TECHNICAL MEMORANDUM

DATE:	**2/14/2021**
PROJECT / VESSEL:	**Brunswick River Discharge Assessment Phase 2**
PROJECT NUMBER:	**21GN01**
CLIENT:	**U.S. Coast Guard**
SUBJECT:	**Phase 2 Ground Water Monitoring and Assessment Plan**

1 INTRODUCTION

1.1 Resolve Marine appreciate the opportunity to provide this scope summary and cost estimate to the U.S. Coast Guard (USCG) ton conduct further investigations into a continuous discharge of oil emanating from the shoreline of the PACCOMM, Inc. (PAC COMM) property into the navigable water of the East River in Brunswick, GA. In addition, information is provided regarding our team's qualifications and experience, our technical approach and other pertinent information relative to our ability to meet the needs of the Federal on Scene Coordinator. The proposed work will expand on previous investigations at the site and more thoroughly assess subsurface conditions at additional properties, in an attempt to pinpoint the source of the oil discharge.

1.2 Geotechnical Services: Tetra Tech – an environmental and engineering consulting firm comprised of engineers, geologist, toxicologists, biologists, chemists, and other professionals experienced in performing a broad scope of environmental services. Tetra Trach has provided Georgia Environmental Protection Division (GA EPD) UST Management Program and Hazardous Site Response Program with a variety of assessment and remediation services since 1997 and is currently working under the fourth renewal of the contract. Services provided have included preparation of Corrective Action Plans, Source Identification Reports, Site Investigation Summary Reports, Local Water Receptor Surveys, Groundwater Pilot Testing and Modeling, Consent Agreements, and remediation system design, installation and operation.

1.3 Waste Profiling and Disposal: SR&R Environmental BOA HSCG84-16-A-P000-46, a U.S.C.G. BOA Contractor specializes in industrial services including intensive cleaning programs for piping systems, tanks, steam generators, marine vessels and process areas. SR&R will provide waste profiling, transport and disposal of drill cuttings and collected drill water.

2 CURRENT CONDITION & FUTURE STUDY GOALS

2.1 To date, a cursory GPR survey and exploratory wells with OIP Instrumentation was conducted identifying subsurface oil at the border of the PACCOMM site and Ocean Petroleum close to the East River. The overarching expanded effort is to evaluate subsurface groundwater trends, evaluate tidal influence, map further extends of any subsurface oil plumes and take samples where possible for analytical testing.

3 STAFFING

3.1 Aaron Jozsef will act as the Project Manager on stie to serve as the main point of contact with the Federal on Scene Coordinator (FOSC) and other agency representatives. The field supervisor will be able to represent and obligate the Contractor during work assignments from the FOSC, be able to enter into subcontracting agreements as necessary, or conduct negotiations with the Government if necessary, during the execution of any work related to the project, and be available to provide daily briefs as required by the FOSC. Mr. John Snyder, will be the Tetra Tech field lead and responsible for directing subcontractor directly associated with the Geotechnical Study.

4 TECHNICAL SUMMARY

4.1 An initial site survey was conducted on the Jan 21st, 2021 with Property Owners, USCG FOSC, Golden Ray Unified Command, Tetra Tech, EPA OSC and Georgia Environmental Protection representatives. Attendees identified suitable locations for wells on the PACCOMM, Ocean Petroleum, Georgia Port Authority & 'Texaco' properties for wells. This site walks also included the identification of existing wells which may be used for sampling or ground water studies versus drilling additional wells. The approximately location and number of wells and area of existing wells for each property is noted at the end of this document with summaries and overhead diagram of each.

5 CURRENT CONDITION & FUTURE ASSESSMENT GOALS

5.1 **Prior to any intrusive work conducted at any of the properties, Tetra Tech will notify GA811 "call-before-you-dig" network and retain the services of a private utility subcontractor to screen all boring locations with ground-penetrating radar and electro-magnetic methods to ensure safe drilling locations.**

5.2 **Tetra Tech will retain the services of a Georgia-licensed drilling subcontractor to install up to five permanent monitoring wells on the PAC COMM property (4 primary – 1 reserve), up to five permanent monitoring wells on the Ocean Petroleum Site (4 primary – 1 reserve), two wells may be installed on the 'Texaco' Property (pending access agreement), one well on the Georgia Port Authority Property.**

5.3 **Prior to well installation, a direct-push boring will be advanced at each location to permit the logging of lithology, screening for VOCs using a photoionization detector (PID) and soil sample collection. Direct push borings will be advanced to top of the surficial aquifer.**

