Voluntary Remediation Program
Semiannual Progress Report

Prepared for

Former MacGregor Golf Company Site
HSI Site No. 10398
Albany, Georgia

January 28, 2016

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Submitted to the Georgia Environmental Protection Division

on behalf of
Albany Partners, LLC
Albany Sport Co.
Brunswick Corporation

Brown AND Caldwell

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Professional Engineer Certification

I certify that I am a qualified environmental professional who has received a baccalaureate or post-graduate degree in a natural science or engineering, and have sufficient training and experience in groundwater hydrology, engineering, and related fields, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this report was prepared by myself or by a subordinate working under my direction.

Patricia C. Reifenberger

Patricia C. Reifenberger, P.E.

1/28/16
(date)

Georgia Registration Number: 20676

Seal:

Section 1

Introduction

This Semiannual Progress Report for the Former MacGregor Golf Company Site (Site) was prepared by Brown and Caldwell (BC) on behalf of Albany Partners, LLC, Albany Sport, Co., and Brunswick Corporation (the Group) for submittal to the Response and Remediation Program of the Land Protection Branch of the Georgia Environmental Protection Division (EPD). The Site is located at 1601 South Slappey Boulevard in Albany, Dougherty County, Georgia (Figure 1). The Site is a participant in EPD's Voluntary Remediation Program (VRP) and is listed on EPD's Hazardous Site Inventory (HSI) as Site No. 10398. This report describes the work performed related to the Site from the last semiannual progress report dated July 27, 2015 through January 30, 2016.

1.1 Background

The Site was accepted into the VRP on July 30, 2012. The Site history, description, regulatory history, and previous environmental work are described in detail in the Compliance Status Report (CSR [BC 2006]), Revised CSR and Corrective Action Plan (CAP [BC 2008]), and Revised CSR and CAP Addendum (BC 2009) submitted in compliance with Hazardous Site Response Act (HSRA) requirements. Additionally, soil and groundwater data were submitted to the EPD in the April 2011 VRP Application, February 2012 Revised VRP Application, and Semiannual Progress Reports since January 2013. In summary, since 2002, the Group has conducted groundwater monitoring, zero valent iron (ZVI) pilot testing in the source area, soil and groundwater delineation, fate and transport modeling, and a limited risk assessment. Refer to Figure 2 for groundwater monitoring locations.

1.2 Report Organization

This report is organized into nine sections. The present section summarizes the project background and provides an outline of the report. The work performed during this period is described in Section 2, and Section 3 presents the results of the work conducted this period. Section 4 presents the updated Conceptual Site Model (CSM). The current Site status relative to delineation and cleanup standards is presented in Section 5. Future work presently anticipated to complete the VRP objectives is presented in Section 6. The project Professional Engineer's services this period are summarized in Section 7. Limitations associated with the use of this report are noted in Section 8, and cited references are provided in Section 9.

Section 2

Work Performed this Period

Work completed at the Site since the submittal of the July 2015 Semiannual Progress Report (BC 2015b) included groundwater assessment and consisted of the following tasks:

- Installation and sampling of two temporary monitoring wells, TW-43 and TW-44, in July 2015 on the neighboring property to the south of the Site, located at 1108 Industry Avenue in Albany, Georgia (Taylor property).
- Installation and sampling of two permanent monitoring wells, MW-27 and MW-28, in November 2015 on the neighboring Taylor Property.
- Groundwater level measurements on July 29 and November 4, 2015.
- Groundwater sampling of MW-4, MW-11, MW-19, and MW-24 in July 2015.

The work conducted this period achieved horizontal delineation of chromium in groundwater south of monitoring well MW-19. In addition, the first of three annual groundwater monitoring events was completed. These activities are discussed in the following sections. Monitoring well locations are provided on Figure 2.

2.1 Temporary and Permanent Monitoring Well Installation

Two temporary monitoring wells (TW-43 and TW-44) were installed in July 2015 on the neighboring Taylor Property to support the fate and transport model provided in the January 2015 Semiannual Progress Report and Final Remediation Plan (BC 2015a), and to achieve delineation of chromium (hexavalent and trivalent) in groundwater south of MW-19. These wells were located in the grassy area between the loading dock and Industry Avenue (Figure 2). To further delineate chromium (hexavalent and trivalent) in groundwater, two permanent monitoring wells (MW-27 and MW-28) were installed on the neighboring Taylor Property in November 2015. Monitoring well MW-27 is located on the north side of the building within the loading dock area, and monitoring well MW-28 is located on the south side of the building (Figure 2).

These temporary and permanent monitoring wells were installed using a CME-55® hollow stem auger drilling rig. The wells were constructed of 2-inch diameter Schedule 40 polyvinyl chloride (PVC) with 10-foot long 0.01 slot screens using procedures presented in United States Environmental Protection Agency (USEPA) Region 4 Science and Ecosystem Support Division (SESD) *Design and Installation of Monitoring Wells Guidance* (USEPA 2013). Following installation, wells TW-43, TW-44, MW-27, and MW-28 were developed using a GeoSub® submersible pump until the turbidity of the purged groundwater had been reduced and the water was visually free of suspended sediment. Well construction details are shown in Table 1, and well construction diagrams are included in Appendix A.

The horizontal locations of the temporary and permanent wells were measured following installation using a Trimble Global Positioning System (GPS) unit with sub-foot accuracy. In addition, the wells were surveyed using laser level surveying equipment to establish vertical elevations, so that groundwater elevations could be calculated and used for potentiometric maps.

Following installation, the wells were purged and sampled as described in Section 2.3. The temporary wells were properly abandoned following sample collection as described in Section 2.4.

2.2 Groundwater Level Measurements

Groundwater levels were measured in all accessible monitoring wells at the Site and in off-site Spartan wells MW-1 and MW-2 on July 29 and November 4, 2015. The depth to groundwater was measured in 15 upper water bearing zone wells (MW-1 through MW-4, MW-10 through MW-14, MW-18, MW-19, MW-22, MW-23, MW-24, and MW-25) and 10 lower water bearing zone wells (MW-5 through MW-7, MW-9, MW-15 through MW-17, MW-26, Spartan MW-1 and Spartan MW-2) at the Site. Groundwater levels were also measured in two upper water bearing zone temporary wells (TW-43 and TW-44) in July 2015, and the two new permanent monitoring wells (MW-27 and MW-28) in November 2015. The temporary wells and permanent wells were allowed to equilibrate for at least 24 hours following purging and other monitoring activities prior to gauging. All measurements were completed using a Heron 100-foot water level meter, and the measured depths to water were recorded (Table 1). The downhole portion of the water level meter was decontaminated with Alconox® and rinsed with distilled water between wells.

The measured depths to water and the surveyed elevations of the existing and temporary monitoring wells were used to calculate the groundwater elevations and prepare potentiometric surface maps for the upper and lower water bearing zones (Figures 3 through 6).

2.3 Groundwater Sampling

Groundwater samples were collected from six wells in July 2015 (TW-43, TW-44, MW-4, MW-11, MW-19, and MW-24) and two wells in November 2015 (MW-27 and MW-28). The samples were collected and analyzed as described below.

2.3.1 Sample Collection

The monitoring wells were purged using low flow/low volume (micro-purging) techniques (i.e., bladder pump with disposable polyethylene tubing). During purging, groundwater parameters (turbidity, dissolved oxygen [DO], pH, conductivity, oxidation-reduction potential [ORP], and temperature) were continuously monitored and recorded on the Field Data Sheets included in Appendix B. The field measurements are summarized in Table 2. Water level measurements were also recorded during purging to limit drawdown and effort was made to ensure that the rate of groundwater withdrawal did not exceed the rate of recharge in the wells.

The groundwater samples were collected once stabilization was achieved, which was indicated by no increasing or decreasing trends in groundwater parameters for three successive readings and a turbidity of less than 10 Nephelometric turbidity units (NTUs). Turbidity of less than 10 NTU was achieved prior to collection of all the groundwater samples with the exception of the sample collected from monitoring well MW-24 in July 2015. Since at least five well volumes of groundwater had been removed and the remaining water quality parameters had stabilized, the groundwater sample was collected even though turbidity was measured at 81.5 NTU. The samples were collected directly from the pump discharge into the laboratory-prepared sample bottles, sealed, placed on ice, and delivered to a certified laboratory for analysis.

Quality assurance/quality control (QA/QC) samples were also collected as follows:

- Duplicate samples were collected from TW-43 during the July 2015 sampling event and from MW-27 during the November 2015 sampling event.
- Three equipment blanks were collected during the July 2015 sampling event and one equipment blank was collected during the November 2015 sampling event.

2.3.2 Sample Analysis

After collection, the samples were immediately placed on ice and delivered to Analytical Environmental Services, Inc. (AES) in Atlanta, Georgia for analysis. Copies of the completed chain-of-custody forms are included in Appendix C with the laboratory reports. The groundwater samples collected from MW-11,

MW-19, MW-24, MW-27, MW-28, TW-43, and TW-44 as well as associated duplicates and equipment blanks were analyzed for total chromium using United States Environmental Protection Agency (USEPA) Method 6010B, and total hexavalent chromium using USEPA Method SW7196. The groundwater sample collected from MW-4 and its associated equipment blank were analyzed for volatile organic compounds (VOCs) using USEPA Method 8260b.

The stipulation letter documenting AES's certification to perform these analyses is provided in Appendix D.

2.4 Temporary Well Abandonment

The two temporary wells, TW-43 and TW-44, were abandoned following groundwater sample collection. The well casing and screen were removed, and the boreholes were filled from the bottom up with a grout/bentonite mixture.

2.5 Fate and Transport Model Update

A fate and transport model was developed for the Site and submitted to the EPD on January 19, 2015 as a component of the January 2015 Semiannual Progress Report and Final Remediation Plan (BC 2015a). The model was used to evaluate whether the observed constituents of concern (COCs) would migrate to or beyond the current property lines and to project future COC concentrations in groundwater. The model suggested that COC concentrations associated with the MW-19 area would migrate beyond the property line to the south and ultimately attenuate to below the Site VRP cleanup levels in 25 to 30 years. Therefore, the off-site temporary monitoring wells TW-43 and TW-44 were installed to further evaluate the extent of COCs downgradient of MW-19, and the permanent monitoring wells MW-27 and MW-28 were installed for long-term monitoring and as points of compliance.

The transport model was updated during this reporting period to incorporate data from these additional temporary and permanent monitoring wells and to evaluate the predicted extent and potential cleanup times of COCs associated with the MW-19 area. Appendix E contains the Updated Fate and Transport Model and Evaluation Technical Memorandum (TM), which documents the selection and use of the updated fate and transport model for this Site and summarizes the updated modeling results.

Section 3

Results of Work this Period

This section presents the results of the work completed this period outlined in Section 2.

3.1 Groundwater Elevation Data

The well construction data, top of casing elevations, and groundwater level measurements for the permanent monitoring wells and the temporary wells that were surveyed are presented in Table 1. The measured depths to water and the surveyed elevations of the monitoring wells were used to calculate the groundwater elevations in the upper and lower water bearing zones. Potentiometric maps of the groundwater surface in the upper and lower water bearing zones in July and November 2015 are presented on Figures 3 through 6.

The groundwater elevations measured during this reporting period were lower than those measured earlier in 2015 and over the past two years. The difference in groundwater elevations between the January and June 2013 gauging events ranged from 0 feet and 5.44 feet. The mounding of the upper water bearing zone in the area of wells MW-4, MW-22, MW-23, and MW-25 that was observed from January 2012 to July 2013 was not present during the July and November 2015 gauging events.

The groundwater flow in the upper water bearing zone appears to be predominantly to the southwest; however, given the flat groundwater gradient at this Site, small water level fluctuations between gauging events result in the appearance of localized changes in groundwater flow direction. The flat groundwater gradient is easily influenced by rainfall as large portions of the Site are impervious, resulting in uneven recharge of the upper water bearing zone during rain events. In the July 2015 sampling event, the groundwater gradient is primarily to the south-southwest in the western portion of the Site, with some northwesterly flow in the eastern portion of the Site in the area of wells MW-1, MW-12, and MW-13 (Figure 3). In the November 2015 event, the groundwater in the upper water bearing zone appears to flow to the southwest in the central portion of the Site, to the north in the northern part of the Site, and to the west in the eastern side of the Site (Figure 4).

The groundwater in the lower water bearing zone appears to flow predominantly toward the northeast. As with the upper water bearing zone, the groundwater gradient is fairly flat and subject to fluctuations in response to localized events (e.g., rainfall). In the July 2015 event, water level elevations indicate east to northeasterly groundwater flow across the Site (Figure 5). In November 2015, the groundwater flow shows a flatter gradient to the northeast across the Site (Figure 6).

Outside of localized water level fluctuations, the groundwater gradients observed in this reporting period were similar to those observed in previous reporting period, and the predominant groundwater flow directions appear consistent.

3.2 Groundwater Sampling Results

Groundwater samples were collected from monitoring wells MW-4, MW-11, MW-19, MW-24, TW-43, and TW-44 in July 2015, and from monitoring wells MW-27 and MW-28 in November 2015. The groundwater parameters measured in the field during purging are summarized in Table 2, and VOCs detected in groundwater samples are summarized in Table 3. Detections from historical groundwater sampling events are presented in Table 4. Figures 7 and 8 present the groundwater chromium and VOC concentrations in

the temporary wells sampled in July and November 2015, respectively. The groundwater sampling field forms and the laboratory analytical reports are included as Appendices B and C, respectively. The results of the laboratory analyses are discussed below.

3.2.1 VOCs in Groundwater

VOCs were detected in groundwater above Site VRP cleanup levels in monitoring well MW-4 in July 2015. This well is located near the former source area (Figure 2) and is screened in the upper water bearing zone. Trichloroethene (TCE) and its daughter products cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) were detected at concentrations of 0.110 mg/L, 0.410 mg/L, and 0.0093 mg/L, respectively. In general, groundwater concentrations of these VOCs at MW-4 have declined by 76 percent, 89 percent, and 86 percent since before ZVI injections via pneumatic fracturing were conducted in May 2003 and February 2004. However, current concentrations still exceed Site VRP cleanup levels of 0.038 mg/L, 0.204 mg/L, and 0.0033 mg/L, respectively. Historical groundwater detections are provided in Table 4.

3.2.2 Chromium in Groundwater

Chromium has been detected above Site VRP cleanup levels in the vicinity of three monitoring wells at the Site (MW-19, MW-11, and MW-24). Based on sampling results, chromium in groundwater at the Site predominantly exists in the hexavalent form. The Site VRP delineation and cleanup levels for hexavalent chromium are both 0.01 mg/L, which is equivalent to the laboratory practical quantitation limit (PQL). Less prevalent in these wells is trivalent chromium, which tends to complex with sulfur as chromium sulfide (Cr_2S_3) and precipitate, and is essentially immobile in groundwater at pH levels between 5 and 12. The Site VRP delineation and cleanup levels for trivalent chromium are 0.01 mg/L and 153 mg/L, respectively, and the Site delineation and cleanup levels for total chromium are both 0.10 mg/L.

Monitoring well MW-19, located near the southern property boundary (Figure 2), is screened in the upper water bearing zone where groundwater is flowing predominantly to the south-southwest towards the adjacent property (Figures 3 and 4). In July 2015, total and hexavalent chromium in groundwater in MW-19 were detected concentrations of 0.0236 mg/L and 0.0301 mg/L, respectively (Table 3 and Figure 7).

Temporary wells TW-43 and TW-44 were installed and sampled in July 2015 to delineate chromium in groundwater to the south of MW-19. These temporary wells were located south of the Site on the neighboring Taylor Property (Figure 2) and were screened in the upper water bearing zone. Total and hexavalent chromium were detected in TW-43 at concentrations of 0.0197 mg/L and 0.0129, respectively (Figure 7). Total and hexavalent chromium were also detected in TW-44 at concentrations of 0.0163 mg/L and 0.0166, respectively. The hexavalent chromium level exceeded the site delineation and cleanup levels.

In order to complete horizontal off-Site delineation to the south, two permanent monitoring wells, MW-27 and MW-28, were installed and sampled in November 2015. These wells were located south of temporary wells TW-43 and TW-44 on the Taylor Property (Figure 2) and were screened in the upper water bearing zone. Total and hexavalent chromium were not detected in the samples collected from MW-27 and MW-28 (Table 3 and Figure 8). These results indicate that delineation of chromium in groundwater to the south of MW-19 has been achieved.

Monitoring well MW-11 is also screened in the upper water bearing zone, but is located near the northern property boundary (Figure 2). Based on recent groundwater elevation measurements (Table 1), groundwater in the upper water bearing zone in this area is flowing predominantly to the south. In July 2015, total and hexavalent chromium in groundwater in MW-11 were detected concentrations of 0.0864 mg/L and 0.0895 mg/L, respectively (Table 3 and Figure 7). While the detected concentration of total chromium is less than the Site VRP cleanup goal of 0.1 mg/L, hexavalent chromium still exceeds the Site VRP cleanup level in groundwater at MW-11; however, chromium around MW-11 has been vertically and horizontally delineated, as discussed in previous semiannual progress reports for the Site.

Monitoring well MW-24 is located near the northern property boundary (Figure 2) and screened at the base of the upper water bearing zone. Chromium concentrations have declined since this well was installed in April 2008, and the most recent total chromium concentration is less than the cleanup standard (0.0715 mg/L in July 2015; Table 3 and Figure 6). The concentration of hexavalent chromium remains above the cleanup standard (0.0772 mg/L in July 2015); however, chromium in this area has been vertically and horizontally delineated, as discussed in previous semiannual progress reports for the Site.

3.2.3 Quality Assurance/Quality Control Samples

No chemicals were detected in the equipment blank samples and the results from analysis of the duplicate samples were similar to those from the parent samples. Thus, the QA/QC samples did not indicate impact to the Site results from field or laboratory methods.

3.2.4 Summary

Based on analysis of samples collected in the temporary and permanent monitoring wells, delineation has been achieved for chromium in groundwater all directions.

3.3 Updated Fate and Transport Model

The primary objective of the updated fate and transport modeling effort was to evaluate localized hexavalent chromium migration using recent data and data from new monitoring locations and provide sufficient predictions to assess compliance with Site VRP cleanup objectives. The results of the updated modeling evaluation (Appendix E) are as follows:

- Dissolved phase hexavalent chromium concentrations around MW-11 are predicted to remain on-site and fall below the Site VRP groundwater cleanup level in 5 to 10 years.
- Hexavalent chromium concentrations around MW-19 are predicted to migrate approximately 375 feet downgradient onto the adjoining Taylor Property, but not to migrate beyond the Taylor Property. Dissolved phase hexavalent chromium concentrations around MW-19 are predicted to fall below the Site VRP groundwater cleanup level after 25 to 30 years.
- Dissolved phase hexavalent chromium concentrations around MW-24 are predicted to remain on-site and fall below the Site VRP groundwater cleanup level in 40 to 45 years.

As noted in the TM in Appendix E, a conservative approach to the model was taken that may result in an overestimate of downgradient migration distances and times to cleanup. The actual extent of migration, time to cleanup, and/or hexavalent chromium concentration may be lower.

Section 4

Updated Conceptual Site Model

This section presents the updated CSM that reflects recent data.

4.1 Elements of the Conceptual Site Model

A three-dimensional CSM was originally developed for the Site's VRP Application (BC 2012) to illustrate the approximate extent of VOCs and inorganics in the subsurface, and the potential exposure pathways and receptors at the Site. The CSM has been updated since then to reflect current conditions at the Site. Figures 9 and 10 illustrate plan and profile views of the updated CSM, respectively.

4.1.1 Ground Surface Features

The Site topography is relatively flat with elevations ranging from 191 to 204 feet above mean sea level (amsl). Stormwater run-off flows primarily towards the intermittent drainage ditch that runs in a westerly direction from north of the former disposal area along the tree line, to the western property boundary. The ditch ends in an on-site intermittent detention basin. The intermittent drainage ditch and detention basin are typically dry, except following significant rain events. Both features also receive stormwater run-off from off-site sources, including a railroad right-of-way to the west.

Soil samples collected from the intermittent ditch and detention basin in 1998, 1999, 2000, 2008, and 2009 indicated elevated concentrations of nickel and chromium. Based on the flow direction of stormwater at the Site, the metals appear to have migrated from the former waste disposal area to the drainage ditch.

4.1.2 Subsurface Features

4.1.2.1 Vadose Zone and Upper Water Bearing Zone

The upper water bearing zone consists predominantly of silty sands, sandy silts, clays and chert of the weathered limestone residuum as illustrated on Figure 10. The thickness of the unconsolidated soil at the Site is approximately 40 to 50 feet with the thin layers of chert occurring at depths of 18 to 45 feet below ground surface (bgs). Beneath the chert, sediments increase in clay content with clay layers ranging from 1 to 6 feet thick. The lower boundary to this zone is the chalky limestone that occurs in the uppermost Ocala Limestone at 50 to 55 feet bgs. In the most recent Site-wide gauging event (November 2015), groundwater was encountered in the upper water bearing zone between 30 and 50 feet bgs (Table 1). The potentiometric surface measured in this event is illustrated on Figure 4.

According to previous reports, waste was poured or spread on the ground surface in the former waste disposal area. The VOCs and inorganics released at the ground surface would be expected to migrate vertically under the influence of gravity, with some horizontal spreading with depth through the unsaturated zone and into the saturated zone. Figures 9 and 10 illustrate the approximate areas where VOCs (MW-4 area) and inorganics (MW-11, MW-19, and MW-24 areas) are present in the upper water bearing zone above the groundwater delineation and/or cleanup standards.

4.1.2.2 Semi-Confining Unit

Between the depths of approximately 50 and 55 feet bgs, a chalky limestone occurs that grades with depth to increasing cementation and induration and decreasing permeability. This layer is laterally continuous across the Site and is interpreted to be a hydraulic boundary to the lower water bearing zone encountered at

about 60 feet bgs. However, based on the hydraulic properties (i.e., vertical groundwater velocity, vertical gradient and vertical hydraulic conductivity) of the semi-confining unit and concentrations of VOCs and inorganics in the lower water bearing zone, vertical leakage occurs through the chalky limestone from the upper water bearing zone to the lower water bearing zone.

4.1.2.3 Lower Water Bearing Zone

At approximately 60 feet bgs, the chalky limestone increases in competency and becomes a porous and permeable fossiliferous limestone of the Ocala Limestone that extends to a depth of approximately 170 feet bgs. This unit, the Upper Floridan aquifer, is a principal water supply aquifer and previously served to supply irrigation and fire water to the Site. The Upper Floridan aquifer is confined above and below. The upper confining zone is the chalky limestone described above, and the lower confining zone is the calcareous clayey Lisbon formation.

In the November 2015 gauging event, potentiometric levels in the wells screened in the lower water bearing zone were between about 41 and 55 feet bgs (Table 1). The potentiometric surface during this event is illustrated on Figure 6. VOCs are not present above Site VRP cleanup levels in the lower water bearing zone; specifically, the upper portion of the permeable fossiliferous limestone. This layer was observed during the installation of monitoring well MW-15 at a depth of approximately 70 feet bgs.

4.1.3 Contaminant Source

Reportedly, manufacturing wastes were likely disposed from approximately 1962 to 1973 in an area located just west of the main building that is part of the former test driving range. This “source area” is approximately 60 by 100 feet and is located next to the equipment shed (Figure 3). According to previous reports, no disposal pit or lagoon was created; the waste was poured or spread directly on the ground. Wastes included spent solvents and plating process sludge that contained xylenes, methyl and ethyl alcohol, toluene, chromium, nickel, lead, and cyanide. The chromium applied during the plating process was likely in the hexavalent form as chromic acid. Construction of the test driving range involved grading of the former disposal area, and the soils were dispersed over a wider area.

4.1.4 Contaminant Fate and Transport

Following the release to the ground surface, spent solvents and plating process sludge appear to have migrated downward through the subsurface. In the vadose zone, soil concentrations of these constituents were likely altered by precipitation flushing and diffusion. Precipitation typically leaches constituents to the shallow water table during wet weather events. Volatile constituents can also evaporate from shallow soils resulting in a decrease of concentrations.

Once in groundwater, spent solvents (chlorinated VOCs) migrate with the flow of groundwater and naturally attenuate through biodegradation and other mechanisms. Chlorinated VOCs degrade to daughter products via reductive dechlorination under certain conditions. More conservative constituents associated with the plating process (inorganics) migrate with the flow of groundwater and may naturally attenuate depending on chemical characteristics and groundwater chemistry and flow.

A limited interim remedial action consisting of injection of ZVI to address VOCs within the upper water bearing zone was conducted in 2003. The interim action created a barrier zone of accelerated attenuation downgradient of monitoring well MW-4. The barrier has most likely resulted in the decrease in VOC concentrations observed in the downgradient monitoring wells.

4.2 Receptors and Exposure Pathways

The potential exposure pathways and receptors are identified on Figures 9 and 10, and are detailed in the February 2012 Revised VRP Application (BC 2012), the January 2013 Semiannual Progress Report (BC 2013a), the January 2015 Semiannual Progress Report and Final Remediation Plan (BC 2015a) and the July 2015 Semiannual Progress Report (BC 2015b).

Section 5

Site Status Update

Historical and recent soil and groundwater analytical results are presented in Table 4. Soil and groundwater sampling locations are shown on Figures 2. The current status of soil and groundwater at the Site relative to the VRP delineation and cleanup levels is discussed below and summarized in Table 5.

5.1 Delineation Status

5.1.1 Soil Delineation

As discussed in previous reports, horizontal and vertical delineation of Site COCs in soil has been achieved.

5.2 Groundwater Delineation

5.2.1 On-Site Horizontal Groundwater Delineation

As discussed in previous semiannual progress reports, horizontal delineation of VOCs has been achieved.

With the sampling conducted in March and June 2014 and discussed in the July 2014 Semiannual Progress Report (BC 2014b), on-site horizontal delineation of chromium (total, hexavalent, and trivalent) in groundwater at the northern end of the property was achieved.

At the southern end of the property, chromium (total, hexavalent, and trivalent) has been delineated. Total chromium has been horizontally delineated on-site, and although hexavalent and trivalent chromium are delineated, concentrations above the delineation level extend onto the adjoining Taylor Property to the south.

5.2.2 Off-Site Horizontal Groundwater Delineation

Off-Site horizontal delineation of hexavalent and trivalent chromium in groundwater was achieved to the south with the installation and sampling of monitoring wells MW-27 and MW-28 on the neighboring Taylor Property in November 2015.

5.2.3 Vertical Groundwater Delineation

As discussed in previous semiannual progress reports, vertical delineation of Site COCs in groundwater has been achieved.

5.3 Status Relative to Cleanup Goals

5.3.1 Soil

The Site soil is in compliance with the Site VRP cleanup levels except in the vicinity of borings B-4 and GP-1, located in the former source area. Concentrations of cis-1,2-DCE and VC in the subsurface soil in boring B-4 and the concentration of cis-1,2-DCE in the subsurface soil in boring GP-1 exceeded the soil cleanup levels. Focused risk assessment and groundwater concentration trend analysis were used to demonstrate compliance with cleanup standards in the Final Remediation Plan (BC 2015a), which was approved by EPD in their April 14, 2015 letter.

5.3.2 Groundwater

VRP groundwater cleanup levels are met in all monitoring wells except in the following areas (sampling locations shown on Figure 2):

MW-4 Vicinity. The July 2015 groundwater concentrations of TCE, cis-1,2-DCE, and VC at monitoring well MW-4 were 0.110 mg/L, 0.410 mg/L, and 0.0093 mg/L, respectively (Table 3). These concentrations slightly exceed the Site VRP cleanup levels of 0.038 mg/L, 0.204 mg/L, and 0.0033 mg/L, respectively. Empirical evidence and groundwater concentration trend analysis has been used demonstrate compliance with cleanup standards in the MW-4 area.

MW-11 Vicinity. The hexavalent chromium concentration in groundwater from monitoring well MW-11 was 0.0895 mg/L in July 2015, which exceeds the cleanup standard of 0.01 mg/L (Table 3).

MW-19 Vicinity. The hexavalent chromium concentration in groundwater from monitoring well MW-19 was 0.0301 mg/L in July 2015, which exceeds the cleanup standard of 0.01 mg/L. Further downgradient on the Taylor Property, hexavalent chromium concentrations in TW-43 and TW-44 slightly exceeded the cleanup standard in July 2015, with concentrations of 0.0129 and 0.0166 mg/L, respectively (Table 3). Concentrations further downgradient at MW-27 and MW-28 meet the cleanup levels.

MW-24 Vicinity. The hexavalent chromium concentration in groundwater from monitoring well MW-24 was 0.0772 mg/L in July 2015, which exceeds the cleanup standard of 0.01 mg/L (Table 3).

Modeling to demonstrate compliance with cleanup standards at the designated point of exposure and point of demonstration well in the MW-11, MW-19, and MW-24 areas was provided in the Final Remediation Plan (BC 2015a). The model was approved for the MW-11 and MW-24 areas by EPD in their April 14, 2015 letter. The model has since been updated with additional data collected in the MW-19 area, as presented in Appendix E.

Section 6

Project Schedule

Planned near-term actions and the project schedule are discussed below. The project schedule is also illustrated in Table 6.

6.1 Planned Near-Term Actions

Tasks to comply with the VRP delineation and cleanup requirements are summarized below:

- Draft environmental covenants for the Site and the Taylor Property.
- Conduct the second annual groundwater monitoring event in April 2016.
- Submit the Final Compliance Status Report with Certifications in July 2016.

6.2 Project Schedule

An updated project milestone schedule is provided in Table 6. This schedule is based on the assumption that compliance with the Site VRP cleanup levels for hexavalent chromium in groundwater can be demonstrated with fate and transport modeling.

Section 7

Engineer's Services this Period

Table 7 summarizes BC's professional engineer's work on this project since the last VRP semiannual report for this project.

Section 8

Limitations

This document was prepared solely for Albany Partners, LLC, Albany Sport, Co., and Brunswick Corporation (the Group) in accordance with professional standards at the time the services were performed and in accordance with the contract between the Group and Brown and Caldwell dated January 7, 2015 and amended on May 18, 2015 and September 11, 2015. This document is governed by the specific scope of work authorized by the Group; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the Group and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

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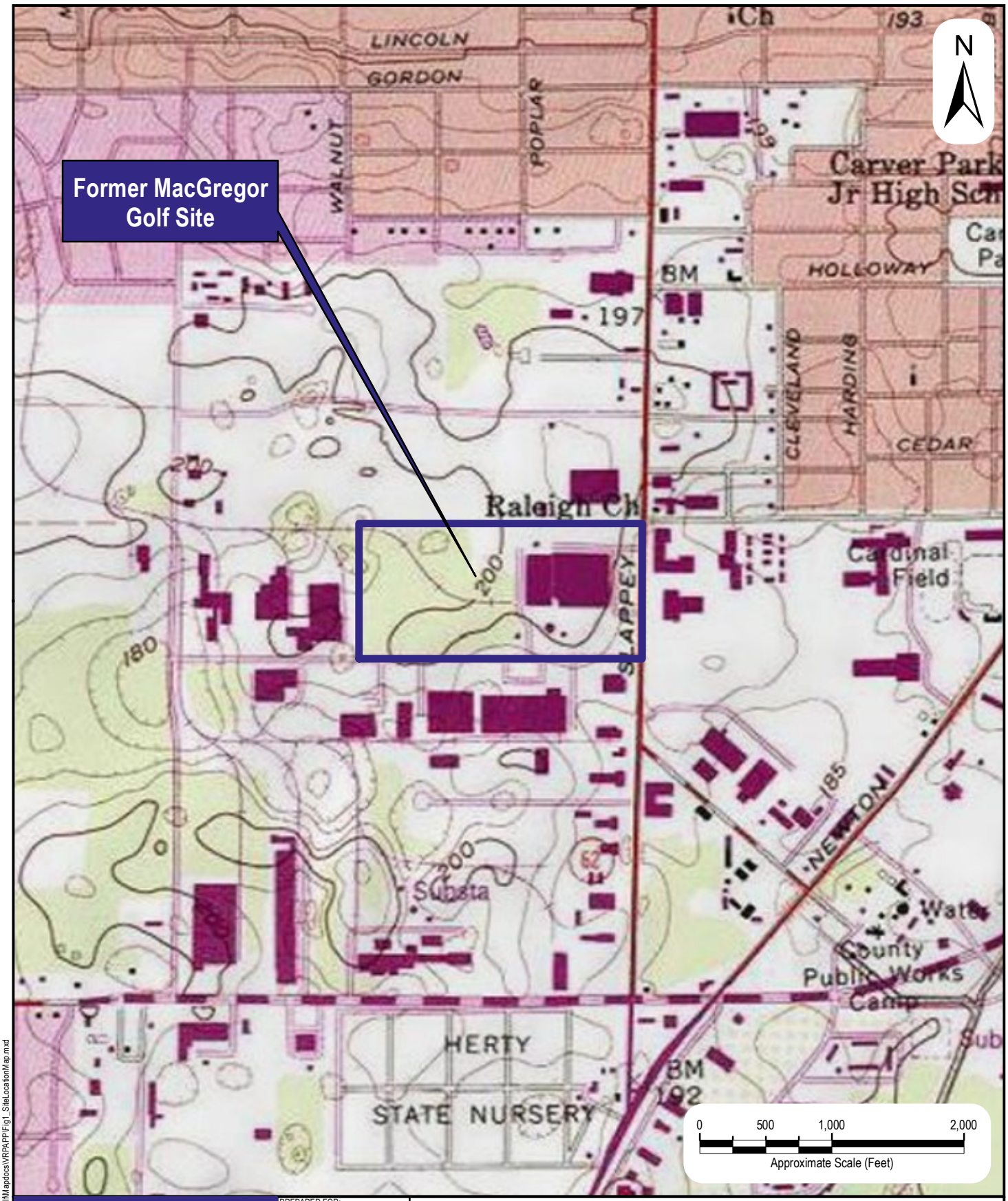

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DATE:	12/28/2015
SCALE:	AS SHOWN
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PROJECT #:	147437

Figure 1

Site Location Map

Former MacGregor Golf Company
1601 South Slappey Blvd, Albany, Dougherty County, Georgia

FILE PATH: R:\Projects\MacGregorGolf\Mapdocs\VRPAPP\Fig1_SiteLocationMap.mxd

SOURCE: NATIONAL GEOGRAPHIC SEAMLESS USGS, 2010

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N

Spartan Property

Former MacGregor Golf Site

Detention Basin

Drainage Ditch

Industry Avenue

South Slappey Boulevard

Taylor Property

Spartan MW-2

Spartan MW-1

TW-23 TW-11 MW-26 TW-12 TW-13 MW-24 TW-29 TW-14 TW-6 MW-1 TW-7 TW-8 TW-24 MW-6 TW-10 TW-9 TW-22 TW-31 TW-35 TW-28 TW-32 TW-34 TW-33

MW-14 MW-17

MW-18 MW-5 MW-22 MW-4 MW-23 MW-25 MW-3 MW-13

MW-2 MW-9 MW-12 MW-15 TW-38 TW-37 TW-26 TW-18 TW-39 TW-4 TW-20 TW-40 MW-1 MW-16 TW-36 TW-30 TW-25 TW-3 MW-19 TW-27 TW-17 TW-5 TW-42 TW-16 TW-2 TW-15 TW-41

