Sand Sampling & Chemical Analysis Plan

A. Introduction

In late-April and early May, 2014, three samples of sand used for beach renourishment were collected by the Town of Surfside, and by TerraCon Consultants. Those sand samples were collected at 88th St. and 94th St, and were analyzed for Total Recoverable Petroleum Hydrocarbons (TRPH), as well as arsenic, aluminum, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc. Of all those analytes, only the arsenic concentrations of 7.0, 7.8 and 8.9 milligrams per kilogram (mg/kg) in the three sand samples exceeded the default residential Soil Cleanup Target Level (SCTL) of 2.1 mg/kg, as set by the Florida Department of Environmental Protection and by Miami-Dade County. The 2.1 mg/kg guideline assumes simultaneous oral, dermal, and inhalation exposure for 350 days/year and for 30 years, including both children and adults. That level represents a conservative, acceptable health-based target level with a reasonable margin of safety that is quite unlikely to underestimate risks. Other protective values are available for comparison. The three results were within the range of sand concentrations reported in the Miami-Dade County natural background study described in the following paragraph.

Based on an evaluation of the Terracon data, the Florida Department of Health (FDOH) has concluded that there was not a significant increased health risk related to exposure to arsenic in the beach sand, even assuming lifetime exposure. That FDOH conclusion supplemented the statement of Dr. Samir Elmir, Ph.D, P.E., Director of Environmental Health & Engineering Services for the Florida Department of Health in Miami-Dade. In addition, Mr. Wilbur Mayorga, P.E., Chief of the Environmental Monitoring and Restoration Division of the Miami-Dade County Department of Environmental Resources Management (DERM) concluded that the results are consistent with natural arsenic levels on the barrier island beaches in Miami-Dade County, which showed values as high as 15.1 mg/kg. Naturally occurring background is indicative of conditions that are geological in origin and do not represent human activities.

Subsequent to the TerraCon and Town of Surfside sample collection, Kimley-Horn in May 2014 collected 14 additional samples of surficial beach sand at locations from South

Point (just to the north of Government Cut), northward to just beyond Haulover Inlet. Those samples did not include samples of the renourishment sand in the Town of Surfside. The 14 samples ranged in arsenic concentration from 2.0 to 11.0 mg/kg. Results were all within the range of sand concentrations reported in the Miami-Dade County natural background study.

This Sand Sampling & Chemical Analysis Plan has been developed in cooperation with the Surfside Sand Committee to assist the Town of Surfside in reaching decisions concerning the chemical characteristics of sand that was used from the Surf Club reconstruction project in April, 2014 for beach renourishment within the Surfside town limits. The objective of this Sampling & Chemical Analysis Plan is to permit a valid comparison between the chemical character of the renourishment sand and the chemical character of the native beach sand which was present prior to the additions made during the renourishment project.

B. Number and Location of Sand Samples

A total of 60 individual samples are proposed for collection from 38 separate locations as shown on Figure 1 and Figure 3. Seventeen sample locations will be established in the beach renourishment area located between 88th St. and 96th St. in the Town of Surfside, FL. Sixteen sample locations will be established in the dune areas located between 88th St. and 96th St. Five sample locations will be established at publicly accessibly locations outside the Town of Surfside. Samples from the beach grid line and the publicly accessible non-Surfside locations will be collected in the renourishment area (or its equivalent for the non-Surfside locations) approximately 20 feet to the east of the dune/vegetation line. Samples from the Surfside dune grid line will be collected approximately 10 feet to the west of the dune/vegetation line (Figure 2). Samples from non-Surfside locations will be collected from Park locations as shown on Figure 3.

Each beach location (Surfside and non-Surfside) will be sampled at two (2) depth intervals, as described in the following bullet points. Intervals may vary somewhat from location to location, given irregularities in renourishment sand layer thickness.

- Interval 1 – Sample will be a composite collected from the 0 to 6 inch vertical depth interval below land surface, to characterize renourishment sand; and,
- Interval 2 – Sample will be a composite collected from the 6 inch vertical depth interval immediately above the water table, measured at high tide, to characterize the native beach sand at depth.

