

DEPARTMENTAL INPUT
CONTRACT/PROJECT MEASURE ANALYSIS AND RECOMMENDATION

☒ New Contract ☐ OTR ☐ Sole Source ☐ Bid Waiver ☐ Emergency
☐ Re-Bid ☐ Other

Previous Contract/Project No.

229115 – RTQ-01055

LIVING WAGE APPLIES: ☐ YES ☒ NO

Requisition No./Project No.: **229115**

TERM OF
CONTRACT

Requisition /Project Title: **2020 SALTFRONT WELLS**

Description: **SALTFRONT WELLS FOR USGS TO ENSURE MOVEMENT OF SALT FRONT**

Issuing Department: **WASD**

Contact
Person:

Basdeo Budhram

Phone:

786-268-5703

Estimate Cost:

GENERAL FEDERAL

OTHER

Funding Source:

ANALYSIS

Commodity Codes: **96893**

Contract/Project History of previous purchases three (3) years
Check here ☐ if this is a new contract/purchase with no previous history.

EXISTING

2ND YEAR

3RD YEAR

Contractor:

Small Business Enterprise:

Contract Value:

\$416,100.00

Comments:

WASD NEEDS TO ENSURE THE MOVEMENT OF SALTFRONT FOR USGS
NOTE: THIS PROJECT WAS REVIEW AND APPORVED. THE PROJECT WORK SHEET WAS PROVIDED BY SBE
UNDER R-213998.
THE BIDS WAS REJECTED AND WILL BE R-SUBMITTED USING REQ# R-229115.

Continued on another page (s): ☐ Yes ☐ No

RECOMMENDATIONS

	Set-aside	Sub-contractor goal	Bid preference	Selection factor
SBE			x	

Basis of
recommendation:

Signed: **Jennyfer Calderon**

Date sent to SBD:

Date returned to PMS:

SCOPE OF WORK, Phase VII, Saltfront Wells 2020

Project Title: SEAWATER ENCROACHMENT ASSESSMENT AND MONITORING NETWORK IMPROVEMENTS, MIAMI-DADE COUNTY, FLORIDA AND PLUGGING AND ABANDONING AQUIFER STORAGE RECOVERY (ASR) WELLS PAD MONITORING WELLS AT SOUTHWEST WELLFIELD AND WEST WELLFIELD

Task Title: 1. Installation (drilling) of five Salt-Front Monitoring Wells, the monitoring wells IDs are: SF20-2, SF20-3, SF20-4, SF20-5 and SF20-6. Three monitoring wells (**SF20-4, SF20-5 and SF20-6**) will not require coring and only two of these wells (**SF20-2 and SF20-3**) will require coring. Please note that there is NO monitoring well SF20-1, therefore there are only 5 saltfront monitoring wells in this Task 1 of this scope of work.

Task Title: 2. Replace damaged shallow monitoring well G-354R as a 2-inch PVC well, 91ft deep, with no coring.

Task Title: 3. Plugging and abandoning shallow Pad monitoring wells at the Aquifer Storage Recovery (ASR) Wells sites.

Purpose

1. Seawater encroachment continues to represent a major threat to the freshwater resources of coastal Miami-Dade County. The installation of these five wells will help to further delineate the extent of saltwater intrusion in areas where the saltwater front is currently estimated, to better define the saltwater front in areas where existing monitoring wells are already on the saltwater side of the front, and to better understand the hydrology of the Biscayne aquifer along the salt front.
2. Install a replacement shallow 2- inch PVC monitoring well near the airport, G-354R.
3. Plug and abandon 20 shallow ASR Wells pad monitoring wells at the Southwest Wellfield and the West Wellfield.

Task Objective

1. Drill two salt front monitoring wells using a 4-inch wireline coring device and collect lithologic core samples for SF20-2 and SF20-3. Wells SF 20-2 and 20-3 must have a stable borehole for geophysical data collection. Then Drill three (20-4, 20-5, 20-6) salt front monitoring wells, that can be drilled with a conventional drill bit but they must fully penetrate the Biscayne aquifer and have a stable borehole for geophysical data collection (fig.1). Each well will be screened at the bottom of the deepest transmissive layer within the Biscayne aquifer, and additional sample tubes and filter packs may be installed in shallower flow zones.
2. Install a replacement shallow 2- inch PVC monitoring well near the airport, G-354R. This well will be drilled to 91 ft and does not require coring.

3. Plug and abandon eight (8) ASR Pad monitoring wells at Southwest wellfield (SWWF) and twelve (12) ASR Pad monitoring wells at West wellfield (WWF). The SWWF has two (2) Aquifer Storage Recovery (ASR) wells with corresponding four wells at the corner of each pad. The WWF has three (3) Aquifer Storage Recovery (ASR) wells with four wells also at the corner each pad. The 2-inch Schedule 40 PVC pad monitoring wells were constructed with a total depth of 15 to 20 ft and 5-foot screen in a 6-inch borehole diameter.

I. General Information and Overview

1.1 Scope of Work

1.1.1 TASK 1

The **First Task** requires the installation of 5 saltfront monitoring wells as follows:

1. Using a wireline coring device drilling a 6-inch borehole to a depth of **350 ft** bls for logging and to construct the well with a 2-inch PVC casing. For this well it will be required continuous collection of both 4-inch core and unconsolidated sediment samples. **This well's ID is SF20-2** (Yellow pin in **Figure 1**).
2. Using a wireline coring device drilling a 6-inch borehole to a depth of **150 ft** bls for logging and to construct the well with a 2-inch PVC casing. For this well it will be required continuous collection of both 4-inch core and unconsolidated sediment samples. **This well's ID is SF20-3** (Yellow pin in **Figure 1**).
3. Drilling a 6-inch borehole to a depth of **120 ft** below land surface (bls) for logging and to construct the well with a 2-inch PVC casing, no coring is required for this well. **This well's ID is SF20-4** (Yellow pin in **Figure 1**).
4. Drilling a 6-inch borehole to a depth of **120 ft** bls for logging and to construct the well with a 2-inch PVC casing, no coring is required for this well. **This well's ID is SF20-5** (Yellow pin in **Figure 1**).
5. Drilling a 6-inch borehole to a depth of **150 ft** bls for logging and to construct the well with a 2-inch PVC casing, no coring is required for this well. **This well's ID is SF20-6** (Yellow pin in **Figure 1**).

It is the intent of this project to drill into at least 20 feet of the uppermost part of the semi-confining unit beneath the Biscayne aquifer as determined by the site geologist for each deep test borehole. Therefore, the actual depth of the test borehole will vary, based on site aquifer properties. It is assumed that total depths of boreholes will vary from 120 feet to 350 feet BLS. The Miami-Dade WASD and the United States Geological Survey (USGS) will oversee the completion of the drilling contract. Actual geologic conditions may require changes to the drilling process described here. The Site geologist, Maria

Macfarlane or Sonia Villamil, will determine any changes to the planned work in consultation with the driller.

