



ENGINEERING  
ENVIRONMENTAL  
ECOLOGICAL

April 20, 2016

Douglas E. Smith  
City Manager  
City of Margate  
5790 Margate Boulevard  
Margate, FL 33063

**Subject:           Assessment Strategy and Sampling Plan  
                      Eagle Lakes/Palm Lakes Golf Course  
                      7590 West Atlantic Boulevard  
                      Margate, Broward County, Florida  
                      E Sciences Project Number 2-1024-001**

Dear Mr. Smith,

E Sciences, Incorporated (E Sciences) is pleased to submit this assessment strategy/sampling plan in order to assist the City of Margate (the City) in evaluating the cost and effort associated with assessment activities necessary to develop a strategy for future site remediation and redevelopment if the City elects to acquire the subject former golf course (the Site). A previous draft plan dated March 29, 2016 was submitted to the City. Based on email correspondence provided by the City the revised plan is presented herein.

## **BACKGROUND INFORMATION**

Our understanding of this project is based upon E Sciences' services previously performed for the Site for Broward County and subsequent communications with various City staff since that time and a meeting held with Broward County Environmental Protection and Growth Management Department (EPGMD), City officials and E Sciences' representatives on March 15, 2016. Additionally, E Sciences conducted a file review of environmental documents available at EPGMD headquarters documenting assessment activities conducted by others in 2008 and 2009.

E Sciences prepared a *Report of a Phase I and Phase II Environmental Site Assessment* (ESA) dated March 24, 2004. During our Phase I ESA, we identified the use of herbicides on the golf course to be a recognized environmental condition. Broward County engaged E Sciences to conduct a Phase II ESA to further evaluate the potential for the presence of arsenic in the soil, groundwater and surface water resulting from the typical application of herbicides at golf courses in Florida. The Phase II ESA revealed concentrations of arsenic in excess of cleanup target levels (CTLs) established by the Florida Department of Environmental Protection (FDEP) in the surface soils. Arsenic was not detected in the surface water samples. Arsenic was detected above CTLs (in place at the time of the assessment) in one of the groundwater samples collected; however, filtered

groundwater samples did not reveal elevated concentrations of arsenic. It was our opinion that the arsenic detected in the groundwater was attributable to sediment in the samples.

Additional assessment was conducted in 2008 and 2009 on behalf of the property owner at that time. These assessment activities confirmed the presence of arsenic impacts above the soil CTL between the zero to six-foot depth interval and revealed the presence of groundwater impacts above the current groundwater CTL for arsenic.

During the March 15, 2016 meeting between EPGMD, City and E Sciences' representatives, assessment alternatives for the Site were discussed. The need for tailoring the assessment work to the remediation goals and ultimate land use was explained during the meeting. It was decided that E Sciences would prepare a plan to complete a Site Assessment Report (SAR) in accordance with applicable regulatory rules. The results documented in the assessment would be used to develop a conceptual remedial strategy and to estimate magnitude of costs associated with the remediation. EPGMD indicated that additional and updated assessment data is required in order to determine an appropriate remedial strategy and the previous soil assessment data does not need to be used as part of the current assessment evaluation. The assessment will include soil testing, soil leachability testing, groundwater testing and surface water testing and would require the City to obtain an Environmental Assessment and Remediation (EAR License). An EAR License is essentially a voluntary cleanup agreement which would obligate the City to complete the assessment and ultimately regulatory site closure. E Sciences noted during a review of County regulatory files for the Site, that the historic owner had maintained an EAR License for some time, but allowed it to expire. There does not appear to be a current EAR License. As an alternative, it was noted during the meeting with EPGMD, that County staff would be willing to conduct an informal review of data, in lieu of a SAR document, to provide some general guidance to the City if it wished to conduct an expanded "due diligence" level assessment without the EAR License, as long as the City did not own the Site.

