Aspect consulting
IN-DEPTH PERSPECTIVE

WEBB HILL BIOSOLIDS FACILITY HYDROGEOLOGIC INVESTIGATION - PHASE 1

Mason County, Washington

Prepared for: **Mason County Department of Community Development, on behalf of WRIA 16 Planning Unit**

Washington State Department of Ecology Grant No. G0700208

Puget Sound Action Team Grant No. HC05-14

Project No. 070041-001-01 • September 6, 2007

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Acronyms

bgs	below ground surface
DNR	Washington Department of Natural Resources
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
GWQC	Ground Water Quality Criteria
HCDOP	Hood Canal Dissolved Oxygen Program
MCL	maximum contaminant level
mg/L	milligrams per liter
QAPP	Quality Assurance Project Plan
SMCL	secondary maximum contaminant level
TKN	total Kjeldah nitrogen
TOC	total organic carbon
µS/cm	microSiemens per centimeter
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WAC	Washington Administrative Code

Executive Summary

The Webb Hill facility is a biosolids treatment and land application facility on Webb Hill Road in Mason County, Washington. This report presents the findings of a hydrogeologic investigation of this facility.

The term biosolids is defined under WAC 173-308-080 as "*municipal sewage sludge that is a primarily organic, semisolid product resulting from the waste water treatment process, that can be beneficially recycled and meets all requirements under this chapter. Biosolids includes a material derived from biosolids, and septic tank sludge, also known as septage, that can be beneficially recycled and meets all applicable requirements under this chapter. For the purposes of this rule, semisolid products include biosolids or products derived from biosolids ranging in character from mostly liquid to fully dried solids*".

The Webb Hill facility is operated by Bio Recycling Corporation and receives biosolids from septic tank pump-out from Mason and surrounding counties and from area sewage treatment facilities. The biosolids are screened, treated with quick lime to kill pathogens, and spray-irrigated on fields at the facility.

Studies performed as part of the Hood Canal Dissolved Oxygen Program (HCDOP) indicate that low dissolved oxygen levels in Hood Canal maybe directly related to nutrient inputs such as nitrate. The Bio Recycling Webb Hill facility has the potential to be a significant source of nitrates in groundwater (Black, 2006). In addition, the WRIA 16 comprehensive watershed plan developed under RCW 90.82 includes the following recommendation: *"The Planning Unit recommends that Mason County and the Department of Ecology continue water quality monitoring efforts and initiate further investigation, as appropriate, at the Webb Hill biosolids application site to identify and assess impacts to surface and groundwater [and Hood Canal]."*

The objective of this investigation is to evaluate if groundwater beneath the facility has been impacted and to determine the groundwater flow (transport) direction at the site. Four groundwater monitoring wells were installed at the facility using rotosonic drilling methods. The drilling method allowed collection of continuous soil core and identification of perched zones.

A regional unconfined aquifer, at least 55 feet thick, was identified beneath the facility at about elevation 300 feet (depths ranging from about 105 to 165 feet below ground surface) within stratified glacial deposits. The deposits exhibited significant heterogeneity, varying vertically within boreholes and laterally between boreholes, which were separated about 1,800 feet. Monitoring wells installed in this investigation were screened across the regional water table and monitor the upper portion of the regional unconfined aquifer.

Groundwater flow direction in the regional aquifer was determined to be southwesterly in May 2007. The groundwater gradient was low at 0.002 ft/ft (about an 11-foot decline in groundwater level per mile). Determination of off-site impacts, such as on Hood Canal or

other water bodies, will require additional information about seasonal variations in water levels, off-site hydraulic gradients, and soil permeability values.

Groundwater quality impacts beneath the facility are indicated by elevated nitrate concentrations, elevated specific conductance, depressed pH, and changes in major ion concentration and chemistry. Background water quality was monitored at upgradient well MW-3. Nitrate concentrations (reported as nitrogen) were below detection levels in this well, specific conductance was low at 82 umohs/cm, and pH was slightly basic (7.3).

In contrast to background conditions, monitoring well MW-1, located near the center of the application areas exhibited nitrate concentrations of 13.3 milligrams per liter (mg/L), a specific conductance of 374 umohs/cm and a pH of 6.7. Monitoring well MW-4, also located downgradient of the application areas exhibited a nitrate concentration of 9.78 mg/L and showed changes in specific conductance and pH similar to well MW-1. Both monitoring wells MW-1 and MW-4 show elevated chloride and sulfate levels compared with background conditions. Nitrate was detected at 0.79 mg/L in monitoring well MW-2 and 0.71 mg/L in WS-2, slightly elevated above the non-detect level of 0.01 mg/L in upgradient well MW-3. On-site water supply well WS-2, which was screened in a lower portion of the aquifer (43 to 49 feet below the water table) was generally similar in groundwater chemistry to well MW-2. Water quality in the uppermost portion of an aquifer may be different than that measured deeper within the aquifer because of greater opportunity for attenuation of solute concentrations. Water quality in the uppermost portion of the aquifer at the WS-2 location is unknown.

Nitrate concentrations at monitoring well MW-1 (13.3 mg/L) exceed the numeric groundwater quality criteria listed in Washington Administrative Code (WAC) 173-200, *Water Quality Standards for Ground Water of the State of Washington* and the maximum contaminant level (MCL) (WAC 246-290-310, *Public Water Supplies*) of 10 mg/L. Nitrate concentrations at monitoring well MW-4 (9.78 mg/L) are very close to the MCL. The secondary MCL for manganese of 0.05 mg/L was exceeded at monitoring well MW-3, but is attributed to natural, not anthropogenic, conditions due to its occurrence in a well located upgradient of the facility.

Recommendations are provided to further define the groundwater flow direction and extent of nitrate contamination through two additional on-site monitoring wells and monitoring of off-site wells. Immediate identification and sampling of off-site water supply wells 3,000 feet downgradient of the facility is recommended.

1 Introduction

Aspect Consulting LLC is contracted to perform a hydrogeologic investigation of the Bio Recycling Corporation's biosolids recycling facility located on Webb Hill Road in Mason County, Washington (Figure 1.1). This work is being performed cooperatively with the Webb Hill Technical Committee, Mason County, U.S. Environmental Protection Agency (USEPA), and U.S. Geological Survey (USGS). The Bio Recycling Webb Hill facility is a biosolids treatment and land application facility permitted to accept Class B biosolids, and untreated sewage sludge. The facility is designated as a Regional Septage Management Facility. Biosolids treated at the facility originate from private septic tanks and area sewage treatment facilities.

The facility has received attention as a potential source of nitrogen entering the Hood Canal via a groundwater pathway. The potential for impacts to groundwater from the facility were identified in an USEPA study, which recommended installation of monitoring wells to evaluate groundwater impacts, groundwater flow directions, and the potential for impact to Hood Canal (Black, 2006). In addition, the WRIA 16 Watershed Plan recommends that further investigations be initiated at the facility to identify and assess impacts to surface and groundwater.

The primary indicators of impact on water beneath the facility are changes in total dissolved solids (TDS), pH, nitrate, and anions such as sulfate and chloride. Nitrates are of specific concern to Hood Canal due to their potential to reduce dissolved oxygen. The primary goal of this investigation is to evaluate if leachate from activities at the Webb Hill facility are impacting groundwater quality and to determine the transport direction of any leachate compounds entrained in groundwater.

To accomplish these objectives, four monitoring wells were installed and sampled. This report presents a summary of the findings of this investigation. The report is organized into the following sections:

- The remainder of the introduction presents background information on site activities and previous investigations;
- Section 2 presents a summary of field activities;
- Section 3 describes site geologic and hydrogeologic conditions;
- Section 4 discusses results of water quality sampling and testing;
- Conclusions and recommendations are presented in Section 5; and
- A detailed description of field activities (well installation, surveying, and sampling) is presented in Appendix A, boring logs are included as Appendix B, and laboratory reported analytical results are presented in Appendix C.

1.1 Site History and Operation

The Webb Hill facility was initially used as a Christmas tree farm and converted to biosolids application in September 1985. In about 1994, business ownership transferred from Solganics to the current owner, Bio Recycling Corporation.

The treatment and spray irrigation process used at the facility is as follows. Total biosolids entering the site are calculated from truck weight measurements made at the scale house at the entrance facility. The trucks discharge biosolids to a screen facility that screens out large-sized debris. To treat pathogens, the biosolids are pumped into two, approximately 8,000-gallon tanks and treated with quick lime (calcium oxide) and maintained at a pH of 12 for a 2-hour period. The biosolids are then pumped to a series of above ground tanks, with a total capacity of about 33,000 gallons, where pH is maintained at 11.5 for a 24-hour period. Some biosolids arrive at the facility pretreated and are applied directly to the fields.

In 2006, 34 million gallons of biosolids were applied to the Webb Hill facility (Ecology, 2006). Fields are irrigated with the treated biosolids using large bore spray guns. Irrigation is rotated among six fields at the facility as shown on Figure 1.2. Fields range in size from about 35 to 160 acres. Application is rotated through the fields, with each field being utilized about 3 to 4 times each year. Field 4 is generally reserved for application during dry periods. Cattle are permitted to graze the fields during drier months following a 30-day rest period after biosolids application.

An on-site well is used predominantly for wash-down purposes. This well was installed in April 2000 and replaced an earlier water supply well that was decommissioned in May 2000. The location of the existing well and the approximate location of the decommissioned well are presented on Figure 1.2 and well logs/decommissioning log for these wells are included in Appendix B. As described below, these wells have been routinely sampled as part of the facility monitoring program.

Since 1999, a Washington State Department of Ecology (Ecology) permit has required quarterly sampling of the on-site well and surface water, and annual soil sampling at the facility through an agreement with Mason County.

1.2 Previous Investigations

Previous investigations at the facility include compliance monitoring of biosolids by Bio Recycling Corporation's routine water quality monitoring by Mason County, an evaluation of potential nutrient loading from the facility by USEPA, a first flush study by Ecology, a soils evaluation report by Land Profile Inc., and geotechnical/geologic studies. These investigations are summarized below.

1.2.1 Routine Monitoring

Annual biosolids reports are submitted to Ecology by Bio Recycling Corporation. These reports present a compilation of monthly septage quality data and complete Ecology's septage management facility form. The reports also include an attached calculation of agronomic biosolids application rate. The annual reports for 2006 indicate that the facility received and applied 34,338,796 gallons of septage to 344 acres for an application rate of

99,822 gallons/acre. Parameters tested include metals listed in Table 3 of WAC 173-308 *Biosolids Management*, total solids, ammonia, and total Kjeldahl nitrogen. These analyses are summarized in Section 4 of this investigation.

Quarterly sampling of surface water and groundwater at the facility is performed by Mason County, under agreement with Ecology, the permitting agency. Soils are collected annually by Bio Recycling consultants. These soil reports are described in Section 1.2.4. Surface water is collected at three locations (SW-1, SW-2 and SW-3). The location of stations SW-2 and SW-3 are shown on Figure 1.2. Station SW-1 is located about a ½ mile southwest of the site in a wetland area bordering Webb Hill Road. Groundwater is collected from the on-site supply well. High nitrate concentrations in surface water would provide an indication that solutes may leach from facility operations and potentially impact groundwater.

1.2.1.1 Quarterly Surface Water Monitoring

Nitrate+nitrite (as N) levels have been elevated frequently at location SW-3, with six samples in excess of 1 mg/L and two samples exceeding 10 mg/L since sampling began in 1998. Nitrate+nitrite levels were also elevated in station SW-2, with four samples exceeding 1 mg/L and one sample in excess of 10 mg/L. In contrast, quarterly samples obtained from station SW-1, located about ½ half mile to the southwest of the facility, had nitrate+nitrite concentrations well below 1 mg/L.

1.2.1.2 Quarterly Groundwater Monitoring

A well was drilled on the site in 1995 to a depth of 160 feet and completed in a sand and gravel unit. No screen was installed in this well and it was completed with the end of the 6-inch-diameter steel casing open to the aquifer. Nitrate+nitrite levels were monitored from September 1998 through March 2000, with concentrations ranging from 7 to 15 mg/L. Maximum nitrate concentrations generally corresponded to late fall sample events.

We understand there was concern over the seal in this well, although no specifics were available for review. Review of the well log indicates a surface seal to 18 feet and compliance with *Minimum Standards for Construction and Maintenance of Wells*, WAC 173-160. The 1995 well was decommissioned by perforating and grouting the casing in May 2000. The approximate location of the decommissioned well was identified by Bio Recycling personnel during our March 19, 2007 field reconnaissance and the global positioning system (GPS) location is indicated on Figure 1.2.

A second well (WS-2) was drilled at the facility in April 2000 at the location shown on Figure 1.2. This well was completed with a well screen from 191 to 197 feet in a coarse sand and gravel aquifer. Nitrate+nitrite analysis concentrations in this well were significantly lower than that identified in the 1995 well. Review of quarterly sample results from June 2000 through June 2006 indicates nitrate+nitrite (as N) concentrations have ranged from a low 0.16 mg/L to a high of 1.84 mg/L.

Nine domestic water supply wells in the vicinity of the Webb Hill facility were sampled in February of 1999 by Mason County Department of Health Services. Nitrate concentrations ranged from 0.51 to 0.81 mg/L, well below the maximum contaminant level (MCL) for drinking water of 10 mg/L.

1.2.2 USEPA Study

USEPA (Black, 2006) identified issues related to the potential loading of nitrates and other contaminants to Hood Canal and Lower Puget Sound. This study included a review of existing data and a site visit in November 2005. The report presented the uncertainty in groundwater flow directions in the area and suggested the potential for a groundwater divide south and east of the facility. Additional concerns included appropriate use of agronomic rates and data showing a build-up of some metals and nutrients in site soils. The report further discussed the potential for groundwater beneath the facility to flow toward Hood Canal and Skokomish River. The report recommended installation of groundwater monitoring wells to confirm the actual groundwater flow paths. Other groundwater-related recommendations for the facility included sampling of surrounding water supply wells for nitrate concentrations.

1.2.3 Ecology First Flush Study

A first flush study was performed by Washington State Department of Ecology in early November 2006 (Maggi, 2006). The study indicated elevated nitrate levels at station SW-2 of about 23 mg/L. This station is located within a biosolids application zone, although geese present in this area at the time of sampling may have contributed to the elevated nitrate levels. Nitrate levels at station SW-3 were about 9 mg/L and about 3 mg/L at station SW-1. The study indicates that elevated nitrates at Station SW-1 may be related to sources other than the biosolids area, due to the large catchment area located outside the facility.

1.2.4 Soil Studies by Land Profile Inc.

Land Profile Inc. has performed studies for Bio Recycling to assess soil conditions and land treatment capacity at the facility since 1999. These studies typically include a site visit, test pit excavation, soil sampling, and evaluation of laboratory results to determine if biosolids application is adversely affecting soil chemistry. Samples are typically collected from 3- to 5-foot deep test pits at 1-foot increments. Samples from the upper foot are typically analyzed for pH, NO_3-N, P (Bray), K, Ca, Mg, Na, B, Zn, %OM, Lime Requirement, SO_4, CEC, and Total N, and for the trace elements As, Cd, Pb, Hg, Se, Cu, Ni and Mo. Samples from below 1-foot are typically analyzed for pH and NO_3-N. The 2006 study concluded that “no deleterious effects to soil or crop productivity are expected by current activity. Application approach is consistent with accepted agronomic practices”. These studies are submitted to Ecology on an annual basis.

1.2.5 Geologic/Geotechnical Studies

Geologic conditions have been investigated during test pit explorations at the site (HWA, 1999) and through mapping being performed by Mike O’Neil as part of Geomap NW (http://geomapnw.ess.washington.edu). Test pit and boring logs from the HWA investigation are presented in Appendix B.

2 Investigative Methods

2.1 Drilling and Monitoring Well Installation

Four monitoring wells were installed at the facility, using rotary-sonic drilling methods by Boart Longyear Company of Fife, Washington. Geologic monitoring during drilling was performed by Aspect Consulting personnel. A near-continuous core was obtained with this method allowing detailed stratigraphic analysis and the delineation of perched ground water zones. All drilling and related activities were performed in accordance with Quality Assurance Project Plan (Aspect, 2007) and WAC 173-160, *Minimum Standards for Construction and Maintenance of Wells*. Drilling, well installation, well development, and soil and water sampling are discussed in detail in Appendix A, Section A.1. Monitoring well drilling and installation was performed between April 17 and May 3, 2007.

A reconnaissance site visit was held with USEPA representatives, Aspect Consulting, Mason County Planning and Health, and Bio Recycling personnel to observe site features, discuss general monitoring well locations, and evaluate access to these locations. In a follow-up visit, locations were field staked by representatives from Aspect Consulting, Mason County Planning, and Boart Longyear.

Monitoring wells were completed with nominal, schedule 80 PVC casing, and machine slotted screen. Monitoring wells were completed with screens positioned within the uppermost portion of the aquifer to minimize the effects of vertical gradients on water levels and to define the potentiometric surface in the shallow portion of the aquifer. The greatest potential for groundwater quality impacts from locally derived infiltration is anticipated to be in the uppermost portion of the aquifer.

A well (21/4-24G1) monitored as part of a previous USGS study (Molenaar and Noble, 1970), located about 1 mile southwest of the central area of the facility, indicated seasonal water level fluctuations of 17 to 18 feet. Water levels in well 21/4-24G1 were estimated to peak in late April and reach their seasonal low in December. The well is completed with a perforated interval from 136 to 144 feet in a gravel aquifer overlain by about 20 feet of till at ground surface and, as such, appears to be in a hydrogeologic setting similar to conditions identified in the log of the on-site water supply well.

Based on well 21/4-24G1, water levels at the facility are expected to fluctuate on the order of 17 to 18 feet. Therefore, with the exception of MW-1, the monitoring wells were completed with 25 feet of screen, with approximately 22 feet of screen placed below the water table as measured at time of drilling and nominally 3 feet of unsaturated screen above the water table. For a 17- to 18-foot water level fluctuation, about a 4- to 5-foot water column would be present in the wells during the seasonal low.

At MW-1, an approximate 4-foot till layer was identified immediately above the water table. This till layer was treated as a semi-confining unit. A 20-foot well screen was placed below the water table to allow for the seal to extend into the till layer. The final

screen settings relative to static water level after well completion are presented in Table 3.2.

Installed wells were tested for alignment by running slugs, or dummies, of different sizes in the wells. Results are presented in Table A-1.

Each monitoring well was developed through a combination of surge and bail and pumping until the discharge was relatively sand free and turbidity was less than 50 NTUs.

Each monitoring well and water supply well WS-2 were surveyed by a licensed surveyor to top-of-casing after well installations were completed. Depth-to-water measurements were made with an electronic water-level indicator to the nearest 0.01 foot.

During drilling, perched groundwater samples were collected whenever possible, either from the core barrel or via bailer. After operations started, USEPA requested that samples be obtained while drilling into the regional groundwater aquifer. Two or three groundwater samples were procured at different depths from within the regional aquifer at each borehole, as permitted by the sequence of drilling operations. A total of 24 groundwater samples, seven samples representing at least four perched zones and 17 samples to characterize variations in regional aquifer water quality with depth, were submitted to the USEPA laboratory at Manchester. Analytical results for samples obtained during drilling are included at the end of Appendix C. Interpretation of these results was outside the scope of this study. We understand interpretation of these data is being addressed by EPA.

2.2 Groundwater Sampling

The monitoring wells and water supply well were sampled on May 30 and 31, 2007, using low-flow sampling protocol as specified in the Quality Assurance Project Plan (QAPP). Intake of the sample pump was placed approximately 3 feet below the water surface. On-site water supply well was sampled using the dedicated submersible pump. Sampling procedures are detailed in Appendix A, Section A.3.

Field parameters of turbidity, temperature, specific conductivity, dissolved oxygen, pH, and Eh were measured during sampling. Field test kits were used to analyze groundwater for ferrous iron and nitrate. Laboratory-prepared sample containers were filled, stored on ice, and submitted under chain-of-custody to a Washington-certified environmental laboratory (Test America Analytical Testing Corporation of Seattle, Washington) for the analysis of inorganic constituents, dissolved metals, total organic carbon (TOC), nitrate, nitrite, ammonia, total Kjeldahl nitrogen (TKN), and total phosphorous. Samples for metals analyses were field filtered. Analytical results and field measured parameters are discussed in Section 4.

3 Facility Hydrogeology

The Webb Hill facility is underlain by a complex sequence of glacial deposits. This section describes these deposits, and the occurrence and movement of water within them.

3.1 Geologic Conditions

Geologic conditions were previously investigated during test pit explorations at the site (HWA, 1999) and through mapping being performed by Mike O'Neil as part of Geomap NW (http://geomapnw.ess.washington.edu). The Geomap NW project is ongoing and updated mapping of the project area was not available for this report. Previously mapped geologic conditions from Washington Department of Natural Resources (DNR) are presented on Figure 3.1.

3.1.1 Geologic History

Groundwater beneath the facility occurs within unconsolidated glacial deposits. Unconsolidated glacial deposits in the project area are between 600 and 900 feet thick (Jones, 1996). Deposition of these deposits occurred during the Fraser Glaciation about 15,000 years before present. The Fraser Glaciation was one of five glacial advances ranging from 2 million to 10,000 years before present.

Two distinct stades (substages of a glaciation) occurred during the Fraser Glaciation in the project vicinity. The Evans Creek Stade occurred during the initial cooling associated with the Fraser Glaciation. During this cooler period (about 20,000 to 16,000 years ago), continental glaciers advanced southward from British Columbia and in the alpine regions of western Washington. Alpine glacial deposits have been mapped along the banks of the Skokomish River, about 1 mile west of the Webb Hill facility and may underlie the younger glacial deposits. Alpine glacial deposits were not identified in the explorations advanced during this investigation.

A minor warming event occurred after the Evans Creek Stade, and the alpine glaciers retreated up-valley. Following retreat of the alpine glaciers, the continental glacier continued to advance during the Vashon Stade of the Fraser Glaciation. At the onset of the Vashon Stade, an arm of the ice sheet advanced southward, blocking off the Strait of Juan de Fuca, forming a large pro-glacial (i.e., in front of the glacier) lake. The continental glacial advance eventually blocked drainages of the Olympic Mountain valleys. Fine-grained sediment settled into the proglacial lake. The continental glaciers reached their maximum southerly limit about 15,000 years ago (Booth, 1986). At the maximum glacial extent, the Olympic Mountains were bounded by the continental Cordilleran ice sheet with the Puget ice lobe to the east and the Juan de Fuca ice lobe to the north.

As the Puget lobe advanced southward, sediments were deposited by glacial meltwater (on top of the lacustrine silts), creating an outwash plain in front of the advancing ice. This unit is referred to as Vashon Advance Outwash. The unit tends to be finer grained in

the lower sections and coarsens upward as the glacier advanced south and deposition occurred closer to the glacial front by higher energy streams proximal to the glacier. The Vashon Advance Outwash is a regionally important aquifer. Advance Outwash has been mapped overlying the alpine outwash in exposures along the east side of the Skokomish River valley (Figure 3.1) and may be present near the base of the on-site monitoring wells.

Subglacial deposition occurred beneath the ice as continental glaciers advanced. Lodgement till was deposited where the glacier overrode its own detritus. Melt-out tills were laid down where the ice was relatively stagnant. Glaciofluvial deposition occurred where flowing water was present within the glacier. As described below, the variable geologic units identified beneath the Webb Hill facility are interpreted to have been deposited in a subglacial environment and are collectively referred to as stratified glacial deposits. These deposits are comprised of interstratified tills and glaciofluvial deposits. The fluted landscape of the area was formed during deposition of till and subglacial deposits. Erosion by subglacial meltwaters may have contributed to the formation of the fluted, drumlinized landscape (Mike O'Neil, personal communication). The stratified glacial deposits are mantled by a thin veneer of recessional outwash, deposited during breakup and recession of the glacier.

3.1.2 Geologic Units

During this investigation, detailed geologic data was obtained during the drilling and logging of four monitoring well boreholes using rotosonic drilling methods and continuous sampling. Detailed geologic logs are presented in Appendix B. Two geologic cross sections were developed through the facility and are presented on Figures 3.2 and 3.3. Cross section location lines are presented on Figure 3.1.

Subsurface conditions at the facility consist of unconsolidated glacial deposits. These deposits are broken into the following two units:

- Recessional glacial outwash
- Stratified glacial deposits

Recessional outwash is typically less than 5 feet thick at the facility, consisting predominantly of slightly silty to silty sands and gravels. The outwash is typically loose and exhibits a higher degree of sorting than the underlying subglacial deposits. Previous test pit explorations at the facility indicate relatively thin deposits (less than 3.5 feet) of outwash in the area east of MW-3 (HWA, 1999).

Stratified glacial deposits were identified beneath the recessional outwash and were present to the total depth of the boreholes. The contact between the overlying recessional outwash and stratified glacial deposits was gradational. The stratified glacial deposits are further divided into the following subunits:

- Clean to debris-rich (i.e., clayey and/or silty) glaciofluvial sands and gravels;
- Melt-out till; and
- Silt.

The unit is very heterogeneous and is interpreted as deposited in a subglacial environment. The principal subunits within the stratified glacial deposits are described below.

The **glaciofluvial subunit** consists of clean to silty sands and gravels. These deposits lack the weak cementation of the till deposits and are typically clast supported. Gradational to clear stratification was recognized within individual layers of the glaciofluvial subunit, indicating deposition in a fluvial environment. The poor sorting of much of the unit indicates that significant fluvial transport and sorting did not occur. A transition to a proglacial advance outwash at depth (below about elevation 300 feet) is suggested by an increase in the presence of clean sands and gravels. Where saturated, the glaciofluvial deposits collectively form an aquifer. The range in textures within this unit suggest a wide range in permeabilities with high permeabilities expected for the cleaner sand and gravel sequences and lower permeabilities for the more debris-rich, slightly silty to silty sands and gravels.

The **till subunit** exhibits textures ranging from silty very sandy gravel to gravelly silts, is typically matrix supported, and is weakly cemented with samples remaining intact upon removal from the core barrel. Thickness of the till ranged from layers 0.5 feet thick to packages up to 15 feet thick.

HWA Associates (1999) bored three test holes and excavated nine test pits approximately 1,200 feet east of MW-3. The exploration covered an area about 350 by 550 feet. The site plan and exploration logs are included in Appendix B.

The three borings were logged as till from 0.5 feet to 21, 23.5, and 32 feet, respectively, with samples taken at approximately 5-foot intervals. Two test pits had recessional outwash (2- and 3.5-foot depth) over till. Five test pits had weathered till (0.5- to 3.5-foot depth) and two pits had near-surface till.

Till soils were dense with descriptions varying from 'sandy gravel' to 'gravelly silty sand' to 'gravelly sandy silt'. The report noted a range of permeability from low to high. This variable till lithology is consistent with the till descriptions of the new wells described herein. The greater depth of till, as compared to the 8.5-foot thickness in MW-3 or 15-foot thickness in MW-2, is not unreasonable.

Texture and interstratified nature of the till suggest a melt-out origin. Melt-out tills form by the slow release of debris from the ice typically when the glacier is nearly stagnant. In contrast to lodgement tills, where clasts are derived by abrasion processes at the base of a moving glacier, clasts in melt-out tills are derived from within the ice sheet. As such, melt-out tills tend to be coarser grained and contain fewer fines (Ashley, et al., 1985). In addition, numerous, thin till interbeds within the glaciofluvial deposits suggest subglacial deposition. Till layers may form within the ice sheet while simultaneous deposition of glaciofluvial deposits may be occurring in a lower part of the ice sheet. The occurrence of perched water on the till suggests that, in places, it may act as an effective aquitard or perching layer.

Silt subunit consists of sandy and gravelly silts. This unit was readily differentiated from the tills by a significantly higher percent of silt. Perched water was identified above silt layers in monitoring well MW-4, indicating the unit locally acts as an aquitard. The sand

and gravel within the silts are supported by the silt matrix and generally lack grain to grain contact. This texture is consistent with silt deposition in a ponded, low energy glaciofluvial environment where sand and gravel melt out from the overlying glacier or floating ice into the silts.

3.1.3 Distribution of Geologic Units

The deposits exhibit a significant degree of heterogeneity, varying both laterally and vertically. Vertical variability was observed by changes in soil classification on a fine scale (0.5-foot) and by the presence of thin till layers at different elevations in the borings. Lateral variability was indicated by qualitative differences between boreholes (e.g., multiple till layers and fine scale variations in MW-2, a single till layer overlying the glaciofluvial deposits in MW-3, and silt layers in MW-4) and by the inability to correlate soil layers between boreholes.

Borehole geology is presented on cross sections in Figures 3.2 and 3.3. Cross sections differentiate the lower permeability till lenses (green color on sections) and silt layers (purple) from the higher permeability glaciofluvial subunit. The glaciofluvial subunit is divided into clean sand and gravel sequences (yellow) and the slightly silty to silty sand and gravels (reddish). Saturated sediments below the water table are shaded blue.

Although the deposits were found to be heterogeneous, some generalities on the distribution of these deposits may be made. In general, the occurrence of cleaner sands and gravels increases with depth. A sequence of clean sand and/or gravel was present beneath elevation 300 feet in each of the boreholes. Thick clean sand and/or gravel sequences up to 30-foot-thick were identified in monitoring wells MW-1 and MW-3. Fewer and thinner clean sand interbeds were identified in monitoring wells MW-2 and MW-4 (Figure 3.2). The increase in well-sorted, fluvial deposits with depth suggests that the deeper portion of the deposits may be part of or grading into a proglacial advance outwash sequence. A thick sequence of coarse sand and gravel logged by the driller of the on-site water supply well WS-2 was identified down to elevation 250 feet (about 30 feet below the monitoring wells) and suggests that the clean sand and gravel identified in the monitoring wells are at the top of a thicker sequence of advance outwash deposits.

Till layers were identified in all monitoring wells, but MW-2 had the greatest number of till sequences (Figure 3.2). The silt subunit was only identified in MW-4 borehole, where it forms at least two perching layers (Figure 3.2).

Both the till and silt subunits are relatively low permeability and locally act as aquitards. The units could not be correlated between the widely spaced boreholes. The units may locally redirect downward percolating water laterally, but downward flow would occur where units pinch out.

3.1.4 Hydrostratigraphic Units

A hydrostatigraphic unit is a geologic formation, part of a formation, or a group of formations with similar hydrologic characteristics such as porosity and permeability that can be characterized as an aquifer or non-water bearing confining layer. The water bearing characteristics discussed in Section 3.3.3 may be summarized as follows:

- **Glaciofluvial Deposits** – Where saturated, these deposits act as aquifer. A high degree of textural variability is present within the unit and corresponding variability in permeability is expected.
- **Till Deposits** – These layers act as an aquitard.
- **Silt Deposits** – These layers act as an aquitard.

3.2 Groundwater Occurrence

3.2.1 Perched Groundwater

Perched groundwater is water found above a low permeability layer with unsaturated conditions present beneath the perching layer. Perched groundwater was identified in the monitoring well borings from elevation 316 to 361 feet NAVD88, or approximately 18 to 61 feet above the regional water table. Occurrence of perched water was variable and no pattern was observed between wells. The lack of conformity is consistent with the absence of laterally continuous fine-grained units in the subsurface soils. Perched water identified during drilling is summarized in Table 3.1

The highest perched water was noted in **MW-3** at elevation 361 feet[1]. Water was found in the core barrel, but water in the borehole was ephemeral and quickly drained away. The boring had penetrated 11 feet of wet, poorly-sorted sand, where water may have been perched by a 1-foot silty, gravelly sand layer. No other perched groundwater was identified in monitoring well MW-3.

Perched groundwater in **MW-4** was observed at several points during drilling. Perched water levels were measured at 16-foot and 22.5-foot depth (Table 3.1). These two perching bodies had water levels above the bottom of the borehole of 2 and 9 feet, respectively. The deeper of the two perched water zones appeared to be confined in a 2-foot-thick gravel layer bounded by silt units above and below. Deeper perched water zones may have been present below this silt and above the top of the regional aquifer (water was constantly observed in the borehole after penetrating the water bearing stratum at 343 feet [33 ft bgs]). It is unknown whether leakage was occurring along the casing from the upper perched water bearing zone or whether perched water was present below the 33-foot depth in MW-4. Evaluation of perched zone water quality data may provide insight into the source of this water. Specific conductivity values were obtained for the upper perched layer at well MW-4 of 250 microSiemens per centimeter (µS/cm), slightly less than the 299 µS/cm specific conductance measured in the regional aquifer.

The presence of perched zones at MW-4 may be due to the combined effects of recharge source and geology. MW-4 is located near a small pond to the east and a wetland to the

[1] All elevations in this investigation are reported relative to NAVD88.

south that could provide a source of recharge. The geologic log indicates more silt layers, which would retard downward flow, than in the other monitoring wells. MW-4 is upslope of the wetlands near surface water sampling point SW-3 (Figure 1.2). The wetlands are about 30 feet lower than the ground surface at MW-4 and at a similar elevation with the perched groundwater zone from 31 to 33 feet below ground surface (bgs), suggesting the potential for hydraulic connection (Figure 3.2).

Two perched groundwater bodies were identified during drilling of **MW-2**, with water levels measured at depths of 101.7 and 112.9 feet bgs (2.3 and 0.6 feet, respectively, above the bottom of the open borehole [Table 3.1]). Perched water in this boring was probably retained on any of several thin till layers that were noted from 105 to 112.5 feet bgs. Soils in this zone varied from silty to trace silt on a scale of 0.5 foot. Specific conductivity values in MW-2 were 300 (105 feet water level bgs) and 150 µS/cm (112.5 water level bgs). Conductivity in the upper zone was significantly greater than the regional aquifer specific conductance of 95 µS/cm.