5.4 **Following the direct-push boring, the driller will install a permanent 2-inch monitoring well at each proposed location. Well installation will be done in general accordance with EPA Region 4 LSASD *Design and Installation of Monitoring Wells*. Hollow-stem augers with a diameter of no less than six inches will be used to install wells. Total well depth will be dependent on the level at which groundwater is encountered. Tetra Tech does not anticipate installing monitoring wells at a depth greater than 15 ft below ground surface. Wells will be screened with a 10-foot section of 0.01-inch slotted screen. The screened section will be set at a depth to include the top of the water table at both high and low tide. Monitoring wells will be finished with a flush-mount manhole cover and 2-ft by 2-ft concrete pad.**

5.5 **At completion of monitoring well installation, a Tetra Tech procured Georgia Licensed surveyor will survey the top-of-casing of all existing and newly-installed wells on the GPA, PAC COMM, Ocean Petroleum, and (if needed) Texaco properties.**

5.6 **Following completion of well installation, Tetra Tech will collect 48 hours of continuous water level data form the East River and newly-installed monitoring wells and up to seven additional existing wells on the various properties. Down-the-hole data loggers will be used to record potentiometric data for four complete tidal cycles on the well and East River.**

5.7 **Existing and newly installed monitoring wells will be sampled in accordance with EPA Region 4 *LSASD Groundwater Sampling*. Prior to groundwater sampling, the newly installed wells will be developed to remove any residual material remaining in the wells after installation and try to re-establish the hydraulic flow conditions of the formation which may have been disturbed by well construction. The team anticipates collecting groundwater samples via the low-flow sampling method using a peristaltic pump to purge and sample wells. Samples will be analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX), Total Petroleum Hydrocarbons-Gasoline-Range Organics (TPH-GRO), TPH-Diesel-Range Organics (DRO), and TPH-Oil-Range Organics (ORO). A National Environmental Laboratory Accreditation Program (NELAP) certified laboratory to conduct these analyses. Tetra Tech will request a standard turnaround time for laboratory results.**

5.8 **If free product is encountered in a newly installed well, Tetra Tech will not develop or purge the well but rather collect a sample of the free product using a hand bailer and submit it for a fingerprint analysis at the USCG Marine Safety Laboratory (MSL). Samples to be submitted to the USCG MSL will be collected by Tetra Tech, then relinquished to the on-site USCG Personnel for laboratory submission under USCG chain-of-custody. In the event the USCG MSL is unable to accept the sample, we have included a separate estimate to provide a private laboratory for fingerprint analysis.**

6 SCHEDULE

ACTIVITY	ANTICIPATED DURATION	COMMENTS
Site Visit	1	Complete – 1/21/21
Utility Clearance	½ day	
Drilling & Installation of Monitoring Wells	4 days	
Surveying top-of-casings	1 day	Concurrent with sampling & study
48-hour ground water study	2 days	
Sampling of up to 22 wells	2 days	Concurrent with sampling existing wells and drilling
Report Preparation	30 business days	
Waste Profiling	5-10 Days	Concurrent start with sample completion
Waste Disposal	3-5 Days	Transported once results received

7 GEOTECHNICAL ASSUMPTIONS

7.1 Field Assessment Activities

a. **Field work will be conducted between 6 PM and 6 AM during night time hours 7 days a week to minimize COVID 19 hazards / exposures and inconvenience to small business.**

b. **We assume USCG will obtain access to the properties listed in this scope summary.**

c. **We assume Tetra Tech will have two field staff on-site during all field activities for oversight of utility clearance, drilling, and surveying activities, and sample collection and water level monitoring.**

d. **Well installation and sampling activities are anticipated to generate up to (25) 55-gallon drums of soils cuttings and five 55-gallon drums of development/purge water. A suitable location for staging these drums is required while awaiting characterization and off-site disposal. This area is immediately adjacent/west of the entrance gate of the PAC COMM Property next to the support/storage building on the exterior eastern wall. This provides easy access for hauling and is well lit for night time**

operations.

e. Tetra Tech anticipates collecting water data at up to 17 wells and the East River during a 48-hour continuous monitoring period.

f. Tetra Tech anticipates up to 17 soils samples to be collected. This includes one from each newly installed well, one duplicate, and one trip blank. Laboratory analysis includes BTEX, TPH-HRO, TPH-DRO, and TPH-ORO.

g. Tetra Tech anticipates up to 25 ground water samples to be collected. One from each newly installed well, seven wells on the PAC COMM Property or GPA Properties, two duplicates, and one trip blank. Laboratory analysis includes BTEX, TPH-GRO, TPH-DRO, and TPH-ORO.

h. Tetra Tech has included costs to collect up to four samples for fingerprint analysis in the event the USCG MSL is unable to accept samples.

i. Tetra Tech Anticipates two IDW samples for characterization purposes – one for soil cuttings and one for purged groundwater.

j. We assume a standard turnaround time for laboratory analytical results will be sufficient.

k. We assume that the IDW (soil cuttings and purged ground water) will be disposed of as non-hazardous waste.

