Attachment 1

**ISSUED FOR BID,
NOT FOR CONSTRUCTION**

TECHNICAL SPECIFICATIONS FOR CONSTRUCTION AND TESTING OF THE GREEN MEADOWS WATER TREATMENT PLANT CLASS I INJECTION WELL IW-2, LEE COUNTY, FL

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SECTION 1 – INTRODUCTION AND SCOPE OF WORK

The purpose of these technical specifications is to detail the work scope, methods, and materials for the construction and testing of Injection Well IW-2 of the Green Meadows Water Treatment Plant WTP Class I injection well system. The general location of the Green Meadows WTP is provided in Figure 1. The location of the new Injection Well IW-2 is shown in Figure 2.

The selected well CONTRACTOR shall be responsible for all labor, personal protective gear, materials, transportation, tools, supplies, equipment, and appurtenances necessary to perform the work as specified herein. In general, all methods and materials used shall be in accordance with the latest revisions of the American Water Works Association (AWWA) Standards for Deep Wells (AWWA A100-06) as they apply to the particular needs or conditions encountered in the proposed work. Authorization for construction of IW-2 is included in the Florida Department of Environmental Protection (FDEP) Underground Injection Control (UIC) operation permit for the well.

The scope includes, but is not limited to:

- Obtaining any necessary additional permits to construct the well.
- Having a Florida licensed land surveyor provides pre-drilling horizontal and vertical control, as well as a signed and sealed survey plat.
- Preparing the well site and mobilizing equipment to the site.
- Constructing a well containment pad and installing four surficial aquifer monitoring wells (Figure 3).
- Constructing, developing, and testing one 20-inch diameter injection well completed to approximately 2,700 feet below land surface (BLS) with the injection zone completed to approximately 3,000 feet BLS (Figure 4).
- Completing geophysical and video logging of the well.
- Conducting packer testing.
- Collecting formation cores.
- Providing water quality analytical services for groundwater samples collected during drilling and testing.
- Conducting mechanical integrity testing of the well.
- Providing equipment, instrumentation, and conducting an injection test.
- After constructing the subsurface portions of the well, complete the wellhead as shown in Figure 5.
- Providing an as-built drawing and survey plat with horizontal and vertical control information for the well signed and sealed by a Florida licensed surveyor.
- Demobilizing equipment and restoration of the site.

SECTION 2 – QUALIFICATION REQUIREMENTS FOR BIDDERS

Bidders should be qualified and experienced in the successful construction and testing of FDEP regulated Class I injection well systems in Florida. CONTRACTOR shall refer to Lee County Form 9 of the Frontend documents for Minimum Qualification Requirements.

The CONTRACTOR shall certify that the present hook load/weight capacity of the derrick and draw works meets the original manufacturer's specifications or at a minimum 1.5 times the heaviest load anticipated to complete the work, as specified, or provide API Certification. The CONTRACTOR shall submit test results that are certified by a State of Florida licensed Professional Engineer regarding the hook load capacity of the drilling rig or provide API Certification before mobilization.

SECTION 3 – EXAMINATION OF CONTRACT DOCUMENTS AND SITE

3.1 GENERAL: Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance or the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents.

3.2 SPECIFICATIONS: Reference is made to the CONSULTANT reports summarizing injection well construction details and subsurface conditions at the site(s) or otherwise affecting cost, progress or performance of the Work which have been relied upon by the CONSULTANT in preparing the Specifications. Such reports will be made available to any Bidder requesting them. These reports are not guaranteed as to accuracy. For his Bid each Bidder will, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

3.3 REAL ESTATE: The lands upon which the Work is to be performed are identified in the Technical Specifications and Drawings.

3.4 QUALIFICATIONS: Refer to Lee County Frontend document for qualifications.

SECTION 4 – SUBSTITUTE MATERIAL AND EQUIPMENT

The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to the CONSULTANT, application for such acceptance will not be considered by the CONSULTANT until after the "effective date of the Agreement." The procedure for submittal or any such application by CONTRACTOR and consideration by the CONSULTANT is set forth in the General Conditions.

SECTION 5 – CONTRACTOR RESPONSIBILITIES

5.1 GENERAL. The work herein described consists of the site preparation, drilling and testing, geophysical and video logging, casing pressure test, water quality analysis, aquifer testing, and completion of surface facilities for one injection well (IW-2) at the Green Meadows WTP. The well will be part of the existing Class I injection well system at the site.

The CONTRACTOR shall be responsible for all labor, materials, taxes, transportation, tools, supplies, equipment, and appurtenances necessary to construct, develop, and test the well as specified herein. In general, all methods and material used under this section shall be in accordance with the latest revisions of the American Water Works Association Standard for Deep Wells (AWWA A100-06) and the National Ground Water Association Standards as they apply to the particular needs or conditions encountered in the proposed work.

The Green Meadows WTP is an active facility, and all CONTRACTOR activities need to be closely coordinated with the WTP staff and with the CONSULTANT.

5.2 CONSTRUCTION SCHEDULE: The CONTRACTOR shall submit a detailed schedule prior to the commencement of any sitework. The schedule shall include a proposed mobilization, completion, and demobilization date. Work is anticipated to occur on a 24 hours a day 7 days a week schedule. Testing required to be witnessed by the FDEP such as pressure tests shall be scheduled during daylight working hours (8:00 a.m. to 5:00 p.m.), unless prior approval from the FDEP has been obtained.

5.3 WATER SUPPLY: The CONTRACTOR shall provide the OWNER and CONSULTANT a description of his water supply needs prior to or at a mandatory pre-construction meeting. The CONTRACTOR shall provide any clean, fresh water that is required for the work described in these Specifications. Water is available at the WTP site, the CONTRACTOR is responsible for metering the volume of water supplied by the OWNER to the OWNER's satisfaction. CONTRACTOR shall maintain any temporary supply line with backflow prevention as required by the OWNER.

5.4 ELECTRICITY: All electricity required by the CONTRACTOR shall be furnished at his own expense. All temporary lines shall be furnished, installed, connected, and maintained by the CONTRACTOR in a workmanlike manner satisfactory to the OWNER and CONSULTANT and shall be removed by the CONTRACTOR in like manner at his expense at the completion of the work. All temporary electrical fixtures, lines, and related equipment and installation shall be in accordance with applicable County and state regulations.

5.5 REMEDIAL WORK: If remedial work proves to be necessary to make the well acceptable to the OWNER to comply with the regulations and/or Specifications because of accident, loss of tools, defective material, or for any other cause, the CONTRACTOR shall propose a method of correcting the problem, in writing. Suggested methods shall be reviewed and approved by the

CONSULTANT before work proceeds. Such work shall be performed at no additional cost to the OWNER and it shall not extend the length of the Contract. The CONTRACTOR is notified that all specifications shall be met, including hole straightness, and setting of casings to the points designated by the CONSULTANT.

5.6 CONTRACTOR'S DAILY LOG: The CONTRACTOR shall maintain a detailed daily log of the drilling and testing operations. The logs shall be on printed forms and shall give a brief description of all field activities and pertinent data as may be required by the CONSULTANT. Two copies of each daily log shall be submitted to the CONSULTANT (or CONSULTANT's representative) on a daily basis.

5.7 ABANDONMENT: If the CONTRACTOR voluntarily stops work, and/or fails to complete it in a satisfactory manner, in accordance with the regulations and/or Specifications and approved changes, the OWNER shall consider the project to be abandoned by him. If the OWNER declares the project abandoned by the CONTRACTOR, then no payment will be made. All salvageable material furnished by the CONTRACTOR may be removed and remain his property. Written approval from the OWNER shall be required before the CONTRACTOR is allowed to proceed.

In the event that the CONTRACTOR shall cause a well to no longer be useable due to damage, or must abandon a well because of loss of tools or for any other cause, then CONTRACTOR shall, if requested by the CONSULTANT, plug the well in accordance with standards and procedures specified in the Rules of the SFWMD, Chapter 40D-3, F.A.C, and install a replacement well at no additional cost.

5.8 GUARANTEE AND WARRANTY: The CONTRACTOR guarantees that the work and service to be performed under the Contract and all workmanship, materials, equipment performed, furnished, used, or installed in the work shall be free from defect and flaws, and shall be performed and furnished in strict accordance with the Contract documents; that the strength of all parts of all manufactured equipment shall be adequate and as specified; and that the performance test requirements of the Contract documents shall be fulfilled. The CONTRACTOR shall repair, correct, or replace all damage to the work resulting from failures covered by the guarantee. The CONTRACTOR shall provide a one-year warranty for all work undertaken as part of this contract.

5.9 STANDBY TIME: The OWNER may ask the CONTRACTOR to stop operations so that extra work not included in these Specifications, such as testing and additional data collection, can be performed. The OWNER and CONSULTANT shall schedule the request, so it causes a minimum of delay. All standby time for which extra payment will be made shall be approved by

the CONSULTANT in writing in advance. The CONTRACTOR shall be reimbursed at hourly rates listed in the unit cost bid form.

5.10 REGULATORY REQUIREMENTS: The CONTRACTOR shall comply with all requirements and conditions of all permits related to the work of this contract and shall comply with the provisions of any permits issued. The CONTRACTOR shall be responsible for obtaining and maintaining any necessary licenses and permits, and for complying with any applicable federal, state, and municipal laws, codes and regulations, in connection with the execution of the Work. The CONTRACTOR shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others.

5.11 REFERENCE STANDARDS: All design, material and work shall be in strict accordance with all applicable governmental, regulatory and testing organizations including, but not limited to the following:

ANSI – American National Standards Institute
API – American Petroleum Institute
ASTM – American Society of Testing and Materials
AWWA – American Water Works Association
FDEP – Florida Department of Environmental Protection
FDOT – Florida Department of Transportation
LCU – Lee County Utilities
NGWA – National Ground Water Association
NSF – National Sanitation Foundation
OSHA – United States Occupational Safety and Health Administration
Florida Building Code 2001 and Companion Codes as amended
SFWMD – South Florida Water Management District
TSSS – Recommended Standards for Sewage Works
TSSW – Recommended Standards for Water Works
USEPA – United States Environmental Protection Agency

5.12 NOISE CONTROL: Noise produced by field operations shall be kept to a minimum. Noisy operations shall be conducted whenever possible during daylight hours and scheduled to minimize duration. The CONTRACTOR shall comply with all applicable federal, state, and local noise pollution control regulations. Noisy equipment shall be kept as far as possible from noise sensitive site boundaries. Equipment shall be properly maintained to reduce noise from excessive vibration, faulty mufflers, or other sources. No equipment shall be left idling unnecessarily.

SECTION 6 – PERMITS

The CONTRACTOR shall procure all permits, certificates, and licenses required of it by law for the execution of the work. The CONTRACTOR shall comply with all Federal, State, and local regulations and ordinances relating to the performance of the work. The CONSULTANT will provide the CONTRACTOR with pertinent information related to the permitting. However, it shall be the CONTRACTOR'S responsibility to file the permit applications, supply the permit application fees, and comply with the conditions of the relevant permits. The following permits may be required for the project: well construction permit from Lee County Natural Resources and the South Florida Water Management District.

The Class I injection well is currently permitted under an Underground Injection Control (UIC) construction permit. An application to modify the construction permit is currently under review by the FDEP. The CONTRACTOR shall provide the CONSULTANT and the OWNER at least one month's notice of its intended start of drilling of the injection well in order that sufficient preparations and notifications can be made.

SECTION 7 – EQUIPMENT AND PERSONNEL

7.1 GENERAL. The CONTRACTOR shall furnish capable personnel and adequate equipment to perform the work as described in Sections 10 through 12.