MW-1 had a weak perching zone at a depth of 86.3 feet bgs. Although a water level was measured, no sample could be obtained. The perching occurred in a large clean sand unit (65 to 100 feet bgs). The only fine-grained unit identified that may have retained water was a thin, 0.5 foot, layer of slightly silty sand.

3.2.2 Regional Aquifer

The uppermost regional aquifer at the site is generally unconfined with a spring season (2007) water table elevation of about 300 feet above mean sea level (NAVD88). The water table is relatively flat, sloping gently to the southwest with a horizontal hydraulic gradient of 0.002 feet per feet. Local confinement at the aquifer was indicated during drilling of MW-1, where the water level rose about 2 feet above the base of a till layer.

Two rounds of water level measurements were made on May 23 and May 31, 2007, and these data are presented in Table 3.1. Groundwater contours are presented in Figures 3.4 and 4.2. Contours were developed using only the monitoring wells. Water level for the new water supply well WS-2 fit the contours very closely, despite completion of WS-2 at a deeper depth in the aquifer. This consistency between wells with screens set at different elevations suggests good hydraulic connection within the aquifer and a weak vertical hydraulic gradient.

Groundwater flow direction is southwest and directly in-line with the northeast-southwest trending drumlinoid surface features. The coincidence of groundwater flow direction with the orientation of the drumlins suggests that this depositional environment may have led to lateral anisotropy within the aquifer, but additional water level data and delineation of the discharge zone would be necessary for confirmation.

Because of the relatively flat groundwater gradient, the effect of the survey elevation accuracy on groundwater flow directions was examined (see Appendix A, Section A.3.1) by altering well elevations within the range indicated by the 99.7% confidence interval. The tested scenarios had very little change on the groundwater gradient and the flow direction remained southwesterly.

The possibility of groundwater flow toward either Hood Canal or the Skokomish River had been raised by Black (2006). The observed data in May 2007 indicate that a groundwater high exists on the north side of the site and that groundwater flow is southwesterly and away from Hood Canal. However, since the gradient is relatively flat, additional water level measurements are necessary to define the seasonal and longer-term changes in the groundwater gradient. Three discharge directions may be speculated based on the observed May 2007 gradient: (1) Projection of the flow direction southwest suggests discharge into Purdy Creek, (2) Flow could swing southerly and discharge into Cranberry Lake, or (3) Flow could swing westerly and discharge into the Skokomish River. Flow paths may also diverge, resulting in a complex discharge pattern. Off-site water level measurements will be required to define the groundwater discharge area.

4 Groundwater Quality

This section provides a presentation and discussion of groundwater quality at the Webb Hill Biosolids Facility based on sampling performed May 30 and 31, 2007. A summary of biosolids quality is presented in Table 4.1 and groundwater analytical data are summarized in Table 4.2.

Data validation was performed by Aspect using criteria specified in the QAPP is discussed in Appendix C. Groundwater samples were analyzed for the following parameters using EPA or standard methods as specified below.

Field Parameters

Turbidity
Temperature
pH
Specific Conductance
Dissolved Oxygen
Eh

Dissolved Metals

Iron (EPA Method 200.7)
Manganese (EPA Method 200.7)

Nutrients

Ammonia as N (EPA 350.3)
Nitrate as N (EPA 353.2)
Nitrite as N (EPA 353.2)
Nitrate+nitrite (EPA 353.2)
Total Kjeldahl Nitrogen (EPA 351.2)
Phosphorous (EPA 365.2)

Major Ions

Calcium (EPA 200.7)
Magnesium (EPA 200.7)
Potassium (EPA 200.7)
Sodium (EPA 200.7)

Chloride (EPA 300.0)
Sulfate (EPA 300.0)
Bicarbonate Alkalinity (SM 2320B)
Carbonate Alkalinity (SM 2320B)
Hydroxide Alkalinity (SM 2320B)

Miscellaneous Conventional Chemistry Parameters

Bromide (EPA 300.0)
Fluoride (EPA 340.2)
Total Organic Carbon (EPA 415.1)

A discussion of the conventional groundwater chemistry and distribution of detected analytes is presented below followed by a comparison of analytes with state water quality standards.

4.1 Nitrate Occurrence and Conventional Chemistry

Nitrate and major ion data indicate water quality impacts have occurred in groundwater beneath the facility. Greatest water quality impacts were identified at monitoring wells MW-1 and MW-4 where nitrate (measured as nitrogen content, i.e., nitrate-N) was detected at concentrations of 13.3 and 9.78 mg/L, respectively. These wells are located hydraulically downgradient of biosolids application areas. In contrast to these wells, monitoring well MW-3, located upgradient of the application areas, shows no nitrate impact (<0.01 mg/L). Monitoring well MW-2 and the on-site water supply well had low nitrate detections (0.79 and 0.71 mg/L, respectively) and may prove to be within background conditions with continued monitoring. The variations in water quality between the monitoring wells are discussed in this section. The discussion is facilitated by Figures 4.1 and 4.2 that present major ion data and nitrate data as described below.

Figure 4.1 presents a trilinear plot or Piper diagram of the major cations and anions dissolved in groundwater beneath the facility. Trilinear plots provide a method for displaying the chemical data from multiple sample points on a single graph. In the lower left hand triangle of the diagram, the major cations are plotted. Anions are plotted in the lower right triangle. For each cation and anion, data pair lines are extended up to the diamond shaped graph and the intersection is plotted as a single point that represents the hydrochemical facies, as defined by major ion concentrations. The size of the points presented on the figure is proportional to the nitrate concentration.

These diagrams are useful for showing water types and mixing of water from two different sources. A water mixture will plot along a straight line, to the extent that the water chemistry has not been affected by ion exchange or other processes within the aquifer such as recharge or dilution of salts.

To facilitate an understanding of the spatial distribution of the major groundwater solutes, bar graphs of major ions in milliequivalents per liter (meq/L) were plotted on the site layout (Figure 4.2). An “equivalent” expresses the concentration of a solute in terms of moles of charge[2]. Theoretically, anions and cations should balance when expressed in terms of equivalents per liter. The bar graphs permit a quick evaluation of the water

[2] A mole is the number of molecules or ions (6×10^{23}) present in one gram of a substance. One mole of charge is one equivalent. One mole of an ion with a charge of one is one equivalent. One mole of an ion with a charge of two is two equivalents. Multiplying the concentration of a constituent by the atomic weight in grams per mole provides the number of moles per liter; multiplying the concentration by the valence number yields equivalents/liter. 0.001 equivalents equals one meq (http://www.geology.wisc.edu/courses/g627/l11_24.html).

types, the relative concentrations of various ions, and the balance error. Nitrate concentrations are also posted on Table 4.2 in milligrams per liter (mg/L) (1 mg/L is equal to one part per million [ppm]).

4.1.1 Upgradient Monitoring Well

MW-3

Monitoring well MW-3 lies hydraulically upgradient of the application area and is considered representative of background conditions. Nitrate concentrations in this well were less than the detection limit (<0.01 mg/L) (Figure 4.2). The well had low specific conductance (82 umhos/cm) indicating low total dissolved solids. pH was slightly basic (7.3) and a dissolved oxygen of 9.71 mg/L was near saturation. The dissolved oxygen content and pH were the highest measured in the monitoring wells. Oxidation-reduction potential of 92 mV indicates oxidizing conditions are present in the aquifer, consistent with the high dissolved oxygen level. Calcium and magnesium are the dominant cations and bicarbonate is the dominant anion at well MW-3. The cations and anions are in close balance (Figure 4.2).

4.1.2 Downgradient Monitoring Wells

MW-1

Monitoring well MW-1 lies down gradient of application fields 1, 2 and 3 (Figures 1.2 and 4.2) and shows degraded water quality in comparison to background well MW-3. This well exhibited the greatest nitrate concentration (13.3 mg/L) of the monitored wells. Relative to background conditions at MW-3, the pH (6.7) and dissolved oxygen (8.85 mg/L) were depressed and specific conductance (374 umohs/cm) elevated.

In addition, the concentration of all ions at MW-1 on weight/volume basis (i.e., mg/L) increase compared to monitoring well MW-3, consistent with the elevated specific conductance. A change in major ion chemistry from background conditions is indicated by an increase in the percent of milliequivalents of calcium, chloride, nitrate, and sulfate (Figures 4.1 and 4.2). The cation-anion balance indicates an anion deficit. This deficit is attributed to lower recoveries of anions and greater recoveries of cations in the analytical testing laboratory (see Appendix C for discussion).

Monitoring well MW-1 was located near a decommissioned water supply well that previously served the facility. The decommissioned well was completed with an open casing at a depth of 160 feet or about elevation 240 feet (see Figure 4.2 for approximate location, and Appendix B for well log). The opening to this well was 30 to 35 feet below the lowest portion of the monitoring well screen at MW-1 and, as such, monitored a deeper portion of the aquifer. Nitrate concentrations in this well measured between September 1998 and March 2000 ranged from 7.1 to 15 mg/L and are generally consistent with those identified in monitoring well MW-1, suggesting that deeper portions of the aquifer may also be impacted by nitrates in this area.

MW-4

Monitoring well MW-4, which also exhibits elevated nitrates (9.78 mg/L), has major ion concentration levels and chemistry very similar to well MW-1. Monitoring well MW-4

lies downgradient of the east portion of field 4 (Figures 1.2 and 4.2). Similar to well MW-1, dissolved oxygen and pH were depressed relative to background conditions and specific conductance was elevated. Changes in dissolved oxygen, pH, and specific conductance between MW-3 and MW-4 were similar to the changes between MW-3 and MW-1.

MW-2

Monitoring well MW-2, located downgradient of field 10, exhibited a low nitrate concentration of 0.78 mg/L. The water type for MW-2 shown on the piper plot in Figure 4.1 (orange dot) lies on a mixing line between impacted water (indicated by MW-1 and MW-4) and background water (MW-3), but is most similar to the background water type indicated by monitoring well MW-3. The position on the mixing line suggests a very slight impact from the biosolids operation; however, additional sampling may prove conditions at well MW-2 to be within background conditions.

Both wells MW-2 and MW-4 are located downgradient of application areas, yet nitrate concentrations are significantly higher at monitoring well MW-4. Nitrate impacts at a given monitoring well location will be influenced by the:

- Portion of the monitoring well detection zone that lies beneath the application area;[3]
- Present and historic nitrogen loading rates in the land area overlying the monitoring well detection zone;
- Size of surface water catchment area that conveys water into a monitoring well detection zone and the associated present and historic land use (i.e., percent of surface catchment that is application area); and
- Presence of perching layers that may redirect infiltrating water into or out of a monitoring well detection zone.

The surface catchment directed into the MW-4 detection zone appears to be much larger than at MW-2, extending north into present area of field 3. In comparison, the surface water catchment located within the facility and overlying the MW-2 detection zone is restricted to a relatively small area between two drumlins. Thus the potential for surface water, presumably carrying nitrogen compounds from present and/or historic land uses, to infiltrate into the MW-4 detection zone is probably much greater than for the MW-2 detection zone.

Perching layers may also redirect infiltrating water either into or away from a monitoring well detection zone. Perching layers were identified overlying the regional aquifer at both wells MW-2 and MW-4. In the case of monitoring well MW-2, specific conductance measurements were elevated within the shallowest perched zone (water level depth 101.7 feet and specific conductance 300 umhos/cm) compared to the underlying perched zone

[3] A monitoring well's detection zone may be defined as that area of the aquifer where solutes present in the aquifer, with time, will be detected at the monitoring well. The monitoring well detection zone will be influenced by horizontal and vertical flow paths, dispersion in the vertical and horizontal directions, dilution, and biological and geochemical reactions within a detection zone.

(water level 112.9 and specific conductance 115 umhos/cm). These data suggest that high conductivity water may be redirected by the perching layers away from MW-2. This possibility may be further evaluated when perched groundwater chemistry results are interpreted.

WS-2

The on-site water supply well WS-2 had a nitrate concentration (0.71 mg/L) similar to that at MW-2. Water supply well WS-2 is located downgradient of field 1. This well has similar major ion concentrations and chemistry to well MW-2 and plots in a similar position on the piper plot (Figure 4.1). The top of the well screen is about 20 to 25 feet lower than the lowest slot on the water table monitoring wells.

In addition to those factors discussed above that may influence nitrate concentrations, the low levels of nitrates in WS-2 could be related to the dilution effects within the aquifer; however, these effects were not indicated at well MW-1 and the decommissioned water supply well. Alternatively, the position of WS-2 upgradient of MW-2 and the similarity in nitrate and major ion chemistry could suggest that water is well mixed within the aquifer and very little change in water chemistry occurs between WS-2 and MW-4. Evaluation of depth to specific samples obtained from the regional aquifer during drilling may provide additional insight into vertical mixing within the aquifer.

The very high dissolved oxygen in well WS-2 may be related to aeration in the sampling process. Samples were obtained using the submersible pump installed in the well (refer to Appendix A for sampling details).

4.2 Nitrogen and Phosphorous Considerations

Potential sources for the nitrates identified beneath the facility include current and past biosolids operations, a Christmas tree farm that operated at the facility prior to 1985, and off-site sources. Current site operations are discussed in Section 1.1. Table 4.1 presents a summary of biosolids testing for years 2001 through 2005 compiled from Annual Biosolids Report data provided to Ecology. The table presents minimum, maximum, and median concentrations of tested analytes. No information on the area utilized for Christmas trees, the period of operation, the types of fertilizers applied, or the rates of application was available for review. No off-site sources have been identified at this time; the potential for off-site sources to impact groundwater quality would require further investigation of surrounding land use practices and possibly the installation of additional upgradient monitoring well(s). Evaluation of changes in groundwater chemistry with respect to potential sources was beyond the scope of this investigation.

Nitrogen is present in sewage biosolids in two basic forms:

- unoxidized (ammonia, organic nitrogen, and nitrogen gas); and,
- oxidized (nitrate, nitrite, nitric oxide, and nitrous oxide).

Nitrogen in untreated waste water is typically in the unoxidized form. Nitrogen within the biosolids is reported as ammonium, organic nitrogen, and total Kjeldahl nitrogen (TKN – which consists of organic nitrogen, ammonia, and ammonium ion) (Table 4.1). Data from Table 4.1 indicate ammonia nitrogen is about one third of the total Kjeldhal nitrogen, with the

balance present as organic nitrogen. The organic nitrogen may be mineralized to ammonia nitrogen depending on the soil chemistry (Cabrera, et al., 2005).

Nitrification is the process of converting ammonia and organic nitrogen compounds to nitrate. Biological oxidation of ammonia to nitrate occurs as a two step process facilitated by bacteria. The combined reactions may be expressed as follows:

$$2O_2 + NH_4^+ = NO_3^- + 2H^+ + H_2O$$

If not consumed by plants or converted to gaseous nitrogen through denitrification, nitrates may continue to the water table (DOH, 2005). Solutes (in this case nitrate dissolved in infiltrating water) must travel downward through the unsaturated zone before the reaching the water table. The velocity of water moving downward through the unsaturated zone is a function of the unsaturated hydraulic conductivity of the soil and the porosity. Unsaturated hydraulic conductivity is not constant for a given soil, but varies with changes in soil moisture (Fetter, 2001). Migration through preferential pathways further complicates and can reduce estimates of travel time through the unsaturated zone.

As noted above, increases in nitrate concentration in groundwater were noted in MW-1, MW-4, and possibly MW-2 and WS-2. These nitrate increases were accompanied by increases in chloride, sulfate, magnesium, and calcium concentrations (Table 4.2). An increase in bicarbonate alkalinity and a decrease in pH were also noted in MW-1 and MW-4 in comparison to background conditions at MW-3. These changes in major ion chemistry are shown in the Piper diagram on Figure 4.1 and on the bar graphs presented in Figure 4.2.

Phosphorous is present in relatively low concentrations in all groundwater samples, with concentrations ranging from 0.031 mg/L in MW-4 to 0.16 mg/L in MW-2. The phosphorous level at upgradient well MW-3 was 0.088 mg/L. There is significant phosphorous loading in biosolids; median phosphorous concentration in Webb Hill biosolids for 2001 to 2005 was 12,800 mg/kg (Table 4.1). However, the tendency of phosphorous to form low solubility complexes with many metals (Hem, 1970) reduces the likelihood of leaching into groundwater. Rather, phosphorous is more likely to form metal complexes in surficial soils, where the complexes are subject to transport off-site via surface water. As such, phosphorous levels in the soils should continue to be monitored, and the monitoring plan reevaluated periodically based on review of trends.

4.3 Comparison with Regulatory Standards

Water quality standards for analytes are presented in Table 4.2. The MCL is a health-based standard used to determine the maximum permissible level of a contaminant in water delivered to any user of a public water drinking system. The Secondary Maximum Contaminant Level (SMCL) is a guideline based on factors other than health effects. SMCLs control aesthetic qualities of water such as taste, odor, or staining characteristics. MCLs and SMCL listed in Table 4.1 were obtained from drinking water standards listed by Department of Health (DOH) in WAC 246-290.

The State of Washington has developed water quality standards for ground water of the state (Ground Water Quality Criteria or GWQC) (WAC 173-200). The goals of the water

quality standards are "*to maintain the highest quality of the state's ground waters and protect existing and future beneficial uses of the ground water through reduction or elimination of the discharge of contaminants to the state's ground waters and protect existing and future beneficial uses of the ground water through reduction or elimination of the discharge of contaminants to the state's ground waters*". The implementing rule, WAC 173-200, establishes water quality criteria for protection of the environment, human health, and current and future beneficial uses of ground water. Under WAC 173-200, enforcement limits are defined on a site specific basis but are generally less than the numeric criteria.

In Table 4.2, GWQC exceedances are indicated with a shaded pattern and MCL or SMCL exceedances are indicated with a bold outline.

For the constituents analyzed, primary groundwater quality criteria and/or MCLs have been established for ammonia, nitrate, nitrite and fluoride. The MCL and groundwater criteria of 10 mg/L nitrate was exceeded in the sample from monitoring well MW-1. Nitrate concentrations of 13.3 and 14.1 mg/L were reported for the two samples obtained from well MW-1 (initial sample and blind duplicate sample). The concentration of 9.78 mg/L reported for monitoring well MW-4 is very close to the MCL. No other MCLs or primary groundwater quality criteria were exceeded in the May 2007 sample event.

For the analytes tested, secondary standards and/or SMCLs have been established for pH, iron, manganese, chloride, sulfate, and fluoride. The manganese concentration of 0.08 mg/L detected in monitoring well MW-3 slightly exceeded the SMCL of 0.05 in monitoring well MW-3. However, as discussed above, this well is considered of representative of upgradient, background conditions. The pH in monitoring wells MW-1 (6.7) and MW-4 (6.6) approach, but do not exceed, the lower end limit for pH of 6.5 listed in the groundwater quality standards. No other secondary standards were exceeded in the May 2007 sample event.

5 Summary of Findings and Recommendations

5.1 Summary of Findings

1. Laterally and vertically heterogeneous glacial deposits underlie the facility. The deposits are interpreted to have formed predominantly in a subglacial environment. Till layers varying from less than 1-foot to over 30 feet were found interbedded with clean and debris rich sands and gravels.

2. The regional aquifer is present beneath the site under unconfined conditions at about elevation 300 feet. The aquifer is at least 55 feet thick. Groundwater flow within the unconfined regional aquifer is toward the southwest at a low gradient of 0.002 ft/ft.

3. Perched zones of were identified in each monitoring well boring, although none were found to correlate between the widely space boreholes.

4. Background water quality is characterized by monitoring well MW-3 located upgradient of the facility. Nitrate concentrations in this well were less than the detection limit of 0.01 mg/L.

5. Water quality impacts in wells located downgradient of biosolids application areas were greatest in monitoring wells MW-1 and MW-4. Nitrate concentrations at MW-1 of 13.3 mg/L exceeded the numeric water quality standard listed in WAC 173-200 and the MCL of 10 mg/L. Nitrate concentrations at MW-4 of 9.78 mg/L are very close to the MCL. Possible nitrate impacts were identified at monitoring wells MW-2 (0.79 mg/L) and the on-site supply well WS-2 (0.71 mg/L). These wells may prove to be within background conditions with additional sampling.

6. Background water quality in the aquifer is characterized by oxidizing conditions, a high dissolved oxygen content, and a slightly basic pH. Water is a magnesium-calcium bicarbonate type. The nitrate impacted water type is characterized by a mixed anion content, with increases in chloride and sulfate and reduction of pH compared to background conditions.

5.2 Recommendations

Because of the exceedance of the numeric criteria for nitrate concentrations under WAC 173-200 in groundwater at the Webb Hill biosolids recycling facility, there are needs for expanded definition of groundwater flow paths both on-site and off-site, assessment of nitrate levels along the downgradient edge of the site, determination of temporal variation in nitrate levels, and investigation of the extent of nitrate exceedances in the groundwater. In addition, immediate identification and testing of any water supply wells within 3,000 feet downgradient of the site is warranted. The following recommendations are made for investigations in the immediate future:

5.2.1 Potable Water Supply Monitoring

As a precautionary measure, any potable water supply wells within 3,000 feet downgradient of the site should be immediately identified and tested. That distance represents about two times the estimated travel time for groundwater in an aquifer with a driving gradient of 0.002 ft/ft (measured at the facility), hydraulic conductivity of 15 ft/day[4] (typical of silty to clean sands, [Freeze and Cherry, 1979]), an effective porosity of 0.15 (typical of glacially consolidated sand to silty sand aquifer), and travel time equal to the 22 years of biosolids application. This estimate of travel distance is only for the purpose of defining a reasonable area for investigation downgradient of the site; the result should not be considered definitive for groundwater flow nor applied to other questions without consideration of the limitations of the data and the assumptions used.

Groundwater flow directions should be reassessed with additional water level data collected under recommendations in Section 5.2.2 below, and used to modify the selection of downgradient off-site water supply wells for testing, as necessary.

5.2.2 Expanded Definition of Groundwater Flow Paths and Seasonal Variation

Continue monitoring water level of wells MW-1, MW-2, MW-3, MW-4, and WS-2 on a monthly basis.

Expand the well network beyond the site, principally in the downgradient, southwest direction by;

- Identifying wells completed in the uppermost regional aquifer;
- Securing owner permission for measurement and sampling;
- Locating wells using GPS;
- Determining elevation from LIDAR maps; and
- Obtaining monthly water level measurements to define seasonal water level changes in groundwater flow direction.

5.2.3 Water Quality Investigation

Assess groundwater nitrate levels along the downgradient border of the site. Install two additional monitoring wells located, respectively, near the southwest corner of the site and along the southern fence line midway between the entrance road and the eastern tree line (i.e., due south of the existing supply well WS-2). The proposed well locations are indicated on Figure 5.1. The wells are sited to maximize the area of the detection zone beneath application areas, based on our current understanding of groundwater flow.

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[4] The equation for groundwater velocity is (Fetter, 1980):

$$V_s = \frac{Ki}{n_c}$$

Where: V_s = seepage velocity,
K = horizontal saturated hydraulic conductivity,
i = groundwater gradient, and
n_c = effective porosity of aquifer.

Continue water quality monitoring on a quarterly basis at wells MW-1, MW-2, MW-3, MW-4, WS-2, and the new downgradient monitoring wells. Install dedicated, in-well sampling pumps. The water quality analytical testing scheme should be based on review of potential sources. Since metals may concentrate in biosolids, the analytical testing should include analysis for dissolved metals as a screening measure.

After 1-year of monitoring, review the water quality and the water level data for the monitoring wells and off-site wells.

1. Assess whether installation of monitoring wells off-site is necessary to determine extent of exceedances of nitrate concentration in groundwater.
2. If constituent concentrations vary sufficiently between quarters, implement a monthly monitoring program for a 1-year period.
3. Review the analytical testing scheme.

6 References

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Limitations

Work for this project was performed and this report prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Mason County Department of Community Development, on behalf of WRIA 16 Planning Unit for specific application to the referenced property. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

Table 2.1 - Monitoring Well Completion Summary

Webb Hill Hydrogeologic Investigation, Mason County, Washington

Well ID	Installation Date	Well Location Coordinates[1]		Ground Surface Elevation[2]	Monument Elevation[2]	Top of Casing		Stickup	Total Boring Depth	Well Depth[3]	Screen Length	Screen Interval Depth	Filter Pack Interval Depth
		Northing	Easting			Elevation[2,3]	Accuracy[4] (3σ)						
		(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet bgs)	(feet bgs)	(feet)	(feet bgs)	(feet bgs)
MW-1	4/26/07	730844	993069	402.52	406.36	405.58	0.015	3.06	125	124.8	19.5	105.0 to 124.5	102.5 to 125.0
MW-2	5/3/07	731148	991371	443.98	447.18	446.74	0.026	2.76	168	168.7	24.5	143.9 to 168.4	140.6 to 166.0
MW-3	4/24/07	732495	992946	465.85	469.15	468.56	0.108	2.71	187	185.3	24.5	160.5 to 185.0	154.9 to 187.0
MW-4	4/30/07	729408	994200	376.00	379.90	379.25	0.037	3.25	105	97.7	24.5	72.9 to 97.4	68.2 to 96.0
WS-2[5]	4/18/00	731673	992859	444.88	-	446.78	0.048	1.9	197	197	6	191 to 197	No
Bench Mark	5/9/07	731757	992697	446.32	-	-	0.11	-	-	-	-	-	-

Notes:

1. Well location coordinates are in Washington State Plane South NAD83 coordinate system using U.S. feet.
2. Elevations are NAVD88 (1996) using U.S. feet.
3. Measuring points for both PVC and steel casings were marked and notched.
4. Well elevation accuracies for MW-1, MW-2, MW-3, MW-4 and WS-2 are relative to the site benchmark. Site benchmark accuracy is +/- 0.11 feet with respect to NAVD88. See Appendix A for discussion.
5. Below grade information taken from state Water Well Report in Appendix B. The reported casing depth of 193.2 ft bgs may be inconsistent with the screen interval of 191 to 197 feet indicated on log.

Abbreviations:

bgs = below ground surface

Table 3.1 - Summary of Perched Water Identified During Drilling

Webb Hill Hydrogeologic Investigation, Mason County, Washington

Monitoring Well ID	Ground Surface Elevation	Drilled Depth		Perched Water Level		Comments
	ft NAVD 88	ft bgs	ft NAVD 88	ft bgs	ft NAVD 88	
MW-1	402.52	90	312.5	86.3	316.2	Insufficient water for sampling.
MW-2	443.96	105	339.0	101.7	342.3	300 µS/cm.
MW-2	443.96	115	329.0	112.9	331.1	150 µS/cm.
MW-3	465.85	105	360.9	105	360.9	Ephemeral, no sample; perched on silty, gravelly sand.
MW-4	376.00	18	358.0	16	360.0	250 µS/cm; perched on silt.
MW-4	376.00	31.5	344.5	22.5	353.5	Locally confined between two silt layers.

Table 3.2 - Groundwater Levels

Webb Hill Hydrogeologic Investigation, Mason County, Washington

Well Name	MW-1		MW-2		MW-3		MW-4		WS-2	
Ground Surface Elevation (ft MSL)	402.51		443.99		465.86		376.01		444.88	
Casing Stickup above Ground Surface (ft)	3.06		2.76		2.71		3.25		1.9	
Casing Elevation (ft MSL)	405.57		446.75		468.57		379.26		446.78	
Top of Screen Elevation (ft MSL)	297.4		300.1		305.4		303.1		254	
Bottom of Screen Elevation (ft MSL)	277.9		275.7		280.9		278.7		248	
Date	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft MSL)	Depth (ft bTOC)	Elevation (ft MSL)
5/23/2007	106.92	298.65	149.98	296.77	168	300.57	80.37	298.89	147.49	299.29
5/30/2007	-	-	150.55	296.2	168.56	300.01	-	-	-	-
5/31/2007	107.64	297.93	150.68	296.07	168.66	299.91	81.18	298.08	148.14	298.64
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Notes:

bTOC = below top of casing. Depths of groundwater levels are measured from the top of the casing.

MSL = mean sea level.

Elevation datum is NAVD88 (1996).

Table 4.1 - Summary of Biosolids Testing 2001-2005

Webb Hill Hydrogeologic Investigation, Mason County, Washington

Analyte	Pollutant Concentration Limit[1]	Max	Median	Min	Units	Total Samples
Ammonium[2]	-	131,000	15,700	995	mg/kg	45
Arsenic	41	11.5	6.7	1.4	mg/kg	55
Cadmium	39	10	2.6	ND	mg/kg	55
Chromium	-	21	19.5	18	mg/kg	2
Copper	1,500	674	388.5	19	mg/kg	56
Lead	300	90	33	0	mg/kg	55
Mercury	17	20	1.2	0	mg/kg	49
Molybdenum	-	40	7	0	mg/kg	55
Nickel	420	42	16	4.5	mg/kg	55
pH	-	6	5.85	5.7	ph	2
Potassium	-	37,300	5,230	90	mg/kg	33
Selenium	100	20	4.9	0	mg/kg	56
Total Kjeldahl Nitrogen	-	170,000	47,000	540	mg/kg	56
Zinc	2,800	1,800	1,055	57	mg/kg	56
Total Phosphorus	-	50,000	12,800	122	mg/kg	56
Total Solids	-	5.78	1.35	0.27	%	56
Total Organic Nitrogen	-	39,000	31,000	3,000	mg/kg	12
Organic Nitrogen	-	62,000	20,500	2,200	mg/kg	12

[1] From WAC 173-308, Table 3. Dash (-) indicates no value available.

[2] Tabulated spreadsheet data from Ecology lists concentration as ammonia. Spot comparisons of results from the 2005 Annual Biosolids Report with Ecology spreadsheets indicate that the parameter analyzed is the ammonium ion.

Table 4.2 - Groundwater Quality Summary

Webb Hill Hydrogeologic Investigation, Mason County, Washington

		Groundwater Quality Standard[1]		DOH Drinking Water Standard[2]							
Parameter or Chemical	**Units**	**Primary**	**Secondary**	**MCL**	**SMCL**	**MW-1 5/31/07**	**MW-1 (Blind Dup.) 5/31/07**	**MW-2 5/30/07**	**MW-3 5/30/07**	**MW-4 5/31/07**	**WS-2 5/31/07**
Field Parameters											
pH	pH		6.5 to 8.5			6.66		7.11	7.28	6.55	7.49
Specific Conductance	umhos/cm					374		95	82	299	101
Dissolved Oxygen	mg/L					8.85		8.81	9.71	8.65	10.83
Eh	mV					140.1		118.7	91.6	148	122.1
Turbidity	NTU					1.51		2.99	33.80	1.46	1.19
Dissolved Metals											
Calcium	mg/L					40.4	40.2	10.1	9.15	31.6	10.7
Iron	mg/L		0.3		0.3	0.150 U	0.150 U	0.150 U	0.150 U	0.150 U	0.150 U
Magnesium	mg/L					17.8	17.8	4.86	3.99	13.3	5.39
Manganese	mg/L		0.05		0.05	0.0100 U	0.0100 U	0.0100 U	**0.0798**	0.0100 U	0.0100 U
Potassium	mg/L					2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Sodium	mg/L			20 [3]		6.25	6.22	3.40	3.29	6.02	3.36
Conventional Chemistry Parameters											
Bicarbonate Alkalinity	mg/L as CaCO3					69.6	70.4	39.8	41.4	50.8	44.6
Carbonate Alkalinity	mg/L as CaCO3					5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Hydroxide Alkalinity	mg/L as CaCO3					5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Chloride	mg/L		250		250	15.5	15.6	2.22	1.71	15.8	2.22
Sulfate	mg/L		250		250	17.5	17.5	1.95	0.870	13.7	1.66
Bromide	mg/L					0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Ammonia as Nitrogen	mg/L as N	0.01				0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Nitrate as Nitrogen	mg/L as N	10		10		**13.3**	**14.1**	0.785	0.0100 U	9.78	0.713
Nitrite as Nitrogen	mg/L as N			1		0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Nitrate-Nitrite	mg/L as N					13.3	14.1	0.785	0.0100 U	9.78	0.713
Total Kjeldahl Nitrogen	mg/L as N					1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phosphorus	mg/L					0.0620	0.0430	0.155	0.0880	0.0310	0.0800
Fluoride	mg/L	4		4	2	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Total Organic Carbon	mg/L					2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U

Notes & Definitions

[1]From Table 1 - Groundwater Quality Criteria in WAC 173-200.