Each dune location will be sampled at one (1) depth interval, from the 0 to 6 inch depth interval below land surface, to characterize the native beach sand at the surface. Sample locations may be adjusted laterally to avoid damaging the vegetation and to ensure that the sample is free of plant roots.

C. Chemical Analysis of Samples

Each sample will be analyzed for four (4) categories of substances, as described in the following bullet points. Analytical categories were selected based on review of previous sample results, historical information, and stated interest by some Town of Surfside residents at public meetings. An experienced environmental firm ("Contractor") and certified analytical laboratory will be selected by the Committee. Samples will be collected by the Contractor as described in Section B, and delivered to a certified laboratory for analysis, with appropriate Chain of Custody documentation.

- "RCRA 8" metals with extraction by USEPA Method 3050 and analysis by USEPA Method 6010 or 200.7 (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver). Data will be expressed in mg/kg. *Rationale: environmental persistence, ongoing interest in arsenic and comparison to naturally occurring background; ongoing interest in lead as it relates to historical activities and prior sampling conducted at Surf Club property;*
- Total Recoverable Petroleum Hydrocarbons (TRPH) by Florida Department of Environmental Protection (FDEP) FL-PRO method. Data will be expressed in mg/kg. *Rationale: inclusion in prior renourishment sand sampling, potential relationship to historical activities at Surf Club property;*
- Chlorinated hydrocarbon pesticides by USEPA Method 8081, specifically aldrin, chlordane, dieldrin, endrin, heptachlor, and the DDT/DDD/DDE group. Data will be expressed in mg/kg. *Rationale: environmental persistence and ongoing interest in potential historical use at Surf Club property;* and,
- Polychlorinated biphenyls (PCBs) by USEPA Method 8082 (i.e., Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260). Data will be expressed in mg/kg. *Rationale: environmental persistence, ongoing interest in potential historical use or release of fluids from PCB-containing electrical transformers at Surf Club property.*

Alternatively, USEPA Method 8270 may be used to capture the analytes listed in both the third and fourth categories.

Appropriate Quality Assurance/Quality Control (QA/QC) procedures will be followed by the firm selected for the sampling, per the applicable Florida Department of Environmental Protection (FDEP) standard protocols (FDEP SOP FS 3000 Soil, available online at *http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/fs3000.pdf*; FDEP SOP FQ 1000 Field Quality Control Requirements, available online at *http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/fq1000.pdf*).

D. Data Presentation & Analysis

The sand analytical data will be summarized in tabular form by sample location and by depth interval. Chemical analysis results will be evaluated by appropriate statistical procedures to assess whether there are significant differences in concentrations between sand intervals and horizontal locations (i.e., dune sand vs renourishment sand). Comparisons will be conducted between beach vs. dune shallow zone samples, as well as between beach shallow vs beach deeper zone samples.

It is recommended that the 95% Upper Tolerance Limit (95% UTL) for individual metals, as identified by Miami-Dade County in the 2004 study entitled "Natural Background Soil Concentrations for the Barrier Islands of Miami-Dade County", be used to assess similarity of measured sand concentrations with existing background concentrations. The UTL regularly is used by regulatory agencies such as USEPA, and the states of TX, GA, MT, MO, OH, and ID, as a measure of background soil conditions. To the extent that concentrations exceed Miami-Dade County natural background, they will be compared to existing health-based guidance criteria for soils as established by relevant agencies (e.g., Florida Department of Environmental Protection, Miami-Dade County Environmental Resources Management, Florida Department of Health).