8 WASTE CHARACTERIZATION & DISPOSAL

8.1 Waste Characterization

l. SRR Environmental has been identified as the preferred BOA contractor for waste profiling and disposal services. Their field technician will conduct sampling for laboratory analysis, perform waste characterization/profiling, and finally remove, transport and dispose of approximately 25-30 drums of waste staged from the four worksites.

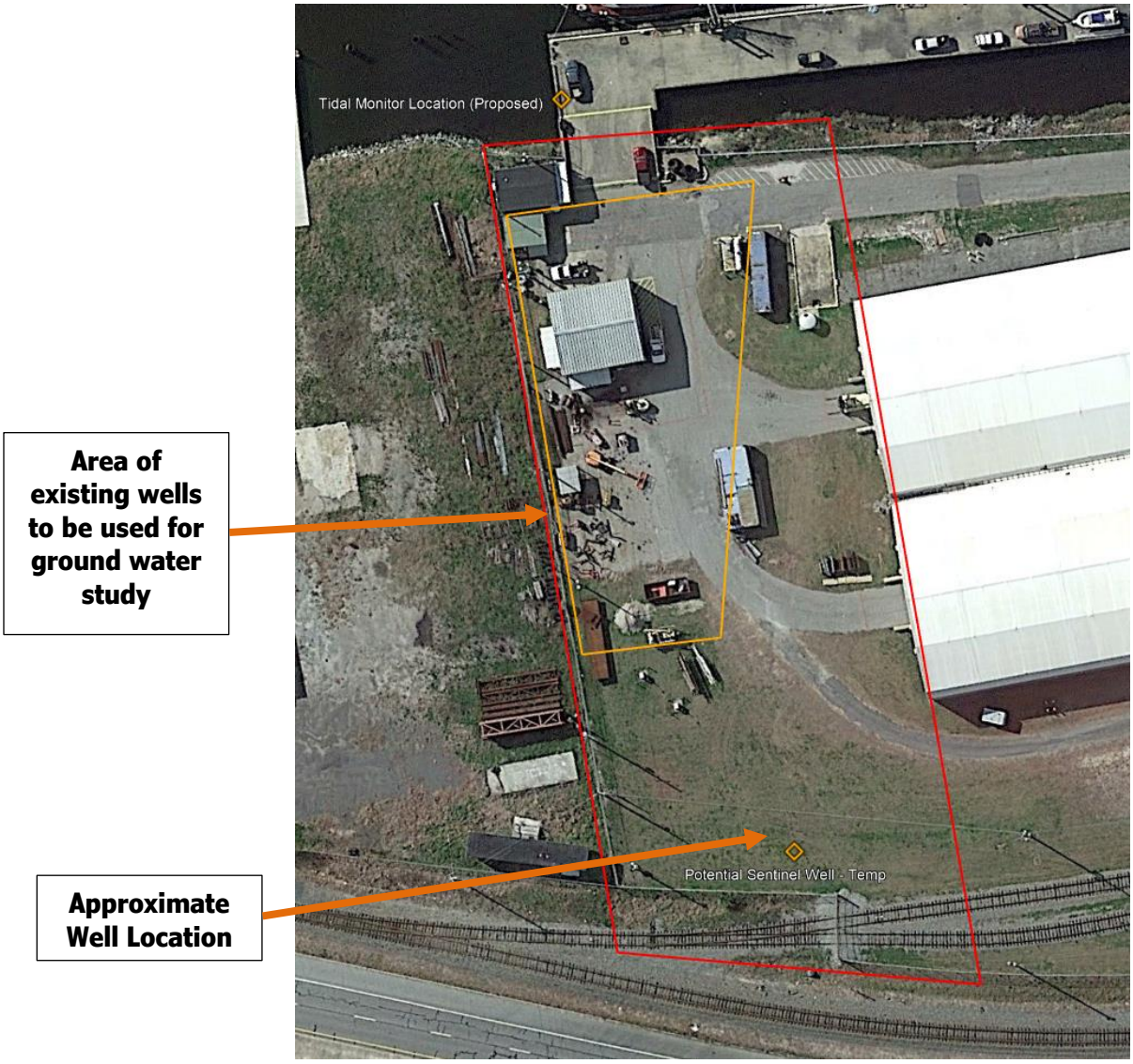
m. Laboratory testing based on 8 total samples – full TCLP Analysis for Wastewater Stream and Drill Cuttings from each of the Four Sites.