All core samples must be stored in 2-foot long, approximately 4-inch high, and approximately 8-inch wide cardboard boxes (appropriate box for core size) designed for core long-term storage, provided by the drilling contractor, and to the specifications of the USGS well-site geologist. The boxes will be labeled by the USGS with the site name, sample depth, sample ID, top, and bottom. All cores shall be identified in the box with top, bottom, sample depth, and appropriate color (black and red) vertical lines marked with a paint pen per USGS-CFWSC Davie standards to identify core orientation by USGS staff.

Each test borehole will be completed as a 2-inch monitoring well and prior to drilling/coring will have a temporary 8 or 10-inch diameter (as determined by the site geologist) schedule 40 PVC surface casing within a 12 or 14-inch diameter borehole, installed from the land surface to the depth where it is necessary to begin initial 4-inch wireline coring, (about 5- to 10-feet below land surface, but could be as deep as 80 feet). If temporary casing cannot be removed it may be grouted as needed, trimmed below grade, and left in place.

Upon completion of drilling each test borehole, if OBI logging is to be conducted, the CONTRACTOR will airlift the borehole with compressed air to remove excess sand and cuttings, so as (1) to prevent the borehole from filling in, (2) to clear the water filling the borehole of particulate, and (3) to develop flow within the well. USGS staff will log each borehole with geophysical tools, collect digital image logs of the borehole wall, and measure hydraulic properties of the borehole with flow meter logs. The CONTRACTOR will clear the borehole at their expense if bridging or sand infilling occurs. If a sand layer is discovered within the limestone bedrock an attempt will first be made to clear the hole using the airlift. If that fails, the CONTRACTOR in consultation with the USGS and WASD will do the following: If the sand is in the lower part of the aquifer, the CONTRACTOR will raise the drill casing to a point just below the deepest sand bed of the Biscayne aquifer and air lift the open hole, so that geophysical and optical logging can be conducted over that part of the borehole where competent rock was drilled and the borehole remains open. After logging, the CONTRACTOR will raise the drill casing and airlift the remaining open hole of the borehole for preparation of geophysical and optical logging. The staged airlift may be done up to three times for the borehole in order to airlift and collect geophysical and optical logs over the competent parts of the borehole. If the sand is in the upper part of the aquifer near the surface, temporary slotted PVC casing may be installed down to competent rock below the sand. The borehole will then be airlifted and logged. The temporary casing will be removed during construction of the monitoring well. If significant sand as determined by the site geologist exists, then logging will be done in the completed well.

The CONTRACTOR will be responsible for producing a straight and stable hole filled with clear ground water to be used for geophysical logging and construction of the five monitoring wells. Drilling of borehole that are not cored should be done with the same drilling casing and a casing advancer. Use of a roller bit to drill the non-cored well is not recommended, and if used, the driller must ensure the borehole is straight, roller bit does not "walk" in cavities creating a crooked borehole and does not impede borehole

geophysical logging. If the borehole drilled with a roller bit is not straight, the contractor will run 6-inch casing to TD at their own expense to straighten the borehole for logging. If the borehole collapses prior to or during borehole geophysical logging, the CONTRACTOR will be responsible for adequately clearing out the borehole for successful logging operations (meaning that all specified tools reach the total depth in a continuous manner, record the appropriate data, and are successfully retrieved). Any downtime related to geophysical logging problems (e.g. probe stuck down-hole, or bridging) is the responsibility of the CONTRACTOR. The expected time required for the USGS to complete the logging is 2 days. Logging should be finished by noon the second day and based on the logs, the USGS will design the well construction plan, therefore, it is estimated that well construction will begin the next working day. No drill crew support will be needed during logging, therefore no stand by time will be available for the drill crew during the logging activities.

Upon successful completion of geophysical logging, the monitoring well will then be constructed per section 3.5 and figures 2 and 3 (again, additional smaller diameter wells in the same bore hole may be added at additional cost). All monitoring wells will be protected by flush mount 15-inch diameter 'meter' type protective boxes (or other size as approved by the site geologist) and concrete pad. Each completed monitoring well opening will be protected inside the wellhead protector with a 2-inch locking cap. The CONTRACTOR will be responsible for installing straight, stable, unbent, unbroken, properly sealed, monitoring wells. The main 2-inch diameter deep monitoring well at each salt front site, must allow a 62.2-inch-long by 1.5-inch diameter induction probe to be lowered smoothly down the well. The CONTRACTOR will be responsible for properly developing monitoring wells per EPA guidelines (Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring wells, EPA/600/4-89/034). If the monitoring wells fail to provide proper communication with the aquifer materials, or if the installed casings and screens are damaged, obstructed, separated, or bent during installation to the extent that they do not meet these specifications, the CONTRACTOR will be responsible for correcting the installations at their expense.

The approximate locations of the five sites have been established and are shown in figure 1. The sites are accessible by a truck-mounted drill-rig, though one of the sites, SF20-5, is along a dirt road in the Model Lands wetlands. Therefore, the CONTRACTOR will evaluate accessibility and consider any necessary measures in their bid. The boreholes may not be located adjacent to a water supply and may require the use of a water truck. The water truck can be filled from fire hydrants with the use of a WASD flow meter. A shallow supply well may also be drilled for water supply at remote sites (SF20-5) but must be abandoned properly by the contractor. WASD and the USGS will provide an on-site geologist during drilling operations to oversee collection of field samples and data, and to oversee well development, and well construction operations. WASD reserves the right to terminate the contract without any further restitution other than payment for services rendered and material installed.

The contractor can visit these 5 saltfront wells sites at anytime without WASD or USGS assistance, however, it is recommended to coordinate with WASD and or the USGS to visit the site located in the Model Lands (SF20-5).

1.1.2 TASK TWO

The **second task** requires the following:

The drilling of one replacement monitoring well **G-354R**, a 2" Schedule 40 PVC well cased to the depth of 91 ft bls with a 5-ft screen at the bottom, no coring or logging will be needed for this well.

1.1.3 TASK THREE

The **third task** requires the following:

To plug and abandon all the Pad monitoring wells at the SWWF and WWF ASR wells pads (a total of 20 shallow monitoring wells). It includes cementing the wells with Type II neat cement to surface and cut the top casing.

1.2 Permits and Utility Clearance

WASD will acquire all land access agreements and permits to enter onto and construct the monitoring well. The CONTRACTOR shall be responsible to obtain any other local, state, or federal drilling permits or occupational licenses, to obtain clearance from all applicable utilities, and to provide notification to local municipalities prior to the start of drilling operations. All site visits with a utility representative are the responsibility of the CONTRACTOR. The CONTRACTOR shall also conform to any local or county ordinances pertaining to noise levels and working hours to avoid any unnecessary delays. Should any unanticipated delays occur due to permit acquisition, WASD reserves the right to postpone the start of this contract.