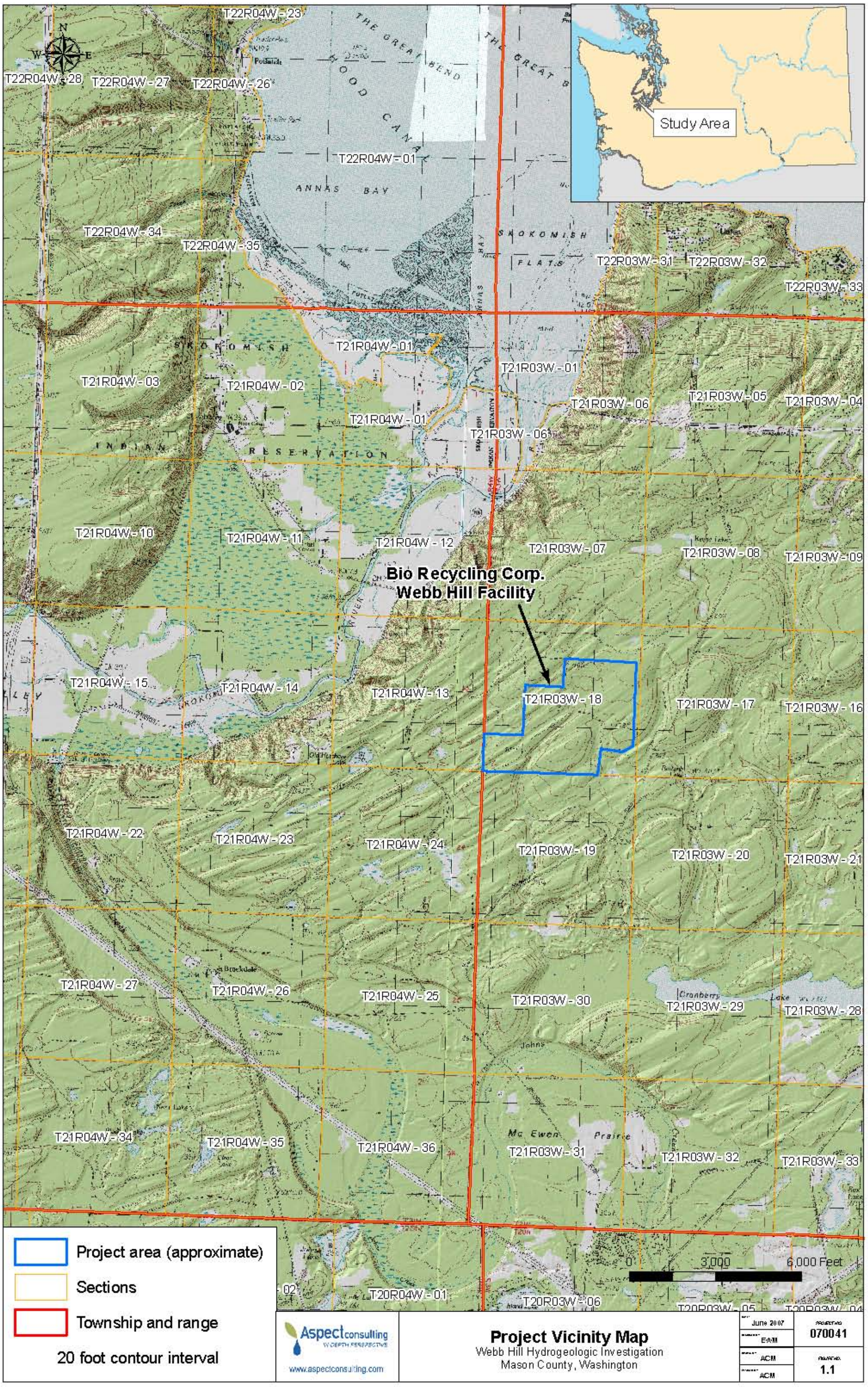
[2]MCLs (Maximum Contaminant Levels) and SMCLs (Secondary Maximum Contaminant Levels) from WAC 246-290-310.

[3]20 mg/L is listed as a "level of concern" and is not an MCL.

Concentrations in bold and shaded exceed Groundwater Quality Criteria in WAC 173-200.

Concentrations located within thick box borders exceed MCLs or SMCLs.

U - Not detected at indicated detection limit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Bio Recycling Corp.
Webb Hill Facility
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T22R04W - 26
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T22R04W - 34
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T21R04W - 35
T21R04W - 36
T21R03W - 31
T21R03W - 32
T21R03W - 33
T20R04W - 01
T20R03W - 06
0
3,000
6,000 Feet
Project area (approximate)
Sections
Township and range
20 foot contour interval
Aspect consulting
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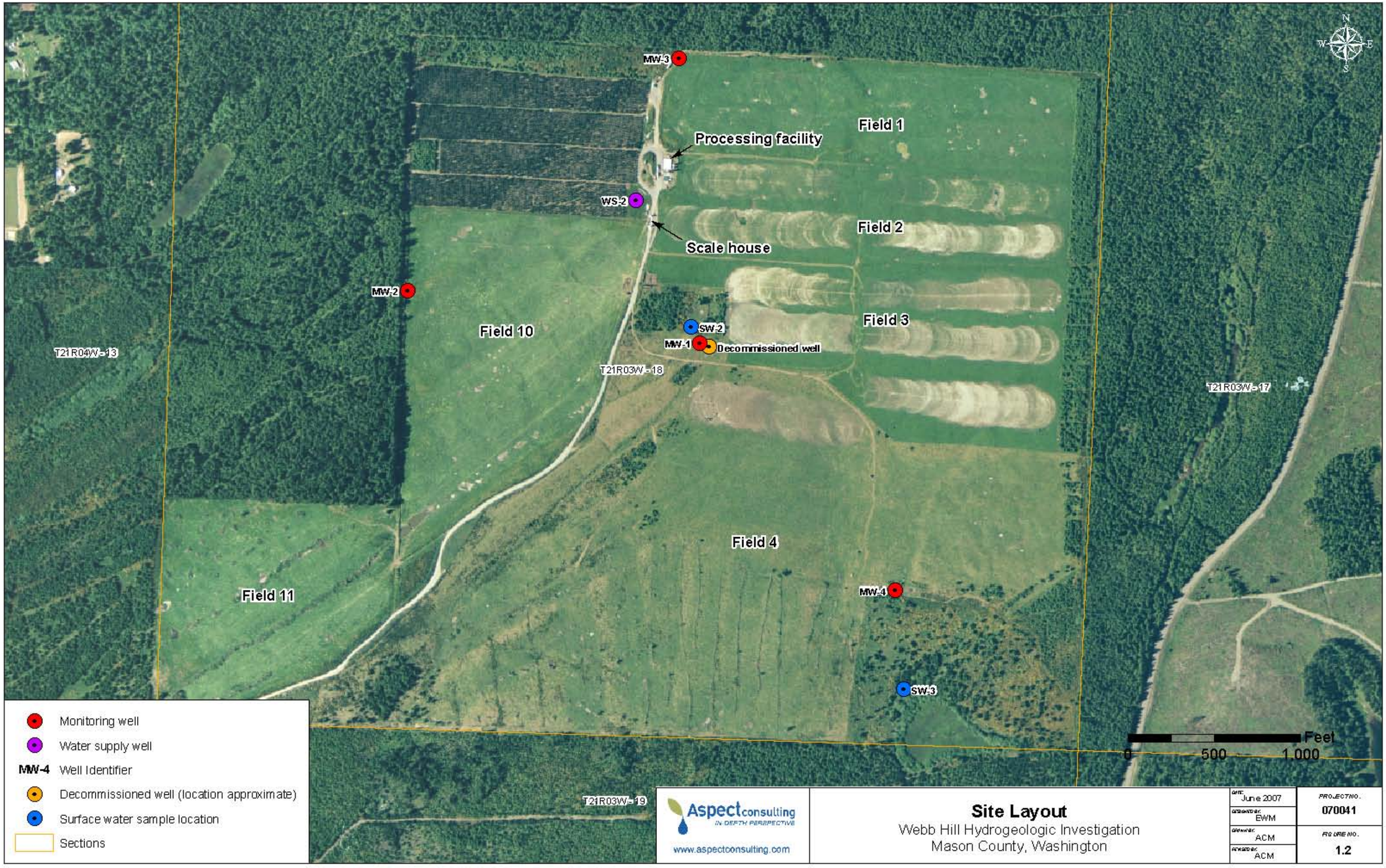
Project Vicinity Map
Webb Hill Hydrogeologic Investigation
Mason County, Washington
June 2007
EWM
ACM
ACM
070041
1.1



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Site Layout
Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2007	PROJECT NO.: 070041
DRAWN BY: EWM	
CHECKED BY: ACM	FIGURE NO.: 1.2
APPROVED BY: ACM	

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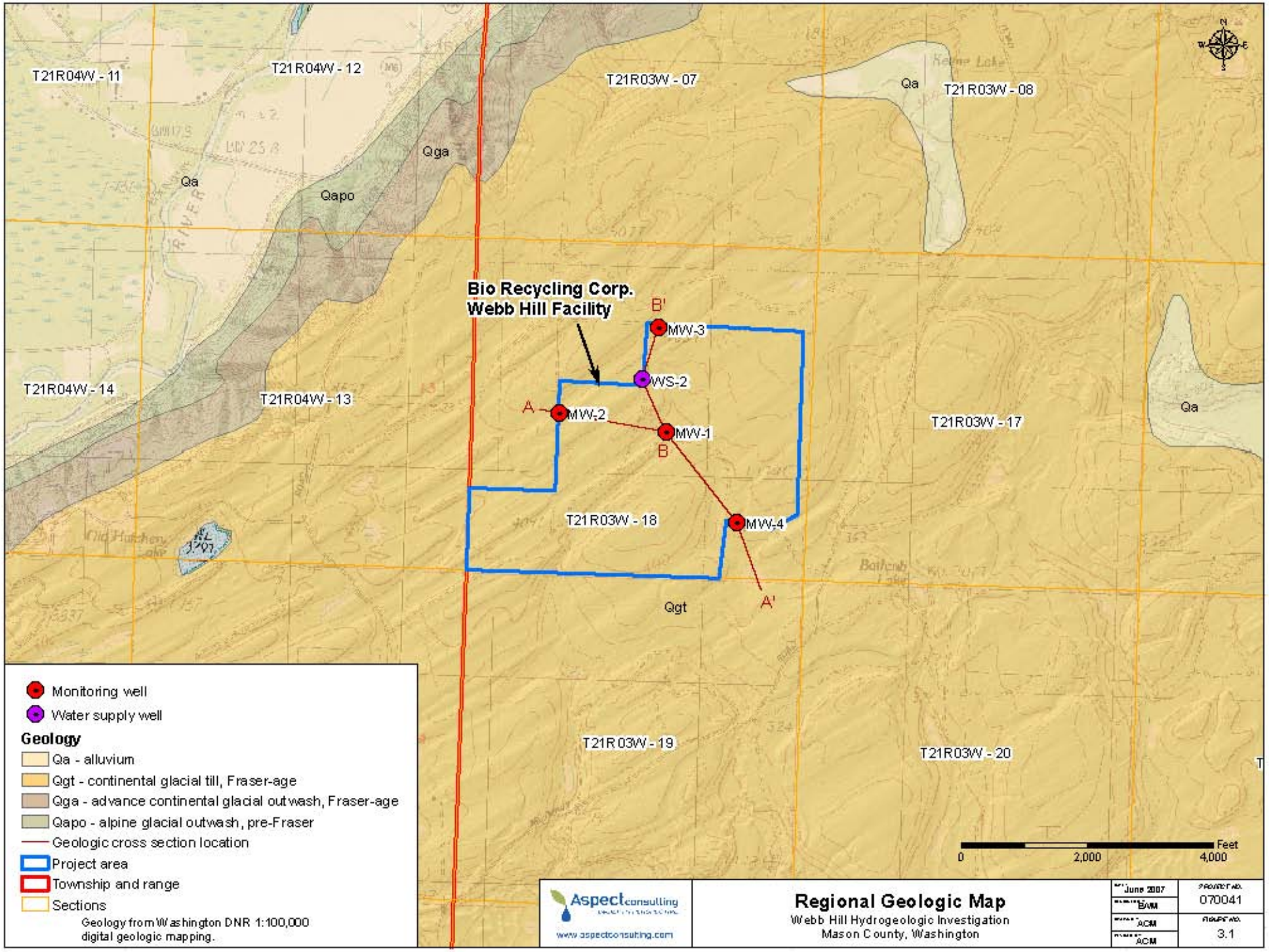
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T21R03W - 08
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T21R03W - 17
T21R03W - 18
T21R03W - 19
T21R03W - 20
Qa
Qga
Qapo
Qgt
Bio Recycling Corp.
Webb Hill Facility
MW-3
WS-2
MW-2
MW-1
MW-4
A
A'
B
B'
Monitoring well
Water supply well
Geology
Qa - alluvium
Qgt - continental glacial till, Fraser-age
Qga - advance continental glacial outwash, Fraser-age
Qapo - alpine glacial outwash, pre-Fraser
Geologic cross section location
Project area
Township and range
Sections
Geology from Washington DNR 1:100,000 digital geologic mapping.
0
2,000
4,000
Feet
Aspect consulting
www.aspectconsulting.com
Regional Geologic Map
Webb Hill Hydrogeologic Investigation
Mason County, Washington
June 2007
BAM
ACM
ACM
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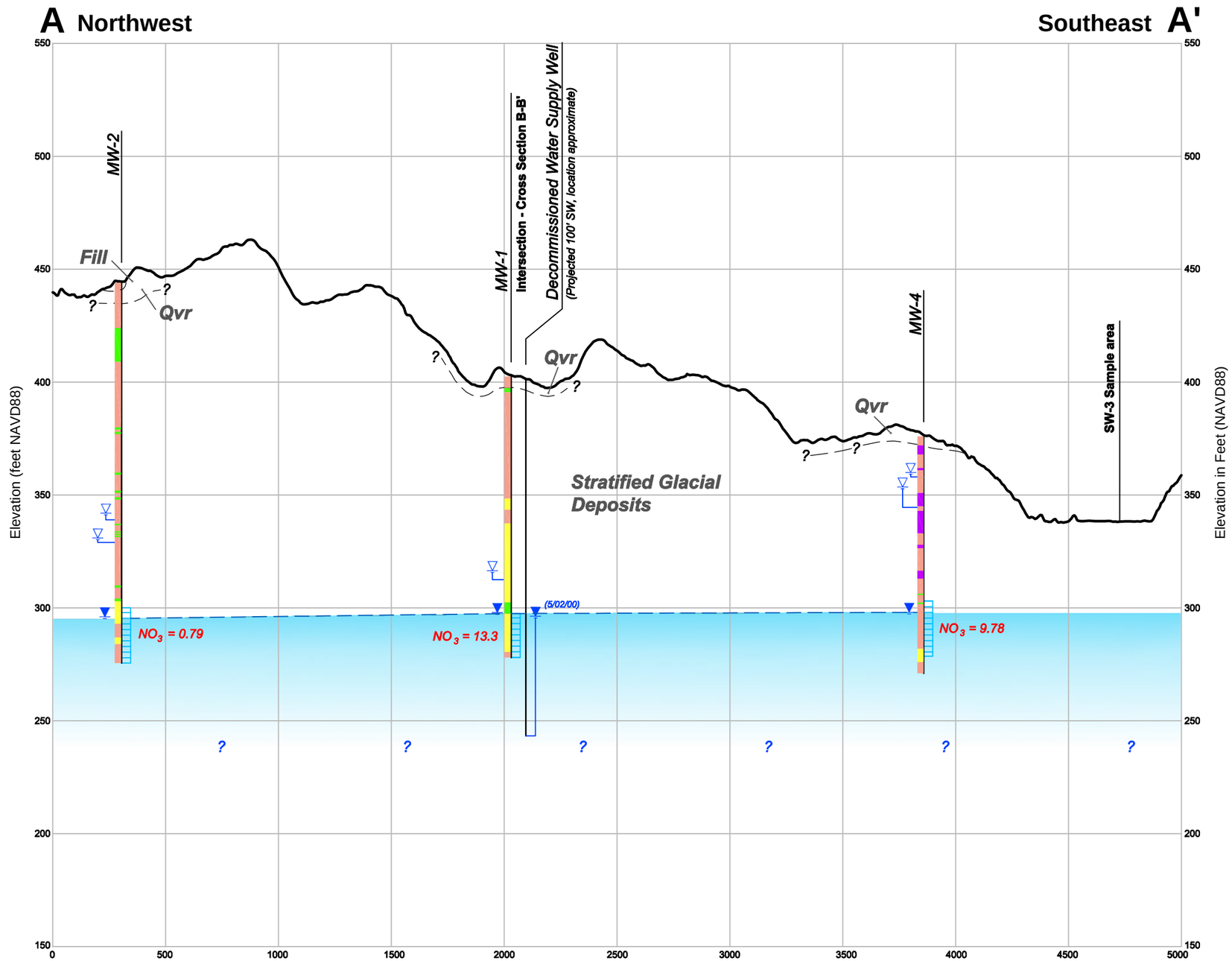

Legend

Qvr	Recessional Glacial Outwash
Stratified Glacial Deposits	Very heterogeneous sequence of clean to silty sands and gravels with interbedded layers of till and silt
	Till
	Silt
	Slightly silty to silty sand and/or gravel
	Sand and/or gravel
	Perched water level ATD
	Drilled depth at time of perched water level measurement
	Static water level (5/31/07, unless specified)
	Screen interval
	Total depth drilled
$NO_3 = 9.78$	Nitrate - N concentration, mg/L (May 30-31, 2007)

Vertical Exaggeration = 10X
Scale: 1" = 500' Horiz.
1" = 50' Vert.

0 500 1000
Feet

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Cross Section A-A'

Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2007	PROJECT NO. 070041
DESIGNED BY: JSL	
DRAWN BY: PMB	FIGURE NO. 3.2
REVISED BY: LAL	

Q:\Webb Hill\2007-06\070041-A-A.dwg

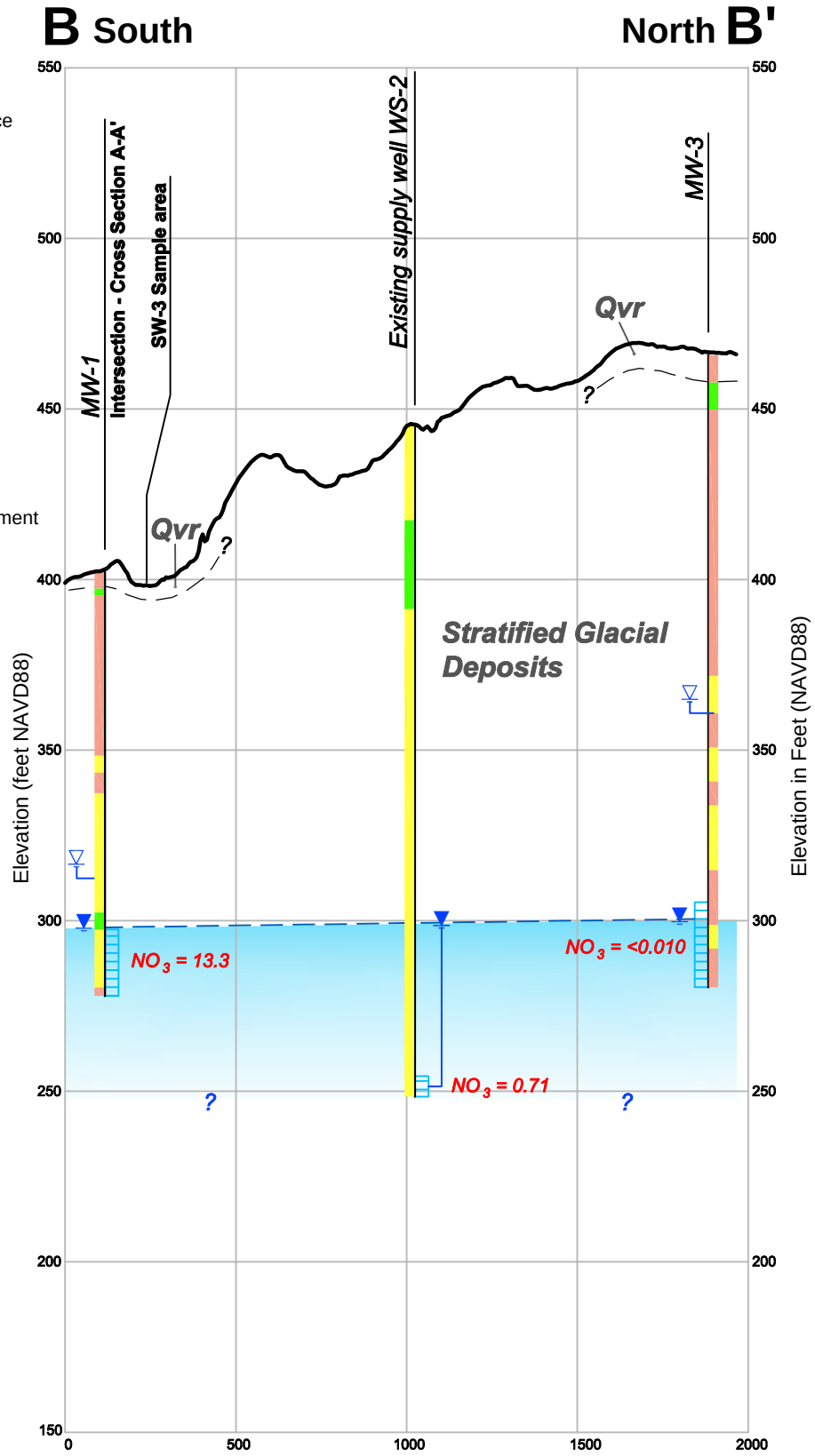
Legend

Qvr — Recessional Glacial Outwash

Stratified Glacial Deposits — Very heterogeneous sequence of clean to silty sands and gravels with interbedded layers of till and silt

- Till
- Silt
- Slightly silty to silty sand and/or gravel
- Sand and/or gravel
- Perched water level ATD
- Drilled depth at time of perched water level measurement
- Static water level (5/31/07, unless specified)
- Screen interval
- Total depth drilled
- Nitrate - N concentration, mg/L (May 30-31, 2007)

NO_3= 9.78



Vertical Exaggeration = 10X
Scale: 1" = 500' Horiz.
1" = 50' Vert.

0 500 1000
Feet

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Cross Section B-B'

Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2007	PROJECT NO. 070041
DESIGNED BY: JSL	
DRAWN BY: PMB	FIGURE NO. 3.3
REVISED BY: LAL/PMB	

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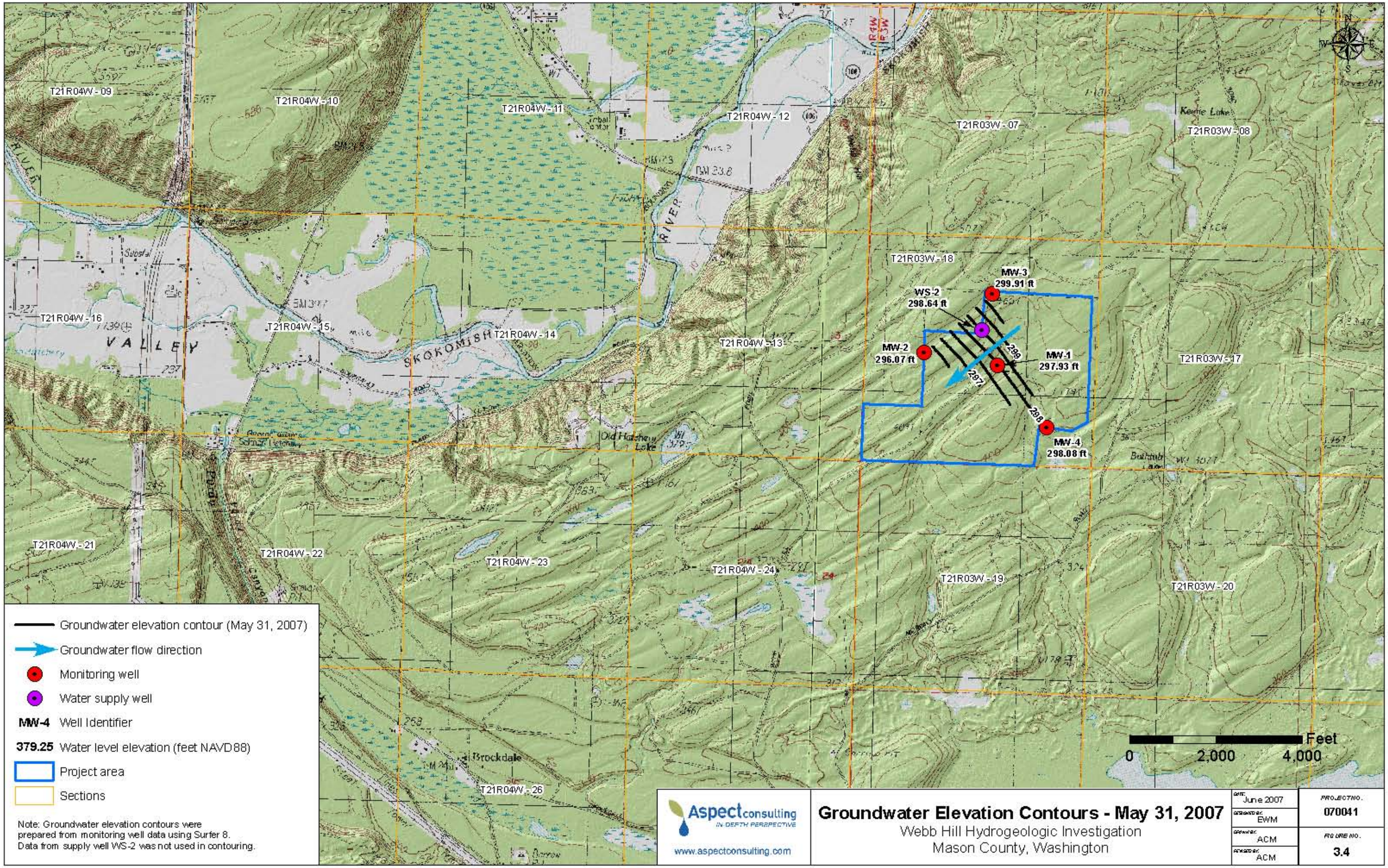
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T21R04W - 24
T21R03W - 19
T21R03W - 20
T21R04W - 26
SKOKOMISH
VALLEY
RIVER
Keene Lake
Old Hatchery Lake
Brockdale
MW-3
299.91 ft
WS-2
298.64 ft
MW-2
296.07 ft
MW-1
297.93 ft
MW-4
298.08 ft
298
297
Feet
0
2,000
4,000
Groundwater elevation contour (May 31, 2007)
Groundwater flow direction
Monitoring well
Water supply well
MW-4 Well Identifier
379.25 Water level elevation (feet NAVD88)
Project area
Sections
Note: Groundwater elevation contours were prepared from monitoring well data using Surfer 8.
Data from supply well WS-2 was not used in contouring.
Aspect consulting
IN-DEPTH PERSPECTIVE
www.aspectconsulting.com
Groundwater Elevation Contours - May 31, 2007
Webb Hill Hydrogeologic Investigation
Mason County, Washington
DATE: June 2007
DESIGNED BY: EWM
DRAWN BY: ACM
REVISED BY: ACM
PROJECT NO. 070041
FIGURE NO. 3.4
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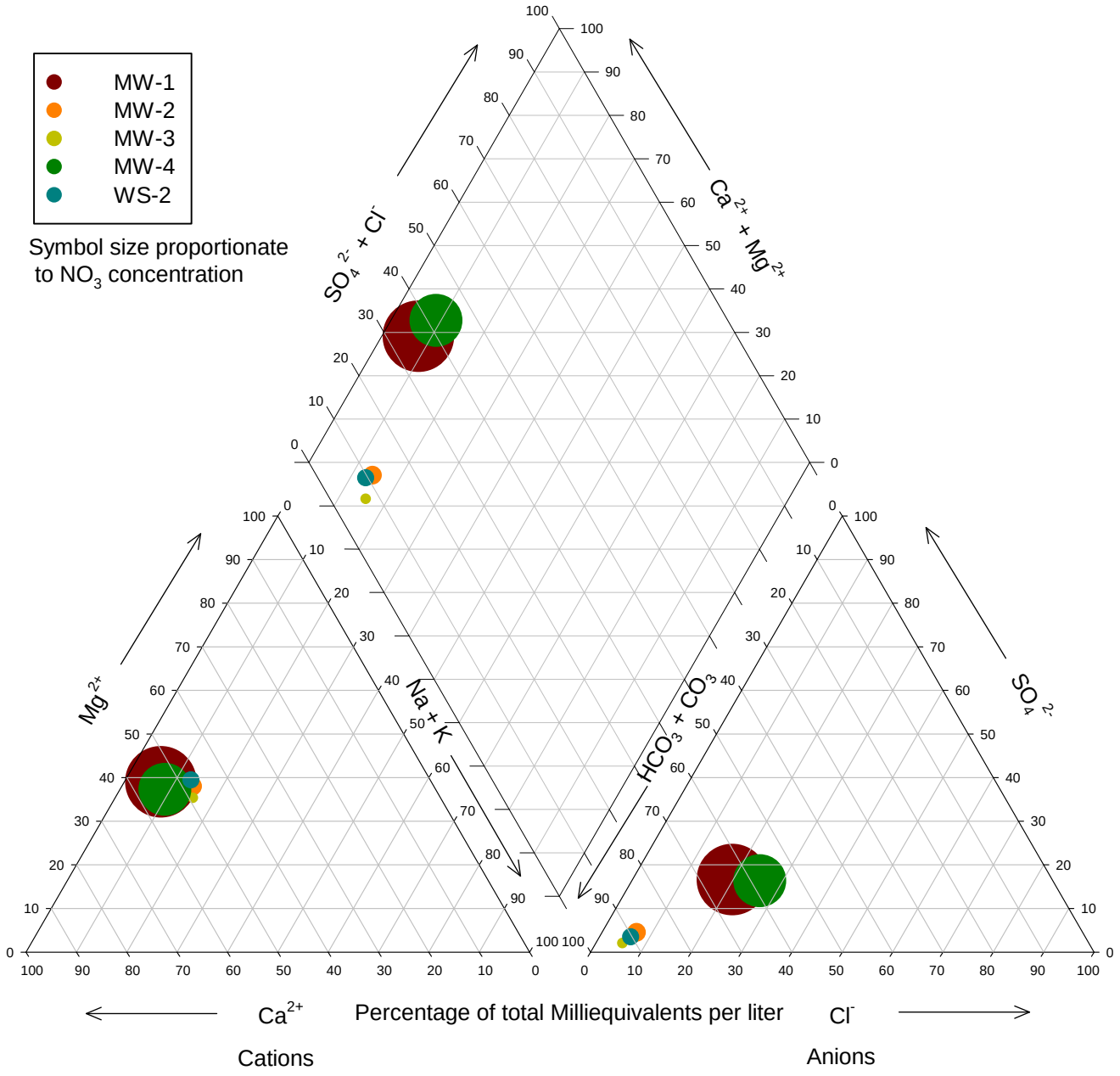
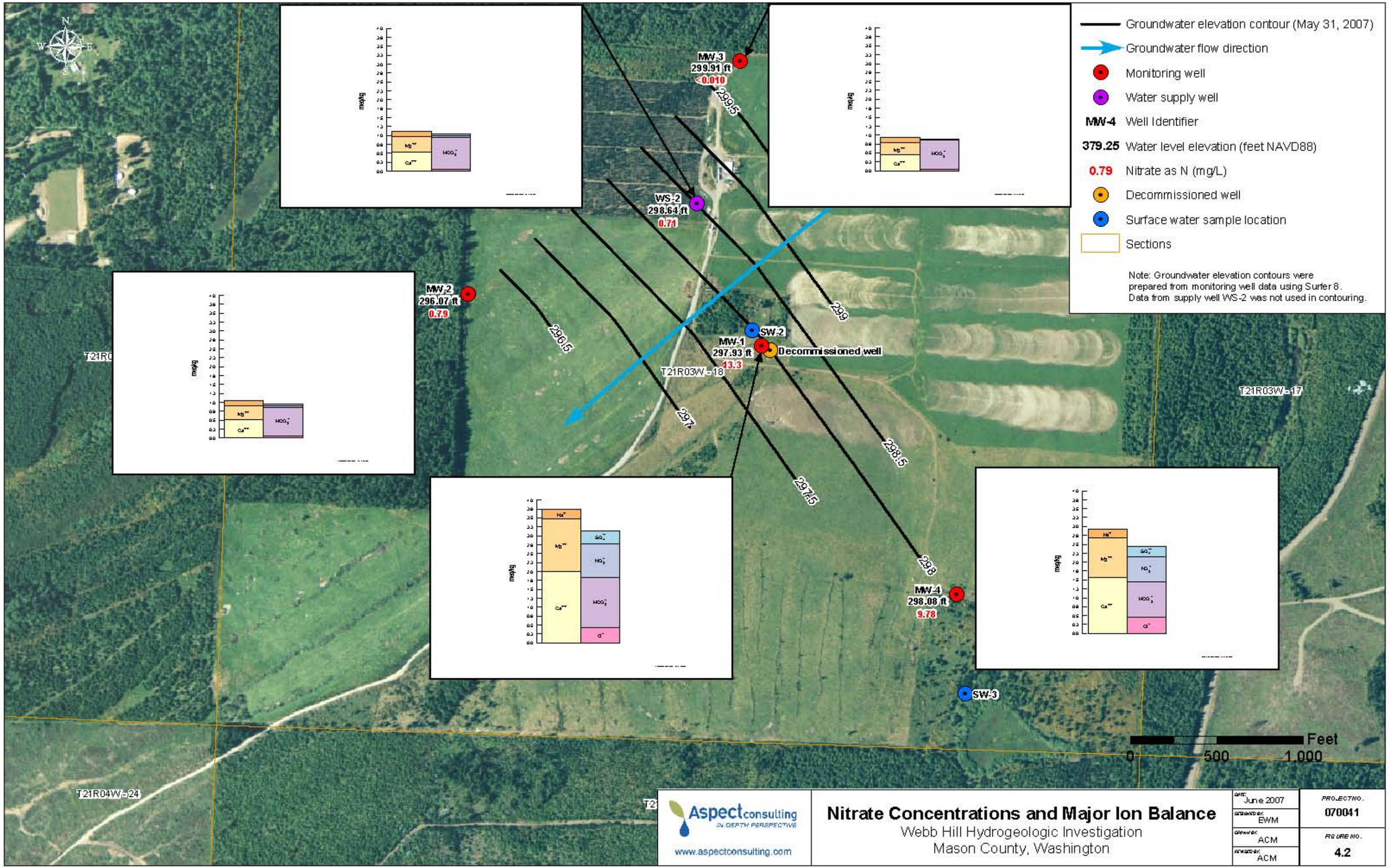