MW-7 MW-10

TW-43 TW-44

MW-27

MW-28

0 150 300 450

Approximate Scale in Feet

LEGEND

- Approximate Property Boundaries
- Deep Monitoring Well
- Shallow Monitoring Well
- Well Not Included in the Current Monitoring Program
- Deep Monitoring Well Installed by Others
- Deep Temporary Monitoring Well
- Shallow Temporary Monitoring Well

Figure 2

Site Map
Monitoring Well Locations

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

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Path: R:\Projects\MacGregor\Golf\Mapdocs\Jan 2016 Status Report\Figure 2 - Site Map - Monitoring Well Locations.mxd

N

MW-26
153.12

MW-24
153.18

MW-11
160.52

MW-6
152.62

MW-14
158.64

Detention Basin

Drainage Ditch

MW-18
161.91

MW-22
161.37

MW-13
158.98

MW-4
161.16

MW-23
161.3

MW-25
159.69

MW-3
158.66

MW-12
159.93

MW-2
159.05

MW-19
158.63

MW-1
158.66

MW-10
155.35

Industry Avenue

TW-43
158.09

TW-44
157.56

South Slappey Boulevard

160
160.5
159.5
159
161
161.5
161
160.5
160
159.5
159
159
158
157.5
157
156.5
156
155.5
155.5
156
156.5
157
157.5
158
159
159.5

LEGEND

148.00 Groundwater Elevation (Feet NAVD88)

Groundwater Elevation Contour (Contour Interval is 0.50 Feet NAVD88)

Estimated Groundwater Elevation Contour

Apparent Groundwater Flow Direction

Deep Monitoring Well

Shallow Monitoring Well

Deep Monitoring Well Installed by Others

Shallow Temporary Monitoring Well

Approximate Property Boundaries

-MW-6, MW-24 and MW-26 not used for contouring due to being screened at the base of the upper water bearing zone

0 150 300 450

Approximate Scale in Feet

Figure 3

Potentiometric Surface Map
Upper Water Bearing Zone
July 29, 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

DATE:	01/19/2016
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CHECKED BY:	SEJ
PROJECT #:	145096

N

MW-26
152.4

MW-24
151.82

MW-11
157.3

MW-6
151.92

MW-14
154.77

Detention Basin

Drainage Ditch

MW-18
156.47

MW-22
161.57

MW-4
159.01

MW-23
158.74

MW-25
158.38

MW-13
157.52

MW-3
157.02

MW-2
156.96

MW-12
157.12

South Slappey Boulevard

MW-10
152.67

MW-19
158.55

MW-1
156.51

MW-27
157.54

MW-28
157.42

155 156 157 158 159 160 161 153 154

0 150 300 450
Approximate Scale in Feet

LEGEND

148.00 Groundwater Elevation (Feet NAVD88)

Groundwater Elevation Contour (Contour Interval is 1.0 Foot NAVD88)

Estimated Groundwater Elevation Contour

Apparent Groundwater Flow Direction

Deep Monitoring Well

Shallow Monitoring Well

Deep Monitoring Well Installed by Others

Approximate Property Boundaries

-MW-6, MW-24 and MW-26 not used for contouring due to being screened at the base of the upper water bearing zone

Figure 4

Potentiometric Surface Map
Upper Water Bearing Zone
November 4, 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

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SCALE:	AS SHOWN
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CHECKED BY:	SEJ
PROJECT #:	145096

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N

Spartan MW-2 152.83

Spartan MW-1 152.55

153

152.5

152

151.5

MW-17 151.03

Detention Basin

Drainage Ditch

MW-5 152.93

South Slappey Boulevard

151.5

152

152.5

MW-9 152.52

MW-15 152.71

MW-7 153.19

153

MW-16 152.64

Industry Avenue

LEGEND

148.00 Groundwater Elevation (Feet NAVD88)

Groundwater Elevation Contour (Contour Interval is 0.50 Feet NAVD88)

Estimated Groundwater Elevation Contour

Apparent Groundwater Flow Direction

Deep Monitoring Well

Shallow Monitoring Well

Deep Monitoring Well Installed by Others

Approximate Property Boundaries

0 150 300 450

Approximate Scale in Feet

Figure 5

Potentiometric Surface Map
Lower Water Bearing Zone
July 29, 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

DATE:	01/19/2016
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	SEJ
PROJECT #:	147437

Path: R:\Projects\MacGregor\Golf\Mapdocs\Jan 2016 Status Report\Figure 4 - Lower Water Bearing Zone - July 29, 2015.mxd

LEGEND

- 148.00 Groundwater Elevation (Feet NAVD88)
- Groundwater Elevation Contour (Contour Interval is 0.50 Feet NAVD88)
- Estimated Groundwater Elevation Contour
- Apparent Groundwater Flow Direction
- Deep Monitoring Well
- Shallow Monitoring Well
- Deep Monitoring Well Installed by Others
- Approximate Property Boundaries

Figure 6

Potentiometric Surface Map
Lower Water Bearing Zone
November 4, 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

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Path: R:\Projects\MacGregorGolf\Mapdocs\Jan 2016 Status Report\Figure 6 - Lower Water Bearing Zone - November 4, 2015_copy.mxd

N

Spartan MW-26
Spartan MW-2
Spartan MW-1
MW-24
MW-11
MW-6
MW-14
MW-17
MW-13
MW-18
MW-5
MW-22
MW-23
MW-4
MW-25
MW-3
MW-2
MW-9
MW-12
MW-15
MW-7
MW-10
MW-19
MW-1
MW-16
MW-43
MW-44
MW-27
MW-28

Detention Basin

Drainage Ditch

Industry A

South Slappey Boulevard

MW-24	
7/30/15	mg/L
Cr-Tot	0.0715
Cr(VI)	0.0772
Cr(III)	< 0.010

MW-11	
7/27/15	mg/L
Cr-Tot	0.0864
Cr(VI)	0.0895
Cr(III)	< 0.010

MW-4	
7/27/15	mg/L
cis-1,2-DCE	0.410
TCE	0.110
VC	0.0093

MW-19	
7/27/15	mg/L
Cr-Tot	0.0236
Cr(VI)	0.0301
Cr(III)	< 0.010

TW-43		DUP*
7/28/15	mg/L	mg/L
Cr-Tot	0.0197	0.0190
Cr(VI)	0.0129	0.0148
Cr(III)	< 0.010	< 0.010

TW-44	
7/28/15	mg/L
Cr-Tot	0.0163
Cr(VI)	0.0166
Cr(III)	< 0.010

LEGEND

- Approximate Property Boundaries
- Deep Monitoring Well
- Shallow Monitoring Well
- Deep Monitoring Well Installed by Others
- Shallow Temporary Monitoring Well
- Concentration greater than delineation and cleanup standard

NOTES:
mg/L - milligrams per liter
Cr-Tot - Total Chromium
Cr(VI) - Hexavalent Chromium
Cr(III) - Trivalent Chromium
cis-1,2-DCE - cis-1,2-Dichloroethene
TCE - Trichloroethene
VC - Vinyl Chloride
* - Duplicate sample

	Standards, mg/L	
	Delineation	Cleanup
Cr-Tot	0.10	0.10
Cr(VI)	0.01	0.01
Cr(III)	0.01	153
cDCE	0.07	0.204
TCE	0.005	0.038
VC	0.002	0.0033

0 150 300 450
Approximate Scale in Feet

Figure 7

Groundwater Concentration Map
July 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

DATE:	01/19/2016
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB
PROJECT #:	147437

N

Spartan MW-2

Spartan MW-1

MW-26

MW-24

MW-11

MW-6

MW-14

MW-17

Detention Basin

Drainage Ditch

MW-18

MW-5

MW-22

MW-23

MW-4

MW-25

MW-13

South Slappey Boulevard

MW-3

MW-2

MW-9

MW-12

MW-15

MW-7

MW-10

MW-19

MW-1

MW-16

Industry Avenue

MW-27		DUP*
11/5/15	mg/L	mg/L
Cr-Tot	< 0.010	< 0.010
Cr(VI)	< 0.010	< 0.010
Cr(III)	< 0.010	< 0.010

MW-27

MW-28	
11/5/15	mg/L
Cr-Tot	< 0.010
Cr(VI)	< 0.010
Cr(III)	< 0.010

MW-28

0 150 300 450

Approximate Scale in Feet

LEGEND

- Approximate Property Boundaries
- Deep Monitoring Well
- Shallow Monitoring Well
- Deep Monitoring Well Installed by Others

Standards, mg/L

	Delineation	Cleanup
Cr-Tot	0.10	0.10
Cr(VI)	0.01	0.01
Cr(III)	0.01	153

NOTES:
mg/L - milligrams per liter
Cr-Tot - Total Chromium
Cr(VI) - Hexavalent Chromium
Cr(III) - Trivalent Chromium
* - Duplicate sample

Figure 8

Groundwater Concentration Map
November 2015

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

DATE:	01/19/2016
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB
PROJECT #:	147437

N

A

Spartan Property

Former MacGregor Golf Site

SPARTAN MW-2

SPARTAN MW-1

MW-26

MW-24

MW-11

MW-6

INORGANICS IN UPPER ZONE

PARKING

PARKING

MW-14

MW-17

SURFICIAL SOIL:
COMMERCIAL WORKER,
CONSTRUCTION WORKER,
GROUNDSKEEPER, &
TRESPASSER

SUBSURFACE SOIL:
EXCAVATION WORKER

DETENTION BASIN

Treeline

MW-18

INORGANICS IN SOIL

MAIN WAREHOUSE

ESTIMATED EXTENT OF FORMER WASTE DISPOSAL AREA

MW-22

VOCS IN UPPER ZONE

VOCS IN SOIL

MW-4

MW-23

MW-25

MW-21

PARKING

MW-13

S. SLAPPEY BOULEVARD

DERMAL CONTACT, INGESTION, & INHALATION OF SOIL

DRIVING RANGE

Treeline

PUTTING GREEN

MW-3

MW-9

MW-12

MW-2

METAL BLDG

SUPPLY WELL

FUTURE INGESTION OF GROUNDWATER

GROUNDWATER:
OFF-SITE RECEPTORS

INORGANICS IN UPPER ZONE

MW-15

VOCS IN LOWER ZONE

MW-7

MW-10

MW-19

MW-16

MW-8D

MW-1

INDUSTRY AVENUE

MW-20

LOADING DOCK

MW-27

A'

Taylor Property

MW-28

Treeline

0 85 170 255 340

Approximate Scale in Feet

LEGEND

- Property Boundary
- Fence
- Drainage Ditch
- Deep Monitoring Well
- Shallow Monitoring Well
- Well Not Included in the Monitoring Program
- Extent of VOCs in Soil
- Extent of VOCs in Upper Water Bearing Zone
- Extent of VOCs in Lower Water Bearing Zone
- Extent of Inorganics in Soil
- Extent of Inorganics in Upper Water Bearing Zone
- Potential Exposure Pathways
- Potential Exposure Receptors

Notes:

1) MW-8 was replaced with MW-8D in August 1999, and was assumed abandoned as of 2006.
2) MW-21 could not be located and was replaced with MW-25 in October 2009.

Figure 9

Updated Conceptual Site Model Plan View

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

PREPARED FOR:
Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

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N

ESTIMATED EXTENT OF FORMER WASTE DISPOSAL AREA (SOURCE AREA)

SURFICIAL SOIL: COMMERCIAL WORKER, CONSTRUCTION WORKER, GROUNDSKEEPER, & TRESPASSER

SUBSURFACE SOIL: EXCAVATION WORKER

DERMAL CONTACT, INGESTION, & INHALATION OF SOIL

FUTURE INGESTION OF GROUNDWATER

GROUNDWATER: OFF-SITE RECEPTORS

Approximate Property Boundary

Pavement

Main Warehouse

Drainage Ditch

Unoccupied Storage Shed

Approximate Property Boundary

Industry Avenue

Approximate Taylor Property Boundary

Taylor Property

A

A'

Approximate Potentiometric Surface Upper Water-Bearing Unit

Approximate Potentiometric Surface Lower Water-Bearing Unit

LEGEND

- Property Boundary
- Approximate Water Table in Upper Water-Bearing Zone
- Approximate Water Table in Lower Water-Bearing Zone
- Potential Exposure Pathways
- Potential Exposure Receptors
- Soil
- Chert
- Semiconfining Unit / Chalky Limestone
- Limestone Bedrock
- Lower Confining Unit / Limestone
- VOC impacts
- Inorganics impacts

Drawing not to scale

Figure 10

Updated Conceptual Site Model
Profile View

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

PREPARED FOR:
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Albany Sport Co., &
Albany Partners, LLC

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PROJECT #:	147437

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Table 1. Well Construction Data and Most Recent Groundwater Elevations
Former MacGregor Golf Company
Albany, Georgia

Well ID	Well Completion Date	Water Bearing Unit	Northing (Feet - Georgia West State Plane NAD83)	Easting (Feet - Georgia West State Plane NAD83)	Total Depth[a] (feet)	Screened Interval[a] (feet)	Open Hole Interval[a] (feet)	Top of Casing Elevation[b] (feet)	July 29, 2015		November 4, 2015	
									Static Depth to Water[a] (feet)	Groundwater Elevation[b] (feet)	Static Depth to Water[a] (feet)	Groundwater Elevation[b] (feet)
Upper Water Bearing Zone												
MW-1	6/28/1995	Upper	566051.98	2293023.36	45.88	33.5-48.5	NA	196.54	37.88	158.66	40.03	156.51
MW-2	6/28/1995	Upper	566220.01	2292765.44	40.19	25-40	NA	196.61	37.56	159.05	39.65	156.96
MW-3	6/29/1995	Upper	566348.21	2293042.11	46.33	32.50-47.50	NA	198.41	39.75	158.66	41.39	157.02
MW-4	6/29/1995	Upper	566470.82	2292611.54	46.96	28-41.50	NA	198.43	37.27	161.16	39.42	159.01
MW-6[c]	7/25/1998	Upper	566911.71	2292317.29	60.13	NA	60-73	200.14	47.52	152.62	48.22	151.92
MW-10	7/15/1998	Upper	566080.73	2292221.58	48.37	33.30-48.30	NA	193.75	38.40	155.35	41.08	152.67
MW-11	7/15/1998	Upper	566921.91	2292317.31	48.30	33-48	NA	200.25	39.73	160.52	42.95	157.30
MW-12	7/16/1998	Upper	566218.48	2293315.55	45.28	35-50	NA	194.70	34.77	159.93	37.58	157.12
MW-13	10/22/1998	Upper	566566.74	2293392.86	50.38	35-50	NA	196.48	37.50	158.98	38.96	157.52
MW-14	10/20/1998	Upper	566899.03	2292756.18	49.71	34.80-49.80	NA	196.99	38.35	158.64	42.22	154.77
MW-18	6/17/1999	Upper	566533.98	2292176.82	43.70	28.8-43.8	NA	196.49	34.58	161.91	40.02	156.47
MW-19	6/17/1999	Upper	566035.83	2292750.34	44.12	29-44	NA	193.40	34.77	158.63	34.85	158.55
MW-21[d,e]	3/11/2003	Upper	NM	NM	38.61	28.61-38.61	NA	196.80	NM	NM	NM	NM
MW-22	3/11/2003	Upper	566540.86	2292649.02	45.69	35.4-45.4	NA	196.89	35.52	161.37	35.32	161.57
MW-23	3/11/2003	Upper	566423.91	2292556.49	48.10	37.95-47.95	NA	199.73	38.43	161.30	40.99	158.74
MW-24[c]	2/8/2008	Upper	566975.84	2292293.48	58.75	50-60	NA	200.39	47.21	153.18	48.57	151.82
MW-25[e]	10/21/2009	Upper	566402.83	2292666.80	39.16	29-39	NA	195.82	36.13	159.69	37.44	158.38
MW-26[c]	11/26/2012	Upper	567002.52	2292301.47	62.20	52.20-62.20	NA	200.90	47.78	153.12	48.50	152.40
MW-27	11/3/2015	Upper	565728.36	2292531.80	43.00	33-43	NA	188.56	NM	NM	31.02	157.54
MW-28	11/3/2015	Upper	565418.49	2292485.20	43.00	33-43	NA	188.04	NM	NM	30.62	157.42
TW-2[f]	3/17/2014	Upper	566015.94	2292736.14	35.51	25.51-35.51	NA	193.36	NM	NM	NM	NM
TW-9[f]	3/19/2014	Upper	566898.95	2292305.58	44.79	34.79-44.79	NA	200.18	NM	NM	NM	NM
TW-10[f]	3/19/2014	Upper	566921.71	2292291.27	44.78	34.78-44.78	NA	200.19	NM	NM	NM	NM
TW-11[c,f]	3/20/2014	Upper	566992.21	2292277.10	59.74	49.74-59.74	NA	200.54	NM	NM	NM	NM
TW-15[f]	3/21/2014	Upper	565998.92	2292779.18	42.95	32.94-42.95	NA	193.99	NM	NM	NM	NM
TW-23[c,f]	3/24/2014	Upper	567002.88	2292252.96	59.78	49.78-59.78	NA	200.26	NM	NM	NM	NM
TW-24[c,f]	3/24/2014	Upper	566940.64	2292250.83	59.68	49.68-59.68	NA	200.15	NM	NM	NM	NM
TW-31[f]	6/4/2014	Upper	566879.07	2292400.98	45.25	35.25-45.25	NA	201.28	NM	NM	NM	NM
TW-35[f]	6/4/2014	Upper	566848.17	2292320.97	45.07	35.07-45.07	NA	200.02	NM	NM	NM	NM
TW-41[f]	6/4/2014	Upper	566002.49	2292870.78	45.11	35.11-45.11	NA	196.35	NM	NM	NM	NM
TW-42[f]	6/4/2014	Upper	566010.23	2292603.03	45.00	35.00-45.00	NA	193.33	NM	NM	NM	NM
TW-43[f]	7/28/2015	Upper	565894.76	2292636.51	44.00	34.00-44.00	NA	191.20	33.11	158.09	NM	NM
TW-44[f]	7/28/2015	Upper	565844.66	2292619.29	44.00	34.00-44.00	NA	189.53	31.97	157.56	NM	NM
Lower Water Bearing Zone												
MW-5	7/23/1998	Lower	566495.97	2292539.09	60.50	NA	60-73	199.89	46.96	152.93	47.57	152.32
MW-7	7/22/1998	Lower	566080.91	2292207.62	69.35	60-70	NA	194.22	41.03	153.19	41.84	152.38
MW-8/8D[d]	8/17/1999	Lower	NM	NM	207.50	197.3-207.3	NA	198.00	NM	NM	NM	NM
MW-9	7/20/1998	Lower	566227.03	2293312.05	69.28	NA	58.5-73.5	194.68	42.16	152.52	42.69	151.99
MW-15	10/23/1998	Lower	566153.85	2292894.90	75.38	65.70-75.70	NA	199.23	46.52	152.71	47.04	152.19
MW-16	10/21/1998	Lower	566065.57	2293320.44	75.47	64.70-74.70	NA	193.61	40.97	152.64	41.37	152.24
MW-17	6/17/1999	Lower	566871.51	2293186.97	73.81	66-76	NA	198.73	47.70	151.03	47.70	151.03
MW-20[c]	8/14/1999	Lower	NM	NM	70.00	60-70	NA	193.31	NM	NM	NM	NM
Spartan MW-1	11/10/2008	Lower	567032.71	2292578.90	68.5	52-67	NA	206.37	53.82	152.55	54.34	152.03
Spartan MW-2	11/10/2008	Lower	567048.65	2292428.10	65.0	49.5-64.5	NA	205.78	52.95	152.83	53.57	152.21
Supply Well	1958	Lower	NM	NM	168.0	NA	NA	NM	NM	NM	NM	NM

[a] Depth below top of casing.

[b] Elevation is feet above mean sea level.

[c] Wells are screened at the base of the upper water bearing zone and are therefore not used for contouring.

[d] Wells are not gauged or sampled as part of the monitoring program.

[e] Well MW-25 was replaced MW-21 in 2009.

[f] Temporary wells were abandoned following survey and water level measurements.

NA - Not Applicable

NM - Not Measured

NAD83 - North American Datum of 1983

Table 2. Recent Field-Measured Groundwater Sampling Parameters Former MacGregor Golf Company Albany, Georgia								
Well	Sample Date	Total Gallons Removed	pH	Temperature (°C)	Conductivity (mS/cm)[a]	ORP (mV)[b]	Dissolved Oxygen (mg/L)[c]	Turbidity (NTU)[d]
MW-4	7/27/15	5.00	6.80	21.88	0.580	174.6	0.32	9.70
MW-11	7/27/15	4.40	6.88	30.12	0.561	170.1	6.60	6.62
MW-19	7/27/15	3.75	7.55	23.09	0.216	167.4	11.90	7.05
MW-24	7/30/15[a]	15.50	6.94	28.02	0.471	135.1	6.29	81.5
TW-43	7/28/15	14.60	7.26	28.88	0.392	30.6	9.52	9.80
TW-44	7/28/15	2.00	7.37	29.67	0.422	95.6	10.01	9.04
MW-27	11/5/15	7.50	6.82	24.43	0.523	-31.7	4.97	8.90
MW-28	11/5/15	9.25	7.26	23.01	0.278	-18.6	5.73	8.70

[a] mS/cm = Millisiemens per centimeter.

[b] ORP = Oxidation Reduction Potential in millivolts (mV).

[c] mg/L = Milligrams per liter.

[d] NTU = Nephelometric Turbidity Unit.

Table 3. Recent Groundwater Detections of Site COCs Former MacGregor Golf Company Albany, Georgia							
Well ID	Sampling Date	Inorganics: Concentration (mg/L)			Organics: Concentration (mg/L)		
		Total Chromium	Hexavalent Chromium	Trivalent Chromium	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride
GW Delineation Standard		0.10	0.01	0.01	0.07	0.005	0.002
GW Cleanup Standard		0.10	0.01	153	0.204	0.038	0.0033
MW-4	7/27/15	NA	NA	NA	0.410	0.110	0.0093
MW-11	7/27/15	0.0864	0.0895	< 0.010	NA	NA	NA
MW-19	7/27/15	0.0236	0.0301	< 0.010	NA	NA	NA
MW-24	7/30/15[a]	0.0715	0.0772	< 0.010	NA	NA	NA
TW-43	7/28/15	0.0197	0.0129	< 0.010	NA	NA	NA
	7/28/15 Dup	0.0190	0.0148	< 0.010	NA	NA	NA
TW-44	7/28/15	0.0163	0.0166	< 0.010	NA	NA	NA
MW-27	11/5/15	< 0.010	< 0.010	< 0.010	NA	NA	NA
	11/5/15 Dup	< 0.010	< 0.010	< 0.010	NA	NA	NA
MW-28	11/5/15	< 0.010	< 0.010	< 0.010	NA	NA	NA

NA -Sample not analyzed for this parameter.

Dup - Duplicate sample

mg/L - milligrams per liter

[a] Sample was collected at a turbidity of 81.5 NTU. Therefore, samples were also collected for dissolved total chromium (0.0653 mg/L), dissolved hexavalent chromium (0.0772 mg/L), and dissolved trivalent chromium (< 0.010).

Purple Highlight - Indicates concentration is greater than delineation standard.

Orange Highlight - Indicates concentration is greater than delineation and cleanup standard.

Table 4. Historical Groundwater Detections of Site COCs
Former MacGregor Golf Company
Albany, Georgia

Well ID	Sampling Date	Inorganics: Concentration (mg/L)					Organics: Concentration (mg/L)						
		Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
GW Delineation Standard		0.10	0.01	0.01	0.20	0.10	0.007	0.07	0.005	0.002	0.005	0.7	10
GW Cleanup Standard		0.10	0.01	153	2.04	2.04	0.58	0.204	0.038	0.0033	0.0088	0.70	10
MW-1	6/30/95	0.05	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.005
	6/10/98	NA	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.005
	7/31/98	< 0.010	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/30/99	NA	NA	NA	NA	NA	0.0017	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	8/6/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA
	3/12/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-2	6/30/95	0.04	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.005
	6/10/98	NA	NA	NA	NA	NA	<0.005	0.0059	<0.005	<0.002	<0.002	<0.002	<0.005
	7/31/98	< 0.010	NA	NA	< 0.02	< 0.02	<0.002	0.004	<0.002	<0.002	<0.002	<0.002	<0.005
MW-3	6/30/95	0.05	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.005
	6/10/98	NA	NA	NA	NA	NA	0.0094	<0.005	0.005	<0.002	<0.002	<0.002	<0.005
	7/31/98	< 0.010	NA	NA	< 0.02	0.03	0.007	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/30/99	NA	NA	NA	NA	NA	0.0058	0.0019	<0.001	<0.001	<0.001	<0.001	<0.002
	2/26/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-4	6/30/95	< 0.010	NA	NA	NA	NA	<0.005	1.560	0.376	0.065	<0.002	<0.002	<0.005
	6/10/98	NA	NA	NA	NA	NA	<0.005	2.900	0.310	<0.002	<0.002	<0.002	<0.005
	7/29/98	0.33	NA	NA	< 0.02	0.39	<0.002	2.800	0.350	0.013	<0.002	<0.002	<0.005
	6/30/99	NA	NA	NA	NA	NA	<0.025	3.700	0.460	<0.001	<0.025	<0.025	<0.050
	2/26/03	NA	NA	NA	NA	NA	<0.0002	2.200	0.290	0.017	<0.0002	<0.0003	<0.0015
	5/21/03	NA	NA	NA	NA	NA	<0.0002	1.300	0.200	0.0034	<0.0002	<0.0003	<0.0015
	6/13/03	NA	NA	NA	NA	NA	<0.0002	2.200	0.190	0.0022	<0.0002	<0.0003	<0.0015
	7/18/03	NA	NA	NA	NA	NA	<0.007	1.500	0.200	0.0068	<0.009	<2.300	<10.000
	8/14/03	NA	NA	NA	NA	NA	<0.00022	1.600	0.200	0.0020	<0.00019	<0.00032	<0.0015
	2/19/04	NA	NA	NA	NA	NA	<0.007	1.800	0.370	0.013	<0.009	<2.300	<10.000
	3/29/04	NA	NA	NA	NA	NA	<0.005	1.700	0.130	0.021	<0.005	<0.005	<0.015
	5/19/04	NA	NA	NA	NA	NA	<0.005	0.890	0.110	0.0087	<0.005	<0.005	<0.015
	8/23/04	NA	NA	NA	NA	NA	<0.005	1.400	0.180	0.0074	<0.005	<0.005	<0.015
	5/30/06	< 0.010	NA	NA	NA	2.83	<0.005	1.100	0.170	0.0088	<0.005	<0.005	<0.015
	10/22/09	NA	NA	NA	NA	NA	0.00025 J	0.400	0.079	0.015	<0.00028	<0.00025	<0.00068
	7/28/10	NA	NA	NA	NA	NA	<0.005	0.690	0.200	0.025	<0.005	<0.005	<0.015
	3/31/11	NA	NA	NA	NA	NA	<0.005	0.410	0.110	0.0048	<0.005	<0.005	<0.015
	1/11/12	NA	NA	NA	NA	0.0725	NA	NA	NA	NA	NA	NA	NA
	11/28/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/22/13	< 0.010	< 0.010	< 0.010	NA	0.203	< 0.005	0.380	0.120	0.015	< 0.005	< 0.005	< 0.005
	1/7/14	NA	NA	NA	NA	NA	< 0.005	0.290	0.097	0.011	< 0.005	< 0.005	< 0.005
	7/27/15	NA	NA	NA	NA	NA	< 0.005	0.410	0.110	0.0093	< 0.005	< 0.005	< 0.005
MW-5	7/30/98	0.01	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	8/9/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA
	9/3/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA
	3/13/03	NA	NA	NA	NA	NA	<0.0002	0.030	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
	5/30/06	NA	NA	NA	NA	< 0.02	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
MW-6	7/30/98	0.01	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-7	7/30/98	< 0.010	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/29/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	3/13/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-8	7/15/98	NA	NA	NA	NA	NA	0.007	<0.002	0.003	<0.002	<0.002	<0.002	<0.005
	7/31/98	< 0.010	NA	NA	0.03	< 0.02	0.008	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/8/99	NA	NA	NA	NA	NA	0.014	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	0.016	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.002
MW-8D	6/17/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA

Table 4. Historical Groundwater Detections of Site COCs
Former MacGregor Golf Company
Albany, Georgia

Well ID	Sampling Date	Inorganics: Concentration (mg/L)					Organics: Concentration (mg/L)						
		Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
GW Delineation Standard		0.10	0.01	0.01	0.20	0.10	0.007	0.07	0.005	0.002	0.005	0.7	10
GW Cleanup Standard		0.10	0.01	153	2.04	2.04	0.58	0.204	0.038	0.0033	0.0088	0.70	10
MW-9	7/29/98	< 0.010	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	8/6/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
	2/21/08	NA	NA	NA	NA	NA	<0.007	NA	NA	NA	NA	NA	NA
MW-10	7/29/98	0.01	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/29/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	3/13/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-11	7/30/98	0.04	NA	NA	< 0.02	<0 .04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	9/13/99	0.37[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
	2/21/08	0.0404	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/21/09	0.0250	0.0300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/29/10	0.1930	0.0322	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/29/11	0.0285	0.0243	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/23/13	0.0459	0.0402	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/7/14	0.0319	0.0351	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/27/15	0.0864	0.0895	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-12	7/30/98	< 0.010	NA	NA	< 0.02	< 0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
	7/28/10	NA	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
	3/28/11	NA	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
MW-13	10/26/98	NA	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	0.014	0.770	4.5
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
	3/20/10	< 0.010	< 0.010	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
	7/28/10	< 0.010	< 0.010	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
	3/29/11	< 0.010	< 0.010	NA	NA	NA	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.015
MW-14	10/27/98	NA	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005
	6/28/99	NA	NA	NA	NA	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002
	2/25/03	NA	NA	NA	NA	NA	<0.0002	<0.0004	<0.0002	<0.0001	<0.0002	<0.0003	<0.0015
MW-15	10/26/98	NA	NA	NA	NA	NA	0.057	<0.002	0.004	<0.002	<0.002	<0.002	<0.005
	6/30/99	NA	NA	NA	NA	NA	0.340	<0.002	0.032	<0.002	<0.002	<0.002	<0.004
	2/26/03	NA	NA	NA	NA	NA	0.066	< 0.0004	0.008	< 0.0001	< 0.0002	< 0.0003	< 0.0015
MW-16	10/26/98	NA	NA	NA	NA	NA	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005
	6/29/99	NA	NA	NA	NA	NA	< 0.001	< 0.001	0.0017	< 0.001	< 0.001	< 0.001	< 0.0002
	8/6/99	NA	NA	NA	NA	NA	< 0.001	0.0018	0.004	NA	NA	NA	NA
	9/3/99	NA	NA	NA	NA	NA	< 0.001	0.0012	< 0.001	NA	NA	NA	NA
	9/13/00	NA	NA	NA	< 0.01	NA	< 0.001	0.0015	0.0029	< 0.001	< 0.001	< 0.001	< 0.002
	2/25/03	NA	NA	NA	NA	NA	< 0.0002	< 0.0004	< 0.0002	<0.0001	< 0.0002	< 0.0003	< 0.0015
MW-17	6/28/99	NA	NA	NA	NA	NA	< 0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001	< 0.002
	8/9/99	NA	NA	NA	NA	NA	< 0.001	< 0.001	< 0.001	NA	NA	NA	NA
	2/25/03	NA	NA	NA	NA	NA	< 0.0002	<0.0004	< 0.0002	<0.0001	< 0.0002	< 0.0003	< 0.0015
MW-18	6/26/99	NA	NA	NA	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002
	8/9/99	NA	NA	NA	NA	NA	< 0.001	<0.001	<0.001	NA	NA	NA	NA
	9/13/99	< 0.010	NA	NA	NA	< 0.04	NA	NA	NA	NA	NA	NA	NA
MW-19	6/28/99	NA	NA	NA	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002
	8/9/99	NA	NA	NA	NA	NA	< 0.001	<0.001	<0.001	NA	NA	NA	NA
	2/26/03	NA	NA	NA	NA	NA	< 0.0002	< 0.0004	< 0.0002	< 0.0001	<0.0002	<0.0003	< 0.0015
	7/28/10	0.0117	0.0139	NA	NA	NA	< 0.005	< 0.005	< 0.005	< 0.002	< 0.005	< 0.005	< 0.015
	3/29/11	< 0.010	< 0.010	NA	NA	NA	< 0.005	< 0.005	< 0.005	< 0.002	< 0.005	< 0.005	< 0.015

Table 4. Historical Groundwater Detections of Site COCs
Former MacGregor Golf Company
Albany, Georgia

Well ID	Sampling Date	Inorganics: Concentration (mg/L)					Organics: Concentration (mg/L)						
		Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
GW Delineation Standard		0.10	0.01	0.01	0.20	0.10	0.007	0.07	0.005	0.002	0.005	0.7	10
GW Cleanup Standard		0.10	0.01	153	2.04	2.04	0.58	0.204	0.038	0.0033	0.0088	0.70	10
	10/23/13	0.296	0.284 J	0.0113 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/8/14	0.196	0.199	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/8/14 Dup	0.204	0.198	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/27/15	0.0236	0.0301	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-20	8/17/99	NA	NA	NA	NA	NA	0.0047	< 0.001	0.0016	NA	NA	NA	NA
	9/3/99	NA	NA	NA	NA	NA	0.0073	< 0.001	< 0.001	NA	NA	NA	NA
	9/13/00	NA	NA	NA	< 0.01	NA	0.0085	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002
	2/25/03	NA	NA	NA	NA	NA	< 0.0002	<0.0004	< 0.0002	< 0.0001	< 0.0002	< 0.0003	< 0.0015
MW-21	3/13/03	NA	NA	NA	NA	NA	< 0.0002	0.030	< 0.0002	< 0.0001	< 0.0002	< 0.0003	< 0.0015
MW-22	3/13/03	NA	NA	NA	NA	NA	< 0.0002	< 0.0004	0.007	< 0.0001	< 0.0002	< 0.0003	< 0.0015
	5/30/06	NA	NA	NA	NA	< 0.02	< 0.005	0.0084	0.0090	< 0.002	< 0.005	< 0.005	< 0.015
	10/22/09	NA	NA	NA	NA	NA	< 0.00024	0.0062	0.0053	< 0.00029	< 0.00028	< 0.00025	< 0.00068
	7/28/10	NA	NA	NA	NA	NA	< 0.005	0.0095	0.0089	<0.002	< 0.005	< 0.005	< 0.015
	3/31/11	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	<0.002	< 0.005	< 0.005	< 0.015
	11/28/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-23	3/13/03	NA	NA	NA	NA	NA	< 0.0002	0.030	< 0.0002	< 0.0001	< 0.0002	< 0.0003	< 0.0015
	5/30/06	NA	NA	NA	NA	< 0.02	< 0.005	< 0.005	< 0.002	< 0.002	< 0.005	< 0.005	< 0.015
	2/8/08	0.33	NA	NA	NA	< 0.02	NA	NA	NA	NA	NA	NA	NA
	10/22/09	NA	NA	NA	NA	NA	<0.00024	0.0012	0.00059J	< 0.00029	< 0.00028	< 0.00025	< 0.00068
	7/28/10	NA	NA	NA	NA	NA	< 0.005	0.0089	< 0.005	<0.002	< 0.005	< 0.005	< 0.015
	3/29/11	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	<0.002	< 0.005	< 0.005	< 0.005
	10/2/12	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/22/13	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-24	4/9/08	0.386	NA	NA	NA	< 0.02	NA	NA	NA	NA	NA	NA	NA
	10/21/09	0.11	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/29/10	0.108	0.107	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/29/10 Dup	0.109	0.110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/30/11	0.120	0.0945	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/11/12	0.153[b]	0.125[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/12	0.138[c]	0.105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/12 Dup	0.139	0.116	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/23/13	0.0829	0.0513	0.0316	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/30/15	0.0715	0.0772	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-25	10/22/09	NA	NA	NA	NA	NA	< 0.00024	0.004	0.0018	< 0.00029	< 0.00028	<0.00025	< 0.00068
	7/28/10	NA	NA	NA	NA	NA	< 0.005	0.011	0.0055	< 0.002	< 0.005	< 0.005	< 0.015
	3/29/11	NA	NA	NA	NA	NA	< 0.005	0.0083	< 0.005	< 0.002	< 0.005	< 0.005	< 0.015
MW-26	11/29/12	0.175	0.184	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/29/12 Dup	0.175	0.180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/20/2013	0.0959	< 0.010	0.0959	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/20/2013 Dup	0.0979	< 0.010	0.0979	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/9/2013	0.0337	0.031	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/24/2013	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/24/2013 Dup	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/8/2014	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-27	11/5/2015	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/5/2015 Dup	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-28	11/5/2015	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
Spartan MW-2	2/21/2013	0.0101	< 0.050	0.0101	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/2013	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/2013 Dup	< 0.010	< 0.010	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
Supply Well	9/22/98	NA	NA	NA	NA	NA	0.003	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.005
	6/15/99	NA	NA	NA	NA	NA	0.0011	< 0.001	0.0026	< 0.001	< 0.001	< 0.001	< 0.002
	3/12/03	NA	NA	NA	NA	NA	0.006	< 0.0004	< 0.0002	< 0.0001	< 0.0002	< 0.0003	< 0.0015

Table 4. Historical Groundwater Detections of Site COCs
Former MacGregor Golf Company
Albany, Georgia

Well ID	Sampling Date	Inorganics: Concentration (mg/L)					Organics: Concentration (mg/L)						
		Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
GW Delineation Standard		0.10	0.01	0.01	0.20	0.10	0.007	0.07	0.005	0.002	0.005	0.7	10
GW Cleanup Standard		0.10	0.01	153	2.04	2.04	0.58	0.204	0.038	0.0033	0.0088	0.70	10
DB-SW-1 (Surface Water)	10/20/09	0.0027J	NA	NA	NA	< 0.0022	NA	NA	NA	NA	NA	NA	NA
TW-1	3/18/2014	0.160	0.143	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-2	3/18/2014	0.034	0.020 J	0.014	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/18/2014 Dup	0.034	0.026 J	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-3	3/18/2014	0.076	0.068	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-4	3/18/2014	0.125	0.110	0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-5	3/19/2014	0.075	0.070 J	< 0.01 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-6	3/19/2014	0.020	< 0.01	0.019	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-7	3/19/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-8	3/19/2014	0.020	0.013	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-9	3/20/2014	0.015 J	< 0.01 UJ	0.015 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-10	3/20/2014	0.011	< 0.01	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-11	3/20/2014	1.740	1.490	0.250	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/20/2014 Dup	1.730	1.460	0.274	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-12	3/20/2014	0.011	< 0.01	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-13	3/21/2014	0.060	0.056	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-14	3/21/2014	0.587	0.580	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-15	3/22/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-16	6/2/2014	0.018	< 0.01	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-17	3/22/2014	0.116	0.102	0.014	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-18	3/23/2014	0.107	0.098	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-20	3/23/2014	0.199	0.185	0.013	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-22	3/21/2014	0.019	0.017	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-23	3/24/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-24	3/24/2014	0.021	0.013	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-25	3/23/2014	0.086	0.075	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-26	3/25/2014	0.083	0.068 J	0.015 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-27	3/25/2014	0.168	0.147 J	0.022 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-28	3/25/2014	0.039	0.024	0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-29	3/26/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-30	3/25/2014	0.064	0.047	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-31	6/4/2013	0.024	0.013	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-32	6/4/2013	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-33	6/5/2014	< 0.01	< 0.01 UJ	< 0.01 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/5/2014 Dup	< 0.01	< 0.01 UJ	< 0.01 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-34	6/5/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-35	6/5/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-36	6/3/2014	0.041	0.028 J	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-37	6/3/2014	0.015	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-38	6/4/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-39	6/4/2014	0.040	0.034 J	< 0.01 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-40	6/3/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-41	6/3/2014	0.049	0.037	0.012	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/3/2014 Dup	0.050	0.038	0.012	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-42	6/2/2014	< 0.01	< 0.01	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-43	7/28/2015	0.0197	0.0129	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/28/2015 Dup	0.0190	0.0148	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA
TW-44	7/28/2015	0.0163	0.0166	< 0.010	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA -Sample not analyzed for this parameter.