1.3 Project Schedule and Time Constraints

The scope of work mentioned above shall be constructed in a timely manner; drilling should begin within one week after contract execution. The entire project shall be completed **within 365 days**. The work week is Monday through Friday. The site geologist is required to travel from Davie, Florida each day so actual drilling time will be less than 8 hours per day. Preparation and maintenance should be done during the time when the site-geologist is not present. Should the contractor fail to complete the project by the required final completion data, as stated in the specifications, then the contractor will be subject to a delay change of \$200.00 a day (excluding Saturday, Sunday and holidays) for each (8) eight-hour day. The final completion data shall be **365 days** from the notice to proceed (including weekends), unless the WASD project manager approves the delay due to special conditions.

1.4 Equipment and Personnel

WASD requires that a Water Well CONTRACTOR, licensed in the State of Florida or the appropriate Water Management District, be responsible for work performed under this Contract. **A copy of the current Florida Water Well Contractor license must be submitted with the proposal.** All equipment utilized by the CONTRACTOR and any subcontractor(s) must be in good working order. The CONTRACTOR shall provide and

operate drilling and support equipment with adequate load/weight capacity for the projected drilling depths. There will be no compensation for downtime incurred due to equipment failure or personnel problems. Unnecessary delays or work stoppages because of equipment or personnel problems will not be accepted nor considered a valid reason for extending the length of the contract.

1.5 Deliverables

Deliverables to WASD shall include:

- a) Construction of 5 salt front monitoring wells
- b) Submission of daily drilling logs at the completion of each site.
 - a. Submission of 5 Saltfront Monitoring Well Completion Reports
- c) Construction of G-354R.
- d) Submission of G-354R Well Completion Report.
 - a. Submission of shallow ASR pad monitoring wells plugging and abandoning Reports.

1.6 Payment Schedule

Payment shall be issued upon completion and approval of each well and plugging and abandoning. This includes, well completion, site restoration approval, and submission of well completion report to the SFWMD and WASD.

1.7 Safety

The contractor must meet all the requirements as listed in the attached Safety section 01 50 10A and the COVID requirements. The Contractor must also submit an acceptable Contractor Site Safety Plan prior to commencing work.

1.8 Indemnification and Insurance:

Contractor shall indemnify and hold harmless the County and its officers, employees, agents and instrumentalities from any and all liability, losses or damages, including attorneys' fees and costs of defense, which the County or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this Agreement by the Contractor or its employees, agents, servants, partners principals or subcontractors. Contractor shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the County, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorney's fees which may issue thereon. Contractor expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by Contractor shall in no way limit the responsibility to indemnify, keep and save harmless and defend the County or its officers, employees, agents and instrumentalities as herein provided.

The Contractor shall furnish to **Miami-Dade Water and Sewer Department** Certificate(s) of Insurance which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

- A. Worker's Compensation Insurance for all employees of the Contractor as required by Florida Statute 440.

- a. If applicable should include coverage required under the U.S. Longshoremen and Harbor Workers' Act (USL&H) and/or Jones Act for any activities on or about navigable water.
- B. Commercial General Liability Insurance in an amount not less than \$1,000,000 per occurrence, and \$2,000,000 in the aggregate, not to exclude Explosion Collapse and Underground Hazards and Products & Completed Operations. **Miami-Dade County must be shown as an additional insured with respect to this coverage.**
- C. Automobile Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the work, in an amount not less than \$1,000,000 combined single limit per occurrence for bodily injury and property damage.

All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida, with the following qualifications:

The company must be rated no less than "A-" as to management, and no less than "Class VII" as to financial strength, by Best's Insurance Guide, published by A.M. Best Company, Oldwick, New Jersey, or its equivalent, subject to the approval of the County Risk Management Division.

or

The company must hold a valid Florida Certificate of Authority as shown in the latest "List of All Insurance Companies Authorized or Approved to Do Business in Florida" issued by the State of Florida Department of Financial Services.

**NOTE: CERTIFICATE HOLDER MUST READ: MIAMI-DADE COUNTY
111 NW 1st STREET
SUITE 2340
MIAMI, FL 33128**

II. Site Information and Environmental requirements

2.1 Site Description

The first task of the project is located in the in eastern portion of Miami-Dade County along the fresh-saltwater interface as mapped in figure 1. The sites may be located in both, residential or commercial areas of the County. Appropriate care must be taken to not disturb the residents during the day while drilling and the site must be left in a clean and safe manner at the end of each workday.

The second task of the project is located near the Miami International Airport in the city of Miami-Springs, therefore proper care must be taken to avoid any type of contamination within the area.

The third task of the project is located in the West and Southwest Wellfields, within the corresponding wellfield protection areas, therefore proper care must be taken to avoid any type of contamination within the area.

2.2 Minimizing Impacts of Drilling

Care must be taken to minimize damage to the sites.

- a) If dry weather conditions make the risk of wildfires high, personnel must refrain from smoking or the use of potential ignition sources. At other times, smoking is permitted if all cigarette butts are properly disposed of. At no time shall they be thrown on the ground.
- b) Activity at the drill site is restricted to specified, small areas and vegetation may not be cut without permission from the site geologist.
- c) The site is near a residential area, drilling and other loud tasks shall not begin before 8 am (or in accordance with appropriate local or county codes) each day unless permission is given by the WASD or USGS on-site site geologist.
- d) Landscaping must be returned to its original condition and excess drill cuttings removed.
- e) Due to the need to sample water quality and proximity to municipal drinking water well fields, only environmental approved grease and lubricants may be used. Hydrocarbon based lubricants such as rod grease and Kopr Cote are strictly prohibited.

2.3 Mobilization, Demobilization, and Site Cleanup and Staging Area Security

Mobilization shall include costs for all materials, equipment, and labor required to prepare the site for drilling operations, install appropriate surface casing, and conduct any other measures that the CONTRACTOR feels is necessary to protect and secure their equipment during drilling operations. Part of the mobilization, set-up and demobilization costs, entail meeting environmental requirements. The cost for providing the following equipment, facilities, and services shall be part of the price for each line item.

- a) The CONTRACTOR shall be responsible for removing trash from the drill site daily.
- b) The CONTRACTOR shall be responsible for installing a temporary fence if deemed necessary around the drill rig to prevent access to the rig for both the safety of the public and security from theft.
- c) The CONTRACTOR shall steam clean the rig, drilling components, and all materials to be emplaced in the borehole according to the guidelines in Section 2.4, Equipment Cleaning.
- d) The CONTRACTOR will not discharge drilling fluids or cuttings into proximal surface waters or into the storm sewer system. Cuttings and drilling fluids must be containerized at residential sites and other sites as directed by WASD and/or USGS geologist. The CONTRACTOR shall remove from the sites and dispose of the containerized cuttings and drilling fluids.
- e) The CONTRACTOR shall comply with all OSHA and EPA requirements regarding heavy equipment, electrical and mechanical operations, storage of compressed and flammable gases, and storage and handling of hazardous materials. Necessary personal safety equipment and containment and absorbent materials will be required on site for the duration of drilling operations. If conditions exist that may be in violation of either OSHA or EPA standards, a site visit from the appropriate representative may be requested by WASD.
- f) Once all drilling and well construction operations have ceased, the CONTRACTOR is required to remove all equipment and restore the site to original grade and

original or better condition. To assure complete site restoration, we recommend the CONTRACTOR take appropriate photographs prior to placing equipment on the site. A WASD representative must approve site restoration.

