Voluntary Remediation Program Semiannual Progress Report and Final Remediation Plan

Prepared for

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

January 29, 2015

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Submitted to the Georgia Environmental Protection Division

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

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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 Brunswick Corporation, Albany Sport, Co., and Albany Partners, LLC (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 Drive 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 30, 2014 through January 30, 2015.

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 the former Hazardous Site Response Act (HSRA) Program (now part of EPD's Response and Remediation Program). 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 pilot testing in the source area, and soil and groundwater delineation.

1.2 Report Organization

This report presents the work conducted from July 30, 2014 through January 30, 2015, and includes the results of a remedial alternatives evaluation, fate and transport modeling, focused risk assessment on subsurface soils, and conclusions from the December 2014 meeting with EPD.

The report is organized into eight sections. The present section references the project background and provides an outline of the report. The work performed during this period is described in Section 2.0, and Section 3.0 presents the updated Conceptual Site Model (CSM). The current Site status relative to delineation and cleanup standards is presented in Section 4. The Final Remediation Plan, planned near-term actions, and a cost estimate for continuing actions are presented in Section 5. The project Professional Engineer's services this period are summarized in Section 6.0. Limitations associated with the use of this report are noted in Section 7.0, and references cited are provided in Section 8.0.

Section 2

Work Performed this Period

Work at the Site since the submittal of the last Semiannual Progress Report dated July 30, 2014 consisted of the following tasks:

- Remedial alternatives evaluation
- Fate and transport modeling
- Focused risk assessment
- Meeting with EPD

The work conducted this period was focused on evaluating the remedial alternatives for VOCs in groundwater and subsurface soil, and for hexavalent chromium in groundwater. Based on the results of the remedial evaluation, a fate and transport model was developed for the Site. The Group then met with the EPD to discuss the current status of the Site and present the preliminary modeling results. These activities are discussed in the following sections.

2.1 Remedial Evaluation

A remedial evaluation was completed to identify potential remedial approaches for areas at the Site where contaminants of concern (COCs) have been detected at concentrations exceeding Site VRP cleanup levels. The evaluation was conducted to support the Final Remediation Plan for the Site (Section 5) and to satisfy requirements under the VRP. A range of alternatives were evaluated for addressing VOCs in groundwater, VOCs in subsurface soil, and hexavalent chromium in groundwater. The following sections describe the preferred remedial approaches.

2.1.1 VOCs in Groundwater

VOCs have been detected in groundwater above Site VRP cleanup levels in monitoring well MW-4. This well is located near the former source area (Figures 2 through 4) and is screened in the upper water bearing zone. Based on the recent groundwater level measurements, groundwater in the upper water bearing zone in the area of MW-4 is flowing predominantly to the south (Figure 5). Tables 1 and 2 provide well construction details and groundwater elevation measurements. Trichloroethene (TCE) and its daughter products cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) reached their maximum groundwater concentrations of 0.460 milligrams per liter (mg/L), 3.7 mg/L, and 0.065 mg/L, respectively, between 1995 and 1999. Zero valent iron (ZVI) injections via pneumatic fracturing were conducted around monitoring well MW-4 in May 2003 and February 2004. By July 2010, TCE, cis-1,2-DCE, and VC concentrations had declined to 0.200 mg/L, 0.690 mg/L, and 0.025 mg/L, respectively. Concentrations of these VOCs had further declined to 0.097 mg/L, 0.290 mg/L, and 0.011 mg/L by January 2014, but 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 3.

Given the continued decline in VOC concentrations in MW-4, it is apparent that natural attenuation is occurring at a sufficient magnitude to keep the limited VOC plume in a state of equilibrium or shrinking. Concentration trend analyses were thus completed to identify statistically significant trends in VOC concentrations. As discussed in Section 5.1.1 of the Final Remediation Plan, this approach will be used to demonstrate compliance with the Site VRP cleanup levels for VOCs in groundwater.

2.1.2 VOCs in Subsurface Soil

VOCs have also been detected in subsurface soil near the former source area in borings B-4 and GP-1, located immediately upgradient of MW-4 (Figure 3). Cis-1,2-DCE and VC have been detected at concentrations up to 120 milligrams per kilogram (mg/Kg) and 1.5 mg/Kg, which exceed Site VRP cleanup levels of 7.0 mg/Kg and 0.2 mg/Kg, respectively (Table 4).

The extent of impacted soil has been delineated and is limited to an area approximately 10 feet by 4 feet and to a depth of approximately 10 feet below ground surface. Excavation of impacted subsurface soils in this area is impractical due to its close proximity to the storage shed. The risks associated with the concentrations of VOCs remaining in subsurface soil were thus assessed in a focused risk assessment (RA), as detailed in Appendix A. Due to the depth below ground surface, no ecological receptors are expected to come into direct contact with impacted soils. In addition, the only human receptor that could come into direct contact with impacted soils at that depth is an excavation worker.

Concentration trends in groundwater from MW-4 were also reviewed to assess the actual impact from the migration of VOCs from subsurface soil to groundwater. As further discussed in Section 5.2, the results of the focused RA and groundwater concentration trend analyses will be used to demonstrate compliance with the Site VRP cleanup levels.

2.1.3 Hexavalent 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 a 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 (Figures 2 through 4), is screened in the upper water bearing zone where groundwater is flowing predominantly to the south towards the adjacent property (Figure 5). In October 2013 and January 2014, hexavalent chromium in groundwater in the vicinity of MW-19 was detected at concentrations of 0.284 mg/L and 0.198 mg/L, respectively (Table 3). Total chromium around MW-19 has been vertically and horizontally delineated; however, hexavalent and trivalent chromium have not. Total and hexavalent chromium concentrations remain above the Site VRP cleanup levels.

Monitoring well MW-11 is also screened in the upper water bearing zone, but is located near the northern property boundary (Figures 2 through 4). Based on recent groundwater elevation measurements (Table 1), groundwater in the upper water bearing zone in this area is flowing predominantly to the south. Chromium around MW-11 has been vertically and horizontally delineated, as discussed in previous semiannual progress reports for the Site. Chromium concentrations have declined by an order of magnitude since September 1999, when the concentration of total chromium was 0.37 mg/L compared to the Site VRP cleanup level of 0.10 mg/L. By July 2010 and January 2014, the concentrations of total chromium declined to 0.193 mg/L and 0.0319 mg/L, respectively; however, hexavalent chromium was present in groundwater during these events above the 0.01 mg/L cleanup level at concentrations of 0.0322 mg/L and 0.0351 mg/L, respectively. Refer to Table 3 for historical groundwater detections.

Monitoring well MW-24 is located near the northern property boundary (Figures 2 through 4) and screened at the base of the upper water bearing zone. Chromium in this area has been vertically and horizontally delineated, as discussed in previous semiannual progress reports for the Site. Chromium concentrations have declined since this well was installed in April 2008, and the most recently measured total chromium concentration is less than the cleanup standard. The concentration of hexavalent chromium remains above the cleanup standard (0.0513 mg/L in January 2014; Table 3).

Since hexavalent chromium concentrations in groundwater exceed Site VRP cleanup levels in these three areas (Figure 3 and Table 3), additional action is necessary to demonstrate compliance under the VRP. Based on our knowledge of the Site and available remedial technologies, fate and transport modeling is the preferred approach to demonstrating compliance with the Site VRP cleanup levels for hexavalent chromium in groundwater. In addition to being cost-effective, fate and transport modeling is the least disruptive to Site activities and to off-site impacted properties. The modeling approach is summarized in Section 2.2 and further detailed in Section 5.1.2 and Appendix B.

2.2 Fate and Transport Modeling

As outlined in Section 2.1, a diagnostic level fate and transport modeling will be used to demonstrate compliance with the Site VRP cleanup levels for hexavalent chromium in groundwater. The VRP allows for the use of modeling to demonstrate that concentrations currently exceeding the VRP cleanup levels will not migrate beyond a designated POD. A diagnostic level groundwater model was constructed using MODFLOW and MT3D for the fate and transport components, respectively. The model assumptions and results are summarized in this section, and additional detail is provided in the Technical Memorandum provided in Appendix B of this report.

The diagnostic level groundwater flow model was constructed using the MODFLOW 2000 computer code (Harbaugh et al., 2000). The preliminary 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 with the ArcGIS™ (Version 10) Geographic Information System (GIS) software (ESRI, 2011) so that model results and input data were fully compatible with current spreadsheet, database, GIS, and modeling software packages. Relevant hydrogeologic and groundwater data collected during the course of this project were also stored within the GIS and were imported directly into the modeling software. Groundwater Vistas, version 6.0 build 11 (ESI, 2011) was used as a graphical user interface to facilitate integration of model data with GIS as well as pre- and post-processing of the numerical model files.

The flow model was calibrated to the groundwater elevation data collected in March 2014 for the upper and lower water bearing zones. Hexavalent chromium modeling relied on advection and dispersion processes. Longitudinal, transverse, and vertical dispersion was calculated using the Modified Xu and Eckstein equation that is dependent on plume transport length. The diagnostic flow and transport model was developed using conservative approaches. These approaches 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.

Results of the modeling indicated the following:

- In the vicinity of MW-11, the hexavalent chromium plume (defined as concentrations greater than the cleanup goal of 0.01 mg/L) will not extend beyond the northwest parking lot on the Site (Figure 11 of Appendix B). Concentrations of hexavalent chromium in groundwater in this area are projected to be below the cleanup goal after 5 to 10 years.
- In the vicinity of MW-19, the hexavalent chromium plume will migrate onto the Industry Avenue right-of-way (ROW) and the property on the south side of the ROW (Taylor Enterprises [Taylor] Property) (Figures 11 through 13 of Appendix B). However, the plume will not migrate beyond the Taylor

property. The modeling indicates that concentrations of hexavalent chromium in groundwater in this area will be below the cleanup goal after 25 to 30 years.

- In the vicinity of MW-24, the hexavalent chromium plume will not extend beyond the northern property boundary (Figure 14 of Appendix B). Based on the modeling, concentrations of hexavalent chromium in groundwater in this area are projected to be below the cleanup goal after 40 to 45 years.

2.3 Meeting with EPD

A meeting with EPD was held on December 10, 2014 at 10:30 am Eastern at their offices in Atlanta, Georgia to discuss the current status of the Site relative to VRP delineation and cleanup levels, and to present the preliminary results of the fate and transport model. General conclusions from this meeting are as follows:

- EPD concurred with a narrative approach for addressing VOCs in groundwater and subsurface soil, as initially described in Section 2.1.3 and further detailed in Section 5. EPD suggested that the Final Remediation Plan include an updated conceptual site model showing an excavation worker as the only receptor for subsurface soil, the focused RA for subsurface soil, and the Mann-Kendall statistical analysis of the declining trend in VOC concentrations in well MW-4. EPD confirmed that a narrative approach to demonstrating compliance with cleanup levels is acceptable for VOCs at this Site.
- EPD concurred with the fate and transport modeling approach for addressing hexavalent chromium in groundwater, with the following comments:
    - A new monitoring well will be installed on the Taylor property (Figure 2) to delineate groundwater impact to the south of MW-19. Depending on well placement, this well could also serve as a POD well to assess compliance with the model results. A general location discussed during the meeting was in the grass area directly south of Industry Avenue, between the two bushes/trees. This location may provide a non-detect for groundwater hexavalent chromium now, but is anticipated to show a detection in the future since it is within the modeled projection of the plume. Plans for this delineation well are included in the Final Remediation Plan described in Section 5.1.1.
    - The variations in groundwater flow in the vicinity of MW-24 and the possibility of groundwater migration off-site was discussed. EPD wondered if an irrigation well on the agricultural fields north and northwest of MW-24 (Spartan property, as shown on Figure 2) could be responsible for the variable groundwater levels and flow direction, and the Group agreed to ask Spartan about such a well. Regardless of the presence of an irrigation well on the northern property, EPD requested a narrative describing the updated groundwater flow analysis, and if and how it may impact the model projections. This narrative is included in the fate and transport model technical memorandum, presented in Appendix B.

      Following the meeting, the owner of the Spartan property was contacted and confirmed that no irrigation or water supply wells are present on the property. In addition, there are no active agricultural practices on the property.
- EPD indicated that some groundwater monitoring for model validation would be needed. Annual monitoring for a few years would likely be acceptable.
- EPD indicated that final compliance will be contingent on executing the necessary environmental covenants.

  - For the Site, an environmental covenant would be required to restrict the use of groundwater. If compliance is to be certified to nonresidential standards, the covenant must also restrict land use to nonresidential use. Alternatively, use of specified portions of the property may be restricted to nonresidential use depending on sampling data. No restrictions related to soil are anticipated.
  - The only restriction that may be required on the Taylor property will be the use of groundwater. EPD provided streamlined environmental covenant language for downgradient impacted properties shortly after the meeting.
- EPD will review the Final Remediation Plan and provide a comment letter by the end of March 2015, after which a meeting or conference call will be scheduled to answer questions regarding the Final Remediation Plan and/or fate and transport model. EPD concurred with the approach of contacting the owner of the Taylor property after EPD has approved the Final Remediation Plan and fate and transport model.

Section 3

Updated Conceptual Site Model

This section presents the updated CSM developed for the Site in order to facilitate development of the Site remedial action objectives.

3.1 Elements of the Conceptual Site Model

A three-dimensional CSM was originally developed for the Site's VRP Application (Brown and Caldwell, 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 to reflect current conditions at the Site. Figures 3 and 4 illustrate plan view and profile diagrams of the updated CSM, respectively.

3.1.1 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 normally 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.

3.1.2 Subsurface Features

3.1.2.1 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 4. The thickness of the unconsolidated sediments at the Site is approximately 40 to 50 feet with the thin layers of chert occurring at depths of 18 to 45 feet 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 a recent gauging event (March 2014), groundwater was encountered in the upper water bearing zone between about 31 and 40 feet bgs (Brown and Caldwell, 2014b). A potentiometric surface map is provided in Figure 5.

According to previous reports, waste was poured or spread onto 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 3 and 4 illustrate the approximate areas where VOCs (MW-4 area) and inorganics (MW-11 and MW-19 areas) are present in the upper water bearing zone above the groundwater delineation and/or cleanup standards.

3.1.2.2 Semi-Confining Unit

Between the depths of approximately 50 to 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.

3.1.2.3 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 March 2014 gauging event, potentiometric levels in the wells screened in the lower water bearing zone were between about 33 and 46 feet bgs (Figure 6; Brown and Caldwell, 2014b). VOCs (MW-15 area) are present 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.

3.1.3 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.

3.1.4 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.

A limited interim remedial action consisting of injection of zero valent iron (ZVI) 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 remaining downgradient monitoring wells.

3.2 Receptors and Exposure Pathways

The potential exposure pathways and receptors are identified on Figures 3 and 4, and are detailed in the February 2012 Revised VRP Application (Brown and Caldwell, 2012) and the January 30, 2013 Semiannual Progress Report (Brown and Caldwell, 2013a). Updates to these exposure pathways and receptors are provided below, and are shown on Figures 3 and 4.

Subsurface Soil Exposure Pathways. Subsurface soil was not included as an impacted medium to which receptors could be exposed during the initial receptor survey (Brown and Caldwell, 2012). However, current/future excavation workers could potentially be exposed to impacted subsurface soils located in the former source area, in the vicinity of B-4 and GP-1, during excavation activities. Possible routes of exposure associated with excavation workers include:

- Current/future ingestion of subsurface soil
- Current/future dermal contact with subsurface soil
- Current/future inhalation of vapors and particulates from subsurface soil.

Section 4

Site Status

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.

4.1 Delineation Status

4.1.1 Soil

As discussed in previous reports, horizontal and vertical delineation of Site COCs in soil has been achieved. Historical soil results are presented in Table 4.

4.1.2 Groundwater

4.1.2.1 On-Site Horizontal Groundwater Delineation

As discussed in previous semiannual progress reports, horizontal delineation of VOCs have been achieved. Historical groundwater results are presented in Table 3.

With the sampling conducted in March and June 2014, as discussed in the July 2014 Semiannual Progress Report (Brown and Caldwell, 2014b), on-Site horizontal delineation of chromium (total, hexavalent, and trivalent) in groundwater at the northern end of the property has been achieved. At the southern end of the property, chromium (total, hexavalent, and trivalent) has been horizontally delineated to the north, east, and west. Total chromium has also been horizontally delineated to the south. However, hexavalent and trivalent chromium concentrations above the delineation levels have been measured at and beyond the southern property boundary.

4.1.2.2 Off-Site Horizontal Groundwater Delineation

Off-Site horizontal delineation of hexavalent and trivalent chromium in groundwater has not yet been achieved to the south. The installation and sampling of an additional monitoring well to the south of the property is planned for the 2015 calendar year, as discussed further in Section 5.1.1. No off-Site delineation of VOCs was required as the extent of VOC impact was delineated on-Site.

