MEMORANDUM

TO: Ranajit Sahu, PhD., Basic Remediation Company

FROM: Stephen J. Cullen, PhD, CEM, Daniel B. Stephens & Associates, Inc.

CC: John J. Dodge, PG, Daniel B. Stephens & Associates, Inc.

DATE: May 20, 2009

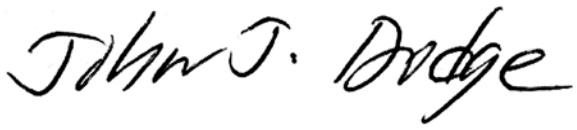
SUBJECT: Technical Memorandum – Work Plan for Evaluation of Arsenic Detections in the Western Hook Area Soils, BMI Common Areas (Eastside) Site, Clark County, Nevada

Responsible CEM for this Project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances.

Stephen J. Cullen, PhD., C.E.M. (No. 1839, Exp. 11/12/09)
Daniel B. Stephens & Associates, Inc.

Individuals Who Provided Technical Input to this Document



John J. Dodge, P.G.
Daniel B. Stephens & Associates, Inc.

INTRODUCTION AND OBJECTIVES

The Western Hook Development sub-area ("Western Hook Area" or "Site") is one of several sub-areas of the BMI Common Areas (Eastside) located in Clark County, Nevada (Figure 1). The Site encompasses an area of approximately 227 acres (Figure 1). The Site formerly included unexcavated ponds, previously excavated ponds, three ditches and areas that were not used for any known waste disposal (BRC *et al*. 2007).

In addition to the interim remedial measures (IRMs) already conducted (BRC 2008), supplemental baseline remediation is planned for certain areas within the BMI Common Areas; however, none is planned for the Western Hook Area other than clearing of obvious contamination (*e.g.*, burn pits, stained soil, abandoned vehicles, and other debris) (BRC *et al*. 2007).

In August 2008, Basic Remediation Company (BRC) prepared a Sampling and Analysis Plan (SAP) for the Western Hook Area. The purpose of the SAP was to evaluate soil and soil vapor conditions that may have been impacted at the Site from former activities and adjoining lands. As described in the SAP, planned clearing activities were completed prior to collecting soil samples throughout the Site on a systematic sampling basis. Samples were collected over a regular grid overlay across the property with a randomly placed sample within each grid cell. Additional biased sampling locations were selected within or near small-scale contamination points of interests, including but not limited to previous debris locations, ponds, berm walls near previously excavated ponds, and conveyance ditches.

This procedure was planned to provide enough samples for completion of a statistically robust assessment of potential contaminant distribution, and to provide a robust data set upon which to perform a human health risk assessment in support a no further action determination (NFAD) for this area (BRC 2008). The scope of the SAP was limited to soil and soil vapor flux sampling in

an effort to assess issues that might directly impact Site development potential consistent with the Closure Plan (BRC *et al*. 2007).

Soil samples were analyzed for a broad suite of analytes, including metals. This work plan addresses the detected concentrations of arsenic (As) in Western Hook Area soils. Arsenic was detected in several surface and subsurface soil samples above the shallow soil background arsenic concentration of 7.2 milligrams per kilogram (mg/kg) (BRC 2009) (Figure 2, Figure 3). Three surface soil samples and four subsurface soil samples exceeded the higher background arsenic concentration of 24.8 mg/kg established for the upper Tertiary Muddy Creek formation (UMCf) (BRC 2009).

The detected arsenic is considered to be potentially naturally occurring due to its relatively widespread and regular distribution across the Western Hook Area. This work plan outlines BRC's proposal to review and assess the arsenic data in detail concurrent with a review of historical and current site conditions to determine if the detections are site-related (anthropogenic) or naturally occurring. Supplemental laboratory data, described below, will also be collected as part of the analysis.

PROPOSED SCOPE OF WORK

BRC proposes to complete the following tasks to investigate the arsenic detections in Western Hook Area soils:

- Summarize and evaluate site geology (including pedogenic, hydrogeologic and geochemical site conditions);
- Summarize and evaluate site use history (including potential anthropogenic sources and potential arsenic mobilization and/or accumulation mechanisms); and
- Complete supplemental laboratory analyses.

Task 1 - Site Geology

BRC will summarize the local geology of the area to determine if natural geologic sources of arsenic are present in the area, such as areas of arsenopyrite mineral occurrence or the presence of other arsenic-bearing rocks, minerals or formations. Soil type maps and pedogenic information from the Natural Resources Conservation Service (NACRES) will be also obtained and reviewed. Available boring logs and analytical data for the existing Site soil samples will be summarized and reviewed to evaluate whether soil appears to be geologically or geochemically unique in this area. Available field logging data (such as moisture content; field pH; color; presence of mottling, gleying, iron nodules/concretions, etc.) will be summarized for inspection.