The CONTRACTOR shall furnish an on-site containment system around the drilling equipment and the proposed location of the injection well, all mud, cuttings, and water discharged during drilling shall be retained in the containment system. All water produced during drilling and testing shall be discharged into the nearby stormwater drain which discharges to the WTP reclamation lagoon located in the northwest area of the WTP property (Figure 6).

7.2 CONTRACTOR'S EXPERIENCE AND CREW REQUIREMENTS: Bidders should provide a list of equipment, personnel, and subcontractors planned to be utilized for the work. Qualifications for the listed personnel should also be provided. Additionally, the Bidders should provide three (3) references with contact names, addresses, and telephone numbers for each of the relevant listed projects.

The CONTRACTOR shall have the following minimum qualified crew on site during drilling and testing:

1 – Superintendent
The Superintendent shall have a minimum of 10 years and acted as a superintendent on a minimum of 5 public utility deep well construction projects in the State of Florida.

2 – Drillers
Drillers shall have a minimum of 3 years and worked on a minimum of 3 public utility well construction projects in the State of Florida.

7.3 EQUIPMENT REQUIREMENTS: Equipment utilized for this project shall be in first-class working order. No unnecessary delays or work stoppages will be tolerated because of *equipment failure. Equipment failure shall not be considered a valid reason for extending the* length of the Contract. The CONTRACTOR shall be held responsible, and payment may be withheld for damages to the well due to any cause of negligence, faulty operation, or equipment failure.

The CONTRACTOR shall furnish adequate equipment to perform the work as described herein. The CONTRACTOR shall conduct all work in accordance with the Code of Federal Regulations Title 29, Chapter XVII, Part 1910: Occupational Safety and Hazardous Standards.

The OWNER and CONSULTANT reserve the right to inspect the equipment of prospective bidders prior to CONTRACTOR selection, as well as that of the selected CONTRACTOR.

All pumps, headers, tubing, piping, and other appurtenances shall be approved for use with the materials and chemicals specified herein.

SECTION 8 – MATERIALS

Well construction materials shall be in accordance with the following requirements:

8.1 DRILLING FLUID: No drilling fluid other than clear potable water will be used in the open-hole section of the well below the surface casing. Drilling fluids used during drilling of the pilot hole and the reaming of the cased portion of hole prior to setting surface casing shall be approved for use in construction of deep injection wells. The CONTRACTOR shall dispose of all drilling mud and fluids in accordance with applicable regulations at a site approved by the Florida Department of Environmental Protection (FDEP) and shall provide the CONSULTANT with a copy of the FDEP approval.

8.2 WELL CASING: All casings shall be new, approved for use in deep injection wells and installed in conformance to the specifications as outlined under "Well Construction Sequence" in this section. Centralizers shall be installed on the casings at approximate 40-foot intervals. Payment for permanent well casing shall be at the unit price of the contract as measured from land surface to depth of casing. The CONTRACT will indicate an estimate of the amount of casing for the well; however, actual field conditions will dictate the exact amount of casing. This will be determined by the CONSULTANT and to be approved by the FDEP. A preliminary summary of the anticipated casing setting depths, diameters, and materials is provided below.

Table 8-1 – Summary of Casing Setting Depths for IW-2

Casing	Anticipated Depth (ft BLS)	Material	Outside Diameter (in)	Inside Diameter (in)
Conductor	60	Steel	60	59
Surface	660	Steel	50	49
Intermediate	1,650	Steel	40	39
Final	2,700	Steel	30	29
Tubing	2,700	FRP	20	18

Material type for the fiberglass final casing shall be Future Pipe Red Box 1500. The box connection diameters for the fiberglass casing shall not exceed 22.00 inches.

8.3 GROUT: The permanent well casing and tubing grout shall be API Class B (ASTM Type II) or Type 1L Portland cement mixed with no more than 5.2 gallons of water per sack of cement. The basal 200 feet emplaced around the intermediate and final casings shall be neat. Cement to plug back pilot-hole shall be neat. Surface casing grout may be API Class A (ASTM Type I) or 1L cement mixed with no more than 5.2 gallons of water per sack. Only fresh water may be used for grout mix. A cementing plan for each stage of cement shall be submitted to the CONSULTANT for approval prior to emplacement of any cement grout. The first stage of each cementing operation for casings shall be performed using the pressure grout method. For all subsequent stages, performed using the tremie method, the bottom of the tremie pipe shall be set no more than ten feet above the bottom of the interval to be grouted.

SECTION 9 – SUBMITTALS/SHOP DRAWINGS/FIELD DIRECTIVES

Prior to commencement of the work, a detailed schedule shall be submitted by the CONTRACTOR for all work included in this Technical Specifications

Before submitting each Shop Drawing, Sample or Field Directive, CONTRACTOR shall have determined and verified:

(1) All field measurements, quantities, dimensions, specified performance, and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
(2) The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
(3) All information relative to the CONTRACTOR'S responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
(4) That each Shop Drawing or Sample has been cross-checked with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

Each submittal shall bear a stamp or specific written certification that CONTRACTOR has satisfied CONTRACTOR'S obligations under the Contract Documents.

All Submittals shall be conveyed to the CONSULTANT for review and approval, allowing for sufficient time for such review. Electronic copy of each submittal shall be provided to the CONSULTANT. No submittal shall be deemed to have been approved by the CONSULTANT without the CONTRACTOR having received approval in writing.

SECTION 10 – SITE PREPARATION

Requirements include any necessary clearing of access and work areas within the OWNER's project site(s) as necessary to complete the Work, including work designated in permits and other agreements. No clearing is anticipated to be needed at the site. A concrete light pole will need to be removed from the well pad area by the CONTRACTOR.

A containment system around the injection well pad and discharge piping to the stormwater system shall be put in place by the CONTRACTOR prior to commencing any work on the well.

The CONTRACTOR shall conduct a detailed pre-construction video of the jobsite including access roads prior to mobilization. The CONTRACTOR agrees to restore the site including access roads, with the exception of the wellpad area, to its original condition. Extreme care will be employed to avoid unnecessary disturbance to property.

Site preparation will include the installation of the CONTRACTOR's and CONSULTANT's field office facilities. The facilities shall include electrical connections, air conditioning, restrooms with plumbing, office chairs, desks, and internet access.

SECTION 11 – WELL CONSTRUCTION AND TESTING PROCEDURES

11.1 WELL CONSTRUCTION

1. Establish vertical and horizontal control and provide a pre-construction survey signed and sealed by a Florida licensed surveyor. Prepare the site and construct a lined temporary containment pad sufficient to contain all fluid during drilling and testing operations. A shallow pit casing may be installed to assist with the initial drilling operations and provide additional support to the containment pad.

2. Install and survey four 2-inch diameter pad monitoring wells screened at least 10 feet into the surficial aquifer at each corner of the containment pad. The monitoring wells shall be sampled prior, during, and after the construction and testing of the injection well on a weekly basis by the CONTRACTOR, in compliance with the FDEP permit requirements. Water samples procured from the wells shall be tested on-site and also transported to an accredited NELAP analytical laboratory. In the event that water quality samples indicate an influence from drilling and/or testing operations, the CONTRACTOR will be required to conduct additional sampling. The additional sampling would continue until final approval is issued from FDEP to plug and abandon the wells.

3. Install a 60-inch diameter, 0.5-inch wall thickness, steel conductor casing to an approximate depth of 60 feet below land surface (BLS) to isolate the surficial aquifer from subsequent drilling operations. The conductor casing will be installed into competent formation to stabilize the well for subsequent construction activities. Installation method for the conductor casing is at the Contractor's discretion with CONSULTANT's approval. Casing information is provided in Table 8-1 and Figure 4.

4. Drill a 12-inch diameter pilot hole by mud rotary method to approximately 665 BLS. Conduct inclination surveys every 90 feet or less while drilling. The pilot-hole will penetrate the confining units of the Arcadia formation and into the upper part of the Lower Hawthorn portion of the Upper Floridan aquifer. Drill cutting collection and description will be conducted per Section 11.2 A. Conduct geophysical logging, as described in Table 11-1.

5. Ream the pilot hole to a nominal 60-inch diameter. Conduct inclination surveys every 90 feet while drilling. Conduct a Caliper log prior to setting the surface casing. The Caliper log will be run on the day that installation of casing occurs.

6. Install the 50-inch diameter, 0.5-inch wall thickness, surface steel casing equipped with centralizers (5', 20', 40' from bottom and at each joint) to an approximate depth of 660 feet into the uppermost portion of the Lower Hawthorn aquifer. The surface casing will facilitate switching the drilling method to reverse air using formation water.

7. Pressure grout the first stage with cement. Install subsequent stages of cement by tremie method. The lower 200 feet of cement will be neat. Up to 6% bentonite may be used for cement stages above that depth. Conduct a Temperature log after each stage of cementing

after allowing a minimum of 12 hours to elapse between the end of cement emplacement and the commencement of Temperature logging. Tag the top of the cement in the annulus using the cementing tubing after running each Temperature log.

8. Evacuate the drilling mud from the borehole for off-site disposal. Install a flow prevention device, switch the drilling method to reverse air rotary, and drill a nominal 12-inch diameter pilot hole to an approximate depth of 1,650 feet BLS. Conduct inclination surveys every 90 feet or less while drilling. Conduct short-term drill stem specific capacity tests at every drilling rod connection. CONTRACTOR is responsible for measuring and recording pumping rate and water level during testing. Static water levels shall be collected after approximately 20 minutes. Collect reverse air water samples per Section 11.2 B. Collect up to three cores as described in Section 11.2 G. and Table 11-3.

9. Conduct packer testing, as described in Section 11.2.F and Table 11-2. Up to four packer tests are anticipated to be completed to a depth of 1,650 feet BLS. Water samples obtained during the packer testing shall be sent to a State of Florida approved laboratory for analyses of TDS, chloride, sulfate, ammonia, Total Kjeldahl Nitrogen (TKN), nitrate, and conductivity.

10. Conduct video and geophysical logging in the pilot hole per Table 11-1. The information and data collected with the pilot-hole drilling and testing will be submitted to the FDEP with a request to approve the setting depth for the intermediate casing. If needed, plug back the pilot hole with neat cement to the depth selected by the CONSULTANT.

11. Ream the pilot hole to a nominal 50-inch diameter. Conduct inclination surveys every 90 feet while drilling. Conduct geophysical logs and video per Table 11-1. The Caliper log will be run on the day that installation of casing occurs.

12. Install the 40-inch diameter, 0.5-inch wall thickness, intermediate steel casing equipped with centralizers to an approximate depth of 1,650 feet into the Avon Park formation. The intermediate casing will isolate the base of USDW documented to be on-site at an approximate depth of 1,605 feet BLS.

13. Pressure grout the first stage with cement. Install subsequent stages of cement by tremie method. The lower 200 feet of cement will be neat. Up to 6% bentonite may be used for cement stages above that depth. Conduct a Temperature log after each stage of cementing after allowing a minimum of 12 hours to elapse between the end of cement emplacement and the commencement of Temperature logging. Tag the top of the cement in the annulus using the cementing tubing after running each Temperature log.

14. Drill a nominal 12-inch diameter pilot hole to an approximate depth of 3,000 feet BLS. Conduct inclination surveys every 90 feet or less while drilling. Conduct short-term drill stem specific capacity tests at every drilling rod connection. Collect reverse air water samples per Section 11.2.B. Collect up to four cores as described in 11.2.G and Table 11-3 to demonstrate confinement above the injection zone. The pilot-hole will penetrate the highly permeable, fractured, and cavernous “Boulder Zone” of the Oldsmar formation.

15. Conduct packer testing, as described in Section 11.2 F and Table 11-2. Up to five packer tests are anticipated to be completed within the confinement above the injection zone. Water samples obtained during the packer testing shall be sent to a State of Florida approved laboratory for analyses of TDS, chloride, sulfate, ammonia, Total Kjeldahl Nitrogen (TKN), nitrate, and conductivity.