4.1.2.3 Vertical Groundwater Delineation

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

4.2 Status Relative to Cleanup Goals

4.2.1 Soil

The Site soil is in compliance with the Site VPR 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 exceed the soil cleanup level (Figure 3 and Table 4).

4.2.2 Groundwater

Areas where VRP cleanup levels are not met are discussed below.

MW-4 Vicinity. This well was last sampled in January 2014, and concentrations of TCE, cis-1,2-DCE, and VC were 0.097 mg/L, 0.290 mg/L, and 0.011 mg/L (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.

MW-11 Vicinity. Hexavalent chromium concentrations in monitoring well MW-11 and temporary wells TW-8, TW-22, TW-28 and TW-31 ranged from 0.013 to 0.035 mg/L in 2014, which slightly exceeded the cleanup standard of 0.01 mg/L (Table 3).

MW-19 Vicinity. Total chromium concentrations in monitoring well MW-19 and temporary wells TW-1, TW-4, TW-17, TW-18, and TW-20 ranged from 0.107 to 0.199 mg/L in 2014, which exceeded cleanup standard of 0.10 mg/L. Hexavalent chromium concentrations in monitoring well MW-19 and temporary wells TW-1 through TW-5, TW-17, TW-18, TW-20, TW-25 through TW-27, TW-30, TW-36, TW-39 and TW-41 ranged from 0.020 to 0.199 mg/L in 2014, which exceeded the cleanup standard of 0.01 mg/L (Table 3).

MW-24 Vicinity. Total chromium concentrations in temporary monitoring wells TW-11 and TW-14 in the vicinity of MW-24 were 1.74 mg/L and 0.587 mg/L in March 2014, which exceeded the cleanup standard of 0.10 mg/L. Hexavalent chromium concentrations in monitoring well MW-24 and temporary monitoring wells TW-11, TW-13, TW-14 and TW-24 ranged from 0.013 to 1.49 mg/L in 2014, which exceeded the cleanup standard of 0.01 mg/L (Table 3).

Section 5

Final Remediation Plan

This section describes the Final Remediation Plan for the Site, the planned tear-term steps towards meeting project goals, an updated milestone schedule for the project, and a final cost estimate. Groundwater and soil remediation are discussed separately below.

5.1 Final Remediation Plan for Groundwater

As described in Section 4.2.2, VOCs in groundwater at MW-4 and chromium (total and hexavalent) in groundwater in the vicinities of MW-11, MW-19, and MW-24 currently exceed the Site VRP cleanup levels. The following sections describe the Final Remediation Plan to address groundwater in these areas.

5.1.1 Groundwater VOC Concentration Trend Analysis

Given the continued decline in VOC concentrations in MW-4, it is apparent that natural attenuation is occurring at a sufficient magnitude to keep the limited VOC plume in equilibrium or shrinking. A graph of the TCE, cis-1,2-DCE, and VC concentrations over time is presented on Figure 7. To provide a quantitative assessment of the trends, concentrations of TCE, cis-1,2-DCE, and VC in groundwater from MW-4 were analyzed using the Mann-Kendall Test (Gilbert, 1987). This test is a non-parametric statistical test that is routinely used to identify trends in groundwater concentration data. Groundwater monitoring data from 2004 through 2014 were used in the test, resulting in ten data points (Tables C1 through C3 in Appendix C).

According to test results at a 90 percent confidence level, TCE and cis-1,2-DCE concentrations in monitoring well MW-4 demonstrate statistically significant decreasing trends from 2004 through 2014 (Tables C1 through C3 in Appendix C), while no significant trends were observed in VC concentrations over this time frame. TCE concentrations in groundwater from MW-4 have decreased by approximately 75 percent, from 0.379 mg/L in February 2004 to 0.097 mg/L January 2014. Similarly, cis-1,2-DCE concentrations in groundwater form this well have decreased by approximately 84 percent, from 1.8 mg/L in February 2004 to 0.290 mg/L January 2014. The presence of cis-1,2-DCE and VC indicates that anaerobic degradation of TCE and cis-1,2-DCE are occurring. The fact that VC concentrations have not been increasing or accumulating indicates that VC is also degrading.

In the 20 years of monitoring, the VOC plume from MW-4 has only reached monitoring wells MW-22 and MW-25, which are located approximately 79 feet and 89 feet downgradient of MW-4, respectively. Concentrations in samples from these wells have generally been at or just above the groundwater cleanup standard (maximum TCE concentrations of 0.009 mg/L), and have not been detected in groundwater from these wells since 2010. Thus the VOC plume appears to be contracting. Given the steady decline in VOC concentrations in MW-4 and the contracting plume, VOC concentrations in MW-4 will not migrate off-Site. Given this empirical evidence, detailed transport modeling of VOCs at the Site was not necessary.

5.1.2 Fate and Transport Modeling For Hexavalent Chromium in Groundwater

The Group will use the option of fate and transport modeling of hexavalent chromium in groundwater to demonstrate compliance with the Site VRP cleanup levels that is afforded by the EPD under the VRP program. The model assumptions and results of modeling to date are summarized in Section 2.2, and additional detail is provided in Appendix B of this report.

Groundwater modeling in the vicinity of monitoring wells MW-11 and MW-24 is considered complete. Additional modeling of the MW-19 plume will be conducted to incorporate the new data gained from sampling on the Taylor property south of the Site. In order to obtain these data and complete the modeling, horizontal delineation will be completed and a new well will be installed on the Taylor property, as described below.

5.1.2.1 Horizontal Delineation of Chromium

To support the fate and transport model and to achieve delineation of chromium (hexavalent and trivalent) in groundwater south of MW-19, an additional permanent groundwater monitoring well is planned to be installed on the Taylor property (Figure 2). The installation and sampling of this well is contingent upon executing the necessary access agreement with the owner of the Taylor property. Based on available data, the preferred location of this well is in the grass area directly south of Industry Avenue, between the two bushes/trees. It is anticipated that chromium concentrations in groundwater at this location will be less than the Site VRP delineation and cleanup levels at the time of installation and thus that this well will provide off-Site horizontal delineation to the south.

5.1.2.2 Point of Demonstration Well

Under the VRP, a POD well must be located between the source of groundwater contamination and the actual or estimated downgradient point of exposure. For this Site, the point of exposure would be the hypothetical point of drinking water exposure located 1,000 feet downgradient from the delineated site contamination.

The designated POD well will be the new permanent monitoring well planned to be installed on the Taylor property. Data from the new well will be used to assess compliance with the model results, as its proposed location is within the modeled projection of the chromium groundwater plume. As concentrations in this well increase in the future as expected, the measured concentrations will be compared to those projected by the model.

5.1.3 Environmental Covenants

Environmental covenants restricting future water well installation and withdrawal will be used to prevent exposure to Site contaminants in groundwater in areas where the cleanup levels are exceeded. Based on current groundwater concentrations, environmental covenants are expected to be required on the following properties (identified on Figure 2):

- The subject property
- The property south of Industry Avenue owned by Taylor.

5.1.4 Continued Monitoring

Groundwater monitoring will be conducted annually for a period of three years to verify the declining VOC concentrations in MW-4 and to validate fate and transport model projections for hexavalent chromium. Results will be presented to EPD within 60 days of each monitoring event in the form of a brief letter report containing a summary of monitoring results, comparison of data to cleanup levels and model-projections, groundwater potentiometric maps, and analytical reports. Monitoring will begin promptly after EPD's approval of the Final Remediation Plan, fate and transport model, and the installation of the new well on the Taylor property. Continued monitoring will consist of the following two tasks.

Water Level Measurements. Groundwater levels will be measured in all accessible shallow and deep aquifer wells that can be located, including those located on the Spartan property to the north and the Taylor property to the south. The depth to water from the top of casing (TOC) will be measured and groundwater elevations will be calculated based on surveyed TOC elevations. The groundwater elevations will be used to prepare updated potentiometric maps of the shallow and deep groundwater surfaces to ensure that current, representative groundwater elevations are used in assessing compliance with model projections, and that groundwater flows are in agreement with model parameters.

Groundwater Sampling and Analysis. Groundwater samples will be collected from monitoring wells MW-4, MW-11, MW-19, MW-24, and the new monitoring well to be installed on the Taylor property. Samples collected from monitoring well MW-4 will be analyzed for TCE, cis-1,2-DCE, and VC using United States Environmental Protection Agency (USEPA) Method 8260B. Samples collected from monitoring wells MW-11, MW-19, MW-24, and the new monitoring well will be analyzed for total and hexavalent chromium using USEPA Methods 6010B and SW7196. Results will be compared to Site VRP cleanup levels as well as model projections to assess the continued validity of the model.

5.2 Final Remediation Plan for Soil

Currently all of the Site soil concentrations are in compliance with Site VRP cleanup levels except for two samples collected below the former source area. The 2012 concentrations of cis-1,2-DCE and VC measured in the subsurface soil in boring B-4 and the 2013 concentration of cis-1,2-DCE in the subsurface soil in boring GP-1 exceed the soil cleanup levels. Due to the depth below ground surface (bgs, 4 to 10 feet below grade), no ecological receptors are expected to come into direct contact with impacted soils, and the only human receptor that could come into direct contact with impacted soils at that depth is an excavation worker. Therefore, the risks associated with the concentrations of VOCs remaining in subsurface soil were assessed in a focused RA, as detailed in Appendix B and summarized below.

In addition, groundwater concentrations in MW-4 were used to assess actual migration of VOCs from subsurface soil to groundwater.

The results of the focused RA and groundwater concentration trend analysis, described below, will be used to demonstrate compliance with the Site VRP soil cleanup levels.

5.2.1 Focused Risk Assessment for Subsurface Soil

The objective of the focused RA was to characterize potential adverse human health effects related to chemical constituents in subsurface soil in the former source area at the Site. The intent of the focused RA was to provide the information necessary to evaluate whether or not the remaining soil concentrations of cis-1,2-DCE and VC can be left in place without adversely affecting potential receptors.

The focused RA is presented in a technical memorandum in Appendix A. Table A6 in Appendix A summarizes the cumulative cancer and non-cancer risks for an excavation worker. HI values for an excavation worker were less than 1, indicating no significant non-cancer risks due to exposure to subsurface soil in the former source area. The cumulative cancer risks for an excavation worker did not exceed the target risk of 1×10^{-6}.

Based on the results of this focused RA, the concentrations of cis-1,2-DCE and VC remaining in subsurface soil in the former source area do not pose significant health risk to an excavation worker, the only human receptor with exposure potential.

5.2.2 Evaluation of VOC Migration from Soil to Groundwater

Cis-1,2-DCE and VC have been detected in subsurface soil in the area of the former source area at concentrations up to 120 mg/kg and 1.5 mg/kg, respectively. The area of impacted soil is located immediately upgradient of monitoring well MW-4. Therefore, concentration trends in groundwater from MW-4 were analyzed to assess actual migration of these VOCs from subsurface soil to groundwater. Concentration trends for TCE, cis-1,2-DCE, and VC in groundwater from MW-4 were determined using the Mann-Kendall Test (Gilbert, 1987), as described in Section 5.1.1 and Appendix C.

TCE and cis-1,2-DCE concentrations in groundwater from monitoring well MW-4 demonstrate statistically significant decreasing trends from 2004 to 2014. Concentrations have continued to decline despite the upgradient source of VOCs in subsurface soil indicated by samples at boring B-4 and GP-1. Thus, the existing groundwater data indicate that cis-1,2-DCE and VC remaining in soil in the former source area is not negatively impacting the groundwater in this area. In addition, as the absence of TCE in subsurface soil indicates that the impact is historic and not ongoing, change in the declining groundwater concentration trend is not anticipated.

5.3 Planned Near-Term Actions

Tasks to comply with the VRP delineation and cleanup requirements are discussed in the preceding sections and are summarized below:

- Execute an access agreement with the owner of the Taylor property for the Group to install a new permanent monitoring well on the Taylor property
- Sample the new well on the Taylor property. The results are expected to provide horizontal groundwater delineation
- Update the groundwater model with the data from the Taylor well in order to demonstrate compliance with cleanup requirements
- Draft environmental covenants for the Site and the Taylor property.

5.4 Cost Estimate for Continuing Activities

The Group provided a cost estimate in conjunction with their February 2012 revised application to the VRP (Brown and Caldwell, 2012) and an approved financial assurance instrument in March 2013. A Trust has been maintained with sufficient funds for the project.

The cost estimate has been reviewed and updated periodically since the Site was accepted into the VRP. In the most recent update in January 2015, probable costs for remaining activities were estimated at approximately $107,476 and include the following:

- Acquire an access agreement with the owner of the Taylor property, and install a permanent monitoring well on the Taylor property following successful acquisition of access agreement - $24,488
- Model Validation Monitoring - $30,000
- Negotiations associated with environmental covenants - $10,000
- Semiannual progress reports with updated CSMs - $17,988
- Compliance Status Report with Certifications - $25,000

The Group continues to deposit funds into the Trust to financially support the project.

5.5 Project Schedule

An Updated Project Milestone Schedule is provided in Table 6. This schedule is based on the following assumptions regarding future work:

- The access agreement with the Taylor property owner will be acquired in the spring of 2015
- The new well on the Taylor property installed in summer of 2015
- Compliance with the Site VRP cleanup levels for hexavalent chromium in groundwater can be demonstrated with fate and transport modeling.

Section 6

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 7

Limitations

This document was prepared solely for 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.

This document sets forth the results of certain services performed by Brown and Caldwell with respect to the property or facilities described therein (the Property). The Group recognizes and acknowledges that these services were designed and performed within various limitations, including budget and time constraints. These services were not designed or intended to determine the existence and nature of all possible environmental risks (which term shall include the presence or suspected or potential presence of any hazardous waste or hazardous substance, as defined under any applicable law or regulation, or any other actual or potential environmental problems or liabilities) affecting the Property. The nature of environmental risks is such that no amount of additional inspection and testing could determine as a matter of certainty that all environmental risks affecting the Property had been identified. Accordingly, THIS DOCUMENT DOES NOT PURPORT TO DESCRIBE ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY, NOR WILL ANY ADDITIONAL TESTING OR INSPECTION RECOMMENDED OR OTHERWISE REFERRED TO IN THIS DOCUMENT NECESSARILY IDENTIFY ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY.

Further, Brown and Caldwell makes no warranties, express or implied, with respect to this document, except for those, if any, contained in the agreement pursuant to which the document was prepared. All data, drawings, documents, or information contained this report have been prepared exclusively for the person or entity to whom it was addressed and may not be relied upon by any other person or entity without the prior written consent of Brown and Caldwell unless otherwise provided by the Agreement pursuant to which these services were provided.