BRC will also assess the direction of groundwater flow in the area and the variation in depth to groundwater relative to the occurrence of gleying or soil mottling which may indicate poor drainage, low oxidation-reduction potential (redox) conditions, anaerobic or low oxygen conditions, or wetland occurrence.

Task 2 - Site Use History

BRC will review historical aerial photographs for the Site area to delineate the current and past site uses in the area, including buildings, roads, pits, ponds, wetlands, streams, and other site features of interest, such as gravel mining pits and surface water bodies. This task will also include a summary and analysis of the potential impact from the historical discharge from the City of Henderson Wastewater treatment plant (WWTP) ponds. Potential anthropogenic sources and mechanisms of arsenic mobilization and/or accumulation will be reviewed, including:

- Potential past use of arsenic compounds at the BMI plants area and adjacent facilities;
- Potential regional application of arsenic compounds in a pesticide formulation;
- Subdrains associated with housing or other construction and/or redevelopment projects;
- Potential fill application;
- Past regional surface water drainage patterns;
- Historical gravel pits and mines.

Task 3 - Laboratory Analyses

BRC retained the following soil samples from the prior round of sampling at the Site:

- WHC1-BG05-0
- WHC1-BM06-0
- WHC1-BO10-0
- WHC1-BP04-0
- WHC1-D11-0
- WHC1-P14-0
- WHC1-BH05-10
- WHC1-BK03-12
- WHC1-BN01-12
- WHC1-BO10-10
- WHC1-BP03-11
- WHC1-P10-10

These samples were retained due to their relatively high detected arsenic concentrations. Where data are not already available, selected soil samples from this group will be resubmitted to BRC's contracted analytical laboratory for the following supplemental analyses (Table 1):

- moisture content
- gain size
- pH
- total As
- arsenate
- arsenite
- phosphate
- orthophosphate
- total organic carbon
- sulfide
- sulfate
- major ions
- monosodium-methylarsonate (CH_3AsO_3HNa)
- sodium-dimethylarsinate ($(CH_3)_2AsO_2Na$)

BRC will also complete electron dot mapping for As on the mineral grains from selected soil samples to determine if As-bearing minerals are present. Electron dot mapping is a technique that utilizes scanning electron microscopy (SEM) and energy-dispersive x-ray (EDX)

spectrometry to identify the presence of As in a particulate sample. Once As is confirmed to be present and is mapped across the soil sample, EDX can be used again at selected points of high As in the sample to determine what other elements are present. An As-bearing mineral species is then inferred from the simultaneous presence of several elements. Available soil samples with the highest As concentrations will be selected for the SEM/EDX analysis.

Reporting

An arsenic evaluation report will be prepared to document the methods and results of the tasks completed for this project. The regional and local geology will be summarized with hydrogeologic and pedogenic information obtained in Task 1. Site use history information obtained in Task 2 will also be summarized and presented in the report with the results of the analytical lab work completed for Task 3. The report will also present the conclusions and interpretations regarding the origin of the relatively high arsenic detections in Western Hook Area soils.