J - Result qualified as estimated by the laboratory or as the result of data verification.

Dup - Duplicate sample

mg/L - milligrams per liter

[a] MW-11 sample from 9/13/99 was highly turbid at time of sample collection; data not representative of groundwater conditions.

[b] MW-24 samples from 1/11/12 were highly turbid at time of sample collection. Concentrations of dissolved total chromium and dissolved hexavalent chromium were 0.122 mg/L and 0.115 mg/L, respectively.

[c] MW-24 samples from 10/2/12 were highly turbid at time of sample collection. Concentration of total dissolved chromium in the parent and duplicate samples was 0.134 mg/L. The samples were not analyzed for

Purple Highlight - Indicates concentration is greater than delineation standard.

Orange Highlight - Indicates concentration is greater than delineation and cleanup standard.

Table 5. Summary of Site Status Relative to Delineation and Cleanup Levels Former MacGregor Golf Company Albany, Georgia			
Delineation		Remediation	
Areas Requiring Additional Delineation	Proposed Plans to Complete Delineation	Areas Requiring Cleanup	Plans to Complete Remediation
Soil			
• None	• None	• Former Waste Disposal Area: cis-1,2-DCE and VC exceed cleanup standards in B4 (5-10 ft bgs) and GP-1 (4-6 ft bgs).	• Focused risk assessment and groundwater concentration trend analysis will be used to demonstrate compliance with cleanup standards.
Groundwater			
• None	• None	• MW-4 (upper water bearing zone, in former waste disposal area): TCE, cis-1,2-DCE, and VC exceed cleanup standards. • Vicinities of MW-11 and MW-24 (upper water bearing zone, near northern property boundary): Total and/or hexavalent chromium exceed cleanup standards. • Vicinity of MW-19 (upper water bearing zone, near southern property boundary): Total and/or hexavalent chromium exceed cleanup standards.	• Empirical evidence and groundwater concentration trend analysis will be used to demonstrate compliance with cleanup standards in the MW-4 area. • Modeling to demonstrate compliance with cleanup standards at the designated point of exposure and point of demonstration well will be used in MW-11, MW-19, and MW-24 areas.

Table 6. Updated Project Milestone Schedule
Former MacGregor Golf Company
Albany, Georgia

Task Name	Projected Completion Date	Completion Date	Year 1: July 2012 - July 2013				Year 2: July 2013 - July 2014				Year 3: July 2014 - July 2015				Year 4: July 2015 - July 2016				Year 5: July 2016 - July 2017				Year 6: July 2017 - July 2018	
			2012		2013				2014				2015				2016				2017			
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enrollment in VRP	--	July 30, 2012																						
Preliminary Cost Estimate for Implementation of Remediation & Continuing Actions, and Financial Assurance Demonstration	Within 60 days of Enrollment[a]	March 13, 2013	X	X	X																			
Monthly Groundwater Level Measurements	Within 3 Months of Enrollment	November 6, 2012	X	X																				
Horizontal Delineation of Site COCs (on accessible property)	Within 6 Months of Enrollment	November 29, 2012	X	X																				
Semiannual Progress Report with Updated CSM	Within 6 Months of Enrollment	January 30, 2013		X																				
Semiannual Progress Report with Updated CSM	Within 12 Months of Enrollment	July 30, 2013				X																		
Vertical Delineation of Site COCs	Within 12 Months of Enrollment	May 31, 2013			X	X																		
Semiannual Progress Report with Updated CSM	Within 18 Months of Enrollment	January 30, 2014						X																
Horizontal Delineation of Site COCs (on property previously inaccessible)	Within 24 Months of Enrollment	November 5, 2015			X	X			X	X					X	X								
Semiannual Progress Report with Updated CSM	Within 24 Months of Enrollment	July 30, 2014								X														
Semiannual Progress Report with Final Remediation Plan, Updated CSM, and Final Cost Estimate for Remediation and/or Continuing Actions	Within 30 Months of Enrollment	January 30, 2015										X												
Active remediation, if necessary	Within 36 Months of Enrollment	NA																						
Semiannual Progress Report with Updated CSM	Within 36 Months of Enrollment	July 27, 2015												X										
Semiannual Progress Report with Updated CSM	Within 42 Months of Enrollment	January 28, 2016														X								
Compliance Status Report under the VRP with Certifications	Within 48 Months of Enrollment																							
Model Validation Monitoring	Within 90 Months of Enrollment																							

Due date indicated on VRP Application.

On-site Horizontal Delineation

Off-site Horizontal Delineation

Vertical Delineation, Final Remediation Plan, and Final Cost Estimate

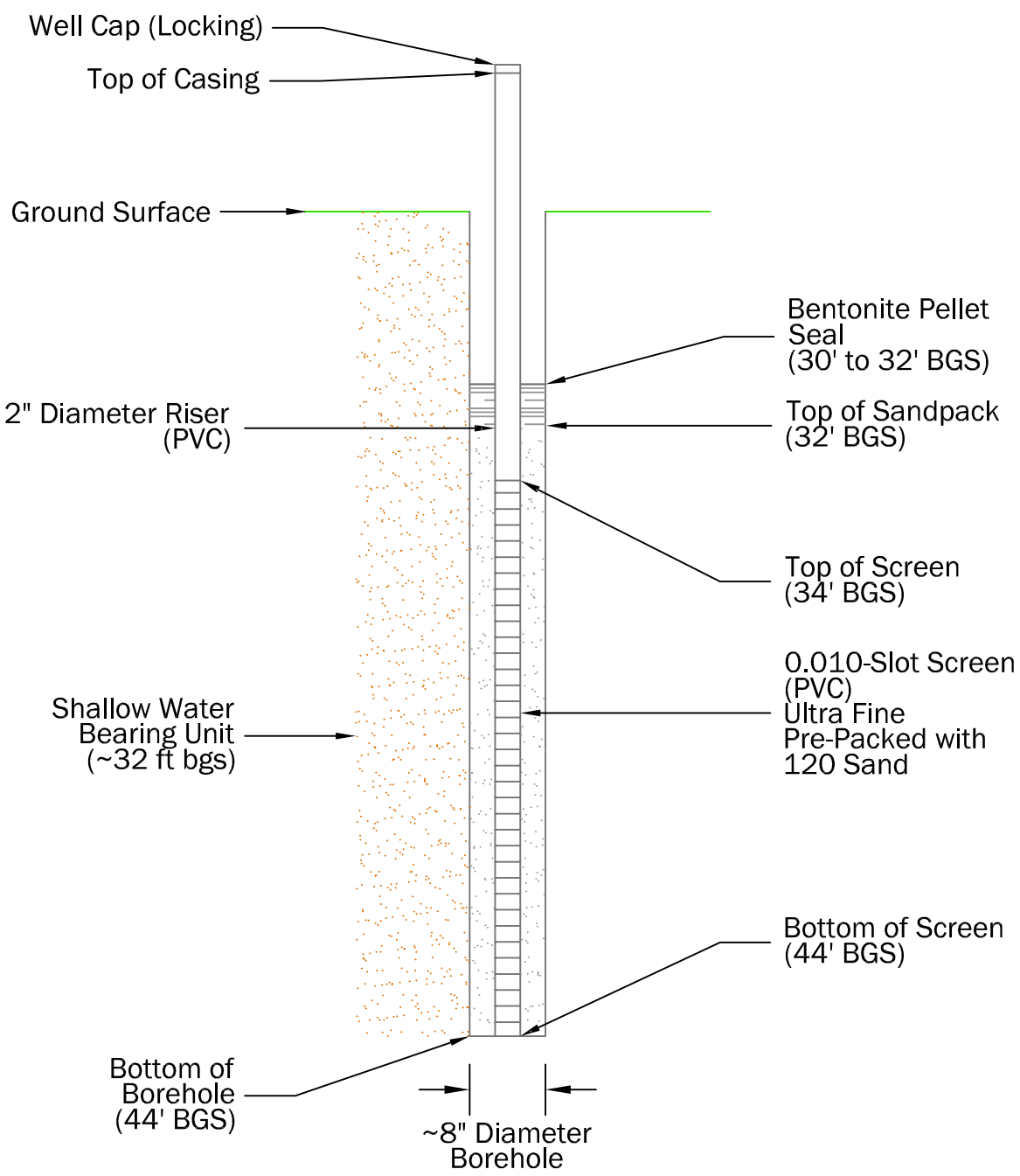
CSR Submittal to VRP with Certifications

[a] Due date for this task was extended per EPD's approval.

"X" Indicates task accomplished.

Table 7. Summary of Hours Invoiced by Professional Engineer This Period Former MacGregor Golf Company Albany, Georgia			
Registered PE	Month	Hours Invoiced	Description of Services
Trish Reifenberger, P.E. Georgia PE No. 20676	August 2015	1.25	* Reviewed monthly status update * Reviewed delineation data from July 2015
	September 2015	1.00	* Reviewed monthly status update * Participated in monthly project status call
	October 2015	0.75	* Reviewed monthly status update * Participated in monthly project status call
	November 2015	1.50	* Reviewed monthly status update * Participated in monthly project status call * Reviewed delineation data from November 2015
	December 2015	2.00	* Reviewed monthly status update * Reviewed UEC for Taylor Property
	January 2016 (through 1/28/16)	4.00	* Reviewed monthly status update * Participated in monthly project status call * Reviewed Semiannual Progress Report and UEC for Site
Total Hours Invoiced this Period		10.50	

Appendix A: Well Construction Diagrams



Brown AND Caldwell

PREPARED FOR: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

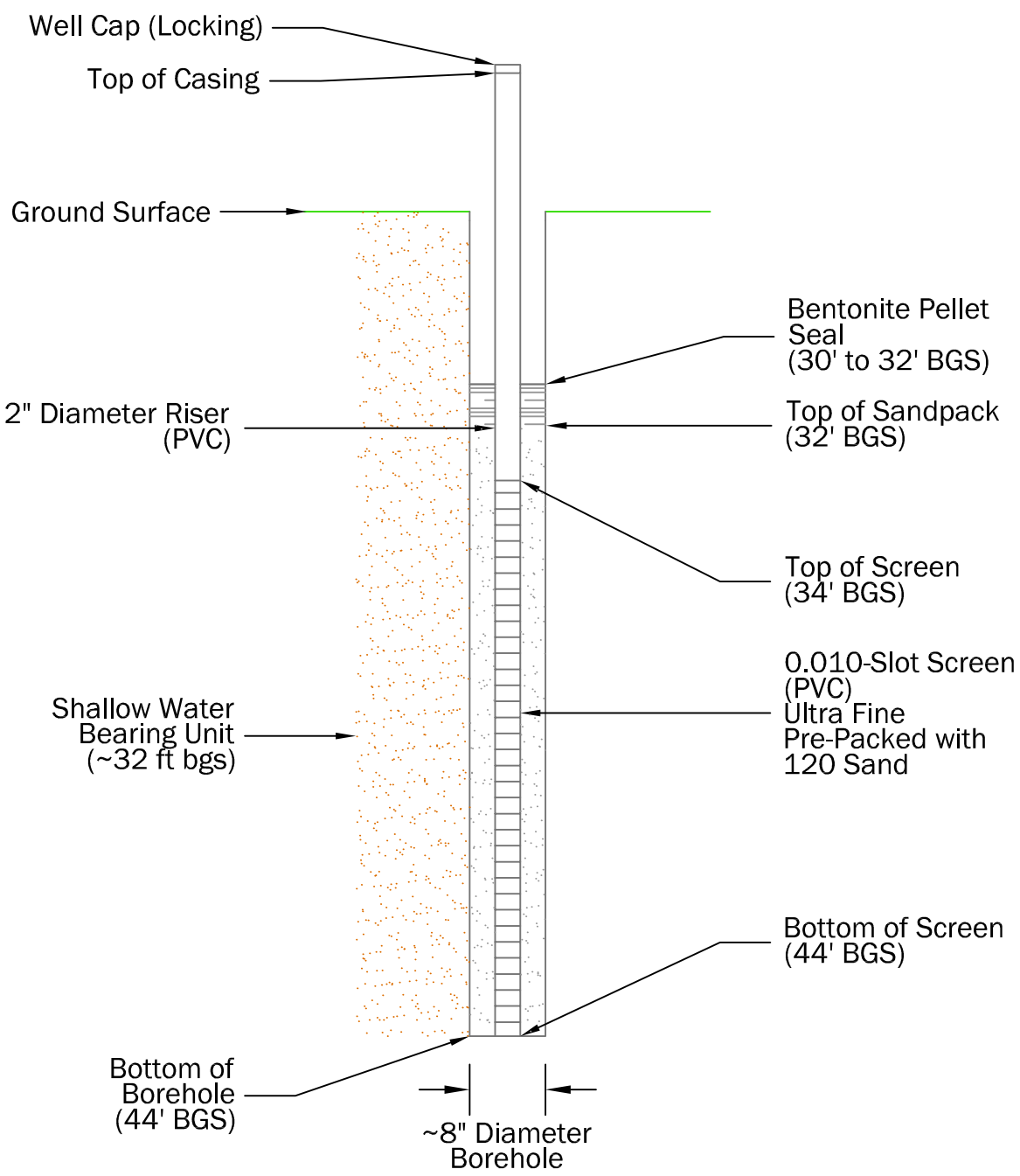
DATE:	01/08/2016
SCALE:	NA
DRAWN BY:	BAS
CHECKED BY:	SEJ
PROJECT #:	147437

Figure A1

TW-43 Well Construction Diagram

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

02/26/2010 13:04 - bsteele - P:\Arnall Golden Gregory\147437 - MacGregor Golf VRP 2015\300 - Reporting\Jan 2016 Progress Report\CAD\Figure A1 - TW-43 Well Construction Diagram.dwg



Brown AND Caldwell

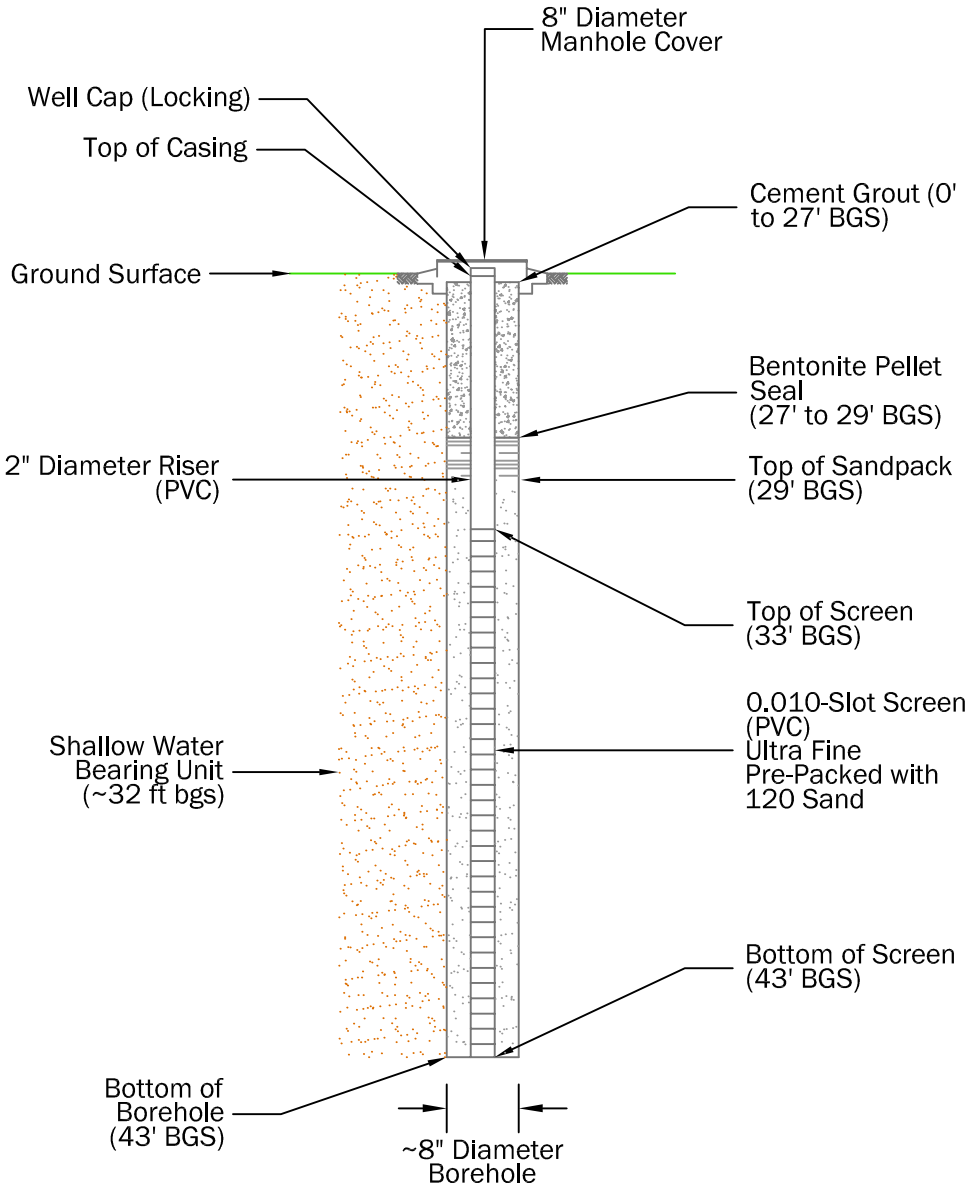
PREPARED FOR: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

DATE:	01/08/2016
SCALE:	NA
DRAWN BY:	BAS
CHECKED BY:	SEJ
PROJECT #:	147437

Figure A2

TW-44 Well Construction Diagram

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia



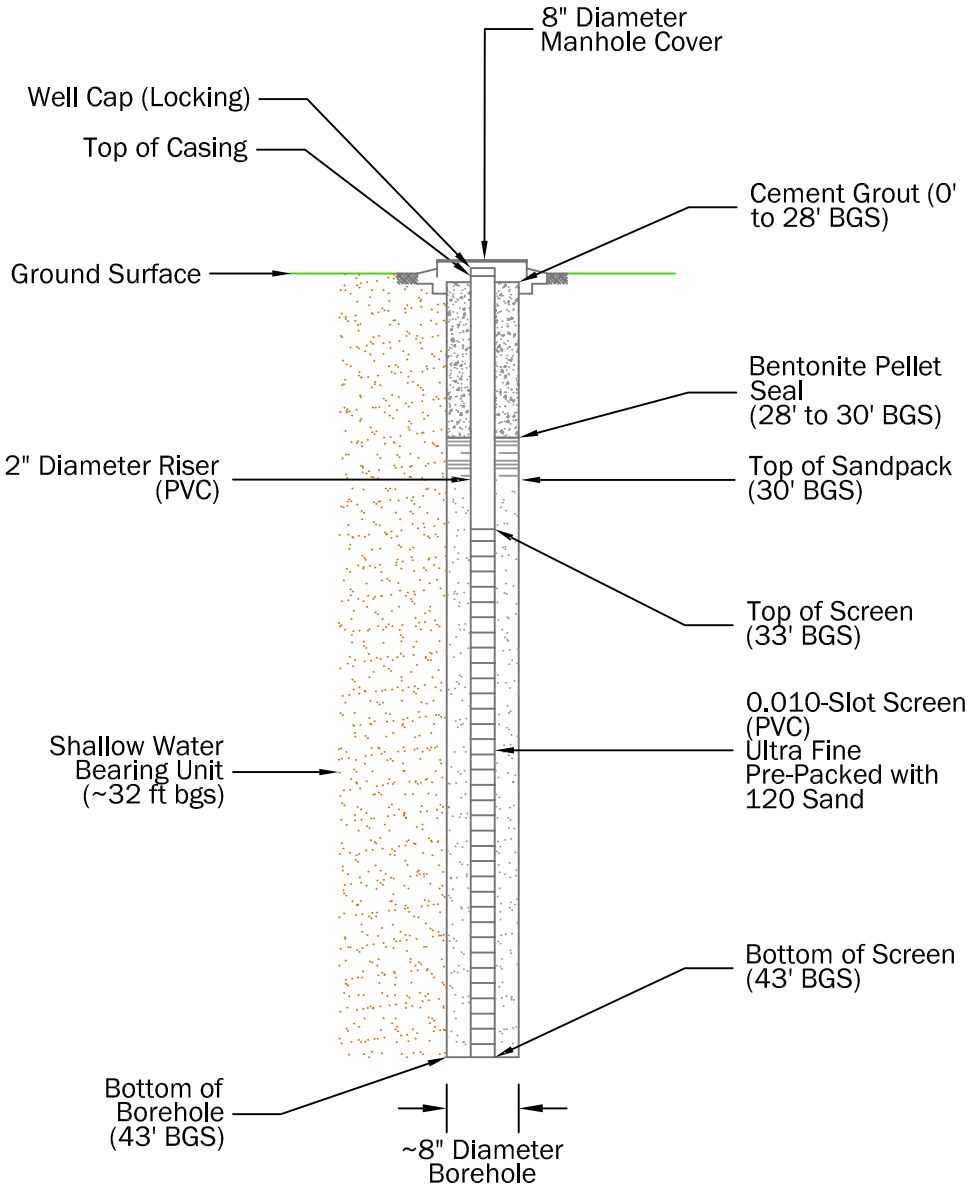
Brown AND Caldwell

PREPARED FOR:	Brunswick Corp., Albany Sport Co., & Albany Partners, LLC
DATE:	01/08/2016
SCALE:	NA
DRAWN BY:	BAS
CHECKED BY:	SEJ
PROJECT #:	147437

Figure A3

MW-27 Well Construction Diagram

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia



Brown AND Caldwell

PREPARED FOR:	Brunswick Corp., Albany Sport Co., & Albany Partners, LLC
DATE:	01/08/2016
SCALE:	NA
DRAWN BY:	BAS
CHECKED BY:	SEJ
PROJECT #:	147437

Figure A4

MW-28 Well Construction Diagram

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Appendix B: Field Data Sheets

GROUNDWATER SAMPLING FIELD DATA SHEET

Brown AND Caldwell

WELL ID: MW-4

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: _____

Project Location: Albany GA Weather: Sunny

2. WELL DATA

Date Measured: 7.27.15 Time: AM Temporary Well: ☐Yes ☑No

Casing Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Screen Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Total Depth of Well: 46.90 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Static Water: 37.13 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Product: — feet From: ☐Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Length of Water Column: 9.77 feet Well Volume: 1.63 gal. Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 7.27.15 Time: 0845

Purge Method: ☐Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☑Field-Cleaned ☐Disposable

Materials: Rope/Tubing ☑Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

Volume to Purge (minimum): _____ well volumes or _____ gallons

Was well purged dry? ☐Yes ☐No Pumping Rate: _____ gal/min

Equipment Model(s)
1. Geo pump
2. MP-50
3. YSI-556
4. Lamotte 2020

Calibrated? ☑Yes ☐No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
0850	0.10	4.11	21.26	0.306	317.8	1.20	154	37.30	
0900	0.50	5.25	20.98	0.320	252.4	0.83	125	37.50	
0910	1.00	6.17	20.89	0.418	205.6	0.59	83.3	37.60	
0920	1.75	6.48	20.93	0.476	192.7	0.51	64.8	37.70	
0930	2.00	6.58	20.95	0.513	189.9	0.45	47.2	37.70	

Purge data continued on next sheet? ☐

4. SAMPLING DATA

Method(s): ☐Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☑Field-Cleaned ☐Disposable

Materials: Tubing/Rope ☑Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐Yes ☑No

Sample ID: 15208-MW-4 Sample Date: 7-27-15 Sample Time: 1105 # of Containers: 2

Duplicate Sample Collected? ☐Yes ☑No ID: _____ # of Containers: _____

Equipment Blank Collected? ☑Yes ☐No ID: 15208-EB-2 @ 1115 # of Containers: 2

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Intake at 45.50 ft.

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-4

3. PURGE DATA (continued from page 1)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
0940	2.25	6.64	21.00	0.538	188.1	0.40	37.9	37.70	
0950	2.75	6.69	20.97	0.555	186.1	0.38	29.1	37.70	
1000	3.50	6.73	21.01	0.563	185.5	0.33	23.5	37.70	
1010	3.75	6.75	21.08	0.569	183.6	0.33	17.7	37.70	
1020	4.00	6.77	21.03	0.572	182.1	0.30	16.0	37.70	
1030	4.25	6.78	21.98	0.579	179.9	0.38	14.9	37.70	
1040	4.50	6.79	21.78	0.581	178.8	0.36	13.1	37.70	
1050	4.75	6.81	21.91	0.581	176.9	0.33	11.4	37.70	
1100	5.00	6.80	21.88	0.580	174.6	0.32	9.7	37.70	
1105	collect sample								

Purge data continued on next sheet? ☐

Signature

GROUNDWATER SAMPLING FIELD DATA SHEET

Brown AND Caldwell

WELL ID: MW-11

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: BS

Project Location: Albany, GA Weather: sunny 93-F

2. WELL DATA

Date Measured: 7.27.15 Time: AM Temporary Well: ☐Yes ☑No

Casing Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Screen Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Total Depth of Well: 48.3 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Static Water: 39.61 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Product: — feet From: ☐Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Length of Water Column: 8.69 feet Well Volume: 1.45 gal Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: _____ Time: 1358

Purge Method: ☐Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☑Field-Cleaned ☐Disposable

Materials: Rope/Tubing ☑Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

Volume to Purge (minimum): _____ well volumes or _____ gallons

Was well purged dry? ☐Yes ☐No Pumping Rate: _____ gal/min

Equipment Model(s)
1. MP-50
2. QED Bladder
3. YSI-556
4. Lamotte 2020

Calibrated? ☑Yes ☐No

Time	Cum. Gallons Removed / (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1408	0.10	6.56	31.38	0.589	178.3	7.61	27	39.5	
1418	0.50	6.82	27.09	0.581	156.4	8.64	157	40.23	
1428	0.75	6.81	26.35	0.578	151.6	8.52	128	40.60	
1438	1.25	6.82	26.59	0.577	149.8	8.31	88.3	40.78	
1448	1.5	6.84	27.93	0.584	143.8	8.47	26.7	41.1	

Purge data continued on next sheet? ☐

4. SAMPLING DATA

Method(s): ☐Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☑Field-Cleaned ☐Disposable

Materials: Tubing/Rope ☑Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐Yes ☑No

Sample ID: 15208-MW-11 Sample Date: 7.27.15 Sample Time: 1650 # of Containers: _____

Duplicate Sample Collected? ☐Yes ☑No ID: _____ # of Containers: _____

Equipment Blank Collected? ☐Yes ☑No ID: _____ # of Containers: _____

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Intake at 47.5 ft

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-11

3. PURGE DATA (continued from page 1)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1458	2.75	6.83	27.23	0.584	144.1	8.76	24.8	41.35	
1508	3.00	6.84	27.85	0.587	142.0	8.56	51.0	41.89	
1518	3.25	6.84	27.04	0.584	138.0	8.55	71.9	42.40	slowed pump.
1528	3.35	6.88	31.40	0.590	136.7	7.19	67.8	42.50	
1538	3.45	6.89	33.75	0.587	137.6	6.28	43.6	42.60	
1548	3.55	6.89	36.03	0.592	135.9	5.61	36.0	42.68	
1558	3.65	6.86	32.72	0.592	136.6	6.61	28.0	42.78	
1608	3.75	6.85	31.28	0.586	145.5	6.85	36.2	42.85	
1618	4.00	6.86	30.38	0.580	155.8	6.80	26.7	42.88	
1628	4.20	6.87	30.32	0.564	161.6	6.55	13.2	42.95	
1638	4.30	6.87	30.07	0.562	166.5	6.64	10.19	42.99	
1648	4.40	6.88	30.12	0.561	170.1	6.60	6.62	43.05	
1650	collect sample								

Purge data continued on next sheet? ☐

Signature

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GROUNDWATER SAMPLING FIELD DATA SHEET

Brown AND Caldwell

WELL ID: MW-19

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: BS

Project Location: Albany GA Weather: Sunny . 90 °F

2. WELL DATA

Date Measured: 7.27.15 Time: AM Temporary Well: ☐Yes ☑No

Casing Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Screen Diameter: 2 inches Type: ☑PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Total Depth of Well: 44.12 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Static Water: 34.65 feet From: ☑Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Product: _____ feet From: ☐Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Length of Water Column: 9.47 feet Well Volume: 1.58 gal Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 7.27.15 Time: 1210

Equipment Model(s)

Purge Method: ☐ Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

1. MP-50

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☑Prepared Off-Site ☐Field-Cleaned ☐Disposable

2. QED Bladder

Materials: Rope/Tubing ☑Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☐Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

3. YSI - 556

Volume to Purge (minimum): _____ well volumes or _____ gallons

4. Lamotte 2020

Was well purged dry? ☐Yes ☐No Pumping Rate: _____ gal/min

Calibrated? ☑Yes ☐No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1220	0.10	7.38	22.95	0.229	184.2	12.12	51	35.01	
1230	0.80	7.47	23.83	0.231	174.9	11.75	81.5	35.30	
1240	1.50	7.46	22.78	0.236	176.8	12.18	28.7	35.6	
1250	2.25	7.49	23.18	0.233	174.5	11.96	11.78	35.9	
1300	02.75	7.56	23.01	0.226	172.5	11.85	7.45	36.2	

Purge data continued on next sheet? ☑

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: _____ ☑Bladder Pump ☐2" Sub. Pump ☐4" Sub. Pump ☐Centrifugal Pump ☐Peristaltic Pump ☐Inertial Lift Pump ☐Other: _____

Materials: Pump/Bailer ☐Polyethylene ☑Stainless ☐PVC ☐Teflon® ☐Other: _____ ☐Dedicated ☑Prepared Off-Site ☑Field-Cleaned ☐Disposable

Materials: Tubing/Rope ☐Polyethylene ☐Polypropylene ☐Teflon® ☐Nylon ☐Other: _____ ☑Dedicated ☐Prepared Off-Site ☐Field-Cleaned ☑Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐Yes ☐No

Sample ID: 15206-MW-19 Sample Date: 7.27.15 Sample Time: 1325 # of Containers: 2

Duplicate Sample Collected? ☐Yes ☑No ID: _____ # of Containers: _____

Equipment Blank Collected? ☐Yes ☑No ID: _____ # of Containers: _____

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Intake at 42'

Hach results < 0.0 mg/L

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-19

3. PURGE DATA (continued from page 1)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1310	3.25	7.53	22.88	0.219	168.9	12.00	6.94	36.6	
1320	3.75	7.55	23.09	0.216	167.4	11.90	7.05	36.9	
1325	collect		sample						

Purge data continued on next sheet? ☐

Signature

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GROUNDWATER SAMPLING FIELD DATA SHEET

Brown AND Caldwell

WELL ID: MW-24

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: BS

Project Location: Albany GA Weather: Partly Cloudy ~ 80°F

2. WELL DATA

Date Measured: 7-29-15 Time: AM Temporary Well: ☐Yes ☒No

Casing Diameter: 2 inches Type: ☒PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Screen Diameter: 2 inches Type: ☒PVC ☐Stainless ☐Galv. Steel ☐Teflon® ☐Other: _____

Total Depth of Well: 58.75 feet From: ☒Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Static Water: 47.21 feet From: ☒Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Depth to Product: — feet From: ☐Top of Well Casing (TOC) ☐Top of Protective Casing ☐Other: _____

Length of Water Column: 11.54 feet Well Volume: 1.92 gal Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 7-30-15 Time: 0810 Equipment Model(s)

Purge Method: ☐ Bailer, Size: _____ ☒Bladder Pump ☐ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____ 1. QED Bladder

Materials: Pump/Bailer ☐ Polyethylene ☒Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒Field-Cleaned ☐ Disposable 2. MP-50

Materials: Rope/Tubing ☒Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☒Disposable 3. 1/51-556

Volume to Purge (minimum): 3 well volumes or 5.76 gallons 5x = 9.6 4. Lamotte 2020

Was well purged dry? ☐ Yes ☒ No Pumping Rate: _____ gal/min Calibrated? ☒Yes ☐ No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
0820	0.20	6.90	23.41	0.461	158.9	7.53	74	48.68	
0830	0.75	6.85	23.50	0.464	150.8	7.33	54	48.80	
0840	1.00	6.88	23.43	0.466	144.5	7.33	117	48.80	
0855	1.5	6.91	23.80	0.466	143.9	7.08	96.6	48.80	
0915	2.0	6.92	24.15	0.467	145.0	6.93	109.4	48.80	

Purge data continued on next sheet? ☐

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: _____ ☒Bladder Pump ☐ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☒Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒Field-Cleaned ☐ Disposable

Materials: Tubing/Rope ☒Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☒Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☒ No

Sample ID: 15211-MW-24 Sample Date: 7-30-15 Sample Time: 1605 # of Containers: 4

Duplicate Sample Collected? ☐ Yes ☒ No ID: _____ # of Containers: _____

Equipment Blank Collected? ☒ Yes ☐ No ID: 15211-EB-3 7-30-15 # of Containers: 2

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Intake at 54 ft, couldn't get turbidity < 10 NTU. Stable at ~80 NTU range, so purged for 6 hours & sampled.