Figure 4.1
Piper Diagram - Webb Hill Monitoring Wells and On-site Supply Well WS-2 (May 30 and 31, 2007)
Webb Hill Hydrogeologic Investigation
Mason County, Washington
P:\Webb Hill\Groundwater Sampling\Piper Plot.JNB



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Nitrate Concentrations and Major Ion Balance
Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2007	PROJECT NO. 070041
DESIGNED BY: EWM	
DRAWN BY: ACM	FIGURE NO. 4.2
REVISED BY: ACM	

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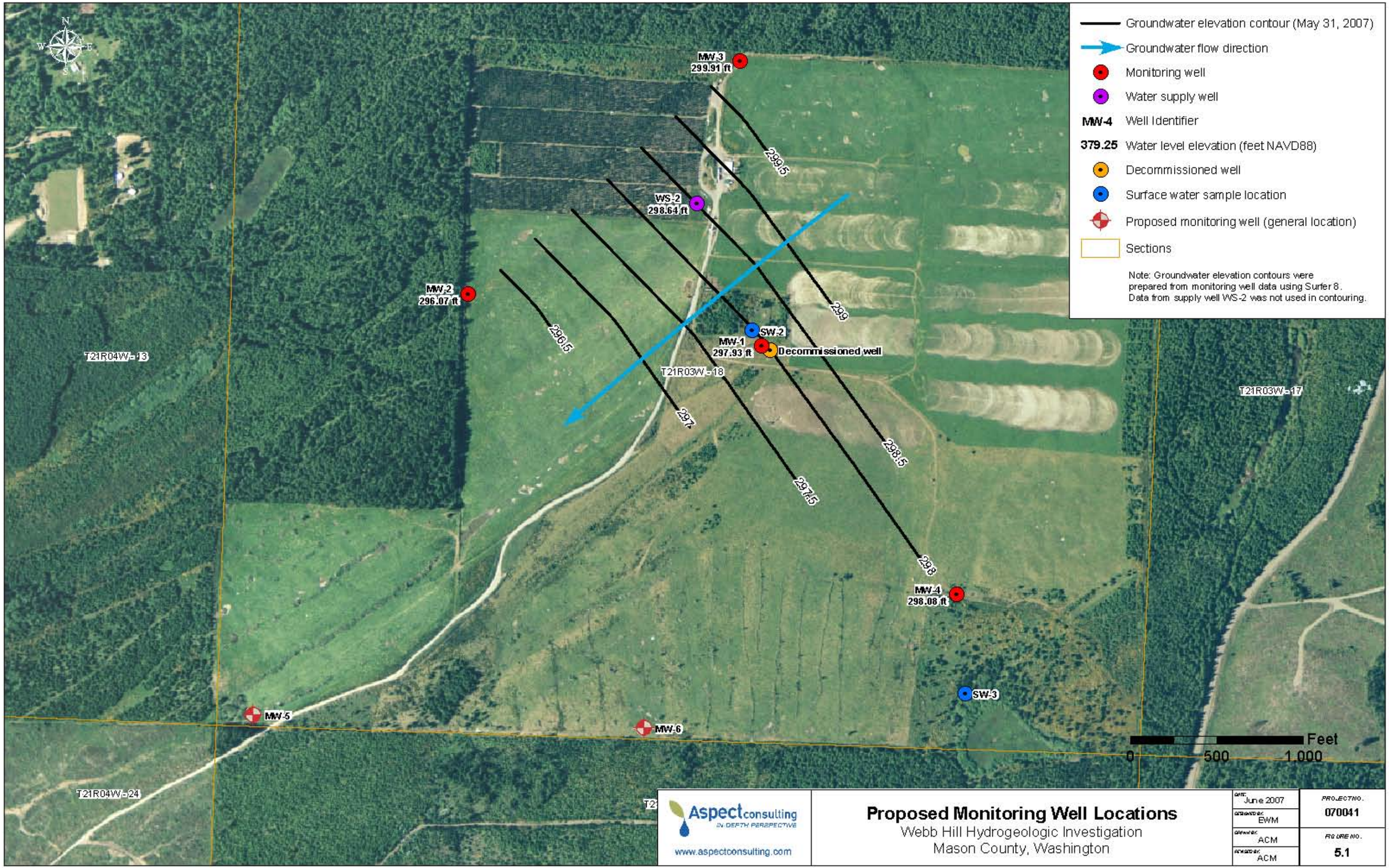

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Proposed Monitoring Well Locations
Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2007	PROJECT NO. 070041
DESIGNED BY: EWM	
DRAWN BY: ACM	FIGURE NO. 5.1
REVIEWED BY: ACM	

T:\projects_3\mason_county\proposed_wells

APPENDIX A

Exploration Methods

A.1 Drilling

A.1.1 Overview and Drilling Preparation

Prior to drilling, the access road and drill site for MW-2 was cleared by Bio Recycling Corporation. The borings for other wells were drilled from existing grade without any modifications. The locations were reviewed by Mason County and Bio Recycling personnel and approved with respect to existing operations and subsurface waste lines.

The drilling locations for MW-1 and MW-4 were relocated to accommodate Bio Recycling operations. MW-4 was moved north and east along the fence line and MW-1 was relocated to the north side of the access road. Other well locations remained the same as specified in the QAPP.

A.1.2 Drilling Procedures

Four monitoring wells were drilled using rotosonic equipment by Boart Longyear Company, Holt Division, Fife, Washington. Drilling activities took place from April 17 through May 3, 2007.

Drill casing was 5.56-inch outside diameter (OD) and the borehole was nominally 6 inches in diameter. The drill bit and core barrel were advanced into the formation and a core sample approximately 3 inches in diameter retrieved. Temporary drill casing was then advanced into the hole and slough removed before drilling ahead to procure another sample. Drilling runs were typically 5 feet long in the upper portion of the hole in order to locate any perched water. Ten-foot runs were made at deeper depths.

A.1.3 Groundwater Sampling During Drilling

Per Section 3.2 of the Quality Assurance Project Plan, the driller was requested to identify any perched water. When there appeared to be water, attempts were made to obtain a sample from water in the core barrel, obtain a sample using a bailer, and/or measure a water level in the boring.

If water was retained in the core barrel on top of a sample, while drilling in the unsaturated zone, a sample was collected in a 5-gallon bucket on the drill rig. If the driller identified perched water in the hole, drilling was stopped to measure the water level and to secure a sample by lowering a bailer.

During drilling of the first well, a request was made by EPA to take multiple samples while drilling into the target aquifer. Subsequently, two or three water samples were collected in the saturated zone during drilling.

A.1.4 Soil Sample Collection

Samples were vibrated from the core barrel into polyethylene sheet tubes and sample depths estimated by the driller. Samples were moved away from the drill rig in approximately 2.5-foot lengths held on 6-inch PVC half-pipes.

A.1.5 Sampling Logging

Cores were laid end-to-end, recovery measured for each sample run, and photographed with depth markers and stadia rod. In the field, soil descriptions were written on standard forms, grab samples taken at lithologic changes and at least every 5 feet, and chip trays prepared. Cores were preserved on-site until completion of well development.

A.2 Well Installation and Development

A.2.1 Well Installation

Wells were constructed using threaded Schedule 80 PVC pipe and machine slotted screen. Slot size was 0.020 inches. The screen zone was filter packed with 10/20 Colorado silica sand and the remainder of the annulus sealed to ground surface with bentonite. A layer of unhydrated bentonite as ¼-inch pellets (PDSCo Pel-Plug™) and/or 3/8-inch chips (Halliburton Holeplug™) was placed above the sand for typically seven feet and the annulus filled with bentonite grout (Baroid Quik-Grout™) placed by tremie pipe. Grout was prepared by power mixing bentonite powder in a tank with a known volume of water. Bentonite chips were used to fill any remaining open hole near the surface.

In MW-3, 20/40 Colorado silica sand was placed above the filter pack to inhibit grout migration. This element was not used in successive holes where geologic conditions, e.g., a possible perching layer just above the screen, required a relatively quick transition from filter pack to sealed annulus. In these cases, the required depth of unhydrate bentonite chips was increased to 7 feet.

Probable formation collapse around the screen was noted for lengths of about 2 feet in MW-1 and 8 feet in MW-3. Although perhaps requiring more development, the formation collapse should not be problematic since the slot size of the screen is so much smaller than the sand and gravel sizes in the formation.

At MW-3, a section of broken drill casing was left in the ground from 105 to 125 feet bgs.

Complete construction details are provided on the boring logs in Appendix B and construction elevations are summarized in Table 2.1.

Well monuments were square steel with a hinged, locking lid and protected by three steel bollards, all set in concrete.

A.2.2 Alignment Testing

Well were tested for satisfactory alignment by dropping slugs, or dummies, downhole. Results are tabulated in Table A-1. Well MW-1 passed the largest 1.66-inch diameter by 4.2-foot long slug. Wells MW-2, MW-3, and MW-4 passed the smaller diameter 1.05-inch by 4.4-foot slug and also the 1.75-inch by 1.35-foot QED Sample-Pro pump. On these wells, the driller was unable to install a 1.81-inch by 0.94-foot Grundfos RediFlo-2 pump for development. On MW-2, a 1.66-inch by 3-foot bailer would not pass approximately 111 feet bgs.

A.2.3 Well Development

Wells were developed from May 8 through May 30, 2007 by mechanical surging followed by pumping. Surging was done by oscillating a 1.66-inch by 3-foot bailer on a ¼-inch nylon rope at successive positions in the well screen. Stroke was 3.5 feet. Wells were bailed after about a one hour run. Sand content was monitored with an Imhoff cone.

One run was made surging/bailing MW-3 and two runs each on MW-1 and MW-4. MW-2 was surged for about three hours with a 1.0-inch by 3-foot bailer with a nominal 1.75-inch diameter surge block attached.

Wells were then pumped until turbidity was less than 50 NTU as measured with a Hach 2100P turbidimeter. Well 1 was pumped with a Grundfos RediFlo-2 pump. Well 4 was pumped with a Waterra inertial pump using 5/8-inch OD tubing. Wells 2 and 3 were pumped by Aspect using the QED SamplePro pump.

A.3 Groundwater Level Measurements and Sampling

A.3.1 Survey

Wellheads MW-1, MW-2, MW-3, MW-4, and WS-2 were surveyed on May 9, 2007 by MacLearnsbury, Inc. of Bainbridge Island, Washington. In addition, a site bench mark (masonry nail with brass ring) was placed in asphalt paving next to the processing facility. The nail is located on the south side of the circular turn-around, along the east edge of the paving, and just south of the existing generator pad.

Monitoring wells were surveyed to top of PVC casings, and the supply well to top of steel casing. Casings were marked and notched. The surveyor's report is presented in Figure A-1.

The QAPP had requested that the survey obtain elevations with absolute and relative tolerances of +/- 0.08 feet and +/- 0.01 feet, respectively. Exposure to satellites at each well and environmental conditions at the site on the day of the survey limited achievable accuracies. The reported error for the site’s elevation datum (site bench mark) is +/- 0.11 feet, NAVD88 (1996). Relative elevation accuracy between wells is reported for each

well as the standard deviation (σ) of the multiple measurements made during the surveying process. Assuming a normal distribution of measurements, values of 2σ and 3σ represent confidence intervals of 95 percent and 99.7 percent, respectively. Data is summarized in Table 2.1.

The effect of the elevation accuracies on groundwater flow direction was evaluated by contouring the following four scenarios:

- Increase in elevation of MW-3 by 0.108 (3σ).
- Decrease in elevation of MW-3 by 0.108 (3σ).
- Increase in elevation of MW-3 by 0.108 (3σ) and decrease MW-4 by 0.037 (3σ).
- Decrease in elevation of MW-3 by 0.108 (3σ) and increase MW-4 by 0.037 (3σ).

These changes had very little effect on the groundwater elevation contours and the groundwater flow direction remained southwesterly.

A.3.2 Groundwater Level Measurements

Groundwater levels were measured with a Waterline Model 300 level indicator to the nearest 0.01 feet. Reference point in all cases was top of casing, where the measuring point was marked and notched.

Two rounds of measurements for all five wells on the site were made on May 23 and May 31, 2007. These data are reported in Table 3.1.

A.3.3 Groundwater Sampling

Groundwater samples were obtained on May 30 and May 31, 2007 using low flow sampling methodology as specified in the QAPP.

Monitoring wells were pumped using a QED Environmental, Inc. SamplePro bladder pump. Air source was a Mi-T-M Corporation Model AC1-PH55-08M air compressor. Dedicated bladders and ¼-inch by ¼-inch twin-tubing of high density polyethylene were used for each well. The bladders, tubing, and security line were bagged, labeled, and retained for possible future use. Pump intakes were set 3 to 4 feet below initial water level.

Drawdowns were very low, but were not measured directly due to amount of equipment in the well that included the level indicator used to position the pump. For future sampling that focuses on the upper portion of the water table, it is anticipated that the pump intake could be set between 1 and 2 feet below the water table.

The on-site water supply well was sampled from an existing polyethylene tube discharging directly from the pressure tank.

All wells were purged until turbidity dropped below 50 nephelometric turbidity units (NTU). Flow rates at the monitoring wells varied from 0.18 to 0.28 liters per minute (lpm) (0.048 to 0.075 gallons per minute (gpm). Supply well discharge was throttled to about 1.6 lpm (0.42 gpm).

After initial purging, pumping continued while water quality parameters were monitored with a YSI 556 multi-parameter instrument. Measured parameters were temperature, specific conductance, dissolved oxygen, pH, and Eh. Samples were taken after parameters had stabilized to 0.1 °C, 1 µS/cm, 2% mg/l DO, 0.05 pH, and 8 mV Eh or better. A blind duplicate, labeled WS-1, was collected from monitoring well MW-1. Samples were stored in insulated coolers with ice and were picked up by the test laboratory within 24 hours. Laboratory results are reported in Appendix C and discussed in Section 4.

Table A-1 - Monitoring Well Alignment Tests

Webb Hill Hydrogeologic Investigation, Mason County, Washington

Well ID	1.66" x 4.2' Slug	1.66" x 3' Bailer	1.05" x 4.4' Slug	1.81" x 0.94' Grundfos RediFlo-2 Pump	Well Depth	Screen Interval Depth
	(feet bgs)	(feet bgs)			(feet bgs)	(feet bgs)
MW-1	passed to bottom	passed to bottom	-	passed	124.8	105.0 to 124.5
MW-2	stopped at 8	stopped at 111	passed to bottom	did not pass	168.7	143.9 to 168.4
MW-3	stopped at 164.5	passed to bottom	passed to bottom	did not pass	185.3	160.5 to 185.0
MW-4	constricted at 16	constricted at 16	passed to bottom	did not pass	97.7	72.9 to 97.4

Grid N: 732495.0
Grid E: 992946.2
Latitude: 47°18'45.163"
Longitude: -123°06'37.940"

MW3
468.57

Grid N: 731756.7
Grid E: 992859.4
Latitude: 47°18'37.852"
Longitude: -123°06'38.845"

Grid N: 731672.6
Grid E: 992697.1
Latitude: 47°18'36.969"
Longitude: -123°06'41.158"

WS2
446.78

Grid N: 731147.8
Grid E: 991370.8
Latitude: 47°18'31.358"
Longitude: -123°07'00.141"

MW2
446.75

Grid N: 730843.9
Grid E: 993069.0
Latitude: 47°18'28.916"
Longitude: -123°06'35.366"

MW1
405.57

Wash. Grid Sys., South Zone (NAD83)

McREAVY ROAD

Grid N: 729829.2
Grid E: 996327.2
Latitude: 47°18'19.968"
Longitude: -123°05'47.628"

WSDOT "CRANBERRY"

Grid N: 729407.5
Grid E: 994199.6
Latitude: 47°18'15.116"
Longitude: -123°06'18.281"

MW4
379.26

Legend

○ Monitoring well (top of 2" PVC casing, at notch point)

⊕ Site Bench Mark (masonry nail with brass ring) Elevation: 446.32

Field measurements for this survey were conducted on May 9, 2007 using Leica System 500 Dual-Frequency apparatus in Real Time Kinematic (RTK) mode and terrestrial measurements with a Geodimeter 3" robotic total station.

The error tolerance for the site datum relative to NAVD88 (1996) is within ±0.11'. For the probable error of individual on-site values relative to one another, see Selected Observations table provided with this map.

DESCRIPTION	ELEVATION
MW1	405.57
MW2	446.75
WS2	446.78
MW3	468.57
MW4	379.26

400 0 200 400 800 1600

1" = 400'

SINCE 1976

DATUM

NAVD88 (1996)
WSDOT "Cranberry"

This survey was performed and prepared by me and/or under my direct supervision.

This note is stamped on all original masters of unrecorded documents prepared by MacLearnsberry, Inc. It also [illegible] a seal on the page beneath the stamp. MacLearnsberry, Inc. [illegible] licensees. MacLearnsberry, Inc. [illegible] employees accept responsibility only for those items here[illegible] and bond with those on the original master [illegible] master on file at its office.

BRUCE A. MACLEARNSBERRY
STATE OF WASHINGTON
32439
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES AUGUST 27, 2008

Date: 6/12/2007

MACLEARNSBERRY, INC.
Land Surveyors ◦ Civil Engineers ◦ Planners
הנני יסד בציון אבן בחן פנת יקרת-מוסד מוסד המאמין לא ידחש. ושמתי משפט לקו וצדקה למשקלת
Ο δε ποιων την αληθειαν ερχεται προς το φως ινα φανερωθη αυτου τα εργα
159 Wyatt Way NE Bainbridge Island, WA 98110
phone: (206) 842-5514 facsimile: (206) 780-2408

Client **Mason County**

Webb Hill Monitoring Well Survey

Drawn by: BAM	Date June 12, 2007	Job No. **7016**
Checked by: BAM	Scale 1" = 400'	Sheet 1 of 1

7016.DWG

MACLEARNSBERRY, INC.
Land Surveyors ∘ Planners ∘ Civil Engineers

159 Wyatt Way NE
Bainbridge Island, WA 98110
206 842-5514

P.O. Box 65382
Port Ludlow, WA 98365
360 437-0430

Joseph Lubischer, PE
Aspect Consulting, LLC
179 Madrone Lane North
Bainbridge Island, WA 98110

Tuesday, June 12, 2007

Re: Webb Hill Monitoring Well Survey

Dear Joe:

We subjected our data to more rigorous statistical analysis, the results of which are disclosed in the accompanying table. In the process, we isolated some raw data which needed to be excluded from our consideration. Unfortunately, the results of this culling and subsequent network adjustment yield values up to 0.02' different from those we released earlier. The accompanying data supercedes the prior values.

I apologize for the confusion in this matter.

Feel free to call me with any comments or questions.

Sincerely,

Bruce MacLearnsberry, PLS

encl.

facsimile: 206 780-2408

e-mail: geodaisia@aol.com

Selected Semi-Raw Standard Deviations
Mason County
Job No. 7016
Calcd. By: KMM, 6/12/2007

Point No.	σ	2σ	3σ
70162	0.004	0.008	0.013
70161	0.014	0.028	0.042
70163	0.013	0.025	0.038
70164	0.013	0.027	0.040
MW1	0.005	0.010	0.015
MW4	0.012	0.025	0.037
MW3	0.036	0.072	0.108
WS2	0.016	0.032	0.048
MW2	0.009	0.017	0.026

APPENDIX B

Monitoring Well and On-Site Water Supply Well Logs

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥15% Fines[5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥15% Fines[5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diato-maceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

Coarse-Grained Soils

Density	SPT[2] blows/foot
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	>50

Fine-Grained Soils

Consistency	SPT[2] blows/foot
Very Soft	0 to 2
Soft	2 to 4
Medium Stiff	4 to 8
Stiff	8 to 15
Very Stiff	15 to 30
Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

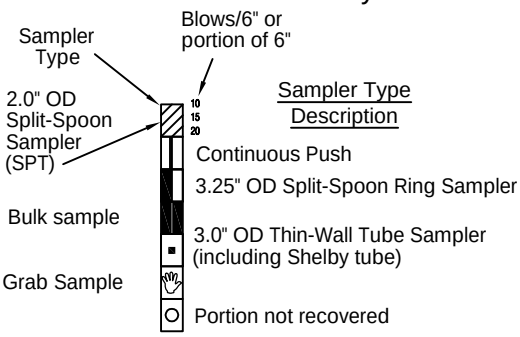
[3] Estimated Percentage

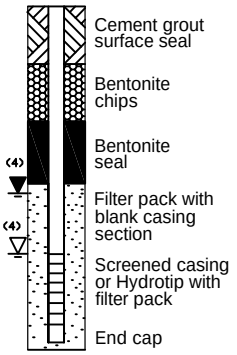
Percentage by Weight	Modifier
<5	Trace
5 to 15	Slightly (sandy, silty, clayey, gravelly)
15 to 30	Sandy, silty, clayey, gravelly)
30 to 49	Very (sandy, silty, clayey, gravelly)

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols





(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of groundwater
(5) Combined USCS symbols used for fines between 5% and 15% as estimated in General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

▽ ATD = At time of drilling
▼ Static water level (date)

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

Aspect consulting
IN-DEPTH PERSPECTIVE
www.aspectconsulting.com

Exploration Log Key

DATE:
DESIGNED BY:
DRAWN BY:
REVISED BY:

PROJECT NO.

FIGURE NO.
B-1

Q:_ACAD Standards\Standard Details\Exploration Log Key B1.dwg

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-1	1 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2')						**TOPSOIL** Slightly moist, dark brown GRAVEL (GP); gravel is fine; abundant organics, roots	
							RECESSIONAL OUTWASH Slightly moist, brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse; gravel is fine, subrounded to rounded	
							Slightly moist, brown, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse (60mm), subrounded to rounded	
5							3-4.5' gravel is subangular to rounded (35mm)	5
	Bentonite chips (2-10')						**STRATIFIED GLACIAL DEPOSITS** **till** Slightly moist, brown to gray, silty sandy GRAVEL (GM)	
							glaciofluvial Slightly moist, dark brown, silty,gravelly SAND (SM)	
							till Slightly moist, dark brown, silty,gravelly SAND (SM)	
		1					Drilling fractured rock: dark brown with maroon tinge, angular gravel	
							glaciofluvial Slightly moist, dark brown, slightly silty, gravelly SAND (SW-SM); gravel is subrounded to rounded Very gravelly	
10							Cobble at 11'	10
							Cobble at 12'	
15							Slightly moist to dry, brown, silty, very gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse (40mm), subrounded to rounded	15
							Trace clay	
20	Bentonite grout (10-95.3')	2					Dark brown, increased moisture 22 to 22.5'	20
							Slightly moist, dark brown to gray, slightly clayey, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse, subrounded to rounded	
25							Dark brown at 25'	25
		3					Cobble at 26'	
							Trace clay at 28'	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 2

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-1	2 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							Moist, brown to light brown, silty, slightly gravelly SAND (SM); trace clay, sand is fine to coarse, predominantly medium to coarse; gravel is fine to coarse (40mm), predominantly fine, subrounded to rounded	
							Gravelly at 31'	
							Slightly moist at 32'	
35		4						35
							No clay, yellow ochre tones at 37'	
							Trace silt at 38' (SW)	
							Slightly silty at 39' (SW-SM)	
40							Light brown to brown at 40'	40
							Brown at 41'	
							Dark brown, increase silt at 42'	
							Trace clay 43-49.5', decreasing 46-49.5'	
45	Bentonite grout (10-95.3')							45
		5					Light and dark brown at 46'	
							Dark brown at 46.5'	
							Light and dark brown at 48.5'	
50							Slightly moist to moist, brown SAND (SW); trace silt; trace gravel; sand is fine to coarse; gravel is fine to coarse (20mm)	50
							Slightly moist, dark brown and gray, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse; gravel is fine to coarse (50mm)	
							Trace silt at 53.5' (SW)	
55		6						55
							Slightly silty at 56.3' (SW-SM)	
							Trace silt at 57' (SW)	
		7					Moist, slightly silty, very gravelly, cobble (SW-SM)	
							Slightly moist at 59.7'	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 2

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-1	3 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		7					Trace silt (SW) Slightly silty (SW-SM)	
65							Slightly moist, dark brown, very gravelly SAND (SW); trace silt; sand is fine to coarse; gravel is fine to coarse (55 mm), predominantly fine	65
70		8						70
75	Bentonite grout (10-95.3')							75
		9						
80								80
							Increase sand 83.5 to 84'	
85	Perched water level 86.3' 4/24/2007	10					Slightly silty (SW-SM) Trace silt (SW)	85

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 2

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-1	4 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Bentonite grout (10-95.3')							
							Cobble at 94'	
95		11						95
							Moist, slightly silty from 96 to 97'	
							Slightly gravelly; sand is fine to medium (SP), trace silt	
							Gravelly	
	Bentonite pellets/chips (95.3-102.5')						Very gravelly; sand is fine to coarse (SW)	
100							**till**	100
							Slightly moist, brown, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse (42 mm)	
	4/26/2007						Slightly moist, brown, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse; gravel is fine to coarse (40 mm)	
	SC=430 µmhos/cm on 4/25/2007						Slightly moist, brown, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse	
	5/31/2007							
105	Probable 2' formation collapse (between 103' and 110')						**glaciofluvial**	105
							Moist, dark brown, gravelly SAND (SW); trace silt; sand is fine to coarse; gravel is fine to coarse (55 mm), predominantly fine	
		12					Moist	
							Grades to very gravelly	
							Slightly moist	
110	10/20 Colorado silica sand filter pack (102.5-125')							110
							Gravelly	
							Very gravelly	
115							Cobble at 115'	115

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 2

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting
IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-1	5 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	2" schedule 80 PVC slotted pipe 0.020" slot size (105.2-124.6') 2" PVC pipe cap						Slightly silty (SW-SM) Trace silt (SW) Slightly silty (SW-SM) Trace silt (SW)	
125							Bottom of hole at 125'.	125
130								130
135								135
140								140
145								145

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 2

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	1 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2') Soil (2-4')	1					**FILL (Reworked Glacial Deposits)** Slightly moist, yellow red/brown, silty, gravelly SAND (SM); sand is predominantly fine to medium, gravel is fine to coarse (60mm), subrounded/rounded, 30% felsic	
5		2					Slightly moist, gray, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (70mm), subangular/subrounded, 15% felsic **RECESSIONAL OUTWASH** Moist/very moist, slightly silty, slightly gravelly SAND (SP-SM); sand is fine to medium predominantly fine, fairly well sorted, gravel is fine to coarse (60mm), subrounded/rounded, 10% felsic, gradational decrease in gravel	5
	Bentonite chips (4-10')							
10		3					**STRATIFIED GLACIAL DEPOSITS** **glaciofluvial** Moist, dark brown/gray, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse but predominantly coarse, gravel is fine to coarse (50mm), subrounded/rounded, 15% felsic	10
15		4					Dry, dark brown/brown, silty, gravelly SAND (SM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (50mm), subrounded/rounded, 20% felsic Moist, dark brown/gray, slightly silty, sand predominantly medium to coarse, <10% felsic	15
20	Bentonite grout (10-131')	5					**till** Moist, yellow red/dark brown, silty, very sandy GRAVEL (GM); matrix supported, sand is fine to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 20% felsic Dry, dark brown/brown, silty, very gravelly SAND (SM); matrix supported, sand is fine to coarse, gravel is fine to coarse (50mm), subrounded/rounded, 15% felsic	20
25		6					Dry/slightly moist, yellow red/brown, silty, very sandy GRAVEL (GM); matrix supported, gravel (70mm), subrounded/rounded, 15% felsic	25
		7					Dry, light gray/brown, silty, very sandy GRAVEL (GM); with cobblesmatrix supported, sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (90mm), subrounded/rounded, 20% felsic	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	2 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		7						
35		8					**glaciofluvial** Slightly moist/moist, yellow red/red brown, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, subangular/subrounded, gravel is fine to coarse (60mm), subrounded/rounded <10% felsic Silty, very sandy gravel lens (6") at 37.5'	35
40		9					Dry/slightly moist, dark brown/brown, silty, very sandy GRAVEL (GM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse rounded, 15% felsic, matrix supported	40
45	Bentonite grout (10-131')	10					Slightly moist, red brown/yellow red, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse, subrounded/rounded, 15% felsic Slightly moist, dark brown, silty, very gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, 10% felsic (gravelly 45-45.5') Trace clay	45
50		11					Slightly moist/moist brown/dark brown, slightly clayey, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse predominantly fine (60mm), rounded/subrounded, 10% felsic, matrix supported	50
55							Slightly moist, dark brown, slightly silty, slightly gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded, 10% felsic Slightly moist, dark brown, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (60mm), subangular/rounded, <10% felsic, matrix supported Slightly moist/moist	55

Sampler Type:

- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	3 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							Slightly moist/moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (60mm), 15% felsic, subrounded/rounded	
		11					**till** Slightly moist/dry, light brown, silty, gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine, subangular/round, matrix supported, <10% felsic	
65							**glaciofluvial** Slightly moist/moist, dark brown, silty, gravelly SAND (SM); trace clay, sand is fine to coarse, gravel is fine, subangular/rounded, <10% felsic	65
							till Slightly moist/dry, brown, slightly gravelly, very silty SAND (SM); sand is fine to coarse, gravel is fine to coarse (30mm), 10% felsic, matrix supported	
70		12					Slightly moist/moist, dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (70mm), angular/rounded, 10% felsic	70
75	Bentonite grout (10-131')							75
80		13						80
							till Slightly moist/dry, brown, silty, very gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse	
85	Perched water level 86.3' 4/24/2007	14					**glaciofluvial** Slightly moist/moist, dark brown/gray, silty, very gravelly SAND (SM); trace clay, sand is fine to coarse, gravel is fine to coarse (65mm), angular/subrounded, 10% felsic No clay at 86.5'	85

Sampler Type:

- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	4 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		15					Boulder	
		16					**till** Slightly moist/dry, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse predominantly fine (30mm) **glaciofluvial** Moist/very moist, dark brown, very sandy GRAVEL (GP); trace silt, sand is fine to coarse, gravel is fine to coarse predominantly fine (55mm), subangular/rounded, 10% felsic	
95		17					**till** Slightly moist/dry, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (40mm) **glaciofluvial** Slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (48mm), subangular/rounded, <10% felsic, matrix supported	95
100	Perched water level 101.7 5/1/2007 Hole drilled to 105' SC=300 µmhos/cm	18					Slightly moist/moist, dark brown/yellow red/gray, silty, very gravelly/gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded, <5% felsic	100
105	Bentonite grout (10-131')	19					Slightly moist, dark brown, very gravelly SAND (SW); trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (30mm), subangular/subrounded, <5% felsic Slightly silty, sand is fine to course at 105.5' Very silty, gravelly SAND (SM); sand is fine to coarse Slightly moist, brown, slightly silty, slightly gravelly SAND (SW-SM); gravel is fine (<1/4") **till** (106.7-107.3') as till at 112', gravel is fine **glaciofluvial** (107.3-110') as glaciofluvial at 112.5'	105
110		20					**till** (110-110.5') as till at 112', gravel is fine **glaciofluvial** (110.5-111') as glaciofluvial at 112.5' **till** (111-111.5') as till at 112' **glaciofluvial** (111.5-112') as glaciofluvial at 112.5' **till** Slightly moist/dry, dark brown/brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (20-60mm), subangular/rounded, 5-10% felsic **glaciofluvial** Slightly moist/moist, dark brown/brown, slightly silty/trace silt, gravelly/very gravelly SAND (SW-SM to SW); sand is fine to coarse, gravel is fine to coarse (30-65mm), subangular/subrounded, 5-10% felsic	110
115	Perched water level 112.9 5/1/2007 Hole drilled to 115' SC=150 µmhos/cm	21						115

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	5 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		21						
125	Bentonite grout (10-131')	22					Moist, dark brown, slightly gravelly SAND (SW); trace silt, sand is fine to coarse, gravel is fine, subangular/subrounded, <15% felsic	125
		23					Slightly moist/dry, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (40mm), subangular/subrounded, 10% felsic Moist, dark brown, very gravelly SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse (50mm), subrounded, 10% felsic Slightly silty at 128.3' Trace silt at 128.7' Slightly moist, dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (70mm), subangular/subrounded, <10% felsic	
130								130
							Slightly silty	
135	Bentonite chips (131-140.6')	24					**till** Slightly moist/dry, brown, very silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (45mm), subangular/subrounded, <10% felsic **glaciofluvial** Slightly moist, dark brown, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (55mm), subangular/subrounded, 10% felsic Moist at 136.5' Sand predominantly fine to medium at 137' Sand is fine to coarse at 138' Sand is predominantly fine to medium at 139.1'	135
140		25					**till** Slightly moist, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse predominantly fine (30mm), subangular/subrounded, <10% felsic **glaciofluvial** Moist/slightly moist, dark brown, gravelly SAND (SP); trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine Very gravelly, gravel is fine to coarse (50mm) at 142' Sand is fine to coarse at 143.5' Gravelly at 144' Silt increases at 145'	140
145	5/3/2007 SC=130 µmhos/cm on 5/2/2007 5/31/2007						Very moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (50mm), subangular/subrounded, 10% felsic Trace silt at 146'	145