16. Conduct video and geophysical logging in the pilot hole per Table 11-1. The information and data collected with the pilot-hole drilling and testing will be submitted to the FDEP with a request to approve the injection casing setting depth for the well.

17. Install a drillable bridge plug in the pilot-hole near the selected injection casing setting depth (i.e. approximately 2,725 feet BLS).

18. Plug back the pilot hole with neat cement though the confining interval above the injection zone to the base of the 40-inch diameter casing (i.e. approximately 1,650 feet BLS).

19. Ream the pilot hole to a nominal 40-inch diameter. Conduct inclination surveys every 90 feet while drilling. Conduct geophysical logs and video per Table 11-1. The Caliper log will be run on the day that installation of casing occurs.

20. Install the 30-inch diameter, 0.5-inch wall thickness, seamless steel final casing equipped with centralizers to an approximate depth of 2,700 feet into the Oldsmar formation. The final casing will isolate the injection zone from the overlying confinement, the producing intervals within the overlying Avon Park formation, and the base of the USDW.

21. Pressure grout the first stage with cement. Install subsequent stages of cement by tremie method. The lower 200 feet of cement will be neat. Up to 6% bentonite may be used for cement stages above that depth. Conduct a Temperature log after each stage of cementing after allowing a minimum of 12 hours to elapse between the end of cement emplacement and the commencement of Temperature logging. Tag the top of the cement in the annulus using the cementing tubing after running each Temperature log. The approximate top 200 feet of annulus will remain uncemented to perform the cement bond log (CBL) to assist with tool calibration during CBL logging. After completion of the CBL, the annulus will be cemented to land surface.

22. Conduct a pressure test of the 30-inch diameter steel casing with an initial pressure of 150 psi. The pressure test will utilize the cement plug at the base of the injection casing. If a good seal is not obtained, the CONTRACTOR shall install a packer to isolate the casing. The pressure test will be successful if the pressure change after one hour is within 5 percent, as stipulated by FDEP regulations.

23. Drill out the cement plug at the base of the injection casing and ream a nominal 30-inch diameter borehole to the anticipated total depth of the well of approximately 3,000 feet BLS.

24. Conduct geophysical logs and video per Table 11-1. The video survey will facilitate inspection of the open-hole section (i.e. injection zone) and final casing interior.

25. Install 20-inch diameter, 1.01 wall thickness, FRP tubing using an external packer or cement basket at the bottom of the 30-inch diameter casing at an approximate depth of 2,700 feet BLS. Conduct a Cement Bond Log prior to cementing the tubing. Install the first stage of cement by using the tremie method. The first stage should be a short volume stage to assure that cement fill has occurred around the base of the casing. Install subsequent stages of neat cement by tremie method. Conduct a Temperature log after each stage of cementing after allowing a minimum of 12 hours to elapse between the end of cement emplacement and the commencement of Temperature logging. Tag the top of the cement in the annulus using the cementing tubing after running each Temperature log. Conduct a Cement Bond log after cement has been staged to 200 feet BLS. Complete cementing to land surface.

26. Develop the well by airlifting and pumping until produced groundwater is free of entrained sediments. Periodic surge will be conducted during well development. Background sampling will be conducted for all parameters included in the FDEP Primary and Secondary Drinking Water Standards for Injection Permit Background Water Samples (Tables 1, 2, 4, 5, 6, and other parameters from 62-550, F.A.C).

27. Conduct final logging and video per Table 11-1.

28. Complete wellhead per Figure 5. Conduct mechanical integrity testing per Section 11.2 J, including tubing pressure test, high resolution temperature, and radioactive tracer survey.

29. Conduct injection test per Section 11.2 K., as approved by the FDEP, at an injection rate of 7,950 gpm or 11.4 MGD.

30. Remove drilling pad and demobilize all equipment from the site. Restore site to original contours. If needed, plug and abandon the four shallow pad monitoring wells.

11.2 WELL TESTING

A. Drill Cutting Collection

Drill cuttings will be collected by the CONTRACTOR in labelled canvas bags, with composite 10-foot samples in each bag. Accurate sample depths will be determined by accounting for the lag time from when the rocks were cut in the subsurface to the time they arrive at the surface. The samples will be delivered to the CONSULTANT for their description and analysis. CONTRACTOR will provide a suitable place for the drill cuttings to be hung for drying purposes.

B. Formation Water Sampling and Analyses

During the entire construction and testing phase of the project, weekly shallow pad monitoring well water samples shall be collected by the CONTRACTOR. FDEP's Groundwater Sampling Log should be used during well purging. A NELAP accredited laboratory should be utilized to analyze the water samples for pH, chlorides, conductance, and TDS.

During reverse air drilling, formation water samples will be collected by the CONTRACTOR at 20-foot intervals and at drill rod connections (approximately 90 feet). The water samples will be analyzed at the site by the CONSULTANT for field conductivity, chloride, temperature, and pH. The samples collected at drill rod connections will be transported by the CONTRACTOR to an analytical laboratory and tested for temperature, pH, chloride, conductance, sulfate, TDS, TKN, and Ammonia.

For each packer test, water samples will be collected by the CONTRACTOR for the following analytes: temperature, pH, chloride, conductance, sulfate, TDS, TKN, ammonia, iron, calcium, magnesium, total nitrogen, total and noncarbonate hardeners.

C. Geophysical and Video Logging

The CONTRACTOR shall perform geophysical logging of the entire open-hole and cased hole sections of the injection well to the satisfaction of the CONSULTANT. The geophysical logging company proposed to be used by the CONTRACTOR shall be approved by the CONSULTANT.

The CONTRACTOR shall perform a video of the entire interior of the cased and open-hole portions of the well to the satisfaction of the CONSULTANT. The CONTRACTOR shall provide four (4) high quality field copies of the video and 4 final copies of the video, all in DVD format. The video logging contractor must be approved in advance by the CONSULTANT. The sequence of logging is provided in Table 11-1.

The CONTRACTOR shall be responsible for keeping the borehole open and free of obstructions during geophysical logging and shall remove any obstruction to the logging tools at his own expense. In the event the logging tools do not reach within twenty (20) feet of the bottom of the hole as measured with the drill pipe, the CONTRACTOR shall clean the hole to the original drilled depth at his own expense. The logs shall be rerun at the CONTRACTOR's expense.

Geophysical logs are to be run on the most sensitive scale available which is consistent with a minimum of off-scale deflection. The use of logging equipment that does not operate at sufficiently sensitive scales will not be approved by the CONSULTANT.

All logs shall be clearly labeled with all pertinent information regarding the well, location, depths, scales, etc. Repeat sections shall be run to verify logging tool performance on all logs. Provide four (4) field copies and pdf version at the time of logging and four (4) report quality copies, Log Ascii Standard (LAS) files, and PDF version within three (3) days of logging. A log derived total dissolved solid (TDS) plot shall be prepared by the CONTRACTOR and provided

to the CONSULTANT.

Table 11-1. Summary of Geophysical Logging Program

Run #	Logs to be Run and Service	Depth Interval (ft BLS)	Description
1	GR/Cal, DIL, BHC Sonic	100 – LS	12.25” dia. pilot hole
2	GR/Cal	100 – LS	68” dia. reamed hole prior to setting 60” dia. casing
3	GR/Cal, DIL, BHC Sonic	665 – 100	12.25” dia. pilot hole
4	GR/Cal	665 – 100	60” dia. reamed hole prior to setting 50” dia. casing
5	Temp	660 – LS	After every cement stage for the 50” dia. casing
6	GR/Cal, DIL, BHC Sonic, FCT (S/D), FM (S/D), Video	1,655 – 660	12.25” dia. pilot hole
7	GR/Cal	1,655 – 660	50” dia. reamed hole prior to setting 40” dia. casing
8	Temp	1,655 – LS	After every cement stage for 40” dia. casing
9	GR/Cal, DIL, BHC Sonic, FCT (S/D), FM (S/D), Video	3,000 – 1,655	12.25” dia. pilot hole
10	GR/Cal	2,700 – 1,655	40” dia. reamed hole prior to setting 30” dia. casing
11	Temp	2,700 – LS	After every cement stage for 30” dia. casing to 200’ BLS
12	CBL with evaluation report	2,700 – LS	Evaluate cement bond for 30” dia. casing to 200’ BLS
13	GR/Cal and Video	3,000 – 2,700	30” dia. reamed open-hole
14	CBL (Uncemented tubing)	2,700 – LS	Baseline for cement bond evaluation for 20” dia. tubing.
15	Temp	2,700 – LS	After every cement stage for 20” dia. tubing to within 200’ of LS
16	CBL with evaluation report (Cemented tubing)	2,700 – LS	Evaluate cement bond outside 20” dia. tubing (upper 200’ uncemented)
17	GR/Cal, Video	3,000 – LS	Open hole and tubing interior

GR = Gamma Ray; Cal = XY Caliper; DIL = Dual Induction Log with Spontaneous Potential; BHC Sonic = Borehole Compensated Sonic with Variable Density Log; FCT = Fluid Conductivity and Temperature; FM = Flowmeter; (S/D) = Static and Dynamic; CBL = Cement Bond Log

D. Deviation Surveys

Deviation surveys shall be conducted by the CONTRACTOR at 90-foot intervals in all pilot and reamed holes. Any hole deviation greater than that specified as allowable shall be corrected by the well contractor before resumption of drilling progress. The completed well shall be sufficiently plumb and straight so that there will be no interference with operation or future maintenance or testing of the well. The maximum allowable inclination from the vertical at any portion of a hole or survey point shall be one (1) degree; the maximum allowable difference between any two successive survey points shall be 0.5 degree. Any deviation greater than one (1) degree or difference greater than 0.5 degree between two surveys shall be corrected by the CONTRACTOR at his own expense.

Well plumbness shall be determined using a TOTCO type wireline inclination survey tool during the drilling operations, or other method approved by the CONSULTANT. Wireline deviation surveys should be recorded at 90-foot intervals during the pilot-hole drilling and reaming operations. Use of wireline methods during drilling does not relieve the CONTRACTOR of the responsibility of installing a plumb completed well.

E. Geolograph Data

The drilling rig geolograph drill time data shall be plotted on a scale at which rapid correlation can be made to offset well geophysical logs. The CONTRACTOR shall annotate all of the geolograph charts in real time to account for stoppages in drilling (e.g. drill pipe connections, rig maintenance, bit trips, safety meetings, crew shift changes, etc.). Copies of the drilling rig geolographs for IW-2 shall be provided to the CONSULTANT with the weekly reports.

F. Packer Testing

Up to nine packer tests shall be conducted in IW-2. The preliminary anticipated test intervals are provided in Table 11-2. The packer tests conducted in IW-2 shall use single packers to isolate a discrete section of the bottom hole and straddle packer tests to isolated specific intervals.

It is the intent to temporarily stop drilling at several depths and conduct the packer tests as single packer tests to evaluate the basal portion of the open hole using a single packer. However, the CONTRACTOR's packer assembly shall be capable of being used either as a dual-seat, or open-hole single packer of a diameter and length capable of sealing the borehole. The packer element shall be capable of being attached to drill pipe of minimum diameter of four inches. The CONTRACTOR shall provide all appurtenances needed to run the packer tests. Equipment shall include a submersible pump and pump column capable of being set at a depth of 150 feet BLS inside the drill pipe. The pump shall be capable of pumping at a rate of up to 150 gpm. The pump discharge assembly shall be equipped with a throttling valve, a totalizer flowmeter, and access to allow for insertion of a water level measuring device inside the drill pipe and in the annulus. For each packer test, the CONTRACTOR shall perform a preliminary test to assure a formation seal has been attained and the pumping setup is working as intended. Each pretest shall be for a minimum of one hour. If deemed necessary by the CONSULTANT, the CONTRACTOR shall

reset the packer element(s) to prevent leakage and/or malfunction. CONTRACTOR shall provide all instrumentation required to measure water levels during the packer tests. CONTRACTOR shall provide calibration records for all instrumentation and devices to be utilized during packer testing including flowmeter and data logger/pressure transducers. CONTRACTOR shall provide documentation for all equipment to be utilized during packer testing including submersible pump, pump curve, and packer.