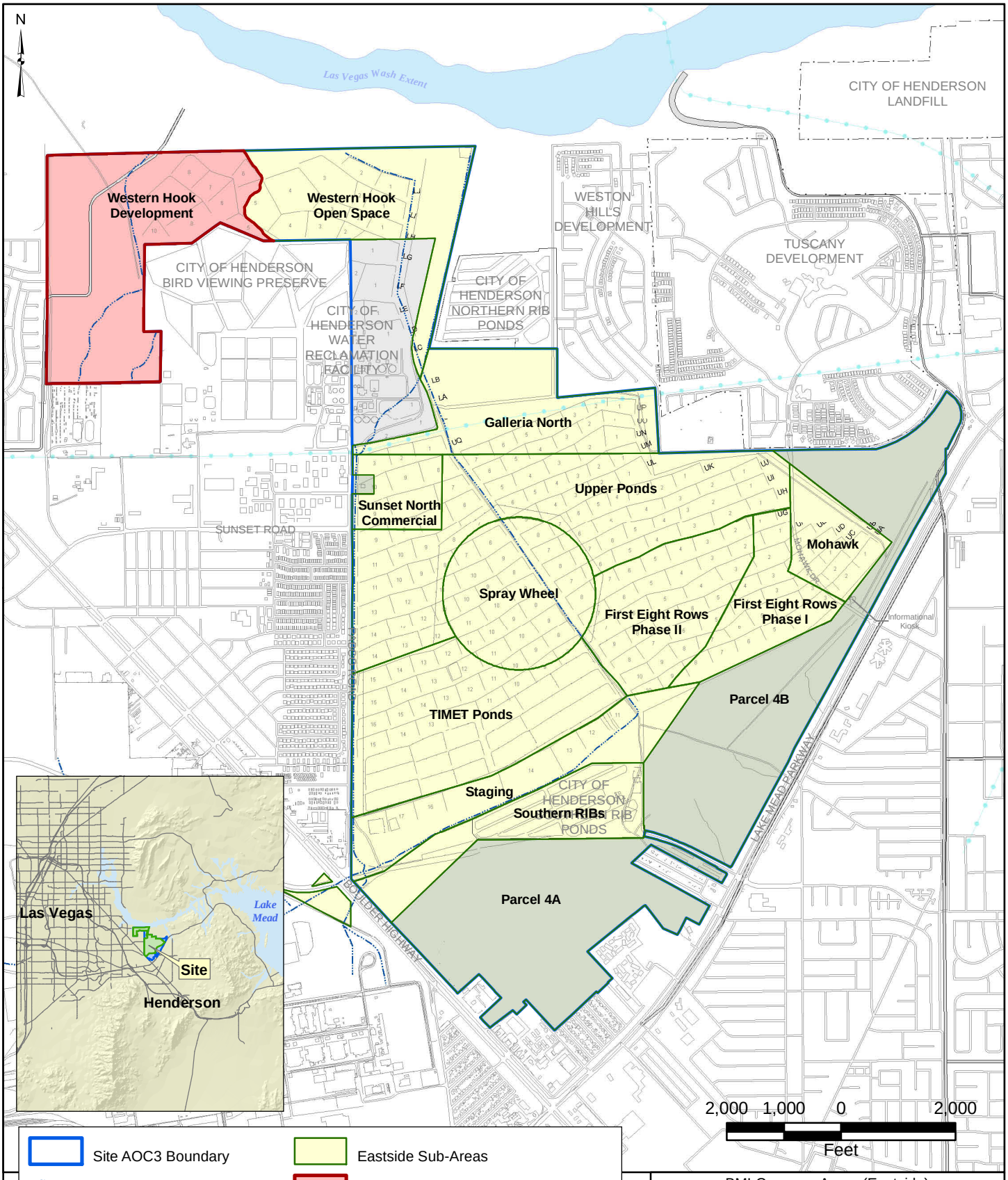
References

Basic Remediation Company (BRC), Environmental Resources Management (ERM), and Daniel B. Stephens & Associates, Inc. (DBS&A). 2007. Closure plan, BMI Common Areas, Clark County, Nevada. Prepared for Basic Remediation Company (BRC), Henderson, Nevada. May.

BRC. 2008. Sampling and Analysis Plan for the Western Hook Development Sub-Area. BMI Common Areas (Eastside), Clark County, Nevada. August.

BRC. 2009. Draft (in preparation) Soil Background Metals Report, BMI Common Areas (Eastside), Clark County, Nevada.