Section 8

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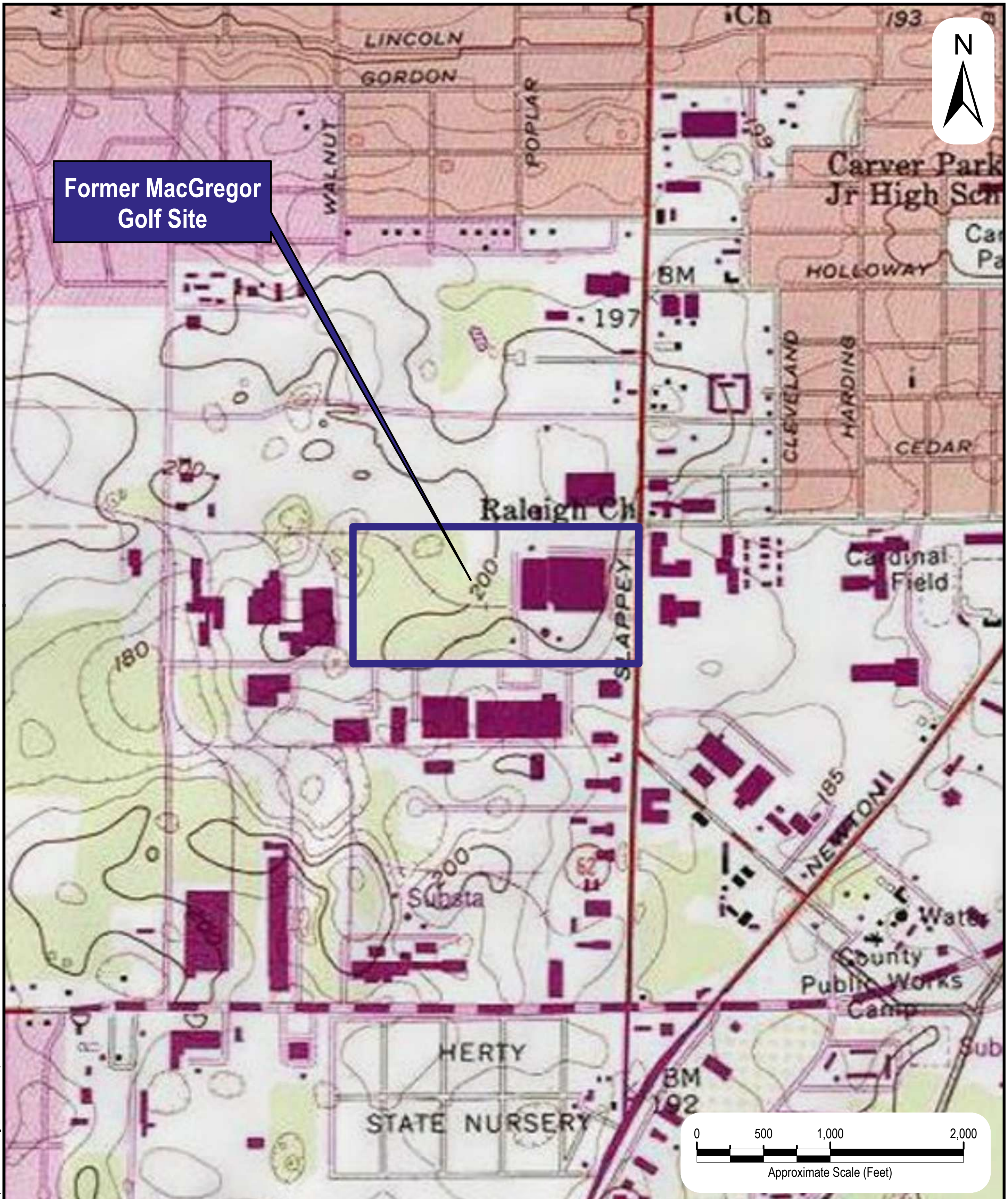

Brown AND Caldwell

PREPARED FOR:

Brunswick Corp.,
Albany Sport Co., &
Albany Partners, LLC

DATE:	07/17/2014
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB, PCR
PROJECT #:	145096

Figure 1

Site Location Map

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

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SOURCE: NATIONAL GEOGRAPHIC SEAMLESS USGS, 2010

LEGEND

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

Figure 2

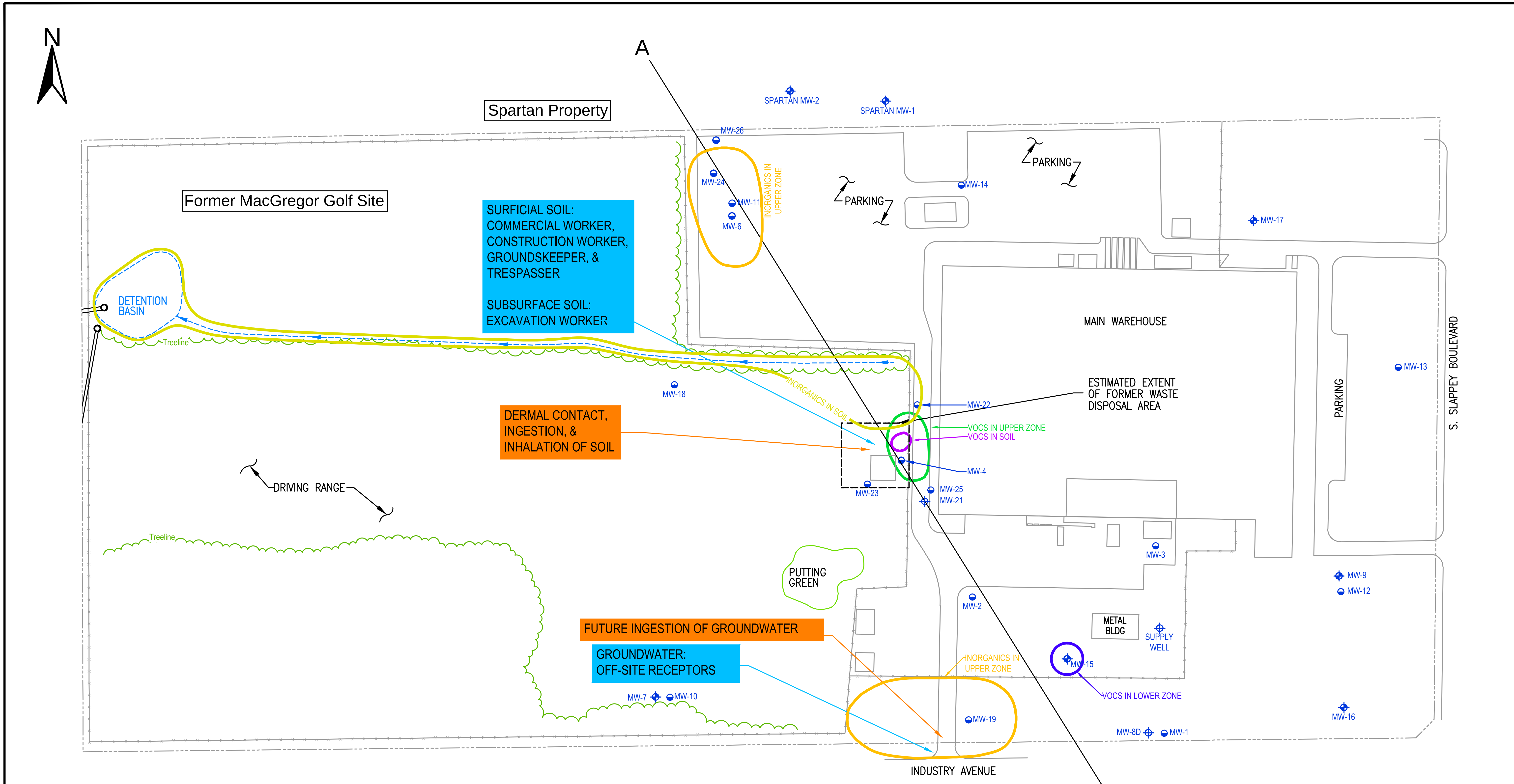
Site Map

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:	01/20/2015
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB
PROJECT #:	145096



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.

0 75 150 225 300

Approximate Scale in Feet

Figure 3

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

DATE:	01/20/2015
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB
PROJECT #:	145096

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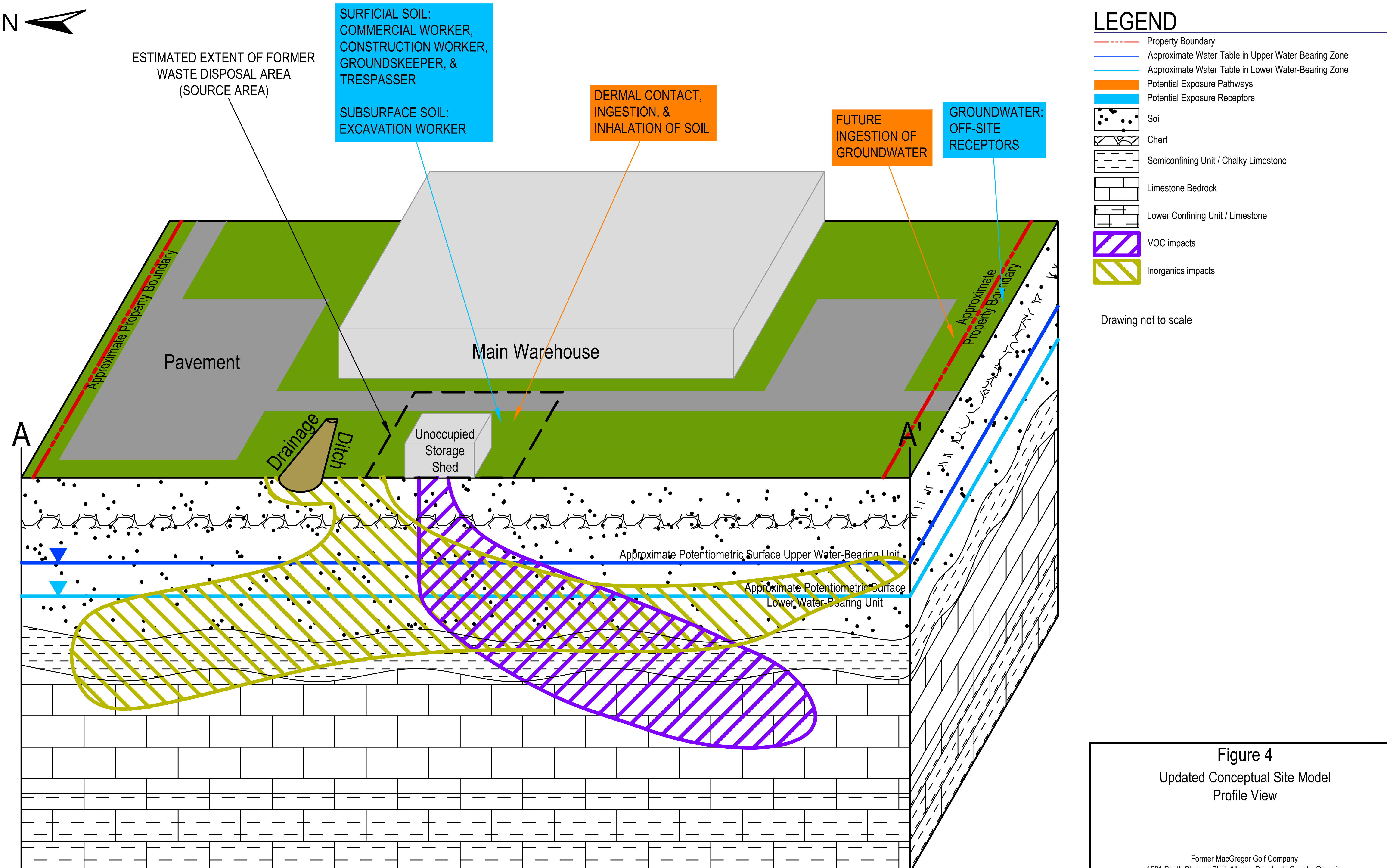

Figure 4
Updated Conceptual Site Model
Profile View

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

DATE:	01/20/2015
SCALE:	NOT TO SCALE
DRAWN BY:	GS4
CHECKED BY:	TCB
PROJECT #:	145096

Figure 5

Potentiometric Surface Map
Upper Water Bearing Zone
March 26, 2014

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:	01/20/2015
SCALE:	AS SHOWN
DRAWN BY:	BAS
CHECKED BY:	TCB
PROJECT #:	145096

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

Figure 6

Potentiometric Surface Map
Lower Water Bearing Zone
March 26, 2014

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:	01/19/2015
SCALE:	AS SHOWN
DRAWN BY:	RPJ
CHECKED BY:	TCB
PROJECT #:	145096

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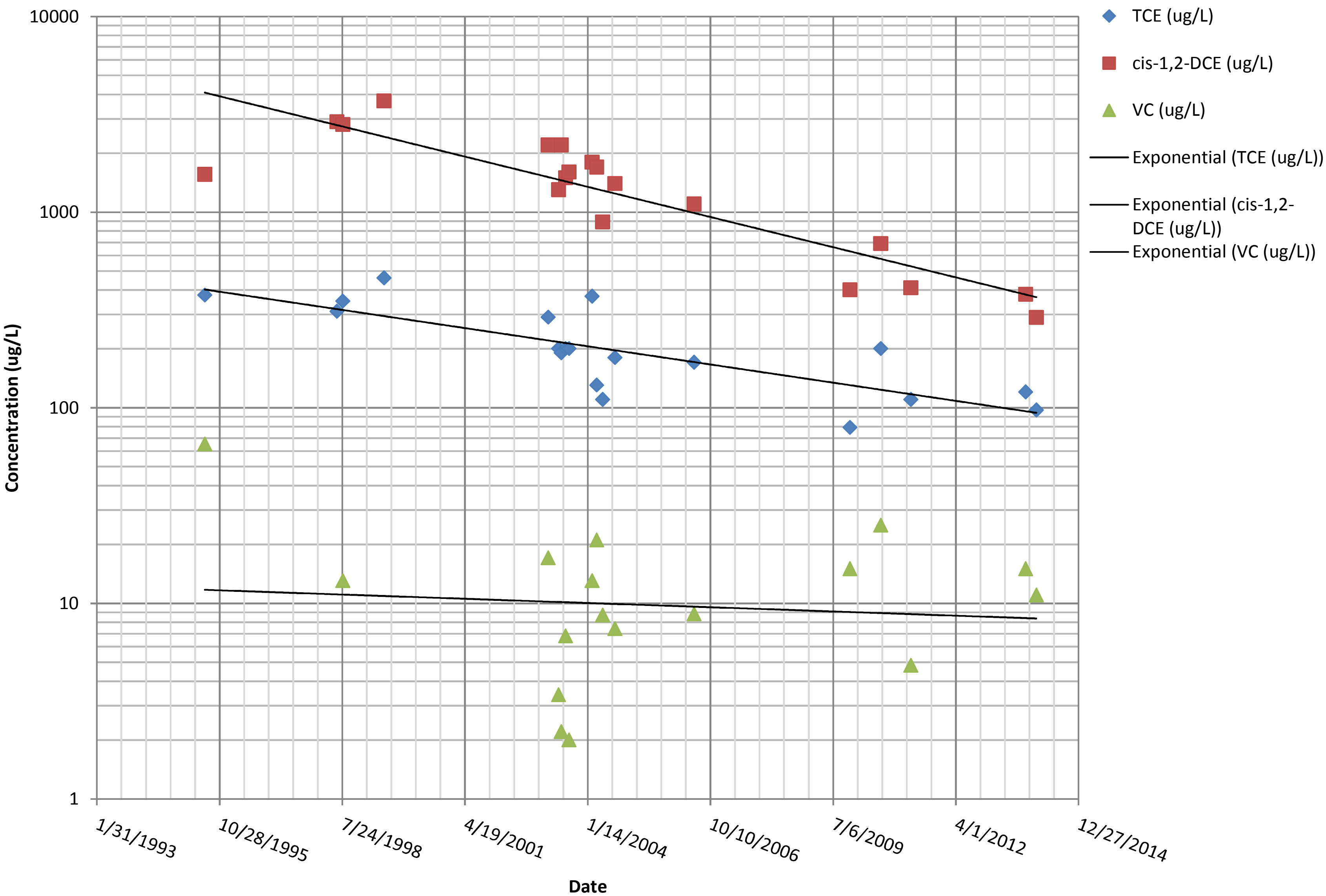