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-24

3. PURGE DATA (continued from page ____)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
0930	2.5	6.93	24.30	0.466	148.1	6.78	95.5	48.80	
0945	3	6.93	24.31	0.466	152.5	6.75	101.7	48.80	
1000	3.5	6.94	24.46	0.465	156.5	6.75	84.8	48.80	
1015	4.0	6.95	25.57	0.466	156.8	6.65	89.3	48.80	
1030	4.5	6.96	26.17	0.467	157.1	6.69	83.1	48.80	
1045	5	6.96	25.90	0.468	158.6	6.85	81.5	48.80	
1100	5.5	6.95	25.67	0.464	154.2	6.95	88.7	48.80	
1115	6.0	6.95	26.05	0.467	160.3	6.57	81.5	48.80	
1130	6.5	6.95	25.82	0.468	164.3	6.72	78.5	48.80	
1145	7.0	6.96	26.04	0.469	166.4	6.72	79.6	48.80	
1200	7.5	6.96	26.30	0.469	165.2	6.65	79.4	48.80	
1215	8	6.97	26.88	0.470	162.2	7.08	81.5	48.80	
1230	8.5	6.97	27.98	0.471	156.0	6.80	78.4	48.80	
1245	9	6.97	28.18	0.471	150.9	6.68	84.9	48.80	
1300	9.5	6.97	28.60	0.471	146.8	6.32	81.5	48.80	
1315	10	6.97	28.97	0.473	142.1	6.20	82.7	48.80	
1330	10.5	6.97	29.59	0.472	138.1	5.98	87.2	48.80	
1345	11	6.97	29.44	0.475	135.1	6.07	75.1	48.80	
1400	11.5	6.97	29.02	0.474	130.7	6.20	74.3	48.80	
1415	~~1430~~ 12	6.97	29.49	0.472	136.1	5.95	81.3	48.80	
1430	~~1500~~ 12.5	6.97	29.46	0.473	133.5	6.02	83.5	48.80	
1445	13	6.97	29.32	0.473	134.1	6.18	84.3	48.80	
1500	13.5	6.98	30.76	0.475	129.9	5.87	80.3	48.80	
1515	14	6.97	30.51	0.475	128.3	5.92	79.4	48.80	
1530	~~15~~ 14.5	6.97	30.82	0.476	128.0	5.92	84.9	48.80	
1545	15	6.97	30.32	0.472	129.3	6.11	79.9	48.80	
1600	15.5	6.94	28.02	0.471	135.1	6.29	81.5	48.80	
1605	collect sample								

Purge data continued on next sheet? ☐

FORM GW-2 (Rev 11.March.10 - sej)

Signature

GROUNDWATER SAMPLING FIELD DATA SHEET

Brown AND Caldwell

WELL ID: TW-43

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: BS

Project Location: Albany, CA Weather: Sunny ~ 95°F

2. WELL DATA

Date Measured: 7.28.15 Time: AM Temporary Well: ☑ Yes ☐ No

Casing Diameter: 2 inches — Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Screen Diameter: 2 inches — Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Total Depth of Well: 46.30 feet — From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Static Water: 32.70 feet — From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Product: — feet — From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: 13.6 feet — Well Volume: 2.27 gal — Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 7.28.15 Time: 1024

Purge Method: ☐ Bailer, Size: _____ ☐ Bladder Pump ☑ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☑ Field-Cleaned ☐ Disposable

Materials: Rope/Tubing ☑ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☑ Disposable

Volume to Purge (minimum): 3 well volumes or 6.81 gallons 5 x 11.35

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min

Equipment Model(s)
1. Geo Sub
2. 451-556
3. Lamotte 2020
4. Heron dipper MP-650 QED

Calibrated? ☑ Yes ☐ No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1030	1.5	6.91	27.10	0.318	141.6	12.04	>1000	36.50	
1035	3.5	7.14	27.02	0.336	139.4	11.34	>1000	37.50	
1040	5.0	7.25	26.93	0.344	111.0	12.06	>1000	38.30	
1055	6.5	7.29	27.12	0.345	121.2	10.85	>1000	39.0	
1105	7.75	7.27	26.94	0.337	118.7	11.27	>1000	39.80	

Purge data continued on next sheet? ☐

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: _____ ☑ Bladder Pump ☐ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☑ Field-Cleaned ☐ Disposable

Materials: Tubing/Rope ☑ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☑ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☑ No

Sample ID: 15209-TW-43 Sample Date: 7.28.15 Sample Time: 1340 # of Containers: 2

Duplicate Sample Collected? ☑ Yes ☐ No ID: 15209-Dup-1 @ 1340 # of Containers: 2

Equipment Blank Collected? ☑ Yes ☐ No ID: 15209-EB-1 @ 1005 # of Containers: 2

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Well developed & purged. very turbid at start. Hach results 0.0 clear

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: TW-43

3. PURGE DATA (continued from page 1)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1115	9.0	7.27	26.83	0.337	106.9	10.90	955	40.70	
1125	10.0	7.28	26.61	0.338	95.8	10.25	>1000	41.80	
1135	11.5	well purged dry, switch to Blackhawk pump							
1145	11.6	7.15	28.08	0.355	87.8	10.50	>1000	41.75	
1155	11.8	7.23	27.87	0.365	63.9	9.76	>1000	41.80	
1205	12.5	7.28	27.11	0.388	55.3	9.83	90.7	41.9	
1215	13.0	7.28	27.33	0.390	50.7	9.93	90.2	41.9	
1225	13.5	7.28	27.48	0.392	44.7	9.78	37.9	41.9	
1235	13.75	7.28	27.62	0.393	41.7	9.91	25.4	41.95	
1245	14.00	7.27	27.42	0.393	38.7	9.91	16.6	42.0	
1305	14.20	7.26	28.34	0.393	35.8	9.86	12.0	~~42.0~~	42.0
1315	14.30	7.26	27.35	0.392	33.7	9.88	11.9	42.05	
1325	14.50	7.26	28.16	0.391	32.5	9.61	11.01	42.09	
1335	14.60	7.26	28.88	0.392	30.6	9.52	9.80	42.10	
1340	collect sample								

Purge data continued on next sheet? ☐

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: TW-4A

1. PROJECT INFORMATION

Project Number: _____ Task Number: _____ Area of Concern: _____

Client: MacGregor Personnel: BC

Project Location: Albany GA Weather: Sunny 95°F

2. WELL DATA

Date Measured: 7.28.15 Time: 1400 Temporary Well: ☑ Yes ☐ No

Casing Diameter: 2 inches Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Screen Diameter: 2 inches Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Total Depth of Well: 46.15 feet From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Static Water: 41.85 feet From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Product: — feet From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 7.28.15 Time: 1405

Equipment Model(s)

1. MP-50, QED Bladder
2. Geo Sub
3. YSI-556
4. Lamotte 2020

Purge Method: ☐ Bailer, Size: _____ ☑ Bladder Pump ☐ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☑ Field-Cleaned ☐ Disposable

Materials: Rope/Tubing ☑ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☑ Disposable

Volume to Purge (minimum): _____ well volumes or _____ gallons

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min Calibrated? ☑ Yes ☐ No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1415	0.10	7.25	30.57	0.436	117.0	9.81	787	40.9	
1425	0.25	7.28	28.90	0.434	104.5	10.27	172	40.9	
1435	0.50	7.31	29.12	0.433	108.6	9.66	104.9	40.9	
1445	0.75	7.35	29.30	0.435	107.8	9.91	48.5	40.9	
1455	1.00	7.36	29.51	0.432	97.9	9.90	27.6	40.9	

Purge data continued on next sheet? ☐

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: _____ ☑ Bladder Pump ☐ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☑ Field-Cleaned ☐ Disposable

Materials: Tubing/Rope ☑ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☑ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: 15209-TW-4A Sample Date: 7.28.15 Sample Time: 1540 # of Containers: 2

Duplicate Sample Collected? ☐ Yes ☑ No ID: _____ # of Containers: _____

Equipment Blank Collected? ☐ Yes ☐ No ID: _____ # of Containers: _____

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Pumped 9 gal with 6 oz sub to clear well up. Awaiting results.

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

Brown AND Caldwell

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: TW-4C

3. PURGE DATA (continued from page ____)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1505	1.25	7.37	29.94	0.432	96.2	9.91	17.6	40.9	
1515	1.50	7.37	29.93	0.431	97.6	10.06	14.9	40.9	
1525	1.75	7.37	29.50	0.429	98.4	10.22	10.96	40.9	
1535	2.00	7.37	29.67	0.422	95.6	10.01	9.04	40.9	
1540	collect sample								

Purge data continued on next sheet? ☐

Signature

Brown AND Caldwell

WELL DEVELOPMENT FIELD DATA SHEET

WELL ID: MW-27

1. PROJECT INFORMATION

Project Number: 147437 Task Number: _____ Area of Concern: _____

Client: MACGREGOR GOLF Personnel: GG

Project Location: ALBANY, GA Weather: SUNNY, 78°F

2. WELL DATA

Date Measured: 11/5/15 Time: 0805 Temporary Well: ☐Yes ☒No

Casing Diameter: 2 inches Type: ☒PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Screen Diameter: 2 inches Type: ☒PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Total Depth of Well: 43 feet From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Static Water: 31.02 feet From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Product: — feet From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: 11.98 feet Well Volume: 2.00 gal Screened Interval (from GS): 33 - 43'

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 11/5/15 Time: 0815

Purge Method: ☐ Bailer, Size: _____ ☐ Bladder Pump ☒ 2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☒ Polyethylene ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field-Cleaned ☐ Disposable

Materials: Rope/Tubing ☒ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☒ Disposable

Volume to Purge (minimum): — well volumes or — gallons

Was well purged dry? ☒ Yes ☐ No Pumping Rate: _____ gal/min

Equipment Model(s)

1. YSI
2. HERON DIPPER
3. MONSOON
4. _____

Calibrated? ☒Yes ☐ No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
0820	1.0	6.46	23.62	0.615	8.5	7.62	>1000	37.73	
0837	2.0	6.37	25.78	0.344	2.8	6.35	7000	40.55	
0900	2.5	6.95	27.90	0.567	8.4	3.64	71000	42.51	
0915	3.0	6.48	27.88	0.542	9.5	3.82	498	42.55	
0930	3.5	6.99	28.01	0.621	10.2	2.82	97	42.6	
0955	3.9	6.42	28.12	0.614	8.5	3.14	78	42.9	
		WELL WENT DRY, LET RECHARGE							
1545	4.2	6.78	23.83	0.573	-36.1	5.41	30.1	34.29	
1550	4.5	6.79	23.86	0.573	-38.1	5.33	9.1	34.41	
1555	4.7	6.79	23.87	0.573	-39.2	5.31	9.0	34.51	
		SWITCH TO BLADDER PUMP							
1610	4.8	6.81	23.79	0.537	-38.1	5.24	32.6	35.40	
1620	5.5	6.83	24.62	0.531	-47.1	4.52	22.1	38.0	

Purge data continued on next sheet? ☒

4. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

FORM GW-2

Brown AND Caldwell

WELL DEVELOPMENT FIELD DATA SHEET

WELL ID: MW-27

3. PURGE DATA (continued from page ____)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1630	6.75	6.83	24.61	0.530	-46.7	4.47	14.2	37.92	
1640	7.00	6.82	24.48	0.526	-41.4	4.65	9.8	38.34	
1650	7.25	6.82	24.42	0.523	-31.8	4.95	9.2	38.51	
1700	7.50	6.82	24.43	0.523	-31.7	4.97	8.9	38.72	
			SAMPLED @ 1710						

Purge data continued on next sheet? ❑

FORM GW-2 (Rev 11.March.10 - sej)

Signature

Brown AND Caldwell

WELL DEVELOPMENT FIELD DATA SHEET

WELL ID: MW-28

1. PROJECT INFORMATION

Project Number: 147437 Task Number: _____ Area of Concern: _____

Client: MACGREGOR GOLF Personnel: GG

Project Location: ALBANY, GA Weather: CLOUDY, 80°F

2. WELL DATA

Date Measured: 11/5/15 Time: 1030 Temporary Well: ☐Yes ☒No

Casing Diameter: 2 inches — Type: ☒PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Screen Diameter: 2 inches — Type: ☒PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____

Total Depth of Well: 43 feet — From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Static Water: 30.62 feet — From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Depth to Product: — feet — From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: 12.36 feet — Well Volume: 2.01 gal — Screened Interval (from GS): 33 - 43

Note: 1-in well = 0.041 gal/ft 2-in well = 0.167 gal/ft 4-in well = 0.667 gal/ft 6-in well = 1.469 gal/ft

3. PURGE DATA

Date Purged: 11/5/15 Time: 1030

Purge Method: ☐ Bailer, Size: _____ ☐ Bladder Pump ☒2" Sub. Pump ☐ 4" Sub. Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Polyethylene ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field-Cleaned ☐ Disposable

Materials: Rope/Tubing ☒ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Nylon ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field-Cleaned ☒ Disposable

Volume to Purge (minimum): — well volumes or — gallons

Was well purged dry? ☐ Yes ☒ No Pumping Rate: _____ gal/min

Equipment Model(s)

1. YSI
2. HERON DIPPER
3. MONSOON
4. _____

Calibrated? ☒Yes ☐ No

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1045	2.0	8.66	25.36	0.292	-21.7	7.69	>1000	38.23	
1050	3.0	8.33	25.94	0.317	-33.6	7.51	32	40.02	
1055	3.25	8.19	26.05	0.327	-29.7	5.64	>100	40.55	
		PUMP CLOGGED							
1130	4.0	8.17	24.66	0.004	-24.2				
		PUMP CLOGGED AGAIN							
1345	6.5	7.50	23.35	0.305	-62.0	11.48	1001	39.50	
1355	7.0	7.24	22.85	0.307	-27.2	6.83	658	39.72	
1405	7.25	7.37	23.15	0.305	-27.0	6.27	27	39.75	
1415	7.6	7.29	23.09	0.292	-22.9	8.72	24.1	39.78	
1425	8.0	7.28	23.15	0.282	-22.1	6.13	22.1	39.80	
1435	8.5	7.27	23.17	0.280	-21.6	5.76	14.2	39.80	
1445	8.8	7.25	23.09	0.279	-18.5	5.72	9.8	39.80	

Purge data continued on next sheet? ☒

4. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

FORM GW-2

Brown AND Caldwell

WELL DEVELOPMENT FIELD DATA SHEET

WELL ID: MW-28

3. PURGE DATA (continued from page ____)

Time	Cum. Gallons Removed (gal)	pH ±0.1 su	Temp ±2°C	Spec. Cond. > of ±3% or ±10 µS/cm	ORP > of ±10% or ±20 mV	DO > of ±10% or ±0.2 mg/L	Turbidity ≤ 10 NTU	Water Level	Comments
1450	9.0	7.25	23.02	0.279	-18.7	5.73	9.2	39.80	
1455	9.25	7.26	23.01	0.278	-18.6	5.73	8.7	39.80	
		SAMPLED @ 1500							

Purge data continued on next sheet? ☐

FORM GW-2 (Rev 11.March.10 - sej)

Signature

Appendix C: Laboratory Analytical Reports

Brown AND Caldwell : LABORATORY DATA VERIFICATION FORM

1. PROJECT INFORMATION

Today's Date: 8/10/15

Project Number: 147437.100 Project Name/Client: MacGregor Golf 2015 VRP Services

Project Manager: S. Jones Sampled By: B. Steele

Laboratory: AES Order No.: 1507M95

2. SAMPLE INFORMATION

Purpose of sampling: Cr delineation and annual monitoring

Total number of samples: 5

☐ Groundwater: 3 ☐ Soil: _____ ☐ Soil Gas: _____ ☐ Trip Blank: 1

☐ Surface water: _____ ☐ Sediment: _____ ☐ Other: _____ ☐ Field Blank: _____

☐ Drinking water: _____ ☐ Air: _____ ☐ Other: _____ ☐ Equip Blank: 1

Analyses requested: Total chromium, total hexavalent chromium, VOCs

Method detection limits (MDLs) or reporting limits (RLs) requested: NA

Duplicates: None

3. DATA VERIFICATION

Check yes or no. Refer to applicable Data Verification Guidelines to determine appropriate action.

☑ Yes ☐ No ☐ NA **Was the Chain of Custody intact?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were custody seals intact on samples bottles and/or coolers as necessary?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were cooler temperatures within the acceptable range of 0-6°C?**

If no: Notes: 3.2

☑ Yes ☐ No ☐ NA **Were samples physically and chemically preserved properly (i.e. no bubbles in VOC vials)**

If no: Notes: _____

☐ Yes ☑ No ☐ NA **Was the case narrative of the analytical report free of any quality issues, discrepancies, etc.?**

If no: Notes: Refer to Comment 1

☑ Yes ☐ No ☐ NA **Were all samples labeled, analyzed, and reported correctly? (no samples held, no wrong analyses, etc.)**

If no: If within holding time, call lab immediately. Notes: _____

☑ Yes ☐ No ☐ NA **Were all samples analyzed within holding time?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were appropriate analytes reported?**

If no: Notes: _____

☐ Yes ☐ No ☑ NA **Were soil and/or sediment concentrations reported appropriately? (DW vs WW)**

If no: Call lab immediately to verify. Notes: No soil samples submitted

☑ Yes ☐ No ☐ NA **If analyzed for the following parameters, was the following true for all analytes?**

- ☐ Yes ☐ No ☐ NA Total metals ≥ Dissolved metals
- ☐ Yes ☐ No ☐ NA TKN > Organic nitrogen
- ☐ Yes ☐ No ☐ NA TKN > Ammonia (NH_3)
- ☐ Yes ☐ No ☐ NA COD > TOC
- ☐ Yes ☐ No ☐ NA COD > BOD

If no: Report to project manager and contact lab's QA/QC manager if needed. Notes: Refer to Comment 1

☑ Yes ☐ No ☐ NA **Were method detection limits (MDL), reporting limits (RLs), and/or dilution factors appropriate?**

If no: Report to project manager and contact lab if needed. Notes: _____

☑ Yes ☐ No ☐ NA **Were surrogate % recoveries within the acceptable range of LCL ≤ x ≤ UCL?**

If no: Notes: _____

☐ Yes ☑ No ☐ NA **Were target analytes detected in any field, equipment, and/or laboratory blanks?**

If yes: Notes: _____

Brown AND Caldwell : **LABORATORY DATA VERIFICATION FORM**

☐ **Yes** ☐ **No** ☑ **NA** **Were any target analytes detected below practical quantitation limits (PQLs)?**

If yes: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA** **Were any sample duplicates collected?**

If yes: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA** **Were any laboratory duplicates reported for project samples?**

If yes: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA** **Were any matrix spikes reported for project samples?**

If yes: Notes: No issues to report

☑ **Yes** ☐ **No** ☐ **NA** **Were any laboratory control samples reported?**

If yes: Notes: No issues to report

☐ **Yes** ☑ **No** ☐ **NA** **Were calibration standards reported?**

If yes: Notes: _____

4. COMMENTS & SUMMARY OF ACTIONS TAKEN (Attach additional pages if necessary)

Comment 1: As stated in the case narrative, hexavalent chromium is reported at a value higher than the total chromium value for samples MW-11 and MW-19. The values are within the expected reproducibility limits for the test methods and the results are suspected to be due to the differences between the sample aliquots used for analysis. The results indicate that all chromium present in these samples is in hexavalent form. No further action required.

Sarah E Jones

Signature of Data Verifier

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

August 04, 2015

Sarah Jones
BROWN AND CALDWELL
990 Hammond Drive
Atlanta GA 30328

TEL: (770) 394-2997
FAX: (770) 396-9495

RE: MacGregor

Dear Sarah Jones: Order No: 1507M95

Analytical Environmental Services, Inc. received 5 samples on 7/28/2015 10:40:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.
AES' certifications are as follows:
-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/15-06/30/16.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 09/01/15.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Ioana Pacurar

Ioana Pacurar
Project Manager

ANALYTICAL ENVIRONMENTAL SERVICES, INC
3080 Presidential Drive, Atlanta GA 30340-3704
AES TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 1507M95

Date: 7-27-15 Page 1 of 1

COMPANY:	ADDRESS:
Brown and Caldwell	990 Hammond Dr Ste 400 Atlanta, GA 30328
PHONE:	FAX:
SAMPLED BY: Brian Steele	SIGNATURE:

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	Total Chromium 6010B	Total Hexavalent Chromium 7196	VOC 8260B	REMARKS	No # of Containers
1	15208-MW-4	7.27.15	1105	X		GW			X		2
2	15208-EB-2	↓	1115			DW			X		2
3	Trip Blank	—	—			DW			X		2
4	15208-MW-19	7.27.15	1325			GW	X	X			2
5	15208-MW-11	↓	1650	↓		GW	X	X			2
6											
7											
8											
9											
10											
11											
12											
13											
14											

ANALYSIS REQUESTED

PRESERVATION (See codes)

Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
1:	7.27.15 / 1730	Katie Folsom	7/28/15 10:40
2:		2:	
3:		3:	

PROJECT INFORMATION

PROJECT NAME: MacGregor
PROJECT #:
SITE ADDRESS: Albany, GA
SEND REPORT TO: SJones@brwncald.com
INVOICE TO: (IF DIFFERENT FROM ABOVE)
QUOTE #: PO#:

RECEIPT

Total # of Containers: 10

~~Turnaround Time Request~~
(✓) Standard 5 Business Days
( ) 2 Business Day Rush
( ) Next Business Day Rush
( ) Same Day Rush (auth req.)
( ) Other

STATE PROGRAM (if any):
E-mail? (Y) / N; Fax? Y / (N)
DATA PACKAGE: I (II) III IV

SPECIAL INSTRUCTIONS/COMMENTS: Short hold time

SHIPMENT METHOD
OUT / / VIA:
IN / / VIA:
CLIENT (FedEx) UPS MAIL COURIER
GREYHOUND OTHER

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES.
SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water
PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Client: BROWN AND CALDWELL
Project: MacGregor
Lab ID: 1507M95

Case Narrative

Hexavalent Chromium vs. Total Chromium:

Please note the Hexavalent Chromium value is reported as greater than the Total Chromium value for samples 1507M95-004B & 1507M95-005B. The values are within the expected reproducibility limits for the test methods used and the results are suspected to be due to differences between the sample aliquots used for analysis. The data indicates that all Chromium present is in the Hexavalent oxidation state.

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-MW-4
Project Name:	MacGregor	**Collection Date:**	7/27/2015 11:05:00 AM
Lab ID:	1507M95-001	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
1,1,1-Trichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,1,2,2-Tetrachloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,1,2-Trichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,1-Dichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,1-Dichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2,4-Trichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2-Dibromo-3-chloropropane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2-Dibromoethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2-Dichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,2-Dichloropropane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,3-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
1,4-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
2-Butanone	BRL	50		ug/L	210865	1	08/04/2015 02:47	TH
2-Hexanone	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
4-Methyl-2-pentanone	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
Acetone	BRL	50		ug/L	210865	1	08/04/2015 02:47	TH
Benzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Bromodichloromethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Bromoform	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Bromomethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Carbon disulfide	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Carbon tetrachloride	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Chlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Chloroethane	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
Chloroform	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Chloromethane	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
cis-1,2-Dichloroethene	410	50		ug/L	210865	10	08/04/2015 03:11	TH
cis-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Cyclohexane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Dibromochloromethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Dichlorodifluoromethane	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
Ethylbenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Freon-113	BRL	10		ug/L	210865	1	08/04/2015 02:47	TH
Isopropylbenzene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
m,p-Xylene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Methyl acetate	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Methyl tert-butyl ether	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Methylcyclohexane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Methylene chloride	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
o-Xylene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-MW-4
Project Name:	MacGregor	**Collection Date:**	7/27/2015 11:05:00 AM
Lab ID:	1507M95-001	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
Styrene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Tetrachloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Toluene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
trans-1,2-Dichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
trans-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Trichloroethene	110	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Trichlorofluoromethane	BRL	5.0		ug/L	210865	1	08/04/2015 02:47	TH
Vinyl chloride	9.3	2.0		ug/L	210865	1	08/04/2015 02:47	TH
Surr: 4-Bromofluorobenzene	93.2	70.6-123		%REC	210865	1	08/04/2015 02:47	TH
Surr: 4-Bromofluorobenzene	95.9	70.6-123		%REC	210865	10	08/04/2015 03:11	TH
Surr: Dibromofluoromethane	118	78.7-124		%REC	210865	1	08/04/2015 02:47	TH
Surr: Dibromofluoromethane	121	78.7-124		%REC	210865	10	08/04/2015 03:11	TH
Surr: Toluene-d8	99.5	81.3-120		%REC	210865	1	08/04/2015 02:47	TH
Surr: Toluene-d8	101	81.3-120		%REC	210865	10	08/04/2015 03:11	TH

Qualifiers:

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- BRL Below reporting limit
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- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-EB-2
Project Name:	MacGregor	**Collection Date:**	7/27/2015 11:15:00 AM
Lab ID:	1507M95-002	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
1,1,1-Trichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,1,2,2-Tetrachloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,1,2-Trichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,1-Dichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,1-Dichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2,4-Trichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2-Dibromo-3-chloropropane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2-Dibromoethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2-Dichloroethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,2-Dichloropropane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,3-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
1,4-Dichlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
2-Butanone	BRL	50		ug/L	210865	1	08/04/2015 04:22	TH
2-Hexanone	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
4-Methyl-2-pentanone	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
Acetone	BRL	50		ug/L	210865	1	08/04/2015 04:22	TH
Benzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Bromodichloromethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Bromoform	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Bromomethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Carbon disulfide	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Carbon tetrachloride	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Chlorobenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Chloroethane	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
Chloroform	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Chloromethane	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
cis-1,2-Dichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
cis-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Cyclohexane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Dibromochloromethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Dichlorodifluoromethane	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
Ethylbenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Freon-113	BRL	10		ug/L	210865	1	08/04/2015 04:22	TH
Isopropylbenzene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
m,p-Xylene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Methyl acetate	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Methyl tert-butyl ether	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Methylcyclohexane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Methylene chloride	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
o-Xylene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-EB-2
Project Name:	MacGregor	**Collection Date:**	7/27/2015 11:15:00 AM
Lab ID:	1507M95-002	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
Styrene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Tetrachloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Toluene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
trans-1,2-Dichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
trans-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Trichloroethene	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Trichlorofluoromethane	BRL	5.0		ug/L	210865	1	08/04/2015 04:22	TH
Vinyl chloride	BRL	2.0		ug/L	210865	1	08/04/2015 04:22	TH
Surr: 4-Bromofluorobenzene	94.4	70.6-123		%REC	210865	1	08/04/2015 04:22	TH
Surr: Dibromofluoromethane	114	78.7-124		%REC	210865	1	08/04/2015 04:22	TH
Surr: Toluene-d8	101	81.3-120		%REC	210865	1	08/04/2015 04:22	TH

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	TRIP BLANK
Project Name:	MacGregor	**Collection Date:**	7/27/2015
Lab ID:	1507M95-003	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
1,1,1-Trichloroethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,1,2,2-Tetrachloroethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,1,2-Trichloroethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,1-Dichloroethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,1-Dichloroethene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2,4-Trichlorobenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2-Dibromo-3-chloropropane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2-Dibromoethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2-Dichlorobenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2-Dichloroethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,2-Dichloropropane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,3-Dichlorobenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
1,4-Dichlorobenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
2-Butanone	BRL	50		ug/L	210865	1	07/30/2015 23:24	CH
2-Hexanone	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
4-Methyl-2-pentanone	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
Acetone	BRL	50		ug/L	210865	1	07/30/2015 23:24	CH
Benzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Bromodichloromethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Bromoform	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Bromomethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Carbon disulfide	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Carbon tetrachloride	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Chlorobenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Chloroethane	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
Chloroform	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Chloromethane	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
cis-1,2-Dichloroethene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
cis-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Cyclohexane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Dibromochloromethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Dichlorodifluoromethane	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
Ethylbenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Freon-113	BRL	10		ug/L	210865	1	07/30/2015 23:24	CH
Isopropylbenzene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
m,p-Xylene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Methyl acetate	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Methyl tert-butyl ether	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Methylcyclohexane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Methylene chloride	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
o-Xylene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	TRIP BLANK
Project Name:	MacGregor	**Collection Date:**	7/27/2015
Lab ID:	1507M95-003	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
TCL VOLATILE ORGANICS SW8260B				**(SW5030B)**				
Styrene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Tetrachloroethene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Toluene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
trans-1,2-Dichloroethene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
trans-1,3-Dichloropropene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Trichloroethene	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Trichlorofluoromethane	BRL	5.0		ug/L	210865	1	07/30/2015 23:24	CH
Vinyl chloride	BRL	2.0		ug/L	210865	1	07/30/2015 23:24	CH
Surr: 4-Bromofluorobenzene	99.1	70.6-123		%REC	210865	1	07/30/2015 23:24	CH
Surr: Dibromofluoromethane	85.1	78.7-124		%REC	210865	1	07/30/2015 23:24	CH
Surr: Toluene-d8	95.3	81.3-120		%REC	210865	1	07/30/2015 23:24	CH

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value
- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- NC Not confirmed
- < Less than Result value
- J Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-MW-19
Project Name:	MacGregor	**Collection Date:**	7/27/2015 1:25:00 PM
Lab ID:	1507M95-004	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/28/2015 12:30	OM
Chromium, Hexavalent	0.0301	0.0100		mg/L	R296827	1	07/28/2015 12:30	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0236	0.0100		mg/L	210676	1	07/30/2015 14:37	TA

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 4-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15208-MW-11
Project Name:	MacGregor	**Collection Date:**	7/27/2015 4:50:00 PM
Lab ID:	1507M95-005	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/28/2015 12:30	OM
Chromium, Hexavalent	0.0895	0.0100		mg/L	R296827	1	07/28/2015 12:30	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0864	0.0100		mg/L	210676	1	07/30/2015 14:40	TA

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc.

Sample/Cooler Receipt Checklist

Client Brown & Caldwell Work Order Number 1507M95

Checklist completed by Jas B 7/28/15
Signature Date

Carrier name: FedEx ✓ UPS __ Courier __ Client __ US Mail __ Other _____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes ✓ No __ Not Present __

Custody seals intact on sample bottles? Yes ✓ No __ Not Present __

Container/Temp Blank temperature in compliance? (0°≤6°C)* Yes ✓ No __

Cooler #1 3.2 Cooler #2 _____ Cooler #3 _____ Cooler #4 _____ Cooler#5 _____ Cooler #6 _____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted __ Yes ✓ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? _____ Checked by JB

Sample Condition: Good ✓ Other(Explain) _____

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

See Case Narrative for resolution of the Non-Conformance.

* Samples do not have to comply with the given range for certain parameters.

