analysis and Report

Task 5.0 – Review Meeting of Focused Statistical Analysis

The CONSULTANT shall attend a meeting at the DISTRICT headquarters in West Palm Beach with DISTRICT technical staff. The purpose of the meeting is to: 1) review results of the focused statistical analysis, 2) discuss conclusions and recommendations resulting from the analysis. After the meeting, the CONSULTANT shall summarize the results of the focused statistical analysis along with all relevant conclusions resulting from the meeting, in a letter to the DISTRICT for review and approval prior to the CONSULTANT proceeding with Task 6.0.

- **Deliverable:**
5.0 Focused Analysis Review Meeting

Task 6.0 – Draft Final Statistical Analysis Report

The CONSULTANT shall provide a Draft Final Statistical Analysis Report (to the DISTRICT for review) based on the results of all previous tasks. The report shall include a description of the data sets used, the methodologies used and the rationale for methods, conclusions based on the results of the analyses, and recommendations for any further analyses, if appropriate. Any figures used in the report shall be accompanied by the data sets used to generate them in an approved electronic format. In addition, the CONSULTANT shall also provide the final data sets used for all analyses in electronic format.

- **Deliverable:**
6.0 Draft Final Statistical Analysis Report

Task 7.0 – Final Statistical Analysis Report

A Final Statistical Analysis Report addressing DISTRICT comments shall be provided within a two-week period from reception of consolidated DISTRICT comments.

- **Deliverable:**
7.0 Final Statistical Analysis Report

5.0 PERFORMANCE

The CONSULTANT's performance for this Purchase Order shall be evaluated by the DISTRICT Project Manager (PM) at the following frequencies:

1. Quarterly
2. Final
3. Additional evaluations as determined by the DISTRICT PM

A Running Average Score ≥ 3.0 is required to maintain active contract status.

6.0 DELIVERABLES

The CONSULTANT shall provide each Deliverable in both written and electronic formats to the DISTRICT, except as noted. All technical references used in completing the work shall be documented by the CONSULTANT. Depending on the Deliverable, the CONSULTANT shall provide it in MSWord, MS Excel, MS Access, AutoCAD, ArcGIS, or Metadata format compatible with DISTRICT software versions as appropriate. Files provided by the CONSULTANT shall have no spaces in the file name, but may include a dash or an underscore as a replacement for a space. The CONSULTANT shall provide reports in a completed format with all tables and figures included in the file(s) of the report as appropriate. Appendices can be provided as separate file(s) but all figures and tables within each appendix must be included in that same file(s). Additionally, the CONSULTANT shall provide full reports and plans as Adobe PDF files.

The numbers and types of copies for the submittals shall be as stated under the specific task for the respective submittal. If not specified in the Deliverable Five (5) hardcopies and five (5) electronic copies (MS Word, MS Excel, and Acrobat PDF) on CD-ROM shall be provided for each final technical memorandum and final report deliverables. One (1) electronic copy of meeting notes shall be transmitted to the DISTRICT PM by email within five (5) business days of the meeting. The CONSULTANT shall coordinate with the DISTRICT PM prior to delivery for direction on any potential adjustment to the number of copies. Any SAS or other statistical analysis programming code developed by the CONSULTANT shall be available for review by the DISTRICT upon request.