Table 11-2. Summary of Packer Testing Program.

Test Intervals IW-1 Depth Equivalent (ft below DF)	Packer Test Type
1,585 - 1,615[1]	Single
1,615 – 1,655[1]	Single
1,900 – 1,950[2]	Single
2,170 – 2,240[3]	Single
2,600 – 2,650[3]	Single
Four Unknown Depths	Straddle or Single

The packer test shall be conducted for a minimum time of 8 hours and may be completed in steps at different pumping rates. The pumping period may be extended until water levels have stabilized. The pressure data shall also be recorded in an electronic format for downloading as a Log ASCII Standard (*.las) file, Comma-Separated Values file (*.csv) and Portable Document Format (*.pdf) file to the CONSULTANT. Collect background data for 12 hours and recovery data for 24 hrs. Just prior to completion of each packer test, after adequate development approved by the CONSULTANT following FDEP Standard Operating Procedures (SOP), the CONTRACTOR shall collect water samples as directed by the CONSULTANT, and have the water analyzed for pH, chloride, conductance, sulfate, TDS, TKN, ammonia, iron, calcium, magnesium, total nitrogen, total and noncarbonate hardeners. An additional 100 mL water sample preserved with nitric acid for metal analysis, should be collected at the end of each packer test (where sufficient water is available). The sample shall be shipped to the Florida Geological Survey, ATTENTION: Acquisition & Management Section, 3915 Commonwealth Boulevard, Tallahassee, Florida 32399.

G. Coring

Drilling and collection of the coring shall be observed by the CONSULTANT. The exact depths of the interval to be cored will be selected by the CONSULTANT. Cores shall be stored on-site, in sturdy wooden boxes of the proper size, until completion of the well. Core boxes shall be clearly and permanently labeled with the depth, the top, the bottom, and sections of the core sent to laboratory for analysis. Recovered core will be delivered to the CONSULTANT for evaluation and selection prior to shipment to an approved laboratory for analysis at the CONTRACTOR's expense.

The laboratory analysis shall include the measurement of the horizontal and vertical permeability, specific gravity, effective porosity, and rock compressibility. At the time the

CONTRACTOR ships a core to the laboratory for testing, the CONTRACTOR shall include the water sample collected from the same interval.

Upon completion of the work, the CONTRACTOR shall arrange for the shipment of the cores to the Florida Geological Survey in Tallahassee, United States Geological Survey in Fort Lauderdale, Florida and to the OWNER.

Table 11-3. Summary of Coring Program

Core Intervals (ft below DF)
1,535 – 1,565
1,580 – 1,610
1,985 – 2,015
2,170 – 2,2240
Three Unknown Depths

H. Pad Monitoring Wells Data Collection and Analyses

CONTRACOR shall conduct the weekly monitoring of the four shallow monitoring wells installed around the IW-2 drill pad. Static water levels shall be measured, and groundwater samples shall be procured weekly from each of the pad monitoring wells. The water samples shall be field analyzed for pH, temperature, conductivity, and chloride concentrations. Samples shall be sent to a certified laboratory for analyses of chloride, TDS, and conductivity.

I. Background Water Quality Analyses for the Injection Zone

CONTRACTOR shall collect representative groundwater samples from the injection zone of IW-2 for analyses of the FDEP Primary and Secondary Drinking Water Standards for Injection Permit Background Water Samples (Tables 1, 2, 4, 5, & 6, from 62-550).

J. Mechanical Integrity Test

CONTRACTOR shall successfully complete a full mechanical integrity test per F.A.C. 62-528.300. The MIT shall include a casing pressure test of the steel injection casing, a pressure test of the FRP injection tubing, a video survey of the entire open-hole section and tubing interior, a high-resolution temperature (HRT) log, and a Radioactive Tracer Survey (RTS).

Casing Pressure Test for the 30-inch diameter steel casing: After cementing the 30-inch diameter steel casing and prior to drilling out the open-hole section of the well, a pressure test shall be conducted. The bridge and cement plug at the bottom of the casing shall be used to provide isolation to conduct the pressure test. However, if a good seal is not obtained, the CONTRACTOR shall install an inflatable packer, set within 20 feet of the base of the casing. A

minimum pressure of 150 pounds per square inch (psi), maintained for one hour, and witnessed by the CONSULTANT and the FDEP, shall be used during the pressure testing. No pressure change in excess of 5% of the initial test pressure shall be allowed during the one hour test period. If a pressure change in excess of 5% of the initial pressure occurs, the test shall be repeated to the satisfaction of the CONSULTANT and the FDEP. If there is any indication of a pressure leak, the CONTRACTOR shall takes steps to locate the leak and expeditiously effect repairs to the satisfaction of the CONSULTANT. The CONTRACTOR shall provide documentation that its pressure gauge has been calibrated within the last six months.

Video Survey: The CONTRACTOR shall conduct a video survey of the tubing interior and open-hole section of the well. Prior to conducting the video survey, potable water from a nearby fire hydrant shall be injected into the well to increase the clarity for the video inspection. The volume of potable water injected will be equivalent to at least one tubing volume (i.e. approximately 36,000 gallons for the 18-inch inside diameter tubing set at 2,700 feet BLS). The video survey shall allow for a visual inspection of the tubing interior. The inspection of the open hole will be to detect any caving of the formation which could cause a restriction to the movement of injected fluid..

Casing Pressure Test for the 20-inch diameter FRP Tubing: After the well is completed, CONTRACTOR shall install an inflatable packer, set within 20 feet of the base of the FRP tubing. The packer will be then inflated, and the well will be pressurized to 150 psi. A pressure gauge, calibrated within the previous six months, shall be used to measure pressure. Pressures will be recorded at five-minute intervals for a period 60 minutes. The casing pressure test shall be considered successful if the pressure decline or increase is not more than 5% during the 60 minute test period. A copy of the pressure gauge calibration certificate shall be provided to the CONSULTANT. After successfully completing the tubing pressure test, the packer shall be deflated and removed from the well. If, during the tubing pressure test, a decline or increase in pressure of more than 5% occurs, the test will need to be repeated after locating and sealing any pressure leaks identified in the wellhead fixtures. The FDEP shall be provided with adequate notice of the scheduled time for any necessary repeat tubing pressure test.

High-Resolution Temperature Log: CONTRACTOR shall conduct a HRT log in the well. The injection well shall be shut in for a minimum of 12 hours prior to conducting the HRT log. A temporary wellhead assembly shall be installed to prevent the well from flowing during the period the HRT log is conducted. CONTRACTOR shall provide field, final, and electronic copies specified in Section 11.

Radioactive Tracer Survey: CONTRACTOR shall conduct an HRT log in the well to determine whether any upward movement of injected fluid is occurring around the outside of the base of the casing. A Geiger counter survey shall be performed by the CONTRACTOR at the site prior to loading the radioactive tracer into the logging tool. The Geiger counter survey shall be repeated prior to the geophysical logging unit demobilizing from the site. The results of the two surveys shall be provided to the CONSULTANT.

The RTS tool shall be configured with a lower or bottom gamma ray tool (GRB), a casing collar locator (CCL), a middle gamma ray tool (GRM), a radioactive tracer ejector, and an upper or top gamma ray tool (GRT). The radioactive tracer used shall be Iodine-131. The Iodine-131 tracer

shall be placed in the RTS tool after the background survey at the site is completed. The volume of this material to be loaded into the ejector will be 5 millicuries. A laboratory certificate for this fluid shall be provided to the CONSULTANT.

The initial portion of the RTS will be performed while the well is shut in. A background gamma ray (GR) log shall be run from the base of the injection zone to land surface prior to releasing any radioactive fluid during a dynamic test. During the dynamic RTS testing water will be injected into the well at a flow rate of not more than 5 feet per minute. Injection well IW-2 will be equipped with an 18-inch inside diameter injection tubing. Therefore, the flow rate into the well will be no more than 66 gallons per minute (gpm). CONTRACTOR shall provide a flowmeter calibrated within the last six month and a copy of the calibration certificate shall be provided to the CONSULTANT.

The RTS ejector shall be positioned inside the tubing and 5 feet above the base of the tubing. An initial volume of 1 millicurie of the tracer will be ejected. The RTS tool will be held in place for a period of 60 minutes to determine any upward movement of fluid as detected by the GRM and GRT tools. After completing the initial dynamic RTS test, if necessary, the well tubing will be flushed by injecting a minimum of one tubing volume of water (i.e. approximately 36,000 gallons). A GR log will then be run to 200 feet above the base of the tubing. If any upward movement of the radioactive tracer is noted, the depth of the top of the tracer will be identified and several overlapping gamma ray passes shall be performed to definitely determine the depth of the maximum upward movement of the tracer.

A second similarly conducted dynamic RTS test shall then be performed using an eject volume of 2 millicuries, with the RTS tool held in place for a period of 30 minutes. After completing the second dynamic RTS test, the well tubing shall be flushed by injecting a minimum of one tubing volume of water. A GR log shall then be run to 200 feet above the base of the tubing.

After completing the dynamic RTS tests, any remaining radioactive tracer fluid shall be ejected below the base of the tubing. A final GR log shall then be performed from the total depth of the well to land surface. CONTRACTOR shall provide the field, final, and electronic copies specified in Section 11.

K. Injection Test

CONTRACTOR shall conduct a 12-hour injection test in IW-2, as directed by the CONSULTANT. The injected fluid will be RO concentrate from the Green Meadows RO WTP supplemented with raw water from the RO wellfield, as needed, to achieve the desired injection rate. The CONTRACTOR shall provide any necessary temporary pipeline and injection pump, if needed. The planned injection rate for the test is 7,950 gpm. Water levels in the IW-2 injection zone, both zones of the DZMW, and IW-1 shall be recorded by pressure transducers. The CONTRACTOR shall provide dataloggers with pressure transducers capable of recording at small rate linear scale and logarithmic scale. The CONTRACTOR shall provide access to the instrumentation to the CONSULTANT during the injection test and provide the collected data to the CONSULTANT in EXCEL or other CONSULTANT approved format. The contractor shall provide a temporary weather station capable of measuring rainfall, temperature, and barometric

pressure.

The injection test shall include a background shut-in period of 24 hours, a 12-hour injection period, and a post-injection recovery period of 24 hours for which water levels and weather data shall be recorded. A pre-injection test shall be conducted prior to the background period of the official injection test. The CONTRACTOR shall provide a totalizer flowmeter calibrated within the last six months. The CONTRACTOR shall provide a copy of the calibration certificate to the CONSULTANT.

Throughout the duration of injection test, the CONTRACTOR shall provide personnel to maintain the operation of the pumping equipment and instrumentation. If injection ceases during the test or if the instrumentation or other equipment malfunctions, the test shall be repeated to the satisfaction of the CONSULTANT. No extra time or additional payment will be allowed for equipment error or operator error.

SECTION 12 – SAFETY

Nothing in these specifications shall be construed as requiring the CONTRACTOR to perform the proposed work in an unsafe manner. Alternate techniques to accomplish the work may be proposed by the CONTRACTOR. The CONTRACTOR shall use every precaution necessary to ensure a safe work area and procedures. It is the responsibility of the CONTRACTOR to be knowledgeable of and to comply with all U.S. Occupational Safety and Health Administration (OSHA) and U.S. Environmental Protection Agency (USEPA) regulations regarding the types of work described herein.