2.4 Equipment Cleaning

Drilling is being done in developed and undeveloped areas of Miami-Dade County and each monitoring well will be used for long-term hydrologic and environmental monitoring. As such, care must be taken in the installation process to prevent cross-contamination from other drill sites and from general contamination, **especially of non-environmental greases such as Kopr-Cote**. All equipment used in the borehole and all equipment that could transport sediments from one site to another must be cleaned according to the following:

- a) The CONTRACTOR shall steam clean (utilizing Alconox™ soap) the rig prior to starting any drilling efforts and before arriving at the park embarkation site. The drilling rig components (drill rods, augers, and bits) pumps, grout barrels, shovels, wheelbarrows, hoses, coring barrels, and temporary casing must be steamed cleaned in the same manner prior to use and between each hole.
- b) The CONTRACTOR shall provide ample buckets, brushes, water, and Alconox™ solution to complete the cleaning as described in this document.
- c) The CONTRACTOR is not allowed to use saline surface water from the site as a source of water for cleaning and drilling activities. Instead the CONTRACTOR must obtain water from the freshwater system or fire main system except at the two remote sites where a shallow water supply is authorized for drilling use only. The CONTRACTOR must comply with the following requirements to use fresh water from the fire main.
- d) The Department will furnish water free of charge for the following construction activities.
 - 1) Drilling
 - 2) Flushing,
 - 3) Chlorination, if applicable:
 - 4) Logging
 - 5) When and where directed or approved by the Engineer.

Water for construction activities listed above will be furnished from adjacent MDWASD-owned water mains or the most convenient water source. Consumption for these activities shall be determined by Department personnel who shall be provided with a minimum of 72-hour advance notification. Charges for water consumption may apply if Department personnel are not present to witness these activities. In instances where no Department-owned source of water is available, the Contractor shall make his own arrangements with the municipality or other controlling authority and include the cost of all water required during construction in his overall construction cost. No reimbursement will be made.

- e) Water used in construction for purposes other than those listed above, including make-up water pumped into the pipe during hydrostatic testing, will be furnished by the Department at a charge. This water will be supplied from the most convenient source through the existing piping, however, all water used must be metered through a Department meter. The Contractor will be billed by the Department based on water usage recorded by the floating meter. Failure of the Contractor to meter the water could result in his being fined and/or a citation being

issued against him in accordance with the rules and regulations of the Department's Tampering Section. The Contractor can obtain the meter through proper application and payment of deposit fee at the Department's New Customer Division, 3575 South Le Jeune Road, Miami, Florida.

- 1) When the project is occurring in Unincorporated Miami-Dade County, City of Miami, or North Miami Beach, the Contractor shall present a Miami-Dade County, City of Miami, or North Miami Beach, respectively, Fire Department Permit during application with New Business Office. This requirement may also apply to some municipal areas of Miami Dade County.
- 2) The deposit fee will be refunded to the Contractor upon return of the meter in a sound satisfactory condition. The largest meter available is 2-inches NPS. Effective October 1, 2007, the required deposit for a 2-inch meter is \$2,500.00 plus \$125.00 service charge. For current fees contact the Department's New Customer Division at (786) 268-5200. Additional fees may be required by other governmental agencies for utilizing existing sources of water.
- 3) All piping, fittings, valves and equipment, including pumps and power, required for handling the water shall be furnished by the Contractor. Care shall be exercised in the use of the water and provision shall be made to protect the water supply for contamination and indiscriminate use by unauthorized persons. The Contractor shall use only potable water unless otherwise specifically called out elsewhere herein and then only in the case of sewage force mains, reclaim water mains or raw water mains.
- 4) Under no circumstance shall the Contractor utilize a water source, including existing piping, until such source or piping has been approved for use by the Department.
- f) The CONTRACTOR may install a shallow supply well at the site to provide the needed water. The CONTRACTOR should be aware that the flows from these wells may not be adequate for continuous drilling and time may be required to fill supply tanks for continuation of drilling. If a shallow supply well is drilled, it must be grouted closed prior to final departure from the site. The water tank should be clean and free from loose particles. **The CONTRACTOR shall steam clean and flush all tank interiors before mobilizing to the initial site.**

III. General Drilling and Well Construction requirements

3.1 Formation Samples

The 5 boreholes will be first drilled with a 12-14-inch auger bit into the uppermost part of the bedrock. Next an 8-10-inch temporary surface casing will be set to the base of the augered hole. After the surface casing has been set, the CONTRACTOR will obtain continuous 4-inch diameter geologic core samples from two of the five test boreholes (SF20-2 and SF20-3) via 4-inch diameter wireline coring using appropriate soft-sediment or hard-rock core catchers depending on whether the geologic formation is incompetent or competent, respectively. Reverse air drilling will not be allowed. Drilling is to be **done with water** unless the site geologist approves the use of liquid drilling polymer such as "Tiger Mud" to facilitate the collection of soft sediments in the core barrel. If unable to provide soft-sediment cores, the split-spoon method of sampling will be used. Some of

the five wells may have unconsolidated sediments above the bedrock. These unconsolidated sediments must be sampled to bedrock if bedrock is deeper than 10 feet below land surface and the site geologist will determine if adequate sampling was done. If sampling is below 60% recovery, a new hole will be sampled adjacent to the existing borehole at the CONTRACTOR'S expense to bedrock to provide the required soft sediment samples.

WASD and the USGS will provide an on-site geologist who will be responsible to collect and describe samples and cores obtained during drilling operations. The CONTRACTOR shall provide the geologist safe access to inspect the samples, and shall accommodate the geologist in retrieving samples, including moderating drill rates and circulation, if necessary. Due to the scientific nature of this project, the collection of geologic samples is extremely important. The CONTRACTOR must recover at least 60 percent of all rock or sediments at each of the two test coreholes in order to be paid. Water will be the only drilling fluid authorized due to the digital optical borehole image requirements for optically clear borehole fluid. Only approved environmental pipe grease may be used.