A draft Assessment Strategy and Sampling plan dated March 29, 2016 was provided to the City. Upon review of the plan, the City provided comments in email correspondence dated April 18, 2016. The draft plan presented two optional scopes and associated fees: completion of a SAR in accordance with regulatory guidelines, and completion of a reduced, limited assessment scope to provide a general evaluation of the contamination impacts onsite. The City has elected to exclude the SAR option at this time. This plan presents the reduced scope option and services.

## **GENERAL ENVIRONMENTAL STRATEGY**

The assessment strategy for this Site should provide a scientific basis for evaluating an appropriate remedial closure option. The degree of remediation that will be required is based upon the future land use, as different soil CTLs apply to different proposed land uses. At this time, there are three CTLs defined for arsenic: residential, recreational and industrial/commercial scenarios (in highest to lowest stringency order). Therefore, the proposed use of the Site should be considered to define the assessment goals to implement for the soil assessment. In the absence of a proposed land use, the most stringent criteria (residential) would be applied so that there are no land use limitations placed upon a property. We understand that if the City takes ownership of the Site it would be developed as a passive park and that conditional regulatory closure of the Site is a favorable option as long as the closure provides protection of human health and the environment. Based upon the historical information we have compiled, EPGMD's input on regulatory requirements and the City's desire to meet the needs of the community, it is our opinion that the remedial strategy would likely employ a combination of the following technologies:

- Source removal of "hot spots" to be delineated during assessment
- Cover of areas with an engineering control to provide a barrier to exposure with impacted media. This engineering control will probably be a combination of two feet of clean fill, impervious materials (e.g. sidewalks), and less than two feet of clean fill with a fabric liner. The impacted areas and final design elevations/covering of the Site would be coordinated to minimize remediation costs to the City. Soils may be blended or moved internally within the site boundaries to reduce the amount of fill that would be needed to be imported to the site to meet the engineering control objectives and to reduce soil disposal costs.
- Restriction of groundwater use; irrigation water to be provided from ponds.
- Land use restrictions to be recorded to prevent residential land use without additional remediation. This would allow the City to apply the recreational CTL to the Site. Unrestricted land use would require that the Site meet the residential CTL, which would be a more costly cleanup.

In order to support this combined remedial strategy and to meet the rule requirements for completing a site assessment report in accordance with Chapter 62-780 of the Florida Administrative Code, will need to be completed. However, because the City does not own the Site and may not wish to enter into an EAR License at this time, the City has elected to implement a more limited scope assessment based upon the input provided during the meeting. It should be

noted that while this data could be used in part in the event that the City does want to obtain an EAR License, some of the data may become outdated and would need to be replicated. In any event, a full SAR would require additional assessment beyond what is contemplated under this scope.

Based on the historical information reviewed and the regulatory feedback provided by EPGMD, the limited assessment would include the following:

- Because the source of the impacts has been applied to the surface of the ground over a period of years, we propose to conduct a “grid” approach to evaluate the soil impacts. We would incorporate an iterative process into the laboratory analysis so that we can collect samples that may be needed for delineation of impacts, but analyze them only when an area has been determined to exceed the applicable standards.
- We would redevelop and re-sample existing monitoring wells in order to save on costs for installing new monitoring wells.
- We would sample the surface water in the lakes onsite to determine if the water meets surface water criteria so that the City will know if the lakes can be used for irrigation.
- Sediment testing is not proposed because the lakes are not going to be disturbed.
- It is important to note that the historic maintenance shed area would be considered to be a separate assessment area because it is common to identify significantly higher concentrations of arsenic in these areas due to incidental spilling that often occurs with storage and mixing of the chemicals and storage and cleaning of application equipment.
- Costs associated with conducting off-site sampling are not included at this time. We have no information that indicates that this would be necessary; however, it is possible that during the course of the assessment it may be determined that contamination has migrated off-site. If this is the case, then we would need to notify off-site landowners and seek their approval to enter their properties to collect samples. If off-site impacts are identified, source removal off-site would likely be required and we would need to resolve groundwater impacts prior to obtaining site closure. The groundwater impacts may not require active remediation, but would require groundwater monitoring until arsenic levels were below groundwater cleanup criteria, at a minimum.