SECTION 13 – RESPONSIBILITY FOR MATERIALS

The CONTRACTOR shall be responsible for all material furnished by it and shall replace at its own expense all such material found defective in manufacture or damaged in handling.

The CONTRACTOR shall be responsible for the safe storage of material. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times.

SECTION 14 – HANDLING OF MATERIALS

All materials needed to conduct the work shall be delivered and distributed at the site by the CONTRACTOR. All fluids, fittings, and accessories shall be loaded and unloaded so as to avoid shock or damage. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

SECTION 15 - CONSULTANT'S REPORT

The CONSULTANT will prepare a daily report reflecting the pay items completed by the CONTRACTOR during the day. Each report will be signed by the CONSULTANT and an authorized individual from the CONTRACTOR.

SECTION 16 - TIME OF COMPLETION

The CONTRACTOR shall complete all well construction work required in these specifications within the time specified by Contract.

SECTION 17 – PROTECTION OF PROPERTY

The CONTRACTOR shall take special precautions to reduce to a minimum the nuisances and damage to property. Any damage to public or private property shall be immediately repaired or paid for by the CONTRACTOR at no expense to the OWNER. Equipment, tools, and materials shall be located in places where they will produce a minimum of nuisance.

Upon completion of the work, the CONTRACTOR shall remove all of its equipment and materials from the site and clean, re-grade, and restore the site to pre-construction conditions.

SECTION 18 – CERTIFICATION OF CHEMICALS

All chemicals used during the project must show approval of either USEPA or the U.S. Department of Agriculture (USDA). The CONTRACTOR shall submit the most recent Material Safety Data Sheets (SDS's) in accordance with OSHA Rule 29 Code of Federal Regulations (CFR) 1910.1200 for each chemical to be used during the project. Two copies shall be furnished to the CONSULTANT.

SECTION 19 – SITE RESTORATION

The site shall be restored to its original contours. All expended work materials shall be removed from the site by the CONTRACTOR to a site approved by appropriate regulatory agencies.

SECTION 20 – PAY ITEMS

20.1 FINAL MEASUREMENT

A. The CONTRACTOR shall make all measurements and check all dimensions necessary for the proper execution of the work called for by the Specifications, and during the prosecution of the work he shall make all necessary measurements to prevent misfitting in said work and shall record such accurate measurements of the construction as provided for herein, included in the CONSULTANT'S daily reports, and as to be submitted to the CONSULTANT.

B. The method of measuring the work for payment under the various items shall be as indicated below. In any event, the unit or lump sum price for the respective items shall be approved by the ENGINEER.

20.2 PAY ITEMS

A. The unit prices stated in the Contract for the respective items shall be considered as the CONTRACTOR'S Schedule of Values for payment purposes. The unit prices shall be paid at the completion of work for each item. Payment will be made under each item only for work as it is not specifically included under other items.

B. CONSTRUCTION AND TESTING OF GREEN MEADOWS WTP IW-2**.**

The CONTRACTOR shall furnish all material, labor, taxes, tools, and equipment required to complete the works, as follows:

ITEM 1 GENERAL ITEMS (OFFICE OVERHEAD, STAND-BY, CONTINGENCY)

1A- General items and home/field office overhead include costs associated with and delineated in the costs not associated with a specific task, but account for the Contractor's business operating expenses including estimating and reconstruction services, accounting, marketing, and management, which are reasonably allocated to this specific project's base duration. The lump sum value bid divided by the project's base duration stated in the contract will be used to determine a monthly amount to be included in each pay application.

1B- Standby and Contingency Time will be paid at the unit price per hour rate resulting from the OWNER requests to stop operations due to an unforeseen situation, time needed for FDEP approvals, and extra time due to adverse downhole conditions. The OWNER and CONSULTANT shall schedule the request, so it causes a minimum of delay. All standby times for which extra payment will be requested shall be approved by the CONSULTANT in writing in advance.

Contingency related to adverse downhole geological conditions will require additional work and time. Those conditions may be related to excessive grouting volumes for cementing casings or minimum or very slow drilling progress (i.e. dredging) through fractured and cavernous intervals during drilling.

1C- High Permeability Zone Gravel Contingency will be paid at the unit cost per cubic foot of gravel. All gravel for which payment will be requested shall be approved by the CONSULTANT in writing in advance.

ITEM 2 MOBILIZATION, PRE-CONSTRUCTION SURVEY, PERMITTING, BONDS, INSURANCE, AND TEMPORARY POWER

Conducting a pre-construction video, pre-construction survey signed and sealed by a licensed Florida surveyor, obtaining all appropriate permits, mobilization of rig, setting up temporary facilities including field offices, and installation of temporary utilities. The said unit price shall include the costs of bonds, OWNER required insurance, furnishing of all material, labor, and equipment necessary to complete the work.

ITEM 3 DEMOBILIZATION, SITE RESTORATION, AND AS-BUILT SURVEY PLAT

Demobilization, site restoration, and as-built survey plat shall be paid at the lump sum price and shall include removing all equipment, excess materials, and debris from site. The amount bid shall include cleanup, the removal of all trash and debris, load, transport, and discard in a lawful manner, including all tipping fees, and post-construction video; the Contractor shall also restore the site to original or better including restoring any disturbed sodding, sidewalks, paving, and landscaping that is the responsibility of the Contractor as define herein. Demobilization will be paid at the lump sum bid price.

ITEM 4 SITE WORK AND CONSTRUCTION OF DRILLING PAD

Site preparation and installation of the containment pad will be paid at the lump sum bid price. Site work includes any clearing, temporary safety devices, and temporary fencing. The said lump sum price shall include the furnishing of all material, labor and equipment necessary to complete the work, including setting up of all equipment necessary and drilling pad capable of contain all drilling fluid and materials.

ITEM 5 CONSTRUCTION OF SHALLOW PAD MONITORING WELLS

Install four 2-inch diameter pad monitoring wells screened at least 10 feet into the surficial aquifer at each corner of the containment pad. The said lump sum price per well shall include the furnishing of all material, labor, taxes, and equipment necessary to complete the work including surveying the water level measuring point for the monitoring wells.

ITEM 6 COLLECTION AND LAB COSTS FOR WATER QUALITY FROM SHALLOW MONITORING WELLS

The shallow pad monitoring wells shall be sampled prior, during, and after the construction and testing of the injection well on a weekly basis by the bidder, in compliance with the FDEP permit requirements. Water samples procured from the wells shall be tested on-site and also transported to an accredited NELAP analytical laboratory for pH, chlorides, conductance, and TDS analysis. The said lump sum price shall include the furnishing of all material, labor, taxes, and equipment/instrumentation necessary to complete the work.

ITEM 7 DRILL 12-INCH DIAMETER PILOT HOLE TO 100 FEET

Drilling a 12-inch diameter pilot hole to approximately 100 feet BLS shall be paid at the unit cost price per linear foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole drilled shall be measured vertically from land surface or the bottom of the pit casing (if installed) to the bottom of the pilot hole.

ITEM 8 CONDUCT GEOPHYSICAL LOGGING FOR THE PILOT HOLE TO 100 FEET

Running geophysical logs in the 12-inch diameter pilot hole to approximately 100 feet BLS shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 9 REAM HOLE TO 68-INCH TO 100 FEET

Reaming of the pilot hole to 68-inch diameter prior to setting intermediate casing shall be paid on the unit cost basis per foot and include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole reamed shall be measured vertically from land surface or the bottom of the pit casing (if installed) to the bottom of the reamed hole.

ITEM 10 CONDUCT GEOPHYSICAL LOGGING FOR THE REAMED HOLE TO 100 FEET

Conduct a Gamma Ray and Caliper log in the reamed borehole shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 11 PROVIDE AND INSTALL 60-INCH DIAMETER STEEL CASING

Providing and installing the 60-inch diameter steel surface casing will be paid for at the specified unit price per linear foot. Unused casing up to the line item quantity will be paid and will become property of the OWNER. The said price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 12 GROUT 60-INCH DIAMETER CASING AND CONDUCT TEMPERATURE LOGS

Grouting the 60-inch diameter surface casing and running temperature logs will be paid for at the unit cost per cubic foot of cement and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 13 DRILL 12-INCH DIAMETER PILOT HOLE TO 680 FEET

Drilling a 12-inch diameter pilot hole to approximately 680 feet BLS shall be paid at the unit cost price per foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of pilot hole drilled shall be measured vertically from the bottom of the surface casing to the bottom of the hole.

ITEM 14 CONDUCT GEOPHYSICAL LOGGING FOR THE PILOT HOLE TO 680 FEET

Running geophysical logs in the 12-inch diameter pilot hole to approximately 680 feet BLS shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 15 REAM HOLE TO 59-INCH TO 680 FEET

Reaming of the hole to 59-inch diameter prior to setting intermediate casing shall be paid on the unit cost basis per linear foot and include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole reamed shall be measured from the bottom of the surface casing to the bottom of the reamed hole and may or may not be equivalent to the pilot-hole length.

ITEM 16 CONDUCT GEOPHYSICAL LOGGING FOR THE REAMED HOLE TO 680 FEET

Conducting a Gamma Ray and Caliper log in the reamed borehole prior to setting the surface casing will be paid at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 17A DELIVER 50-INCH DIAMETER STEEL CASING

Delivering the 50-inch diameter steel surface casing will be paid for at the specified unit price per linear foot. Unused casing up to the line item quantity will be paid and will become property of the OWNER. The said price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to deliver the casing.

ITEM 17B INSTALL 50-INCH DIAMETER STEEL CASING

Installing the 50-inch diameter steel surface casing will be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 18 GROUT 50-INCH DIAMETER CASING AND CONDUCT TEMPERATURE LOGS

Grouting the 50-inch diameter steel casing and running temperature logs will be paid for at the unit cost per cubic foot of cement and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 19 INSTALL FLOW PREVENTION DEVICE AND SETUP FOR REVERSE AIR DRILLING

Installing a flow prevention device on the wellhead to control artesian flows, evacuation and disposal of the drilling mud from the borehole, and setup transition for switching the drilling method to reverse air rotary will be paid at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 20 DRILL 12-INCH DIAMETER PILOT HOLE TO 1,680 FEET

Drilling a 12-inch diameter pilot hole to approximately 1,680 feet BLS shall be paid at the unit cost price per linear foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole drilled shall be measured vertically from the bottom of the surface casing to the bottom of the pilot hole.

ITEM 21 COLLECT FORMATION CORES TO 1,680 FEET

Drilling and collecting up to three (3) formation cores to 1,680 feet will be paid at the per core lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 22 LABORATORY ANALYSES FOR ROCK CORES TO 1,680 FEET

The packaging, shipment, and laboratory analytical costs for the core samples collected to 1,680 feet BLS will be paid at the per core lump sum price and shall include the furnishing of all material, labor, tools, and taxes to complete the work as specified.

ITEM 23 CONDUCT GEOPHYSICAL LOGGING OF PILOT-HOLE TO 1,680 FEET

Running geophysical logs in the 12-inch diameter pilot hole to approximately 1,680 feet BLS shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 24 CONDUCT PACKER TESTS TO 1,680 FEET

Conducting up to three (3) off-bottom single zone and one (1) straddle packer tests in the 12-inch diameter pilot hole to 1,680 feet BLS will be paid at the specified lump sum price per packer test and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 25 PLUG BACK 12-INCH PILOT HOLE DRILLED TO 1,680 FEET

Plugging back the pilot hole to a depth to be provided by the CONSULTANT shall be paid at the unit cost price per cubic foot of cement and include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 26 REAM HOLE TO 49-INCH TO 1,680 FEET

Reaming of the pilot hole to 49-inch diameter prior to setting intermediate casing shall be paid on the unit cost basis per linear foot and include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole reamed shall be measured vertically from the bottom of the surface casing to the bottom of the reamed hole.