- a) Sample collection methods – 4-inch core wireline coring will be used for the test borehole below the depth of the 10-inch surface casing. All wireline cores shall be obtained using a core barrel where the inner barrel is locked to the outer barrel and the core catcher is a small core bit, protruding a few inches ahead of the main core bit. A catcher, appropriate for the sediments encountered, will also be used. All wireline samples are to be four inches in diameter. **The CONTRACTOR is required to have an adequate supply of soft-sediment core catchers for use in collecting 4-inch diameter soft-sediment cores on the drilling location at all times. When the CONTRACTOR encounters unconsolidated sediment during coring operations, the CONTRACTOR needs to collect core samples with the soft-sediment core catcher, if ordered by WASD or USGS staff.**
- b) Soft Sediment Coring – Soft sediment-coring operations shall be conducted as outlined in the **ASTM Standard No. D-2113-83**. During 4-inch wireline coring operations, an appropriately sized core barrel with a soft sediment core catcher is required and the recovered soft sediment cores will be stored in 2-foot long cardboard core boxes (with lids) provided by the contractor and approved by the USGS. A liquid drilling polymer such as “Tiger Mud” may be used to facilitate the collection of soft sediments in the core barrel.

3.2 Borehole Development

Each borehole will be developed using the compressed airlift method by injecting air via a flexible air hose up through the bottom of 3-inch drill pipe, allowing sand and cuttings to be lifted out of the borehole through the inner diameter of the drill pipe. A right-angle elbow will be provided at the top of the drill string for extrusion of borehole fluids, rock cuttings, and sediment. Airlift will continue until the borehole remains open and the borehole fluid is clear of particulate as determined by the WASD and/or on-site geologist. The CONTRACTOR will provide the air compressor. If the borehole will not remain open, steel drill casing or temporary slotted casing may be used as described in section 1.1 to clear the borehole for geophysical logging. The contractor will remove all sand and rock generated from the airlift from the site. The site must be restored to its original condition.

3.3 Drilling Logs

Accurate drilling records are critical to the success of this project. The CONTRACTOR shall furnish WASD with a daily drilling record. The log shall accurately describe the following: geologic materials and depths encountered, depths of lost circulation zone(s), and methods of regaining circulation, drilling rate, time, depth, and description of any unusual occurrences or problems during drilling, diameters and lengths of drill rod and casing, and any other work performed at the site. WASD will provide a blank field logbook for the driller in the field. The logbook must be available on site for review by WASD and the USGS and the logbook will become the property of the WASD upon completion of the wells. WASD and USGS on-site geologists will also keep a log and some of this information may be kept in this log by mutual agreement.

3.4 Borehole Surface Casing

WASD and/or USGS site geologist will specify the depth of the 8-10-inch casing to the depth necessary to begin 4-inch wireline coring (about 5- to 10-feet below land surface but could be as deep as 80 feet) for the borehole. A 2-inch wireline core will be collected to that depth if requested by WASD and or the USGS site geologist. Next, a 14-inch borehole will be drilled to the depth of the 2-inch core using a 14-inch auger. The CONTRACTOR shall then install an 8 or 10-inch diameter, schedule 40 PVC Tri-Loc riser (or equivalent) to the depth of the 14-inch hole. The 10-inch PVC will then be cemented in place and allowed to set overnight. WASD will only authorize payment for casing installed to the actual depth and grouted into place back to land surface. All casing shall be of new, first quality material and free of defects in manufacturing and handling.

The wells may require the installation of a temporary 6-inch slotted PVC casing if interbedded sand prevents successful clearing of the borehole. This temporary casing will facilitate the geophysical logging of the unconsolidated sediments. The temporary slotted casing will be removed during construction of the monitoring well.

3.5 Monitoring Well Construction

Upon completion of borehole geophysics, 2-inch, PVC, monitoring wells will be constructed in accordance with figures 2 and 3. A 5- or 10- foot screen will be constructed at the depth specified by WASD and/or USGS site geologist. Due to the varying depth to the base of the Biscayne Aquifer throughout Miami-Dade County, this could mean that the screen would be constructed at 350-feet below land surface. An additional length of casing will extend below the screened interval to allow geophysical logs collected in the completed well to record a full tool response at the base of the aquifer. The length of casing below the screen will be determined by the WASD and/or USGS site geologist (about 5- to 10-feet). Each monitoring well will be constructed with 2-inch tri-lock schedule 40 PVC. The screened interval will be constructed with five-foot screen sections with 0.02-inch slots. The casing will be centered every 20 feet with plastic centralizers and plastic screws. **No metal** of any kind will be used in construction of the monitoring well as it will interfere with future induction logging. An end cap will be placed on the bottom of the cased interval below the screen. The completed monitoring well must be vertical with no bends that would interfere with the movement of logging tools over the total well depth. Additional sampling wells of a smaller diameter (3/4- to 1-inch) may be installed in the final monitoring well at an extra cost. Additional reaming of the hole will not be required.

3.6 Cement Grouting

All work performed shall conform to State of Florida well drilling practices and to American Water Works Association standards. The depths of all fills, packs, and seals will be measured to ensure the specified thicknesses have been achieved. Once the WASD and/or USGS site geologist determines the necessary depth of the well's screened interval, the hole shall be backfilled to the specified depth using neat cement and a tremie pipe and allowed to set. A filter pack of pea gravel pack will be placed using a tremie line spanning an interval of 2 feet above and below the 5-foot screened PVC interval. A 2-foot sand pack will be placed on top of the pea gravel pack and then a minimum 1-foot seal bentonite pellets on top of the sand pack. This will be allowed to set for at least ½ hour before pumping cement grout on top of the seal. It should be assumed that no more than 10-feet of grout should be pumped in a lift. The CONTRACTOR shall be responsible for calculating volumes pumped during grouting operations. And depending on the site and lithologic conditions, the WASD and/or USGS Geologist may authorize the use of bentonite pellets instead on neat cement grout. The WASD and/or USGS Geologist may also determine intervals that should be filled with sand or pea gravel rather than cement. These intervals could occur where there are large voids in the aquifer. If cement were used to fill these voids it could flow several feet into the aquifer which would prevent future geophysical logs from detecting changes in the water quality of these zones. In addition, the heat of curing of very thick intervals of cement could damage the PVC casing. Sand or pea gravel fill of these zones would avert these problems. If these sand or pea gravel filled intervals are necessary, 2 ft thick fine sand and 1 ft thick bentonite pellet seals need to be installed above them to prevent cement from intruding the sand and pea gravel below. The WASD and/or USGS Geologist will review methods and volumes prior to commencement of pumping cement grout. The grouting method used must completely fill the annular space with grout from the top of the bentonite seal to the surface. The CONTRACTOR will let the cement set for a minimum of twenty-four (24) hours between successive cement lifts. All subsequent cement lifts shall be tagged by the tremie method prior to installing an additional stage.

3.7 Wellhead Completion

At this time, it is assumed that the five monitoring wells shall be recessed below grade and enclosed in a 15-inch diameter 'meter' type protective box (or other size as approved by the site geologist) with bolting lids. These boxes must be made of steel or cast iron and dipped in primer once and in Rustoleum® brand red paint twice before installation. The well recesses will have coarse sand or pea gravel fill in the borehole at least three feet below the cement pad to allow drainage of rainwater. The well will be completed and sealed at the surface with a 3-ft x 3-ft x 12-inch (or other size as approved by the site geologist) cement pad (with reinforcing bars) that slopes slightly away from the well.