Figures



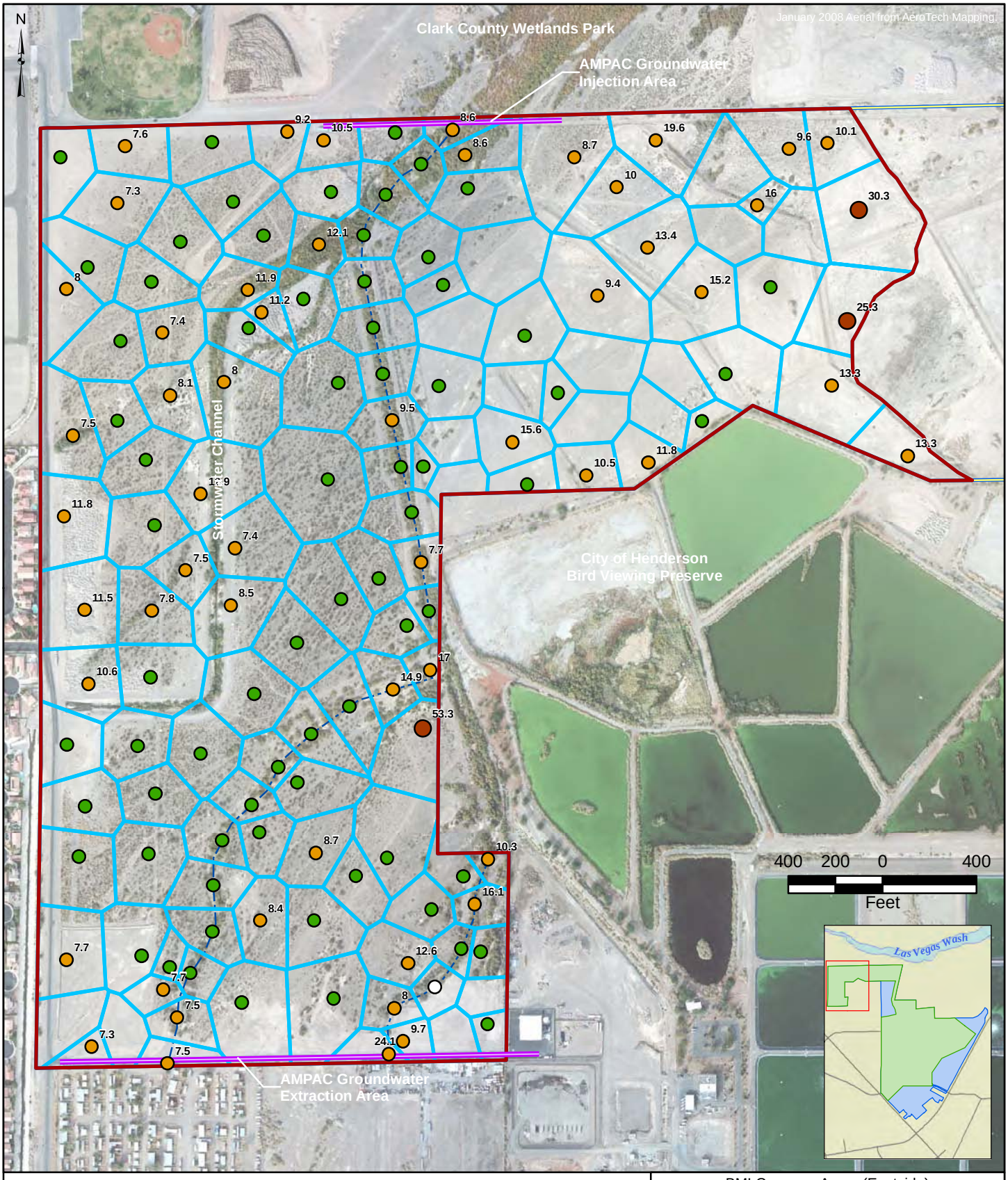
BMI Common Areas (Eastside)
Clark County, Nevada

FIGURE 1

WESTERN HOOK DEVELOPMENT SUB-AREA LOCATION

Basic Remediation Company

Prepared by	Date	JOB No. 0064276
MKJ (ERM)	08/14/08	FILE: GIS/BRC/WH-DEVELOP_SAP/FIGURE_1.MXD



Western Hook-Development Sub-Area

Site AOC3 Boundary

Eastside Soil Sub-Areas

No Data

<= 7.2 mg/kg (Shallow Back. Max.)

<= 24.8 mg/kg (UMCf Back. Max.)