ITEM 27 CONDUCT GEOPHYSICAL LOGGING OF REAMED HOLE TO 1,680 FEET

Conducting a Gamma Ray and Caliper log in the reamed borehole to 1,700 feet BLS will be paid at the lump sum price bid and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 28A DELIVER 40-INCH DIAMETER STEEL CASING

Delivering the 40-inch diameter steel casing will be paid for at the specified unit price per linear foot. Unused casing up to the line item quantity will be paid and will become property of the OWNER. The said price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to deliver the casing.

ITEM 28A INSTALL 40-INCH DIAMETER STEEL CASING

Installing the 40-inch diameter steel casing will be paid for at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 29 GROUT 40-INCH DIAMETER CASING AND CONDUCT TEMPERATURE LOGS

Grouting the intermediate casing and running temperature logs will be paid for at the unit cost per cubic foot of cement and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 30 DRILL 12-INCH DIAMETER PILOT HOLE TO 3,000 FEET

Drilling a 12-inch diameter pilot hole to approximately 3,000 feet BLS shall be paid at the unit cost price per linear foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole drilled shall be measured vertically from the bottom of the intermediate casing to the bottom of the pilot hole.

ITEM 31 COLLECT FORMATION CORES TO 3,000 FEET

Drilling and collecting up to four (4) formation cores to 3,000 feet BLS will be paid at the per core price bid as stated in the Contractor 's bid and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 32 LABORATORY ANALYSES FOR ROCK CORES TO 3,000 FEET

The packaging, shipment, and laboratory analytical costs for the core samples collected to 3,000 feet BLS will be paid at the per core lump sum price and shall include the furnishing of all material, labor, tools, and taxes to complete the work as specified.

ITEM 33 CONDUCT GEOPHYSICAL LOGGING OF PILOT-HOLE TO 3,000 FEET

Running geophysical logs in the 12-inch diameter pilot hole to approximately 3,000 feet BLS shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 34 CONDUCT PACKER TESTS TO 3,000 FEET

Conducting single and straddle packer tests in the 12-inch diameter pilot hole to 3,000 feet BLS shall be paid at the specified lump sum price per test and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. Up to three off-bottom single and two straddle packer tests will be conducted.

ITEM 35 INSTALLING A BRIDGE PLUG NEAR THE TOP OF THE INJECTION ZONE

Installing a drillable bridge plug approximately 25 feet below the final steel casing setting depth will be paid at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 36 PLUG BACK 12-INCH PILOT HOLE TO 1,680 FEET

Plugging back the pilot hole to a depth of approximately 1,680 feet BLS shall be paid at the unit cost price per cubic foot of cement and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 37 REAM HOLE TO 39-INCH TO 2,700 FEET

Reaming of the pilot hole to 39-inch diameter prior to setting the 30-inch diameter casing shall be paid on the unit cost basis per linear foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole reamed shall be measured vertically from the bottom of the intermediate casing to the bottom of the reamed hole.

ITEM 38 CONDUCT GEOPHYSICAL LOGGING OF REAMED HOLE TO 2,700 FEET

Conducting a Gamma and Caliper log in the reamed borehole will be paid at the lump sum price bid and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 39A DELIVER 30-INCH DIAMETER SEAMLESS STEEL CASING

Delivering the 30-inch diameter seamless steel casing will be paid for at the bidder's unit price per linear foot. Unused casing up to the line item quantity will be paid and will become property of the OWNER. The said price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to deliver the casing.

ITEM 39B INSTALL 30-INCH DIAMETER SEAMLESS STEEL CASING

Installing the 30-inch diameter seamless steel casing will be paid for at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 40 GROUT 30-INCH DIAMETER CASING, CONDUCT TEMPERATURE, AND CBL LOGS

Grouting the 30-inch diameter seamless steel casing and running temperature and Cement Bond logs will be paid for at the unit cost per cubic foot of cement and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work.

ITEM 41 CONDUCT PRESSURE TEST OF 30-INCH DIA CASING

Conducting a pressure test on the 30-inch diameter steel casing will be paid at the lump sum price bid as quoted and shall include all material, labor, tools, and other equipment necessary to complete the work as specified.

ITEM 42 DRILL OUT CEMENT PLUG

Drilling out the cement plug with a 29-inch diameter bit using the reverse air circulation method will be paid on the unit cost basis per linear foot and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 43 REAM HOLE TO 29-INCH DIA. BOREHOLE TO 3,000 FEET

Reaming the pilot hole to 29-inch diameter to 3,000 feet BLS will be paid on the unit cost basis per linear foot and include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified. The actual length of hole reamed shall be measured vertically from the bottom of the 30-inch diameter steel casing to the bottom of the reamed hole.

ITEM 44 CONDUCT GEOPHYSICAL AND VIDEO LOGGING TO TOTAL DEPTH

Conducting geophysical and video logging in the entire length of the well (casing and open-hole section) shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 45A DELIVER 20-INCH DIAMETER FRP TUBING

Delivering the 20-inch diameter FRP tubing shall be paid on the unit cost basis per linear foot and shall include the furnishing of all material, labor, tools, and equipment necessary to deliver the tubing. Unused FRP tubing up to the line item quantity will be paid and will become property of the OWNER.

ITEM 45B INSTALL 20-INCH DIAMETER FRP TUBING

Installing the 20-inch diameter FRP tubing shall be paid on lump sum basis and shall include the furnishing of all material, labor, tools, and equipment necessary to complete the work.

ITEM 46 GROUT 20-INCH DIAMETER FRP TUBING AND CONDUCT TEMPERATURE LOGS

Furnishing and installing the ASTM C150 Type II or ASTM C595M-21 Type 1L cement for the grouting in place of the 20-inch diameter FRP tubing will be paid in accordance with the unit price bid per cubic foot of cement. The said price shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 47 CONDUCT LOGGING FOR THE TUBING (CBL BEFORE AND AFTER GROUTING)

Conducting cement bond logs before and after cementing the FRP tubing shall be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 48 WELL DEVELOPMENT AND INJECTION ZONE SAMPLES

Development of the injection zone by air lift method and subsequent collection and laboratory analytical costs for analysis of groundwater samples shall be paid at the lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 49 CONDUCT LOGGING AND VIDEO OF COMPLETED WELL

Conduct final suite of logs and video survey of the completed well will be paid at the specified lump sum price and shall include the furnishing of all material, labor, tools, taxes, and equipment necessary to complete the work as specified.

ITEM 50 COMPLETE WELLHEAD AND CONDUCT FULL MIT

Completing the wellhead and conducting a Mechanical Integrity Test on the completed 20-inch diameter casing will be paid at the lump sum price bid as quoted and shall include furnishing all material, labor, tools, and other equipment necessary to complete the work as specified.

ITEM 51 CONDUCT INJECTION TEST

Conducting a 12-hour injection test with associated pre-test, background, post-injection data collection, and routing and design of all temporary appurtenances needed to provide the injection test water will be paid in accordance with the lump sum price bid as quoted and shall include furnishing all material, labor, tools, and other equipment necessary to complete the work as specified.

20.3 NONPAYMENT ITEMS

A. Payment will not be made for following:
   1. Loading, hauling, and disposing of rejected material.
   2. Quantities of material wasted or disposed of in nner not called for under Contract Documents.
   3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
   4. Material not unloaded from transporting vehicle.
   5. Defective Work not accepted by County.
   6. Material remaining on hand after completion of Work.

FIGURES

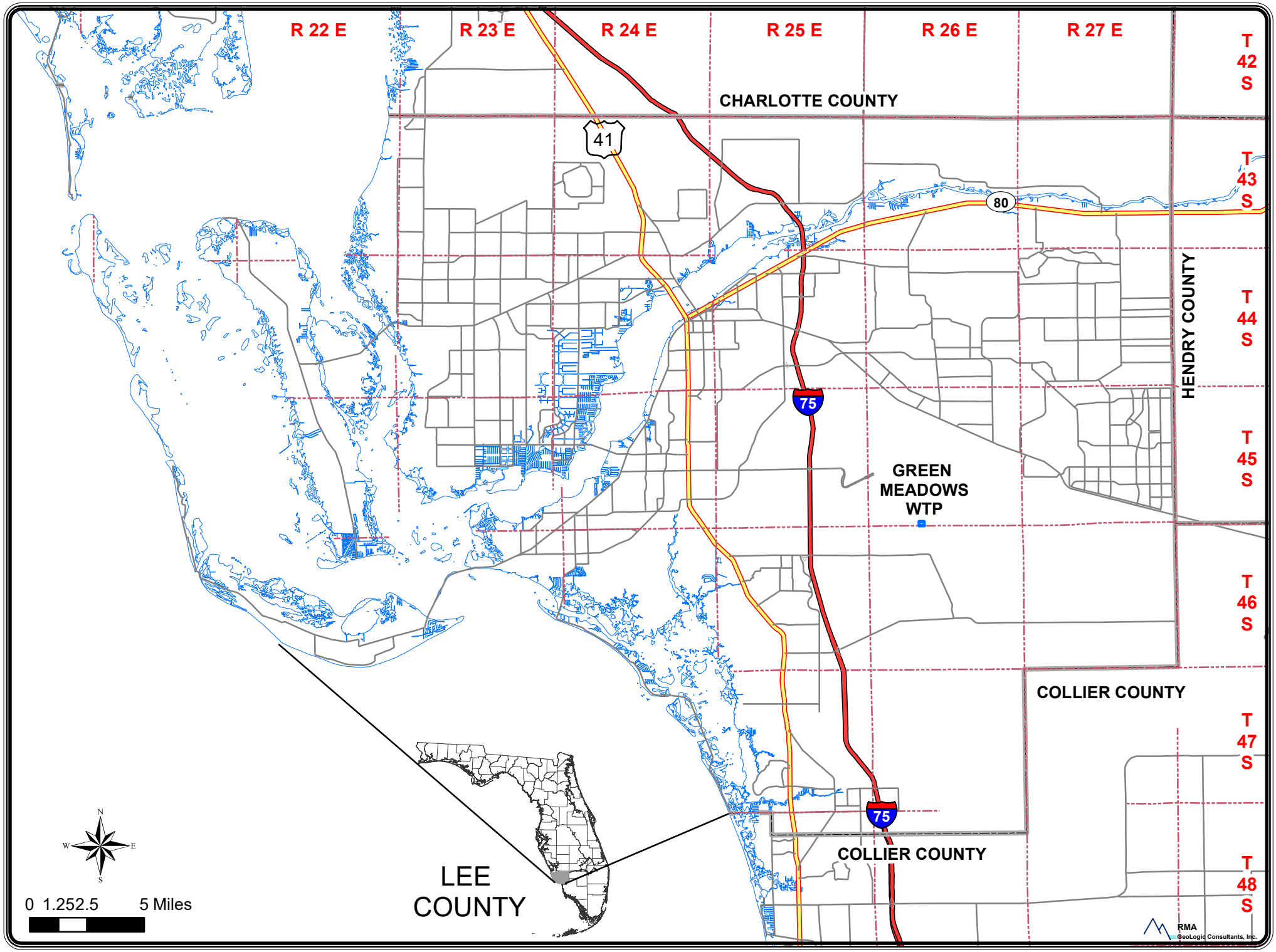


FIGURE 1- GENERAL SITE LOCATION MAP FOR GREEN MEADOWS WTP.