3.8 Well Development

The CONTRACTOR will develop the well using standard methods which may include: (a) using a surge block combined with bailing or pumping, (b) bailing, or (c) pumping and backwashing. The purpose of this development is to remove fines and mud from the filter pack which might contaminate samples and reduce flow through the screen. The CONTRACTOR will take care to ensure that the well is not damaged by the well development process.

IV. RECOMMENDED PROCEDURES

4.1 Listed below is the summary of the well drilling and construction procedures and proposed sequence of activities to be conducted for the new well.

- a) Prior to mobilization, the CONTRACTOR will steam clean and flush all tank interiors and fill tanks with clean water as specified in Section 2.4.
- b) The CONTRACTOR will mobilize to the drilling site, ensure all drilling and containerization equipment is properly set-up, install a security fence if needed, and complete all necessary steam cleaning of drill rig, equipment, and supplies.
- c) Install a water supply well if needed.
- d) The CONTRACTOR will install 8-10-inch diameter Schedule 40 PVC temporary surface casing after completion of drilling a 12-14-inch borehole to the depth top of the bedrock. It is expected that the maximum 10-inch diameter casing length will be about 10 feet below land surface, but sand conditions could make it as deep as 80 feet.
- e) The CONTRACTOR will then begin the drilling or coring as appropriate for the underlying sediment type. For cores, the CONTRACTOR will indicate core tops and bottoms and direction of sample layout. The USGS on-site geologist will place the cores in a protective box (provided by the contractor) and annotate the box with well name, sample interval, and sample number on all sample box covers. The CONTRACTOR will continue the borehole to at least 20 feet beyond the base of the Biscayne aquifer as determined by the site geologist. Due to the nature of this project, it is important to facilitate collection of high resolution downhole digital borehole image logs. Therefore, the drilling method should not include the use of drilling mud until the digital borehole image log has been run, unless approved by the WASD and/or USGS geologist. The CONTRACTOR is responsible for maintaining a clean borehole for geophysical logging. If a stable borehole cannot be maintained, the situation may require that the drilling be done in several stages with geophysical logging completed for that stage before the next stage is begun.
- f) When the maximum well depth is reached for the borehole, the CONTRACTOR must use a compressed airlift to insure a clean and stable borehole prior to geophysical logging. In boreholes with unconsolidated sediments of over 10 feet or interbedded sand, a temporary 6-inch slotted PVC casing may be installed. Sediments from the airlift may not be allowed to remain at the site and must be moved to a separate location determined by the on-site geologist and Miami-Dade County personnel. The borehole shall be developed using the airlift method until the water becomes clear or water quality field parameters become stable. At a minimum, the well shall be developed for one hour.
- g) If the WASD and/or USGS geologist approves using the mud rotary method, the CONTRACTOR shall provide an efficient de-sander to maintain optimal mud weights (8.5 to 9.0 lbs./gal) to minimize invasion and formation damage. **Under no circumstances shall any drilling fluids be discharged into the surrounding surface area or surface water.** If the mud rotary drilling method is used, the CONTRACTOR will ream the pilot-hole prior to beginning the next sample. The CONTRACTOR will repeat the process by obtaining the core sample for the next interval and reaming the pilot hole.

- h) Logging will be conducted on the borehole by USGS staff and their contractors. The drilling CONTRACTOR is responsible for providing a straight and stable hole filled with optically clear water for geophysical logging operations. **There will be no compensation for standby associated with geophysical logging operations.**
- i) All well construction and necessary site restoration will then be completed at the site as stated in Sections 1.1, 2.3, and 3.5.

VI. WELL ABANDONMENT

Should a borehole be determined by the WASD and USGS Geologists to be unacceptable, the CONTRACTOR shall abandon the hole by grouting the hole from bottom to surface, following State of Florida abandonment procedures. A well may be declared unacceptable due to the CONTRACTOR's failure to complete the drilling, incorrect casing placement, lost tool, or for any other CONTRACTOR failures to complete the borehole in a satisfactory manner. The CONTRACTOR must provide a new borehole, meeting the original specifications, at no cost to WASD.

For the ASR Monitoring Well Abandonment, the Contractor shall pump TYPE II NEAT Cement into the well using a tremie method to ensure that the cement reaches the bottom of the open hole. The wells must be plugged up with neat cement to surface and then have any additional casing or material that is above the ground level cut and removed.

VII. STANDBY TIME

During the normal progression of work, the CONTRACTOR will be authorized standby time when it is necessary for WASD and USGS personnel to perform work or conduct tests that are not specified in the Contract. The CONTRACTOR will be notified in advance and the amount of time authorized will be mutually agreed upon and noted on the CONTRACTOR's daily logs.

VIII. BOREHOLES

Figure 1 shows the generalized locations of the five, deep salt front monitoring wells required to complete the proposed work plan. Figures 2 and 3 show how the completed monitoring wells should look. Figure 6 shows the location of the replacement monitoring well G-354R.

IX. The CONTRACTOR shall include a line item for "contingency items" for additional airlifting time that may be required if during construction of well sand or sandy formations are encountered, and additional sample tubes.