Analytical Environmental Services, Inc

Date: 4-Aug-15

Client: BROWN AND CALDWELL
Project Name: MacGregor
Lab Order: 1507M95

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1507M95-001A	15208-MW-4	7/27/2015 11:05:00AM	Groundwater	TCL VOLATILE ORGANICS		7/30/2015 8:58:00 PM	08/04/2015
1507M95-002A	15208-EB-2	7/27/2015 11:15:00AM	Drinking Water	TCL VOLATILE ORGANICS		7/30/2015 8:58:00 PM	08/04/2015
1507M95-003A	TRIP BLANK	7/27/2015 12:00:00AM	Drinking Water	TCL VOLATILE ORGANICS		7/30/2015 8:58:00 PM	07/30/2015
1507M95-004A	15208-MW-19	7/27/2015 1:25:00PM	Groundwater	TOTAL METALS BY ICP		7/29/2015 1:00:00 PM	07/30/2015
1507M95-004B	15208-MW-19	7/27/2015 1:25:00PM	Groundwater	Hexavalent Chromium			07/28/2015
1507M95-005A	15208-MW-11	7/27/2015 4:50:00PM	Groundwater	TOTAL METALS BY ICP		7/29/2015 1:00:00 PM	07/30/2015
1507M95-005B	15208-MW-11	7/27/2015 4:50:00PM	Groundwater	Hexavalent Chromium			07/28/2015

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: 210676

Sample ID: **MB-210676**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **297044**
SampleType: **MBLK**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210676**	Analysis Date: **07/30/2015**	Seq No: **6338530**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-210676**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **297044**
SampleType: **LCS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210676**	Analysis Date: **07/30/2015**	Seq No: **6338531**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.004	0.0100	1.000		100	80	120				

Sample ID: **1507N45-001BMS**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **297044**
SampleType: **MS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210676**	Analysis Date: **07/30/2015**	Seq No: **6338533**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9628	0.0100	1.000	0.0004300	96.2	75	125				

Sample ID: **1507N45-001BMSD**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **297044**
SampleType: **MSD**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210676**	Analysis Date: **07/30/2015**	Seq No: **6338534**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9777	0.0100	1.000	0.0004300	97.7	75	125	0.9628	1.54	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: 210865

Sample ID: **MB-210865** Client ID: Units: **ug/L** Prep Date: **07/30/2015** Run No: **297022**
SampleType: **MBLK** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **07/30/2015** Seq No: **6337669**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	BRL	5.0									
1,1,2,2-Tetrachloroethane	BRL	5.0									
1,1,2-Trichloroethane	BRL	5.0									
1,1-Dichloroethane	BRL	5.0									
1,1-Dichloroethene	BRL	5.0									
1,2,4-Trichlorobenzene	BRL	5.0									
1,2-Dibromo-3-chloropropane	BRL	5.0									
1,2-Dibromoethane	BRL	5.0									
1,2-Dichlorobenzene	BRL	5.0									
1,2-Dichloroethane	BRL	5.0									
1,2-Dichloropropane	BRL	5.0									
1,3-Dichlorobenzene	BRL	5.0									
1,4-Dichlorobenzene	BRL	5.0									
2-Butanone	BRL	50									
2-Hexanone	BRL	10									
4-Methyl-2-pentanone	BRL	10									
Acetone	BRL	50									
Benzene	BRL	5.0									
Bromodichloromethane	BRL	5.0									
Bromoform	BRL	5.0									
Bromomethane	BRL	5.0									
Carbon disulfide	BRL	5.0									
Carbon tetrachloride	BRL	5.0									
Chlorobenzene	BRL	5.0									
Chloroethane	BRL	10									
Chloroform	BRL	5.0									
Chloromethane	BRL	10									

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: 210865

Sample ID: **MB-210865** Client ID: Units: **ug/L** Prep Date: **07/30/2015** Run No: **297022**
SampleType: **MBLK** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **07/30/2015** Seq No: **6337669**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	BRL	5.0									
cis-1,3-Dichloropropene	BRL	5.0									
Cyclohexane	BRL	5.0									
Dibromochloromethane	BRL	5.0									
Dichlorodifluoromethane	BRL	10									
Ethylbenzene	BRL	5.0									
Freon-113	BRL	10									
Isopropylbenzene	BRL	5.0									
m,p-Xylene	BRL	5.0									
Methyl acetate	BRL	5.0									
Methyl tert-butyl ether	BRL	5.0									
Methylcyclohexane	BRL	5.0									
Methylene chloride	BRL	5.0									
o-Xylene	BRL	5.0									
Styrene	BRL	5.0									
Tetrachloroethene	BRL	5.0									
Toluene	BRL	5.0									
trans-1,2-Dichloroethene	BRL	5.0									
trans-1,3-Dichloropropene	BRL	5.0									
Trichloroethene	BRL	5.0									
Trichlorofluoromethane	BRL	5.0									
Vinyl chloride	BRL	2.0									
Surr: 4-Bromofluorobenzene	50.70	0	50.00		101	70.6	123				
Surr: Dibromofluoromethane	41.73	0	50.00		83.5	78.7	124				
Surr: Toluene-d8	46.55	0	50.00		93.1	81.3	120				

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: 210865

Sample ID: **LCS-210865** Client ID: Units: **ug/L** Prep Date: **07/30/2015** Run No: **297022**
SampleType: **LCS** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **07/30/2015** Seq No: **6337668**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
1,1-Dichloroethene	43.65	5.0	50.00		87.3	64.2	137				
Benzene	47.86	5.0	50.00		95.7	72.8	128				
Chlorobenzene	47.89	5.0	50.00		95.8	72.3	126				
Toluene	48.14	5.0	50.00		96.3	74.9	127				
Trichloroethene	44.74	5.0	50.00		89.5	70.5	134				
Surr: 4-Bromofluorobenzene	48.52	0	50.00		97.0	70.6	123				
Surr: Dibromofluoromethane	40.46	0	50.00		80.9	78.7	124				
Surr: Toluene-d8	45.71	0	50.00		91.4	81.3	120				

Sample ID: **1507M95-001AMS** Client ID: **15208-MW-4** Units: **ug/L** Prep Date: **07/30/2015** Run No: **297184**
SampleType: **MS** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **08/04/2015** Seq No: **6340808**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
1,1-Dichloroethene	618.3	50	500.0		124	60.5	156				
Benzene	491.4	50	500.0		98.3	70	135				
Chlorobenzene	545.5	50	500.0		109	70.5	132				
Toluene	516.7	50	500.0		103	70.5	137				
Trichloroethene	642.0	50	500.0	108.0	107	71.8	139				
Surr: 4-Bromofluorobenzene	501.6	0	500.0		100	70.6	123				
Surr: Dibromofluoromethane	571.1	0	500.0		114	78.7	124				
Surr: Toluene-d8	490.9	0	500.0		98.2	81.3	120				

Sample ID: **1507M95-001AMSD** Client ID: **15208-MW-4** Units: **ug/L** Prep Date: **07/30/2015** Run No: **297184**
SampleType: **MSD** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **08/04/2015** Seq No: **6340809**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
1,1-Dichloroethene	587.4	50	500.0		117	60.5	156	618.3	5.13	20	
Benzene	475.8	50	500.0		95.2	70	135	491.4	3.23	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: 210865

Sample ID: **1507M95-001AMSD** Client ID: **15208-MW-4** Units: **ug/L** Prep Date: **07/30/2015** Run No: **297184**
SampleType: **MSD** TestCode: **TCL VOLATILE ORGANICS SW8260B** BatchID: **210865** Analysis Date: **08/04/2015** Seq No: **6340809**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chlorobenzene	547.9	50	500.0		110	70.5	132	545.5	0.439	20	
Toluene	516.3	50	500.0		103	70.5	137	516.7	0.077	20	
Trichloroethene	611.0	50	500.0	108.0	101	71.8	139	642.0	4.95	20	
Surr: 4-Bromofluorobenzene	470.7	0	500.0		94.1	70.6	123	501.6	0	0	
Surr: Dibromofluoromethane	558.2	0	500.0		112	78.7	124	571.1	0	0	
Surr: Toluene-d8	493.6	0	500.0		98.7	81.3	120	490.9	0	0	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507M95

ANALYTICAL QC SUMMARY REPORT

BatchID: R296827

Sample ID: **MB-R296827**	Client ID:			Units: **mg/L**	Prep Date:		Run No: **296827**
SampleType: **MBLK**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R296827**	Analysis Date: **07/28/2015**		Seq No: **6332846**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R296827**	Client ID:			Units: **mg/L**	Prep Date:		Run No: **296827**
SampleType: **LCS**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R296827**	Analysis Date: **07/28/2015**		Seq No: **6332847**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5369	0.0100	0.5000		107	90	110				

Sample ID: **1507M95-004BMS**	Client ID: **15208-MW-19**			Units: **mg/L**	Prep Date:		Run No: **296827**
SampleType: **MS**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R296827**	Analysis Date: **07/28/2015**		Seq No: **6332854**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5515	0.0100	0.5000	0.03010	104	85	115				

Sample ID: **1507M95-004BMSD**	Client ID: **15208-MW-19**			Units: **mg/L**	Prep Date:		Run No: **296827**
SampleType: **MSD**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R296827**	Analysis Date: **07/28/2015**		Seq No: **6332856**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5521	0.0100	0.5000	0.03010	104	85	115	0.5515	0.109	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Brown AND Caldwell : LABORATORY DATA VERIFICATION FORM

1. PROJECT INFORMATION

Today's Date: 8/10/15

Project Number: 147437.100 Project Name/Client: MacGregor Golf 2015 VRP Services

Project Manager: S. Jones Sampled By: B. Steele

Laboratory: AES Order No.: 1507N55

2. SAMPLE INFORMATION

Purpose of sampling: Cr delineation and annual monitoring

Total number of samples: 4

☐ Groundwater: 3 ☐ Soil: _____ ☐ Soil Gas: _____ ☐ Trip Blank: _____

☐ Surface water: _____ ☐ Sediment: _____ ☐ Other: _____ ☐ Field Blank: _____

☐ Drinking water: _____ ☐ Air: _____ ☐ Other: _____ ☐ Equip Blank: 1

Analyses requested: Total chromium, total hexavalent chromium

Method detection limits (MDLs) or reporting limits (RLs) requested: NA

Duplicates: 15209-DUP-1 is a field duplicate of 15209-TW-43.

3. DATA VERIFICATION

Check yes or no. Refer to applicable Data Verification Guidelines to determine appropriate action.

☑ Yes ☐ No ☐ NA **Was the Chain of Custody intact?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were custody seals intact on samples bottles and/or coolers as necessary?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were cooler temperatures within the acceptable range of 0-6°C?**

If no: Notes: 3.7

☑ Yes ☐ No ☐ NA **Were samples physically and chemically preserved properly (i.e. no bubbles in VOC vials)**

If no: Notes: _____

☐ Yes ☑ No ☐ NA **Was the case narrative of the analytical report free of any quality issues, discrepancies, etc.?**

If no: Notes: Refer to Comment 1

☐ Yes ☑ No ☐ NA **Were all samples labeled, analyzed, and reported correctly? (no samples held, no wrong analyses, etc.)**

If no: If within holding time, call lab immediately. Notes: Refer to Comment 2

☑ Yes ☐ No ☐ NA **Were all samples analyzed within holding time?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were appropriate analytes reported?**

If no: Notes: _____

☐ Yes ☐ No ☑ NA **Were soil and/or sediment concentrations reported appropriately? (DW vs WW)**

If no: Call lab immediately to verify. Notes: No soil samples submitted

☑ Yes ☐ No ☐ NA **If analyzed for the following parameters, was the following true for all analytes?**

- ☐ Yes ☐ No ☐ NA Total metals ≥ Dissolved metals
- ☐ Yes ☐ No ☐ NA TKN > Organic nitrogen
- ☐ Yes ☐ No ☐ NA TKN > Ammonia (NH_3)
- ☐ Yes ☐ No ☐ NA COD > TOC
- ☐ Yes ☐ No ☐ NA COD > BOD

If no: Report to project manager and contact lab's QA/QC manager if needed. Notes: Refer to Comment 1

☑ Yes ☐ No ☐ NA **Were method detection limits (MDL), reporting limits (RLs), and/or dilution factors appropriate?**

If no: Report to project manager and contact lab if needed. Notes: _____

☐ Yes ☐ No ☑ NA **Were surrogate % recoveries within the acceptable range of LCL ≤ x ≤ UCL?**

If no: Notes: _____

☐ Yes ☑ No ☐ NA **Were target analytes detected in any field, equipment, and/or laboratory blanks?**

If yes: Notes: _____

Brown AND Caldwell : **LABORATORY DATA VERIFICATION FORM**

☐ Yes ☐ No ☑ NA **Were any target analytes detected below practical quantitation limits (PQLs)?**

If yes: Notes: _____

☑ Yes ☐ No ☐ NA **Were any sample duplicates collected?**

If yes: Notes: Refer to Comment 3

☐ Yes ☑ No ☐ NA **Were any laboratory duplicates reported for project samples?**

If yes: Notes: _____

☑ Yes ☐ No ☐ NA **Were any matrix spikes reported for project samples?**

If yes: Notes: No issues to report

☑ Yes ☐ No ☐ NA **Were any laboratory control samples reported?**

If yes: Notes: No issues to report

☐ Yes ☑ No ☐ NA **Were calibration standards reported?**

If yes: Notes: _____

4. COMMENTS & SUMMARY OF ACTIONS TAKEN (Attach additional pages if necessary)

Comment 1: As stated in the case narrative, hexavalent chromium is reported at a value higher than the total chromium value for samples MW-11 and MW-19. The values are within the expected reproducibility limits for the test methods and the results are suspected to be due to the differences between the sample aliquots used for analysis. The results indicate that all chromium present in these samples is in hexavalent form. No further action required.

Comment 2: The sample collection times for 15209-EB-1, 15209-DUP-1, and 15209-TW-44 do not match those provided on the COC. Action required: Contact the lab and have these collection times corrected.

Comment 3: Sample 15209-DUP-1 is a field duplicate of 15209-TW-43. Refer to the attached sheet for a detailed duplicate comparison and RPD calculation. All RPDs are within acceptable control limits. No further actions required.

1/19/2016 UPDATE - A revised report with corrected sample collection times has been received and is included herein. No further action required.

Sarah E Jones

Signature of Data Verifier

LABORATORY DATA VERIFICATION

Sample Duplicate Comparison

PROJECT INFORMATION

Project Number: 147437 **Project Name:** MacGregor Golf VRP Services **Task/Purpose of Sampling:** Delineation and Annual Monitoring
Project Manager: S. Jones **Client:** MacGregor Golf
Laboratory: AES **Data Report:** 1507N55

DUPLICATE INFORMATION

Parent Sample ID: 15209-TW-43 **Date/Time:** **Matrix:** Groundwater
Duplicate Sample ID: 15209-DUP-1 **Date/Time:** **Matrix:** Groundwater

Analytes (Units)	Analytical Results[a]		Relative Percent Difference (RPD) Comparison		Reporting Limit (RL) Comparison (If Needed)					Actions Required
	15209-TW-43	15209-DUP-1	RPD	Inorg: RPD > 20%? Org: RPD > 30%?	15209-TW-43		15209-DUP-1		Either Sample Conc. ≥ 2X RLs?	
					RL	2x RL	RL	2x RL		
Chromium, total (mg/L)	0.0197	0.019	4%	NO						No further action required.
Chromium, hexavalent	0.0129	0.0148	14%	NO						No further action required.

[a] Results in red text and italics were below reporting limits. Values are reporting limits for comparison purposes only.

Relative Percent Difference (RPD) is a quantitative indicator of quality assurance and quality control (QA/QC) for repeated measurements (i.e. duplicates) where the outcome is expected to be the same. It is calculated using the following equation:

$$RPD = \left| \frac{x_1 - x_2}{(x_1 + x_2)/2} \right| \times 100$$

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

January 19, 2016

Sarah Jones
BROWN AND CALDWELL
990 Hammond Drive
Atlanta GA 30328

TEL: (770) 394-2997
FAX: (770) 396-9495

RE: MacGregor

Dear Sarah Jones: Order No: 1507N55

Analytical Environmental Services, Inc. received 4 samples on 7/29/2015 7:10:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.
AES' certifications are as follows:
-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/15-06/30/16.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 09/01/17.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Ioana Pacurar

Ioana Pacurar
Project Manager

Revision 1/19/2016

ANALYTICAL ENVIRONMENTAL SERVICES, INC

3080 Presidential Drive, Atlanta GA 30340-3704
TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 1507155

Date: 7-28-15 Page 1 of 1

COMPANY: Brown and Caldwell

ADDRESS: 990 Hammond D. Ste400 Atlanta, GA 30328

PHONE:

FAX:

SAMPLED BY: Brian Steele

SIGNATURE:

ANALYSIS REQUESTED

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	Total Chromium	Total Hexavalent Chromium	Total Trivalent Chromium											REMARKS	No # of Containers
	PRESERVATION (See codes)						HNO3	NA	NA												
1	15209-TW-43	7.28.15	1340	X		GW	X	X	X												2
2	15209-EB-1	↓	1005	X		DW	X	X	X												2
3	15209-Dup-1		1340	X		GW	X	X	X												2
4	15209-TW-44	↓	1540	X		GW	X	X	X											Do not report, speak with Tara E.	2
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					

Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.

RELINQUISHED BY DATE/TIME

1: 7.28.15 / 1730

2:

3:

RECEIVED BY DATE/TIME

1: Cataya Reeves 7/29/15 7:10a

2:

3:

PROJECT INFORMATION

PROJECT NAME: MacGregor

PROJECT #:

SITE ADDRESS: Albany, GA

SEND REPORT TO: Jtones@brwncald.com

INVOICE TO: (IF DIFFERENT FROM ABOVE)

QUOTE #: PO#:

RECEIPT

Total # of Containers: 8

Turnaround Time Request

- ○ Standard 5 Business Days
- ○ 2 Business Day Rush
- ○ Next Business Day Rush
- ✓ Same Day Rush (auth req.)
- ○ Other

STATE PROGRAM (if any):

E-mail? (Y) N; Fax? Y (N)

DATA PACKAGE: I II III IV

SPECIAL INSTRUCTIONS/COMMENTS:

Same day rush, chart now times.

★ "See Tara E at Login" ★

SHIPMENT METHOD

OUT / / VIA:

IN / / VIA:

CLIENT (FedEx) UPS MAIL COURIER

GREYHOUND OTHER

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES. SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water

PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Client: BROWN AND CALDWELL
Project: MacGregor
Lab ID: 1507N55

Case Narrative

Hexavalent Chromium vs Total Chromium:

Please note the Hexavalent Chromium value is reported as greater than the Total Chromium value for sample 1507N55-004B. The values are within the expected reproducibility limits for the test methods used and the results are suspected to be due to differences between the sample aliquots used for analysis. The data indicates that all Chromium present is in the Hexavalent oxidation state.

Analytical Environmental Services, Inc **Date:** 19-Jan-16

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15209-TW-43
Project Name:	MacGregor	**Collection Date:**	7/28/2015 1:40:00 PM
Lab ID:	1507N55-001	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
Chromium, Hexavalent	0.0129	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0197	0.0100		mg/L	210564	1	07/29/2015 13:27	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 19-Jan-16

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15209-EB-1
Project Name:	MacGregor	**Collection Date:**	7/28/2015 10:05:00 AM
Lab ID:	1507N55-002	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
Chromium, Hexavalent	BRL	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	210564	1	07/29/2015 13:46	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 19-Jan-16

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15209-DUP-1
Project Name:	MacGregor	**Collection Date:**	7/28/2016 1:40:00 PM
Lab ID:	1507N55-003	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
Chromium, Hexavalent	0.0148	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0190	0.0100		mg/L	210564	1	07/29/2015 13:49	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 19-Jan-16

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15209-TW-44
Project Name:	MacGregor	**Collection Date:**	7/28/2016 3:40:00 PM
Lab ID:	1507N55-004	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
Chromium, Hexavalent	0.0166	0.0100		mg/L	R296827	1	07/29/2015 09:15	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0163	0.0100		mg/L	210564	1	07/29/2015 13:52	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc.

Sample/Cooler Receipt Checklist

Client BROWN & CALDWELL Work Order Number 1507N55

Checklist completed by Signature Hadzic Date 7/29/15

Carrier name: FedEx ✓ UPS __ Courier __ Client __ US Mail __ Other _____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes ✓ No __ Not Present __

Custody seals intact on sample bottles? Yes ✓ No __ Not Present __

Container/Temp Blank temperature in compliance? (0°≤6°C)* Yes ✓ No __

Cooler #1 3.7 Cooler #2 _____ Cooler #3 _____ Cooler #4 _____ Cooler#5 _____ Cooler #6 _____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted ✓ Yes __ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? _____ Checked by _____

Sample Condition: Good ✓ Other(Explain) _____

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

See Case Narrative for resolution of the Non-Conformance.

* Samples do not have to comply with the given range for certain parameters.

\\Aes_server\I\Sample Receipt\My Documents\COCs and pH Adjustment Sheet\Sample_Cooler_Recipt_Checklist_Rev1.rtf

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507N55

ANALYTICAL QC SUMMARY REPORT

BatchID: 210564

Sample ID: **MB-210564**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **296873**
SampleType: **MBLK**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210564**	Analysis Date: **07/29/2015**	Seq No: **6333789**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-210564**	Client ID:			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **296873**
SampleType: **LCS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210564**	Analysis Date: **07/29/2015**	Seq No: **6333790**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.042	0.0100	1.000		104	80	120				

Sample ID: **1507N55-001AMS**	Client ID: **15209-TW-43**			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **296873**
SampleType: **MS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210564**	Analysis Date: **07/29/2015**	Seq No: **6333792**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.033	0.0100	1.000	0.01967	101	75	125				

Sample ID: **1507N55-001AMSD**	Client ID: **15209-TW-43**			Units: **mg/L**	Prep Date: **07/29/2015**	Run No: **296873**
SampleType: **MSD**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210564**	Analysis Date: **07/29/2015**	Seq No: **6333793**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.026	0.0100	1.000	0.01967	101	75	125	1.033	0.634	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507N55

ANALYTICAL QC SUMMARY REPORT

BatchID: R296827

Sample ID: **MB-R296827** Client ID: Units: **mg/L** Prep Date: Run No: **296827**
SampleType: **MBLK** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R296827** Analysis Date: **07/28/2015** Seq No: **6332846**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R296827** Client ID: Units: **mg/L** Prep Date: Run No: **296827**
SampleType: **LCS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R296827** Analysis Date: **07/28/2015** Seq No: **6332847**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5369	0.0100	0.5000		107	90	110				

Sample ID: **1507M95-004BMS** Client ID: Units: **mg/L** Prep Date: Run No: **296827**
SampleType: **MS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R296827** Analysis Date: **07/28/2015** Seq No: **6332854**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5515	0.0100	0.5000	0.03010	104	85	115				

Sample ID: **1507M95-004BMSD** Client ID: Units: **mg/L** Prep Date: Run No: **296827**
SampleType: **MSD** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R296827** Analysis Date: **07/28/2015** Seq No: **6332856**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5521	0.0100	0.5000	0.03010	104	85	115	0.5515	0.109	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Brown AND Caldwell : LABORATORY DATA VERIFICATION FORM

1. PROJECT INFORMATION

Today's Date: 8/10/15

Project Number: 147437.100 Project Name/Client: MacGregor Golf 2015 VRP Services

Project Manager: S. Jones Sampled By: B. Steele

Laboratory: AES Order No.: 1507P87

2. SAMPLE INFORMATION

Purpose of sampling: Cr delineation and annual monitoring

Total number of samples: 2

☐ Groundwater: 1 ☐ Soil: _____ ☐ Soil Gas: _____ ☐ Trip Blank: _____

☐ Surface water: _____ ☐ Sediment: _____ ☐ Other: _____ ☐ Field Blank: _____

☐ Drinking water: _____ ☐ Air: _____ ☐ Other: _____ ☐ Equip Blank: 1

Analyses requested: Total chromium, total hexavalent chromium

Method detection limits (MDLs) or reporting limits (RLs) requested: NA

Duplicates: None

3. DATA VERIFICATION

Check yes or no. Refer to applicable Data Verification Guidelines to determine appropriate action.

☑ **Yes** ☐ **No** ☐ **NA Was the Chain of Custody intact?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were custody seals intact on samples bottles and/or coolers as necessary?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were cooler temperatures within the acceptable range of 0-6°C?**

If no: Notes: 3.4

☑ **Yes** ☐ **No** ☐ **NA Were samples physically and chemically preserved properly (i.e. no bubbles in VOC vials)**

If no: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA Was the case narrative of the analytical report free of any quality issues, discrepancies, etc.?**

If no: Notes: Refer to Comment 1

☑ **Yes** ☐ **No** ☐ **NA Were all samples labeled, analyzed, and reported correctly? (no samples held, no wrong analyses, etc.)**

If no: If within holding time, call lab immediately. Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were all samples analyzed within holding time?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were appropriate analytes reported?**

If no: Notes: _____

☐ **Yes** ☐ **No** ☑ **NA Were soil and/or sediment concentrations reported appropriately? (DW vs WW)**

If no: Call lab immediately to verify. Notes: No soil samples submitted

☑ **Yes** ☐ **No** ☐ **NA If analyzed for the following parameters, was the following true for all analytes?**

- ☐ Yes ☐ No ☐ NA Total metals ≥ Dissolved metals
- ☐ Yes ☐ No ☐ NA TKN > Organic nitrogen
- ☐ Yes ☐ No ☐ NA TKN > Ammonia (NH_3)
- ☐ Yes ☐ No ☐ NA COD > TOC
- ☐ Yes ☐ No ☐ NA COD > BOD

If no: Report to project manager and contact lab's QA/QC manager if needed. Notes: Refer to Comment 1

☑ **Yes** ☐ **No** ☐ **NA Were method detection limits (MDL), reporting limits (RLs), and/or dilution factors appropriate?**

If no: Report to project manager and contact lab if needed. Notes: _____

☐ **Yes** ☐ **No** ☑ **NA Were surrogate % recoveries within the acceptable range of LCL ≤ x ≤ UCL?**

If no: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA Were target analytes detected in any field, equipment, and/or laboratory blanks?**

If yes: Notes: _____

Brown AND Caldwell : **LABORATORY DATA VERIFICATION FORM**

☐ **Yes** ☐ **No** ☑ **NA** **Were any target analytes detected below practical quantitation limits (PQLs)?**

If yes: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA** **Were any sample duplicates collected?**

If yes: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA** **Were any laboratory duplicates reported for project samples?**

If yes: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA** **Were any matrix spikes reported for project samples?**

If yes: Notes: No issues to report

☑ **Yes** ☐ **No** ☐ **NA** **Were any laboratory control samples reported?**

If yes: Notes: No issues to report

☐ **Yes** ☑ **No** ☐ **NA** **Were calibration standards reported?**

If yes: Notes: _____

4. COMMENTS & SUMMARY OF ACTIONS TAKEN (Attach additional pages if necessary)

Comment 1: As stated in the case narrative, hexavalent chromium is reported at a value higher than the total chromium value for samples MW-11 and MW-19. The values are within the expected reproducibility limits for the test methods and the results are suspected to be due to the differences between the sample aliquots used for analysis. The results indicate that all chromium present in these samples is in hexavalent form. No further action required.

Sarah E Jones

Signature of Data Verifier

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

August 11, 2015

Sarah Jones
BROWN AND CALDWELL
990 Hammond Drive
Atlanta GA 30328

TEL: (770) 394-2997
FAX: (770) 396-9495

RE: MacGregor

Dear Sarah Jones: Order No: 1507P87

Analytical Environmental Services, Inc. received 2 samples on 7/31/2015 10:35:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.
AES' certifications are as follows:
-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/15-06/30/16.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 09/01/15.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Ioana Pacurar

Ioana Pacurar
Project Manager

ANALYTICAL ENVIRONMENTAL SERVICES, INC

3080 Presidential Drive, Atlanta GA 30340-3704
TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 1507187

Date: 7.30.15 Page 1 of 1

COMPANY: Brown and Caldwell

ADDRESS: 990 Hammond, Ste 400 Atlanta GA, 30328

PHONE:

FAX:

SAMPLED BY: Brian Steele

SIGNATURE:

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	Total Chromium	Total Hexavalent Chromium	Total Trivalent chromium	Dissolved Chromium	Dissolved Hexavalent Chromium	Dissolved Trivalent chromium	REMARKS	No # of Containers
	PRESERVATION (See codes)						NP	NA	NA	NA	NA	NA		
1	15211-MW-24	7.30.15	1605	X		GW								
2	15211-EB-3	↓	1615	X		DW	X	X	X					
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														

ANALYSIS REQUESTED

Visit our website **www.aesatlanta.com** to check on the status of your results, place bottle orders, etc.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
1:	7.30.15 / 1730	1:	7/31/2015 10:35AM
2:		2:	
3:		3:	

SPECIAL INSTRUCTIONS/COMMENTS: Short hold times

SHIPMENT METHOD

OUT / / VIA:

IN / / VIA:

CLIENT (FedEx) UPS MAIL COURIER

GREYHOUND OTHER_____

PROJECT INFORMATION

PROJECT NAME: MacGregor

PROJECT #:

SITE ADDRESS: Albany, GA

SEND REPORT TO: SJoregybrowncold.com

INVOICE TO: (IF DIFFERENT FROM ABOVE)

QUOTE #:_____ PO#:_____

RECEIPT

Total # of Containers

Turnaround Time Request

- (●) Standard 5 Business Days
- ( ) 2 Business Day Rush
- ( ) Next Business Day Rush
- ( ) Same Day Rush (auth req.)
- ( ) Other _____

STATE PROGRAM (if any): _____

E-mail? (Y) N: Fax? Y (N)

DATA PACKAGE: I (II) III IV

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES.
SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water

PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Client: BROWN AND CALDWELL
Project: MacGregor
Lab ID: 1507P87

Case Narrative

Sample Receiving Nonconformance:

Per Brian Steele via phone 7/31/15 at 11:12am, all analyses requested on the Chain of Custody were ran by the laboratory on sample 15211-MW-24.

Hexavalent Chromium vs Total Chromium:

Please note the Hexavalent Chromium value is reported as greater than the Total Chromium value for sample 1507P87-001. The values are within the expected reproducibility limits for the test methods used and the results are suspected to be due to differences between the sample aliquots used for analysis. The data indicates that all Chromium present is in the Hexavalent oxidation state.

Analytical Environmental Services, Inc **Date:** 11-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15211-MW-24
Project Name:	MacGregor	**Collection Date:**	7/30/2015 4:05:00 PM
Lab ID:	1507P87-001	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
METALS, DISSOLVED SW6010C (SW3005A)								
Chromium	0.0653	0.0100		mg/L	211121	1	08/07/2015 15:10	TA
Hexavalent Chromium, Dissolved SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
Chromium, Hexavalent	0.0772	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
Chromium, Hexavalent	0.0772	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	0.0715	0.0100		mg/L	210935	1	08/04/2015 13:45	TA

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 11-Aug-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15211-EB-3
Project Name:	MacGregor	**Collection Date:**	7/30/2015 4:15:00 PM
Lab ID:	1507P87-002	**Matrix:**	Drinking Water

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
Chromium, Hexavalent	BRL	0.0100		mg/L	R297085	1	07/31/2015 15:00	OM
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	210935	1	08/04/2015 13:47	TA

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc.

Sample/Cooler Receipt Checklist

Client Brown & Caldwell Work Order Number 1507P87

Checklist completed by Miriam Lamar 7/31/2015
Signature Date

Carrier name: FedEx ✓ UPS __ Courier __ Client __ US Mail __ Other _____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes ✓ No __ Not Present __

Custody seals intact on sample bottles? Yes ✓ No __ Not Present __

Container/Temp Blank temperature in compliance? (0°≤6°C)* Yes ✓ No __

Cooler #1 3.4°C Cooler #2 _____ Cooler #3 _____ Cooler #4 _____ Cooler#5 _____ Cooler #6 _____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted ✓ Yes __ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? _____ Checked by MIRIAM

Sample Condition: Good ✓ Other(Explain) _____

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

See Case Narrative for resolution of the Non-Conformance.

* Samples do not have to comply with the given range for certain parameters.

Client: BROWN AND CALDWELL
Project Name: MacGregor
Lab Order: 1507P87

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1507P87-001A	15211-MW-24	7/30/2015 4:05:00PM	Groundwater	TOTAL METALS BY ICP		8/3/2015 1:20:00 PM	08/04/2015
1507P87-001B	15211-MW-24	7/30/2015 4:05:00PM	Groundwater	Hexavalent Chromium			07/31/2015
1507P87-001C	15211-MW-24	7/30/2015 4:05:00PM	Groundwater	DISSOLVED METALS BY ICP		8/6/2015 10:30:00 AM	08/07/2015
1507P87-001D	15211-MW-24	7/30/2015 4:05:00PM	Groundwater	Hexavalent Chromium, Dissolved			07/31/2015
1507P87-002A	15211-EB-3	7/30/2015 4:15:00PM	Drinking Water	TOTAL METALS BY ICP		8/3/2015 1:20:00 PM	08/04/2015
1507P87-002B	15211-EB-3	7/30/2015 4:15:00PM	Drinking Water	Hexavalent Chromium			07/31/2015

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507P87

ANALYTICAL QC SUMMARY REPORT

BatchID: 210935

Sample ID: **MB-210935**	Client ID:			Units: **mg/L**	Prep Date: **08/03/2015**	Run No: **297273**
SampleType: **MBLK**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210935**	Analysis Date: **08/04/2015**	Seq No: **6342833**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-210935**	Client ID:			Units: **mg/L**	Prep Date: **08/03/2015**	Run No: **297273**
SampleType: **LCS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210935**	Analysis Date: **08/04/2015**	Seq No: **6342834**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.024	0.0100	1.000	0.0003900	102	80	120				

Sample ID: **1507O95-006CMS**	Client ID:			Units: **mg/L**	Prep Date: **08/03/2015**	Run No: **297273**
SampleType: **MS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210935**	Analysis Date: **08/04/2015**	Seq No: **6342836**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.016	0.0100	1.000	0.001270	102	75	125				

Sample ID: **1507O95-006CMSD**	Client ID:			Units: **mg/L**	Prep Date: **08/03/2015**	Run No: **297273**
SampleType: **MSD**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **210935**	Analysis Date: **08/04/2015**	Seq No: **6342837**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.024	0.0100	1.000	0.001270	102	75	125	1.016	0.774	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507P87

ANALYTICAL QC SUMMARY REPORT

BatchID: 211121

Sample ID: **MB-211121**	Client ID:				Units: **mg/L**	Prep Date: **08/06/2015**	Run No: **297532**
SampleType: **MBLK**	TestCode: **METALS, DISSOLVED**	**SW6010C**			BatchID: **211121**	Analysis Date: **08/07/2015**	Seq No: **6349718**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-211121**	Client ID:				Units: **mg/L**	Prep Date: **08/06/2015**	Run No: **297532**
SampleType: **LCS**	TestCode: **METALS, DISSOLVED**	**SW6010C**			BatchID: **211121**	Analysis Date: **08/07/2015**	Seq No: **6349723**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9986	0.0100	1.000		99.9	80	120				

Sample ID: **1507Q17-004AMS**	Client ID:				Units: **mg/L**	Prep Date: **08/06/2015**	Run No: **297532**
SampleType: **MS**	TestCode: **METALS, DISSOLVED**	**SW6010C**			BatchID: **211121**	Analysis Date: **08/07/2015**	Seq No: **6349725**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9710	0.0100	1.000		97.1	75	125				

Sample ID: **1507Q17-004AMSD**	Client ID:				Units: **mg/L**	Prep Date: **08/06/2015**	Run No: **297532**
SampleType: **MSD**	TestCode: **METALS, DISSOLVED**	**SW6010C**			BatchID: **211121**	Analysis Date: **08/07/2015**	Seq No: **6349726**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9890	0.0100	1.000		98.9	75	125	0.9710	1.84	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507P87

ANALYTICAL QC SUMMARY REPORT

BatchID: R297085

Sample ID: **MB-R297085** Client ID: Units: **mg/L** Prep Date: Run No: **297085**
SampleType: **MBLK** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R297085** Analysis Date: **07/31/2015** Seq No: **6338656**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **MB-R297085** Client ID: Units: **mg/L** Prep Date: Run No: **297085**
SampleType: **MBLK** TestCode: **Hexavalent Chromium, Dissolved SW7196A** BatchID: **R297085** Analysis Date: **07/31/2015** Seq No: **6338665**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R297085** Client ID: Units: **mg/L** Prep Date: Run No: **297085**
SampleType: **LCS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R297085** Analysis Date: **07/31/2015** Seq No: **6338657**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5129	0.0100	0.5000		103	90	110				

Sample ID: **LCS-R297085** Client ID: Units: **mg/L** Prep Date: Run No: **297085**
SampleType: **LCS** TestCode: **Hexavalent Chromium, Dissolved SW7196A** BatchID: **R297085** Analysis Date: **07/31/2015** Seq No: **6338666**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5129	0.0100	0.5000		103	90	110				

Sample ID: **1507P87-001BMS** Client ID: **15211-MW-24** Units: **mg/L** Prep Date: Run No: **297085**
SampleType: **MS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R297085** Analysis Date: **07/31/2015** Seq No: **6338660**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5117	0.0100	0.5000	0.07720	86.9	85	115				

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1507P87

ANALYTICAL QC SUMMARY REPORT

BatchID: R297085

Sample ID: **1507P87-001DMS**	Client ID: **15211-MW-24**				Units: **mg/L**		Prep Date:		Run No: **297085**	
SampleType: **MS**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**				BatchID: **R297085**		Analysis Date: **07/31/2015**		Seq No: **6338668**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5117	0.0100	0.5000	0.07720	86.9	85	115				

Sample ID: **1507P87-001BMSD**	Client ID: **15211-MW-24**				Units: **mg/L**		Prep Date:		Run No: **297085**	
SampleType: **MSD**	TestCode: **Hexavalent Chromium in Water SW7196A**				BatchID: **R297085**		Analysis Date: **07/31/2015**		Seq No: **6338661**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5099	0.0100	0.5000	0.07720	86.5	85	115	0.5117	0.352	20	

Sample ID: **1507P87-001DMSD**	Client ID: **15211-MW-24**				Units: **mg/L**		Prep Date:		Run No: **297085**	
SampleType: **MSD**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**				BatchID: **R297085**		Analysis Date: **07/31/2015**		Seq No: **6338669**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.5099	0.0100	0.5000	0.07720	86.5	85	115	0.5117	0.352	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Brown AND Caldwell : LABORATORY DATA VERIFICATION FORM

1. PROJECT INFORMATION

Today's Date: 11/11/15

Project Number: 147437.100 Project Name/Client: MacGregor Golf 2015 VRP Services

Project Manager: S. Jones Sampled By: B. Steele

Laboratory: AES Order No.: 1511281

2. SAMPLE INFORMATION

Purpose of sampling: Cr delineation

Total number of samples: 1

☐ Groundwater: _____ ☐ Soil: _____ ☐ Soil Gas: _____ ☐ Trip Blank: _____

☐ Surface water: _____ ☐ Sediment: _____ ☐ Other: _____ ☐ Field Blank: _____

☐ Drinking water: _____ ☐ Air: _____ ☐ Other: _____ ☐ Equip Blank: 1

Analyses requested: Total chromium, total hexavalent chromium

Method detection limits (MDLs) or reporting limits (RLs) requested: NA

Duplicates: None

3. DATA VERIFICATION

Check yes or no. Refer to applicable Data Verification Guidelines to determine appropriate action.