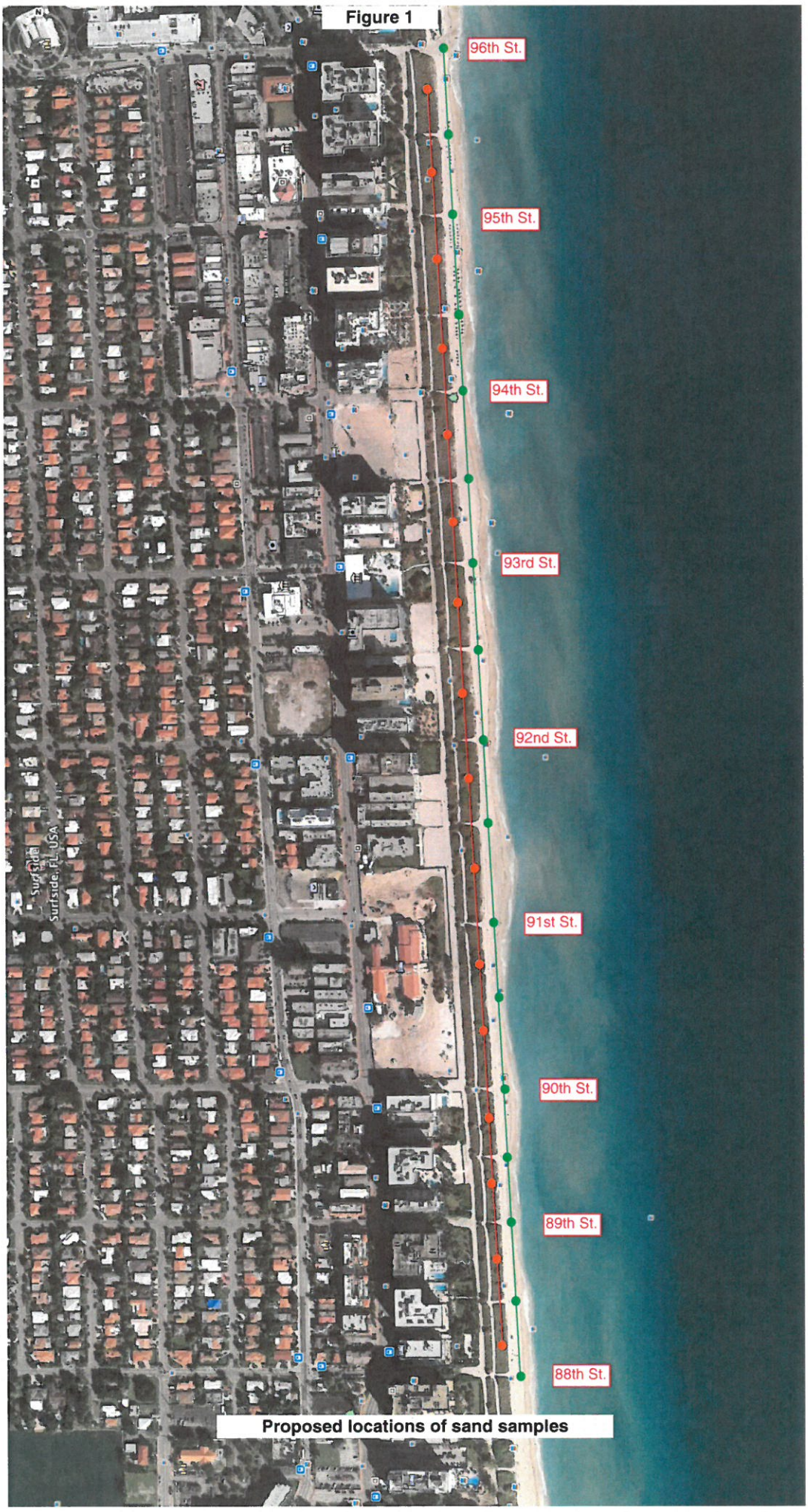
Figure 1
96th St.
95th St.
94th St.
93rd St.
92nd St.
91st St.
90th St.
89th St.
88th St.
Surfside
Surfside, FL, USA
Proposed locations of sand samples

Figure 2

Proposed criteria for sample node locations

Figure 3
Non-Surfside Sand Sampling Locations