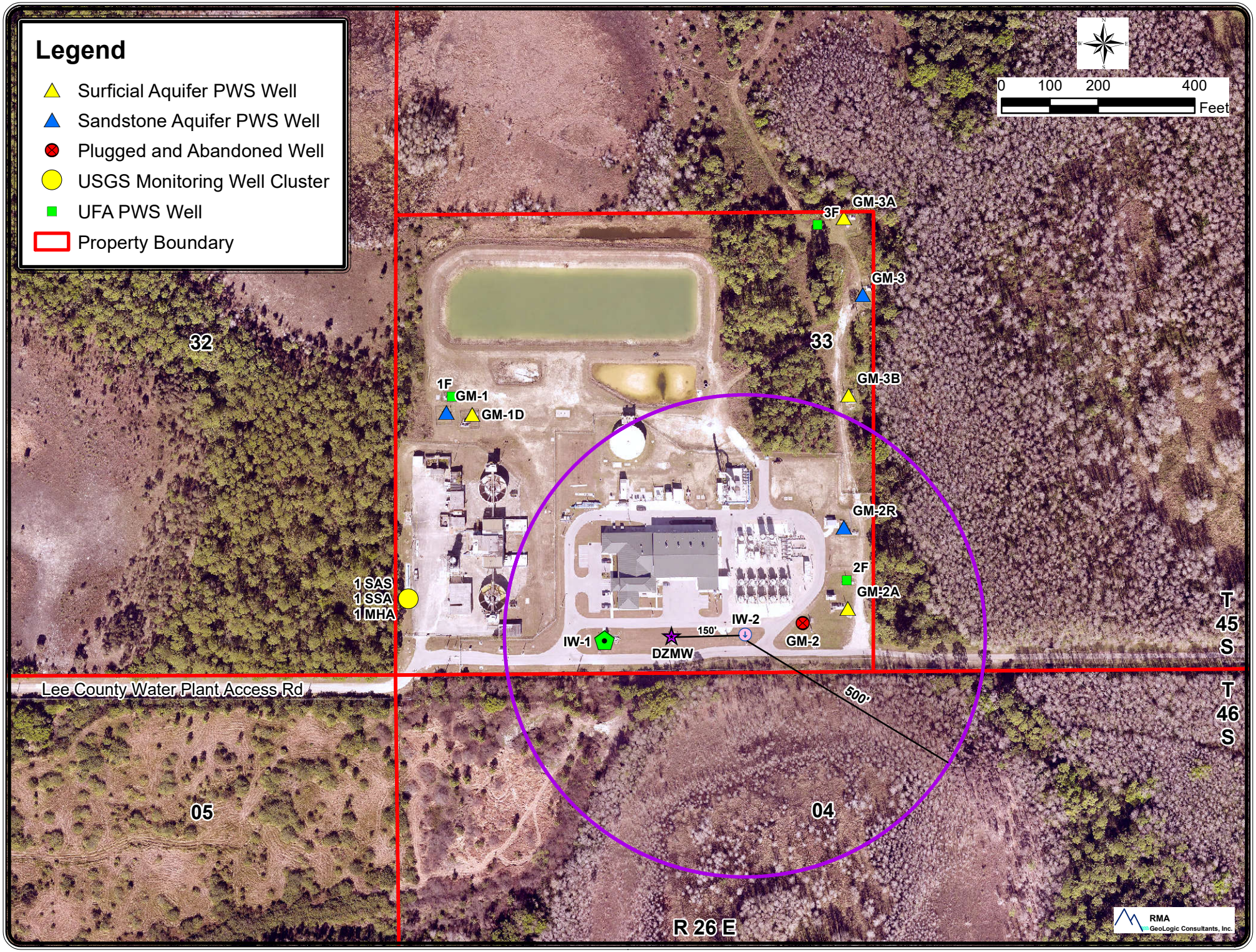
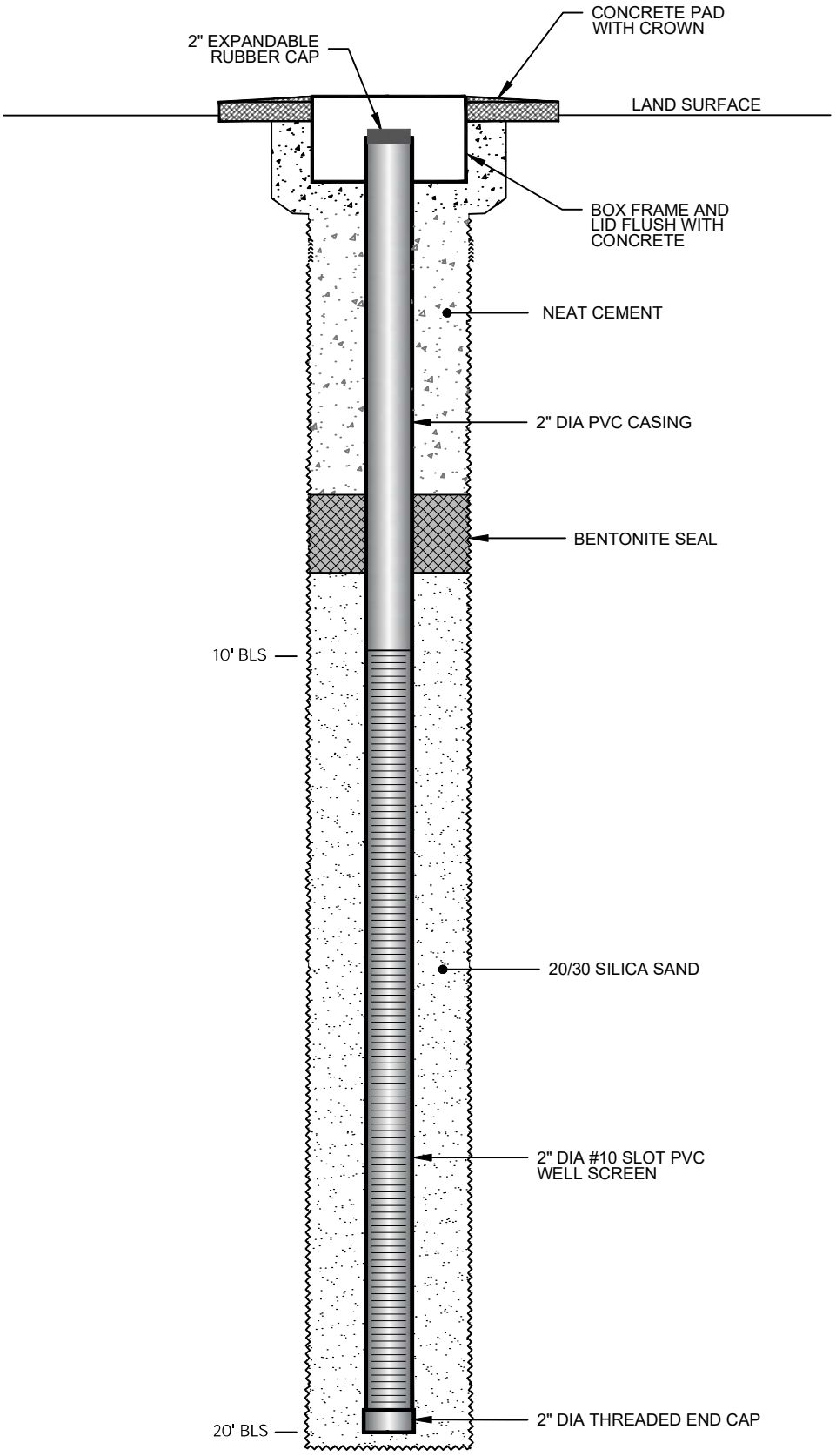


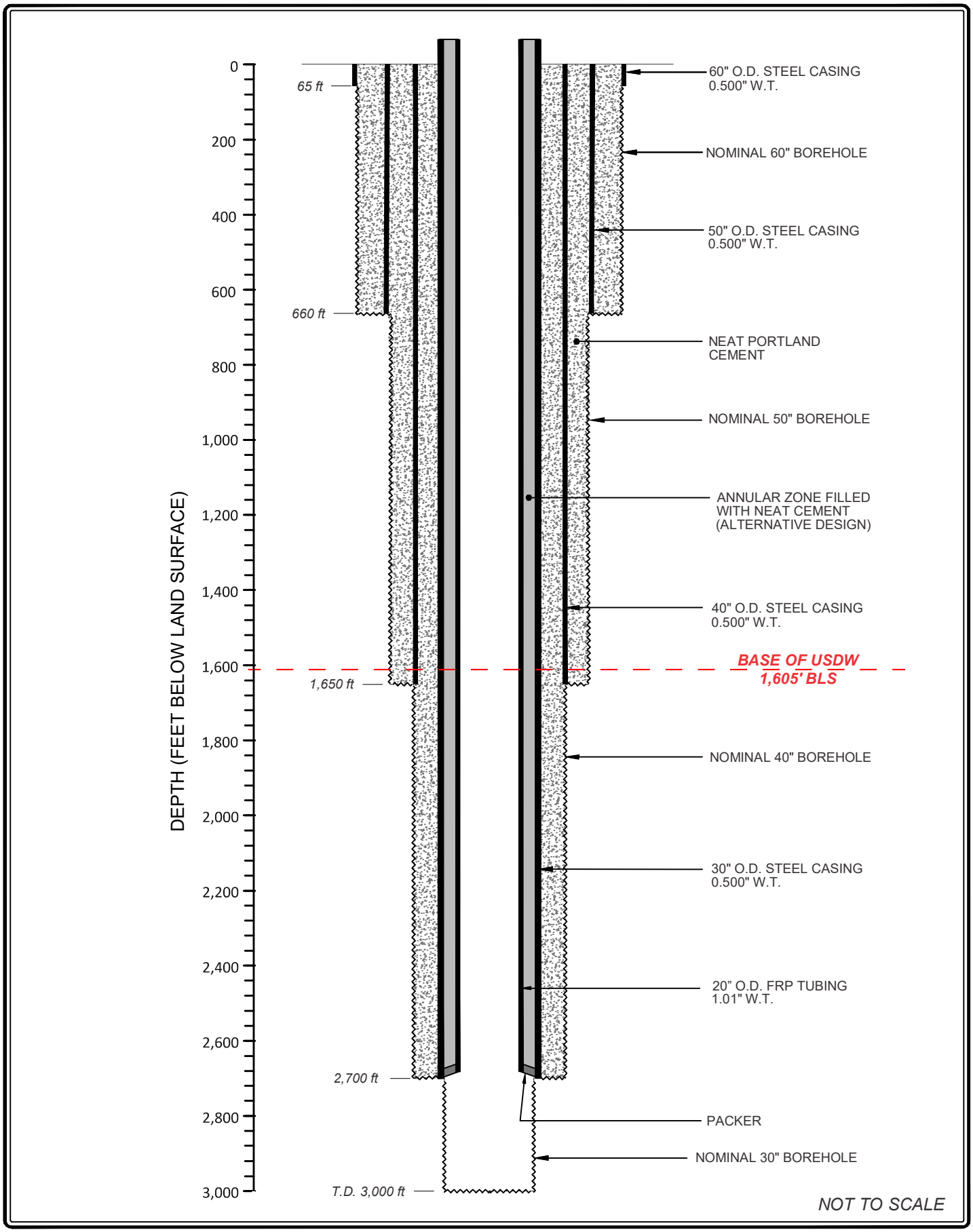
FIGURE 2- AERIAL PHOTO SHOWING LOCATION OF GREEN MEADOWS WTP INJECTION WELL SYSTEM, PROPOSED LOCATION OF IW-2, AND OTHER WELLS AT THE WTP SITE.



NOT TO SCALE

RMA GeoLogic Consultants, Inc.	PROJECT NAME: GREEN MEADOWS WTP IW-2	
	PROJECT NUMBER: 23-400	DATE: 10/30/23

FIGURE 3. SCHEMATIC ILLUSTRATION SHOWING PLANNED CONSTRUCTION DETAILS FOR TYPICAL SHALLOW PAD MONITORING WELL.