Prepared For: Brunswick Corp., Albany Sport Co., & Albany Partners, LLC

Brown AND Caldwell

SAVED DATE:	01/19/2015
SCALE:	AS SHOWN
DRAWN BY:	GLC
CHECKED BY:	SEJ
PROJECT #:	145096

Figure 7
Historic VOC Concentrations in Monitoring Well MW-4

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

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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)	March 26, 2014	
									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	33.39	163.15
MW-2	6/28/1995	Upper	566220.01	2292765.44	40.19	25-40	NA	196.61	34.87	161.74
MW-3	6/29/1995	Upper	566348.21	2293042.11	46.33	32.50-47.50	NA	198.41	36.64	161.77
MW-4	6/29/1995	Upper	566470.82	2292611.54	46.96	28-41.50	NA	198.43	37.58	160.85
MW-6[c]	7/25/1998	Upper	566911.71	2292317.29	60.13	NA	60-73	200.14	39.89	160.25
MW-10	7/15/1998	Upper	566080.73	2292221.58	48.37	33.30-48.30	NA	193.75	32.69	161.06
MW-11	7/15/1998	Upper	566921.91	2292317.31	48.30	33-48	NA	200.25	36.52	163.73
MW-12	7/16/1998	Upper	566218.48	2293315.55	45.28	35-50	NA	194.70	31.72	162.98
MW-13	10/22/1998	Upper	566566.74	2293392.86	50.38	35-50	NA	196.48	33.85	162.63
MW-14	10/20/1998	Upper	566899.03	2292756.18	49.71	34.80-49.80	NA	196.99	34.58	162.41
MW-18	6/17/1999	Upper	566533.98	2292176.82	43.70	28.8-43.8	NA	196.49	33.54	162.95
MW-19	6/17/1999	Upper	566035.83	2292750.34	44.12	29-44	NA	193.40	31.57	161.83
MW-21[d,e]	3/11/2003	Upper	NM	NM	38.61	28.61-38.61	NA	196.80	NM	NM
MW-22	3/11/2003	Upper	566540.86	2292649.02	45.69	35.4-45.4	NA	196.89	34.50	162.39
MW-23	3/11/2003	Upper	566423.91	2292556.49	48.10	37.95-47.95	NA	199.73	37.52	162.21
MW-25[e]	10/21/2009	Upper	566402.83	2292666.80	39.16	29-39	NA	195.82	33.78	162.04
MW-24[c]	2/8/2008	Upper	566975.84	2292293.48	58.75	50-60	NA	200.39	39.79	160.60
MW-26[c]	11/26/2012	Upper	567002.52	2292301.47	62.20	52.20-62.20	NA	200.90	39.96	160.94
TW-2[f]	3/17/2014	Upper	566015.94	2292736.14	35.51	25.51-35.51	NA	193.36	31.49	161.87
TW-9[f]	3/19/2014	Upper	566898.95	2292305.58	44.79	34.79-44.79	NA	200.18	36.54	163.64
TW-10[f]	3/19/2014	Upper	566921.71	2292291.27	44.78	34.78-44.78	NA	200.19	36.29	163.90
TW-11[c,f]	3/20/2014	Upper	566992.21	2292277.10	59.74	49.74-59.74	NA	200.54	39.75	160.79
TW-15[f]	3/21/2014	Upper	565998.92	2292779.18	42.95	32.94-42.95	NA	193.99	32.14	161.85
TW-23[c,f]	3/24/2014	Upper	567002.88	2292252.96	59.78	49.78-59.78	NA	200.26	39.52	160.74
TW-24[c,f]	3/24/2014	Upper	566940.64	2292250.83	59.68	49.68-59.68	NA	200.15	39.51	160.64
TW-31[f]	6/4/2014	Upper	566879.07	2292400.98	45.25	35.25-45.25	NA	201.28	NM	NM
TW-35[f]	6/4/2014	Upper	566848.17	2292320.97	45.07	35.07-45.07	NA	200.02	NM	NM
TW-41[f]	6/4/2014	Upper	566002.49	2292870.78	45.11	35.11-45.11	NA	196.35	NM	NM
TW-42[f]	6/4/2014	Upper	566010.23	2292603.03	45.00	35.00-45.00	NA	193.33	NM	NM
Lower Water Bearing Zone										
MW-5	7/23/1998	Lower	566495.97	2292539.09	60.50	NA	60-73	199.89	39.50	160.39
MW-7	7/22/1998	Lower	566080.91	2292207.62	69.35	60-70	NA	194.22	33.52	160.70
MW-8/8D[d]	8/17/1999	Lower	NM	NM	207.50	197.3-207.3	NA	198.00	NM	NM
MW-9	7/20/1998	Lower	566227.03	2293312.05	69.28	NA	58.5-73.5	194.68	35.28	159.40
MW-15	10/23/1998	Lower	566153.85	2292894.90	75.38	65.70-75.70	NA	199.23	39.38	159.85
MW-16	10/21/1998	Lower	566065.57	2293320.44	75.47	64.70-74.70	NA	193.61	33.41	160.20
MW-17	6/17/1999	Lower	566871.51	2293186.97	73.81	66-76	NA	198.73	39.84	158.89
MW-20[c]	8/14/1999	Lower	NM	NM	70.00	60-70	NA	193.31	NM	NM
Spartan MW-1	11/10/2008	Lower	567032.71	2292578.90	68.5	52-67	NA	206.37	45.99	160.38
Spartan MW-2	11/10/2008	Lower	567048.65	2292428.10	65.0	49.5-64.5	NA	205.78	45.10	160.68
Supply Well	1958	Lower	NM	NM	168.0	NA	NA	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. Temporary Well Construction Details Former MacGregor Golf Company Albany, Georgia						
Well	General Location	Date Installed	Date Abandoned	Installation Method (DPT/HSA/SSA)[a]	Screen Interval (ft bgs)[b]	Total Depth (ft bgs)
TW-1	MW-19 Vicinity	3/17/2014	3/25/2014	DPT	24.95-34.95	34.95
TW-2	MW-19 Vicinity	3/17/2014	3/25/2014	DPT	25.51-35.51	35.51
TW-3	MW-19 Vicinity	3/18/2014	3/25/2014	DPT	26.34-36.34	36.34
TW-4	MW-19 Vicinity	3/18/2014	3/25/2014	DPT	26.93-36.93	36.93
TW-5	MW-19 Vicinity	3/18/2014	3/25/2014	DPT/SSA	27.42-37.42	37.42
TW-6	MW-11 Vicinity	3/18/2014	3/24/2014	DPT/SSA	34.76-44.76	44.76
TW-7	MW-11 Vicinity	3/19/2014	3/24/2014	SSA	34.79-44.79	44.79
TW-8	MW-11 Vicinity	3/19/2014	3/24/2014	SSA	34.76-44.76	44.76
TW-9	MW-11 Vicinity	3/19/2014	3/24/2014	SSA	34.79-44.79	44.79
TW-10	MW-11 Vicinity	3/19/2014	3/24/2014	SSA	34.78-44.78	44.78
TW-11	MW-24 Vicinity	3/20/2014	3/24/2014	DPT/SSA	49.74-59.74	59.74
TW-12	MW-24 Vicinity	3/19/2014	3/24/2014	SSA	49.75-59.75	59.75
TW-13	MW-24 Vicinity	3/21/2014	3/24/2014	SSA	49.77-59.77	59.77
TW-14	MW-24 Vicinity	3/20/2014	3/24/2014	SSA	49.71-59.71	59.71
TW-15	MW-19 Vicinity	3/21/2014	3/24/2014	SSA	32.95-42.95	42.95
TW-16	MW-19 Vicinity	6/2/2014	6/5/2014	HSA	35.15-45.15	45.15
TW-17	MW-19 Vicinity	3/21/2014	3/25/2014	SSA	32.93-42.93	42.93
TW-18	MW-19 Vicinity	3/22/2014	3/25/2014	SSA	32.30-42.30	42.30
TW-20	MW-19 Vicinity	3/22/2014	3/25/2014	SSA	32.89-42.89	42.89
TW-22	MW-11 Vicinity	3/21/2014	3/24/2014	SSA	34.78-44.78	44.78
TW-23	MW-24 Vicinity	3/24/2014	3/25/2014	SSA	49.78-59.78	59.78
TW-24	MW-24 Vicinity	3/24/2014	3/25/2014	SSA	49.68-59.68	59.68
TW-25	MW-19 Vicinity	3/22/2014	3/25/2014	SSA	33.13-43.13	43.13
TW-26	MW-19 Vicinity	3/24/2014	3/24/2014	SSA	34.78-44.78	44.78
TW-27	MW-19 Vicinity	3/25/2014	3/25/2014	SSA	34.73-44.73	44.73
TW-28	MW-11 Vicinity	3/25/2014	3/25/2014	SSA	34.82-44.82	44.82
TW-29	MW-24 Vicinity	3/25/2014	3/25/2014	SSA	49.78-59.78	59.78
TW-30	MW-19 Vicinity	3/25/2014	3/25/2014	SSA	33.19-43.19	43.19
TW-31	MW-11 Vicinity	6/3/2014	6/5/2014	SSA	35.25-45.25	45.25
TW-32	MW-11 Vicinity	6/3/2014	6/5/2014	SSA	35.27-45.27	45.27
TW-33	MW-11 Vicinity	6/4/2014	6/5/2014	SSA	35.03-45.03	45.03
TW-34	MW-11 Vicinity	6/4/2014	6/5/2014	SSA	35.10-45.10	45.10
TW-35	MW-11 Vicinity	6/4/2014	6/5/2014	SSA	35.07-45.07	45.07
TW-36	MW-19 Vicinity	6/2/2014	6/5/2014	SSA	35.15-45.15	45.15
TW-37	MW-19 Vicinity	6/2/2014	6/5/2014	SSA	35.10-45.10	45.10
TW-38	MW-19 Vicinity	6/3/2014	6/5/2014	SSA	35.02-45.02	45.02
TW-39	MW-19 Vicinity	6/3/2014	6/5/2014	SSA	35.16-45.16	45.16
TW-40	MW-19 Vicinity	6/3/2014	6/5/2014	SSA	35.15-45.15	45.15
TW-41	MW-19 Vicinity	6/2/2014	6/5/2014	HSA	35.11-45.11	45.11
TW-42	MW-19 Vicinity	6/2/2014	6/5/2014	HSA	35.00-45.00	45.00

[a]DPT - direct push technology, HSA - hollow stem auger, and SSA - solid stem auger.

[b]ft bgs - feet below ground surface

Table 3. 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
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

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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
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
	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

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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-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
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
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
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

Table 3. 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
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

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

Location	Sample Depth (feet)	Sampling Date	Inorganics: Concentration (mg/kg)					Organics: Concentration (mg/kg)						
			Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
Soil Delineation Standard			100	2.0	2.5	20	50	0.7	7.0	0.5	0.2	0.5	70	1,000
Soil Cleanup Standard			1,200	3.84	3,066,000	412.9	2,665	4.18	7.0	0.5	0.2	0.5	70	1,000
SB-1	0-2	7/27/98	12	NA	NA	< 0.2	2.9	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	0-2 D	7/27/98	5.3	NA	NA	< 0.2	2.6	< 0.005	0.015	< 0.005	NA	NA	NA	< 0.005
	28-30	7/27/98	6.7	NA	NA	< 0.2	13	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
SB-2	0-2[a]	7/25/98	7.6	NA	NA	0.2	4	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.007
	0-2[b]	7/25/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	29-31[a]	7/25/98	2.7	NA	NA	< 0.2	2.7	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.005
	29-31[b]	7/25/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	34-36	7/25/98	9.4	NA	NA	0.4	14	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
SB-3	2-4[a]	7/24/98	4.2	NA	NA	3.7	300	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.019
	2-4[b]	7/24/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	8-10[a]	7/24/98	3.8	NA	NA	< 0.2	620	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.017
	8-10[b]	7/24/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	34-36[a]	7/24/98	12	NA	NA	0.5	23	< 0.005	1 E	0.45 E	NA	NA	NA	0.019
	34-36[b]	7/25/98	NA	NA	NA	NA	NA	< 0.005	0.1	0.04	NA	NA	NA	< 0.005
SB-4	0-2[a]	7/25/98	530	NA	NA	0.2	52	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.008
	0-2[b]	7/25/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.0024 E
	29-31[a]	7/25/98	1.8	NA	NA	< 0.2	< 2	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.01
	29-31[b]	7/25/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	34-36[a]	7/24/98	8.6	NA	NA	0.3	5.2	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.008
	34-36[b]	7/24/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
MW-5	3-5[a]	7/18/98	4	NA	NA	< 0.2	< 2	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.02
	3-5[b]	7/18/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	8-10[a]	7/18/98	6.1	NA	NA	< 0.2	< 2	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.018
	8-10[b]	7/18/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	32-34[a]	7/18/98	< 1	NA	NA	< 0.2	< 2	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.012
	32-34[b]	7/18/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
MW-6	13-15[a]	7/21/98	13	NA	NA	< 0.2	< 1	< 0.005	< 0.005	< 0.005	NA	NA	NA	0.023
	13-15[b]	7/21/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
SB-5	0-2	10/23/98	6.8	NA	NA	NA	< 2	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	8-10	10/23/98	5.5	NA	NA	NA	< 2	NA	NA	NA	NA	NA	NA	NA
	34-36	10/23/98	45	NA	NA	NA	28	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
SB-6	0-2	10/23/98	650	NA	NA	NA	61	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	8-10	10/23/98	7.2	NA	NA	NA	< 2	NA	NA	NA	NA	NA	NA	NA
	20-22	10/23/98	NA	NA	NA	NA	NA	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
	34-36	10/23/98	30	NA	NA	NA	24	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.005
SB-7	0-2	6/24/99	9.9	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.01
	8-10	6/24/99	7.1	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.009
	18-20	6/24/99	2.6	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0096
SB-8	0-2	6/24/99	10	NA	NA	< 1.1	< 4.3	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0084
	8-10	6/24/99	6.3	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0092
	18-20	6/24/99	4.7	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
SB-9	0-2	6/24/99	14	NA	NA	< 1.1	< 4.4	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0087
	8-10	6/24/99	10	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
	18-20	6/24/99	2.6	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.009
SB-10	0-2	6/24/99	8.3	NA	NA	< 1.1	< 4.5	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0086
	8-10	6/24/99	7.8	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.009
	18-20	6/24/99	3.9	NA	NA	< 1.1	< 4.5	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
SB-11	0-2	6/24/99	8.1	NA	NA	< 1.1	4.9	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0093
	8-10	6/24/99	12	NA	NA	< 1.1	< 4.5	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
	18-20	6/24/99	8.4	NA	NA	< 1.1	< 4.5	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0089
SB-12	0-2	6/24/99	7.9	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.01
	8-10	6/24/99	6.9	NA	NA	< 1.1	< 4.6	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
	18-20	6/24/99	23	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0091
SB-13	0-2	6/24/99	17	NA	NA	< 1.1	6.3	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0089
	8-10	6/24/99	22	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.01
	18-20	6/24/99	5.2	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0096

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

Location	Sample Depth (feet)	Sampling Date	Inorganics: Concentration (mg/kg)					Organics: Concentration (mg/kg)						
			Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
Soil Delineation Standard			100	2.0	2.5	20	50	0.7	7.0	0.5	0.2	0.5	70	1,000
Soil Cleanup Standard			1,200	3.84	3,066,000	412.9	2,665	4.18	7.0	0.5	0.2	0.5	70	1,000
SB-14	0-2	6/24/99	7.8	NA	NA	< 1.1	< 8.7	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.01
	8-10	6/24/99	9.9	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0093
	18-20	6/24/99	9	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0092
SB-15	0-2	6/25/99	60	NA	NA	< 1.1	< 4.5	< 0.004	< 0.004	< 0.004	NA	NA	NA	< 0.0089
	8-10	6/25/99	280	NA	NA	< 1.3	39	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.01
	18-20	6/25/99	2	NA	NA	< 1.1	< 4.2	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0094
SB-16	0-2	6/25/99	390	NA	NA	< 1.2	68	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.011
	8-10	6/25/99	15	NA	NA	< 1.1	< 4.4	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.0092
	18-20	6/25/99	2.8	NA	NA	< 1.1	< 4.3	< 0.005	< 0.005	< 0.005	NA	NA	NA	< 0.009
SB-17	0-2	8/5/99	74	NA	NA	NA	6.4	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	88	NA	NA	NA	82	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	8.9	NA	NA	NA	22	NA	NA	NA	NA	NA	NA	NA
SB-17A	18-20	9/3/99	8.7	NA	NA	NA	7.7	NA	NA	NA	NA	NA	NA	NA
	23-25	9/3/99	31	NA	NA	NA	61	NA	NA	NA	NA	NA	NA	NA
	28-30	11/26/12	NA	NA	NA	NA	48.3	NA	NA	NA	NA	NA	NA	NA
SB-18	0-2	8/5/99	730	NA	NA	NA	39	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	29	NA	NA	NA	6.7	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	4.9	NA	NA	NA	< 4.2	NA	NA	NA	NA	NA	NA	NA
SB-19	0-2	8/5/99	32	NA	NA	NA	8.6	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	9.3	NA	NA	NA	< 4.5	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	3.8	NA	NA	NA	< 4	NA	NA	NA	NA	NA	NA	NA
SB-20	0-2	8/5/99	7.2	NA	NA	NA	< 8.5	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	11	NA	NA	NA	< 4.5	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	9.8	NA	NA	NA	< 4.7	NA	NA	NA	NA	NA	NA	NA
SB-21	0-2	8/5/99	5.3	NA	NA	NA	< 3.9	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	22	NA	NA	NA	< 4.4	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	12	NA	NA	NA	< 4.7	NA	NA	NA	NA	NA	NA	NA
SB-22	0-2	8/5/99	13	NA	NA	NA	< 3.9	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	15	NA	NA	NA	< 4.1	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	6.6	NA	NA	NA	< 4.1	NA	NA	NA	NA	NA	NA	NA
SB-23	0-2	8/5/99	7.5	NA	NA	NA	< 4.3	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	7.8	NA	NA	NA	< 4.3	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	9.2	NA	NA	NA	< 4.5	NA	NA	NA	NA	NA	NA	NA
SB-24	0-2	9/13/00	28	NA	NA	NA	< 4.2	NA	NA	NA	NA	NA	NA	NA
SB-25	0-2	9/13/00	190	NA	NA	NA	22	NA	NA	NA	NA	NA	NA	NA
SB-26	0-2	9/13/00	170	NA	NA	NA	18	NA	NA	NA	NA	NA	NA	NA
MW-17	0-2	6/16/99	6.6	NA	NA	< 1.1	< 4.2	NA	NA	NA	NA	NA	NA	NA
	8-10	6/17/99	21	NA	NA	< 1.1	< 4.3	NA	NA	NA	NA	NA	NA	NA
	18-20	6/17/99	5.8	NA	NA	< 1.1	< 4.4	NA	NA	NA	NA	NA	NA	NA
MW-18	0-2	6/16/99	16	NA	NA	< 1.1	6.2	NA	NA	NA	NA	NA	NA	NA
	8-10	6/16/99	19	NA	NA	< 1.2	< 4.7	NA	NA	NA	NA	NA	NA	NA
	18-20	6/16/99	7.1	NA	NA	< 1.1	< 4.4	NA	NA	NA	NA	NA	NA	NA
MW-20	0-2	8/5/99	18	NA	NA	NA	5.4	NA	NA	NA	NA	NA	NA	NA
	8-10	8/5/99	16	NA	NA	NA	< 5.1	NA	NA	NA	NA	NA	NA	NA
	18-20	8/5/99	2.1	NA	NA	NA	< 4.2	NA	NA	NA	NA	NA	NA	NA
B-1	10-15	5/24/05	NA	NA	NA	NA	NA	< 0.0032	0.0062	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	20-25	5/24/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	35-40	5/24/05	NA	NA	NA	NA	NA	< 0.0032	0.12	0.01	< 0.0071	0.0042	< 0.0036	< 0.0036
B-2	5-10	5/24/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	25-30	5/24/05	NA	NA	NA	NA	NA	< 0.0032	0.11	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
B-3	5-10	5/24/05	NA	NA	NA	NA	NA	< 0.0034	< 0.0034	< 0.0034	< 0.0069	< 0.0034	32	130
	15-20	5/24/05	NA	NA	NA	NA	NA	< 0.0032	0.018	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036