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-2	6 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	10/20 Colorado silica sand filter pack (140.6-166')	25					Slightly silty	
		26						
155								155
	2" schedule 80 PVC slotted pipe 0.020" slot size (143.9-168.3')						Very moist, dark brown, gravelly SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse (50mm), subrounded, <5% felsic	
							Slightly silty, very gravelly (SW-SM) silt lens	
							Trace silt	
160		27						160
							Very moist, dark brown, slightly clayey, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine, includes silt lens 0.1'	
							Very moist, dark brown, slightly silty, very gravelly SAND (SW-SM); trace silt, sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (70mm), subangular/subrounded (mostly subrounded), <5% felsic	
							Sand is fine to coarse at 161.5', silt increases	
165							Silt decreasees at 164'	165
		28					Cobble at 166'	
	Formation (166-168')							
	2" PVC pipe cap						Bottom of hole at 168'	
170								170
175								175

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	1 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-1')	1					**RECESSIONAL OUTWASH** Dry, yellow red, slightly silty, gravelly SAND (SW-SM); sand is fine to medium, gravel is fine to coarse, rounded, roots.	
5	Bentonite chips (1-10')	2					Dry, light gray/yellow red, silty, very gravelly SAND (SM); sand is fine to coarse, predominantly coarse; gravel is fine to coarse (40 mm), rounded to well rounded.	5
10		3					**STRATIFIED GLACIAL DEPOSITS** **till** Slightly moist, dark brown/yellow red, slightly sandy, gravelly SILT (ML); sand is fine; gravel is fine to coarse (80 mm), matrix supported.	10
							Slightly moist, dark brown, sandy, very gravelly SILT (ML); sand is fine to medium; gravel is fine to coarse (40 mm), subrounded/rounded, matrix supported.	
15		4					Slightly moist, dark brown, sandy SILT (ML) with trace gravel; sand is fine; gravel is fine, matrix supported.	15
							glaciofluvial Dry, dark brown, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse; gravel is fine to coarse (50 mm), subrounded/rounded, predominantly matrix supported.	
							Dry, dark brown/yellow red, slightly silty, sandy GRAVEL (GW-GM); sand is fine to coarse; gravel is fine to coarse (60 mm), subrounded to rounded.	
20	Bentonite grout (10-139.4')	5					Dry/slightly moist, dark brown/yellow red, silty, very sandy GRAVEL (GM) sand is fine to coarse; gravel is fine to coarse (35 mm), subrounded to rounded.	20
25		6					Dry, yellow red/brown, silty, very sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse,	25
							Dry, dark brown/yellow red/ trace gray-blue, silty, very sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded to rounded, primarily mafic origin	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	2 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		7					Dry, dark brown/yellow red, slightly silty, very gravelly, SAND (SP-SM); sand is fine to coarse predominantly coarse, gravel is fine to coarse (75mm), predominantly mafic (80%)	
35							Dry, dark brown/yellow red, slightly silty, gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse with small cobbles (85mm), rounded/subrounded, predominantly mafic (90%)	35
40		8					Dry, dark brown, slightly silty, very sandy, GRAVEL (GW-GM); sand is fine to coarse predominantly medium, gravel is fine to coarse (70mm), subrounded to rounded, presence of quartzite and granite (20%)	40
							Dry, dark brown, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse, small cobbles (100mm), subrounded/rounded, presence of quartzite and granite (10%)	
45	Bentonite grout (10-139.4')						Dry, dark brown, slightly silty, sandy, GRAVEL (GW-GM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded	45
							Dry/slightly moist, dark brown/yellow red, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (70mm), rounded/subrounded, <10% felsic	
50		9						50
							Slightly moist/moist, dark brown/yellow red, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse (30mm), rounded, <10% felsic	
55							Dry, dark brown with yellow red oxidization, slightly silty, gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded, 20% felsic, 2' boulder present	55
		10						
		11					Slightly moist/moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse predominantly	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	3 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Probable formation collapse (8' cumulative between 157.3 & 177.4')	11					medium to coarse, subangular/subrounded, gravel is fine to coarse (80mm), subrounded/rounded, ~15% felsic Slightly gravelly sand pocket, sand is medium to coarse	
65								65
		12					Slightly moist/moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse predominantly medium, gravel is fine to coarse (50mm), rounded/subrounded, ~15% felsic Silty	
70							Moist, dark brown, slightly silty, very gravelly, SAND (SP-SM); sand is fine to coarse but predominantly medium to coarse, rounded/subrounded, gravel is fine to coarse (70mm), subrounded/rounded, ~10% felsic	70
75	Bentonite grout (10-139.4')						Slightly moist, dark brown, silty, very sandy, GRAVEL (GM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (50mm), subrounded/rounded, ~15% felsic, matrix supported	75
		13					Slightly moist/dry, dark brown, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (80mm), subrounded, ~10% felsic	
80								80
85								85
		14					Slightly moist-moist, dark brown, slightly silty, very sandy, GRAVEL (GW-GM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, <10% felsic Decreasing silt, increase in medium sand	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	4 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		14						
95							Wet, dark brown and yellow red, gravelly, SAND (SP); trace silt, sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (50mm), rounded/subrounded, 20% felsic	95
							Decreasing silt	
100	Bentonite grout (10-139.4')	15						100
							Very gravelly	
	Perched water Ephemeral							
105							Wet (top) to moist (bottom), gray, silty, gravelly, SAND (SM), sand is fine to coarse, gravel is fine to coarse (30mm), subrounded/rounded	105
		16					Slightly moist to moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded, 20% felsic	
110	Drill casing (105-125')							110
		17						
115							Moist, dark brown, very gravelly, SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded	115
		18						
							Slightly moist, dark brown, very sandy, GRAVEL (GW); trace silt, sand is fine to coarse, gravel is fine to coarse	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	5 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							(60mm), subrounded/rounded, 10% felsic	
	Drill casing (105-125')							
125	Bentonite grout (10-139.4')	19					Moist, slightly silty (GW-GM)	125
							Slightly moist	
130								130
		20					Moist, dark brown, gravelly, SAND (SP); trace silt, sand is fine to coarse, gravel is fine to coarse (60mm), subrounded/round, 15% felsic	
135								135
							Moist, dark brown, gravelly, SAND (SP); trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (50mm), subrounded/rounded, 10% felsic	
		21					Very moist to moist, dark brown, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded Gravelly at 140'.	
140								140
							Very moist, dark brown, gravelly, SAND (SP); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (60mm), subrounded/rounded	
							Very moist to moist, gravel is predominantly fine	
145	Bentonite pellets (50 lbs) (139.4-154.9') (Note: 3.2 lb/ft is less than recommended usage of 13.3 lb/ft)						Increased fine to coarse gravel (45 mm), subrounded/rounded	145
		22					Slightly silty (SP-SM)	
							Trace silt (SP)	
							Gravel predominantly fine	

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	6 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							Moist, dark brown, gravelly SAND (SP); trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine	
							Moist/slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (60mm)	
							SAND (SP); trace gravel, trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine (20mm), subrounded/rounded	
155	20/40 Colorado silica sand cap (154.9-157.3')	23					Moist/slightly moist, dark brown, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (45mm), 10% felsic	155
160	10/20 Colorado silica sand filter pack (157.3-187')							160
	5/2/2007						Very moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (65mm), 10% felsic, silt is variable	
		24						
165	5/31/2007							165
							Trace silt	
		25						
							Slightly silty	
170	2" schedule 80 PVC slotted pipe 0.020" slot size (160.5-185')						Trace silt	170
							Slightly silty	
175		26						175
		27						

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting
IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-3	7 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Probable formation collapse (183.4-185.7') 2" PVC pipe cap Formation (185.7-187')	27						
185								185
							Gravelly, trace silt Very gravelly	
							Bottom of hole at 187'.	
190								190
195								195
200								200
205								205

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-4	1 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2')	1					**RECESSIONAL OUTWASH** Slightly moist, yellow red, silty, very sandy GRAVEL (GM); sand is fine to coarse, subrounded, gravel is fine to coarse (60mm), subrounded/rounded, 15% felsic, matrix supported Slightly moist, gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, subrounded, gravel is fine to coarse (50mm), subrounded/rounded, clast supported, 15% felsic	
5	Bentonite chips (2-10')	2					**STRATIFIED GLACIAL DEPOSITS** **glaciofluvial** Slightly moist, dark brown/gray, slightly sandy, very gravelly SILT (ML); sand is fine, gravel is fine to coarse (80mm), subrounded/rounded, matrix supported, 10% felsic	5
							Moist, dark brown, silty, sandy GRAVEL (GM); sand is predominantly fine to medium, gravel is fine to coarse (60mm), subrounded/rounded 50% felsic	
10		3					Slightly moist, yellow red, slightly sandy, very silty GRAVEL (GM); sand is fine to medium, gravel is fine to coarse (80mm), rounded, 35% felsic, matrix supported	10
							Moist, yellow red, clayey SILT (MH) bedding, ~1'	
15	Perched water level 16' 4/27/2007 Hole drilled to 18' SC=250 µmhos/cm	4					Slightly moist, yellow red, sandy, very silty GRAVEL (GM); sand predominantly fine to medium, gravel is fine to coarse (40mm), rounded, 30% felsic	15
20	Bentonite grout (10-61') Perched water level 22.5' 4/27/2007 Hole drilled to 31.5'	5					Slightly moist, yellow red/red brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to medium, gravel is fine to coarse (60mm), rounded Very moist, yellow red, slightly sandy, silty, very clayey GRAVEL (GM); sand is fine to medium, gravel is fine to coarse (75mm), subrounded/rounded, 25% felsic, matrix supported Brown/dark brown	20
25		6					Slightly moist, dark brown/brown, slightly sandy, gravelly SILT (ML); sand is fine to medium, gravel is fine to coarse (70mm), rounded, matrix supported, 20% felsic	25

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-4	2 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		6					Wet, brown, silty, sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse predominantly fine (40mm), subangular/rounded, <10% felsic	
		7					Moist, brown/yellow red, slightly sandy, very gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, matrix supported, 15% felsic	
35							Olive gray, coarse sand bedding, 0.5' at 34' Slightly moist at 35'	35
		8					Slightly moist, dark brown/light brown, slightly sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse (45mm), angular/subangular, <5% felsic	
40							Slightly moist, dark brown, sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine, subrounded/rounded, matrix supported, 20% felsic	40
		9					Slightly moist, light gray/dark brown, slightly sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse predominantly fine (30mm), angular/rounded, matrix supported	
45	Bentonite grout (10-61')						Slightly moist, red brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 20% felsic	45
		10					Slightly moist, dark brown, sandy, gravelly SILT (ML); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse predominantly fine (50mm), angular/subrounded, matrix supported, <10% felsic	
50							Slightly moist, yellow red/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 10% felsic, matrix supported Light brown, slightly clayey, silty, sandy GRAVEL (GM); bedding, 0.5', sand is fine to coarse, gravel is fine to coarse	50
55		11					Slightly moist, gray/dark brown, gravelly SAND (SP); trace silt, sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (55mm), subrounded/rounded, 20% felsic	55
							Slightly moist, yellow red/dark brown, sandy, gravelly	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-4	3 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Bentonite grout (10-61')	12					SILT (ML); sand is fine to coarse, gravel is fine to coarse (30mm), subrounded/rounded, 30% felsic	
65	Bentonite chips (61-68.2')	13					Slightly moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (80mm), occasional cobbles	65
							Slightly moist, dark brown, gravelly SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse	
							Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	
							Light brown, slightly clayey, 0.7'	
70		14					**till** Sandy, gravelly SILT (ML)	70
							glaciofluvial Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	
							till Sandy, gravelly SILT (ML)	
75	SC=330 µmhos/cm on 4/27/2007; 5/9/2007						**glaciofluvial** Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	75
	5/31/2007	15					Very moist/wet, brown/dark brown, slightly silty, very sandy GRAVEL (GW-GM); sand is medium to coarse predominantly coarse, angular, gravel is fine to coarse (40mm), subrounded/rounded	
							Slightly sandy, gravelly, silty CLAY (CL) bedding, 0.5', sand is fine to coarse, gravel is fine (77-77.5')	
	10/20 Colorado silica sand filter pack (68.2-96')						Very moist, brown/dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, subrounded, gravel is fine to coarse (50mm), rounded, 15% felsic	
80								80
							Light brown, sandy, gravelly, silty CLAY (CL), 1'	
85	2" schedule 80 PVC slotted pipe 0.020" slot size (72.9-97.4')	16					Very moist, dark brown, gravelly SAND (SW); sand is medium to coarse, rounded, gravel is fine, rounded, 1'	85

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-4	4 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	2" PVC pipe cap Formation (96-105')	16					Very moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly medium to coarse, subangular/subrounded, gravel is fine to coarse (50mm), subrounded/rounded, clast supported, 40% felsic	
							Very moist, dark brown, SAND (SP); trace silt, trace gravel, sand is medium	
95							Very moist, dark brown, very gravelly SAND (SP); trace silt, sand is medium to coarse, gravel is fine to coarse predominantly fine (30mm), rounded, ~20% felsic	95
100		17					Very moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly coarse, gravel is fine to coarse (65mm), rounded, 25% felsic	100
105							Bottom of hole at 105'.	105
110								110
115								115

Sampler Type:

- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

WS-2

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W126738
Unique Well I.D. # AFK643
Water Right Permit No.

(1) OWNER: Name BIO RECYCLING Address PO BOX 982 CENTRALIA, WA 98531-

(2) LOCATION OF WELL: County MASON - SE 1/4 NW 1/4 Sec 18 T 21 N., R 3 (W)
(2a) STREET ADDRESS OF WELL (or nearest address) WEBB HILL ROAD, SHELTON

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 197 ft. Depth of completed well 197 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 * Dia. from +2 ft. to 193.2 ft.
WELDED CASING * Dia. from ft. to ft.
* Dia. from ft. to ft.

Perforations: NO
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: YES
Manufacturer's Name KOUSTON
Type SLOTTED Model No.
Diam. 5 slot size .030 from 197 ft. to 191 ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 20 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 146 ft. below top of well Date 04/18/00
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
LOOSE PACKED SAND PEA GRAVEL	0	5
LOOSE PACKED SAND GRAVEL	5	28
SAND & GRAVEL BRN CLAY BINDER HARD PAN	28	54
PACKED COURSE SAND GRAVEL	54	87
MULTI-COLOR GRY LOOSE COURSE SAND	87	151
LOOSE MULTI-COLOR GRY COURSE SAND	151	160
MULTI-COLOR GRY COURSE SAND WATER	160	197

RECEIVED
MAY - 1 2000
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

Work started 04/17/00 Completed 04/18/00

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data

Time	Water Level	Time	Water Level	Time	Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test 40 gal/min. w/ stem set at 180 ft. for 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA DRILLING INC.
(Person, firm, or corporation) (Type or print)

ADDRESS SE 170 WALKER PARK RD

[SIGNED] License No. 2053

Contractor's Registration No. ARCADDI098K1 Date 04/18/00

WELL REPORT
STATE OF WASHINGTON

Start card number W060740

(1) Name BIO RECYCLING Address 18506 SARGENT ROAD, ROCHESTER

(2) Location of well, County- MASON 1/4 1/4 Sec 18 Tn 21 R 3WWM
(2a) Street address of well- OFF WEBB HILL ROAD

(3) Proposed use- COMMERCIAL

(4) Type of work --
Number of well ONE
NEW CONSTRUCTION
Method of drill ROTARY

(5) Dimensions -- Diameter of well 6"
Drilled 160 ' Completed 158'

(6) Construction details --
Casing 6" from +2 ' to 158 '
from ' to '
Welded YES Liner installed NO
Perforations - NO
Type of perforater
Size of perforations " by "
holes from ' to '
holes from ' to '
Screen NO
Manufacturer's Name
Type
Diam. "
Slot size " from ' to '
Slot size " from ' to '
Gravel packed No
Surface seal YES to 18+ feet
Material used in seal BENTONITE
Any unusable water? NO
Type of water
Where?
Method of seal

(7) Water Levels
Elevation above sea level
Static water level '
Artesian pressure

(8) Well tests
Air test;
40+ gpm bit at 150' for 1 hr.
Was pump test made NO
(if yes see attached)

COMMENTS

DESCRIPTION
WELL LOG or ABANDONMENT PROCEDURES

MATERIALS	FROM	TO
SAND,GRAVEL W/SMALL BOULDRS	0	24
SAND,GRAVEL	24	160
	160	

STARTED 6/22/95 COMPLETED 6/26/95

RECEIVED
'95 SEP -8 PM 1:14
DEPARTMENT OF ECOLOGY
S.W. REGIONAL OFFICE

WELL CONSTRUCTERS CERTIFICATION
I accept responsibility for construction of this well and its compliance with all Washington well construction standards. The information reported above is true to my best knowledge and belief.

KING BROS. DRILLING INC.
644 SHOREY ROAD
CHEHALIS, WASHINGTON 98532
206-748-3798
Contractors number KING BDI 124 DC

C D King

GERALD E. BLUHM License# 2116
DATE MONDAY JUNE 26, 1995

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. A49208
Unique Well I.D. # N/A
Water Right Permit No.

(1) OWNER: Name BIO RECYCLING Address PO BOX 982 CENTRALIA, WA 98531-

(2) LOCATION OF WELL: County MASON - SE 1/4 NW 1/4 Sec 18 T 21 N., R 3 (WM)
(2a) STREET ADDRESS OF WELL (or nearest address) WEBB HILL ROAD, SHELTON]

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
DECOMMISSION Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled ft. Depth of completed well 160 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from ft. to 160.6 ft.
WELDED CASING " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: YES
Type of perforator used AIR PERFORATOR
SIZE of perforations 1/4 in. by 1 in.
2560 perforations from 150 ft. to 0 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: NO
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: NO To what depth? ft.
Material used in seal
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 105 ft. below top of well Date 05/01/00
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
Perferated 4 sides of casing		
Filled with Bentonite Slurry topped off with Hole Plug		

RECEIVED
JUN 02 2000
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

Work started 05/01/00 Completed 05/01/00

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data

Time	Water Level	Time	Water Level	Time	Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

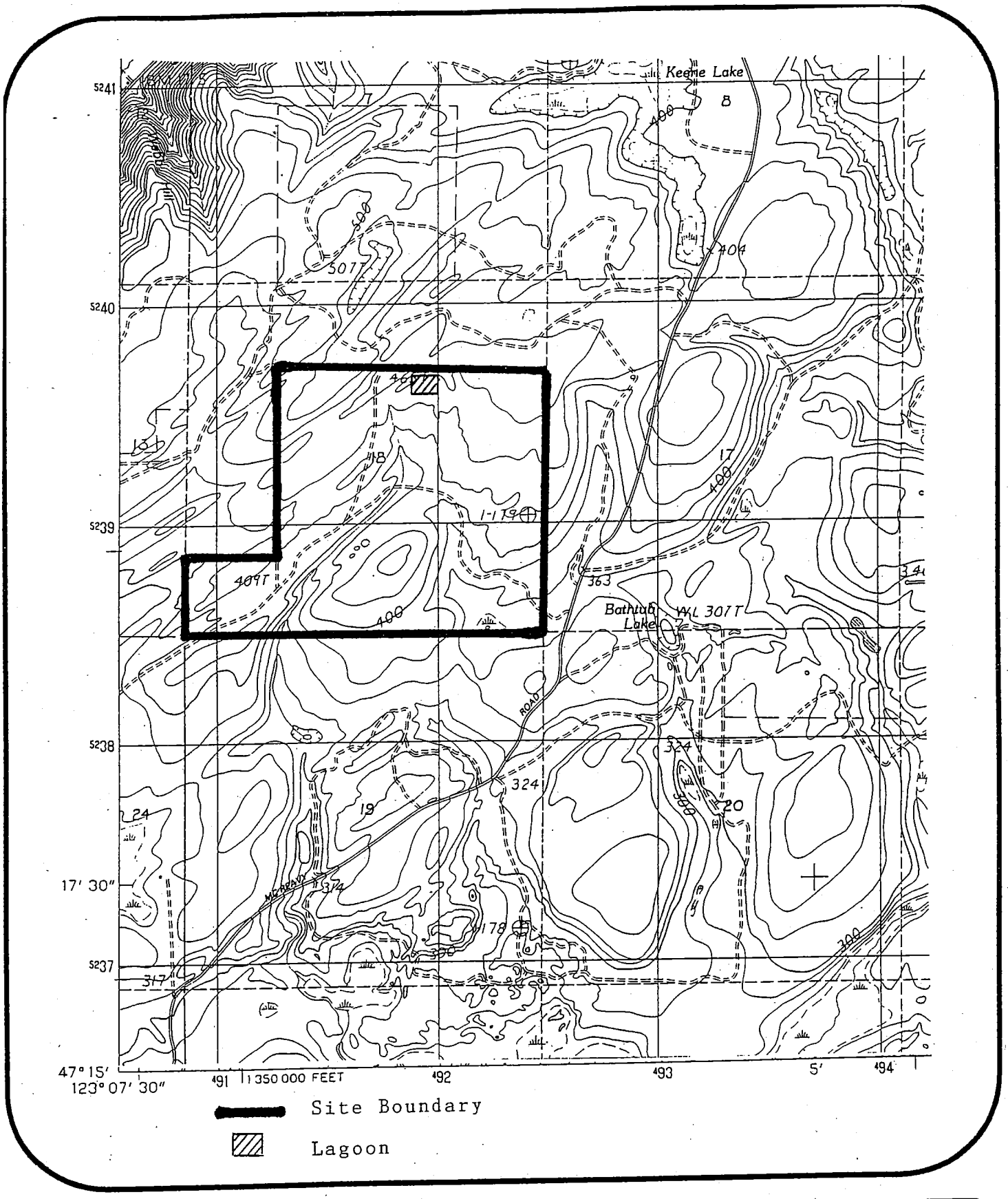
WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA DRILLING INC.
(Person, firm, or corporation) (Type or print)

ADDRESS SE 170 WALKER PARK RD

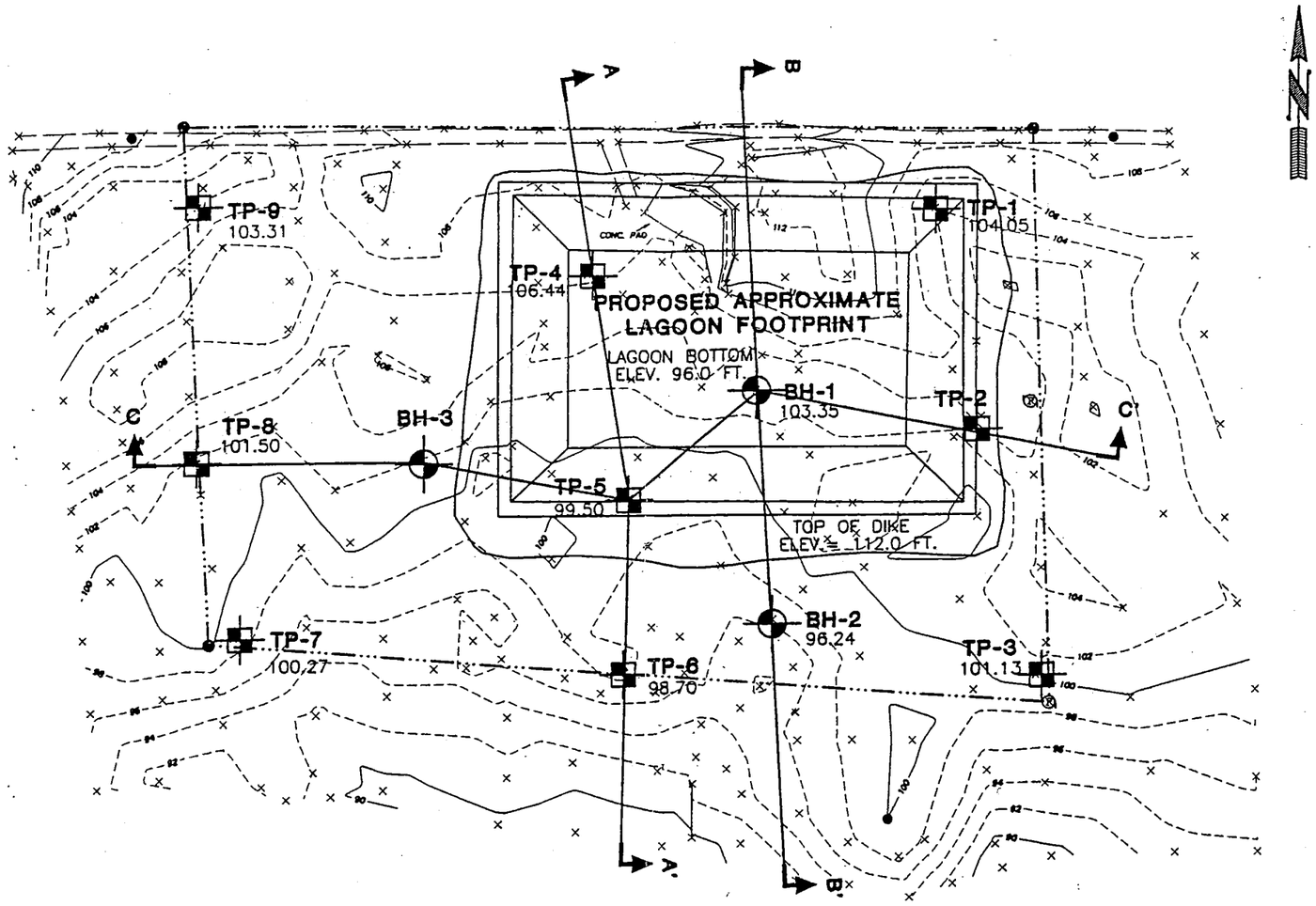
[SIGNED] License No. 2053

Contractor's
Registration No. ARCADDI098K1 Date 05/02/00



E & A ENVIRONMENTAL CONSULTANTS, INC.

FIGURE 1
Bio Recycling Corp.
North Ranch Septage Lagoon
Topography and Drainage



LEGEND

BH-1 103.35 — BORING DESIGNATION ELEVATION (FT.) AND SURVEYED LOCATION. (EXCEPT BH-3, APPROX.)

TP-1 104.05 — TEST PIT DESIGNATION ELEVATION (FT.) AND SURVEYED LOCATION. (EXCEPT TP-2, APPROX.)

0' 100' 200'

SCALE: 1"=100'

HWA GEOSCIENCES INC.

NORTH RANCH
SEPTAGE LAGOON
SHELTON, WASHINGTON

SITE AND
EXPLORATION PLAN

DRAWN BY Helen C	FIGURE NO. 2
CHECKED BY Michelle R.	
DATE 7.9.99	PROJECT NO. 99108

REFERENCE: Base map provided by E & A Environmental Consultants, Inc.

C:\JOBS\99108\99108002.DWG

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
	More than 50% of Coarse Fraction Retained on No. 4 Sieve	Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
More than 50% Retained on No. 200 Sieve Size	Sand and Sandy Soils	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
	50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- 3.0" OD Split Spoon with Brass Rings
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 99108 FIGURE: A-1

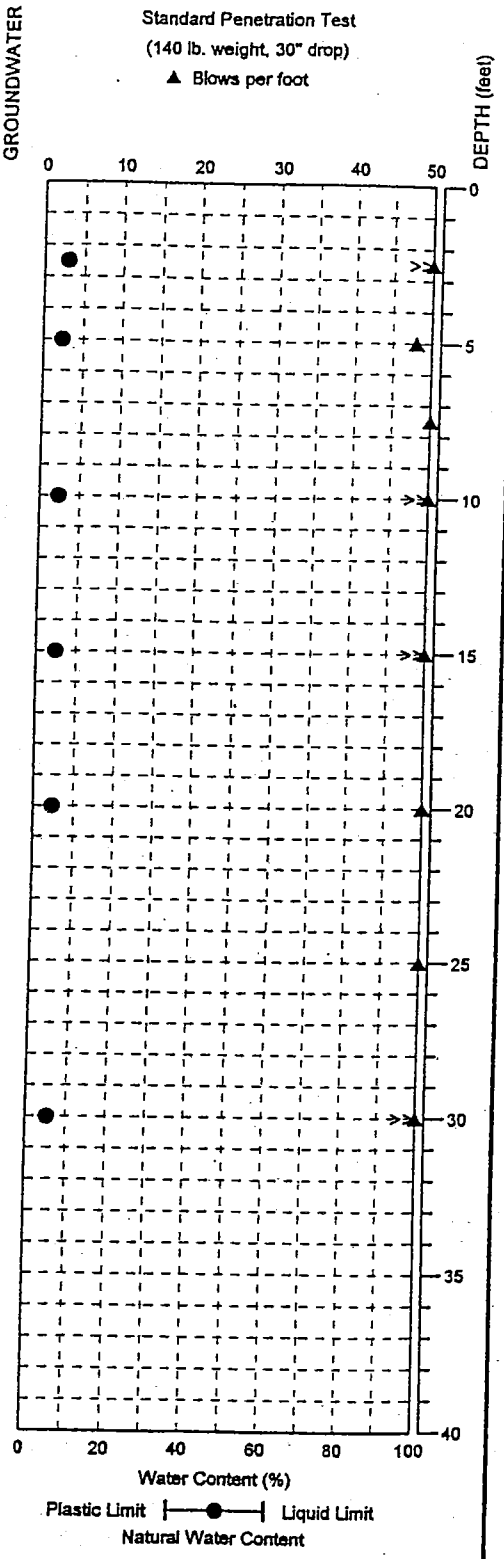
DRILLING COMPANY: Holt Drilling, Inc.
DRILLING METHOD: Mobile B-59, HSA
SAMPLING METHOD: Wireline, SPT
SURFACE ELEVATION: 103 ± feet

LOCATION: See Site Plan, Figure 2
DATE STARTED: 7/1/99
DATE COMPLETED: 7/1/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		ML	Stiff, brown, sandy SILT, moist. Trace gravel. Rootlets. (TOPSOIL)				
			Very dense, brown, gravelly, sandy SILT, moist. Gravel particles are embedded. Cobbles and boulders possible. (GLACIAL TILL)	S-1	20-50/6"		
5		ML	Becomes grayish brown.	S-2	29-25-23		
				S-3	50/5"		
10				S-4	18-50/6"		
		SM	Very dense, brownish gray, gravelly, silty SAND, moist. Gravel particles are embedded and some are broken by the sampler.	S-5	20-50/3"		
15		ML	Very dense, brownish gray, sandy, gravelly SILT, moist. Gravel and cobbles are embedded. Possibly large cobbles and boulders.	S-6	50/6"		
20							
25				S-7	50/3"		
30				S-8	18-50/6"		
35							
40							

Bottom of hole at 31 feet.