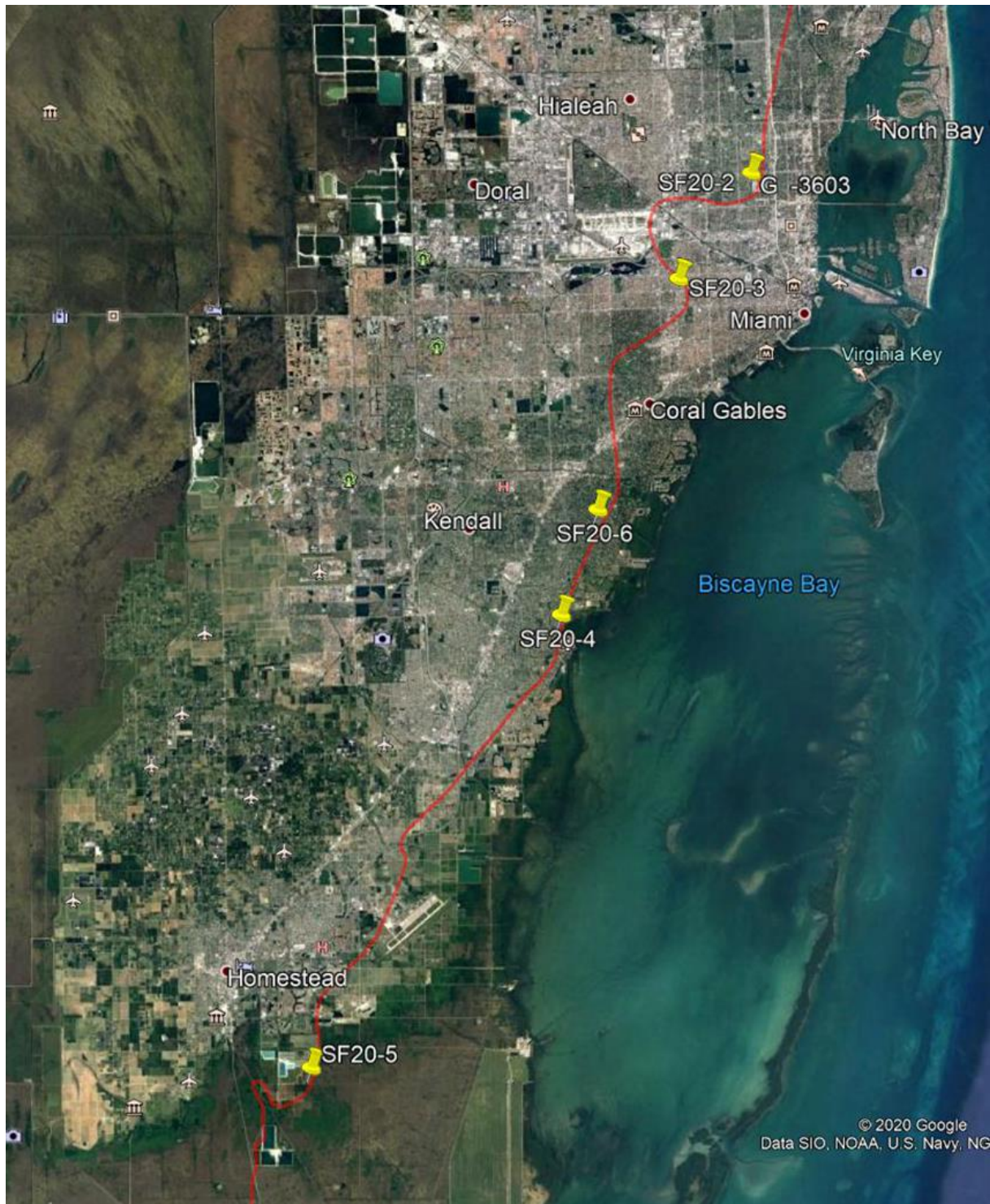


Figure 1. Location of study area and proposed five new monitoring wells that will be drilled along the mapped salt front within the study area during fiscal years 2020/21. Yellow pins are the five new salt front monitoring wells and the red line is the salt front.

Example Cross Section of Basic Monitoring Well

Depths will be based on results of logging

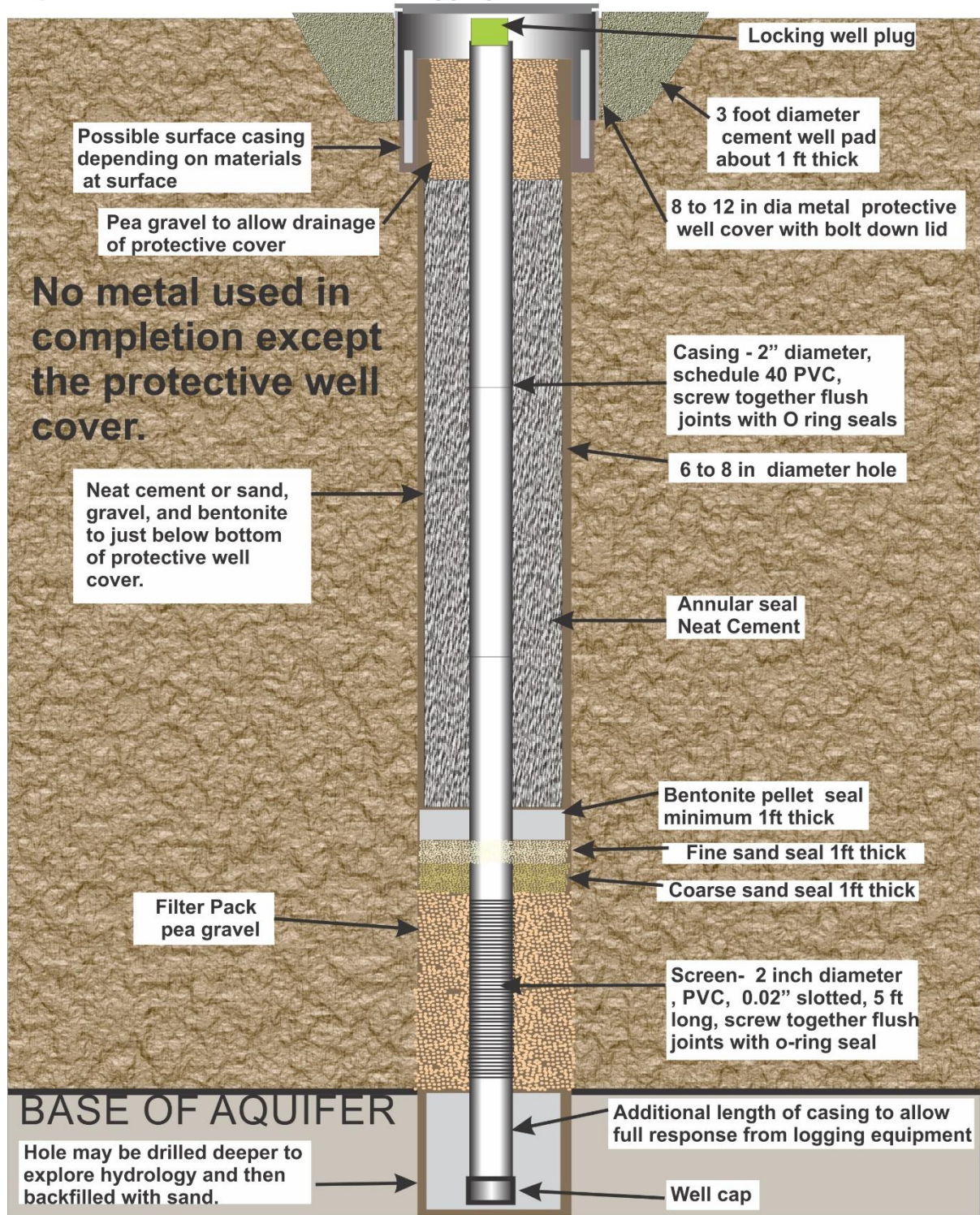


Figure 2. Schematic showing cross section of completed monitoring well and requirements to be used in construction.