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

Location	Sample Depth (feet)	Sampling Date	Inorganics: Concentration (mg/kg)					Organics: Concentration (mg/kg)						
			Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
Soil Delineation Standard			100	2.0	2.5	20	50	0.7	7.0	0.5	0.2	0.5	70	1,000
Soil Cleanup Standard			1,200	3.84	3,066,000	412.9	2,665	4.18	7.0	0.5	0.2	0.5	70	1,000
B-4	5-10	5/24/05	NA	NA	NA	NA	NA	0.013	11	< 0.0036	1.5	0.0098	4.00	16.6
	9-10	11/26/12	NA	NA	NA	NA	NA	NA	25	NA	1.5	NA	NA	NA
	9-10	11/26/12 Dup	NA	NA	NA	NA	NA	NA	37	NA	1.4	NA	NA	NA
	15-20	5/24/05	NA	NA	NA	NA	NA	0.025	0.32	0.0056	< 0.0071	< 0.0036	0.0061	0.028
	25-30	5/24/05	NA	NA	NA	NA	NA	0.025	2.1	0.014	< 0.0071	< 0.0036	0.67	3.21
B-4a	3-4	2/22/13	NA	NA	NA	NA	NA	NA	1.500	NA	< 0.0087	NA	NA	NA
	7-8	2/22/13	NA	NA	NA	NA	NA	NA	0.110	NA	< 0.011	NA	NA	NA
	10-11	2/22/13	NA	NA	NA	NA	NA	NA	0.140	NA	< 0.013	NA	NA	NA
	15-19	2/22/13	NA	NA	NA	NA	NA	NA	0.130	NA	< 0.015	NA	NA	NA
B-5	15-20	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	25-30	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
B-6	5-10	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	25-30	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
B-7	5-10	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	15-20	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
B-8	0-5	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
	15-20	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
B-10	5-10	5/25/05	NA	NA	NA	NA	NA	< 0.0032	< 0.0036	< 0.0036	< 0.0071	< 0.0036	< 0.0036	< 0.0036
SB-27	0-2	2/20/08	58.60	NA	NA	NA	13.10	NA	NA	NA	NA	NA	NA	NA
	2-4	2/20/08	52.90	NA	NA	NA	11.50	NA	NA	NA	NA	NA	NA	NA
SB-28	0-2	2/20/08	89.60	NA	NA	NA	15.70	NA	NA	NA	NA	NA	NA	NA
	2-4	2/20/08	49.60	NA	NA	NA	18.20	NA	NA	NA	NA	NA	NA	NA
SB-29	0-2	2/20/08	133	NA	NA	NA	11.10	NA	NA	NA	NA	NA	NA	NA
	2-4	2/20/08	16.70	NA	NA	NA	< 4.34	NA	NA	NA	NA	NA	NA	NA
SB-30	0-2	2/20/08	5.47	NA	NA	NA	< 5.80	NA	NA	NA	NA	NA	NA	NA
SB-31	0-2	2/20/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8-10	2/20/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-31	23-25	2/20/08	< 2.20	NA	NA	NA	< 4.41	NA	NA	NA	NA	NA	NA	NA
	30-32	2/20/08	5.72	NA	NA	NA	< 5.30	< 0.0095	< 0.0095	< 0.0095	< 0.0095	< 0.019	< 0.0095	< 0.0095
SB-32	0-2	2/20/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8-10	2/20/08	13.00	NA	NA	NA	< 5.32	NA	NA	NA	NA	NA	NA	NA
	23-25	2/20/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-33	0-2	2/20/08	NA	NA	NA	< 1.08	NA	NA	NA	NA	NA	NA	NA	NA
	34-36	2/20/08	6.53	NA	NA	NA	< 4.5	NA	NA	NA	NA	NA	NA	NA
	40-42	2/20/08	8.70	NA	NA	NA	< 5.73	NA	NA	NA	NA	NA	NA	NA
SB-34	34-36	2/20/08	22.50	NA	NA	NA	7.31	NA	NA	NA	NA	NA	NA	NA
SB-35	0-2	2/20/08	9.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-36	0-2	4/8/08	8.56	NA	NA	NA	< 5.14	NA	NA	NA	NA	NA	NA	NA
SB-37	0--2	4/8/08	9.46	NA	NA	NA	< 4.41	NA	NA	NA	NA	NA	NA	NA
SB-38	0-2	4/8/08	6.39	NA	NA	NA	< 5.06	NA	NA	NA	NA	NA	NA	NA
	0-2	4/8/08 Dup	3.4	NA	NA	NA	< 5.06	NA	NA	NA	NA	NA	NA	NA
SB-39	34-36	4/8/08	12	NA	NA	NA	< 4.60	NA	NA	NA	NA	NA	NA	NA
DB-S1	0-1	10/20/09	5.9	< 0.37	5.9	NA	1.3	NA	NA	NA	NA	NA	NA	NA
DB-S2	0-1	10/20/09	45.0	< 0.75	45.0	NA	8.0	NA	NA	NA	NA	NA	NA	NA
	0-1 D	10/20/09	40.0	< 0.60	40.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-1	0-3"	2000	3,300[c]	NA	NA	NA	210	NA	NA	NA	NA	NA	NA	NA
SED-2	0-3"	2000	500[c]	NA	NA	NA	240	NA	NA	NA	NA	NA	NA	NA
	0-3"	2000 Dup	490[c]	NA	NA	NA	270	NA	NA	NA	NA	NA	NA	NA
SED-3	0-1	10/20/09	1,400[d]	< 0.36	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-4	0-1	10/20/09	2,900[d]	< 0.42	2,900	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-5	0-1	10/20/09	2,400[d]	< 0.36	2,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-6	0-1	10/20/09	880	< 0.35	880	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Location	Sample Depth (feet)	Sampling Date	Inorganics: Concentration (mg/kg)					Organics: Concentration (mg/kg)						
			Total Chromium	Hexavalent Chromium	Trivalent Chromium	Cyanide	Nickel	1,1-Dichloroethene	cis-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Benzene	Ethylbenzene	Xylenes (Total)
Soil Delineation Standard			100	2.0	2.5	20	50	0.7	7.0	0.5	0.2	0.5	70	1,000
Soil Cleanup Standard			1,200	3.84	3,066,000	412.9	2,665	4.18	7.0	0.5	0.2	0.5	70	1,000
GP-1	4-5	2/22/13	NA	NA	NA	NA	NA	NA	13	NA	< 0.0089	NA	NA	NA
	5-6	2/22/13	NA	NA	NA	NA	NA	NA	120	NA	0.023	NA	NA	NA
	14-15	2/22/13	NA	NA	NA	NA	NA	NA	0.110	NA	< 0.014	NA	NA	NA
	19-20	2/22/13	NA	NA	NA	NA	NA	NA	0.580	NA	< 0.008	NA	NA	NA
GP-2	4-5	2/22/13	NA	NA	NA	NA	NA	NA	0.066	NA	< 0.0093	NA	NA	NA
	7-8	2/22/13	NA	NA	NA	NA	NA	NA	< 0.006	NA	< 0.012	NA	NA	NA
	14-15	2/22/13	NA	NA	NA	NA	NA	NA	1.000	NA	< 0.014	NA	NA	NA
	18-19	2/22/13	NA	NA	NA	NA	NA	NA	0.540	NA	< 0.0067	NA	NA	NA
GP-3	4-5	2/22/13	NA	NA	NA	NA	NA	NA	< 0.0045	NA	< 0.009	NA	NA	NA
	7-8	2/22/13	NA	NA	NA	NA	NA	NA	0.100	NA	< 0.008	NA	NA	NA
	14-15	2/22/13	NA	NA	NA	NA	NA	NA	0.380	NA	< 0.008	NA	NA	NA
	17-18	2/22/13	NA	NA	NA	NA	NA	NA	0.082	NA	< 0.011	NA	NA	NA
GP-4	3-4	2/22/13	NA	NA	NA	NA	NA	NA	1.700	NA	0.033	NA	NA	NA
	9-10	2/22/13	NA	NA	NA	NA	NA	NA	< 0.0059	NA	< 0.012	NA	NA	NA
	14-15	2/22/13	NA	NA	NA	NA	NA	NA	< 0.0051	NA	< 0.010	NA	NA	NA
	17-18	2/22/13	NA	NA	NA	NA	NA	NA	0.075	NA	< 0.011	NA	NA	NA
GP-6	2-3	2/22/13	NA	NA	NA	NA	NA	NA	< 0.0047	NA	< 0.0095	NA	NA	NA
	8-9	2/22/13	NA	NA	NA	NA	NA	NA	0.076	NA	< 0.008	NA	NA	NA

NA - Sample not analyzed for this parameter.

Dup - Duplicate sample

mg/kg - milligrams per kilogram

E - Estimated (value above quantitation range)

J - Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an estimated value.

[a] Soil from lab-contaminated Encore samplers run for 8260 VOCs.

[b] Soil from soil jars run for 8260 VOCs.

[c] The area immediately surrounding SED-1 and SED-2 was resampled in 2009. Based on the speciation of samples SED-3 through SED-6, the chromium in SED-1 and SED-2 was assumed to be in trivalent form.

[d] Based on the speciation of samples SED-3 through SED-6, the chromium is in trivalent form.

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	Proposed 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			
• Vicinity of MW-19 (upper water bearing zone): Chromium (hexavalent and trivalent) has not been delineated to the south.	• Install and sample an additional montoring well south of MW-19 on the Taylor Property • Additional steps, if any, to be determined based on data obtained.	• 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 wells 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				Year 7: July 2018 - Dec 2018	
			2012		2013				2014				2015				2016				2017				2018			
			Q3	Q4	Q1	Q2	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				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																											
Semiannual Progress Report with Updated CSM	Within 36 Months of Enrollment													■														
Semiannual Progress Report with Updated CSM	Within 42 Months of Enrollment															■												
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	July 2014 (since 7/17/14)	1.50	*Reviewed monthly status updates and participated in monthly project status calls *Remedial evaluation oversight.
	August 2014	3.00	*Reviewed monthly status updates and participated in monthly project status calls *Remedial evaluation oversight.
	September 2014	5.00	*Reviewed monthly status updates and participated in monthly project status calls *Remedial evaluation oversight.
	October 2014	2.00	*Reviewed monthly status updates and participated in monthly project status calls
	November 2014	3.25	*Reviewed monthly status updates and participated in monthly project status calls
	December 2014	12.00	*Reviewed monthly status updates and participated in monthly project status calls *Attended meeting with Georgia EPA
	January 2015 (as of 1/15/15)	8.50	*Reviewed monthly status updates and participated in monthly project status calls *Review of January 2015 Semiannual Progress Report and Final Remediation Plan
Total Hours Invoiced this Period		35.25	

Appendix A: Technical Memorandum - Focused Risk Assessment for Subsurface Soil

Technical Memorandum

990 Hammond Drive, Suite 400
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T: 770.394.2997
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Prepared for: MacGregor Golf Group

Project Title: Former MacGregor Golf Company, Voluntary Remediation Program Services

Project No.: 145096

Technical Memorandum

Subject: Focused Risk Assessment for Subsurface Soil
Former MacGregor Golf Company Site
HSI Site No. 10398

Date: January 19, 2015

To: Ray Berens, Esq, Eric Gold, and David Selig (the Group)

From: Sarah Jones, PhD, CHMM, Senior Ecotoxicologist, Brown and Caldwell

Copy to: File

Prepared by: Sarah E Jones
Sarah Jones, PhD, CHMM, Senior Ecotoxicologist

Reviewed by: Lynnette Gerbert
Lynnette Gerbert, Principal Toxicologist

Limitations:

This document was prepared solely for the MacGregor Golf Group in accordance with professional standards at the time the services were performed and in accordance with the contract between the MacGregor Golf 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 MacGregor Golf 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 MacGregor Golf 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

The objective of this focused risk assessment (RA) was to characterize potential adverse human health effects related to chemical constituents in subsurface soil in the former source area at the Former MacGregor Golf Company Site (Site). The intent of the focused RA was to provide the information necessary to evaluate whether or not the remaining soil concentrations of cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) can be left in place without adversely affecting potential receptors. The following sections describe the methodology, results, and conclusions from the assessment.

Section 2: Data Usage

Only quantifiable, validated analytical data were utilized in this focused RA. Data validation was performed to ensure that the generated data are of acceptable quality such that appropriate decisions can be made. Data validation included a quality control review of the field and laboratory generated data following USEPA guidelines (USEPA, 2008).

Subsurface soil samples collected within the former source area (SB-3, B-1 through B-10, and GP-1 through GP-6) in 2012 and 2013 were included in the focused RA (Table 4 in the report). Details of these investigations are included in previous semiannual monitoring reports (Brown and Caldwell, 2013a; Brown and Caldwell, 2013b). Samples collected from 2 feet below ground surface (bgs) to 15 feet bgs were included in the RA, since human receptors (i.e., construction/excavation workers) are unlikely to come into contact with soils at depths greater than 15 feet bgs.

The Site contaminants of concern (COCs) included in the focused RA were trichloroethene (TCE), cis-1,2-DCE, and VC. Cis-1,2-DCE and VC are the only COCs detected in subsurface soil above the Site VRP cleanup levels. TCE was included in the focused RA since it is the parent product for these constituents. It is common risk assessment practice to determine an exposure point concentration (EPC) for each COC, which is the lesser of the maximum detected concentration (MCD) and the calculated 95 percent upper confidence limit (UCL). However, the focused RA for this Site was based on MCDs to provide a conservative risk estimate. The MCDs for TCE, cis-1,2-DCE and VC in subsurface soil in the former source area are 0.014 milligrams per kilogram (mg/kg), 120 mg/kg, and 1.5 mg/kg, respectively (Table 4 of the report).

Section 3: Receptors and Exposure Pathways

The only receptor included in this focused RA is a current/future excavation worker, as this is the only human receptor that would potentially be exposed to subsurface soils at the Site above the cleanup levels. The following pathways were identified for this receptor:

- Current/future ingestion of subsurface soil.
- Current/future dermal contact with subsurface soil.
- Current/future inhalation of vapors and particulates from subsurface soil.

Section 4: Conceptual Site Model

Refer to Section 3 of the report for an updated Conceptual Site Model (CSM) for the Site, which is also illustrated in Figures 3 and 4 of the report.

Section 5: Quantitation of Exposure

Quantitative estimates of chemical exposure are referred to as the Chronic Daily Intake (CDI) or “Intake”. The CDI is the average amount of chemical expected to be taken into the body from a particular exposure pathway each day over a long (chronic) period of time. Standard intake equations are presented in Section 6 of *Risk Assessment Guidance for Superfund (RAGS) Volume I, Human Health Evaluation Manual (Part A)* (EPA, 1989). These equations take the general form indicated below:

$$CDI = \frac{(C \times IR \times EF \times ED)}{(BW \times AT)}$$

Where:

CDI	=	chronic daily intake
C	=	contaminant concentration in the medium
IR	=	intake rate
EF	=	exposure frequency
ED	=	exposure duration
BW	=	body weight
AT	=	averaging time

The intake equations used for each receptor and exposure pathway, along with appropriate exposure parameters are shown in Tables A1 through A5. Exposure parameters were obtained from the most recent (November 2014) USEPA Regional Screening Level (RSL) Tables (USEPA, 2014). These exposure parameters are in agreement with those specified in Table 3 of Appendix III of the *Rules of the Georgia Department of Natural Resources, EPD, Chapter 391-3-19, Hazardous Site Response* (the Rules; EPD, 1994), with the following exceptions:

Adult Body Weight (BW). The body weight specified in Table 3 of Appendix III of the Rules is 70 kg. However, the USEPA recently updated the adult body weight in the RSL table to 80 kg. As a lower body weight would result in a more conservative risk estimate, the lower value of 70 kg was used.