☑ **Yes** ☐ **No** ☐ **NA Was the Chain of Custody intact?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were custody seals intact on samples bottles and/or coolers as necessary?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were cooler temperatures within the acceptable range of 0-6°C?**

If no: Notes: 3.9

☑ **Yes** ☐ **No** ☐ **NA Were samples physically and chemically preserved properly (i.e. no bubbles in VOC vials)**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Was the case narrative of the analytical report free of any quality issues, discrepancies, etc.?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were all samples labeled, analyzed, and reported correctly? (no samples held, no wrong analyses, etc.)**

If no: If within holding time, call lab immediately. Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were all samples analyzed within holding time?**

If no: Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were appropriate analytes reported?**

If no: Notes: _____

☐ **Yes** ☐ **No** ☑ **NA Were soil and/or sediment concentrations reported appropriately? (DW vs WW)**

If no: Call lab immediately to verify. Notes: No soil samples submitted

☑ **Yes** ☐ **No** ☐ **NA If analyzed for the following parameters, was the following true for all analytes?**

- ☐ Yes ☐ No ☐ NA Total metals ≥ Dissolved metals
- ☐ Yes ☐ No ☐ NA TKN > Organic nitrogen
- ☐ Yes ☐ No ☐ NA TKN > Ammonia (NH_3)
- ☐ Yes ☐ No ☐ NA COD > TOC
- ☐ Yes ☐ No ☐ NA COD > BOD

If no: Report to project manager and contact lab's QA/QC manager if needed. Notes: _____

☑ **Yes** ☐ **No** ☐ **NA Were method detection limits (MDL), reporting limits (RLs), and/or dilution factors appropriate?**

If no: Report to project manager and contact lab if needed. Notes: _____

☐ **Yes** ☐ **No** ☑ **NA Were surrogate % recoveries within the acceptable range of LCL ≤ x ≤ UCL?**

If no: Notes: _____

☐ **Yes** ☑ **No** ☐ **NA Were target analytes detected in any field, equipment, and/or laboratory blanks?**

If yes: Notes: _____

LABORATORY DATA VERIFICATION FORM

☐ Yes ☐ No ☑ NA **Were any target analytes detected below practical quantitation limits (PQLs)?**

If yes: Notes: _____

☐ Yes ☑ No ☐ NA **Were any sample duplicates collected?**

If yes: Notes: _____

☐ Yes ☑ No ☐ NA **Were any laboratory duplicates reported for project samples?**

If yes: Notes: _____

☑ Yes ☐ No ☐ NA **Were any matrix spikes reported for project samples?**

If yes: Notes: No issues to report

☑ Yes ☐ No ☐ NA **Were any laboratory control samples reported?**

If yes: Notes: No issues to report

☐ Yes ☑ No ☐ NA **Were calibration standards reported?**

If yes: Notes: _____

4. COMMENTS & SUMMARY OF ACTIONS TAKEN (Attach additional pages if necessary)

Sarah E Jones

Signature of Data Verifier

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

November 13, 2015

Sarah Jones
BROWN AND CALDWELL
990 Hammond Drive
Atlanta GA 30328

TEL: (770) 394-2997
FAX: (770) 396-9495

RE: MacGregor

Dear Sarah Jones: Order No: 1511281

Analytical Environmental Services, Inc. received 1 samples on 11/4/2015 10:45:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.
AES' certifications are as follows:
-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/15-06/30/16.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 09/01/17.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Ioana Pacurar

Ioana Pacurar
Project Manager

ANALYTICAL ENVIRONMENTAL SERVICES, INC

3080 Presidential Drive, Atlanta GA 30340-3704
AES TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 1511281

Date: 11/3/15 Page 1 of 1

COMPANY:	ADDRESS:
BROWN AND CALDWELL	990 HAMMOND DR. STE. 400 ATLANTA, GA
PHONE: 770-673-3678	FAX:
SAMPLED BY: GEOFF GAGAT	SIGNATURE:

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	PRESERVATION (See codes) N	PRESERVATION (See codes) NA	REMARKS	No # of Containers
1	15307-EB	11/3/15	1410	X		W	X	X		2
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

ANALYSIS REQUESTED: Total Metals; ICP Cr6 M

Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
1: GEOFF GAGAT	11/3/15 1730	1: Katie Jenn	11/4/15 10:45
2:		2:	
3:		3:	

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPMENT METHOD
OUT / / VIA:
IN / / VIA:
CLIENT (FedEx) UPS MAIL COURIER
GREYHOUND OTHER

PROJECT INFORMATION
PROJECT NAME: MACGREGOR
PROJECT #: 147437
SITE ADDRESS: ALBANY, GA
SEND REPORT TO: SEJONES@BRWNCALD.COM
INVOICE TO: (IF DIFFERENT FROM ABOVE)
QUOTE #: PO#:

RECEIPT
Total # of Containers: 2

Turnaround Time Request
(✓) Standard 5 Business Days
( ) 2 Business Day Rush
( ) Next Business Day Rush
( ) Same Day Rush (auth req.)
( ) Other

STATE PROGRAM (if any):
E-mail? (Y) N; Fax? Y (N)
DATA PACKAGE: I (II) III IV

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES.
SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water
PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Analytical Environmental Services, Inc **Date:** 13-Nov-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15307-EB
Project Name:	MacGregor	**Collection Date:**	11/3/2015 2:10:00 PM
Lab ID:	1511281-001	**Matrix:**	Aqueous

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R303717	1	11/04/2015 11:35	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R303717	1	11/04/2015 11:35	JC
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	215519	1	11/06/2015 14:40	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc.

Sample/Cooler Receipt Checklist

Client Brown & Caldwell Work Order Number 1511281

Checklist completed by [signature] 11/4/15
Signature Date

Carrier name: FedEx ✓ UPS __ Courier __ Client __ US Mail __ Other _____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes __ No __ Not Present ✓

Custody seals intact on sample bottles? Yes ✓ No __ Not Present __

Container/Temp Blank temperature in compliance? (0°≤6°C)* Yes ✓ No __

Cooler #1 3.9 Cooler #2 _____ Cooler #3 _____ Cooler #4 _____ Cooler#5 _____ Cooler #6 _____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted ✓ Yes __ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? _____ Checked by [signature]

Sample Condition: Good ✓ Other(Explain) _____

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

See Case Narrative for resolution of the Non-Conformance.

* Samples do not have to comply with the given range for certain parameters.

Analytical Environmental Services, Inc

Date: 13-Nov-15

Client: BROWN AND CALDWELL
Project Name: MacGregor
Lab Order: 1511281

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1511281-001A	15307-EB	11/3/2015 2:10:00PM	Aqueous	TOTAL METALS BY ICP		11/6/2015 10:07:00 AM	11/06/2015
1511281-001B	15307-EB	11/3/2015 2:10:00PM	Aqueous	Hexavalent Chromium			11/04/2015

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511281

ANALYTICAL QC SUMMARY REPORT

BatchID: 215519

Sample ID: **MB-215519**	Client ID:			Units: **mg/L**	Prep Date: **11/06/2015**	Run No: **303818**
SampleType: **MBLK**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **215519**	Analysis Date: **11/06/2015**	Seq No: **6503433**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-215519**	Client ID:			Units: **mg/L**	Prep Date: **11/06/2015**	Run No: **303818**
SampleType: **LCS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **215519**	Analysis Date: **11/06/2015**	Seq No: **6503434**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.059	0.0100	1.000		106	80	120				

Sample ID: **1511281-001AMS**	Client ID: **15307-EB**			Units: **mg/L**	Prep Date: **11/06/2015**	Run No: **303818**
SampleType: **MS**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **215519**	Analysis Date: **11/06/2015**	Seq No: **6503438**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.034	0.0100	1.000	0.0005420	103	75	125				

Sample ID: **1511281-001AMSD**	Client ID: **15307-EB**			Units: **mg/L**	Prep Date: **11/06/2015**	Run No: **303818**
SampleType: **MSD**	TestCode: **METALS, TOTAL** **SW6010C**			BatchID: **215519**	Analysis Date: **11/06/2015**	Seq No: **6503441**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.021	0.0100	1.000	0.0005420	102	75	125	1.034	1.22	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511281

ANALYTICAL QC SUMMARY REPORT

BatchID: R303717

Sample ID: **MB-R303717** Client ID: Units: **mg/L** Prep Date: Run No: **303717**
SampleType: **MBLK** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R303717** Analysis Date: **11/04/2015** Seq No: **6500969**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R303717** Client ID: Units: **mg/L** Prep Date: Run No: **303717**
SampleType: **LCS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R303717** Analysis Date: **11/04/2015** Seq No: **6500970**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4983	0.0100	0.5000		99.7	90	110				

Sample ID: **1511281-001BMS** Client ID: **15307-EB** Units: **mg/L** Prep Date: Run No: **303717**
SampleType: **MS** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R303717** Analysis Date: **11/04/2015** Seq No: **6500972**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4934	0.0100	0.5000	0.009200	96.8	85	115				

Sample ID: **1511281-001BMSD** Client ID: **15307-EB** Units: **mg/L** Prep Date: Run No: **303717**
SampleType: **MSD** TestCode: **Hexavalent Chromium in Water SW7196A** BatchID: **R303717** Analysis Date: **11/04/2015** Seq No: **6500973**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4884	0.0100	0.5000	0.009200	95.8	85	115	0.4934	1.02	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Brown AND Caldwell : LABORATORY DATA VERIFICATION FORM

1. PROJECT INFORMATION

Today's Date: 11/14/15

Project Number: 147437.100 Project Name/Client: MacGregor Golf 2015 VRP Services

Project Manager: S. Jones Sampled By: B. Steele

Laboratory: AES Order No.: 1511590

2. SAMPLE INFORMATION

Purpose of sampling: Cr delineation

Total number of samples: 3

☐ Groundwater: 3 ☐ Soil: _____ ☐ Soil Gas: _____ ☐ Trip Blank: _____

☐ Surface water: _____ ☐ Sediment: _____ ☐ Other: _____ ☐ Field Blank: _____

☐ Drinking water: _____ ☐ Air: _____ ☐ Other: _____ ☐ Equip Blank: _____

Analyses requested: Total chromium, total hexavalent chromium

Method detection limits (MDLs) or reporting limits (RLs) requested: NA

Duplicates: 15309-DUP is a field duplicate of 15309-MW-27

3. DATA VERIFICATION

Check yes or no. Refer to applicable Data Verification Guidelines to determine appropriate action.

☑ Yes ☐ No ☐ NA **Was the Chain of Custody intact?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were custody seals intact on samples bottles and/or coolers as necessary?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were cooler temperatures within the acceptable range of 0-6°C?**

If no: Notes: 3.8

☑ Yes ☐ No ☐ NA **Were samples physically and chemically preserved properly (i.e. no bubbles in VOC vials)**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Was the case narrative of the analytical report free of any quality issues, discrepancies, etc.?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were all samples labeled, analyzed, and reported correctly? (no samples held, no wrong analyses, etc.)**

If no: If within holding time, call lab immediately. Notes: _____

☑ Yes ☐ No ☐ NA **Were all samples analyzed within holding time?**

If no: Notes: _____

☑ Yes ☐ No ☐ NA **Were appropriate analytes reported?**

If no: Notes: _____

☐ Yes ☐ No ☑ NA **Were soil and/or sediment concentrations reported appropriately? (DW vs WW)**

If no: Call lab immediately to verify. Notes: No soil samples submitted

☑ Yes ☐ No ☐ NA **If analyzed for the following parameters, was the following true for all analytes?**

- ☐ Yes ☐ No ☐ NA Total metals ≥ Dissolved metals
- ☐ Yes ☐ No ☐ NA TKN > Organic nitrogen
- ☐ Yes ☐ No ☐ NA TKN > Ammonia (NH_3)
- ☐ Yes ☐ No ☐ NA COD > TOC
- ☐ Yes ☐ No ☐ NA COD > BOD

If no: Report to project manager and contact lab's QA/QC manager if needed. Notes: _____

☑ Yes ☐ No ☐ NA **Were method detection limits (MDL), reporting limits (RLs), and/or dilution factors appropriate?**

If no: Report to project manager and contact lab if needed. Notes: _____

☐ Yes ☐ No ☑ NA **Were surrogate % recoveries within the acceptable range of LCL ≤ x ≤ UCL?**

If no: Notes: _____

☐ Yes ☑ No ☐ NA **Were target analytes detected in any field, equipment, and/or laboratory blanks?**

If yes: Notes: _____

Brown AND Caldwell

LABORATORY DATA VERIFICATION FORM

☐ Yes ☐ No ☑ NA **Were any target analytes detected below practical quantitation limits (PQLs)?**

If yes: Notes: _____

☑ Yes ☐ No ☐ NA **Were any sample duplicates collected?**

If yes: Notes: Refer to Comment 1

☐ Yes ☑ No ☐ NA **Were any laboratory duplicates reported for project samples?**

If yes: Notes: _____

☑ Yes ☐ No ☐ NA **Were any matrix spikes reported for project samples?**

If yes: Notes: No issues to report

☑ Yes ☐ No ☐ NA **Were any laboratory control samples reported?**

If yes: Notes: No issues to report

☐ Yes ☑ No ☐ NA **Were calibration standards reported?**

If yes: Notes: _____

4. COMMENTS & SUMMARY OF ACTIONS TAKEN (Attach additional pages if necessary)

Comment 1: 15309-DUP is a field duplicate of 15309-MW-27. All results were BRL; therefore, no RPDs could be calculated. No further action required.

Sarah E Jones

Signature of Data Verifier

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

November 13, 2015

Sarah Jones
BROWN AND CALDWELL
990 Hammond Drive
Atlanta GA 30328

TEL: (770) 394-2997
FAX: (770) 396-9495

RE: MacGregor

Dear Sarah Jones: Order No: 1511590

Analytical Environmental Services, Inc. received 3 samples on 11/6/2015 8:35:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.
AES' certifications are as follows:
-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/15-06/30/16.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 09/01/17.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Ioana Pacurar

Ioana Pacurar
Project Manager

ANALYTICAL ENVIRONMENTAL SERVICES, INC
3080 Presidential Drive, Atlanta GA 30340-3704
AES TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 1511590

Date: 11/6/15 Page 1 of 1

COMPANY:	ADDRESS:
BROWN AND CALDWELL	990 HAMMOND DR STE. 400 ATLANTA, GA
PHONE: 770-673-3678	FAX:
SAMPLED BY: GEOFF GAGAT	SIGNATURE:

#	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	Grab	Composite	Matrix (See codes)	TOTAL METALS	HEX CHROM	DISSOLVED METALS	REMARKS	No # of Containers
							PRESERVATION (See codes)				
							N	NA	NA		
1	15309 - MW-27	11/5/15	1710	X		GW	X	X	X		3
2	15309 - MW-28	11/5/15	1500	X		GW	X	X	X		3
3	15309 - DUP	11/5/15	1200	X		GW	X	X			2
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

ANALYSIS REQUESTED

Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
1:	11/6/15 0820	1:	11/6/15 8:35
2:		2:	
3:		3:	

PROJECT INFORMATION

PROJECT NAME: MACGREGOR
PROJECT #: 147437
SITE ADDRESS: ALBANY, GA
SEND REPORT TO: SEJONES@BRWNCALD.COM
INVOICE TO: (IF DIFFERENT FROM ABOVE)
QUOTE #: PO#:

RECEIPT

Total # of Containers: 8

Turnaround Time Request
- ✓ Standard 5 Business Days
- 2 Business Day Rush
- Next Business Day Rush
- Same Day Rush (auth req.)
- Other

STATE PROGRAM (if any):
E-mail? Y / N; Fax? Y / N
DATA PACKAGE: I II III IV

SPECIAL INSTRUCTIONS/COMMENTS:
SHORT HOLD TIMES (24 HOURS)

SHIPMENT METHOD
OUT / / VIA:
IN / / VIA:
CLIENT FedEx UPS MAIL COURIER
GREYHOUND OTHER

SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES.
SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water
PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Analytical Environmental Services, Inc **Date:** 13-Nov-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15309-MW-27
Project Name:	MacGregor	**Collection Date:**	11/5/2015 5:10:00 PM
Lab ID:	1511590-001	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
METALS, DISSOLVED SW6010C (SW3005A)								
Chromium	BRL	0.0100		mg/L	215523	1	11/10/2015 23:21	IO
Hexavalent Chromium, Dissolved SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R304139	1	11/06/2015 11:45	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R304139	1	11/06/2015 11:45	JC
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	215519	1	11/06/2015 16:32	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 13-Nov-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15309-MW-28
Project Name:	MacGregor	**Collection Date:**	11/5/2015 3:00:00 PM
Lab ID:	1511590-002	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
METALS, DISSOLVED SW6010C (SW3005A)								
Chromium	BRL	0.0100		mg/L	215523	1	11/10/2015 23:24	IO
Hexavalent Chromium, Dissolved SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R304139	1	11/06/2015 11:45	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R304139	1	11/06/2015 11:45	JC
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	215519	1	11/06/2015 16:35	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 13-Nov-15

Client:	BROWN AND CALDWELL	**Client Sample ID:**	15309-DUP
Project Name:	MacGregor	**Collection Date:**	11/5/2015 12:00:00 PM
Lab ID:	1511590-003	**Matrix:**	Groundwater

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Hexavalent Chromium, Dissolved SW7196A								
Chromium, Hexavalent	BRL	0.0100		mg/L	R304139	1	11/06/2015 11:45	JC
Hexavalent Chromium in Water SW7196A								
Chromium as Cr+3	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
Chromium, Hexavalent	BRL	0.0100		mg/L	R303950	1	11/06/2015 11:45	JC
METALS, TOTAL SW6010C (SW3010A)								
Chromium	BRL	0.0100		mg/L	215519	1	11/06/2015 16:39	IO

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	NC	Not confirmed
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc.

Sample/Cooler Receipt Checklist

Client Brown & Caldwell Work Order Number 1511590

Checklist completed by [signature] 11/6/15
Signature Date

Carrier name: FedEx __ UPS __ Courier __ Client ✓ US Mail __ Other _____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes __ No __ Not Present ✓

Custody seals intact on sample bottles? Yes ✓ No __ Not Present __

Container/Temp Blank temperature in compliance? (0°≤6°C)* Yes ✓ No __

Cooler #1 3.8 Cooler #2 _____ Cooler #3 _____ Cooler #4 _____ Cooler#5 _____ Cooler #6 _____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted ✓ Yes __ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? _____ Checked by TB

Sample Condition: Good ✓ Other(Explain) _____

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

See Case Narrative for resolution of the Non-Conformance.

* Samples do not have to comply with the given range for certain parameters.

Analytical Environmental Services, Inc

Date: 13-Nov-15

Client: BROWN AND CALDWELL
Project Name: MacGregor
Lab Order: 1511590

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1511590-001A	15309-MW-27	11/5/2015 5:10:00PM	Groundwater	TOTAL METALS BY ICP		11/6/2015 12:40:00PM	11/06/2015
1511590-001B	15309-MW-27	11/5/2015 5:10:00PM	Groundwater	DISSOLVED METALS BY ICP		11/10/2015 10:29:00AM	11/10/2015
1511590-001C	15309-MW-27	11/5/2015 5:10:00PM	Groundwater	Hexavalent Chromium			11/06/2015
1511590-001C	15309-MW-27	11/5/2015 5:10:00PM	Groundwater	Hexavalent Chromium, Dissolved			11/06/2015
1511590-002A	15309-MW-28	11/5/2015 3:00:00PM	Groundwater	TOTAL METALS BY ICP		11/6/2015 12:40:00PM	11/06/2015
1511590-002B	15309-MW-28	11/5/2015 3:00:00PM	Groundwater	DISSOLVED METALS BY ICP		11/10/2015 10:29:00AM	11/10/2015
1511590-002C	15309-MW-28	11/5/2015 3:00:00PM	Groundwater	Hexavalent Chromium			11/06/2015
1511590-002C	15309-MW-28	11/5/2015 3:00:00PM	Groundwater	Hexavalent Chromium, Dissolved			11/06/2015
1511590-003A	15309-DUP	11/5/2015 12:00:00PM	Groundwater	TOTAL METALS BY ICP		11/6/2015 12:40:00PM	11/06/2015
1511590-003B	15309-DUP	11/5/2015 12:00:00PM	Groundwater	Hexavalent Chromium			11/06/2015
1511590-003B	15309-DUP	11/5/2015 12:00:00PM	Groundwater	Hexavalent Chromium, Dissolved			11/06/2015

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511590

ANALYTICAL QC SUMMARY REPORT

BatchID: 215519

Sample ID: **MB-215519** Client ID: Units: **mg/L** Prep Date: **11/06/2015** Run No: **303818**
SampleType: **MBLK** TestCode: **METALS, TOTAL SW6010C** BatchID: **215519** Analysis Date: **11/06/2015** Seq No: **6503433**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-215519** Client ID: Units: **mg/L** Prep Date: **11/06/2015** Run No: **303818**
SampleType: **LCS** TestCode: **METALS, TOTAL SW6010C** BatchID: **215519** Analysis Date: **11/06/2015** Seq No: **6503434**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.059	0.0100	1.000		106	80	120				

Sample ID: **1511281-001AMS** Client ID: Units: **mg/L** Prep Date: **11/06/2015** Run No: **303818**
SampleType: **MS** TestCode: **METALS, TOTAL SW6010C** BatchID: **215519** Analysis Date: **11/06/2015** Seq No: **6503438**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.034	0.0100	1.000	0.0005420	103	75	125				

Sample ID: **1511281-001AMSD** Client ID: Units: **mg/L** Prep Date: **11/06/2015** Run No: **303818**
SampleType: **MSD** TestCode: **METALS, TOTAL SW6010C** BatchID: **215519** Analysis Date: **11/06/2015** Seq No: **6503441**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.021	0.0100	1.000	0.0005420	102	75	125	1.034	1.22	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511590

ANALYTICAL QC SUMMARY REPORT

BatchID: 215523

Sample ID: **MB-215523**	Client ID:			Units: **mg/L**	Prep Date: **11/10/2015**	Run No: **304000**
SampleType: **MBLK**	TestCode: **METALS, DISSOLVED**	**SW6010C**		BatchID: **215523**	Analysis Date: **11/10/2015**	Seq No: **6507687**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	BRL	0.0100									

Sample ID: **LCS-215523**	Client ID:			Units: **mg/L**	Prep Date: **11/10/2015**	Run No: **304000**
SampleType: **LCS**	TestCode: **METALS, DISSOLVED**	**SW6010C**		BatchID: **215523**	Analysis Date: **11/10/2015**	Seq No: **6507688**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.038	0.0100	1.000		104	80	120				

Sample ID: **1511371-001DMS**	Client ID:			Units: **mg/L**	Prep Date: **11/10/2015**	Run No: **304000**
SampleType: **MS**	TestCode: **METALS, DISSOLVED**	**SW6010C**		BatchID: **215523**	Analysis Date: **11/10/2015**	Seq No: **6507690**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	0.9939	0.0100	1.000		99.4	75	125				

Sample ID: **1511371-001DMSD**	Client ID:			Units: **mg/L**	Prep Date: **11/10/2015**	Run No: **304000**
SampleType: **MSD**	TestCode: **METALS, DISSOLVED**	**SW6010C**		BatchID: **215523**	Analysis Date: **11/10/2015**	Seq No: **6507691**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium	1.032	0.0100	1.000		103	75	125	0.9939	3.75	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511590

ANALYTICAL QC SUMMARY REPORT

BatchID: R303950

Sample ID: **MB-R303950**	Client ID:			Units: **mg/L**	Prep Date:		Run No: **303950**
SampleType: **MBLK**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R303950**	Analysis Date: **11/06/2015**		Seq No: **6506431**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R303950**	Client ID:			Units: **mg/L**	Prep Date:		Run No: **303950**
SampleType: **LCS**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R303950**	Analysis Date: **11/06/2015**		Seq No: **6506432**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4586	0.0100	0.5000		91.7	90	110				

Sample ID: **1511590-001CMS**	Client ID: **15309-MW-27**			Units: **mg/L**	Prep Date:		Run No: **303950**
SampleType: **MS**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R303950**	Analysis Date: **11/06/2015**		Seq No: **6506448**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4522	0.0100	0.5000		90.4	85	115				

Sample ID: **1511590-001CMSD**	Client ID: **15309-MW-27**			Units: **mg/L**	Prep Date:		Run No: **303950**
SampleType: **MSD**	TestCode: **Hexavalent Chromium in Water SW7196A**			BatchID: **R303950**	Analysis Date: **11/06/2015**		Seq No: **6506450**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4487	0.0100	0.5000		89.7	85	115	0.4522	0.777	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: BROWN AND CALDWELL
Project Name: MacGregor
Workorder: 1511590

ANALYTICAL QC SUMMARY REPORT

BatchID: R304139

Sample ID: **MB-R304139**	Client ID:		Units: **mg/L**	Prep Date:	Run No: **304139**
SampleType: **MBLK**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**		BatchID: **R304139**	Analysis Date: **11/06/2015**	Seq No: **6510755**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium as Cr+3	BRL	0.0100									
Chromium, Hexavalent	BRL	0.0100									

Sample ID: **LCS-R304139**	Client ID:		Units: **mg/L**	Prep Date:	Run No: **304139**
SampleType: **LCS**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**		BatchID: **R304139**	Analysis Date: **11/06/2015**	Seq No: **6510756**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4609	0.0100	0.5000		92.2	90	110				

Sample ID: **1511590-001CMS**	Client ID: **15309-MW-27**		Units: **mg/L**	Prep Date:	Run No: **304139**
SampleType: **MS**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**		BatchID: **R304139**	Analysis Date: **11/06/2015**	Seq No: **6510760**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4533	0.0100	0.5000		90.7	85	115				

Sample ID: **1511590-001CMSD**	Client ID: **15309-MW-27**		Units: **mg/L**	Prep Date:	Run No: **304139**
SampleType: **MSD**	TestCode: **Hexavalent Chromium, Dissolved SW7196A**		BatchID: **R304139**	Analysis Date: **11/06/2015**	Seq No: **6510762**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.4486	0.0100	0.5000		89.7	85	115	0.4533	1.04	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Appendix D: Laboratory Stipulation Letter

AES

Analytical Environmental Services, Inc.,
3785 Presidential Parkway
Atlanta, GA 30340

Stipulation of Approval for Commercial Laboratory

According to Georgia State Law (O.C.G.A. 12-2-9) Commercial Rules for Commercial Laboratory Accreditation, any person submitting data to EPD prepared by a commercial laboratory shall stipulate that the laboratory is approved (Chapter 391-3-26-.05). The following information is provided as requested.

Laboratory	Analytical Environmental Services, Inc. (AES) 3785 Presidential Parkway, NE Atlanta, GA 30340 (770) 457-8177
Accredited By:	State of Florida, Department of Health, Bureau of Laboratories; Accrediting NELAP Authority
Accreditation ID:	E87582
Scope:	Clean Water Act – Extractable Organics, General Chemistry, Metals, Microbiology, Pesticides-Herbicides, PCBs, Volatile Organics RCRA/CERCLA – Extractable Organics, General Chemistry, Metals, Pesticides-Herbicides, PCBs, Volatile Organics
Effective:	July 1, 2012
Expires:	June 30, 2013

I further certify that the sample(s) for which this data is being submitted has been handled pursuant to the appropriate chain of custody. Any question regarding this stipulation of approval may be directed to AES at 770 457-8177. Thank you for your business and please do not hesitate contacting us if we can be of further assistance.

James Forrest

Director of Project Management
September, 19 2012

Appendix E: Updated Fate and Transport Model Technical Memorandum

Brown AND Caldwell

220 Athens Way, Suite 500
Nashville, Tennessee 37228

T: 615.255.2288
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Technical Memorandum

Prepared for: MacGregor Golf Group

Project Title: Former MacGregor Golf Company, Voluntary Remediation Program Services

Project No: 145096

Technical Memorandum

Subject: Updated Fate and Transport Model Evaluation
Former MacGregor Golf Company Site
HSI Site No. 10398

Date: January 28, 2016

To: Sarah Jones, PhD, CHMM, Principal Ecotoxicologist, Brown and Caldwell

From: Gregory L. Christians, PG, Associate Hydrogeologist, Brown and Caldwell

Copy to: File

Prepared by: _____
Gregory L Christians, PG, Associate Hydrogeologist

Reviewed by: _____
Jeff Weaver, PG, Managing Hydrogeologist

Limitations:

This document was prepared solely for the Brunswick Corporation, Albany Sport, Co., and Albany Partners, LLC (the Group) in accordance with professional standards at the time the services were performed and in accordance with the contract between the Group and Brown and Caldwell dated September 18, 2013 and amended on February 20, 2014 and April 24, 2014. This document is governed by the specific scope of work authorized by the Group; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the Group and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 1: Introduction

In compliance with the Georgia Environmental Protection Division's (EPD's) Voluntary Remediation Program (VRP), a fate and transport model was developed for the Former MacGregor Golf Company Site (Site) in Albany, Georgia and submitted to the EPD on January 19, 2015. The model was used to evaluate whether the current observed site constituents of concern (COCs) would migrate to or beyond the current property lines and to project future COC concentrations in groundwater. The model suggested that COC concentrations associated with the MW-19 area would migrate beyond the property lines and ultimately attenuate to below the Site VRP cleanup level between 25 to 30 years. Therefore, off-site shallow temporary monitoring wells (TW-43 and TW-44) were installed to further evaluate the extent of COCs down-gradient of MW-19. Following this, two permanent shallow monitoring wells (MW-27 and MW-28) were installed for long term monitoring and as points of compliance.

The COC concentrations from these additional temporary and permanent monitoring wells were used to update the transport model and to evaluate the predicted extent and potential cleanup times of COCs associated with the MW-19 area. This technical memorandum (TM) documents the selection and use of the updated fate and transport models employed for this Site, and summarizes the updated modeling results.

Because of the previous transport model predictions, down-gradient off-site shallow temporary monitoring wells TW-43 and TW-44 were installed and sampled in July 2015 (Figure 1). Two shallow permanent monitoring wells MW-27 and MW-28 were installed in October 2015 and sampled in November 2015. These wells were installed for long-term monitoring and down-gradient points of compliance (Figure 1). Groundwater samples were also collected from MW-11, MW-19, and MW-24 during the July 2015 sampling event. The updated fate and transport model incorporated the COC concentrations from the temporary monitoring wells collected in 2014 and 2015 and COC concentrations form the permanent existing and newly installed monitoring wells collected in July of 2015 and November or 2015.

The updated fate and transport modeling effort documented in this TM focused on assessing hexavalent chromium migration around monitoring wells MW-11, MW-19, and MW-24. The specific objectives were to evaluate, whether concentrations at MW-11 and MW-24 will decline to below the Site VRP groundwater cleanup level up-gradient of the property boundary, and to evaluate hexavalent chromium migration down-gradient of MW-19 to allow a point of compliance to be established and monitored. This TM summarizes key assumptions and the results of this modeling effort.

1.1 Objective

The primary objective of this updated fate and transport modeling effort was to evaluate localized hexavalent chromium migration and provide sufficient predictive data to assess compliance with VRP remediation requirements. Specific objectives were as follows:

- Access whether dissolved phase hexavalent chromium concentrations around MW-11 and MW-24 will fall below the Site VRP groundwater cleanup level of 0.010 milligram per liter (mg/L) before reaching an off-site boundary
- Evaluate the predicted extent of hexavalent chromium migration down-gradient of MW-19 to allow a point of compliance to be established and monitored.
- Evaluate the predicted migration extent and estimated time for dissolved phase hexavalent chromium concentrations around and down-gradient of MW-19 to fall below the Site VRP groundwater cleanup level of 0.010 milligram per liter (mg/L).

1.2 Conceptual Site Model

The development of a Conceptual Site Model (CSM) is a critical part of a site investigation and remediation project and as it serves as the basis for understanding hydrogeologic conditions and how these conditions influence the fate and transport of released COCs. The following is a brief discussion of the CSM for this Site.

1.2.1 Site Hydrogeology

Two separate water bearing units have been identified at this Site. The upper water bearing zone is an unconfined surficial aquifer that occurs within the undifferentiated overburden. Beneath this unit is the Upper Floridian Aquifer, or lower water bearing zone, which is a member of the Ocala Limestone. Site COCs observed within the upper water bearing zone will be the primary focus of this evaluation.

The upper water bearing zone is primarily comprised of two units. The upper vadose zone layer is approximately 10 to 13 feet thick and is comprised of sandy clay. Below this unit is an approximately 20-foot thick vadose zone comprised of fine sand. At the base of this sand is a thin cemented unit that is generally observed at or near the water table. This unit may be associated with mineral cementation occurring at or just above the water table.

The lower portion of the upper water bearing unit underlying the vadose zone ranges in thickness from approximately 20 to 30 feet and is comprised of unconsolidated heterogeneous and discontinuous lenses of sand, silty sand, silt, silty clay, and weathered bedrock. The weathered bedrock is the most continuous unit observed; and is comprised of silt to very-fine clayey sand. The basal portion of this unit is generally characterized as a thin zone of lower permeable clays.

The lower water bearing unit is the upper Floridan Aquifer, which ranges in depth from approximately 55 to 70 feet below ground surface (bgs) at the Site. The upper Floridan Aquifer, based on bedrock cores, has been characterized as a massive limestone with fractures being predominately bedding plane fractures. The Floridan Aquifer is known for its highly karstic nature; however, karst conduits in the upper 10 to 20 feet of the bedrock have not been observed at the Site. Given the known karst nature of the Floridan Aquifer, it is assumed that karst features increase in nature and frequency with depth and become the controlling regional water transport feature in the underlying aquifer system.