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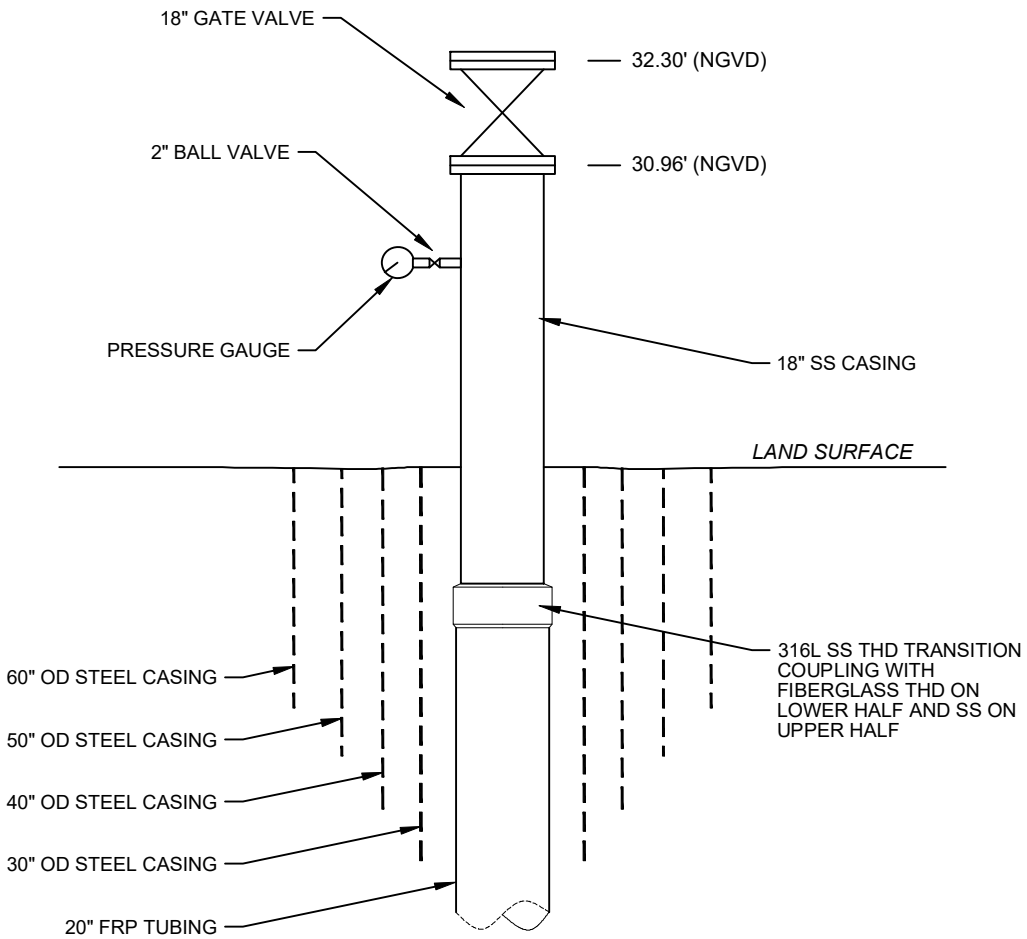
PROJECT NAME: GREEN MEADOWS WTP IW-2
PROJECT NUMBER: 23-400 DATE: 10/30/23

FIGURE 4. SCHEMATIC DIAGRAM SHOWING PROPOSED CONSTRUCTION DETAILS FOR INJECTION WELL IW-2.

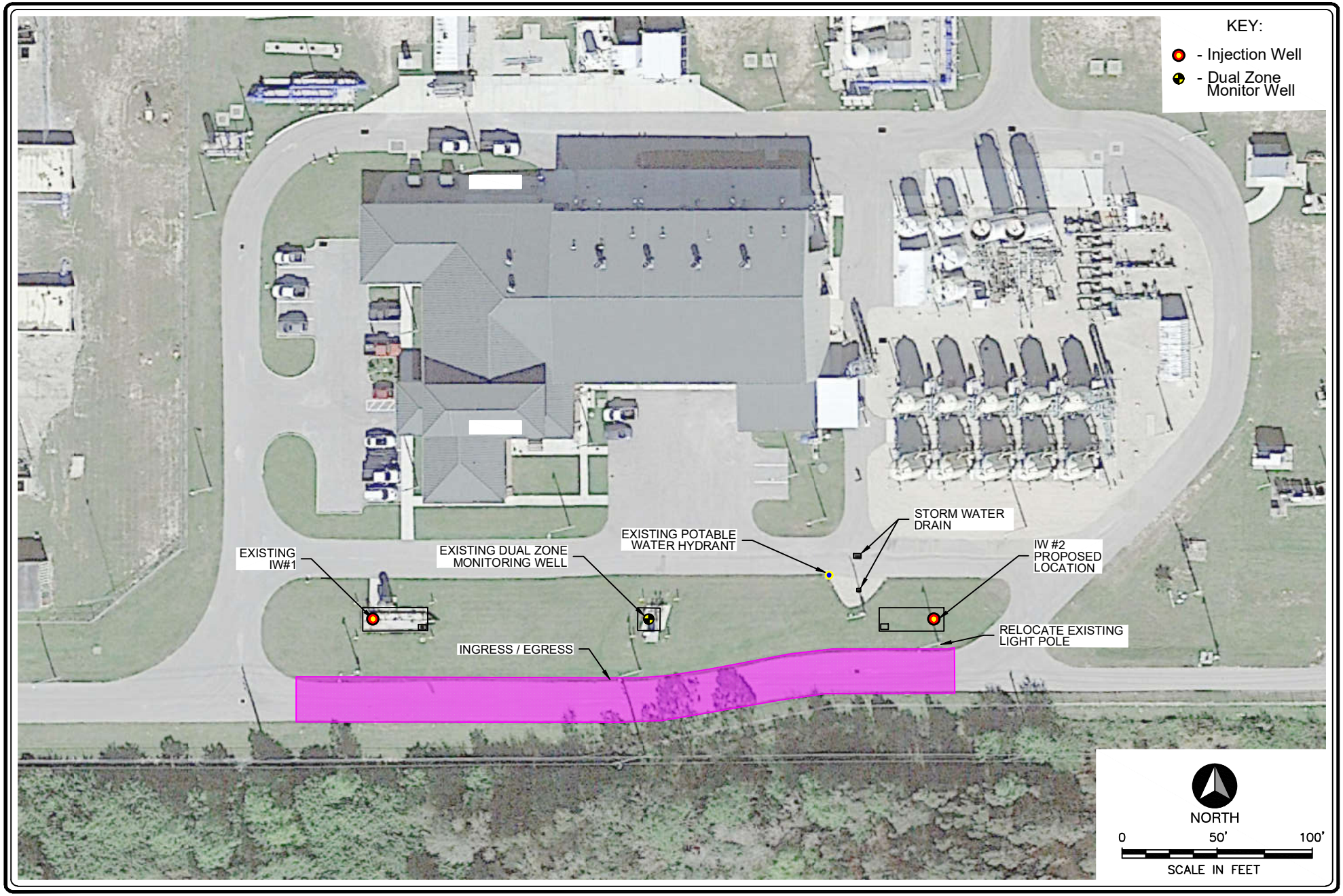


NOT TO SCALE

RMA GeoLogic Consultants, Inc.

PROJECT NAME: GREEN MEADOWS WTP IW-2
PROJECT NUMBER: 23-400 DATE: 10/30/23

FIGURE 5. WELLHEAD SCHEMATICS FOR INJECTION WELL IW-2.



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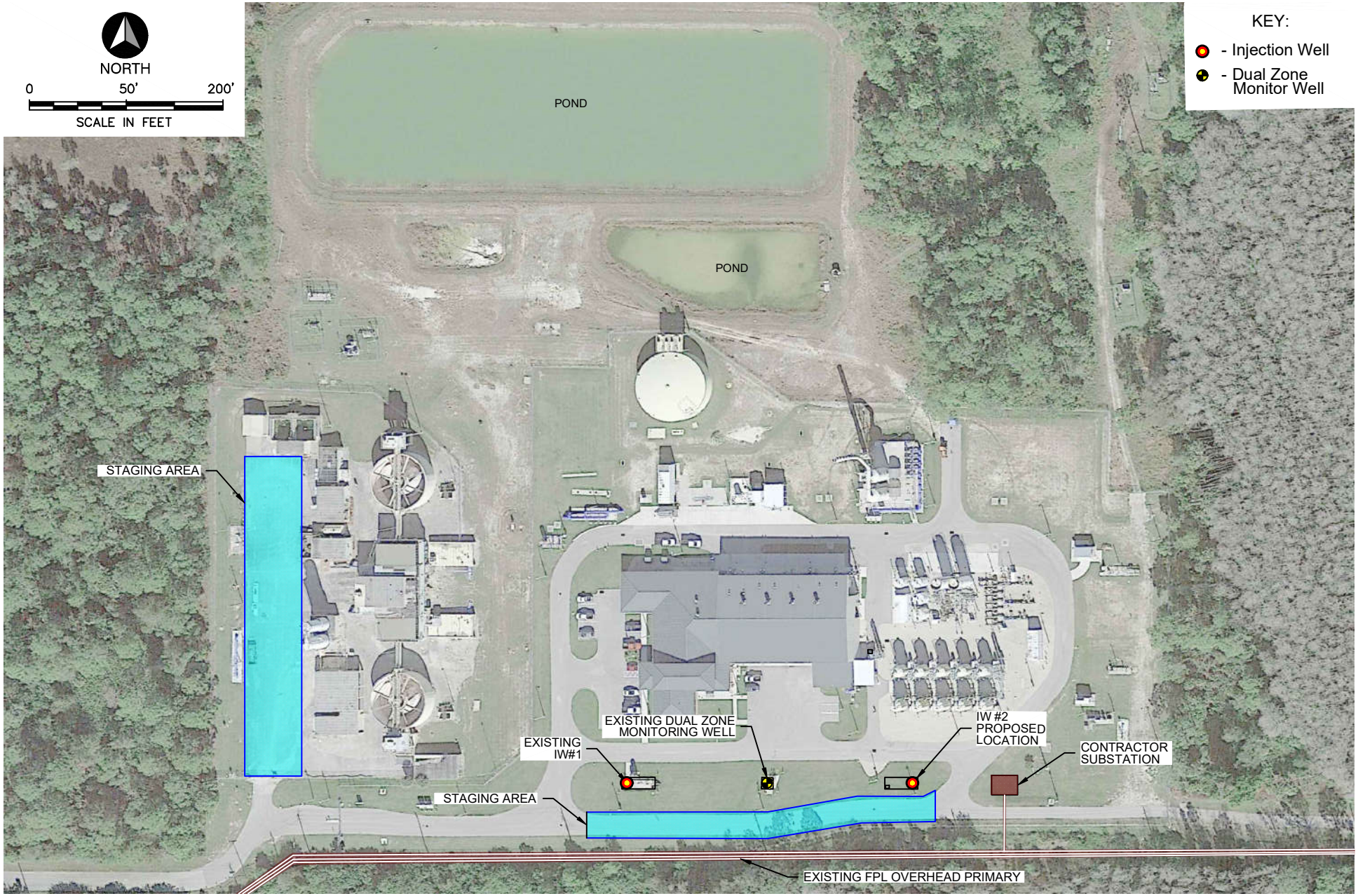
PROJECT NAME: GREEN MEADOWS WTP IW-2	
PROJECT NUMBER: 23-400	DATE: 10/30/23

FIGURE 6. CONCEPTUAL SITE PLAN SHOWING INGRESS / EGRESS, FIRE HYDRANT, AND STORMWATER DRAIN LOCATIONS.



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PROJECT NAME: GREEN MEADOWS WTP IW-2

PROJECT NUMBER: 23-400 | DATE: 10/30/23

FIGURE 7. SITE PLAN SHOWING STAGING AREAS, EXISTING FPL OVERHEAD PRIMARY, AND CONTRACTOR SUBSTATION.