Exposure Frequency (EF). The exposure frequency for non-residents specified in Table 3 of Appendix III of the Rule is 250 days/year. This exposure frequency was developed for commercial or industrial workers. However, it is highly unlikely that an excavation worker will be exposed to subsurface soils in an active excavation for 250 days out of the year. For this reason, the USEPA developed an exposure frequency of 1 year for an excavation worker.

Soil Ingestion Rate (IR_{soil}). The soil ingestion rate for non-residents specified in Table 3 of Appendix III of the Rule is 50 mg/day. Similar to exposure duration, this ingestion rate was developed for commercial or industrial workers. The USEPA developed higher soil ingestion rate of 330 mg/day for construction workers involved with grading, tilling, excavating, dozing, and wind related projects. Therefore, the higher soil ingestion rate of 330 mg/day was used.

Section 6: Toxicity Assessment

The purpose of the toxicity assessment is to compile the key toxicity criteria used to convert CDIs to cancer and non-cancer risk estimates. These criteria are developed by USEPA, and include cancer slope factors

(SFs) used to calculate cancer risk for carcinogenic chemicals, and reference doses (RfDs) used to calculate non-cancer health risks. Toxicity criteria for the COPCs were obtained from the November 2014 USEPA RSL Table (USEPA, 2014). Toxicity criteria used in this focused RA are shown in Table A2.

Section 7: Risk Characterization

The health risks of a chemical are characterized in terms of non-cancer risks as well as carcinogenic risks if the chemical is considered a carcinogen. Non-cancer health risks refer to all other adverse health effects besides cancer. Carcinogenic chemicals may present non-cancer health risks in addition to cancer risks, therefore the potential for both types of effects were evaluated for carcinogenic COPCs.

The purpose of the risk characterization is to use the toxicity criteria described above to convert the long-term, average chemical exposure levels for each receptor population to actual health risk estimates. The equations used for each receptor and exposure pathway, along with appropriate toxicity criteria are shown in Tables A3 through A5. The results of the risk characterization are summarized in Table A6, and discussed in detail below.

7.1 Non-cancer Risks

The risk of non-cancer health effects is evaluated by comparing the CDIs for each exposure pathway to the RfDs or RfCs. These values are defined by USEPA as "estimates of a daily exposure to the human population (including sensitive subgroups) that are likely to be without an appreciable risk of deleterious effects during a lifetime" (USEPA, 1989). The risk of non-cancer health effects is expressed quantitatively as the ratio of the CDI to the RfD or RfC. This ratio is termed the Hazard Quotient (HQ). For example, in the case of an oral or ingestion exposure (such as soil ingestion):

$$HQ = \frac{CDI_{oral}}{RfD_{oral}}$$

An HQ value greater than 1 indicates that the chemical exposure may exceed the level considered safe for long-term exposure by USEPA.

In most cases, exposure from additional routes of exposure must be considered (dermal and inhalation), and the above equation is modified as follows:

$$HQ = \frac{CDI_{oral}}{RfD_{oral}} + \frac{CDI_{inh}}{RfC} + \frac{CDI_{dermal}}{RfD_{oral}}$$

An HQ value greater than 1 indicates that the daily intake of chemical via all routes of exposure may exceed USEPA safe levels for long-term exposure as defined by the RfD. Since USEPA has not developed RfDs for the dermal exposure route, the oral route RfD in conjunction with a Gastrointestinal Absorption Factor (GIABS) is used to evaluate exposure via dermal exposure pathways. For TCE, cis-1,2-DCE, and VC, the GIABS is 1 and therefore not shown in the equations on Tables A3 through A5.

It is possible for the total HQ (for all pathways) for each contaminant at a site to be less than 1 but still presents a potential for adverse non-carcinogenic effects. This can happen from the cumulative effects of contaminants that have a similar toxic mechanism and/or target organ. Although each contaminant exposure level may be acceptable when considered separately, the total cumulative effect of similarly acting toxicants can create a potential for an adverse effect. To ensure that the cumulative non-carcinogenic risk from multiple similarly acting contaminants is adequately considered, the total HQs across all contaminants are summed to obtain a Hazard Index (HI) as follows:

$$HI = HQ_1 + HQ_2 + HQ_3 .... + HQ_n$$

The HI value for an excavation worker due to exposure to subsurface soil was 0.2, which is less than the target HI of 1. The calculated HI of 0.2 is therefore indicative of no significant non-cancer risks (Table A6).

7.2 Cancer Risks

Cancer risks are calculated by multiplying the total CDI for all direct exposure pathways for each route of exposure by the route-specific CSF or IUR. For example, in the case of an oral or ingestion exposure (such as soil ingestion):

$$Cancer\ \ Risk\ = CSF\ \ x\ CDI$$

Cancer risks are summed across all exposure pathways for all carcinogens to arrive at a total increased lifetime cancer risk for each receptor population.

The cumulative cancer risk for an excavation worker due to exposure to subsurface soil was 5×10^{-8}, which is less than the target risk of 1×10^{-6} (Table A6).

7.3 Risk Summary

Table A6 summarizes the cumulative cancer and non-cancer risks for each receptor. HI values for an excavation worker were less than 1, indicating no significant non-cancer risks due to exposure to subsurface soil in the former source area. The cumulative cancer risks for an excavation worker did not exceed the target risk of 1×10^{-6}.

Based on the results of this focused RA, the concentrations of cis-1,2-DCE and VC remaining in subsurface soil in the former source area do not pose significant health risk to an excavation worker, the only human receptor with exposure potential.

Section 8: References

Georgia Department of Environmental Protection (EPD). 1994. Rules of Georgia Department of Natural Resources. Chapter 391-3-19 Hazardous Site Response.

United States Environmental Protection Agency. 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A*). Interim Final. December 1989. EPA/540/1-89/002.

United States Environmental Protection Agency. 2008. *National Functional Guidelines for Superfund Organic Methods Data Review*. USEPA Contract Laboratory Program. Office of Superfund Remediation and Technology Innovation (OSRTI). USEPA-540-R-08-01.

United States Environmental Protection Agency. 2014. *Regional Screening Levels for Chemical Contaminants at Superfund Sites.* http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. November 2014.

Table A1. Exposure Factors for Risk Characterization Former MacGregor Golf Company Albany, Georgia		
Exposure Factor	Excavation Worker, Adult	
Exposure Time for Inhalation, ET (8 hr/day x day/24 hr)	0.33	a
Exposure Frequency, EF (days/year)	250	a
Exposure Duration, ED (years)	1	a
Body Weight, BW (kg)	70	b
Average Time, Carcinogenic, AT_c (years)	70	a
Average Time - Noncarcinogenic, AT_{nc} (years)	1	a
Soil Ingestion Rate, IR_{soil} (mg/day)	330	a
Soil to skin adherence factor, AF (mg/cm^2)	0.3	a
Skin surface area available for contact with Soil, SA (cm^2/event)	3470	a

Sources of Data:

a USEPA Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites (November 2014)
b Table 3 of Appendix III of the Rules of the Georgia Department of Natural Resources, Environmental Protection Division (EPD), Chapter 391-3-19, Hazardous Site Response.

Acronyms:
USEPA - United States Environmental Protection Agency

A blank ("------") indicates that a parameter is not available for that chemical.

Table A2. Chemical-Specific Parameters for Risk Characterization Former MacGregor Golf Company Albany, Georgia										
Chemical	Oral Cancer Slope Factor SF_o 1/(mg/kg/day)		Oral Reference Dose RfD_o (mg/kg/day)		Inhalation Cancer Slope Factor SF_i 1/(µg/m³)		Inhalation Reference Dose RfD_i (mg/m³)		Dermal Absorption Factor ABS (unitless)	
Trichloroethene	4.6E-02	a	5.0E-04	a	4.1E-06	a	2.0E-03	a	-------	a
cis-1,2-Dichloroethene	-------	a	2.0E-03	a	-------	a	-------		-------	a
Vinyl Chloride	7.2E-01	a	3.0E-03	a	4.4E-06	a	1.0E-01	a	-------	a

Sources of Data in order of use:

a USEPA Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites (November 2014)

A blank ("------") indicates that a parameter is not available, or required, for that chemical.

Table A3. Subsurface Soil Risk Levels: Ingestion
Former MacGregor Golf Company
Albany, Georgia

R_{ING} — Carcinogenic Effects : Risk or the increased chance of developing cancer over a lifetime due to ingestion of subsurface soil

$$R_{ING} = \frac{C \times EF \times ED \times SF_o \times 10^{-6}\ kg/mg \times IRS}{BW \times AT_c \times 365\ days/yr}$$

HQ_{ING} — Non-carcinogenic Effects : Hazard quotient due to ingestion of subsurface soil

$$HQ_{ING} = \frac{C \times EF \times ED \times 10^{-6}\ kg/mg \times IRS}{BW \times AT_{nc} \times 365\ days/yr \times RfD_o}$$

Parameter	Excavation Worker
AT_c = Averaging time for carcinogens (years) =	70
AT_{nc} = Averaging time for noncarcinogens (years) =	1
BW = Body weight (kg) =	70
ED = Exposure duration (years) =	1
EF = Exposure frequency (days/year) =	250
IRS = Soil ingestion rate (mg/day) =	330

Chemical	C_{ss} RepCon for Subsurface Soil (mg/kg)	SF_o Oral Cancer Slope Factor 1/(mg/kg)	RfD_o Oral Reference Dose (mg/kg-day)	Excavation Worker R_{ING}	Excavation Worker HQ_{ING}
Trichloroethene	0.014	4.60E-02	5.00E-04	3.0E-11	9.0E-05
cis-1,2-Dichloroethene	120	-------	2.00E-03	-----	1.9E-01
Vinyl Chloride	1.5	7.20E-01	3.00E-03	5.0E-08	1.6E-03
TOTAL				**5.0E-08**	**2.0E-01**

A blank ("------") indicates that a parameter is not available or that a risk/hazard quotient could not be calculated for that chemical.

Table A4. Subsurface Soil Risk Levels: Inhalation
Former MacGregor Golf Company
Albany, Georgia

R_{INH}	Carcinogenic Effects : Risk or the increased chance of developing cancer over a lifetime due to inhalation of vapors & particulates in subsurface soil	$\frac{C \times EF \times ED \times ET \times SF_i\ 1000 \mu g/m^3 \times (VF_{ss} + VF_p)}{AT_c \times 365\ days/yr}$
HQ_{INH}	Non-carcinogenic Effects : Hazard quotient due to inhalation of vapors and particulates in subsurface soil	$\frac{C \times EF \times ED \times ET \times (VF_{ss} + VF_p)}{AT_{nc} \times 365\ days/yr \times RfD_i}$

Parameter	Excavation Worker
AT_c = Averaging time for carcinogens (years) =	70
AT_{nc} = Averaging time for noncarcinogens (years) =	1
ED = Exposure duration (years) =	1
EF = Exposure frequency (days/year) =	250
ET = Exposure Time for Inhalation (8 hr/day x day/24 hr) =	0.33

Chemical	C_{ss}	SF_i	RfD_i	VF_P	VF_{SS}	Excavation Worker	
	RepCon for Subsurface Soil	Inhalation Cancer Slope Factor	Inhalation Reference Dose	Volatilization Factor of Particulates	Volatilization Factor from Surficial Soil	R_{INH}	HQ_{INH}
	(mg/kg)	1/(µg/m³)	(mg/m³)	(mg/m^3-air)/(mg/kg-soil)	(mg/m3-air)/(mg/kg-soil)		
Trichloroethene	0.014	4.10E-06	2.00E-03	4.63E-09	-----	8.7E-19	7.4E-09
cis-1,2-Dichloroethene	120	-------	-------	4.63E-09	-----	-----	-----
Vinyl Chloride	1.5	4.40E-06	1.00E-01	4.63E-09	-----	1.0E-16	1.6E-08
TOTAL						**1.0E-16**	**2.3E-08**

A blank ("------") indicates that a parameter is not available or that a risk/hazard quotient could not be calculated for that chemical.

Table A5. Subsurface Soil Risk Levels: Dermal Contact
Former MacGregor Golf Company
Albany, Georgia

R_{DER} — Carcinogenic Effects: Risk or the increased chance of developing cancer over a lifetime due to dermal contact with subsurface soil

$$R_{DER} = \frac{C \times EF \times ED \times SA \times SF_o \times 10^{-6}\ kg/mg \times AF \times ABS}{BW \times AT_c \times 365\ days/yr}$$

HQ_{DER} — Non-carcinogenic Effects: Hazard quotient due to dermal contact with subsurface soil

$$HQ_{DER} = \frac{C \times EF \times ED \times SA \times 10^{-6}\ kg/mg \times AF \times ABS}{BW \times AT_{nc} \times 365\ days/yr \times RfD_o}$$

Parameter	Excavation Worker
AT_c = Averaging time for carcinogens (years) =	70
AT_{nc} = Averaging time for noncarcinogens (years) =	1
BW = Body weight (kg) =	70
ED = Exposure duration (years) =	1
EF = Exposure frequency (days/year) =	250
AF = Soil to skin adherence factor (mg/cm^2) =	0.30
SA = Skin surface area (cm^2/day) =	3470

Chemical	C_{ss}	SF_o	RfD_o	ABS	Excavation Worker	
	RepCon for Subsurface Soil	Oral Cancer Slope Factor	Oral Reference Dose	Dermal Absorption Factor	R_{DER}	HQ_{DER}
	(mg/kg)	1/(mg/kg)	(mg/kg-day)	(unitless)		
Trichloroethene	0.014	4.60E-02	5.00E-04	-------	-----	-----
cis-1,2-Dichloroethene	120	-------	2.00E-03	-------	-----	-----
Vinyl Chloride	1.5	7.20E-01	3.00E-03	-------	-----	-----
TOTAL					**0.0E+00**	**0.0E+00**

A blank ("------") indicates that a parameter is not available or that a risk/hazard quotient could not be calculated for that chemical

Table A6. Summary of Risks and Hazard Quotients Former MacGregor Golf Company Albany, Georgia		
Media/ Pathway	Excavation Worker	
	Risk	Hazard Quotient
Subsurface Soil		
Ingestion	5.0E-08	2.0E-01
Dermal Contact	0.0E+00	0.0E+00
Inhalation	1.0E-16	2.3E-08
Cumulative Risk & Hazard Index	5.0E-08	2.0E-01

Is the Cumulative Risk greater than the target of 1 x 10^{-6}?	NO
Is the Hazard Index greater than the target of 1?	NO

Appendix B: Technical Memorandum - Fate and Transport Model

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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: Fate and Transport Model Development and Evaluation
Former MacGregor Golf Company Site
HSI Site No. 10398

Date: January 19, 2015

To: Sarah Jones, PhD, CHMM, Senior Ecotoxicologist, Brown and Caldwell

From: Gregory L. Christians, P.G., Associate Hydrogeologist, Brown and Caldwell

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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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Table B1. Specifications of the Numerical Flow Model

Section 1: Introduction

In compliance with the Georgia Environmental Protection Division's (EPD's) Voluntary Remediation Program (VRP), a fate and transport model has been developed for the Former MacGregor Golf Company Site (Site) in Albany, Georgia. The model has been used to evaluate whether the current observed site constituents of concern (COCs) will migrate to or beyond the current property lines and to project future COC concentrations in groundwater. This technical memorandum (TM) documents the selection and use of the fate and transport models employed for this Site, and summarizes the modeling results.

Due to the detections of hexavalent chromium in groundwater at concentrations exceeding Site VRP cleanup levels, remediation or long-term monitoring will be necessary at several locations to achieve compliance under the VRP. Additional hexavalent chromium delineation around monitoring wells MW-11, MW-19, and MW-24 (Figure 1) was conducted in March 2014 to better define the extent of impact for remedial design and to satisfy VRP delineation requirements. Based on the results of the March 2014 field event, further delineation of hexavalent chromium was conducted in June 2014 around monitoring well MW-19 for remedial design and to satisfy VRP delineation requirements, and around MW-11 for remedial design.

The 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 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.