No groundwater observed during drilling.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

BORING:
BH-1

PAGE: 1 of 1

PROJECT NO.: 99108

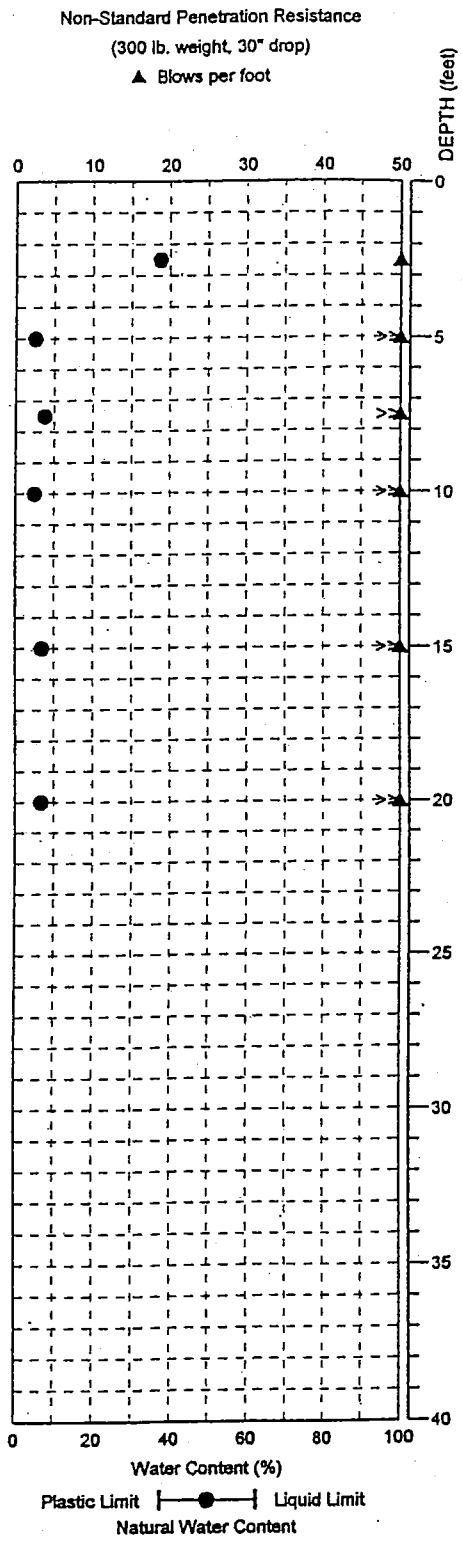
FIGURE: A-2

DRING 99108.GPJ 8/4/99

DRILLING COMPANY: Holt Drilling, Inc.
DRILLING METHOD: Mobile B-59, HSA
SAMPLING METHOD: Wireline, SPT
SURFACE ELEVATION: 96 ± feet

LOCATION: See Site Plan, Figure 2
DATE STARTED: 7/1/99
DATE COMPLETED: 7/1/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		ML	Stiff, brown, sandy SILT, moist. Trace gravel. Rootlets. (TOPSOIL)					
			Very dense, brownish gray to grayish brown, sandy, gravelly SILT, moist. Gravel and cobbles are embedded and fractured by sampler. Boulders are possible.		S-1	50/3"		
5			(GLACIAL TILL) Pounding on rock. No recovery. Lithology inferred from cuttings.		S-2	35-35-50/4"		
					S-3	35-50/6"		
10		ML	Very dense, gray, fine to medium sandy, gravelly SILT moist. Gravel and cobbles are embedded and some are broken by the sampler.		S-4	21-50/6"		
15		ML	Very dense, reddish- brownish-gray, gravelly, sandy, SILT, moist. Gravel and cobbles are embedded. Possibly boulders.		S-5	15-50/6"		
		ML	Very dense, brownish gray to grayish brown, sandy, gravelly SILT, moist. Gravel and cobbles are embedded and fractured by sampler. Boulders are possible.		S-6	22-50/5.5"		
20								
25			Bottom of hole at 21 feet.					
			No groundwater observed during drilling.					
30								
35								
40								



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

BORING:
BH-2

PAGE: 1 of 1

PROJECT NO.: 99108

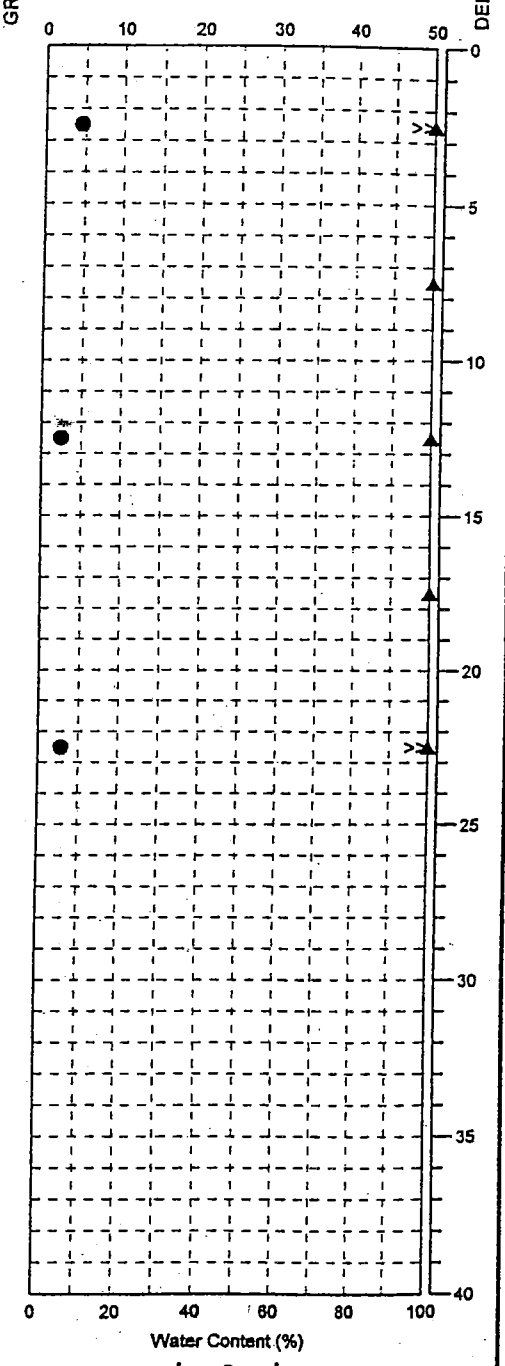
FIGURE: A-3

DRILLING COMPANY: Holt Drilling, Inc.
DRILLING METHOD: Mobile B-59, HSA
SAMPLING METHOD: Wireline, SPT
SURFACE ELEVATION: ~102 ± feet

LOCATION: See Site Plan, Figure 2
DATE STARTED: 7/1/99
DATE COMPLETED: 7/1/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		ML	Stiff, brown, sandy SILT, moist. Trace gravel. Rootlets. (TOPSOIL)					
		ML	Dense to very dense, grayish reddish brown, gravelly, sandy SILT, moist. Gravel and cobbles are embedded and fractured by sampler. Boulders are possible.		S-1	19-35-50/4"		
5			(GLACIAL TILL) Very dense, brownish gray, gravelly, fine to medium sandy SILT moist. Gravel and cobbles are embedded and some are broken by the sampler. Pounding on rock. No recovery. Lithology inferred from cuttings.		S-2	50/3"		
10					S-3	50/3"		
15		ML	Very dense, gray, gravelly, sandy SILT to sandy gravelly SILT, moist. Gravel and cobbles are embedded. Possibly boulders. No recovery of sample. Pounding on cobble.		S-4	50/3"		
20					S-5	35-50/4"		
25			Bottom of hole at 23.5 feet. No groundwater observed during drilling.					
30								
35								
40								

Non-Standard Penetration Resistance
(300 lb. weight, 30" drop)
▲ Blows per foot



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

BORING:
BH-3

PAGE: 1 of 1

PROJECT NO.: 99108

FIGURE: A-4

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 104 ± Feet

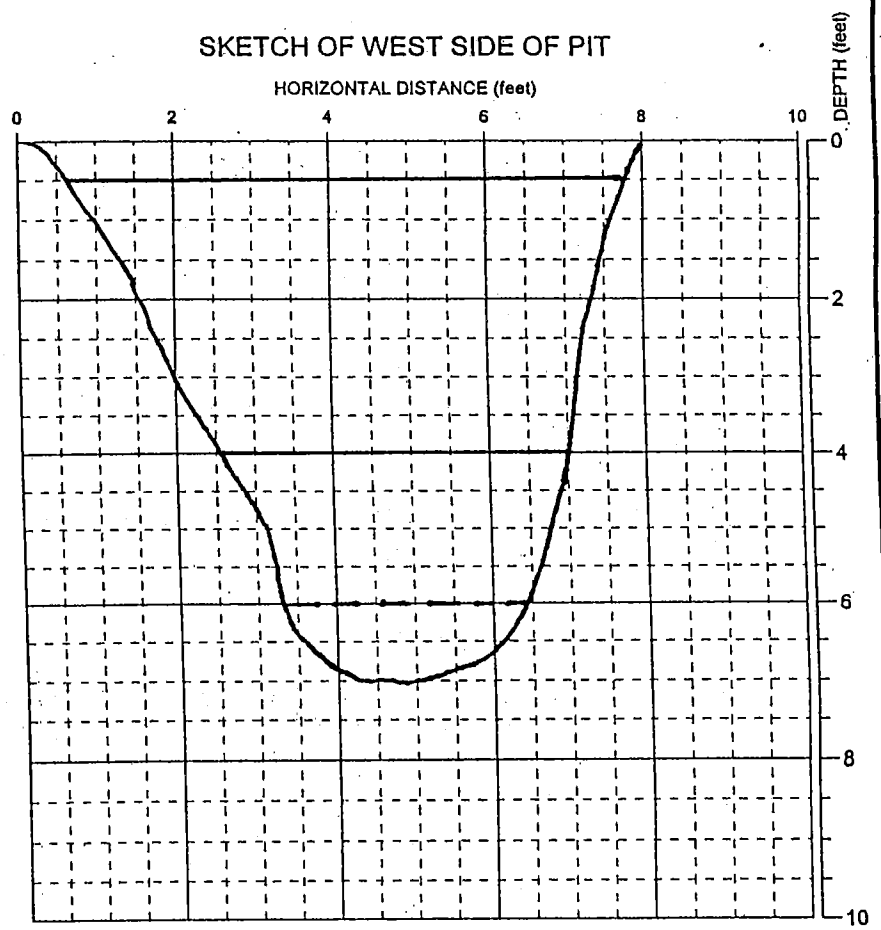
LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		SM	Medium dense, grayish brown, silty, fine SAND with a trace of gravel, moist. (RECESSIONAL OUTWASH)					
2					S-1	11	G/S	
4		SM	Dense, brownish gray to grayish brown, silty, gravelly SAND, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. (GLACIAL TILL)		S-2A	6		
					S-2B	10	G/S	
6		ML	Very dense, brownish gray, gravelly, sandy SILT, moist.		S-3	6		
8								
10								

Bottom of excavation at 7 feet.

No groundwater or caving observed during excavation.

Test pit was left open for over 5 hours. No caving or seepage was observed after 5 hours.



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-1

PAGE: 1 of 1

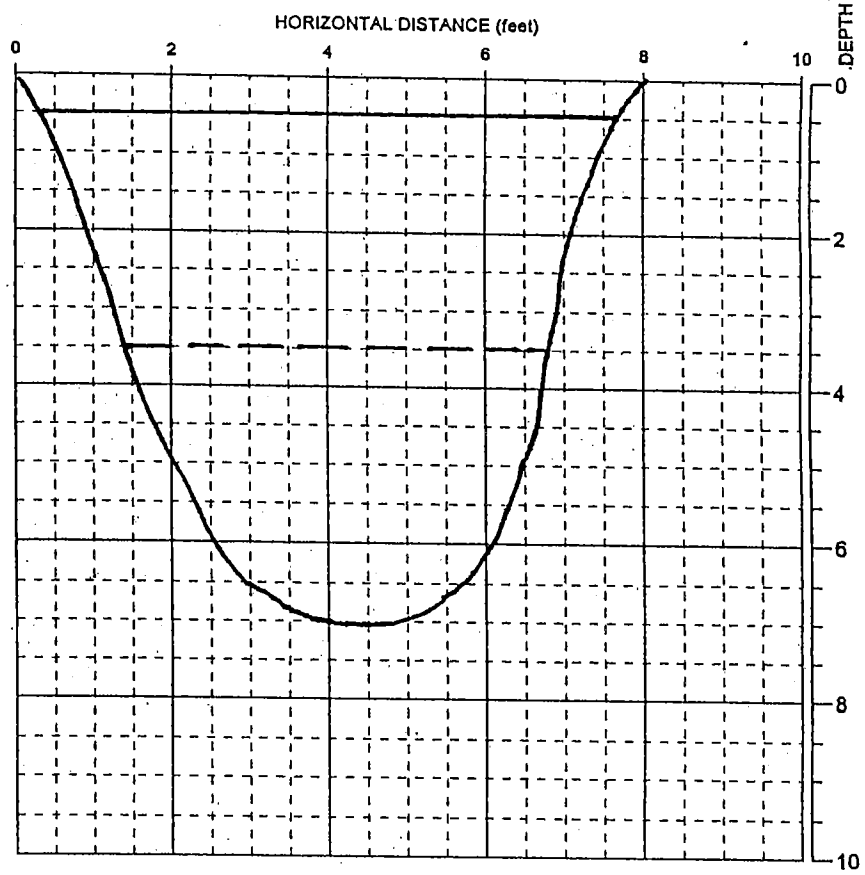
PROJECT NO. 99108 FIGURE: A-5

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: ~103 ± Feet

LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		GP	Dense, grayish brown mottled, slightly silty, sandy GRAVEL, moist. Cobbles. Gravel and cobbles are embedded in non-plastic finer grain matrix. Possibly boulders. (GLACIAL TILL)		S-1 S-1A	3	G/S AL	
4		SM	Very dense, gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders.		S-2	4		
8			Bottom of excavation at 7 feet.					
			No groundwater or caving observed during excavation.					
10								

SKETCH OF WEST SIDE OF PIT



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-2

PAGE: 1 of 1

PROJECT NO.: 99108

FIGURE: A-6

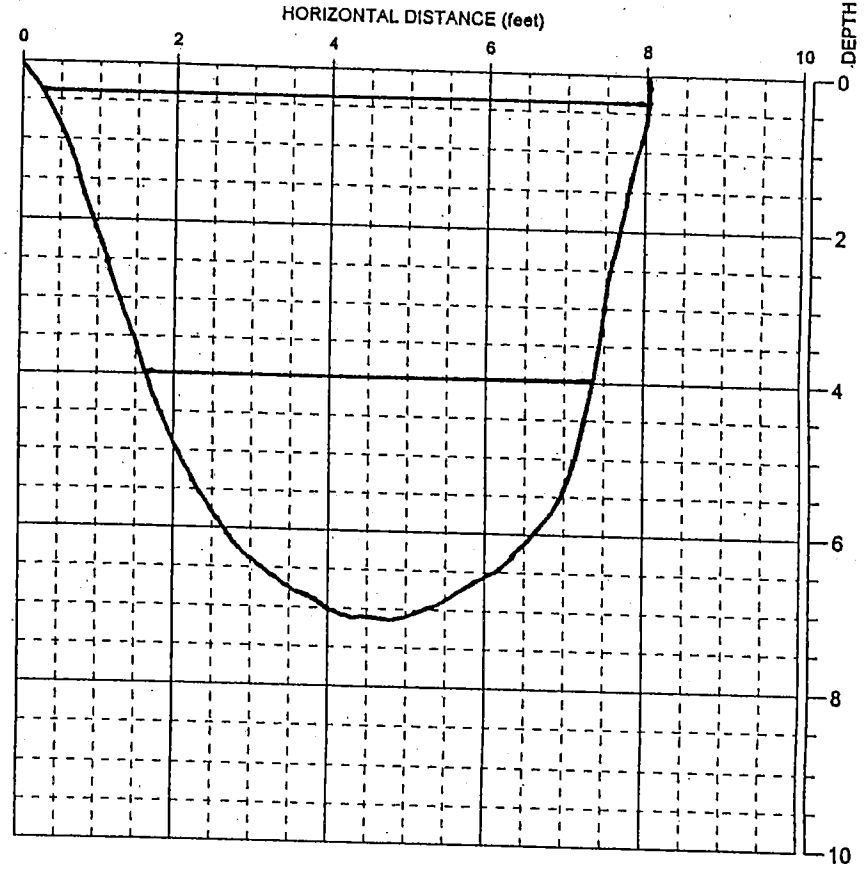
TPIT10 99108.GPJ 8/4/99

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 101 ± Feet

LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		SM	Medium dense to dense, reddish brown to brown mottled, gravelly, silty, fine to medium SAND to sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (WEATHERED GLACIAL TILL)					
2					S-1	6		
4		SM	Very dense, gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (GLACIAL TILL)					
6					S-2	5		
8			Bottom of excavation at 7 feet.					
			No groundwater or caving observed during excavation.					
10								

SKETCH OF EAST SIDE OF PIT



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HWA GEOSCIENCES INC.

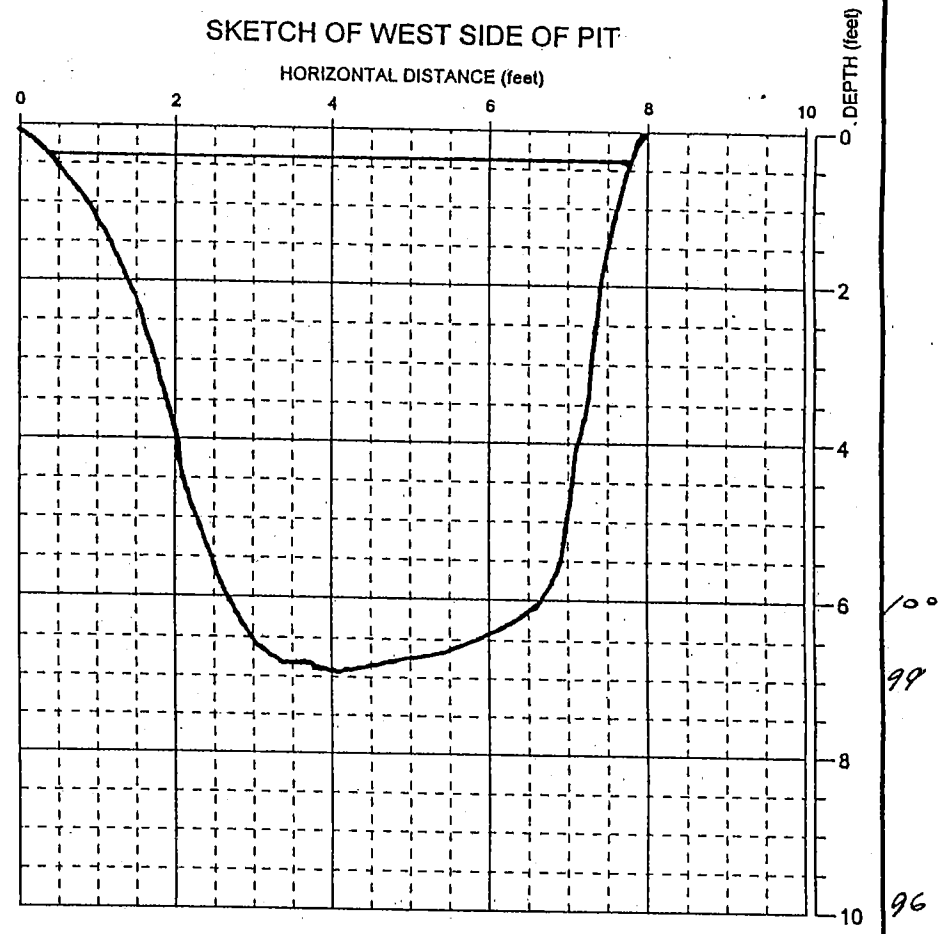
Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-3

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 108 ± Feet

LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		ML SM	Very dense, gray, sandy, gravelly SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Large cobbles and possibly boulders present. (GLACIAL TILL)		S-1	10	G/S AL	
					S-2			
10			Bottom of excavation at 7 feet. No groundwater or caving observed during excavation.					



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-4

PAGE: 1 of 1

PROJECT NO.: 99108

FIGURE: A-8

TPIT10 99108 GPJ 8/4/99

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 100 ± Feet

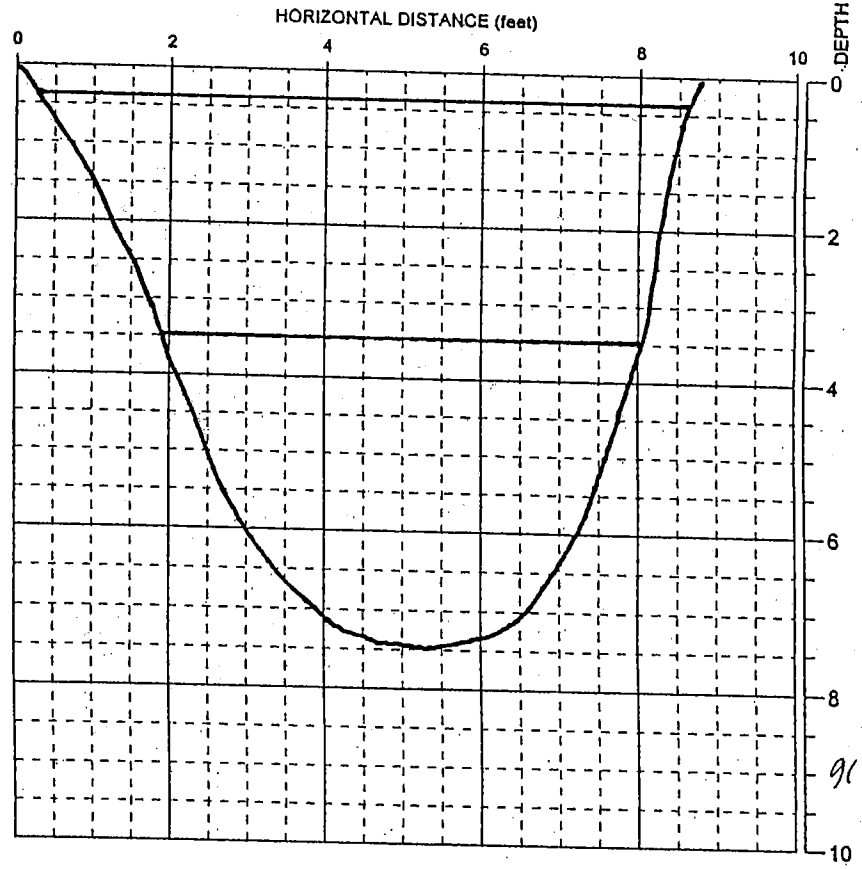
LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
2		SM	Dense, reddish brown to grayish brown mottled, gravelly, silty, fine to medium SAND to sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. Remnant root weathering. (WEATHERED GLACIAL TILL)		S-1	5		
4		SM	Very dense, gray to brownish gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (GLACIAL TILL)		S-2	9		
6								
8								
10								

Bottom of excavation at 7.5 feet.

No groundwater or caving observed during excavation.

SKETCH OF WEST SIDE OF PIT



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-5

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 99 ± Feet

LOCATION: See Site Plan
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

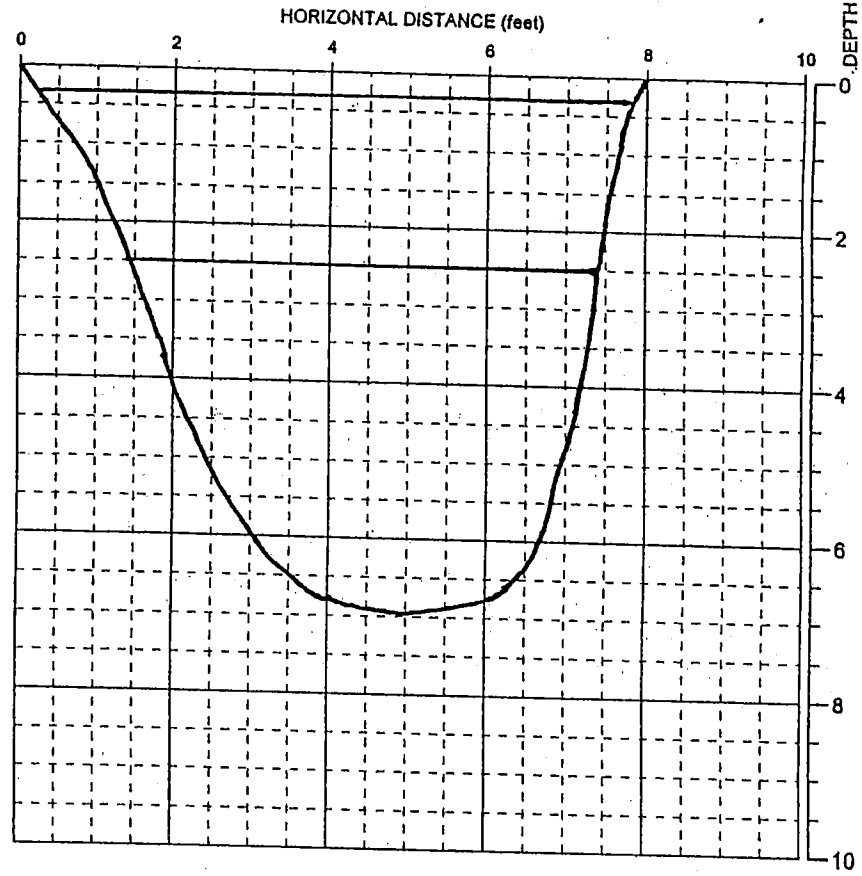
DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		GP GM	Medium dense, reddish brown, slightly silty, very sandy GRAVEL, moist. Pieces of charcoal and burned bark/tree at 2.5 feet. (RECESSIONAL OUTWASH)		S-1	6	G/S	
2		SM	Very dense, gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (GLACIAL TILL)					
4								
6					S-2	6		
8								
10								

Bottom of excavation at 7 feet.

No groundwater observed during excavation.

Slight sloughing observed between 0.5 to 1.5 feet.

SKETCH OF WEST SIDE OF PIT



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-6

PAGE: 1 of 1

TPIT10 99108.GPJ 8/4/99

PROJECT NO.: 99108

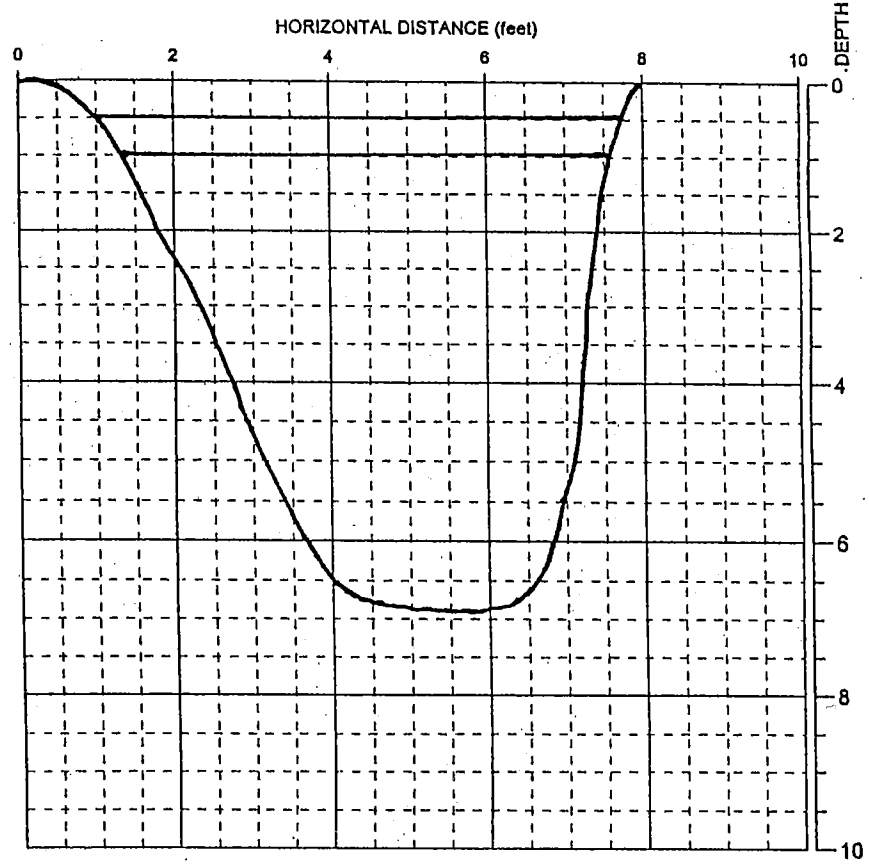
FIGURE: A-10

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 100 ± Feet

LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		ML	Medium dense to dense, reddish brown, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (WEATHERED GLACIAL TILL)					
		SM						
2		SM	Very dense, gray to brownish gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (GLACIAL TILL)					
4					S-1	7		
6								
8			Bottom of excavation at 7 feet. No groundwater or caving observed during excavation.					
10								

SKETCH OF EAST SIDE OF PIT



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-7

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 102 ± Feet

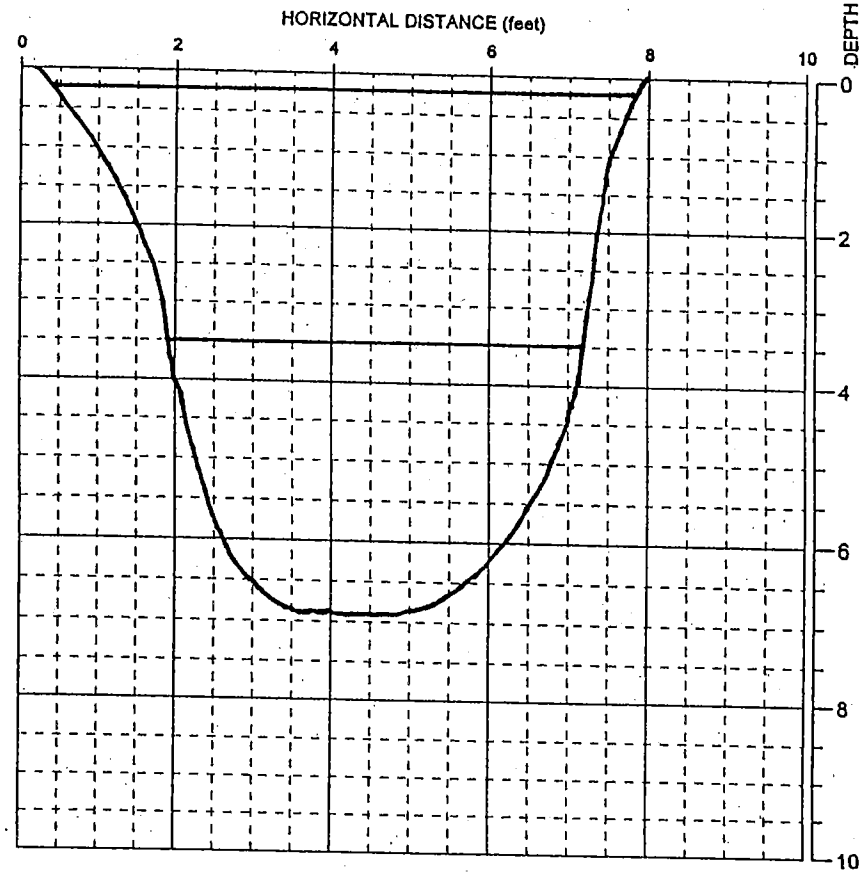
LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		GP GM	Medium dense to dense, reddish brown, slightly silty, very sandy GRAVEL, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (WEATHERED GLACIAL TILL)					
2					S-1	5	G/S	
4		SM	Very dense, gray to brownish gray, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (GLACIAL TILL)					
6					S-2			
8								
10								

Bottom of excavation at 7 feet.

No groundwater or caving observed during excavation.

SKETCH OF EAST SIDE OF PIT



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HWA GEOSCIENCES INC.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-8

PAGE: 1 of 1

TPIT10 99108 GPJ 8/4/99

PROJECT NO.: 99108

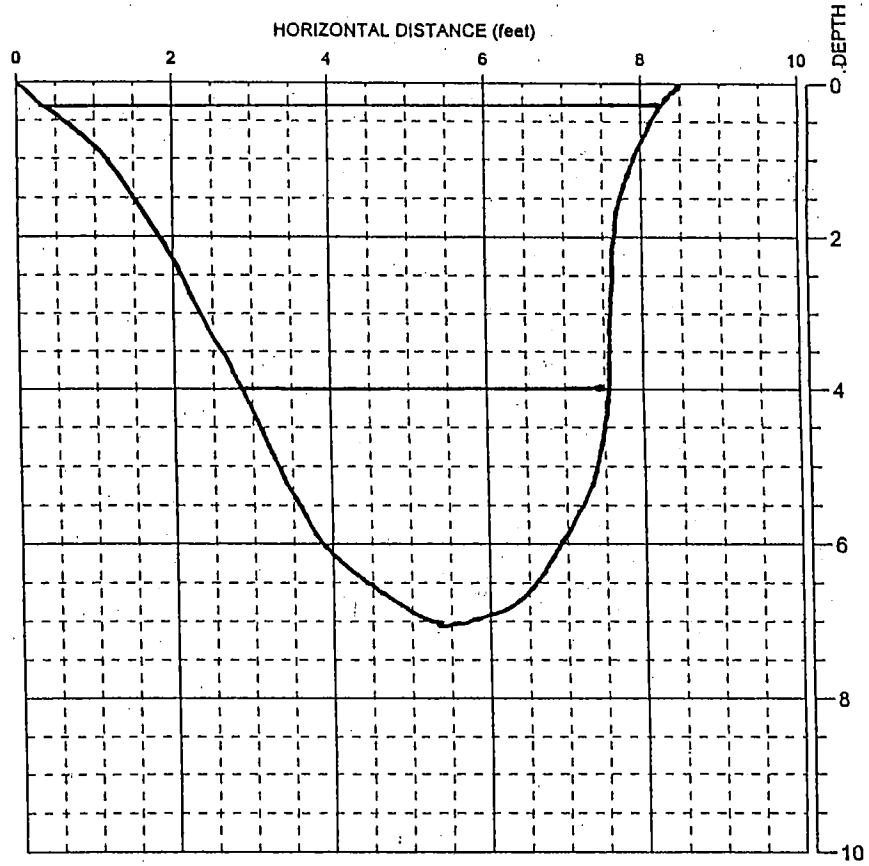
FIGURE: A-12

EXCAVATION COMPANY: Owner's Agent
EXCAVATING EQUIPMENT: CAT Turbo 4x4 416B
SURFACE ELEVATION: 103 ± Feet

LOCATION: See Site Plan, Figure 2
DATE COMPLETED: 6/30/99
LOGGED BY: M. Ramos

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0			Stiff, brown, fine sandy SILT, moist. Rootlets. Trace fine gravel. (TOPSOIL)					
		ML SM	Medium dense to dense, reddish brown, gravelly, sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Possibly boulders. (WEATHERED GLACIAL TILL)					
4		SM	Very dense, gray to brownish gray, gravelly, silty SAND to sandy SILT, moist. Cobbles. Gravel and cobbles are embedded in finer grain matrix. Large cobbles and possibly boulders. (GLACIAL TILL)		S-1	14		
10			Bottom of excavation at 7 feet. No groundwater or caving observed during excavation.					

SKETCH OF SOUTH SIDE OF PIT



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GeoSciences Inc.

Shelton Septage Lagoon
North Ranch Site
Shelton, Washington

LOG OF TEST PIT
TP-9

Appendix C

Data Validation and Laboratory Reported Analytical Results

C.1 Laboratory Analysis

Laboratory analysis was provided by Test America Analytical Testing Corporation, Bothell, Washington. Analytical data were provided in two reports, both dated June 14, 2007, and are included with this appendix. The results are discussed in Section 4.

Samples were packed in coolers with ice and picked up by the test laboratory within 29 hours from time of sampling. No deviation from required holding temperature was noted by the laboratory.

Samples were analyzed for nitrite within 30 hours, which is less than the required 48 hour holding time. All other lab tests were completed within 14 days from time of sampling.

A blind field duplicate, labeled WS-1, of MW-1 was submitted to the laboratory. Test values were within acceptable range of variation.

Results of laboratory verification tests–laboratory blank, laboratory control spike (LCS), laboratory duplicate, and matrix spike–were all within acceptable limits, as specified in the QAPP. The first matrix spike for total Kjeldahl nitrogen (TKN) had low recovery due to interference of the matrix. The matrix spike test was repeated twice, once using a sample from MW-3, with acceptable recoveries.