## **PROPOSED LIMITED SITE ASSESSMENT SAMPLING PLAN**

Drilling services will be provided by licensed well driller. Laboratory analysis services will be provided by NELAC state-certified laboratory. Soil and groundwater sampling activities will be conducted in general accordance with FDEP Standard Operating Procedures.

### **Task 1: Soil Assessment**

- A grid pattern will be superimposed across the Site and in the former maintenance shed area. Soil borings will be advanced manually to the groundwater table. We note that the groundwater table was documented to be at an approximate depth of six feet during the documented 2008-2009 assessment activities. Up to 45 soil borings will be advanced.
- Soil samples will be collected at two-foot depth intervals from each boring from the ground surface to the water table. Based on a six foot water table depth, we anticipate collecting up to three soil samples at each boring location. Up to 135 soil samples will be collected. Please note that the total number of samples may vary due to groundwater table depth changes with the changes in surface topography.
- Soil samples will be analyzed for total arsenic as follows:
  - Phase I: Up to 45 soil samples will be collected from the zero to two foot (or zero to six inch) depth interval and analyzed for the presence of arsenic. The samples collected from deeper intervals will be placed on hold at the laboratory facility pending results of the initial testing.
  - Phase II: Soil samples from the second depth interval (two to four foot depth or six to 24 inch depth) from those locations where the shallower depth interval samples exceeded the soil CTL will be analyzed for total arsenic. For the purposes of this assessment we anticipate that 80% of samples collected from this depth interval will require analysis. Therefore, we based our estimated fee on 36 samples to be analyzed during this Phase II.
  - Phase III: If deeper samples are collected from deeper than four feet based on the groundwater table observed during sampling activities, only those samples collected from those locations where the two to four foot depth samples exceed the soil CTL will be analyzed for total arsenic. For the purposes of this assessment we anticipate that 60% of samples collected from this depth interval will require analysis. Therefore, we based the estimated fee on analyzing up to 27 samples for arsenic during this Phase III.

### **Task 2: Soil Leachability Assessment**

Up to eight soil samples collected during Task 1 will be analyzed for leachable arsenic. These results are compared to the groundwater CTL in order to evaluate the leaching potential of the soil to contribute to groundwater contamination at the Site as requested by EPGMD.

### **Task 3: Groundwater Assessment**

Based on the 2008/2009 assessment documents reviewed, eleven “temporary” monitoring wells were installed at the Site during assessment activities. E Sciences assumes that these monitoring wells still exist and are in good condition and anticipates utilizing these wells for the proposed sampling activities. The following groundwater assessment activities are proposed:

- E Sciences will conduct one initial groundwater sampling event to collect samples from the 11 existing “temporary” monitoring wells. The samples will be delivered to the laboratory for total arsenic analysis. The viability and condition of the wells will be evaluated during field activities. Anticipated costs associated with the installation of replacement wells are not included in this scope.
- E Sciences will install two shallow groundwater monitoring wells (approximate 12 to 15 foot sampling interval depth) within the maintenance building area. Groundwater samples will be collected from the newly installed wells and analyzed for total arsenic
- All proposed monitoring wells will be installed using Direct Push Technology (DPT). The wells will be constructed with five to ten feet of pre-packed 0.001-inch screen followed by a solid riser extending to the surface level. The wells will be equipped with a locking cap and traffic-bearing manhole.

Purge water generated during field activities will be containerized in 55-gallon drums. Samples will be collected for disposal characterization and the contents properly disposed. Our estimated fee assumes that the wastes will not be hazardous.

#### **Task 4: Surface Water Assessment**

One surface water sample will be collected from each of the two existing lakes at the site. The samples will be submitted to the laboratory for analysis of arsenic.