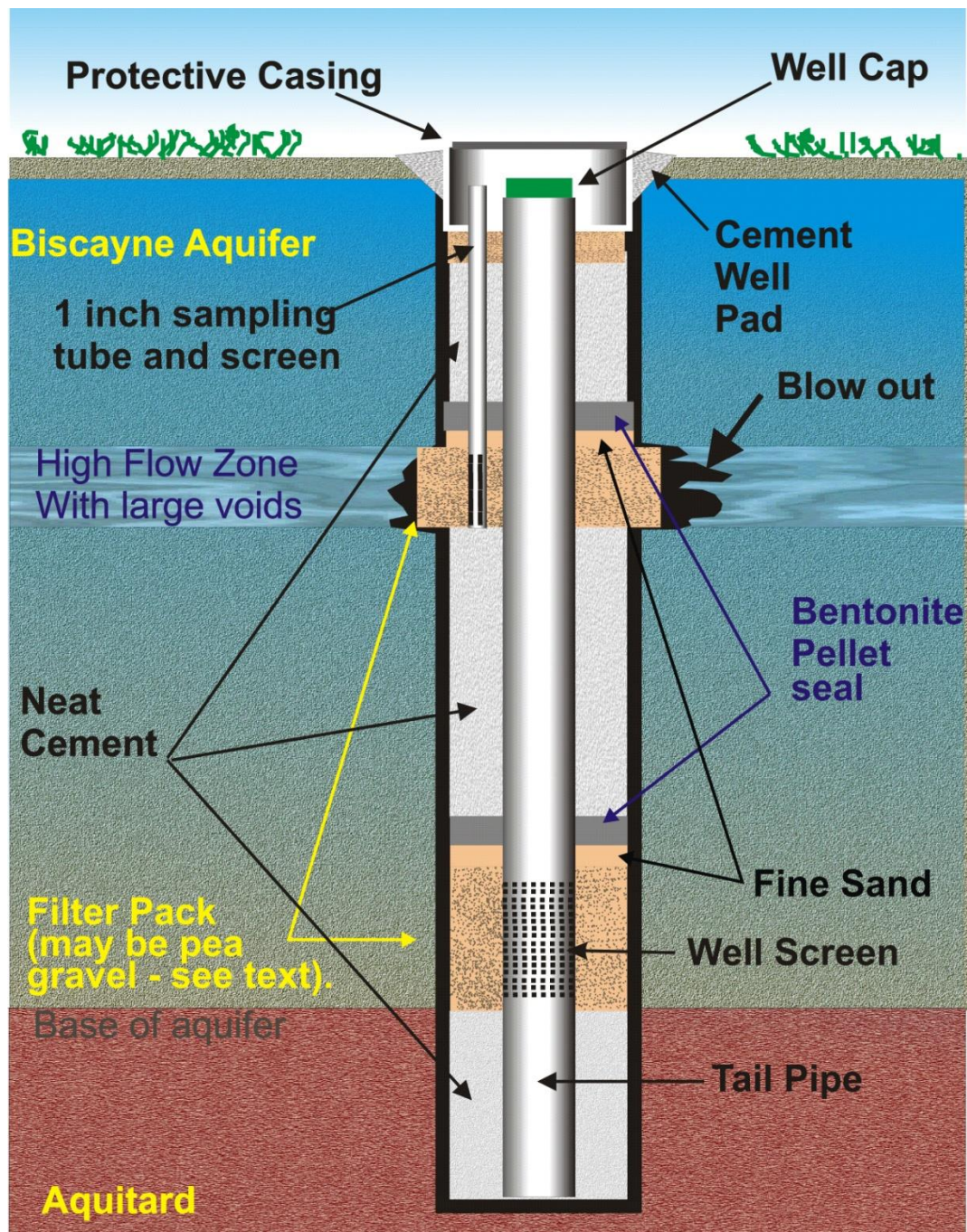


Figure 3. Schematic showing cross section of completed monitoring well showing use of sand instead of grout in large cavities and possible addition of a smaller sampling well. Neat cement may also be replaced by bentonite and sand as determined by the on-site geologist.



Figure 4. Location of the ASR wells in the West wellfield



Figure 5. Location of the ASR wells in the Southwest wellfield

**Location Map
G-354 R**

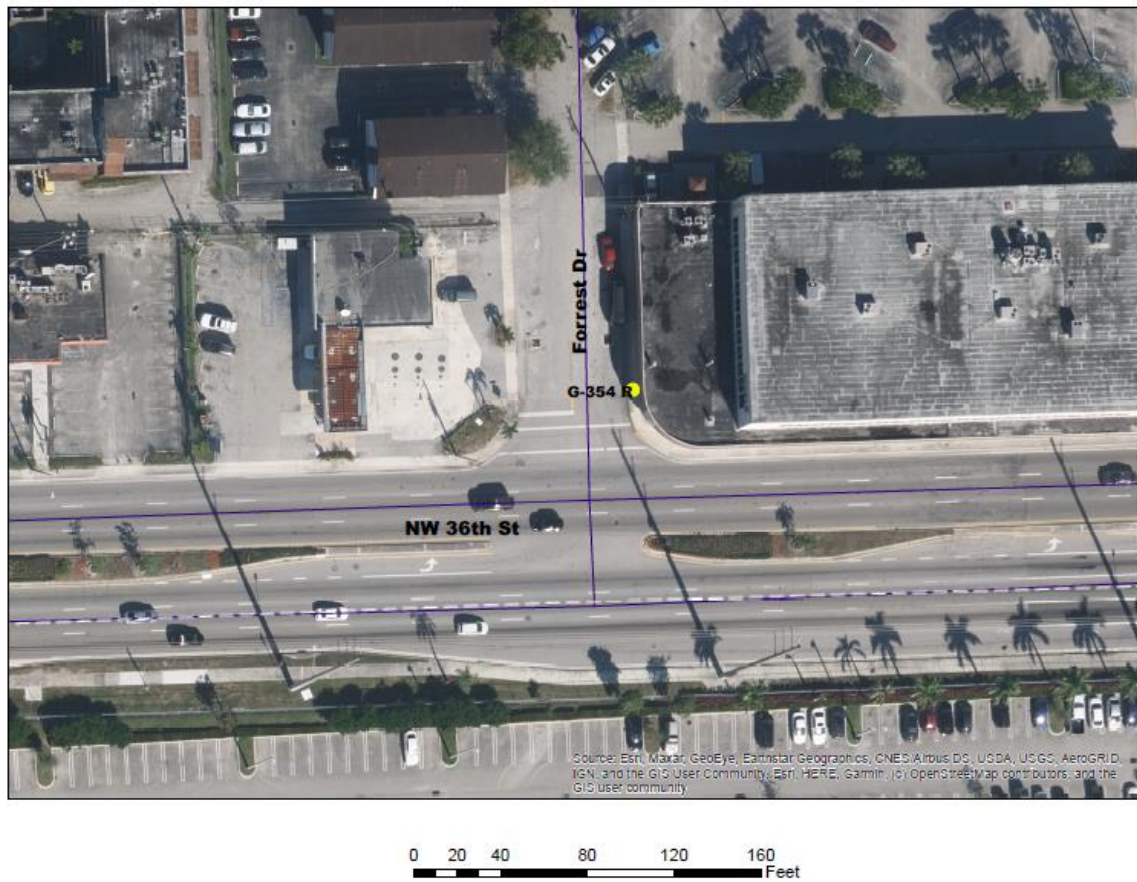


Figure 6. Location map for G-354R, on NW 36th St and Forrest Dr, near MIA