Groundwater elevations within the upper water bearing zone generally range from approximately 161 to 165 feet above mean sea-level (ft amsl) across the Site. Slug tests suggest that sufficient permeability is present within the upper water bearing zone to allow it to behave as a local-scale aquifer with predominately-lateral flow. The underlying karst Floridan Aquifer with its potential hydraulic conductivities, which can be as great as two to three orders of magnitude greater than the overlying unit, impacts the flow behavior within the upper water-bearing units. This relative hydraulic conductivity difference between the upper water bearing zone and the underlying Floridan Aquifer makes the upper water bearing zone behave as an aquitard instead of as an aquifer where lateral flow predominates. This is illustrated by the vertical head difference observed between the coupled monitoring wells MW-11 and MW-6. Both monitoring wells are screened within the upper unconsolidated water bearing zone. MW-11 is screened near the water table with a groundwater elevation of 163.73 ft amsl (measured in March 2014). MW-6 is screened at the base of the upper water bearing zone with a groundwater elevation of 160.25 ft amsl (measured in March 2014). A comparison of these elevations indicates a vertical head difference of 3.48 ft. Although this value has varied through time, the vertical head relationship between these two monitoring wells has been relatively consistent. Observing a vertical head loss within a shallow water table aquifer is a common occurrence where the aquifer or system is underlain by the high permeable Floridan Aquifer system. As a result, the upper, unconsolidated, water bearing zone has both a lateral and vertical component of groundwater flow.

An understanding of lateral flow in such a system is gained by measuring groundwater elevations in wells with similar screen lengths and elevations. Incorporating data from monitoring wells that are screened at different elevations will result in erroneous interpretations of lateral flow within the upper water bearing zone. Following the 2014 groundwater elevation monitoring events, the screen length and depth of each well within the upper water bearing zone was re-evaluated and the group of upper water bearing zone wells was confirmed based on the screen elevation. The March 2014 upper water bearing zone potentiometric surface based on the new well grouping is presented on Figure 2. As shown on the figure, lateral groundwater flow is complex on the site. Both in March and January of 2014, groundwater flow generally flowed to the southeast near MW-11, to the southeast near MW-17, to the northwest near MW-12 and ultimately south-southwest, and exits the Site along the southern border near MW-16 and MW-19. Under normal flow conditions, groundwater within the upper water bearing zone would be expected to flow to a localized or regional discharge area. Currently, the regional discharge point is the Flint River, which is located approximately 1.9 miles to the east of the Site. No localized discharge areas or influence on groundwater flow have been identified. In the absence of these influences, localized groundwater flow within the upper water bearing zone is most likely influenced by lateral variations in hydraulic conductivity. This is consistent with the heterogeneity observed within this unit and was be further supported during model calibration.

Historically, groundwater elevations within MW-6, MW-24, and MW-26 have been included in the lower water bearing zone potentiometric surface maps due to their similarities to bedrock groundwater elevations in the vicinity of these monitoring wells. However, these wells are screened at the base of the upper water bearing zone, not the bedrock. Additionally, upon inspection, groundwater elevations within these wells are approximately 0.25 to 0.5 feet higher than one would predict based on the potentiometric surface elevation derived from the bedrock monitoring wells. As a result, MW-6, MW-24, and MW-26 are interpreted as monitoring groundwater that is part of the upper water bearing zone. As indicated, vertical head losses have been observed between the upper and lower portion of the upper water-bearing unit. Typically, in an aquifer such as this, lateral flow within the lower portion of the aquifer generally mimics lateral flow within the upper portion of the aquifer system. Though data is limited, groundwater elevations collected from TW-11, TW-23, TW-24, MW-6, MW-24, and MW-26 generally have shown groundwater flow to the southeast, which is consistent with groundwater flow within the upper portion of the water bearing zone in this area of the site.

Historic groundwater elevation data collected from MW-6, MW-24, and MW-26 have shown groundwater flow in the base of the upper water-bearing zone to be to the north-northwest. The possible presence of irrigation well on the farm property located north of the Site was suggested by EPD in the December 10, 2014 meeting with the Group as a cause of the observed gradient reversal. BC subsequently contacted the landowner and determined that no well exists or had existed on the farm property. The groundwater flow variations potentially result during times of elevated recharge as a result of the heterogeneity of the aquifer system and localized occurrence of impervious surfaces. It is believed that these conditions are temporary in nature and that the controlling groundwater flow direction is to the southeast. This is generally supported by the hexavalent chromium concentrations observed during the 2014 delineation fieldwork around MW-24. The highest hexavalent chromium concentration was observed in the groundwater sample from temporary well TW-11. Other detected concentrations of hexavalent chromium generally declined exponentially, with the primary axis of the plume extending to the south-southeast. The absence of hexavalent chromium in wells TW-23 and MW-26 at or near the northern property line supports that occasional flow reversals are temporary and do not play a significant role in long-term lateral transport.

The March 2014 potentiometric surface map for the lower water bearing zone (upper portion of the Floridan Aquifer) is presented on Figure 3. Groundwater elevations range from 160.7 ft amsl in MW-7 to 158.89 ft amsl in MW-17. Groundwater flow is generally to the east toward the Flint River, which is the regional discharge point for the bedrock aquifer.

1.2.2 Distribution of Site Constituents of Concern

All Site hexavalent chromium concentrations are observed within the upper water bearing zone around MW-11, MW-19, and MW-24. Hexavalent chromium concentrations observed near MW-11 and MW-19 are associated with the upper, or shallow, portion of the upper water bearing zone. The distribution of hexavalent chromium at these two locations is presented on Figure 4. Hexavalent chromium concentrations observed around MW-24 are associated with the base, or lower portion, of the upper water bearing zone. The distribution of hexavalent chromium associated with the MW-24 area is presented on Figure 5. The data shown in Figures 4 and 5 represent the starting concentrations used in the transport model.

1.3 Fate and Transport Models

As indicated above, the upper water bearing zone and the underlying Floridan Aquifer are the primary lateral migration pathways associated with the Site and therefore, a diagnostic level fate and transport model was developed to evaluate COC migration within these units. Several axial 1- and 2-dimensional fate and transport analytical models were initially evaluated for use as the diagnostic level model for the Site. However, due to complexities associated with groundwater flow within the upper water bearing zone, the simple 1- and 2-dimensional analytical models were deemed inappropriate to meet the objectives of this evaluation. As a result, a numerical model using MODFLOW and MT3D were selected and updated to evaluate flow and transport, respectively.

The updated diagnostic level groundwater flow model was developed using the MODFLOW 2000 computer code (Harbaugh et al., 2000). A diagnostic level flow model is a model that reasonably represents Site groundwater flow conditions, and uncertainty. A diagnostic level model was constructed and calibrated and provides a reasonable representation of Site conditions which can be used to adequately access Site risks. Solute transport modeling was performed using the MT3DMS version of the MT3D computer code coupled with the results of the flow model (Zheng, 1990). Development and quality assurance/quality control (QA/QC) of this numerical model was fully integrated using the ArcGIS™ (Version 10) Geographic Information System (GIS) software (ESRI, 2011) so that model results and input data were fully compatible between current spreadsheet, database, GIS, and modeling software packages. Groundwater Vistas, version 6 (ESI, 2011), was used as a graphic user interface to facilitate integration of model data with GIS, as well as pre- and post-processing of the numerical model files.

Section 2: Flow Model Development

2.1 Model Specifications

Table 1 presents the general specifications of the flow and transport model setup. Specific details and assumptions associated with the model are presented in the following sections.

2.2 Model Grid

A model domain of 4,300 ft by 6,800 ft was selected to model flow within the upper water bearing zone and the underlying Floridan Aquifer. The long axis of the model domain was set generally parallel to the observed groundwater flow direction in the Floridan Aquifer. The model domain and grid layout is presented on Figure 6. The grid was developed as a telescoping grid. The finest grid sizes were located within the area of interest and have a starting cell size of 5 ft by 5 ft. The area of interest covers the extent of the hexavalent chromium plumes and their potential migration pathways. Once the grid extends outside the primary area of interest, the cells are increased by a factor of 1.5 until the cells reach a maximum cell size of 100 ft by 100 ft.

2.3 Model Layering

Two layers (Layer 1 and Layer 2) were selected to represent groundwater flow within the upper water bearing zone and the lower water bearing zone (underlying Floridan Aquifer). The top of Layer 1 was varied based on the estimated topographic surface of the Site and surrounding area. The base of Layer 1 was set to an elevation of 142 ft amsl, which represents the average top of bedrock elevation obtained from Site well data. The base of Layer 2 was set at 75 ft amsl, which was deemed to provide a reasonable representation of the characteristics of the upper Floridan Aquifer as observed from Site data.

The estimated thickness of the saturated water-bearing unit Layer 1 within the area of interest was estimated to be approximately 22 to 25 ft. The thickness of the upper portion of the Floridan Aquifer that that is consistent with that previously described in the CSM Section is was assumed to be 67 ft.

2.4 Boundary Conditions

General-head boundary cells were used to represent the margins of the model. The location of the general head boundary conditions are presented on Figure 6. General Head cells were used along the perimeter of the model. The general head cells were used to represent groundwater flow into the model along this perimeter. The general head boundary heads for Layer 1 were estimated by extrapolating groundwater elevations observed on-Site to the edges of the model grid. In areas where no Site groundwater elevation contours were extrapolated, a consistent gradient and flow direction was maintained to mimic the on-Site observations.

The general head boundary heads for Layer 2 were estimated by extrapolating groundwater elevations observed on-Site to the edges of the model grid. Groundwater flow and gradient within Layer 2 was much more uniform. In areas where no Site groundwater elevation contours were present a flow direction and gradient were developed consistent with that observed within the upper Floridan Aquifer Site data.

2.5 Recharge

Average rainfall for the Albany, Georgia area is approximately 50 inches per year. Although the Albany area receives abundant rainfall, most of the precipitation does not recharge the aquifer. Estimates for the Albany area suggest approximately 12 percent of precipitation may recharge in non-urban areas (McLemore, 1990). Using the suggested 12 percent value, an estimated 6 inches per year may reach the upper water-bearing unit. Following numerous calibration runs, a recharge rate of 1.5 inches was selected to best fit the Site conditions. This is on the low end of the potential available recharge but is consistent with a partially urbanized area where much of the rainfall is carried away by surface collection systems.

2.6 Aquifer Parameter

Slug tests were conducted in three upper water-bearing zone wells, MW-1, MW-4, and MW-12. Hydraulic conductivity values ranged from 6.7 ft/day to 15.7 ft./day, with a geometric mean value of 6.4 ft./day. This range in hydraulic conductivity may not cover the total range of the actual hydraulic conductivity variation due to the heterogeneity observed within the upper-water bearing unit. Additionally, slug tests tend to under-estimate actual in-situ hydraulic conductivities by a factor of 2 to 3 (Christians and Brother, 1993). Because of the suspected heterogeneity, lateral hydraulic conductivity distribution was derived through a Pilot Point approach using the PEST inverse model (Doherty, 2010). This approach is an inverse parameterization method that statistically varies hydraulic conductivity to achieve calibration to a complex flow field. The Pest Pilot Point method is an inverse-modeling process that interpolates hydraulic conductivities within individual cells within the model domain allowing heterogeneity to be represented in more detail.

The calibrated hydraulic conductivity distribution for the Site is presented on Figure 7. The Pest calibrated hydraulic conductivities range from 1 ft/day to a localized high of 690 ft/day. This high conductivity zone is located just to the south of MW-22 and MW-25. In conjunction with this localized hydraulically conductive area is a generally broad zone of projected high hydraulic conductivities that trends northeast between MW-10 and MW-19 to monitoring wells MW-2, MW-3, and MW-13. This distribution of hydraulic conductivity was required to match the March 2014 groundwater flow field, which suggests that groundwater flow is generally influenced by this trend during that time period. The zones of elevated hydraulic conductivity values appear somewhat high as compared to general site observations. However, the distribution of hydraulic conductivity in the areas of the hexavalent chromium plumes and their migration pathways are generally consistent with the anticipated hydraulic conductivity values for the upper water-bearing zone.

Hydraulic conductivity tests were conducted in Floridan Aquifer monitoring wells MW-5, MW-8, MW-9, MW-16, MW-17, and MW-20. Hydraulic conductivity values ranged from 2.2 ft/day to 56.5 ft/day, with a geomean value of 16.1 ft/day. Three of the monitoring wells tested had hydraulic conductivity values of 21.5 ft/day, 48.3 ft/day, and 56.5 ft/day. The geometric mean value for these upper bound wells was 38.8 ft/day. This suggests that the bulk hydraulic conductivity associated with the upper portion of the bedrock is higher than the geometric mean value for all the locations tested. During calibration, the hydraulic conductivity of Layer 2 of the upper Floridian Aquifer was fixed at a value of 30 ft/day.

2.7 Stress Periods and Initial Conditions

The calibrated diagnostic level groundwater flow model was initially set-up to produce a steady-state solution for groundwater flow. In support of the updated MT3D transport model simulations, the groundwater flow model was then set to run under transient conditions. A single stress period of 40 years was used in both the flow and transport models to allow for COC plumes to be simulated 40 years into the future.

2.8 Calibration

Given the nature of a diagnostic level model, the flow model was calibrated to target heads in Layer 1 and Layer 2 that were based on the March 2014 measurement event. Hydraulic conductivity, recharge and general head boundary elevation were varied to obtain the best match with observed water levels. The process resulted in simulated groundwater elevations that were similar to those observed in March 2014. The calibrated, simulated groundwater elevation for both layers and a comparison to actual measured groundwater elevation are presented on Figure 8 and Figure 9, respectively. As previously indicated, the PEST parameterization statistical approach was used to develop the hydraulic conductivity field that resulted in the best calibration to heads in Layer 1. A reasonable match between the model heads in both Layer 1 and Layer 2 has thus been achieved.

A graph of simulated groundwater heads and observed heads is provided in Figure 10. The head plot is generally linear suggesting a reasonable calibration (Spitz and Moreno, 1996). Calibration statistics such as absolute residual mean and residual sum of squares are important measures of calibration. The general rule of thumb is that a model is deemed calibrated if one achieved absolute residual mean is equal to or less than 10 percent of the head loss over the critical model domain (Spitz and Moreno, 1996). Ten percent of the head loss across the critical model domain was estimated to be 0.35 ft. The measured absolute residual mean was calculated to be 0.24 ft. An additional calibration statistic is the residual sum of squares, which is a measure of whether the model is biased high or low. The calculated residual sum of mean squares was calculated to be 2.04 ft. The calculated absolute residual mean is within the criteria set forth and the residual sum of squares is low, suggesting that the model is slightly biased high. Given these statistics, the diagnostic level flow model is deemed calibrated and will meet objectives for the flow and updated transport modeling effort.

2.9 Sensitivity

A sensitivity analysis was conducted to determine which of the diagnostic flow model parameters presented the greatest level of model uncertainty. Model parameters of hydraulic conductivity, recharge, and general head boundary conductance were varied independently by using multipliers of 0.5, 0.7, 0.9, 1.1, 1.3, and 1.5; and the sensitivity of the model calibration statistics to these variations was assessed. The general head boundary conductance showed little effect on the quality of the model calibration over the varied ranges of conductance, indicating that the model is relatively insensitive to these parameters. Hydraulic conductivity and recharge showed a proportionally equal but inverse effect on the quality of the model calibration over the range of multipliers; indicating that the model is proportionally equally sensitive to changes in hydraulic conductivity and/or recharge.

The diagnostic level groundwater flow model was calibrated to steady-state conditions based on the values of hydraulic conductivity developed using PEST and recharge estimates varied during calibration. In doing so, the flow model does not present a unique model solution. That is, other combinations of hydraulic conductivity and recharge could also result in a reasonable calibrated solution. The use of transient or aquifer pumping test data, if made available, would allow one to define a more unique model solution. However, BC's current understanding of the CSM, ranges and distributions of hydraulic conductivity, and acceptable ranges of recharge, serve to limit the uncertainty associated with the current model. The current diagnostic level flow-model uncertainty is considered to be within acceptable ranges for its anticipated use.

Section 3: Updated Solute Transport Model Development

3.1 Updated Solute Transport Model

The primary objective of this diagnostic level transport model is to assess the general extent to which the hexavalent chromium within the upper water bearing zone will migrate off-site and at what concentration. The solute transport code, MT3DMS (or MT3D), was used to model behavior of the hexavalent chromium under the primary assumption that observed concentrations within the upper water-bearing unit are residual in nature with no continuing sources present.

For this updated modeling effort, a worst-case scenario was assumed for the individual hexavalent chromium plumes. This scenario assumes that only advection and dispersion act to transport and reduce hexavalent chromium concentrations. The upper water-bearing unit was only represented as a single layer due to the observed complexities within the groundwater flow system. The hexavalent plumes associated with MW-11 and MW-19 have only been observed within the upper portion of the upper water bearing zone. The hexavalent plume associated with MW-24 has only been observed in the lower portion of the upper water bearing zone. Because the upper water bearing zone is only represented as a single layer, the total starting mass of the individual hexavalent plumes will be distributed vertically throughout the entire layer. This has resulted in a conservative over-estimation of the actual hexavalent chromium mass at each of these locations. This is very conservative and may result in an over-estimation of down-gradient migration distances and times to cleanup. However, if the results are acceptable under these conditions, then the actual risk for the Site is less than projected based on these modeling results.

3.2 Transport Model and Parameters

MT3D was used to simulate the transport of hexavalent chromium in the upper water bearing zone. The groundwater flow model grid and cell-to-cell flow parameters were used to support the development of the MT3D transport model. The primary transport parameters used in the model simulation are as follows:

- Only advection and dispersion were used to transport and reduce hexavalent chromium concentrations

- Because hexavalent chromium generally behaves as a conservative compound, no retardation was assumed in the transport model
- Average effective porosity of the upper water bearing zone was assumed to be 25 percent (Freeze and Cherry, 1979). The average effective porosity for the lower water bearing zone (underlying upper Floridan Aquifer) was assumed to be 5 percent to represent the potential for primary flow along bedding plane fractures (Freeze and Cherry, 1979)
- The longitudinal dispersivity was estimated using the Modified Xu and Eckstein equation (Xu and Eckstein, 1995) and an estimated average migration distance of 500 ft. Therefore, the longitudinal dispersivity was estimated to be 18 ft. The transverse and vertical dispersivity was estimated to be 1.8 ft and 0.18 ft, respectively.
- The total transport time was 14,600 days or 40 years
- No ongoing hexavalent chromium sources have been identifies and therefore no on-going sources have been represented in the transport model.
- In order to reduce computational times for the transport simulation, non-essential areas of the transport grid were set to "not active". The active portion of the transport grid encompassed the Site and extended down-gradient to the south approximately 1,000 ft.

3.3 Transport Model Uncertainty

A level of uncertainty exists associated with transport parameters such as dispersivity and porosity. Site-specific data are needed, which would require extensive field and lab testing, to further limit the overall model uncertainty. Given this, the current updated transport model is considered to be a conservative diagnostic level model, meaning that the levels of uncertainty associated with the transport model parameters are understood and are considered to be within acceptable levels to allow the objectives of the transport modeling effort to be met.

Section 4: Predictive Model Simulations

Three scenarios were simulated involving the transport of dissolved phase hexavalent chromium from the MW-11, MW-19, and MW-24 areas. Each scenario assumed that current dissolved phase hexavalent plumes were derived from the most recent temporary well and monitoring well data served as the starting concentration. Each plume was then modeled forward in time 14,400 days or 40 years to access the ultimate nature of the plumes.

4.1 Scenario 1

Scenario 1 includes the transport of the hexavalent chromium plumes near MW-11 and MW-19, which are located in the upper water bearing zone. Figure 11 shows the hexavalent chromium results after 5 years. Concentrations in MW-11 have dropped significantly and will drop below the groundwater standard of 0.01 mg/L in between 5 and 10 years. After 15 years (Figure 12), the plume starting out in the vicinity of MW-19 has thinned, experienced an overall reduction in concentration and mass, and reached its maximum down-gradient extent. The maximum plume extent down-gradient of the southern property line is approximately 375 ft. Figure 13 presents the hexavalent chromium concentration following 25 years. Here the plume associated with MW-19 has shrunk back toward the Site and will fall below the groundwater standard in between 25 and 30 years.

4.2 Scenario 2

Scenario 2 includes the transport of the hexavalent chromium observed near MW-24 at the base of the upper water bearing zone. Figure 14 provides plume concentrations following 40 years. The concentrations have fallen significantly and are well within the property boundaries. The hexavalent chromium plume associated with MW-24 falls below the groundwater standard between 40 and 45 years. It should be noted that no chromium concentration above a Site VRP groundwater cleanup level was observed in the lower water bearing zone (underlying Floridan Aquifer) during this transport simulation.

4.3 Scenario 3

Scenario 3 assumes that all of the hexavalent chromium around MW-24 has migrated into the lower water bearing zone (upper Floridan Aquifer) because of the strong downward gradients. The lower porosity, higher relative hydraulic conductivity values, and overall increase in groundwater velocity in the upper Floridan Aquifer causes the plume to dissipate much more rapidly. As shown on Figure 15, the hexavalent chromium concentrations fall below the groundwater standard after approximately 3 years. If hexavalent chromium concentrations were to leach into the underlying bedrock system, the leaching rate should be relatively slow and allow for a significant dilution factor. This coupled with the higher hydraulic conductivity and lower porosity, are expected to keep bedrock rock concentrations below the groundwater standard. This is consistent with the fact that hexavalent chromium has not been detected in any bedrock well, to date.

Section 5: Conclusions

The primary objective of this updated fate and transport modeling effort was to evaluate localized hexavalent chromium migration and provide sufficient predictions to assess compliance with Site VRP cleanup objectives. The results of the evaluation are as follows:

- Dissolved phase hexavalent chromium concentrations around MW-11 are predicted to stay on-Site and fall below the Site VRP groundwater cleanup level in 5 to 10 years.
- The updated fate and transport modeling effort demonstrated that hexavalent chromium concentrations around MW-19 will migrate approximately 375 feet down-gradient, onto the adjoining Taylor property and will not migrate beyond that property. Dissolved phase hexavalent chromium concentrations around MW-19 are predicted to fall below the Site VRP groundwater cleanup level after 25 to 30 years.
- Dissolved phase hexavalent chromium concentrations around MW-24 are predicted to stay on-Site and fall below the Site VRP groundwater cleanup level in 40 to 45 years.

As noted previously, a conservative approach was taken by assuming hexavalent chromium concentrations throughout the entire thickness of Layer 1. This approach may result in an overestimate of down-gradient migration distances and times to cleanup. The actual extent of migration, time to cleanup, and/or hexavalent chromium concentration is expected to be lower.

Section 6: References

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Spartan Property

SP MW-2
SP MW-1
MW-26
TW-23
TW-24
MW-6
TW-9
MW-14
MW-17
MW-18
MW-22
MW-5
MW-4
MW-23
MW-25
MW-13
MW-3
MW-2
MW-15
MW-12
MW-10
MW-19
MW-1
MW-16
TW-15
TW-2
TW-43
TW-44
MW-28

Taylor Property

N

0 100 200 400 Feet

LEGEND

- Shallow Temporary Upper Water-Bearing Unit Monitoring Well
- Deep Upper Water-Bearing Unit Temporary Monitoring
- Shallow Upper Water-Bearing Unit Monitoring Well
- Deep Upper Water-Bearing Unit Monitoring Well
- Upper Bedrock Well
- Approximate Property Boundaries

Figure 1

Site Layout

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

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Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

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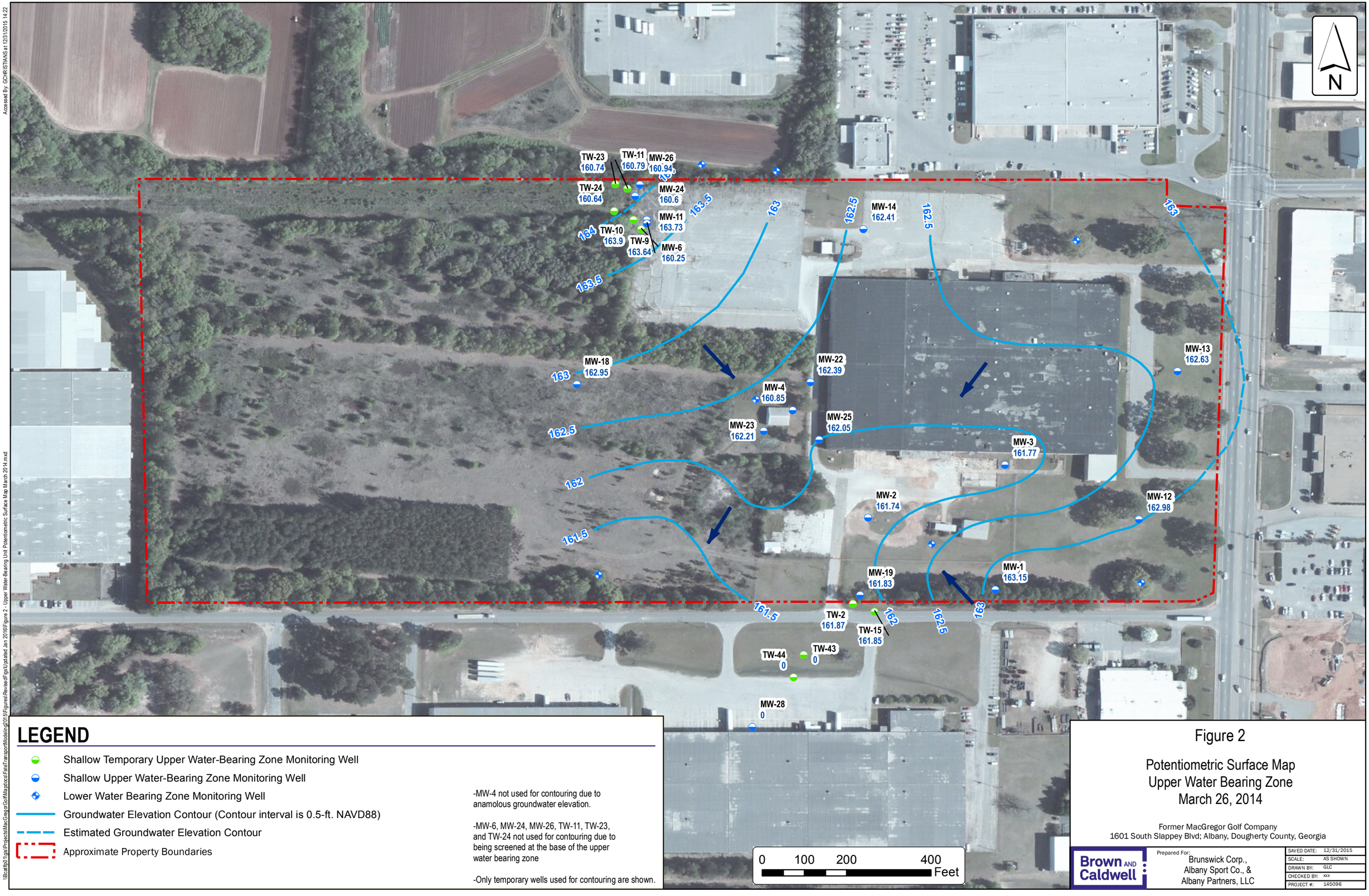
\\Bcafp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigsUpdated Jan 2016\Figure 1 - Site Layout.mxd



LEGEND

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Groundwater Elevation Contour (Contour interval is 0.5-ft. NAVD88)
- Estimated Groundwater Elevation Contour
- Approximate Property Boundaries

-MW-4 not used for contouring due to anamolous groundwater elevation.

-MW-6, MW-24, MW-26, TW-11, TW-23, and TW-24 not used for contouring due to being screened at the base of the upper water bearing zone

-Only temporary wells used for contouring are shown.

Figure 2

Potentiometric Surface Map
Upper Water Bearing Zone
March 26, 2014

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\\Bcalfp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 2 - Upper Water-Bearing Unit Potentiometric Surface Map March 2014.mxd

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\\Bcatfp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\ReviseFigs\Updated Jan 2016\Figure 3 - Upper FLoridan Potentiometric Surface Map March 2014.mxd

LEGEND

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Groundwater Elevation Contour (Contour interval is 0.5-ft. NAVD88)
- Approximate Property Boundaries

Figure 3

Potentiometric Surface Map
Lower Water Bearing Zone
March 26, 2014

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MW-26
Spartan MW-2
Spartan MW-1
TW-23
MW-24
TW-11
MW-11
TW-24
TW-10
TW-9
MW-6
MW-14
MW-17
MW-18
MW-22
MW-13
MW-5
MW-4
MW-23
MW-25
MW-3
MW-2
MW-12
MW-15
MW-10
MW-19
MW-1
MW-16
TW-2
TW-44
TW-15
TW-43
MW-27

N

0 75 150 300 Feet

LEGEND

Hexavalent Chromium Concentration (ug/L)

- 10 - 37 ug/L
- 37 - 75 ug/L
- 75 - 100 ug/L
- 100 - 150 ug/L
- 150 - 186 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 4

Initial Hexavalent Chromium Concentrations Shallow Upper Water-Bearing Zone

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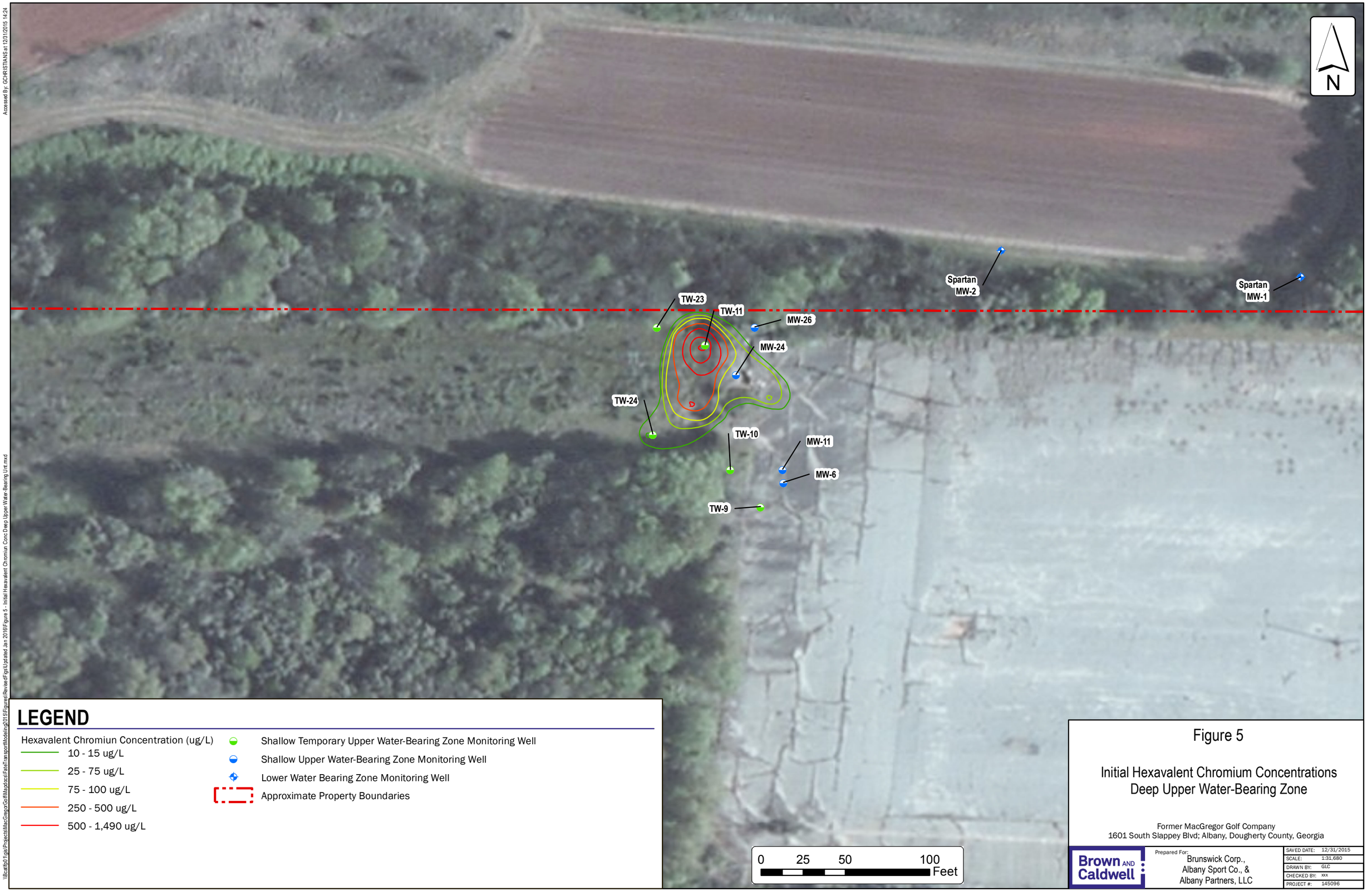
\\Bcal\fp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 5 - Initial Hexavalent Chromium Conc Deep Upper Water-Bearing Unt.mxd



LEGEND

Hexavalent Chromiun Concentration (ug/L)

- 10 - 15 ug/L
- 25 - 75 ug/L
- 75 - 100 ug/L
- 250 - 500 ug/L
- 500 - 1,490 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 5

Initial Hexavalent Chromium Concentrations Deep Upper Water-Bearing Zone

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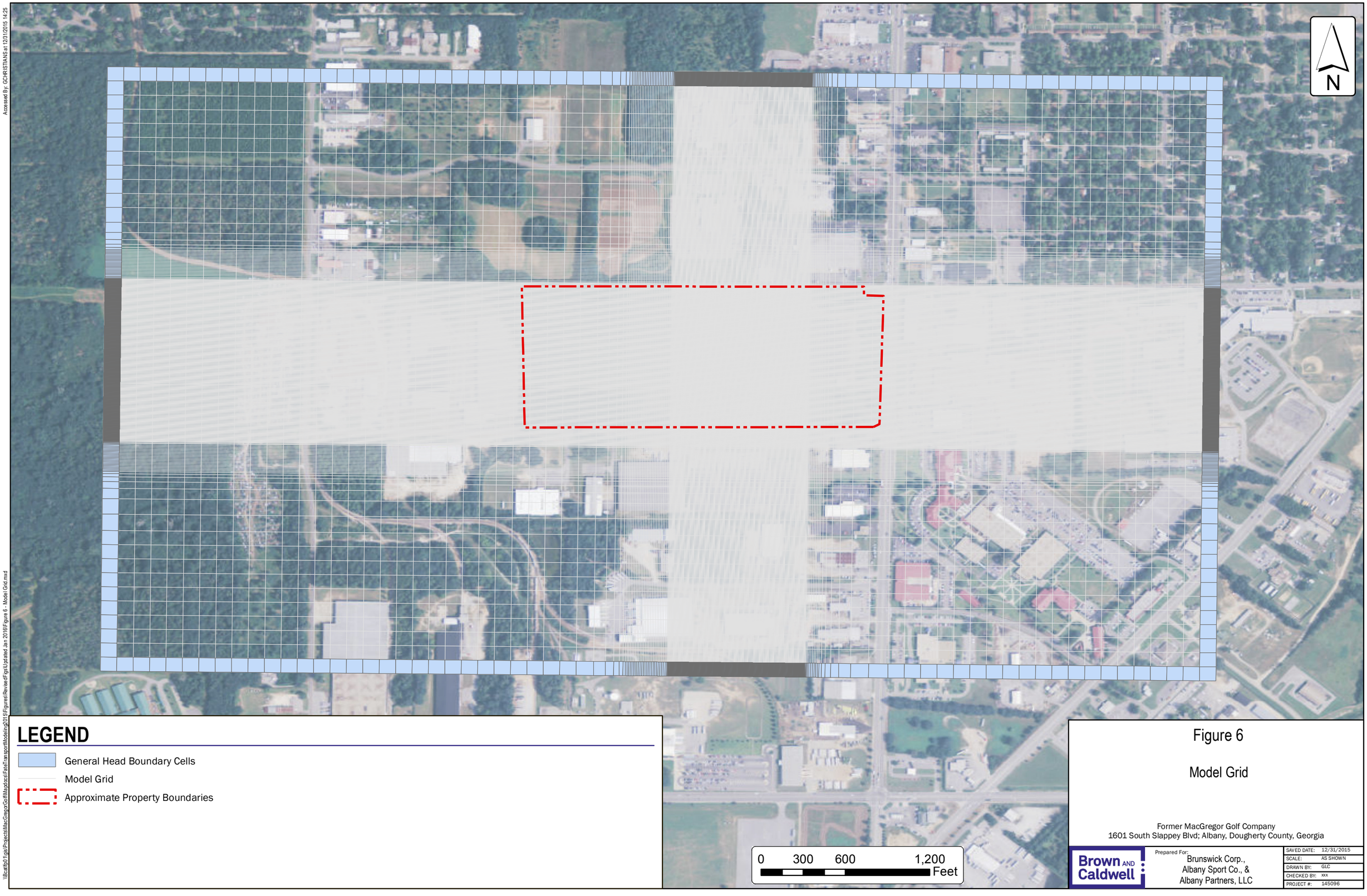