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BOTHELL, WA 98011-8244
PH: (425) 420.9200 FAX: (425) 420.9210

June 14, 2007

Joe Lubischer
Aspect Consulting - Bainbridge Island
179 Madrone Lane N
Bainbridge Island, WA/USA 98110

RE: Webb Hill Biosolids Facility

Enclosed are the results of analyses for samples received by the laboratory on 05/31/07 16:30. The following list is a summary of the Work Orders contained in this report, generated on 06/14/07 16:38.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
BQF0015	Webb Hill Biosolids Facility	070041-001-01

TestAmerica - Seattle, WA

Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-3-05-30-07	BQF0015-01	Water	05/30/07 11:47	05/31/07 16:30
MW-2-05-30-07	BQF0015-02	Water	05/30/07 15:50	05/31/07 16:30

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Dissolved Metals by EPA 200 Series Methods

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0015-01 (MW-3-05-30-07)		**Water**			**Sampled: 05/30/07 11:47**					
Calcium	EPA 200.7 - Diss	**9.15**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:07	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**3.99**	-----	0.500	"	"	"	"	"	
Manganese	"	**0.0798**	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**3.29**	-----	0.250	"	"	"	"	"	
BQF0015-02 (MW-2-05-30-07)		**Water**			**Sampled: 05/30/07 15:50**					
Calcium	EPA 200.7 - Diss	**10.1**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:12	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**4.86**	-----	0.500	"	"	"	"	"	
Manganese	"	ND	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**3.40**	-----	0.250	"	"	"	"	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0015-01 (MW-3-05-30-07)		**Water**			**Sampled: 05/30/07 11:47**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F11039	06/11/07 13:32	06/11/07 14:47	
Bicarbonate Alkalinity	SM 2320B	**41.4**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F04033	06/04/07 10:47	06/04/07 14:40	
Nitrate/Nitrite-Nitrogen	EPA 353.2	ND	-----	0.0100	mg/l as N	"	7F04050	06/04/07 12:20	06/04/07 18:30	
Nitrate-Nitrogen	"	ND	-----	0.0100	"	"	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.0880**	-----	0.00500	mg/l	"	7F11055	06/11/07 15:26	06/11/07 21:00	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	"	7F04039	06/04/07 11:50	06/05/07 14:49	
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 14:05	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**41.4**	-----	5.00	"	"	"	"	"	
BQF0015-02 (MW-2-05-30-07)		**Water**			**Sampled: 05/30/07 15:50**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F11039	06/11/07 13:32	06/11/07 14:47	
Bicarbonate Alkalinity	SM 2320B	**39.8**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F04033	06/04/07 10:47	06/04/07 14:40	
Nitrate/Nitrite-Nitrogen	EPA 353.2	**0.785**	-----	0.0100	mg/l as N	"	7F04050	06/04/07 12:20	06/04/07 18:31	
Nitrate-Nitrogen	"	**0.785**	-----	0.0100	"	"	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.155**	-----	0.00625	mg/l	1.25x	7F11055	06/11/07 15:26	06/11/07 21:00	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	1x	7F04039	06/04/07 11:50	06/05/07 14:50	
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 14:15	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**39.8**	-----	5.00	"	"	"	"	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Anions by EPA Method 300.0

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0015-01 (MW-3-05-30-07)		**Water**			**Sampled: 05/30/07 11:47**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 02:15	**R4**
Chloride	"	**1.71**	-----	0.400	"	"	"	"	"	
Sulfate	"	**0.870**	-----	0.400	"	"	7F06005	06/06/07 07:01	06/06/07 13:18	
BQF0015-02 (MW-2-05-30-07)		**Water**			**Sampled: 05/30/07 15:50**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 02:30	
Chloride	"	**2.22**	-----	0.400	"	"	"	"	"	
Sulfate	"	**1.95**	-----	0.400	"	"	7F06005	06/06/07 07:01	06/06/07 13:34	

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Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Dissolved Metals by EPA 200 Series Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F08008 **Water Preparation Method: EPA 200 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F08008-BLK1)								Extracted: 06/08/07 08:33						
Potassium	EPA 200.7 - Diss	ND	---	2.00	mg/l	1x	--	--	--	--	--	--	06/08/07 11:42	
Iron	"	ND	---	0.150	"	"	--	--	--	--	--	--	"	
Calcium	"	ND	---	0.250	"	"	--	--	--	--	--	--	"	
Sodium	"	ND	---	0.250	"	"	--	--	--	--	--	--	"	
Manganese	"	ND	---	0.0100	"	"	--	--	--	--	--	--	"	
Magnesium	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
LCS (7F08008-BS1)								Extracted: 06/08/07 08:33						
Magnesium	EPA 200.7 - Diss	5.20	---	0.500	mg/l	1x	--	5.00	104%	(85-115)	--	--	06/08/07 11:47	
Calcium	"	5.19	---	0.250	"	"	--	"	104%	"	--	--	"	
Potassium	"	10.6	---	2.00	"	"	--	10.0	106%	"	--	--	"	
Manganese	"	5.23	---	0.0100	"	"	--	5.00	105%	"	--	--	"	
Iron	"	5.19	---	0.150	"	"	--	"	104%	"	--	--	"	
Sodium	"	5.25	---	0.250	"	"	--	"	105%	"	--	--	"	
Duplicate (7F08008-DUP1)				QC Source: BQF0015-01				Extracted: 06/08/07 08:33						
Calcium	EPA 200.7 - Diss	9.14	---	0.250	mg/l	1x	9.15	--	--	--	0.109%	(20)	06/08/07 12:02	
Sodium	"	3.30	---	0.250	"	"	3.29	--	--	--	0.303%	"	"	
Iron	"	ND	---	0.150	"	"	ND	--	--	--	NR	"	"	
Potassium	"	ND	---	2.00	"	"	ND	--	--	--		"	"	R4
Magnesium	"	4.00	---	0.500	"	"	3.99	--	--	--	0.250%	"	"	
Manganese	"	0.0804	---	0.0100	"	"	0.0798	--	--	--	0.749%	"	"	R4
Matrix Spike (7F08008-MS1)				QC Source: BQF0015-01				Extracted: 06/08/07 08:33						
Manganese	EPA 200.7 - Diss	5.52	---	0.0100	mg/l	1x	0.0798	5.00	109%	(80-120)	--	--	06/08/07 11:52	
Calcium	"	14.2	---	0.250	"	"	9.15	"	101%	"	--	--	"	
Iron	"	5.42	---	0.150	"	"	ND	"	108%	"	--	--	"	
Potassium	"	11.1	---	2.00	"	"	ND	10.0	111%	"	--	--	"	
Magnesium	"	9.38	---	0.500	"	"	3.99	5.00	108%	"	--	--	"	
Sodium	"	8.70	---	0.250	"	"	3.29	"	108%	"	--	--	"	
Matrix Spike (7F08008-MS2)				QC Source: BQF0015-02				Extracted: 06/08/07 08:33						
Manganese	EPA 200.7 - Diss	5.48	---	0.0100	mg/l	1x	0.00380	5.00	110%	(80-120)	--	--	06/08/07 11:57	
Sodium	"	8.81	---	0.250	"	"	3.40	"	108%	"	--	--	"	
Magnesium	"	10.2	---	0.500	"	"	4.86	"	107%	"	--	--	"	
Potassium	"	10.6	---	2.00	"	"	ND	10.0	106%	"	--	--	"	
Iron	"	5.44	---	0.150	"	"	ND	5.00	109%	"	--	--	"	

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Dissolved Metals by EPA 200 Series Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F08008 **Water Preparation Method: EPA 200 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (7F08008-MS2)					**QC Source: BQF0015-02**			**Extracted: 06/08/07 08:33**						
Calcium	EPA 200.7 - Diss	15.2	---	0.250	mg/l	1x	10.1	5.00	102%	(80-120)	--	--	06/08/07 11:57	

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Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04033 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04033-BLK1)								Extracted: 06/04/07 10:47						
Fluoride	EPA 340.2	ND	---	0.100	mg/l	1x	--	--	--	--	--	--	06/04/07 14:40	
LCS (7F04033-BS1)								Extracted: 06/04/07 10:47						
Fluoride	EPA 340.2	1.02	---	0.100	mg/l	1x	--	1.00	102%	(90-110)	--	--	06/04/07 14:40	
Duplicate (7F04033-DUP1)				QC Source: BQE0239-01				Extracted: 06/04/07 10:47						
Fluoride	EPA 340.2	0.423	---	0.100	mg/l	1x	0.440	--	--	--	3.94%	(20)	06/04/07 14:40	
Matrix Spike (7F04033-MS1)				QC Source: BQE0239-01				Extracted: 06/04/07 10:47						
Fluoride	EPA 340.2	1.67	---	0.100	mg/l	1x	0.440	1.00	123%	(75-125)	--	--	06/04/07 14:40	

QC Batch: 7F04036 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04036-BLK1)								Extracted: 06/04/07 10:51						
Total Organic Carbon	EPA 415.1	ND	---	2.00	mg/l	1x	--	--	--	--	--	--	06/11/07 11:26	
LCS (7F04036-BS1)								Extracted: 06/04/07 10:51						
Total Organic Carbon	EPA 415.1	26.2	---	2.00	mg/l	1x	--	25.0	105%	(90-110)	--	--	06/11/07 11:37	
Duplicate (7F04036-DUP1)				QC Source: BQF0004-07				Extracted: 06/04/07 10:51						
Total Organic Carbon	EPA 415.1	6.07	---	2.00	mg/l	1x	7.04	--	--	--	14.8%	(25)	06/11/07 11:59	
Matrix Spike (7F04036-MS1)				QC Source: BQF0004-07				Extracted: 06/04/07 10:51						
Total Organic Carbon	EPA 415.1	32.8	---	4.00	mg/l	2x	7.04	25.0	103%	(60-140)	--	--	06/11/07 12:09	

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04039 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04039-BLK1)									Extracted: 06/04/07 11:50					
Total Kjeldahl Nitrogen	EPA 351.2	ND	---	1.00	mg/l as N	1x	--	--	--	--	--	--	06/05/07 14:16	
LCS (7F04039-BS1)									Extracted: 06/04/07 11:50					
Total Kjeldahl Nitrogen	EPA 351.2	4.83	---	1.00	mg/l as N	1x	--	5.00	96.6%	(90-110)	--	--	06/05/07 14:18	
Duplicate (7F04039-DUP1)					QC Source: BQE0558-01				Extracted: 06/04/07 11:50					
Total Kjeldahl Nitrogen	EPA 351.2	2.56	---	1.00	mg/l as N	1x	2.55	--	--	--	0.391%	(20)	06/05/07 14:20	
Matrix Spike (7F04039-MS1)					QC Source: BQE0558-01				Extracted: 06/04/07 11:50					
Total Kjeldahl Nitrogen	EPA 351.2	4.02	---	1.00	mg/l as N	1x	2.55	5.00	29.4%	(75-125)	--	--	06/05/07 14:21	M2
Matrix Spike (7F04039-MS2)					QC Source: BQF0015-01				Extracted: 06/04/07 11:50					
Total Kjeldahl Nitrogen	EPA 351.2	4.89	---	1.00	mg/l as N	1x	ND	5.00	97.8%	(75-125)	--	--	06/05/07 14:50	

QC Batch: 7F04046 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04046-BLK1)									Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	05/31/07 17:48	
LCS (7F04046-BS1)									Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	0.985	---	0.0100	mg/l as N	1x	--	1.00	98.5%	(90-110)	--	--	05/31/07 17:48	
Duplicate (7F04046-DUP1)					QC Source: BQF0036-01				Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	ND	--	--	--	NR	(20)	05/31/07 17:48	
Matrix Spike (7F04046-MS1)					QC Source: BQF0036-01				Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	1.01	---	0.0100	mg/l as N	1x	ND	1.00	101%	(75-125)	--	--	05/31/07 17:48	

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Kortland Orr For Blake T. Meinert, Project Manager

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BOTHELL, WA 98011-8244
PH: (425) 420.9200 FAX: (425) 420.9210

Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04049 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04049-BLK1)								**Extracted: 05/31/07 18:16**						
Nitrate-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	05/31/07 20:02	
LCS (7F04049-BS1)								**Extracted: 05/31/07 18:16**						
Nitrate-Nitrogen	EPA 353.2	1.00	---	0.0100	mg/l as N	1x	--	1.00	100%	(90-110)	--	--	05/31/07 20:02	
Duplicate (7F04049-DUP1)				**QC Source: BQF0036-01**				**Extracted: 05/31/07 18:16**						
Nitrate-Nitrogen	EPA 353.2	13.3	---	0.0100	mg/l as N	1x	13.3	--	--	--	0.00%	(20)	05/31/07 20:02	
Matrix Spike (7F04049-MS1)				**QC Source: BQF0036-01**				**Extracted: 05/31/07 18:16**						
Nitrate-Nitrogen	EPA 353.2	14.2	---	0.0100	mg/l as N	1x	13.3	1.00	90.0%	(70-124)	--	--	05/31/07 20:02	

QC Batch: 7F04050 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04050-BLK1)								**Extracted: 06/04/07 12:20**						
Nitrate/Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	06/04/07 18:19	
LCS (7F04050-BS1)								**Extracted: 06/04/07 12:20**						
Nitrate/Nitrite-Nitrogen	EPA 353.2	0.975	---	0.0100	mg/l as N	1x	--	1.00	97.5%	(90-110)	--	--	06/04/07 18:21	
Duplicate (7F04050-DUP1)				**QC Source: BQF0036-01**				**Extracted: 06/04/07 12:20**						
Nitrate/Nitrite-Nitrogen	EPA 353.2	13.3	---	0.100	mg/l as N	10x	13.3	--	--	--	0.00%	(20)	06/04/07 18:42	
Matrix Spike (7F04050-MS1)				**QC Source: BQF0036-01**				**Extracted: 06/04/07 12:20**						
Nitrate/Nitrite-Nitrogen	EPA 353.2	14.2	---	0.100	mg/l as N	10x	13.3	1.00	90.0%	(73-125)	--	--	06/04/07 18:44	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F08031 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F08031-BLK1)									Extracted: 06/08/07 13:43					
Bicarbonate Alkalinity	SM 2320B	ND	---	5.00	mg/L as CaCO3	1x	--	--	--	--	--	--	06/08/07 13:43	
Carbonate Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Hydroxide Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Total Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
LCS (7F08031-BS1)									Extracted: 06/08/07 13:43					
Total Alkalinity	SM 2320B	51.1	---	5.00	mg/L as CaCO3	1x	--	50.0	102%	(90-110)	--	--	06/08/07 13:43	
Duplicate (7F08031-DUP1)					QC Source: BQF0015-01				Extracted: 06/08/07 13:43					
Bicarbonate Alkalinity	SM 2320B	41.4	---	5.00	mg/L as CaCO3	1x	41.4	--	--	--	0.00%	(20)	06/08/07 13:43	
Carbonate Alkalinity	"	ND	---	5.00	"	"	ND	--	--	--	NR	"	"	
Hydroxide Alkalinity	"	ND	---	5.00	"	"	ND	--	--	--	NR	"	"	
Total Alkalinity	"	41.4	---	5.00	"	"	41.4	--	--	--	0.00%	"	"	

QC Batch: 7F11039 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F11039-BLK1)									Extracted: 06/11/07 13:32					
Ammonia-Nitrogen	EPA 350.3	ND	---	0.100	mg/l as N	1x	--	--	--	--	--	--	06/11/07 14:47	
LCS (7F11039-BS1)									Extracted: 06/11/07 13:32					
Ammonia-Nitrogen	EPA 350.3	4.77	---	0.100	mg/l as N	1x	--	5.00	95.4%	(90-110)	--	--	06/11/07 14:47	
Duplicate (7F11039-DUP1)					QC Source: BQF0071-01				Extracted: 06/11/07 13:32					
Ammonia-Nitrogen	EPA 350.3	0.492	---	0.100	mg/l as N	1x	0.523	--	--	--	6.11%	(30)	06/11/07 14:47	
Matrix Spike (7F11039-MS1)					QC Source: BQF0071-01				Extracted: 06/11/07 13:32					
Ammonia-Nitrogen	EPA 350.3	5.29	---	0.100	mg/l as N	1x	0.523	5.00	95.3%	(75-125)	--	--	06/11/07 14:47	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F11055 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F11055-BLK1)								**Extracted: 06/11/07 15:26**						
Phosphorus	EPA 365.2	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	06/11/07 21:00	
LCS (7F11055-BS1)								**Extracted: 06/11/07 15:26**						
Phosphorus	EPA 365.2	0.100	---	0.00500	mg/l	1x	--	0.0970	103%	(90-110)	--	--	06/11/07 21:00	
Duplicate (7F11055-DUP1)				**QC Source: BQE0547-01**				**Extracted: 06/11/07 15:26**						
Phosphorus	EPA 365.2	0.0560	---	0.00500	mg/l	1x	0.0640	--	--	--	13.3%	(25)	06/11/07 21:00	
Matrix Spike (7F11055-MS1)				**QC Source: BQE0547-01**				**Extracted: 06/11/07 15:26**						
Phosphorus	EPA 365.2	0.173	---	0.00500	mg/l	1x	0.0640	0.0970	112%	(66-142)	--	--	06/11/07 21:00	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Anions by EPA Method 300.0 - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F06005 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F06005-BLK1)									**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	ND	---	0.400	mg/l	1x	--	--	--	--	--	--	06/06/07 10:42	
LCS (7F06005-BS1)									**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	5.76	---	0.400	mg/l	1x	--	6.00	96.0%	(90-110)	--	--	06/06/07 10:57	
Duplicate (7F06005-DUP1)				**QC Source: BQF0109-01**					**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	29.1	---	0.800	mg/l	2x	28.9	--	--	--	0.690%	(25)	06/06/07 12:16	
Matrix Spike (7F06005-MS1)				**QC Source: BQF0109-01**					**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	32.7	---	0.800	mg/l	2x	28.9	6.00	63.3%	(54-124)	--	--	06/06/07 12:00	

QC Batch: 7F13013 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F13013-BLK1)									**Extracted: 06/12/07 14:00**					
Chloride	EPA 300.0	ND	---	0.400	mg/l	1x	--	--	--	--	--	--	06/13/07 00:25	
Bromide	"	ND	---	0.400	"	"	--	--	--	--	--	--	"	
LCS (7F13013-BS1)									**Extracted: 06/12/07 14:00**					
Bromide	EPA 300.0	4.02	---	0.400	mg/l	1x	--	4.00	100%	(90-110)	--	--	06/13/07 00:41	
Chloride	"	1.98	---	0.400	"	"	--	2.00	99.0%	"	--	--	"	
Duplicate (7F13013-DUP1)				**QC Source: BQF0015-01**					**Extracted: 06/12/07 14:00**					
Chloride	EPA 300.0	1.75	---	0.400	mg/l	1x	1.71	--	--	--	2.31%	(25)	06/13/07 17:45	
Bromide	"	ND	---	0.400	"	"	ND	--	--	--	NR	"	"	**R4**
Matrix Spike (7F13013-MS1)				**QC Source: BQF0015-01**					**Extracted: 06/12/07 14:00**					
Bromide	EPA 300.0	4.01	---	0.400	mg/l	1x	ND	4.00	100%	(75-125)	--	--	06/13/07 18:01	
Chloride	"	3.59	---	0.400	"	"	1.71	2.00	94.0%	(40-149)	--	--	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:38

Notes and Definitions

Report Specific Notes:

M2 - The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

R4 - Due to the low levels of analyte in the sample, the duplicate RPD calculation does not provide useful information.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR/NA - Not Reported / Not Available

dry - Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.

wet - Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.

RPD - RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting Limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

Electronic Signature - Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy.* Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

TestAmerica - Seattle, WA

Kortland Orr For Blake T. Meinert, Project Manager

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9405 SW Nimbus Ave, Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: BQF0015

CLIENT: ASPECT CONSULTING
REPORT TO: 179 MADRONE LN
ADDRESS: BAINBRIDGE IS, WA 98110
PHONE: 206-780-9370 FAX: 780-9438
PROJECT NAME: WEBB HILL
PROJECT NUMBER: 070041-001-01
SAMPLED BY: JOSEPH LUBISCHER

INVOICE TO: ASPECT CONSULTING
P.O. NUMBER: 070041

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: 10 (STD.) 7 5 4 3 2 1 <1
Petroleum Hydrocarbon Analyses: 5 (STD.) 4 3 2 1 <1
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE: HNO_3 | H_2SO_4 | — | — | H_2SO_4 | H_2SO_4 | — | H_2SO_4 | —

REQUESTED ANALYSES: 200.7 (Ca K Fe Na Mg Mn) | 415.1 (TOC) | 300.0 (Bromide Chloride Fluoride Sulfate) | Nitrite | NO_2 + NO_3 | Nitrate by calc. | Ammonia Total phosphorus TKN | Carbonate Bicarbonate

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	200.7	415.1	300.0	Nitrite	NO_2 + NO_3	Nitrate by calc.	Ammonia Total phosphorus TKN	Carbonate Bicarbonate	MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	TA WO ID
1	MW-3-05-30-07	5/30/07 11:47	X	X	X	X	X	X	X	X				-01
2	MW-2-05-30-07	" 15:50	X	X	X	X	X	X	X	X				-02
3														
4														
5														
6														
7														
8														
9														
10														

Samples for dissolved metals have been field filtered. (Voss 0.45μ)

RELEASED BY: [signature] DATE: 5-30-07
PRINT NAME: JOSEPH LUBISCHER FIRM: ASPECT TIME: 16:25
RECEIVED BY: [signature] DATE: 5/31/07
PRINT NAME: Francisco Luna, Jr. FIRM: TA-S TIME: 1240
RELEASED BY: DATE:
PRINT NAME: FIRM: TIME:
RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS: @Lab 1630 w/o
TEMP: 3.7°C
PAGE OF

COC REV 09/2004

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June 14, 2007

Joe Lubischer
Aspect Consulting - Bainbridge Island
179 Madrone Lane N
Bainbridge Island, WA/USA 98110

RE: Webb Hill Biosolids Facility

Enclosed are the results of analyses for samples received by the laboratory on 06/01/07 16:35. The following list is a summary of the Work Orders contained in this report, generated on 06/14/07 16:45.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
BQF0036	Webb Hill Biosolids Facility	070041-001-01

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1-05-31-07	BQF0036-01	Water	05/31/07 11:42	06/01/07 16:35
WS-1-05-31-07	BQF0036-02	Water	05/31/07 12:12	06/01/07 16:35
MW-4-05-31-07	BQF0036-03	Water	05/31/07 14:41	06/01/07 16:35
WS-2-05-31-07	BQF0036-04	Water	05/31/07 16:27	06/01/07 16:35

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Dissolved Metals by EPA 200 Series Methods

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0036-01 (MW-1-05-31-07)		**Water**			**Sampled: 05/31/07 11:42**					
Calcium	EPA 200.7 - Diss	**40.4**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:22	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**17.8**	-----	0.500	"	"	"	"	"	
Manganese	"	ND	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**6.25**	-----	0.250	"	"	"	"	"	
BQF0036-02 (WS-1-05-31-07)		**Water**			**Sampled: 05/31/07 12:12**					
Calcium	EPA 200.7 - Diss	**40.2**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:27	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**17.8**	-----	0.500	"	"	"	"	"	
Manganese	"	ND	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**6.22**	-----	0.250	"	"	"	"	"	
BQF0036-03 (MW-4-05-31-07)		**Water**			**Sampled: 05/31/07 14:41**					
Calcium	EPA 200.7 - Diss	**31.6**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:43	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**13.3**	-----	0.500	"	"	"	"	"	
Manganese	"	ND	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**6.02**	-----	0.250	"	"	"	"	"	
BQF0036-04 (WS-2-05-31-07)		**Water**			**Sampled: 05/31/07 16:27**					
Calcium	EPA 200.7 - Diss	**10.7**	-----	0.250	mg/l	1x	7F08008	06/08/07 08:33	06/08/07 12:48	
Iron	"	ND	-----	0.150	"	"	"	"	"	
Magnesium	"	**5.39**	-----	0.500	"	"	"	"	"	
Manganese	"	ND	-----	0.0100	"	"	"	"	"	
Potassium	"	ND	-----	2.00	"	"	"	"	"	
Sodium	"	**3.36**	-----	0.250	"	"	"	"	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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SEATTLE, WA 11720 NORTH CREEK PKWY N, SUITE 400
BOTHELL, WA 98011-8244
PH: (425) 420.9200 FAX: (425) 420.9210

Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0036-01 (MW-1-05-31-07)		**Water**			**Sampled: 05/31/07 11:42**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F13018	06/13/07 10:32	06/13/07 14:43	
Bicarbonate Alkalinity	SM 2320B	**69.6**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F12026	06/12/07 10:30	06/12/07 14:38	
Nitrate/Nitrite-Nitrogen	EPA 353.2	**13.3**	-----	0.100	mg/l as N	10x	7F04050	06/04/07 12:20	06/04/07 18:41	
Nitrate-Nitrogen	"	**13.3**	-----	0.0100	"	1x	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.0620**	-----	0.00500	mg/l	"	7F11056	06/11/07 15:33	06/11/07 22:30	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	"	7F04028	06/04/07 10:12	06/05/07 13:36	
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 14:31	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**69.6**	-----	5.00	"	"	"	"	"	
BQF0036-02 (WS-1-05-31-07)		**Water**			**Sampled: 05/31/07 12:12**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F13018	06/13/07 10:32	06/13/07 14:43	
Bicarbonate Alkalinity	SM 2320B	**70.4**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F12026	06/12/07 10:30	06/12/07 14:38	
Nitrate/Nitrite-Nitrogen	EPA 353.2	**14.1**	-----	0.100	mg/l as N	10x	7F04050	06/04/07 12:20	06/04/07 18:45	
Nitrate-Nitrogen	"	**14.1**	-----	0.0100	"	1x	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.0430**	-----	0.00500	mg/l	"	7F11056	06/11/07 15:33	06/11/07 22:30	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	"	7F04028	06/04/07 10:12	06/05/07 13:37	
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 14:14	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**70.4**	-----	5.00	"	"	"	"	"	
BQF0036-03 (MW-4-05-31-07)		**Water**			**Sampled: 05/31/07 14:41**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F13018	06/13/07 10:32	06/13/07 14:43	
Bicarbonate Alkalinity	SM 2320B	**50.8**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F12026	06/12/07 10:30	06/12/07 14:38	
Nitrate/Nitrite-Nitrogen	EPA 353.2	**9.78**	-----	0.100	mg/l as N	10x	7F04050	06/04/07 12:20	06/04/07 18:46	
Nitrate-Nitrogen	"	**9.78**	-----	0.0100	"	1x	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.0310**	-----	0.00500	mg/l	"	7F11056	06/11/07 15:33	06/11/07 22:30	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	"	7F04028	06/04/07 10:12	06/05/07 13:38	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0036-03 (MW-4-05-31-07)		**Water**			**Sampled: 05/31/07 14:41**					
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	1x	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 15:25	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**50.8**	-----	5.00	"	"	"	"	"	
BQF0036-04 (WS-2-05-31-07)		**Water**			**Sampled: 05/31/07 16:27**					
Ammonia-Nitrogen	EPA 350.3	ND	-----	0.100	mg/l as N	1x	7F13018	06/13/07 10:32	06/13/07 14:43	
Bicarbonate Alkalinity	SM 2320B	**44.6**	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Fluoride	EPA 340.2	ND	-----	0.100	mg/l	"	7F12026	06/12/07 10:30	06/12/07 14:38	
Nitrate/Nitrite-Nitrogen	EPA 353.2	**0.713**	-----	0.0100	mg/l as N	"	7F04050	06/04/07 12:20	06/04/07 18:29	
Nitrate-Nitrogen	"	**0.713**	-----	0.0100	"	"	7F04049	05/31/07 18:16	05/31/07 20:02	
Nitrite-Nitrogen	"	ND	-----	0.0100	"	"	7F04046	05/31/07 17:10	05/31/07 17:48	
Phosphorus	EPA 365.2	**0.0800**	-----	0.00500	mg/l	"	7F11056	06/11/07 15:33	06/11/07 22:30	
Total Kjeldahl Nitrogen	EPA 351.2	ND	-----	1.00	mg/l as N	"	7F04028	06/04/07 10:12	06/05/07 13:43	
Carbonate Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Organic Carbon	EPA 415.1	ND	-----	2.00	mg/l	"	7F04036	06/04/07 10:51	06/11/07 15:35	
Hydroxide Alkalinity	SM 2320B	ND	-----	5.00	mg/L as CaCO3	"	7F08031	06/08/07 13:43	06/08/07 13:43	
Total Alkalinity	"	**44.6**	-----	5.00	"	"	"	"	"	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Anions by EPA Method 300.0

TestAmerica - Seattle, WA

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
BQF0036-01 (MW-1-05-31-07)		**Water**			**Sampled: 05/31/07 11:42**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 02:46	
Chloride	"	**15.5**	-----	2.00	"	5x	"	"	06/13/07 16:27	
Sulfate	"	**17.5**	-----	0.400	"	1x	7F06005	06/06/07 07:01	06/06/07 13:50	
BQF0036-02 (WS-1-05-31-07)		**Water**			**Sampled: 05/31/07 12:12**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 03:33	
Chloride	"	**15.6**	-----	2.00	"	5x	"	"	06/13/07 16:42	
Sulfate	"	**17.5**	-----	0.400	"	1x	7F06005	06/06/07 07:01	06/06/07 14:05	
BQF0036-03 (MW-4-05-31-07)		**Water**			**Sampled: 05/31/07 14:41**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 03:49	
Chloride	"	**15.8**	-----	2.00	"	5x	"	"	06/13/07 16:58	
Sulfate	"	**13.7**	-----	0.400	"	1x	7F06005	06/06/07 07:01	06/06/07 14:21	
BQF0036-04 (WS-2-05-31-07)		**Water**			**Sampled: 05/31/07 16:27**					
Bromide	EPA 300.0	ND	-----	0.400	mg/l	1x	7F13013	06/12/07 14:00	06/13/07 04:04	
Chloride	"	**2.22**	-----	0.400	"	"	"	"	"	
Sulfate	"	**1.66**	-----	0.400	"	"	7F06005	06/06/07 07:01	06/06/07 14:37	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Dissolved Metals by EPA 200 Series Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F08008 **Water Preparation Method: EPA 200 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F08008-BLK1)								Extracted: 06/08/07 08:33						
Calcium	EPA 200.7 - Diss	ND	---	0.250	mg/l	1x	--	--	--	--	--	--	06/08/07 11:42	
Iron	"	ND	---	0.150	"	"	--	--	--	--	--	--	"	
Potassium	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
Sodium	"	ND	---	0.250	"	"	--	--	--	--	--	--	"	
Manganese	"	ND	---	0.0100	"	"	--	--	--	--	--	--	"	
Magnesium	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
LCS (7F08008-BS1)								Extracted: 06/08/07 08:33						
Sodium	EPA 200.7 - Diss	5.25	---	0.250	mg/l	1x	--	5.00	105%	(85-115)	--	--	06/08/07 11:47	
Iron	"	5.19	---	0.150	"	"	--	"	104%	"	--	--	"	
Potassium	"	10.6	---	2.00	"	"	--	10.0	106%	"	--	--	"	
Manganese	"	5.23	---	0.0100	"	"	--	5.00	105%	"	--	--	"	
Calcium	"	5.19	---	0.250	"	"	--	"	104%	"	--	--	"	
Magnesium	"	5.20	---	0.500	"	"	--	"	104%	"	--	--	"	
Duplicate (7F08008-DUP1)				QC Source: BQF0015-01				Extracted: 06/08/07 08:33						
Calcium	EPA 200.7 - Diss	9.14	---	0.250	mg/l	1x	9.15	--	--	--	0.109%	(20)	06/08/07 12:02	
Magnesium	"	4.00	---	0.500	"	"	3.99	--	--	--	0.250%	"	"	
Manganese	"	0.0804	---	0.0100	"	"	0.0798	--	--	--	0.749%	"	"	R4
Potassium	"	ND	---	2.00	"	"	ND	--	--	--		"	"	R4
Iron	"	ND	---	0.150	"	"	ND	--	--	--	NR	"	"	
Sodium	"	3.30	---	0.250	"	"	3.29	--	--	--	0.303%	"	"	
Matrix Spike (7F08008-MS1)				QC Source: BQF0015-01				Extracted: 06/08/07 08:33						
Calcium	EPA 200.7 - Diss	14.2	---	0.250	mg/l	1x	9.15	5.00	101%	(80-120)	--	--	06/08/07 11:52	
Iron	"	5.42	---	0.150	"	"	ND	"	108%	"	--	--	"	
Potassium	"	11.1	---	2.00	"	"	ND	10.0	111%	"	--	--	"	
Magnesium	"	9.38	---	0.500	"	"	3.99	5.00	108%	"	--	--	"	
Manganese	"	5.52	---	0.0100	"	"	0.0798	"	109%	"	--	--	"	
Sodium	"	8.70	---	0.250	"	"	3.29	"	108%	"	--	--	"	
Matrix Spike (7F08008-MS2)				QC Source: BQF0015-02				Extracted: 06/08/07 08:33						
Potassium	EPA 200.7 - Diss	10.6	---	2.00	mg/l	1x	ND	10.0	106%	(80-120)	--	--	06/08/07 11:57	
Sodium	"	8.81	---	0.250	"	"	3.40	5.00	108%	"	--	--	"	
Manganese	"	5.48	---	0.0100	"	"	0.00380	"	110%	"	--	--	"	
Magnesium	"	10.2	---	0.500	"	"	4.86	"	107%	"	--	--	"	
Calcium	"	15.2	---	0.250	"	"	10.1	"	102%	"	--	--	"	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Dissolved Metals by EPA 200 Series Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F08008 **Water Preparation Method: EPA 200 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (7F08008-MS2)					**QC Source: BQF0015-02**				**Extracted: 06/08/07 08:33**					
Iron	EPA 200.7 - Diss	5.44	---	0.150	mg/l	1x	ND	5.00	109%	(80-120)	--	--	06/08/07 11:57	