8.2 Transportation & Disposal

n. Transportation – a 53′ box trailer equipped with liftgate, Driver, Technician and manual drum handling shall be used to take the material to be disposed of from site to final disposition handler.

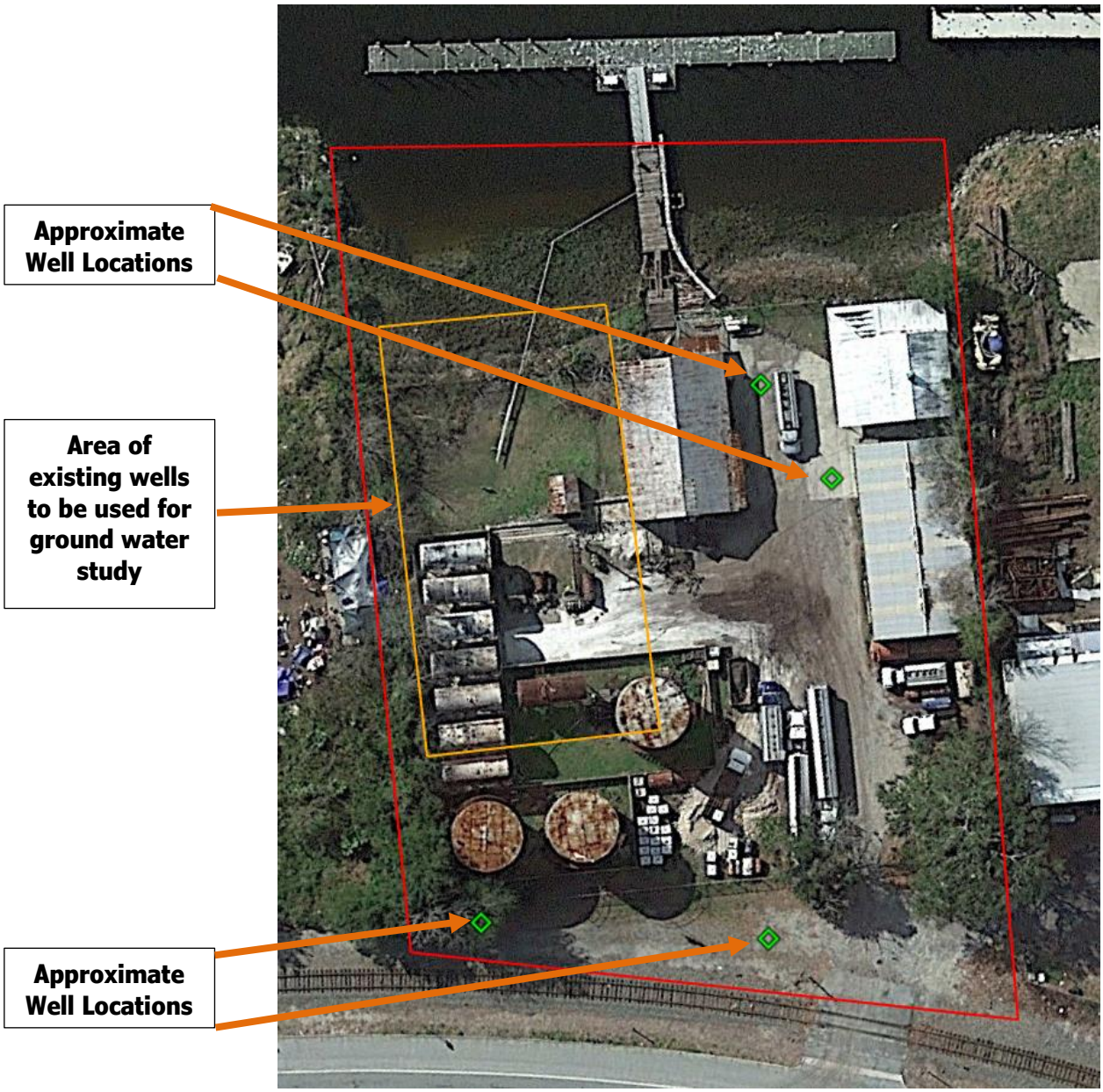
o. All waste disposal conducted will be documented on Waste Disposal Manifests and will be accompanied by Certificates of Treatment/Disposal, all of which will be provided to Resolve Marine Group upon project completion.