#### **Task 5: Reporting**

A memorandum or letter report summarizing the sampling activities and methodologies and presenting a discussion of the findings and proposed remedial alternatives will be prepared. This deliverable would include summary tables presenting current analytical data and maps depicting the analytical results and delineation of the impact plume(s), as applicable. A discussion of conceptual remedial approaches based on the results of the assessment would be provided to assist the City in evaluating the cost and effort that might need to be invested to seek regulatory closure to facilitate

future redevelopment. The information contained in this deliverable could be used to seek input from EPGMD and facilitate a general discussion of the results and alternative remedial approaches.

### **COST ESTIMATE**

E Sciences estimates the following fee options for the City:

<b><u>Task</u></b>	<b><u>Estimated Opinion of Cost</u></b>
Task 1: Groundwater Assessment	\$9,058.10
Task 2: Soil Assessment	
Phase I: Field Sample Collection and Phase I Analysis	\$10,296.50
Phase II Analysis	\$1,238.20
Phase III Analysis	\$1,069.90
Task 3: Soil Leachability Assessment	\$1,357.00
Task 4: Surface Water Assessment	\$1,210.00
Task 5: Reporting	\$8,630.00
Additional Support (two meetings, two conference calls)	\$2,000

Please note that the efforts for each individual task have been estimated based on the tasks being conducted independently of each other. Coordinating the tasks concurrently may provide cost savings to the City. For example, conducting well installation proposed under Task 1 and advancement of soil borings proposed under Task 2 during the same field event will provide cost savings associated with driller and mobilization costs.

### **SCHEDULE**

We estimate that assessment and reporting activities can be completed within two months of authorization to proceed for the limited assessment and reporting.

### **FUNDING AVAILABILITY**

The site is not currently designated as a brownfield but could be eligible to participate in the program after a designation process is complete. If a Brownfield Site Rehabilitation Agreement (BSRA) is executed between the responsible party and the regulatory agency to prescribe the rehabilitation requirements and goals for the Site, additional regulatory and financial incentives become available. The BSRA would become the cleanup agreement in lieu of an EPGMD EAR License.

The brownfield program provides tax credit incentives based on the costs associated with assessment, remediation planning and remediation of the Site conducted under the BSRA. We anticipate that the assessment costs for a SAR would be eligible for reimbursement of site rehabilitation costs in the form of voluntary cleanup tax credits (VCTC). A VCTC is a tax credit that can be applied to state corporate income tax. Cities can sell them on the open market through a broker or transfer them (one time) to another entity that can use them as a credit against their Florida corporate income tax. The VCTCs are often used as compensation to contractors for municipal redevelopment projects. The VCTC allows for up to 50% of costs incurred and paid annually (up to \$500,000) during the calendar year. Another 25% of the total site rehabilitation costs can be obtained once the site achieves regulatory closure. Additionally, the City would not be assessed the annual EAR license fee.

The South Florida Regional Planning Council (SFRPC) has \$150,000 in grant funding to spend on assessing Brownfields Sites. This site may be eligible for receiving funding for assessment under this grant. The assessment activities proposed herein should be eligible expenses under the grant, if the site qualifies for grant funding. However, additional services, such as a development of a site-specific Quality Assurance Project Plan and EPA Brownfields reporting forms, would be required in addition to the items listed herein for grant compliance. The grant also strongly encourages public engagement be included on funded projects. We anticipate that the use of grant funds would extend the project time frame by six weeks and add \$5,000 to \$10,000 in costs to the total project cost, which should also be paid by the grant. We note that the SFRPC also has a revolving loan fund with favorable terms to fund remediation on Brownfield sites and the EPA has Brownfield Cleanup Grants that can be pursued, but are awarded on a competitive basis.

We appreciate the opportunity to assist you on this project. If you have any questions concerning this proposal, please contact us at 954-484-8500.

Sincerely,  
**E SCIENCES, INCORPORATED**

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