LEGEND

- General Head Boundary Cells
- Model Grid
- Approximate Property Boundaries

Figure 6

Model Grid

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\\Bcatfp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 6 - Model Grid.mxd

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\\Bcafil01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 7 - Layer1 K Distribution.mxd

N

LEGEND

Layer 1 Hydraulic Conductivity (ft/day)

- 0.75 - 1 ft/day
- 1 - 5 ft/day
- 5 - 10 ft/day
- 10 - 20 ft/day
- 20 - 30 ft/day
- 30 - 40 ft/day
- 40 - 50 ft/day
- 50 - 100 ft/day
- 100 - 500 ft/day
- 500 - 700 ft/day

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

0 300 600 1,200 Feet

Figure 7

Model Layer I
Hydraulic Conductivity Distribution

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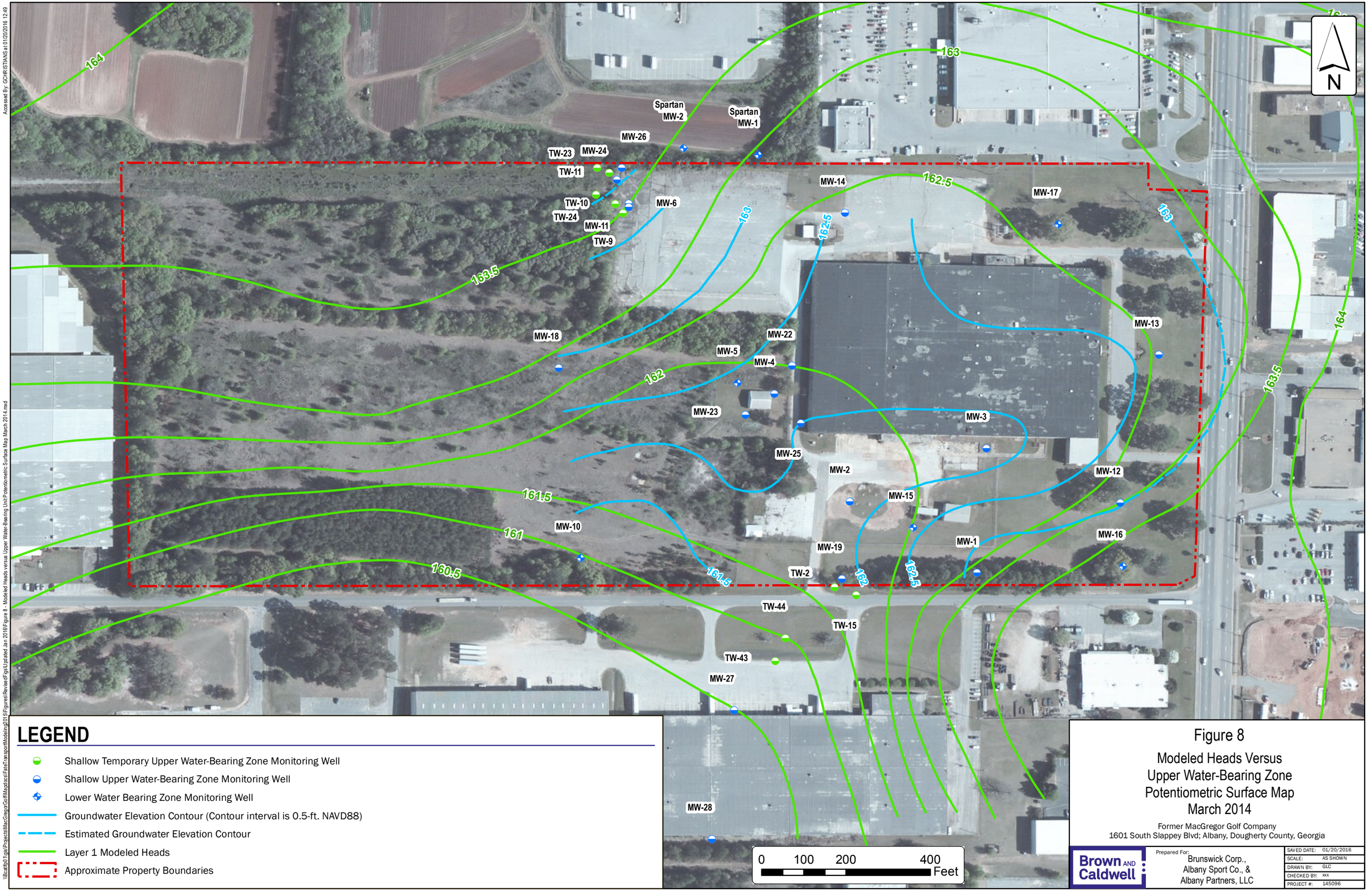

LEGEND

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Groundwater Elevation Contour (Contour interval is 0.5-ft. NAVD88)
- Estimated Groundwater Elevation Contour
- Layer 1 Modeled Heads
- Approximate Property Boundaries

Figure 8

Modeled Heads Versus Upper Water-Bearing Zone Potentiometric Surface Map March 2014

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\\Bcafp01\Igis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigsUpdated Jan 2016\Figure 8 - Modeled Heads versus Upper Water-Bearing Unit Potentiometric Surface Map March 2014.mxd

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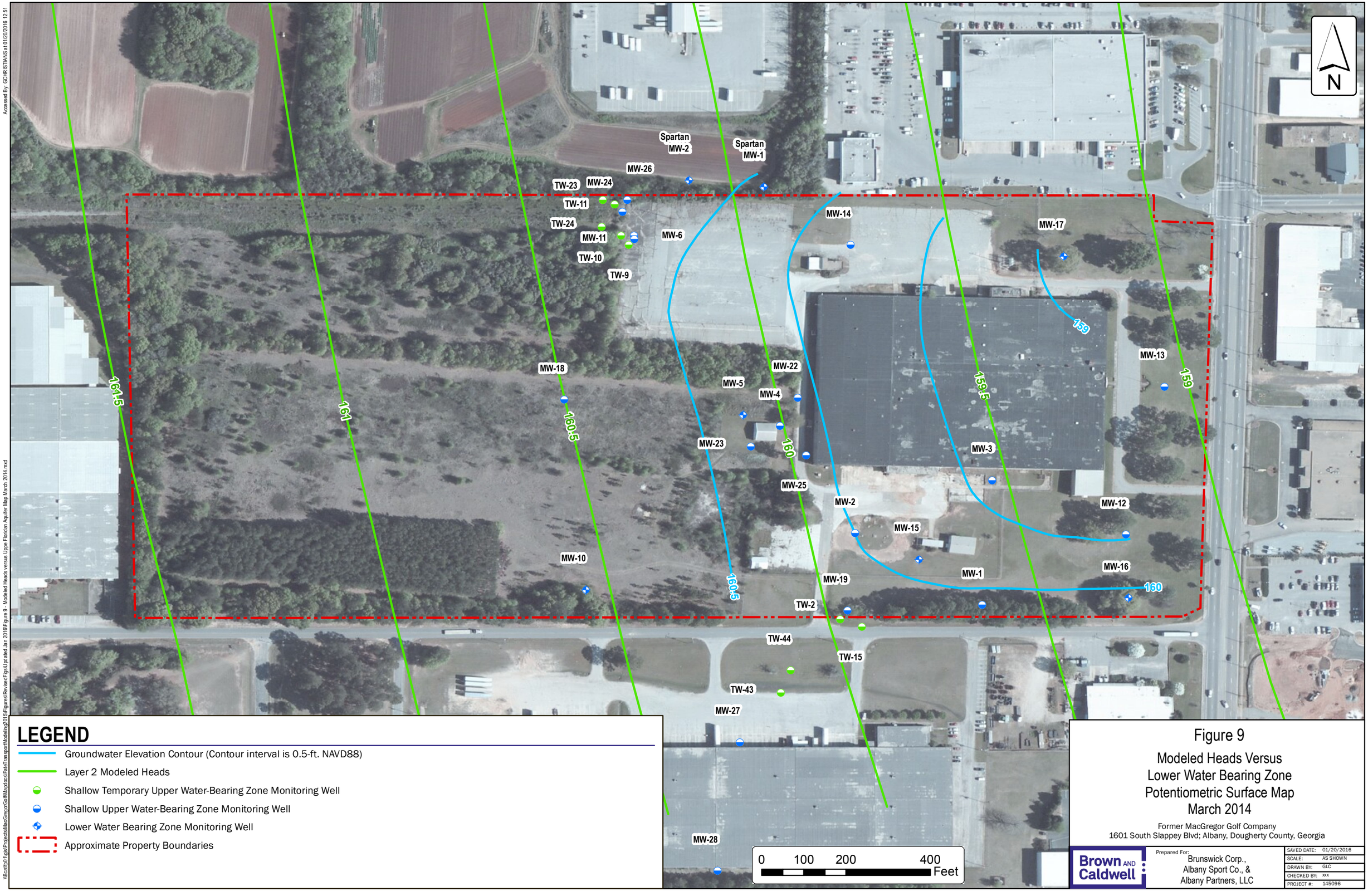
\\Bcaffp01\gis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\ReviseFigs\Updated Jan 2016\Figure 9 - Modeled Heads versus Upper Floridan Aquifer Map March 2014.mxd



LEGEND

- Groundwater Elevation Contour (Contour interval is 0.5-ft. NAVD88)
- Layer 2 Modeled Heads
- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 9

Modeled Heads Versus Lower Water Bearing Zone Potentiometric Surface Map March 2014

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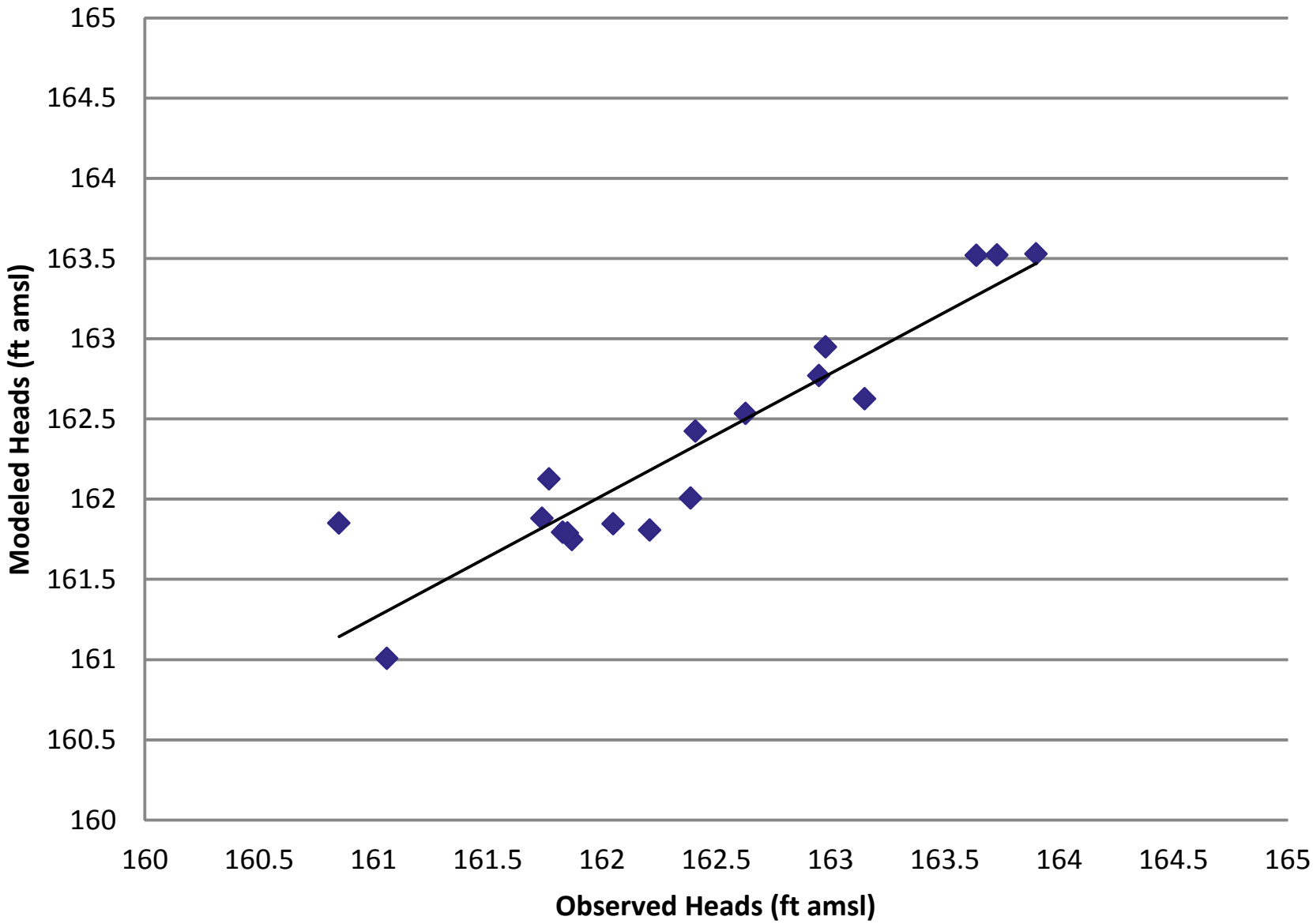

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Figure 10
Modeled Versus Observed Heads

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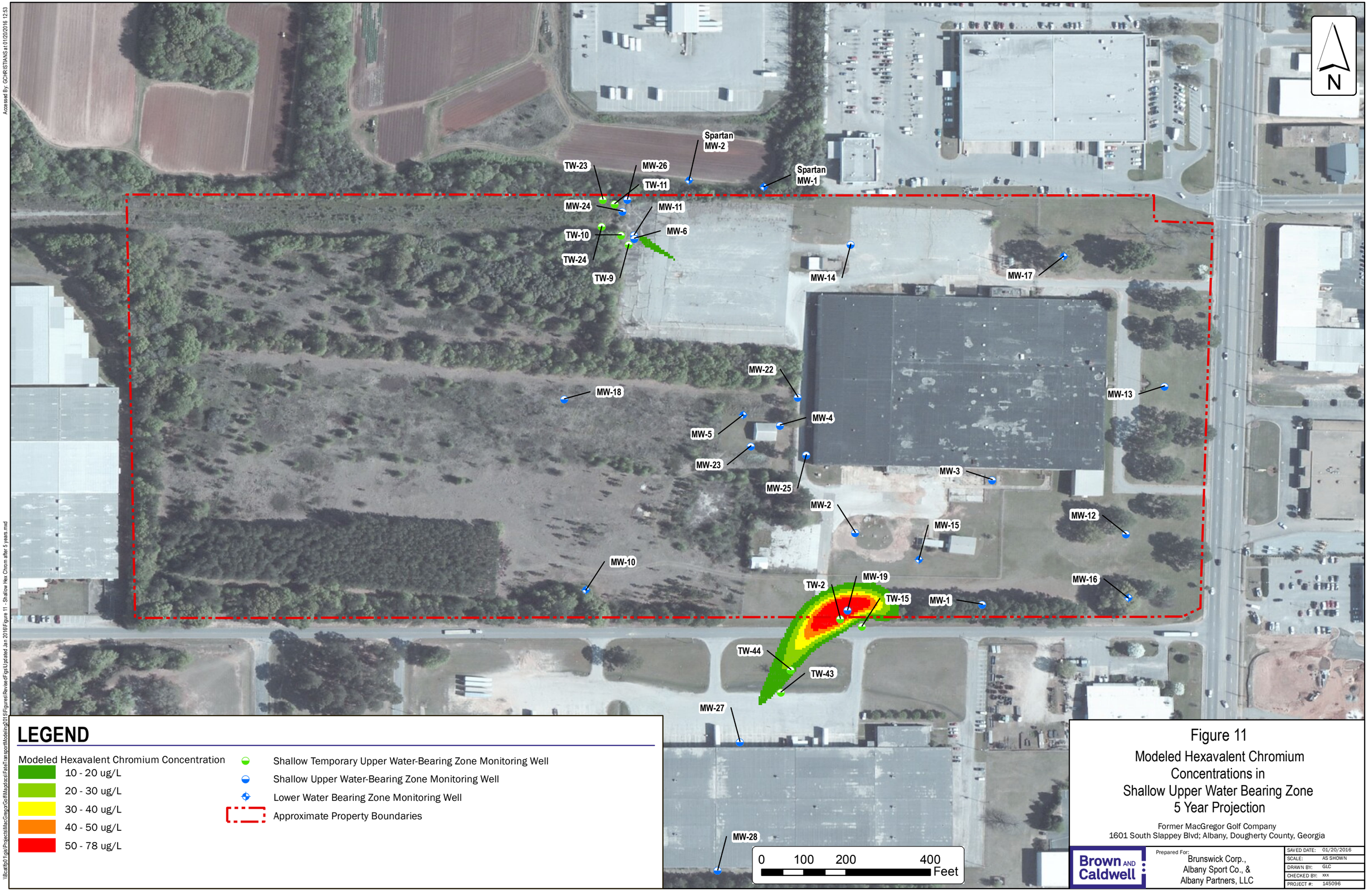
\\Bcatfp01\Igis\Projects\MacGregorGolf\Mxd\cxs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 11 - Shallow Hex Chrom after 5 years.mxd



LEGEND

Modeled Hexavalent Chromium Concentration

- 10 - 20 ug/L
- 20 - 30 ug/L
- 30 - 40 ug/L
- 40 - 50 ug/L
- 50 - 78 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 11

Modeled Hexavalent Chromium Concentrations in Shallow Upper Water Bearing Zone 5 Year Projection

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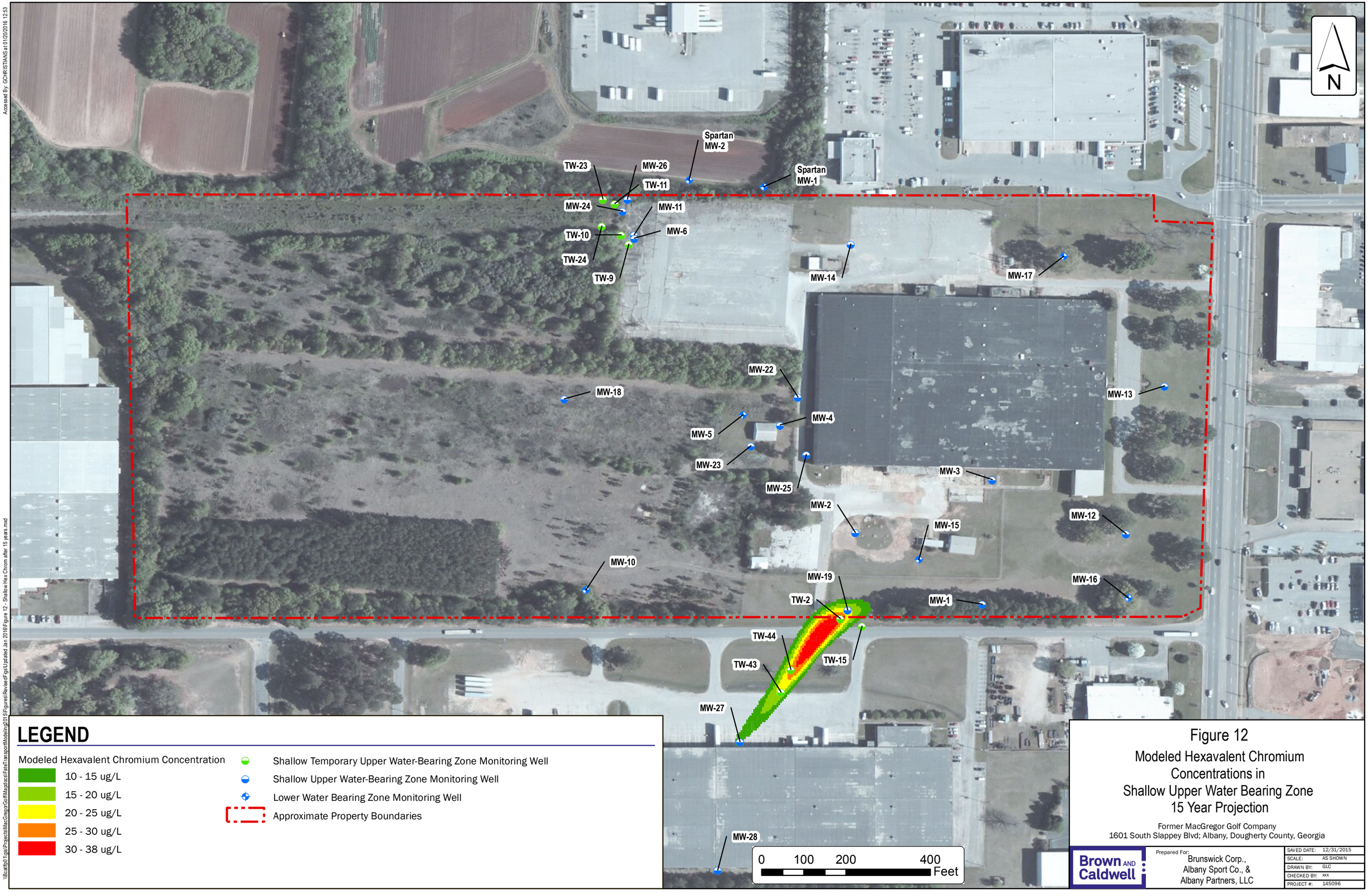
\\Bcatfp01\Igis\Projects\MacGregorGolf\Mxds\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 12 - Shallow Hex Chrom after 15 years.mxd



LEGEND

Modeled Hexavalent Chromium Concentration

- 10 - 15 ug/L
- 15 - 20 ug/L
- 20 - 25 ug/L
- 25 - 30 ug/L
- 30 - 38 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 12

Modeled Hexavalent Chromium Concentrations in Shallow Upper Water Bearing Zone 15 Year Projection

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

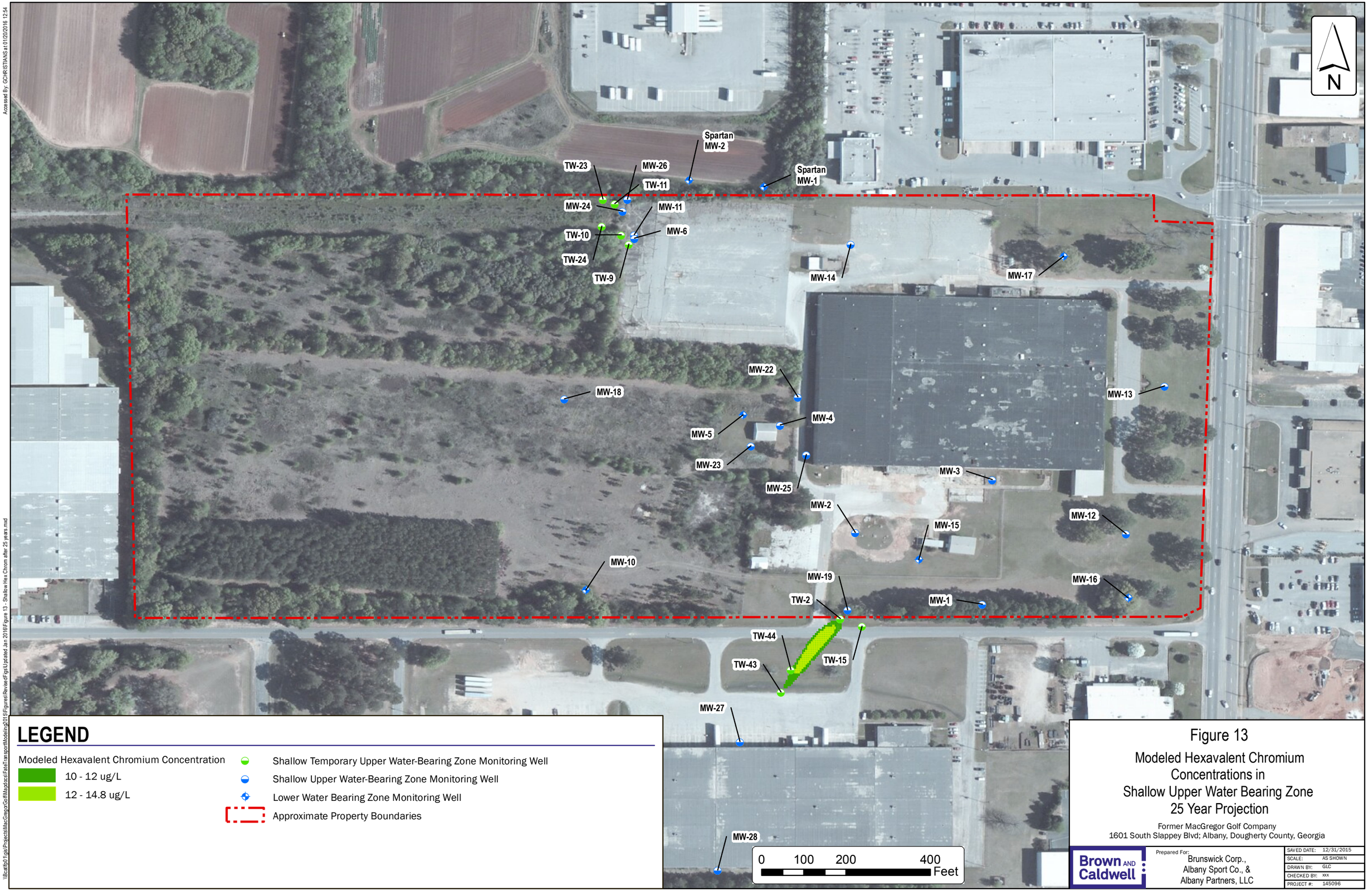
Brown AND Caldwell

Prepared For:
Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

SAVED DATE:	12/31/2015
SCALE:	AS SHOWN
DRAWN BY:	GLC
CHECKED BY:	xxx
PROJECT #:	145096

Accessed By: GCHRISTIANS at 10/20/2016 12:54

\\Bcatfp01\Igis\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 13 - Shallow Hex Chrom after 25 years.mxd



LEGEND

Modeled Hexavalent Chromium Concentration

- 10 - 12 ug/L
- 12 - 14.8 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 13

Modeled Hexavalent Chromium Concentrations in Shallow Upper Water Bearing Zone 25 Year Projection

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For:
Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

SAVED DATE:	12/31/2015
SCALE:	AS SHOWN
DRAWN BY:	GLC
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PROJECT #:	145096

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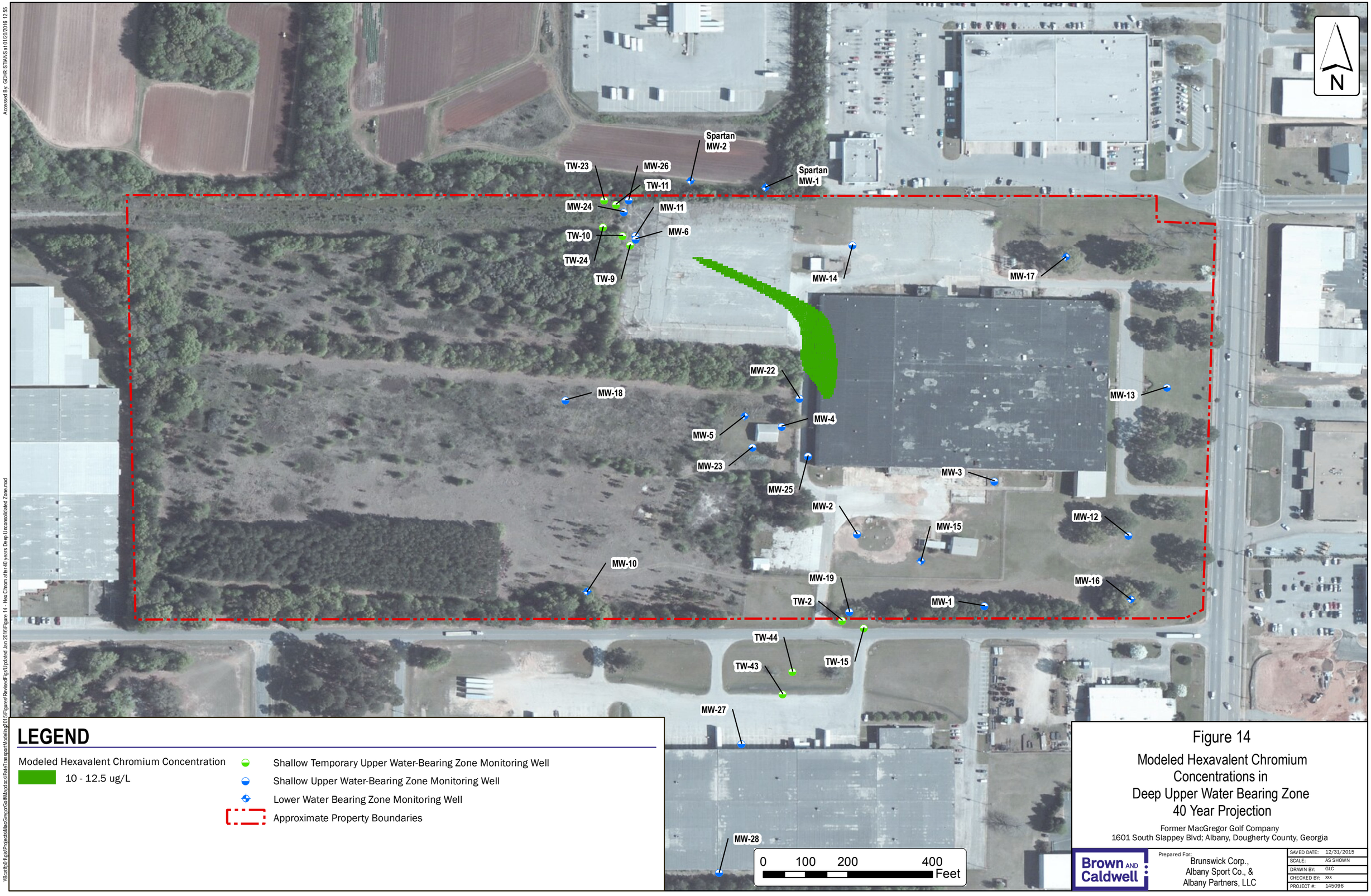
\\Bcatfp01\Igs\Projects\MacGregorGolf\Maps\cs\FateTransportModeling2015\Figures\RevisedFigs\Updated Jan 2016\Figure 14 - Hex Chrom after 40 years Deep Unconsolidated Zone.mxd



LEGEND

Modeled Hexavalent Chromium Concentration

10 - 12.5 ug/L

- Shallow Temporary Upper Water-Bearing Zone Monitoring Well
- Shallow Upper Water-Bearing Zone Monitoring Well
- Lower Water Bearing Zone Monitoring Well
- Approximate Property Boundaries

Figure 14

Modeled Hexavalent Chromium Concentrations in Deep Upper Water Bearing Zone 40 Year Projection

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For:
Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

SAVED DATE:	12/31/2015
SCALE:	AS SHOWN
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CHECKED BY:	xxx
PROJECT #:	145096

N

Spartan MW-2

Spartan MW-1

TW-23

TW-11

MW-26

MW-24

MW-11

TW-10

MW-6

TW-24

TW-9

MW-14

MW-17

MW-22

MW-18

MW-4

MW-5

MW-23

MW-25

MW-3

MW-2

MW-15

MW-12

MW-10

MW-19

MW-16

TW-2

MW-1

TW-44

TW-15

TW-43

MW-27

MW-28

MW-13

0 100 200 400 Feet

LEGEND

Modeled Hexavalent Chromium Concentration

10 - 10 ug/L

Shallow Temporary Upper Water-Bearing Zone Monitoring Well

Shallow Upper Water-Bearing Zone Monitoring Well

Lower Water Bearing Zone Monitoring Well

Approximate Property Boundaries

Figure 15

Modeled Hexavalent Chromium Concentrations in Deep Fractured Bedrock 3 Year Projection

Former MacGregor Golf Company
1601 South Slappey Blvd; Albany, Dougherty County, Georgia

Brown AND Caldwell

Prepared For:
Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

SAVED DATE:	12/31/2015
SCALE:	AS SHOWN
DRAWN BY:	GLC
CHECKED BY:	xxx
PROJECT #:	145096

Table 1. Specifications of the Numerical Flow Model Former MacGregor Golf Company Albany, Georgia	
Model Characteristics	Specifications
Active Model Domain	Approximately 4,300 ft. by 6,800 ft.
Units	Time: Days Length: Feet
Model Grid	540 rows by 433 columns (Active cells)
Cell Size	5 feet to 100 feet
Layering – 1 Layer	Layer 1 (Upper Water-Bearing Unit); Unconfined Aquifer
Layering – 2 Layer	Layer 2 (Underlying Floridan Aquifer); Confined Aquifer
Leakance	Leakance from the overlying upper water-bearing unit into the Floridan Aquifer was calculated based on vertical hydraulic conductivities by the flow model
Hydraulic Parameters	Layer 1 hydraulic parameters were derived using a PEST Pilot Point approach, which is a statistical parameterization method to calibrate complex flow fields. Layer 2 was consistent with measured Site parameters
MODFLOW Packages	MODFLOW 2000 (groundwater flow): Basic, Layer-Property Flow, Discretization, Output Control, Solver, General Head MT3DMS (solute transport)
Boundary Conditions	General head boundaries were used along the perimeter of the flow model for Layer 1 and Layer 2 to simulate site groundwater elevations along said perimeter
Surface Water Interactions	None
Base Flow Model Calibration Period	Steady-state model calibrated to observed heads measured in March 2014 (One Stress Period)
Transport Quasi-Calibration Period	One Transient Stress Period, One time step
Stress Period	Estimated Release Period length: 14,600 days (40 years)