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 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 heterogenic 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 will 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 to evaluate flow and transport, respectively.

The 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 B1 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 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 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 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: Solute Transport Model Development

3.1 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 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 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 366 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 wells MW-11, MW-19, and 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 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 fate and transport modeling effort demonstrated that hexavalent chromium concentrations around MW-19 will migrate approximately 366 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 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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LEGEND

- 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 1

Site Layout

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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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.

0 100 200 400 Feet

Figure 2

Potentiometric Surface Map
Upper Water Bearing Zone
March 26, 2014

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- 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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Figure 4

Initial Hexavalent Chromium Concentrations
Shallow Upper Water-Bearing Zone

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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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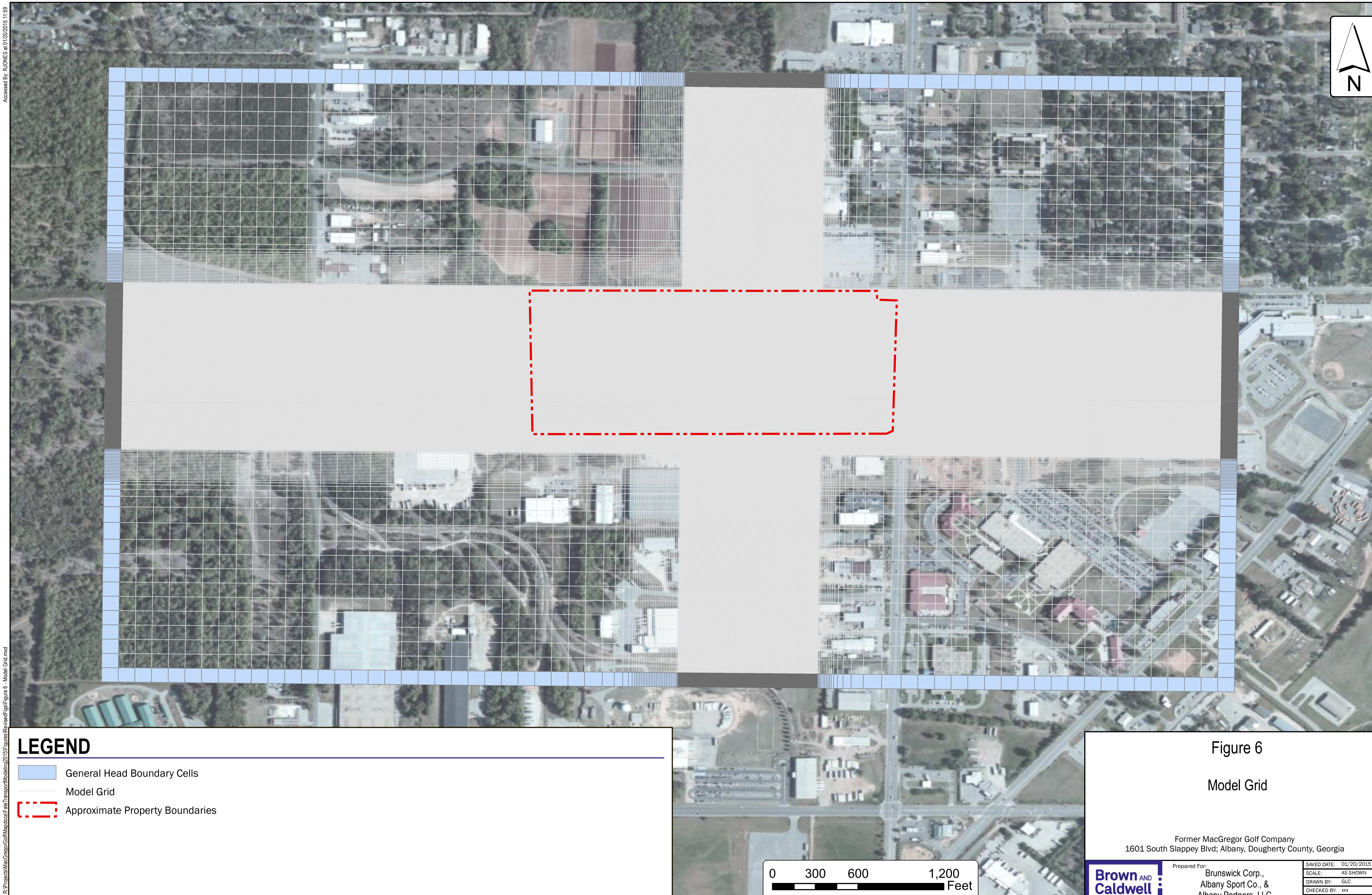

LEGEND

- General Head Boundary Cells
- Model Grid
- Approximate Property Boundaries

Figure 6

Model Grid

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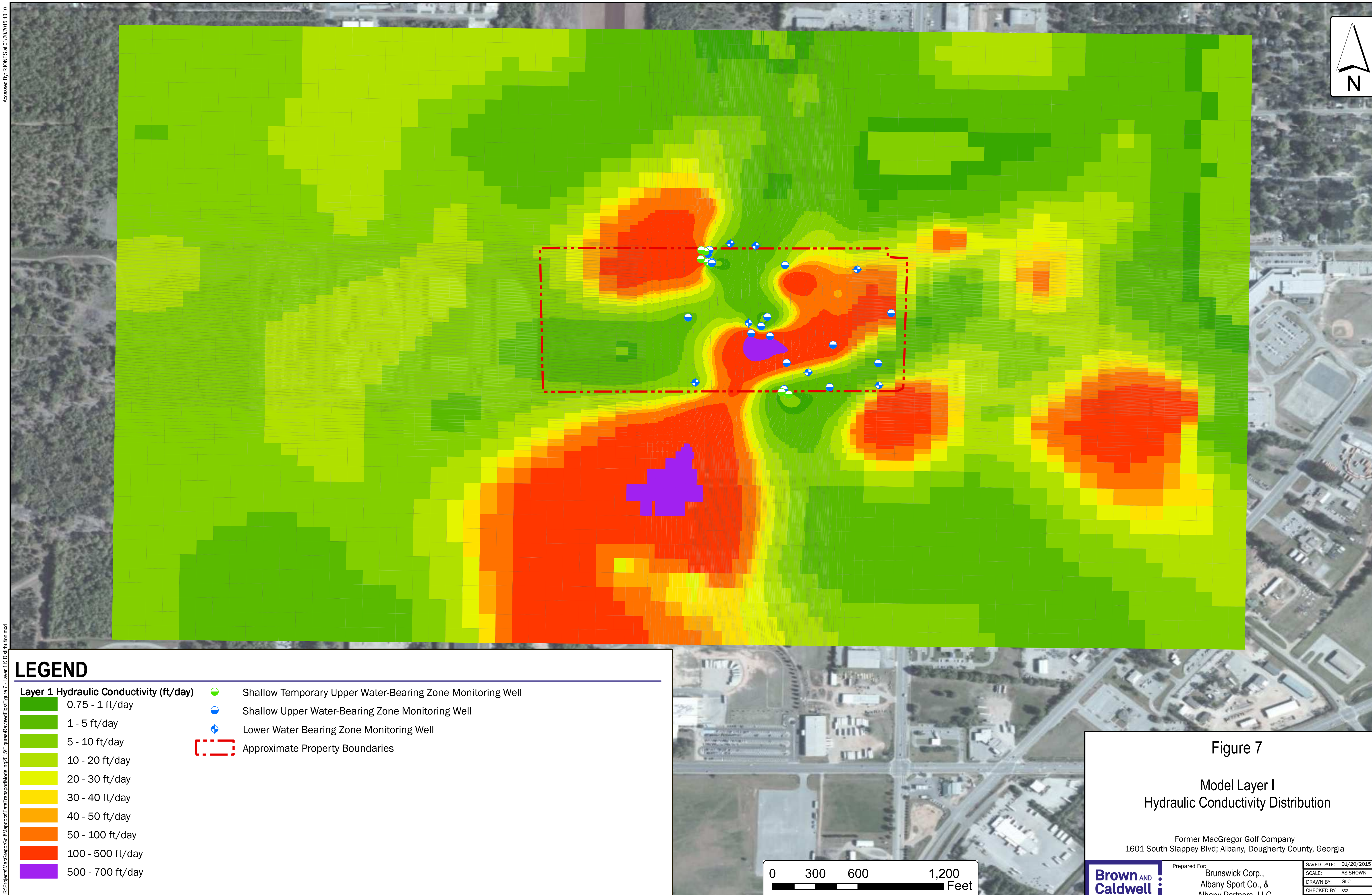

Figure 7

Model Layer I
Hydraulic Conductivity Distribution

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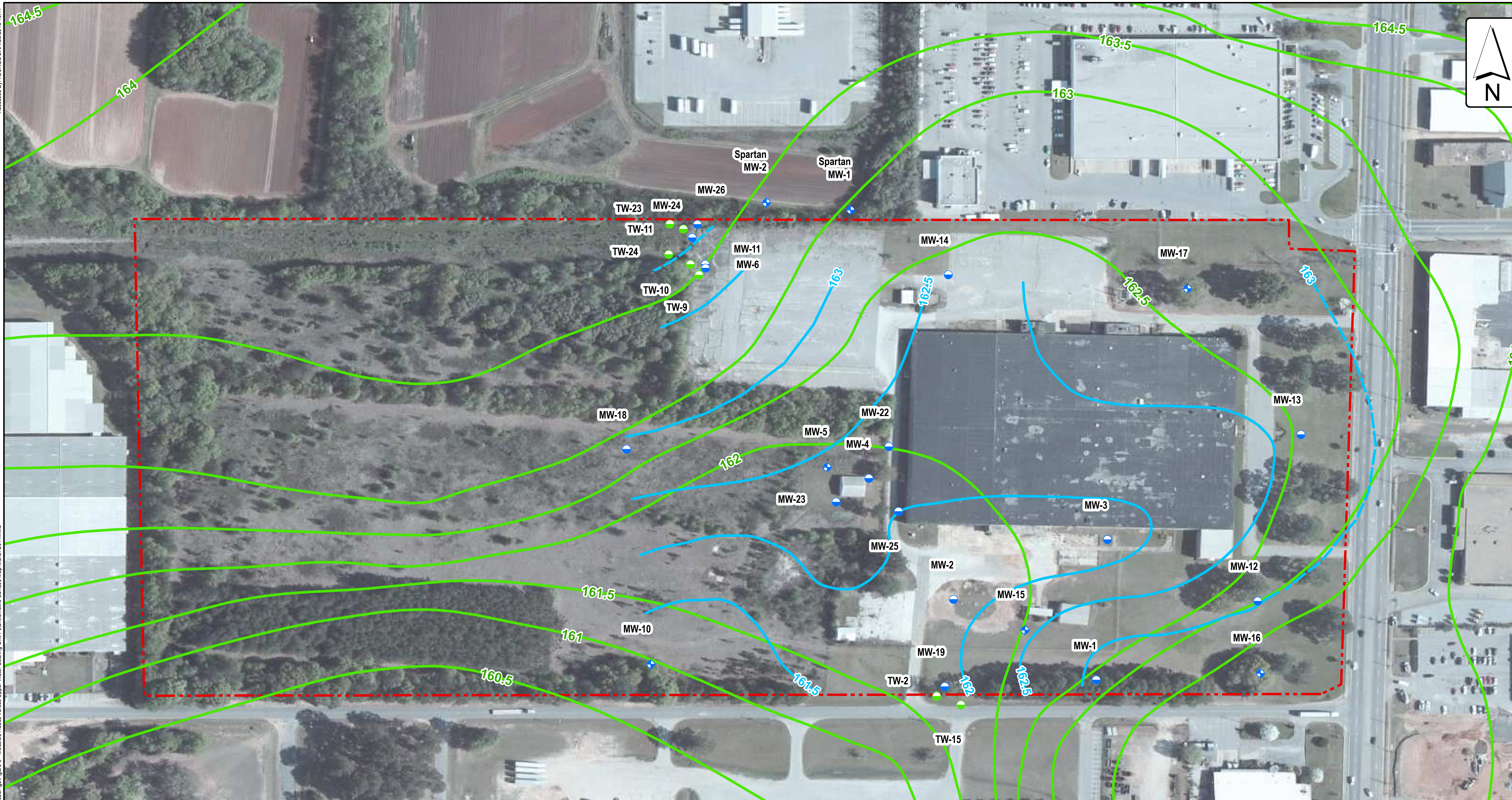

LEGEND

- 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

0 100 200 400 Feet

Figure 8

Modeled Heads Versus Upper Water-Bearing Zone Potentiometric Surface Map March 2014

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R:\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Figure 8 - Modeled Heads versus Upper Water-Bearing Unit Potentiometric Surface Map March 2014.mxd

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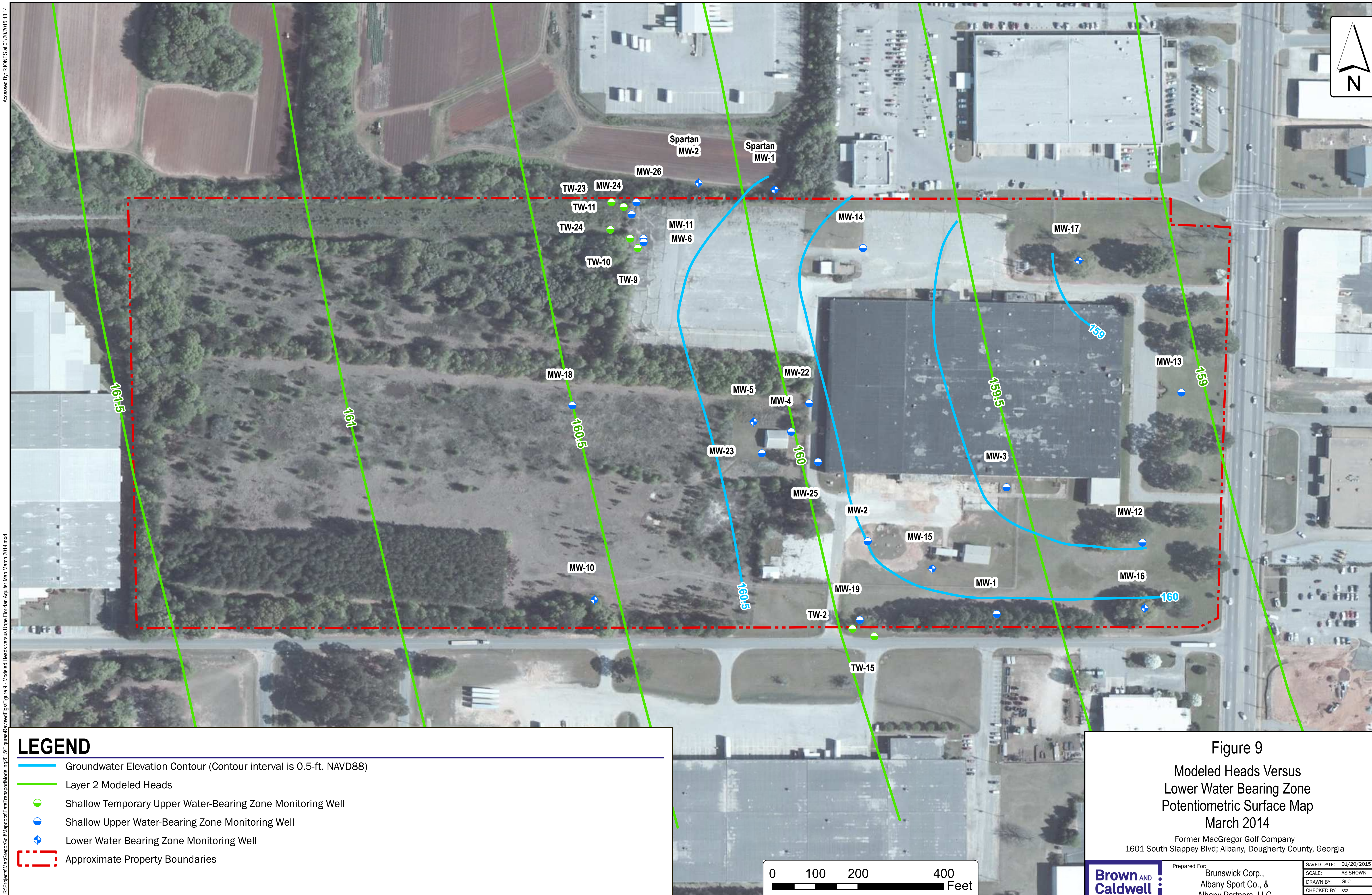

