



ENGINEERING
ENVIRONMENTAL
ECOLOGICAL

March 29, 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 a future site remediation and redevelopment if the City elects to acquire the subject former golf course (the Site).

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, rather than dissolved into the groundwater.

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 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 will prepare a plan to complete a Site Assessment Report (SAR) in accordance with applicable regulatory rules. The results documented in the assessment will be used to develop a conceptual remedial strategy and 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 may not 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.

GENERAL ENVIRONMENTAL STRATEGY

The assessment strategy for this Site should provide a scientific basis for the 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 will 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 brought 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 will allow the City to apply the recreational CTL to the Site. Unrestricted land use would require that the Site meet the residential CTL, which will 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, E Sciences proposes 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 will 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 will redevelop and re-sample existing monitoring wells in order to save costs on installing new monitoring wells. The rule requires that we install additional monitoring wells in order to delineate the extent of impacted groundwater. We will also have a contingency to replace monitoring wells that may have been damaged or removed since the 2009 assessment.
- We will 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 will 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 is 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 SITE ASSESSMENT SAMPLING PLAN

E Sciences proposes complete the following assessment activities in order to compile current representative data of the site conditions with the intent of meeting the SAR requirements expressed by EPGMD and the current regulatory guidelines.

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 using a 150-foot spacing across the Site and a maximum of a 50-foot spacing 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 60 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 180 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 eighty 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 56 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 34 samples for arsenic during this Phase III.
Up to 12 soil samples collected 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 2: Groundwater Assessment

Based on the 2008/2009 assessment documents reviewed, eleven “temporary” monitoring wells were installed at the Site during assessment activities. E Sciences 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 included under the Contingency Monitoring Well Installation task below.
- 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

- Based on evaluation of the results of the groundwater samples collected from the existing wells and newly installed maintenance area wells, E Sciences anticipates installing and sampling up to 12 additional groundwater monitoring wells in order to evaluate the potential extent of the groundwater impact plume at the Site.
- 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 3: 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 4 Site Assessment Report (SAR)

Under this alternative, we would prepare a Site Assessment Report compliant with current regulatory guidelines for formal submittal to the regulatory agency and a separate memorandum or letter summarizing the findings and proposed remedial alternatives will be prepared for the City. The summary would include a discussion of conceptual remedial approaches, costs and time frames based on the results of the assessment would be provided to assist the City to evaluate the investment necessary to seek regulatory closure to facilitate future redevelopment. The regulatory SAR deliverable will include the following:

- Project background;
- Summary of the field activities and methodology;
- Groundwater and soil analytical summary tables including historical and current analytical data;
- Potable water well survey survey
- Soil and groundwater sampling location and analytical maps including impact delineation, as applicable;

- Recommendations for additional assessment or regulatory actions consistent with the findings of the assessment completed and the regulatory closure approach considered at that time.
- Diagram illustrating the monitoring well construction details;
- Discussion of the surface water, groundwater and soil analytical data;
- Field forms (i.e. groundwater sampling logs, equipment calibration logs, chain of custody form, well construction and development logs);
- A map showing the approximate locations of the water supply wells identified during the well survey in relation to the subject site;
- Scaled site maps that illustrate the water-level elevations calculated at each monitoring well, and depict the estimated elevation contours and an interpretation of groundwater flow direction.
- A description of the site-specific stratigraphy, based on the lithologic logs prepared during soil assessment and monitoring well installation;
- As part of the reporting requirements, a survey of the elevations of the top of casings of the monitoring wells will be conducted in order to evaluate the groundwater direction flow and gradient. Well survey elevations may be relative to each other or to a stationary datum.
- A table summarizing the well construction details (including the top-of-casing elevation, total depth, screen length, and depth of the top of the screen below land surface) of monitoring wells;
- A description of the treatment or disposal methods of any investigation-derived waste generated during the assessment phase and documentation that confirms the proper treatment or proper disposal of the waste, as applicable;
- Summary of conclusions regarding site assessment objectives and conceptual remedial approach.

Task 5: Contingency Monitoring Well Installation

Up to 5 replacement wells will be installed in the event that the existing monitoring wells are found to be damaged or destroyed. The new wells will be installed using DPT, and will be constructed with five feet of prepacked 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.

ALTERNATIVE, LIMITED ASSESSMENT SCOPE AND REPORTING

Because the City does not own the Site and may not wish to enter into an EAR License at this time, E Sciences can implement a more limited scope assessment based upon the input provided during the meeting. We anticipate that this assessment would be limited to approximately 70 percent of the sampling effort of the SAR. It should be noted that while this data could be used 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 scenario. 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 evaluation of 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:

<u>Scope</u>	<u>Estimated Fee</u>
Site Assessment	\$55,000
Limited Assessment	\$40,000
Contingency Monitoring Well Installation	\$5,000
Additional Support (two meetings, two conference calls)	\$2,000
Annual Broward County EAR License Fee	\$2,000

SCHEDULE

We estimate that assessment and reporting activities can be completed within two months of authorization to proceed for the limited assessment and reporting. If the City elects to conduct a Site Assessment, an additional one month will be required to complete the scope.

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 described herein for the SAR option 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 (under both assessment options) 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 less than \$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

Maria Paituvi, P.E.
Senior Engineer

Nadia Locke, P.E., LEED AP
Associate