9 GEORGIA PORT AUTHORITY SITES



NOTE: locations denoted are approximate and pend additional investigation for subterranean hazards prior to drilling. This diagram is meant to illustrate the general area of observations for logistics or access concerns. Names listed in title are subject to change from official owner or regulatory documentation and will be properly reflected in the final report.

10 OCEAN PETROLEUM SITES



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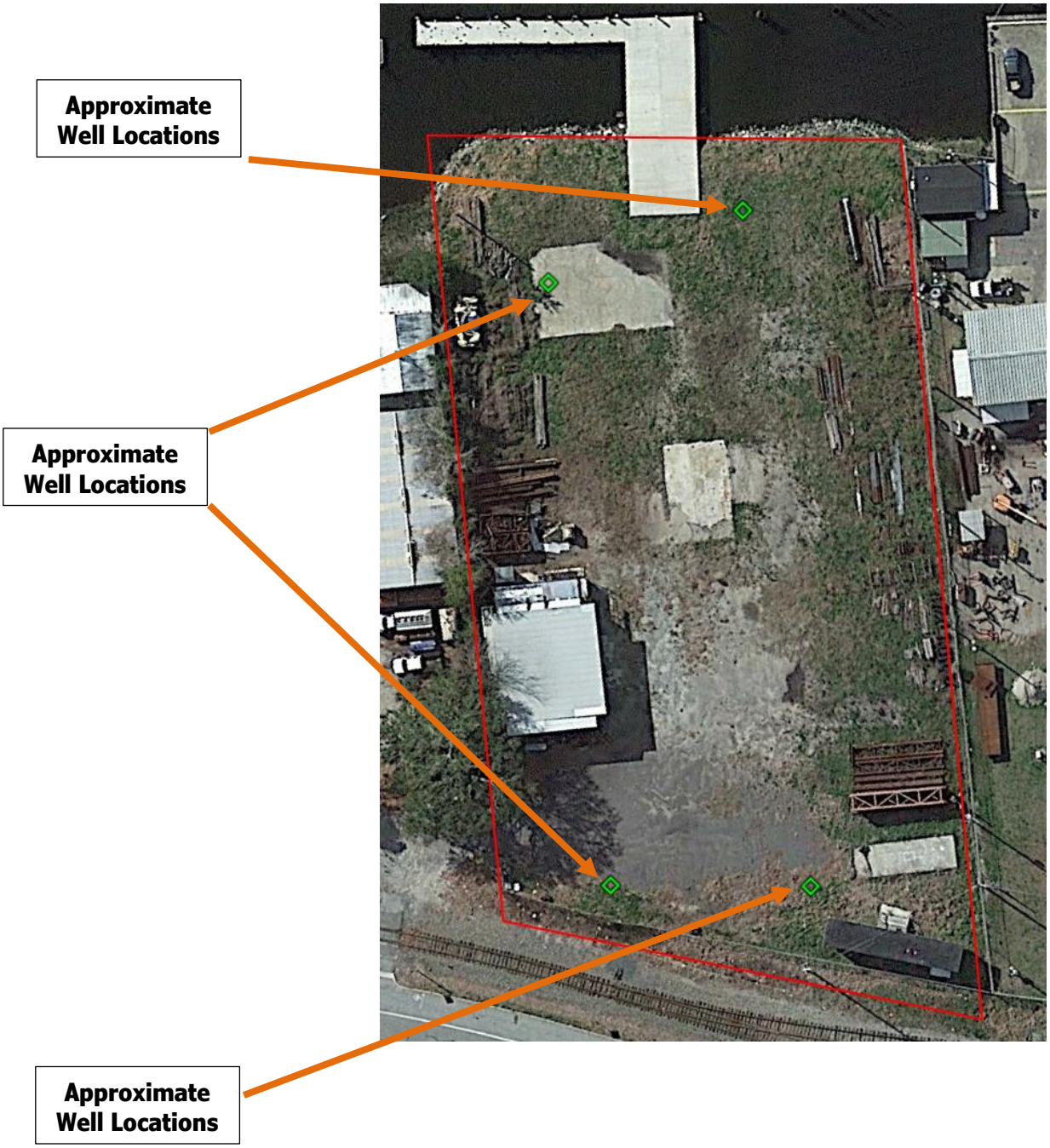
11 PACC COMM PROPERTY SITES



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12 'TEXACO' PROPERTY SITES

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