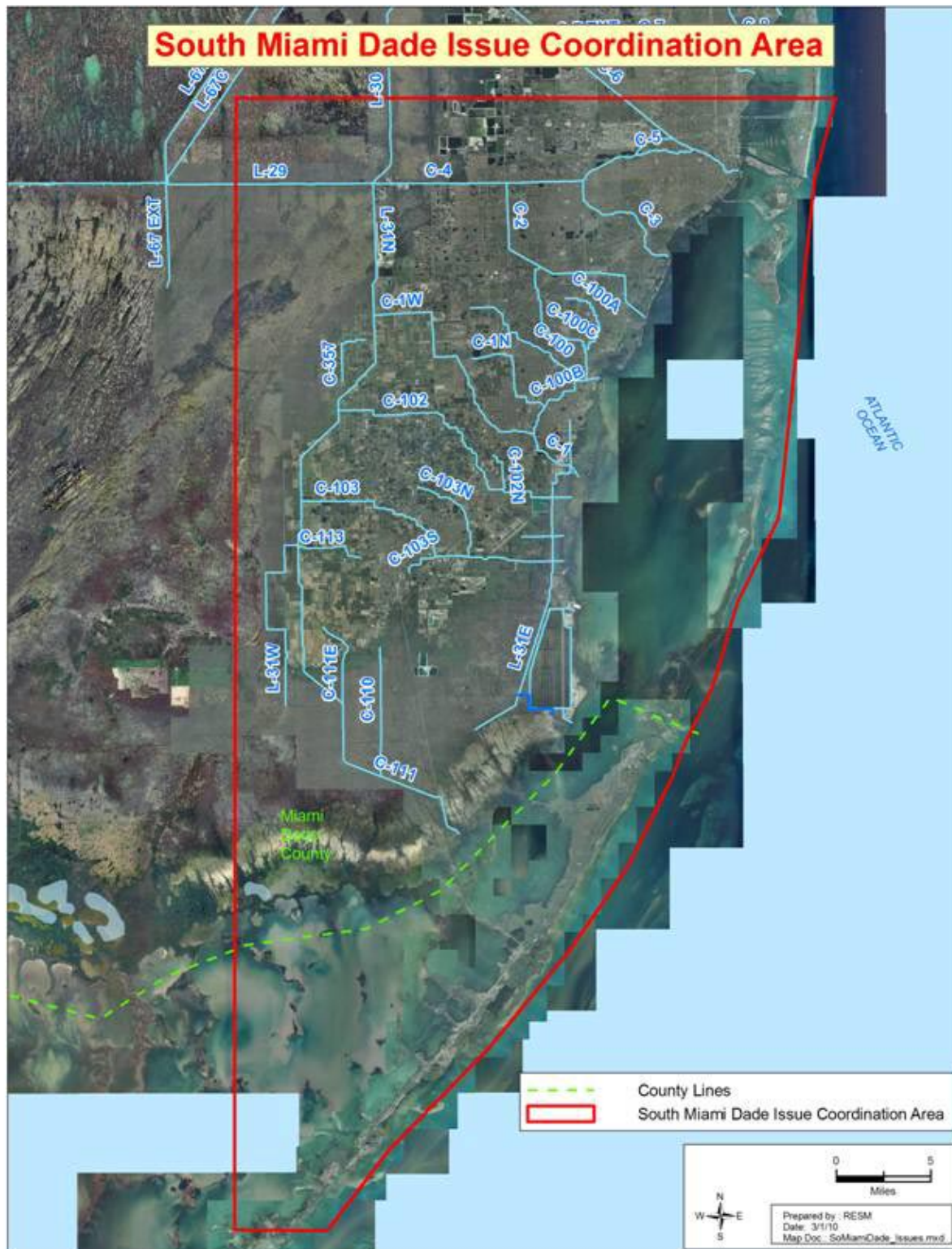
Following completion of Task 3.0, the DISTRICT will determine whether and how the CONSULTANT should proceed with subsequent tasks. The DISTRICT reserves the right to discontinue the project and cancel the remaining tasks; in which case, the CONSULTANT hereby agrees that the DISTRICT shall have no further obligations regarding subsequent tasks described herein. In the event the DISTRICT determines the Purchase Order should continue, the DISTRICT will provide the CONSULTANT with written Notice to Proceed along with appropriate technical direction.

7.0 PAYMENT AND DELIVERABLES SCHEDULE

Payment shall be made on a fixed price basis in the fixed amounts specified below for each deliverable following receipt and acceptance by the DISTRICT.

Payment and Deliverables Schedule Table

South Dade Statistical Evaluation			
Deliverable	Description	Due Date	Amount Due
1.0	Kick-off Meeting Summary	August 25, 2010	\$7,600
2.0	Exploratory Statistical Data Analysis and Report	October 6, 2010	\$12,000
3.0	Exploratory Analysis Review Meeting	October 13, 2010	\$3,000
4.0	Focused Statistical Data Analysis and Report	November 17, 2010	\$4,000
5.0	Focused Analysis Review Meeting	December 1, 2010	\$2,000
6.0	Draft Final Statistical Analysis Report	December 15, 2010	\$4,000
7.0	Final Statistical Analysis Report	December 29, 2010	\$2,000
TOTAL			\$34,600



Appendix A