LEGEND

- 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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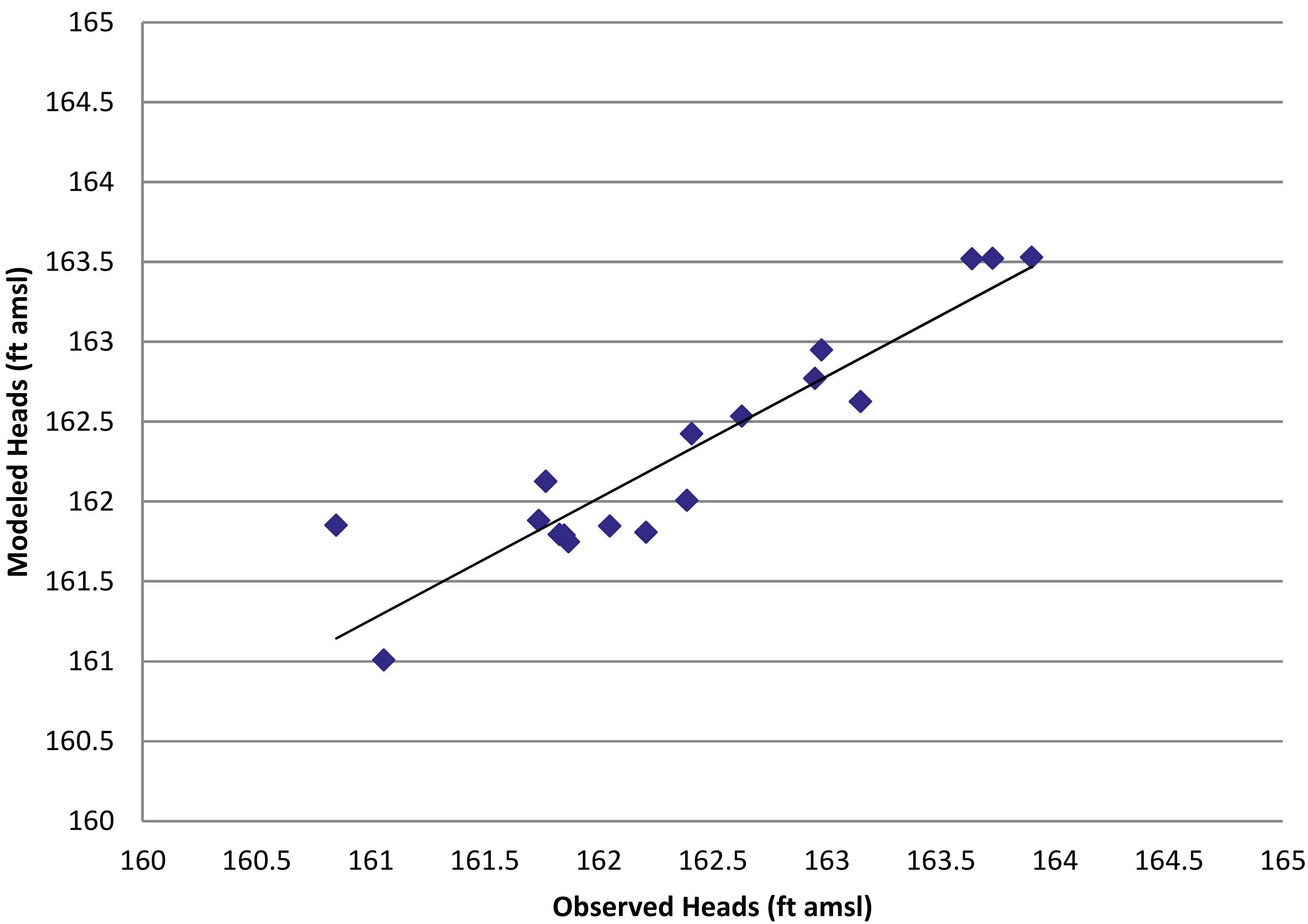
R:\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Figure 9 - Modeled Heads versus Uppe Floridan Aquifer Map March 2014.mxd



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

Brown AND Caldwell

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Figure 10
Modeled Versus Observed Heads

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

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

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

Brown AND Caldwell

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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

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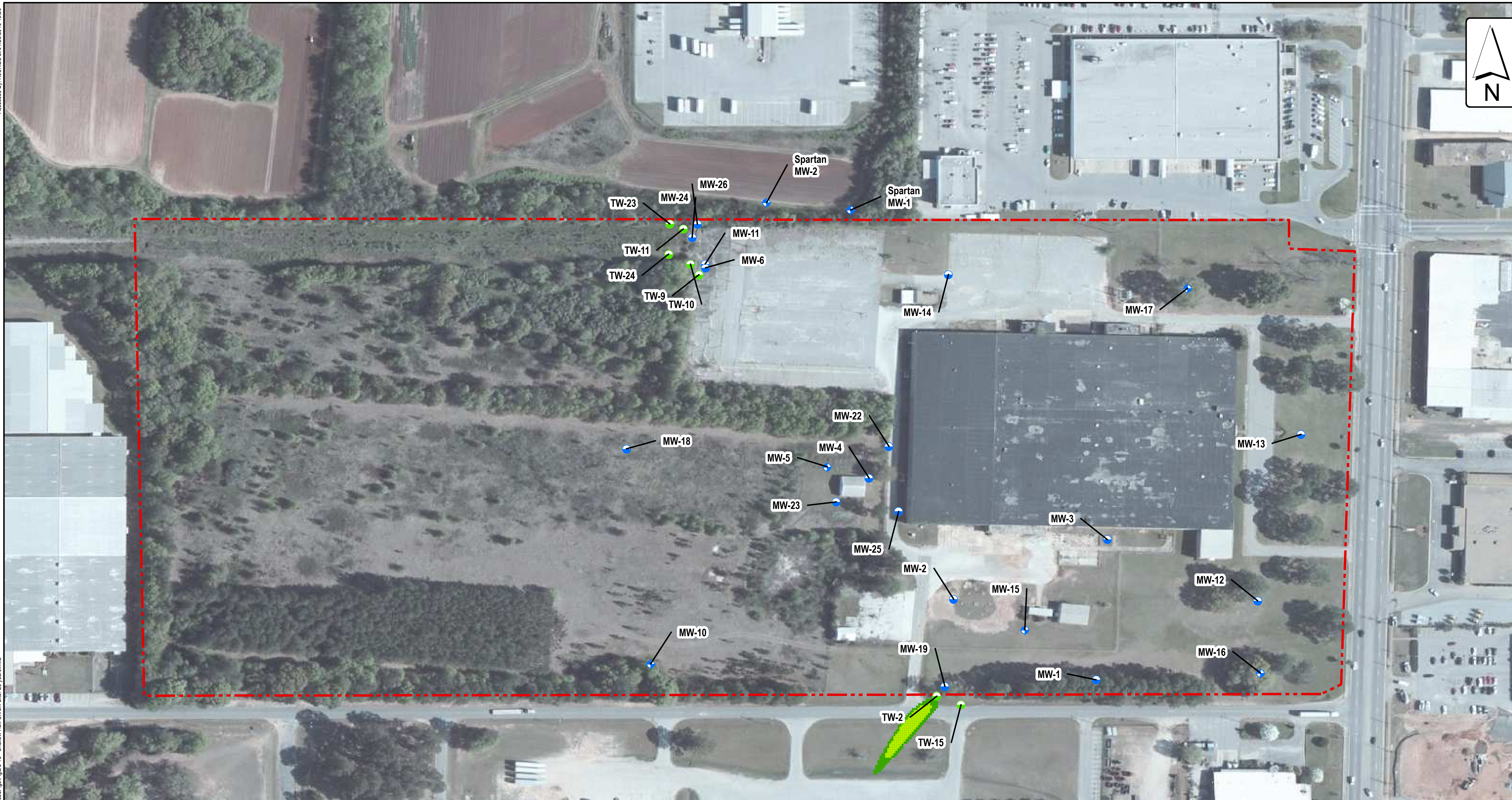
R:\Projects\MacGregorGolf\Magodos\FateTransportModeling2015\Figures\Revised\Figs\Figure 12 - Shallow Hex Chrom after 15 years.mxd



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

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R:\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Figure 13 - Shallow Hex Chrom after 25 years.mxd

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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

0 100 200 400 Feet

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

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R:\Projects\MacGregorGolf\Mapdocs\FateTransportModeling2015\Figures\RevisedFigs\Figure 14 - Hex Chrom after 40 years Deep Unconsolidated Zone.mxd

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:	01/20/2015
SCALE:	AS SHOWN
DRAWN BY:	GLC
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Table B1. 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)

Appendix C: Groundwater VOC Concentration Trend Analysis

Table C1. Mann-Kendall Test - Trichloroethene in MW-4
Former MacGregor Golf Company
Albany, Georgia

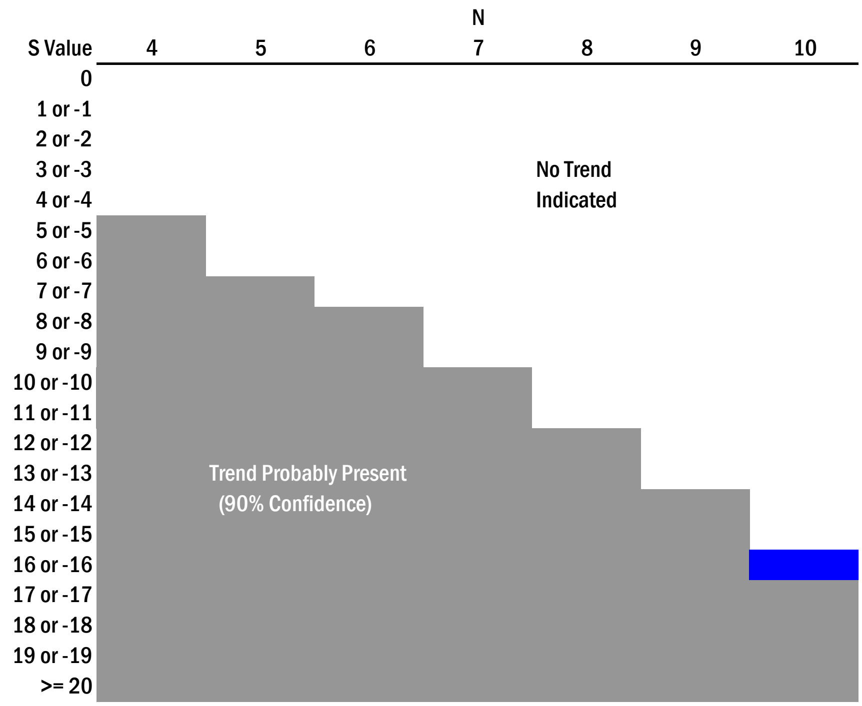
Date		Feb-04	Mar-04	May-04	Aug-04	May-06	Oct-09	Jul-10	Mar-11	Oct-13	Jan-14	Sums
Concentration (mg/L)		0.370	0.130	0.110	0.180	0.170	0.079	0.200	0.110	0.120	0.097	
Row 1: Compare to	Feb-04		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to	Mar-04			-1	1	1	-1	1	-1	-1	-1	-2
Row 3: Compare to	May-04				1	1	-1	1	0	1	-1	2
Row 4: Compare to	Aug-04					-1	-1	1	-1	-1	-1	-4
Row 5: Compare to	May-06						-1	1	-1	-1	-1	-3
Row 6: Compare to	Oct-09							1	1	1	1	4
Row 7: Compare to	Jul-10								-1	-1	-1	-3
Row 8: Compare to	Mar-11									1	-1	0
Row 9: Compare to	Oct-13										-1	-1

Mann-Kendall Statistic (S) = -16

Conclusion: Decreasing Trend

N = 10

Confidence Level Chart



Stability Evaluation Results		
Trend present (>= 90% Confidence)		
	S < 0	Concentration decreasing
	S > 0	Concentration Increasing

Table C2. Mann-Kendall Test - cis-1,2-Dichloroethene in MW-4
Former MacGregor Golf Company
Albany, Georgia

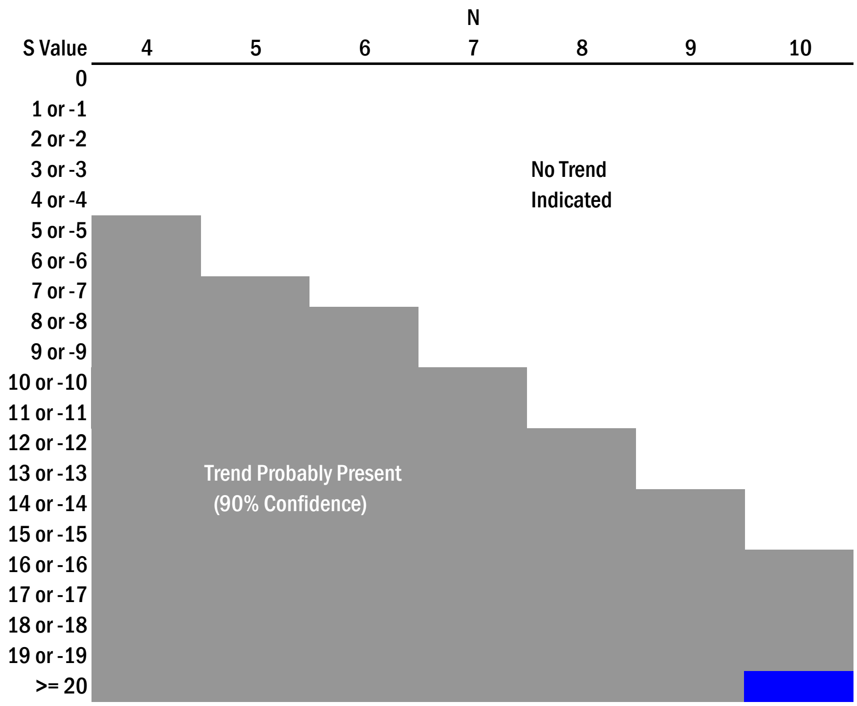
Date		Feb-04	Mar-04	May-04	Aug-04	May-06	Oct-09	Jul-10	Mar-11	Oct-13	Jan-14	Sums
Concentration (mg/L)		1.8	1.7	0.890	1.400	1.1	0.400	0.690	0.410	0.380	0.290	
Row 1: Compare to	Feb-04		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to	Mar-04			-1	-1	-1	-1	-1	-1	-1	-1	-8
Row 3: Compare to	May-04				1	1	-1	-1	-1	-1	-1	-3
Row 4: Compare to	Aug-04					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to	May-06						-1	-1	-1	-1	-1	-5
Row 6: Compare to	Oct-09							1	1	-1	-1	0
Row 7: Compare to	Jul-10								-1	-1	-1	-3
Row 8: Compare to	Mar-11									-1	-1	-2
Row 9: Compare to	Oct-13										-1	-1

Mann-Kendall Statistic (S) = -37

N = 10

Conclusion: Decreasing Trend

Confidence Level Chart



Stability Evaluation Results	
Trend present (>= 90% Confidence)	
S < 0	Concentration decreasing
S > 0	Concentration Increasing

Table C3. Mann-Kendall Test - Vinyl Chloride in MW-4
Former MacGregor Golf Company
Albany, Georgia

Date		Feb-04	Mar-04	May-04	Aug-04	May-06	Oct-09	Jul-10	Mar-11	Oct-13	Jan-14	Sums
Concentration (mg/L)		0.0130	0.0210	0.0087	0.0074	0.0088	0.0150	0.0250	0.0048	0.0150	0.0110	
Row 1: Compare to	Feb-04		1	-1	-1	-1	1	1	-1	1	-1	-1
Row 2: Compare to	Mar-04			-1	-1	-1	-1	1	-1	-1	-1	-6
Row 3: Compare to	May-04				-1	1	1	1	-1	1	1	3
Row 4: Compare to	Aug-04					1	1	1	-1	1	1	4
Row 5: Compare to	May-06						1	1	-1	1	1	3
Row 6: Compare to	Oct-09							1	-1	0	-1	-1
Row 7: Compare to	Jul-10								-1	-1	-1	-3
Row 8: Compare to	Mar-11									1	1	2
Row 9: Compare to	Oct-13										-1	-1

Mann-Kendall Statistic (S) = 0

Conclusion: No Trend Indicated

N = 10

Confidence Level Chart

N

S Value	4	5	6	7	8	9	10
0							
1 or -1							
2 or -2							
3 or -3							
4 or -4							
5 or -5							
6 or -6							
7 or -7							
8 or -8							
9 or -9							
10 or -10							
11 or -11							
12 or -12							
13 or -13							
14 or -14							
15 or -15							
16 or -16							
17 or -17							
18 or -18							
19 or -19							
>= 20							

No Trend Indicated

Trend Probably Present (90% Confidence)

Stability Evaluation Results

Trend present (>= 90% Confidence)

S < 0 Concentration decreasing

S > 0 Concentration Increasing