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04028 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04028-BLK1)								**Extracted: 06/04/07 10:12**						
Total Kjeldahl Nitrogen	EPA 351.2	ND	---	1.00	mg/l as N	1x	--	--	--	--	--	--	06/05/07 13:28	
LCS (7F04028-BS1)								**Extracted: 06/04/07 10:12**						
Total Kjeldahl Nitrogen	EPA 351.2	4.66	---	1.00	mg/l as N	1x	--	5.00	93.2%	(90-110)	--	--	06/05/07 13:30	
Duplicate (7F04028-DUP1)				**QC Source: BQF0032-01**				**Extracted: 06/04/07 10:12**						
Total Kjeldahl Nitrogen	EPA 351.2	34.8	---	4.00	mg/l as N	4x	36.2	--	--	--	3.94%	(20)	06/06/07 15:06	
Matrix Spike (7F04028-MS1)				**QC Source: BQF0032-01**				**Extracted: 06/04/07 10:12**						
Total Kjeldahl Nitrogen	EPA 351.2	41.2	---	4.00	mg/l as N	4x	36.2	5.00	100%	(75-125)	--	--	06/06/07 15:06	

QC Batch: 7F04036 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04036-BLK1)								**Extracted: 06/04/07 10:51**						
Total Organic Carbon	EPA 415.1	ND	---	2.00	mg/l	1x	--	--	--	--	--	--	06/11/07 11:26	
LCS (7F04036-BS1)								**Extracted: 06/04/07 10:51**						
Total Organic Carbon	EPA 415.1	26.2	---	2.00	mg/l	1x	--	25.0	105%	(90-110)	--	--	06/11/07 11:37	
Duplicate (7F04036-DUP1)				**QC Source: BQF0004-07**				**Extracted: 06/04/07 10:51**						
Total Organic Carbon	EPA 415.1	6.07	---	2.00	mg/l	1x	7.04	--	--	--	14.8%	(25)	06/11/07 11:59	
Matrix Spike (7F04036-MS1)				**QC Source: BQF0004-07**				**Extracted: 06/04/07 10:51**						
Total Organic Carbon	EPA 415.1	32.8	---	4.00	mg/l	2x	7.04	25.0	103%	(60-140)	--	--	06/11/07 12:09	

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179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04046 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04046-BLK1)									Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	05/31/07 17:48	
LCS (7F04046-BS1)									Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	0.985	---	0.0100	mg/l as N	1x	--	1.00	98.5%	(90-110)	--	--	05/31/07 17:48	
Duplicate (7F04046-DUP1)				QC Source: BQF0036-01					Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	ND	--	--	--	NR	(20)	05/31/07 17:48	
Matrix Spike (7F04046-MS1)				QC Source: BQF0036-01					Extracted: 05/31/07 17:00					
Nitrite-Nitrogen	EPA 353.2	1.01	---	0.0100	mg/l as N	1x	ND	1.00	101%	(75-125)	--	--	05/31/07 17:48	

QC Batch: 7F04049 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04049-BLK1)									Extracted: 05/31/07 18:16					
Nitrate-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	05/31/07 20:02	
LCS (7F04049-BS1)									Extracted: 05/31/07 18:16					
Nitrate-Nitrogen	EPA 353.2	1.00	---	0.0100	mg/l as N	1x	--	1.00	100%	(90-110)	--	--	05/31/07 20:02	
Duplicate (7F04049-DUP1)				QC Source: BQF0036-01					Extracted: 05/31/07 18:16					
Nitrate-Nitrogen	EPA 353.2	13.3	---	0.0100	mg/l as N	1x	13.3	--	--	--	0.00%	(20)	05/31/07 20:02	
Matrix Spike (7F04049-MS1)				QC Source: BQF0036-01					Extracted: 05/31/07 18:16					
Nitrate-Nitrogen	EPA 353.2	14.2	---	0.0100	mg/l as N	1x	13.3	1.00	90.0%	(70-124)	--	--	05/31/07 20:02	

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Kortland Orr For Blake T. Meinert, Project Manager

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ANALYTICAL TESTING CORPORATION

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F04050 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F04050-BLK1)									Extracted: 06/04/07 12:20					
Nitrate/Nitrite-Nitrogen	EPA 353.2	ND	---	0.0100	mg/l as N	1x	--	--	--	--	--	--	06/04/07 18:19	
LCS (7F04050-BS1)									Extracted: 06/04/07 12:20					
Nitrate/Nitrite-Nitrogen	EPA 353.2	0.975	---	0.0100	mg/l as N	1x	--	1.00	97.5%	(90-110)	--	--	06/04/07 18:21	
Duplicate (7F04050-DUP1)					QC Source: BQF0036-01				Extracted: 06/04/07 12:20					
Nitrate/Nitrite-Nitrogen	EPA 353.2	13.3	---	0.100	mg/l as N	10x	13.3	--	--	--	0.00%	(20)	06/04/07 18:42	
Matrix Spike (7F04050-MS1)					QC Source: BQF0036-01				Extracted: 06/04/07 12:20					
Nitrate/Nitrite-Nitrogen	EPA 353.2	14.2	---	0.100	mg/l as N	10x	13.3	1.00	90.0%	(73-125)	--	--	06/04/07 18:44	

QC Batch: 7F08031 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F08031-BLK1)									Extracted: 06/08/07 13:43					
Bicarbonate Alkalinity	SM 2320B	ND	---	5.00	mg/L as CaCO3	1x	--	--	--	--	--	--	06/08/07 13:43	
Carbonate Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Hydroxide Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Total Alkalinity	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
LCS (7F08031-BS1)									Extracted: 06/08/07 13:43					
Total Alkalinity	SM 2320B	51.1	---	5.00	mg/L as CaCO3	1x	--	50.0	102%	(90-110)	--	--	06/08/07 13:43	
Duplicate (7F08031-DUP1)					QC Source: BQF0015-01				Extracted: 06/08/07 13:43					
Bicarbonate Alkalinity	SM 2320B	41.4	---	5.00	mg/L as CaCO3	1x	41.4	--	--	--	0.00%	(20)	06/08/07 13:43	
Carbonate Alkalinity	"	ND	---	5.00	"	"	ND	--	--	--	NR	"	"	
Hydroxide Alkalinity	"	ND	---	5.00	"	"	ND	--	--	--	NR	"	"	
Total Alkalinity	"	41.4	---	5.00	"	"	41.4	--	--	--	0.00%	"	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F11056 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F11056-BLK1)									Extracted: 06/11/07 15:33					
Phosphorus	EPA 365.2	ND	---	0.00500	mg/l	1x	--	--	--	--	--	--	06/11/07 22:30	
LCS (7F11056-BS1)									Extracted: 06/11/07 15:33					
Phosphorus	EPA 365.2	0.0990	---	0.00500	mg/l	1x	--	0.0970	102%	(90-110)	--	--	06/11/07 22:30	
Duplicate (7F11056-DUP1)				QC Source: BQF0036-01					Extracted: 06/11/07 15:33					
Phosphorus	EPA 365.2	0.0510	---	0.00500	mg/l	1x	0.0620	--	--	--	19.5%	(25)	06/11/07 22:30	
Matrix Spike (7F11056-MS1)				QC Source: BQF0036-01					Extracted: 06/11/07 15:33					
Phosphorus	EPA 365.2	0.138	---	0.00500	mg/l	1x	0.0620	0.0970	78.4%	(66-142)	--	--	06/11/07 22:30	

QC Batch: 7F12026 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F12026-BLK1)									Extracted: 06/12/07 10:30					
Fluoride	EPA 340.2	ND	---	0.100	mg/l	1x	--	--	--	--	--	--	06/12/07 14:42	
LCS (7F12026-BS1)									Extracted: 06/12/07 10:30					
Fluoride	EPA 340.2	0.948	---	0.100	mg/l	1x	--	1.00	94.8%	(90-110)	--	--	06/12/07 14:38	
Duplicate (7F12026-DUP1)				QC Source: BQF0022-01					Extracted: 06/12/07 10:30					
Fluoride	EPA 340.2	0.725	---	0.100	mg/l	1x	0.699	--	--	--	3.65%	(20)	06/12/07 14:38	
Matrix Spike (7F12026-MS1)				QC Source: BQF0022-01					Extracted: 06/12/07 10:30					
Fluoride	EPA 340.2	1.73	---	0.100	mg/l	1x	0.699	1.00	103%	(75-125)	--	--	06/12/07 14:38	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Conventional Chemistry Parameters by APHA/EPA Methods - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F13018 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F13018-BLK1)								**Extracted: 06/13/07 10:32**						
Ammonia-Nitrogen	EPA 350.3	ND	---	0.100	mg/l as N	1x	--	--	--	--	--	--	06/13/07 14:43	
LCS (7F13018-BS1)								**Extracted: 06/13/07 10:32**						
Ammonia-Nitrogen	EPA 350.3	5.06	---	0.100	mg/l as N	1x	--	5.00	101%	(90-110)	--	--	06/13/07 14:43	
Duplicate (7F13018-DUP1)				**QC Source: BQF0123-01**				**Extracted: 06/13/07 10:32**						
Ammonia-Nitrogen	EPA 350.3	2.56	---	0.100	mg/l as N	1x	2.57	--	--	--	0.390%	(30)	06/13/07 14:43	
Matrix Spike (7F13018-MS1)				**QC Source: BQF0123-01**				**Extracted: 06/13/07 10:32**						
Ammonia-Nitrogen	EPA 350.3	7.37	---	0.100	mg/l as N	1x	2.57	5.00	96.0%	(75-125)	--	--	06/13/07 14:43	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Anions by EPA Method 300.0 - Laboratory Quality Control Results

TestAmerica - Seattle, WA

QC Batch: 7F06005 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F06005-BLK1)									**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	ND	---	0.400	mg/l	1x	--	--	--	--	--	--	06/06/07 10:42	
LCS (7F06005-BS1)									**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	5.76	---	0.400	mg/l	1x	--	6.00	96.0%	(90-110)	--	--	06/06/07 10:57	
Duplicate (7F06005-DUP1)				**QC Source: BQF0109-01**					**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	29.1	---	0.800	mg/l	2x	28.9	--	--	--	0.690%	(25)	06/06/07 12:16	
Matrix Spike (7F06005-MS1)				**QC Source: BQF0109-01**					**Extracted: 06/06/07 07:01**					
Sulfate	EPA 300.0	32.7	---	0.800	mg/l	2x	28.9	6.00	63.3%	(54-124)	--	--	06/06/07 12:00	

QC Batch: 7F13013 **Water Preparation Method: General Preparation**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7F13013-BLK1)									**Extracted: 06/12/07 14:00**					
Chloride	EPA 300.0	ND	---	0.400	mg/l	1x	--	--	--	--	--	--	06/13/07 00:25	
Bromide	"	ND	---	0.400	"	"	--	--	--	--	--	--	"	
LCS (7F13013-BS1)									**Extracted: 06/12/07 14:00**					
Bromide	EPA 300.0	4.02	---	0.400	mg/l	1x	--	4.00	100%	(90-110)	--	--	06/13/07 00:41	
Chloride	"	1.98	---	0.400	"	"	--	2.00	99.0%	"	--	--	"	
Duplicate (7F13013-DUP1)				**QC Source: BQF0015-01**					**Extracted: 06/12/07 14:00**					
Chloride	EPA 300.0	1.75	---	0.400	mg/l	1x	1.71	--	--	--	2.31%	(25)	06/13/07 17:45	
Bromide	"	ND	---	0.400	"	"	ND	--	--	--	NR	"	"	**R4**
Matrix Spike (7F13013-MS1)				**QC Source: BQF0015-01**					**Extracted: 06/12/07 14:00**					
Chloride	EPA 300.0	3.59	---	0.400	mg/l	1x	1.71	2.00	94.0%	(40-149)	--	--	06/13/07 18:01	
Bromide	"	4.01	---	0.400	"	"	ND	4.00	100%	(75-125)	--	--	"	

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Kortland Orr For Blake T. Meinert, Project Manager

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Aspect Consulting - Bainbridge Island	Project Name:	**Webb Hill Biosolids Facility**	
179 Madrone Lane N	Project Number:	070041-001-01	Report Created:
Bainbridge Island, WA/USA 98110	Project Manager:	Joe Lubischer	06/14/07 16:45

Notes and Definitions

Report Specific Notes:

R4 - Due to the low levels of analyte in the sample, the duplicate RPD calculation does not provide useful information.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR/NA - Not Reported / Not Available

dry - Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.

wet - Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.

RPD - RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting Limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

Electronic Signature - Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy.* Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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11922 E. First Ave, Spokane, WA 99206-5302 509-924-9200 FAX 924-9290
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2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: BJF 0036

CLIENT: ASPECT

REPORT TO: 179 Madrona
ADDRESS: Bainbridge Island WA 98110

PHONE: 206 7809370 FAX: 9438

INVOICE TO:

P.O. NUMBER: 070041

PROJECT NAME: WEBSTALL

PROJECT NUMBER: 070041-001-01

SAMPLED BY: Joseph Luscher

TURNAROUND REQUEST
in Business Days *
Organic & Inorganic Analyses: [10] STD. 7 5 4 3 2 1 <1
Petroleum Hydrocarbon Analyses: 5 STD. 4 3 2 1 <1
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

PRESERVATIVE: HNO_3 | H_2SO_4 | 250.3 | 353.2 | No | - | No | | No

REQUESTED ANALYSES: 200.7 | 365.2 | 387.2 | 405.1 | 2320B

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	Ca K Fe Na Mg Mn		Total Phosphorus	TKN	TOC	NH_4	NO_2 + NO_3	NO_2	NO_3 by calc	Carbonate Bicarbonate	Bromide Chloride Fluoride Sulfate		MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	TA WO ID
1	MW-1-05-31-07	5-31-07 1142	X		X	X	X	X	X	X	X	X	X					01
2	WS-1-05-31-07	" 1212	X		X	X	X	X	X	X	X	X	X					02
3	MW-4-05-31-07	" 1441	X		X	X	X	X	X	X	X	X	X					03
4	WS2-05-31-07	" 1627	X		X	X	X	X	X	X	X	X	X					04
5																		
6																		
7																		
8																		
9																		
10																		

field filtered - Voss 0.45μ

RELEASED BY: Joseph Luscher
PRINT NAME: [signature] FIRM: ASPECT DATE: 5-31-07 TIME: 1845
RECEIVED BY: [signature] PRINT NAME: [signature] FIRM: Aspect DATE: 5/31/07 TIME: 1845

RELEASED BY: [signature]
PRINT NAME: [signature] FIRM: Aspect DATE: 6/1/07 TIME: 0700
RECEIVED BY: [signature] PRINT NAME: Francisco Luna, Jr FIRM: TA-S DATE: 6/1/07 TIME: 1635

ADDITIONAL REMARKS: w/cs TEMP: 4.1°C PAGE OF

COC REV 09/2004

Appendix C.2

Analytical Results for Groundwater Samples Collected During Drilling

C.2 Analytical Results for Groundwater Samples Collected During Drilling

This Appendix contains analytical results for samples collected by Aspect Consulting during the monitoring well drilling. Samples were analyzed by EPA's Manchester Laboratory. We understand that interpretation of these results will be forthcoming from EPA.

Bio Recycling/ Webb Hill ESD-131A Manchester Lab Nitrate Data

Nitrate + Nitrite Concentration mg/L (as N)	Sample Number	Comment/Depth of collection
1.63	07164000	MW-3 165’ Maybe from bucket of on site water added by driller during Fishing
0.0541	07164001	MW-3 171’
0.050 U	07164002	MW-3 179’
0.050 U	07164003	MW-3 179-2 Dup
0.050 U	07164004	MW-3 187’
4.83	07174050	MW-1 100’BGS
2.85	07174051	MW-1 100’EST on top of slough of 100-114 run
11.6	07174052	MW-1 on top of 110-1125 soil sample
15.3	07174053	MW-1 Hole at 125’, cased @110’, Bailer sample, WL=103’
16.2	07174054	MW-1 From bottom casing @ 125’
1.00	07174056	MW-4 Bailer sample, hole @ 25’, Average @ 16’
1.59	07174057	MW-4 Drilled to 31.5’, cased to 4, average 15.5’
4.12	07174058	MW-4 From drill string after 15-20 run
1.58	07174059	MW-4 From drill string after 31.5-35’
10.5	07174060	MW-4 Bailer sample, cased 35’, hole open 45’ probably remnant for 31-33
3.45	07174061	MW-4 Bailer sample cased 55’, bottom@ 63’
10.9	07174062	MW-4 Bailer sample cased to 65’, drilled to 76’ average 70.4
10.1	07174063	MW-4 Bailer sample cased 79, drilled to 95’
11.5	07174064	MW-4 Bailer sample cased 90, bottom 91’, drilled 105’
12.6	07174065	MW-4 Bailer sample cased 97, bottom 96.5 Bailer sample from bottom

3.13	07184066	MW-2 Bailer sample cased 85’, bottom 104’ average 101.5
1.64	07184067	MW-2 Bottom 113.6, cased to 105, average 112.9, bailer sample
0.563	07184068	MW-2 Bailer sample cased 145’, bottom 150’, drilled 155’
0.590	07184069	MW-2 Drilled rod sample after 155-165 run
0.597	07184070	MW-2 Bailer sample from + or – 158’, drilled 168’, bottom 165’, cased 158’Average 146.8

Note – All data were qualified “J” based on the following from the QA report:

The following is a quality assurance review of the results of the analysis of 26 water samples for Nitrate plus Nitrite.
These samples were submitted for the Bio-Recycling/Webb Hill Road Site Project. The analyses were performed by EPA
chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.
This review was conducted for the following samples:
07164000 07164001 07164002 07164003 07164004 07174050 07174051
07174052 07174053 07174054 07174056 07174057 07174058 07174059
07174060 07174061 07174062 07174063 07174064 07174065 07184066
07184067 07184068 07184069 07184070 07184071

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory’s current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.
All measures of quality control met Laboratory/QAPP criteria. For those tests for which the USEPA Region 10 Laboratory has been accredited by the National Environmental Laboratory Accreditation Conference (NELAC), all requirements of the current NELAC Standard have been met.

1. Sample Transport and Receipt

The samples for this project arrived at the lab muddy and unpreserved and too late to be preserved within the 48 hour holding time for nitrate. As per project officer Curt Black’s verbal approval, the samples were filtered through precleaned, 0.45µm glass fiber filters and preserved with H_2SO_4 to pH 1. This filtration changed the matrix of the samples from total water to dissolved water. The paperwork for the samples collected during weeks 17 and 18 was improperly filled out and required information was missing from the sample bottles. The paperwork was corrected at the lab and the missing information was added to the sample bottle labels.

2. Sample Holding Times – Laboratory/QAPP Criteria Not Met

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. EPA Method 353.2 requires that water samples for nitrate and nitrite analysis be completed within 48 hours unless the samples have been preserved with H_2SO_4 to pH <2 at the time of collection. Samples preserved in this manner may be held for up to 28 days prior to analysis. The samples were not preserved within 48 hours of collection and so the results were qualified, “J”, estimate. No other data qualification was required based on holding time criteria.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

MEMORANDUM

SUBJECT: Data Release for Inorganic Chemistry Results from the Region 10 USEPA Laboratory

PROJECT NAME: Bio-Recycling/Webb Hill

PROJECT CODE: ESD-131A

FROM: Gerald Dodo, Chemistry Supervisor
US EPA Region 10 Laboratory
Office of Environmental Assessment

TO: Curt Black, Project Manager
Office of Environmental Assessment, US EPA Region 10

CC: Don Matheny, Office of Environmental Assessment
US EPA Region 10

I have authorized release of this data package. Attached you will find the nitrate plus nitrite results for the Bio-Recycling/Webb Hill project for the samples received from 04/20/2007 to 05/07/2007. For further information regarding the attached data, contact Isabel Chamberlain at 360-871-8706.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

QUALITY ASSURANCE MEMORANDUM FOR INORGANIC CHEMICAL ANALYSES

DATE: June 25, 2007

TO: Curt Black, Project Manager
Office of Environmental Assessment, Risk Evaluation Unit, US EPA Region 10

From: Stephanie Le, Chemist
Office of Environmental Assessment, US EPA Region 10 Laboratory

SUBJECT: Quality Assurance Review of the Bio-Recycling/Webb Hill Road Site
For Nitrate plus Nitrite

Project Code: ESD-131A
Account Code: 0708B10P201B53C

CC: Don Matheny
Office of Environmental Assessment, Environmental Services Unit, US EPA Region 10

The following is a quality assurance review of the results of the analysis of 26 water samples for Nitrate plus Nitrite. These samples were submitted for the Bio-Recycling/Webb Hill Road Site Project. The analyses were performed by EPA chemists at the US EPA Region 10 Laboratory in Port Orchard, WA, following US EPA and Laboratory guidelines.

This review was conducted for the following samples:

07164000	07164001	07164002	07164003	07164004	07174050	07174051
07174052	07174053	07174054	07174056	07174057	07174058	07174059
07174060	07174061	07174062	07174063	07174064	07174065	07184066
07184067	07184068	07184069	07184070	07184071		

Data Qualifications

Comments below refer to the quality control specifications outlined in the Laboratory's current Quality Assurance Manual, Standard Operating Procedures (SOPs) and the Quality Assurance Project Plan (QAPP). No excursions were required from the method Standard Operating Procedure.

All measures of quality control met Laboratory/QAPP criteria.

For those tests for which the USEPA Region 10 Laboratory has been accredited by the National Environmental Laboratory Accreditation Conference (NELAC), all requirements of the current NELAC Standard have been met.

1. Sample Transport and Receipt

The samples for this project arrived at the lab muddy and unpreserved and too late to be preserved within the 48 hour holding time for nitrate. As per project officer Curt Black's verbal approval, the samples were filtered through pre-cleaned, 0.45µm glass fiber filters and preserved with H_2SO_4 to pH 1. This filtration changed the matrix of the samples from total water to dissolved water. The paperwork for the samples collected during weeks 17 and 18 was improperly filled out and required information was missing from the sample bottles. The paperwork was corrected at the lab and the missing information was added to the sample bottle labels.

2. Sample Holding Times – Laboratory/QAPP Criteria Not Met

The concentration of an analyte in a sample or sample extract may increase or decrease over time depending on the nature of the analyte. For this reason, holding time limits are recommended for samples. EPA Method 353.2 requires that water samples for nitrate and nitrite analysis be completed within 48 hours unless the samples have been preserved with H_2SO_4 to pH <2 at the time of collection. Samples preserved in this manner may be held for up to 28 days prior to analysis. The samples were not preserved within 48 hours of collection and so the results were qualified, "J", estimate. No other data qualification was required based on holding time criteria.

3. Sample Preparation

Samples were prepared according to the method outlined in the SOP for these analytes for this type of matrix. No qualification of the data was required based on sample preparation.

4. Initial Calibration and Calibration Verification

The linear regression generated for the initial calibration met method criteria. The low point of the calibration curve is usually the Minimum Reporting Level (MRL) of the method. All calibration verification checks met the frequency and recovery criteria on the day of analysis. No qualification was required based on calibration or calibration verification.

5. Laboratory Control Samples

All laboratory control sample results met the recovery acceptance criteria for the method. No qualification was required based on laboratory control sample analysis.

6. Blank Analysis

The method blank did not contain detectable levels of analyte which would require data qualification.

7. Internal Standards

No internal standards were performed for this method.

8. Duplicate Analysis

Duplicate analysis was performed on samples 07164002 and 07184071. Sample results which were greater than five times the MRL level were within the +/- 20% RPD requirement. No qualification was required based on duplicate analysis.

9. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike analyses were performed on samples 07164002 and 07184071. Sample results were within the +/- 75-125% recovery requirements. No qualification was required based on matrix spike analyses.

10. Reference Materials

Reference materials were not required for this project.

11. Instrument Peak Integrations

No manual integrations were performed for this method.

12. Interferences

Not applied for this method.

13. Reporting Limits

All sample results that fall below the MRL are assigned the value of the MRL and the 'U' qualifier is attached.

14. Data Qualifiers

The qualifier, "J" estimate, was added to all samples due to failure to preserve the samples within 48 hour holding time window. No other data qualification was required for this analysis.

Below are the definitions for the codes used for qualifying data from these analyses. When more than one quality issue was involved, the most restrictive qualifier has been attached to the data.

U - The analyte was not detected at or above the reported value.

J - The identification of the analyte is acceptable; however the reported value is an estimate.

UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.

NA - Not Applicable; the parameter was not included in the analysis, or there is no analytical result for this parameter. <u>No value is reported with this qualification.</u>

The usefulness of qualified data should be treated according to the severity of the qualifier in light of the project's data quality objectives. Should questions arise regarding the data, contact Isa Chamberlain at the Region 10 Laboratory, phone number (360) 871- 8706.

15. Definitions

Accuracy - the degree of conformity of a measured or calculated quantity to its actual value.

Duplicate Analysis – when a duplicate of a sample (DS), a matrix spike (MSD), or a laboratory control sample (LCSD) is analyzed, it is possible to use the comparison of the results in terms of relative percent difference (RPD) to calculate precision.

Internal standards - Compounds used to help evaluate instrument analytical performance for individual samples. Internal standards provide an instrument response for reference to accurately quantify the analytes for all associated instrumental analyses.

Laboratory Control Sample (LCS) - a clean matrix spiked with known quantities of analytes. The LCS is processed with samples through every step of preparation and analysis. Measuring percent recovery of each analyte in the LCS provides a measurement of accuracy for the analyte in the project samples. A laboratory control sample is prepared and analyzed at a frequency no less than one for every 20 project samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Sample analyses performed to provide information about the effect of the sample matrix on analyte recovery and measurement within the project samples. To create the MS/MSD, a project sample is spiked with known quantities of analytes and the percent recovery of the analytes are determined.

Method Blank- An analytical control that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination. A method blank is prepared and analyzed for every batch of samples at a minimum frequency of one per every 20 samples. To

produce unqualified data, the result of the method blank analysis is required to be less than the MRL and less than 10 times the amount of analyte found in any project sample.

Minimum Reporting Level (MRL) - the smallest measured concentration of a substance that can be reliably measured using a given analytical method.

Peak Integrations - The output of many analytical instruments is a peak which represents the quantity of analyte in the sample. The instrument automatically integrates the peak area to provide the concentration of the analyte; however, sometimes these peaks need to be manually integrated by the analyst.

Precision – the degree of mutual agreement or repeatability among a series of individual results.

Reference materials – Samples with analyte values that are homogeneous and well established. This allows the reference material to be used to assess the accuracy of the measurement method.

Relative Percent Difference – The difference between two sample results divided by their mean and expressed as a percentage.

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/20/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164000
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-3 165 FEET		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**1.63**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/20/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164001
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-3 171 FEET		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**0.0541**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/20/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164002
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-3 179 FEET		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	*90040	Nitrate+Nitrite as N	0.050	mg/L	UJ

07164002 Reg sample .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164002
Account Code:	0708B10P201B53C	**Type:**	Duplicate
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):		*90040 Nitrate+Nitrite as N	0.050	mg/L	UJ

07164002 Duplicate .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164002
Account Code:	0708B10P201B53C	**Type:**	Matrix Spike
Station Description:			

	Result	Units	Qlfr

GEN

Parameter :	Nitrate & Nitrite			Container ID :	D1
Method :	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method :	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Surrogate(s):	*90040	Nitrate+Nitrite as N	100	%Rec	

07164002 Matrix Spike .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164002
Account Code:	0708B10P201B53C	**Type:**	Matrix Spike Dupl
Station Description:			

	Result	Units	Qlfr

GEN

Parameter	:	Nitrate & Nitrite			Container ID :	D1
Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Surrogate(s):		*90040	Nitrate+Nitrite as N	99	%Rec	

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/20/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164003
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-3 179 FEET DUP		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	*90040	Nitrate+Nitrite as N	0.050	mg/L	UJ

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/20/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07164004
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):		*90040 Nitrate+Nitrite as N	0.050	mg/L	UJ

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/24/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174050
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-1 100' BGS		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**4.83**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/24/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174051
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-1 100' EST		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**2.85**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/24/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174052
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-1 ON TOP OF 110-125'		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**11.6**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/24/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174053
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-1 HOLE AT 125'		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**15.3**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/25/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174054
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-1 FROM BOTTOM CASING AT 125'		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**16.2**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174056
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE HOLE AT 25'		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**1.00**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174057
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 DRILLED TO 31.5'		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**1.59**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174058
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 FROM DRILL STRING AFTER 15-20		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**4.12**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174059
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 FROM DRILL STRING AFTER 31.5-35		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**1.58**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174060
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE CASED 35, HOLE 45		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**10.5**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174061
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE CASING AT 55		

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):		***90040**	**Nitrate+Nitrite as N**	**3.45**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174062
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE CASING AT 65		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**10.9**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/26/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174063
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE CASING AT 78		

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Analytes(s):			Result	Units	Qlfr
	***90040**	**Nitrate+Nitrite as N**	**10.1**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/27/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174064
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE CASING AT 90		

GEN

Parameter	:	Nitrate & Nitrite			Container ID :	D1
Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007

			Result	Units	Qlfr
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**11.5**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	4/27/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07174065
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:	MW-4 BAILER SAMPLE FR BOT. CASING AT 97		

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**12.6**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/1/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184066
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**3.13**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/1/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184067
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):		***90040 Nitrate+Nitrite as N**	**1.64**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/2/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184068
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**0.563**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/2/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184069
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	: Nitrate & Nitrite			Container ID :	D1
Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	: 353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):	***90040**	**Nitrate+Nitrite as N**	**0.590**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/2/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184070
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):		***90040 Nitrate+Nitrite as N**	**0.597**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	5/2/07
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184071
Account Code:	0708B10P201B53C	**Type:**	Reg sample
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	D1
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):		***90040 Nitrate+Nitrite as N**	**0.348**	**mg/L**	**J**

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184071
Account Code:	0708B10P201B53C	**Type:**	Duplicate
Station Description:			

			Result	Units	Qlfr

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/18/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/17/2007

Analytes(s):				
***90040**	**Nitrate+Nitrite as N**	**0.345**	**mg/L**	**J**

07184071 Duplicate .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184071
Account Code:	0708B10P201B53C	**Type:**	Matrix Spike
Station Description:			

	Result	Units	Qlfr

GEN

Parameter :	Nitrate & Nitrite			Container ID :	D1
Method :	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method :	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Surrogate(s):	*90040	Nitrate+Nitrite as N	96	%Rec	

07184071 Matrix Spike .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	07184071
Account Code:	0708B10P201B53C	**Type:**	Matrix Spike Dupl
Station Description:			

	Result	Units	Qlfr

GEN

Parameter : Nitrate & Nitrite — Container ID : D1

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/18/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/17/2007

Surrogate(s):				
	*90040	Nitrate+Nitrite as N	98	%Rec

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070502A
Account Code:	0708B10P201B53C	**Type:**	Blank
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/3/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/2/2007
Analytes(s):		*90040 Nitrate+Nitrite as N	0.050	mg/L	U

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070502A
Account Code:	0708B10P201B53C	**Type:**	LCS
Station Description:			

	Result	Units	Qlfr

GEN

Parameter : Nitrate & Nitrite — Container ID :

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/3/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/2/2007

Surrogate(s):				
	*90040	Nitrate+Nitrite as N	99	%Rec

CW070502A LCS .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070502A
Account Code:	0708B10P201B53C	**Type:**	LCSD
Station Description:			

			Result	Units	Qlfr

GEN

Parameter	:	Nitrate & Nitrite		Container ID :	
Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction	Analysis Date :	5/3/2007
Prep Method	:	353.2	Nitrogen, (Nitrate-Nitrite), Colorimetri	Prep Date :	5/2/2007
Surrogate(s):		*90040	Nitrate+Nitrite as N	98	%Rec

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070517A
Account Code:	0708B10P201B53C	**Type:**	Blank
Station Description:			

			Result	Units	Qlfr
GEN					
Parameter	:	Nitrate & Nitrite		Container ID :	
Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction		Analysis Date :	5/18/2007
Prep Method	:	353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri		Prep Date :	5/17/2007
Analytes(s):		*90040 Nitrate+Nitrite as N	0.050	mg/L	U

CW070517A Blank .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070517A
Account Code:	0708B10P201B53C	**Type:**	LCS
Station Description:			

	Result	Units	Qlfr

GEN

Parameter : Nitrate & Nitrite — Container ID :

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/18/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/17/2007

Surrogate(s):				
	*90040	Nitrate+Nitrite as N	102	%Rec

CW070517A LCS .

Manchester Environmental Laboratory
Report by Parameter for Project ESD-131A

Project Code:	ESD-131A	**Collected:**	
Project Name:	BIO-RECYCLING/ WEBB HILL	**Matrix:**	Liq-Filtered
Project Officer:	CURT BLACK	**Sample Number:**	CW070517A
Account Code:	0708B10P201B53C	**Type:**	LCSD
Station Description:			

	Result	Units	Qlfr

GEN

Parameter : Nitrate & Nitrite — Container ID :

Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetric, Automated Cadmium Reduction — Analysis Date : 5/18/2007

Prep Method : 353.2 Nitrogen, (Nitrate-Nitrite), Colorimetri — Prep Date : 5/17/2007

Surrogate(s):				
	*90040	Nitrate+Nitrite as N	102	%Rec

CW070517A LCSD .