> 24.8 mg/kg

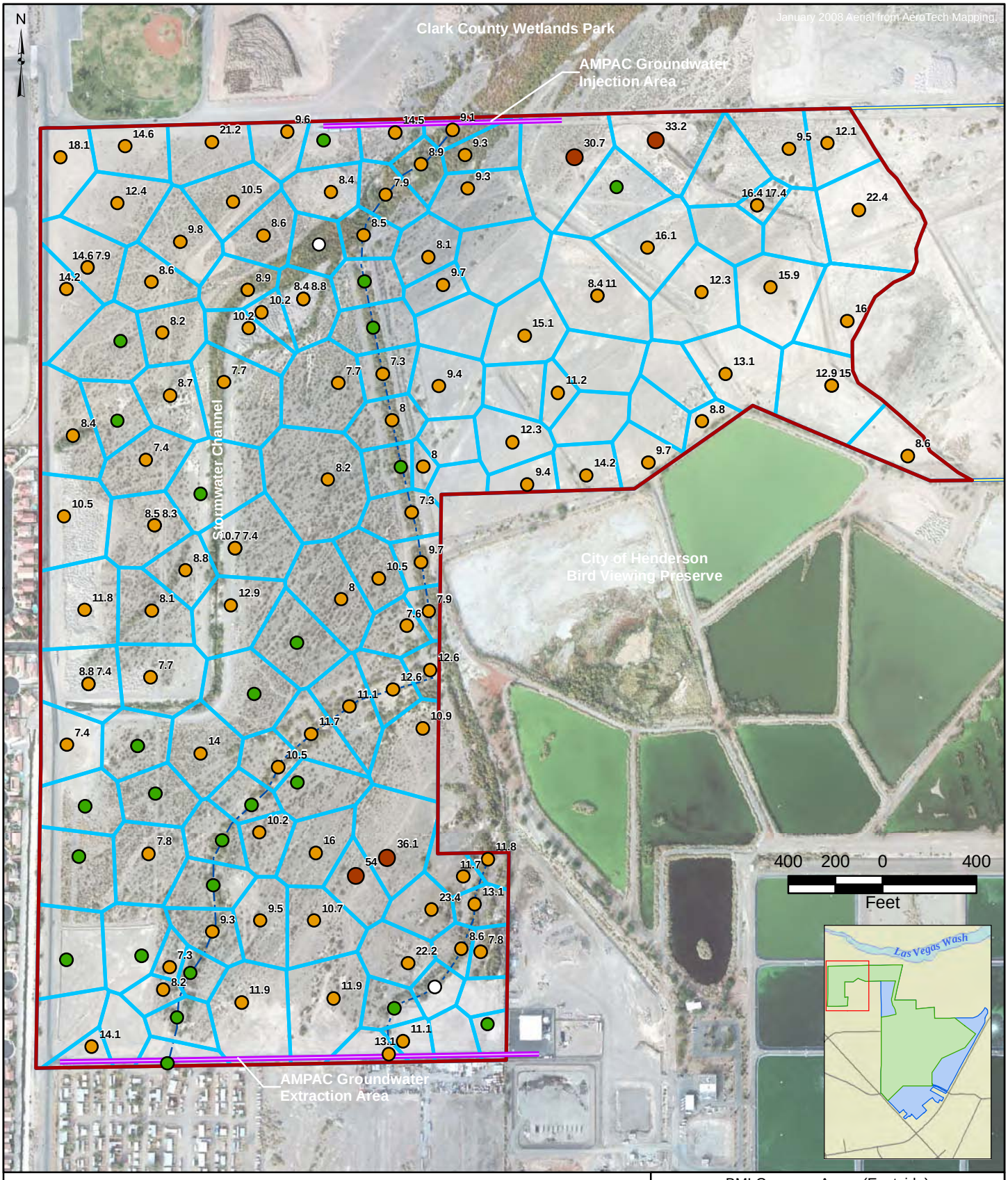
BMI Common Areas (Eastside)
Clark County, Nevada

FIGURE 2

PRELIMINARY ARSENIC RESULTS (SURFACE SOIL)

Basic Remediation Company

Prepared by	Date	JOB No. 0064276
MKJ (ERM)	04/08/09	FILE: GIS/BRC/WH-DEVELOP/FIGURE.MXD



BMI Common Areas (Eastside)
Clark County, Nevada

FIGURE 3

PRELIMINARY
ARSENIC RESULTS
(SUB-SURFACE SOIL)

Basic Remediation Company

Prepared by		Date	JOB No. 0064276
MKJ (ERM)	ERM	04/08/09	FILE: GIS/BRC/WH-DEVELOP/FIGURE.MXD

Table

Table 1. Soil Analytical Specifications
Western Hook Area Arsenic Evaluation

Parameter of Interest	Analytical Method	Compound List	CAS Number
Ions	EPA 300.0A	Bromide	24959-67-9
		Chlorate	14866-68-3
		Chloride	16887-00-6
		Chlorine (soluble)	7782-50-5
		Chlorite	14998-27-7
		Fluoride	16984-48-8
		Nitrate (as N)	14797-55-8
		Nitrite (as N)	14797-65-0
		Orthophosphate	14265-44-2
		Phosphate	14265-44-2
		Sulfate	14808-79-8
	EPA M1632	Arsenate ion	25537-06-8
	EPA M1632	Arsenite ion	28380-38-3
General Chemistry Parameters	EPA 9040B	pH in soil	pH
	NA	Percent moisture	%MOISTURE
	EPA 376.1/376.2	Sulfide	18496-25-8
	EPA 9060	Total organic carbon (TOC)	7440-44-0
Metals	EPA 6020/6010B collision cell ICP/MS	Arsenic	7440-38-2
Grain size	ASTM D422	grain size (sieve and hydrometer)	NA
Organic species of Arsenic	EPA M1632	Monosodium methylarsonate (CH_3AsO_3HNa)	2163-80-6
	EPA M1632	Sodium dimethylarsinate ((CH3)2AsO2Na)	124-65-2
As-bearing particles	SEM/EDX	As and other elements	NA

NA - not applicable
SEM/EDX - scanning electron microscopy/energy-dispersive x-ray spectrometry